LACKAWANNA STEEL COMPANY

W H Moore
Oct 1914

HAND BOOK

Containing General Information
for the use of

ENGINEERS, ARCHITECTS and BUILDERS

Together with Diagrams, Dimensions and Weights of Structural Steel Sections, Special Shapes, Merchant Bars, Steel Sheet Piling, Standard Heavy and Light Rails, Track Accessories, etc.

Manufactured by

LACKAWANNA STEEL COMPANY

BUFFALO, NEW YORK

General Offices and Works

Lackawanna, Erie County, N. Y., U. S. A.

EDITION OF 1915 PRICE $2.00

DISTRICT SALES OFFICES.

NEW YORK CITY
2 Rector Street

CHICAGO, ILL.
Continental & Commercial Bank Building

BUFFALO, N. Y.
Marine National Bank Building

BOSTON, MASS.
Marshall Building
40 Central Street

PHILADELPHIA, PA.
Morris Building

DETROIT, MICH.
Penobscot Building

CLEVELAND, O.
Citizens Building

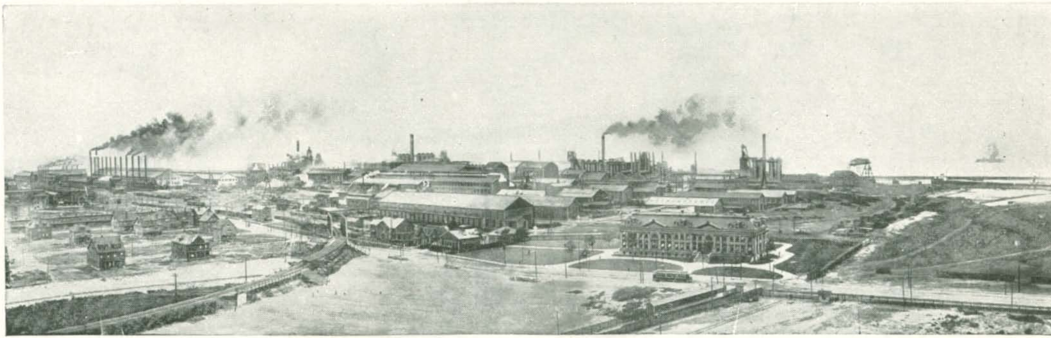
CINCINNATI, O.
Front, Freeman and Sargent Streets

ST. LOUIS, MO.
Pierce Building

ATLANTA, GA.
Candler Building

SAN FRANCISCO, CAL.
22 Battery Street

MONTREAL, CANADA
H. A. DRURY & CO., LTD.,
309 Craig St., W.



Works of Lackawanna Steel Company, Buffalo, N. Y.

THE works of the Lackawanna Steel Company are located in the city of Lackawanna, Erie County, N. Y., on Hamburg Turnpike, adjacent to the city line of Buffalo, and can be conveniently reached in twenty-five minutes by Buffalo & Lake Erie trolley cars, starting from Lafayette Square, Main Street, Buffalo.

The general view on opposite page is from a point near the north end of plant and looking in a southwesterly direction.

The enclosure extends a length of three miles, and is bounded on the east by Hamburg Turnpike, on the west by Lake Erie, and has an average width of about 3,000 feet.

The eleven stacks to the extreme west indicate the location of the coke plant, which is situated between the lake shore on the west and the large ship canal on the east, next to which can be seen the large traveling bridges used in handling ore.

The high stacks in the center of the picture show location of blast furnaces. The central high stack is on line with and back of the bessemer plant and the new open hearth duplex plant. Directly to the south is the large standard rail mill.

The group of fourteen stacks to the left shows the location of the stationary open-hearth furnaces. Beyond are the blooming, slabbing, plate, structural, sheet piling, and light rail mills; to the right are the merchant bar, sheet bar, and billet mills, and the physical laboratory.

Centrally amongst the large buildings is the foundry. The smaller buildings in the foreground are the structural, roll, forging, machine and tool shops, also the electrical power house and wood-working shops, storehouses, etc.

One of the villages of the company may be seen to the left and in the foreground is the South Buffalo Railroad, entering the plant over a bridge crossing the highway.

The main office building is to the right of center and in the foreground.

IN this Hand Book we have endeavored to bring before consumers the utility of our various products, and to give general information appertaining to the shapes and weights of products rolled by the Lackawanna Steel Company from bessemer and open hearth steel.

Where profiles of section of various weights are shown the dimensions apply to the minimum, the weights of different sections being given in pounds per lineal foot. The method of increasing the weights of the various sections is illustrated. We also show the mill length of beams, channels and angles that can be regularly supplied by our mills. Lengths greater than those given in the tables may be furnished by making special arrangements with the sales department.

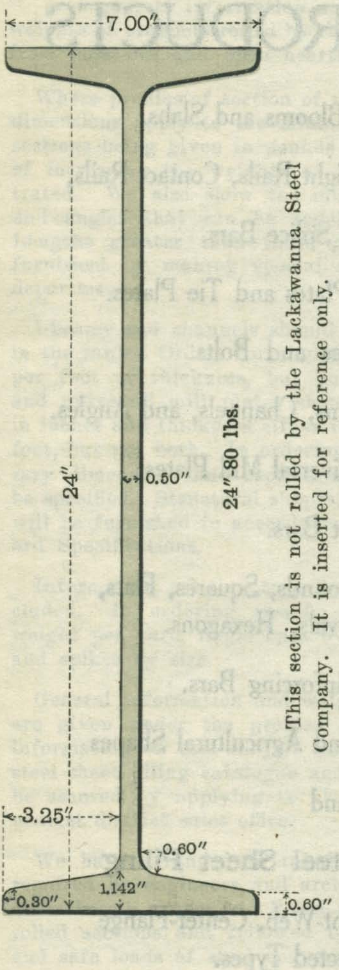
I-beams and channels should be ordered to weights given in the tables. Orders for angles should specify either weight per foot or thickness, but not both. Orders for sheared and universal mill plates should specify width and length in inches and thickness either in inches or weight per square foot, but not both. In ordering bar mill products, all necessary dimensions and section numbers where shown should be specified. Structural shapes, plates and bar mill products will be furnished in accordance with Manufacturers' Standard Specifications.

Information relative to rails and track accessories is included. In ordering specify rails by section number or weight per yard, angle bars by section number, track bolts and spikes by size.

General information and weights of our steel sheet piling are given under the profiles of each section. Additional information on this subject can be had by referring to our steel sheet piling catalogue and special bulletins, which can be secured by applying to the general sales office, or the nearest district sales office.

We have arranged in tabular form such information as required by engineers and architects in the use of our products herein shown and listed, beginning with properties of rolled sections and followed by the dimensions, properties and safe loads of steel columns and struts, also dimensions and safe loads of girders and beams.

BEAMS.



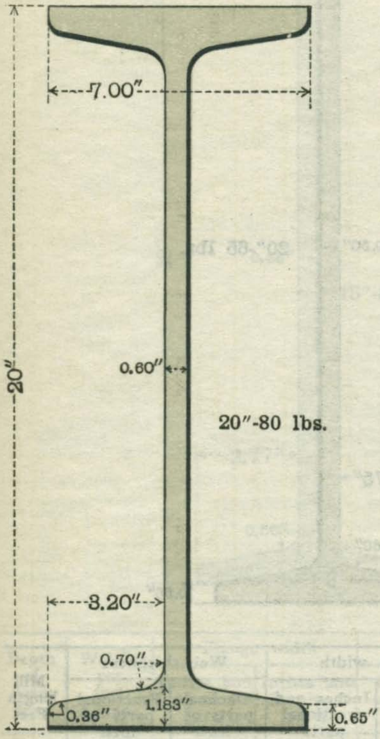
24"-80 lbs.

This section is not rolled by the Lackawanna Steel Company. It is inserted for reference only.

Depth of beam Inches	Weight per foot Pounds	Flange width: Inches and decimal parts	Flange width: Inches and fractional parts	Web thickness: Decimal parts of inch	Web thickness: Fractional parts of inch	Mill length Feet
24	100.00	7.254	7¼	0.754	¾	57
	95.00	7.192	7 3/16	0.692	11/16	60
	90.00	7.131	7⅛	0.631	⅝	62
	85.00	7.070	7 1/16	0.570	9/16	65
	80.00	7.000	7	0.500	½	69

Note—Lengths greater than those given above can be obtained by special arrangement.

BEAMS.



Depth of beam Inches	Weight per foot Pounds	Flange width: Inches and decimal parts	Flange width: Inches and fractional parts	Web thickness: Decimal parts of inch	Web thickness: Fractional parts of inch	Mill length Feet
	100.00	7.284	7 9/32	.884	7/8	43
	95.00	7.210	7 13/64	.810	51/64	45
20	90.00	7.137	7 9/64	.737	47/64	48
	85.00	7.063	7 1/16	.663	21/32	51
	80.00	7.000	7	.600	19/32	54

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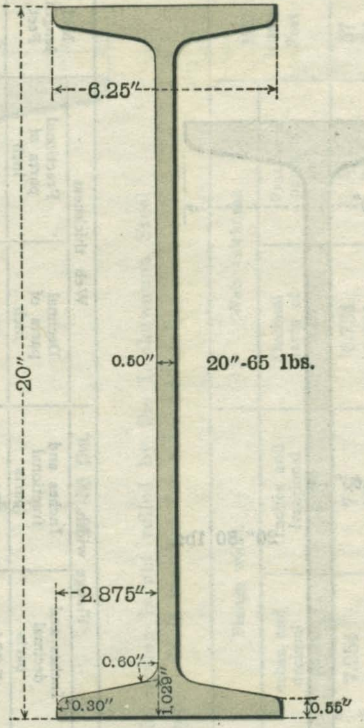
BEAMS.



Depth of beam Ins.	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
20	75.00	6.399	6 13/32	.649	21/32	58
	70.00	6.325	6 21/64	.575	37/64	63
	65.00	6.250	6 1/4	.500	1/2	68

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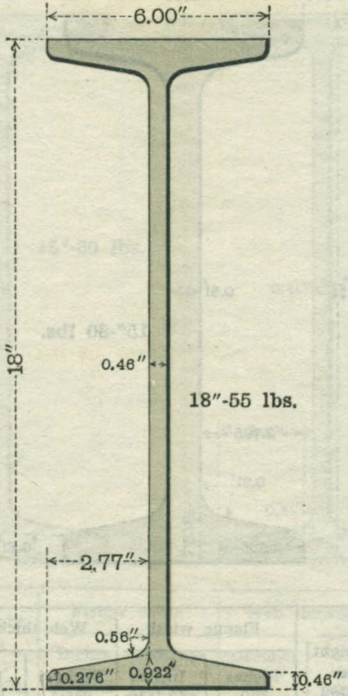
BEAMS.



Depth of beam Ins.	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
18	70.00	6.259	6 17/64	.719	23/32	55
	65.00	6.177	6 11/64	.637	5/8	60
	60.00	6.095	6 3/32	.555	35/64	65
	55.00	6.000	6	.460	29/64	72

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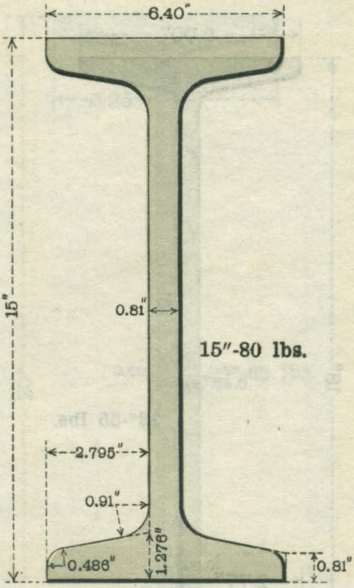
BEAMS.



Depth of beam Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
15	100.00	6.774	6 25/32	1.184	1 3/16	35
	95.00	6.675	6 43/64	1.085	1 5/64	37
	90.00	6.577	6 37/64	.987	63/64	39
	85.00	6.479	6 31/64	.889	57/64	42
	80.00	6.400	6 13/32	.810	13/16	44

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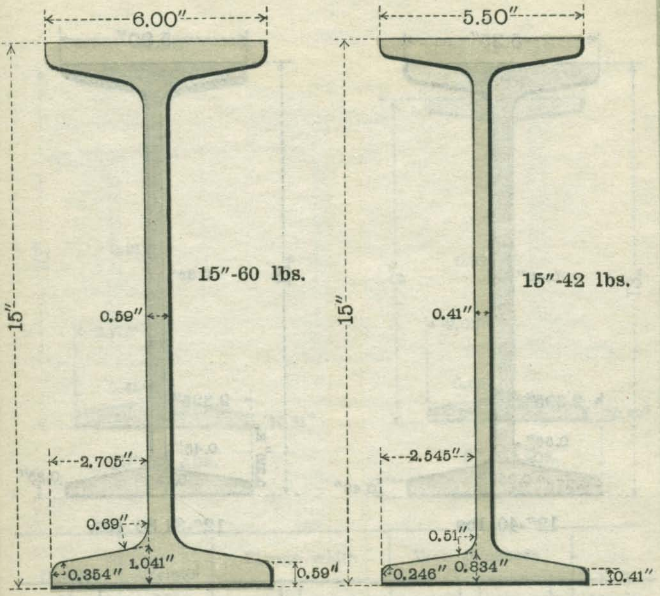
BEAMS.



Depth of beam Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
15	75.00	6.292	6 19/64	.882	57/64	48
	70.00	6.194	6 3/16	.784	25/32	51
	65.00	6.096	6 3/32	.686	11/16	56
	60.00	6.000	6	.590	19/32	61
15	55.00	5.746	5 3/4	.656	21/32	65
	50.00	5.648	5 41/64	.558	35/64	65
	45.00	5.550	5 35/64	.460	29/64	65
	42.00	5.500	5 1/2	.410	13/32	65

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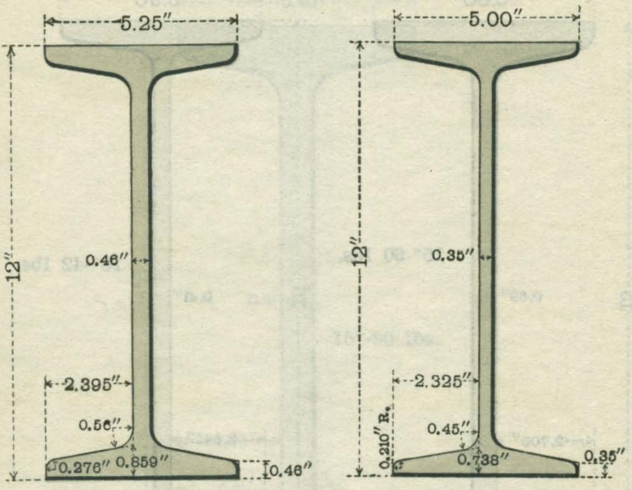
BEAMS.



12″-40 lbs. 12″-31.50 lbs.

Depth of beam Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
12	55.00	5.612	5$\frac{39}{64}$	.822	$\frac{13}{16}$	58
	50.00	5.489	5$\frac{31}{64}$	.699	$\frac{11}{16}$	64
	45.00	5.366	5$\frac{23}{64}$	.576	$\frac{9}{16}$	65
	40.00	5.250	5$\frac{1}{4}$	.460	$\frac{29}{64}$	65
12	35.00	5.086	5$\frac{3}{32}$	.436	$\frac{7}{16}$	65
	31.50	5.000	5	.350	$\frac{11}{32}$	65

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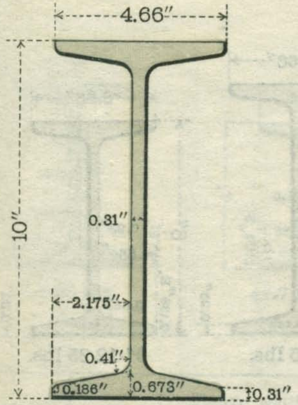
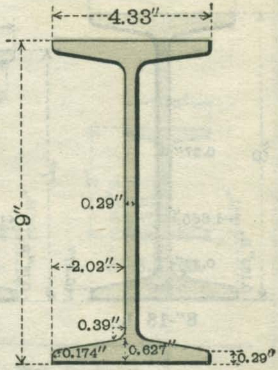
BEAMS.



10″-25 lbs.



9″-21 lbs.

Depth of beam Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
10	40.00	5.099	$5\frac{3}{32}$	.749	$\frac{3}{4}$	62
	35.00	4.952	$4\frac{61}{64}$	.602	$\frac{39}{64}$	65
	30.00	4.805	$4\frac{13}{16}$	.455	$\frac{15}{32}$	65
	25.00	4.660	$4\frac{21}{32}$	.310	$\frac{5}{16}$	65
9	35.00	4.772	$4\frac{49}{64}$	.732	$\frac{47}{64}$	65
	30.00	4.609	$4\frac{39}{64}$	.569	$\frac{37}{64}$	65
	25.00	4.446	$4\frac{29}{64}$	.406	$\frac{27}{64}$	65
	21.00	4.330	$4\frac{21}{64}$	.290	$\frac{19}{64}$	65

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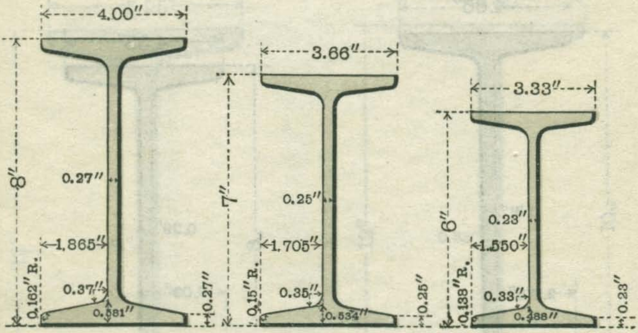
BEAMS.



8″-18 lbs.　　7″-15 lbs.　　6″-12.25 lbs.

Depth of beam Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
8	25.50	4.271	4 17/64	.541	17/32	65
	23.00	4.179	4 11/64	.449	7/16	65
	20.50	4.087	4 3/32	.357	23/64	65
	18.00	4.000	4	.270	17/64	65
7	20.00	3.868	3 7/8	.458	15/32	65
	17.50	3.763	3 49/64	.353	23/64	65
	15.00	3.660	3 21/32	.250	1/4	65
6	17.25	3.575	3 37/64	.475	31/64	65
	14.75	3.452	3 29/64	.352	23/64	65
	12.25	3.330	3 21/64	.230	15/64	65

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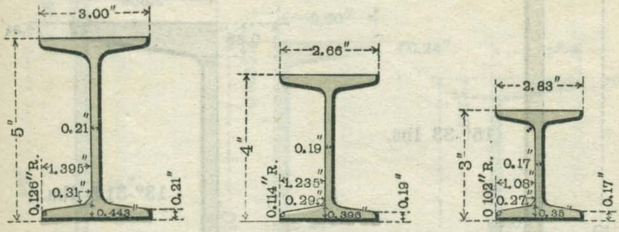
BEAMS.

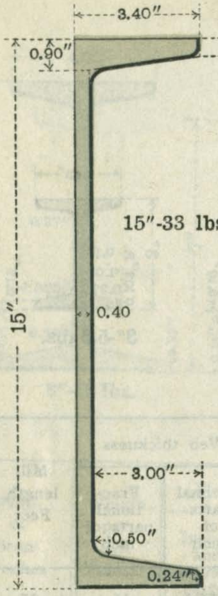


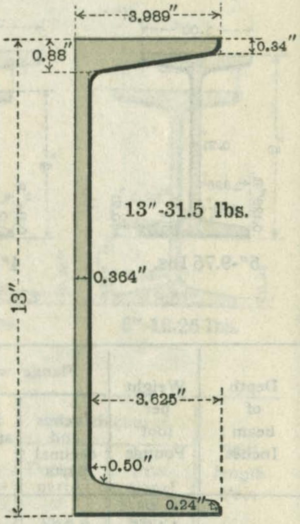
5"-9.75 lbs. 4"-7.50 lbs. 3"-5.5 lbs.

Depth of beam Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
5	14.75	3.294	3 19/64	.504	½	65
	12.25	3.147	3 9/64	.357	11/32	65
	9.75	3.000	3	.210	13/64	65
4	10.50	2.880	2⅞	.410	13/32	51
	9.50	2.807	2 13/16	.337	11/32	56
	8.50	2.733	2 47/64	.263	17/64	63
	7.50	2.660	2 21/32	.190	3/16	65
3	7.50	2.521	2 33/64	.361	23/64	45
	6.50	2.423	2 27/64	.263	17/64	53
	5.50	2.330	2 21/64	.170	11/64	62

Note—Lengths greater than those given above can be obtained by special arrangement.

CHANNELS.





Depth of channel Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
15	55.00	3.818	3 13/16	.818	13/16	65
	50.00	3.720	3 23/32	.720	23/32	65
	45.00	3.622	3 5/8	.622	5/8	65
	40.00	3.524	3 17/32	.524	17/32	65
	35.00	3.426	3 27/64	.426	27/64	65
	33.00	3.400	3 13/32	.400	13/32	65
13	50.00	4.420	4 27/64	.790	51/64	65
	40.00	4.190	4 3/16	.560	9/16	65
	37.00	4.115	4 7/64	.490	31/64	65
	35.00	4.080	4 5/64	.450	29/64	65
	32.00	4.000	4	.375	3/8	65
	31.50	3.989	3 63/64	.364	23/64	65

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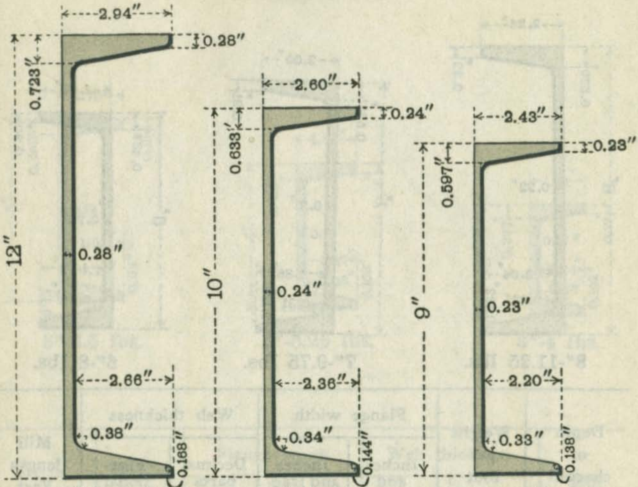
CHANNELS.

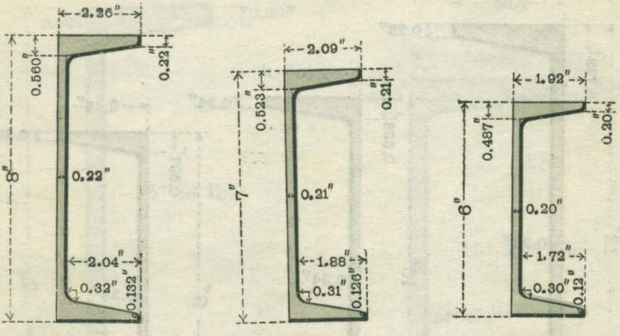


12"-20.5 lbs. 10"-15 lbs. 9"-13.25 lbs.

Depth of channel Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
12	40.00	3.418	3 27/64	.758	49/64	65
	35.00	3.296	3 19/64	.636	41/64	65
	30.00	3.173	3 11/64	.513	33/64	65
	25.00	3.050	3 3/64	.390	25/64	65
	20.50	2.940	2 15/16	.280	9/32	65
10	35.00	3.183	3 3/16	.823	53/64	65
	30.00	3.036	3 1/32	.676	43/64	65
	25.00	2.889	2 57/64	.529	17/32	65
	20.00	2.742	2 47/64	.382	3/8	65
	15.00	2.600	2 19/32	.240	15/64	65
9	25.00	2.815	2 13/16	.615	39/64	65
	20.00	2.652	2 21/32	.452	29/64	65
	15.00	2.488	2 31/64	.288	9/32	65
	13.25	2.430	2 7/16	.230	15/64	65

Note—Lengths greater than those given above can be obtained by special arrangement.

CHANNELS.

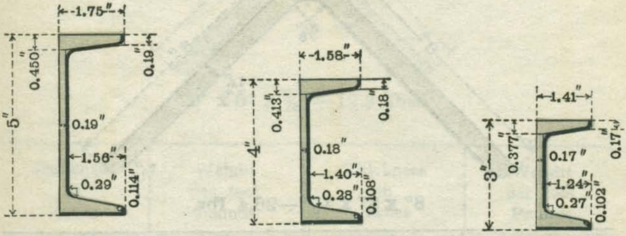


8"-11.25 lbs. 7"-9.75 lbs. 6"-8 lbs.

Depth of channel Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
	21.25	2.622	2 5/8	.582	37/64	65
	18.75	2.530	2 17/32	.490	31/64	65
8	16.25	2.439	2 7/16	.399	25/64	65
	13.75	2.347	2 11/32	.307	19/64	65
	11.25	2.260	2 17/64	.220	7/32	65
	19.75	2.513	2 33/64	.633	5/8	65
	17.25	2.408	2 13/32	.528	33/64	65
7	14.75	2.303	2 19/64	.423	13/32	65
	12.25	2.198	2 13/64	.318	5/16	65
	9.75	2.090	2 3/32	.210	13/64	65
	15.50	2.283	2 9/32	.563	9/16	65
6	13.00	2.160	2 5/32	.440	7/16	65
	10.50	2.038	2 1/32	.318	5/16	65
	8.00	1.920	1 59/64	.200	13/64	65

Note—Lengths greater than those given above can be obtained by special arrangement.

CHANNELS.

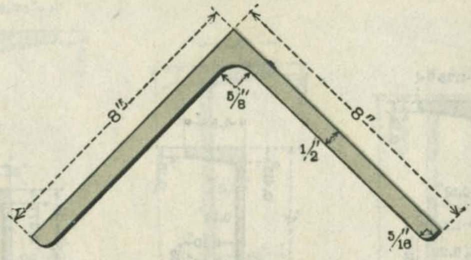


5"-6.5 lbs. 4"-5.25 lbs. 3"-4 lbs.

Depth of channel Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
5	11.50	2.037	2 1/32	.477	15/32	65
	9.00	1.890	1 57/64	.330	21/64	65
	6.50	1.750	1 3/4	.190	3/16	65
4	7.25	1.725	1 23/32	.325	21/64	62
	6.25	1.652	1 21/32	.252	17/64	65
	5.25	1.580	1 37/64	.180	3/16	65
3	6.00	1.602	1 39/64	.362	3/8	65
	5.00	1.504	1 1/2	.264	17/64	65
	4.00	1.410	1 13/32	.170	11/64	65

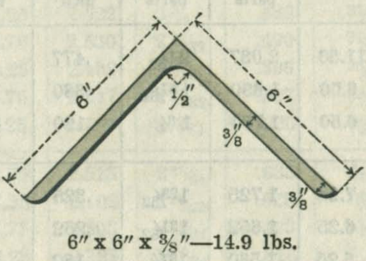
Note—Lengths greater than those given above can be obtained by special arrangement.

ANGLES WITH EQUAL LEGS.



8" x 8" x ½"—26.4 lbs.

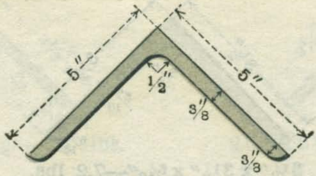
Thickness in inches	Weight per foot Pounds	Thickness in inches	Weight per foot Pounds
1⅛	56.9	¾	38.9
1 1/16	54.0	11/16	35.8
1	51.0	⅝	32.7
15/16	48.1	9/16	29.6
⅞	45.0	½	26.4
13/16	42.0		



6" x 6" x ⅜"—14.9 lbs.

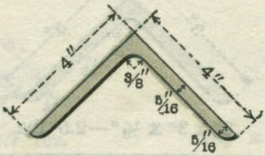
Thickness in inches	Weight per foot Pounds	Thickness in inches	Weight per foot Pounds
1	37.4	⅝	24.2
15/16	35.3	9/16	21.9
⅞	33.1	½	19.6
13/16	31.0	7/16	17.2
¾	28.7	⅜	14.9
11/16	26.5		

ANGLES WITH EQUAL LEGS.



5″ x 5″ x ⅜″—12.3 lbs.

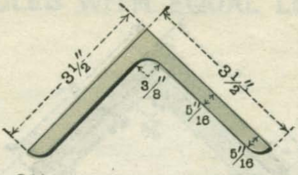
Thickness in inches	Weight per foot Pounds	Thickness in inches	Weight per foot Pounds
1	30.6	⅝	20.0
15/16	28.9	9/16	18.1
⅞	27.2	½	16.2
13/16	25.4	7/16	14.3
¾	23.6	⅜	12.3
11/16	21.8		



4″ x 4″ x 5/16″—8.2 lbs.

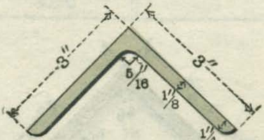
Thickness in inches	Weight per foot Pounds	Thickness in inches	Weight per foot Pounds
13/16	19.9	½	12.8
¾	18.5	7/16	11.3
11/16	17.1	⅜	9.8
⅝	15.7	5/16	8.2
9/16	14.3		

ANGLES WITH EQUAL LEGS.



3½" x 3½" x 5/16"—7.2 lbs.

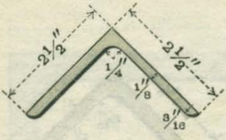
Thickness in inches	Weight per foot Pounds
13/16	17.1
¾	16.0
11/16	14.8
⅝	13.6
9/16	12.4
½	11.1
7/16	9.8
⅜	8.5
5/16	7.2



3" x 3" x ⅛"—2.5 lbs.

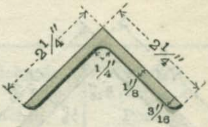
Thickness in inches	Weight per foot Pounds
⅝	11.5
9/16	10.4
½	9.4
7/16	8.3
⅜	7.2
5/16	6.1
¼	4.9
3/16	3.7
⅛	2.5

ANGLES WITH EQUAL LEGS.



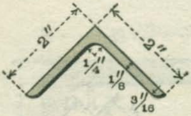
2½" x 2½" x ⅛"—2.1 lbs.

Thickness in inches	Weight per foot Pounds
½	7.7
7/16	6.8
⅜	5.9
5/16	5.0
¼	4.1
3/16	3.1
⅛	2.1



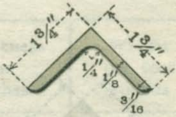
2¼" x 2¼" x ⅛"—1.9 lbs.

Thickness in inches	Weight per foot Pounds
½	6.8
7/16	6.1
⅜	5.3
5/16	4.5
¼	3.7
3/16	2.8
⅛	1.9



2" x 2" x ⅛"—1.7 lbs.

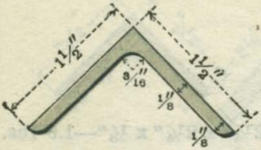
Thickness in inches	Weight per foot Pounds
7/16	5.3
⅜	4.7
5/16	4.0
¼	3.2
3/16	2.5
⅛	1.7



1¾" x 1¾" x ⅛"—1.4 lbs.

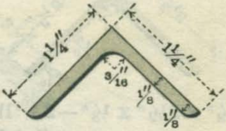
Thickness in inches	Weight per foot Pounds
7/16	4.6
⅜	4.0
5/16	3.4
¼	2.8
3/16	2.2
⅛	1.4

ANGLES WITH EQUAL LEGS.



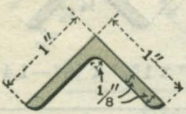
1½" x 1½" x ⅛"—1.3 lbs.

Thickness in inches	Weight per foot Pounds
⅜	3.4
5/16	2.9
¼	2.4
3/16	1.8
⅛	1.3



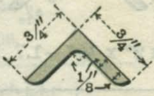
1¼" x 1¼" x ⅛"—1.1 lbs.

Thickness in inches	Weight per foot Pounds
5/16	2.4
¼	2.0
3/16	1.5
⅛	1.1



1" x 1" x ⅛"—0.8 lbs.

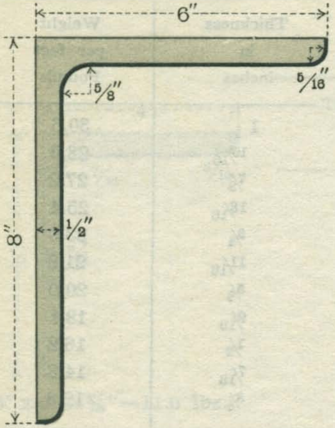
Thickness in inches	Weight per foot Pounds
¼	1.5
3/16	1.2
⅛	0.8



¾" x ¾" x ⅛"—0.6 lbs.

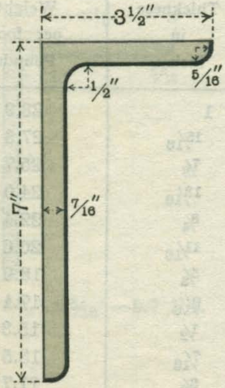
Thickness in inches	Weight per foot Pounds
3/16	0.9
⅛	0.6

ANGLES WITH UNEQUAL LEGS.



8″ x 6″ x ½″—23.0 lbs.

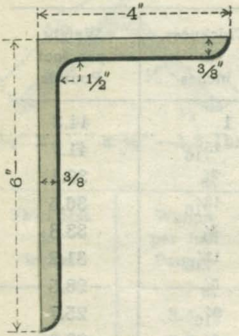
Thickness in inches	Weight per foot Pounds
1	44.3
15/16	41.7
7/8	39.1
13/16	36.5
3/4	33.8
11/16	31.2
5/8	28.5
9/16	25.7
1/2	23.0



7″ x 3½″ x 7/16″—15.0 lbs.

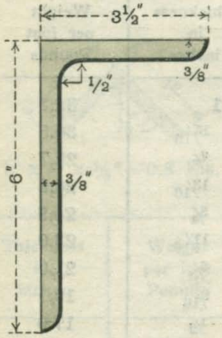
Thickness in inches	Weight per foot Pounds
1	32.3
15/16	30.5
7/8	28.7
13/16	26.8
3/4	24.9
11/16	23.0
5/8	21.0
9/16	19.1
1/2	17.0
7/16	15.0

ANGLES WITH UNEQUAL LEGS.



6" x 4" x ⅜"—12.3 lbs.

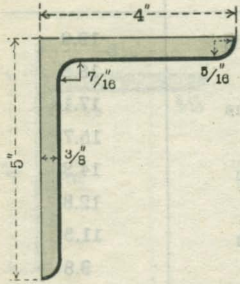
Thickness in inches	Weight per foot Pounds
1	30.6
15/16	28.9
⅞	27.2
13/16	25.4
¾	23.6
11/16	21.8
⅝	20.0
9/16	18.1
½	16.2
7/16	14.3
⅜	12.3



6" x 3½" x ⅜"—11.7 lbs.

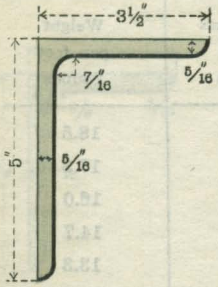
Thickness in inches	Weight per foot Pounds
1	28.9
15/16	27.3
⅞	25.7
13/16	24.0
¾	22.4
11/16	20.6
⅝	18.9
9/16	17.1
½	15.3
7/16	13.5
⅜	11.7

ANGLES WITH UNEQUAL LEGS.



5″ x 4″ x 3/8″—11.0 lbs.

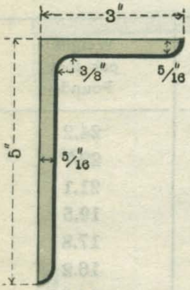
Thickness in inches	Weight per foot Pounds
7/8	24.2
13/16	22.7
3/4	21.1
11/16	19.5
5/8	17.8
9/16	16.2
1/2	14.5
7/16	12.8
3/8	11.0



5″ x 3½″ x 5/16″—8.7 lbs.

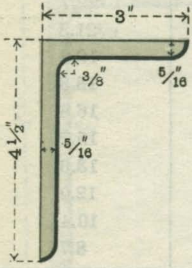
Thickness in inches	Weight per foot Pounds
7/8	22.7
13/16	21.3
3/4	19.8
11/16	18.3
5/8	16.8
9/16	15.2
1/2	13.6
7/16	12.0
3/8	10.4
5/16	8.7

ANGLES WITH UNEQUAL LEGS.



5" x 3" x 5/16"—8.2 lbs.

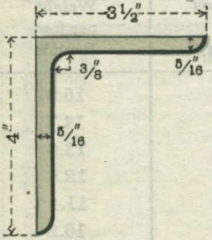
Thickness in inches	Weight per foot Pounds
13/16	19.9
3/4	18.5
11/16	17.1
5/8	15.7
9/16	14.3
1/2	12.8
7/16	11.3
3/8	9.8
5/16	8.2



4½" x 3" x 5/16"—7.7 lbs.

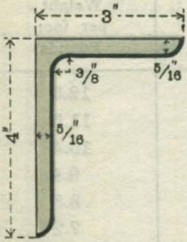
Thickness in inches	Weight per foot Pounds
13/16	18.5
3/4	17.3
11/16	16.0
5/8	14.7
9/16	13.3
1/2	11.9
7/16	10.6
3/8	9.1
5/16	7.7

ANGLES WITH UNEQUAL LEGS.



4" x 3½" x 5/16"—7.7 lbs.

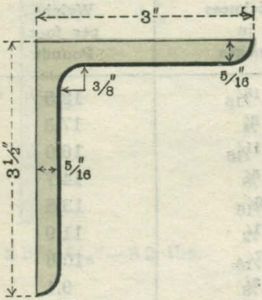
Thickness in inches	Weight per foot Pounds
13/16	18.5
¾	17.3
11/16	16.0
⅝	14.7
9/16	13.3
½	11.9
7/16	10.6
⅜	9.1
5/16	7.7



4" x 3" x 5/16"—7.2 lbs.

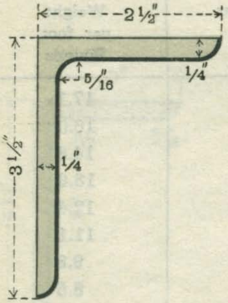
Thickness in inches	Weight per foot Pounds
13/16	17.1
¾	16.0
11/16	14.8
⅝	13.6
9/16	12.4
½	11.1
7/16	9.8
⅜	8.5
5/16	7.2

ANGLES WITH UNEQUAL LEGS.



3½" x 3" x 5/16"—6.6 lbs.

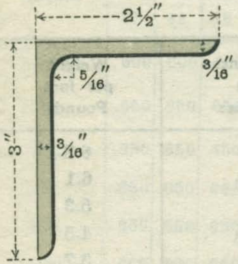
Thickness in inches	Weight per foot Pounds
13/16	15.8
¾	14.7
11/16	13.6
⅝	12.5
9/16	11.4
½	10.2
7/16	9.1
⅜	7.9
5/16	6.6



3½" x 2½" x ¼"—4.9 lbs.

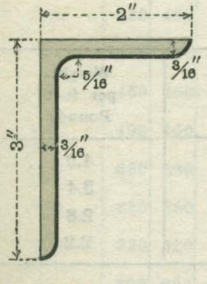
Thickness in inches	Weight per foot Pounds
11/16	12.5
⅝	11.5
9/16	10.4
½	9.4
7/16	8.3
⅜	7.2
5/16	6.1
¼	4.9

ANGLES WITH UNEQUAL LEGS.



3" x 2½" x 3/16"—3.4 lbs.

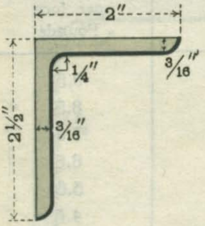
Thickness in inches	Weight per foot Pounds
9/16	9.5
½	8.5
7/16	7.6
3/8	6.6
5/16	5.6
¼	4.5
3/16	3.4



3" x 2" x 3/16"—3.1 lbs.

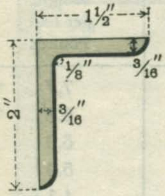
Thickness in inches	Weight per foot Pounds
½	7.7
7/16	6.8
3/8	5.9
5/16	5.0
¼	4.1
3/16	3.1

ANGLES WITH UNEQUAL LEGS.



2½″ x 2″ x 3/16″—2.8 lbs.

Thickness in inches	Weight per foot Pounds
½	6.8
7/16	6.1
⅜	5.3
5/16	4.5
¼	3.7
3/16	2.8



2″ x 1½″ x 3/16″—2.1 lbs.

Thickness in inches	Weight per foot Pounds
⅜	4.0
5/16	3.4
¼	2.8
3/16	2.2

SHEARED PLATES.

Approximate maximum sizes, inches.

Thickness in inches	Width of plate in inches										Weight per sq. foot
	37	42	48	50	56	62	68	72	75	78½	
3/16	600	600	600	600	540	480	420	400			7.65
¼	650	650	650	650	600	540	500	480	450	400	10.20
5/16	650	650	650	650	600	540	500	500	480	420	12.75
⅜	650	650	650	650	600	540	500	500	480	420	15.30
7/16	650	650	650	650	600	540	500	500	480	420	17.86
½	600	600	600	600	600	540	500	500	500	420	20.40
9/16	600	600	600	600	600	540	500	500	480	420	22.96
⅝	580	580	580	580	540	540	480	480	450	400	25.50
¾	580	580	580	580	540	540	480	480	450	390	30.60
⅞	540	540	540	540	520	520	420	420	400	360	35.70
1	520	520	520	520	500	500	400	400	380	300	40.80
1⅛	480	450	450	450	420	420	340	340	320		45.90
1¼	480	450	450	450	420	420	340	340	300		51.00
1⅜	450	450	420	420	420	400	310	310	280		56.10
1½	400	400	380	380	380	360	300	300	260		61.20
1⅝	380	380	360	360	360	320	280	280	240		66.30
1¾	380	380	360	360	360	320	280	280	240		71.40
1⅞	320	320	300	300	300	280	260	260	220		76.50
2	300	280	280	260	260	240	220	220	200		81.60

Note—Greater lengths than shown above can be furnished by special arrangement. Sheared plates can be furnished rectangular, to sketch or in circles 20″ to 80″ diameter. Intermediate widths and thicknesses can be furnished.

For table of weights of rectangular plates see pages 61 to 71. For circles see pages 72 to 74.

RECTANGULAR UNIVERSAL MILL PLATES.

Thickness, width and maximum length in inches.

Thickness in inches	Width in inches						Weight per sq. foot
	6½-10	11-16	17-23	24-28	29-32	33-36	
3/16	1000	1400	1400	1400	1400	1200	7.65
¼	1200	1500	1500	1500	1500	1200	10.20
5/16	1500	1500	1500	1500	1500	1200	12.75
⅜	1500	1500	1500	1500	1500	1200	15.30
7/16	1500	1500	1500	1500	1400	1200	17.86
½	1400	1500	1500	1500	1400	1200	20.40
9/16	1400	1500	1500	1500	1200	1200	22.96
⅝	1200	1200	1200	1200	1200	1200	25.50
¾	1100	1000	1000	1000	900	900	30.60
⅞	900	900	900	900	850	850	35.70
1	840	840	840	800	800	800	40.80
1⅛	780	780	780	720	720	720	45.90
1¼	720	720	720	660	660	660	51.00
1⅜	660	660	660	600	600	600	56.10
1½	600	600	600	540	540	540	61.20
1⅝	540	540	540	480	480	480	66.30
1¾	480	480	480	420	420	420	71.40
1⅞	480	480	480	420	420	420	76.50
2	480	480	480	420	420	420	81.60

Note—Greater lengths than shown above can be furnished by special arrangement.

Intermediate widths and thicknesses can be furnished.

For table of weights see pages 61 to 71 inclusive.

MERCHANT BARS.

ROUNDS.

¼″ to 2″ inclusive advancing by 64ths.

2″ to 6″ inclusive advancing by 16ths.

Bolt and rivet sizes can be rolled to decimal diameters.

For table of weights see page 75.

Rounds can be furnished in coils as follows:

¼″ to 23/64″ inclusive in coils weighing 100, 150 and 300 lbs.

⅜″ to ⅞″ inclusive in coils weighing 150, 200 and 300 lbs.

Inside diameter of coils 26″ or 34″.

SQUARES.

¼″ to ⅞″ inclusive advancing by 64ths.

⅞″ to 2″ inclusive advancing by 32nds.

2⅛″ to 4″ inclusive advancing by 8ths.

For table of weights see page 76.

MERCHANT BARS.

OVALS.

5/8"	by 5/16"	to 1/2"	inclusive advancing	by 32nds.
11/16"	by 11/32"	to 7/16"	inclusive advancing	by 32nds.
3/4"	by 3/16"	to 1/2"	inclusive advancing	by 32nds.
13/16"	by 11/32"	to 9/16"	inclusive advancing	by 32nds.
7/8"	by 5/16"	to 3/4"	inclusive advancing	by 32nds.
1"	by 3/8"	to 1/2"	inclusive advancing	by 32nds.

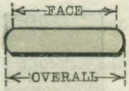
For table of weights see page 77.

HEXAGONS.

Width across faces.

1/4" to 31/32" inclusive advancing by 32nds.
1" to 2 1/16" inclusive advancing by 16ths.

For table of weights see page 78.



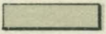
ROUND EDGE FLATS.

5/8"	to 11/16"	by 1/8"	to 3/8"	inclusive.
3/4"	to 15/16"	by 1/8"	to 1/2"	inclusive.
1"	to 1 3/8"	by 1/8"	to 5/8"	inclusive.
1 1/2"	to 3 1/2"	by 1/8"	to 1"	inclusive.
3 5/8"	to 4"	by 3/16"	to 1"	inclusive.
4 1/8"	to 6"	by 1/4"	to 1"	inclusive.

Orders must state which measurements to use, whether face or over-all.

For table of weights see pages 79 to 82 inclusive.

MERCHANT BARS.



SQUARE EDGE FLATS.

7/16" to 1/2" by 3/16" to 3/8" inclusive.
9/16" by 1/4" to 1/2" inclusive.
5/8" to 15/16" by 1/8" to 1/2" inclusive.
1" to 2" by 1/8" up to width.
2 1/8" to 3" by 1/8" to 1 1/2" inclusive.
3 1/8" to 4" by 1/8" to 2 1/4" inclusive.
4 1/8" to 6" by 3/16" to 2 1/4" inclusive.

For table of weights see pages 61 and 62.

Nut flats can be furnished within the above range of sizes and the following sizes in coils:

7/16" to 1/2" by 3/16" to 3/8"
9/16" by 1/4" to 1/2"

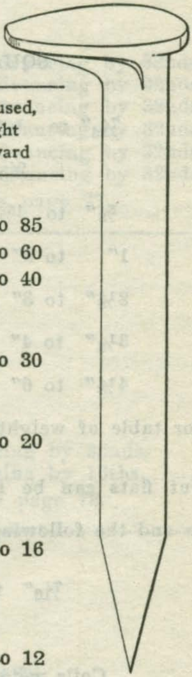
Coils weighing 100, 150 and 300 lbs.

5/8" by 1/4" to 1/2"
11/16" to 3/4" by 5/16" to 1/2"
13/16" to 7/8" by 3/8" to 1/2"

Coils weighing 150, 200 and 300 lbs.

Inside diameter of coils 26" or 34".

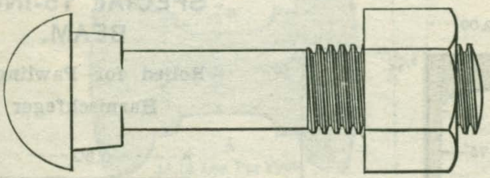
RAILROAD SPIKES.



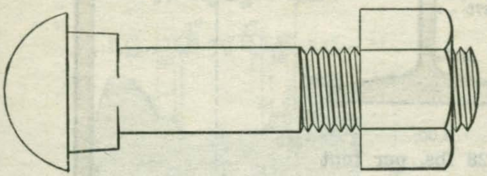
Size measured under head	Average No. per keg of 200 lb.	Rail used, weight per yard
6½ x ⅝	230	
6 x ⅝	262	100 to 85
5½ x 9/16	340	85 to 60
5 x 9/16	360	60 to 40
4½ x 9/16	420	
5 x ½	490	
4½ x ½	535	40 to 30
4 x ½	605	
3½ x ½	675	
4½ x 7/16	690	30 to 20
4 x 7/16	780	
3½ x 7/16	900	
3 x 7/16	1030	
4 x ⅜	1025	20 to 16
3½ x ⅜	1250	
3 x ⅜	1380	
2½ x ⅜	1650	
3 x 5/16	2050	16 to 12
2½ x 5/16	2230	
2 x 5/16	2400	12 to 8

Full information on spikes is contained in a separate pamphlet, copies of which may be had on application.

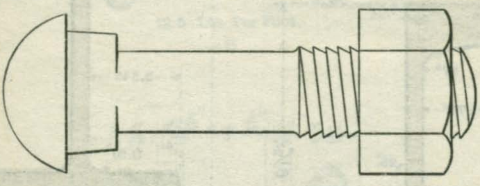
TRACK BOLTS.



U. S. Standard rolled threads.



U. S. Standard cut threads.

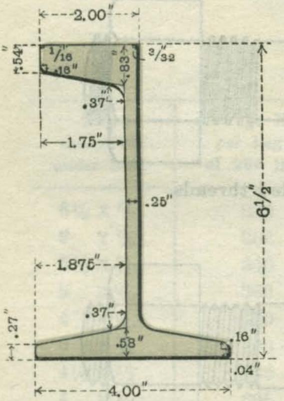


U. S. Standard rolled buttress threads.

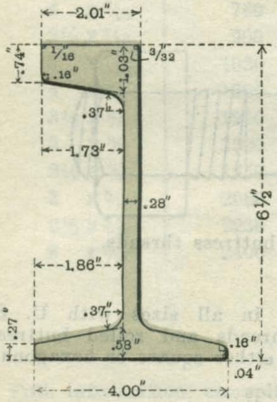
We manufacture track bolts in all sizes with U. S. Standard cut threads, rolled threads and rolled buttress threads. Nuts can be furnished either square or hexagonal, and recessed nuts if required.

Full information on track bolts is given in a separate pamphlet. Copies may be had on application.

SPECIAL BRAKE BEAMS.



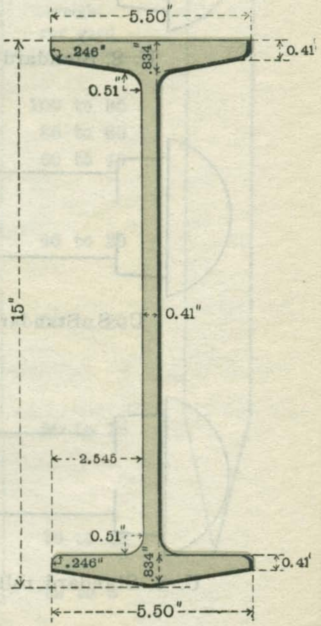
15.28 lbs. per foot



17.00 lbs. per foot

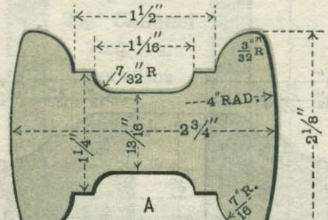
SPECIAL 15-INCH BEAM.

Rolled for Pawling & Harnischfeger



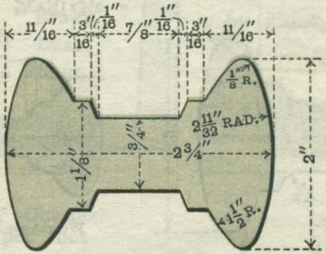
42 lbs. per foot

PLOW BEAMS.



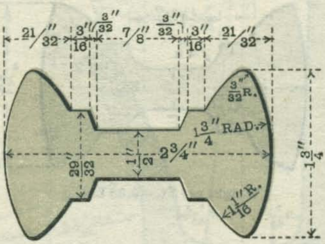
13.01 Lbs. Per Foot.

Also	$2\frac{3}{4}'' \times 2'' \times \frac{11}{16}''$	11.84 Lbs. Per Ft
"	$2\frac{3}{4}'' \times 1\frac{7}{8}'' \times \frac{9}{16}''$	10.67 " " "
"	$2\frac{3}{4}'' \times 1\frac{3}{4}'' \times \frac{7}{16}''$	9.50 " " "
"	$2\frac{3}{4}'' \times 1\frac{21}{32}'' \times \frac{11}{32}''$	8.62 " " "
"	$2\frac{3}{4}'' \times 1\frac{5}{8}'' \times \frac{5}{16}''$	8.33 " " "



12.5 Lbs. Per Foot.

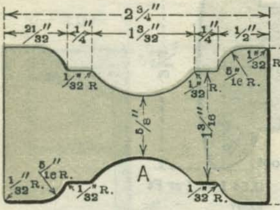
B



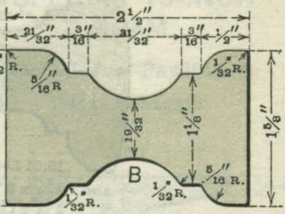
9.5 Lbs. Per Foot

C

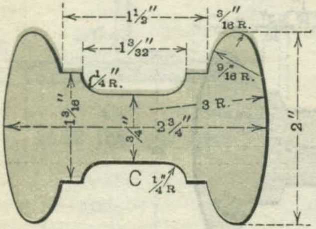
PLOW BEAMS.



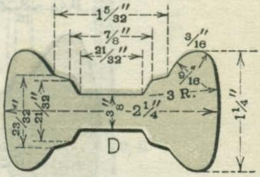
Weight per Ft. = 11.13 Lbs.
Also $2\frac{3}{4}'' \times 1\frac{3}{4}'' \times \frac{3}{4}''$ 12.30 Lbs. per Ft.



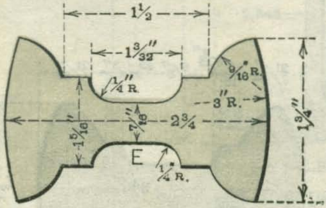
Weight per Ft. = 10.10 Lbs.
Also $2\frac{1}{2}'' \times 1\frac{1}{2}'' \times \frac{15}{32}''$ 9.04 Lbs. per Foot
" $2\frac{1}{2}'' \times 1\frac{3}{8}'' \times \frac{11}{32}''$ 7.97 " " "
" $2\frac{1}{2}'' \times 1\frac{1}{4}'' \times \frac{7}{32}''$ 6.91 " " "



Weight per Ft. = 11.90 Lbs.

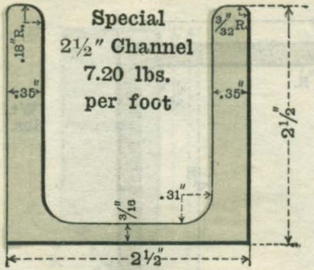


Weight per Ft. = 5.95 Lbs.

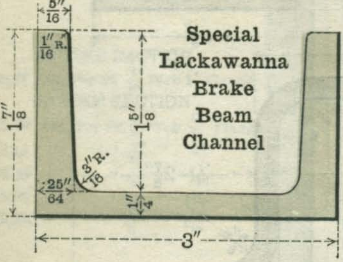


Weight per Ft. = 9.33 Lbs.

SPECIAL SECTIONS.



Special 2½" Channel 7.20 lbs. per foot

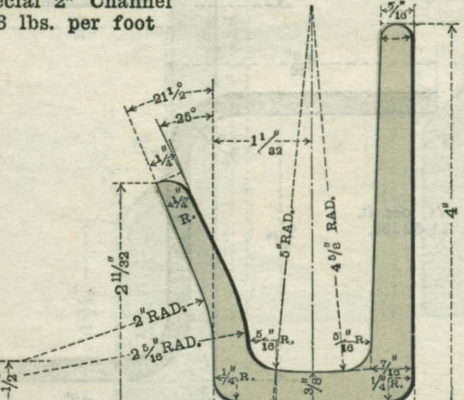


Special Lackawanna Brake Beam Channel

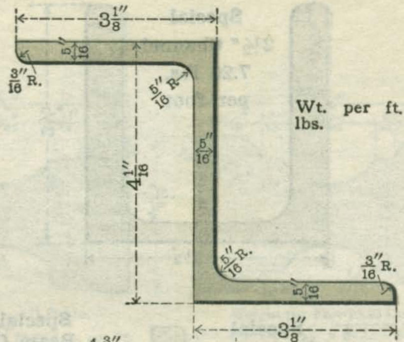
Special Brake Beam Channels

Width Ins.	Flange Ins.	Web In.	Wt. per foot Lbs.
3	2¼	⅝	10.3
3	2⅛	½	9.0
3	1 15/16	5/16	7.1
3	1⅞	¼	6.5
3	1 103/128	23/128	5.75

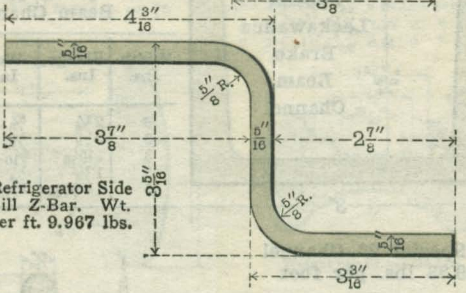
Special 2" Channel 9.33 lbs. per foot



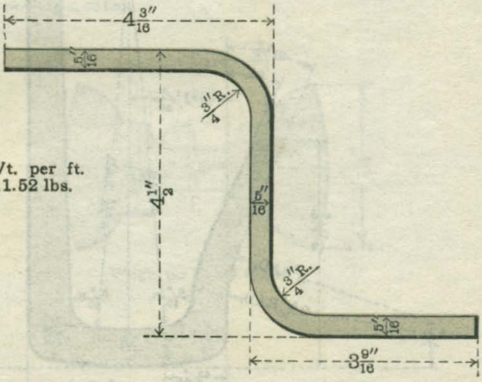
SPECIAL Z-BARS.



Wt. per ft. 10.3 lbs.

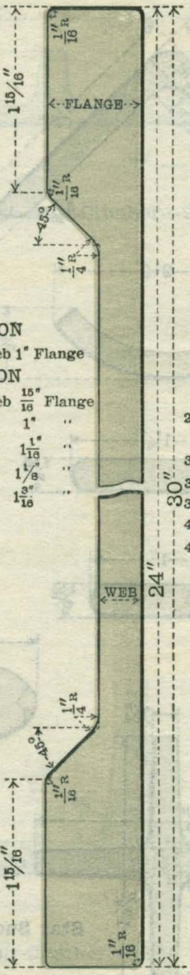


Refrigerator Side Sill Z-Bar. Wt. per ft. 9.967 lbs.



Wt. per ft. 11.52 lbs.

TIRE SECTIONS.

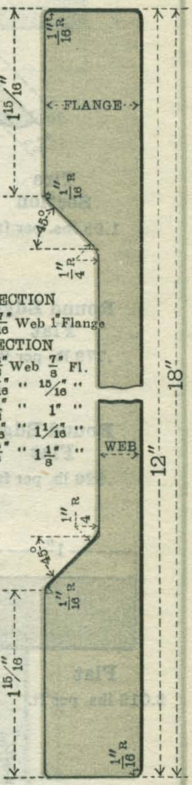


24" TIRE SECTION

44.17 Lbs. Per Ft $\frac{7}{16}''$ Web 1" Flange

30" TIRE SECTION

Lbs. Per Ft.	Web	Flange
46.74	$\frac{3}{8}''$	$\frac{15}{16}''$
53.12	$\frac{7}{16}''$	1"
59.49	$\frac{1}{2}''$	$1\frac{1}{16}''$
65.87	$\frac{9}{16}''$	$1\frac{1}{8}''$
72.24	$\frac{5}{8}''$	$1\frac{3}{16}''$



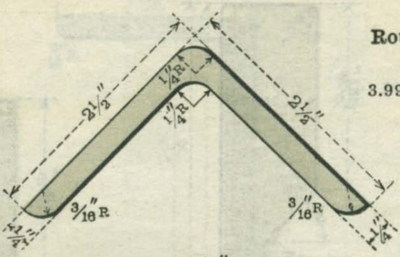
12" TIRE SECTION

26.32 Lbs. Per Ft $\frac{7}{16}''$ Web 1" Flange

18" TIRE SECTION

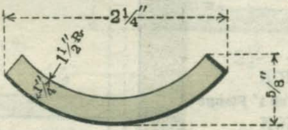
Lbs. Per Ft.	Web	Fl.
30.39	$\frac{3}{8}''$	$\frac{7}{8}''$
34.21	$\frac{7}{16}''$	$\frac{15}{16}''$
38.04	$\frac{1}{2}''$	1"
41.87	$\frac{9}{16}''$	$1\frac{1}{16}''$
45.69	$\frac{5}{8}''$	$1\frac{1}{8}''$

SPECIAL SECTIONS.

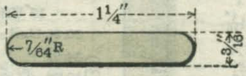


Round Back Angle
3.99 lbs. per ft.

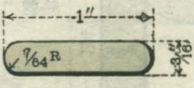
Tire Section
1.98 lbs. per ft.

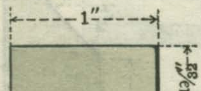


Round Edge Flat
.779 lb. per ft.

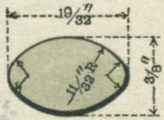


Round Edge Flat
.620 lb. per ft.

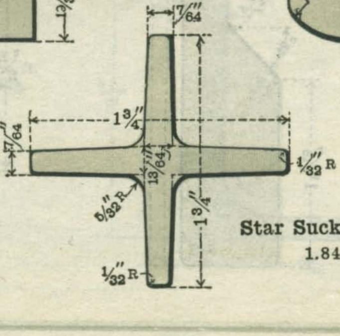




Flat
2.019 lbs. per ft.

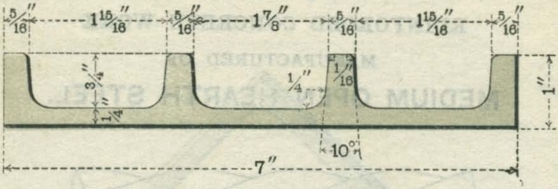


Oval
.55 lb. per ft.

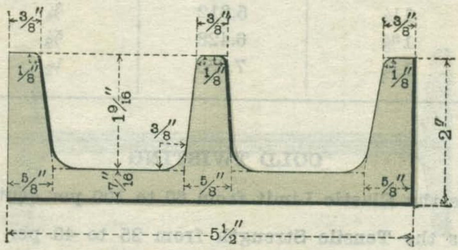


Star Sucker Rod Section
1.84 lbs. per ft.

ANTI-CLIMBER SECTIONS.



Hedley Anti-Climber—9.83 lbs. per foot



Anti-Climber—16.50 lbs. per foot

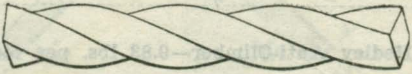
COLD TWISTED SOFT STEEL SQUARES

FOR

REINFORCED CONCRETE WORK

MANUFACTURED OF

MEDIUM OPEN HEARTH STEEL.



Size Inch	Weight per lineal foot	Number of turns per foot
¼	.213	4
5/16	.332	3¾
⅜	.478	3½
7/16	.651	3¼
½	.850	3
⅝	1.328	2
¾	1.913	1½
⅞	2.603	1¼
1	3.400	1
1⅛	4.303	⅞
1¼	5.312	¾
1⅜	6.428	⅝
1½	7.650	½

COLD TWISTING

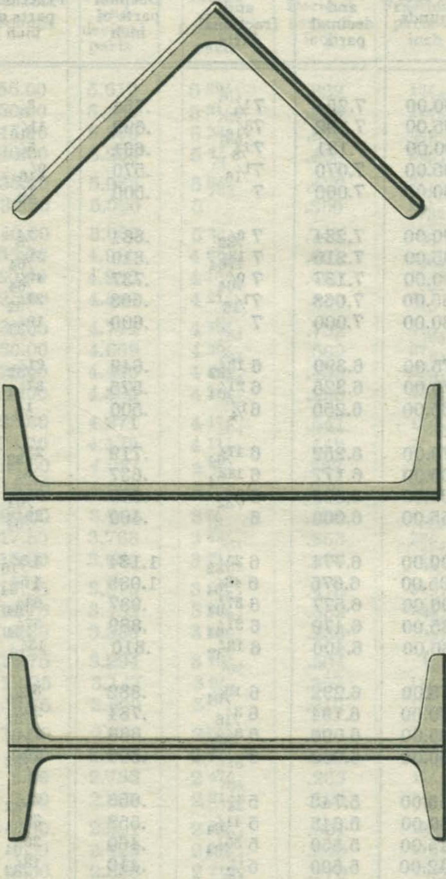
Increases the Elastic Limit from 60 to 100 per cent.

Increases the Tensile Strength from 25 to 40 per cent.

Removes the scale, permitting close bond with the concrete.

Ensures uniformity of the twists.

Diagrams showing method of increasing areas and weights of structural shapes. The shaded portion indicates the minimum sections and the blank portion the added material.



WEIGHTS AND DIMENSIONS OF STANDARD BEAMS.

Depth of beam Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
24	100.00	7.254	7¼	.754	¾	57
	95.00	7.192	7 3/16	.692	11/16	60
	90.00	7.131	7⅛	.631	⅝	62
	85.00	7.070	7 1/16	.570	9/16	65
	80.00	7.000	7	.500	½	69
20	100.00	7.284	7 9/32	.884	⅞	43
	95.00	7.210	7 13/64	.810	51/64	45
	90.00	7.137	7 9/64	.737	47/64	48
	85.00	7.063	7 1/16	.663	21/32	51
	80.00	7.000	7	.600	19/32	54
20	75.00	6.399	6 13/32	.649	21/32	58
	70.00	6.325	6 21/64	.575	37/64	63
	65.00	6.250	6¼	.500	½	68
18	70.00	6.259	6 17/64	.719	23/32	55
	65.00	6.177	6 11/64	.637	⅝	60
	60.00	6.095	6 3/32	.555	35/64	65
	55.00	6.000	6	.460	29/64	72
15	100.00	6.774	6 25/32	1.184	1 3/16	35
	95.00	6.675	6 43/64	1.085	1 5/64	37
	90.00	6.577	6 37/64	.987	63/64	39
	85.00	6.479	6 31/64	.889	57/64	42
	80.00	6.400	6 13/32	.810	13/16	44
15	75.00	6.292	6 19/64	.882	57/64	48
	70.00	6.194	6 3/16	.784	25/32	51
	65.00	6.096	6 3/32	.686	11/16	56
	60.00	6.000	6	.590	19/32	61
15	55.00	5.746	5¾	.656	21/32	65
	50.00	5.648	5 41/64	.558	35/64	65
	45.00	5.550	5 35/64	.460	29/64	65
	42.00	5.500	5½	.410	13/32	65

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD BEAMS.

Depth of beam Inches	Weight per foot Pounds	Flange width: Inches and decimal parts	Flange width: Inches and fractional parts	Web thickness: Decimal parts of inch	Web thickness: Fractional parts of inch	Mill length Feet
12	55.00	5.612	5 39/64	.822	13/16	58
	50.00	5.489	5 31/64	.699	11/16	64
	45.00	5.366	5 23/64	.576	9/16	65
	40.00	5.250	5 1/4	.460	29/64	65
12	35.00	5.086	5 3/32	.436	7/16	65
	31.50	5.000	5	.350	11/32	65
10	40.00	5.099	5 3/32	.749	3/4	62
	35.00	4.952	4 61/64	.602	39/64	65
	30.00	4.805	4 13/16	.455	15/32	65
	25.00	4.660	4 21/32	.310	5/16	65
9	35.00	4.772	4 49/64	.732	47/64	65
	30.00	4.609	4 39/64	.569	37/64	65
	25.00	4.446	4 29/64	.406	27/64	65
	21.00	4.330	4 21/64	.290	19/64	65
8	25.50	4.271	4 17/64	.541	17/32	65
	23.00	4.179	4 11/64	.449	7/16	65
	20.50	4.087	4 3/32	.357	23/64	65
	18.00	4.000	4	.270	17/64	65
7	20.00	3.868	3 7/8	.458	15/32	65
	17.50	3.763	3 49/64	.353	23/64	65
	15.00	3.660	3 21/32	.250	1/4	65
6	17.25	3.575	3 37/64	.475	31/64	65
	14.75	3.452	3 29/64	.352	23/64	65
	12.25	3.330	3 21/64	.230	15/64	65
5	14.75	3.294	3 19/64	.504	1/2	65
	12.25	3.147	3 9/64	.357	11/32	65
	9.75	3.000	3	.210	13/64	65
4	10.50	2.880	2 7/8	.410	13/32	51
	9.50	2.807	2 13/16	.337	11/32	56
	8.50	2.733	2 47/64	.263	17/64	63
	7.50	2.660	2 21/32	.190	3/16	65
3	7.50	2.521	2 33/64	.361	23/64	45
	6.50	2.423	2 27/64	.263	17/64	53
	5.50	2.330	2 21/64	.170	11/64	62

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD CHANNELS.

Depth of channel Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
	55.00	3.818	$3\frac{13}{16}$	.818	$\frac{13}{16}$	65
	50.00	3.720	$3\frac{23}{32}$	.720	$\frac{23}{32}$	65
15	45.00	3.622	$3\frac{5}{8}$	.622	$\frac{5}{8}$	65
	40.00	3.524	$3\frac{17}{32}$	.524	$\frac{17}{32}$	65
	35.00	3.426	$3\frac{27}{64}$	.426	$\frac{27}{64}$	65
	33.00	3.400	$3\frac{13}{32}$	.400	$\frac{13}{32}$	65
	50.00	4.420	$4\frac{27}{64}$	.790	$\frac{51}{64}$	65
	40.00	4.190	$4\frac{3}{16}$	.560	$\frac{9}{16}$	65
13	37.00	4.115	$4\frac{7}{64}$	.490	$\frac{31}{64}$	65
	35.00	4.080	$4\frac{5}{64}$	.450	$\frac{29}{64}$	65
	32.00	4.000	4	.375	$\frac{3}{8}$	65
	31.50	3.989	$3\frac{63}{64}$	.364	$\frac{23}{64}$	65
	40.00	3.418	$3\frac{27}{64}$	.758	$\frac{49}{64}$	65
	35.00	3.296	$3\frac{19}{64}$	.636	$\frac{41}{64}$	65
12	30.00	3.173	$3\frac{11}{64}$	.513	$\frac{33}{64}$	65
	25.00	3.050	$3\frac{3}{64}$	.390	$\frac{25}{64}$	65
	20.50	2.940	$2\frac{15}{16}$	.280	$\frac{9}{32}$	65
	35.00	3.183	$3\frac{3}{16}$	.823	$\frac{53}{64}$	65
	30.00	3.036	$3\frac{1}{32}$	.676	$\frac{43}{64}$	65
10	25.00	2.889	$2\frac{57}{64}$	.529	$\frac{17}{32}$	65
	20.00	2.742	$2\frac{47}{64}$	.382	$\frac{3}{8}$	65
	15.00	2.600	$2\frac{19}{32}$	.240	$\frac{15}{64}$	65
	25.00	2.815	$2\frac{13}{16}$	.615	$\frac{39}{64}$	65
9	20.00	2.652	$2\frac{21}{32}$	.452	$\frac{29}{64}$	65
	15.00	2.488	$2\frac{31}{64}$	.288	$\frac{9}{32}$	65
	13.25	2.430	$2\frac{7}{16}$	.230	$\frac{15}{64}$	65

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD CHANNELS.

Depth of channel Inches	Weight per foot Pounds	Flange width		Web thickness		Mill length Feet
		Inches and decimal parts	Inches and fractional parts	Decimal parts of inch	Fractional parts of inch	
8	21.25	2.622	2⅝	.582	37/64	65
	18.75	2.530	2 17/32	.490	31/64	65
	16.25	2.439	2 7/16	.399	25/64	65
	13.75	2.347	2 11/32	.307	19/64	65
	11.25	2.260	2 17/64	.220	7/32	65
7	19.75	2.513	2 33/64	.633	⅝	65
	17.25	2.408	2 13/32	.528	33/64	65
	14.75	2.303	2 19/64	.423	13/32	65
	12.25	2.198	2 13/64	.318	5/16	65
	9.75	2.090	2 3/32	.210	13/64	65
6	15.50	2.283	2 9/32	.563	9/16	65
	13.00	2.160	2 5/32	.440	7/16	65
	10.50	2.038	2 1/32	.318	5/16	65
	8.00	1.920	1 59/64	.200	13/64	65
5	11.50	2.037	2 1/32	.477	15/32	65
	9.00	1.890	1 57/64	.330	21/64	65
	6.50	1.750	1 ¾	.190	3/16	65
4	7.25	1.725	1 23/32	.325	21/64	62
	6.25	1.652	1 21/32	.252	17/64	65
	5.25	1.580	1 37/64	.180	3/16	65
3	6.00	1.602	1 39/64	.362	⅜	65
	5.00	1.504	1½	.264	17/64	65
	4.00	1.410	1 13/32	.170	11/64	65

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD ANGLES—EQUAL LEGS.

Size	Thickness	Weight per foot	Mill length
Inches	Inches	Pounds	Feet
8 x 8	1⅛	56.9	65
8 x 8	1 1/16	54.0	65
8 x 8	1	51.0	65
8 x 8	15/16	48.1	65
8 x 8	⅞	45.0	65
8 x 8	13/16	42.0	65
8 x 8	¾	38.9	65
8 x 8	11/16	35.8	65
8 x 8	⅝	32.7	65
8 x 8	9/16	29.6	65
8 x 8	½	26.4	65
6 x 6	1	37.4	65
6 x 6	15/16	35.3	65
6 x 6	⅞	33.1	65
6 x 6	13/16	31.0	65
6 x 6	¾	28.7	65
6 x 6	11/16	26.5	65
6 x 6	⅝	24.2	65
6 x 6	9/16	21.9	65
6 x 6	½	19.6	65
6 x 6	7/16	17.2	65
6 x 6	⅜	14.9	65
5 x 5	1	30.6	65
5 x 5	15/16	28.9	65
5 x 5	⅞	27.2	65
5 x 5	13/16	25.4	65
5 x 5	¾	23.6	65
5 x 5	11/16	21.8	65
5 x 5	⅝	20.0	65
5 x 5	9/16	18.1	65
5 x 5	½	16.2	65
5 x 5	7/16	14.3	65
5 x 5	⅜	12.3	65

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD ANGLES—EQUAL LEGS.

Size	Thickness	Weight per foot	Mill length
Inches	Inches	Pounds	Feet
4 x 4	13/16	19.9	65
4 x 4	3/4	18.5	65
4 x 4	11/16	17.1	65
4 x 4	5/8	15.7	65
4 x 4	9/16	14.3	65
4 x 4	1/2	12.8	65
4 x 4	7/16	11.3	65
4 x 4	3/8	9.8	65
4 x 4	5/16	8.2	65
3½ x 3½	13/16	17.1	65
3½ x 3½	3/4	16.0	65
3½ x 3½	11/16	14.8	65
3½ x 3½	5/8	13.6	65
3½ x 3½	9/16	12.4	65
3½ x 3½	1/2	11.1	65
3½ x 3½	7/16	9.8	65
3½ x 3½	3/8	8.5	65
3½ x 3½	5/16	7.2	65
3 x 3	5/8	11.5	65
3 x 3	9/16	10.4	65
3 x 3	1/2	9.4	65
3 x 3	7/16	8.3	65
3 x 3	3/8	7.2	65
3 x 3	5/16	6.1	65
3 x 3	1/4	4.9	65
3 x 3	3/16	3.7	65
3 x 3	1/8	2.5	65
2½ x 2½	1/2	7.7	65
2½ x 2½	7/16	6.8	65
2½ x 2½	3/8	5.9	65
2½ x 2½	5/16	5.0	65
2½ x 2½	1/4	4.1	65
2½ x 2½	3/16	3.1	65
2½ x 2½	1/8	2.1	65

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD ANGLES—EQUAL LEGS.

Size	Thickness	Weight per foot	Mill length
Inches	Inches	Pounds	Feet
2¼ x 2¼	½	6.8	65
2¼ x 2¼	7/16	6.1	65
2¼ x 2¼	⅜	5.3	65
2¼ x 2¼	5/16	4.5	65
2¼ x 2¼	¼	3.7	65
2¼ x 2¼	3/16	2.8	65
2¼ x 2¼	⅛	1.9	65
2 x 2	7/16	5.3	65
2 x 2	⅜	4.7	65
2 x 2	5/16	4.0	65
2 x 2	¼	3.2	65
2 x 2	3/16	2.5	65
2 x 2	⅛	1.7	65
1¾ x 1¾	7/16	4.6	65
1¾ x 1¾	⅜	4.0	65
1¾ x 1¾	5/16	3.4	65
1¾ x 1¾	¼	2.8	65
1¾ x 1¾	3/16	2.2	65
1¾ x 1¾	⅛	1.4	65
1½ x 1½	⅜	3.4	65
1½ x 1½	5/16	2.9	65
1½ x 1½	¼	2.4	65
1½ x 1½	3/16	1.8	65
1½ x 1½	⅛	1.3	65
1¼ x 1¼	5/16	2.4	65
1¼ x 1¼	¼	2.0	65
1¼ x 1¼	3/16	1.5	65
1¼ x 1¼	⅛	1.1	65
1 x 1	¼	1.5	65
1 x 1	3/16	1.2	65
1 x 1	⅛	0.8	65
¾ x ¾	3/16	0.9	45
¾ x ¾	⅛	0.6	45

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD ANGLES—UNEQUAL LEGS.

Size	Thickness	Weight per foot	Mill length
Inches	Inches	Pounds	Feet
8 x 6	1	44.3	65
8 x 6	15/16	41.7	65
8 x 6	7/8	39.1	65
8 x 6	13/16	36.5	65
8 x 6	3/4	33.8	65
8 x 6	11/16	31.2	65
8 x 6	5/8	28.5	65
8 x 6	9/16	25.7	65
8 x 6	1/2	23.0	65
7 x 3½	1	32.3	65
7 x 3½	15/16	30.5	65
7 x 3½	7/8	28.7	65
7 x 3½	13/16	26.8	65
7 x 3½	3/4	24.9	65
7 x 3½	11/16	23.0	65
7 x 3½	5/8	21.0	65
7 x 3½	9/16	19.1	65
7 x 3½	1/2	17.0	65
7 x 3½	7/16	15.0	65
6 x 4	1	30.6	65
6 x 4	15/16	28.9	65
6 x 4	7/8	27.2	65
6 x 4	13/16	25.4	65
6 x 4	3/4	23.6	65
6 x 4	11/16	21.8	65
6 x 4	5/8	20.0	65
6 x 4	9/16	18.1	65
6 x 4	1/2	16.2	65
6 x 4	7/16	14.3	65
6 x 4	3/8	12.3	65
6 x 3½	1	28.9	65
6 x 3½	15/16	27.3	65
6 x 3½	7/8	25.7	65
6 x 3½	13/16	24.0	65
6 x 3½	3/4	22.4	65

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD ANGLES—UNEQUAL LEGS.

Size	Thickness	Weight per foot	Mill length
Inches	Inches	Pounds	Feet
6 x 3½	11/16	20.6	65
6 x 3½	⅝	18.9	65
6 x 3½	9/16	17.1	65
6 x 3½	½	15.3	65
6 x 3½	7/16	13.5	65
6 x 3½	⅜	11.7	65
5 x 4	⅞	24.2	65
5 x 4	13/16	22.7	65
5 x 4	¾	21.1	65
5 x 4	11/16	19.5	65
5 x 4	⅝	17.8	65
5 x 4	9/16	16.2	65
5 x 4	½	14.5	65
5 x 4	7/16	12.8	65
5 x 4	⅜	11.0	65
5 x 3½	⅞	22.7	65
5 x 3½	13/16	21.3	65
5 x 3½	¾	19.8	65
5 x 3½	11/16	18.3	65
5 x 3½	⅝	16.8	65
5 x 3½	9/16	15.2	65
5 x 3½	½	13.6	65
5 x 3½	7/16	12.0	65
5 x 3½	⅜	10.4	65
5 x 3½	5/16	8.7	65
5 x 3	13/16	19.9	65
5 x 3	¾	18.5	65
5 x 3	11/16	17.1	65
5 x 3	⅝	15.7	65
5 x 3	9/16	14.3	65
5 x 3	½	12.8	65
5 x 3	7/16	11.3	65
5 x 3	⅜	9.8	65
5 x 3	5/16	8.2	65

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD ANGLES—UNEQUAL LEGS.

Size	Thickness	Weight per foot	Mill length
Inches	Inches	Pounds	Feet
4½ x 3	13/16	18.5	65
4½ x 3	¾	17.3	65
4½ x 3	11/16	16.0	65
4½ x 3	⅝	14.7	65
4½ x 3	9/16	13.3	65
4½ x 3	½	11.9	65
4½ x 3	7/16	10.6	65
4½ x 3	⅜	9.1	65
4½ x 3	5/16	7.7	65
4 x 3½	13/16	18.5	65
4 x 3½	¾	17.3	65
4 x 3½	11/16	16.0	65
4 x 3½	⅝	14.7	65
4 x 3½	9/16	13.3	65
4 x 3½	½	11.9	65
4 x 3½	7/16	10.6	65
4 x 3½	⅜	9.1	65
4 x 3½	5/16	7.7	65
4 x 3	13/16	17.1	65
4 x 3	¾	16.0	65
4 x 3	11/16	14.8	65
4 x 3	⅝	13.6	65
4 x 3	9/16	12.4	65
4 x 3	½	11.1	65
4 x 3	7/16	9.8	65
4 x 3	⅜	8.5	65
4 x 3	5/16	7.2	65
3½ x 3	13/16	15.8	65
3½ x 3	¾	14.7	65
3½ x 3	11/16	13.6	65
3½ x 3	⅝	12.5	65
3½ x 3	9/16	11.4	65
3½ x 3	½	10.2	65
3½ x 3	7/16	9.1	65

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS AND DIMENSIONS OF STANDARD ANGLES—UNEQUAL LEGS.

Size	Thickness	Weight per foot	Mill length
Inches	Inches	Pounds	Feet
3½ x 3	⅜	7.9	65
3½ x 3	5/16	6.6	65
3½ x 2½	11/16	12.5	65
3½ x 2½	⅝	11.5	65
3½ x 2½	9/16	10.4	65
3½ x 2½	½	9.4	65
3½ x 2½	7/16	8.3	65
3½ x 2½	⅜	7.2	65
3½ x 2½	5/16	6.1	65
3½ x 2½	¼	4.9	65
3 x 2½	9/16	9.5	65
3 x 2½	½	8.5	65
3 x 2½	7/16	7.6	65
3 x 2½	⅜	6.6	65
3 x 2½	5/16	5.6	65
3 x 2½	¼	4.5	65
3 x 2½	3/16	3.4	65
3 x 2	½	7.7	65
3 x 2	7/16	6.8	65
3 x 2	⅜	5.9	65
3 x 2	5/16	5.0	65
3 x 2	¼	4.1	65
3 x 2	3/16	3.1	65
2½ x 2	½	6.8	65
2½ x 2	7/16	6.1	65
2½ x 2	⅜	5.3	65
2½ x 2	5/16	4.5	65
2½ x 2	¼	3.7	65
2½ x 2	3/16	2.8	65
2 x 1½	⅜	4.0	65
2 x 1½	5/16	3.4	65
2 x 1½	¼	2.8	65
2 x 1½	3/16	2.2	65

Note—Lengths greater than those given above can be obtained by special arrangement.

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches ½	⅝	¾	⅞	1	1¼	1½	1¾	12
1/16	.106	.133	.159	.186	.213	.266	.319	.372	2.55
⅛	.212	.266	.319	.372	.425	.531	.638	.743	5.10
3/16	.319	.398	.478	.558	.638	.797	.956	1.12	7.65
¼	.425	.531	.638	.744	.850	1.06	1.28	1.49	10.20
5/16	.531	.664	.797	.929	1.06	1.33	1.59	1.86	12.75
⅜	.638	.797	.956	1.12	1.28	1.59	1.91	2.23	15.30
7/16	.744	.930	1.12	1.30	1.49	1.86	2.23	2.60	17.85
½	.850	1.06	1.28	1.49	1.70	2.13	2.55	2.98	20.40
9/16	.956	1.20	1.43	1.67	1.91	2.39	2.87	3.35	22.95
⅝	1.06	1.33	1.59	1.86	2.12	2.65	3.19	3.72	25.50
11/16	1.17	1.46	1.75	2.05	2.34	2.92	3.51	4.09	28.05
¾	1.28	1.59	1.91	2.23	2.55	3.19	3.83	4.46	30.60
13/16	1.38	1.73	2.07	2.42	2.76	3.45	4.14	4.83	33.15
⅞	1.49	1.86	2.23	2.60	2.98	3.72	4.47	5.21	35.70
15/16	1.59	1.99	2.39	2.79	3.19	3.99	4.78	5.58	38.25
1	1.70	2.12	2.55	2.98	3.40	4.25	5.10	5.95	40.80
1 1/16	1.81	2.26	2.71	3.16	3.61	4.52	5.42	6.32	43.35
1⅛	1.91	2.39	2.87	3.35	3.83	4.78	5.74	6.69	45.90
1 3/16	2.02	2.52	3.03	3.53	4.04	5.05	6.06	7.07	48.45
1¼	2.13	2.66	3.19	3.72	4.25	5.31	6.38	7.44	51.00
1 5/16	2.23	2.79	3.35	3.90	4.46	5.58	6.69	7.81	53.55
1⅜	2.34	2.92	3.51	4.09	4.67	5.84	7.02	8.18	56.10
1 7/16	2.44	3.05	3.66	4.28	4.89	6.11	7.34	8.55	58.65
1½	2.55	3.19	3.83	4.46	5.10	6.38	7.65	8.93	61.20
1 9/16	2.66	3.32	3.98	4.65	5.32	6.64	7.97	9.30	63.75
1⅝	2.76	3.45	4.14	4.83	5.52	6.90	8.29	9.67	66.30
1 11/16	2.87	3.59	4.30	5.02	5.74	7.17	8.61	10.04	68.85
1¾	2.98	3.72	4.46	5.21	5.95	7.44	8.93	10.41	71.40
1 13/16	3.08	3.85	4.62	5.39	6.16	7.70	9.24	10.78	73.95
1⅞	3.19	3.98	4.78	5.58	6.38	7.97	9.57	11.16	76.50
1 15/16	3.29	4.12	4.94	5.76	6.59	8.24	9.88	11.53	79.05
2	3.40	4.25	5.10	5.95	6.80	8.50	10.20	11.90	81.60

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches								
	2	2¼	2½	2¾	3	3¼	3½	3¾	12
1/16	.425	.478	.531	.584	.637	.690	.743	.797	2.55
⅛	.849	.956	1.06	1.17	1.28	1.38	1.49	1.59	5.10
3/16	1.28	1.43	1.59	1.75	1.91	2.07	2.23	2.39	7.65
¼	1.70	1.91	2.13	2.34	2.55	2.76	2.98	3.19	10.20
5/16	2.13	2.39	2.66	2.92	3.19	3.45	3.72	3.99	12.75
⅜	2.55	2.87	3.19	3.51	3.83	4.15	4.47	4.78	15.30
7/16	2.98	3.35	3.72	4.09	4.46	4.83	5.20	5.58	17.85
½	3.40	3.83	4.25	4.68	5.10	5.53	5.95	6.38	20.40
9/16	3.83	4.30	4.78	5.26	5.74	6.22	6.70	7.17	22.95
⅝	4.25	4.78	5.31	5.84	6.38	6.91	7.44	7.97	25.50
11/16	4.68	5.26	5.84	6.43	7.02	7.60	8.18	8.76	28.05
¾	5.10	5.74	6.38	7.01	7.65	8.29	8.93	9.57	30.60
13/16	5.53	6.22	6.91	7.60	8.29	8.98	9.67	10.36	33.15
⅞	5.95	6.69	7.44	8.18	8.93	9.67	10.41	11.16	35.70
15/16	6.38	7.17	7.97	8.77	9.57	10.36	11.16	11.95	38.25
1	6.80	7.65	8.50	9.35	10.20	11.05	11.90	12.75	40.80
1 1/16	7.23	8.13	9.03	9.93	10.84	11.74	12.65	13.55	43.35
1⅛	7.65	8.61	9.56	10.52	11.48	12.43	13.39	14.34	45.90
1 3/16	8.08	9.08	10.09	11.10	12.12	13.12	14.13	15.14	48.45
1¼	8.50	9.56	10.63	11.69	12.75	13.81	14.87	15.94	51.00
1 5/16	8.93	10.04	11.16	12.27	13.39	14.50	15.62	16.74	53.55
1⅜	9.35	10.52	11.69	12.86	14.03	15.20	16.36	17.53	56.10
1 7/16	9.78	11.00	12.22	13.44	14.66	15.88	17.10	18.33	58.65
1½	10.20	11.48	12.75	14.03	15.30	16.58	17.85	19.13	61.20
1 9/16	10.63	11.95	13.28	14.61	15.94	17.27	18.60	19.92	63.75
1⅝	11.05	12.43	13.81	15.19	16.58	17.96	19.34	20.72	66.30
1 11/16	11.48	12.91	14.34	15.78	17.22	18.65	20.08	21.51	68.85
1¾	11.90	13.39	14.88	16.36	17.85	19.34	20.83	22.32	71.40
1 13/16	12.33	13.87	15.41	16.95	18.49	20.03	21.57	23.11	73.95
1⅞	12.75	14.34	15.94	17.53	19.13	20.72	22.31	23.91	76.50
1 15/16	13.18	14.82	16.47	18.12	19.77	21.41	23.06	24.70	79.05
2	13.60	15.30	17.00	18.70	20.40	22.10	23.80	25.50	81.60

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thick-ness Inches	Width, Inches								
	4	4¼	4½	4¾	5	5¼	5½	5¾	12
1/16	.849	.902	.956	1.01	1.06	1.11	1.17	1.22	2.55
⅛	1.70	1.81	1.92	2.02	2.12	2.23	2.34	2.45	5.10
3/16	2.55	2.71	2.87	3.03	3.19	3.35	3.51	3.67	7.65
¼	3.40	3.61	3.83	4.04	4.25	4.46	4.67	4.89	10.20
5/16	4.25	4.52	4.78	5.05	5.31	5.58	5.84	6.11	12.75
⅜	5.10	5.42	5.74	6.06	6.38	6.69	7.02	7.34	15.30
7/16	5.95	6.32	6.70	7.07	7.44	7.81	8.18	8.56	17.85
½	6.80	7.22	7.65	8.08	8.50	8.93	9.35	9.77	20.40
9/16	7.65	8.13	8.61	9.09	9.57	10.04	10.53	11.00	22.95
⅝	8.50	9.03	9.57	10.10	10.63	11.16	11.69	12.22	25.50
11/16	9.35	9.93	10.52	11.11	11.69	12.27	12.85	13.44	28.05
¾	10.20	10.84	11.48	12.12	12.75	13.39	14.03	14.67	30.60
13/16	11.05	11.74	12.43	13.12	13.81	14.50	15.19	15.88	33.15
⅞	11.90	12.65	13.39	14.13	14.87	15.62	16.36	17.10	35.70
15/16	12.75	13.55	14.34	15.14	15.94	16.74	17.53	18.33	38.25
1	13.60	14.45	15.30	16.15	17.00	17.85	18.70	19.55	40.80
1 1/16	14.45	15.35	16.26	17.16	18.06	18.96	19.87	20.77	43.35
1⅛	15.30	16.26	17.22	18.17	19.13	20.08	21.04	21.99	45.90
1 3/16	16.15	17.16	18.17	19.18	20.19	21.20	22.21	23.22	48.45
1¼	17.00	18.06	19.13	20.19	21.25	22.32	23.38	24.44	51.00
1 5/16	17.85	18.96	20.08	21.20	22.32	23.43	24.54	25.66	53.55
1⅜	18.70	19.87	21.04	22.21	23.38	24.54	25.71	26.88	56.10
1 7/16	19.55	20.77	21.99	23.22	24.44	25.66	26.88	28.10	58.65
1½	20.40	21.68	22.95	24.23	25.50	26.78	28.05	29.33	61.20
1 9/16	21.25	22.58	23.91	25.24	26.57	27.89	29.22	30.55	63.75
1⅝	22.10	23.48	24.87	26.25	27.63	29.01	30.39	31.77	66.30
1 11/16	22.95	24.38	25.82	27.26	28.69	30.12	31.55	32.99	68.85
1¾	23.80	25.29	26.78	28.27	29.75	31.24	32.73	34.22	71.40
1 13/16	24.65	26.19	27.73	29.27	30.81	32.35	33.89	35.43	73.95
1⅞	25.50	27.10	28.69	30.28	31.87	33.47	35.06	36.65	76.50
1 15/16	26.35	28.00	29.64	31.29	32.94	34.59	36.23	37.88	79.05
2	27.20	28.90	30.60	32.30	34.00	35.70	37.40	39.10	81.60

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches								
	6	6¼	6½	6¾	7	7¼	7½	7¾	12
3/16	3.83	3.99	4.14	4.30	4.46	4.62	4.78	4.94	7.65
¼	5.10	5.31	5.53	5.74	5.95	6.16	6.36	6.58	10.20
5/16	6.38	6.64	6.90	7.17	7.44	7.70	7.97	8.23	12.75
⅜	7.65	7.97	8.29	8.61	8.93	9.25	9.57	9.88	15.30
7/16	8.93	9.29	9.67	10.04	10.41	10.78	11.16	11.53	17.85
½	10.20	10.63	11.05	11.48	11.90	12.32	12.75	13.18	20.40
9/16	11.48	11.95	12.43	12.91	13.39	13.86	14.34	14.82	22.95
⅝	12.75	13.28	13.81	14.34	14.87	15.40	15.94	16.47	25.50
11/16	14.03	14.61	15.20	15.78	16.36	16.94	17.53	18.12	28.05
¾	15.30	15.94	16.58	17.22	17.85	18.49	19.13	19.77	30.60
13/16	16.58	17.27	17.95	18.65	19.34	20.03	20.72	21.41	33.15
⅞	17.85	18.60	19.34	20.08	20.83	21.57	22.32	23.05	35.70
15/16	19.13	19.92	20.72	21.51	22.32	23.11	23.91	24.70	38.25
1	20.40	21.25	22.10	22.95	23.80	24.65	25.50	26.35	40.80
1 1/16	21.68	22.58	23.48	24.39	25.29	26.19	27.10	28.00	43.35
1⅛	22.95	23.91	24.87	25.82	26.78	27.73	28.68	29.64	45.90
1 3/16	24.23	25.23	26.24	27.25	28.26	29.27	30.28	31.29	48.45
1¼	25.50	26.56	27.62	28.69	29.75	30.81	31.88	32.94	51.00
1 5/16	26.78	27.90	29.01	30.12	31.23	32.35	33.48	34.59	53.55
1⅜	28.05	29.22	30.39	31.56	32.72	33.89	35.06	36.23	56.10
1 7/16	29.33	30.55	31.77	32.99	34.21	35.44	36.66	37.88	58.65
1½	30.60	31.88	33.15	34.43	35.70	36.98	38.26	39.53	61.20
1 9/16	31.88	33.20	34.53	35.86	37.19	38.51	39.84	41.17	63.75
1⅝	33.15	34.53	35.91	37.29	38.67	40.05	41.44	42.82	66.30
1 11/16	34.43	35.86	37.30	38.73	40.16	41.59	43.03	44.47	68.85
1¾	35.70	37.19	38.68	40.17	41.65	43.14	44.63	46.12	71.40
1 13/16	36.98	38.52	40.05	41.60	43.14	44.68	46.22	47.76	73.95
1⅞	38.25	39.85	41.44	43.03	44.63	46.22	47.82	49.40	76.50
1 15/16	39.53	41.17	42.82	44.46	46.12	47.76	49.41	51.05	79.05
2	40.80	42.50	44.20	45.90	47.60	49.30	51.00	52.70	81.60

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches								
	8	8¼	8½	8¾	9	9¼	9½	9¾	12
3/16	5.10	5.26	5.42	5.58	5.74	5.90	6.06	6.22	7.65
¼	6.80	7.01	7.22	7.43	7.65	7.86	8.08	8.29	10.20
5/16	8.50	8.76	9.03	9.29	9.56	9.83	10.10	10.36	12.75
⅜	10.20	10.52	10.84	11.16	11.48	11.80	12.12	12.44	15.30
7/16	11.90	12.27	12.64	13.02	13.40	13.76	14.14	14.51	17.85
½	13.60	14.03	14.44	14.87	15.30	15.73	16.16	16.58	20.40
9/16	15.30	15.78	16.26	16.74	17.22	17.69	18.18	18.65	22.95
⅝	17.00	17.53	18.06	18.59	19.13	19.65	20.19	20.72	25.50
11/16	18.70	19.28	19.86	20.45	21.04	21.62	22.21	22.79	28.05
¾	20.40	21.04	21.68	22.32	22.96	23.59	24.23	24.86	30.60
13/16	22.10	22.79	23.48	24.17	24.86	25.55	26.24	26.94	33.15
⅞	23.80	24.55	25.30	26.04	26.78	27.52	28.26	29.01	35.70
15/16	25.50	26.30	27.10	27.89	28.69	29.49	30.28	31.08	38.25
1	27.20	28.05	28.90	29.75	30.60	31.45	32.30	33.15	40.80
1 1/16	28.90	29.80	30.70	31.61	32.52	33.41	34.32	35.22	43.35
1⅛	30.60	31.56	32.52	33.47	34.43	35.38	36.34	37.29	45.90
1 3/16	32.30	33.31	34.32	35.33	36.34	37.35	38.36	39.37	48.45
1¼	34.00	35.06	36.12	37.20	38.26	39.31	40.37	41.44	51.00
1 5/16	35.70	36.81	37.93	39.05	40.16	41.28	42.40	43.52	53.55
1⅜	37.40	38.57	39.74	40.91	42.08	43.25	44.41	45.58	56.10
1 7/16	39.10	40.32	41.54	42.77	44.00	45.22	46.44	47.66	58.65
1½	40.80	42.08	43.35	44.63	45.90	47.18	48.45	49.73	61.20
1 9/16	42.50	43.83	45.16	46.49	47.82	49.14	50.48	51.80	63.75
1⅝	44.20	45.58	46.96	48.34	49.73	51.10	52.49	53.87	66.30
1 11/16	45.90	47.33	48.76	50.20	51.64	53.07	54.51	55.94	68.85
1¾	47.60	49.09	50.58	52.07	53.56	55.04	56.53	58.01	71.40
1 13/16	49.30	50.84	52.38	53.92	55.46	57.00	58.54	60.09	73.95
1⅞	51.00	52.60	54.20	55.79	57.38	58.97	60.56	62.16	76.50
1 15/16	52.70	54.35	56.00	57.64	59.29	60.94	62.58	64.23	79.05
2	54.40	56.10	57.80	59.50	61.20	62.90	64.60	66.30	81.60

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches								
	10	10¼	10½	10¾	11	11¼	11½	11¾	12
3/16	6.38	6.54	6.70	6.86	7.02	7.17	7.32	7.49	7.65
¼	8.50	8.71	8.92	9.14	9.34	9.57	9.78	10.00	10.20
5/16	10.62	10.89	11.16	11.42	11.68	11.95	12.22	12.49	12.75
⅜	12.75	13.07	13.39	13.71	14.03	14.35	14.68	14.99	15.30
7/16	14.88	15.25	15.62	15.99	16.36	16.74	17.12	17.49	17.85
½	17.00	17.42	17.85	18.28	18.70	19.13	19.55	19.97	20.40
9/16	19.14	19.61	20.08	20.56	21.02	21.51	22.00	22.48	22.95
⅝	21.25	21.78	22.32	22.85	23.38	23.91	24.44	24.97	25.50
11/16	23.38	23.96	24.54	25.13	25.70	26.30	26.88	27.47	28.05
¾	25.50	26.14	26.78	27.42	28.05	28.68	29.33	29.97	30.60
13/16	27.62	28.32	29.00	29.69	30.40	31.08	31.76	32.46	33.15
⅞	29.75	30.50	31.24	31.98	32.72	33.47	34.21	34.95	35.70
15/16	31.88	32.67	33.48	34.28	35.06	35.86	36.66	37.46	38.25
1	34.00	34.85	35.70	36.55	37.40	38.25	39.10	39.95	40.80
1 1/16	36.12	37.03	37.92	38.83	39.74	40.64	41.54	42.45	43.35
1⅛	38.25	39.21	40.17	41.12	42.08	43.04	44.00	44.94	45.90
1 3/16	40.38	41.39	42.40	43.40	44.42	45.42	46.44	47.45	48.45
1¼	42.50	43.56	44.63	45.69	46.76	47.82	48.88	49.94	51.00
1 5/16	44.64	45.75	46.86	47.97	49.08	50.20	51.32	52.44	53.55
1⅜	46.75	47.92	49.08	50.25	51.42	52.59	53.76	54.93	56.10
1 7/16	48.88	50.10	51.32	52.54	53.76	54.99	56.21	57.43	58.65
1½	51.00	52.28	53.55	54.83	56.10	57.37	58.65	59.93	61.20
1 9/16	53.14	54.46	55.78	57.11	58.42	59.76	61.10	62.43	63.75
1⅝	55.25	56.63	58.02	59.40	60.78	62.16	63.54	64.92	66.30
1 11/16	57.38	58.81	60.24	61.68	63.10	64.55	65.98	67.42	68.85
1¾	59.50	60.99	62.48	63.97	65.45	66.93	68.43	69.92	71.40
1 13/16	61.62	63.17	64.70	66.24	67.80	69.33	70.86	72.41	73.95
1⅞	63.75	65.35	66.94	68.53	70.12	71.72	73.31	74.90	76.50
1 15/16	65.88	67.52	69.18	70.83	72.46	74.11	75.76	77.41	79.05
2	68.00	69.70	71.40	73.10	74.80	76.50	78.20	79.90	81.60

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches								
	13	14	15	16	17	18	19	20	21
3/16	8.28	8.92	9.56	10.20	10.84	11.48	12.10	12.76	13.40
1/4	11.06	11.90	12.75	13.60	14.44	15.30	16.16	17.00	17.84
5/16	13.81	14.88	15.94	17.00	18.06	19.12	20.20	21.24	22.32
3/8	16.58	17.86	19.14	20.40	21.68	22.96	24.24	25.50	26.78
7/16	19.34	20.82	22.32	23.80	25.28	26.79	28.28	29.75	31.24
1/2	22.10	23.80	25.50	27.20	28.89	30.60	32.31	34.00	35.70
9/16	24.86	26.78	28.70	30.60	32.52	34.44	36.34	38.27	40.16
5/8	27.62	29.74	31.88	34.00	36.12	38.25	40.37	42.50	44.64
11/16	30.39	32.72	35.06	37.40	39.72	42.08	44.42	46.74	49.08
3/4	33.16	35.71	38.26	40.80	43.36	45.92	48.46	51.00	53.56
13/16	35.91	38.67	41.43	44.20	46.96	49.72	52.48	55.25	58.01
7/8	38.68	41.65	44.62	47.60	50.60	53.56	56.52	59.50	62.49
15/16	41.44	44.63	47.82	51.00	54.20	57.38	60.57	63.76	66.96
1	44.20	47.60	51.00	54.40	57.80	61.20	64.60	68.00	71.40
1 1/16	46.96	50.57	54.20	57.80	61.40	65.02	68.64	72.25	75.85
1 1/8	49.72	53.55	57.37	61.20	65.04	68.85	72.68	76.50	80.33
1 3/16	52.48	56.52	60.56	64.60	68.64	72.68	76.72	80.75	84.79
1 1/4	55.25	59.50	63.76	68.00	72.26	76.50	80.74	85.00	89.26
1 5/16	58.02	62.47	66.95	71.40	75.86	80.33	84.80	89.28	93.72
1 3/8	60.77	65.45	70.12	74.80	79.48	84.15	88.83	93.50	98.17
1 7/16	63.54	68.42	73.32	78.20	83.08	88.00	92.88	97.75	102.65
1 1/2	66.30	71.40	76.51	81.60	86.70	91.80	96.90	102.00	107.10
1 9/16	69.06	74.38	79.69	85.00	90.31	95.63	100.94	106.25	111.56
1 5/8	71.83	77.35	82.88	88.40	93.93	99.45	104.98	110.50	116.03
1 11/16	74.59	80.33	86.06	91.80	97.54	103.28	109.01	114.75	120.49
1 3/4	77.35	83.30	89.25	95.20	101.15	107.10	113.05	119.00	124.95
1 13/16	80.11	86.28	92.44	98.60	104.76	110.93	117.09	123.25	129.41
1 7/8	82.88	89.25	95.63	102.00	108.38	114.75	121.13	127.50	133.88
1 15/16	85.64	92.23	98.81	105.40	111.99	118.58	125.16	131.75	138.34
2	88.40	95.20	102.00	108.80	115.60	122.40	129.20	136.00	142.80

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches								
	22	23	24	25	26	27	28	29	30
3/16	14.04	14.64	15.32	15.96	16.56	17.20	17.84	18.48	19.12
1/4	18.69	19.56	20.40	21.26	22.12	22.96	23.80	24.64	25.50
5/16	23.36	24.44	25.52	26.56	27.62	28.68	29.76	30.80	31.88
3/8	28.06	29.33	30.60	31.88	33.16	34.44	35.72	37.00	38.28
7/16	32.72	34.24	35.72	37.20	38.68	40.17	41.65	43.14	44.64
1/2	37.40	39.10	40.80	42.50	44.20	45.92	47.60	49.28	51.00
9/16	42.04	44.00	45.92	47.80	49.73	51.64	53.56	55.48	57.40
5/8	46.76	48.88	51.00	53.12	55.24	57.37	59.49	61.60	63.76
11/16	51.40	53.76	56.12	58.44	60.78	63.11	65.44	67.77	70.13
3/4	56.10	58.66	61.20	63.76	66.32	68.88	71.42	73.97	76.53
13/16	60.79	63.53	66.29	69.06	71.82	74.58	77.34	80.10	82.86
7/8	65.44	68.43	71.40	74.38	77.36	80.33	83.30	86.29	89.24
15/16	70.13	73.32	76.50	79.68	82.88	86.07	89.26	92.44	95.64
1	74.80	78.20	81.60	85.00	88.40	91.80	95.20	98.60	102.00
1 1/16	79.48	83.08	86.70	90.32	93.92	97.54	101.14	104.75	108.38
1 1/8	84.16	88.00	91.80	95.64	99.44	103.26	107.10	110.92	114.74
1 3/16	88.83	92.88	96.92	100.92	104.96	109.01	113.05	117.09	121.13
1 1/4	93.52	97.76	102.00	106.24	110.50	114.76	119.00	123.24	127.51
1 5/16	98.16	102.64	107.12	111.56	116.04	120.50	124.94	129.40	133.89
1 3/8	102.84	107.52	112.20	116.88	121.54	126.22	130.90	135.58	140.24
1 7/16	107.52	112.42	117.30	122.20	127.08	131.96	136.84	141.76	146.64
1 1/2	112.20	117.30	122.40	127.50	132.60	137.72	142.80	147.92	153.02
1 9/16	116.88	122.19	127.50	132.81	138.13	143.44	148.75	154.06	159.38
1 5/8	121.55	127.08	132.60	138.13	143.65	149.18	154.70	160.23	165.75
1 11/16	126.23	131.96	137.70	143.44	149.18	154.91	160.65	166.39	172.13
1 3/4	130.90	136.85	142.80	148.75	154.70	160.65	166.60	172.55	187.50
1 13/16	135.58	141.74	147.90	154.06	160.23	166.39	172.55	178.71	184.88
1 7/8	140.25	146.63	153.00	159.38	165.75	172.13	178.50	184.88	191.25
1 15/16	144.93	151.51	158.10	164.69	171.28	177.86	184.45	191.04	197.63
2	149.60	156.40	163.20	170.00	176.80	183.60	190.40	197.20	204.00

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches								
	31	32	33	34	35	36	38	40	42
3/16	19.75	20.40	21.04	21.68	22.32	22.96	24.20	25.52	26.80
1/4	26.36	27.20	28.04	28.88	29.72	30.59	32.32	34.00	35.68
5/16	32.94	34.00	35.04	36.12	37.16	38.24	40.39	42.48	44.64
3/8	39.54	40.80	42.08	43.36	44.64	45.92	48.48	51.00	53.56
7/16	46.12	47.60	49.08	50.57	52.07	53.58	56.56	59.50	62.48
1/2	52.70	54.40	56.10	57.78	59.50	61.20	64.62	68.00	71.40
9/16	59.32	61.22	63.12	65.04	66.96	68.88	72.68	76.54	80.32
5/8	65.88	68.00	70.13	72.24	74.36	76.50	80.74	85.00	89.28
11/16	72.48	74.80	77.12	79.44	81.79	84.15	88.84	93.48	98.16
3/4	79.08	81.61	84.16	86.72	89.28	91.84	96.92	102.00	107.12
13/16	85.62	88.39	91.15	93.91	96.68	99.44	104.96	110.50	116.02
7/8	92.20	95.20	98.20	101.20	104.16	107.12	113.04	119.00	124.98
15/16	98.82	102.00	105.20	108.40	111.59	114.76	121.14	127.52	133.92
1	105.40	108.80	112.20	115.60	119.00	122.40	129.20	136.00	142.80
1 1/16	112.00	115.59	119.20	122.80	126.42	130.04	137.28	144.50	151.70
1 1/8	118.56	122.40	126.24	130.08	133.90	137.70	145.36	153.00	160.66
1 3/16	125.16	129.21	133.24	137.28	141.32	145.36	153.44	161.50	169.58
1 1/4	131.76	136.00	140.28	144.52	148.76	153.00	161.48	170.00	178.52
1 5/16	138.36	142.81	147.24	151.72	156.20	160.66	169.60	178.56	187.44
1 3/8	144.92	149.60	154.28	158.96	163.62	168.30	177.66	187.00	196.34
1 7/16	151.52	156.40	161.28	166.16	171.08	176.00	185.75	195.50	205.29
1 1/2	158.11	163.20	168.32	173.40	178.51	183.60	193.80	204.00	214.20
1 9/16	164.69	170.00	175.31	180.63	185.94	191.25	201.88	212.50	223.13
1 5/8	171.28	176.80	182.33	187.85	193.38	198.90	209.95	221.00	232.05
1 11/16	177.86	183.60	189.34	195.08	200.81	206.55	218.03	229.50	240.98
1 3/4	184.45	190.40	196.35	202.30	208.25	214.20	226.10	238.00	249.90
1 13/16	191.04	197.20	203.36	209.53	215.69	221.85	234.18	246.50	258.83
1 7/8	197.63	204.00	210.38	216.75	223.13	229.50	242.25	255.00	267.75
1 15/16	204.21	210.80	217.39	223.98	230.56	237.15	250.33	263.50	276.68
2	210.80	217.60	224.40	231.20	238.00	244.80	258.40	272.00	285.60

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches								
	44	46	48	50	52	54	56	58	60
3/16	28.08	29.29	30.64	31.92	33.12	34.40	35.68	36.96	38.24
1/4	37.38	39.11	40.80	42.52	44.24	45.92	47.60	49.28	51.00
5/16	46.72	48.88	51.04	53.12	55.24	57.36	59.51	61.60	63.76
3/8	56.12	58.65	61.20	63.76	66.32	68.88	71.44	74.00	76.56
7/16	65.44	68.47	71.44	74.40	77.37	80.34	83.30	86.28	89.28
1/2	74.80	78.20	81.60	85.00	88.40	91.84	95.20	98.56	102.00
9/16	84.09	88.00	91.84	95.60	99.46	103.28	107.12	110.96	114.80
5/8	93.52	97.76	102.00	106.24	110.48	114.74	118.98	123.20	127.52
11/16	102.81	107.53	112.24	116.88	121.56	126.22	130.88	135.54	140.26
3/4	112.20	117.31	122.40	127.52	132.64	137.76	142.85	147.94	153.06
13/16	121.56	127.06	132.58	138.12	143.64	149.16	154.68	160.20	165.72
7/8	130.89	136.86	142.80	148.76	154.72	160.66	166.60	172.58	178.48
15/16	140.27	146.64	153.00	159.36	165.76	172.15	178.52	184.88	191.28
1	149.60	156.40	163.20	170.00	176.80	183.60	190.40	197.20	204.00
1 1/16	158.96	166.16	173.40	180.64	187.84	195.08	202.28	209.50	216.76
1 1/8	168.32	175.99	183.60	191.28	198.88	206.52	214.20	221.84	229.48
1 3/16	177.66	185.76	193.84	201.84	209.92	218.02	226.10	234.18	242.26
1 1/4	187.04	195.52	204.00	212.48	221.00	229.52	238.00	246.48	255.02
1 5/16	196.32	205.28	214.24	223.12	232.08	241.00	249.88	258.80	267.78
1 3/8	205.68	215.04	224.40	233.76	243.08	252.44	261.80	271.16	280.48
1 7/16	215.04	224.84	234.60	244.40	254.16	263.92	273.68	283.52	293.28
1 1/2	224.40	234.60	244.80	255.00	265.20	275.44	285.60	295.84	306.04
1 9/16	233.75	244.38	255.00	265.63	276.25	286.88	297.50	308.13	318.75
1 5/8	243.10	254.15	265.20	276.25	287.30	298.35	309.40	320.45	331.50
1 11/16	252.45	263.93	275.40	286.88	298.35	309.83	321.30	332.78	344.25
1 3/4	261.80	273.70	285.60	297.50	309.40	321.30	333.20	345.10	357.00
1 13/16	271.15	283.48	295.80	308.13	320.45	332.78	345.10	357.43	369.75
1 7/8	280.50	293.25	306.00	318.75	331.50	344.25	357.00	369.75	382.50
1 15/16	289.85	303.03	316.20	329.38	342.55	355.73	368.90	382.08	395.25
2	299.20	312.80	326.40	340.00	353.60	367.20	380.80	394.40	408.00

WEIGHTS OF FLAT ROLLED STEEL.

PER LINEAL FOOT.

(One cubic foot of steel weighs 489.6 lbs.)

Thickness Inches	Width, Inches								
	62	64	66	68	70	72	74	76	78
3/16	39.53	40.80	42.08	43.35	44.63	45.90	47.18	48.45	49.73
1/4	52.70	54.40	56.10	57.80	59.50	61.20	62.90	64.60	66.30
5/16	65.88	68.00	70.13	72.25	74.38	76.50	78.63	80.75	82.88
3/8	79.05	81.60	84.15	86.70	89.25	91.80	94.35	96.90	99.45
7/16	92.23	95.20	98.18	101.16	104.12	107.11	110.08	113.05	116.03
1/2	105.40	108.80	112.20	115.60	119.00	122.40	125.80	129.21	132.61
9/16	118.58	122.40	126.23	130.05	133.88	137.70	141.53	145.36	149.18
5/8	131.75	136.00	140.25	144.50	148.75	153.01	157.26	161.51	165.76
11/16	144.93	149.60	154.28	158.95	163.63	168.31	172.98	177.66	182.33
3/4	158.10	163.20	168.30	173.40	178.51	183.61	188.71	193.81	198.91
13/16	171.28	176.80	182.33	187.85	193.38	198.91	204.43	209.96	215.48
7/8	184.45	190.40	196.35	202.30	208.26	214.21	220.16	226.11	232.06
15/16	197.63	204.00	210.38	216.76	223.13	229.51	235.88	242.26	248.64
1	210.80	217.60	224.40	231.21	238.01	244.81	251.61	258.41	265.21
1 1/16	223.98	231.20	238.43	245.66	252.88	260.11	267.34	274.56	281.79
1 1/8	237.15	244.80	252.45	260.11	267.76	275.41	283.06	290.71	298.36
1 3/16	250.33	258.40	266.48	274.56	282.64	290.71	298.79	306.86	314.94
1 1/4	263.50	272.00	280.50	289.01	297.51	306.01	314.51	323.01	331.51
1 5/16	276.68	285.60	294.53	303.46	312.39	321.31	330.24	339.16	348.09
1 3/8	289.85	299.20	308.55	317.91	327.26	336.61	345.96	355.31	364.66
1 7/16	303.05	312.80	322.58	332.36	342.14	351.91	361.69	371.46	381.24
1 1/2	316.20	326.40	336.60	346.81	357.01	367.21	377.41	387.62	397.82
1 9/16	329.38	340.00	350.63	361.26	371.89	382.51	393.14	403.77	414.39
1 5/8	342.55	353.60	364.65	375.71	386.76	397.82	408.87	419.92	430.97
1 11/16	355.73	367.20	378.68	390.16	401.64	413.12	424.59	436.07	447.54
1 3/4	368.90	380.80	392.70	404.61	416.52	428.42	440.32	452.22	464.12
1 13/16	382.08	394.40	406.73	419.06	431.39	443.72	456.04	468.37	480.69
1 7/8	395.25	408.00	420.75	433.51	446.27	459.02	471.77	484.52	497.27
1 15/16	408.43	421.60	434.78	447.97	461.14	474.32	487.49	500.67	513.85
2	421.60	435.20	448.80	462.42	476.02	489.62	503.22	516.82	530.42

WEIGHTS OF CIRCULAR STEEL PLATES.

Thickness in inches	Diameter, inches.												
	20	20½	21	21½	22	22½	23	23½	24	24½	25	25½	26
3/16	16.7	17.5	18.4	19.3	20.2	21.1	22.1	23.1	24.0	25.1	26.1	27.1	28.2
1/4	22.3	23.4	24.5	25.7	26.9	28.2	29.4	30.7	32.0	33.4	34.8	36.2	37.6
5/16	27.8	29.2	30.7	32.2	33.7	35.2	36.8	38.4	40.1	41.8	43.5	45.2	47.0
3/8	33.4	35.1	36.8	38.6	40.4	42.3	44.1	46.1	48.1	50.1	52.2	54.3	56.4
7/16	38.9	40.9	42.9	45.0	47.1	49.3	51.5	53.8	56.1	58.5	60.8	63.3	65.8
1/2	44.5	46.8	49.1	51.4	53.9	56.3	58.9	61.5	64.1	66.8	69.5	72.4	75.2
9/16	50.1	52.6	55.2	57.9	60.6	63.4	66.2	69.1	72.1	75.1	78.2	81.4	84.6
5/8	55.6	58.5	61.3	64.3	67.3	70.4	73.6	76.8	80.1	83.5	86.9	90.4	94.0
11/16	61.2	64.3	67.5	70.7	74.0	77.5	80.9	84.5	88.1	91.8	95.6	99.5	103.4
3/4	66.8	70.2	73.6	77.2	80.8	84.5	88.3	92.2	96.1	100.2	104.3	108.5	112.8
Thickness	26½	27	27½	28	28½	29	29½	30	30½	31	31½	32	32½
3/16	29.3	30.4	31.6	32.7	33.9	35.1	36.3	37.6	38.8	40.1	41.4	42.7	44.1
1/4	39.1	40.6	42.1	43.6	45.2	46.8	48.4	50.1	51.8	53.5	55.2	57.0	58.8
5/16	48.8	50.7	52.6	54.5	56.5	58.5	60.5	62.6	64.7	66.8	69.0	71.2	73.5
3/8	58.6	60.8	63.1	65.4	67.8	70.2	72.6	75.1	77.6	80.2	82.8	85.5	88.2
7/16	68.4	71.0	73.6	76.3	79.1	81.9	84.7	87.6	90.6	93.6	96.6	99.7	102.8
1/2	78.1	81.1	84.2	87.2	90.4	93.6	96.8	100.1	103.5	106.9	110.4	113.9	117.5
9/16	87.9	91.3	94.7	98.1	101.7	105.3	108.9	112.7	116.5	120.3	124.4	128.2	132.2
5/8	97.7	101.4	105.2	109.0	113.0	117.0	121.0	125.2	129.4	133.7	138.0	142.4	146.9
11/16	107.4	111.5	115.7	119.9	124.3	128.7	133.2	137.7	142.3	147.0	151.8	156.7	161.6
3/4	117.2	121.7	126.2	130.8	135.6	140.4	145.3	150.2	155.3	160.4	165.6	170.9	176.3

Note—Circles from 20″ to 80″ inclusive—Cut on rotary shears.

WEIGHTS OF CIRCULAR STEEL PLATES.

(CONTINUED)

Thickness in inches	Diameter, inches. 33	33½	34	34½	35	36	37	38	39	40	41	42	43
3/16	45.4	46.8	48.2	49.7	51.1	54.1	57.1	60.2	63.5	66.8	70.1	73.6	77.1
1/4	60.6	62.4	64.3	66.2	68.1	72.1	76.2	80.3	84.6	89.0	93.5	98.1	102.9
5/16	75.7	78.1	80.4	82.8	85.2	90.1	95.2	100.4	105.8	111.3	116.9	122.7	128.6
3/8	90.9	93.7	96.5	99.3	102.2	108.1	114.2	120.5	126.9	133.5	140.3	147.2	154.3
7/16	106.0	109.3	112.5	115.9	119.3	126.2	133.3	140.6	148.1	155.8	163.7	171.7	180.0
1/2	121.2	124.9	128.6	132.4	136.3	144.2	152.3	160.7	169.2	178.0	187.0	196.3	205.7
9/16	136.3	140.5	144.7	149.0	153.3	162.2	171.4	180.7	190.4	200.3	210.4	220.8	231.4
5/8	151.5	156.1	160.8	165.6	170.4	180.2	190.4	200.8	211.5	222.5	233.8	245.3	257.2
11/16	166.6	171.7	176.9	182.1	187.4	198.3	209.4	220.9	232.7	244.8	257.2	269.9	282.9
3/4	181.8	187.3	192.9	198.7	204.4	216.3	228.5	241.0	253.9	267.0	280.6	294.4	308.6

Thickness	44	45	46	47	48	49	50	51	52	53	54	55	56
3/16	80.8	84.5	88.3	92.2	96.1	100.2	104.3	108.5	112.8	117.2	121.7	126.2	130.8
1/4	107.7	112.7	117.7	122.9	128.2	133.6	139.1	144.7	150.4	156.3	162.2	168.3	174.5
5/16	134.6	140.8	147.1	153.6	160.2	167.0	173.9	180.9	188.0	195.3	202.8	210.4	218.1
3/8	161.6	169.0	176.6	184.3	192.3	200.4	208.6	217.0	225.6	234.4	243.3	252.4	261.7
7/16	183.5	197.1	206.0	215.1	224.3	233.8	243.3	253.2	263.3	273.5	283.9	294.5	305.3
1/2	215.4	225.3	235.4	245.8	256.4	267.1	278.2	289.4	300.9	312.5	324.4	336.6	348.9
9/16	242.3	253.5	264.9	276.5	288.4	300.5	312.9	325.6	338.5	351.6	365.0	378.6	392.5
5/8	269.3	281.6	294.3	307.2	320.4	333.9	347.7	361.7	376.1	390.7	405.6	420.7	436.2
11/16	296.2	309.8	323.7	338.0	352.5	367.3	382.5	397.9	413.7	429.7	446.1	462.8	479.8
3/4	323.1	338.0	353.2	368.7	384.5	400.7	417.2	434.1	451.3	468.8	486.7	504.9	523.4

Note—Circles from 20″ to 80″ inclusive—Cut on rotary shears.

WEIGHTS OF CIRCULAR STEEL PLATES.

(CONTINUED)

Thickness in inches	Diameter, inches.											
	57	58	59	60	61	62	63	64	65	66	67	68
3/16	135.6	140.4	145.2	150.2	155.3	160.4	165.6	170.9	176.3	181.8	187.3	192.9
1/4	180.7	187.1	193.7	200.3	207.0	213.9	220.8	227.9	235.0	242.3	249.7	257.2
5/16	225.9	233.9	242.1	250.3	258.8	267.3	276.0	284.8	293.8	302.9	312.2	321.6
3/8	271.1	280.7	290.5	300.4	310.5	320.8	331.2	341.8	352.6	363.5	374.6	385.9
7/16	316.3	327.5	338.9	350.5	362.3	374.2	386.4	398.8	411.3	424.1	437.0	450.2
1/2	361.5	374.3	387.3	400.6	414.0	427.7	441.6	455.7	470.1	484.7	499.5	514.5
9/16	406.7	421.1	435.7	450.6	465.8	481.2	496.8	512.7	528.9	545.3	561.9	578.8
5/8	451.9	467.9	484.1	500.7	517.5	534.6	552.0	569.7	587.6	605.8	624.3	643.1
11/16	497.1	514.7	532.6	550.8	569.3	588.1	607.2	626.6	646.4	666.4	686.8	707.4
3/4	542.2	561.4	581.0	600.8	621.0	641.6	662.4	683.6	705.1	727.0	749.2	771.7
Thickness	69	70	71	72	73	74	75	76	77	78	79	80
3/16	198.6	204.4	210.3	216.3	222.3	228.5	234.7	241.0	247.4	253.9	260.4	267.0
1/4	264.9	272.6	280.4	288.4	296.5	304.6	312.9	321.3	329.8	338.5	347.2	356.0
5/16	331.1	340.7	350.6	360.5	370.6	380.8	391.2	401.7	412.3	423.1	434.0	445.1
3/8	397.3	408.9	420.7	432.6	444.7	457.0	469.4	482.0	494.8	507.7	520.8	534.1
7/16	463.5	477.0	490.8	504.7	518.8	533.1	547.6	562.3	577.2	592.3	607.6	623.1
1/2	529.7	545.2	560.9	576.8	592.9	609.3	625.9	642.7	659.7	676.9	694.4	712.1
9/16	595.9	613.3	631.0	648.9	667.0	685.4	704.1	723.0	742.1	761.6	781.2	801.1
5/8	662.2	681.5	701.1	721.0	741.2	761.6	782.3	803.3	824.6	846.2	868.0	890.1
11/16	728.4	749.6	771.2	793.1	815.3	837.8	860.6	883.7	907.1	930.8	954.8	979.1
3/4	794.6	817.8	841.3	865.2	889.4	913.9	938.8	964.0	989.5	1015.4	1041.6	1068.1

Note—Circles from 20″ to 80″ inclusive—Cut on rotary shears.

WEIGHTS OF ROUND BARS.

in pounds per lineal foot.

Size inches	Pounds per foot	Size inches	Pounds per foot	Size inches	Pounds per foot	Size inches	Pounds per foot
1/8	.0417	1 1/32	2.8399	2 25/32	20.656	5 9/16	82.62
9/64	.0528	1 1/16	3.0146	2 13/16	21.123	5 5/8	84.49
5/32	.0652	1 3/32	3.1945	2 27/32	21.595	5 11/16	86.38
11/64	.0789	1 1/8	3.3797	2 7/8	22.072	5 3/4	88.29
3/16	.0939	1 5/32	3.5700	2 29/32	22.555	5 13/16	90.22
13/64	.1102	1 3/16	3.7656	2 15/16	23.042	5 7/8	92.17
7/32	.1278	1 7/32	3.9664	2 31/32	23.535	5 15/16	94.14
15/64	.1467	1 1/4	4.1724	3	24.033	6	96.13
1/4	.1669	1 9/32	4.3836	3 1/32	24.547	6 1/16	98.15
17/64	.1884	1 5/16	4.6001	3 1/16	25.045	6 1/8	100.18
9/32	.2112	1 11/32	4.8218	3 3/32	25.559	6 3/16	102.24
19/64	.2354	1 3/8	5.0486	3 1/8	26.078	6 1/4	104.31
5/16	.2608	1 13/32	5.2807	3 5/32	26.602	6 5/16	106.41
21/64	.2875	1 7/16	5.5180	3 3/16	27.131	6 3/8	108.53
11/32	.3155	1 15/32	5.7606	3 7/32	27.666	6 7/16	110.66
23/64	.3449	1 1/2	6.0083	3 1/4	28.206	6 1/2	112.82
3/8	.3755	1 17/32	6.2613	3 9/32	28.751	6 9/16	115.00
25/64	.4075	1 9/16	6.5194	3 5/16	29.301	6 5/8	117.20
13/32	.4407	1 19/32	6.7828	3 11/32	29.856	6 11/16	119.43
27/64	.4753	1 5/8	7.0514	3 3/8	30.417	6 3/4	121.67
7/16	.5111	1 21/32	7.3252	3 13/32	30.983	6 13/16	123.93
29/64	.5483	1 11/16	7.6043	3 7/16	31.554	6 7/8	126.22
15/32	.5867	1 23/32	7.8885	3 15/32	32.130	6 15/16	128.52
31/64	.6265	1 3/4	8.1780	3 1/2	32.712	7	130.85
1/2	.6676	1 25/32	8.4727	3 9/16	33.891	7 1/16	133.19
33/64	.7100	1 13/16	8.7725	3 5/8	35.090	7 1/8	135.56
17/32	.7536	1 27/32	9.0777	3 11/16	36.311	7 3/16	137.95
35/64	.7986	1 7/8	9.3880	3 3/4	37.552	7 1/4	140.36
9/16	.8449	1 29/32	9.7035	3 13/16	38.814	7 5/16	142.79
37/64	.8925	1 15/16	10.0243	3 7/8	40.097	7 3/8	145.24
19/32	.9414	1 31/32	10.3503	3 15/16	41.401	7 7/16	147.71
39/64	.9916	2	10.6814	4	42.726	7 1/2	150.21
5/8	1.0431	2 1/32	11.0178	4 1/16	44.071	7 9/16	152.72
41/64	1.0959	2 1/16	11.3595	4 1/8	45.438	7 5/8	155.26
21/32	1.1500	2 3/32	11.7063	4 3/16	46.825	7 11/16	157.81
43/64	1.2054	2 1/8	12.0583	4 1/4	48.233	7 3/4	160.39
11/16	1.2622	2 5/32	12.4156	4 5/16	49.662	7 13/16	162.99
45/64	1.3202	2 3/16	12.7781	4 3/8	51.112	7 7/8	165.60
23/32	1.3795	2 7/32	13.1458	4 7/16	52.583	7 15/16	168.24
47/64	1.4401	2 1/4	13.5187	4 1/2	54.075	8	170.90
3/4	1.5021	2 9/32	13.8968	4 9/16	55.587	8 1/16	173.58
49/64	1.5653	2 5/16	14.2802	4 5/8	57.121	8 1/8	176.29
25/32	1.6299	2 11/32	14.6687	4 11/16	58.675	8 3/16	179.01
51/64	1.6957	2 3/8	15.0625	4 3/4	60.250	8 1/4	181.75
13/16	1.7629	2 13/32	15.4615	4 13/16	61.846	8 5/16	184.52
53/64	1.8313	2 7/16	15.8657	4 7/8	63.473	8 3/8	187.30
27/32	1.9011	2 15/32	16.2751	4 15/16	65.100	8 7/16	190.11
55/64	1.9721	2 1/2	16.6898	5	66.759	8 1/2	192.93
7/8	2.0445	2 17/32	17.1096	5 1/16	68.438	8 9/16	195.78
57/64	2.1182	2 9/16	17.5347	5 1/8	70.139	8 5/8	198.65
29/32	2.1931	2 19/32	17.9650	5 3/16	71.860	8 11/16	201.54
59/64	2.2694	2 5/8	18.4004	5 1/4	73.602	8 3/4	204.45
15/16	2.3470	2 21/32	18.8412	5 5/16	75.365	8 13/16	207.38
61/64	2.4259	2 11/16	19.2871	5 3/8	77.148	8 7/8	210.33
31/32	2.5061	2 23/32	19.7382	5 7/16	78.953	8 15/16	213.31
63/64	2.5876	2 3/4	20.1946	5 1/2	80.778	9	216.30
1	2.6704						

WEIGHTS OF SQUARE BARS.

in pounds per lineal foot.

Size inches	Pounds per foot	Size inches	Pounds per foot	Size inches	Pounds per foot	Size inches	Pounds per foot
1/8	.0531	1 1/32	3.616	2 25/32	26.300	5 9/16	105.20
9/64	.0672	1 1/16	3.838	2 13/16	26.895	5 5/8	107.58
5/32	.0830	1 3/32	4.067	2 27/32	27.496	5 11/16	109.98
11/64	.1004	1 1/8	4.303	2 7/8	28.103	5 3/4	112.41
3/16	.1195	1 5/32	4.546	2 29/32	28.717	5 13/16	114.87
13/64	.1403	1 3/16	4.795	2 15/16	29.338	5 7/8	117.35
7/32	.1627	1 7/32	5.050	2 31/32	29.966	5 15/16	119.86
15/64	.1868	1 1/4	5.313	3	30.600	6	122.40
1/4	.2125	1 9/32	5.581	3 1/32	31.241	6 1/16	124.96
17/64	.2399	1 5/16	5.857	3 1/16	31.888	6 1/8	127.55
9/32	.2689	1 11/32	6.139	3 3/32	32.542	6 3/16	130.17
19/64	.2997	1 3/8	6.428	3 1/8	33.203	6 1/4	132.81
5/16	.3320	1 13/32	6.724	3 5/32	33.871	6 5/16	135.48
21/64	.3661	1 7/16	7.026	3 3/16	34.545	6 3/8	138.18
11/32	.4018	1 15/32	7.335	3 7/32	35.225	6 7/16	140.90
23/64	.4391	1 1/2	7.650	3 1/4	35.913	6 1/2	143.65
3/8	.4781	1 17/32	7.972	3 9/32	36.606	6 9/16	146.43
25/64	.5188	1 9/16	8.301	3 5/16	37.307	6 5/8	149.23
13/32	.5611	1 19/32	8.636	3 11/32	38.014	6 11/16	152.06
27/64	.6051	1 5/8	8.978	3 3/8	38.728	6 3/4	154.91
7/16	.6508	1 21/32	9.327	3 13/32	39.449	6 13/16	157.79
29/64	.6981	1 11/16	9.682	3 7/16	40.176	6 7/8	160.70
15/32	.7471	1 23/32	10.044	3 15/32	40.910	6 15/16	163.64
31/64	.7977	1 3/4	10.413	3 1/2	41.650	7	166.60
1/2	.8500	1 25/32	10.788	3 9/16	43.151	7 1/16	169.59
33/64	.9040	1 13/16	11.170	3 5/8	44.678	7 1/8	172.60
17/32	.9596	1 27/32	11.558	3 11/16	46.232	7 3/16	175.64
35/64	1.0168	1 7/8	11.953	3 3/4	47.813	7 1/4	178.71
9/16	1.0758	1 29/32	12.355	3 13/16	49.420	7 5/16	181.81
37/64	1.1364	1 15/16	12.763	3 7/8	51.053	7 3/8	184.93
19/32	1.1986	1 31/32	13.178	3 15/16	52.713	7 7/16	188.08
39/64	1.2625	2	13.600	4	54.400	7 1/2	191.25
5/8	1.3281	2 1/32	14.028	4 1/16	56.113	7 9/16	194.45
41/64	1.3954	2 1/16	14.463	4 1/8	57.853	7 5/8	197.68
21/32	1.4643	2 3/32	14.905	4 3/16	59.620	7 11/16	200.93
43/64	1.5348	2 1/8	15.353	4 1/4	61.413	7 3/4	204.21
11/16	1.6070	2 5/32	15.808	4 5/16	63.232	7 13/16	207.52
45/64	1.6809	2 3/16	16.270	4 3/8	65.078	7 7/8	210.85
23/32	1.7564	2 7/32	16.738	4 7/16	66.951	7 15/16	214.21
47/64	1.8336	2 1/4	17.213	4 1/2	68.850	8	217.60
3/4	1.9125	2 9/32	17.694	4 9/16	70.776	8 1/16	221.01
49/64	1.9930	2 5/16	18.182	4 5/8	72.728	8 1/8	224.45
25/32	2.0752	2 11/32	18.677	4 11/16	74.707	8 3/16	227.92
51/64	2.1590	2 3/8	19.178	4 3/4	76.713	8 1/4	231.41
13/16	2.2445	2 13/32	19.686	4 13/16	78.745	8 5/16	234.93
53/64	2.3317	2 7/16	20.201	4 7/8	80.803	8 3/8	238.48
27/32	2.4205	2 15/32	20.722	4 15/16	82.888	8 7/16	242.01
55/64	2.5110	2 1/2	21.250	5	85.000	8 1/2	245.65
7/8	2.6031	2 17/32	21.785	5 1/16	87.138	8 9/16	249.28
57/64	2.6969	2 9/16	22.326	5 1/8	89.303	8 5/8	252.93
29/32	2.7924	2 19/32	22.874	5 3/16	91.495	8 11/16	256.61
59/64	2.8895	2 5/8	23.428	5 1/4	93.713	8 3/4	260.31
15/16	2.9883	2 21/32	23.989	5 5/16	95.957	8 13/16	264.04
61/64	3.0887	2 11/16	24.557	5 3/8	98.228	8 7/8	267.80
31/32	3.1908	2 23/32	25.131	5 7/16	100.526	8 15/16	271.59
63/64	3.2946	2 3/4	25.713	5 1/2	102.850	9	275.40
1	3.4000						

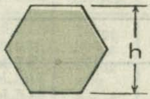
WEIGHTS OF OVALS.

In pounds per lineal foot.

Width inches	Thickness, inches. 3/32	1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2	17/32	9/16	19/32	5/8	21/32	11/16	23/32	3/4	13/16	7/8
3/8	.081	.109	.137	.167	.198	.230																		
13/32	.087	.117	.148	.180	.213	.247																		
7/16	.094	.126	.159	.193	.228	.264																		
15/32	.101	.135	.170	.206	.243	.280	.319	.359																
1/2	.107	.143	.180	.218	.257	.297	.338	.380	.424	.470														
17/32		.152	.191	.231	.272	.314	.357	.401	.447	.491														
9/16		.161	.202	.244	.287	.331	.376	.422	.470	.519	.569	.621												
19/32		.170	.213	.257	.302	.348	.395	.443	.492	.543	.595	.648												
5/8		.179	.224	.270	.317	.365	.414	.464	.515	.568	.522	.677	.734	.792										
11/16			.250	.298	.348	.399	.453	.507	.562	.618	.665	.724	.795	.857										
3/4			.268	.319	.371	.435	.492	.550	.608	.668	.729	.792	.856	.921	.988	1.056								
13/16				.349	.409	.469	.530	.593	.655	.719	.784	.851	.918	.987	1.058	1.130								
7/8						.504	.569	.635	.702	.770	.839	.909	.981	1.054	1.128	1.203	1.280	1.358						
15/16						.539	.608	.679	.750	.822	.895	.969	1.044	1.121	1.199	1.278	1.358	1.440						
1						.574	.648	.722	.797	.873	.950	1.029	1.108	1.188	1.270	1.353	1.437	1.522	1.608	1.697	1.787	1.878		
1 1/8										.977	1.062	1.149	1.236	1.324	1.413	1.504	1.596	1.688	1.782	1.878	1.975	2.073	2.275	2.482
1 1/4										1.092	1.176	1.270	1.365	1.461	1.558	1.657	1.756	1.857	1.958	2.061	2.165	2.271	2.486	2.708

WEIGHTS OF HEXAGON BARS.

In pounds per lineal foot.

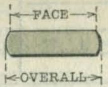


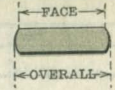
Size, h, inches	Wt. per foot	Size, h, inches	Wt. per foot	Size, h, inches	Wt. per foot
1/8	.0460	1 1/32	3.131	2 3/8	16.609
5/32	.0719	1 1/16	3.324	2 7/16	17.494
3/16	.1035	1 3/32	3.522	2 1/2	18.403
7/32	.1409	1 1/8	3.727	2 9/16	19.335
1/4	.1840	1 5/32	3.937	2 5/8	20.289
9/32	.2329	1 3/16	4.152	2 11/16	21.267
5/16	.2875	1 7/32	4.374	2 3/4	22.268
11/32	.3479	1 1/4	4.601	2 13/16	23.291
3/8	.4141	1 9/32	4.834	2 7/8	24.338
13/32	.4860	1 5/16	5.072	2 15/16	25.408
7/16	.5636	1 11/32	5.317	3	26.500
15/32	.6470	1 3/8	5.567	3 1/16	27.616
1/2	.7361	1 13/32	5.823	3 1/8	28.755
17/32	.8310	1 7/16	6.085	3 3/16	29.916
9/16	.9316	1 15/32	6.352	3 1/4	31.101
19/32	1.0380	1 1/2	6.625	3 5/16	32.309
5/8	1.1502	1 9/16	7.189	3 3/8	33.540
21/32	1.2681	1 5/8	7.775	3 7/16	34.793
11/16	1.3917	1 11/16	8.385	3 1/2	36.070
23/32	1.5211	1 3/4	9.018	3 9/16	37.370
3/4	1.6563	1 13/16	9.673	3 5/8	38.692
25/32	1.7972	1 7/8	10.352	3 11/16	40.038
13/16	1.9438	1 15/16	11.053	3 3/4	41.407
27/32	2.0962	2	11.778	3 13/16	42.799
7/8	2.2544	2 1/16	12.525	3 7/8	44.213
29/32	2.4183	2 1/8	13.296	3 15/16	45.651
15/16	2.5879	2 3/16	14.089	4	47.112
31/32	2.7633	2 1/4	14.907		
1	2.9445	2 5/16	15.746		

WEIGHTS OF ROUND EDGE FLATS.

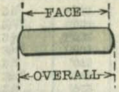
In pounds per lineal foot.

Face Measure.

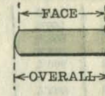




Face measure, inches	Thickness, inches.														
	⅛	3/16	¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
⅜	.178	.281	.393	.514	.645										
7/16	.204	.321	.446	.581	.725	.878									
½	.231	.361	.499	.647	.805	.971	1.147								
9/16	.258	.400	.552	.714	.884	1.064	1.253	1.498							
⅝	.284	.440	.605	.780	.964	1.157	1.360	1.617	1.792						
11/16	.311	.480	.659	.347	1.044	1.250	1.466	1.737	1.925	2.114					
¾	.337	.520	.712	.913	1.123	1.343	1.572	1.856	2.058	2.260	2.462				
13/16	.364	.560	.765	.979	1.203	1.436	1.678	1.976	2.191	2.406	2.621	2.964			
⅞	.390	.600	.818	1.046	1.283	1.529	1.785	2.096	2.324	2.552	2.781	3.136	3.373		
15/16	.417	.639	.871	1.112	1.362	1.622	1.891	2.215	2.456	2.698	2.940	3.309	3.559	3.810	
1	.444	.679	.924	1.179	1.442	1.715	1.997	2.335	2.589	2.844	3.099	3.482	3.745	4.009	4.273
1 1/16	.470	.719	.977	1.245	1.522	1.808	2.103	2.454	2.722	2.990	3.259	3.654	3.931	4.209	4.486
1⅛	.497	.759	1.030	1.311	1.601	1.901	2.210	2.574	2.855	3.136	3.418	3.827	4.117	4.408	4.698
1 3/16	.523	.799	1.084	1.378	1.681	1.994	2.316	2.693	2.988	3.282	3.577	4.000	4.303	4.607	4.911
1¼	.550	.839	1.137	1.444	1.761	2.087	2.422	2.813	3.120	3.428	3.737	4.172	4.489	4.806	5.123
1 5/16	.576	.897	1.190	1.511	1.841	2.180	2.528	2.932	3.253	3.575	3.896	4.345	4.675	5.005	5.336
1⅜	.603	.918	1.243	1.577	1.920	2.273	2.635	3.052	3.386	3.721	4.056	4.518	4.861	5.205	5.548
1 7/16	.629	.958	1.296	1.643	2.000	2.366	2.741	3.171	3.519	3.867	4.215	4.690	5.047	5.404	5.761
1½	.656	.998	1.349	1.710	2.080	2.459	2.847	3.291	3.652	4.013	4.374	4.863	5.233	5.603	5.973
1 9/16	.683	1.038	1.402	1.776	2.159	2.552	2.953	3.410	3.784	4.159	4.534	5.036	5.419	5.802	6.186
1⅝	.709	1.078	1.455	1.843	2.239	2.645	3.060	3.530	3.917	4.305	4.693	5.208	5.605	6.002	6.398
1 11/16	.736	1.118	1.509	1.909	2.319	2.738	3.166	3.649	4.050	4.451	4.852	5.381	5.791	6.201	6.611
1¾	.762	1.157	1.562	1.975	2.398	2.831	3.272	3.769	4.133	4.597	5.012	5.554	5.977	6.400	6.823
1 13/16	.789	1.197	1.615	2.042	2.478	2.924	3.378	3.888	4.316	4.743	5.171	5.726	6.163	6.599	7.036
1⅞	.815	1.237	1.668	2.108	2.558	3.016	3.485	4.008	4.449	4.889	5.331	5.899	6.348	6.798	7.248
1 15/16	.842	1.277	1.721	2.175	2.637	3.109	3.591	4.128	4.581	5.035	5.490	6.072	6.534	6.998	7.461
2	.869	1.317	1.774	2.241	2.717	3.202	3.697	4.247	4.714	5.182	5.649	6.244	6.720	7.197	7.673
2 1/16	.895	1.357	1.827	2.307	2.797	3.295	3.803	4.367	4.847	5.328	5.809	6.417	6.906	7.396	7.886
2⅛	.922	1.396	1.880	2.374	2.876	3.388	3.910	4.486	4.980	5.474	5.968	6.590	7.092	7.595	8.098
2 3/16	.948	1.436	1.934	2.440	2.956	3.481	4.016	4.606	5.113	5.620	6.127	6.762	7.278	7.795	8.311
2¼	.975	1.476	1.987	2.507	3.036	3.574	4.122	4.725	5.245	5.766	6.287	6.935	7.464	7.994	8.523
2 5/16	1.001	1.516	2.040	2.573	3.116	3.667	4.228	4.845	5.378	5.912	6.446	7.108	7.650	8.193	8.736
2⅜	1.028	1.556	2.093	2.639	3.195	3.760	4.335	4.964	5.511	6.058	6.606	7.280	7.836	8.392	8.948
2 7/16	1.054	1.596	2.146	2.706	3.275	3.853	4.441	5.084	5.644	6.204	6.765	7.453	8.022	8.591	9.161
2½	1.081	1.636	2.199	2.772	3.355	3.946	4.547	5.203	5.777	6.350	6.924	7.625	8.208	8.791	9.373



WEIGHTS OF ROUND EDGE FLATS.



In pounds per lineal foot.

Face measure—(Continued)

Face measure, inches	Thickness, inches.														
	⅛	3/16	¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
2⅝	1.134	1.715	2.305	2.905	3.514	4.132	4.760	5.442	6.042	6.643	7.243	7.971	8.580	9.189	9.798
2¾	1.187	1.795	2.412	3.038	3.673	4.318	4.972	5.681	6.308	6.935	7.562	8.316	8.952	9.587	10.223
2⅞	1.240	1.875	2.518	3.171	3.833	4.504	5.185	5.921	6.574	7.227	7.881	8.661	9.323	9.986	10.648
3	1.294	1.954	2.624	3.304	3.992	4.690	5.397	6.160	6.839	7.519	8.199	9.007	9.695	10.384	11.073
3⅛	1.347	2.034	2.730	3.436	4.151	4.876	5.610	6.399	7.105	7.811	8.518	9.352	10.067	10.783	11.498
3¼	1.400	2.114	2.837	3.569	4.311	5.062	5.822	6.638	7.370	8.103	8.837	9.697	10.439	11.181	11.923
3⅜	1.453	2.193	2.943	3.702	4.470	5.248	6.035	6.877	7.636	8.396	9.156	10.043	10.811	11.579	12.348
3½	1.506	2.273	3.049	3.835	4.630	5.434	6.247	7.116	7.902	8.688	9.474	10.388	11.183	11.978	12.773
3⅝		2.353	3.155	3.968	4.789	5.620	6.460	7.355	8.167	8.980	9.793	10.733	11.555	12.377	13.198
3¾		2.432	3.262	4.100	4.948	5.806	6.672	7.594	8.433	9.272	10.112	11.079	11.927	12.775	13.623
3⅞		2.512	3.368	4.233	5.108	5.991	6.885	7.833	8.699	9.564	10.431	11.424	12.298	13.173	14.048
4		2.592	3.474	4.366	5.267	6.177	7.097	8.072	8.964	9.857	10.749	11.769	12.670	13.572	14.473
4⅛			3.580	4.499	5.426	6.363	7.310	8.311	9.230	10.149	11.068	12.115	13.042	13.970	14.898
4¼			3.687	4.632	5.586	6.549	7.522	8.550	9.495	10.441	11.387	12.460	13.414	14.369	15.323
4⅜			3.793	4.764	5.745	6.735	7.735	8.789	9.761	10.733	11.706	12.805	13.786	14.767	15.748
4½			3.899	4.897	5.905	6.921	7.947	9.028	10.027	11.025	12.024	13.150	14.158	15.166	16.173
4⅝			4.005	5.030	6.064	7.107	8.160	9.267	10.292	11.318	12.343	13.496	14.530	15.564	16.598
4¾			4.112	5.163	6.223	7.293	8.372	9.506	10.558	11.610	12.662	13.841	14.902	15.962	17.023
4⅞			4.218	5.296	6.383	7.479	8.585	9.746	10.824	11.902	12.981	14.186	15.273	16.361	17.448
5			4.324	5.429	6.542	7.665	8.797	9.985	11.089	12.194	13.299	14.532	15.645	16.759	17.873
5⅛			4.430	5.561	6.701	7.851	9.010	10.224	11.355	12.486	13.618	14.877	16.017	17.158	18.298
5¼			4.537	5.694	6.861	8.037	9.222	10.463	11.620	12.778	13.937	15.222	16.389	17.556	18.723
5⅜			4.643	5.827	7.020	8.223	9.435	10.702	11.886	13.071	14.256	15.568	16.761	17.955	19.148
5½			4.749	5.960	7.180	8.409	9.647	10.941	12.152	13.363	14.574	15.913	17.133	18.353	19.573
5⅝			4.855	6.093	7.339	8.595	9.860	11.180	12.417	13.655	14.893	16.258	17.505	18.752	19.998
5¾			4.962	6.225	7.498	8.781	10.072	11.419	12.683	13.947	15.212	16.604	17.877	19.150	20.423
5⅞			5.068	6.358	7.658	8.966	10.285	11.658	12.949	14.239	15.531	16.949	18.248	19.548	20.848
6			5.174	6.491	7.817	9.152	10.497	11.897	13.214	14.532	15.849	17.294	18.620	19.947	21.273

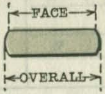
To obtain over-all measure from any thickness, add to face measure the increment given in table below for corresponding thickness.

Thickness, inches.														
⅛	3/16	¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
Increment, inches.														
1/16	3/32	⅛	5/32	3/16	7/32	¼	5/16	5/16	5/16	5/16	⅜	⅜	⅜	⅜

WEIGHTS OF ROUND EDGE FLATS.

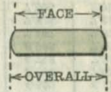
In pounds per lineal foot.

Over-all measure.



Over-all measure, inches	Thickness, inches.														
	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8	.151	.221	.287	.348	.406										
7/16	.178	.261	.340	.415	.486	.553									
1/2	.204	.301	.393	.481	.566	.646	.722								
9/16	.231	.341	.446	.548	.645	.739	.828	.900							
5/8	.258	.380	.499	.614	.725	.832	.935	1.020	1.128						
11/16	.284	.420	.552	.680	.805	.925	1.041	1.139	1.261	1.383					
3/4	.311	.460	.605	.747	.884	1.018	1.147	1.259	1.394	1.529	1.665				
13/16	.337	.500	.659	.813	.964	1.111	1.253	1.378	1.527	1.675	1.824	1.928			
7/8	.364	.540	.712	.880	1.044	1.204	1.360	1.498	1.659	1.821	1.984	2.100	2.258		
15/16	.390	.580	.765	.946	1.123	1.297	1.466	1.617	1.792	1.968	2.143	2.273	2.444	2.615	
1	.417	.620	.818	1.013	1.203	1.390	1.572	1.737	1.925	2.114	2.302	2.446	2.630	2.814	2.998
1 1/16	.444	.659	.871	1.079	1.283	1.483	1.678	1.856	2.058	2.260	2.462	2.618	2.816	3.013	3.211
1 1/8	.470	.699	.924	1.145	1.362	1.575	1.785	1.976	2.191	2.406	2.621	2.791	3.002	3.212	3.432
1 3/16	.497	.739	.977	1.212	1.442	1.668	1.891	2.096	2.324	2.552	2.781	2.964	3.188	3.412	3.636
1 1/4	.523	.779	1.030	1.278	1.522	1.761	1.997	2.215	2.456	2.698	2.940	3.136	3.373	3.611	3.848
1 5/16	.550	.819	1.084	1.345	1.601	1.854	2.103	2.335	2.589	2.844	3.099	3.309	3.559	3.810	4.061
1 3/8	.576	.859	1.137	1.411	1.681	1.947	2.210	2.454	2.722	2.990	3.259	3.482	3.745	4.009	4.273
1 7/16	.603	.898	1.190	1.477	1.761	2.040	2.316	2.574	2.855	3.136	3.418	3.654	3.931	4.209	4.486
1 1/2	.629	.938	1.243	1.544	1.841	2.133	2.422	2.693	2.988	3.282	3.577	3.827	4.117	4.408	4.698
1 9/16	.656	.973	1.296	1.610	1.920	2.226	2.528	2.813	3.120	3.428	3.737	4.000	4.303	4.607	4.911
1 5/8	.683	1.018	1.349	1.677	2.000	2.319	2.635	2.932	3.253	3.575	3.896	4.172	4.489	4.806	5.123
1 11/16	.709	1.058	1.402	1.743	2.080	2.412	2.741	3.052	3.386	3.721	4.056	4.345	4.675	5.005	5.336
1 3/4	.736	1.098	1.455	1.809	2.159	2.505	2.847	3.171	3.519	3.867	4.215	4.518	4.861	5.205	5.548
1 13/16	.762	1.137	1.509	1.876	2.239	2.598	2.953	3.291	3.652	4.013	4.374	4.690	5.047	5.404	5.761
1 7/8	.789	1.177	1.562	1.942	2.319	2.691	3.060	3.410	3.784	4.159	4.531	4.863	5.233	5.603	5.973
1 15/16	.815	1.217	1.615	2.009	2.398	2.784	3.166	3.530	3.917	4.305	4.693	5.036	5.419	5.802	6.186
2	.842	1.257	1.668	2.075	2.478	2.877	3.272	3.649	4.050	4.451	4.852	5.208	5.605	6.002	6.398
2 1/16	.869	1.297	1.721	2.141	2.558	2.970	3.378	3.769	4.183	4.597	5.012	5.381	5.791	6.201	6.611
2 1/8	.895	1.337	1.774	2.208	2.637	3.063	3.485	3.888	4.316	4.743	5.171	5.554	5.977	6.400	6.823
2 3/16	.922	1.377	1.827	2.274	2.717	3.156	3.591	4.008	4.449	4.889	5.331	5.726	6.163	6.599	7.036
2 1/4	.948	1.416	1.880	2.341	2.797	3.249	3.697	4.128	4.581	5.035	5.490	5.899	6.348	6.798	7.248
2 5/16	.975	1.456	1.934	2.407	2.876	3.342	3.803	4.247	4.714	5.182	5.649	6.072	6.534	6.998	7.461
2 3/8	1.001	1.496	1.987	2.473	2.956	3.435	3.910	4.367	4.847	5.328	5.809	6.244	6.720	7.197	7.673
2 7/16	1.028	1.536	2.040	2.540	3.036	3.528	4.016	4.486	4.980	5.474	5.968	6.417	6.906	7.396	7.886
2 1/2	1.054	1.576	2.093	2.606	3.116	3.621	4.122	4.606	5.113	5.620	6.127	6.590	7.092	7.595	8.098

WEIGHTS OF ROUND EDGE FLATS.



In pounds per lineal foot.

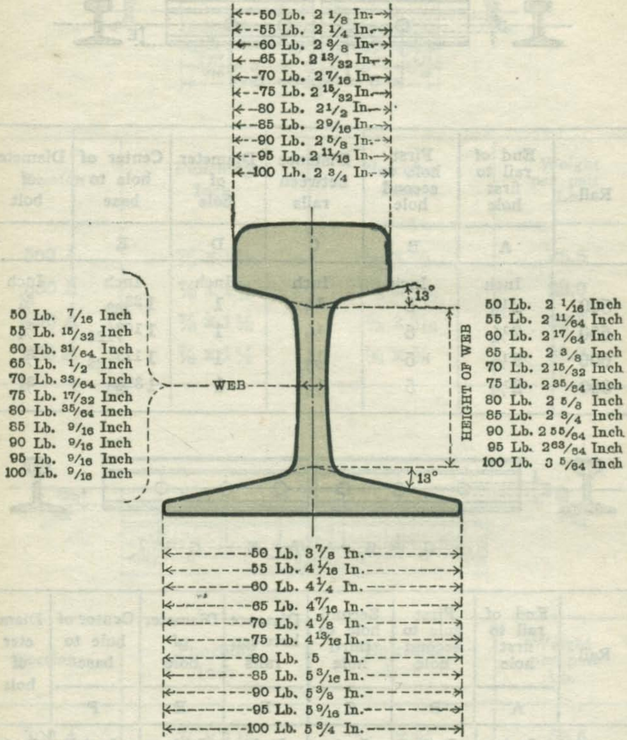
Over-all measure—(Continued)

Over-all measure, inches	Thickness, inches. 1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
2 5/8	1.108	1.655	2.199	2.739	3.275	3.807	4.335	4.845	5.378	5.912	6.446	6.935	7.464	7.994	8.523
2 3/4	1.161	1.735	2.305	2.872	3.434	3.993	4.547	5.084	5.644	6.204	6.765	7.280	7.836	8.392	8.948
2 7/8	1.214	1.815	2.412	3.004	3.594	4.179	4.760	5.323	5.909	6.496	7.084	7.625	8.208	8.791	9.373
3	1.267	1.895	2.518	3.138	3.753	4.365	4.972	5.562	6.175	6.789	7.402	7.971	8.580	9.189	9.798
3 1/8	1.320	1.974	2.624	3.270	3.912	4.551	5.185	5.801	6.441	7.081	7.721	8.316	8.952	9.587	10.223
3 1/4	1.373	2.054	2.730	3.403	4.072	4.736	5.397	6.040	6.706	7.373	8.040	8.661	9.323	9.986	10.648
3 3/8	1.426	2.134	2.837	3.536	4.231	4.922	5.610	6.279	6.972	7.665	8.359	9.007	9.695	10.384	11.073
3 1/2	1.479	2.213	2.943	3.669	4.391	5.108	5.822	6.518	7.238	7.957	8.677	9.352	10.067	10.783	11.498
3 5/8		2.293	3.049	3.802	4.550	5.294	6.035	6.757	7.503	8.250	8.996	9.697	10.439	11.181	11.923
3 3/4		2.373	3.155	3.934	4.709	5.480	6.247	6.996	7.769	8.542	9.315	10.043	10.811	11.580	12.348
3 7/8		2.452	3.262	4.067	4.869	5.666	6.460	7.235	8.034	8.834	9.634	10.388	11.183	11.973	12.773
4		2.532	3.368	4.200	5.028	5.852	6.672	7.474	8.300	9.126	9.952	10.733	11.555	12.377	13.198
4 1/8			3.474	4.333	5.187	6.038	6.885	7.713	8.566	9.418	10.271	11.079	11.927	12.775	13.623
4 1/4			3.580	4.466	5.347	6.224	7.097	7.953	8.831	9.710	10.590	11.424	12.298	13.173	14.048
4 3/8			3.687	4.598	5.506	6.410	7.310	8.192	9.097	10.003	10.909	11.769	12.670	13.572	14.473
4 1/2			3.793	4.731	5.666	6.596	7.522	8.431	9.363	10.295	11.227	12.115	13.042	13.970	14.898
4 5/8			3.899	4.864	5.825	6.782	7.735	8.670	9.628	10.587	11.546	12.460	13.414	14.369	15.323
4 3/4			4.005	4.997	5.984	6.968	7.947	8.909	9.894	10.879	11.865	12.805	13.786	14.767	15.748
4 7/8			4.112	5.130	6.144	7.154	8.160	9.148	10.159	11.171	12.184	13.150	14.158	15.166	16.173
5			4.218	5.263	6.303	7.340	8.372	9.387	10.425	11.464	12.502	13.496	14.530	15.564	16.598
5 1/8			4.324	5.395	6.462	7.525	8.585	9.626	10.691	11.756	12.821	13.841	14.902	15.962	17.023
5 1/4			4.430	5.528	6.622	7.711	8.797	9.865	10.956	12.048	13.140	14.186	15.273	16.361	17.448
5 3/8			4.537	5.661	6.781	7.897	9.010	10.104	11.222	12.340	13.459	14.532	15.645	16.759	17.873
5 1/2			4.643	5.794	6.941	8.083	9.222	10.343	11.488	12.632	13.777	14.877	16.017	17.158	18.298
5 5/8			4.749	5.927	7.100	8.269	9.435	10.582	11.753	12.925	14.096	15.222	16.389	17.556	18.723
5 3/4			4.855	6.059	7.259	8.455	9.647	10.821	12.019	13.217	14.415	15.568	16.761	17.955	19.148
5 7/8			4.962	6.192	7.419	8.641	9.860	11.060	12.284	13.509	14.734	15.913	17.133	18.353	19.573
6			5.068	6.325	7.578	8.827	10.072	11.299	12.550	13.801	15.052	16.258	17.505	18.752	19.998

To obtain face measure for any thickness, subtract from over-all measure the increment given in table below for corresponding thickness.

Thickness, inches.	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
Increment, inches.	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	5/16	5/16	5/16	3/8	3/8	3/8	3/8

STANDARD A. S. C. E. RAILS
WEIGHTS AND DIMENSIONS.

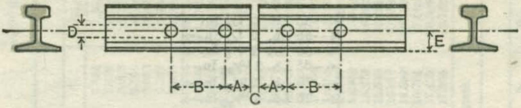


Total height same as width of rail base.

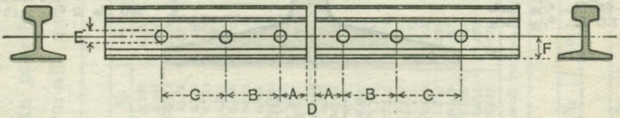
Distribution of metal.

Head	42 per cent.
Web	21 " "
Base	37 " "

STANDARD A. S. C. E. RAILS
STANDARD DRILLING AND BOLTS.

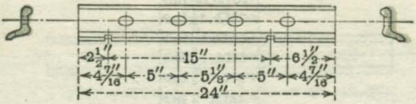


Rail	End of rail to first hole A	First hole to second hole B	Distance between rails C	Diameter of hole D	Center of hole to base E	Diameter of bolt
	Inch	Inch	Inch	Inch	Inch	Inch
500	2½	5	⅛	1	1 23/32	¾
550	2½	5	⅛	1	1 103/128	¾
600	2½	5	⅛	1	1 115/128	¾
650	2½	5	⅛	1	1 31/32	¾

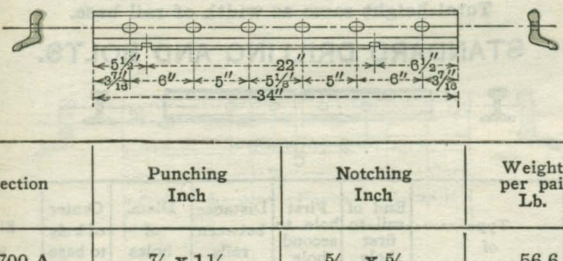


Rail	End of rail to first hole A	First hole to second hole B	Second hole to third hole C	Distance between rails D	Diameter of hole E	Center of hole to base F	Diameter of bolt
	Inch	Inch	Inch	Inch	Inch	Inch	Inch
700	2½	5	6	⅛	1	2 3/64	¾
750	2½	5	6	⅛	1	2 15/128	¾
800	2½	5	6	⅛	1	2 3/16	¾
850	2½	5	6	⅛	1	2 17/64	¾
900	2½	5	6	⅛	1	2 45/128	¾
950	2½	5	6	⅛	1	2 55/128	¾
1000	2½	5	6	⅛	1	2 65/128	¾

STANDARD A. S. C. E. RAILS
STANDARD PUNCHING OF SPLICE BARS.

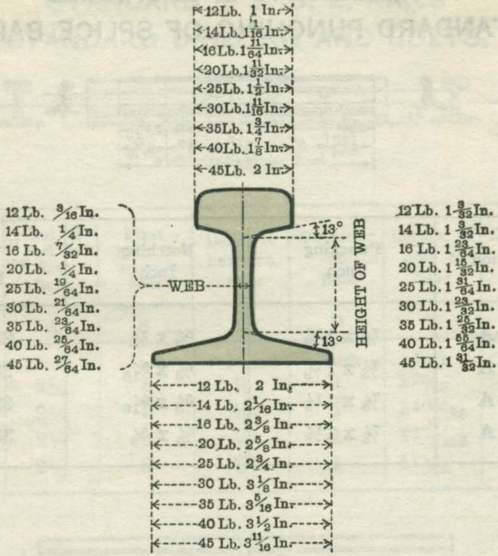


Section	Punching Inch	Notching Inch	Weight per pair Lb.
500 A	⅞ x 1⅛	⅝ x ½	25.5
550 A	⅞ x 1⅛	⅝ x 9/16	28.9
600 A	⅞ x 1⅛	⅝ x 9/16	32.5
650 A	⅞ x 1⅛	⅝ x ⅝	35.6



Section	Punching Inch	Notching Inch	Weight per pair Lb.
700 A	⅞ x 1⅛	⅝ x ⅝	56.6
750 A	⅞ x 1⅛	11/16 x 11/16	60.6
800 A	⅞ x 1⅛	11/16 x 11/16	65.3
850 A	⅞ x 1⅛	11/16 x ¾	70.2
900 A	⅞ x 1⅛	11/16 x ¾	76.5
950 A	⅞ x 1⅛	11/16 x ¾	83.3
1000 A	⅞ x 1⅛	11/16 x ¾	89.5

STANDARD LIGHT RAILS.



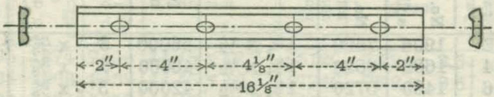
Total height same as width of rail base.

STANDARD DRILLING AND BOLTS.

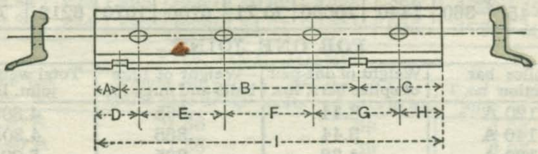
Rail	Type of splice bar	End of rail to first hole	First hole to second hole	Distance between rails	Diam. of holes	Center of hole to base	Size of bolts
		A	B	C	D	E	
		Ins.	Ins.	Inch	Inch	Ins.	Ins.
12	Flat	2	4	1/8	5/8	57/64	1/2 x 1 3/4
14	"	2	4	1/8	5/8	57/64	1/2 x 1 3/4
16	"	2	4	1/8	5/8	1 7/128	1/2 x 1 3/4
20	"	2	4	1/8	5/8	1 11/64	1/2 x 2
25	"	2	4	1/8	5/8	1 29/128	1/2 x 2 1/4
30	Flat and Angle	2	4	1/8	3/4	1 25/64	5/8 x 2 1/2
35	" " "	2	4	1/8	3/4	1 15/32	5/8 x 2 1/2
40	Angle	2 1/2	5	1/8	7/8	1 71/128	3/4 x 3
45	"	2 1/2	5	1/8	7/8	1 41/64	3/4 x 3

LIGHT RAILS

STANDARD PUNCHING OF SPLICE BARS.



Section	Punching inch	Weight per pair lbs.
350 A	11/16 x 31/32	8.80
300 A	11/16 x 31/32	7.66
250 A	9/16 x 3/4	5.70
200 A	9/16 x 3/4	4.86
160 A	9/16 x 3/4	4.36



Section	Punching	Notching	A	B	C	D	E	F	G	H	I	Weight per pair
	Inch	Inch	In.	In.	In.	In.	In.	In.	In.	In.	Inch	Lb.
450A	13/16x1 1/8	3/4x1/2	1 1/8	15	3 7/8	2 7/16	5	5 1/8	5	2 7/16	20	18.75
400A	13/16x1 1/8	3/4x7/16	1 1/8	15	3 7/8	2 7/16	5	5 1/8	5	2 7/16	20	16.10
350A	11/16x 31/32					2	4	4 1/8	4	2	16 1/8	12.10
300A	11/16x 31/32					2	4	4 1/8	4	2	16 1/8	10.45

TABLE OF LIGHT RAILS AND FASTENINGS.

FOR 100 TONS OF RAILS

Rail section No.	Weight of rails per yard, lbs.	No. of pairs of splice bars	No. of bolts and nuts	Size of bolt	No. of spikes	Size of spike	Miles of single track 100 tons will lay
120	12	1906	7620	1¾ x ½	56000	3 x ⅜	5.30
140	14	1632	6528	1¾ x ½	48000	3 x ⅜	4.54
160	16	1430	5720	1¾ x ½	42000	3½ x ⅜	3.98
200	20	1144	4576	2 x ½	33600	3½ x ½	3.18
250	25	916	3660	2¼ x ½	26880	4 x ½	2.54
300	30	764	3052	2½ x ⅝	22400	4 x ½	2.12
350	35	652	2608	2½ x ⅝	19200	4½ x ½	1.82
400	40	572	2288	3 x ¾	16800	5 x ½	1.59
450	45	508	2032	3 x ¾	14934	5½ x 9/16	1.41

FOR ONE MILE OF SINGLE TRACK

Rail section No.	Weight of rails per yard, lbs.	No. of pairs of splice bars	No. of bolts and nuts	No. of spikes	Gross tons of rails	Weight of splice bars, lbs.	Weight of bolts and nuts, lbs.	Weight of spikes, lbs.	Total wt. of rails and fastenings, gr. tons
120	12	360	1440	10560	18.86	1240	310	1705	20.31
140	14	360	1440	10560	22.00	1240	310	1705	23.45
160	16	360	1440	10560	25.14	1570	310	1805	26.78
200	20	360	1440	10560	31.43	1750	328	3406	33.87
250	25	360	1440	10560	39.29	2052	350	3770	42.05
300	30	360	1440	10560	47.14	3762	625	3770	50.78
350	35	360	1440	10560	55.00	4356	625	4140	59.07
400	40	360	1440	10560	62.86	5796	1070	4512	67.92
450	45	360	1440	10560	70.71	6750	1070	6212	76.98

FOR ONE JOINT

Splice bar section no.	Weight of one pair of splice bars, lbs.	Weight of four bolts and nuts, lbs.	Total weight of joint, lbs.
120 A	3.44	.865	4.305
140 A	3.44	.865	4.305
160 A	4.36	.865	5.225
200 A	4.86	.91	5.77
250 A	5.70	.97	6.67
300 A	10.45	1.74	12.19
350 A	12.10	1.74	13.84
400 A	16.10	2.90	19.00
450 A	18.75	2.90	21.65

Table is based on lengths of rails, 90% to be 30 ft., 10% to be shorts down to 20 ft.

Ties 2 ft. center to center. Four spikes per tie. No excess has been allowed.

TABLE OF LIGHT RAILS AND FASTENINGS.

METRIC SYSTEM

FOR 100 TONNES RAILS

Rail section No.	Weight of rails per meter in kg.	No. of pairs of splice bars	No. of bolts and nuts	Size of bolt in mm.	No. of spikes	Size of spike in mm.	Kilometers of single track 100 tonnes will lay
120	5.95	1874	7496	44.45 x 12.7	55120	76.2 x 9.5	8.40
140	6.94	1608	6432	44.45 x 12.7	47246	76.2 x 9.5	7.20
160	7.94	1404	5616	44.45 x 12.7	41340	88.9 x 9.5	6.30
200	9.92	1124	4496	50.8 x 12.7	33072	88.9 x 12.7	5.04
250	12.4	900	3600	57.15 x 12.7	26444	101.6 x 12.7	4.03
300	14.88	748	2992	63.5 x 15.87	22048	101.6 x 12.7	3.36
350	17.36	642	2568	63.5 x 15.87	18898	114.3 x 12.7	2.88
400	19.84	562	2248	76.2 x 19.05	16536	127 x 12.7	2.52
450	22.32	500	2000	76.2 x 19.05	14698	140 x 14.3	2.24

FOR ONE KILOMETER SINGLE TRACK

Rail section No.	Weight of rails per meter in kg.	No. of pairs of splice bars	No. of bolts and nuts	No. of spikes	Tonnes of rails	Weight of splice bars in kg.	Weight of bolts and nuts in kg.	Weight of spikes in kg.	Total wt. of rails and fastenings in tonnes
120	5.95	224	896	6562	11.9	349	87	490	12.83
140	6.94	224	896	6562	13.88	349	87	490	14.81
160	7.94	224	896	6562	15.88	444	87	520	16.93
200	9.92	224	896	6562	19.84	493	92	980	21.41
250	12.4	224	896	6562	24.8	578	99	1080	26.56
300	14.88	224	896	6562	29.76	1062	177	1080	32.08
350	17.36	224	896	6562	34.72	1232	177	1190	37.32
400	19.84	224	896	6562	39.68	1635	296	1290	42.90
450	22.32	224	896	6562	44.64	1904	296	1780	48.62

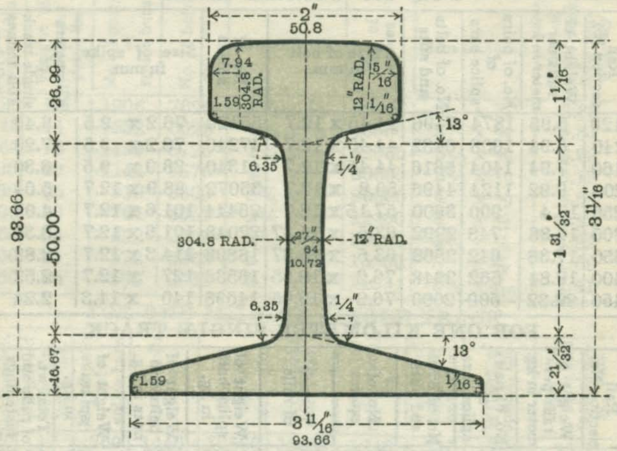
FOR ONE JOINT

Splice bar section no.	Weight one pair splice bars in kg.	Weight of four bolts and nuts in kg.	Total weight of joint in kg.
120 A	1.56	.39	1.95
140 A	1.56	.39	1.95
160 A	1.98	.39	2.37
200 A	2.20	.41	2.61
250 A	2.58	.44	3.02
300 A	4.74	.79	5.53
350 A	5.50	.79	6.29
400 A	7.30	1.32	8.62
450 A	8.50	1.32	9.82

Table is based on length of rails: 90% to be 9.14 m. (30 feet), 10% to be shorts down to 6.10 m. (20 feet).

Ties .61 m. (2 feet) center to center. Four spikes per tie. No excess has been allowed.

RAIL SECTION 450.



22.32 kg. per meter

44.64 tonnes per kilometer of single track

22.40 meters of single track per tonne

45 lbs. per yard

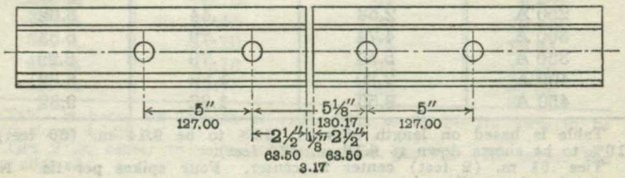
70.71 gross tons per mile of single track

74.67 ft. of single track per gross ton

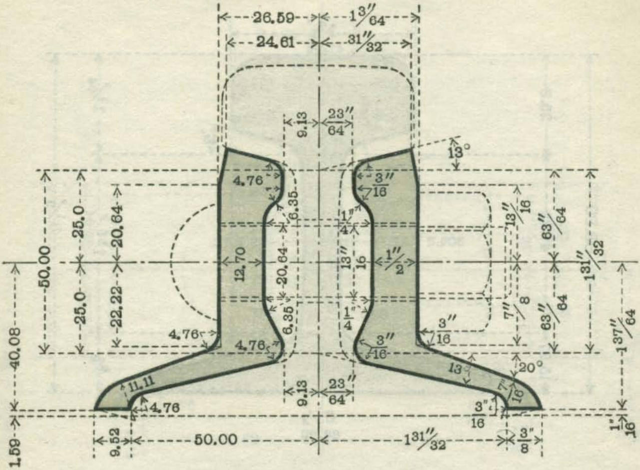
DRILLING OF RAIL.

Center of web

22.22 mm. Dia. of holes 7/8 inch



SPLICE BAR SECTION 450A.



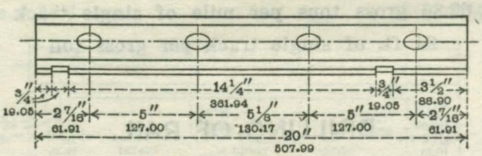
ANGLE SPLICE BAR.

8.60 kg. per meter — 5.80 lbs. per foot

PUNCHING OF SPLICE BAR.

Elliptical holes

20.6 mm. x 28.6 mm. — 13/16 x 1⅛ inches



Weight of splice bars, per pair

8.50 kg. — 18.75 lbs.

Weight of bolts, per joint

1.32 kg. — 2.90 lbs.

Total weight of each joint

9.82 kg. — 21.65 lbs.

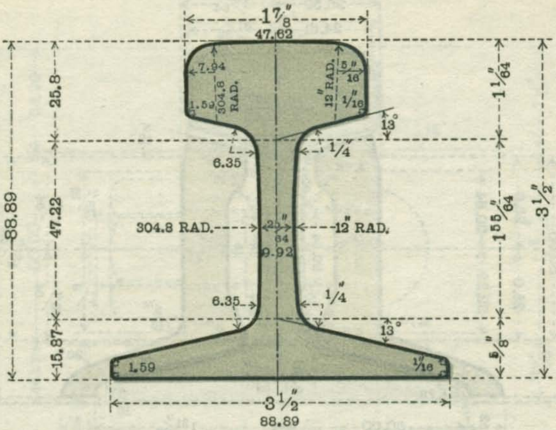
Standard steel spike

140 mm. x 14.3 mm. — 5½ x 9/16 inches

Standard steel bolts, hex. nut

19.05 mm. x 76.2 mm. — ¾ x 3 inches

RAIL SECTION 400.



19.84 kg. per meter

39.68 tonnes per kilometer of single track

25.20 meters of single track per tonne

40 lbs. per yard

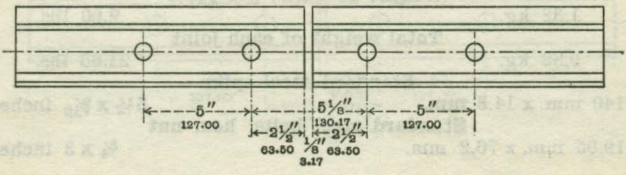
62.86 gross tons per mile of single track

84 ft. of single track per gross ton

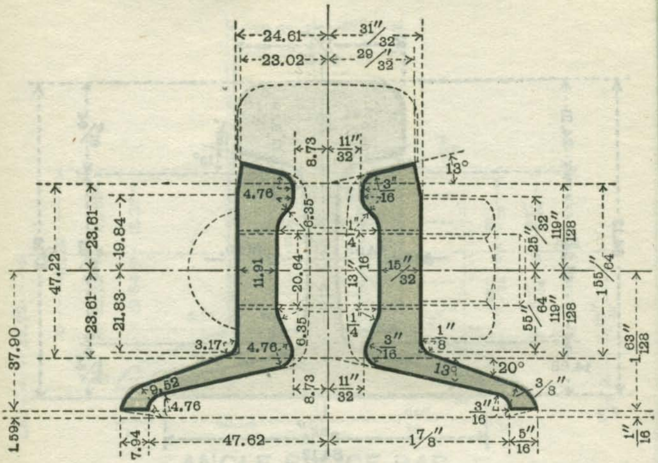
DRILLING OF RAIL.

Center of web

22.22 mm.	Dia. of holes	⅞ inch



SPLICE BAR SECTION 400A.



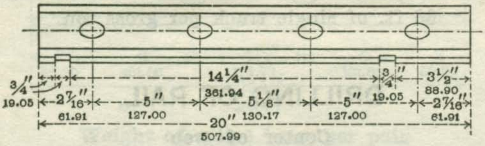
ANGLE SPLICE BAR.

7.44 kg. per meter 5.00 lbs. per foot

PUNCHING OF SPLICE BAR.

Elliptical holes

20.6 mm. x 28.6 mm. $\frac{13}{16}$ x $1\frac{1}{8}$ inches



Weight of splice bars, per pair

7.30 kg. 16.10 lbs.

Weight of bolts, per joint

1.32 kg. 2.90 lbs.

Total weight of each joint

8.62 kg. 19.00 lbs.

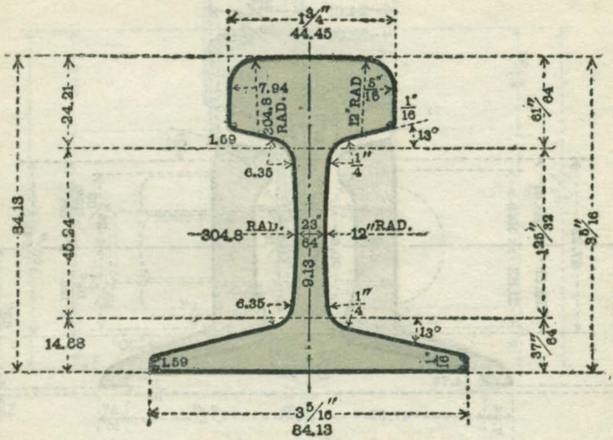
Standard steel spike

127 mm. x 12.7 mm. 5 x ½ inches

Standard steel bolt, hex. nut

19.05 mm. x 76.2 mm. ¾ x 3 inches

RAIL SECTION 350.



17.36 kg. per meter

34.72 tonnes per kilometer of single track

28.8 meters of single track per tonne

35 lbs. per yard

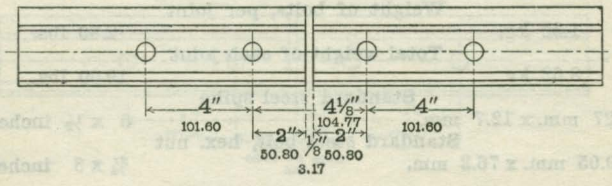
55 gross tons per mile of single track

96 ft. of single track per gross ton

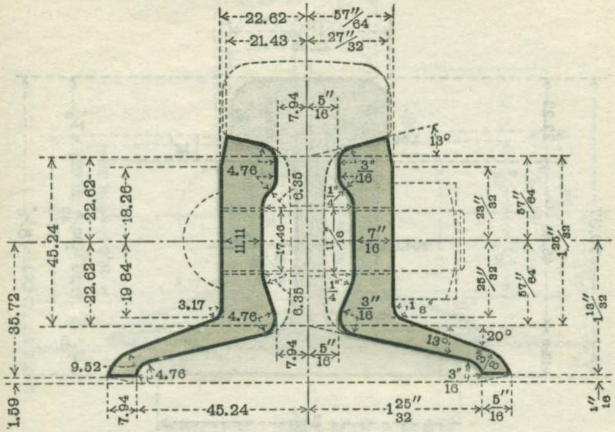
DRILLING OF RAIL.

Center of web

19.05 mm. Dia. of holes ¾ inch



SPLICE BAR SECTION 350A.



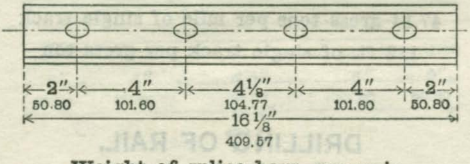
ANGLE SPLICE BAR.

6.82 kg. per meter 4.58 lbs. per foot

PUNCHING OF SPLICE BAR.

Elliptical holes

17.46 mm. x 24.6 mm. 11/16 x 31/32 inch



Weight of splice bars, per pair

5.50 kg. 12.1 lbs.

Weight of bolts, per joint

0.79 kg. 1.74 lbs.

Total weight of each joint

6.29 kg. 13.84 lbs.

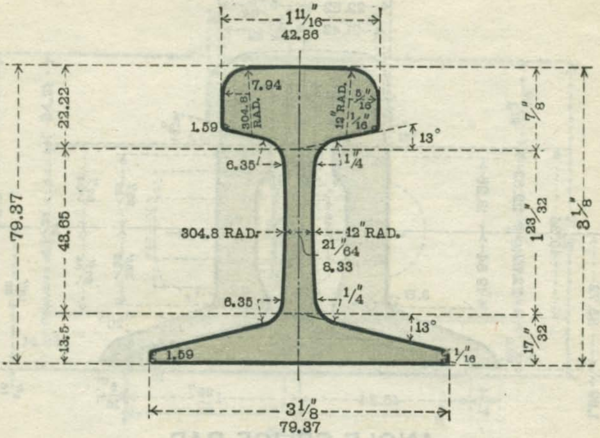
Standard steel spike

114.3 mm. x 12.7 mm. 4½ x ½ inches

Standard steel bolt, sq. nut

15.87 mm. x 63.5 mm. ⅝ x 2½ inches

RAIL SECTION 300.



14.88 kg. per meter

29.76 tonnes per kilometer of single track

33.60 meters of single track per tonne

30 lbs. per yard

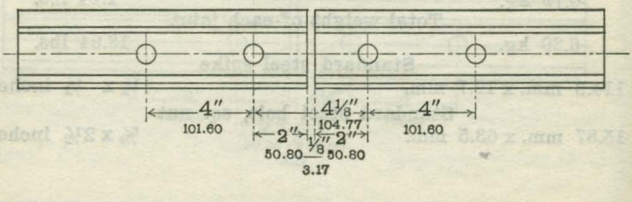
47.14 gross tons per mile of single track

112 ft. of single track per gross ton

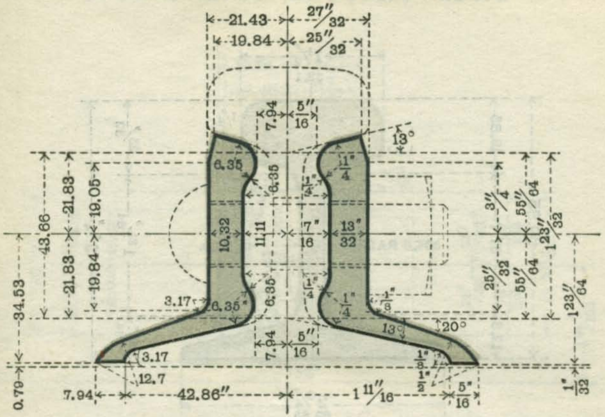
DRILLING OF RAIL.

Center of web

19.05 mm. **Dia. of holes** ¾ inch



SPLICE BAR SECTION 300A.



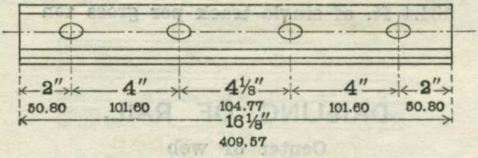
ANGLE SPLICE BAR.

5.90 kg. per meter — 3.97 lbs. per foot

PUNCHING OF SPLICE BAR.

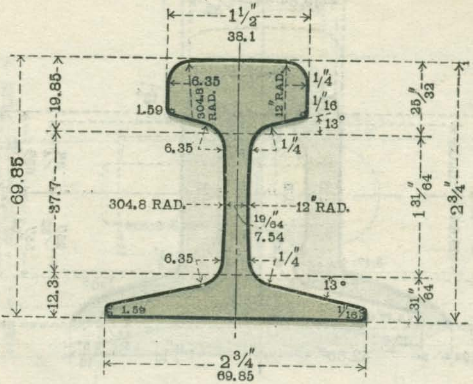
Elliptical holes

17.46 mm. x 24.6 mm. — 11/16 x 31/32 inch



	Weight of splice bars, per pair	
4.74 kg.		10.45 lbs.
	Weight of bolts, per joint	
0.79 kg.		1.74 lbs.
	Total weight of each joint	
5.53 kg.		12.19 lbs.
	Standard steel spike	
101.6 mm. x 12.7 mm.		4 x ½ inches
	Standard steel bolts, sq. nut	
15.87 mm. x 63.5 mm.		⅝ x 2½ inches

RAIL SECTION 250.



12.4 kg. per meter

24.80 tonnes per kilometer of single track

40.32 meters of single track per tonne

25 lbs. per yard

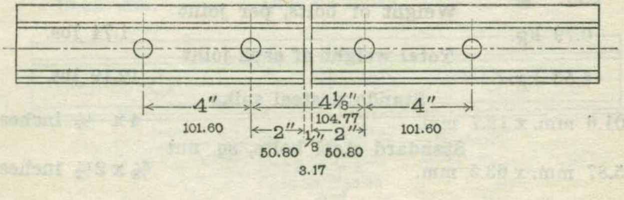
39.29 gross tons per mile of single track

134.4 ft. of single track per gross ton

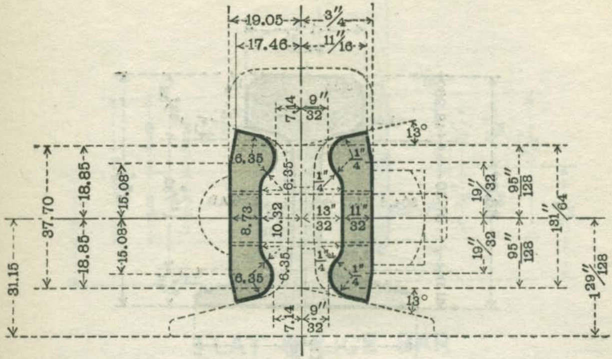
DRILLING OF RAIL.

Center of web

15.87 mm. **Dia. of holes** ⅝ inch



SPLICE BAR SECTION 250A.



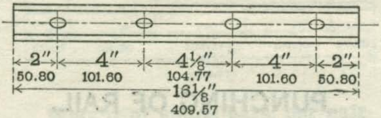
FLAT SPLICE BAR.

3.30 kg. per meter **2.20 lbs. per foot**

PUNCHING OF FLAT SPLICE BAR.

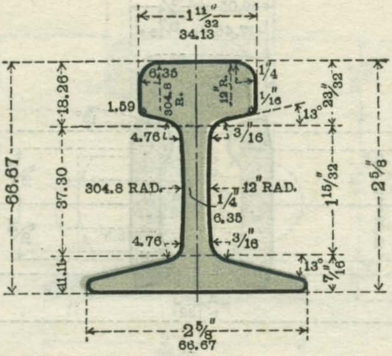
Elliptical holes

14.29 mm. x 19 mm. $\frac{9}{16}$ x $\frac{3}{4}$ inch



	Weight of splice bars, per pair	
2.58 kg.		5.70 lbs.
	Weight of bolts, per joint	
0.44 kg.		0.97 lbs.
	Total weight of joint	
3.02 kg.		6.67 lbs.
	Standard steel spike	
101.6 mm. x 12.7 mm.		4 x ½ inches
	Standard steel bolt, sq. nut	
12.7 mm. x 57.15 mm.		½ x 2¼ inches

RAIL SECTION 200.



9.92 kg. per meter

19.84 tonnes per kilometer of single track

50.4 meters of single track per tonne

20 lbs. per yard

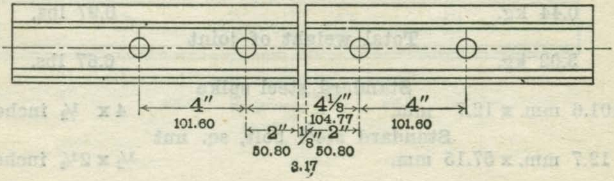
31.43 gross tons per mile of single track

168 ft. of single track per gross ton

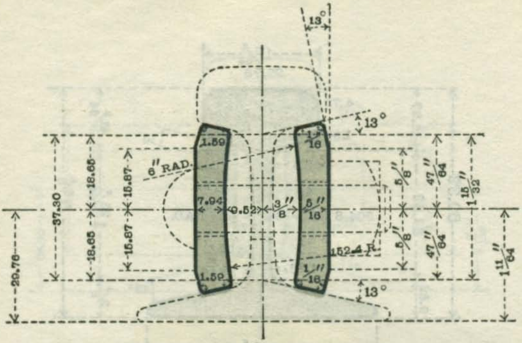
PUNCHING OF RAIL.

Center of web

15.87 mm.	Dia. of holes	5/8 inch



SPLICE BAR SECTION 200A.



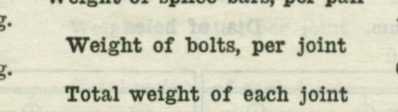
FLAT SPLICE BAR

2.78 kg. per meter — 1.87 lbs. per foot

PUNCHING OF FLAT SPLICE BAR.

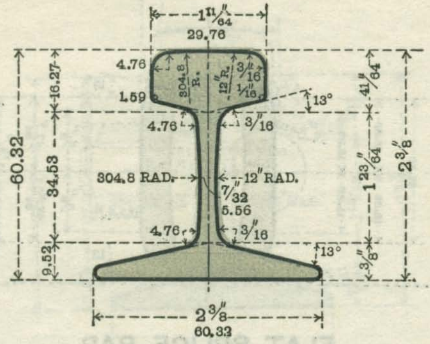
Elliptical holes

14.29 mm. x 19 mm. — 9/16 x 3/4 inch



	Weight of splice bars, per pair	
2.20 kg.		4.86 lbs.
	Weight of bolts, per joint	
0.41 kg.		0.91 lbs.
	Total weight of each joint	
2.61 kg.		5.77 lbs.
	Standard steel spike	
88.9 mm. x 12.7 mm.		3½ x ½ inches
	Standard steel bolt, sq. nut	
12.7 mm. x 50.8 mm.		½ x 2 inches

RAIL SECTION 160.



7.94 kg. per meter

15.88 tonnes per kilometer of single track

62.97 meters of single track per tonne

16 lbs. per yard

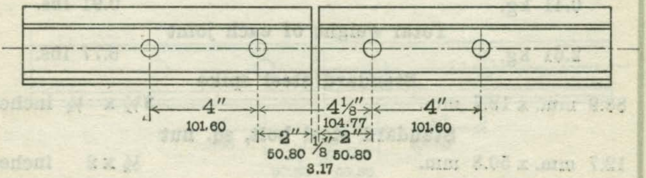
25.14 gross tons per mile of single track

210 ft. of single track per gross ton

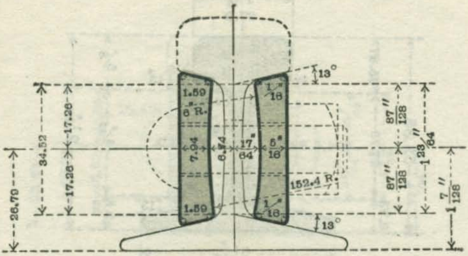
PUNCHING OF RAIL.

Center of web

15.87 mm.	**Dia. of holes**	**⅝ inch**



SPLICE BAR SECTION 160A.



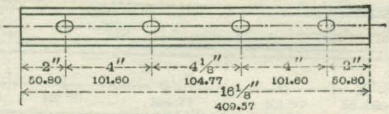
FLAT SPLICE BAR.

2.52 kg. per meter 1.70 lbs. per foot

PUNCHING OF FLAT SPLICE BAR.

Elliptical holes

14.29 mm. x 19 mm. 9/16 x 3/4 inch



Weight of splice bars, per pair

1.98 kg. 4.36 lbs.

Weight of bolts, per joint

0.39 kg. 0.865 lbs.

Total weight of each joint

2.37 kg. 5.225 lbs.

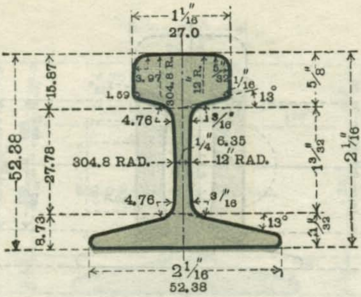
Standard steel spike

88.9 mm. x 9.5 mm. 3½ x 3/8 inches

Standard steel bolt, sq. nut

12.7 mm. x 44.45 mm. ½ x 1¾ inches

RAIL SECTION 140.



6.94 kg. per meter

13.88 tonnes per kilometer of single track

72.05 meters of single track per tonne

14 lbs. per yard

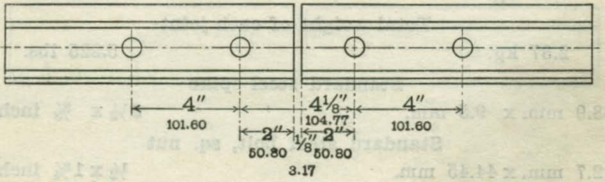
22 gross tons per mile of single track

240 ft. of single track per gross ton

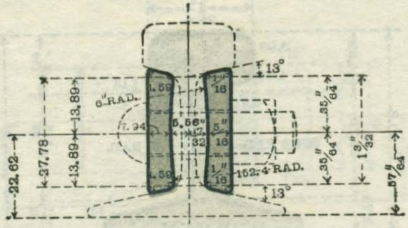
PUNCHING OF RAIL.

Center of web

15.87 mm. **Dia. of holes** **⅝ inch**



SPLICE BAR SECTION 140A.



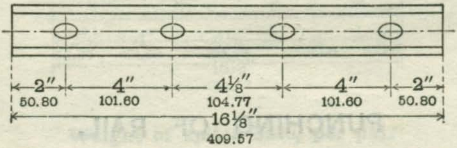
FLAT SPLICE BAR.

2.00 kg. per meter 1.36 lbs. per foot

PUNCHING OF FLAT SPLICE BAR.

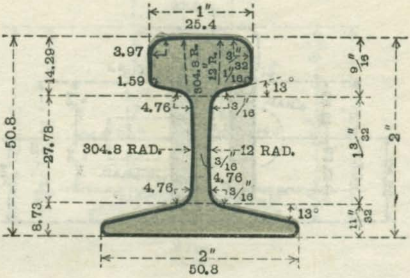
Elliptical holes

14.29 mm. x 19 mm. $\frac{9}{16}$ x $\frac{3}{4}$ inch



	Weight of splice bars, per pair	
1.56 kg.		3.44 lbs.
	Weight of bolts, per joint	
0.39 kg.		0.865 lbs.
	Total weight of each joint	
1.95 kg.		4.305 lbs.
	Standard steel spike	
76.2 mm. x 9.5 mm.		3 x ⅜ inches
	Standard steel bolt, sq. nut	
12.7 mm. x 44.45 mm.		½ x 1¾ inches

RAIL SECTION 120.



5.95 kg. per meter

11.90 tonnes per kilometer of single track

84.03 meters of single track per tonne

12 lbs. per yard

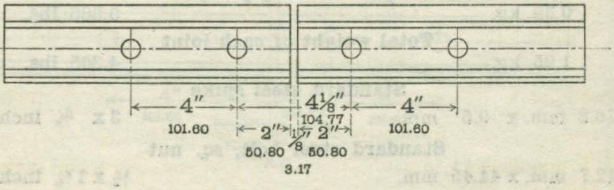
18.86 gross tons per mile of single track

280 ft. of single track per gross ton

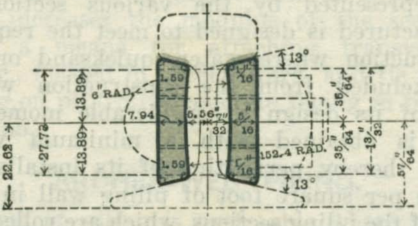
PUNCHING OF RAIL.

Center of web

15.87 mm. **Dia. of holes** 5/8 inch



SPLICE BAR SECTION 120A.



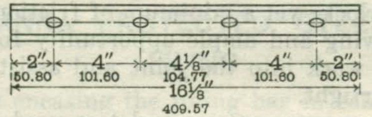
FLAT SPLICE BAR.

2.00 kg. per meter — 1.36 lbs. per foot

PUNCHING OF FLAT SPLICE BAR.

Elliptical holes

14.29 mm. x 19 mm. — 9/16 x 3/4 inch



Weight of splice bars, per pair

1.56 kg. — 3.44 lbs.

Weight of bolts, per joint

0.39 kg. — 0.865 lbs.

Total weight of each joint

1.95 kg. — 4.305 lbs.

Standard steel spike

76.2 mm. x 9.5 mm. — 3 x 3/8 inches

Standard steel bolt, sq. nut

12.7 mm. x 44.45 mm. — 1/2 x 1 3/4 inches

LACKAWANNA STEEL SHEET PILING.

LACKAWANNA STEEL SHEET PILING as represented by the various sections manufactured is designed to meet the requirements of construction where water, quicksand or earth is to be excluded from the construction work. On account of its design a considerable moment of resistance is obtained with a minimum weight of material, thereby permitting of its installation at a low price per square foot of piling wall in place.

Each of the piling sections, which are rolled integral, are simple, strong, easily driven and are capable of interlocking with each other. No fabrication is required to form the interlock, hence there are no rivets, bolts or parts to loosen, shear off, or cause high friction in driving or pulling.

The interlock consists of similar hooks and guards on both edges of the pile. The interlocked joint is flexible through an equal arc at each edge. There are three lines of contact between the interlocked members of each joint, so that there is a positive, double interlock; yet a minimum of friction in driving or withdrawing and ample opportunity for displaced material to work into the joint and assist in rendering it watertight.

Types of corners, crosses and tees used as junction members can be furnished as illustrated on page 115.

STRAIGHT-WEB PILING.

This type is suitable for general work and for any construction requiring high tensional and compressive resistance in the section and interlocked joint, as in self-contained cofferdams made up of square. circular or rectangular filled pockets.

CENTER-FLANGE PILING.

This type is designed for any construction requiring high tensional and compressive strength in the web and joint, together with a high transverse strength. The center flange acts as a stiffener to the web, increases the modulus of the section and furnishes a means for attaching transverse ties, braces, etc., needed in special work, and tie rods used in binding on protective concrete facing in permanent construction.

ARCHED-WEB PILING.

This type of piling is preferable where the transverse strength of the pile is of primary importance. The modulus and moment of resistance of the pile section, per unit of pile width is high. A wall of this Arched-Web Piling, however, is very thin in proportion to its transverse strength, having no greater thickness at any point than the thickness of the interlocked joints. Where waling timbers are used the arching of the web prevents distortion of the section when transmitting its load.

LACKAWANNA PROTECTED STEEL SHEET PILING

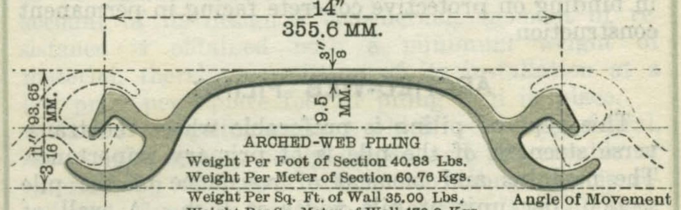
is made by encasing the piling bar in concrete before it is driven. The facing is mechanically and adhesively bonded to the steel and so formed as to permit driving of the pile with the protective concrete facing attached.

Protected piling can be furnished using all types of Lackawanna piling.

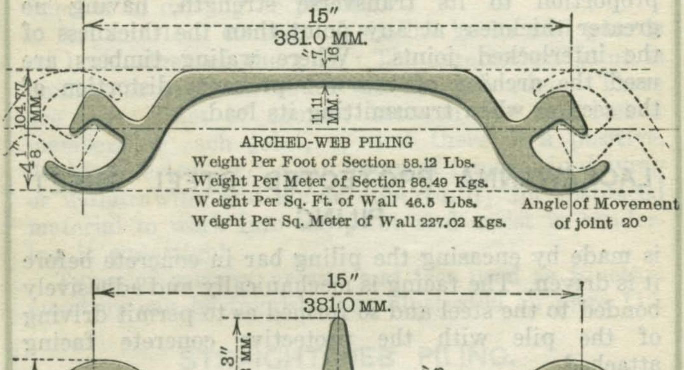
General information and weights of our steel sheet piling are given under the profiles of each section. Additional information on this subject can be had by referring to our steel sheet piling catalogue and special bulletins, which can be secured by applying to the general sales office, or the nearest district sales office.

LACKAWANNA STEEL SHEET PILING.

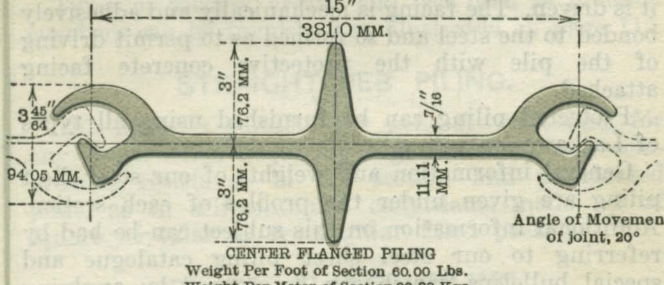
These three sections have an exceptionally high modulus per inch of width. For further details of properties and uses see special bulletins.



ARCHED-WEB PILING
Weight Per Foot of Section 40.83 Lbs.
Weight Per Meter of Section 60.76 Kgs.
Weight Per Sq. Ft. of Wall 35.00 Lbs.
Weight Per Sq. Meter of Wall 170.9 Kgs.



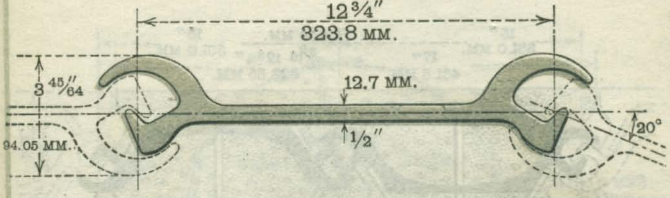
ARCHED-WEB PILING
Weight Per Foot of Section 58.12 Lbs.
Weight Per Meter of Section 86.49 Kgs.
Weight Per Sq. Ft. of Wall 46.5 Lbs.
Weight Per Sq. Meter of Wall 227.02 Kgs.



CENTER FLANGED PILING
Weight Per Foot of Section 60.00 Lbs.
Weight Per Meter of Section 89.29 Kgs.
Weight Per Sq. Ft. of Wall 48.00 Lbs.
Weight Per Sq. Meter of Wall 234.34 Kgs.

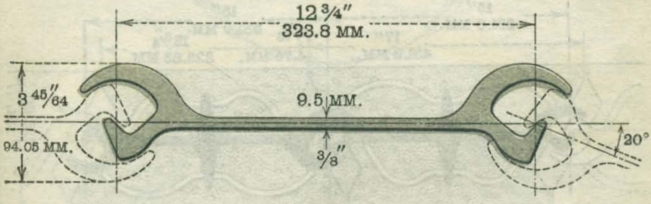
LACKAWANNA STEEL SHEET PILING.

For further details of properties and uses see special bulletins.



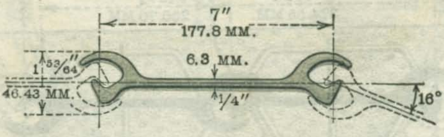
STRAIGHT-WEB PILING 12¾" × ½" (323.8 mm. × 12.7 mm.)

Wt. per ft. of section = 42.50 lbs. Wt. per meter of sec. = 63.25 kgs.
" " sq. ft. of wall = 40.00 lbs. " " sq. meter of wall = 195.32 kgs.



STRAIGHT-WEB PILING 12¾" × ⅜" (323.8 mm. × 9.5 mm.)

Wt. per ft. of section = 37.18 lbs. Wt. per meter of sec. = 55.36 kgs.
" " sq. ft. of wall = 35.00 lbs. " " sq. meter of wall = 170.90 kgs.

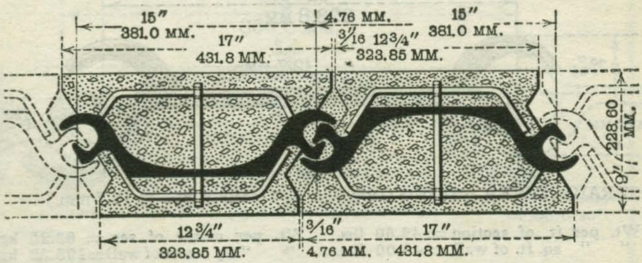


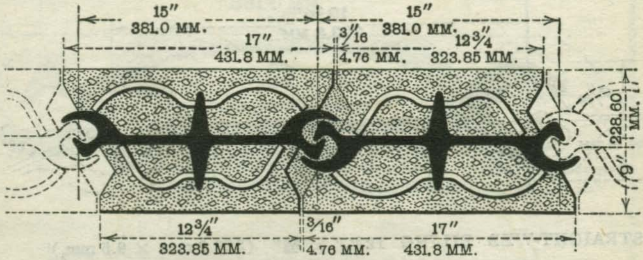
STRAIGHT-WEB PILING 7" × ¼" (177.8 mm. × 6.3 mm.)

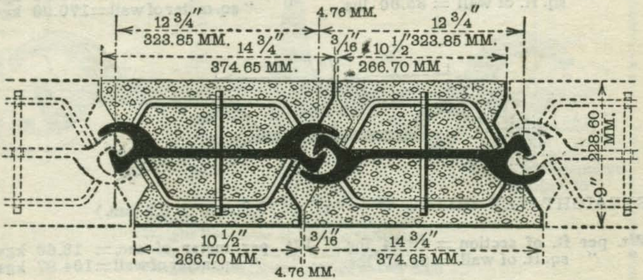
Wt. per ft. of section = 12.54 lbs. Wt. per meter of sec. = 18.60 kgs.
" " sq. ft. of wall = 21.50 lbs. " " sq. meter of wall = 104.97 kgs.

LACKAWANNA PROTECTED STEEL SHEET PILING.

For further details of properties and uses see special bulletin.



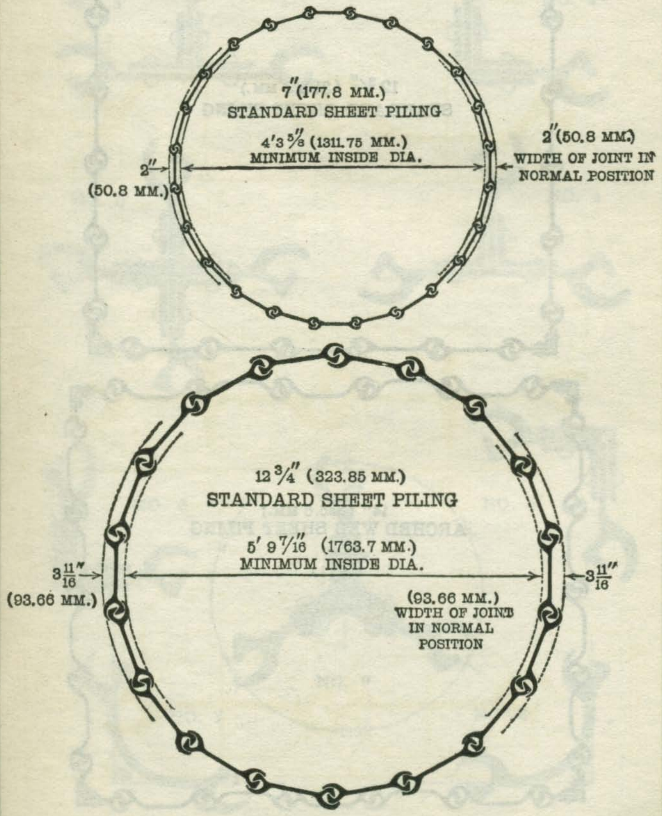




LACKAWANNA STEEL SHEET PILING.

COFFERDAMS AND OPEN CAISSON FORMS.

CIRCULAR CONSTRUCTION.



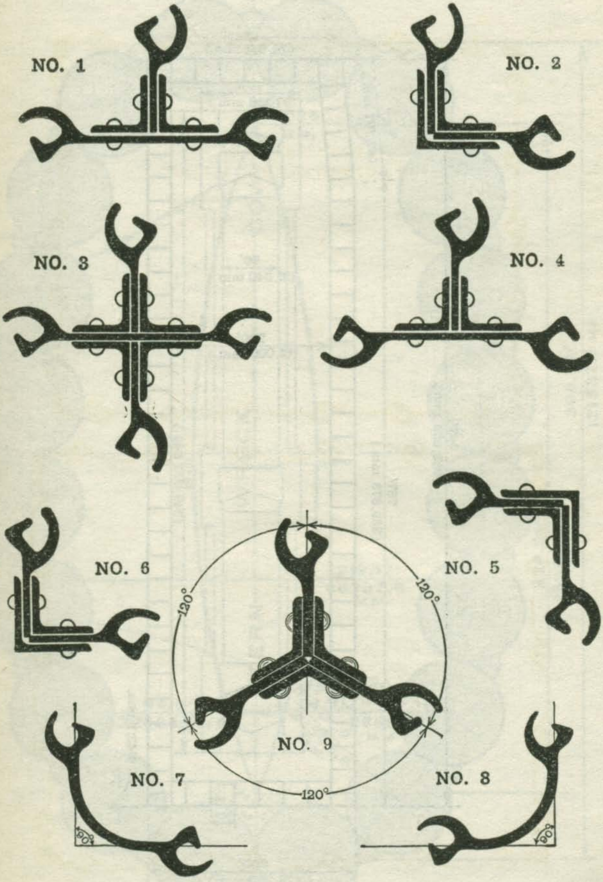
LACKAWANNA STEEL SHEET PILING.

COFFERDAMS AND OPEN CAISSON FORMS.

RECTANGULAR CONSTRUCTION.

LACKAWANNA STEEL SHEET PILING.
STANDARD CORNERS, CROSS AND TEES.

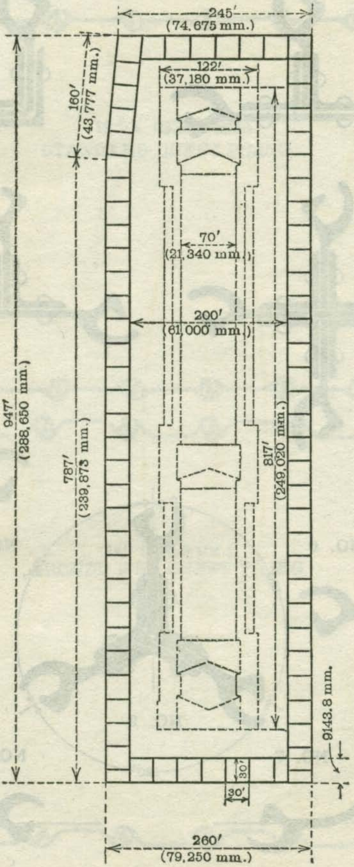
THESE CORNERS AND TEES ARE SUITABLE FOR ALL SECTIONS.



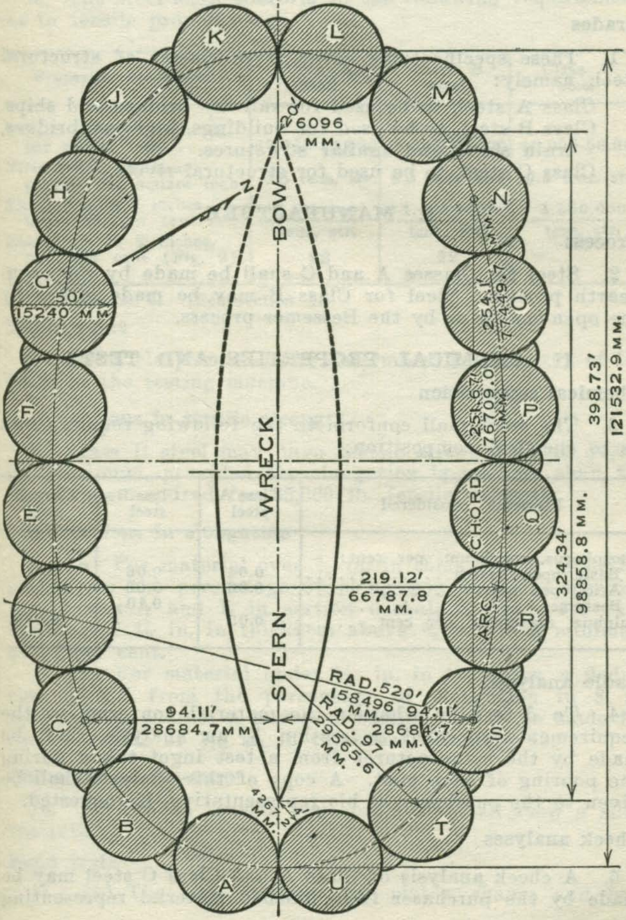
LACKAWANNA STEEL SHEET PILING.

GENERAL PLAN FOR SELF-SUSTAINING COFFERDAM.

(Drawing represents cofferdam as built for United States ship canal at Black Rock Harbor, Buffalo, New York.)



COFFERDAM OF LACKAWANNA STEEL SHEET PILING USED IN RAISING THE U. S. S. MAINE.



MANUFACTURERS' STANDARD SPECIFICATIONS.

Revision of 1914

STRUCTURAL STEEL

Grades

1. These specifications cover three classes of structural steel, namely:

Class A steel, to be used for railway bridges and ships.
Class B steel, to be used for buildings, highway bridges, train sheds and similar structures.
Class C steel, to be used for structural rivets.

I. MANUFACTURE

Process

2. Steel for Classes A and C shall be made by the open-hearth process. Steel for Class B may be made either by the open-hearth or by the Bessemer process.

II. CHEMICAL PROPERTIES AND TESTS

Chemical composition

3. The steel shall conform to the following requirements as to chemical composition:

Elements considered	Class A steel	Class B steel	Class C steel
Phosphorus, maximum, per cent:			
Basic open hearth..............	0.04	0.06	0.04
Acid open hearth...............	0.06	0.08	0.04
Bessemer		0.10	
Sulphur, maximum, per cent.......	0.05		0.045

Ladle analyses

4. To determine whether the material conforms to the requirements specified in section 3, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. A copy of this analysis shall be given to the purchaser or his representative, if requested.

Check analyses

5. A check analysis of Class A and Class C steel may be made by the purchaser from finished material representing

each melt, in which case an excess of 25 per cent above the requirements specified in section 3 shall be allowed.

III. PHYSICAL PROPERTIES AND TESTS

Tension tests

6. The steel shall conform to the following requirements as to tensile properties:

Properties considered	Class A steel	Class B steel	Class C steel
Tensile strength, pounds per square inch........	55,000-65,000	55,000-65,000*	46,000-56,000
Yield point, minimum, pounds per square inch.	0.5 tens. str.	0.5 tens. str.	0.5 tens. str.
Elongation in 8 inches, minimum, per cent.....	1,400,000† / tens. str.	1,400,000† / tens. str.	1,400,000 / tens. str.
Elongation in 2 inches. min. per cent (Fig. 2).	22	22	

*See section 8. †See section 9.

Yield point

7. The yield point shall be determined by the drop of the beam of the testing machine.

Modifications in tensile strength

8. Class B steel may have tensile strength up to 70,000 lb. maximum, provided the elongation is not less than the percentage required for 65,000 lb. tensile strength.

Modifications in elongation

9. (a) For material over ¾ in. in thickness, a deduction of 1 from the percentage of elongation in 8 in. specified for Classes A and B in section 6 shall be made for each increase of ⅛ in. in thickness above ¾ in., to a minimum of 18 per cent.

(b) For material under 5⁄16 in. in thickness, a deduction of 2.5 from the percentage of elongation in 8 in. specified for Classes A and B in section 6 shall be made for each decrease of 1⁄16 in. in thickness below 5⁄16 in.

Character of fracture

10. All broken tension test specimens shall show a silky fracture.

Bend tests

11. (a) The test specimen for plates, shapes and bars

shall bend cold through 180 deg. without fracture on the outside of the bent portion, as follows. For material ¾ in. and under in thickness, flat on itself; for material over ¾ in. up to 1¼ in. in thickness, around a pin the diameter of which is equal to 1½ times the thickness of the specimen; and for material over 1¼ in. in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

(b) The test specimen for pins and rollers shall bend cold through 180 deg. around a 1-in. pin without fracture on the outside of the bent portion.

(c) A rivet rod shall bend cold through 180 deg. flat on itself without fracture on the outside of the bent portion.

(d) Bend tests may be made by pressure or by blows.

Test specimens

12. (a) Tension and bend test specimens shall be taken from the finished rolled or forged product, and shall not be annealed or otherwise treated, except as specified in section 13.

(b) Tension and bend test specimens for plates, shapes and bars, except as specified in paragraph (c), shall be of the full thickness of material as rolled, and with both edges milled to the form and dimensions shown in Fig. 1, or may have both edges parallel.

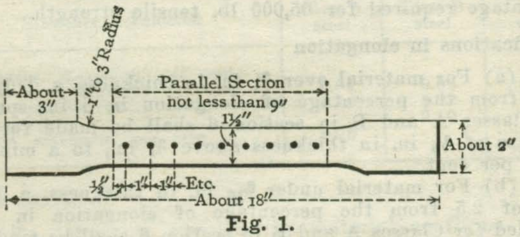


Fig. 1.

(c) Tension and bend test specimens for plates and bars (except eye-bar flats) over 1½ in. in thickness or diameter may be turned or planed to a diameter or thickness of at least ¾ in. for a length of at least 9 in.

(d) Tension and bend test specimens for pins and rollers shall be taken parallel to the axis, 1 in. from the surface of the bar. Tension test specimens shall be of the form and dimensions shown in Fig. 2. Bend test specimens shall be 1 in. by ½ in. in section.

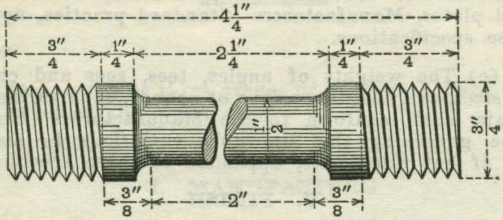


Fig. 2.

(e) Rivet bars shall be tested in full-size section as rolled.

Annealed specimens

13. Test specimens for material which is to be annealed or otherwise treated before use, shall be cut from properly annealed or similarly treated short lengths of the full section of the piece.

Number of tests

14. (a) At least one tension test and one bend test shall be made from each melt. If material from one melt differs ⅜ in. or more in thickness, tests shall be made from both the thickest and the thinnest material rolled.

(b) If any test specimen develops flaws, or if an 8-in. tension test specimen breaks outside the middle third of the gauge length, or if a 2-in. tension test specimen breaks outside the gauge length, it may be discarded and another specimen substituted therefor.

(c) Material intended for fillers or ornamental purposes will not be subject to test.

IV. PERMISSIBLE VARIATIONS IN WEIGHT AND GAUGE

Permissible variations

15. (a) The sectional area or weight of each structural shape, and of each rolled-edge plate up to and including 36 inches in width, shall not vary more than 2.5 per cent from theoretical or specified amounts.

(b) The thickness or weight of each universal plate over 36 inches in width, and of each sheared plate, shall conform to the schedules of permissible variations for sheared plates, Manufacturers' Standard practice, appended to these specifications.

(c) The weights of angles, tees, zees and channels of bar sizes, and the dimensions of rounds, squares, hexagons and flats, shall conform to the Manufacturers' Standard practice governing the allowable variations in size and weight of hot-rolled bars, appended to these specifications.

V. FINISH

Finish

16. The finished material shall be free from injurious defects, and shall have a workmanlike finish.

VI. MARKING

Marking

17. The name of the manufacturer and the melt number shall be legibly marked, stamped or rolled upon all finished material, except that each pin and roller shall be stamped on the end. Rivet and lattice steel and other small pieces may be shipped in securely fastened bundles, with the above marks legibly stamped on attached metal tags. Test specimens shall have their melt numbers plainly marked or stamped.

VII. INSPECTION AND REJECTION

Inspection

18. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

Rejection

19. Material which, subsequent to the above tests at the mills and its acceptance there, develops weak spots, brittleness, cracks or other imperfections, or is found to have injurious defects, may be rejected at the shop, and shall then be replaced by the manufacturer at his own cost.

BOILER STEEL

Grades

1. There shall be three grades of steel for boilers, namely: flange, firebox, and boiler rivet.

I. MANUFACTURE

Process

2. The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

Chemical composition

3. The steel shall conform to the following requirements as to chemical composition:

Elements considered	Flange steel	Firebox steel	Boiler rivet steel
Manganese, per cent	0.30 to 0.60	0.30 to 0.50	0.30 to 0.50
Phosphorus, maximum, per cent:			
Basic	0.04	0.035	0.04
Acid	0.05	0.04	0.04
Sulphur, maximum, per cent	0.05	0.04	0.045

Ladle analyses

4. To determine whether the material conforms to the requirements specified in section 3, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. A copy of this analysis shall be given to the purchaser or his representative.

Check analyses

5. A check analysis may be made by the purchaser from a broken tension test specimen representing each plate as rolled, and this analysis shall conform to the requirements specified in section 3.

III. PHYSICAL PROPERTIES AND TESTS

Tension tests

6. The steel shall conform to the following requirements as to tensile properties:

Properties considered	Flange steel	Firebox steel	Boiler rivet steel
Tensile strength, pounds per square inch........	55,000-65,000	52,000-62,000	45,000-55,000
Yield point, minimum, pounds per square inch.	0.5 tens. str.	0.5 tens. str.	0.5 tens. str.
Elongation in 8 inches, minimum, per cent.....	$\frac{1,450,000^{*}}{\text{tens. str.}}$	$\frac{1,450,000^{*}}{\text{tens. str.}}$	$\frac{1,450,000}{\text{tens. str.}}$

* See section 8.

Yield point

7. The yield point shall be determined by the drop of the beam of the testing machine.

Modifications in elongation

8. The following modifications will be allowed in the requirement as to elongation specified in section 6:

(a) For plates over ¾ in. in thickness, a deduction of 0.5 from the specified percentage of elongation will be allowed for each increase of ⅛ in. in thickness above ¾ in., to a minimum of 20 per cent.

(b) For plates under 5/16 in. in thickness, a deduction of 2.5 from the percentage of elongation specified in section 6 shall be made for each decrease of 1/16 in. in thickness below 5/16 in.

Bend tests

9. (a) Cold-bend tests shall be made on the material as rolled.

(b) Quench-bend test specimens, before bending, shall be heated to a light cherry red as seen in the dark (about 1200 deg. F.), and quenched in water the temperature of which is about 80 deg. F.

(c) Specimens for cold-bend and quench-bend tests of flange and firebox steel shall bend through 180 deg. without fracture on the outside of the bent portion, as follows: For material ¾ in. and under in thickness, flat on themselves; for material over ¾ in. up to 1¼ in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for material over 1¼ in. in thickness, around a pin the diameter of which is equal to 1½ times the thickness of the specimen.

(d) Specimens for cold-bend and quench-bend tests of boiler rivet steel shall bend cold through 180 deg. flat on themselves without fracture on the outside of the bent portion.

(e) Bend tests may be made by pressure or by blows.

Test specimens

10. (a) Tension and bend test specimens for plates shall be taken from the finished product, and shall be of the full thickness of material as rolled. Tension test specimens shall be of the form and dimensions shown in Fig. 1. Bend test specimens shall be 1½ in. to 2½ in. wide, and shall have the sheared edges milled or planed.

(b) The tension and bend test specimens for rivet bars shall be of the full-size section of material as rolled.

Number of tests

11. (a) One tension, one cold-bend, and one quench-bend test shall be made from each plate as rolled.

(b) Two tension, two cold-bend, and two quench-bend tests shall be made for each melt of rivet steel

(c) If any test specimen develops flaws, or if a tension test specimen breaks outside the middle third of the gauge length, it may be discarded and another specimen substituted therefor.

IV. PERMISSIBLE VARIATIONS IN WEIGHT AND GAUGE

Permissible variations

12. (a) The thickness or weight of each sheared plate shall conform to the schedule of permissible variations, Manufacturers' Standard practice, appended to these specifications.

(b) The dimensions of rivet bars shall conform to the Manufacturers' Standard practice governing allowable variations in the size of hot-rolled bars, appended to these specifications.

V. FINISH

Finish

13. The finished material shall be free from injurious defects, and shall have a workmanlike finish.

VI. MARKING

Marking

14. The melt or slab number, name of the manufacturer, grade, and minimum tensile strength for its grade as specified in section 6 shall be legibly stamped on each plate. The melt or slab number shall be legibly stamped on each test specimen representing that melt or slab.

VII. INSPECTION AND REJECTION

Inspection

15. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

Rejection

16. Material which, subsequent to the above tests at the mills and its acceptance there, develops weak spots, brittleness, cracks or other imperfections, or is found to have injurious defects, may be rejected at the shop, and shall then be replaced by the manufacturer at his own cost.

PERMISSIBLE VARIATIONS IN GAUGE AND WEIGHT OF SHEARED PLATES.

(Manufacturers' Standard Practice Adopted 1914.)

When ordered to gauge, the thickness of each plate shall not vary more than 0.01 inch under that ordered, and the over weight of each plate shall not exceed the amount given in the following table:

Gauge ordered	Permissible excess in weight of plate for width given, expressed in percentage of nominal weight.								
	Under 48 in.	48 in. incl. to 60 in. excl.	60 in. incl. to 72 in. excl.	72 in. incl. to 84 in. excl.	84 in. incl. to 96 in. excl.	96 in. incl. to 108 in. excl.	108 in. incl. to 120 in. excl.	120 in. incl. to 132 in. excl.	132 in. and over
Under 1/8	13	15	17	20					
1/8 incl. to 3/16 excl.	11	13	15	17					
3/16 incl. to 1/4 excl.	9	10	12	14	17	20	23		
1/4 incl. to 5/16 excl.	8	9	10	12	14	17	20	23	26
5/16 incl. to 3/8 excl.	7	8	9	10	12	14	17	20	23
3/8 incl. to 7/16 excl.	6	7	8	9	10	12	14	17	20
7/16 incl. to 1/2 excl.	5	6	7	8	9	10	12	14	17
1/2 incl. to 5/8 excl.	4	5	6	7	8	9	10	12	14
5/8 incl. to 3/4 excl.	3.5	4	5	6	7	8	9	10	12
3/4 incl. to 1 excl.	3	3.5	4	5	6	7	8	9	10
1 and over	3	3	3.5	4	5	6	7	8	9

PERMISSIBLE VARIATIONS IN GAUGE AND WEIGHT OF SHEARED PLATES.

(Manufacturers' Standard Practice Adopted 1914.)

One cubic inch of rolled steel is assumed to weigh 0.2833 pound.

When ordered to weight per square foot, the weight of each plate shall not vary, from the weight ordered, more than the amount given in the following table:

Weight ordered Lbs. per sq. ft.	Permissible variations in weight of plate for width given, expressed in percentage of ordered weight.																	
	Under 48 in.		48 in. incl. to 60 in. excl.		60 in. incl. to 72 in. excl.		72 in. incl. to 84 in. excl.		84 in. incl. to 96 in. excl.		96 in. incl. to 108 in. excl.		108 in. incl. to 120 in. excl.		120 in. incl. to 132 in. excl.		132 in. and over	
	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under
Under 5	6	4	6.5	4	7	4	8	4										
5 incl. to 7.5 excl.	5.5	4	6	4	6.5	4	7.5	4										
7.5 incl. to 10 excl.	5	4	5.5	4	6	4	7	4	8	4	10	4	11	5				
10 incl. to 12.5 excl.	4.5	3	5	3	5.5	4	6	4	7	4	7.5	4	9	4	10	4	12	5
12.5 incl. to 15 excl.	4	3	4.5	3	4.5	4	5	4	5.5	4	6	4	7	4	9	4	11	4
15 incl. to 17.5 excl.	3.5	2.5	4	2.5	4	3	4.5	3	4.5	3.5	5	4	6	4	8	4	10	4
17.5 incl. to 20 excl.	3	2.5	3.5	2.5	3.5	3	4	3	4.5	3	5	3	6	4	7	4	9	4
20 incl. to 25 excl.	2.5	2.5	3	2.5	3.5	2.5	3.5	3	4	3	4.5	3	5	4	6	4	8	4
25 incl. to 30 excl.	2.5	2.5	2.5	2.5	2.5	2.5	3	2.5	3.5	2.5	4	3	4.5	4	5	4	7	4
30 incl. to 40 excl.	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	2.5	3.5	2.5	4	3.5	4.5	4	6.5	4
40 and over	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	2.5	3.5	2.5	4	3	4.5	3.5	6	4

ALLOWABLE VARIATIONS IN WEIGHT OF BAR SIZES OF ANGLES, TEES, ZEES AND CHANNELS.

(Manufacturers' Standard Practice. Adopted 1910)

For bar sizes of angles, tees, zees and channels the following average variations in weight will be permitted for sections of the various dimensions and thicknesses stated, namely:

Dimensions	Thickness	Variation in weight over and under
Any dimension over 1½ in.	Over 3/16 in.	4 per cent
All dimensions 1½ in. and less	Over 3/16 in.	5 per cent
Any dimension over 1½ in.	3/16 in. and less	6 per cent
All dimensions 1½ in. and less	3/16 in. and less	7 per cent

NOTE—A channel is in "bar" size when its greatest dimension is less than 3 in. An angle, tee or zee is in "bar" size when its greatest dimension is less than 3 in.; or when it is 3 in. or more and at the same time the thickness is less than ¼ in.

MANUFACTURERS' STANDARD SPECIFICATIONS FOR OPEN-HEARTH STEEL BLOOMS, BILLETS AND SLABS FOR FORGING PURPOSES.

Adopted 1912.

I. MANUFACTURE.

Process

1. The steel shall be made by the open-hearth process.

Discard

2. A sufficient discard shall be made from the top of each ingot to secure freedom from injurious piping and undue segregation.

II. CHEMICAL PROPERTIES AND TESTS.

Chemical Composition

3. The steel shall conform to the following requirements as to chemical composition:

Element	Class	Least range to be specified	Allowable variation on check analysis outside of range specified: Under	Allowable variation on check analysis outside of range specified: Over
Carbon	Up to .10, .11 or .12	....	....	.02
	.10 to .25	.05	.02	.05
	.26 to .60	.10	.02	.05
	.61 to .90	.15	.02	.08
Manganese	Up to .60	.20	.05	.05
	.61 and over	.30	.05	.05
		Least maximum to be specified		
Phosphorus	....	.040	....	.010
Sulphur	....	.045	....	.010

Class

4. The class shall be determined by the upper limit specified for carbon and manganese.

Ladle Analyses

5. To determine whether the material conforms to the requirements specified in section 3, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. If requested, a copy of this analysis shall be given to the purchaser or his representative.

Check Analyses

6. Check analyses may be made by the purchaser in accordance with the standard methods of sampling for check analysis adopted by the Association of American Steel Manufacturers, and these analyses shall conform to the requirements specified in section 3.

III. WORKMANSHIP AND FINISH.

Chipping

7. Chipping shall be done in such a manner as not to cause any imperfections when the billets, blooms and slabs are properly forged.

Finish

8. Billets, blooms and slabs shall be free from all injurious defects.

IV. MARKING.

Marking

9. The melt number shall be legibly stamped on each billet, bloom and slab.

V. INSPECTION AND REJECTION.

Inspection

10. (a) The inspector, representing the purchaser, shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

Rejection

11. Billets, blooms and slabs which show injurious defects while being finished by the purchaser may be rejected, and the manufacturer shall be notified.

Rehearing

12. Samples tested in accordance with section 10 (b) which represent rejected material, shall be preserved for one month from the date of the test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

MANUFACTURERS' STANDARD PRACTICE.

Adopted 1912.

STANDARD METHODS OF SAMPLING FOR CHECK ANALYSIS.

INTRODUCTION.

It is a recognized fact that the different parts of a piece of steel are liable to vary in composition. This variation occurs principally between the center and the outside, and to a slighter extent is dependent upon the position of the piece in the ingot, and the size of the ingot.

Where a sufficient number of check analyses have been made from drillings properly taken at different points in the heat to represent it fairly, their average has been found to compare favorably with the ladle analysis, which is the analysis of a small test ingot taken at any time during the pouring of the heat.

From this it is evident:

1. That the ladle analysis is more representative of the composition than any single analysis of the finished material.

2. That drillings for check analysis, to be fairly representative, should be taken at a point intermediate between the outside and the center of the cross-section.

3. That a sufficient number of check analyses of different pieces should be made to afford a fair average to compare with the ladle analysis.

1, POINTS TO BE OBSERVED IN THE SAMPLING OF MATERIAL FOR CHECK ANALYSIS

(a) Each heat in a lot shall be considered separately, and pieces for sampling shall be taken to represent the heat as fairly as possible.

(b) Samples must be drillings or chips cut by some machine tool without the application of water, oil or other lubricant, and shall be free from scale, grease, dirt or other foreign substance. If samples are taken by drilling, the size of the drill shall be not less than ½″ nor more than ¾″ in diameter.

(c) Samples must be uniformly fine and each must be carefully mixed before analysis.

(d) In referring samples to the manufacturer or other analysts for check analysis, a piece of the full size section, when possible, should be submitted rather than cuttings, unless the latter are specially requested.

(e) Where material has been subjected to heat treatment other than annealing or simple cooling, subsequent to its manufacture, it should be annealed before sampling.

(f) Check analyses are not representative of the original material when its composition has been altered in any way by some operation such as casehardening, overheating, etc.

2. METHODS OF OBTAINING SAMPLES FOR CHECK ANALYSIS.

Material has been divided into the following classes, depending upon the manner of sampling:

I. MATERIAL SUBJECT TO PHYSICAL REQUIREMENTS.

Samples for check analysis shall be taken from a test specimen. Where it is required to make additional check analyses, samples shall be taken as indicated under II.

II. MATERIAL NOT SUBJECT TO PHYSICAL REQUIREMENTS.

(a) Special cast, rolled or forged, semi-finished material of large size, such as ingots, blooms, billets, slabs, rounds, shapes, etc., subject to acceptance on check analysis.

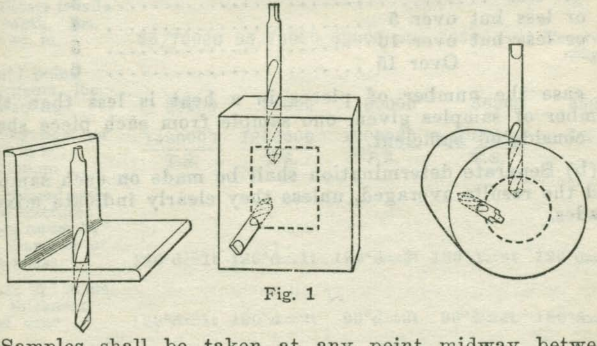


Fig. 1

Samples shall be taken at any point midway between the outside and the center by drilling parallel to the axis.

In cases where this method is not practicable, a piece may be drilled on the side, but drillings shall not be taken until they represent the portion midway between the outside and the center. See Fig. 1.

(b) Small or thin material, such as plates, shapes, bars, etc., subject to acceptance on check analysis.

Material for which the previous method is not applicable shall have samples for analysis taken entirely through the material at a point midway between the outside and the center, or by machining off the entire cross-section.

(c) Commercial material subject to acceptance on ladle analysis.

The methods described under II (a) and (b) shall apply, except that samples shall be taken at any point one-third of the distance from the outside to the center.

3. METHODS OF ANALYSIS.

Analyses shall be made by well-known accurate methods. Carbon shall be determined by the combustion method.

4. REJECTION OF MATERIAL ON CHECK ANALYSIS.

Any rejection of material ordered to a specific chemical range shall be based on the following:

(a) The minimum number of samples to be taken from a heat before rejection by the purchaser shall be as follows:

Weight in gross tons	Minimum number of samples
5 or less	3
10 or less but over 5	4
15 or less but over 10	5
Over 15	6

In case the number of pieces in a heat is less than the number of samples given, one sample from each piece shall be considered sufficient.

(b) Separate determination shall be made on each sample and the results averaged, unless they clearly indicate mixed grades.

MANUFACTURERS' STANDARD SPECIFICATIONS FOR CONCRETE REINFORCEMENT BARS ROLLED FROM BILLETS.

Adopted 1910.
Revised 1912.

MANUFACTURE

1. Steel may be made by either the open-hearth or Bessemer process. Bars shall be rolled from standard new billets.

CHEMICAL AND PHYSICAL PROPERTIES

2. The chemical and physical properties shall conform to the following limits:

Properties considered	Structural steel grade Plain bars	Structural steel grade Deformed bars	High grade Plain bars	High grade Deformed bars	Cold-twisted bars
Phosphorus maximum					
Bessemer	.10	.10	.10	.10	.10
Open-hearth	.06	.06	.06	.06	.06
Ultimate tensile strength, lbs. per sq. in.	55/70000	55/70000	80000 min.	80000 min.	Recorded only
Yield point, minimum, lbs. per sq. in.	33000	33000	50000	50000	55000
Elongation, per cent in 8″, minimum	$\frac{1400000}{\text{T.S.}}$	$\frac{1250000}{\text{T.S.}}$	$\frac{1200000}{\text{T.S.}}$	$\frac{1000000}{\text{T.S.}}$	5%
Cold bend without fracture:					
Bars under ¾″ in diameter or thickness	180° d=1t	180° d=1t	180° d=3t	180° d=4t	180° d=2t
Bars ¾″ in dia. or thickness and over	180° d=1t	180° d=2t	90° d=3t	90° d=4t	180° d=3t

The hard grade will be used only when specified.

CHEMICAL DETERMINATIONS.

3. In order to determine if the material conforms to the chemical limitations prescribed in paragraph 2 herein, analysis shall be made by the manufacturer from a test ingot taken at the time of the pouring of each melt or blow of steel, and a correct copy of such analysis shall be furnished to the engineer or his inspector.

YIELD POINT.

4. For the purposes of these specifications, the yield point shall be determined by careful observation of the drop of the beam of the testing machine, or by other equally accurate method.

FORM OF SPECIMENS.

5. (a) Tensile and bending test specimens may be cut from the bars as rolled, but tensile and bending test specimens of deformed bars may be planed or turned for a length of at least 9 inches if deemed necessary by the manufacturer in order to obtain uniform cross-section.

(b) Tensile and bending test specimens of cold-twisted bars shall be cut from the bars after twisting, and shall be tested in full size without further treatment, unless otherwise specified as in (c), in which case the conditions therein stipulated shall govern.

(c) If it is desired that the testing and acceptance for cold-twisted bars be made upon the hot rolled bars before being twisted, the hot rolled bars shall meet the requirements of the structural steel grade for plain bars shown in this specification.

NUMBER OF TESTS

6. At least one tensile and one bending test shall be made from each melt of open-hearth steel rolled and from each blow or lot of ten tons of Bessemer steel rolled. In case bars differing ⅜ inch and more in diameter or thickness are rolled from one melt or blow, a test shall be made from the thickest and thinnest material rolled. Should either of these test specimens develop flaws, or should the tensile test specimen break outside of the middle third of its gauged length it may be discarded and another test specimen substituted therefor. In case a tensile test specimen does not meet the specifications, an additional test may be made.

(d) The bending test may be made by pressure or by light blows.

MODIFICATIONS IN ELONGATION FOR THIN AND THICK MATERIAL.

7. For bars less than 7/16 inch and more than 3/4 inch nominal diameter or thickness, the following modifications shall be made in the requirements for elongation:

(e) For each increase of 1/8 inch in diameter or thickness above 3/4 inch a deduction of 1 shall be made from the specified percentage of elongation.

(f) For each decrease of 1/16 inch in diameter or thickness below 7/16 inch, a deduction of 1 shall be made from the specified percentage elongation.

(g) The above modifications in elongation shall not apply to cold-twisted bars.

NUMBER OF TWISTS.

8. Cold-twisted bars shall be twisted cold with one complete twist in a length equal to not more than 12 times the thickness of the bar.

FINISH.

9. Material must be free from injurious seams, flaws or cracks, and have a workmanlike finish.

VARIATION IN WEIGHT.

10. Bars for reinforcement are subject to rejection if the actual weight of any lot varies more than 5% over or under the theoretical weight of that lot.

LACKAWANNA STANDARD CLASSIFICATIONS OF EXTRAS ON STRUCTURAL SHAPES.

MATERIAL TAKING BASE PRICE.

Beams and channels, 3″ to 15″.

Angles 3″ on one leg and larger, up to 6″ x 6″, inclusive, ¼″ and heavier.

Zees, 3″ and larger, ¼″ and heavier.

EXTRAS PER POUND, APPLY IN FULL

Beams, 18″, 20″ and 24″	.10c
Angles, larger than 6″ on one or both legs	.10c
Tees, 3″ and larger	.05c
Bulb angles and deck beams	.30c
For cutting to lengths under 3 feet	
Under 3′ to 2′ inclusive	.25c
Under 2′ to 1′ inclusive	.50c
Under 1′	1.55c
For cutting to a less variation than plus or minus ⅜″	.15c
This extra also applies in addition to any extra for cutting to lengths under 3 feet.	
Oiling or painting	.10c
Cambering	.25c

LACKAWANNA STEEL SHEET PILING.

7″ and 12¾″ Straight-web, 14″ and 15″ Arched-web and 15″ Center-flange sections punched with one pulling hole .... base

Extras for fabricated parts, special punching, etc., will be quoted on application.

LACKAWANNA STANDARD CLASSIFICATIONS OF EXTRAS ON SHAPES AND BARS.

SHAPES UNDER 3 INCHES, ANGLES, CHANNELS AND TEES.

EXTRAS PER POUND, APPLY ONE HALF.

Gauge	½"x½" Angles and ½" Channels	⅝"x⅝" Angles and ⅝" Channels	⅝"x⅝" Tees	¾"x¾" Angles and ¾" Channels	¾"x¾" Tees	⅞"x⅞" Angles and ⅞" Channels	⅞"x⅞" Tees	1"x1" to 1⅛"x1⅛" Angles & 1" to 1⅛" Channels	1"x1" to 1⅛"x1⅛" Tees	1¼"x1¼" Angles and 1¼" Channels	1¼"x1¼" Tees	1½"x1½" Angles & Chan. 1½" & wider but under 3"	1½"x1½" Tees and wider but under 3"	3" Angles and Tees on one or both legs
3/32"	3.60c	2.60c												
⅛"	3.20c	2.20c	2.20c	.60c	1.10c	.50c	.90c	.40c	.70c	.40c	.60c	.30c	.50c	.70c
3/16"				.50c	1.10c	.40c	.90c	.30c	.60c	.30c	.50c	.20c	.40c	.70c
¼" and heavier						.40c	.90c	.30c	.60c	.30c	.40c	.20c	.20c	

For intermediate sizes, the next higher extra to be charged in all cases.

Unequal Leg Angles and Tees are subject to special prices which will be furnished on application.

STEEL BARS.

EXTRAS PER POUND, APPLY ONE HALF.

Commodity	3/16"	7/32"	15/64"	¼"	9/32"	5/16"	11/32"	⅜"	7/16"	½"	9/16"	⅝" to 11/16"	¾" to 1¾"	1 13/16" to 2½"	2 9/16" to 3 1/16"	3⅛" to 3 9/16"	3⅝" to 4 1/16"	4⅛" to 4 9/16"	4⅝" to 5"	5⅛" to 5½"	5⅝" to 6"	6⅛" to 6½"	6⅝" to 7¼"
Rounds & Squares	2.50c	2.00c	1.50c	1.00c	.80c	.70c	.60c	.50c	.40c	.20c	.20c	.10c	Base	Base	Base	.15c	.25c	.30c	.40c	.50c	.75c	1.00c	1.25c
Hexagons						1.50c	1.50c	1.30c	1.10c	.70c	.70c	50c	.30c	.30c									
Ovals								1.20c	1.00c	.80c	.60c	.50c	.30c										

For intermediate sizes, the next higher extra to be charged in all cases.

Extras for twisting squares, which are in addition to all other extras shown, will be quoted on application.

LACKAWANNA STANDARD CLASSIFICATIONS OF EXTRAS ON STEEL PLATE.

Rectangular plates conforming to Manufacturers' Standard Specifications for Structural Steel (1914) or equivalent, ¼″ thick and over on thinnest edge, 100″ wide and under, down to but not including 6″ wide of which one dimension measures 36″ or over, are base.

Steel plates up to 72″ wide, inclusive, ordered 10.2 lbs. per square foot shall be considered ¼″ plate. Steel plates over 72″ wide must be ordered ¼″ thick on edge, or not less than 11 lbs. per square foot to take base price. Steel plates over 72″ wide ordered less than 11 lbs. per square foot down to the weight of 3/16″ shall take the price of 3/16″.

Allowable overweight on plates, whether ordered to gauge or weight, to be governed by our standard specifications.

EXTRAS PER POUND, APPLY IN FULL.

Gauges lighter than ¼″ to and including 3/16″ plates on thin edges	.10c
Gauges under 3/16″ to and including No. 8	.15c
Gauges under No. 8 to and including No. 11	.25c
Widths over 100″ to 110″	.05c
Widths over 110″ to 115″	.10c
Widths over 115″ to 120″	.15c
Widths over 120″ to 125″	.25c
Widths over 125″ to 130″	.50c
Widths over 130″	1.00c
Ordinary sketches (including straight taper plates, varying not more than 4″ in width at ends, narrowest end being not less than 30″)	.10c
Small sketches, or those unusually wasteful in shearing, will be quoted on application.	
Complete circles, 3′ diameter and over	.20c
Boiler and flange steel plates	.10c
"A. B. M. A." and ordinary fire-box steel plates	.20c
Still bottom steel	.30c
Marine steel	.40c
Locomotive fire-box steel	.50c
Cutting to lengths or diameters under 3′ to 2′, inclusive	.25c
Cutting to lengths or diameters under 2′ to 1′, inclusive	.50c
Cutting to lengths or diameters under 1′	1.55c

LACKAWANNA STANDARD CLASSIFICATIONS OF EXTRAS ON SHAPES AND BARS.

EXTRAS PER POUND, APPLY ONE-HALF.

CUTTING TO SPECIFIED LENGTHS.

Hot sawing or shearing to lengths 5 feet and over..	Base
Hot sawing or shearing to lengths over 24 inches to under 60 inches	.10c
Hot sawing or shearing to lengths, 12 inches to 24 inches, inclusive	.20c
Hot sawing or shearing to lengths under 12 inches..	.30c
Machine cutting to lengths over 24 inches..........	.20c
Machine cutting to lengths 12 to 24 inches inclusive..	.40c
Machine cutting to lengths less than 12 inches, extra, on application (not less than .60c).	
For cutting to less variation than plus or minus ¼"..	.30c

This extra also applies in addition to any extra for cutting to lengths under 5 feet.

MACHINE STRAIGHTENING AND CENTERING.

Machine straightening	.20c

Extra for machine straightening and centering will be furnished on application.

TWISTING EXTRAS.

Extras for twisting squares, which are in addition to all other extras shown, will be quoted on application.

CARBON DIFFERENTIALS.

Carbon .20 or less	Base
Carbon .21 to .50	.10c
Carbon .51 and over	.30c

QUANTITY DIFFERENTIALS.

All specifications for less than 2000 lbs. of a size will be subject to the following extras, the total weight of a size ordered to determine the extra, regardless of lengths and regardless of exact quantity actually shipped.

Quantities less than 2000 lbs., but not less than 1000 lbs.	.30c
Quantities less than 1000 lbs..........................	.70c

LACKAWANNA STANDARD CLASSIFICATIONS OF EXTRAS ON BARS (CONTINUED)

STEEL BARS, FLAT BARS, AND BANDS, HALF ROUNDS AND HALF OVALS.

EXTRAS PER POUND, APPLY ONE HALF.

Width	THICKNESS: Half Rounds & Half Ovals Gauges 15, 14 and 13	3/32", 7/64" and 1/8" and Gauges 12, 11 and 10: Flats	3/32", 7/64" and 1/8" and Gauges 12, 11 and 10: Half Rounds & Half Ovals	Gauges 9, 8 and 7 and 5/32" and 3/16": Flats	Gauges 9, 8 and 7 and 5/32" and 3/16": Half Rounds & Half Ovals	7/32": Flats	7/32": Half Rounds & Half Ovals	1/4" to 5/16": Flats	1/4" to 5/16": Half Rounds & Half Ovals	3/8" to 9/16": Flats	3/8" to 9/16": Half Rounds & Half Ovals	3/4": Flats	3/4": Half Rounds & Half Ovals	13/16" to 1": Flats	13/16" to 1": Half Rounds & Half Ovals	1 1/16" to 1 3/16": Flats	1 1/16" to 1 3/16": Half Rounds & Half Ovals
1 1/2" and up		.60c	1.00c	.40c	.70c	.40c	.50c	.20c	.50c	Base	.50c	Base	.50c	Base	.50c	.10c	50c
1" to 1 7/16"		.70c	1.00c	.50c	.70c	.50c	.50c	.20c	.50c	Base	.50c	Base	.50c	Base		.10c	
15/16"		.80c	1.00c	.70c	.70c	.70c	.50c	.50c	.50c	.40c	.50c	.40c					
7/8"		.80c	1.00c	.70c	.70c	.70c	.50c	.50c	.50c	.40c	.50c	.40c					
13/16"	1.40c	.80c	1.20c	.70c	.80c	.70c	.80c	.50c	.80c	.40c	.80c	.40c					
3/4"	1.40c	1.20c	1.20c	1.00c	.80c	1.00c	.80c	.50c	.80c	.40c	.80c						
11/16"	1.50c	1.20c	1.30c	1.00c	1.00c	1.00c	1.00c	.50c	1.00c	.40c							
5/8"	1.50c	1.30c	1.30c	1.20c	1.00c	1.20c	1.00c	.70c	1.00c	.50c							
9/16"	1.80c	1.30c	1.30c	1.20c	1.30c	1.20c	1.30c	.70c	1.30c	.50c							
1/2"	1.80c	1.50c	1.30c	1.30c	1.30c	1.30c	1.30c	1.20c	1.30c	1.00c							
7/16"	2.30c	2.10c	2.10c	1.80c	2.10c	1.80c	2.10c	1.60c		1.40c							
3/8"	2.70c	2.40c	2.50c	1.90c	2.50c	1.90c		2.00c									
5/16"	2.80c		2.80c		2.60c												

Width	1 1/4" to 1 1/2": Flats	1 1/4" to 1 1/2": Half Rounds & Half Ovals	1 5/8" to 2 3/4": Flats	1 5/8" to 2 3/4": Half Rounds & Half Ovals	Flats 3" and up
1 1/2" and up	.20c	.50c	.30c	.50c	.40c
1" to 1 7/16"	.20c				

For intermediate sizes, the next higher extra to be charged in all cases.

LACKAWANNA STANDARD CLASSIFICATIONS OF EXTRAS FOR RAILROAD SPIKES AND TRACK BOLTS.

STANDARD EXTRAS FOR RAILROAD SPIKES.

Per 100 Pounds.

Size	2"	2½"	3"	3½"	4"	4½"	5"	5½"	6"
⅝"								Base	Base
9/16"						Base	Base	Base	Base
½"		.20	.10	.10	.10	.10	.10		
7/16"		.30	.30	.20	.20	.20			
⅜	.50	.40	.30	.30	.30	.30			
5/16"	.80	.60	.60	.60					

REVERSE POINTS
Smallest 3" x ⅜"
Extra Quoted upon Request.

STANDARD EXTRAS FOR TRACK BOLTS.

Per 100 Pounds.

3½" and Longer by ¾" and Larger with Square Nuts Base.

Diam.	1¼" to ¾"		⅝"		9/16" and ½"		7/16"		⅜"	
Length	Sq. nut	Hex. nut	Sq. nut	Hex. nut	Sq. nut	Hex. nut	Sq. nut	Hex. nut	Sq. nut	Hex. nut
3½"	Base	.15	.30	.55						
3¼"	.05	.25	.30	.55	.75	1.10				
3"	.15	.35	.40	.65	.75	1.10				
2¾"	.25	.45	.50	.75	.90	1.25	1.55	2.00		
2½"			.60	.85	1.05	1.40	1.55	2.00	2.40	2.95
2¼"			.75	1.00	1.20	1.55	1.75	2.20	2.40	2.95
2"			.90	1.15	1.35	1.70	1.95	2.40	2.65	3.20
1¾"					1.55	1.90	2.15	2.60	2.90	3.45
1½"					1.80	2.15	2.40	2.85	3.15	3.70

We will furnish our standard button head oval neck track bolt with United States square nuts unless requested to work to blue print, sample, or the following information:

1st. Diameter of thread and whether rolled or cut.
2nd. Length under head to end of bolt.
3rd. Size of nut and whether square or hexagon.

EXPLANATION OF TABLES ON THE PROPERTIES OF ROLLED SHAPES AND NOTES ON THE FLEXURE OF BEAMS.

The tables given on pages 164 to 185 inclusive, giving the properties of I-beams, channels and angles, will furnish all the information necessary in using these shapes for usual construction.

Column No. 7 gives the section moduli, which are used to determine the fibre stress per square inch, in a shape under flexural stresses, by dividing the same into the bending moment expressed in inch-pounds. Conversely by assuming the fibre stress and dividing it into the bending moment, the section modulus is obtained and furnishes a method of determining sections.

Example: Determine section of beam span $= 20'\text{-}0'' = 240''$, load $= 10{,}000$ lbs., uniformly distributed. The formula for bending moment (No. 1, page 151).

$$M = \frac{Wl}{8} = \frac{10{,}000 \times 240}{8} = 300{,}000 \text{ inch pounds}$$

Assuming fibre stress of 16,000 pounds per square inch, we get

$$\text{Section Modulus} = \frac{300{,}000}{16{,}000} = 18.75$$

On page 166, Column 7, we find the beam having a section modulus nearest this value to be a 9-in. 21-lb. I-beam, the section modulus of which is 18.9.

Columns 12 and 13 for I-beams and 14 and 15 for channels furnish another method of determining sections by the use of the coefficients C_s or C_{s1}. The coefficient is obtained in the case of a uniformly loaded beam by multiplying the span in feet by the load in pounds and then referring to the tables for a section having a coefficient corresponding to this value.

If the loads are considered quiescent as in the case given, the coefficients for a fibre stress of 16,000 lbs. per sq. in. C_8 may be used, but if impact is apt to occur, then coefficients for a fibre stress of 12,500 lbs. should be used. Any other fibre stress alters the coefficient in a direct proportion.

Example (same as above).

$W \times L = 10{,}000 \times 20 = 200{,}000.$

Column 12, page 167, gives a 9-in. 21-lb. I-beam as having a coefficient $= 201{,}300$.

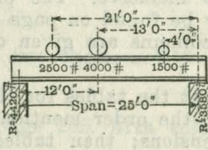
If the load is concentrated at the center of the span, multiply the given coefficient by 2 and then consider it as uniformly distributed. Under special conditions of loading, compute the maximum bending moment (as per formula given) and then multiply the same by 8.

CONCENTRATED LOADING

In the case of the loads being concentrated and distributed at irregular distances over the beam, the reactions will have to be determined by taking moments about one end of support.

Example:

R = Reaction at point of support
M = Maximum bending moment
S = Section modulus
P = Allowable fibre stress per square inch (assumed in this case to be 12,500 lbs.)



To determine the reaction at the left support we take moments about the right support thus:

$$R = \frac{1500 \text{ lbs. x } 4' + 4000 \text{ lbs. x } 13' + 2500 \text{ lbs. x } 21'}{25'} = 4420 \text{ lbs.}$$

The maximum bending moment in this case would occur under the center load; therefore—

$$M = 4420 \times 12' - 2500 \times 8' = 33040 \text{ foot-pounds.}$$

$$33040 \text{ ft. lbs.} \times 12'' = 396480 \text{ inch-pounds.}$$

$$S = \frac{M}{P} = \frac{396480}{12500} = 31.7$$

By referring to the tables of properties, column 7, page 166, we find that this will require a 10″-40-lb. I-beam, the section modulus of which is 31.7, but it would be more economical to use a 12″-31½-lb. I-beam, with a section modulus of 36.0.

COEFFICIENT OF DEFLECTION

When the deflection of a beam under a given load is desired, as for instance, the first example previously given of a 9″-21-lb. I-beam carrying a uniformly distributed load of 10,000 lbs., the coefficient given in the properties of I-beams for the above beam under column 14 of page 167 is .00000914. The deflection of the beam in inches is determined by multiplying the coefficient by the cube of the span in feet and the number of 1000 pound units contained in the load.

Thus:—$.00000914 \times 20^3 \times 10 = .731$ inches.

The deflection of a beam with a single load at the center is found in the same manner, using column number 15 but for a beam with irregular concentrated loads and beams with but one support or cantilever, it would be necessary to use the formulas given on pages 149 to 154 inclusive.

EXPLANATION OF TABLES OF DIMENSIONS, SAFE LOADS AND PROPERTIES OF STEEL COLUMNS

The properties of plate and channel columns are given on pages 213 to 219 inclusive. The properties for lattice channel columns may be found on page 249. The properties of plate and angle columns are given on pages 256 to 261 inclusive.

It will be noted that the tables for the different types of columns are given in the order mentioned above, beginning with tables of dimensions; then tables of properties and tables of safe loads for certain lengths of column.

The tables of safe loads are based on Gordon's formula for columns with square ends.

$$P = \frac{50{,}000}{1 + \frac{(12L)^2}{36000r^2}}$$

Where the use of other formulae is desired or special conditions in the design of the column are to be determined, all the necessary information will be found in the tables of properties.

STRENGTH OF STRUTS COMPOSED OF TWO ANGLES PLACED BACK TO BACK, AND I-BEAMS USED AS COLUMNS.

The safe loads for I-beams used as columns or struts are given on pages 282 to 285 inclusive. The radii of gyration and strength of steel columns or angle struts are given on pages 200 to 208 inclusive, and may be used to determine the strength of any steel column composed of rolled shapes, the length and least radius of gyration being given.

Example:

Length of strut to be 12′ 0″.

Load = 45,000 lbs.

Try two angles 5 x 3½ x ⅜″, 3½″ legs placed back to back.

The least radius of gyration = 1.02. (see page 203).

$$\frac{L}{r} = \frac{12}{1.02} = 11.75$$

Total area of two angles = 6.10 square inches.

By referring to page 205, fifth column, we find 11.8 to be the nearest value and the ultimate strength per square inch for square bearing strut is given as 32114 pounds.

Using a factor of safety of 4, we have

$$\frac{32114}{4} = 8028 \text{ lbs. per sq. in.}$$

6.10 x 8028 lbs. = 48970 lbs. = Total strength of strut.

SAFE LOADS FOR PLATE GIRDERS AND BEAM BOX GIRDERS.

The safe loads for plate and angle girders are given on pages 289 to 293 inclusive, and for beam box girders on pages 294 to 303 inclusive. The safe loads given are inclusive of the weight of the girder and allowance has been made for deducting the rivet holes. It will be noted that these tables are for uniformly distributed loads. The safe load for girder with concentrated load at the center would be one-half of that given in the tables. For special or eccentric loading, the bending moment should be computed. The required section modulus may be found by dividing the bending moment by the allowable fibre stress per square inch, thus: $S = \frac{M}{P}$

The section moduli for the Beam Box Girders are given at the bottom of the page of safe loads, pages 294 to 303 inclusive.

GENERAL THEORY ON BEAM FLEXURE.

NOTATION.

L = Length of span in feet.

l = Length of span in inches.

D = Depth of beam in inches.

A = Area of beam in square inches.

C_1 = Distance of extreme fibre from neutral axis in inches.

I = Moment of inertia of section about gravity axis perpendicular to direction of load, in inches^4.

I_t = Moment of inertia about an axis parallel to gravity axis in inches^4, but not through center of gravity.

K = Distance between gravity axis and above axis in inches.

r = Radius of gyration in inches.

S = Section modulus in inches^3.

E = Modulus of elasticity in pounds per sq. in. (Steel = 29,000,000)

W = Total load uniformly distributed, including weight of beam in pounds.

W_1 = Total weight of beam uniformly distributed in pounds.

W_u = Total safe superimposed load uniformly distributed, in pounds.

W_c = Total safe superimposed load concentrated at middle of beam, in pounds.

M = Total bending moment due to weight of beam and superimposed load in inch-pounds.

P = Stress in extreme fibre in pounds per square inch.

Δ = Maximum deflection due to total loads.

Δ_u = Maximum deflection due to W_u in inches.

Δ_c = Maximum deflection due to W_1 and W_c in inches.

C_s = Coefficient of strength. This is the safe load in pounds uniformly distributed over a span of 12 inches for a fibre stress of 16,000 pounds per square inch.

C_{s1} = Same as above except for fibre stress of 12,500 lbs. per sq. in.

C_d = Coefficient of deflection. This is the deflection in inches due to a total load of 1,000 pounds uniformly distributed over a span of 12 inches.

C_{d1} = Coefficient of deflection for a concentrated load of 1,000 pounds at middle of span of 12 inches.

GENERAL FORMULAE

$$M = \frac{PI}{C_1} = PS \qquad S = \frac{I}{C_1} \qquad r = \sqrt{\frac{I}{A}} \qquad I_t = I + AK^2$$

$$P = \frac{MC_1}{I} = \frac{M}{S} \quad M = \frac{Wl}{8} = \frac{(W_1 + W_u)l}{8} = \frac{(W_c l}{4} + \frac{W_u l)}{8} = \frac{(W_c l}{4} + \frac{Wl)}{8}$$

GENERAL THEORY ON BEAM FLEXURE—Continued

SAFE LOADS

(1) $M = PS$

(2) $\frac{Wl}{8} = PS$

(3) and $W = \frac{8\ PS}{l}$

When $l = 12''$ and $P = 16000$

(4) $W = C_s = \frac{8}{12}\ 16000s$

(5) $C_s = \frac{2}{3}\ 16000s$

Also $C_{s1} = \frac{2}{3}\ 12500s$

To obtain safe load for any span find value of C_s or C_{s1} as desired and divide this value by the span in feet. (See tables pages 165-167-169-171.)

DEFLECTIONS

(1) Uniform section Beam, supported at each end and uniformly loaded:

$$\Delta = \frac{Wl^3}{76.8\ EI} = \frac{(W_1 + W_u)l^3}{76.8\ EI}$$

For superimposed load only $\Delta_u = \frac{W_u l^3}{76.8\ EI}$

(2) Uniform section Beam, supported at each end with concentrated load at the middle.

$$\Delta = \frac{W_c l^3}{48\ EI} + \frac{W_1 l^3}{76.8\ EI}$$

When weight of beam is not considered $\Delta_o = \frac{W_c l^3}{48\ EI}$ = Deflection to W_c only.

(3) Cantilever beam, fixed at one end, unsupported at the other end, and uniformly loaded.

$$\Delta = \frac{Wl^3}{8\ EI} = \frac{(W_1 + W_u)l^3}{8\ EI}, \text{ Due to load and weight of beam}$$

$$\Delta_u = \frac{W_u l^3}{8\ EI}, \text{ Due to weight of superimposed load only.}$$

(4) Cantilever beam fixed at one end, unsupported at the other, and concentrated load at the unfixed end.

$$\Delta = \frac{W_c l^3}{3\ EI} + \frac{W_1 l^3}{8\ EI}, \text{ Due to load and weight of beam}$$

$$\Delta_o = \frac{W_c l^3}{3\ EI}, \text{ Due to load } W_c \text{ only.}$$

$$C_d = \frac{Wl^3}{76.8\ EI} = \frac{(W_1 + W_u)l^3}{76.8\ EI}$$ When W or $(W_1 + W_u) = 1000$ lbs. and when $l = 12$ inches.

$$C_{d1} = \frac{W_c l^3}{48\ EI}, \text{ When } W_c = 1000 \text{ lbs. and } l = 12''$$

Deflection due to uniform and concentrated loads will be the sum of the deflections at that point due to the respective loads.

To find deflection for given section, length and loading, take from table of properties C_d or C_{d1}, according to whether load is uniform or concentrated and multiply this value by the length in feet of the span cubed (L^3) and by the load in units of 1000 pounds.

$$\Delta = \frac{C_d \times L^3 \times W}{1000}, \text{ uniform load}$$

$$\Delta_c = \frac{C_{d1} \times L^3 \times W_c}{1000}, \text{ Due to concentrated load } W_c \text{ only.}$$

SHEAR, BENDING MOMENTS AND DEFLECTIONS FOR BEAMS OF UNIFORM SECTION.

W = Total uniformly distributed load in lbs. (includes weight of beam).

W_u = Total uniformly distributed superimposed load in lbs.

W_1 = Weight of beam in lbs.

R, R_1, R_2, R_3 = Loads in lbs. concentrated at any point.

M = Total bending moment in inch-lbs.

I = Moment of inertia in inches^4.

l = Length of span in inches.

E = Modulus of elasticity in lbs. per sq. in. (Steel = 28,000,000-30,000,000).

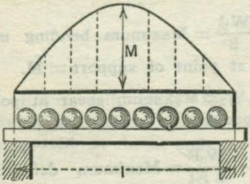
$\Delta, \Delta_u, \Delta_o$ = Deflection in inches.

W_s = Total safe load in lbs. uniformly distributed, including weight of beam.

W_1 in formulas equal zero for superimposed loads only.

On the diagrams, ordinates to the curves show graphically the bending moments at corresponding points in the beam.

(1) Beam uniformly loaded and supported at both ends.



Total load diagram:

Draw parabola having $M = \frac{Wl}{8}$

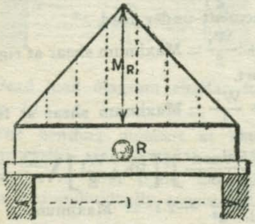
$W'_s = (W_s - W_1)$ = Safe superimposed uniformly distributed load in lbs.

$M = \frac{Wl}{8} = \frac{(W_u + W_1)l}{8}$ = Maximum bending moment at middle of beam.

$\frac{W}{2} = \frac{W_u + W_1}{2}$ = Maximum shear at points of support.

$\Delta = \frac{Wl^3}{76.8\,EI} = \frac{(W_u + W_1)l^3}{76.8\,EI}$

(2) Beam with concentrated load at middle supported at both ends.



Superimposed load diagram:

Draw triangle having $M_R = \frac{Rl}{4}$

Dead load diagram similar to case (1)

$R_s = \frac{W'_s}{2} = \frac{W_s - W_1}{2}$ = Safe concentrated load at middle of the beam in lbs.

$M = \frac{Rl}{4} + \frac{W_1 l}{8}$ = Max. bending moment at middle of beam.

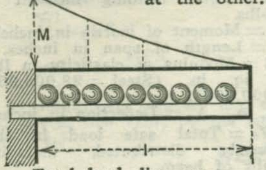
$\frac{R + W_1}{2}$ = Max. shear at support.

$\Delta = \frac{Rl^3}{48\,EI} + \frac{W_1 l^3}{76.8\,EI}$

SHEAR, BENDING MOMENTS AND DEFLECTIONS FOR BEAMS OF UNIFORM SECTION.

(For explanation of notation, see top of page 151)

(3) Beam uniformly loaded, fixed at one end, unsupported at the other.



Total load diagram:

Draw parabola having $M = \frac{Wl}{2}$

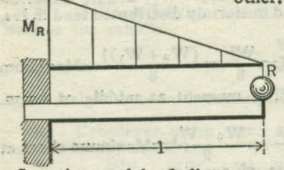
$W'_s = \frac{W_s}{4} - W_1$ = Safe superimposed uniform load in lbs.

$M = \frac{Wl}{2} = \frac{(W_u + W_1)l}{2}$ = Maximum bending moment at support.

$W = W_1 + W_u$ = Maximum shear at support.

$\frac{Wl^3}{8\,EI} = \frac{(W_1 + W_u)l^3}{8\,EI}$ = Maximum deflection $= \Delta$.

(4) Beam with concentrated load at free end. Beam fixed at one end and unsupported at the other.



Superimposed load diagram: Draw triangle having $M_R = Rl$.

Dead load diagram similar to Case (3).

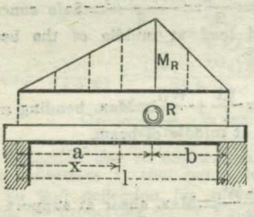
$R_s = \frac{W_s - 4W_1}{8}$ = Safe superimposed concentrated load in pounds.

$Rl + \frac{W_1 l}{2}$ = Maximum bending moment at point of support $= M$.

$R + W_1$ = Maximum shear at point of support.

$\frac{Rl^3}{3\,EI} + \frac{W_1 l^3}{8\,EI}$ = Maximum deflection at unsupported end $= \Delta$

(5) Beam with load concentrated at any point, and supported at both ends.



Superimposed load diagram:

Draw triangle having $M_R = \frac{Rab}{l}$.

Dead load diagram similar to Case (1).

$R_s = \frac{W_s l^2 - 4a\,W_1(l - a)}{8\,ab}$ = Safe superimposed concentrated loads in pounds.

$\frac{a(2\,Rb + W_1 l - W_1 a)}{2\,l}$ = Maximum bending moment under load.

$\frac{Ra}{l} + \frac{W_1}{2}$ = Maximum shear at right support.

$\frac{Rb}{l} + \frac{W_1}{2}$ = Maximum shear at left support.

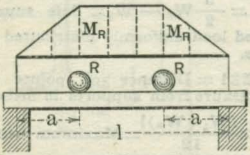
$\frac{1}{3\,EIl}\left[\frac{2al - a^2}{3}\right]^{\frac{3}{2}}\left[Rb + \frac{W_1}{8}\right]\sqrt{\frac{2al - a^2}{3}} + \frac{3l^3}{2al - a^2} - 2l$ = Maximum deflection at point X.

$X = \sqrt{\frac{2al - a^2}{3}}$ = Distance from left support to point of maximum deflection.

SHEAR, BENDING MOMENTS AND DEFLECTIONS FOR BEAMS OF UNIFORM SECTION.

(For explanation of notation, see top of page 151)

(6) Beam with two symmetrical loads supported at both ends.



Superimposed load diagram: Draw trapezoid having $M_R = Ra$.

Dead load diagram similar to Case (1).

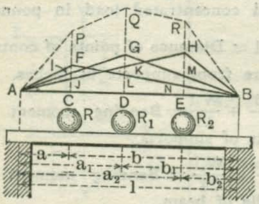
$R_s = \dfrac{W_s l - W_1 l}{8a}$ = Weight in pounds of each safe superimposed concentrated load.

$Ra + \dfrac{W_1 l}{8}$ = Maximum bending moment at center of beam.

$\dfrac{2R + W_1}{2}$ = Maximum shear at supports.

$\dfrac{Ra}{24\,EI}\left(3l^2 - 4a^2\right) + \dfrac{5}{384}\,\dfrac{W_1 l^3}{EI}$ = Maximum deflection $= \Delta$

(7) Beam with loads concentrated at various points, and supported at both ends.



Dead load diagram similar to Case (1).

The bending moment at any point is the sum of the bending moments at that point due to each load individually considered.

Neglecting the weight of beam, the maximum bending moment will occur where shear is zero, and under one of the loads.

Left reaction $= R_L$.

$M_R = R_L a - \dfrac{W_1 a^2}{2l}$ = Bending moment at R.

$M_{R_1} = R_L a_1 - \left[\dfrac{W_1 a_1^2}{2l} + R\,(a_1 - a)\right]$ = Bending moment at R_1.

$M_{R2} = R_L a2 - \left[\dfrac{W_1 a_2^2}{2l} + R_1(a_2 - a_1) + R(a_2 - a)\right]$ = Bending moment at R_2.

$\dfrac{R_2 b_2 + R_1 b_1 + Rb}{l} + \dfrac{W_1}{2}$ = Reaction or shear at left support.

$\dfrac{R_2 a_2 + R_1 a_1 + Ra}{l} + \dfrac{W_2}{2}$ = Reaction or shear at right support.

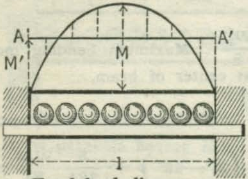
In the diagram the ordinates to the bending moment curve A P Q R H B is obtained by graphically adding the ordinates at F, G and H which represent the bending moments at those points.

The moment at any point is obtained by taking the sum of the moments at that point due to each load and that due to the weight of the beam.

SHEAR, BENDING MOMENTS AND DEFLECTIONS FOR BEAMS OF UNIFORM SECTION.

(For explanation of notation, see top of page 151)

(8) Beam uniformly loaded and fixed at both ends.



Total load diagram:

Draw parabola having $M = \frac{Wl}{8}$. Also AA' parallel to base and at a distance $M' = \frac{Wl}{12}$. The distances on vertical lines between parabola and line AA' are the moments for corresponding points on beam.

$W'_s = \frac{3}{2} W_s - W_1 =$ Safe superimposed load uniformly distributed in pounds.

$.212\ l =$ Distance of points of contraflexure from supports in inches.

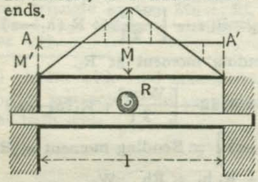
$\frac{Wl}{12} = \frac{(W_1 + W_u)l}{12} =$ Maximum bending moment at supports.

$\frac{Wl}{24} = \frac{(W_1 + W_u)l}{24} =$ Maximum bending moment at middle of beam.

$\frac{W}{2} = \frac{W_1 + W_u}{2} =$ Maximum shear at supports.

$\frac{Wl^3}{384\ EI} = \frac{(W_1 + W_u)l^3}{384\ EI} =$ Maximum deflection $= \Delta$.

(9) Beam with concentrated load at middle, and fixed at both ends.



Superimposed load diagram:

Draw triangle having $M = \frac{Rl}{4}$. Also AA' parallel to base and at a distance $M' = \frac{Rl}{8}$. The distances on vertical lines between triangle and line AA' are the moments on corresponding points on beam.

Dead load diagram similar to Case (8).

$R_s = W_s - \frac{2}{3} W_1 =$ Safe superimposed concentrated load in pounds.

$\frac{1}{4} l =$ Distance of points of contraflexure from supports in inches.

$\frac{Rl}{8} + \frac{W_1 l}{12} =$ Bending moment at points of supports.

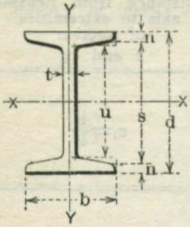
$\frac{Rl}{8} + \frac{W_1 l}{24} =$ Bending moment at middle of beam.

$\frac{R + W_2}{2} =$ Maximum shear at points of supports.

$\frac{Rl^3}{192\ EI} + \frac{W_2 l^3}{384\ EI} =$ Maximum deflection.

$\frac{Rl^3}{192\ EI} =$ Deflection due to R only.

PROPERTIES OF STANDARD SECTIONS.



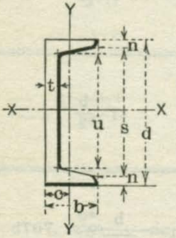
$$A = td + 2n(b-t) + \frac{(b-t)^2}{12}.$$

$$I_x\text{, Axis X-X} = \frac{bd^3}{12} - \frac{s^4-u^4}{8}.$$

$$I_y\text{, Axis Y-Y} = \frac{b^3n}{6} + \frac{ut^3}{12} + \frac{b^4-t^4}{288}.$$

Slope of flange $= g = \dfrac{s-u}{b-t} = \tfrac{1}{6}$ for standard sections.

$s = d - 2n.$ $u = s - g\,(b-t).$



$$A = td + 2n(b-t) + \frac{(b-t)^2}{6}.$$

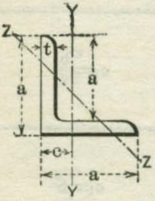
$$C = \left[b^2n + \frac{st^2}{2} + \frac{(b-t)^2(b+2t)}{18}\right] \div A.$$

$$I_x\text{, Axis X-X} = \frac{bd^3}{12} - \frac{s^4-u^4}{16}.$$

$$I_y\text{, Axis Y-Y} = \tfrac{1}{3}\left[2\,nb^3 + ut^3 + \frac{b^4-t^4}{12}\right] - Ac^2.$$

Slope of flange $= g = \dfrac{s-u}{2(b-t)} = \tfrac{1}{6}$ for standard sections.

$s = d - 2n.$ $u = s - 2g\,(b-t).$

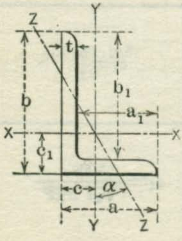


$$A = t\,(2a - t).$$

$$c = \frac{a^2 + at - t^2}{2\,(2a-t)}.$$

$$I_y\text{, Axis Y-Y} = \frac{t(a-c)^3 + ac^3 - (a-t)(c-t)^3}{3}$$

$$I_z\text{, Axis Z-Z} = \frac{2c^4 - 2(c-t)^4 + t\left[a - \left(2c - \frac{t}{2}\right)\right]^3}{3}.$$



$$A = t\,(a + b - t)$$

$$c = \frac{t(2a_1+b) + a_1^2}{2(a_1+b)}. \qquad c_1 = \frac{t(2b_1+a) + b_1^2}{2(b_1+a)}.$$

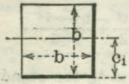
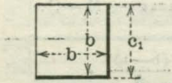
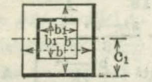
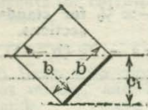
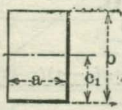
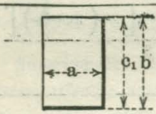
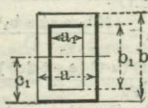
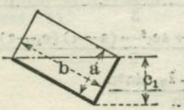
$$\text{Tan } 2\alpha = \frac{[(2c-t)b(b-2c_1) + (2c_1-t)(a-t)(a+t-2c)]t}{2(I_x - I_y)}$$

$$I_y\text{, Axis Y-Y} = \frac{t\,(a-c)^3 + bc^3 - (b-t)\,(c-t)^3}{3}.$$

$$I_x\text{, Axis X-X} = \frac{t\,(b-c_1)^3 + ac_1^3 - (a-t)\,(c_1-t)^3}{3}.$$

$$I_z\text{, Axis Z-Z} = \frac{I_y\ \cos^2\alpha - I_x\ \sin^2\alpha}{\text{Cos } 2\alpha}.$$

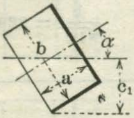
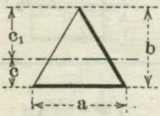
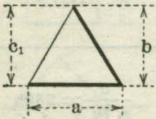
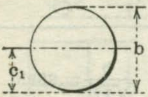
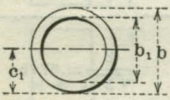
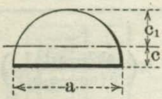
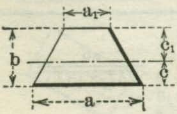
PROPERTIES OF VARIOUS SECTIONS.

Sections	Area of section A	Distance from neutral axis to extremities of section c and c_1
	b^2	$c_1 = \frac{b}{2}$
	b^2	$c_1 = b$
	$b^2 - b_1^2$	$c_1 = \frac{b}{2}$
	b^2	$c_1 = \frac{b}{\sqrt{2}} = .707b$
	ab	$c_1 = \frac{b}{2}$
	ab	$c_1 = b$
	$ab - a_1b_1$	$c_1 = \frac{b}{2}$
	ab	$c_1 = \frac{ab}{\sqrt{a^2 + b^2}}$

PROPERTIES OF VARIOUS SECTIONS.

Moment of inertia I	Section modulus $S=\frac{I}{c_1}$	Radius of gyration $r=\left(\frac{I}{A}\right)^{1/2}$
$\frac{b^4}{12}$	$\frac{b^3}{6}$	$\frac{b}{\sqrt{12}}=.289b$
$\frac{b^4}{3}$	$\frac{b^3}{3}$	$\frac{b}{\sqrt{3}}=.577b$
$\frac{b^4-b_1^4}{12}$	$\frac{b^4-b_1^4}{6b}$	$\left(\frac{b^2+b_1^2}{12}\right)^{1/2}$
$\frac{b^4}{12}$	$\frac{b^3}{6\sqrt{2}}=.118b^3$	$\frac{b}{\sqrt{12}}=.289b$
$\frac{ab^3}{12}$	$\frac{ab^2}{6}$	$\frac{b}{\sqrt{12}}=.289b$
$\frac{ab^3}{3}$	$\frac{ab^2}{3}$	$\frac{b}{\sqrt{3}}=.577b$
$\frac{ab^3-a_1b_1^3}{12}$	$\frac{ab^3-a_1b_1^3}{6b}$	$\frac{1}{2}\left(\frac{ab^3-a_1b_1^3}{3(ab-a_1b_1)}\right)^{1/2}$
$\frac{a^3b^3}{6(a^2+b^2)}$	$\frac{a^2b^2}{6\sqrt{a^2+b^2}}$	$\frac{ab}{\sqrt{6(a^2+b^2)}}$

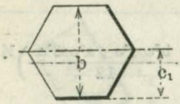
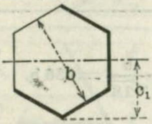
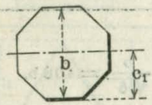
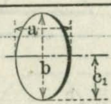
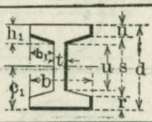
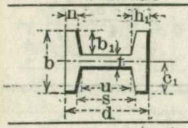
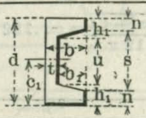
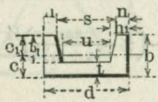
PROPERTIES OF VARIOUS SECTIONS.

Sections	Area of section A	Distance from neutral axis to extremities of section c and c_1
	ab	$c_1 = \frac{b \cos\alpha + a \sin\alpha}{2}$
	$\frac{ab}{2}$	$c = \frac{b}{3}$ $c_1 = \frac{2b}{3}$
	$\frac{ab}{2}$	$c_1 = b$
	$\frac{\pi b^2}{4} = .785\ b^2$	$c_1 = \frac{b}{2}$
	$\frac{\pi(b^2 - b_1^2)}{4} = .785(b^2 - b_1^2)$	$c_1 = \frac{b}{2}$
	$\frac{\pi a^2}{8} = .393\ a^2$	$c = \frac{2a}{3\pi} = .212\ a$ $c_1 = \frac{(3\pi - 4)a}{6\pi} = .288\ a$
	$\frac{a + a_1}{2} . b$	$c = \frac{a + 2a_1}{a + a_1} \cdot \frac{b}{3}$ $c_1 = \frac{a_1 + 2a}{a + a_1} \cdot \frac{b}{3}$

PROPERTIES OF VARIOUS SECTIONS.

Moments of inertia I	Section modulus $S = \frac{I}{c_1}$	Radius of gyration $r = \left(\frac{I}{A}\right)^{1/2}$
$\frac{ab}{12}(b^3 \cos^2 a + a^3 \sin^2 a)$	$\frac{ba}{6}\left(\frac{b^2 \cos^2 a + a^2 \sin^2 a}{b \cos a + a \sin a}\right)$	$\left(\frac{b^2 \cos^2 a + a^2 \cos^2 a}{12}\right)^{1/2}$
$\frac{ab^3}{36}$	$\frac{ab^2}{24}$	$\frac{b}{\sqrt{18}} = .236\ b.$
$\frac{ab^3}{12}$	$\frac{ab^2}{12}$	$\frac{b}{\sqrt{6}} = .408\ b.$
$\frac{\pi b^4}{64} = .049\ b^4$	$\frac{\pi b^3}{32} = .098\ b^3$	$\frac{b}{4}$
$\frac{\pi(b^4 - b_1^4)}{64} = .049(b^4 - b_1^4)$	$\frac{\pi}{32}\ \frac{(b^4 - b_1^4)}{b} = .098\frac{(b^4 - b_1^4)}{b}$	$\frac{\sqrt{b^2 + b_1^2}}{4}$
$\frac{9\pi^2 - 64.a^4}{1152\pi} = .007\ a^4$	$\frac{9\pi^2 - 64}{192(3\pi - 4)}.a^3 = .024\ a^3$	$\frac{\sqrt{9\pi^2 - 64}}{12\ \pi}.a = .132\ a.$
$\frac{a^2 + 4aa_1 + a_1^2}{36(a + a_1)}.\ b^3$	$\frac{a^2 + 4aa_1 + a_1^2}{12(a_1 + 2a)}.\ b^2$	$\frac{b}{3}\left(\frac{1}{2} + \frac{aa_1}{(a + a_1)^2}\right)^{1/2}$

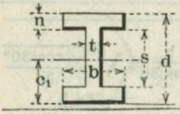
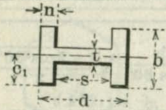
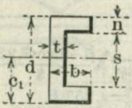
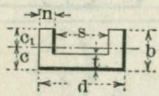
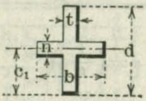
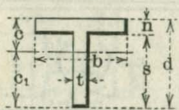
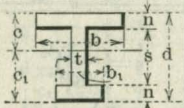
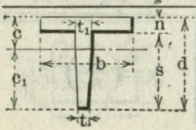
PROPERTIES OF VARIOUS SECTIONS.

Sections	Area of section A	Distance from neutral axis to extremities of section c and c_1
	$\frac{3}{2}b^2 \tan 30° = .866\,b^2$	$c_1 = \frac{b}{2}$
	$\frac{3}{2}b^2 \tan 30° = .866\,b^2$	$c_1 = \frac{b}{2\cos 30°} = .577b$
	$2b^2 \tan. 22\frac{1}{2}° = .828b^2$	$c_1 = \frac{b}{2}$
	$\frac{\pi ab}{4} = .785\ ab$	$c_1 = \frac{b}{2}$
	$td + 2b_1(n + h_1)$	$c_1 = \frac{d}{2}$
	$td + 2b_1(n + h_1)$	$c_1 = \frac{b}{2}$
	$td + b_1(n + h_1)$	$c_1 = \frac{d}{2}$
	$td + b_1(n + h_1)$	$c = [b^2n + \frac{st^2}{2} + \frac{g}{3}(b - t)^2 (b + 2t)] \div A$ $c_1 = b - c$

PROPERTIES OF VARIOUS SECTIONS.

Moment of inertia I	Section modulus $S = \frac{I}{c_1}$	Radius of gyration $r = \left(\frac{I}{A}\right)^{1/2}$
$\frac{A}{12}\left[\frac{b^2(1+2\cos^2 30°)}{4\cos^2 30°}\right]$ $= .06\ b^4$	$\frac{A}{6}\left[\frac{b(1+2\cos^2 30°)}{4\cos^2 30°}\right]$ $= .12\ b^3$	$\frac{b}{4\cos 30°}\sqrt{\frac{1+2\cos^2 30°}{3}}$ $= .264\ b$
$\frac{A}{12}\left[\frac{b^2(1+2\cos^2 30°)}{4\cos^2 30°}\right]$ $= .06\ b^4$	$\frac{A}{6}\left[\frac{b(1+2\cos^2 30°)}{4\cos 30°}\right]$ $= .104 b^3$	$\frac{b}{4\cos 30°}\sqrt{\frac{1+2\cos^2 30°}{3}}$ $= .264\ b$
$\frac{A}{12}\left[\frac{b^2(1+2\cos^2 22\frac{1}{2}°)}{4\cos^2 22\frac{1}{2}°}\right]$ $= .055\ b^4$	$\frac{A}{6}\left[\frac{b(1+2\cos^2 22\frac{1}{2}°)}{4\cos 22\frac{1}{2}°}\right]$ $= .109\ b^3$	$\frac{b}{4\cos 22\frac{1}{2}°}\sqrt{\frac{1+2\cos^2 22\frac{1}{2}°}{3}}$ $= .257\ b$
$\frac{\pi ab^3}{64} = .049\ ab^3$	$\frac{\pi ab^2}{32} = .098\ ab^2$	$\frac{b}{4}$
$\frac{1}{12}\left[bd^3 - \frac{1}{4g}(s^4 - u^4)\right]$	$\frac{2\,I}{d}$	$r = \left(\frac{I}{A}\right)^{1/2}$
$\frac{1}{12}\left[b^3(d-s) + ut^3 + \frac{g}{4}(b^4 - t^4)\right]$	$\frac{2\,I}{b}$	$r = \left(\frac{I}{A}\right)^{1/2}$
$\frac{1}{12}\left[bd^3 - \frac{1}{8g}(s^4 - u^4)\right]$	$\frac{2\,I}{d}$	$r = \left(\frac{I}{A}\right)^{1/2}$
$\frac{1}{3}\left[2nb^3 + ut^3 + \frac{g}{2}(b^4 - t^4)\right] - A\,c^2$	$\frac{I}{b-c}$	$r = \left(\frac{I}{A}\right)^{1/2}$

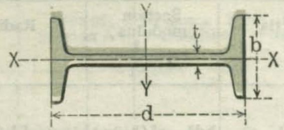
PROPERTIES OF VARIOUS SECTIONS.

Sections	Area of Section A	Distance from neutral axis to extremities of section c and c_1
	$bd - s(b - t)$	$c_1 = \frac{d}{2}$
	$bd - s(b - t)$	$c_1 = \frac{b}{2}$
	$bd - s(b - t)$	$c_1 = \frac{d}{2}$
	$bd - s(b - t)$	$c = \frac{2b^2n + st^2}{2A}$ $c_1 = b - c.$
	$td + n(b - t)$	$c_1 = \frac{d}{2}$
	$bn + st$	$c = \frac{d^2t + n^2(b - t)}{2A}$ $c_1 = d - c.$
	$bn + st + b_1n$	$c = \frac{td^2 + n^2(b - t) + n(b_1 - t)(2d - n)}{2A}$ $c_1 = d - c.$
	$bn + \frac{s(t + t_1)}{2}$	$c = \frac{3bn^2 + 3ts(d + n) + s(t_1 - t)(s + 3n)}{6A}$ $c_1 = d - c.$

PROPERTIES OF VARIOUS SECTIONS.

Moment of inertia I	Section modulus $S=\frac{I}{c_1}$	Radius of gyration $r=\left(\frac{I}{A}\right)^{1/2}$
$\frac{bd^3-s^3(b-t)}{12}$	$\frac{bd^3-s^3(b-t)}{6d}$	$\frac{1}{2}\left[\frac{b(d^3-s^3)+s^3t}{3A}\right]^{1/2}$
$\frac{2nb^3+st^3}{12}$	$\frac{2nb^3+st^3}{6b}$	$\frac{1}{2}\left(\frac{2nb^3+st^3}{3A}\right)^{1/2}$
$\frac{bd^3-s^3(b-t)}{12}$	$\frac{bd^3-s^3(b-t)}{6d}$	$\frac{1}{2}\left[\frac{b(d^3-s^3)+s^3t}{3A}\right]^{1/2}$
$\frac{2nb^3+st^3}{3}-Ac^2$	$\frac{I}{b-c}$	$\left(\frac{2nb^3+st^3}{3A}-c^2\right)^{1/2}$
$\frac{td^3+n^3(b-t)}{12}$	$\frac{td^3+n^3(b-t)}{6d}$	$\frac{1}{2}\left[\frac{td^3+n^3(b-t)}{3A}\right]^{1/2}$
$\frac{tc_1^3+bc^3-(b-t)(c-n)^3}{3}$	$\frac{I}{d-c}$	$\left[\frac{tc_1^3+bc^3-(b-t)(c-n)^3}{3A}\right]^{1/2}$
$\frac{bc^3+b_1c_1^3-(b-t)(c-n)^3}{3}-\frac{(b_1-t)(c_1-n)^3}{3}$	$\frac{I}{d-c}$	$\left[\frac{bc^3+b_1c_1^3-(b-t)(c-n)^3}{3A}-\frac{(b_1-t)(c_1-n)^3}{3A}\right]^{1/2}$
$\frac{4bn^3+s^3(3t+t_1)}{12}-A(c-n)^2$	$\frac{I}{d-c}$	$\frac{1}{2}\left[\frac{4bn^3+s^3(3t+t_1)}{3A}-4(c-n)^2\right]^{1/2}$

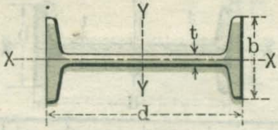
PROPERTIES OF STANDARD I-BEAMS.



1	2	3	4	5	6	7	8	9	10
Depth of beam	Weight per foot	Area of section	Thickness of web	Width of flange	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y	Radius of gyration Axis Y-Y	Moment of inertia Axis X-X	Radius of gyration Axis X-X
d		A	t	b	I	S	r	I′	r′
Ins.	Lbs.	Sq.ins.	In.	Ins.	Ins.⁴	Ins.³	Ins.	Ins.⁴	Ins.
24	100.00	29.41	.75	7.25	2379.5	198.3	8.99	48.55	1.28
	95.00	27.94	.69	7.19	2309.0	192.4	9.09	47.10	1.30
	90.00	26.47	.63	7.13	2238.4	186.5	9.20	45.70	1.31
	85.00	25.00	.57	7.07	2167.8	180.7	9.31	44.35	1.33
	80.00	23.32	.50	7.00	2087.2	173.9	9.46	42.86	1.36
20	100.00	29.41	.88	7.28	1655.6	165.6	7.50	52.65	1.34
	95.00	27.94	.81	7.21	1606.6	160.7	7.58	50.78	1.35
	90.00	26.47	.74	7.14	1557.5	155.8	7.67	48.98	1.36
	85.00	25.00	.66	7.06	1508.5	150.9	7.77	47.25	1.37
	80.00	23.73	.60	7.00	1466.3	146.6	7.86	45.81	1.39
20	75.00	22.06	.65	6.40	1268.8	126.9	7.58	30.25	1.17
	70.00	20.59	.58	6.33	1219.8	122.0	7.70	29.04	1.19
	65.00	19.08	.50	6.25	1169.5	117.0	7.83	27.86	1.21
18	70.00	20.59	.72	6.26	921.2	102.4	6.69	24.62	1.09
	65.00	19.12	.64	6.18	881.5	97.9	6.79	23.47	1.11
	60.00	17.65	.56	6.10	841.8	93.5	6.91	22.38	1.13
	55.00	15.93	.46	6.00	795.6	88.4	7.07	21.19	1.15
15	100.00	29.41	1.18	6.77	900.5	120.1	5.53	50.98	1.31
	95.00	27.94	1.09	6.68	872.9	116.4	5.59	48.37	1.32
	90.00	26.47	.99	6.58	845.4	112.7	5.65	45.91	1.32
	85.00	25.00	.90	6.48	817.8	109.0	5.72	43.57	1.32
	80.00	23.81	.81	6.40	795.5	106.1	5.78	41.76	1.32
15	75.00	22.06	.88	6.29	691.2	92.2	5.60	30.68	1.18
	70.00	20.59	.78	6.19	663.7	88.5	5.68	29.00	1.19
	65.00	19.12	.69	6.10	636.1	84.8	5.77	27.42	1.20
	60.00	17.67	.59	6.00	609.0	81.2	5.87	25.96	1.21
15	55.00	16.18	.66	5.75	511.0	68.1	5.62	17.06	1 03
	50.00	14.71	.56	5.65	483.4	64.5	5.73	16.04	1.04
	45.00	13.24	.46	5.55	455.8	60.8	5.87	15.09	1.07
	42.00	12.48	.41	5.50	441.8	58.9	5.95	14.62	1.08

L = Safe load in pounds uniformly distributed. l = Span in feet. M = Moment of forces in foot pounds. C_s and C_{s1} = Coefficients given on opposite page.

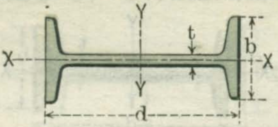
PROPERTIES OF STANDARD I-BEAMS.



11	12	13	14	15	16
	Coefficient of strength		Coefficient of deflection		
Increase of thickness of web for each pound increase in weight	For fibre stress of 16000 lbs. per sq. in. for buildings	For fibre stress of 12500 lbs. per sq. in. for bridges	Uniform load	Load at center	Distance center to center required to make radii of gyration equal
	C_s	C_{s1}	C_D	C_{D1}	D
	2115190	1652490	.00000033	.00000052	17.82
	2052440	1603470	.00000034	.00000054	17.99
.0123	1989700	1554450	.00000035	.00000056	18.21
	1926950	1505430	.00000036	.00000057	18.43
	1855310	1449460	.00000037	.00000060	18.72
	1765960	1379660	.00000047	.00000075	14.76
	1713670	1338810	.00000048	.00000077	14.92
.015	1661390	1297960	.00000050	.00000080	15.10
	1609100	1257110	.00000051	.00000082	15.30
	1564060	1221920	.00000053	.00000085	15.47
	1353400	1057340	.00000061	.00000098	14.98
.015	1301110	1016490	.00000064	.00000102	15.21
	1247490	974600	.00000066	.00000106	15.47
	1091800	852970	.00000084	.00000135	13.20
	1044740	816200	.00000088	.00000141	13.40
.016	997680	779440	.00000092	.00000148	13.63
	942880	736620	.00000098	.00000156	13.95
	1277980	998420	.00000086	.00000138	10.75
	1238770	967790	.00000089	.00000143	10.86
.020	1199550	937150	.00000092	.00000147	10.99
	1160340	906520	.00000095	.00000152	11.13
	1122290	876790	.00000098	.00000157	11.25
	983090	768040	.00000112	.00000180	10.95
.020	943870	737400	.00000117	.00000187	11.11
	904660	706770	.00000122	.00000195	11.29
	866130	676670	.00000127	.00000204	11.49
	726740	567770	.00000152	.00000243	11.05
0.20	687530	537130	.00000161	.00000257	11.27
	648310	506490	.00000170	.00000272	11.54
	628270	490840	.00000176	.00000281	11.70

$L = \frac{C_s \text{ or } C_{s1}}{l}$; $M = \frac{C_s \text{ or } C_{s1}}{8}$; $C_s \text{ or } C_{s1} = Ll = 8M = \frac{8fS}{12}$.

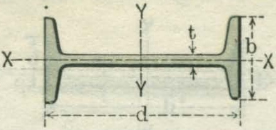
PROPERTIES OF STANDARD I-BEAMS



1	2	3	4	5	6	7	8	9	10
Depth of beam	Weight per foot	Area of section	Thickness of web	Width of flange	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y	Radius of gyration Axis Y-Y	Moment of inertia Axis X-X	Radius of gyration Axis X-X
d		A	t	b	I	S	r	I′	r′
Ins.	Lbs.	Sq. ins.	In.	Ins.	Ins.[4]	Ins.[3]	Ins.	Ins.[4]	Ins.
12	55.00	16.18	.82	5.61	321.0	53.5	4.45	17.46	1.04
	50.00	14.71	.70	5.49	303.4	50.6	4.54	16.12	1.05
	45.00	13.24	.58	5.37	285.7	47.6	4.65	14.89	1.06
	40.00	11.84	.46	5.25	268.9	44.8	4.77	13.81	1.08
12	35.00	10.29	.44	5.09	228.3	38.0	4.71	10.07	.99
	31.50	9.26	.35	5.00	215.8	36.0	4.83	9.50	1.01
10	40.00	11.76	.75	5.10	158.7	31.7	3.67	9.50	.90
	35.00	10.29	.60	4.95	146.4	29.3	3.77	8.52	.91
	30.00	8.82	.46	4.81	134.2	26.8	3.90	7.65	.93
	25.00	7.37	.31	4.66	122.1	24.4	4.07	6.89	.97
9	35.00	10.29	.73	4.77	111.8	24.8	3.30	7.31	.84
	30.00	8.82	.57	4.61	101.9	22.6	3.40	6.42	.85
	25.00	7.35	.41	4.45	91.9	20.4	3.54	5.65	.88
	21.00	6.31	.29	4.33	84.9	18.9	3.67	5.16	.90
8	25.50	7.50	.54	4.27	68.4	17.1	3.02	4.75	.80
	23.00	6.76	.45	4.18	64.5	16.1	3.09	4.39	.81
	20.50	6.03	.36	4.09	60.6	15.1	3.17	4.07	.82
	18.00	5.33	.27	4.00	56.9	14.2	3.27	3.78	.84
7	20.00	5.88	.46	3.87	42.2	12.1	2.68	3.24	.74
	17.50	5.15	.35	3.76	39.2	11.2	2.76	2.94	.76
	15.00	4.42	.25	3.66	36.2	10.4	2.86	2.67	.78
6	17.25	5.07	.48	3.58	26.2	8.7	2.27	2.36	.68
	14.75	4.34	.35	3.45	24.0	8.0	2.35	2.09	.69
	12.25	3.61	.23	3.33	21.8	7.3	2.46	1.85	.72
5	14.75	4.34	.50	3.29	15.1	6.1	1.87	1.70	.63
	12.25	3.60	.36	3.15	13.6	5.4	1.94	1.45	.63
	9.75	2.87	.21	3.00	12.1	4.8	2.05	1.23	.65
4	10.50	3.09	.41	2.88	7.1	3.6	1.52	1.01	.57
	9.50	2.79	.34	2.81	6.7	3.4	1.54	.93	.58
	8.50	2.50	.26	2.73	6.4	3.2	1.59	.85	.58
	7.50	2.21	.19	2.66	6.0	3.0	1.64	.77	.59
3	7.50	2.21	.36	2.52	2.9	1.9	1.15	.60	.52
	6.50	1.91	.26	2.42	2.7	1.8	1.19	.53	.52
	5.50	1.63	.17	2.33	2.5	1.7	1.23	.46	.53

L = Safe load in pounds uniformly distributed. l = Span in feet. M = Moment of forces in foot pounds. C_s and C_{s1} = Coefficients given on opposite page.

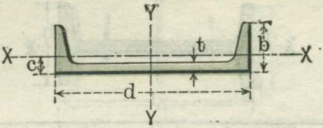
PROPERTIES OF STANDARD I-BEAMS.



11	12	13	14	15	16
Increase of thickness of web for each pound increase in weight	Coefficient of strength		Coefficient of deflection		Distance center to center required to make radii of gyration equal
	For fibre stress of 16000 lbs. per sq. in. for buildings	For fibre stress of 12500 lbs. per sq. in. for bridges	Uniform load	load at center	D
	C_s	C_{s1}	C_D	C_{D1}	
	570670	445830	.00000242	.00000387	8.65
.025	539300	421320	.00000256	.00000409	8.83
	507930	396820	.00000272	.00000435	9.06
	478130	373540	.00000288	.00000462	9.29
.025	405800	317030	.00000340	.00000544	9.21
	383670	299740	.00000360	.00000575	9.45
	338530	264480	.00000489	.00000782	7.12
.029	312390	244050	.00000530	.00000848	7.32
	286250	223630	.00000578	.00000925	7.57
	260470	203500	.00000635	.00001017	7.91
	264990	207020	.00000694	.00001110	6.36
.033	241460	188640	.00000762	.00001219	6.58
	217930	170260	.00000844	.00001350	6.86
	201300	157260	.00000914	.00001462	7.12
	182500	142600	.00001134	.00001815	5.82
.037	172000	134400	.00001203	.00001924	5.96
	161600	126200	.00001280	.00002049	6.12
	151700	118500	.00001364	.00002182	6.32
	128560	100430	.00001839	.00002943	5.15
.042	119400	93290	.00001980	.00003168	5.31
	110410	86260	.00002142	.00003427	5.50
	93110	72740	.00002963	.00004741	4.33
.049	85270	66610	.00003235	.00005177	4.49
	77460	60520	.00003561	.00005698	4.70
	64630	50490	.00005122	.00008195	3.53
.059	58100	45390	.00005698	.00009117	3.68
	51590	40300	.00006417	.00010267	3.88
	38070	29750	.00010868	.00017389	
.074	35980	28110	.00011500	.00018400	
	33890	26480	.00012209	.00019535	2.98
	31810	24850	.00013009	.00020815	3.07
	20710	16180	.00026644	.00042630	
.098	19140	14950	.00028827	.00046124	
	17650	13790	.00031253	.00050006	

$$L = \frac{C_s \text{ or } C_{s1}}{l}; \quad M = \frac{C_s \text{ or } C_{s1}}{8}; \quad C_s \text{ or } C_{s1} = Ll = 8M = \frac{8\,S\,F}{12}.$$

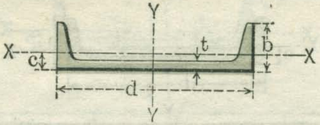
PROPERTIES OF STANDARD CHANNELS.



1	2	3	4	5	6	7	8	9	10	11
Depth of channel	Weight per foot	Area of section	Thickness of web	Width of flange	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y	Radius of gyration Axis Y-Y	Moment of inertia Axis X-X	Section modulus Axis X-X	Radius of gyration Axis X-X
d		A	t	b	I	S	r	I′	S′	r′
Ins.	Lbs.	Sq. ins.	In.	Ins.	Ins.⁴	Ins.³	Ins.	Ins.⁴	Ins.³	Ins.
	55.00	16.18	.82	3.82	430.2	57.4	5.16	12.19	4.07	.87
	50.00	14.71	.72	3.72	402.7	53.7	5.23	11.22	3.85	.87
15	45.00	13.24	.62	3.62	375.1	50.0	5.32	10.29	3.63	.88
	40.00	11.76	.52	3.52	247.5	46.3	5.44	9.39	3.43	.89
	35.00	10.29	.43	3.43	319.9	42.7	5.57	8.48	3.22	.91
	33.00	9.90	.40	3.40	312.6	41.7	5.62	8.23	3.16	.91
	50.00	14.71	.79	4.42	313.7	48.3	4.62	16.71	4.86	1.07
	40.00	11.76	.56	4.19	272.2	41.9	4.81	13.94	4.33	1.09
13	37.00	10.88	.50	4.12	259.8	40.0	4.89	13.10	4.17	1.10
	35.00	10.29	.45	4.08	251.5	38.7	4.94	12.54	4.06	1.10
	32.00	9.30	.38	4.00	237.5	36.5	5.05	11.54	3.86	1.11
	31.50	9.27	.36	3.99	233.0	35.9	5.01	10.39	3.82	1.12
	40.00	11.76	.76	3.42	196.9	32.8	4.09	6.63	2.46	.75
	35.00	10.29	.64	3.30	179.3	29.9	4.17	5.90	2.27	.76
12	30.00	8.82	.51	3.17	161.6	26.9	4.28	5.21	2.09	.77
	25.00	7.35	.39	3.05	144.0	24.0	4.43	4.53	1.91	.78
	20.50	6.03	.28	2.94	128.1	21.4	4.61	3.91	1.75	.81
	35.00	10.29	.82	3.18	115.5	23.1	3.35	4.66	1.87	.67
	30.00	8.82	.68	3.04	103.2	20.6	3.42	3.99	1.67	.67
10	25.00	7.35	.53	2.89	91.0	18.2	3.52	3.40	1.50	.68
	20.00	5.88	.38	2.74	78.7	15.7	3.66	2.85	1.34	.70
	15.00	4.46	.24	2.60	66.9	13.4	3.87	2.30	1.17	.72
	25.00	7.35	.61	2.81	70.7	15.7	3.10	2.98	1.36	.64
9	20.00	5.88	.45	2.65	60.8	13.5	3.21	2.45	1.19	.65
	15.00	4.41	.29	2.49	50.9	11.3	3.40	1.95	1.03	.66
	13.25	3.89	.23	2.43	47.3	10.5	3.49	1.77	.97	.67

L = Safe load in pounds uniformly distributed. l = Span in feet. M = Moment of forces in foot pounds. C_s and C_{s1} = Coefficients given on opposite page.

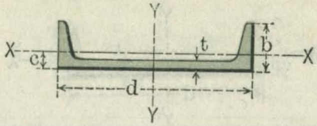
PROPERTIES OF STANDARD CHANNELS.



12	13	14	15	16	17	18
Distance of center of gravity from outside of web	Increase of Thickness of web for each lb. increase in wt.	Coefficient of strength — Fibre stress 16000 lb. per sq. in. for buildings	Coefficient of strength — Fibre stress 12500 lb. per sq. in. for bridges	Coefficient of deflection — Uniform load	Coefficient of deflection — Load at center	Distance required to make radii of gyration equal
c		C_s	C_{s1}	C_D	C_{D1}	D
Inch	Inches					
.82		611900	478050	.0000018	.0000029	8.53
.80		572680	447410	.0000019	.0000031	8.71
.79	.020	533470	416770	.0000021	.0000033	8.92
.78		494250	386130	.0000022	.0000036	9.15
.79		455030	355500	.0000024	.0000039	9.43
.79		444520	347280	.0000025	.0000040	9.50
.98		514710	402120	.0000025	.0000040	7.02
.97		446740	349010	.0000029	.0000046	7.44
.98	.023	426340	333080	.0000030	.0000048	7.56
.99		412750	322460	.0000031	.0000049	7.66
1.01		389710	304460	.0000033	.0000052	7.77
1.01		382400	298800	.0000034	.0000053	7.78
.72		350120	273530	.0000039	.0000063	6.60
.69		318750	249020	.0000043	.0000069	6.81
.68	.025	287370	224510	.0000048	.0000077	7.07
.68		256000	200000	.0000054	.0000086	7.36
.70		227750	177930	.0000061	.0000097	7.67
.69		246380	192480	.0000067	.0000107	5.17
.65		220230	172060	.0000075	.0000120	5.40
.62	.029	194090	151630	.0000085	.0000136	5.67
.61		167940	131210	.0000099	.0000158	5.97
.64		142680	111470	.0000116	.0000186	6.33
.62		167590	130930	.0000110	.0000176	4.84
.58	.033	144070	112550	.0000128	.0000204	5.12
.59		120540	94170	.0000153	.0000244	5.49
.61		112170	87630	.0000164	.0000262	5.63

$L = \frac{C_s \text{ or } C_{s1}}{l}$; $M = \frac{C_s \text{ or } C_{s1}}{8}$; $C_s \text{ or } C_{s1} = Ll = 8M = \frac{8\,f\,S}{12}$.

PROPERTIES OF STANDARD CHANNELS.

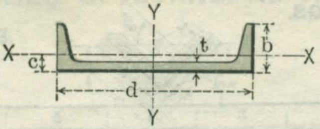


1 Depth of channel d Ins.	2 Weight per foot Lbs.	3 Area of section A Sq. In.	4 Thickness of web t In.	5 Width of flange b Ins.	6 Moment of inertia Axis Y-Y I Ins.⁴	7 Section modulus Axis Y-Y S Ins.³	8 Radius of gyration Axis Y-Y r Ins.	9 Moment of inertia Axis X-X I′ Ins.⁴	10 Section modulus Axis X-X S′ Ins.³	11 Radius of gyration Axis X-X r′ In.
8	21.25	6.25	.58	2.62	47.8	11.9	2.76	2.25	1.11	.60
	18.75	5.51	.49	2.53	43.8	11.0	2.82	2.01	1.02	.60
	16.25	4.78	.40	2.44	39.9	10.0	2.89	1.78	.95	.61
	13.75	4.04	.31	2.35	36.0	9.0	2.98	1.55	.87	.62
	11.25	3.35	.22	2.26	32.3	8.1	3.10	1.33	.79	.63
7	19.75	5.81	.63	2.51	33.2	9.5	2.39	1.85	.96	.56
	17.25	5.07	.53	2.41	30.2	8.6	2.44	1.62	.87	.56
	14.75	4.34	.42	2.30	27.2	7.8	2.50	1.40	.79	.57
	12.25	3.60	.32	2.20	24.2	6.9	2.59	1.19	.71	.57
	9.75	2.85	.21	2.09	21.1	6.0	2.72	.98	.63	.59
6	15.50	4.56	.56	2.28	19.5	6.5	2.07	1.28	.74	.53
	13.00	3.82	.44	2.16	17.3	5.8	2.13	1.07	.65	.53
	10.50	3.09	.32	2.04	15.1	5.0	2.21	.88	.57	.53
	8.00	2.38	.20	1.92	13.0	4.3	2.34	.70	.50	.54
5	11.50	3.38	.48	2.04	10.4	4.2	1.75	.82	.54	.49
	9.00	2.65	.33	1.89	8.9	3.5	1.83	.64	.45	.49
	6.50	1.95	.19	1.75	7.4	3.0	1.95	.48	.38	.50
4	7.25	2.13	.33	1.73	4.6	2.3	1.46	.44	.35	.46
	6.25	1.84	.25	1.65	4.2	2.1	1.51	.38	.32	.45
	5.25	1.55	.18	1.58	3.8	1.9	1.56	.32	.29	.45
3	6.00	1.76	.36	1.60	2.1	1.4	1.08	.31	.27	.42
	5.00	1.47	.26	1.50	1.8	1.2	1.12	.25	.24	.41
	4.00	1.19	.17	1.41	1.6	1.1	1.17	.20	.21	.41

L = Safe load in pounds uniformly distributed. l = Span in feet.

M = Moment of forces in foot pounds. C_s and C_{s1} = Coefficients given on opposite page.

PROPERTIES OF STANDARD CHANNELS.

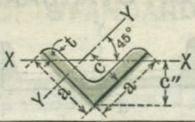


12	13	14	15	16	17	18
Distance of center of gravity from outside of web	Increase of Thickness of web for each lb. increase in wt.	Coef. of strength: Fibre stress 16000 lb. per sq. in. for buildings	Coef. of strength: Fibre stress 12500 lb. per sq. in. for bridges	Coef. of deflection: Uniform load	Coef. of deflection: Load at center	Distance required to make radii of gyration equal
c		Cs	Cs1	Cd	Cd1	D
Inch	Inches					
.59		127370	99510	.0000162	.0000260	4.23
.57		116910	91340	.0000177	.0000283	4.38
.56	.037	106450	83170	.0000194	.0000311	4.54
.56		95990	75000	.0000216	.0000345	4.72
.58		86140	67300	.0000240	.0000384	4.94
.58		101100	78990	.0000234	.0000374	3.48
.55		91950	71840	.0000257	.0000411	3.64
.53	.042	82740	64690	.0000286	.0000457	3.80
.53		73650	57540	.0000321	.0000514	3.99
.55		64270	50210	.0000368	.0000588	4.22
.55		69440	54250	.0000397	.0000636	2.91
.52	.049	61600	48120	.0000448	.0000717	3.09
.50		53750	42000	.0000513	.0000821	3.28
.52		46210	36100	.0000597	.0000855	3.52
.51		44390	34680	.0000746	.0001193	2.34
.48	.059	37860	29570	.0000875	.0001399	2.56
.49		31640	24720	.0001046	.0001674	2.79
.46		24360	19030	.0001698	.0002717	1.85
.46	.074	22270	17400	.0001858	.0002973	1.96
.46		20230	15800	.0002046	.0003273	2.06
.46		14710	11490	.0003751	.0006001	1.07
.44	.098	13140	10270	.0004199	.0006718	1.19
.44		11630	9090	.0004743	.0007589	1.31

$L = \frac{C_s \text{ or } C_{s1}}{\;}$; $M = \frac{C_s \text{ or } C_{s1}}{8}$; $C_s \text{ or } C_{s1} = Ll = 8M = \frac{8fS}{12}$.

PROPERTIES OF STANDARD ANGLES.

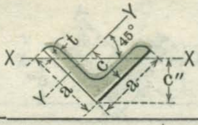
EQUAL LEGS.



1	2	3	4	5	6	7
Dimensions	Thickness	Weight per foot	Area of section	Distance of center of gravity from back of leg	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y
a x a	t		A	c	I	S
Inches	Inch	Pounds	Sq. In.	Inches	Inches⁴	Inches³
8 x 8	1 1/8	56.9	16.74	2.41	97.97	17.53
8 x 8	1 1/16	54.0	15.88	2.39	93.53	16.67
8 x 8	1	51.0	15.00	2.37	88.98	15.80
8 x 8	15/16	48.1	14.13	2.34	84.34	14.91
8 x 8	7/8	45.0	13.24	2.32	79.58	14.02
8 x 8	13/16	42.0	12.34	2.30	74.72	13.11
8 x 8	3/4	38.9	11.44	2.28	69.74	12.18
8 x 8	11/16	35.8	10.53	2.25	64.64	11.25
8 x 8	5/8	32.7	9.61	2.23	59.43	10.30
8 x 8	9/16	29.6	8.69	2.21	54.09	9.34
8 x 8	1/2	26.4	7.75	2.19	48.65	8.37
6 x 6	1	37.4	11.00	1.86	35.46	8.57
6 x 6	15/16	35.3	10.38	1.84	33.72	8.11
6 x 6	7/8	33.1	9.74	1.82	31.92	7.63
6 x 6	13/16	31.0	9.09	1.80	30.06	7.15
6 x 6	3/4	28.7	8.44	1.78	28.15	6.66
6 x 6	11/16	26.5	7.78	1.75	26.19	6.17
6 x 6	5/8	24.2	7.11	1.73	24.16	5.66
6 x 6	9/16	21.9	6.44	1.71	22.07	5.14
6 x 6	1/2	19.6	5.75	1.68	19.91	4.61
6 x 6	7/16	17.2	5.06	1.66	17.68	4.07
6 x 6	3/8	14.9	4.36	1.64	15.39	3.53
5 x 5	1	30.6	9.00	1.61	19.64	5.80
5 x 5	15/16	28.9	8.50	1.59	18.71	5.49
5 x 5	7/8	27.2	7.99	1.57	17.75	5.17
5 x 5	13/16	25.4	7.46	1.55	16.77	4.85
5 x 5	3/4	23.6	6.94	1.52	15.74	4.53
5 x 5	11/16	21.8	6.41	1.50	14.68	4.20
5 x 5	5/8	20.0	5.86	1.48	13.58	3.86
5 x 5	9/16	18.1	5.31	1.46	12.44	3.51
5 x 5	1/2	16.2	4.75	1.43	11.25	3.16
5 x 5	7/16	14.3	4.19	1.41	10.02	2.79
5 x 5	3/8	12.3	3.61	1.39	8.74	2.42

PROPERTIES OF STANDARD ANGLES.

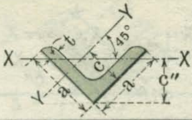
EQUAL LEGS.



8	9	10	11	12
Radius of gyration Axis Y-Y	Distance of center of gravity from external apex	Least moment of inertia Axis X-X	Section modulus Axis X-X	Least radius of gyration Axis X-X
r	c″	I″	S″	r″
Inches	Inches	Inches[4]	Inches[3]	Inch
2.42	3.41	40.33	11.83	1.55
2.43	3.38	38.38	11.36	1.56
2.44	3.35	36.40	10.88	1.56
2.44	3.32	34.40	0.38	1.56
2.45	3.28	32.38	9.86	1.56
2.46	3.25	30.33	9.33	1.57
2.47	3.22	28.24	8.77	1.57
2.48	3.19	26.13	8.20	1.58
2.49	3.16	23.97	7.60	1.58
2.50	3.12	21.79	6.98	1.58
2.51	3.09	19.56	6.33	1.59
1.80	2.64	14.78	5.61	1.16
1.80	2.60	13.98	5.37	1.16
1.81	2.57	13.17	5.12	1.16
1.82	2.54	12.35	4.86	1.17
1.83	2.51	11.52	4.59	1.17
1.83	2.48	10.67	4.31	1.17
1.84	2.45	9.81	4.01	1.17
1.85	2.41	8.94	3.70	1.18
1.86	2.38	8.04	3.37	1.18
1.87	2.34	7.13	3.04	1.19
1.88	2.32	6.19	2.67	1.19
1.48	2.27	8.28	3.64	.96
1.48	2.24	7.85	3.50	.96
1.49	2.21	7.41	3.35	.96
1.50	2.18	6.96	3.20	.97
1.51	2.15	6.50	3.02	.97
1.51	2.12	6.03	2.84	.97
1.52	2.09	5.55	2.66	.97
1.53	2.06	5.06	2.46	.98
1.54	2.03	4.56	2.25	.98
1.55	2.00	4.05	2.03	.98
1.56	1.96	3.53	1.79	.99

PROPERTIES OF STANDARD ANGLES.

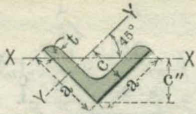
EQUAL LEGS.



1	2	3	4	5	6	7
Dimensions	Thick-ness	Weight per foot	Area of section	Distance of center of gravity from back of leg	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y
a x a	t		A	c	I	S
Inches	Inch	Pounds	Sq. In.	Inches	Inches^4	Inches^3
4 x 4	13/16	19.9	5.84	1.29	8.14	3.01
4 x 4	3/4	18.5	5.44	1.27	7.66	2.81
4 x 4	11/16	17.1	5.03	1.25	7.17	2.61
4 x 4	5/8	15.7	4.62	1.23	6.66	2.40
4 x 4	9/16	14.3	4.19	1.21	6.12	2.19
4 x 4	1/2	12.8	3.75	1.18	5.56	1.97
4 x 4	7/16	11.3	3.31	1.16	4.97	1.75
4 x 4	3/8	9.8	2.86	1.14	4.36	1.52
4 x 4	5/16	8.2	2.41	1.12	3.71	1.29
3½ x 3½	13/16	17.1	5.03	1.17	5.25	2.25
3½ x 3½	3/4	16.0	4.69	1.15	4.96	2.11
3½ x 3½	11/16	14.8	4.34	1.12	4.65	1.96
3½ x 3½	5/8	13.6	3.99	1.10	4.33	1.81
3½ x 3½	9/16	12.4	3.63	1.08	3.99	1.65
3½ x 3½	1/2	11.1	3.25	1.06	3.64	1.49
3½ x 3½	7/16	9.8	2.88	1.04	3.26	1.32
3½ x 3½	3/8	8.5	2.49	1.01	2.87	1.15
3½ x 3½	5/16	7.2	2.09	.99	2.45	.98
3 x 3	5/8	11.5	3.36	.98	2.62	1.30
3 x 3	9/16	10.4	3.06	.95	2.43	1.19
3 x 3	1/2	9.4	2.75	.93	2.22	1.07
3 x 3	7/16	8.3	2.44	.91	1.99	.95
3 x 3	3/8	7.2	2.11	.89	1.76	.83
3 x 3	5/16	6.1	1.78	.87	1.51	.71
3 x 3	1/4	4.9	1.44	.84	1.24	.58
2½ x 2½	1/2	7.7	2.25	.81	1.23	.72
2½ x 2½	7/16	6.8	2.00	.78	1.11	.65
2½ x 2½	3/8	5.9	1.74	.76	.98	.57
2½ x 2½	5/16	5.0	1.47	.74	.85	.48
2½ x 2½	1/4	4.1	1.19	.72	.70	.39
2½ x 2½	3/16	3.1	.91	.69	.55	.30

PROPERTIES OF STANDARD ANGLES.

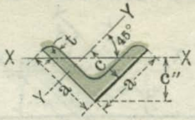
EQUAL LEGS.



8	9	10	11	12
Radius of gyration Axis Y-Y	Distance of center of gravity from external apex	Least moment of inertia Axis X-X	Section modulus Axis X-X	Least radius of gyration Axis X-X
r	c″	I″	S″	r″
Inches	Inches	Inches[4]	Inches[3]	Inch
1.18	1.83	3.46	1.89	.77
1.19	1.80	3.23	1.80	.77
1.19	1.77	3.00	1.70	.77
1.20	1.74	2.76	1.59	.77
1.21	1.71	2.52	1.48	.78
1.22	1.67	2.28	1.36	.78
1.23	1.64	2.02	1.23	.78
1.23	1.61	1.77	1.10	.79
1.24	1.58	1.50	.95	.79
1.02	1.65	2.28	1.38	.67
1.03	1.62	2.13	1.31	.67
1.04	1.59	1.97	1.24	.67
1.04	1.56	1.82	1.17	.68
1.05	1.53	1.66	1.09	.68
1.06	1.50	1.50	1.00	.68
1.07	1.46	1.33	.91	.68
1.07	1.43	1.16	.81	.68
1.08	1.40	.99	.71	.69
.88	1.38	1.12	.81	.58
.89	1.35	1.02	.76	.58
.90	1.32	.92	.70	.58
.91	1.29	.82	.64	.58
.91	1.26	.72	.57	.58
.92	1.22	.61	.50	.59
.93	1.19	.50	.42	.59
.74	1.14	.52	.46	.48
.75	1.11	.46	.42	.48
.75	1.08	.41	.38	.48
.76	1.05	.35	.33	.49
.77	1.01	.29	.28	.49
.78	.98	.22	.22	.49

PROPERTIES OF STANDARD ANGLES.

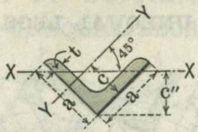
EQUAL LEGS.



1	2	3	4	5	6	7
Dimensions	Thick-ness	Weight per foot	Area of section	Distance of center of gravity from back of leg	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y
a x a	t		A	c	I	S
Inches	Inch	Pounds	Sq. In.	Inches	Inches⁴	Inches³
2¼ x 2¼	7/16	6.1	1.78	.72	.79	.52
2¼ x 2¼	⅜	5.3	1.55	.70	.70	.45
2¼ x 2¼	5/16	4.5	1.31	.68	.61	.39
2¼ x 2¼	¼	3.7	1.07	.65	.50	.32
2¼ x 2¼	3/16	2.8	.81	.63	.39	.24
2 x 2	7/16	5.3	1.56	.66	.54	.40
2 x 2	⅜	4.7	1.36	.64	.48	.35
2 x 2	5/16	4.0	1.16	.61	.42	.30
2 x 2	¼	3.2	.94	.59	.35	.25
2 x 2	3/16	2.5	.72	.57	.27	.19
1¾ x 1¾	7/16	4.6	1.34	.59	.35	.30
1¾ x 1¾	⅜	4.0	1.18	.57	.31	.26
1¾ x 1¾	5/16	3.4	1.00	.55	.27	.23
1¾ x 1¾	¼	2.8	.82	.53	.23	.19
1¾ x 1¾	3/16	2.2	.63	.51	.18	.14
1½ x 1½	⅜	3.4	.99	.51	.19	.188
1½ x 1½	5/16	2.9	.84	.49	.16	.162
1½ x 1½	¼	2.4	.69	.47	.14	.134
1½ x 1½	3/16	1.8	.53	.44	.11	.104
1½ x 1½	⅛	1.3	.36	.42	.08	.072
1¼ x 1¼	5/16	2.4	.69	.42	.090	.109
1¼ x 1¼	¼	2.0	.57	.40	.077	.091
1¼ x 1¼	3/16	1.5	.44	.38	.061	.071
1¼ x 1¼	⅛	1.1	.30	.36	.044	.049
1 x 1	¼	1.5	.44	.34	.037	.056
1 x 1	3/16	1.2	.34	.32	.030	.044
1 x 1	⅛	.8	.24	.30	.022	.031
¾ x ¾	3/16	.9	.25	.25	.012	.024
¾ x ¾	⅛	.6	.18	.23	.009	.017

PROPERTIES OF STANDARD ANGLES.

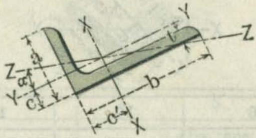
EQUAL LEGS.



8	9	10	11	12
Radius of gyration Axis Y-Y	Distance of center of gravity from external apex	Least moment of inertia Axis X-X	Section modulus Axis X-X	Least radius of gyration Axis X-X
r	c"	I"	S"	r"
Inches	Inches	Inches⁴	Inches³	Inch
.67	1.02	.33	.33	.43
.67	.99	.29	.30	.43
.68	.96	.25	.26	.44
.69	.92	.21	.22	.44
.70	.89	.16	.18	.44
.59	.93	.23	.25	.38
.59	.90	.20	.22	.39
.60	.87	.17	.20	.39
.61	.84	.14	.17	.39
.62	.80	.11	.14	.39
.51	.84	.152	.18	.34
.51	.81	.133	.16	.34
.52	.78	.113	.15	.34
.53	.75	.094	.13	.34
.54	.72	.073	.10	.34
.44	.72	.082	.114	.29
.44	.69	.070	.101	.29
.45	.66	.058	.088	.29
.46	.63	.045	.072	.29
.47	.60	.031	.053	.30
.36	.60	.040	.066	.24
.37	.57	.033	.057	.24
.38	.54	.025	.047	.24
.38	.51	.018	.035	.24
.29	.48	.016	.034	.19
.30	.45	.013	.028	.19
.30	.42	.009	.021	.19
.22	.36	.005	.014	.14
.22	.33	.004	.011	.14

PROPERTIES OF STANDARD ANGLES.

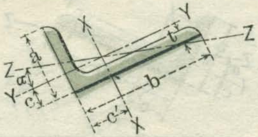
UNEQUAL LEGS.



1	2	3	4	5	6	7
Dimensions	Thickness	Weight per foot	Area of section	Distance of center of gravity from back of longer leg	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y
Inches	Inch	Pounds	Sq. Ins.	Inches	Inches⁴	Inches³
b x a	t		A	c	I	S
8 x 6	1	44.3	13.00	1.65	38.78	8.92
8 x 6	15/16	41.7	12.25	1.63	36.85	8.43
8 x 6	7/8	39.1	11.48	1.61	34.86	7.94
8 x 6	13/16	36.5	10.71	1.59	32.82	7.44
8 x 6	3/4	33.9	9.94	1.56	30.72	6.92
8 x 6	11/16	31.2	9.15	1.54	28.56	6.40
8 x 6	5/8	28.5	8.36	1.52	26.33	5.88
8 x 6	9/16	25.8	7.56	1.50	24.04	5.34
8 x 6	1/2	23.0	6.75	1.47	21.68	4.79
7 x 3 1/2	1	32.3	9.50	.96	7.53	2.96
7 x 3 1/2	15/16	30.5	8.97	.94	7.18	2.80
7 x 3 1/2	7/8	28.7	8.43	.91	6.83	2.64
7 x 3 1/2	13/16	26.8	7.88	.89	6.46	2.48
7 x 3 1/2	3/4	24.9	7.32	.87	6.08	2.31
7 x 3 1/2	11/16	23.0	6.75	.85	5.69	2.14
7 x 3 1/2	5/8	21.0	6.18	.82	5.28	1.97
7 x 3 1/2	9/16	19.1	5.59	.80	4.86	1.80
7 x 3 1/2	1/2	17.0	5.00	.78	4.41	1.62
7 x 3 1/2	7/16	15.0	4.41	.75	3.95	1.44
6 x 4	1	30.6	9.00	1.17	10.75	3.79
6 x 4	15/16	28.9	8.50	1.14	10.26	3.59
6 x 4	7/8	27.2	7.99	1.12	9.75	3.39
6 x 4	13/16	25.4	7.47	1.10	9.23	3.18
6 x 4	3/4	23.6	6.94	1.08	8.68	2.97
6 x 4	11/16	21.8	6.41	1.06	8.11	2.76
6 x 4	5/8	20.0	5.86	1.03	7.52	2.54
6 x 4	9/16	18.1	5.31	1.01	6.91	2.31
6 x 4	1/2	16.2	4.75	.99	6.27	2.08
6 x 4	7/16	14.3	4.19	.96	5.60	1.85
6 x 4	3/8	12.3	3.61	.94	4.90	1.60
6 x 3 1/2	1	28.9	8.50	1.01	7.21	2.90
6 x 3 1/2	15/16	27.3	8.03	.99	6.88	2.74
6 x 3 1/2	7/8	25.7	7.55	.97	6.55	2.59
6 x 3 1/2	13/16	24.0	7.06	.95	6.20	2.43
6 x 3 1/2	3/4	22.4	6.57	.93	5.84	2.27

PROPERTIES OF STANDARD ANGLES.

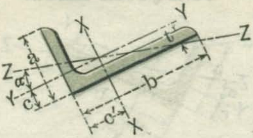
UNEQUAL LEGS.



8	9	10	11	12	13	14
Radius of gyration Axis Y-Y	Distance of center of gravity from back of shorter leg	Moment of inertia Axis X-X	Section modulus Axis X-X	Radius of gyration Axis X-X	Tangent of angle α	Radius of gyration Axis Z-Z
r	c'	I'	S'	r'		r''
Inch	Inches	Inches⁴	Inches³	Inches		Inch
1.73	2.65	80.78	15.11	2.49	.543	1.28
1.73	2.63	76.59	14.27	2.50	.545	1.28
1.74	2.61	72.32	13.41	2.51	.546	1.28
1.75	2.59	67.92	12.55	2.52	.549	1.28
1.76	2.56	63.42	11.67	2.53	.553	1.28
1.77	2.54	58.82	10.77	2.54	.554	1.29
1.77	2.52	54.10	9.87	2.54	.554	1.29
1.78	2.50	49.26	8.95	2.55	.556	1.30
1.79	2.47	44.31	8.02	2.56	.558	1.30
.89	2.71	45.37	10.58	2.19	.241	.74
.89	2.69	43.13	10.00	2.19	.244	.74
.90	2.66	40.82	9.42	2.20	.247	.74
.91	2.64	38.45	8.83	2.21	.250	.74
.91	2.62	35.99	8.22	2.22	.253	.74
.92	2.60	33.47	7.60	2.23	.257	.74
.93	2.57	30.86	6.96	2.24	.259	.75
.93	2.55	28.18	6.34	2.25	.262	.75
.94	2.53	25.41	5.68	2.25	.264	.75
.95	2.50	22.56	5.01	2.26	.267	.76
1.09	2.17	30.75	8.02	1.85	.414	.86
1.10	2.14	29.26	7.59	1.86	.418	.86
1.11	2.12	27.73	7.15	1.86	.421	.86
1.11	2.10	26.15	6.70	1.87	.425	.86
1.12	2.08	24.51	6.25	1.88	.428	.86
1.13	2.06	22.82	5.78	1.89	.431	.86
1.13	2.03	21.07	5.31	1.90	.434	.86
1.14	2.01	19.26	4.83	1.90	.438	.87
1.15	1.99	17.40	4.33	1.91	.440	.87
1.16	1.96	15.46	3.83	1.92	.443	.87
1.17	1.94	13.47	3.32	1.93	.446	.88
.92	2.26	29.15	7.80	1.85	.317	.75
.93	2.24	27.84	7.41	1.86	.320	.75
.93	2.22	26.39	6.98	1.87	.323	.75
.94	2.20	24.89	6.55	1.88	.327	.75
.94	2.18	23.34	6.10	1.89	.331	.75

PROPERTIES OF STANDARD ANGLES.

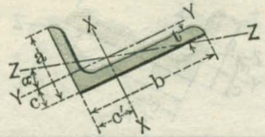
UNEQUAL LEGS.



1	2	3	4	5	6	7
Dimensions	Thickness	Weight per foot	Area of section	Distance of center of gravity from back of longer leg	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y
b x a	t		A	c	I	S
Inches	Inch	Pounds	Sq. Ins.	Inches	$Inches^4$	$Inches^3$
6 x 3½	11/16	20.6	6.06	.90	5.47	2.11
6 x 3½	5/8	18.9	5.55	.88	5.08	1.94
6 x 3½	9/16	17.1	5.03	.86	4.67	1.77
6 x 3½	1/2	15.3	4.50	.83	4.25	1.59
6 x 3½	7/16	13.5	3.97	.81	3.81	1.41
6 x 3½	3/8	11.7	3.43	.79	3.34	1.23
5 x 4	7/8	24.2	7.11	1.21	9.23	3.31
5 x 4	13/16	22.7	6.65	1.18	8.74	3.11
5 x 4	3/4	21.1	6.19	1.16	8.23	2.90
5 x 4	11/16	19.5	5.72	1.14	7.70	2.69
5 x 4	5/8	17.8	5.24	1.12	7.14	2.48
5 x 4	9/16	16.2	4.75	1.10	6.56	2.26
5 x 4	1/2	14.5	4.25	1.07	5.96	2.04
5 x 4	7/16	12.8	3.74	1.05	5.32	1.81
5 x 4	3/8	11.0	3.24	1.03	4.66	1.57
5 x 3½	7/8	22.7	6.68	1.04	6.21	2.52
5 x 3½	13/16	21.3	6.25	1.02	5.89	2.37
5 x 3½	3/4	19.8	5.82	1.00	5.55	2.22
5 x 3½	11/16	18.3	5.38	.97	5.20	2.06
5 x 3½	5/8	16.8	4.93	.95	4.83	1.90
5 x 3½	9/16	15.2	4.47	.93	4.45	1.73
5 x 3½	1/2	13.6	4.00	.91	4.05	1.56
5 x 3½	7/16	12.0	3.53	.88	3.63	1.39
5 x 3½	3/8	10.4	3.05	.86	3.18	1.21
5 x 3½	5/16	8.7	2.56	.84	2.72	1.02
5 x 3	13/16	19.9	5.84	.86	3.71	1.74
5 x 3	3/4	18.5	5.44	.84	3.51	1.62
5 x 3	11/16	17.1	5.03	.82	3.29	1.51
5 x 3	5/8	15.7	4.61	.80	3.06	1.39
5 x 3	9/16	14.3	4.19	.77	2.83	1.27
5 x 3	1/2	12.8	3.75	.75	2.58	1.15
5 x 3	7/16	11.3	3.31	.73	2.32	1.02
5 x 3	3/8	9.8	2.86	.70	2.04	.89
5 x 3	5/16	8.2	2.41	.68	1.75	.75

PROPERTIES OF STANDARD ANGLES.

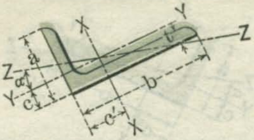
UNEQUAL LEGS.



8	9	10	11	12	13	14
Radius of gyration Axis Y-Y	Distance of center of gravity from back of shorter leg	Moment of inertia Axis X-X	Section modulus Axis X-X	Radius of gyration Axis X-X	Tangent of angle α	Radius of gyration Axis Z-Z
r	c′	I′	S′	r′		r″
Inch	Inches	Inches⁴	Inches³	Inches		Inch
.95	2.15	21.74	5.65	1.89	.334	.75
.96	2.13	20.08	5.19	1.90	.338	.75
.96	2.11	18.37	4.72	1.91	.341	.75
.97	2.08	16.59	4.24	1.92	.344	.76
.98	2.06	14.76	3.75	1.93	.347	.76
.99	2.04	12.86	3.24	1.94	.350	.77
1.14	1.71	16.42	4.99	1.52	.608	.84
1.15	1.68	15.54	4.69	1.53	.611	.84
1.15	1.66	14.60	4.37	1.54	.614	.84
1.16	1.64	13.62	4.05	1.54	.617	.84
1.17	1.62	12.61	3.73	1.55	.620	.84
1.18	1.60	11.55	3.39	1.56	.623	.85
1.18	1.57	10.46	3.05	1.57	.626	.85
1.19	1.55	9.32	2.70	1.58	.629	.85
1.20	1.53	8.14	2.34	1.59	.631	.85
.96	1.79	15.67	4.88	1.53	.455	.75
.97	1.77	14.81	4.58	1.54	.460	.75
.98	1.75	13.92	4.28	1.55	.464	.75
.98	1.72	12.99	3.97	1.56	.468	.75
.99	1.70	12.03	3.65	1.56	.472	.75
1.00	1.68	11.03	3.32	1.57	.476	.75
1.01	1.66	9.99	2.99	1.58	.479	.75
1.01	1.63	8.90	2.64	1.59	.482	.76
1.02	1.61	7.78	2.29	1.60	.485	.76
1.03	1.59	6.60	1.94	1.61	.489	.77
.80	1.86	13.98	4.46	1.55	.336	.64
.80	1.84	13.15	4.16	1.55	.340	.64
.81	1.82	12.28	3.86	1.56	.345	.64
.82	1.80	11.37	3.55	1.57	.349	.64
.82	1.77	10,43	3.23	1.58	.353	.65
.83	1.75	9.45	2.91	1.59	.357	.65
.84	1.73	8.43	2.58	1.60	.361	.65
.84	1.70	7.37	2.24	1.61	.364	.65
.85	1.68	6.26	1.89	1.61	.368	.66

PROPERTIES OF STANDARD ANGLES.

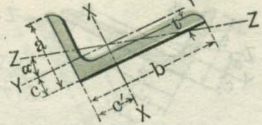
UNEQUAL LEGS.



1	2	3	4	5	6	7
Dimensions	Thickness	Weight per foot	Area of section	Distance of center of gravity from back of longer leg	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y
b x a	t		A	c	I	S
Inches	Inch	Pounds	Sq. Ins.	Inches	Inches⁴	Inches³
4½ x 3	13/16	18.5	5.43	.90	3.60	1.71
4½ x 3	¾	17.3	5.06	.88	3.40	1.60
4½ x 3	11/16	16.0	4.68	.85	3.19	1.49
4½ x 3	⅝	14.7	4.30	.83	2.98	1.37
4½ x 3	9/16	13.3	3.90	.81	2.75	1.25
4½ x 3	½	11.9	3.50	.79	2.51	1.13
4½ x 3	7/16	10.6	3.09	.76	2.25	1.01
4½ x 3	⅜	9.1	2.67	.74	1.98	.88
4½ x 3	5/16	7.7	2.25	.72	1.73	.76
4 x 3½	13/16	18.5	5.43	1.11	5.49	2.30
4 x 3½	¾	17.3	5.06	1.09	5.18	2.15
4 x 3½	11/16	16.0	4.68	1.07	4.86	2.00
4 x 3½	⅝	14.7	4.30	1.04	4.52	1.84
4 x 3½	9/16	13.3	3.90	1.02	4.17	1.68
4 x 3½	½	11.9	3.50	1.00	3.79	1.52
4 x 3½	7/16	10.6	3.09	.98	3.40	1.35
4 x 3½	⅜	9.1	2.67	.96	2.99	1.18
4 x 3½	5/16	7.7	2.25	.93	2.59	1.01
4 x 3	13/16	17.1	5.03	.94	3.47	1.68
4 x 3	¾	16.0	4.69	.92	3.28	1.57
4 x 3	11/16	14.8	4.34	.89	3.08	1.46
4 x 3	⅝	13.6	3.99	.87	2.87	1.35
4 x 3	9/16	12.4	3.63	.85	2.66	1.23
4 x 3	½	11.1	3.25	.83	2.42	1.12
4 x 3	7/16	9.8	2.88	.80	2.18	.99
4 x 3	⅜	8.5	2.49	.78	1.92	.87
4 x 3	5/16	7.2	2.09	.76	1.65	.73
3½ x 3	13/16	15.8	4.63	.98	3.33	1.65
3½ x 3	¾	14.7	4.32	.96	3.15	1.54
3½ x 3	11/16	13.6	4.00	.94	2.96	1.44
3½ x 3	⅝	12.5	3.68	.92	2.76	1.33
3½ x 3	9/16	11.4	3.34	.90	2.55	1.21
3½ x 3	½	10.2	3.00	.88	2.33	1.10
3½ x 3	7/16	9.1	2.66	.85	2.09	.98

PROPERTIES OF STANDARD ANGLES.

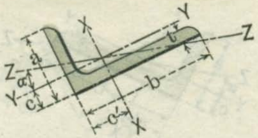
UNEQUAL LEGS.



8	9	10	11	12	13	14
Radius of gyration Axis Y-Y	Distance of center of gravity from back of shorter leg	Moment of inertia Axis X-X	Section modulus Axis X-X	Radius of gyration Axis X-X	Tangent of angle ∝	Radius of gyration Axis Z-Z
r	c′	I′	S′	r′		r″
Inch	Inches	Inches⁴	Inches³	Inches		Inch
.81	1.65	10.33	3.62	1.38	.410	.64
.82	1.63	9.73	3.38	1.39	.414	.64
.83	1.60	9.10	3.14	1.39	.419	.64
.83	1.58	8.44	2.89	1.40	.424	.64
.85	1.56	7.75	2.64	1.41	.428	.64
.85	1.54	7.04	2.37	1.42	.431	.65
.85	1.51	6.29	2.10	1.43	.437	.65
.86	1.49	5.50	1.83	1.44	.440	.66
.88	1.47	4.69	1.54	1.44	.444	.66
1.01	1.36	7.77	2.92	1.19	.730	.72
1.01	1.34	7.32	2.75	1.20	.734	.72
1.02	1.32	6.86	2.56	1.21	.738	.72
1.03	1.29	6.37	2.35	1.22	.742	.72
1.03	1.27	5.86	2.15	1.23	.747	.72
1.04	1.25	5.32	1.93	1.23	.750	.72
1.05	1.23	4.76	1.72	1.24	.753	.72
1.06	1.21	4.18	1.50	1.25	.755	.73
1.07	1.18	3.56	1.26	1.26	.757	.73
.83	1.44	7.35	2.87	1.21	.518	.64
.84	1.42	6.93	2.68	1.22	.524	.64
.84	1.39	6.49	2.49	1.22	.529	.64
.85	1.37	6.03	2.30	1.23	.534	.64
.86	1.35	5.55	2.09	1.24	.538	.64
.86	1.33	5.05	1.89	1.25	.543	.64
.87	1.30	4.52	1.68	1.25	.547	.64
.88	1.28	3.96	1.46	1.26	.551	.64
.89	1.26	3.38	1.23	1.27	.554	.65
.85	1.23	4.98	2.20	1.04	.694	.62
.85	1.21	4.70	2.05	1.04	.698	.62
.86	1.19	4.41	1.91	1.05	.703	.62
.87	1.17	4.11	1.76	1.06	.707	.62
.87	1.15	3.79	1.61	1.07	.711	.62
.88	1.13	3.45	1.45	1.07	.714	.62
.89	1.10	3.10	1.29	1.08	.718	.62

PROPERTIES OF STANDARD ANGLES.

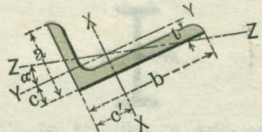
UNEQUAL LEGS.



1	2	3	4	5	6	7
Dimensions	Thick-ness	Weight per foot	Area of section	Distance of center of gravity from back of longer leg	Moment of inertia Axis Y-Y	Section modulus Axis Y-Y
b x a	t		A	c	I	S
Inches	Inch	Pounds	Sq. Ins.	Inches	Inches⁴	Inches³
3½ x 3	⅜	7.9	2.30	.83	1.85	.85
3½ x 3	5/16	6.6	1.94	.81	1.58	.72
3½ x 2½	11/16	12.5	3.66	.77	1.72	.99
3½ x 2½	⅝	11.5	3.36	.75	1.61	.92
3½ x 2½	9/16	10.4	3.06	.73	1.49	.84
3½ x 2½	½	9.4	2.75	.70	1.36	.76
3½ x 2½	7/16	8.3	2.44	.68	1.23	.68
3½ x 2½	⅜	7.2	2.11	.66	1.09	.59
3½ x 2½	5/16	6.1	1.78	.64	.94	.50
3½ x 2½	¼	4.9	1.44	.61	.78	.41
3 x 2½	9/16	9.5	2.78	.77	1.42	.82
3 x 2½	½	8.5	2.50	.75	1.30	.74
3 x 2½	7/16	7.6	2.22	.73	1.18	.66
3 x 2½	⅜	6.6	1.93	.71	1.04	.58
3 x 2½	5/16	5.6	1.63	.68	.90	.49
3 x 2½	¼	4.5	1.32	.66	.74	.40
3 x 2½	3/16	3.4	.99	.59	.60	.31
3 x 2	½	7.7	2.25	.58	.67	.47
3 x 2	7/16	6.8	2.00	.56	.61	.42
3 x 2	⅜	5.9	1.74	.54	.54	.37
3 x 2	5/16	5.0	1.47	.51	.47	.32
3 x 2	¼	4.1	1.19	.49	.39	.26
3 x 2	3/16	3.1	.91	.47	.31	.20
2½ x 2	½	6.8	2.00	.63	.64	.46
2½ x 2	7/16	6.1	1.78	.60	.58	.41
2½ x 2	⅜	5.3	1.55	.58	.51	.36
2½ x 2	5/16	4.5	1.31	.56	.45	.31
2½ x 2	¼	3.7	1.07	.54	.37	.25
2½ x 2	3/16	2.8	.81	.51	.29	.20
2 x 1½	⅜	4.0	1.18	.46	.21	.20
2 x 1½	5/16	3.4	1.00	.44	.18	.17
2 x 1½	¼	2.8	.82	.41	.15	.14
2 x 1½	3/16	2.2	.63	.39	.12	.11

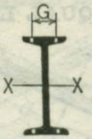
PROPERTIES OF STANDARD ANGLES.

UNEQUAL LEGS.



8	9	10	11	12	13	14
Radius of gyration Axis Y-Y	Distance of center of gravity from back of shorter leg	Moment of inertia Axis X-X	Section modulus Axis X-X	Radius of gyration Axis X-X	Tangent of angle α	Radius of gyration Axis Z-Z
r	c′	I′	S′	r′		r″
Inch	Inches	Inches⁴	Inches³	Inches		Inch
.90	1.08	2.72	1.13	1.09	.721	.62
.90	1.06	2.33	.95	1.10	.724	.63
.69	1.27	4.13	1.85	1.06	.468	.53
.69	1.25	3.85	1.71	1.07	.472	.53
.70	1.23	3.55	1.56	1.08	.480	.53
.70	1.20	3.24	1.41	1.09	.486	.53
.71	1.18	2.91	1.26	1.09	.491	.54
.72	1.16	2.56	1.09	1.10	.496	.54
.73	1.14	2.19	.93	1.11	.501	.54
.74	1.11	1.80	.75	1.12	.506	.54
.72	1.02	2.28	1.15	.91	.661	.52
.72	1.00	2.08	1.04	.91	.666	.52
.73	.98	1.88	.93	.92	.672	.52
.74	.96	1.66	.81	.93	.676	.52
.74	.93	1.42	.69	.94	.680	.53
.75	.91	1.17	.56	.95	.684	.53
.75	.88	.90	.42	.95	.688	.53
.55	1.08	1.92	1.00	.92	.414	.43
.55	1.06	1.73	.89	.93	.421	.43
.56	1.04	1.53	.78	.94	.428	.43
.57	1.02	1.32	.66	.95	.434	.43
.57	.99	1.09	.54	.96	.440	.43
.58	.97	.84	.41	.97	.446	.44
.56	.88	1.14	.70	.75	.600	.42
.57	.85	1.03	.62	.76	.607	.42
.58	.83	.91	.55	.77	.614	.42
.58	.81	.79	.47	.78	.620	.42
.59	.79	.65	.38	.78	.626	.42
.60	.76	.51	.29	.79	.632	.43
.42	.71	.43	.34	.61	.524	.32
.42	.69	.38	.29	.62	.534	.32
.43	.66	.32	.24	.62	.543	.32
.44	.64	.25	.18	.63	.551	.32

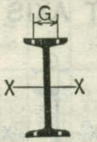
NET VALUES OF BEAMS. ABOUT AXIS "XX."



Deducting one hole in top flange and one hole in bottom flange, using standard gauge and maximum size rivet.

Beam		Diam. of rivets	Diam. of holes	Deduct for holes.			Net values of beam		
Depth	Weight			I	C_s	S	I	C_s	S
Ins.	Lbs	Ins.	Ins.	Ins.^{4}		Ins.^{3}	Ins.^{4}		Ins.^{3}
24	100	⅞	1	226.3	201200	18.9	2154.0	1914600	179.5
24	95	⅞	1	226.3	201200	18.9	2083.3	1851700	173.6
24	90	⅞	1	226.3	201200	18.9	2012.8	1789100	167.7
24	85	⅞	1	226.3	201200	18.9	1942.3	1726400	161.8
24	80	⅞	1	226.3	201200	18.9	1861.6	1654700	155.1
20	100	⅞	1	165.3	176200	16.5	1490.5	1589900	149.1
20	95	⅞	1	165.3	176200	16.5	1441.5	1537700	144.2
20	90	⅞	1	165.3	176200	16.5	1392.5	1485400	139.3
20	85	⅞	1	165.3	176200	16.5	1343.4	1433100	134.4
20	80	⅞	1	165.3	176200	16.5	1301.2	1388100	130.2
20	75	⅞	1	144.4	153900	14.4	1124.5	1199600	112.5
20	70	⅞	1	144.4	153900	14.4	1075.5	1147300	107.6
20	65	⅞	1	144.4	153900	14.4	1025.2	1093700	102.6
18	70	⅞	1	103.1	122100	11.5	818.2	969800	90.9
18	65	⅞	1	103.1	122100	11.5	778.4	922700	86.4
18	60	⅞	1	103.1	122100	11.5	738.7	875600	82.0
18	55	⅞	1	103.1	122100	11.5	692.5	820900	76.9
15	75	¾	⅞	71.5	101700	9.5	619.7	881300	82.7
15	70	¾	⅞	71.5	101700	9.5	592.1	842100	79.0
15	65	¾	⅞	71.5	101700	9.5	564.5	802900	75.3
15	60	¾	⅞	71.5	101700	9.5	537.5	764400	71.7
15	55	¾	⅞	56.6	80400	7.5	454.4	646400	60.6
15	50	¾	⅞	56.6	80400	7.5	426.8	607100	57.0
15	45	¾	⅞	56.6	80400	7.5	399.2	567800	53.3
15	42	¾	⅞	56.6	80400	7.5	385.1	547900	51.4

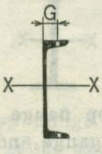
NET VALUES OF BEAMS. ABOUT AXIS "XX."



Deducting one hole in top flange and one hole in bottom flange, using standard gauge and maximum size rivet.

Beam		Diam. of rivets	Diam. of holes	Deduct for holes.			Net values of beam		
Depth	Weight			I	C_s	S	I	C_s	S
Ins.	Lbs.	Ins.	Ins.	$Ins.^4$		$Ins.^3$	$Ins.^4$		$Ins.^3$
12	55	¾	⅞	37.0	65800	6.2	284.0	504800	47.3
12	50	¾	⅞	37.0	65800	6.2	266.3	473400	44.4
12	45	¾	⅞	37.0	65800	6.2	248.7	442100	41.4
12	40	¾	⅞	37.0	65800	6.2	231.9	412300	36.6
12	35	¾	⅞	30.6	54400	5.1	197.7	351400	32.9
12	31.50	¾	⅞	30.6	54400	5.1	185.2	329300	30.9
10	40	¾	⅞	18.6	39700	3.7	140.1	298800	28.0
10	35	¾	⅞	18.6	39700	3.7	127.8	272700	25.6
10	30	¾	⅞	18.6	39700	3.7	115.6	246600	23.1
10	25	¾	⅞	18.6	39700	3.7	103.5	220800	20.7
9	35	¾	⅞	14.0	33300	3.1	97.8	231700	21.7
9	30	¾	⅞	14.0	33300	3.1	87.9	208200	19.5
9	25	¾	⅞	14.0	33300	3.1	77.9	184600	17.3
9	21	¾	⅞	14.0	33300	3.1	70.9	168000	15.8
8	25.5	¾	⅞	10.3	27400	2.6	58.1	155100	14.5
8	23	¾	⅞	10.3	27400	2.6	54.2	144600	13.5
8	20.5	¾	⅞	10.3	27400	2.6	50.3	134200	12.5
8	18	¾	⅞	10.3	27400	2.6	46.6	124300	11.6
7	20	⅝	¾	6.2	18800	1.8	36.0	109800	10.3
7	17.5	⅝	¾	6.2	18800	1.8	33.0	100600	9.4
7	15	⅝	¾	6.2	18800	1.8	30.0	91600	8.6
6	17.25	⅝	¾	4.1	14700	1.4	22.1	78400	7.3
6	14.75	⅝	¾	4.1	14700	1.4	19.9	70600	6.6
6	12.25	⅝	¾	4.1	14700	1.4	17.7	62800	5.9

NET VALUES OF CHANNELS.
ABOUT AXIS "XX."



Deducting one hole in top flange and one hole in bottom flange, using standard gauge and maximum size rivet.

Channel		Diameter of rivets	Diameter of holes	Deduct for holes			Net values of channel		
Depth	Weight			I	C_s	S	I	C_s	S
Ins.	Lbs.	Ins.	Ins.	Ins.^{4}		Ins.^{3}	Ins.^{4}		Ins.^{3}
15	55	¾	⅞	56.6	80400	7.5	373.6	531500	49.9
15	50	¾	⅞	56.6	80400	7.5	346.1	492300	46.2
15	45	¾	⅞	56.6	80400	7.5	318.5	453100	42.5
15	40	¾	⅞	59.1	84100	7.9	288.4	410100	38.4
15	35	¾	⅞	59.1	84100	7.9	260.9	370900	34.8
15	33	¾	⅞	59.1	84100	7.9	253.5	360400	33.8
12	40	¾	⅞	27.3	48500	4.5	169.7	301700	28.3
12	35	¾	⅞	27.3	48500	4.5	152.0	270300	25.4
12	30	¾	⅞	27.3	48500	4.5	134.4	238900	22.4
12	25	¾	⅞	27.3	48500	4.5	116.7	207600	19.5
12	20.50	¾	⅞	27.3	48500	4.5	100.8	179300	16.9
10	25	¾	⅞	15.2	32400	3.0	75.8	161700	15.2
10	20	¾	⅞	17.5	37300	3.5	61.2	130700	12.2
10	15	¾	⅞	17.5	37300	3.5	49.4	105400	9.9
9	20	¾	⅞	12.2	28900	2.7	48.6	115200	10.8
9	15	¾	⅞	13.1	31100	2.9	37.8	89400	8.4
9	13.25	¾	⅞	13.1	31100	2.9	34.2	81100	7.6
8	16.25	¾	⅞	9.5	25400	2.4	30.4	81000	7.6
8	13.75	¾	⅞	9.5	25400	2.4	26.5	70600	6.6
8	11.25	¾	⅞	9.5	25400	2.4	22.8	60700	5.7
7	14.75	⅝	¾	5.7	17400	1.6	21.5	65400	6.2
7	12.25	⅝	¾	5.7	17400	1.6	18.5	56300	5.3
7	9.75	⅝	¾	5.7	17400	1.6	15.4	49400	4.4
6	13	⅝	¾	4.1	14700	1.4	13.2	46900	4.4
6	10.50	⅝	¾	4.1	14700	1.4	11.0	39100	3.6
6	8	⅝	¾	4.1	14700	1.4	8.9	31500	2.9

NET SECTION IN SQ. INS. OF ONE ANGLE DEDUCTING ONE ¾-IN. HOLE.

Thickness deducted	¼ .19	5/16 .23	⅜ .28	7/16 .33	½ .38	9/16 .42	⅝ .47	11/16 .52	¾ .56	13/16 .61	⅞ .66	15/16 .70	1 .75
8 x8	...	...	...	...	7.37	8.26	9.14	10.01	10.88	11.73	12.57	13.42	14.25
7 x3½	...	...	...	4.07	4.62	5.17	5.70	6.23	6.75	7.26	7.76	8.27	8.75
6 x6	...	...	4.08	4.73	5.37	6.01	6.64	7.26	7.88	8.48	9.08	9.67	10.25
6 x4	...	...	3.33	3.85	4.37	4.89	5.39	5.89	6.38	6.86	7.33	7.80	8.25
6 x3½	...	...	3.15	3.64	4.12	4.61	5.08	5.54	6.01	6.45	6.89	7.33	7.75
5 x3½	...	2.33	2.77	3.20	3.62	4.05	4.45	4.85	5.25	5.64	6.01		
5 x3	...	2.18	2.58	2.98	3.37	3.77	4.14	4.51	4.88	5.23	5.58		
4 x4	...	2.17	2.58	2.98	3.37	3.76	4.14	4.51	4.88	5.23			
4 x3	...	1.86	2.20	2.54	2.87	3.20	3.51	3.82	4.13	4.42			
3½x3½	...	1.86	2.21	2.55	2.87	3.21	3.52	3.82	4.13	4.42	4.70		
3 x3	1.25	1.55	1.83	2.10	2.37	2.64	2.89						
3 x2½	1.12	1.39	1.64	1.89	2.12	2.36							
2½x2½	1.00	1.24	1.45	1.67	1.87								
2½x2	.87	1.08	1.27	1.45	1.62								
2 x2	.75	.92	1.08	1.23									

NET SECTION IN SQ. INS. OF ONE ANGLE DEDUCTING TWO ¾-IN. HOLES.

Thickness deducted	¼ .38	5/16 .47	⅜ .56	7/16 .66	½ .75	9/16 .84	⅝ .94	11/16 1.03	¾ 1.13	13/16 1.22	⅞ 1.31	15/16 1.41	1 1.50
8 x8	...	...	...	...	7.00	7.84	8.67	9.50	10.31	11.12	11.92	12.71	13.50
7 x3½	...	...	...	3.74	4.25	4.75	5.23	5.72	6.18	6.65	7.11	7.56	8.00
6 x6	...	...	3.80	4.40	5.00	5.59	6.17	6.75	7.31	7.87	8.43	8.96	9.50
6 x4	...	...	3.05	3.52	4.00	4.47	4.92	5.38	5.81	6.25	6.68	7.09	7.50
6 x3½	...	...	2.87	3.31	3.75	4.19	4.61	5.03	5.44	5.84	6.24	6.62	7.00
5 x3½	...	2.09	2.49	2.87	3.25	3.63	3.98	4.34	4.68	5.03	5.36		
5 x3	...	1.94	2.30	2.65	3.00	3.35	3.67	4.00	4.31	4.62	4.93		
4 x4	...	1.93	2.30	2.65	3.00	3.34	3.67	4.00	4.31	4.62			
4 x3	...	1.62	1.92	2.21	2.50	2.78	3.04	3.31	3.56	3.81			
3½x3½	...	1.62	1.93	2.22	2.50	2.79	3.05	3.30	3.57	3.81	4.04		
3 x3	1.06	1.31	1.55	1.77	2.00	2.22	2.42						
3 x2½	.93	1.15	1.36	1.56	1.75	1.94							
2½x2½	.81	1.00	1.17	1.34	1.50								
2½x2	.68	.84	.99	1.12	1.25								
2 x2	.56	.68	.80	.90									

NET SECTION IN SQ. INS. OF ONE ANGLE DEDUCTING THREE ¾-IN. HOLES.

Thickness deducted	⅜ .84	7/16 .98	½ 1.13	9/16 1.27	⅝ 1.41	11/16 1.55	¾ 1.69	13/16 1.83	⅞ 1.97	15/16 2.12	1 2.25
8 x 8	...	...	6.62	7.41	8.20	8.98	9.75	10.51	11.26	12.01	12.75
6 x 6	3.52	4.08	4.62	5.16	5.70	6.23	6.75	7.26	7.77	8.26	8.75

NET SECTION IN SQ. INS. OF ONE ANGLE DEDUCTING ONE ⅞-IN. HOLE.

Thickness deducted	¼ .22	5/16 .27	⅜ .33	7/16 .38	½ .44	9/16 .49	⅝ .55	11/16 .60	¾ .66	13/16 .71	⅞ .77	15/16 .82	1 .88
8 x8	...	...	...	...	7.31	8.19	9.06	9.93	10.78	11.63	12.46	13.30	14.12
7 x3½	...	....	...	4.02	4.56	5.10	5.62	6.15	6.65	7.16	7.65	8.15	8.62
6 x6	...	....	4.03	4.68	5.31	5.94	6.56	7.18	7.78	8.38	8.97	9.55	10.12
6 x4	...	...	3.28	3.80	4.31	4.82	5.31	5.81	6.28	6.76	7.22	7.68	8.12
6 x3½	...	...	3.10	3.59	4.06	4.54	5.00	5.46	5.91	6.35	6.78	7.21	7.62
5 x3½	...	2.29	2.72	3.15	3.56	3.98	4.37	4.77	5.15	5.54	5.90		
5 x3	...	2.14	2.53	2.93	3.31	3.70	4.06	4.43	4.78	5.13	5.47		
4 x4	...	2.13	2.53	2.93	3.31	3.69	4.06	4.43	4.78	5.13			
4 x3	...	1.82	2.15	2.49	2.81	3.13	3,43	3.74	4.03	4.32			
3½x3½	...	1.82	2.16	2.50	2.81	3.14	3.44	3.74	4.03	4.32	4.59		
3 x3	1.22	1.51	1.78	2.05	2.31	2.57	2.81						
3 x2½	1.09	1.35	1.59	1.84	2,06	2.29							
2½x2½	.97	1.20	1.40	1.62	1.81								
2½x2	.84	1.04	1.22	1.40	1.56								
2 x2	.72	.88	1.03	1.18									

NET SECTION IN SQ. INS. OF ONE ANGLE DEDUCTING TWO ⅞-IN. HOLES.

Thickness deducted	¼ .44	5/16 .55	⅜ .66	7/16 .77	½ .88	9/16 .98	⅝ 1.09	11/16 1.20	¾ 1.31	13/16 1.42	⅞ 1.53	15/16 1.64	1 1.75
8 x8	...	....	....	....	6.87	7.70	8.52	9.33	10.13	10.92	11.70	12.48	13.25
7 x3½	...	....	...	3.63	4.12	4.61	5.08	5.55	6.00	6.45	6.89	7.33	7.75
6 x6	...	....	3.70	4.29	4.87	5.45	6.02	6.58	7.13	7.67	8.21	8.73	9.25
6 x4	...	...	2.95	3.41	3.87	4.33	4.77	5.21	5.63	6.05	6.46	6.86	7.25
6 x3½	...	...	2.77	3.20	3.62	4.05	4.46	4.86	5.26	5.64	6.02	6.39	6.75
5 x3½	...	2.01	2.39	2.76	3.12	3.49	3.83	4.17	4.50	4.83	5.14		
5 x3	...	1.86	2,20	2.54	2.87	3.21	3.52	3.83	4.13	4.42	4.71		
4 x4	...	1.85	2.20	2.54	2.87	3.20	3.52	3.83	4.13	4.42			
4 x3	...	1.54	1.82	2.10	2.37	2.64	2.89	3.14	3.38	3.61			
3½x3½	..	1.54	1.83	2.11	2.37	2.65	2,90	3.14	3.38	3.61	3.83		
3 x3	1.00	1.23	1.45	1.66	1.87	2.08	2.27						
3 x2½	.87	1.07	1.26	1.45	1.62	1.80							
2½x2½	.75	.92	1.07	1.23	1.37								
2½x2	.62	.76	.89	1.01	1.12								
2 x2	.50	.60	.70	.79									

NET SECTION IN SQ. INS. OF ONE ANGLE DEDUCTING THREE ⅞-IN. HOLES.

Thickness deducted	⅜ .98	7/16 1.15	½ 1.31	9/16 1.48	⅝ 1.64	11/16 1.80	¾ 1.97	13/16 2.13	⅞ 2.30	15/16 2.46	1 2.63
8 x 8	...		6.44	7.20	7.97	8.73	9.47	10.21	10.93	11.66	12.37
6 x 6	3.38	3.91	4.44	4.95	5.47	5.98	6.47	6.96	7.44	7.91	8.37

NET SECTION IN SQ. INS. OF ONE ANGLE DEDUCTING ONE 1-IN. HOLE

Thickness deducted	¼ .25	5/16 .31	⅜ .38	7/16 .44	½ .50	9/16 .56	⅝ .63	11/16 .69	¾ .75	13/16 .81	⅞ .88	15/16 .94	1 1.00
8 x8	...	....	....	....	7.25	8.12	8.98	9.84	10.69	11.53	12.35	13.18	14.00
7 x3½	...	....	....	3.96	4.50	5.03	5.54	6.06	6.56	7.06	7.54	8.03	8.50
6 x6	...	....	3.98	4.62	5.25	5.87	6.48	7.09	7.69	8.28	8.86	9.43	10.00
6 x4	...	....	3.23	3.74	4.25	4.75	5.23	5.72	6.19	6.66	7.11	7.56	8.00
6 x3½	...	....	3.05	3.53	4.00	4.47	4.92	5.37	5.82	6.25	6.67	7.09	7.50
5 x3½	..	2.25	2.67	3.09	3.50	3.91	4.29	4.68	5.06	5.44	5.79		
5 x3	...	2.10	2.48	2.87	3.25	3.63	3.98	4.34	4.69	5.03	5.36		
4 x4	...	2.09	2.48	2.87	3.25	3.62	3.98	4.34	4.69	5.03			
4 x3	...	1.78	2.10	2.43	2.75	3.06	3.35	3.65	3.94	4.22			
3½x3½	...	1.78	2.11	2.44	2.75	3.07	3.36	3.65	3.94	4.22	4.48		
3 x3	1.19	1.47	1.73	1.99	2.25	2.50	2.73						
3 x2½	1.06	1.31	1.54	1.78	2.00	2.22							
2½x2½	.94	1.16	1.35	1.56	1.75								
2½x2	.81	1.00	1.17	1.34	1.50								
2 x2	.69	.84	.98	1.12									

NET SECTION IN SQ. INS. OF ONE ANGLE DEDUCTING TWO 1-IN. HOLES.

Thickness deducted	¼ .50	5/16 .63	⅜ .75	7/16 .88	½ 1.00	9/16 1.13	⅝ 1.25	11/16 1.38	¾ 1.50	13/16 1.63	⅞ 1.75	15/16 1.88	1 2.00
8 x8	...	...	....	....	6.75	7.55	8.36	9.15	9.94	10.71	11.48	12.24	13.00
7 x3½	...	....	....	3.52	4.00	4.46	4.92	5.37	5.81	6.24	6.67	7.09	7.50
6 x6	...	....	3.61	4.18	4.75	5.30	5.86	6.40	6.94	7.46	7.99	8.49	9.00
6 x4	...	....	2.86	3.30	3.75	4.18	4.61	5.03	5.44	5.84	6.24	6.62	7.00
6 x3½	...	....	2.68	3.09	3.50	3.90	4.30	4.68	5.07	5.43	5.80	6.15	6.50
5 x3½	...	1.93	2.30	2.65	3.00	3.34	3.67	3.99	4.31	4.62	4.92		
5 x3	...	1.78	2.11	2.43	2.75	3.06	3.36	3.65	3.94	4.21	4.49		
4 x4	...	1.77	2.11	2.43	2.75	3.05	3.36	3.65	3.94	4.21			
4 x3	...	1.46	1.73	1.99	2.25	2.49	2.73	2.96	3.19	3.40			
3½x3½	...	1.46	1.75	2.00	2.25	2.50	2.74	2.96	3.19	3.40	3.61		
3 x3	.94	1.15	1.36	1.55	1.75	1.93	2.11						
3 x2½	.81	.99	1.17	1.34	1.50	1.65							
2½x2½	.69	.84	.98	1.12	1.25								
2½x2	.56	.68	.80	.90	1.00								
2 x2	.44	.52	.61	.68									

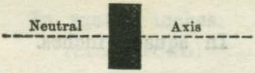
NET SECTION IN SQ. INS. OF ONE ANGLE DEDUCTING THREE 1-IN. HOLES.

Thickness deducted	⅜ 1.13	7/16 1.31	½ 1.50	9/16 1.69	⅝ 1.88	11/16 2.06	¾ 2.25	13/16 2.44	⅞ 2.63	15/16 2.81	1 3.00
8 x 8	..	....	6.25	6.99	7.73	8.47	9.19	9.90	10.60	11.31	12.00
6 x 6	3.23	3.75	4.25	4.74	5.23	5.72	6.19	6.65	7.11	7.56	8.00

MOMENTS OF INERTIA OF RECTANGLES.

Depth in ins.	Width of rectangle in inches						
	¼	5/16	⅜	7/16	½	9/16	⅝
2	.17	.21	.25	.29	.33	.38	.42
3	.56	.70	.84	.98	1.13	1.27	1.41
4	1.33	1.67	2.00	2.33	2.67	3.00	3.33
5	2.60	3.26	3.91	4.56	5.21	5.86	6.51
6	4.50	5.63	6.75	7.88	9.00	10.13	11.25
7	7.15	8.93	10.72	12.51	14.29	16.08	17.86
8	10.67	13.33	16.00	18.67	21.33	24.00	26.67
9	15.19	18.98	22.78	26.58	30.38	34.17	37.97
10	20.83	26.04	31.25	36.46	41.67	46.87	52.08
11	27.73	34.66	41.59	48.53	55.46	62.39	69.32
12	36.00	45.00	54.00	63.00	72.00	81.00	90.00
13	45.77	57.21	68.66	80.10	91.54	102.98	114.43
14	57.17	71.46	85.75	100.04	114.33	128.63	142.92
15	70.31	87.89	105.47	123.05	140.63	158.20	175.78
16	85.33	106.67	128.00	149.33	170.67	192.00	213.33
17	102.35	127.94	153.53	179.12	204.71	230.30	255.89
18	121.50	151.88	182.25	212.63	243.00	273.38	303.75
19	142.90	178.62	214.34	250.07	285.79	321.52	357.24
20	166.67	208.33	250.00	291.67	333.33	375.00	416.67
21	192.94	241.17	289.41	337.64	385.88	434.11	482.34
22	221.83	277.29	332.75	388.21	443.67	499.13	554.58
23	253.48	316.85	380.22	443.59	506.96	570.33	633.70
24	288.00	360.00	432.00	504.00	576.00	648.00	720.00
25	325.52	406.90	488.28	569.66	651.04	732.42	813.80
26	366.17	457.71	549.25	640.79	732.33	823.88	915.42
27	410.06	512.58	615.09	717.61	820.13	922.64	1025.16
28	457.33	571.67	686.00	800.33	914.67	1029.00	1143.33
29	508.10	635.13	762.16	889.18	1016.21	1143.23	1270.26
30	562.50	703.13	843.75	984.38	1125.00	1265.63	1406.25
32	682.67	853.33	1024.00	1194.67	1365.33	1536.00	1706.67
34	818.83	1023.54	1228.25	1432.96	1637.67	1842.38	2047.08
36	972.00	1215.00	1458.00	1701.00	1944.00	2187.00	2430.00
38	1143.17	1428.96	1714.75	2000.54	2286.33	2572.13	2857.92
40	1333.33	1666.67	2000.00	2333.33	2666.67	3000.00	3333.33
42	1543.50	1929.38	2315.25	2701.13	3087.00	3472.88	3858.75
44	1774.67	2218.33	2662.00	3105.67	3549.33	3993.00	4436.67
46	2027.83	2534.79	3041.75	3548.71	4055.67	4562.63	5069.58
48	2304.00	2880.00	3456.00	4032.00	4608.00	5184.00	5760.00
50	2604.17	3255.21	3906.25	4557.29	5208.33	5859.38	6510.42
52	2929.33	3661.67	4394.00	5126.33	5858.67	6591.00	7323.33
54	3280.50	4100.63	4920.75	5740.88	6561.00	7381.13	8201.25
56	3658.67	4573.33	5488.00	6402.67	7317.33	8232.00	9146.67
58	4064.83	5081.04	6097.25	7113.46	8129.67	9145.87	10162.08
60	4500.00	5625.00	6750.00	7875.00	9000.00	10125.00	11250.00

MOMENTS OF INERTIA OF RECTANGLES.



Width of rectangle in inches						Depth in inches
11/16	3/4	13/16	7/8	15/16	1	
.46	.50	.54	.58	.63	.67	2
1.55	1.69	1.83	1.97	2.11	2.25	3
3.67	4.00	4.33	4.67	5.00	5.33	4
7.16	7.81	8.46	9.11	9.77	10.42	5
12.38	13.50	14.63	15.75	16.88	18.00	6
19.65	21.44	23.22	25.01	26.80	28.58	7
29.33	32.00	34.67	37.33	40.00	42.67	8
41.77	45.56	49.36	53.16	56.95	60.75	9
57.29	62.50	67.71	72.92	78.13	83.33	10
76.26	83.19	90.12	97.05	103.98	110.92	11
99.00	108.00	117.00	126.00	135.00	144.00	12
125.87	137.31	148.75	160.20	171.64	183.08	13
157.21	171.50	185.79	200.08	214.38	228.67	14
193.36	210.94	228.52	246.09	263.67	281.25	15
234.67	256.00	277.33	298.67	320.00	341.33	16
281.47	307.06	332.65	358.24	383.83	409.42	17
334.13	364.50	394.88	425.25	455.63	486.00	18
392.96	428.69	464.41	500.14	535.86	571.58	19
458.33	500.00	541.67	583.33	625.00	666.67	20
530.58	578.81	627.05	675.28	723.52	771.75	21
610.04	665.50	720.96	776.42	831.87	887.33	22
697.07	760.44	823.81	887.18	950.55	1013.92	23
792.00	864.00	936.00	1008.00	1080.00	1152.00	24
895.18	976.56	1057.94	1139.32	1220.70	1302.08	25
1006.96	1098.50	1190.04	1281.58	1373.13	1464.67	26
1127.67	1230.19	1332.70	1435.22	1537.73	1640.25	27
1257.67	1372.00	1486.33	1600.67	1715.00	1829.33	28
1397.29	1524.31	1651.34	1778.36	1905.39	2032.42	29
1546.88	1687.50	1828.13	1968.75	2109.38	2250.00	30
1877.33	2048.00	2218.67	2389.33	2560.00	2730.67	32
2251.79	2456.50	2661.21	2865.92	3070.63	3275.33	34
2673.00	2916.00	3159.00	3402.00	3645.00	3888.00	36
3143.71	3429.50	3715.29	4001.08	4286.88	4572.67	38
3666.67	4000.00	4333.33	4666.67	5000.00	5333.33	40
4244.63	4630.50	5016.38	5402.25	5788.13	6174.00	42
4880.33	5324.00	5767.67	6211.33	6655.00	7098.67	44
5576.54	6083.50	6590.46	7097.42	7604.38	8111.33	46
6336.00	6912.00	7488.00	8064.00	8640.00	9216.00	48
7161.46	7812.50	8463.54	9114.58	9765.63	10416.67	50
8055.67	8788.00	9520.33	10252.67	10985.00	11717.33	52
9021.38	9841.50	10661.63	11481.75	12301.88	13122.00	54
10061.33	10976.00	11890.67	12805.33	13720.00	14634.67	56
11178.29	12194.50	13210.71	14226.92	15243.12	16259.33	58
12375.00	13500.00	14625.00	15750.00	16875.00	18000.00	60

SECTIONAL AREAS OF RECTANGLES.

In square inches.

Thickness of metal inches	Width, inches. ¼	½	¾	1	2	3	4	5	6	7	8	9	10
1/16	.02	.03	.05	.06	.13	.19	.25	.31	.38	.44	.50	.56	.63
1/8	.03	.06	.09	.13	.25	.38	.50	.63	.75	.88	1.00	1.13	1.25
3/16	.05	.09	.14	.19	.38	.56	.75	.94	1.13	1.31	1.50	1.69	1.88
1/4	.06	.13	.19	.25	.50	.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
5/16	.08	.16	.23	.31	.63	.94	1.25	1.56	1.88	2.19	2.50	2.81	3.13
3/8	.09	.19	.28	.38	.75	1.13	1.50	1.88	2.25	2.63	3.00	3.38	3.75
7/16	.11	.22	.33	.44	.88	1.31	1.75	2.19	2.63	3.06	3.50	3.94	4.38
1/2	.13	.25	.38	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
9/16	.14	.28	.42	.56	1.13	1.69	2.25	2.81	3.38	3.94	4.50	5.06	5.63
5/8	.16	.31	.47	.63	1.25	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25
11/16	.17	.34	.52	.69	1.38	2.06	2.75	3.44	4.13	4.81	5.50	6.19	6.88
3/4	.19	.38	.56	.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50
13/16	.20	.41	.61	.81	1.63	2.44	3.25	4.06	4.88	5.69	6.50	7.31	8.13
7/8	.22	.44	.66	.88	1.75	2.63	3.50	4.38	5.25	6.13	7.00	7.88	8.75
15/16	.23	.47	.70	.94	1.88	2.81	3.75	4.69	5.63	6.56	7.50	8.44	9.38
1	.25	.50	.75	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00

Thickness of metal inches	Width, inches. 11	12	13	14	15	16	17	18	19	20
1/16	.69	.75	.81	.88	.94	1.00	1.06	1.13	1.19	1.25
1/8	1.38	1.50	1.63	1.75	1.88	2.00	2.13	2.25	2.38	2.50
3/16	2.06	2.25	2.44	2.63	2.81	3.00	3.19	3.38	3.56	3.75
1/4	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00
5/16	3.44	3.75	4.06	4.38	4.69	5.00	5.31	5.63	5.94	6.25
3/8	4.13	4.50	4.88	5.25	5.63	6.00	6.38	6.75	7.13	7.50
7/16	4.81	5.25	5.69	6.13	6.56	7.00	7.44	7.88	8.31	8.75
1/2	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00
9/16	6.19	6.75	7.31	7.88	8.44	9.00	9.56	10.13	10.69	11.25
5/8	6.88	7.50	8.13	8.75	9.38	10.00	10.63	11.25	11.88	12.50
11/16	7.56	8.25	8.94	9.63	10.31	11.00	11.69	12.38	13.06	13.75
3/4	8.25	9.00	9.75	10.50	11.25	12.00	12.75	13.50	14.25	15.00
13/16	8.94	9.75	10.56	11.38	12.19	13.00	13.81	14.63	15.44	16.25
7/8	9.63	10.50	11.38	12.25	13.13	14.00	14.88	15.75	16.63	17.50
15/16	10.31	11.25	12.19	13.13	14.06	15.00	15.94	16.88	17.81	18.75
1	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00

SECTIONAL AREAS OF RECTANGLES.

In square inches.

(CONTINUED)

Thickness of metal inches	Width, inches.									
	21	22	23	24	25	26	27	28	29	30
1/16	1.31	1.38	1.44	1.50	1.56	1.63	1.69	1.75	1.81	1.88
1/8	2.63	2.75	2.88	3.00	3.13	3.25	3.38	3.50	3.63	3.75
3/16	3.94	4.13	4.31	4.50	4.69	4.88	5.06	5.25	5.44	5.63
1/4	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.50
5/16	6.56	6.88	7.19	7.50	7.81	8.13	8.44	8.75	9.06	9.38
3/8	7.88	8.25	8.63	9.00	9.38	9.75	10.13	10.50	10.88	11.25
7/16	9.19	9.63	10.06	10.50	10.94	11.38	11.81	12.25	12.69	13.13
1/2	10.50	11.00	11.50	12.00	12.50	13.00	13.50	14.00	14.50	15.00
9/16	11.81	12.38	12.94	13.50	14.06	14.63	15.19	15.75	16.31	16.88
5/8	13.13	13.75	14.38	15.00	15.63	16.25	16.88	17.50	18.13	18.75
11/16	14.44	15.13	15.81	16.50	17.19	17.88	18.56	19.25	19.94	20.63
3/4	15.75	16.50	17.25	18.00	18.75	19.50	20.25	21.00	21.75	22.50
13/16	17.06	17.88	18.69	19.50	20.31	21.13	21.94	22.75	23.56	24.38
7/8	18.38	19.25	20.13	21.00	21.88	22.75	23.63	24.50	25.38	26.25
15/16	19.69	20.63	21.56	22.50	23.44	24.38	25.31	26.25	27.19	28.13
1	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00
	Width, inches.									
	31	32	33	34	35	36	37	38	39	40
1/16	1.94	2.00	2.06	2.13	2.19	2.25	2.31	2.38	2.44	2.50
1/8	3.88	4.00	4.13	4.25	4.38	4.50	4.63	4.75	4.88	5.00
3/16	5.81	6.00	6.19	6.38	6.56	6.75	6.94	7.13	7.31	7.50
1/4	7.75	8.00	8.25	8.50	8.75	9.00	9.25	9.50	9.75	10.00
5/16	9.69	10.00	10.31	10.63	10.94	11.25	11.56	11.88	12.19	12.50
3/8	11.63	12.00	12.38	12.75	13.13	13.50	13.88	14.25	14.63	15.00
7/16	13.56	14.00	14.44	14.88	15.31	15.75	16.19	16.63	17.06	17.50
1/2	15.50	16.00	16.50	17.00	17.50	18.00	18.50	19.00	19.50	20.00
9/16	17.44	18.00	18.56	19.13	19.69	20.25	20.81	21.38	21.94	22.50
5/8	19.38	20.00	20.63	21.25	21.88	22.50	23.13	23.75	24.38	25.00
11/16	21.31	22.00	22.69	23.38	24.06	24.75	25.44	26.13	26.81	27.50
3/4	23.25	24.00	24.75	25.50	26.25	27.00	27.75	28.50	29.25	30.00
13/16	25.19	26.00	26.81	27.63	28.44	29.25	30.06	30.88	31.69	32.50
7/8	27.13	28.00	28.88	29.75	30.63	31.50	32.38	33.25	34.13	35.00
15/16	29.06	30.00	30.94	31.88	32.81	33.75	34.69	35.63	36.56	37.50
1	31.00	32.00	33.00	34.00	35.00	36.00	37.00	38.00	39.00	40.00

SECTIONAL AREAS OF RECTANGLES.

In square inches.

(CONTINUED)

Thickness of metal inches.	Width, inches. 41	42	43	44	45	46	47	48	49	50
1/16	2.56	2.63	2.69	2.75	2.81	2.88	2.94	3.00	3.06	3.13
1/8	5.13	5.25	5.38	5.50	5.63	5.75	5.88	6.00	6.13	6.25
3/16	7.69	7.88	8.06	8.25	8.44	8.63	8.81	9.00	9.19	9.38
1/4	10.25	10.50	10.75	11.00	11.25	11.50	11.75	12.00	12.25	12.50
5/16	12.81	13.13	13.44	13.75	14.06	14.38	14.69	15.00	15.31	15.63
3/8	15.38	15.75	16.13	16.50	16.88	17.25	17.63	18.00	18.38	18.75
7/16	17.94	18.38	18.81	19.25	19.69	20.13	20.56	21.00	21.44	21.88
1/2	20.50	21.00	21.50	22.00	22.50	23.00	23.50	24.00	24.50	25.00
9/16	23.06	23.63	24.19	24.75	25.31	25.88	26.44	27.00	27.56	28.13
5/8	25.63	26.25	26.88	27.50	28.13	28.75	29.38	30.00	30.63	31.25
11/16	28.19	28.88	29.56	30.25	30.94	31.63	32.31	33.00	33.69	34.38
3/4	30.75	31.50	32.25	33.00	33.75	34.50	35.25	36.00	36.75	37.50
13/16	33.31	34.13	34.94	35.75	36.56	37.38	38.19	39.00	39.81	40.63
7/8	35.88	36.75	37.63	38.50	39.38	40.25	41.13	42.00	42.88	43.75
15/16	38.44	39.38	40.31	41.25	42.19	43.13	44.06	45.00	45.94	46.88
1	41.00	42.00	43.00	44.00	45.00	46.00	47.00	48.00	49.00	50.00

Thickness of metal inches.	Width, inches. 51	52	53	54	55	56	57	58	59	60
1/16	3.19	3.25	3.31	3.38	3.44	3.50	3.56	3.63	3.69	3.75
1/8	6.38	6.50	6.63	6.75	6.88	7.00	7.13	7.25	7.38	7.50
3/16	9.56	9.75	9.94	10.13	10.31	10.50	10.69	10.88	11.06	11.25
1/4	12.75	13.00	13.25	13.50	13 75	14.00	14.25	14.50	14.75	15.00
5/16	15.94	16.25	16.56	16.88	17.19	17.50	17.81	18.13	18.44	18.75
3/8	19.13	19.50	19.88	20.25	20.63	21.00	21.38	21.75	22.13	22.50
7/16	22.31	22.75	23.19	23.63	24.06	24.50	24.94	25.38	25.81	26.25
1/2	25.50	26.00	26.50	27.00	27.50	28.00	28.50	29.00	29.50	30.00
9/16	28.69	29.25	29.81	30.38	30.94	31.50	32.06	32.63	33.19	33.75
5/8	31.88	32.50	33.13	33.75	34.38	35.00	35.63	36.25	36.88	37.50
11/16	35.06	35.75	36.44	37.13	37.81	38.50	39.19	39.88	40.56	41.25
3/4	38.25	39.00	39.75	40.50	41.25	42.00	42.75	43.50	44.25	45.00
13/16	41.44	42.25	43.06	43.88	44.69	45.50	46.31	47.13	47.94	48.75
7/8	44.63	45.50	46.38	47.25	48.13	49.00	49.88	50.75	51.63	52.50
15/16	47.81	48.75	49.69	50.63	51.56	52.50	53.44	54.38	55.31	56.25
1	51.00	52.00	53.00	54.00	55.00	56.00	57.00	58.00	59.00	60.00

WEIGHTS AND AREAS OF SQUARE AND ROUND BARS AND CIRCUMFERENCES OF ROUND BARS.

One cubic foot of steel weighs 489.6 pounds.

Thickness or diameter in inches	Weight of ■ bar 1 ft. long	Weight of ● bar 1 ft. long	Area of ■ bar in sq. ins.	Area of ● bar in sq. ins.	Circumference of ○ bar in inches
0					
1/16	.013	.010	.0039	.0031	.1963
1/8	.053	.042	.0156	.0123	.3927
3/16	.119	.094	.0352	.0276	.5890
1/4	.212	.167	.0625	.0491	.7854
5/16	.333	.261	.0977	.0767	.9817
3/8	.478	.375	.1406	.1104	1.1781
7/16	.651	.511	.1914	.1503	1.3744
1/2	.850	.667	.2500	.1963	1.5708
9/16	1.076	.845	.3164	.2485	1.7671
5/8	1.328	1.043	.3906	.3068	1.9635
11/16	1.608	1.262	.4727	.3712	2.1598
3/4	1.913	1.502	.5625	.4418	2.3562
13/16	2.245	1.763	.6602	.5185	2.5525
7/8	2.603	2.044	.7656	.6013	2.7489
15/16	2.989	2.347	.8789	.6903	2.9452
1	3.400	2.670	1.0000	.7854	3.1416
1/16	3.838	3.014	1.1289	.8866	3.3379
1/8	4.303	3.379	1.2656	.9940	3.5343
3/16	4.795	3.766	1.4102	1.1075	3.7306
1/4	5.312	4.173	1.5625	1.2272	3.9270
5/16	5.857	4.600	1.7227	1.3530	4.1233
3/8	6.428	5.049	1.8906	1.4849	4.3197
7/16	7.026	5.518	2.0664	1.6230	4.5160
1/2	7.650	6.008	2.2500	1.7671	4.7124
9/16	8.301	6.520	2.4414	1.9175	4.9087
5/8	8.978	7.051	2.6406	2.0739	5.1051
11/16	9.682	7.604	2.8477	2.2365	5.3014
3/4	10.41	8.178	3.0625	2.4053	5.4978
13/16	11.17	8.773	3.2852	2.5802	5.6941
7/8	11.95	9.388	3.5156	2.7612	5.8905
15/16	12.76	10.02	3.7539	2.9483	6.0868

WEIGHTS AND AREAS OF SQUARE AND ROUND BARS AND CIRCUMFERENCES OF ROUND BARS.

One cubic foot of steel weighs 489.6 pounds.

Thickness or diameter in inches	Weight of ■ bar 1 ft. long	Weight of ● bar 1 ft. long	Area of ■ bar in sq. ins.	Area of ● bar in sq. ins.	Circumference of ○ bar in inches
2	13.60	10.68	4.0000	3.1416	6.2832
1/16	14.46	11.36	4.2539	3.3410	6.4795
1/8	15.35	12.06	4.5156	3.5466	6.6759
3/16	16.27	12.78	4.7852	3.7583	6.8722
1/4	17.22	13.52	5.0625	3.9761	7.0686
5/16	18.19	14.28	5.3477	4.2000	7.2649
3/8	19.18	15.07	5.6406	4.4301	7.4613
7/16	20.20	15.86	5.9414	4.6664	7.6576
1/2	21.25	16.69	6.2500	4.9087	7.8540
9/16	22.33	17.53	6.5664	5.1572	8.0503
5/8	23.43	18.40	6.8906	5.4119	8.2467
11/16	24.56	19.29	7.2227	5.6727	8.4430
3/4	25.71	20.20	7.5625	5.9396	8.6394
13/16	26.90	21.12	7.9102	6.2126	8.8357
7/8	28.10	22.07	8.2656	6.4918	9.0321
15/16	29.35	23.04	8.6289	6.7771	9.2284
3	30.60	24.03	9.0000	7.0686	9.4248
1/16	31.89	25.04	9.3789	7.3662	9.6211
1/8	33.20	26.08	9.7656	7.6699	9.8175
3/16	34.55	27.13	10.160	7.9798	10.014
1/4	35.92	28.20	10.563	8.2958	10.210
5/16	37.31	29.30	10.973	8.6179	10.407
3/8	38.73	30.42	11.391	8.9462	10.603
7/16	40.18	31.56	11.816	9.2806	10.799
1/2	41.65	32.71	12.250	9.6211	10.996
9/16	43.14	33.90	12.691	9.9678	11.192
5/8	44.68	35.09	13.141	10.321	11.388
11/16	46.24	36.31	13.598	10.680	11.585
3/4	47.82	37.56	14.063	11.045	11.781
13/16	49.42	38.81	14.535	11.416	11.977
7/8	51.05	40.10	15.016	11.793	12.174
15/16	52.71	41.40	15.504	12.177	12.370

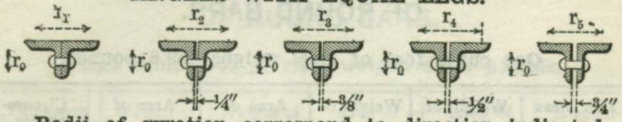
WEIGHTS AND AREAS OF SQUARE AND ROUND BARS AND CIRCUMFERENCES OF ROUND BARS.

One cubic foot of steel weighs 489.6 pounds.

Thickness or diameter in inches	Weight of ■ bar 1 ft. long	Weight of ● bar 1 ft. long	Area of ■ bar in sq. ins.	Area of ● bar in sq. ins.	Circumference of ○ bar in inches
4	54.40	42.73	16.000	12.566	12.566
1/16	56.11	44.07	16.504	12.962	12.763
1/8	57.85	45.44	17.016	13.364	12.959
3/16	59.62	46.83	17.535	13.772	13.155
1/4	61.41	48.24	18.063	14.186	13.352
5/16	63.23	49.66	18.598	14.607	13.548
3/8	65.08	51.11	19.141	15.033	13.744
7/16	66.95	52.58	19.691	15.466	13.941
1/2	68.85	54.07	20.250	15.904	14.137
9/16	70.78	55.59	20.816	16.349	14.334
5/8	72.73	57.12	21.391	16.800	14.530
11/16	74.70	58.67	21.973	17.257	14.726
3/4	76.71	60.25	22.563	17.721	14.923
13/16	78.74	61.84	23.160	18.190	15.119
7/8	80.81	63.46	23.766	18.665	15.315
15/16	82.89	65.10	24.379	19.147	15.512
5	85.00	66.76	25.000	19.635	15.708
1/16	87.14	68.44	25.629	20.129	15.904
1/8	89.30	70.14	26.266	20.629	16.101
3/16	91.49	71.86	26.910	21.135	16.297
1/4	93.72	73.60	27.563	21.648	16.493
5/16	95.96	75.37	28.223	22.166	16.690
3/8	98.23	77.15	28.891	22.691	16.886
7/16	100.5	78.95	29.566	23.221	17.082
1/2	102.8	80.77	30.250	23.758	17.279
9/16	105.2	82.62	30.941	24.301	17.475
5/8	107.6	84.49	31.641	24.850	17.671
11/16	110.0	86.38	32.348	25.406	17.868
3/4	112.4	88.29	33.063	25.967	18.064
13/16	114.9	90.22	33.785	26.535	18.261
7/8	117.4	92.17	34.516	27.109	18.457
15/16	119.9	94.14	35.254	27.688	18.653
6	122.4	96.14	36.000	28.274	18.850

RADII OF GYRATION FOR TWO ANGLES PLACED BACK TO BACK.

ANGLES WITH EQUAL LEGS.



Radii of gyration correspond to direction indicated by arrow heads.

Dimensions	Thickness	Area of two angles	Radii of gyration					
Inches	Inch	Sq. ins.	r_0	r_1	r_2	r_3	r_4	r_5
8 x 8	½	15.50	2.51	3.32	3.41	3.45	3.49	3.58
8 x 8	⅝	19.22	2.49	3.34	3.43	3.47	3.51	3.60
8 x 8	¾	22.88	2.47	3.36	3.44	3.49	3.53	3.62
8 x 8	⅞	26.47	2.45	3.38	3.46	3.51	3.55	3.64
8 x 8	1	30.00	2.44	3.40	3.48	3.53	3.57	3.67
8 x 8	1⅛	33.47	2.42	3.42	3.51	3.55	3.60	3.69
6 x 6	7/16	10.12	1.87	2.50	2.58	2.63	2.67	2.76
6 x 6	⅝	14.22	1.84	2.53	2.62	2.66	2.71	2.80
6 x 6	⅞	19.48	1.81	2.57	2.66	2.70	2.75	2.85
5 x 5	⅜	7.22	1.56	2.09	2.17	2.22	2.26	2.35
5 x 5	½	9.50	1.54	2.10	2.19	2.24	2.28	2.38
5 x 5	⅝	11.72	1.52	2.12	2.21	2.26	2.30	2.40
4 x 4	5/16	4.82	1.24	1.67	1.76	1.80	1.85	1.94
4 x 4	9/16	8.38	1.21	1.71	1.80	1.85	1.89	1.99
4 x 4	13/16	11.68	1.18	1.75	1.85	1.89	1.94	2.04
3½ x 3½	⅜	4.98	1.07	1.48	1.56	1.61	1.66	1.75
3½ x 3½	⅝	7.98	1.04	1.52	1.61	1.66	1.71	1.81
3½ x 3½	13/16	10.06	1.02	1.55	1.65	1.70	1.75	1.85
3 x 3	¼	2.88	0.93	1.26	1.34	1.39	1.43	1.53
3 x 3	7/16	4.88	0.91	1.28	1.37	1.42	1.47	1.57
3 x 3	⅝	6.72	0.88	1.32	1.41	1.46	1.51	1.61
2½ x 2½	¼	2.38	0.77	1.05	1.14	1.19	1.24	1.34
2½ x 2½	⅜	3.48	0.75	1.07	1.16	1.21	1.26	1.36
2½ x 2½	½	4.50	0.74	1.09	1.19	1.24	1.29	1.39
2¼ x 2¼	3/16	1.62	0.70	0.94	1.03	1.08	1.12	1.22
2¼ x 2¼	⅜	3.10	0.67	0.97	1.06	1.11	1.16	1.27
2 x 2	3/16	1.44	0.62	0.84	0.93	0.98	1.03	1.13
2 x 2	5/16	2.32	0.60	0.86	0.95	1.00	1.05	1.16
2 x 2	7/16	3.12	0.59	0.88	0.98	1.03	1.08	1.19
1¾ x 1¾	3/16	1.26	0.54	0.74	0.83	0.88	0.93	1.03
1¾ x 1¾	7/16	2.68	0.51	0.78	0.88	0.93	0.98	1.09
1½ x 1½	3/16	1.06	0.46	0.64	0.73	0.78	0.83	0.94
1½ x 1½	⅜	1.98	0.44	0.67	0.77	0.82	0.88	0.99

RADII OF GYRATION FOR TWO ANGLES PLACED BACK TO BACK.

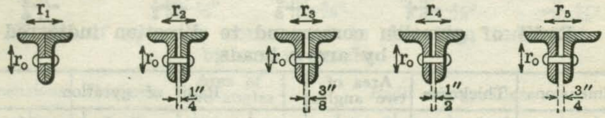
ANGLES WITH UNEQUAL LEGS.

Radii of gyration correspond to direction indicated by arrow heads.

Dimensions	Thickness	Area of two angles	Radii of gyration					
Inches	Inch	Sq. ins.	r_0	r_1	r_2	r_3	r_4	r_5
8 x 6	½	13.50	2.56	2.32	2.40	2.44	2.48	2.58
8 x 6	⅝	16.72	2.55	2.33	2.42	2.46	2.50	2.60
8 x 6	13/16	21.42	2.52	2.37	2.45	2.50	2.54	2.64
8 x 6	1	26.00	2.49	2.39	2.48	2.52	2.57	2.65
7 x 3½	7/16	8.82	2.26	1.16	1.29	1.33	1.38	1.47
7 x 3½	½	10.00	2.25	1.22	1.30	1.35	1.39	1.48
7 x 3½	⅝	12.36	2.24	1.24	1.32	1.37	1.42	1.51
7 x 3½	13/16	15.76	2.21	1.27	1.36	1.41	1.46	1.56
7 x 3½	1	19.00	2.19	1.31	1.40	1.45	1.50	1.60
6 x 4	⅜	7.22	1.93	1.50	1.58	1.62	1.67	1.76
6 x 4	⅝	11.72	1.90	1.53	1.62	1.67	1.71	1.81
6 x 4	⅞	15.98	1.86	1.58	1.67	1.71	1.76	1.86
6 x 3½	⅜	6.86	1.94	1.26	1.34	1.39	1.43	1.53
6 x 3½	⅝	11.10	1.90	1.30	1.39	1.43	1.48	1.58
6 x 3½	⅞	15.10	1.87	1.34	1.44	1.49	1.53	1.64
5 x 4	⅜	6.48	1.59	1.58	1.66	1.71	1.75	1.85
5 x 4	½	8.50	1.57	1.60	1.68	1.73	1.78	1.87
5 x 4	⅝	10.48	1.55	1.62	1.71	1.75	1.80	1.90
5 x 3½	⅜	6.10	1.60	1.34	1.42	1.46	1.51	1.60
5 x 3½	⅝	9.86	1.56	1.37	1.46	1.51	1.56	1.66
5 x 3½	⅞	13.36	1.53	1.42	1.51	1.56	1.61	1.71
5 x 3	5/16	4.82	1.61	1.09	1.17	1.22	1.26	1.36
5 x 3	9/16	8.38	1.58	1.13	1.22	1.26	1.31	1.41
5 x 3	13/16	11.68	1.55	1.17	1.27	1.32	1.37	1.47
4½ x 3	⅜	5.36	1.44	1.14	1.22	1.27	1.31	1.41
4½ x 3	½	7.00	1.42	1.15	1.24	1.29	1.34	1.44
4½ x 3	⅝	8.60	1.40	1.18	1.27	1.31	1.36	1.46
4 x 3½	5/16	4.50	1.26	1.42	1.50	1.55	1.59	1.69
4 x 3½	½	7.00	1.23	1.44	1.53	1.58	1.63	1.72
4 x 3½	⅝	8.60	1.22	1.46	1.55	1.60	1.65	1.75
4 x 3	5/16	4.18	1.27	1.17	1.25	1.30	1.34	1.44
4 x 3	9/16	7.26	1.24	1.21	1.30	1.34	1.39	1.49
4 x 3	13/16	10.06	1.21	1.25	1.35	1.40	1.45	1.55

RADII OF GYRATION FOR TWO ANGLES PLACED BACK TO BACK.

ANGLES WITH UNEQUAL LEGS.

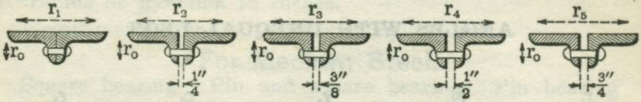


Radii of gyration correspond to direction indicated by arrow heads.

Dimensions	Thickness	Area of two angles	Radii of gyration					
Inches	Inch	Sq. ins.	r_0	r_1	r_2	r_3	r_4	r_5
3½ x 3	5/16	3.88	1.10	1.21	1.30	1.35	1.39	1.49
3½ x 3	9/16	6.68	1.07	1.25	1.34	1.39	1.44	1.54
3½ x 3	13/16	9.26	1.04	1.30	1.40	1.45	1.50	1.60
3½ x 2½	¼	2.88	1.12	0.96	1.04	1.09	1.13	1.23
3½ x 2½	½	5.50	1.09	1.00	1.09	1.14	1.19	1.29
3½ x 2½	11/16	7.32	1.06	1.03	1.13	1.18	1.23	1.33
3 x 2½	¼	2.64	0.95	1.00	1.09	1.13	1.18	1.28
3 x 2½	⅜	3.86	0.93	1.02	1.11	1.16	1.21	1.31
3 x 2½	9/16	5.56	0.91	1.05	1.15	1.20	1.25	1.35
3 x 2	3/16	1.82	0.97	0.75	0.83	0.88	0.93	1.03
3 x 2	5/16	2.94	0.95	0.76	0.85	0.90	0.95	1.05
3 x 2	7/16	4.00	0.93	0.79	0.88	0.93	0.98	1.09
2½ x 2	3/16	1.62	0.79	0.79	0.88	0.92	0.97	1.07
2½ x 2	⅜	3.10	0.77	0.82	0.91	0.96	1.01	1.12
2½ x 2	½	4.00	0.75	0.84	0.94	0.99	1.04	1.15
2 x 1½	3/16	1.26	0.63	0.59	0.68	0.73	0.78	0.88
2 x 1½	⅜	2.36	0.61	0.62	0.72	0.77	0.82	0.93

RADII OF GYRATION FOR TWO ANGLES PLACED BACK TO BACK.

ANGLES WITH UNEQUAL LEGS.

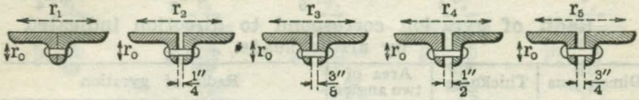


Radii of gyration correspond to direction indicated by arrow heads.

Dimensions	Thickness	Area of two angles	Radii of gyration					
Inches	Inch	Sq. ins.	r_0	r_1	r_2	r_3	r_4	r_5
8 x 6	½	13.50	1.79	3.56	3.65	3.69	3.74	3.83
8 x 6	⅝	16.72	1.77	3.58	3.67	3.71	3.75	3.85
8 x 6	13/16	21.42	1.75	3.61	3.70	3.75	3.80	3.90
8 x 6	1	26.00	1.73	3.64	3.73	3.78	3.83	3.92
7 x 3½	7/16	8.82	0.95	3.37	3.47	3.52	3.56	3.66
7 x 3½	½	10.00	0.94	3.39	3.48	3.53	3.58	3.67
7 x 3½	⅝	12.36	0.93	3.40	3.50	3.55	3.60	3.70
7 x 3½	13/16	15.76	0.91	3.45	3.54	3.59	3.64	3.74
7 x 3½	1	19.00	0.89	3.48	3.58	3.63	3.68	3.78
6 x 4	⅜	7.22	1.17	2.74	2.83	2.87	2.92	3.02
6 x 4	⅝	11.72	1.13	2.78	2.87	2.92	2.97	3.06
6 x 4	⅞	15.98	1.11	2.82	2.92	2.97	3.02	3.12
6 x 3½	⅜	6.86	0.99	2.81	2.90	2.95	3.00	3.09
6 x 3½	⅝	11.10	0.96	2.86	2.95	3.00	3.05	3.15
6 x 3½	⅞	15.10	0.93	2.90	3.00	3.05	3.10	3.20
5 x 4	⅜	6.48	1.20	2.20	2.29	2.34	2.38	2.48
5 x 4	½	8.50	1.18	2.22	2.31	2.36	2.41	2.50
5 x 4	⅝	10.48	1.17	2.24	2.33	2.38	2.43	2.53
5 x 3½	⅜	6.10	1.02	2.27	2.36	2.41	2.45	2.55
5 x 3½	⅝	9.86	0.99	2.31	2.40	2.45	2.50	2.60
5 x 3½	⅞	13.36	0.96	2.36	2.45	2.50	2.55	2.65
5 x 3	5/16	4.82	0.85	2.33	2.42	2.47	2.52	2.61
5 x 3	9/16	8.38	0.82	2.37	2.47	2.52	2.57	2.67
5 x 3	13/16	11.68	0.80	2.42	2.52	2.57	2.62	2.72
4½ x 3	⅜	5.36	0.86	2.07	2.16	2.21	2.26	2.35
4½ x 3	½	7.00	0.85	2.09	2.18	2.23	2.28	2.38
4½ x 3	⅝	8.60	0.83	2.11	2.21	2.26	2.31	2.41
4 x 3½	5/16	4.50	1.07	1.73	1.81	1.86	1.91	2.00
4 x 3½	½	7.00	1.04	1.76	1.85	1.89	1.94	2.04
4 x 3½	⅝	8.60	1.02	1.78	1.87	1.92	1.97	2.07
4 x 3	5/16	4.18	0.89	1.79	1.88	1.93	1.97	2.07
4 x 3	9/16	7.26	0.86	1.83	1.93	1.97	2.02	2.12
4 x 3	13/16	10.06	0.83	1.88	1.97	2.02	2.08	2.18

RADII OF GYRATION FOR TWO ANGLES PLACED BACK TO BACK.

ANGLES WITH UNEQUAL LEGS.



Radii of gyration correspond to direction indicated by arrow heads.

Dimensions	Thickness	Area of two angles	Radii of gyration					
Inches	Inch	Sq. ins.	r_0	r_1	r_2	r_3	r_4	r_5
3½ x 3	5/16	3.88	0.90	1.52	1.61	1.66	1.71	1.80
3½ x 3	9/16	6.68	0.87	1.57	1.66	1.71	1.76	1.86
3½ x 3	13/16	9.26	0.85	1.61	1.71	1.76	1.81	1.91
3½ x 2½	¼	2.88	0.74	1.58	1.67	1.72	1.76	1.86
3½ x 2½	½	5.50	0.70	1.62	1.72	1.77	1.81	1.92
3½ x 2½	11/16	7.32	0.69	1.66	1.75	1.80	1.86	1.96
3½ x 2	¼	2.63	0.56	1.65	1.75	1.79	1.84	1.94
3½ x 2	7/16	4.43	0.54	1.69	1.78	1.83	1.88	1.99
3½ x 2	⅝	6.10	0.52	1.72	1.82	1.87	1.92	2.03
3 x 2½	¼	2.64	0.75	1.31	1.40	1.45	1.50	1.60
3 x 2½	⅜	3.86	0.74	1.33	1.42	1.47	1.52	1.63
3 x 2½	9/16	5.56	0.72	1.37	1.46	1.51	1.56	1.66
3 x 2	3/16	1.82	0.58	1.37	1.46	1.51	1.56	1.66
3 x 2	5/16	2.94	0.57	1.39	1.48	1.53	1.58	1.68
3 x 2	7/16	4.00	0.55	1.41	1.51	1.56	1.61	1.71
2½ x 2	3/16	1.62	0.60	1.10	1.19	1.24	1.29	1.39
2½ x 2	⅜	3.10	0.58	1.13	1.23	1.28	1.33	1.43
2½ x 2	½	4.00	0.56	1.15	1.25	1.30	1.35	1.46
2 x 1½	3/16	1.26	0.44	0.90	0.99	1.05	1.09	1.20
2 x 1½	⅜	2.36	0.42	0.93	1.09	1.14	1.19	1.29

STRENGTH OF STEEL COLUMNS OR STRUTS.

For various values of $\frac{L}{r}$ in which L=length in feet and r=radius of gyration in inches.

P=ultimate strength in lbs. per square inch.

For Medium Steel.

Square bearing

$$P = \frac{50\,000}{1 + \frac{(12\,L)^2}{36\,000\,r^2}}$$

Pin and square bearing

$$P = \frac{50\,000}{1 + \frac{(12\,L)^2}{24\,000\,r^2}}$$

Pin bearing

$$P = \frac{50\,000}{1 + \frac{(12\,L)^2}{18\,000\,r^2}}$$

To obtain safe unit stress:

For quiescent loads, as in buildings, divide by 4.

For moving loads, as in bridges, divide by 5.

$\frac{L}{r}$	Ultimate strength in lbs. per square inch			$\frac{L}{r}$	Ultimate strength in lbs. per square inch		
	Square	Pin and square	Pin		Square	Pin and square	Pin
3.0	48263	47438	46642	7.6	40616	37132	34199
3.2	48033	47106	46214	7.8	40214	36629	33631
3.4	47790	46757	45767				
3.6	47536	46393	45303	8.0	39809	36127	33069
3.8	47270	46013	44822	8.2	39402	35627	32511
				8.4	38994	35128	31959
4.0	46993	45620	44325	8.6	38585	34632	31413
4.2	46705	45214	43817	8.8	38175	34138	30874
4.4	46406	44797	43295				
4.6	46098	44367	42761	9.0	37764	33647	30340
4.8	45781	43927	42220	9.2	37345	33160	29813
				9.4	36943	32676	29293
5.0	45455	43478	41667	9.6	36533	32197	28781
5.2	45120	43119	41108	9.8	36123	31721	28275
5.4	44777	42555	40542				
5.6	44427	42082	39972	10.0	35714	31250	27778
5.8	44070	41603	39397	10.2	35307	30784	27288
				10.4	34901	30322	26806
6.0	43706	41118	38820	10.6	34504	29866	26331
6.2	43337	40629	38240	10.8	34093	29415	25865
6.4	42961	40136	37660				
6.6	42581	39640	37079	11.0	33693	28969	25407
6.8	42196	39132	36499	11.2	33294	28528	24956
				11.4	32898	28094	24514
7.0	41796	38640	35920	11.6	32497	27665	24079
7.2	41413	38138	35343	11.8	32114	27241	23653
7.4	41016	37635	34769				

STRENGTH OF STEEL COLUMNS OR STRUTS.

For various values of $\frac{L}{r}$ in which L=length in feet and r=radius of gyration in inches.

P=ultimate strength in lbs. per square inch.

For Medium Steel.

Square bearing

$$P = \frac{50\,000}{1 + \frac{(12\,L)^2}{36\,000\,r^2}}$$

Pin and square bearing

$$P = \frac{50\,000}{1 + \frac{(12\,L)^2}{24\,000\,r^2}}$$

Pin bearing

$$P = \frac{50\,000}{1 + \frac{(12\,L)^2}{18\,000\,r^2}}$$

To obtain safe unit stress:

For quiescent loads, as in buildings, divide by 4.

For moving loads, as in bridges, divide by 5.

$\frac{L}{r}$	Ultimate strength in lbs. per square inch			$\frac{L}{r}$	Ultimate strength in lbs. per square inch		
	Square	Pin and square	Pin		Square	Pin and square	Pin
12.0	31726	26824	23234	16.6	23784	18844	15603
12.2	31341	26412	22824	16.8	23486	18564	15347
12.4	30959	26007	22421				
12.6	30580	25607	22026	17.0	23191	18288	15093
12.8	30205	25214	21638	17.2	22901	18018	14851
				17.4	22614	17752	14611
13.0	29833	24826	21259	17.6	22331	17491	14376
13.2	29471	24450	20886	17.8	22052	17235	14145
13.4	29099	24069	20521				
13.6	28738	23699	20164	18.0	21777	16984	13920
13.8	28381	23336	19814	18.2	21501	16737	13699
				18.4	21238	16494	13483
14.0	28027	22978	19470	18.6	20975	16256	13271
14.2	27677	22626	19134	18.8	20715	16022	13063
14.4	27331	22280	18805				
14.6	26989	21940	18482	19.0	20464	15798	12865
14.8	26650	21605	18167	19.2	20206	15567	12661
				19.4	19957	15346	12466
15.0	26316	21276	17857	19.6	19711	15129	12275
15.2	25985	20953	17554	19.8	19466	14913	12086
15.4	25659	20636	17258				
15.6	25337	20320	16967	20.0	19231	14706	11905
15.8	25018	20017	16683	20.2	18996	14500	11725
				20.4	18764	14298	11549
16.0	24704	19716	16404	20.6	18536	14100	11377
16.2	24393	19420	16131	20.8	18311	13905	11208
16.4	24087	19129	15865				

STRENGTH OF STEEL COLUMNS OR STRUTS.

For various values of $\frac{L}{r}$ in which L=length in feet and r=radius of gyration in inches.

P=ultimate strength in lbs. per square inch.

For Soft Steel.

Square bearing

$$P = \frac{45\,000}{1 + \frac{(12\,L)^2}{36\,000\,r^2}}$$

Pin and square bearing

$$P = \frac{45\,000}{1 + \frac{(12\,L)^2}{24\,000\,r^2}}$$

Pin bearing

$$P = \frac{45\,000}{1 + \frac{(12\,L)^2}{18\,000\,r^2}}$$

To obtain safe unit stress:

For quiescent loads, as in buildings, divide by 4.
For moving loads, as in bridges, divide by 5.

$\frac{L}{r}$	Ultimate strength in lbs. per square inch			$\frac{L}{r}$	Ultimate strength in lbs. per square inch		
	Square	Pin and square	Pin		Square	Pin and square	Pin
3.0	43437	42694	41978	7.6	36554	33419	30779
3.2	43230	42395	41593	7.8	36193	32966	30268
3.4	43011	42081	41190				
3.6	42782	41754	40773	8.0	35828	32514	29762
3.8	42543	41412	40340	8.2	35462	32064	29260
				8.4	35095	31615	28763
4.0	42294	41058	39893	8.6	34727	31169	28272
4.2	42035	40693	39435	8.8	34358	30724	27787
4.4	41765	40317	38966				
4.6	41488	39930	38485	9.0	33988	30282	27306
4.8	41203	39534	37998	9.2	33611	29844	26832
				9.4	33249	29408	26364
5.0	40910	39130	37500	9.6	32880	28977	25903
5.2	40608	38807	36997	9.8	32511	28549	25448
5.4	40299	38300	36488				
5.6	39984	37874	35975	10.0	32143	28125	25000
5.8	39663	37443	35457	10.2	31776	27706	24559
				10.4	31411	27290	24125
6.0	39335	37006	34938	10.6	31054	26879	23698
6.2	39003	36566	34416	10.8	30684	26474	23279
6.4	38665	36122	33894				
6.6	38323	35676	33371	11.0	30324	26072	22866
6.8	37976	35219	32849	11.2	29965	25675	22460
				11.4	29608	25285	22063
7.0	37616	34776	32328	11.6	29247	24899	21671
7.2	37272	34324	31809	11.8	28903	24517	21288
7.4	36914	33872	31292				

STRENGTH OF STEEL COLUMNS OR STRUTS.

For various values of $\frac{L}{r}$ in which L=length in feet and r=radius of gyration in inches.

P=ultimate strength in lbs. per square inch.

For Soft Steel.

Square bearing

$$P = \frac{45\,000}{1 + \frac{(12\,L)^2}{36\,000\,r^2}}$$

Pin and square bearing

$$P = \frac{45\,000}{1 + \frac{(12\,L)^2}{24\,000\,r^2}}$$

Pin bearing

$$P = \frac{45\,000}{1 + \frac{(12\,L)^2}{18\,000\,r^2}}$$

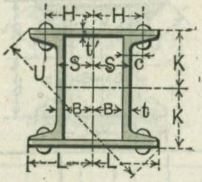
To obtain safe unit stress:

For quiescent loads, as in buildings, divide by 4.

For moving loads, as in bridges, divide by 5.

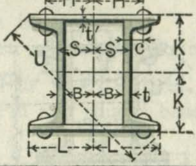
$\frac{L}{r}$	Ultimate strength in lbs. per square inch			$\frac{L}{r}$	Ultimate strength in lbs. per square inch		
	Square	Pin and square	Pin		Square	Pin and square	Pin
12.0	28553	24142	20911	16.6	21406	16960	14043
12.2	28207	23771	20542	16.8	21137	16708	13812
12.4	27863	23406	20179				
12.6	27522	23046	19823	17.0	20872	16459	13584
12.8	27185	22693	19474	17.2	20611	16216	13366
				17.4	20353	15977	13150
13.0	26850	22343	19133	17.6	20098	15742	12938
13.2	26524	22005	18797	17.8	19847	15512	12731
13.4	26189	21662	18469				
13.6	25864	21329	18148	18.0	19599	15286	12528
13.8	25543	21002	17833	18.2	19351	15063	12329
				18.4	19114	14845	12135
14.0	25224	20680	17523	18.6	18878	14630	11944
14.2	24909	20363	17221	18.8	18644	14420	11757
14.4	24598	20052	16925				
14.6	24290	19746	16634	19.0	18418	14218	11579
14.8	23985	19445	16350	19.2	18185	14010	11394
				19.4	17961	13811	11219
15.0	23684	19148	16071	19.6	17740	13616	11048
15.2	23387	18858	15799	19.8	17519	13422	10877
15.4	23093	18572	15532				
15.6	22803	18288	15270	20.0	17308	13235	10715
15.8	22516	18015	15105	20.2	17096	13050	10553
				20.4	16888	12868	10434
16.0	22234	17744	14764	20.6	16682	12690	10249
16.2	21954	17478	14518	20.8	16480	12515	10087
16.4	21678	17216	14279				

DIMENSIONS FOR PLATE AND CHANNEL COLUMNS.



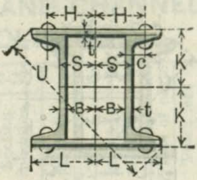
Depth of channel	Weight per foot	Size of plates: Width	Size of plates: Thickness t'	t	L	K	U	H	B	S	C
Ins.	Lbs.	Ins.	In.	In.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
	55.0	20	3/4	.82	10	8 1/4	25 15/16	8 1/4	5 15/16	6 3/4	2 5/16
	55.0	20	3/8	.82	10	7 7/8	25 7/16	8 1/4	5 15/16	6 3/4	2 5/16
	50.0	20	3/4	.72	10	8 1/4	25 15/16	8 1/4	6 1/16	6 3/4	2 1/4
	50.0	20	3/8	.72	10	7 7/8	25 7/16	8 1/4	6 1/16	6 3/4	2 1/4
	45.0	20	3/4	.62	10	8 1/4	25 15/16	8 1/4	6 1/8	6 3/4	2 1/8
15	45.0	20	3/8	.62	10	7 7/8	25 7/16	8 1/4	6 1/8	6 3/4	2 1/8
	40.0	20	3/4	.52	10	8 1/4	25 15/16	8 1/4	6 1/4	6 3/4	2
	40.0	20	3/8	.52	10	7 7/8	25 7/16	8 1/4	6 1/4	6 3/4	2
	35.0	20	3/4	.43	10	8 1/4	25 15/16	8 1/4	6 5/16	6 3/4	1 15/16
	35.0	20	3/8	.43	10	7 7/8	25 7/16	8 1/4	6 5/16	6 3/4	1 15/16
	33.0	20	3/4	.40	10	8 1/4	25 15/16	8 1/4	6 3/8	6 3/4	1 7/8
	33.0	20	3/8	.40	10	7 7/8	25 7/16	8 1/4	6 3/8	6 3/4	1 7/8
	55.0	17	3/4	.82	8 1/2	8 1/4	23 11/16	6 3/4	4 7/16	5 1/4	2 5/16
	55.0	17	3/8	.82	8 1/2	7 7/8	23 3/16	6 3/4	4 7/16	5 1/4	2 5/16
	50.0	17	3/4	.72	8 1/2	8 1/4	23 11/16	6 3/4	4 9/16	5 1/4	2 1/4
	50.0	17	3/8	.72	8 1/2	7 7/8	23 3/16	6 3/4	4 9/16	5 1/4	2 1/4
	45.0	17	3/4	.62	8 1/2	8 1/4	23 11/16	6 3/4	4 5/8	5 1/4	2 1/8
15	45.0	17	3/8	.62	8 1/2	7 7/8	23 3/16	6 3/4	4 5/8	5 1/4	2 1/8
	40.0	17	3/4	.52	8 1/2	8 1/4	23 11/16	6 3/4	4 3/4	5 1/4	2
	40.0	17	3/8	.52	8 1/2	7 7/8	23 3/16	6 3/4	4 3/4	5 1/4	2
	35.0	17	3/4	.43	8 1/2	8 1/4	23 11/16	6 3/4	4 13/16	5 1/4	1 15/16
	35.0	17	3/8	.43	8 1/2	7 7/8	23 3/16	6 3/4	4 13/16	5 1/4	1 15/16
	33.0	17	3/4	.40	8 1/2	8 1/4	23 11/16	6 3/4	4 7/8	5 1/4	1 7/8
	33.0	17	3/8	.40	8 1/2	7 7/8	23 3/16	6 3/4	4 7/8	5 1/4	1 7/8
	40.0	16	5/8	.76	8	6 5/8	20 3/4	6 5/8	4 3/8	5 1/8	2 1/4
	40.0	16	1/4	.76	8	6 1/4	20 5/16	6 5/8	4 3/8	5 1/8	2 1/4
	35.0	16	5/8	.64	8	6 5/8	20 3/4	6 5/8	4 1/2	5 1/8	2 1/8
	35.0	16	1/4	.64	8	6 1/4	20 5/16	6 5/8	4 1/2	5 1/8	2 1/8
12	30.0	16	5/8	.51	8	6 5/8	20 3/4	6 5/8	4 5/8	5 1/8	2
	30.0	16	1/4	.51	8	6 1/4	20 5/16	6 5/8	4 5/8	5 1/8	2
	25.0	16	5/8	.39	8	6 5/8	20 3/4	6 5/8	4 3/4	5 1/8	1 7/8
	25.0	16	1/4	.39	8	6 1/4	20 5/16	6 5/8	4 3/4	5 1/8	1 7/8
	20.5	16	5/8	.28	8	6 5/8	20 3/4	6 5/8	4 7/8	5 1/8	1 3/4
	20.5	16	1/4	.28	8	6 1/4	20 5/16	6 5/8	4 7/8	5 1/8	1 3/4

DIMENSIONS FOR PLATE AND CHANNEL COLUMNS.



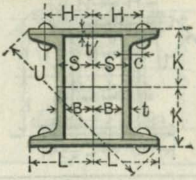
Depth of channel	Weight per foot	Size of plates: Width	Size of plates: Thickness t'	t	L	K	U	H	B	S	C
Ins.	Lbs.	Ins.	In.	In.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
12	40.0	14	⅝	.76	7	6⅝	19 9/16	5⅝	3⅜	4⅛	2¼
	40.0	14	¼	.76	7	6¼	18¾	5⅝	3⅜	4⅛	2¼
	35.0	14	⅝	.64	7	6⅝	19 9/16	5⅝	3½	4⅛	2⅛
	35.0	14	¼	.64	7	6¼	18¾	5⅝	3½	4⅛	2⅛
	30.0	14	⅝	.51	7	6⅝	19 9/16	5⅝	3⅝	4⅛	2
	30.0	14	¼	.51	7	6¼	18¾	5⅝	3⅝	4⅛	2
	25.0	14	⅝	.39	7	6⅝	19 9/16	5⅝	3¾	4⅛	1⅞
	25.0	14	¼	.39	7	6¼	18¾	5⅝	3¾	4⅛	1⅞
	20.5	14	⅝	.28	7	6⅝	19 9/16	5⅝	3⅞	4⅛	1¾
	20.5	14	¼	.28	7	6¼	18¾	5⅝	3⅞	4⅛	1¾
10	35.0	15	⅝	.82	7½	5⅝	18¾	6	3 15/16	4¾	2 1/16
	35.0	15	¼	.82	7½	5¼	18 5/16	6	3 15/16	4¾	2 1/16
	30.0	15	⅝	.68	7½	5⅝	18¾	6	4 1/16	4¾	1 15/16
	30.0	15	¼	.68	7½	5¼	18 5/16	6	4 1/16	4¾	1 15/16
	25.0	15	⅝	.53	7½	5⅝	18¾	6	4¼	4¾	1¾
	25.0	15	¼	.53	7½	5¼	18 5/16	6	4¼	4¾	1¾
	20.0	15	⅝	.38	7½	5⅝	18¾	6	4⅜	4¾	1⅝
	20.0	15	¼	.38	7½	5¼	18 5/16	6	4⅜	4¾	1⅝
	15.0	15	⅝	.24	7½	5⅝	18¾	6	4½	4¾	1½
	15.0	15	¼	.24	7½	5¼	18 5/16	6	4½	4¾	1½
10	35.0	12	⅝	.82	6	5⅝	16 7/16	4½	2 7/16	3¼	2 1/16
	35.0	12	¼	.82	6	5¼	15 15/16	4½	2 7/16	3¼	2 1/16
	30.0	12	⅝	.68	6	5⅝	16 7/16	4½	2 9/16	3¼	1 15/16
	30.0	12	¼	.68	6	5¼	15 15/16	4½	2 9/16	3¼	1 15/16
	25.0	12	⅝	.53	6	5⅝	16 7/16	4½	2¾	3¼	1¾
	25.0	12	¼	.53	6	5¼	15 15/16	4½	2¾	3¼	1¾
	20.0	12	⅝	.38	6	5⅝	16 7/16	4½	2⅞	3¼	1⅝
	20.0	12	¼	.38	6	5¼	15 15/16	4½	2⅞	3¼	1⅝
	15.0	12	⅝	.24	6	5⅝	16 7/16	4½	3	3¼	1½
	15.0	12	¼	.24	6	5¼	15 15/16	4½	3	3¼	1½

DIMENSIONS FOR PLATE AND CHANNEL COLUMNS.



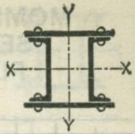
Depth of channel	Weight per foot	Size of plates: Width	Size of plates: Thickness t'	t	L	K	U	H	B	S	C
Ins.	Lbs.	Ins.	In.	In.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
	25.00	13	5/8	.61	6 1/2	5 1/8	16 9/16	5 1/8	3 3/8	4	1 3/4
	25.00	13	1/4	.61	6 1/2	4 3/4	16 1/8	5 1/8	3 3/8	4	1 3/4
	20.00	13	5/8	.45	6 1/2	5 1/8	16 9/16	5 1/8	3 9/16	4	1 9/16
9	20.00	13	1/4	.45	6 1/2	4 3/4	16 1/8	5 1/8	3 9/16	4	1 9/16
	15.00	13	5/8	.29	6 1/2	5 1/8	16 9/16	5 1/8	3 11/16	4	1 7/16
	15.00	13	1/4	.29	6 1/2	4 3/4	16 1/8	5 1/8	3 11/16	4	1 7/16
	13.25	13	5/8	.23	6 1/2	5 1/8	16 9/16	5 1/8	3 3/4	4	1 3/8
	13.25	13	1/4	.23	6 1/2	4 3/4	16 1/8	5 1/8	3 3/4	4	1 3/8
	25.00	11	5/8	.61	5 1/2	5 1/8	15 1/16	4 1/8	2 3/8	3	1 3/4
	25.00	11	1/4	.61	5 1/2	4 3/4	14 1/2	4 1/8	2 3/8	3	1 3/4
	20.00	11	5/8	.45	5 1/2	5 1/8	15 1/16	4 1/8	2 9/16	3	1 9/16
9	20.00	11	1/4	.45	5 1/2	4 3/4	14 1/2	4 1/8	2 9/16	3	1 9/16
	15.00	11	5/8	.29	5 1/2	5 1/8	15 1/16	4 1/8	2 11/16	3	1 7/16
	15.00	11	1/4	.29	5 1/2	4 3/4	11 1/2	4 1/8	2 11/16	3	1 7/16
	13.25	11	5/8	.23	5 1/2	5 1/8	15 1/16	4 1/8	2 3/4	3	1 3/8
	13.25	11	1/4	.23	5 1/2	4 3/4	14 1/2	4 1/8	2 3/4	3	1 3/8
	21.25	12	5/8	.58	6	4 5/8	15 1/2	4 5/8	3 1/16	3 5/8	1 9/16
	21.25	12	1/4	.58	6	4 1/4	14 11/16	4 5/8	3 1/16	3 5/8	1 9/16
	18.75	12	5/8	.49	6	4 5/8	15 1/2	4 5/8	3 1/8	3 5/8	1 1/2
	18.75	12	1/4	.49	6	4 1/4	14 11/16	4 5/8	3 1/8	3 5/8	1 1/2
	16.25	12	5/8	.40	6	4 5/8	15 1/2	4 5/8	3 1/4	3 5/8	1 3/8
8	16.25	12	1/4	.40	6	4 1/4	14 11/16	4 5/8	3 1/4	3 5/8	1 3/8
	13.75	12	5/8	.31	6	4 5/8	15 1/2	4 5/8	3 5/16	3 5/8	1 5/16
	13.75	12	1/4	.31	6	4 1/4	14 11/16	4 5/8	3 5/16	3 5/8	1 5/16
	11.25	12	5/8	.22	6	4 5/8	15 1/2	4 5/8	3 7/16	3 5/8	1 1/4
	11.25	12	1/4	.22	6	4 1/4	14 11/16	4 5/8	3 7/16	3 5/8	1 1/4
	21.25	10	5/8	.58	5	4 5/8	13 5/8	3 5/8	2 1/16	2 5/8	1 9/16
	21.25	10	1/4	.58	5	4 1/4	13 1/8	3 5/8	2 1/16	2 5/8	1 9/16
	18.75	10	5/8	.49	5	4 5/8	13 5/8	3 5/8	2 1/8	2 5/8	1 1/2
	18.75	10	1/4	.49	5	4 1/4	13 1/8	3 5/8	2 1/8	2 5/8	1 1/2
8	16.25	10	5/8	.40	5	4 5/8	13 5/8	3 5/8	2 1/4	2 5/8	1 3/8
	16.25	10	1/4	.40	5	4 1/4	13 1/8	3 5/8	2 1/4	2 5/8	1 3/8
	13.75	10	5/8	.31	5	4 5/8	13 5/8	3 5/8	2 5/16	2 5/8	1 5/16
	13.75	10	1/4	.31	5	4 1/4	13 1/8	3 5/8	2 5/16	2 5/8	1 5/16
	11.25	10	5/8	.22	5	4 5/8	13 5/8	3 5/8	2 3/8	2 5/8	1 1/4
	11.25	10	1/4	.22	5	4 1/4	13 1/8	3 5/8	2 3/8	2 5/8	1 1/4

DIMENSIONS FOR PLATE AND CHANNEL COLUMNS.



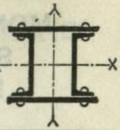
Depth of channel	Weight per foot	Size of plates: Width	Size of plates: Thickness t'	t	L	K	U	H	B	S	C
Ins.	Lbs.	Ins.	In.	In.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
	19.75	11	5/8	.63	5 1/2	4 1/8	13 3/4	4 1/4	2 5/8	3 1/4	1 5/8
	19.75	11	1/4	.63	5 1/2	3 3/4	13 5/16	4 1/4	2 5/8	3 1/4	1 5/8
	17.25	11	5/8	.53	5 1/2	4 1/8	13 3/4	4 1/4	2 3/4	3 1/4	1 1/2
	17.25	11	1/4	.53	5 1/2	3 3/4	13 5/16	4 1/4	2 3/4	3 1/4	1 1/2
	14.75	11	5/8	.42	5 1/2	4 1/8	13 3/4	4 1/4	2 13/16	3 1/4	1 7/16
7	14.75	11	1/4	.42	5 1/2	3 3/4	13 5/16	4 1/4	2 13/16	3 1/4	1 7/16
	12.25	11	5/8	.32	5 1/2	4 1/8	13 3/4	4 1/4	2 15/16	3 1/4	1 5/16
	12.25	11	1/4	.32	5 1/2	3 3/4	13 5/16	4 1/4	2 15/16	3 1/4	1 5/16
	9.75	11	5/8	.21	5 1/2	4 1/8	13 3/4	4 1/4	3 1/16	3 1/4	1 3/16
	9.75	11	1/4	.21	5 1/2	3 3/4	13 5/16	4 1/4	3 1/16	3 1/4	1 3/16
	19.75	9	5/8	.63	4 1/2	4 1/8	12 3/16	3 1/4	1 5/8	2 1/4	1 5/8
	19.75	9	1/4	.63	4 1/2	3 3/4	11 3/4	3 1/4	1 5/8	2 1/4	1 5/8
	17.25	9	5/8	.53	4 1/2	4 1/8	12 3/16	3 1/4	1 3/4	2 1/4	1 1/2
	17.25	9	1/4	.53	4 1/2	3 3/4	11 3/4	3 1/4	1 3/4	2 1/4	1 1/2
	14.75	9	5/8	.42	4 1/2	4 1/8	12 3/16	3 1/4	1 13/16	2 1/4	1 7/16
7	14.75	9	1/4	.42	4 1/2	3 3/4	11 3/4	3 1/4	1 13/16	2 1/4	1 7/16
	12.25	9	5/8	.32	4 1/2	4 1/8	12 3/16	3 1/4	1 15/16	2 1/4	1 5/16
	12.25	9	1/4	.32	4 1/2	3 3/4	11 3/4	3 1/4	1 15/16	2 1/4	1 5/16
	9.75	9	5/8	.21	4 1/2	4 1/8	12 3/16	3 1/4	2 1/16	2 1/4	1 3/16
	9.75	9	1/4	.21	4 1/2	3 3/4	11 3/4	3 1/4	2 1/16	2 1/4	1 3/16
	15.50	9	5/8	.56	4 1/2	3 5/8	11 9/16	3 3/8	1 15/16	2 1/2	1 7/16
	15.50	9	1/4	.56	4 1/2	3 1/4	11 1/8	3 3/8	1 15/16	2 1/2	1 7/16
	13.00	9	5/8	.44	4 1/2	3 5/8	11 9/16	3 3/8	2 1/16	2 1/2	1 5/16
	13.00	9	1/4	.44	4 1/2	3 1/4	11 1/8	3 3/8	2 1/16	2 1/2	1 5/16
6	10.50	9	5/8	.32	4 1/2	3 5/8	11 9/16	3 3/8	2 3/16	2 1/2	1 3/16
	10.50	9	1/4	.32	4 1/2	3 1/4	11 1/8	3 3/8	2 3/16	2 1/2	1 3/16
	8.00	9	5/8	.20	4 1/2	3 5/8	11 9/16	3 3/8	2 5/16	2 1/2	1 1/16
	8.00	9	1/4	.20	4 1/2	3 1/4	11 1/8	3 3/8	2 5/16	2 1/2	1 1/16
	15.50	8	5/8	.56	4	3 5/8	10 13/16	2 7/8	1 7/16	2	1 7/16
	15.50	8	1/4	.56	4	3 1/4	10 5/16	2 7/8	1 7/16	2	1 7/16
	13.00	8	5/8	.44	4	3 5/8	10 13/16	2 7/8	1 9/16	2	1 5/16
6	13.00	8	1/4	.44	4	3 1/4	10 5/16	2 7/8	1 9/16	2	1 5/16
	10.00	8	5/8	.32	4	3 5/8	10 13/16	2 7/8	1 11/16	2	1 3/16
	10.50	8	1/4	.32	4	3 1/4	10 5/16	2 7/8	1 11/16	2	1 3/16
	8.00	8	5/8	.20	4	3 5/8	10 13/16	2 7/8	1 13/16	2	1 1/16
	8.00	8	1/4	.20	4	3 1/4	10 5/16	2 7/8	1 13/16	2	1 1/16

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND CHANNEL COLUMNS.



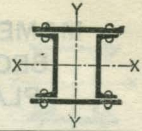
Depth of channel	Weight per foot	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Ins.	Lbs.	Ins.	In.	Ins.^{4}	Ins.^{3}	Ins.^{4}	Ins.^{3}	Ins.	In.	Ins.^{4}	Ins.^{3}	Ins.^{4}	Ins.^{3}
	55.0	20	3/4	2722.3	330.3	2498.8	249.9	17	3/4	2443.0	296.1	1530.4	180.1
	55.0	20	11/16	2553.4	311.9	2415.5	241.6	17	11/16	2299.8	280.9	1479.4	174.0
	55.0	20	5/8	2387.1	293.8	2332.1	233.2	17	5/8	2158.1	265.6	1428.1	168.0
15	55.0	20	9/16	2223.3	275.8	2248.8	224.9	17	9/16	2018.6	250.4	1376.8	162.0
	55.0	20	1/2	2062.1	257.8	2165.5	216.6	17	1/2	1881.8	235.2	1325.7	156.0
	55.0	20	7/16	1903.3	239.8	2082.1	208.2	17	7/16	1747.2	220.1	1274.7	150.0
	55.0	20	3/8	1747.0	221.9	1998.8	199.9	17	3/8	1614.1	205.0	1223.4	143.9
	50.0	20	3/4	2667.3	323.3	2394.9	239.5	17	3/4	2388.0	289.5	1472.4	173.2
	50.0	20	11/16	2498.4	305.2	2311.5	231.2	17	11/16	2244.8	274.2	1421.3	167.2
	50.0	20	5/8	2332.1	287.0	2228.2	222 8	17	5/8	2103.1	258.8	1370.0	161.2
15	50.0	20	9/16	2168.3	268.9	2144.9	214.5	17	9/16	1963.6	243.5	1318.7	155.1
	50.0	20	1/2	2007.1	250.9	2061.5	206.2	17	1/2	1826.8	228.4	1267.7	149.1
	50.0	20	7/16	1848.3	232.9	1978.2	197.8	17	7/16	1692.2	213.2	1216.6	143.1
	50.0	20	3/8	1692.0	214.9	1894.9	189.5	17	3/8	1559.1	198.0	1165.3	137.1
	45.0	20	3/4	2612.1	316.6	2288.6	228.9	17	3/4	2332.8	282.8	1412.6	166.2
	45.0	20	11/16	2443.2	298.4	2205.3	220.5	17	11/16	2189.6	267.4	1361.5	160.2
	45.0	20	5/8	2276.9	280.2	2121.9	212.2	17	5/8	2047.9	252.0	1310.2	154.2
15	45.0	20	9/16	2113.1	262.1	2038.6	203.9	17	9/16	1908.4	236.7	1258.9	148.1
	45.0	20	1/2	1951.9	244.0	1955.3	195.5	17	1/2	1771.6	221.5	1207.9	142.1
	45.0	20	7/16	1793.1	225.9	1871.9	187.2	17	7/16	1637.0	206.2	1156.8	136.1
	45.0	20	3/8	1636,8	207.9	1788.6	178.9	17	3/8	1503.9	191.0	1105.4	130.1
	40.0	20	3/4	2556.9	309.9	2174.6	217.5	17	3/4	2277.6	276.1	1347.0	158.5
	40.0	20	11/16	2388.0	291.7	2091.2	209.1	17	11/16	2134.4	260.7	1295.9	152.5
	40.0	20	5/8	2221.7	273.4	2007.9	200.8	17	5/8	1992.7	245.3	1244.6	146.4
15	40.0	20	9/16	2057.9	255.3	1924.6	192.5	17	9/16	1853.2	229.9	1193.3	140.4
	40.0	20	1/2	1896.7	237.1	1841.2	184.1	17	1/2	1716.4	214.6	1142.3	134.4
	40.0	20	7/16	1737.9	219.0	1757.9	175.8	17	7/16	1581.8	199.3	1091.2	128.4
	40.0	20	3/8	1581.6	200.8	1674.6	167.5	17	3/8	1448.7	184.0	1039.9	122.3
	35.0	20	3/4	2501.7	303.2	2057.3	205.7	17	3/4	2222.4	269.4	1278.8	150.4
	35.0	20	11/16	2332.8	284.9	1974.0	197.4	17	11/16	2079.2	254.0	1227.7	144.4
	35.0	20	5/8	2166.5	266.6	1890.7	189.1	17	5/8	1937.5	238 5	1176.4	138.4
15	35.0	20	9/16	2002.7	248.4	1807.3	180.7	17	9/16	1798.0	223.0	1125.1	132.4
	35.0	20	1/2	1841.5	230.2	1724.0	172.4	17	1/2	1661.2	207.7	1074.1	126.4
	35.0	20	7/16	1682.7	212.0	1640.7	164.1	17	7/16	1526.6	192.3	1023.0	120.4
	35.0	20	3/8	1526.4	193.8	1557.3	155.7	17	3/8	1393.5	177.0	971.7	114.3
	33.0	20	3/4	2487.1	301.5	2025.9	202.6	17	3/4	2207.8	267.6	1260.4	148.3
	33.0	20	11/16	2318.2	283.1	1942.5	194.3	17	11/16	2064.6	252.2	1209.4	142.3
	33.0	20	5/8	2151.9	264.9	1859.2	185.9	17	5/8	1922.9	236.7	1158.1	136.2
15	33.0	20	9/16	1988.1	246.6	1775.9	177.6	17	9/16	1783.4	221.2	1106.8	130.2
	33.0	20	1/2	1826.9	228.4	1692.5	169.3	17	1/2	1646.6	205.8	1055.7	124.2
	33.0	20	7/16	1668.1	210.2	1609.2	160.9	17	7/16	1512.0	190.5	1004.7	118.2
	33.0	20	3/8	1511.8	192.0	1525.9	152.6	17	3/8	1378.9	175.1	953.4	112.2

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND CHANNEL COLUMNS.



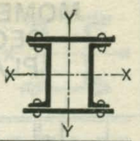
Depth of channel	Weight per foot	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Ins.	Lbs.	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³
	40.0	16	3/4	1370.3	203.0	1133.4	141.7	14	3/4	1248.2	184.9	748.7	107.0
	40.0	16	11/16	1280.0	191.4	1090.8	136.3	14	11/16	1169.2	174.8	720.2	102.9
	40.0	16	5/8	1191.4	179.8	1048.1	131.0	14	5/8	1091.7	164.8	691.6	98.8
12	40.0	16	9/16	1104.5	168.3	1005.4	125.7	14	9/16	1015.6	154.8	663.0	94.7
	40.0	16	1/2	1019.1	156.8	962.8	120.3	14	1/2	941.0	144.8	634.4	90.6
	40.0	16	7/16	935.4	145.3	920.1	115.0	14	7/16	867.7	134.8	605.8	86.6
	40.0	16	3/8	853.4	133.9	877.4	109.7	14	3/8	795.9	124.9	577.2	82.5
	40.0	16	5/16	772.9	122.4	834.8	104.3	14	5/16	725.5	114.9	548.7	78.4
	40.0	16	1/4	694.0	111.0	792.1	99.0	14	1/4	656.5	105.0	520.1	74.3
	35.0	16	3/4	1335.1	197.8	1074.9	134.4	14	3/4	1213.0	179.7	713.5	101.9
	35.0	16	11/16	1244.8	186.1	1032.3	129.0	14	11/16	1134.0	169.6	684.9	97.9
	35.0	16	5/8	1156.2	174.5	989.6	123.7	14	5/8	1056.5	159.5	656.4	93.8
12	35.0	16	9/16	1069.3	162.9	946.9	118.4	14	9/16	980.4	149.4	627.8	89.7
	35.0	16	1/2	983.9	151.4	904.3	113.0	14	1/2	905.8	139.4	599.2	85.6
	35.0	16	7/16	900.2	139.8	861.6	107.7	14	7/16	832.5	129.3	570.6	81.5
	35.0	16	3/8	818.2	128.3	818.9	102.4	14	3/8	760.7	119.3	542.0	77.4
	35.0	16	5/16	737.7	116.9	776.3	97.0	14	5/16	690.3	109.4	513.4	73.4
	35.0	16	1/4	658.8	105.4	733.6	91.7	14	1/4	621.3	99.4	484.9	69.3
	30.0	16	3/4	1299.7	192.6	1017.0	127.1	14	3/4	1177.6	174.5	678.8	97.0
	30.0	16	11/16	1209.4	180.9	974.3	121.8	14	11/16	1098.6	164.3	650.3	92.9
	30.0	16	5/8	1120.8	169.2	931.6	116.5	14	5/8	1021.1	154.1	621.7	88.8
12	30.0	16	9/16	1033.9	157.5	889.0	111.1	14	9/16	945.0	144.0	593.1	84.7
	30.0	16	1/2	948.5	145.9	846.3	105.8	14	1/2	870.4	133.9	564.5	80.6
	30.0	16	7/16	864.8	134.3	803.7	100.5	14	7/16	797.1	123.8	535.9	76.6
	30.0	16	3/8	782.8	122.8	761.0	95.1	14	3/8	725.3	113.8	507.3	72.5
	30.0	16	5/16	702.3	111.3	718.3	89.8	14	5/16	654.9	103.7	478.8	68.4
	30.0	16	1/4	623.4	99.7	675.7	84.5	14	1/4	585.9	93.7	450.2	64.3
	25.0	16	3/4	1264.5	187.3	952.1	119.0	14	3/4	1142.4	169.3	638.6	91.2
	25.0	16	11/16	1174.2	175.6	909.4	113.7	14	11/16	1063.4	159.0	610.0	87.2
	25.0	16	5/8	1085.6	163.9	868.8	108.4	14	5/8	985.9	148.8	581.4	83.1
12	25.0	16	9/16	998.7	152.2	824.1	103.0	14	9/16	909.8	138.6	552.9	79.0
	25.0	16	1/2	913.3	140.5	781.4	97.7	14	1/2	835.2	128.5	524.3	74.9
	25.0	16	7/16	829.6	128.9	738.8	92.4	14	7/16	761.9	118.4	495.7	70.8
	25.0	16	3/8	747.6	117.3	696.1	87.0	14	3/8	690.1	108.3	467.1	66.7
	25.0	16	5/16	667.1	105.7	653.4	81.7	14	5/16	619.7	98.2	438.5	62.7
	25.0	16	1/4	588.2	94.1	610.8	76.4	14	1/4	550.7	88.1	409.9	58.6
	20.5	16	3/4	1232.7	182.6	890.6	111.3	14	3/4	1110.6	164.5	599.9	85.7
	20.5	16	11/16	1142.4	170.8	848.0	106.0	14	11/16	1031.6	154.3	571.4	81.6
	20.5	16	5/8	1053.8	159.1	805.3	100.7	14	5/8	954.1	144.0	542.8	77.5
12	20.5	16	9/16	966.9	147.3	726.6	95.3	14	9/16	878.0	133.8	514.2	73.5
	20.5	16	1/2	881.5	135.6	720.0	90.0	14	1/2	803.4	123.6	485.6	69.4
	20.5	16	7/16	797.8	123.9	677.3	84.7	14	7/16	730.1	113.4	457.0	65.3
	20.5	16	3/8	715.8	112.3	634.6	79.3	14	3/8	658.3	103.3	428.4	61.2
	20.5	16	5/16	635.3	100.6	592.0	74.0	14	5/16	587.9	93.1	399.9	57.1
	20.5	16	1/4	556.4	89.0	549.3	68.7	14	1/4	518.9	83.0	371.3	53.0

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND CHANNEL COLUMNS.



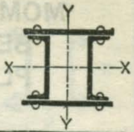
Depth of channel	Weight per foot	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Ins.	Lbs.	Ins.	In.	Ins.^{4}	Ins.^{3}	Ins.^{4}	Ins.^{3}	Ins.	In.	Ins.^{4}	Ins.^{3}	Ins.^{4}	Ins.^{3}
	35.0	15	3/4	882.1	153.4	870.5	116.1	12	3/4	751.9	130.8	425.7	70.9
	35.0	15	11/16	820.9	144.3	835.3	111.4	12	11/16	702.8	123.6	407.7	67.9
	35.0	15	5/8	760.8	135.3	800.2	106.7	12	5/8	654.8	116.4	389.7	64.9
	35.0	15	9/16	702.3	126.3	765.0	102.0	12	9/16	607.9	109.3	371.7	61.9
10	35.0	15	1/2	644.8	117.2	729.8	97.3	12	1/2	562.0	102.2	353.7	58.9
	35.0	15	7/16	588.8	108.3	694.7	92.6	12	7/16	517.1	95.1	335.7	55.9
	35.0	15	3/8	533.9	99.3	659.5	87.9	12	3/8	473.3	88.1	317.7	52.9
	35.0	15	5/16	480.5	90.4	624.4	83.3	12	5/16	430.5	81.0	299.7	49.9
	35.0	15	1/4	428.0	81.5	589.2	78.6	12	1/4	388.6	74.0	281.7	46.9
	30.0	15	3/4	857.5	149.1	822.9	109.7	12	3/4	727.3	126.5	406.9	67.8
	30.0	15	11/16	796.3	140.0	787.7	105.0	12	11/16	678.2	119.3	388.9	64.8
	30.0	15	5/8	736.2	130.9	752.5	100.3	12	5/8	630.2	112.0	370.9	61.8
	30.0	15	9/16	677.7	121.8	717.4	95.7	12	9/16	583.3	104.9	352.9	58.8
10	30.0	15	1/2	620.2	112.8	682.2	91.0	12	1/2	537.4	97.7	334.9	55.8
	30.0	15	7/16	564.2	103.8	647.1	86.3	12	7/16	492.5	90.6	316.9	52.8
	30.0	15	3/8	509.3	94.8	611.9	81.6	12	3/8	448.7	83.5	298.9	49.8
	30.0	15	5/16	455.9	85.8	576.8	76.9	12	5/16	405.9	76.4	280.9	46.8
	30.0	15	1/4	403.4	76.8	541.6	72.2	12	1/4	364.0	69.3	262.9	43.8
	25.0	15	3/4	833.1	144.9	773.0	103.1	12	3/4	702.9	122.2	386.8	64.5
	25.0	15	11/16	771.9	135.7	737.9	98.4	12	11/16	653.8	115.0	368.8	61.5
	25.0	15	5/8	711.8	126.5	702.7	93.7	12	5/8	605.8	107.7	350.8	58.5
	25.0	15	9/16	653.3	117.4	667.6	89.0	12	9/16	558.9	100.5	332.8	55.5
10	25.0	15	1/2	595.8	108.3	632.4	84.3	12	1/2	513.0	93.3	314.8	52.5
	25.0	15	7/16	539.8	99.3	597.3	79.6	12	7/16	468.1	86.1	296.8	49.5
	25.0	15	3/8	484.9	90.2	562.1	75.0	12	3/8	424.3	78.9	278.8	46.5
	25.0	15	5/16	431.5	81.2	526.9	70.3	12	5/16	381.5	71.8	260.8	43.5
	25.0	15	1/4	379.0	72.2	491.8	65.6	12	1/4	339.6	64.7	242.8	40.5
	20.0	15	3/4	808.5	140.6	719.2	95.9	12	3/4	678.3	118.0	364.1	60.7
	20.0	15	11/16	747.3	131.4	684.1	91.2	12	11/16	629.2	110.6	346.1	57.7
	20.0	15	5/8	687.2	122.2	648.9	86.5	12	5/8	581.2	103.3	328.1	54.7
	20.0	15	9/16	628.7	113.0	613.8	81.8	12	9/16	534.3	96.1	310.1	51.7
10	20.0	15	1/2	571.2	103.9	578.6	77.2	12	1/2	488.4	88.8	292.1	48.7
	20.0	15	7/16	515.2	94.8	543.4	72.5	12	7/16	443.5	81.6	274.1	45.7
	20.0	15	3/8	460.3	85.6	508.3	67.8	12	3/8	399.7	74.4	256.1	42.7
	20.0	15	5/16	406.9	76.6	473.1	63.1	12	5/16	356.9	67.2	238.1	39.7
	20.0	15	1/4	354.4	67.5	438.0	58.4	12	1/4	315.0	60.0	220.1	36.7
	15.0	15	3/4	784.9	136.5	663.1	88.4	12	3/4	654.7	113.9	339.4	56.6
	15.0	15	11/16	723.7	127.3	627.9	83.7	12	11/16	605.6	106.5	321.4	53.6
	15.0	15	5/8	663.6	118.0	592.7	79.0	12	5/8	557.6	99.1	303.4	50.6
10	15.0	15	9/16	605.1	108.8	557.6	74.3	12	9/16	510.7	91.8	285.4	47.6
	15.0	15	1/2	547.6	99.6	522.4	69.7	12	1/2	464.8	84.5	267.4	44.6
	15.0	15	7/16	491.6	90.4	487.3	65.0	12	7/16	419.9	77.2	249.4	41.6
	15.0	15	3/8	436.7	81.2	452.1	60.3	12	3/8	376.1	70.0	231.4	38.6
	15.0	15	5/16	383.3	72.1	417.0	55.6	12	5/16	333.3	62.7	213.4	35.6
	15.0	15	1/4	330.8	63.0	381.8	50.9	12	1/4	291.4	55.5	195.4	32.6

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND CHANNEL COLUMNS.



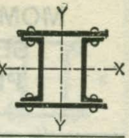
Depth of channel	Weight per foot	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Ins.	Lbs.	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³
	25.00	13	¾	605.7	115.4	517.0	79.5	11	¾	534.3	101.8	305.5	55.6
	25.00	13	11/16	561.5	108.2	494.1	76.0	11	11/16	496.7	95.8	291.6	53.0
	25.00	13	⅝	518.3	101.1	471.2	72.5	11	⅝	460.3	89.8	277.8	50.5
9	25.00	13	9/16	476.1	94.1	448.3	69.0	11	9/16	424.7	83.9	264.0	48.0
	25.00	13	½	435.0	87.0	425.4	65.5	11	½	389.8	78.0	250.1	45.5
	25.00	13	7/16	394.9	80.0	402.5	61.9	11	7/16	355.8	72.1	236.1	42.9
	25.00	13	⅜	355.7	73.0	379.7	58.4	11	⅜	322.8	66.2	222.3	40.4
	25.00	13	5/16	317.6	66.0	356.8	54.9	11	5/16	290.6	60.4	208.5	37.9
	25.00	13	¼	280.5	59.1	333.9	51.4	11	¼	259.1	54.5	194.6	35.4
	20.00	13	¾	585.9	111.6	480.1	73.9	11	¾	514.5	98.0	286.5	52.1
	20.00	13	11/16	541.7	104.4	457.2	70.3	11	11/16	476.9	91.9	272.6	49.6
	20.00	13	⅝	498.5	97.3	434.3	66.8	11	⅝	440.5	86.0	258.8	47.1
9	20.00	13	9/16	456.3	90.1	411.5	63.3	11	9/16	404.9	80.0	244.9	44.5
	20.00	13	½	415.2	83.0	388.6	59.8	11	½	370.0	74.0	231.0	42.0
	20.00	13	7/16	375.1	76.0	365.7	56.3	11	7/16	336.0	68.0	217.1	39.5
	20.00	13	⅜	335.9	68.9	342.8	52.7	11	⅜	303.0	62.2	203.3	37.0
	20.00	13	5/16	297.8	61.9	319.9	49.2	11	5/16	270.8	56.3	189.5	34.5
	20.00	13	¼	260.7	54.9	297.0	45.7	11	¼	239.3	50.4	175.6	31.9
	15.00	13	¾	566.1	107.8	441.6	67.9	11	¾	494.7	94.2	266.3	48.4
	15.00	13	11/16	521.9	100.6	418.7	64.4	11	11/16	457.1	88.1	252.4	45.9
	15.00	13	⅝	478.7	93.4	395.8	60.9	11	⅝	420.7	82.1	238.6	43.4
9	15.00	13	9/16	436.5	86.2	373.0	57.4	11	9/16	385.1	76.1	224.8	40.9
	15.00	13	½	395.4	79.1	350.1	53.9	11	½	350.2	70.0	210.9	38.3
	15.00	13	7/16	355.3	72.0	327.2	50.3	11	7/16	316.2	64.0	197.0	35.8
	15.00	13	⅜	316.1	64.9	304.3	46.8	11	⅜	283.2	58.1	183.1	33.3
	15.00	13	5/16	278.0	57.8	281.4	43.3	11	5/16	251.0	52.2	169.3	30.8
	15.00	13	¼	240.9	50.7	258.5	39.8	11	¼	219.5	46.2	155.4	28.3
	13.25	13	¾	558.9	106.5	427.4	65.8	11	¾	487.5	92.9	258.8	47.1
	13.25	13	11/16	514.7	99.2	404.5	62.2	11	11/16	449.9	86.7	244.9	44.5
	13.25	13	⅝	471.5	92.0	381.6	58.7	11	⅝	413.5	80.7	231.1	42.0
9	13.25	13	9/16	429.3	84.8	358.8	55.2	11	9/16	377.9	74.7	217.3	39.5
	13.25	13	½	388.2	77.6	335.9	51.7	11	½	343.0	68.6	203.3	37.0
	13.25	13	7/16	348.1	70.5	313.0	48.2	11	7/16	309.0	62.6	189.4	34.4
	13.25	13	⅜	308.9	63.4	290.1	44.6	11	⅜	276.0	56.6	175.6	31.9
	13.25	13	5/16	270.8	56.3	267.2	41.1	11	5/16	243.8	50.7	161.8	29.4
	13.25	13	¼	233.7	49.2	244.3	37.6	11	¼	212.3	44.7	147.9	26.9

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND CHANNEL COLUMNS.



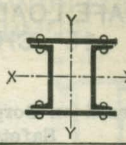
Depth of channel	Weight per foot	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Ins.	Lbs.	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³
	21.25	12	3/4	441.0	92.8	385.7	64.3	10	3/4	383.4	80.7	216.3	43.3
	21.25	12	11/16	407.6	87.0	367.7	61.3	10	11/16	355.6	75.9	205.9	41.2
	21.25	12	5/8	375.1	81.1	349.7	58.3	10	5/8	328.5	71.0	195.5	39.1
	21.25	12	9/16	343.4	75.3	331.7	55.3	10	9/16	302.1	66.2	185.0	37.0
8	21.25	12	1/2	312.6	69.5	313.7	52.3	10	1/2	276.4	61.4	174.6	34.9
	21.25	12	7/16	282.7	63.7	295.7	49.3	10	7/16	251.5	56.7	164.2	32.8
	21.25	12	3/8	253.5	58.0	277.7	46.3	10	3/8	227.2	51.9	153.8	30.8
	21.25	12	5/16	225.2	52.2	259.7	43.3	10	5/16	203.6	47.2	143.4	28.7
	21.25	12	1/4	197.9	46.5	241.7	40.3	10	1/4	180.7	42.5	133.0	26.6
	18.75	12	3/4	433.0	91.2	371.3	61.9	10	3/4	375.4	79.0	209.7	41.9
	18.75	12	11/16	399.6	85.2	353.3	58.9	10	11/16	347.6	74.2	199.2	39.9
	18.75	12	5/8	367.1	79.4	335.3	55.9	10	5/8	320.5	69.3	188.8	37.8
8	18.75	12	9/16	335.4	73.5	317.3	52.9	10	9/16	294.1	64.5	178.4	35.7
	18.75	12	1/2	304.6	67.7	299.3	49.9	10	1/2	268.4	59.7	168.0	33.6
	18.75	12	7/16	274.7	61.9	281.3	46.9	10	7/16	243.5	54.9	157.6	31.5
	18.75	12	3/8	245.5	56.1	263.3	43.9	10	3/8	219.2	50.1	147.2	29.4
	18.75	12	5/16	217.2	50.4	245.3	40.9	10	5/16	195.6	45.4	136.7	27.4
	18.75	12	1/4	189.7	44.6	227.3	37.9	10	1/4	172.7	40.6	126.3	25.3
	16.25	12	3/4	425.2	89.5	356.5	59.4	10	3/4	367.6	77.4	202.7	40.5
	16.25	12	11/16	391.8	83.6	338.5	56.4	10	11/16	339.8	72.5	192.3	38.5
	16.25	12	5/8	359.3	77.7	320.5	53.4	10	5/8	312.7	67.6	181.9	36.4
8	16.25	12	9/16	327.6	71.8	302.5	50.4	10	9/16	286.3	62.8	171.5	34.3
	16.25	12	1/2	296.8	66.0	284.5	47.4	10	1/2	260.6	57.9	161.0	32.2
	16.25	12	7/16	266.9	60.1	266.5	44.4	10	7/16	235.7	53.1	150.6	30.1
	16.25	12	3/8	237.7	54.3	248.5	41.4	10	3/8	211.4	48.3	140.2	28.0
	16.25	12	5/16	209.4	48.6	230.5	38.4	10	5/16	187.8	43.6	129.8	26.0
	16.25	12	1/4	181.9	42.8	212.5	35.4	10	1/4	164.9	38.8	119.4	23.9
	13.75	12	3/4	417.4	87.9	340.4	56.7	10	3/4	359.8	75.8	194.9	39.0
	13.75	12	11/16	384.0	81.9	322.4	53.7	10	11/16	332.0	70.8	184.5	36.9
	13.75	12	5/8	351.5	76.0	304.4	50.7	10	5/8	304.9	65.9	174.1	34.8
8	13.75	12	9/16	319.8	70.1	286.4	47.7	10	9/16	278.5	61.0	163.6	32.7
	13.75	12	1/2	289.0	64.2	268.4	44.7	10	1/2	252.8	56.2	153.2	30.6
	13.75	12	7/16	250.1	58.4	250.4	41.7	10	7/16	227.9	51.4	142.8	28.6
	13.75	12	3/8	229.9	52.6	232.4	38.7	10	3/8	203.6	46.5	132.4	26.5
	13.75	12	5/16	201.6	46.8	214.4	35.7	10	5/16	180.0	41.7	122.0	24.4
	13.75	12	1/4	174.1	41.0	196.4	32.7	10	1/4	157.1	37.0	111.6	22.3
	11.25	12	3/4	410.0	86.3	325.1	54.2	10	3/4	352.4	74.2	187.4	37.5
	11.25	12	11/16	376.6	80.3	307.1	51.2	10	11/16	324.6	69.2	176.9	35.4
	11.25	12	5/8	344.1	74.4	289.1	48.2	10	5/8	297.5	64.3	166.5	33.3
8	11.25	12	9/16	312.4	68.5	271.1	45.2	10	9/16	271.1	59.4	156.1	31.2
	11.25	12	1/2	281.6	62.6	253.1	42.2	10	1/2	245.4	54.5	145.7	29.1
	11.25	12	7/16	251.7	56.7	235.1	39.2	10	7/16	220.5	49.7	135.3	27.1
	11.25	12	3/8	222.5	50.9	217.1	36.2	10	3/8	196.2	44.9	124.9	25.0
	11.25	12	5/16	194.2	45.0	199.1	33.2	10	5/16	172.6	40.0	114.4	22.9
	11.25	12	1/4	166.7	39.2	181.1	30.2	10	1/4	149.7	35.2	104.0	20.8

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND CHANNEL COLUMNS.



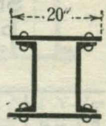
Depth channel	Weight per foot	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Ins.	Lbs.	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³
	19.75	11	3/4	314.9	74.1	289.1	52.6	9	3/4	269.7	63.5	151.1	33.6
	19.75	11	11/16	290.5	69.4	275.2	50.0	9	11/16	249.8	59.7	143.5	31.9
	19.75	11	5/8	266.7	64.7	261.3	47.5	9	5/8	230.4	55.9	135.9	30.2
	19.75	11	9/16	243.7	60.0	247.5	45.0	9	9/16	211.4	52.0	128.3	28.5
	19.75	11	1/2	221.3	55.3	233.6	42.5	9	1/2	193.2	48.3	120.7	26.8
7	19.75	11	7/16	199.7	50.7	219.7	40.0	9	7/16	175.5	44.6	113.1	25.1
	19.75	11	3/8	178.7	46.1	205.9	37.4	9	3/8	158.3	40.8	105.5	23.4
	19.75	11	5/16	158.4	41.5	192.0	34.9	9	5/16	141.6	37.1	97.9	21.8
	19.75	11	1/4	138.7	37.0	178.2	32.4	9	1/4	125.6	33.5	90.3	20.1
	17.25	11	3/4	308.9	72.7	278.1	50.6	9	3/4	263.7	62.1	146.6	32.6
	17.25	11	11/16	284.5	67.9	264.2	48.0	9	11/16	243.8	58.2	139.1	30.9
	17.25	11	5/8	260.7	63.2	250.3	45.5	9	5/8	224.4	54.4	131.4	29.2
	17.25	11	9/16	237.7	53.5	236.5	43.0	9	9/16	205.4	50.6	123.8	27.5
7	17.25	11	1/2	215.3	53.8	222.6	40.5	9	1/2	187.2	46.8	116.2	25.8
	17.25	11	7/16	193.7	49.2	208.7	38.0	9	7/16	169.5	43.1	108.7	24.2
	17.25	11	3/8	172.7	44.6	194.9	35.4	9	3/8	152.3	39.3	101.1	22.5
	17.25	11	5/16	152.4	40.0	181.0	32.9	9	5/16	135.6	35.6	93.4	20.8
	17.25	11	1/4	132.7	35.4	167.1	30.4	9	1/4	119.6	31.9	85.9	19.1
	14.75	11	3/4	302.9	71.3	267.2	48.6	9	3/4	257.7	60.6	142.3	31.6
	14.75	11	11/16	278.5	66.5	253.3	46.1	9	11/16	237.8	56.8	134.7	29.9
	14.75	11	5/8	254.7	61.8	239.4	43.5	9	5/8	218.4	53.0	127.1	28.2
7	14.75	11	9/16	231.7	57.0	225.6	41.0	9	9/16	199.4	49.1	119.5	26.5
	14.75	11	1/2	209.3	52.3	211.7	38.5	9	1/2	181.2	45.3	111.9	24.9
	14.75	11	7/16	187.7	47.7	197.8	36.0	9	7/16	163.5	41.5	104.3	23.2
	14.75	11	3/8	166.7	43.0	184.0	33.5	9	3/8	146.3	37.7	96.7	21.5
	14.75	11	5/16	146.4	38.4	170.1	30.9	9	5/16	129.6	34.0	89.1	19.8
	14.75	11	1/4	126.7	33.8	156.3	28.4	9	1/4	113.6	30.3	81.5	18.1
	12.25	11	3/4	296.9	69.9	255.0	46.4	9	3/4	251.7	59.2	137.1	30.5
	12.25	11	11/16	272.5	65.1	241.1	43.8	9	11/16	231.8	55.4	129.5	28.8
	12.25	11	5/8	248.7	60.3	227.2	41.3	9	5/8	212.4	51.5	121.9	27.1
7	12.25	11	9/16	225.7	55.6	213.4	38.8	9	9/16	193.4	47.6	114.3	25.4
	12.25	11	1/2	203.3	50.8	199.5	36.3	9	1/2	175.2	43.8	106.7	23.7
	12.25	11	7/16	181.7	46.1	185.6	33.8	9	7/16	157.5	40.0	99.1	22.0
	12.25	11	3/8	160.7	41.5	171.8	31.2	9	3/8	140.3	36.2	91.5	20.3
	12.25	11	5/16	140.4	36.8	157.9	28.7	9	5/16	123.6	32.4	83.9	18.6
	12.25	11	1/4	120.7	32.2	144.0	26.2	9	1/4	107.6	28.7	76.3	17.0
	9.75	11	3/4	290.7	68.4	241.8	44.0	9	3/4	245.5	57.8	131.3	29.2
	9.75	11	11/16	266.3	63.6	227.9	41.4	9	11/16	225.6	53.9	123.8	27.5
	9.75	11	5/8	242.5	58.8	214.1	38.9	9	5/8	206.2	50.0	116.1	25.8
7	9.75	11	9/16	219.5	54.0	200.2	36.4	9	9/16	187.2	46.1	108.5	24.1
	9.75	11	1/2	197.1	49.3	186.3	33.9	9	1/2	169.0	42.2	101.0	22.4
	9.75	11	7/16	175.5	44.6	172.5	31.4	9	7/16	151.3	38.4	93.4	20.8
	9.75	11	3/8	154.5	39.9	158.6	28.8	9	3/8	134.1	34.6	85.8	19.1
	9.75	11	5/16	134.2	35.2	144.7	26.3	9	5/16	117.4	30.8	78.1	17.4
	9.75	11	1/4	114.5	30.5	130.9	23.8	9	1/4	101.4	27.0	70.6	15.7

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND CHANNEL COLUMNS.



Depth channel	Weight per foot	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus	Width of plate	Thickness of plate	Axis X-X. Moment of inertia	Axis X-X. Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Ins.	Lbs.	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³	Ins.	In.	Ins.⁴	Ins.³	Ins.⁴	Ins.³
	15.50	9	5/8	162.8	44.9	135.0	30.0	8	5/8	149.1	41.1	92.0	23.0
	15.50	9	9/16	148.3	41.6	127.4	28.3	8	9/16	136.1	38.2	86.7	21.7
	15.50	9	1/2	134.3	38.4	119.9	26.6	8	1/2	123.7	35.3	81.4	20.3
6	15.50	9	7/16	120.8	35.1	112.3	25.0	8	7/16	111.6	32.5	76.0	19.0
	15.50	9	3/8	107.7	31.9	104.7	23.3	8	3/8	100.0	29.6	70.7	17.7
	15.50	9	5/16	95.1	28.7	97.1	21.6	8	5/16	88.9	26.8	65.4	16.3
	15.50	9	1/4	83.0	25.5	89.5	19.9	8	1/4	78.1	24.0	60.0	15.0
	13.00	9	5/8	158.4	43.7	128.9	28.7	8	5/8	144.7	39.9	88.5	22.1
	13.00	9	9/16	143.9	40.4	121.3	27.0	8	9/16	131.7	37.0	83.2	20.8
	13.00	9	1/2	129.9	37.1	113.7	25.3	8	1/2	119.3	34.1	77.9	19.5
6	13.00	9	7/16	116.4	33.9	106.2	23.6	8	7/16	107.2	31.2	72.5	18.1
	13.00	9	3/8	103.3	30.6	98.6	21.9	8	3/8	95.6	28.3	67.2	16.8
	13.00	9	5/16	90.7	27.4	91.0	20.2	8	5/16	84.5	25.5	61.9	15.5
	13.00	9	1/4	78.6	24.2	83.4	18.5	8	1/4	73.7	22.7	56.5	14.1
	10.50	9	5/8	154.0	42.5	122.1	27.1	8	5/8	140.3	38.7	84.5	21.1
	10.50	9	9/16	139.5	39.2	114.5	25.4	8	9/16	127.3	35.7	79.1	19.8
	10.50	9	1/2	125.5	35.8	106.9	23.8	8	1/2	114.9	32.8	73.8	18.5
6	10.50	9	7/16	112.0	32.6	99.3	22.1	8	7/16	102.8	29.9	68.5	17.1
	10.50	9	3/8	98.9	29.3	91.7	20.4	8	3/8	91.2	27.0	63.1	15.8
	10.50	9	5/16	86.3	26.1	84.1	18.7	8	5/16	80.1	24.2	57.8	14.5
	10.50	9	1/4	74.2	22.8	76.5	17.0	8	1/4	69.3	21.3	52.5	13.1
	8.00	9	5/8	149.8	41.3	115.2	25.6	8	5/8	136.1	37.5	80.4	20.1
	8.00	9	9/16	135.3	38.0	107.6	23.9	8	9/16	123.1	34.6	75.0	18.8
	8.00	9	1/2	121.3	34.6	100.0	22.2	8	1/2	110.7	31.6	69.7	17.4
6	8.00	9	7/16	107.8	31.4	92.4	20.5	8	7/16	98.6	28.7	64.4	16.1
	8.00	9	3/8	94.7	28.1	84.8	18.9	8	3/8	87.0	25.8	59.0	14.8
	8.00	9	5/16	82.1	24.8	77.2	17.2	8	5/16	75.9	22.9	53.7	13.4
	8.00	9	1/4	70.0	21.5	69.6	15.5	8	1/4	65.1	20.0	48.4	12.1

SAFE LOADS IN THOUSANDS OF POUNDS FOR 15″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

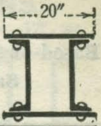


Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet								
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	12	14	16	18	20	22	24	26	28
55	3/4	212.0	62.36	6.33	768	764	760	756	751	743	737	730	724
55	11/16	203.5	59.86	6.35	738	734	730	726	721	713	707	701	694
55	5/8	195.0	57.36	6.38	707	703	700	695	690	685	678	672	665
55	9/16	186.5	54.86	6.37	676	673	669	665	660	654	648	643	636
55	1/2	178.0	52.36	6.28	645	642	639	633	629	624	619	613	605
55	7/16	169.5	49.86	6.18	614	610	607	603	599	593	588	582	577
55	3/8	161.0	47.36	6.07	583	580	576	571	567	563	556	551	546
50	3/4	202.0	59.42	6.35	732	729	725	720	715	708	702	696	689
50	11/16	193.5	56.92	6.37	701	698	694	690	685	678	673	667	660
50	5/8	185.0	54.42	6.40	671	667	664	660	655	650	643	637	631
50	9/16	176.5	51.92	6.43	640	636	633	629	625	620	615	610	602
50	1/2	168.0	49.42	6.37	609	606	603	599	595	589	584	579	573
50	7/16	159.5	46.92	6.28	578	575	572	567	563	559	555	550	543
50	3/8	151.0	44.42	6.17	547	544	541	537	533	528	523	519	514
45	3/4	192.0	56.48	6.37	696	693	689	685	680	673	667	661	655
45	11/16	183.5	53.98	6.39	665	662	658	654	650	645	638	632	626
45	5/8	175.0	51.48	6.42	634	631	628	624	620	615	610	603	597
45	9/16	166.5	48.98	6.45	604	601	597	594	590	585	580	575	570
45	1/2	158.0	46.48	6.48	573	570	567	563	559	555	551	546	541
45	7/16	149.5	43.98	6.39	542	539	536	533	529	525	520	515	510
45	3/8	141.0	41.48	6.28	511	509	506	502	498	494	490	486	480
40	3/4	182.0	53.52	6.37	659	656	653	649	644	638	633	627	621
40	11/16	173.5	51.02	6.40	629	626	622	618	614	610	603	598	592
40	5/8	165.0	48.52	6.43	598	595	592	588	584	580	575	570	563
40	9/16	156.5	46.02	6.47	567	564	561	558	554	550	545	541	536
40	1/2	148.0	43.52	6.50	537	534	531	527	524	520	516	511	507
40	7/16	139.5	41.02	6.51	506	503	500	497	494	490	486	482	477
40	3/8	131.0	38.52	6.41	475	472	470	467	464	460	457	451	447
35	3/4	172.0	50.58	6.38	623	620	617	613	609	604	598	592	587
35	11/16	163.5	48.08	6.41	592	590	586	583	579	574	570	563	558
35	5/8	155.0	45.58	6.44	562	559	556	552	549	545	540	535	531
35	9/16	146.5	43.08	6.48	531	528	525	522	519	515	511	506	501
35	1/2	138.0	40.58	6.52	501	498	495	492	488	485	481	477	472
35	7/16	129.5	38.08	6.56	470	468	465	463	459	455	451	447	443
35	3/8	121.0	35.58	6.55	439	437	435	432	428	425	422	418	414
33	3/4	168.0	49.80	6.38	614	611	607	604	599	595	589	583	578
33	11/16	159.5	47.30	6.41	583	580	577	573	569	565	561	554	549
33	5/8	151.0	44.80	6.44	552	549	546	543	539	535	531	526	521
33	9/16	142.5	42.30	6.48	521	519	516	513	509	505	501	497	492
33	1/2	134.0	39.80	6.52	491	489	485	482	479	476	472	468	463
33	7/16	125.5	37.30	6.57	460	458	456	453	450	447	442	438	434
33	3/8	117.0	34.80	6.59	429	427	425	423	420	417	414	410	406

SAFE LOADS IN THOUSANDS OF POUNDS FOR 15″ CHANNEL AND PLATE COLUMNS.
SQUARE ENDS.



Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.
Safety factor 4.

Length in feet												Thickness of plates	Weight of each channel
30	32	34	36	38	40	42	44	46	48	50	52	In.	Lbs. per foot
716	706	698	690	681	673	664	652	643	633	624	614	¾	55
687	680	670	662	654	646	637	628	620	608	599	590	11/16	55
659	652	645	637	627	619	611	602	594	585	577	565	⅝	55
630	623	616	607	599	592	584	576	568	560	552	540	9/16	55
599	593	586	579	570	562	555	547	540	532	521	513	½	55
569	562	556	549	542	533	525	519	511	501	494	486	7/16	55
540	532	526	520	511	504	497	490	481	474	466	457	⅜	55
682	675	665	657	649	641	632	623	615	603	594	585	¾	50
654	647	640	630	622	614	606	598	589	581	572	561	11/16	50
625	618	612	604	597	590	579	571	563	555	547	539	⅝	50
596	590	583	577	570	563	555	548	538	530	522	514	9/16	50
568	562	555	547	540	533	526	519	512	504	497	487	½	50
537	531	525	519	510	504	497	493	483	476	467	460	7/16	50
507	501	495	489	481	475	469	462	453	447	440	433	⅜	50
649	642	635	625	617	609	601	593	585	576	568	556	¾	45
620	613	607	600	592	582	575	567	559	551	543	535	11/16	45
591	585	578	572	565	558	550	540	533	525	518	510	⅝	45
563	557	550	544	537	531	524	517	509	502	492	485	9/16	45
536	530	524	516	510	504	497	490	483	477	470	463	½	45
505	500	494	488	483	474	468	462	455	449	442	435	7/16	45
475	470	464	459	451	445	440	433	427	421	413	407	⅜	45
615	608	601	592	585	577	570	562	554	546	538	527	¾	40
586	580	573	567	560	553	543	536	528	521	513	505	11/16	40
557	551	545	539	532	526	519	512	502	495	488	480	⅝	40
530	525	517	511	505	499	492	485	479	472	465	458	9/16	40
502	496	491	485	480	471	465	459	453	446	440	433	½	40
473	468	463	457	452	446	439	433	427	421	414	408	7/16	40
442	438	433	428	423	417	410	404	399	393	387	381	⅜	40
581	575	568	562	553	546	538	531	524	516	509	498	¾	35
552	546	540	534	528	521	512	505	498	491	483	476	11/16	35
523	518	512	506	500	494	487	481	474	465	458	451	⅝	35
496	491	486	478	473	467	461	454	448	442	435	429	9/16	35
468	463	458	452	447	442	436	430	422	416	410	404	½	35
439	434	430	425	420	414	409	404	398	392	387	381	7/16	35
410	406	401	397	392	387	382	377	372	367	361	356	⅜	35
572	566	560	553	544	537	530	523	516	508	501	491	¾	33
543	538	532	525	519	512	504	497	490	483	476	468	11/16	33
515	509	503	498	492	485	479	473	466	457	450	444	⅝	33
487	482	477	470	464	458	452	446	440	434	427	421	9/16	33
459	454	449	444	439	433	427	422	414	408	402	396	½	33
430	425	421	416	411	406	401	395	390	384	379	373	7/16	33
401	397	393	388	383	379	374	369	364	359	353	348	⅜	33

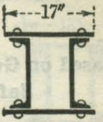
SAFE LOADS IN THOUSANDS OF POUNDS FOR 15″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P=\dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet								
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	12	14	16	18	20	22	24	26	28
55	3/4	196.7	57.86	5.14	708	703	696	689	682	673	665	655	648
55	11/16	189.4	55.74	5.15	682	677	671	664	657	649	640	633	624
55	5/8	182.2	53.61	5.16	656	651	645	639	632	624	616	609	600
55	9/16	175.0	51.48	5.17	630	625	620	613	607	599	593	585	576
55	1/2	167.8	49.36	5.18	604	600	594	588	582	576	569	561	553
55	7/16	160.6	47.24	5.19	578	574	569	563	557	552	544	537	529
55	3/8	153.4	45.11	5.21	552	548	543	538	533	527	520	513	505
50	3/4	186.7	54.92	5.18	672	667	661	654	647	641	633	624	615
50	11/16	179.4	52.80	5.19	646	641	636	629	622	616	608	600	591
50	5/8	172.2	50.67	5.20	620	615	610	604	599	592	584	576	567
50	9/16	165.0	48.54	5.21	594	590	584	578	574	567	559	552	543
50	1/2	157.8	46.42	5.23	568	564	559	555	549	542	535	528	520
50	7/16	150.6	44.30	5.24	542	538	533	529	524	517	511	503	498
50	3/8	143.4	42.17	5.26	516	512	509	504	498	492	486	481	474
45	3/4	176.7	51.98	5.21	636	631	626	619	614	607	599	591	582
45	11/16	169.4	49.86	5.23	610	606	600	596	589	582	575	567	558
45	5/8	162.2	47.73	5.24	584	580	575	570	564	557	550	542	536
45	9/16	155.0	45.60	5.25	558	554	550	545	539	532	525	518	512
45	1/2	147.8	43.48	5.27	532	528	525	519	514	508	501	496	489
45	7/16	140.6	41.36	5.29	506	503	499	494	489	483	478	472	465
45	3/8	133.4	39.23	5.31	480	477	473	469	464	459	454	447	441
40	3/4	166.7	49.02	5.24	600	595	590	586	579	572	565	557	551
40	11/16	159.4	46.90	5.26	574	570	566	560	554	548	540	535	527
40	5/8	152.2	44.77	5.27	548	544	540	535	529	523	516	511	503
40	9/16	145.0	42.64	5.29	522	519	514	509	504	498	493	486	479
40	1/2	137.8	40.52	5.31	496	493	489	484	479	475	469	462	455
40	7/16	130.6	38.40	5.33	470	467	463	459	454	450	444	438	432
40	3/8	123.4	36.27	5.35	445	441	438	433	430	425	419	414	409
35	3/4	156.7	46.08	5.27	564	560	566	551	545	538	531	525	518
35	11/16	149.4	43.96	5.28	538	534	530	525	520	513	508	501	494
35	5/8	142.2	41.83	5.30	512	509	505	500	494	488	484	477	470
35	9/16	135.0	39.70	5.32	486	483	479	474	469	465	459	453	446
35	1/2	127.8	37.58	5.35	461	457	453	449	445	440	435	429	424
35	7/16	120.6	35.46	5.37	435	432	428	424	420	415	410	406	400
35	3/8	113.4	33.33	5.40	409	406	402	399	395	390	387	381	376
33	3/4	152.7	45.30	5.24	555	550	545	541	535	529	522	515	509
33	11/16	145.4	43.18	5.29	529	526	521	516	510	504	499	492	485
33	5/8	138.2	41.05	5.31	502	500	495	490	485	481	475	468	461
33	9/16	131.0	38.92	5.33	476	474	470	465	460	456	450	444	437
33	1/2	123.8	36.80	5.36	451	448	444	440	436	431	426	420	415
33	7/16	116.6	34.68	5.38	425	422	418	415	411	406	401	397	391
33	3/8	109.4	32.55	5.41	399	396	393	390	386	381	378	373	367

SAFE LOADS IN THOUSANDS OF POUNDS FOR 15″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.



Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Length in feet												Thickness of plates	Weight of each channel
30	32	34	36	38	40	42	44	46	48	50	52	Inch	Lbs. per foot
638	627	616	605	593	582	570	558	549	537	525	514	3/4	55
614	604	593	582	572	560	549	541	529	518	506	495	11/16	55
591	581	571	560	550	539	531	520	509	498	487	476	5/8	55
567	558	548	538	528	520	510	499	489	478	468	457	9/16	55
544	535	525	516	509	499	489	479	469	458	448	441	1/2	55
520	512	503	496	487	477	468	458	448	441	431	422	7/16	55
497	491	482	474	465	456	447	440	431	421	412	403	3/8	55
605	595	585	574	566	555	544	533	521	510	499	490	3/4	50
582	572	562	554	544	533	523	512	501	493	482	471	11/16	50
558	549	542	532	522	512	502	491	484	473	463	452	5/8	50
535	528	519	510	500	490	481	473	463	453	443	433	9/16	50
513	505	496	487	478	471	462	453	443	433	424	417	1/2	50
490	482	474	465	456	450	441	432	423	414	407	398	7/16	50
466	459	451	445	437	428	420	411	405	396	387	379	3/8	50
573	566	556	546	536	525	515	507	496	485	475	464	3/4	45
552	542	533	523	514	506	496	486	476	465	455	448	11/16	45
528	519	510	501	492	485	475	465	456	446	438	429	5/8	45
504	496	488	479	472	463	454	445	435	428	419	409	9/16	45
481	473	465	459	450	441	433	426	417	408	399	390	1/2	45
458	452	444	436	428	420	414	405	397	388	380	374	7/16	45
436	429	421	414	406	400	392	384	376	370	362	354	3/8	45
542	533	524	515	505	498	488	478	468	458	450	440	3/4	40
519	510	502	495	486	476	467	457	450	440	431	421	11/16	40
495	487	479	472	464	455	446	439	430	420	411	402	5/8	40
472	466	458	450	441	433	427	418	409	400	392	385	9/16	40
450	443	435	427	420	413	405	397	389	383	374	366	1/2	40
427	420	412	405	399	392	384	376	370	363	355	347	7/16	40
403	396	390	384	377	370	363	357	350	342	337	329	3/8	40
510	501	493	486	477	468	459	452	442	433	423	414	3/4	35
486	478	472	464	455	446	437	431	422	413	404	397	11/16	35
463	457	449	441	433	427	418	410	401	393	386	378	5/8	35
441	434	426	419	413	405	397	389	383	375	367	359	9/16	35
417	411	404	398	391	383	376	370	362	355	349	341	1/2	35
394	387	383	376	369	364	357	349	342	337	329	322	7/16	35
370	366	360	353	348	342	335	330	323	316	310	304	3/8	35
501	493	484	476	467	460	451	442	432	423	416	407	3/4	33
478	472	464	456	447	438	432	423	414	405	397	390	11/16	33
456	449	441	433	425	419	411	402	394	388	379	371	5/8	33
432	425	418	411	405	397	389	381	375	367	359	351	9/16	33
409	402	397	390	383	376	370	362	355	347	342	334	1/2	33
385	381	374	368	361	356	349	342	335	329	322	315	7/16	33
363	357	351	345	340	334	327	322	316	309	304	297	3/8	33

SAFE LOADS IN THOUSANDS OF POUNDS FOR 12″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet								
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	8	10	12	14	16	18	20	22	24
40	5/8	148.0	43.52	4.91	538	535	532	526	521	516	510	503	496
40	9/16	141.2	41.52	4.92	514	511	507	503	497	492	486	480	473
40	1/2	134.4	39.52	4.94	489	486	483	479	474	470	464	457	451
40	7/16	127.6	37.52	4.95	464	462	458	455	451	446	441	435	429
40	3/8	120.8	35.52	4.90	439	437	434	430	425	421	416	411	405
40	5/16	114.0	33.52	4.80	414	412	409	405	402	396	391	386	381
40	1/4	107.2	31.52	4.69	389	387	384	380	377	373	367	362	357
35	5/8	138.0	40.58	4.94	502	499	496	492	487	482	477	469	463
35	9/16	131.2	38.58	4.95	477	475	471	468	463	458	453	448	442
35	1/2	124.4	36.58	4.97	453	450	447	443	439	435	430	424	419
35	7/16	117.6	34.58	4.99	428	425	422	419	415	411	406	401	396
35	3/8	110.8	32.58	5.01	403	401	398	395	391	387	383	378	373
35	5/16	104.0	30.58	4.91	378	376	374	370	366	362	358	354	349
35	1/4	97.2	28.58	4.80	353	351	349	346	342	338	334	329	325
30	5/8	128.0	37.64	4.98	466	463	460	456	452	447	442	437	431
30	9/16	121.2	35.64	4.99	441	438	435	432	428	424	419	413	408
30	1/2	114.4	33.64	5.02	416	414	411	408	404	400	395	390	385
30	7/16	107.6	31.64	5.04	391	389	387	383	380	376	373	367	362
30	3/8	100.8	29.64	5.07	367	365	362	359	356	352	349	345	340
30	5/16	94.0	27.64	5.04	342	340	338	335	332	328	326	321	316
30	1/4	87.2	25.64	4.93	317	315	313	311	308	304	300	296	292
25	5/8	118.0	34.70	5.00	429	427	424	421	417	412	408	403	397
25	9/16	111.2	32.70	5.02	405	402	400	396	393	389	384	379	374
25	1/2	104.4	30.70	5.05	380	378	375	372	369	365	361	356	351
25	7/16	97.6	28.70	5.07	355	353	351	348	345	341	338	334	330
25	3/8	90.8	26.70	5.11	330	328	326	324	321	318	315	311	307
25	5/16	84.0	24.70	5.14	306	304	302	300	297	294	291	287	284
25	1/4	77.2	22.70	5.09	281	279	277	275	273	270	267	264	261
20.5	5/8	109.0	32.06	5.01	397	394	392	389	385	381	377	372	367
20.5	9/16	102.2	30.06	5.04	372	370	367	364	361	357	354	349	344
20.5	1/2	95.4	28.06	5.07	347	345	343	340	337	333	331	327	322
20.5	7/16	88.6	26.06	5.10	322	321	318	317	314	311	307	303	299
20.5	3/8	81.8	24.06	5.14	298	296	295	292	290	287	283	280	276
20.5	5/16	75.0	22.06	5.18	273	272	270	268	266	263	260	258	254
20.5	1/4	68.2	20.06	5.23	248	247	246	244	241	240	237	234	231

SAFE LOADS IN THOUSANDS OF POUNDS FOR 12″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Length in feet: 26	28	30	32	34	36	38	40	42	44	46	48	Thickness of plates, Inch	Weight of each channel, Lbs. per foot
489	481	473	465	457	448	440	431	420	411	402	393	5/8	40
466	459	452	444	436	428	420	411	403	394	386	375	9/16	40
444	437	430	423	415	407	399	391	383	375	367	359	1/2	40
422	415	408	401	394	387	379	372	364	356	348	341	7/16	40
399	393	386	380	373	366	357	350	343	335	328	321	3/8	40
375	369	363	355	349	342	335	328	320	313	306	299	5/16	40
351	344	339	333	326	318	312	306	298	291	285	278	1/4	40
456	449	442	434	426	418	410	402	394	385	377	369	5/8	35
434	427	420	413	405	398	390	382	374	366	358	350	9/16	35
413	406	400	393	386	379	371	364	355	347	340	332	1/2	35
390	384	378	371	365	358	351	344	337	330	323	316	7/16	35
368	362	356	350	344	337	331	324	318	311	304	298	3/8	35
344	338	333	327	321	315	309	303	295	289	282	276	5/16	35
320	315	310	303	297	292	286	280	273	267	261	255	1/4	35
425	418	411	404	397	390	382	375	367	359	351	344	5/8	30
402	396	389	383	376	369	362	355	347	340	333	326	9/16	30
379	374	368	361	355	348	342	335	328	321	314	307	1/2	30
357	351	346	341	335	329	323	316	310	304	297	291	7/16	30
336	330	325	320	314	308	302	296	290	284	278	272	3/8	30
312	307	302	298	293	287	282	276	271	265	260	254	5/16	30
288	284	279	274	269	264	259	254	249	243	238	233	1/4	30
391	385	379	373	366	359	352	345	338	331	324	317	5/8	25
369	363	357	351	345	339	332	325	319	312	305	299	9/16	25
348	342	337	331	325	319	313	307	301	295	288	282	1/2	25
325	320	315	310	304	299	293	287	281	275	269	264	7/16	25
302	298	293	288	283	279	274	268	263	258	252	247	3/8	25
280	276	272	268	263	258	253	248	243	238	234	229	5/16	25
257	253	249	245	241	236	232	227	222	219	214	210	1/4	25
362	356	350	344	338	332	326	319	313	306	299	293	5/8	20.5
339	334	328	324	319	313	307	301	295	288	282	276	9/16	20.5
318	313	308	303	297	292	286	281	275	269	263	258	1/2	20.5
295	291	286	281	276	271	266	262	257	251	246	241	7/16	20.5
272	269	265	261	256	251	247	242	237	232	228	223	3/8	20.5
251	247	243	239	235	231	227	223	218	214	209	205	5/16	20.5
228	225	222	218	215	211	207	204	200	196	191	187	1/4	20.5

SAFE LOADS IN THOUSANDS OF POUNDS FOR 12″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet							
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	8	10	12	14	16	18	20	22
40	5/8	139.5	41.02	4.11	505	501	496	490	483	476	468	459
40	9/16	133.6	39.27	4.11	484	480	475	469	463	456	448	440
40	1/2	127.6	37.52	4.11	462	458	454	448	442	435	428	420
40	7/16	121.7	35.77	4.12	441	437	433	427	421	415	408	402
40	3/8	115.7	34.02	4.12	419	416	411	406	401	359	388	382
40	5/16	109.8	32.27	4.12	398	394	390	386	380	374	368	363
40	1/4	103.8	30.52	4.13	376	373	369	365	360	354	349	343
35	5/8	129.5	38.08	4.15	469	465	461	455	449	443	436	428
35	9/16	123.6	36.33	4.16	448	444	439	434	429	423	416	408
35	1/2	117.6	34.58	4.16	426	422	418	413	409	402	396	389
35	7/16	111.7	32.83	4.17	405	401	397	392	388	382	376	369
35	3/8	105.7	31.08	4.18	383	380	376	372	367	362	356	349
35	5/16	99.8	29.33	4.18	361	358	355	351	347	341	336	330
35	1/4	93.8	27.58	4.19	340	337	334	330	326	321	316	310
30	5/8	119.5	35.14	4.21	433	429	425	421	415	409	402	396
30	9/16	113.6	33.39	4.21	411	408	404	400	395	389	382	377
30	1/2	107.6	31.64	4.22	390	387	383	379	374	368	363	357
30	7/16	101.7	29.89	4.23	368	365	362	358	353	348	343	337
30	3/8	95.7	28.14	4.25	347	344	341	337	333	329	323	317
30	5/16	89.8	26.39	4.26	325	323	320	316	312	308	303	298
30	1/4	83.8	24.64	4.27	304	302	299	295	292	288	283	278
25	5/8	109.5	32.20	4.25	397	393	390	386	381	376	370	363
25	9/16	103.6	30.45	4.26	375	373	369	365	360	356	350	343
25	1/2	97.6	28.70	4.27	354	351	348	344	340	335	330	324
25	7/16	91.7	26.95	4.29	332	330	327	323	319	315	310	305
25	3/8	85.7	25.20	4.31	311	308	305	303	299	294	290	285
25	5/16	79.8	23.45	4.32	289	287	284	282	278	274	270	266
25	1/4	73.8	21.70	4.35	268	266	263	261	257	254	250	246
20.5	5/8	100.5	29.56	4.28	364	362	358	354	350	345	339	335
20.5	9/16	94.6	27.81	4.30	343	340	337	333	330	325	319	315
20.5	1/2	88.6	26.06	4.32	321	319	316	313	309	304	300	295
20.5	7/16	82.7	24.31	4.34	300	298	295	292	288	285	280	275
20.5	3/8	76.7	22.56	4.36	278	276	273	271	267	264	260	256
20.5	5/16	70.8	20.81	4.38	257	255	253	250	247	244	240	236
20.5	1/4	64.8	19.06	4.41	235	233	232	229	227	223	220	217

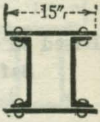
SAFE LOADS IN THOUSANDS OF POUNDS FOR 12″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.

Length in feet											Thickness of plates	Weight of each channel
24	26	28	30	32	34	36	38	40	42	44	In.	Lbs. per foot
452	442	433	423	412	402	391	383	373	362	352	5/8	40
433	424	412	405	395	385	375	367	357	347	337	9/16	40
413	405	396	387	377	368	358	350	341	331	322	1/2	40
394	386	377	369	360	351	343	334	325	316	307	7/16	40
375	367	359	351	342	333	326	318	309	300	292	3/8	40
356	348	340	333	324	316	310	301	293	285	277	5/16	40
336	329	322	314	308	301	293	285	277	269	262	1/4	40
420	411	404	394	385	375	365	356	348	338	328	5/8	35
400	394	385	376	367	358	349	341	332	323	313	9/16	35
381	375	366	358	349	341	332	325	316	307	298	1/2	35
362	356	348	340	332	323	317	308	300	291	283	7/16	35
344	337	329	322	314	308	300	292	284	277	270	3/8	35
324	318	311	304	296	290	283	275	268	262	254	5/16	35
305	299	292	286	280	273	266	259	253	246	239	1/4	35
389	381	372	365	357	348	339	332	323	314	305	5/8	30
369	362	354	347	339	331	322	315	307	298	290	9/16	30
350	343	337	329	321	313	307	299	291	282	276	1/2	30
331	325	318	311	304	297	290	282	275	268	261	7/16	30
313	306	300	293	287	280	273	267	260	253	246	3/8	30
293	287	281	276	269	263	256	250	244	237	232	5/16	30
274	268	262	257	251	245	240	234	228	223	216	1/4	30
358	350	343	335	326	320	312	306	297	289	281	5/8	25
338	331	324	318	311	303	295	289	281	273	267	9/16	25
319	312	306	300	293	286	280	272	265	259	252	1/2	25
299	293	288	282	275	270	263	256	250	243	237	7/16	25
280	275	269	263	258	252	246	241	234	229	222	3/8	25
260	256	251	246	240	235	230	224	218	213	207	5/16	25
242	237	233	228	223	218	213	208	203	197	193	1/4	25
328	322	316	309	302	296	288	281	274	267	259	5/8	20.5
309	304	297	291	285	278	271	265	258	251	245	9/16	20.5
289	285	279	274	267	261	255	249	242	237	230	1/2	20.5
271	266	260	255	249	244	238	232	227	223	216	7/16	20.5
252	246	242	237	232	227	221	216	211	206	200	3/8	20.5
232	228	223	220	214	209	205	200	195	190	186	5/16	20.5
213	209	206	201	196	193	188	184	179	175	170	1/4	20.5

SAFE LOADS IN THOUSANDS OF POUNDS FOR 10″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.



Based on Gordon's Formula, $P=\dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet								
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	8	10	12	14	16	18	20	22	24
35	5/8	133.8	39.33	4.40	485	481	478	472	467	461	455	447	439
35	9/16	127.4	37.46	4.33	462	459	454	450	444	437	432	424	418
35	1/2	121.0	35.58	4.26	438	436	431	426	420	415	409	401	395
35	7/16	114.6	33.71	4.18	415	412	408	404	398	392	386	379	373
35	3/8	108.3	31.83	4.10	392	389	385	380	375	369	363	356	349
35	5/16	101.9	29.96	4.00	369	365	361	357	352	346	340	334	327
35	1/4	95.5	28.08	3.90	345	342	338	334	329	324	318	312	304
30	5/8	123.8	36.39	4.50	449	446	442	438	432	428	422	415	409
30	9/16	117.4	34.52	4.43	426	423	419	415	410	404	399	392	386
30	1/2	111.0	32.64	4.36	403	400	396	392	387	382	376	371	364
30	7/16	104.6	30.77	4.28	379	377	373	369	365	359	353	348	342
30	3/8	98.3	28.89	4.20	356	353	349	346	341	336	331	326	320
30	5/16	91.9	27.02	4.11	333	330	327	323	318	313	308	302	298
30	1/4	85.5	25.14	4.01	309	307	303	300	295	291	286	280	275
25	5/8	113.8	33.45	4.58	413	410	407	403	399	394	388	383	377
25	9/16	107.4	31.58	4.55	390	387	384	380	376	371	366	361	355
25	1/2	101.0	29.70	4.48	367	364	361	357	353	349	343	339	332
25	7/16	94.6	27.83	4.40	343	341	338	334	331	326	322	316	310
25	3/8	88.3	25.95	4.32	320	318	315	312	308	303	299	294	288
25	5/16	81.9	24.08	4.23	297	294	292	288	285	280	277	272	266
25	1/4	75.5	22.20	4.13	274	271	268	265	262	258	254	249	245
20	5/8	103.8	30.51	4.61	377	374	371	368	364	359	355	349	344
20	9/16	97.4	28.64	4.63	354	351	349	346	341	337	333	328	323
20	1/2	91.0	26.76	4.62	331	328	326	323	319	315	311	306	302
20	7/16	84.6	24.89	4.55	307	305	303	300	297	292	289	285	280
20	3/8	78.3	23.01	4.47	284	282	279	277	273	270	266	262	258
20	5/16	71.9	21.14	4.39	261	259	257	254	251	248	244	240	236
20	1/4	65.5	19.26	4.29	237	236	233	231	228	225	221	218	214
15	5/8	93.8	27.67	4.63	342	339	337	334	330	326	322	317	312
15	9/16	87.4	25.80	4.65	319	316	314	311	308	304	300	296	291
15	1/2	81.0	23.92	4.67	296	294	291	289	286	282	278	275	271
15	7/16	74.6	22.05	4.70	272	271	268	266	263	261	257	253	250
15	3/8	68.3	20.17	4.65	249	247	245	243	241	238	235	232	228
15	5/16	61.9	18.30	4.58	226	224	223	220	218	216	212	209	206
15	1/4	55.5	16.42	4.49	203	201	199	198	195	193	190	187	185

SAFE LOADS IN THOUSANDS OF POUNDS FOR 10″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Length in feet												Thickness of plates	Weight of each channel
26	28	30	32	34	36	38	40	42	44	46	48	Inch	Lbs. per foot
432	422	415	405	397	387	379	369	361	351	341	333	5/8	35
409	401	393	384	375	367	358	350	340	331	323	314	9/16	35
387	379	372	363	354	345	338	329	320	312	303	294	1/2	35
365	357	349	340	334	325	317	309	301	292	284	276	7/16	35
343	336	328	320	312	304	296	287	281	273	265	257	3/8	35
320	313	306	298	291	283	275	267	260	252	245	238	5/16	35
298	291	284	277	269	262	255	248	239	232	225	219	1/4	35
401	394	386	378	370	362	355	345	338	329	321	312	5/8	30
379	372	364	357	349	342	333	326	317	310	301	294	9/16	30
357	351	342	336	328	320	313	305	298	290	282	275	1/2	30
335	329	322	314	308	300	292	286	278	270	264	256	7/16	30
313	306	300	293	286	279	273	265	258	251	243	238	3/8	30
291	285	278	272	265	258	252	245	239	232	225	218	5/16	30
269	263	257	250	244	237	231	224	218	212	205	199	1/4	30
370	364	356	350	343	335	328	321	312	305	299	290	5/8	25
349	342	336	330	322	316	308	301	295	287	280	274	9/16	25
327	322	315	309	302	296	288	282	274	268	261	255	1/2	25
305	299	294	287	281	274	268	261	256	248	241	236	7/16	25
284	277	272	266	260	254	248	241	236	229	223	217	3/8	25
262	256	250	245	240	234	227	221	216	210	204	190	5/16	25
239	234	229	224	219	213	207	202	196	190	186	180	1/4	25
339	332	326	320	313	307	301	293	286	280	272	266	5/8	20
318	313	306	301	295	288	282	276	269	263	257	250	9/16	20
297	291	286	281	274	269	264	257	251	246	239	233	1/2	20
275	270	265	260	254	249	243	238	232	226	221	216	7/16	20
254	248	244	238	232	228	223	218	213	208	202	197	3/8	20
232	227	223	218	214	208	203	198	193	189	183	179	5/16	20
210	206	201	197	193	188	183	179	174	169	165	160	1/4	20
307	302	296	291	285	278	273	267	260	254	248	241	5/8	15
287	282	276	271	266	261	254	249	244	237	232	226	9/16	15
266	261	257	251	246	242	237	231	226	221	215	210	1/2	15
246	241	237	233	228	223	218	214	209	204	199	195	7/16	15
224	220	216	212	208	204	199	195	190	185	181	177	3/8	15
202	199	195	191	188	183	179	176	171	167	163	159	5/16	15
181	178	174	171	167	163	159	156	152	148	145	141	1/4	15

SAFE LOADS IN THOUSANDS OF POUNDS FOR 10″ CHANNEL AND PLATE COLUMNS.

SQUARE ENDS.

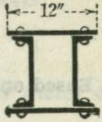
Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet					
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	6	8	10	12	14	16
35	5/8	121.0	35.58	3.31	439	435	429	423	415	407
35	9/16	115.9	34.08	3.30	421	416	411	405	398	390
35	1/2	110.8	32.58	3.29	402	398	393	387	379	372
35	7/16	105.7	31.08	3.29	384	380	375	369	362	354
35	3/8	100.6	29.58	3.28	365	361	357	351	344	337
35	5/16	95.5	28.08	3.27	347	343	338	333	327	320
35	1/4	90.4	26.58	3.26	328	324	320	315	309	303
30	5/8	111.0	32.64	3.37	403	399	394	388	381	375
30	9/16	105.9	31.14	3.37	384	380	376	370	364	358
30	1/2	100.8	29.64	3.36	366	362	358	352	346	339
30	7/16	95.7	28.14	3.36	347	344	340	334	329	322
30	3/8	90.6	26.64	3.35	329	325	321	317	311	305
30	5/16	85.5	25.14	3.34	310	307	303	299	294	288
30	1/4	80.4	23.64	3.33	292	289	285	281	276	271
25	5/8	101.0	29.70	3.44	367	364	359	355	348	341
25	9/16	95.9	28.20	3.44	348	345	341	336	330	324
25	1/2	90.8	26.70	3.43	330	327	323	318	313	307
25	7/16	85.7	25.20	3.43	311	308	305	300	295	289
25	3/8	80.6	23.70	3.43	293	290	287	282	278	272
25	5/16	75.5	22.20	3.43	274	272	268	265	260	255
25	1/4	70.4	20.70	3.42	255	253	250	247	242	238
20	5/8	91.0	26.76	3.50	331	328	324	320	314	308
20	9/16	85.9	25.26	3.50	312	309	305	302	297	291
20	1/2	80.8	23.76	3.51	294	291	288	284	279	274
20	7/16	75.7	22.26	3.51	275	272	270	266	262	257
20	3/8	70.6	20.76	3.51	257	254	252	248	244	239
20	5/16	65.5	19.26	3.52	238	236	233	230	226	223
20	1/4	60.4	17.76	3.52	219	217	215	212	209	205
15	5/8	81.0	23.92	3.56	296	293	290	286	282	277
15	9/16	75.9	22.42	3.57	277	275	272	268	264	259
15	1/2	70.8	20.92	3.58	259	257	254	250	247	242
15	7/16	65.7	19.42	3.58	240	238	235	232	229	225
15	3/8	60.6	17.92	3.59	221	220	217	215	211	207
15	5/16	55.5	16.42	3.61	203	201	199	197	193	191
15	1/4	50.4	14.92	3.62	184	183	181	179	176	173

SAFE LOADS IN THOUSANDS OF POUNDS FOR 10″ CHANNEL AND PLATE COLUMNS.

SQUARE ENDS.



Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.
Safety factor 4.

Length in feet										Thickness of plates	Weight of each channel
18	20	22	24	26	28	30	32	34	36	Inch	Lbs. per foot
398	389	379	367	356	345	334	323	312	301	5/8	35
380	371	361	351	341	330	320	310	299	289	9/16	35
363	354	345	336	326	316	306	296	286	276	1/2	35
347	338	329	320	311	301	292	282	273	263	7/16	35
330	322	313	305	296	287	278	267	258	249	3/8	35
313	306	298	289	279	271	262	254	245	237	5/16	35
296	289	282	273	265	256	248	240	232	224	1/4	35
367	358	349	339	330	320	310	300	290	280	5/8	30
350	342	333	324	315	305	296	286	276	267	9/16	30
332	324	317	308	299	290	281	272	263	254	1/2	30
315	307	301	293	284	276	267	258	250	241	7/16	30
298	291	284	276	268	260	252	243	237	228	3/8	30
281	275	268	260	253	245	237	230	222	214	5/16	30
265	258	252	245	238	230	223	216	209	201	1/4	30
335	327	319	310	302	294	285	276	267	258	5/8	25
318	311	303	295	286	279	271	262	253	245	9/16	25
301	294	287	279	271	263	256	248	240	232	1/2	25
284	278	271	263	256	248	242	234	226	219	7/16	25
267	261	255	248	241	233	227	220	213	206	3/8	25
250	245	238	232	225	219	213	206	199	193	5/16	25
233	228	222	216	210	204	198	191	186	180	1/4	25
303	296	289	281	274	266	258	251	243	235	5/8	20
286	279	272	265	259	251	244	237	229	222	9/16	20
269	263	256	251	244	236	230	223	216	209	1/2	20
252	246	240	235	228	222	216	209	202	195	7/16	20
235	230	224	219	213	207	201	195	189	182	3/8	20
218	213	208	203	197	192	187	181	175	170	5/16	20
201	196	192	187	182	177	172	167	161	157	1/4	20
271	266	259	253	246	239	233	226	218	212	5/8	15
255	249	243	238	231	225	219	212	206	199	9/16	15
238	232	228	222	216	210	204	199	192	186	1/2	15
221	216	211	206	200	195	189	184	178	172	7/16	15
204	199	195	190	186	180	175	170	165	160	3/8	15
187	183	179	175	170	165	161	156	152	147	5/16	15
170	166	162	159	154	151	146	142	138	134	1/4	15

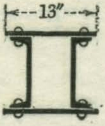
SAFE LOADS IN THOUSANDS OF POUNDS FOR 9″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$. **Safety factor 4.**

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet							
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	6	8	10	12	14	16	18	20
25.0	5/8	105.2	30.95	3.90	383	380	377	373	368	362	357	350
25.0	9/16	99.7	29.32	3.91	363	361	357	353	348	343	338	332
25.0	1/2	94.2	27.70	3.92	343	341	337	333	329	324	319	314
25.0	7/16	88.7	26.08	3.89	323	320	317	314	310	305	301	295
25.0	3/8	83.2	24.45	3.81	303	300	298	294	290	285	281	276
25.0	5/16	77.6	22.82	3.73	282	280	277	274	270	266	261	255
25.0	1/4	72.1	21.20	3.64	262	260	257	254	251	246	242	236
20.0	5/8	95.2	28.01	3.94	347	345	342	338	333	328	323	317
20.0	9/16	89.7	26.39	3.95	327	325	322	318	314	309	304	299
20.0	1/2	84.2	24.76	3.96	306	305	302	299	295	291	286	280
20.0	7/16	78.7	23.14	3.98	286	285	282	279	276	272	268	263
20.0	3/8	73.2	21.51	3.95	266	264	262	260	256	252	248	244
20.0	5/16	67.6	19.88	3.87	246	244	242	239	236	233	228	224
20.0	1/4	62.1	18.26	3.78	226	224	222	219	216	213	209	205
15.0	5/8	85.2	25.07	3.97	310	308	306	302	299	295	290	285
15.0	9/16	79.7	23.44	3.99	290	288	286	283	279	275	271	266
15.0	1/2	74.2	21.82	4.01	270	268	266	263	260	256	252	248
15.0	7/16	68.7	20.20	4.03	250	249	246	244	241	237	234	230
15.0	3/8	63.2	18.57	4.05	230	228	226	224	221	218	215	212
15.0	5/16	57.6	16.94	4.05	210	208	207	204	202	199	197	193
15.0	1/4	52.1	15.32	3.97	190	188	187	185	183	180	177	174
13.25	5/8	81.7	24.03	3.99	297	296	293	290	286	282	278	273
13.25	9/16	76.2	22.40	4.00	277	276	273	270	267	263	259	255
13.25	1/2	70.7	20.78	4.02	257	256	253	251	248	244	240	236
13.25	7/16	65.2	19.16	4.04	237	236	234	231	228	225	222	218
13.25	3/8	59.7	17.53	4.07	217	216	214	212	209	207	203	200
13.25	5/16	54.1	15.90	4.10	197	196	194	192	190	187	184	181
13.25	1/4	48.6	14.28	4.05	177	176	174	172	170	168	166	163

SAFE LOADS IN THOUSANDS OF POUNDS FOR 9″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$. **Safety factor 4.**



Length in feet											Thickness of plates	Weight of each channel
22	24	26	28	30	32	34	36	38	40	42	In.	Lbs. per foot
344	335	328	320	313	309	297	289	281	273	264	5/8	25.0
326	319	312	304	296	289	281	274	266	260	251	9/16	25.0
308	301	295	288	280	273	266	259	252	245	238	1/2	25.0
288	283	276	270	264	257	250	242	236	229	222	7/16	25.0
269	264	258	252	245	238	232	226	218	212	206	3/8	25.0
250	245	238	233	227	220	214	207	201	196	189	5/16	25.0
232	226	221	214	209	202	197	190	185	179	173	1/4	25.0
311	305	298	291	284	277	270	263	256	247	240	5/8	20.0
293	287	281	274	268	261	255	248	241	234	228	9/16	20.0
275	269	264	258	251	245	239	232	226	220	214	1/2	20.0
258	253	247	242	236	230	224	218	213	205	200	7/16	20.0
239	234	229	224	218	213	207	202	196	191	186	3/8	20.0
220	215	211	206	200	195	190	185	180	174	168	5/16	20.0
201	197	192	187	183	177	172	168	162	158	153	1/4	20.0
280	274	268	261	255	248	242	235	229	223	216	5/8	15.0
261	256	251	245	239	233	227	221	215	209	203	9/16	15.0
243	238	233	228	223	217	212	206	200	195	189	1/2	15.0
225	221	216	212	207	202	197	192	187	181	176	7/16	15.0
208	204	199	195	190	186	181	176	172	167	162	3/8	15.0
190	186	182	178	174	169	165	161	156	152	148	5/16	15.0
171	167	164	159	156	152	148	144	140	136	132	1/4	15.0
268	263	257	251	245	239	233	227	221	215	208	5/8	13.25
250	245	240	234	229	223	217	211	206	200	194	9/16	13.25
232	227	222	217	212	207	202	196	191	186	181	1/2	13.25
214	210	206	201	196	192	187	182	177	172	167	7/16	13.25
196	192	188	184	180	175	171	167	163	158	154	3/8	13.25
178	174	172	168	164	160	156	152	148	144	140	5/16	13.25
160	157	153	150	146	143	139	136	132	128	125	1/4	13.25

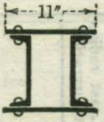
SAFE LOADS IN THOUSANDS OF POUNDS FOR 9″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$. **Safety factor 4.**

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet					
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	6	8	10	12	14	16
25	5/8	96.8	28.45	3.12	351	346	342	336	329	322
25	9/16	92.0	27.08	3.12	334	330	325	320	313	307
25	1/2	87.4	25.70	3.12	317	313	309	304	297	291
25	7/16	82.7	24.32	3.12	300	296	292	287	281	275
25	3/8	78.1	22.95	3.11	283	279	276	270	265	260
25	5/16	73.4	21.58	3.11	266	263	259	254	250	244
25	1/4	68.7	20.20	3.10	249	246	243	238	234	228
20	5/8	86.8	25.51	3.18	314	311	307	301	296	290
20	9/16	82.0	24.14	3.19	297	294	291	285	280	274
20	1/2	77.4	22.76	3.19	280	278	274	269	264	259
20	7/16	72.7	21.38	3.19	263	261	257	253	248	243
20	3/8	68.1	20.01	3.19	247	244	241	236	232	227
20	5/16	63.4	18.64	3.19	230	227	224	220	216	212
20	1/4	58.7	17.26	3.19	213	210	208	204	200	196
15	5/8	76.8	22.57	3.25	279	275	272	267	263	257
15	9/16	72.0	21.20	3.26	262	259	255	251	247	242
15	1/2	67.4	19.82	3.26	245	242	239	235	231	226
15	7/16	62.7	18.44	3.27	228	225	222	219	215	210
15	3/8	58.1	17.07	3.28	211	209	206	202	199	195
15	5/16	53.4	15.70	3.28	194	192	189	186	183	179
15	1/4	48.7	14.32	3.29	177	175	173	170	167	163
13.25	5/8	73.3	21.53	3.28	266	263	260	255	251	246
13.25	9/16	68.5	20.16	3.28	249	246	243	239	235	230
13.25	1/2	63.9	18.78	3.29	232	229	227	223	219	214
13.25	7/16	59.2	17.40	3.30	215	213	210	207	203	199
13.25	3/8	54.6	16.03	3.31	198	196	193	191	187	183
13.25	5/16	49.9	14.66	3.32	181	179	177	174	171	168
13.25	1/4	45.2	13.28	3.34	164	162	160	158	155	152

SAFE LOADS IN THOUSANDS OF POUNDS FOR 9″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$. **Safety factor 4.**



Length in feet									Thickness of plates	Weight of each channel
18	20	22	24	26	28	30	32	34	Inch	Lbs. per foot
313	306	296	287	279	269	260	250	241	5/8	25
298	291	282	274	265	256	247	238	229	9/16	25
283	276	267	260	252	243	235	226	218	1/2	25
268	261	253	246	238	230	222	213	206	7/16	25
253	246	239	232	224	217	210	201	194	3/8	25
238	232	224	218	210	204	197	189	183	5/16	25
223	216	210	204	197	191	183	177	170	1/4	25
282	275	268	260	251	243	236	226	219	5/8	20
268	260	253	246	238	230	223	216	207	9/16	20
253	246	239	232	224	217	210	203	195	1/2	20
237	231	224	218	211	204	197	191	183	7/16	20
222	216	210	204	197	191	185	179	172	3/8	20
207	201	196	190	184	178	172	166	160	5/16	20
192	186	181	176	170	165	159	154	148	1/4	20
252	245	238	231	225	218	211	204	196	5/8	15
236	231	225	217	211	204	197	191	183	9/16	15
221	216	210	203	197	191	185	179	173	1/2	15
206	201	195	190	184	178	172	167	161	7/16	15
190	186	181	176	171	166	160	154	149	3/8	15
175	171	166	162	157	152	147	142	137	5/16	15
160	156	152	148	143	139	134	130	126	1/4	15
240	234	228	222	215	209	202	194	188	5/8	13.25
225	219	214	208	202	195	189	182	176	9/16	13.25
209	204	199	194	188	182	176	171	165	1/2	13.25
194	189	184	179	174	169	163	158	153	7/16	13.25
179	175	171	165	160	155	150	146	141	3/8	13.25
164	160	156	152	147	143	138	134	129	5/16	13.25
149	145	141	137	134	129	125	121	117	1/4	13.25

SAFE LOADS IN THOUSANDS OF POUNDS FOR 8″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.
Safety factor 4.

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet						
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	6	8	10	12	14	16	18
21.25	5/8	93.5	27.50	3.57	340	337	333	329	324	318	313
21.25	9/16	88.4	26.00	3.57	321	319	315	311	306	301	295
21.25	1/2	83.3	24.50	3.57	303	300	297	293	289	283	278
21.25	7/16	78.2	23.00	3.51	284	282	279	275	270	265	260
21.25	3/8	73.1	21.50	3.43	266	263	260	256	252	247	243
21.25	5/16	68.0	20.00	3.36	247	244	241	238	234	229	224
21.25	1/4	62.9	18.50	3.27	228	226	223	219	215	211	206
18.75	5/8	88.5	26.02	3.59	322	319	315	312	307	301	296
18.75	9/16	88.4	24.52	3.60	303	301	297	294	289	284	279
18.75	1/2	78.3	23.02	3.61	284	282	279	276	271	267	262
18.75	7/16	73.2	21.52	3.57	266	264	261	257	254	249	245
18.75	3/8	68.1	20.02	3.50	247	245	242	239	235	231	227
18.75	5/16	63.0	18.52	3.42	229	227	224	221	217	213	208
18.75	1/4	57.9	17.02	3.34	210	208	205	202	199	195	191
16.25	5/8	83.5	24.56	3.61	303	301	298	294	289	285	279
16.25	9/16	78.4	23.06	3.62	285	283	279	276	272	268	262
16.25	1/2	73.3	21.56	3.63	266	264	261	258	254	250	245
16.25	7/16	68.2	20.06	3.64	248	246	244	240	237	233	229
16.25	3/8	63.1	18.56	3.58	229	228	225	222	219	215	211
16.25	5/16	58.0	17.06	3.50	211	209	206	204	200	197	193
16.25	1/4	52.9	15.56	3.42	192	190	188	185	182	179	175
13.75	5/8	78.5	23.08	3.63	285	283	280	276	272	268	262
13.75	9/16	73.4	21.58	3.64	267	265	262	258	255	250	246
13.75	1/2	68.3	20.08	3.66	248	246	244	241	237	233	229
13.75	7/16	63.2	18.58	3.67	230	228	226	223	220	216	212
13.75	3/8	58.1	17.08	3.67	211	209	207	205	202	198	195
13.75	5/16	53.0	15.58	3.60	193	191	189	187	184	181	177
13.75	1/4	47.9	14.08	3.52	174	172	171	168	165	163	159
11.25	5/8	73.5	21.70	3.65	268	266	264	260	256	252	247
11.25	9/16	68.4	20.20	3.66	250	248	245	242	239	234	230
11.25	1/2	63.3	18.70	3.68	231	229	227	224	221	218	213
11.25	7/16	58.2	17.20	3.70	213	211	209	207	203	200	196
11.25	3/8	53.1	15.70	3.72	194	193	191	189	186	183	180
11.25	5/16	48.0	14.20	3.70	176	174	172	171	168	165	162
11.25	1/4	42.9	12.70	3.62	157	156	154	152	150	147	144

SAFE LOADS IN THOUSANDS OF POUNDS FOR 8″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

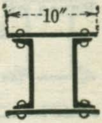
Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.
Safety factor 4.

Length in feet										Thickness of plates	Weight of each channel
20	22	24	26	28	30	32	34	36	38	Inch	Lbs. per foot
305	298	291	283	276	268	260	253	244	237	5/8	21.25
289	282	276	268	261	253	245	239	231	224	9/16	21.25
272	265	260	252	246	239	231	225	218	211	1/2	21.25
254	248	243	236	229	223	216	209	202	196	7/16	21.25
237	231	225	218	212	206	200	193	187	180	3/8	21.25
219	214	208	202	196	190	184	178	172	165	5/16	21.25
201	196	191	184	178	173	167	161	156	150	1/4	21.25
289	283	276	269	262	254	247	239	232	224	5/8	18.75
272	267	260	254	247	240	233	226	219	212	9/16	18.75
257	250	245	238	231	226	219	213	206	200	1/2	18.75
239	233	228	222	216	210	203	198	191	186	7/16	18.75
221	216	210	205	199	193	188	182	176	170	3/8	18.75
204	199	194	188	182	177	171	166	161	155	5/16	18.75
186	181	176	171	166	161	155	150	145	140	1/4	18.75
274	267	261	254	247	241	233	227	219	213	5/8	16.25
257	251	245	239	233	226	220	213	207	200	9/16	16.25
240	235	230	223	218	211	206	199	194	187	1/2	16.25
224	219	214	209	203	198	191	186	180	175	7/16	16.25
206	202	197	191	187	181	176	170	165	160	3/8	16.25
189	184	179	175	170	165	160	155	150	145	5/16	16.25
171	167	163	158	153	149	144	140	135	130	1/4	16.25
257	251	246	239	233	226	220	213	207	200	5/8	13.75
241	236	230	224	218	213	206	200	194	188	9/16	13.75
224	219	214	209	203	198	193	186	181	175	1/2	13.75
208	203	199	193	187	183	178	173	168	162	7/16	13.75
191	187	183	178	173	168	164	159	154	149	3/8	13.75
173	170	165	161	157	153	148	144	139	134	5/16	13.75
156	152	149	144	140	137	132	128	124	120	1/4	13.75
242	237	231	226	219	214	207	202	195	189	5/8	11.25
225	221	215	210	204	199	194	188	182	176	9/16	11.25
209	204	200	194	190	184	179	175	169	164	1/2	11.25
193	189	184	180	175	170	166	161	156	151	7/16	11.25
176	172	168	164	160	155	151	147	143	139	3/8	11.25
159	156	152	148	144	141	137	133	129	125	5/16	11.25
142	138	135	131	128	124	121	117	114	110	1/4	11.25

SAFE LOADS IN THOUSANDS OF POUNDS FOR 8" CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.



Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet				
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	4	6	8	10	12
21.25	5/8	85.0	25.00	2.80	310	307	302	297	291
21.25	9/16	80.8	23.75	2.79	295	291	287	282	276
21.25	1/2	76.5	22.50	2.79	279	276	272	267	262
21.25	7/16	72.3	21.25	2.78	264	261	257	253	247
21.25	3/8	68.0	20.00	2.77	248	245	242	238	233
21.25	5/16	63.7	18.75	2.77	233	230	227	223	218
21.25	1/4	59.5	17.50	2.76	217	215	212	208	204
18.75	5/8	80.0	23.52	2.83	292	289	285	280	275
18.75	9/16	75.8	22.27	2.83	276	274	270	265	260
18.75	1/2	71.5	21.02	2.83	261	258	255	250	245
18.75	7/16	67.3	19.77	2.82	245	243	240	236	230
18.75	3/8	63.0	18.52	2.82	230	227	224	221	216
18.75	5/16	58.7	17.27	2.81	214	212	209	205	201
18.75	1/4	54.5	16.02	2.81	199	197	194	190	186
16.25	5/8	75.0	22.06	2.87	274	271	267	263	258
16.25	9/16	70.8	20.81	2.87	258	256	252	248	243
16.25	1/2	66.5	19.56	2.87	243	240	237	233	228
16.25	7/16	62.3	18.31	2.87	227	225	222	218	214
16.25	3/8	58.0	17.06	2.87	212	210	207	203	199
16.25	5/16	53.7	15.81	2.87	196	194	192	188	185
16.25	1/4	49.5	14.56	2.86	181	179	176	173	170
13.75	5/8	70.0	20.58	2.91	255	253	250	246	241
13.75	9/16	65.8	19.33	2.91	240	237	235	231	226
13.75	1/2	61.5	18.08	2.91	224	222	220	216	212
13.75	7/16	57.3	16.83	2.91	209	207	204	201	197
13.75	3/8	53.0	15.58	2.92	193	191	189	186	182
13.75	5/16	48.7	14.33	2.92	178	176	174	171	168
13.75	1/4	44.5	13.08	2.92	162	161	159	156	153
11.25	5/8	65.0	19.20	2.95	238	236	233	229	225
11.25	9/16	60.8	17.95	2.95	223	221	219	214	210
11.25	1/2	56.5	16.70	2.95	207	205	203	200	196
11.25	7/16	52.3	15.45	2.96	192	190	188	185	181
11.25	3/8	48.0	14.20	2.97	176	175	172	170	167
11.25	5/16	43.7	12.95	2.97	161	159	157	155	152
11.25	1/4	39.5	11.70	2.98	145	144	142	140	137

SAFE LOADS IN THOUSANDS OF POUNDS FOR 8″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

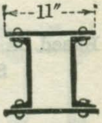
Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Length in feet									Thickness of plates	Weight of each channel
14	16	18	20	22	24	26	28	30	Inch	Lbs. per foot
284	277	268	260	250	241	232	223	214	5/8	21.25
270	263	254	246	238	229	221	212	202	9/16	21.25
256	249	241	233	225	217	209	201	192	1/2	21.25
241	234	227	220	213	205	196	189	181	7/16	21.25
226	220	214	207	200	192	185	178	170	3/8	21.25
212	207	200	194	187	180	173	166	159	5/16	21.25
198	193	187	181	174	168	162	155	148	1/4	21.25
268	260	253	245	236	228	220	211	203	5/8	18.75
254	246	239	232	224	216	208	200	192	9/16	18.75
240	233	226	219	211	204	196	189	181	1/2	18.75
225	219	212	206	199	192	185	178	171	7/16	18.75
210	205	199	193	186	180	173	166	160	3/8	18.75
196	191	185	180	174	167	160	154	148	5/16	18.75
182	177	172	167	161	155	149	143	137	1/4	18.75
252	245	238	231	223	215	207	199	191	5/8	16.25
237	231	227	217	210	203	195	188	181	9/16	16.25
223	217	211	204	198	191	184	177	170	1/2	16.25
209	203	198	191	185	178	172	165	159	7/16	16.25
195	189	184	178	172	166	160	154	148	3/8	16.25
180	176	171	165	160	154	148	143	137	5/16	16.25
166	162	157	152	147	142	137	131	126	1/4	16.25
236	229	223	216	209	203	195	187	181	5/8	13.75
221	216	209	203	196	190	183	176	170	9/16	13.75
207	202	196	190	184	178	172	164	159	1/2	13.75
193	188	182	177	171	166	160	153	148	7/16	13.75
178	174	169	164	159	153	148	142	137	3/8	13.75
164	160	155	151	146	141	136	131	126	5/16	13.75
150	146	142	138	133	129	124	119	115	1/4	13.75
221	215	209	203	196	190	183	177	169	5/8	11.25
206	201	195	189	183	178	171	165	158	9/16	11.25
192	187	182	176	170	165	159	153	147	1/2	11.25
177	173	168	163	158	153	147	142	137	7/16	11.25
163	159	154	150	146	141	136	131	126	3/8	11.25
149	145	141	137	133	128	124	120	115	5/16	11.25
134	131	128	124	120	116	112	108	104	1/4	11.25

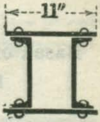
SAFE LOADS IN THOUSANDS OF POUNDS FOR 7″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P=\dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.
Safety factor 4.



Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet					
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	6	8	10	12	14	16
19.75	5/8	86.3	25.37	3.21	313	309	305	301	294	288
19.75	9/16	81.5	24.00	3.19	296	293	289	284	278	273
19.75	1/2	76.9	22.62	3.13	279	275	272	267	262	256
19.75	7/16	72.2	21.24	3.07	261	259	254	250	245	240
19.75	3/8	67.6	19.87	3.00	244	241	238	233	228	223
19.75	5/16	62.9	18.50	2.93	228	225	221	217	212	206
19.75	1/4	58.2	17.12	2.85	210	207	204	200	195	190
17.25	5/8	81.3	23.89	3.24	294	291	288	283	278	272
17.25	9/16	76.5	22.52	3.24	277	275	271	267	262	257
17.25	1/2	71.9	21.14	3.19	260	258	254	250	245	240
17.25	7/16	67.2	19.76	3.13	243	240	237	234	228	224
17.25	3/8	62.6	18.39	3.06	226	224	220	217	212	207
17.25	5/16	57.9	17.02	2.99	209	207	204	200	195	191
17.25	1/4	53.2	15.64	2.91	192	190	187	183	179	174
14.75	5/8	76.3	22.43	3.27	277	274	270	266	261	256
14.75	9/16	71.5	21.06	3.27	260	257	253	250	245	240
14.75	1/2	66.9	19.68	3.26	243	240	237	233	229	224
14.75	7/16	62.2	18.30	3.20	225	223	220	216	212	208
14.75	3/8	57.6	16.93	3.14	209	206	203	200	196	192
14.75	5/16	52.9	15.56	3.07	191	189	186	183	179	176
14.75	1/4	48.2	14.18	2.99	174	172	170	167	163	159
12.25	5/8	71.3	20.95	3.29	259	256	253	249	244	239
12.25	9/16	66.5	19.58	3.30	242	239	236	233	229	224
12.25	1/2	61.9	18.20	3.31	225	222	220	216	213	208
12.25	7/16	57.2	16.82	3.29	208	206	203	200	196	192
12.25	3/8	52.6	15.45	3.22	190	188	186	183	180	176
12.25	5/16	47.9	14.08	3.16	173	172	169	166	163	159
12.25	1/4	43.2	12.70	3.08	156	155	153	150	147	143
9.75	5/8	66.3	19.45	3.32	240	238	235	231	227	223
9.75	9/16	61.5	18.08	3.33	223	221	218	215	211	207
9.75	1/2	56.9	16.70	3.34	206	204	202	198	195	191
9.75	7/16	52.2	15.32	3.35	189	187	185	182	179	175
9.75	3/8	47.6	13.95	3.33	172	170	168	166	163	160
9.75	5/16	42.9	12.58	3.27	155	154	151	149	146	143
9.75	1/4	38.2	11.20	3.20	138	137	135	132	130	127

SAFE LOADS IN THOUSANDS OF POUNDS FOR 7″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.



Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.

Length in feet									Thickness of plates	Weight of each channel
18	20	22	24	26	28	30	32	34	Inch	Lbs. per foot
282	275	266	259	251	243	236	227	219	5/8	19.75
267	259	252	245	236	229	222	214	206	9/16	19.75
249	243	236	229	222	215	207	200	192	1/2	19.75
233	227	220	214	206	199	192	185	178	7/16	19.75
217	211	205	198	191	185	177	170	164	3/8	19.75
201	195	189	182	176	169	163	157	150	5/16	19.75
185	179	173	167	161	155	149	143	137	1/4	19.75
265	259	252	245	238	230	222	215	207	5/8	17.25
250	244	238	231	224	217	209	202	195	9/16	17.25
235	228	222	216	208	202	195	189	181	1/2	17.25
218	212	206	200	194	188	180	174	167	7/16	17.25
202	197	190	185	178	172	166	160	154	3/8	17.25
186	180	175	169	163	157	152	146	140	5/16	17.25
169	164	159	154	148	143	137	132	128	1/4	17.25
250	244	238	231	223	216	209	203	196	5/8	14.75
235	229	223	217	210	203	197	190	184	9/16	14.75
219	214	209	202	196	190	184	178	172	1/2	14.75
203	198	192	187	181	175	169	163	158	7/16	14.75
187	182	177	172	166	161	155	149	144	3/8	14.75
171	166	161	156	151	146	141	136	130	5/16	14.75
155	150	145	141	136	131	127	122	117	1/4	14.75
234	228	222	216	210	203	197	190	184	5/8	12.25
218	213	207	202	196	190	184	178	172	9/16	12.25
204	199	194	188	182	176	171	165	160	1/2	12.25
188	183	178	173	168	163	158	153	148	7/16	12.25
172	167	163	158	153	148	143	139	133	3/8	12.25
156	152	147	143	139	134	129	125	120	5/16	12.25
140	136	132	128	124	119	115	111	107	1/4	12.25
218	213	207	201	196	190	184	178	172	5/8	9.75
202	198	192	187	182	176	171	165	160	9/16	9.75
187	182	178	173	168	163	158	153	147	1/2	9.75
171	167	163	159	154	149	145	140	136	7/16	9.75
156	152	148	144	140	136	132	127	123	3/8	9.75
140	137	133	130	125	121	117	114	110	5/16	9.75
124	121	118	114	111	107	103	100	97	1/4	9.75

SAFE LOADS IN THOUSANDS OF POUNDS FOR 7″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.

Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet			
Lbs. per foot	In.	Lbs. per foot	Sq. Ins.	Ins.	4	6	8	10
19.75	5/8	77.8	22.87	2.44	283	279	274	268
19.75	9/16	73.9	21.74	2.43	269	265	260	255
19.75	1/2	70.1	20.62	2.42	255	251	247	242
19.75	7/16	66.3	19.50	2.41	241	238	234	228
19.75	3/8	62.5	18.37	2.40	227	224	220	214
19.75	5/16	58.6	17.24	2.38	213	210	206	201
19.75	1/4	54.8	16.12	2.37	199	197	193	188
17.25	5/8	72.8	21.39	2.48	265	261	257	251
17.25	9/16	68.9	20.26	2.47	251	248	243	238
17.25	1/2	65.1	19.14	2.46	237	234	229	224
17.25	7/16	61.3	18.02	2.46	223	220	216	211
17.25	3/8	57.5	16.89	2.45	209	206	202	198
17.25	5/16	53.6	15.76	2.43	195	192	189	185
17.25	1/4	49.8	14.64	2.42	181	178	175	171
14.75	5/8	67.8	19.93	2.53	247	244	239	234
14.75	9/16	63.9	18.80	2.52	233	230	226	221
14.75	1/2	60.1	17.68	2.52	219	216	212	208
14.75	7/16	56.3	16.56	2.51	205	202	199	195
14.75	3/8	52.5	15.43	2.50	191	189	185	181
14.75	5/16	48.6	14.30	2.50	177	175	172	168
14.75	1/4	44.8	13.18	2.49	163	161	158	155
12.25	5/16	62.8	18.45	2.57	228	226	222	217
12.25	9/16	58.9	17.32	2.57	214	212	208	204
12.25	1/2	55.1	16.20	2.57	200	198	195	191
12.25	7/16	51.3	15.08	2.56	187	185	182	178
12.25	3/8	47.5	13.95	2.56	173	171	168	164
12.25	5/16	43.6	12.82	2.56	159	157	154	151
12.25	1/4	39.8	11.70	2.55	145	143	141	138
9.75	5/8	57.8	16.95	2.62	210	207	204	200
9.75	9/16	53.9	15.82	2.62	196	194	190	187
9.75	1/2	50.1	14.70	2.62	182	180	177	174
9.75	7/16	46.3	13.58	2.62	168	166	163	160
9.75	3/8	42.5	12.45	2.62	154	152	150	147
9.75	5/16	38.6	11.32	2.63	140	139	137	134
9.75	1/4	34.8	10.20	2.63	126	125	123	121

SAFE LOADS IN THOUSANDS OF POUNDS FOR 7″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

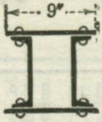
Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.

Length in feet								Thickness of plates	Weight of each channel
12	14	16	18	20	22	24	26	Inch	Lbs. per foot
261	253	243	235	225	216	207	196	5/8	19.75
248	240	231	223	214	204	195	186	9/16	19.75
234	227	220	211	202	194	185	177	1/2	19.75
222	215	208	199	191	183	174	166	7/16	19.75
209	202	195	187	180	172	164	157	3/8	19.75
196	189	183	175	168	161	153	146	5/16	19.75
183	177	170	164	157	150	143	136	1/4	19.75
245	238	229	220	212	203	194	186	5/8	17.25
231	224	217	209	201	192	184	176	9/16	17.25
218	212	205	197	190	182	173	165	1/2	17.25
206	199	193	186	178	171	163	155	7/16	17.25
193	187	181	174	166	159	153	146	3/8	17.25
180	174	168	162	155	148	142	135	5/16	17.25
166	161	156	150	143	137	131	126	1/4	17.25
229	222	215	207	199	191	183	175	5/8	14.75
215	209	203	196	188	180	173	165	9/16	14.75
202	196	191	184	177	170	162	155	1/2	14.75
190	184	178	171	165	158	151	144	7/16	14.75
177	171	166	160	154	147	141	135	3/8	14.75
164	159	154	148	142	136	131	125	5/16	14.75
151	146	142	136	131	126	120	115	1/4	14.75
212	207	200	193	185	178	171	164	5/8	12.25
199	194	188	181	174	167	161	154	9/16	12.25
186	181	176	169	163	156	150	144	1/2	12.25
173	168	163	158	152	145	139	133	7/16	12.25
160	156	151	146	140	135	129	123	3/8	12.25
147	143	139	134	129	124	118	113	5/16	12.25
134	130	126	122	118	113	108	103	1/4	12.25
195	190	184	178	172	165	158	152	5/8	9.75
182	178	172	166	161	154	148	142	9/16	9.75
169	165	160	154	149	143	137	132	1/2	9.75
156	153	148	143	138	132	127	122	7/16	9.75
143	140	135	131	126	121	116	112	3/8	9.75
130	127	123	119	115	110	106	102	5/16	9.75
118	115	111	108	104	99	96	92	1/4	9.75

SAFE LOADS IN THOUSANDS OF POUNDS FOR 6″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

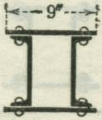
Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$. **Safety factor 4.**



Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet				
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	4	6	8	10	12
15.5	5/8	69.3	20.37	2.57	252	249	245	240	234
15.5	9/16	65.4	19.25	2.57	238	236	232	227	221
15.5	1/2	61.6	18.12	2.57	224	222	218	214	208
15.5	7/16	57.8	17.00	2.57	210	208	205	200	195
15.5	3/8	54.0	15.87	2.57	196	194	191	187	182
15.5	5/16	50.1	14.75	2.54	183	180	178	174	169
15.5	1/4	46.3	13.62	2.47	169	166	164	160	155
13	5/8	64.3	18.89	2.61	234	231	227	223	218
13	9/16	60.4	17.77	2.61	220	218	214	210	205
13	1/2	56.6	16.64	2.61	206	204	200	197	192
13	7/16	52.8	15.52	2.62	192	190	187	183	179
13	3/8	49.0	14.39	2.62	178	176	173	170	164
13	5/16	45.1	13.27	2.62	164	162	160	157	153
13	1/4	41.3	12.14	2.54	150	148	146	143	139
10.5	5/8	59.3	17.43	2.65	216	213	210	206	202
10.5	9/16	55.4	16.31	2.65	202	200	197	193	189
10.5	1/2	51.6	15.18	2.65	188	186	183	179	176
10.5	7/16	47.8	14.06	2.66	174	172	170	166	163
10.5	3/8	44.0	12.93	2.66	160	158	156	153	150
10.5	5/16	40.1	11.81	2.67	146	145	142	140	137
10.5	1/4	36.3	10.68	2.68	132	131	129	126	123
8	5/8	54.3	16.01	2.68	198	196	193	190	185
8	9/16	50.4	14.89	2.69	184	183	180	176	172
8	1/2	46.6	13.76	2.70	170	169	166	163	160
8	7/16	42.8	12.64	2.70	156	155	153	150	147
8	3/8	39.0	11.51	2.71	142	141	139	136	134
8	5/16	35.1	10.39	2.73	129	127	126	123	121
8	1/4	31.3	9.26	2.74	115	114	112	110	107

SAFE LOADS IN THOUSANDS OF POUNDS FOR 6″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \frac{50\,000}{1 + \frac{(12\,L)^2}{36\,000\,r^2}}$. **Safety factor 4.**



Length in feet								Thickness of plates	Weight of each channel
14	16	18	20	22	24	26	28	Inch	Lbs. per foot
228	221	213	205	196	189	181	173	5/8	15.5
215	209	201	194	186	179	171	163	9/16	15.5
203	196	189	182	175	168	161	154	1/2	15.5
190	184	178	171	164	158	151	144	7/16	15.5
178	172	166	160	153	147	141	134	3/8	15.5
164	159	153	148	142	136	130	124	5/16	15.5
151	146	140	135	129	124	118	113	1/4	15.5
211	206	198	191	184	176	169	162	5/8	13
199	193	187	180	173	166	159	152	9/16	13
186	181	175	168	162	155	149	143	1/2	13
174	169	163	158	151	145	139	133	7/16	13
162	157	151	146	134	134	129	123	3/8	13
149	144	139	135	129	124	119	114	5/16	13
135	131	126	121	116	112	107	102	1/4	13
196	190	184	178	171	164	157	151	5/8	10.5
183	178	172	166	160	153	147	141	9/16	10.5
171	166	160	155	149	143	137	131	1/2	10.5
158	154	148	143	138	133	127	122	7/16	10.5
145	141	136	132	127	122	117	112	3/8	10.5
133	129	125	121	116	111	107	102	5/16	10.5
120	116	113	108	105	100	96	92	1/4	10.5
181	175	170	163	158	151	145	140	5/8	8
168	163	158	153	147	141	135	130	9/16	8
155	151	146	141	136	131	126	120	1/2	8
143	139	134	130	125	120	115	110	7/16	8
130	126	123	118	114	109	105	101	3/8	8
118	114	111	107	103	99	95	91	5/16	8
105	102	99	95	92	88	85	82	1/4	8

SAFE LOADS IN THOUSANDS OF POUNDS FOR 6″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$ **Safety factor 4.**

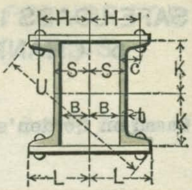
Weight of each channel	Thickness of plates	Weight of column	Area of column section	Least radius of gyration	Length in feet			
Lbs. per foot	In.	Lbs. per foot	Sq. ins.	Ins.	4	6	8	10
15.5	5/8	65.0	19.12	2.19	236	232	227	220
15.5	9/16	61.6	18.12	2.19	224	220	215	209
15.5	1/2	58.2	17.12	2.18	211	207	203	197
15.5	7/16	54.8	16.12	2.17	199	195	191	186
15.5	3/8	51.4	15.12	2.16	186	183	179	174
15.5	5/16	48.0	14.12	2.15	174	171	167	162
15.5	1/4	44.6	13.12	2.14	162	159	155	151
13	5/8	60.0	17.64	2.24	218	214	210	204
13	9/16	56.6	16.64	2.24	205	202	198	192
13	1/2	53.2	15.64	2.23	193	190	186	181
13	7/16	49.8	14.64	2.23	181	178	174	169
13	3/8	46.4	13.64	2.22	168	166	162	158
13	5/16	43.0	12.64	2.21	156	154	150	146
13	1/4	39.6	11.64	2.20	144	141	138	135
10.5	5/8	55.0	16.18	2.28	200	197	193	188
10.5	9/16	51.6	15.18	2.28	187	185	181	176
10.5	1/2	48.2	14.18	2.28	175	173	169	165
10.5	7/16	44.8	13.18	2.28	163	160	157	153
10.5	3/8	41.4	12.18	2.28	150	148	145	141
10.5	5/16	38.0	11.18	2.27	138	136	133	130
10.5	1/4	34.6	10.18	2.27	126	124	121	118
8	5/8	50.0	14.76	2.33	182	180	176	172
8	9/16	46.6	13.76	2.34	170	167	164	160
8	1/2	43.2	12.76	2.34	158	155	152	149
8	7/16	39.8	11.76	2.34	145	143	141	137
8	3/8	36.4	10.76	2.34	133	131	129	125
8	5/16	33.0	9.76	2.35	121	119	117	114
8	1/4	29.6	8.76	2.35	108	107	105	102

SAFE LOADS IN THOUSANDS OF POUNDS FOR 6″ CHANNEL AND PLATE COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$. **Safety factor 4.**

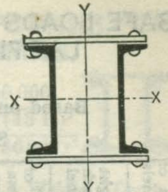
Length in feet 12	14	16	18	20	22	24	Thickness of plates, Inch	Weight of each channel, Lbs. per foot
213	205	197	188	180	171	161	5/8	15.5
202	195	187	178	170	162	153	9/16	15.5
191	184	176	168	160	152	144	1/2	15.5
180	172	165	158	150	143	135	7/16	15.5
170	162	155	148	140	133	127	3/8	15.5
157	151	145	138	131	125	118	5/16	15.5
146	140	134	128	122	115	109	1/4	15.5
197	190	183	176	167	159	151	5/8	13
186	179	173	166	158	150	143	9/16	13
175	169	162	155	148	140	133	1/2	13
164	158	152	145	138	131	125	7/16	13
153	147	141	135	129	122	116	3/8	13
141	136	131	125	119	113	107	5/16	13
130	125	120	115	109	104	99	1/4	13
182	176	169	162	154	148	140	5/8	10.5
171	165	159	152	144	139	132	9/16	10.5
159	154	148	142	135	130	123	1/2	10.5
148	143	138	132	126	120	114	7/16	10.5
137	133	127	122	116	111	106	3/8	10.5
126	121	117	112	107	102	96	5/16	10.5
114	110	106	102	97	92	88	1/4	10.5
166	161	155	149	142	136	130	5/8	8
156	150	145	139	133	127	121	9/16	8
144	139	135	129	124	118	112	1/2	8
133	128	124	119	114	109	103	7/16	8
122	118	114	109	104	99	94	3/8	8
111	107	103	99	95	90	86	5/16	8
99	96	92	89	85	81	77	1/4	8

DIMENSIONS FOR LATTICED CHANNEL COLUMNS.



Depth of channel	Weight per foot	t	L	K	U	H	B	S	C
Ins.	Lbs.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
15	55.00	.82	8⅛	7½	22⅛	6⅝	4 5/16	5⅛	2 5/16
15	50.00	.72	8⅛	7½	22⅛	6⅝	4 7/16	5⅛	2¼
15	45.00	.62	8⅛	7½	22⅛	6⅝	4½	5⅛	2⅛
15	40.00	.52	8⅛	7½	22⅛	6⅝	4⅝	5⅛	2
15	35.00	.43	8⅛	7½	22⅛	6⅝	4 11/16	5⅛	1 15/16
15	33.00	.40	8⅛	7½	22⅛	6⅝	4¾	5⅛	1⅞
12	40.00	.76	6 13/16	6	18⅛	5⅝	3⅜	4⅛	2¼
12	35.00	.64	6 13/16	6	18⅛	5⅝	3½	4⅛	2⅛
12	30.00	.51	6 13/16	6	18⅛	5⅝	3⅝	4⅛	2
12	25.00	.39	6 13/16	6	18⅛	5⅝	3¾	4⅛	1⅞
12	20.50	.28	6 13/16	6	18⅛	5⅝	3⅞	4⅛	1¾
10	35.00	.82	5¾	5	15¼	4⅝	2 9/16	3⅜	2 1/16
10	30.00	.68	5¾	5	15¼	4⅝	2 11/16	3⅜	1 15/16
10	25.00	.53	5¾	5	15¼	4⅝	2⅞	3⅜	1¾
10	20.00	.38	5¾	5	15¼	4⅝	3	3⅜	1⅝
10	15.00	.24	5¾	5	15¼	4⅝	3⅛	3⅜	1½
9	25.00	.61	5 3/16	4½	13¾	4⅛	2⅜	3	1¾
9	20.00	.45	5 3/16	4½	13¾	4⅛	2 9/16	3	1 9/16
9	15.00	.29	5 3/16	4½	13¾	4⅛	2 11/16	3	1 7/16
9	13.25	.23	5 3/16	4½	13¾	4⅛	2¾	3	1⅜
8	21.25	.58	4 13/16	4	12½	3¾	2 3/16	2¾	1 9/16
8	18.75	.49	4 13/16	4	12½	3¾	2¼	2¾	1½
8	16.25	.40	4 13/16	4	12½	3¾	2⅜	2¾	1⅜
8	13.75	.31	4 13/16	4	12½	3¾	2 7/16	2¾	1 5/16
8	11.25	.22	4 13/16	4	12½	3¾	2½	2¾	1¼
7	19.75	.63	4¼	3½	11	3⅜	1¾	2⅜	1⅝
7	17.25	.53	4¼	3½	11	3⅜	1⅞	2⅜	1½
7	14.75	.42	4¼	3½	11	3⅜	1 15/16	2⅜	1 7/16
7	12.25	.32	4¼	3½	11	3⅜	2 1/16	2⅜	1 5/16
7	9.75	.21	4¼	3½	11	3⅜	2 3/16	2⅜	1 3/16
6	15.50	.56	3¾	3	9 9/16	2⅞	1 7/16	2	1 7/16
6	13.00	.44	3¾	3	9 9/16	2⅞	1 9/16	2	1 5/16
6	10.50	.32	3¾	3	9 9/16	2⅞	1 11/16	2	1 3/16
6	8.00	.20	3¾	3	9 9/16	2⅞	1 13/16	2	1 1/16

PROPERTIES OF LATTICED CHANNEL COLUMNS.



Depth of channel	Weight per foot	Axis X-X Moment of inertia	Axis X-X Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Ins.	Pounds	Inches⁴	Inches³	Inches⁴	Inches³
15	55.00	860.4	114.7	874.3	107.6
15	50.00	805.4	107.4	819.5	100.9
15	45.00	750.2	100.0	763.0	93.9
15	40.00	695.0	92.7	700.8	86.3
15	35.00	639.8	85.3	636.1	78.3
15	33.00	625.2	83.4	618.7	76.1
12	40.00	393.8	65.6	405.7	59.8
12	35.00	358.6	59.8	370.5	54.6
12	30.00	323.2	53.9	335.8	49.5
12	25.00	288.0	48.0	295.6	43.6
12	20.50	256.2	42.7	256.9	37.9
10	35.00	231.0	46.2	226.0	39.4
10	30.00	206.4	41.3	205.4	35.8
10	25.00	182.0	36.4	183.3	32.0
10	20.00	157.4	31.5	158.5	27.6
10	15.00	133.8	26.8	131.7	23.0
9	25.00	141.4	31.4	139.1	26.8
9	20.00	121.6	27.0	120.1	23.1
9	15.00	101.8	22.6	100.0	19.2
9	13.25	94.6	21.0	92.4	17.8
8	21.25	95.6	23.9	99.7	20.8
8	18.75	87.7	21.9	92.3	19.3
8	16.25	79.8	20.0	84.5	17.6
8	13.75	72.0	18.0	75.8	15.8
8	11.25	64.6	16.2	67.5	14.0
7	19.75	66.4	19.0	66.5	15.6
7	17.25	60.4	17.3	61.4	14.4
7	14.75	54.4	15.5	56.4	13.3
7	12.25	48.4	13.8	50.5	11.9
7	9.75	42.2	12.1	44.0	10.3
6	15.50	39.0	13.0	38.7	10.4
6	13.00	34.6	11.5	35.2	9.5
6	10.50	30.2	10.1	31.1	8.4
6	8.00	26.0	8.7	27.0	7.3

SAFE LOADS IN THOUSANDS OF POUNDS FOR LATTICED CHANNEL COLUMNS.
SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.

Depth of channels	Weight of each channel	Area of column section	Least radius of gyration	Length in feet					
Ins.	Lbs. per foot	Sq. ins.	Inches	4	6	8	10	12	14
15	55.0	32.36	5.16	...	...	400	399	396	393
15	50.0	29.42	5.23	...	...	364	363	360	357
15	45.0	26.48	5.32	...	...	328	326	324	322
15	40.0	23.52	5.44	...	...	291	290	288	286
15	35.0	20.58	5.57	...	...	255	254	252	251
15	33.0	19.80	5.62	...	...	246	244	243	241
12	40.0	23.52	4.09	...	...	289	287	284	281
12	35.0	20.58	4.17	...	...	254	251	249	246
12	30.0	17.64	4.28	...	...	217	216	214	211
12	25.0	14.70	4.43	...	...	181	180	179	177
12	20.5	12.06	4.61	...	...	149	148	147	146
10	35.0	20.58	3.35	...	254	251	248	245	240
10	30.0	17.64	3.42	...	218	216	213	210	207
10	25.0	14.70	3.52	...	182	180	178	176	173
10	20.0	11.76	3.66	...	146	144	143	141	139
10	15.0	8.92	3.87	...	110	110	109	107	106
9	25.00	14.70	3.10	...	181	179	177	173	170
9	20.00	11.76	3.21	...	145	143	142	139	137
9	15.00	8.82	3.40	...	109	108	107	105	103
9	13.25	7.78	3.49	...	96	95	94	93	91
8	21.25	12.50	2.76	155	153	151	149	145	142
8	18.75	11.02	2.82	137	135	134	131	128	125
8	16.25	9.56	2.89	119	117	116	114	112	109
8	13.75	8.08	2.98	100	99	98	97	95	93
8	11.25	6.70	3.10	83	83	82	80	79	77
7	19.75	11.62	2.39	144	142	139	136	132	128
7	17.25	10.14	2.44	125	124	121	119	116	112
7	14.75	8.68	2.50	107	106	104	102	99	96
7	12.25	7.20	2.59	89	88	87	85	83	81
7	9.75	5.70	2.72	71	70	69	68	66	65
6	15.5	9.12	2.06	112	110	107	104	100	96
6	13.0	7.64	2.13	94	93	90	88	85	81
6	10.5	6.18	2.21	76	75	73	71	69	67
6	8.0	4.76	2.34	59	58	57	55	54	52

SAFE LOADS IN THOUSANDS OF POUNDS FOR LATTICED CHANNEL COLUMNS.

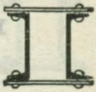
SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.

Length in feet								Weight of each channel	Depth of chan'ls
16	18	20	22	24	26	28	30	Lbs. per foot	Inches
390	386	381	377	372	368	362	357	55.0	15
354	352	348	344	339	334	329	325	50.0	15
319	316	313	310	306	302	298	294	45.0	15
284	282	279	276	273	269	266	262	40.0	15
249	247	245	242	240	236	234	230	35.0	15
240	238	235	233	230	228	225	222	33.0	15
277	273	268	263	258	253	248	243	40.0	12
243	240	236	231	227	223	218	213	35.0	12
209	206	203	200	196	192	187	184	30.0	12
175	172	170	167	165	161	159	155	25.0	12
144	142	140	138	136	134	131	129	20.5	12
236	230	225	219	213	207	201	194	35.0	10
203	198	194	189	185	179	174	168	30.0	10
170	166	163	159	155	151	146	143	25.0	10
136	134	131	128	125	122	119	116	20.0	10
104	102	101	99	97	95	93	90	15.0	10
166	162	157	153	149	143	139	134	25.00	9
134	131	127	124	120	116	113	109	20.00	9
101	99	97	94	92	90	87	84	15.00	9
90	88	86	84	82	80	77	75	13.25	9
138	134	129	124	120	115	111	106	21.25	8
122	118	115	111	107	103	99	95	18.75	8
107	104	100	97	94	90	87	83	16.25	8
90	88	86	83	80	78	75	72	13.75	8
76	74	72	70	68	65	63	61	11.25	8
123	119	113	108	104	98	...	...	19.75	7
108	104	100	96	92	87	...	...	17.25	7
93	90	86	83	79	76	...	...	14.75	7
78	76	73	70	67	64	...	...	12.25	7
63	61	58	56	54	52	...	...	9.75	7
92	88	83	78	74	...	...	...	15.5	6
78	74	71	67	63	...	...	...	13.0	6
64	61	58	55	52	...	...	...	10.5	6
50	48	46	44	42	...	...	...	8.0	6

SAFE LOADS IN THOUSANDS OF POUNDS FOR LATTICED CHANNEL COLUMNS. SQUARE ENDS.



Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

Depth of channels	Weight of each channel	Area of column section	Least radius of gyration	Length in feet				
Inches	Lbs. per ft	Sq. ins.	Inches	32	34	36	38	40
15	55.0	32.36	5.16	351	344	328	332	325
15	50.0	29.42	5.23	320	315	309	303	299
15	45.0	26.48	5.32	289	284	279	275	270
15	40.0	23.52	5.44	258	254	250	246	241
15	35.0	20.58	5.57	228	224	220	217	213
15	33.0	19.80	5.62	219	215	213	202	206
12	40.0	23.52	4.09	236	231	224	218	212
12	35.0	20.58	4.17	208	203	199	193	188
12	30.0	17.64	4.28	180	176	172	167	164
12	25.0	14.70	4.43	152	149	146	142	139
12	20.5	12.06	4.61	127	124	121	119	116
10	35.0	20.58	3.35	188	183	176	...	...
10	30.0	17.64	3.42	163	158	153	...	...
10	25.0	14.70	3.52	138	134	130	...	...
10	20.0	11.76	3.66	113	109	106	...	...
10	15.0	8.92	3.87	87	85	83	...	...
9	25.00	14.70	3.10	129	124	...	...	...
9	20.00	11.76	3.21	106	101	...	...	...
9	15.00	8.82	3.40	81	79	...	...	...
9	13.25	7.78	3.49	73	71	...	...	...

SIZE OF LATTICE BARS TO BE USED WITH LATTICED CHANNEL COLUMNS.

Depth of channels	Dimensions of lattice bars		Weight of lattice bars per ft	Center of hole to end of Bar (E)	Distance, center to center of rivets (C)	
	B	Thickness				
Inches	Inches	Inch	Pounds	Inch	Maximum	Minimum
15	2½	⅜	3.19	1½	2′— 2½″	1′—3 5/16″
12	2¼	⅜	2.87	1⅜	1′—10½″	1′—1″
10	2	⅜	2.55	1¼	1′— 6½″	10 11/16″
9	2	5/16	2.12	1¼	1′— 4½″	9½″
8	2	5/16	2.12	1¼	1′— 3″	8 11/16″
7	1¾	¼	1.49	1⅛	1′— 1½″	7⅝″
6	1½	¼	1.28	1⅛	0′—11½″	6⅝″

SAFE LOADS IN THOUSANDS OF POUNDS FOR LATTICED CHANNEL COLUMNS. SQUARE ENDS.

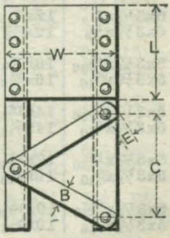
Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.

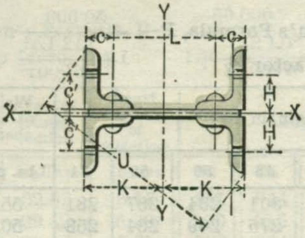
Length in feet							Weight of each channel	Depth of channels
42	44	46	48	50	52	54	Lbs. per ft.	Inches
319	314	307	301	294	287	281	55.0	15
293	287	281	275	269	264	258	50.0	15
265	260	255	250	245	239	234	45.0	15
238	233	228	224	220	215	211	40.0	15
210	206	203	199	194	191	187	35.0	15
202	199	195	192	188	184	181	33.0	15
206	200	196	...	...	...	...	40.0	12
183	178	173	...	...	...	...	35.0	12
159	155	151	...	...	...	...	30.0	12
135	132	128	...	...	...	...	25.0	12
113	111	108	...	...	...	...	20.5	12
...	...	...	...	...	...	...	35.0	10
...	...	...	...	...	...	...	30.0	10
...	...	...	...	...	...	...	25.0	10
...	...	...	...	...	...	...	20.0	10
...	...	...	...	...	...	...	15.0	10
...	...	...	...	...	...	...	25.00	9
...	...	...	...	...	...	...	20.00	9
...	...	...	...	...	...	...	15.00	9
...	...	...	...	...	...	...	13.25	9

SIZE OF BATTEN PLATES TO BE USED WITH LATTICED CHANNEL COLUMNS.

Minimum size of batten plates at ends of columns			Weight of minimum batten plates	Diameter of rivets
W	Thickness	L		
Inches	Inch	Inches	Pounds	Inch
1′-4¼″	⅜	15	25.90	¾
1′-2¼″	⅜	15	22.73	¾
1′-0¼″	⅜	12	15.62	¾
11¼	5/16	12	11.95	¾
10½	5/16	9	8.37	¾
9¼	¼	10	6.55	⅝
8¼	¼	7½	4.38	⅝

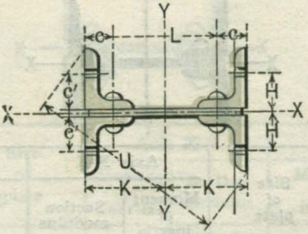


DIMENSIONS FOR PLATE AND ANGLE COLUMNS.



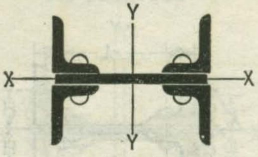
Size of angles	Size of plates	Weight of column	Area of column section	K	H	C	C'	L	U
Ins.	Ins.	Lbs. per foot	Sq. ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
7x3½x1	20x1	199.1	58.00	10⅛	2¾	2¼	2¼	15¾	25 3/16
7x3½x7/16	20x7/16	91.6	26.40	10⅛	2½	2¼	2¼	15¾	24⅞
7x3½x1	18x1	192.3	56.00	9⅛	2¾	2¼	2¼	13¾	23⅝
7x3½x7/16	18x7/16	88.6	25.49	9⅛	2½	2¼	2¼	13¾	23¼
7x3½x1	16x1	185.5	54.00	8⅛	2¾	2¼	2¼	11¾	22⅛
7x3½x7/16	16x7/16	85.6	24.61	8⅛	2½	2¼	2¼	11¾	21¾
7x3½x1	14x1	178.7	52.00	7⅛	2¾	2¼	2¼	9¾	20 11/16
7x3½x7/16	14x7/16	82.6	23.74	7⅛	2½	2¼	2¼	9¾	20 5/16
6x3½x1	18x1	178.7	52.00	9⅛	2¾	2¼	2¼	13¾	22 7/16
6x3½x⅜	18x⅜	71.8	20.48	9⅛	2 7/16	2¼	2¼	13¾	22 1/16
6x3½x1	16x1	171.9	50.00	8⅛	2¾	2¼	2¼	11¾	20 13/16
6x3½x⅜	16x⅜	69.3	19.73	8⅛	2 7/16	2¼	2¼	11¾	20 7/16
6x3½x1	14x1	165.1	48.00	7⅛	2¾	2¼	2¼	9¾	19 5/16
6x3½x⅜	14x⅜	66.7	18.98	7⅛	2 7/16	2¼	2¼	9¾	18⅞
6x3½x1	12x1	158.3	46.00	6⅛	2¾	2¼	2¼	7¾	17⅞
6x3½x⅜	12x⅜	64.2	18.23	6⅛	2 7/16	2¼	2¼	7¾	17 7/16
5x3½x15/16	16x15/16	149.8	43.36	8⅛	2¾	2¼	2¼	11¾	19 9/16
5x3½x5/16	16x5/16	53.7	15.23	8⅛	2 7/16	2¼	2¼	11¾	19¼
5x3½x15/16	14x15/16	143.4	41.49	7⅛	2¾	2¼	2¼	9¾	17 15/16
5x3½x5/16	14x5/16	51.6	14.61	7⅛	2 7/16	2¼	2¼	9¾	17 9/16
5x3½x15/16	12x15/16	137.0	39.61	6⅛	2¾	2¼	2¼	7¾	16 7/16
5x3½x5/16	12x5/16	49.5	13.98	6⅛	2 7/16	2¼	2¼	7¾	16
5x3½x15/16	10x15/16	130.6	37.74	5⅛	2¾	2¼	2¼	5¾	15
5x3½x5/16	10x5/16	47.4	13.36	5⅛	2 7/16	2¼	2¼	5¾	14 9/16

DIMENSIONS FOR PLATE AND ANGLE COLUMNS.



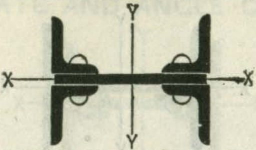
Size of angles	Size of plates	Weight of column	Area of column section	K	H	C	C'	L	U
Ins.	Ins.	Lbs. per foot	Sq. ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
4 x3 x7/8	14x7/8	116.5	33.69	7 1/8	2 11/16	1 3/4	2 1/4	10 3/4	16 13/16
4 x3 x5/16	14x5/16	45.6	12.74	7 1/8	2 7/16	1 3/4	2 1/4	10 3/4	16 1/2
4 x3 x7/8	12x7/8	110.5	31.94	6 1/8	2 11/16	1 3/4	2 1/4	8 3/4	15 1/8
4 x3 x5/16	12x5/16	43.5	12.11	6 1/8	2 7/16	1 3/4	2 1/4	8 3/4	14 13/16
4 x3 x7/8	10x7/8	104.6	30.19	5 1/8	2 11/16	1 3/4	2 1/4	6 3/4	13 9/16
4 x3 x5/16	10x5/16	41.4	11.49	5 1/8	2 7/16	1 3/4	2 1/4	6 3/4	13 3/16
4 x3 x7/8	8x7/8	98.6	28.44	4 1/8	2 11/16	1 3/4	2 1/4	4 3/4	12 1/8
4 x3 x5/16	8x5/16	39.3	10.86	4 1/8	2 7/16	1 3/4	2 1/4	4 3/4	11 11/16
3 1/2x2 1/2x3/4	12x3/4	86.1	24.75	6 1/8	2 5/8	1 3/8	2 1/4	9 1/2	14 1/2
3 1/2x2 1/2x1/4	12x1/4	31.7	8.75	6 1/8	2 3/8	1 3/8	2 1/4	9 1/2	14 1/4
3 1/2x2 1/2x3/4	10x3/4	81.0	23.25	5 1/8	2 5/8	1 3/8	2 1/4	7 1/2	12 7/8
3 1/2x2 1/2x1/4	10x1/4	30.0	8.25	5 1/8	2 3/8	1 3/8	2 1/4	7 1/2	12 9/16
3 1/2x2 1/2x3/4	8x3/4	75.9	21.75	4 1/8	2 5/8	1 3/8	2 1/4	5 1/2	11 5/16
3 1/2x2 1/2x1/4	8x1/4	28.3	7.75	4 1/8	2 3/8	1 3/8	2 1/4	5 1/2	11
3 1/2x2 1/2x3/4	7x3/4	73.3	21.00	3 5/8	2 5/8	1 3/8	2 1/4	4 1/2	10 5/8
3 1/2x2 1/2x1/4	7x1/4	27.4	7.50	3 5/8	2 3/8	1 3/8	2 1/4	4 1/2	10 1/4
3 x2 1/2x5/8	12x5/8	68.9	19.69	6 1/8	2 1/16	1 3/8	1 3/4	9 1/2	13 15/16
3 x2 1/2x1/4	12x1/4	30.0	8.29	6 1/8	1 7/8	1 3/8	1 3/4	9 1/2	13 3/4
3 x2 1/2x5/8	10x5/8	64.6	18.44	5 1/8	2 1/16	1 3/8	1 3/4	7 1/2	12 3/16
3 x2 1/2x1/4	10x1/4	28.3	7.99	5 1/8	1 7/8	1 3/8	1 3/4	7 1/2	12
3 x2 1/2x5/8	8x5/8	60.4	17.19	4 1/8	2 1/16	1 3/8	1 3/4	5 1/2	10 9/16
3 x2 1/2x1/4	8x1/4	26.6	7.29	4 1/8	1 7/8	1 3/8	1 3/4	5 1/2	10 3/8
3 x2 1/2x5/8	6x5/8	56.1	15.94	3 1/8	2 1/16	1 3/8	1 3/4	3 1/2	9 1/8
3 x2 1/2x1/4	6x1/4	24.9	6.79	3 1/8	1 7/8	1 3/8	1 3/4	3 1/2	8 13/16

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND ANGLE COLUMNS.



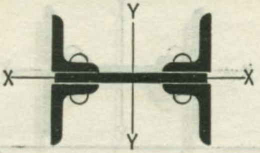
Size of angles	Size of plate	Axis X-X Moment of inertia	Axis X-X Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Inches	Inches	Ins.⁴	Ins.³	Ins.⁴	Ins.³
7 x 3½ x 1	20 x 1	574.8	76.6	3888.3	384.0
7 x 3½ x 15/16	20 x 15/16	531.2	71.1	3680.5	363.5
7 x 3½ x ⅞	20 x ⅞	488.6	65.7	3468.5	342.6
7 x 3½ x 13/16	20 x 13/16	447.5	60.4	3251.4	321.1
7 x 3½ x ¾	20 x ¾	406.8	55.2	3030.5	299.3
7 x 3½ x 11/16	20 x 11/16	367.5	50.0	2804.4	277.0
7 x 3½ x ⅝	20 x ⅝	328.6	44.9	2574.2	254.2
7 x 3½ x 9/16	20 x 9/16	292.8	40.2	2339.4	231.1
7 x 3½ x ½	20 x ½	255.9	35.3	2099.4	207.4
7 x 3½ x 7/16	20 x 7/16	220.8	30.6	1854.8	183.2
7 x 3½ x 1	18 x 1	574.7	76.6	3049.1	334.2
7 x 3½ x 15/16	18 x 15/16	531.0	71.1	2888.1	316.5
7 x 3½ x ⅞	18 x ⅞	488.5	65.7	2723.5	298.5
7 x 3½ x 13/16	18 x 13/16	447.4	60.4	2554.7	280.0
7 x 3½ x ¾	18 x ¾	406.7	55.2	2382.7	261.1
7 x 3½ x 11/16	18 x 11/16	367.4	50.0	2206.4	241.8
7 x 3½ x ⅝	18 x ⅝	328.6	44.9	2026.6	222.1
7 x 3½ x 9/16	18 x 9/16	292.8	40.2	1843.0	202.0
7 x 3½ x ½	18 x ½	255.9	35.3	1655.1	181.4
7 x 3½ x 7/16	18 x 7/16	220.8	30.6	1463.2	160.4
7 x 3½ x 1	16 x 1	574.5	76.6	2322.0	285.8
7 x 3½ x 15/16	16 x 15/16	530.9	71.1	2201.1	270.9
7 x 3½ x ⅞	16 x ⅞	488.4	65.7	2077.4	255.7
7 x 3½ x 13/16	16 x 13/16	447.3	60.4	1950.3	240.0
7 x 3½ x ¾	16 x ¾	406.7	55.1	1820.5	224.0
7 x 3½ x 11/16	16 x 11/16	367.4	50.0	1687.2	207.7
7 x 3½ x ⅝	16 x ⅝	328.5	44.9	1550.9	190.9
7 x 3½ x 9/16	16 x 9/16	292.7	40.2	1411.6	173.7
7 x 3½ x ½	16 x ½	255.8	35.3	1268.8	156.2
7 x 3½ x 7/16	16 x 7/16	220.8	30.6	1122.6	138.2
7 x 3½ x 1	14 x 1	574.3	76.6	1702.8	239.0
7 x 3½ x 15/16	14 x 15/16	530.8	71.1	1615.9	226.8
7 x 3½ x ⅞	14 x ⅞	488.3	65.7	1526.7	214.3
7 x 3½ x 13/16	14 x 13/16	447.2	60.4	1434.8	201.4
7 x 3½ x ¾	14 x ¾	406.6	55.1	1340.7	188.2
7 x 3½ x 11/16	14 x 11/16	367.3	50.0	1243.9	174.6
7 x 3½ x ⅝	14 x ⅝	328.5	44.9	1144.6	160.7
7 x 3½ x 9/16	14 x 9/16	292.7	40.2	1043.0	146.4
7 x 3½ x ½	14 x ½	255.8	35.3	938.4	131.7
7 x 3½ x 7/16	14 x 7/16	220.8	30.6	831.2	116.7

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND ANGLE COLUMNS.



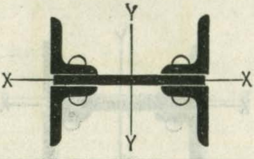
Size of angles	Size of plate	Axis X-X		Axis Y-Y	
		Moment of inertia	Section modulus	Moment of inertia	Section modulus
Inches	Inches	Ins.⁴	Ins.³	Ins.⁴	Ins.³
6 x 3½ x 1	18 x 1	378.0	58.2	2751.3	301.5
6 x 3½ x 15/16	18 x 15/16	348.6	53.9	2606.8	285.7
6 x 3½ x 7/8	18 x 7/8	319.8	49.7	2459.2	269.5
6 x 3½ x 13/16	18 x 13/16	291.8	45.5	2307.4	252.9
6 x 3½ x 3/4	18 x 3/4	264.7	41.5	2152.9	235.9
6 x 3½ x 11/16	18 x 11/16	238.4	37.6	1994.3	218.6
6 x 3½ x 5/8	18 x 5/8	213.0	33.7	1832.8	200.9
6 x 3½ x 9/16	18 x 9/16	188.4	30.0	1667.1	182.7
6 x 3½ x 1/2	18 x 1/2	164.6	26.3	1497.5	164.1
6 x 3½ x 7/16	18 x 7/16	141.5	22.8	1324.4	145.1
6 x 3½ x 3/8	18 x 3/8	119.3	19.3	1147.4	125.7
6 x 3½ x 1	16 x 1	377.8	58.1	2089.1	257.1
6 x 3½ x 15/16	16 x 15/16	348.5	53.9	1981.1	243.8
6 x 3½ x 7/8	16 x 7/8	319.7	49.7	1870.4	230.2
6 x 3½ x 13/16	16 x 13/16	291.7	45.5	1756.4	216.2
6 x 3½ x 3/4	16 x 3/4	264.6	41.5	1640.2	201.9
6 x 3½ x 11/16	16 x 11/16	238.4	37.6	1520.6	187.2
6 x 3½ x 5/8	16 x 5/8	213.0	33.7	1398.6	172.1
6 x 3½ x 9/16	16 x 9/16	188.4	30.0	1273.2	156.7
6 x 3½ x 1/2	16 x 1/2	164.5	26.3	1144.7	140.9
6 x 3½ x 7/16	16 x 7/16	141.5	22.8	1013.2	124.7
6 x 3½ x 3/8	16 x 3/8	119.2	19.3	878.6	108.1
6 x 3½ x 1	14 x 1	377.7	58.1	1526.9	214.3
6 x 3½ x 15/16	14 x 15/16	348.4	53.9	1449.5	203.4
6 x 3½ x 7/8	14 x 7/8	319.6	49.6	1370.0	192.3
6 x 3½ x 13/16	14 x 13/16	291.6	45.5	1287.9	180.8
6 x 3½ x 3/4	14 x 3/4	264.6	41.5	1203.9	169.0
6 x 3½ x 11/16	14 x 11/16	238.3	37.6	1117.3	156.8
6 x 3½ x 5/8	14 x 5/8	212.9	33.7	1028.8	144.4
6 x 3½ x 9/16	14 x 9/16	188.3	30.0	937.6	131.6
6 x 3½ x 1/2	14 x 1/2	164.5	26.3	843.9	118.4
6 x 3½ x 7/16	14 x 7/16	141.5	22.8	747.7	104.9
6 x 3½ x 3/8	14 x 3/8	119.2	19.3	649.1	91.1
6 x 3½ x 1	12 x 1	377.5	58.1	1060.8	173.2
6 x 3½ x 15/16	12 x 15/16	348.2	53.8	1008.4	164.6
6 x 3½ x 7/8	12 x 7/8	319.5	49.6	954.4	155.8
6 x 3½ x 13/16	12 x 13/16	291.5	45.5	898.5	146.7
6 x 3½ x 3/4	12 x 3/4	264.5	41.5	841.2	137.2
6 x 3½ x 11/16	12 x 11/16	238.3	37.6	781.8	127.6
6 x 3½ x 5/8	12 x 5/8	212.9	33.7	720.9	117.7
6 x 3½ x 9/16	12 x 9/16	188.3	30.0	657.9	107.4
6 x 3½ x 1/2	12 x 1/2	164.5	26.3	593.0	96.8
6 x 3½ x 7/16	12 x 7/16	141.5	22.8	526.2	85.9
6 x 3½ x 3/8	12 x 3/8	119.2	19.3	457.5	74.7

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND ANGLE COLUMNS.



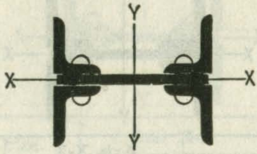
Size of angles	Size of plate	Axis X-X		Axis Y-Y	
		Moment of inertia	Section modulus	Moment of inertia	Section modulus
Inches	Inches	Ins.⁴	Ins.³	Ins.⁴	Ins.³
5 x 3½ x 15/16	16 x 15/16	214.6	39.2	1761.0	216.7
5 x 3½ x 7/8	16 x 7/8	196.0	36.0	1663.3	204.7
5 x 3½ x 13/16	16 x 13/16	178.1	32.9	1562.6	192.3
5 x 3½ x 3/4	16 x 3/4	160.8	29.9	1459.8	179.7
5 x 3½ x 11/16	16 x 11/16	144.2	27.0	1354.0	166.6
5 x 3½ x 5/8	16 x 5/8	128.3	24.2	1245.9	153.3
5 x 3½ x 9/16	16 x 9/16	113.0	21.4	1134.7	139.7
5 x 3½ x 1/2	16 x 1/2	98.3	18.7	1020.6	125.6
5 x 3½ x 7/16	16 x 7/16	84.1	16.1	903.8	111.2
5 x 3½ x 3/8	16 x 3/8	70.6	13.6	784.0	96.5
5 x 3½ x 5/16	16 x 5/16	57.6	11.2	660.8	81.3
5 x 3½ x 15/16	14 x 15/16	214.4	39.2	1283.1	180.1
5 x 3½ x 7/8	14 x 7/8	195.9	36.0	1213.2	170.3
5 x 3½ x 13/16	14 x 13/16	178.0	32.9	1141.0	160.1
5 x 3½ x 3/4	14 x 3/4	160.8	29.9	1067.1	149.8
5 x 3½ x 11/16	14 x 11/16	144.2	27.0	990.8	139.1
5 x 3½ x 5/8	14 x 5/8	128.3	24.1	912.7	128.1
5 x 3½ x 9/13	14 x 9/16	112.9	21.4	832.1	116.8
5 x 3½ x 1/2	14 x 1/2	98.2	18.7	749.3	105.2
5 x 3½ x 7/16	14 x 7/16	84.1	16.1	664.2	93.2
5 x 3½ x 3/8	14 x 3/8	70.6	13.6	576.9	81.0
5 x 3½ x 5/16	14 x 5/16	57.6	11.2	486.8	68.3
5 x 3½ x 15/16	12 x 15/16	214.3	39.2	888.2	145.0
5 x 3½ x 7/8	12 x 7/8	195.8	36.0	841.0	137.3
5 x 3½ x 13/16	12 x 13/16	177.9	32.9	792.1	129.3
5 x 3½ x 3/4	12 x 3/4	160.7	29.9	741.8	121.1
5 x 3½ x 11/16	12 x 11/16	144.1	27.0	689.8	112.6
5 x 3½ x 5/8	12 x 5/8	128.2	24.1	636.4	103.9
5 x 3½ x 9/16	12 x 9/16	112.9	21.4	581.0	94.9
5 x 3½ x 1/2	12 x 1/2	98.2	18.7	524.0	85.5
5 x 3½ x 7/16	12 x 7/16	84.1	16.1	465.2	75.9
5 x 3½ x 3/8	12 x 3/8	70.6	13.6	401.6	66.1
5 x 3½ x 5/16	12 x 5/16	57.6	11.2	341.9	55.8
5 x 3½ x 15/16	10 x 15/16	214.2	39.2	572.5	111.7
5 x 3½ x 7/8	10 x 7/8	195.7	36.0	543.1	106.0
5 x 3½ x 13/16	10 x 13/16	177.8	32.9	512.6	100.0
5 x 3½ x 3/4	10 x 3/4	160.6	29.9	481.1	93.9
5 x 3½ x 11/16	10 x 11/16	144.1	27.0	448.2	87.5
5 x 3½ x 5/8	10 x 5/8	128.2	24.1	414.4	80.9
5 x 3½ x 9/16	10 x 9/16	112.9	21.4	379.1	74.0
5 x 3½ x 1/2	10 x 1/2	98.2	18.7	342.6	66.9
5 x 3½ x 7/16	10 x 7/16	84.1	16.1	304.8	59.5
5 x 3½ x 3/8	10 x 3/8	70.6	13.6	265.7	51.8
5 x 3½ x 5/16	10 x 5/16	57.6	11.2	225.0	43.9

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND ANGLE COLUMNS.



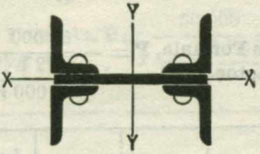
Size of angles	Size of plate	Axis X-X		Axis Y-Y	
		Moment of inertia	Section modulus	Moment of inertia	Section inertia
Inches	Inches	$Ins.^3$	$Ins.^4$	$Ins.^3$	$Ins.^4$
4 x 3 x 7/8	14 x 7/8	108.8	24.5	1030.1	144.6
4 x 3 x 13/16	14 x 13/16	98.3	22.3	969.8	136.1
4 x 3 x 3/4	14 x 3/4	88.3	20.2	907.7	127.4
4 x 3 x 11/16	14 x 11/16	78.7	18.1	843.7	118.4
4 x 3 x 5/8	14 x 5/8	69.6	16.1	777.8	109.2
4 x 3 x 9/16	14 x 9/16	60.9	14.2	709.6	99.6
4 x 3 x 1/2	14 x 1/2	52.7	12.4	639.7	89.8
4 x 3 x 7/16	14 x 7/16	44.8	10.6	567.4	79.6
4 x 3 x 3/8	14 x 3/8	37.4	8.9	493.4	69.3
4 x 3 x 5/16	14 x 5/16	30.3	7.3	416.8	58.5
4 x 3 x 7/8	12 x 7/8	108.7	24.5	713.1	116.4
4 x 3 x 13/16	12 x 13/16	98.2	22.3	672.2	109.8
4 x 3 x 3/4	12 x 3/4	88.2	20.2	630.1	102.9
4 x 3 x 11/16	12 x 11/16	78.7	18.1	586.5	95.8
4 x 3 x 5/8	12 x 5/8	69.6	16.1	541.5	88.4
4 x 3 x 9/16	12 x 9/16	60.9	14.2	494.7	80.8
4 x 3 x 1/2	12 x 1/2	52.6	12.4	446.6	72.9
4 x 3 x 7/16	12 x 7/16	44.8	10.6	396.7	64.8
4 x 3 x 3/8	12 x 3/8	37.4	8.9	345.5	56.4
4 x 3 x 5/16	12 x 5/16	30.3	7.3	292.3	47.7
4 x 3 x 7/8	10 x 7/8	108.6	24.5	459.8	89.7
4 x 3 x 13/16	10 x 13/16	98.2	22.3	434.4	84.7
4 x 3 x 3/4	10 x 3/4	88.2	20.2	408.0	79.6
4 x 3 x 11/16	10 x 11/16	78.6	18.1	380.5	74.2
4 x 3 x 5/8	10 x 5/8	69.5	16.1	352.0	68.7
4 x 3 x 9/16	10 x 9/16	60.9	14.2	322.2	62.9
4 x 3 x 1/2	10 x 1/2	52.6	12.4	291.5	56.9
4 x 3 x 7/16	10 x 7/16	44.8	10.6	259.5	50.6
4 x 3 x 3/8	10 x 3/8	37.4	8.9	226.4	44.2
4 x 3 x 5/16	10 x 5/16	30.3	7.3	192.0	37.5
4 x 3 x 7/8	8 x 7/8	108.5	24.4	267.0	64.7
4 x 3 x 13/16	8 x 13/16	98.1	22.3	253.0	61.3
4 x 3 x 3/4	8 x 3/4	88.1	20.1	238.3	57.8
4 x 3 x 11/16	8 x 11/16	78.6	18.1	223.0	54.1
4 x 3 x 5/8	8 x 5/8	69.5	16.1	206.9	50.2
4 x 3 x 9/16	8 x 9/16	60.8	14.2	190.0	46.1
4 x 3 x 1/2	8 x 1/2	52.6	12.4	172.4	41.8
4 x 3 x 7/16	8 x 7/16	44.8	10.6	154.0	37.3
4 x 3 x 3/8	8 x 3/8	37.4	8.9	134.8	32.7
4 x 3 x 5/16	8 x 5/16	30.3	7.3	114.6	27.8

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND ANGLE COLUMNS.



Size of angles	Size of plate	Axis X-X Moment of inertia	Axis X-X Section modulus	Axis Y-Y Moment of inertia	Axis Y-Y Section modulus
Inches	Inches	Ins.	Ins.	Ins.	Ins.
3½ x 2½ x ¾	12 x ¾	61.8	15.9	563.3	92.0
3½ x 2½ x 11/16	12 x 11/16	54.9	14.3	524.8	85.7
3½ x 2½ x ⅝	12 x ⅝	48.4	12.7	484.9	79.2
3½ x 2½ x 9/16	12 x 9/16	42.2	11.2	443.4	72.4
3½ x 2½ x ½	12 x ½	36.4	9.7	400.7	65.4
3½ x 2½ x 7/16	12 x 7/16	30.8	8.3	356.2	58.2
3½ x 2½ x ⅜	12 x ⅜	25.6	7.0	310.5	50.7
3½ x 2½ x 5/16	12 x 5/16	20.7	5.7	262.9	42.9
3½ x 2½ x ¼	12 x ¼	16.0	4.4	213.7	34.9
3½ x 2½ x ¾	10 x ¾	61.7	15.9	365.6	71.3
3½ x 2½ x 11/16	10 x 11/16	54.9	14.3	341.2	66.6
3½ x 2½ x ⅝	10 x ⅝	48.3	12.7	315.9	61.7
3½ x 2½ x 9/16	10 x 9/16	42.2	11.2	289.4	56.5
3½ x 2½ x ½	10 x ½	36.3	9.7	262.1	51.1
3½ x 2½ x 7/16	10 x 7/16	30.8	8.3	233.5	45.6
3½ x 2½ x ⅜	10 x ⅜	25.6	6.9	203.9	39.8
3½ x 2½ x 5/16	10 x 5/16	20.7	5.7	173.0	33.8
3½ x 2½ x ¼	10 x ¼	16.0	4.4	140.9	27.5
3½ x 2½ x ¾	8 x ¾	61.6	15.9	214.3	52.0
3½ x 2½ x 11/16	8 x 11/16	54.8	14.3	200.6	48.6
3½ x 2½ x ⅝	8 x ⅝	48.3	12.7	186.3	45.2
3½ x 2½ x 9/16	8 x 9/16	42.1	11.1	171.2	41.5
3½ x 2½ x ½	8 x ½	36.3	9.7	155.5	37.7
3½ x 2½ x 7/16	8 x 7/16	30.8	8.3	138.9	33.7
3½ x 2½ x ⅜	8 x ⅜	25.6	6.9	121.7	29.5
3½ x 2½ x 5/16	8 x 5/16	20.7	5.7	103.6	25.1
3½ x 2½ x ¼	8 x ¼	16.0	4.4	84.7	20.5
3½ x 2½ x ¾	7 x ¾	61.6	15.9	155.2	42.8
3½ x 2½ x 11/16	7 x 11/16	54.8	14.3	145.6	40.2
3½ x 2½ x ⅝	7 x ⅝	48.3	12.7	135.5	37.4
3½ x 2½ x 9/16	7 x 9/16	42.1	11.1	124.8	34.4
3½ x 2½ x ½	7 x ½	36.3	9.7	113.6	31.3
3½ x 2½ x 7/16	7 x 7/16	30.8	8.3	101.7	28.1
3½ x 2½ x ⅜	7 x ⅜	25.6	6.9	89.3	24.6
3½ x 2½ x 5/16	7 x 5/16	20.7	5.7	76.2	21.0
3½ x 2½ x ¼	7 x ¼	16.0	4.4	62.4	17.2

MOMENTS OF INERTIA AND SECTION MODULI FOR PLATE AND ANGLE COLUMNS.

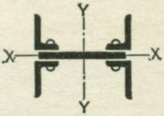


Size of angles	Size of plate	Axis-X-X		Axis-Y-Y	
		Moment of inertia	Section modulus	Moment of inertia	Section modulus
Inches	Inches	Ins.^{4}	Ins.^{3}	Ins.^{4}	Ins.^{3}
3 x 2½ x ⅝	12 x ⅝	32.5	9.8	442.7	72.3
3 x 2½ x 9/16	12 x 9/16	28.2	8.6	405.1	66.1
3 x 2½ x ½	12 x ½	24.1	7.4	366.1	59.8
3 x 2½ x 7/16	12 x 7/16	20.3	6.3	325.8	53.2
2 x 2½ x ⅜	12 x ⅜	16.7	5.3	284.0	46.4
3 x 2½ x 5/16	12 x 5/16	13.4	4.3	240.5	39.3
3 x 2½ x ¼	12 x ¼	10.3	3.3	195.7	32.0
3 x 2½ x ⅝	10 x ⅝	32.5	9.8	286.9	56.0
3 x 2½ x 9/16	10 x 9/16	28.1	8.6	263.1	51.3
3 x 2½ x ½	10 x ½	24.1	7.4	238.3	46.5
3 x 2½ x 7/16	10 x 7/16	20.3	6.3	212.5	41.5
3 x 2½ x ⅜	10 x ⅜	16.7	5.3	185.6	36.2
3 x 2½ x 5/16	10 x 5/16	13.4	4.3	157.5	30.7
3 x 2½ x ¼	10 x ¼	10.3	3.3	128.4	25.1
3 x 2½ x ⅝	8 x ⅝	32.4	9.8	168.1	40.8
3 x 2½ x 9/16	8 x 9/16	28.1	8.6	154.6	37.5
3 x 2½ x ½	8 x ½	24.0	7.4	140.5	34.1
3 x 2½ x 7/16	8 x 7/16	20.3	6.3	125.6	30.5
3 x 2½ x ⅜	8 x ⅜	16.7	5.3	110.1	26.7
3 x 2½ x 5/16	8 x 5/16	13.4	4.3	93.7	22.7
3 x 2½ x ¼	8 x ¼	10.3	3.3	76.7	18.6
3 x 2½ x ⅝	6 x ⅝	32.4	9.8	83.7	26.8
3 x 2½ x 9/16	6 x 9/16	28.1	8.6	77.3	24.8
3 x 2½ x ½	6 x ½	24.0	7.4	70.6	22.6
3 x 2½ x 7/16	6 x 7/16	20.2	6.3	63.5	20.3
3 x 2½ x ⅜	6 x ⅜	16.7	5.2	55.9	17.9
3 x 2½ x 5/16	6 x 5/16	13.4	4.3	47.9	15.3
3 x 2½ x ¼	6 x ¼	10.3	3.3	39.4	12.6

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.
Safety factor 4.



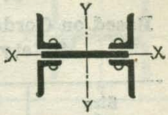
Size of angles	Size of plate	Weight of column	Area of column section	Least radius of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet	
Inches	Inches	Lbs. per foot	Sq. ins.	Ins.	Ins.	10	12
7 x 3½ x 1	20 x 1	197.2	58.00	3.15	8.19	...	...
7 x 3½ x 15/16	20 x 15/16	185.8	54.65	3.12	8.21	...	...
7 x 3½ x 7/8	20 x 7/8	174.3	51.23	3.09	8.23	...	...
7 x 3½ x 13/16	20 x 13/16	162.5	47.77	3.06	8.25	...	...
7 x 3½ x ¾	20 x ¾	150.6	44.29	3.03	8.28	...	...
7 x 3½ x 11/16	20 x 11/16	138.7	40.73	3.00	8.30	...	...
7 x 3½ x 5/8	20 x 5/8	126.5	37.23	2.97	8.32	...	...
7 x 3½ x 9/16	20 x 9/16	114.7	33.61	2.95	8.34	...	...
7 x 3½ x ½	20 x ½	102.0	30.00	2.92	8.37	...	...
7 x 3½ x 7/16	20 x 7/16	89.8	26.40	2.89	8.39	...	...
7 x 3½ x 1	18 x 1	190.4	56.00	3.20	7.38	...	693
7 x 3½ x 15/16	18 x 15/16	179.4	52.78	3.17	7.40	...	652
7 x 3½ x 7/8	18 x 7/8	168.4	49.48	3.14	7.42	...	612
7 x 3½ x 13/16	18 x 13/16	156.9	46.15	3.11	7.44	...	570
7 x 3½ x ¾	18 x ¾	145.5	42.79	3.08	7.47	...	529
7 x 3½ x 11/16	18 x 11/16	134.1	39.36	3.06	7.49	...	487
7 x 3½ x 5/8	18 x 5/8	122.3	35.98	3.02	7.51	...	445
7 x 3½ x 9/16	18 x 9/16	110.8	32.49	3.00	7.53	...	402
7 x 3½ x ½	18 x ½	98.6	29.00	2.97	7.55	...	359
7 x 3½ x 7/16	18 x 7/16	86.8	25.53	2.94	7.58	...	315
7 x 3½ x 1	16 x 1	183.6	54.00	3.26	6.56	...	666
7 x 3½ x 15/16	16 x 15/16	173.0	50.90	3.23	6.58	...	627
7 x 3½ x 7/8	16 x 7/8	162.4	47.73	3.20	6.60	...	588
7 x 3½ x 13/16	16 x 13/16	151.4	44.52	3.17	6.62	...	549
7 x 3½ x ¾	16 x ¾	140.4	41.29	3.14	6.64	...	509
7 x 3½ x 11/16	16 x 11/16	129.4	37.98	3.11	6.67	...	469
7 x 3½ x 5/8	16 x 5/8	118.0	34.73	3.08	6.69	...	428
7 x 3½ x 9/16	16 x 9/16	107.0	31.36	3.06	6.71	...	387
7 x 3½ x ½	16 x ½	95.2	28.00	3.02	6.73	...	346
7 x 3½ x 7/16	16 x 7/16	83.8	24.65	3.00	6.75	...	304
7 x 3½ x 1	14 x 1	176.8	52.00	3.32	5.72	642	639
7 x 3½ x 15/16	14 x 15/16	166.6	49.03	3.29	5.74	605	602
7 x 3½ x 7/8	14 x 7/8	156.5	49.03	3.26	5.76	567	564
7 x 3½ x 13/16	14 x 13/16	145.9	42.90	3.23	5.79	529	527
7 x 3½ x ¾	14 x ¾	135.3	39.79	3.20	5.81	491	489
7 x 3½ x 11/16	14 x 11/16	124.7	36.61	3.17	5.83	452	450
7 x 3½ x 5/8	14 x 5/8	113.7	33.48	3.13	5.85	413	411
7 x 3½ x 9/16	14 x 9/16	103.2	30.24	3.11	5.87	374	372
7 x 3½ x ½	14 x ½	91.8	27.00	3.08	5.90	334	332
7 x 3½ x 7/16	14 x 7/16	80.8	23.78	3.05	5.92	293	292

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.



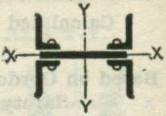
Length in feet													
14	16	18	20	22	24	26	28	30	32	34	36	38	40
717	714	711	708	705	701	697	693	688	683	678	673	667	662
675	672	670	667	664	660	656	652	648	644	639	634	629	623
633	630	628	625	622	619	615	612	608	603	599	594	590	585
590	588	585	583	580	577	574	570	567	563	559	554	550	545
547	545	543	541	538	535	532	529	526	522	518	514	510	506
503	502	500	498	495	493	490	487	484	481	477	473	470	466
460	458	456	454	452	450	447	445	442	439	436	432	429	426
415	414	412	411	409	407	404	402	399	397	394	391	388	385
371	370	368	367	365	363	361	359	357	354	352	349	346	344
326	325	324	322	321	319	317	315	313	311	309	307	305	302
690	687	684	680	676	672	667	662	657	651	645	639	633	626
650	647	644	641	637	633	628	624	619	613	608	602	596	590
609	607	604	601	597	593	589	585	580	575	570	565	559	554
568	566	563	560	557	553	550	546	541	537	532	527	522	517
527	525	522	519	516	513	510	506	502	498	493	489	484	479
485	483	481	478	476	473	469	466	462	459	455	450	446	442
443	441	439	437	434	432	429	426	422	419	415	411	408	403
401	399	397	395	393	390	388	385	382	379	376	372	369	365
358	356	354	353	351	348	346	344	341	338	335	332	329	326
314	313	312	310	308	306	304	302	300	297	295	292	290	287
663	659	655	651	646	641	635	629	623	616	609	602	595	588
624	621	617	613	609	604	598	593	587	581	574	568	561	554
586	582	579	575	571	566	561	556	551	545	539	533	526	520
546	543	540	536	532	528	524	519	514	509	503	497	491	485
507	504	501	498	494	490	486	481	477	472	467	461	456	450
467	464	461	458	455	451	448	443	439	435	430	425	420	415
426	424	421	419	416	412	409	405	401	397	393	389	384	379
385	383	381	379	376	373	370	366	363	359	355	352	347	343
344	342	340	338	336	333	330	327	324	321	318	314	310	307
302	301	299	297	295	293	290	288	285	282	279	276	273	270
635	630	625	620	614	607	600	593	586	578	570	561	553	544
598	594	589	584	578	572	566	559	552	545	537	529	521	513
561	557	553	548	543	537	531	525	518	511	504	497	489	482
523	520	516	511	506	501	496	490	484	477	471	464	457	450
486	482	478	474	470	465	460	455	449	443	437	431	424	418
447	444	441	437	433	429	424	419	414	408	403	397	391	385
409	406	403	399	396	392	387	383	378	373	368	363	358	352
370	367	364	361	358	354	351	347	342	338	333	329	324	319
330	328	325	323	320	317	313	310	306	302	298	294	289	285
290	288	286	284	281	278	275	272	269	266	262	258	255	251

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



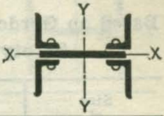
Size of angles	Size of plates	Weight of column	Area of column section	Least rad. of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet		
Inches	Inches	Lbs. per ft.	Sq. ins.	Ins.	Ins.	6	8	10
6x3½x1	18x1	176.8	52.00	2.70	7.27	...	...	...
6x3½x15/16	18x15/16	166.6	48.99	2.67	7.29	...	...	...
6x3½x⅞	18x⅞	156.4	45.94	2.64	7.32	...	...	...
6x3½x13/16	18x13/16	145.7	42.86	2.61	7.34	...	...	...
6x3½x¾	18x¾	135.5	39.79	2.58	7.36	...	...	...
6x3½x11/16	18x11/16	124.5	36.61	2.55	7.38	...	...	...
6x3½x⅝	18x⅝	113.9	33.44	2.52	7.40	...	...	...
6x3½x9/16	18x9/16	102.8	30.24	2.50	7.42	...	...	...
6x3½x½	18x½	91.8	27.00	2.47	7.45	...	...	...
6x3½x7/16	18x7/16	80.8	23.78	2.44	7.47	...	...	...
6x3½x⅜	18x⅜	69.8	20.48	2.42	7.49	...	...	...
5x3½x15/16	16x15/16	147.8	43.36	2.22	6.37	...	...	537
5x3½x⅞	16x⅞	138.4	40.73	2.19	6.39	...	...	504
5x3½x13/16	16x13/16	129.4	37.98	2.17	6.41	...	...	470
5x3½x¾	16x¾	120.0	35.29	2.14	6.44	...	...	436
5x3½x11/16	16x11/16	110.6	32.52	2.11	6.46	...	...	402
5x3½x⅝	16x⅝	101.2	29.73	2.08	6.48	...	...	368
5x3½x9/16	16x9/16	91.4	26.90	2.05	6.50	...	...	333
5x3½x½	16x½	81.6	24.00	2.02	6.52	...	...	297
5x3½x7/16	16x7/16	71.8	21.11	2.00	6.54	...	...	261
5x3½x⅜	16x⅜	62.0	18.19	1.97	6.57	...	...	225
5x3½x5/16	16x5/16	51.8	15.23	1.94	6.59	...	...	189
4x3x⅞	14x⅞	114.9	33.69	1.80	5.53	...	418	416
4x3x13/16	14x13/16	107.1	31.49	1.77	5.55	...	390	389
4x3x¾	14x¾	99.7	29.25	1.74	5.57	...	363	361
4x3x11/16	14x11/16	91.9	26.99	1.71	5.59	...	335	333
4x3x⅝	14x⅝	84.1	24.73	1.68	5.61	...	306	305
4x3x9/16	14x9/16	76.4	22.40	1.65	5.63	...	277	276
4x3x½	14x½	68.2	20.00	1.62	5.66	...	248	247
4x3x7/16	14x7/16	60.0	17.65	1.60	5.68	...	218	217
4x3x⅜	14x⅜	51.9	15.23	1.57	5.70	...	188	188
4x3x5/16	14x5/16	43.7	12.74	1.54	5.72	...	158	157
3½x2½x¾	12x¾	84.2	24.75	1.58	4.77	...	306	304
3½x2½x11/16	12x11/16	78.1	22.90	1.55	4.79	...	283	281
3½x2½x⅝	12x⅝	71.5	20.94	1.52	4.81	...	259	257
3½x2½x9/16	12x9/16	64.6	18.98	1.49	4.83	...	235	233
3½x2½x½	12x½	58.0	17.00	1.46	4.85	...	210	209
3½x2½x7/16	12x7/16	51.1	15.02	1.43	4.88	...	185	184
3½x2½x⅜	12x⅜	44.1	12.94	1.41	4.90	...	160	159
3½x2½x5/16	12x5/16	37.2	10.86	1.38	4.92	...	134	134
3½x2½x¼	12x¼	29.8	8.75	1.35	4.94	...	108	108
3x2½x⅝	12x⅝	67.1	19.69	1.28	4.74	245	243	242
3x2½x9/16	12x9/16	61.0	17.86	1.26	4.76	222	221	219
3x2½x½	12x½	54.4	16.00	1.23	4.78	199	198	197
3x2½x7/16	12x7/16	48.3	14.15	1.20	4.81	175	174	173
3x2½x⅜	12x⅜	41.7	12.23	1.17	4.83	151	151	150
3x2½x5/16	12x5/16	35.2	10.27	1.15	4.85	127	126	126
3x2½x¼	12x¼	28.2	8.29	1.12	4.87	103	102	101

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



Length in feet

12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
643	641	638	634	631	627	623	618	614	609	603	598	592	586	580
606	603	601	598	595	591	587	583	578	574	569	563	558	552	547
568	566	563	561	558	554	551	547	542	538	533	529	524	518	513
530	528	526	523	520	517	514	510	506	502	498	493	489	484	479
492	490	488	485	483	480	477	473	470	466	462	458	453	449	444
453	451	449	447	445	442	439	436	433	429	426	422	418	414	410
414	412	410	408	406	404	401	398	395	392	389	385	382	378	374
374	373	371	369	367	365	363	360	358	355	352	349	346	342	339
334	333	331	330	328	326	324	322	319	317	314	312	309	306	303
294	293	291	290	288	287	285	283	281	279	276	274	272	269	266
253	252	251	250	248	247	245	244	242	240	238	236	234	232	229
534	532	529	525	521	517	513	508	503	498	492	487	481	475	468
502	499	496	493	489	486	481	477	472	467	462	457	451	446	440
468	466	463	460	457	453	450	445	441	437	432	427	422	416	411
435	432	430	427	424	421	417	414	410	405	401	396	392	387	382
400	399	396	394	391	388	385	381	378	374	370	365	361	357	352
366	364	362	360	357	355	352	349	345	342	338	334	330	326	322
331	330	328	326	324	321	318	316	313	309	306	303	299	295	292
296	295	293	291	289	287	285	282	279	277	274	271	267	264	261
260	259	258	256	254	252	250	248	246	243	241	238	235	233	230
224	223	222	221	219	218	216	214	212	210	208	205	203	201	198
188	187	186	185	184	182	181	179	178	176	174	172	170	168	166
413	411	407	404	400	396	392	387	382	377	371	366	360	354	348
386	384	381	378	374	370	366	362	357	352	347	342	337	331	326
359	357	354	351	348	344	340	336	332	328	323	318	313	308	303
331	329	327	324	321	318	314	311	307	303	298	294	289	285	280
303	301	299	296	294	291	288	284	281	277	273	269	265	261	257
275	273	271	269	266	263	261	258	254	251	248	244	240	236	233
246	244	242	240	238	236	233	231	228	225	222	218	215	212	208
216	215	213	212	210	208	205	203	201	198	195	193	190	187	184
187	185	184	183	181	179	177	175	173	171	169	166	164	161	159
156	156	154	153	152	150	149	147	145	143	142	140	137	135	133
302	299	296	293	289	285	281	277	272	267	262	257	252	247	241
279	276	274	270	267	264	260	256	251	247	242	238	233	228	233
255	253	251	248	245	242	238	234	231	227	222	218	214	210	205
232	230	227	225	222	219	216	213	209	206	202	198	194	190	186
207	206	204	201	199	196	194	191	188	184	181	178	174	171	167
183	181	180	178	175	173	171	168	165	163	160	157	154	151	148
158	157	155	153	152	150	148	145	143	141	138	136	133	130	128
133	131	130	129	127	126	124	122	120	118	116	114	112	110	107
107	106	105	104	103	101	100	98	97	95	94	92	90	88	87
240	238	235	233	230	227	223	220	216	212	208	204	200	196	192
218	216	214	211	209	206	203	199	196	193	189	185	182	178	174
195	193	191	189	187	184	182	179	176	173	170	166	163	160	156
172	171	169	167	165	163	160	158	155	153	150	147	144	141	138
149	147	146	144	143	141	139	137	134	132	130	127	125	122	120
125	124	123	121	120	118	116	115	113	111	109	107	105	103	101
101	100	99	98	97	95	94	93	91	90	88	86	85	83	81

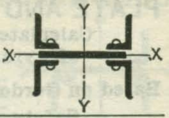
SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration.

Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



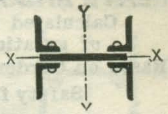
Size of angles	Size of plates	Weight of column	Area of column section	Least rad. of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet		
Inches	Inches	Lbs. per ft.	Sq. ins.	Ins.	Ins.	6	8	10
6 x3½x1	16x1	170.0	50.00	2.75	6.46	...	...	...
6 x3½x15/16	16x15/16	160.2	47.11	2.72	6.48	...	...	...
6 x3½x7/8	16x7/8	150.4	44.19	2.69	6.51	...	...	...
6 x3½x13/16	16x13/16	140.2	41.23	2.65	6.53	...	...	...
6 x3½x¾	16x¾	130.4	38.29	2.63	6.55	...	...	...
6 x3½x11/16	16x11/16	119.8	35.23	2.60	6.57	...	...	...
6 x3½x5/8	16x5/8	109.6	32.19	2.57	6.59	...	...	...
6 x3½x9/16	16x9/16	99.0	29.11	2.54	6.61	...	...	...
6 x3½x½	16x½	88.4	26.00	2.52	6.64	...	...	...
6 x3½x7/16	16x7/16	77.8	22.90	2.49	6.66	...	...	...
6 x3½x3/8	16x3/8	67.2	19.73	2.46	6.68	...	...	...
5 x3½x15/16	14x15/16	141.4	41.49	2.27	5.56	...	...	512
5 x3½x7/8	14x7/8	132.5	38.98	2.24	5.58	...	...	481
5 x3½x13/16	14x13/16	123.9	36.35	2.21	5.60	...	...	449
5 x3½x¾	14x¾	114.9	33.79	2.18	5.62	...	...	417
5 x3½x11/16	14x11/16	105.9	31.15	2.15	5.64	...	...	384
5 x3½x5/8	14x5/8	96.9	28.48	2.12	5.67	...	...	351
5 x3½x9/16	14x9/16	87.6	25.78	2.09	5.69	...	...	318
5 x3½x½	14x½	78.2	23.00	2.07	5.71	...	...	284
5 x3½x7/16	14x7/16	68.8	20.24	2.04	5.73	...	...	250
5 x3½x3/8	14x3/8	59.5	17.44	2.01	5.75	...	...	215
5 x3½x5/16	14x5/16	49.7	14.61	1.98	5.77	...	...	180
4 x3 x7/8	12x7/8	108.9	31.94	1.84	4.72	...	395	392
4 x3 x13/16	12x13/16	101.6	29.86	1.81	4.74	...	369	367
4 x3 x¾	12x¾	94.6	27.75	1.78	4.77	...	343	341
4 x3 x11/16	12x11/16	87.3	25.61	1.75	4.79	...	317	315
4 x3 x5/8	12x5/8	79.9	23.48	1.72	4.81	...	290	288
4 x3 x9/16	12x9/16	72.6	21.27	1.69	4.83	...	262	261
4 x3 x½	12x½	64.8	19.00	1.66	4.85	...	235	234
4 x3 x7/16	12x7/16	57.1	16.77	1.64	4.87	...	207	206
4 x3 x3/8	12x3/8	49.3	14.48	1.61	4.89	...	179	178
4 x3 x5/16	12x5/16	41.6	12.11	1.58	4.91	...	150	149
3½x2½x¾	10x¾	79.1	23.25	1.63	3.97	288	286	283
3½x2½x11/16	10x11/16	73.4	21.53	1.60	3.99	266	264	262
3½x2½x5/8	10x5/8	67.3	19.69	1.57	4.01	244	242	240
3½x2½x9/16	10x9/16	60.7	17.86	1.54	4.03	221	220	218
3½x2½x½	10x½	54.6	16.00	1.51	4.05	198	197	195
3½x2½x7/16	10x7/16	48.1	14.15	1.48	4.07	175	174	172
3½x2½x3/8	10x3/8	41.6	12.19	1.45	4.09	151	150	149
3½x2½x5/16	10x5/16	35.0	10.24	1.42	4.11	127	126	125
3½x2½x¼	10x¼	28.1	8.25	1.39	4.13	102	102	101
3 x2½x5/8	10x5/8	62.9	18.44	1.33	3.94	228	227	225
3 x2½x9/16	10x9/16	57.1	16.74	1.30	3.96	207	206	204
3 x2½x½	10x½	51.0	15.00	1.27	3.99	186	185	183
3 x2½x7/16	10x7/16	45.3	13.28	1.24	4.01	164	163	161
3 x2½x3/8	10x3/8	39.2	11.48	1.21	4.03	142	141	140
3 x2½x5/16	10x5/16	33.0	9.65	1.18	4.05	119	118	117
3 x2½x¼	10x¼	26.5	7.79	1.16	4.07	96	95	95

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\, r^2}}$

Safety factor 4.



Length in feet

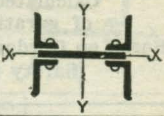
12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
617	613	610	606	602	597	592	587	581	575	569	563	556	549	542
581	578	575	571	567	563	558	553	548	542	537	531	524	518	511
545	542	539	536	532	528	524	519	514	509	504	498	492	486	480
509	506	503	500	497	493	489	485	480	475	470	465	459	454	448
472	470	467	464	461	457	454	450	446	441	436	432	427	421	416
435	433	430	428	425	421	418	414	411	406	402	398	393	388	384
397	395	393	391	388	385	382	379	375	372	368	364	359	355	351
359	357	356	353	351	348	346	343	340	336	333	329	325	321	317
321	319	318	316	314	311	309	306	303	300	297	294	291	287	284
282	281	279	278	276	274	272	269	267	264	262	259	256	253	250
243	242	241	239	238	236	234	232	230	228	225	223	221	218	215
509	506	502	498	493	488	483	477	471	465	458	451	444	437	430
478	475	471	467	463	458	453	448	442	436	430	424	417	411	404
446	443	440	436	432	428	423	418	413	408	402	396	390	384	378
414	412	409	405	402	398	393	389	384	379	373	368	362	357	351
382	380	377	374	370	367	363	358	354	349	345	340	334	329	324
349	347	345	342	339	335	332	328	324	320	315	311	306	301	296
316	314	312	309	307	304	300	297	293	290	286	281	277	273	269
283	281	279	277	274	271	269	265	262	259	255	252	248	244	240
249	247	245	243	241	239	236	234	231	228	225	222	218	215	212
214	213	211	210	208	206	204	202	199	197	194	191	188	186	183
180	178	177	176	174	173	171	169	167	165	163	160	158	156	153
389	386	382	377	373	367	362	356	350	344	337	331	324	317	310
364	361	357	353	348	344	339	333	328	322	316	310	303	297	291
338	335	332	328	324	320	315	310	305	299	294	288	282	277	271
312	310	306	303	299	295	291	286	282	277	272	266	261	256	250
286	283	281	277	274	270	266	262	258	254	249	244	239	234	229
259	257	254	251	248	245	242	238	234	230	226	221	217	213	208
232	230	228	225	222	216	216	213	210	206	202	198	195	191	187
204	202	200	198	196	193	191	188	185	182	178	175	172	168	165
176	175	173	171	169	167	165	162	160	157	154	151	148	145	142
148	147	145	144	142	140	138	136	134	132	129	127	125	122	120
280	277	273	268	264	259	253	248	242	236	231	225	219	213	207
259	256	252	248	244	239	235	230	224	219	214	208	203	197	191
238	235	231	228	224	220	215	211	206	201	196	191	186	181	176
216	213	210	207	203	199	195	191	187	183	178	174	169	165	160
193	191	188	185	182	179	175	172	168	164	160	156	152	148	144
170	168	166	164	161	158	155	152	148	145	141	138	134	131	127
147	146	144	141	139	137	134	131	128	125	122	119	116	113	110
124	122	121	119	117	115	113	110	108	106	103	101	98	95	93
100	99	97	96	94	93	91	89	87	85	83	81	79	77	75
222	219	216	213	209	205	201	196	192	187	182	178	173	168	163
202	199	196	193	190	186	183	179	174	170	166	162	157	153	149
181	179	176	173	170	167	164	160	157	153	149	145	141	138	134
160	158	156	153	150	148	145	142	138	135	132	128	125	122	118
138	136	135	132	130	128	125	123	120	117	114	111	108	106	103
116	115	113	111	109	107	105	103	101	98	96	94	91	89	86
94	92	91	90	88	87	85	83	81	80	78	76	74	72	70

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



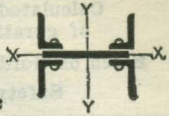
Size of angles	Size of plates	Weight of column	Area of column section	Least rad. of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet		
Inches	Inches	Lbs. per ft.	Sq. ins.	Ins.	Ins.	4	6	8
6 x3½x1	14x1	163.2	48.00	2.81	5.64	...	...	...
6 x3½x15/16	14x15/16	153.8	45.24	2.77	5.66	...	...	...
6 x3½x7/8	14x7/8	144.5	42.44	2.74	5.68	...	...	...
6 x3½x13/16	14x13/16	134.7	39.61	2.71	5.70	...	...	...
6 x3½x¾	14x¾	125.3	36.79	2.68	5.72	...	...	...
6 x3½x11/16	14x11/16	115.1	33.86	2.65	5.74	...	...	...
6 x3½x5/8	14x5/8	105.3	30.94	2.62	5.77	...	...	...
6 x3½x9/16	14x9/16	95.2	27.99	2.59	5.79	...	...	...
6 x3½x½	14x½	85.0	25.00	2.57	5.81	...	...	...
6 x3½x7/16	14x7/16	74.8	22.03	2.54	5.83	...	...	...
6 x3½x3/8	14x3/8	64.7	18.98	2.51	5.85	...	...	...
5 x3½x15/16	12x15/16	135.1	39.61	2.33	4.74	...	...	490
5 x3½x7/8	12x7/8	126.5	37.23	2.29	4.76	...	...	460
5 x3½x13/16	12x13/16	118.4	34.73	2.26	4.78	...	...	429
5 x3½x¾	12x¾	109.8	32.29	2.23	4.80	...	...	399
5 x3½x11/16	12x11/16	101.3	29.77	2.20	4.82	...	...	368
5 x3½x5/8	12x5/8	92.7	27.23	2.17	4.84	...	...	336
5 x3½x9/16	12x9/16	83.8	24.65	2.14	4.86	...	...	304
5 x3½x½	12x½	74.8	22.00	2.11	4.88	...	...	272
5 x3½x7/16	12x7/16	65.9	19.36	2.08	4.90	...	...	239
5 x3½x3/8	12x3/8	56.9	16.69	2.06	4.92	...	...	206
5 x3½x5/16	12x5/16	47.6	13.98	2.03	4.95	...	...	173
4 x3 x7/8	10x7/8	103.0	30.19	1.90	3.90	...	374	371
4 x3 x13/16	10x13/16	96.0	28.24	1.86	3.92	...	350	347
4 x3 x¾	10x¾	89.5	26.25	1.83	3.94	...	325	323
4 x3 x11/16	10x11/16	82.6	24.24	1.80	3.96	...	300	298
4 x3 x5/8	10x5/8	75.7	22.23	1.77	3.98	...	275	273
4 x3 x9/16	10x9/16	68.7	20.15	1.74	4.00	...	249	247
4 x3 x½	10x½	61.4	18.00	1.71	4.02	...	223	222
4 x3 x7/16	10x7/16	54.1	15.90	1.68	4.04	...	197	195
4 x3 x3/8	10x3/8	46.8	13.73	1.65	4.07	...	170	169
4 x3 x5/16	10x5/16	39.4	11.49	1.62	4.09	...	142	141
3½x2½x¾	8x¾	74.0	21.75	1.68	3.14	...	268	265
3½x2½x11/16	8x11/16	68.7	20.15	1.65	3.16	...	248	245
3½x2½x5/8	8x5/8	63.0	18.44	1.62	3.18	...	227	225
3½x2½x9/16	8x9/16	56.9	16.73	1.59	3.20	...	206	204
3½x2½x½	8x½	51.2	15.00	1.56	3.22	...	185	183
3½x2½x7/16	8x7/16	45.1	13.27	1.53	3.24	...	163	161
3½x2½x3/8	8x3/8	39.0	11.44	1.50	3.26	...	141	140
3½x2½x5/16	8x5/16	32.9	9.61	1.47	3.28	...	119	117
3½x2½x¼	8x¼	26.4	7.75	1.44	3.31	...	96	95
3 x2½x5/8	8x5/8	58.6	17.19	1.37	3.13	213	212	209
3 x2½x9/16	8x9/16	53.3	15.61	1.34	3.15	194	192	190
3 x2½x½	8x½	47.6	14.00	1.31	3.17	174	173	171
3 x2½x7/16	8x7/16	42.3	12.40	1.28	3.19	154	152	151
3 x2½x3/8	8x3/8	36.6	10.73	1.25	3.21	183	132	130
3 x2½x5/16	8x5/16	30.9	9.02	1.22	3.23	112	111	110
3 x2½x¼	8x¼	24.8	7.29	1.19	3.25	90	89	88

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



Length in feet

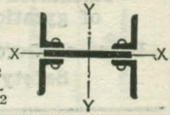
10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
593	589	586	581	577	571	566	559	553	546	539	532	524	516	508	500
559	556	552	548	544	539	533	528	521	515	508	501	494	487	479	471
524	521	518	514	510	505	500	495	490	484	477	471	464	457	450	443
489	487	483	480	476	472	467	462	457	452	446	440	433	427	420	414
454	451	449	445	442	438	434	429	424	419	414	408	403	397	391	384
418	416	413	411	407	404	400	396	391	387	382	377	371	366	360	355
382	380	378	375	372	369	365	362	358	353	349	344	340	335	330	324
346	344	342	340	337	334	331	327	324	320	316	312	307	303	298	294
309	307	305	303	301	298	296	293	289	286	282	279	275	271	267	263
272	270	269	267	265	263	260	257	255	252	249	245	242	239	235	231
234	233	231	230	228	226	224	222	219	217	214	211	209	206	203	199
486	483	478	474	468	462	456	449	442	434	427	419	410	402	394	385
457	453	449	445	440	434	428	422	415	408	401	394	386	378	370	362
427	423	420	415	411	406	400	394	388	382	375	368	361	354	346	339
396	393	390	386	382	377	372	366	361	355	349	342	336	329	322	315
365	363	359	356	352	348	343	338	333	327	322	316	310	304	298	291
334	332	329	326	322	318	314	309	305	300	295	289	284	278	273	267
303	300	298	295	292	288	284	280	276	272	267	262	257	252	247	242
270	269	266	264	261	258	254	251	247	243	239	235	230	226	221	217
238	236	234	232	230	227	224	221	218	214	210	207	203	199	195	191
205	204	202	200	198	196	193	191	188	185	182	178	175	172	168	165
172	171	169	168	166	164	162	160	157	155	152	150	147	144	141	139
368	364	359	354	348	342	335	328	320	313	305	297	289	282	274	266
344	340	336	331	326	320	314	307	300	293	286	279	271	264	257	249
320	316	312	308	303	298	292	286	280	273	266	260	253	246	239	232
295	292	289	284	280	275	270	264	258	253	246	240	234	228	222	215
271	268	264	261	256	252	247	242	237	232	226	220	215	209	203	198
245	243	240	236	233	229	224	220	215	210	205	200	195	190	185	180
220	217	215	212	208	205	201	197	193	189	184	180	175	170	166	161
194	192	189	187	184	181	177	174	170	166	162	159	155	151	147	143
167	165	163	161	159	156	153	150	147	144	141	137	134	130	127	123
140	139	137	135	133	131	129	126	124	121	118	115	112	110	107	104
261	257	252	246	240	234	227	220	213	206	199	192	185	178	171	165
242	238	233	228	222	217	211	204	198	191	185	178	172	165	159	153
222	218	214	209	204	199	193	188	182	176	170	164	158	152	147	141
201	198	194	190	186	181	176	171	165	160	155	149	144	139	134	129
181	178	174	171	167	162	158	153	149	144	139	134	130	125	120	116
159	157	154	151	147	144	140	136	132	127	123	119	115	111	107	103
138	136	133	130	127	124	121	118	114	110	107	103	100	96	93	89
116	114	112	110	108	105	102	99	96	93	90	87	84	81	78	75
93	92	90	89	87	85	82	80	78	75	73	70	68	66	63	61
206	203	199	195	190	185	179	174	168	163	157	151	146	140	135	130
188	184	181	177	173	168	163	158	153	148	143	138	133	128	123	119
168	166	162	159	155	151	147	142	138	133	129	124	120	115	111	107
149	146	143	140	137	133	130	126	122	118	114	110	106	102	99	95
129	127	124	122	119	116	112	109	106	102	99	96	92	89	86	82
108	106	104	102	100	97	95	92	89	86	83	81	78	75	72	70
87	86	84	83	81	79	77	74	72	70	68	65	63	61	59	56

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



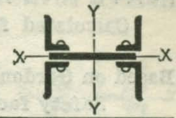
Size of angles	Size of plates	Weight of column	Area of column section	Least rad. of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet		
Inches	Inches	Lbs. per ft.	Sq. ins.	Ins.	Ins.	4	6	8
6 x3½x1	12x1	156.4	46.00	2.86	4.80	...	...	569
6 x3½x15/16	12x15/16	147.5	43.36	2.83	4.82	...	...	536
6 x3½x7/8	12x7/8	138.5	40.69	2.80	4.84	...	...	503
6 x3½x13/16	12x13/16	129.2	37.98	2.77	4.86	...	...	470
6 x3½x¾	12x¾	120.2	35.29	2.74	4.88	...	...	436
6 x3½x11/16	12x11/16	110.5	32.48	2.71	4.91	...	...	402
6 x3½x5/8	12x5/8	101.1	29.69	2.68	4.93	...	...	367
6 x3½x9/16	12x9/16	91.4	26.86	2.65	4.95	...	...	332
6 x3½x½	12x½	81.6	24.00	2.62	4.97	...	...	297
6 x3½x7/16	12x7/16	71.9	21.15	2.59	4.99	...	...	261
6 x3½x3/8	12x3/8	62.1	18.23	2.56	5.01	...	...	225
5 x3½x15/16	10x15/16	128.7	37.74	2.38	3.89	...	467	464
5 x3½x7/8	10x7/8	120.6	35.48	2.35	3.91	...	439	436
5 x3½x13/16	10x13/16	112.8	33.11	2.32	3.93	...	410	407
5 x3½x¾	10x¾	104.7	30.79	2.29	3.96	...	381	378
5 x3½x11/16	10x11/16	96.6	28.40	2.25	3.98	...	351	349
5 x3½x5/8	10x5/8	88.5	25.98	2.22	4.00	...	321	319
5 x3½x9/16	10x9/16	79.9	23.53	2.19	4.02	...	291	289
5 x3½x½	10x½	71.4	21.00	2.16	4.04	...	260	258
5 x3½x7/16	10x7/16	62.9	18.49	2.13	4.06	...	229	228
5 x3½x3/8	10x3/8	54.4	15.94	2.10	4.08	...	198	196
5 x3½x5/16	10x5/16	45.4	13.36	2.08	4.10	...	166	165
4 x3 x7/8	8x7/8	97.0	28.44	1.95	3.06	...	350	346
4 x3 x13/16	8x13/16	90.5	26.61	1.92	3.08	...	328	324
4 x3 x¾	8x¾	84.4	24.75	1.89	3.10	...	305	301
4 x3 x11/16	8x11/16	77.9	22.86	1.85	3.12	...	282	278
4 x3 x5/8	8x5/8	71.4	20.98	1.82	3.14	...	258	255
4 x3 x9/16	8x9/16	64.9	19.02	1.79	3.16	...	234	231
4 x3 x½	8x½	58.0	17.00	1.76	3.18	...	210	207
4 x3 x7/16	8x7/16	51.1	15.02	1.73	3.21	...	185	183
4 x3 x3/8	8x3/8	44.2	12.98	1.70	3.23	...	160	158
4 x3 x5/16	8x5/16	37.3	10.86	1.67	3.25	...	134	133
3½x2½x¾	7x¾	71.5	21.00	1.71	2.72	260	257	254
3½x2½x11/16	7x11/16	66.4	19.46	1.68	2.74	241	238	235
3½x2½x5/8	7x5/8	60.9	17.82	1.65	2.76	221	219	216
3½x2½x9/16	7x9/16	55.0	16.17	1.61	2.78	200	198	196
3½x2½x½	7x½	49.5	14.50	1.58	2.80	180	178	176
3½x2½x7/16	7x7/16	43.6	12.83	1.55	2.82	159	157	155
3½x2½x3/8	7x3/8	37.7	11.07	1.52	2.84	137	136	134
3½x2½x5/16	7x5/16	31.8	9.30	1.49	2.86	115	114	113
3½x2½x¼	7x¼	25.6	7.50	1.46	2.88	93	92	91
3 x2½x5/8	6x5/8	54.4	15.94	1.43	2.29	197	194	190
3 x2½x9/16	6x9/16	49.5	14.49	1.39	2.31	179	176	173
3 x2½x½	6x½	44.2	13.00	1.36	2.33	161	158	155
3 x2½x7/16	6x7/16	39.3	11.53	1.33	2.35	142	140	137
3 x2½x3/8	6x3/8	34.1	9.98	1.30	2.37	123	121	119
3 x2½x5/16	6x5/16	28.8	8.40	1.27	2.39	103	102	100
3 x2½x¼	6x¼	23.1	6.79	1.24	2.41	83	82	81

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis Y-Y.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



Length in feet

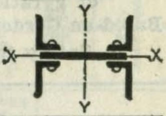
10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
565	561	556	551	544	538	530	523	515	506	497	488	479	469	460	450
533	529	524	519	513	507	500	493	486	478	469	461	452	443	434	425
500	496	492	487	482	476	470	463	456	449	441	433	425	417	408	400
467	463	460	455	450	445	439	433	426	419	412	405	397	389	382	374
433	430	427	422	418	413	408	402	396	389	383	376	369	362	355	347
399	397	393	389	385	381	376	371	365	359	353	347	341	334	327	321
365	363	360	356	352	348	344	339	334	329	323	318	312	306	300	294
330	328	325	322	319	315	311	307	302	298	293	288	282	277	272	266
295	293	291	288	285	282	278	274	270	266	262	257	253	248	243	238
260	258	256	253	251	248	245	242	238	234	231	227	223	218	214	210
224	222	221	218	216	214	211	208	205	202	199	196	192	189	185	181
460	454	449	442	435	427	418	410	400	391	381	371	362	352	342	332
432	427	421	415	408	401	393	385	377	368	359	350	340	331	322	313
403	399	394	388	382	375	368	360	352	344	336	327	319	310	301	293
375	371	366	361	355	349	342	335	328	320	312	305	297	289	281	273
346	342	338	333	328	322	316	309	303	296	289	282	274	267	260	252
316	313	309	305	300	295	289	283	277	271	265	258	251	245	238	232
287	284	280	276	272	267	262	257	251	246	240	234	228	222	216	210
256	254	250	247	243	239	235	230	225	220	215	210	205	199	194	189
226	223	221	218	214	211	207	203	199	194	190	185	181	176	171	166
195	193	190	188	185	182	179	175	171	168	164	160	156	152	148	144
163	161	160	157	155	153	150	147	144	141	138	134	131	128	124	121
341	335	328	321	312	304	295	285	276	266	257	248	238	229	220	211
319	314	307	300	293	285	276	268	259	250	241	232	224	215	207	199
297	292	286	280	273	265	258	250	242	233	225	217	209	201	193	186
274	270	264	259	252	245	238	231	224	216	209	201	194	187	179	173
252	247	243	237	231	225	219	212	206	199	192	185	178	172	165	159
228	224	220	215	210	205	199	193	187	181	175	168	162	156	150	145
204	201	197	193	188	184	178	173	168	162	157	151	146	141	135	130
180	177	174	170	166	162	158	153	148	143	139	134	129	124	120	115
156	153	150	147	144	140	136	132	128	124	120	116	112	108	104	100
131	129	126	124	121	118	115	111	108	105	101	98	94	91	88	85
249	244	237	231	223	216	208	200	192	184	177	169	161	154	...	...
230	225	220	214	207	200	193	186	178	171	164	157	150	144	...	...
212	207	202	196	190	184	178	171	164	158	151	145	139	132	...	...
192	188	183	178	173	167	162	156	150	144	138	132	126	121	...	...
172	169	165	160	156	151	145	140	135	129	124	119	114	109	...	...
152	149	146	142	137	133	129	124	119	115	110	106	101	97	...	...
132	129	126	123	119	115	112	108	104	100	96	92	88	84	...	...
111	109	106	103	100	97	94	91	87	84	81	77	74	71	...	...
89	88	86	83	81	79	76	73	71	68	65	63	60	58	...	...
185	180	173	167	160	153	146	138	132	125	118	...	...	...	...	...
169	163	158	152	146	139	133	127	120	114	108	...	...	...	...	...
151	147	142	137	131	126	120	114	108	103	98	...	...	...	...	...
134	130	126	121	116	111	106	101	97	92	87	...	...	...	...	...
116	113	109	105	101	97	92	88	84	80	76	...	...	...	...	...
98	95	92	89	85	82	78	75	71	68	64	...	...	...	...	...
79	77	74	72	69	66	63	60	58	55	52	...	...	...	...	...

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.

Based on Gordon's Formula. $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



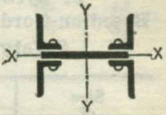
Size of angles	Size of plates	Wt. of column	Area of column section	Least radius of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet		
Inches	Inches	Lbs. per ft.	Sq. ins.	Ins.	Ins.	6	8	10
7 x3½x1	20x1	197.2	58.00	3.15	8.19	715	707	697
7 x3½x15/16	20x15/16	185.8	54.65	3.12	8.21	673	605	656
7 x3½x7/8	20x7/8	174.3	51.23	3.09	8.23	630	623	614
7 x3½x13/16	20x13/16	162.5	47.77	3.06	8.25	588	581	572
7 x3½x¾	20x¾	150.6	44.29	3.03	8.28	545	538	530
7 x3½x11/16	20x11/16	138.7	40.73	3.00	8.30	501	495	488
7 x3½x5/8	20x5/8	126.5	37.23	2.97	8.32	457	452	445
7 x3½x9/16	20x9/16	114.7	33.61	2.95	8.34	413	408	402
7 x3½x½	20x½	102.0	30.00	2.92	8.37	369	364	358
7 x3½x7/16	20x7/16	89.8	26.40	2.89	8.39	324	320	314
7 x3½x1	18x1	190.4	56.00	3.20	7.38	690	683	674
7 x3½x15/16	18x15/16	179.4	52.78	3.17	7.40	650	643	634
7 x3½x7/8	18x7/8	168.4	49.48	3.14	7.42	609	602	594
7 x3½x13/16	18x13/16	156.9	46.15	3.11	7.44	568	562	554
7 x3½x¾	18x¾	145.5	42.79	3.08	7.47	526	520	513
7 x3½x11/16	18x11/16	134.1	39.36	3.06	7.49	485	479	472
7 x3½x5/8	18x5/8	122.3	35.98	3.02	7.51	442	437	430
7 x3½x9/16	18x9/16	110.8	32.49	3.00	7.53	400	395	389
7 x3½x½	18x½	98.6	29.00	2.97	7.55	357	352	347
7 x3½x7/16	18x7/16	86.8	25.53	2.94	7.58	313	309	305
7 x3½x1	16x1	183.6	54.00	3.26	6.56	666	659	651
7 x3½x15/16	16x15/16	173.0	50.90	3.23	6.58	627	621	612
7 x3½x7/8	16x7/8	162.4	47.73	3.20	6.60	588	582	574
7 x3½x13/16	16x13/16	151.4	44.52	3.17	6.62	548	542	535
7 x3½x¾	16x¾	140.4	41.29	3.14	6.64	508	503	496
7 x3½x11/16	16x11/16	129.4	37.98	3.11	6.67	468	463	456
7 x3½x5/8	16x5/8	118.0	34.73	3.08	6.69	427	422	416
7 x3½x9/16	16x9/16	107.0	31.36	3.06	6.71	386	382	376
7 x3½x½	16x½	95.2	28.00	3.02	6.73	345	340	335
7 x3½x7/16	16x7/16	83.8	24.65	3.00	6.75	303	299	294
7 x3½x1	14x1	176.8	52.00	3.32	5.72	642	635	627
7 x3½x15/16	14x15/16	166.6	49.03	3.29	5.74	604	598	591
7 x3½x7/8	14x7/8	156.5	45.98	3.26	5.76	567	561	553
7 x3½x13/16	14x13/16	145.9	42.90	3.23	5.79	528	523	516
7 x3½x¾	14x¾	135.3	39.79	3.20	5.81	490	485	478
7 x3½x11/16	14x11/16	124.7	36.61	3.17	5.83	451	446	449
7 x3½x5/8	14x5/8	113.7	33.48	3.13	5.85	412	407	402
7 x3½x9/16	14x9/16	103.2	30.24	3.11	5.87	372	368	363
7 x3½x½	14x½	91.8	27.00	3.08	5.90	332	329	324
7 x3½x7/16	14x7/16	80.8	23.78	3.05	5.92	292	289	285

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



Length in feet

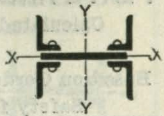
12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
685	672	657	641	624	607	588	570	551	532	513	494	476	458	...
644	632	618	602	586	569	552	534	516	498	480	463	445	428	...
603	591	578	563	548	532	515	499	482	465	448	431	415	399	...
562	551	538	524	510	495	479	463	447	431	415	400	384	369	...
521	510	498	485	471	457	442	427	412	397	383	368	354	340	...
479	468	457	445	432	419	406	392	378	364	350	337	323	310	...
436	427	417	405	394	381	369	356	343	330	318	305	293	281	...
394	385	376	336	355	344	332	321	309	297	286	274	263	253	...
351	343	335	326	316	306	295	285	274	264	253	243	233	224	...
308	301	294	285	277	268	258	249	240	230	221	212	204	195	...
663	650	636	622	606	589	572	554	536	518	500	483	465	448	...
624	612	598	584	569	553	536	520	503	486	469	452	435	419	...
584	573	560	546	532	517	501	485	469	453	437	421	405	390	...
544	533	521	508	495	481	466	451	436	420	405	390	376	361	...
504	494	483	470	457	444	430	416	402	388	374	360	346	333	...
463	454	443	432	420	407	395	382	368	355	342	329	316	304	...
425	414	404	393	382	371	359	347	335	322	310	298	287	275	...
382	374	365	355	345	334	323	312	301	290	279	268	258	247	...
340	333	325	316	307	297	287	277	267	257	248	238	228	219	...
299	292	285	277	269	260	252	243	234	255	216	208	199	191	...
640	629	616	602	587	571	555	538	521	504	487	471	454	437	421
603	591	579	566	551	536	521	505	489	473	457	441	425	409	394
564	554	542	529	516	501	487	472	456	441	426	411	396	381	367
526	516	505	493	480	466	452	438	424	409	395	381	367	353	340
487	478	467	456	444	431	418	405	391	378	364	351	338	325	313
448	439	429	419	407	396	383	371	359	346	334	321	309	297	286
409	400	391	381	371	360	349	337	326	314	303	291	280	269	259
369	362	353	344	335	325	314	304	293	283	272	262	252	242	233
329	322	315	307	298	289	280	270	261	251	242	232	223	214	206
289	283	276	269	261	253	245	236	228	220	211	203	195	187	180
618	607	595	582	568	553	538	522	506	490	474	458	442	427	412
581	571	559	547	534	520	505	490	475	460	444	429	414	399	385
545	535	524	512	499	486	472	458	443	429	415	400	386	372	358
508	498	488	477	465	452	439	425	412	398	385	371	358	345	332
470	462	452	441	430	418	406	393	380	368	355	342	330	318	306
433	424	415	405	395	384	372	360	349	337	325	313	302	290	279
395	387	379	369	359	349	339	328	317	306	295	284	274	263	253
357	350	342	333	324	315	305	295	286	276	266	256	246	237	228
318	312	305	297	289	280	271	263	254	245	236	227	218	210	201
279	274	267	260	253	246	238	230	222	214	206	198	191	183	176

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

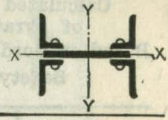
Safety factor 4.



Size of angles	Size of plates	Weight of column	Area of column section	Least rad. of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet		
Inches	Inches	Lbs. per ft.	Sq. ins.	Ins.	Ins.	2	4	6
6 x3½x1	18x1	176.8	52.00	2.70	7.27	...	644	637
6 x3½x15/16	18x15/16	166.6	48.99	2.67	7.29	...	607	600
6 x3½x⅞	18x⅞	156.4	45.94	2.64	7.32	...	569	563
6 x3½x13/16	18x13/16	145.7	42.86	2.61	7.34	...	531	525
6 x3½x¾	18x¾	135.5	39.79	2.58	7.36	...	492	486
6 x3½x11/16	18x11/16	124.5	36.61	2.55	7.38	...	453	448
6 x3½x⅝	18x⅝	113.9	33.44	2.52	7.40	...	414	409
6 x3½x9/16	18x9/16	102.8	30.24	2.50	7.42	...	374	369
6 x3½x½	18x½	91.8	27.00	2.47	7.45	...	334	330
6 x3½x7/16	18x7/16	80.8	23.78	2.44	7.47	...	294	290
6 x3½x⅜	18x⅜	69.8	20.48	2.42	7.49	...	253	249
5 x3½x15/16	16x15/16	147.8	43.36	2.22	6.37	...	535	527
5 x3½x⅞	16x⅞	138.4	40.73	2.19	6.39	...	502	494
5 x3½x13/16	16x13/16	129.4	37.98	2.17	6.41	...	468	461
5 x3½x¾	16x¾	120.0	35.29	2.14	6.44	...	435	427
5 x3½x11/16	16x11/16	110.6	32.52	2.11	6.46	...	400	393
5 x3½x⅝	16x⅝	101.2	29.73	2.08	6.48	...	366	359
5 x3½x9/16	16x9/16	91.4	26.90	2.05	6.50	...	331	325
5 x3½x½	16x½	81.6	24.00	2.02	6.52	...	295	290
5 x3½x7/16	16x7/16	71.8	21.11	2.00	6.54	...	260	255
5 x3½x⅜	16x⅜	62.0	18.19	1.97	6.57	...	224	219
5 x3½x5/16	16x5/16	51.8	15.23	1.94	6.59	...	187	183
4 x3 x⅞	14x⅞	114.9	33.69	1.80	5.53	...	413	403
4 x3 x13/16	14x13/16	107.1	31.49	1.77	5.55	...	386	376
4 x3 x¾	14x¾	99.7	29.25	1.74	5.57	...	358	349
4 x3 x11/16	14x11/16	91.9	26.99	1.71	5.59	...	330	322
4 x3 x⅝	14x⅝	84.1	24.73	1.68	5.61	...	302	294
4 x3 x9/16	14x9/16	76.4	22.40	1.65	5.63	...	273	265
4 x3 x½	14x½	68.2	20.00	1.62	5.66	...	244	237
4 x3 x7/16	14x7/16	60.0	17.65	1.60	5.68	...	215	208
4 x3 x⅜	14x⅜	51.9	15.23	1.57	5.70	...	185	179
4 x3 x5/16	14x5/16	43.7	12.74	1.54	5.72	...	155	150
3½x2½x¾	12x¾	84.2	24.75	1.58	4.77	307	302	292
3½x2½x11/16	12x11/16	78.1	22.90	1.55	4.79	284	278	270
3½x2½x⅝	12x⅝	71.5	20.94	1.52	4.81	260	255	246
3½x2½x9/16	12x9/16	64.6	18.98	1.49	4.83	236	231	223
3½x2½x½	12x½	58.0	17.00	1.46	4.85	211	206	199
3½x2½x7/16	12x7/16	51.1	15.02	1.43	4.88	186	182	175
3½x2½x⅜	12x⅜	44.1	12.94	1.41	4.90	160	157	151
3½x2½x5/16	12x5/16	37.2	10.86	1.38	4.92	135	131	126
3½x2½x¼	12x¼	29.8	8.75	1.35	4.94	108	106	101
3 x2½x⅝	12x⅝	67.1	19.69	1.28	4.74	244	237	226
3 x2½x9/16	12x9/16	61.0	17.86	1.26	4.76	221	215	205
3 x2½x½	12x½	54.4	16.00	1.23	4.78	198	192	183
3 x2½x7/16	12x7/16	48.3	14.15	1.20	4.81	174	169	160
3 x2½x⅜	12x⅜	41.7	12.23	1.17	4.83	151	146	138
3 x2 x5/16	12x5/16	35.2	10.27	1.15	4.85	126	122	115
3 x2½x¼	12x¼	28.2	8.29	1.12	4.87	102	98	92

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.
Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.
Safety factor 4.



Length in feet

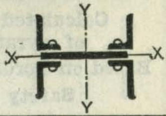
8	10	12	14	16	18	20	22	24	26	28	30	32	34
628	616	602	587	570	552	533	513	494	474	454	435	416	397
591	580	567	552	535	518	500	481	463	444	425	407	389	371
554	543	530	516	501	484	467	449	431	414	396	378	362	345
516	506	494	480	466	450	434	417	400	383	367	350	334	319
478	469	457	445	431	416	401	385	369	353	338	323	308	293
440	431	420	408	395	382	367	353	338	323	309	295	281	268
402	392	383	372	360	347	334	321	307	293	280	267	254	242
363	355	346	336	325	313	301	288	276	264	251	240	228	217
324	317	308	299	289	278	267	256	245	234	223	212	202	192
285	278	271	262	253	244	234	224	214	204	194	185	176	167
245	239	233	225	217	209	201	192	183	175	166	158	150	143
515	501	485	468	449	430	410	390	370	350	332	...	...	...
483	470	454	437	419	401	382	363	344	326	308	...	...	...
450	437	423	407	390	372	354	336	318	301	284	...	...	...
417	405	391	376	360	343	326	309	293	277	261	...	...	...
384	372	359	345	330	314	298	283	267	252	238	...	...	...
350	340	327	314	300	286	271	256	242	228	215	...	...	...
316	307	295	283	270	257	243	230	217	204	192	...	...	...
282	273	263	252	240	228	216	204	192	181	170	...	...	...
248	240	231	220	210	199	188	178	167	157	148	...	...	...
213	206	198	189	180	170	161	152	143	134	126	...	...	...
178	172	165	158	150	142	134	126	118	111	104	...	...	...
390	375	357	339	320	301	282	263	246	...	...	...	...	...
364	349	332	315	296	278	260	243	226	...	...	...	...	...
337	323	307	290	273	256	239	223	207	...	...	...	...	...
310	297	282	266	250	234	218	203	188	...	...	...	...	...
283	270	256	241	226	211	197	183	170	...	...	...	...	...
255	244	231	217	203	189	176	163	151	...	...	...	...	...
228	217	205	193	180	168	156	144	133	...	...	...	...	...
200	190	180	168	157	146	135	125	116	...	...	...	...	...
172	163	154	144	134	124	115	106	98	...	...	...	...	...
144	136	128	120	111	103	95	88	81	...	...	...	...	...
281	267	251	235	219	204	188	...	...	...	...	...	...	...
258	245	230	215	200	186	171	...	...	...	...	...	...	...
236	223	210	195	181	168	155	...	...	...	...	...	...	...
213	201	188	175	162	150	138	...	...	...	...	...	...	...
190	179	167	156	144	132	122	...	...	...	...	...	...	...
167	157	146	136	125	115	105	...	...	...	...	...	...	...
143	135	125	116	107	98	89	...	...	...	...	...	...	...
120	112	104	96	88	81	74	...	...	...	...	...	...	...
96	90	83	77	70	64	58	...	...	...	...	...	...	...
213	198	182	167	152	...	...	...	...	...	...	...	...	...
192	178	164	149	135	...	...	...	...	...	...	...	...	...
171	158	145	131	119	...	...	...	...	...	...	...	...	...
150	138	126	114	103	...	...	...	...	...	...	...	...	...
128	118	107	97	87	...	...	...	...	...	...	...	...	...
107	98	89	80	72	...	...	...	...	...	...	...	...	...
86	78	71	63	57	...	...	...	...	...	...	...	...	...

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.



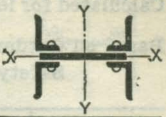
Size of angles	Size of plates	Weight of column	Area of column section	Least rad. of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet		
Inches	Inches	Lbs. per ft.	Sq. ins.	Ins.	Ins.	2	4	6
6 x3½x1	16x1	170.0	50.00	2.75	6.46	...	620	613
6 x3½x15/16	16x15/16	160.2	47.11	2.72	6.48	...	584	578
6 x3½x⅞	16x⅞	150.4	44.19	2.69	6.51	...	548	542
6 x3½x13/16	16x13/16	140.2	41.23	2.66	6.53	...	511	505
6 x3½x¾	16x¾	130.4	38.29	2.63	6.55	...	474	468
6 x3½x11/16	16x11/16	119.8	35.23	2.60	6.57	...	436	431
6 x3½x⅝	16x⅝	109.6	32.19	2.57	6.59	...	399	394
6 x3½x9/16	16x9/16	99.0	29.11	2.54	6.61	...	360	356
6 x3½x½	16x½	88.4	26.00	2.52	6.64	...	322	318
6 x3½x7/16	16x7/16	77.8	22.90	2.49	6.66	...	283	279
6 x3½x⅜	16x⅜	67.2	19.73	2.46	6.68	...	244	240
5 x3½x15/16	14x15/16	141.4	41.49	2.27	5.56	...	512	505
5 x3½x⅞	14x⅞	132.5	38.98	2.24	5.58	...	481	473
5 x3½x13/16	14x13/16	123.9	36.36	2.21	5.60	...	449	442
5 x3½x¾	14x¾	114.9	33.79	2.18	5.62	...	416	410
5 x3½x11/16	14x11/16	105.9	31.15	2.15	5.64	...	384	377
5 x3½x⅝	14x⅝	96.9	28.48	2.12	5.67	...	351	345
5 x3½x9/16	14x9/16	87.6	25.78	2.09	5.69	...	317	312
5 x3½x½	14x½	78.2	23.00	2.07	5.71	...	283	278
5 x3½x7/16	14x7/16	68.8	20.24	2.04	5.73	...	249	245
5 x3½x⅜	14x⅜	59.5	17.44	2.01	5.75	...	215	211
5 x3½x5/16	14x5/16	49.7	14.61	1.98	5.77	...	180	176
4 x3 x⅞	12x⅞	108.9	31.94	1.84	4.72	...	392	383
4 x3 x13/16	12x13/16	101.6	29.86	1.81	4.74	...	366	358
4 x3 x¾	12x¾	94.6	27.75	1.78	4.77	...	340	332
4 x3 x11/16	12x11/16	87.3	25.61	1.75	4.79	...	314	306
4 x3 x⅝	12x⅝	79.9	23.48	1.72	4.81	...	287	279
4 x3 x9/16	12x9/16	72.6	21.27	1.69	4.83	...	260	253
4 x3 x½	12x½	64.8	19.00	1.66	4.85	...	232	226
4 x3 x7/16	12x7/16	57.1	16.77	1.64	4.87	...	204	198
4 x3 x⅜	12x⅜	49.3	14.48	1.61	4.89	...	176	171
4 x3 x5/16	12x5/16	41.6	12.11	1.58	4.91	...	148	143
3½x2½x¾	10x¾	79.1	23.25	1.63	3.97	289	284	276
3½x2½x11/16	10x11/16	73.4	21.53	1.60	3.99	267	262	254
3½x2½x⅝	10x⅝	67.3	19.69	1.57	4.01	245	240	232
3½x2½x9/16	10x9/16	60.7	17.86	1.54	4.03	222	217	210
3½x2½x½	10x½	54.6	16.00	1.51	4.05	199	195	188
3½x2½x7/16	10x7/16	48.1	14.15	1.48	4.07	175	171	165
3½x2½x⅜	10x⅜	41.6	12.19	1.45	4.09	151	148	143
3½x2½x5/16	10x5/16	35.0	10.24	1.42	4.11	127	124	119
3½x2½x¼	10x¼	28.1	8.25	1.39	4.13	102	100	96
3 x2½x⅝	10x⅝	62.9	18.44	1.33	3.94	228	222	213
3 x2½x9/16	10x9/16	57.1	16.74	1.30	3.96	207	202	193
3 x2½x½	10x½	51.0	15.00	1.27	3.99	186	180	172
3 x2½x7/16	10x7/16	45.3	13.28	1.24	4.01	164	159	151
3 x2½x⅜	10x⅜	39.2	11.48	1.21	4.03	141	137	130
3 x2½x5/16	10x5/16	33.0	9.65	1.18	4.05	119	115	109
3 x2½x¼	10x¼	26.5	7.79	1.16	4.07	96	92	87

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$.

Safety factor 4.



Length in feet

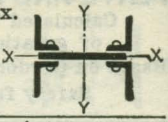
8	10	12	14	16	18	20	22	24	26	28	30	32	34
605	594	581	566	550	534	516	498	479	460	442	423	405	328
569	559	546	532	517	501	484	467	449	431	414	396	379	362
533	523	512	498	484	468	452	436	419	402	385	369	353	337
497	488	477	464	450	436	420	405	389	373	357	342	326	312
461	452	441	429	416	403	388	374	359	344	329	314	300	287
424	416	406	395	382	370	356	342	329	315	301	287	274	262
387	379	370	360	348	336	324	311	298	286	273	261	249	237
350	343	334	325	314	303	292	280	268	257	245	234	223	212
312	306	298	289	280	270	259	249	238	228	217	207	197	188
274	268	261	254	245	236	227	218	208	199	190	181	172	164
236	231	225	218	211	203	195	187	178	170	162	154	147	140
494	481	467	450	433	415	396	377	359	340	323	...	...	...
463	451	437	421	404	387	369	351	334	317	300	...	...	...
432	420	407	392	376	359	343	326	309	293	277	...	...	...
400	389	376	362	347	332	316	300	284	269	254	...	...	...
369	358	346	333	319	304	289	274	260	246	232	...	...	...
336	327	315	303	290	276	262	249	235	222	210	...	...	...
304	295	284	273	261	248	236	223	211	199	188	...	...	...
271	263	253	243	232	221	209	198	187	176	166	...	...	...
238	231	222	213	203	193	183	173	163	153	144	...	...	...
205	198	191	183	174	165	156	147	139	131	123	...	...	...
171	166	159	152	145	137	130	122	115	108	102	...	...	...
371	357	341	324	307	289	272	254	238	...	...	...	...	...
346	333	318	301	285	268	251	235	220	...	...	...	...	...
321	308	294	278	262	246	231	216	201	...	...	...	...	...
296	283	270	255	240	225	210	196	183	...	...	...	...	...
270	258	245	232	218	204	190	177	165	...	...	...	...	...
244	233	221	208	196	183	170	158	147	...	...	...	...	...
217	208	197	185	173	162	151	140	130	...	...	...	...	...
191	182	172	162	151	141	131	121	112	...	...	...	...	...
164	156	148	139	129	120	112	103	95	...	...	...	...	...
137	131	123	115	107	100	92	85	79	...	...	...	...	...
265	253	239	224	210	195	181	...	...	...	...	...	...	...
244	232	219	205	192	178	165	...	...	...	...	...	...	...
223	212	199	187	174	161	149	...	...	...	...	...	...	...
201	191	179	168	156	144	133	...	...	...	...	...	...	...
180	170	160	149	138	127	117	...	...	...	...	...	...	...
158	149	140	130	120	111	102	...	...	...	...	...	...	...
136	128	120	111	102	94	86	...	...	...	...	...	...	...
114	107	100	92	85	78	71	...	...	...	...	...	...	...
91	86	80	73	68	62	57	...	...	...	...	...	...	...
201	188	174	159	146	...	...	...	...	...	...	...	...	...
182	169	156	143	130	...	...	...	...	...	...	...	...	...
162	150	138	126	114	...	...	...	...	...	...	...	...	...
142	131	120	109	99	...	...	...	...	...	...	...	...	...
122	112	103	93	84	...	...	...	...	...	...	...	...	...
102	93	85	77	69	...	...	...	...	...	...	...	...	...
81	75	68	61	55	...	...	...	...	...	...	...	...	...

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



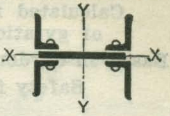
Size of angles	Size of plates	Weight of column	Area of column section	Least rad. of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet		
Inches	Inches	Lbs. per ft.	Sq. ins.	Ins.	Ins.	2	4	6
6 x3½x1	14x1	163.2	48.00	2.81	5.64	...	595	589
6 x3½x15/16	14x15/16	153.8	45.24	2.77	5.66	...	561	555
6 x3½x7/8	14x7/8	144.5	42.44	2.74	5.68	...	526	521
6 x3½x13/16	14x13/16	134.7	39.61	2.71	5.70	...	491	486
6 x3½x3/4	14x3/4	125.3	36.79	2.68	5.72	...	455	450
6 x3½x11/16	14x11/16	115.1	33.86	2.65	5.74	...	419	415
6 x3½x5/8	14x5/8	105.3	30.94	2.62	5.77	...	383	379
6 x3½x9/16	14x9/16	95.2	27.99	2.59	5.79	...	347	343
6 x3½x1/2	14x1/2	85.0	25.00	2.57	5.81	...	309	306
6 x3½x7/16	14x7/16	74.8	22.03	2.54	5.83	...	272	269
6 x3½x3/8	14x3/8	64.7	18.98	2.51	5.85	...	234	231
5 x3½x15/16	12x15/16	135.1	39.61	2.33	4.74	...	489	482
5 x3½x7/8	12x7/8	126.5	37.23	2.29	4.76	...	459	452
5 x3½x13/16	12x13/16	118.4	34.73	2.26	4.78	...	429	422
5 x3½x3/4	12x3/4	109.8	32.29	2.23	4.80	...	398	392
5 x3½x11/16	12x11/16	101.3	29.77	2.20	4.82	...	367	361
5 x3½x5/8	12x5/8	92.7	27.23	2.17	4.84	...	335	330
5 x3½x9/16	12x9/16	83.8	24.65	2.14	4.86	...	303	298
5 x3½x1/2	12x1/2	74.8	22.00	2.11	4.88	...	271	266
5 x3½x7/16	12x7/16	65.9	19.36	2.08	4.90	...	238	234
5 x3½x3/8	12x3/8	56.9	16.69	2.06	4.92	...	206	202
5 x3½x5/16	12x5/16	47.6	13.98	2.03	4.95	...	172	169
4 x3 x7/8	10x7/8	103.0	30.19	1.90	3.90	...	371	363
4 x3 x13/16	10x13/16	96.0	28.24	1.86	3.92	...	347	339
4 x3 x3/4	10x3/4	89.5	26.25	1.83	3.94	...	322	315
4 x3 x11/16	10x11/16	82.6	24.24	1.80	3.96	...	297	290
4 x3 x5/8	10x5/8	75.7	22.23	1.77	3.98	...	272	265
4 x3 x9/16	10x9/16	68.7	20.15	1.74	4.00	...	246	240
4 x3 x1/2	10x1/2	61.4	18.00	1.71	4.02	...	220	214
4 x3 x7/16	10x7/16	54.1	15.90	1.68	4.04	...	194	189
4 x3 x3/8	10x3/8	46.8	13.73	1.65	4.07	...	167	163
4 x3 x5/16	10x5/16	39.4	11.49	1.62	4.09	...	140	136
3½x2½x3/4	8x3/4	74.0	21.75	1.68	3.14	270	266	259
3½x2½x11/16	8x11/16	68.7	20.15	1.65	3.16	250	246	239
3½x2½x5/8	8x5/8	63.0	18.44	1.62	3.18	229	225	218
3½x2½x9/16	8x9/16	56.9	16.73	1.59	3.20	208	204	198
3½x2½x1/2	8x1/2	51.2	15.00	1.56	3.22	186	183	177
3½x2½x7/16	8x7/16	45.1	13.27	1.53	3.24	164	161	156
3½x2½x3/8	8x3/8	39.0	11.44	1.50	3.26	142	139	134
3½x2½x5/16	8x5/16	32.9	9.61	1.47	3.28	119	117	113
3½x2½x1/4	8x1/4	26.4	7.75	1.44	3.31	96	94	91
3 x2½x5/8	8x5/8	58.6	17.19	1.37	3.13	213	208	200
3 x2½x9/16	8x9/16	53.3	15.61	1.34	3.15	193	188	181
3 x2½x1/2	8x1/2	47.6	14.00	1.31	3.17	173	169	161
3 x2½x7/16	8x7/16	42.3	12.40	1.28	3.19	153	149	142
3 x2½x3/8	8x3/8	36.6	10.73	1.25	3.21	132	128	122
3 x2½x5/16	8x5/16	30.9	9.02	1.22	3.23	111	108	102
3 x2½x1/4	8x1/4	24.8	7.29	1.19	3.25	90	87	82

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\, r^2}}$

Safety factor 4.



Length in feet

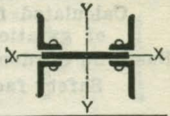
8	10	12	14	16	18	20	22	24	26	28	30	32	34
581	571	559	546	531	515	499	482	464	447	429	412	395	378
547	538	526	513	499	484	468	452	435	419	402	385	369	353
513	504	493	480	467	453	438	422	406	390	375	359	344	329
478	470	459	447	435	421	407	392	377	362	347	333	318	304
444	435	425	414	402	389	376	362	348	334	320	306	293	280
408	400	391	381	369	357	345	332	319	306	293	280	268	255
373	366	357	347	337	325	314	302	290	278	266	254	242	231
337	330	322	313	304	293	283	272	261	250	239	228	217	207
301	295	287	279	270	261	251	241	231	221	212	202	193	184
264	259	252	245	237	229	220	211	202	194	185	176	168	160
228	223	217	211	204	196	189	181	173	166	158	151	143	136
473	461	447	432	416	399	382	365	347	330	313	...	...	...
443	432	419	405	389	373	357	340	323	307	291	...	...	...
413	403	390	376	362	346	331	315	299	284	269	...	...	...
383	373	361	348	334	320	305	290	276	261	247	...	...	...
353	343	332	320	307	293	279	266	252	239	226	...	...	...
322	313	303	291	279	267	254	241	228	216	204	...	...	...
291	283	273	263	251	240	228	216	205	194	183	...	...	...
260	252	244	234	224	213	202	192	181	171	162	...	...	...
229	222	214	205	196	186	177	167	158	149	141	...	...	...
197	191	184	176	168	160	151	143	135	127	120	...	...	...
165	159	153	147	140	133	126	119	112	105	99	...	...	...
352	340	325	310	294	277	261	245	230	...	...	...	...	...
329	317	303	288	273	257	242	227	212	...	...	...	...	...
305	293	280	266	251	237	222	208	195	...	...	...	...	...
281	270	257	244	230	216	203	190	177	...	...	...	...	...
256	246	234	222	209	196	184	171	160	...	...	...	...	...
232	222	211	200	188	176	164	153	143	...	...	...	...	...
207	198	188	177	167	156	145	135	126	...	...	...	...	...
182	174	165	155	145	136	127	118	109	...	...	...	...	...
156	149	141	133	124	116	108	100	93	...	...	...	...	...
131	125	118	111	103	96	89	83	77	...	...	...	...	...
249	238	226	213	200	187	174	...	...	...	...	...	...	...
230	219	208	195	183	170	158	...	...	...	...	...	...	...
210	200	189	177	166	154	143	...	...	...	...	...	...	...
190	180	170	159	149	138	128	...	...	...	...	...	...	...
170	161	151	142	132	122	113	...	...	...	...	...	...	...
149	141	133	124	115	106	98	...	...	...	...	...	...	...
128	121	114	106	98	91	83	...	...	...	...	...	...	...
107	101	95	88	81	75	69	...	...	...	...	...	...	...
86	81	76	70	65	60	55	...	...	...	...	...	...	...
189	177	165	152	139	...	...	...	...	...	...	...	...	...
171	160	148	136	124	...	...	...	...	...	...	...	...	...
152	142	131	120	110	...	...	...	...	...	...	...	...	...
134	124	114	105	95	...	...	...	...	...	...	...	...	...
115	106	98	89	81	...	...	...	...	...	...	...	...	...
96	89	81	74	67	...	...	...	...	...	...	...	...	...
77	71	65	58	53	...	...	...	...	...	...	...	...	...

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



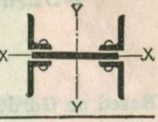
Size of angles	Size of plates	Weight of column	Area of column section	Least rad. of gyration Axis X-X	Radius of gyration Axis Y-Y	Length in feet		
Inches	Inches	Lbs. per ft.	Sq. ins.	Ins.	Ins.	2	4	6
6 x3½x1	12x1	156.4	46.00	2.86	4.80	...	571	565
6 x3½x15/16	12x15/16	147.5	43.36	2.83	4.82	...	538	532
6 x3½x⅞	12x⅞	138.5	40.69	2.80	4.84	...	505	499
6 x3½x13/16	12x13/16	129.2	37.98	2.77	4.86	...	471	466
6 x3½x¾	12x¾	120.2	35.29	2.74	4.88	...	437	432
6 x3½x11/16	12x11/16	110.5	32.48	2.71	4.91	...	402	398
6 x3½x⅝	12x⅝	101.1	29.69	2.68	4.93	...	368	364
6 x3½x9/16	12x9/16	91.4	26.86	2.65	4.95	...	333	329
6 x3½x½	12x½	81.6	24.00	2.62	4.97	...	297	294
6 x3½x7/16	12x7/16	71.9	21.15	2.59	4.99	...	261	258
6 x3½x⅜	12x⅜	62.1	18.23	2.56	5.01	...	225	222
5 x3½x⅞	10x⅞	120.6	35.48	2.35	3.91	...	466	460
5 x3½x⅞	10x⅞	120.6	35.48	2.35	3.91	...	438	432
5 x3½x13/16	10x13/16	112.8	33.11	2.32	3.93	...	409	403
5 x3½x¾	10x¾	104.7	30.79	2.29	3.96	...	380	374
5 x3½x11/16	10x11/16	96.6	28.40	2.25	3.98	...	350	345
5 x3½x⅝	10x⅝	88.5	25.98	2.22	4.00	...	320	315
5 x3½x9/16	10x9/16	79.9	23.53	2.19	4.02	...	290	285
5 x3½x½	10x½	71.4	21.00	2.16	4.04	...	259	255
5 x3½x7/16	10x7/16	62.9	18.49	2.13	4.06	...	228	224
5 x3½x⅜	10x⅜	54.4	15.94	2.10	4.08	...	196	193
5 x3½x5/16	10x5/16	45.4	13.36	2.08	4.10	...	165	162
4 x3 x⅞	8x⅞	97.0	28.44	1.95	3.06	...	250	343
4 x3 x13/16	8x13/16	90.5	26.61	1.92	3.08	...	327	320
4 x3 x¾	8x¾	84.4	24.75	1.89	3.10	...	304	297
4 x3 x11/16	8x11/16	77.9	22.86	1.85	3.12	...	281	274
4 x3 x⅝	8x⅝	71.4	20.98	1.82	3.14	...	257	251
4 x3 x9/16	8x9/16	64.9	19.02	1.79	3.16	...	233	227
4 x3 x½	8x½	58.0	17.00	1.76	3.18	...	208	203
4 x3 x7/16	8x7/16	51.1	15.02	1.73	3.21	...	183	179
4 x3 x⅜	8x⅜	44.2	12.98	1.70	3.23	...	158	154
4 x3 x5/16	8x5/16	37.3	10.86	1.67	3.25	...	133	129
3½x2½x¾	7x¾	71.5	21.00	1.71	2.72	261	257	250
3½x2½x11/16	7x11/16	66.4	19.45	1.68	2.74	241	237	231
3½x2½x⅝	7x⅝	60.9	17.82	1.65	2.76	221	218	212
3½x2½x9/16	7x9/16	55.0	16.17	1.61	2.78	201	197	192
3½x2½x½	7x½	49.5	14.50	1.58	2.80	180	177	171
3½x2½x7/16	7x7/16	43.6	12.83	1.55	2.82	159	156	151
3½x2½x⅜	7x⅜	37.7	11.07	1.52	2.84	137	135	130
3½x2½x5/16	7x5/16	31.8	9.30	1.49	2.86	115	113	109
3½x2½x¼	7x¼	25.6	7.50	1.46	2.88	93	91	88
3 x2½x⅝	6x⅝	54.4	15.94	1.43	2.29	198	193	186
3 x2½x9/16	6x9/16	49.5	14.49	1.39	2.31	180	175	169
3 x2½x½	6x½	44.2	13.00	1.36	2.33	161	157	151
3 x2½x7/16	6x7/16	39.3	11.53	1.33	2.35	142	139	133
3 x2½x⅜	6x⅜	34.1	9.98	1.30	2.37	123	120	114
3 x2½x5/16	6x5/16	28.8	8.40	1.27	2.39	103	100	96
3 x2½x¼	6x¼	23.1	6.79	1.24	2.41	84	81	77

SAFE LOADS IN THOUSANDS OF POUNDS FOR PLATE AND ANGLE COLUMNS. SQUARE ENDS.

Calculated for least radius of gyration. Axis x-x.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$

Safety factor 4.



Length in feet

8	10	12	14	16	18	20	22	24	26	28	30	32	34
558	548	537	525	511	497	481	465	449	432	416	400	384	368
525	516	506	494	481	467	452	437	421	405	390	374	359	344
493	484	474	462	450	437	423	408	393	378	363	349	334	320
459	451	442	431	419	406	393	379	365	351	337	323	310	296
426	418	409	399	388	376	363	350	337	324	311	298	285	273
392	385	376	367	356	345	333	321	309	297	284	272	261	249
358	352	344	335	325	314	303	292	281	269	258	247	236	226
324	318	310	302	293	283	273	263	253	242	232	222	212	202
289	283	277	269	261	252	243	234	225	215	206	197	188	179
254	249	243	236	229	221	213	205	196	188	180	172	164	156
219	214	209	203	197	190	183	176	168	161	154	147	140	133
451	441	428	414	400	384	368	352	336	320	304	...	...	...
423	413	401	388	374	359	343	328	313	297	283	...	...	...
395	385	374	361	348	333	319	304	290	275	261	...	...	...
366	357	346	334	321	308	294	280	267	253	240	...	...	...
337	329	318	307	295	282	270	257	244	231	219	...	...	...
308	300	290	280	269	257	245	233	221	210	198	...	...	...
279	271	262	252	242	231	220	209	198	188	178	...	...	...
249	242	234	225	215	206	196	186	176	166	157	...	...	...
219	212	205	197	189	180	171	162	153	145	137	...	...	...
188	183	176	169	162	154	146	139	131	124	117	...	...	...
158	153	147	141	135	128	122	115	109	103	97	...	...	...
333	322	309	295	280	265	250	236	222	...	...	...	...	...
311	300	288	274	260	246	232	218	205	...	...	...	...	...
289	278	266	254	240	227	213	200	188	...	...	...	...	...
266	256	245	233	220	208	195	183	171	...	...	...	...	...
243	234	223	212	200	188	177	165	155	...	...	...	...	...
220	211	201	191	180	169	158	148	138	...	...	...	...	...
196	188	179	170	160	150	140	131	122	...	...	...	...	...
172	165	157	148	139	131	122	114	106	...	...	...	...	...
149	142	135	127	119	112	104	97	90	...	...	...	...	...
124	119	113	106	99	93	86	80	74	...	...	...	...	...
241	231	219	207	195	182	170	...	...	...	...	...	...	...
223	213	202	190	178	166	155	...	...	...	...	...	...	...
204	194	184	173	162	151	140	...	...	...	...	...	...	...
184	175	166	155	145	135	125	...	...	...	...	...	...	...
164	156	147	138	129	119	111	...	...	...	...	...	...	...
145	137	129	121	112	104	96	...	...	...	...	...	...	...
125	118	111	103	96	89	82	...	...	...	...	...	...	...
104	99	92	86	80	73	68	...	...	...	...	...	...	...
84	79	74	69	63	58	54	...	...	...	...	...	...	...
177	166	155	144	132	...	...	...	...	...	...	...	...	...
160	150	140	129	119	...	...	...	...	...	...	...	...	...
143	134	124	114	105	...	...	...	...	...	...	...	...	...
125	117	108	99	91	...	...	...	...	...	...	...	...	...
108	100	93	85	77	...	...	...	...	...	...	...	...	...
90	84	77	70	64	...	...	...	...	...	...	...	...	...
72	67	61	56	51	...	...	...	...	...	...	...	...	...

SAFE LOADS IN THOUSANDS OF POUNDS FOR I-BEAMS USED AS COLUMNS WITH SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000 r^2}}$. **Safety factor 4.**

Depth of beam	Wt. per foot	Area of section	Least radius of gyration	Length in feet							
Ins.	Lbs.	Sq. ins.	Ins.	2	3	4	5	6	7	8	9
24	100.0	29.41	1.28	364	360	354	347	338	328	317	307
24	95.0	27.94	1.30	346	342	336	330	322	313	303	293
24	90.0	26.47	1.31	328	324	319	313	305	297	288	278
24	85.0	25.00	1.33	309	306	302	295	289	281	273	264
24	80.0	23.32	1.36	289	286	282	276	271	264	256	248
20	100.0	29.41	1.34	364	361	355	349	340	332	321	312
20	95.0	27.94	1.35	346	343	337	331	324	315	307	296
20	90.0	26.47	1.36	328	352	320	314	307	300	290	282
20	85.0	25.00	1.37	309	307	302	297	290	283	275	266
20	80.0	23.73	1.39	294	291	287	282	276	270	261	254
20	75.0	22.06	1.17	273	268	264	257	250	241	233	223
20	70.0	20.59	1.19	254	251	246	240	234	226	218	209
20	65.0	19.08	1.21	236	233	229	223	217	210	203	196
18	70.0	20.59	1.09	254	250	244	237	230	221	212	202
18	65.0	19.12	1.11	236	232	227	221	214	206	198	189
18	60.0	17.65	1.13	218	214	210	205	198	191	184	176
18	55.0	15.93	1.15	197	194	190	185	180	173	166	160
15	100.0	29.41	1.31	364	360	354	348	339	330	320	309
15	95.0	27.94	1.31	346	342	336	330	322	314	304	293
15	90.0	26.47	1.32	328	324	319	313	306	297	288	279
15	85.0	25.00	1.32	309	306	302	295	289	281	272	264
15	80.0	23.57	1.32	292	289	284	279	273	265	256	249
15	75.0	22.06	1.18	273	269	264	258	250	242	233	224
15	70.0	20.59	1.19	254	251	246	240	234	226	218	209
15	65.0	19.12	1.20	236	233	229	223	217	211	203	195
15	60.0	17.67	1.21	218	215	212	207	201	195	188	181
15	55.0	16.18	1.03	199	196	191	185	178	171	163	155
15	50.0	14.71	1.04	181	178	174	168	162	156	149	141
15	45.0	13.24	1.07	163	160	157	152	147	142	135	129
15	42.0	12.48	1.08	154	151	148	144	139	133	128	122
12	55.0	16.18	1.04	199	196	191	185	178	171	163	155
12	50.0	14.71	1.05	181	178	174	168	163	156	149	142
12	45.0	13.24	1.06	163	160	156	152	146	141	135	128
12	40.0	11.84	1.08	146	144	140	136	132	127	121	116

SAFE LOADS IN THOUSANDS OF POUNDS FOR I-BEAMS USED AS COLUMNS WITH SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1+\dfrac{(12\,L)^2}{36\,000\,r^2}}$. **Safety factor 4.**

Length in feet										Weight per foot	Depth of Beam
10	11	12	13	14	15	16	17	18	19	Lbs.	Ins.
296	284	272	260	249	238	226	215	205	196	100.0	24
282	271	261	249	239	228	218	207	198	188	95.0	24
269	258	247	238	227	216	207	197	189	180	90.0	24
255	245	236	226	217	207	198	189	181	172	85.0	24
239	231	223	213	205	196	187	179	172	163	80.0	24
300	290	278	267	257	245	235	223	214	203	100.0	20
286	277	265	255	244	234	223	214	205	195	95.0	20
271	262	253	241	232	223	213	204	195	185	90.0	20
258	249	239	230	221	212	202	194	185	176	85.0	20
246	237	229	219	211	202	194	186	177	169	80.0	20
214	204	194	185	175	167	158	150	142	135	75.0	20
201	192	183	174	165	157	150	142	135	127	70.0	20
187	179	171	164	155	148	141	134	126	120	65.0	20
192	183	173	164	155	146	138	130	123	116	70.0	18
181	172	163	154	146	138	131	123	117	110	65.0	18
168	160	152	144	137	129	122	116	110	104	60.0	18
153	145	139	132	125	119	112	106	100	95	55.0	18
299	287	275	264	252	240	230	219	210	200	100.0	15
284	272	261	251	240	228	219	208	199	190	95.0	15
269	259	249	239	228	218	209	199	190	181	90.0	15
254	245	235	226	216	206	197	188	180	171	85.0	15
239	231	221	213	203	194	186	177	169	161	80.0	15
214	205	195	186	176	168	158	151	142	135	75.0	15
201	192	183	174	165	157	150	142	135	127	70.0	15
187	179	171	163	154	147	140	132	126	120	65.0	15
173	166	159	152	144	137	130	124	117	111	60.0	15
147	139	131	124	116	109	103	97	91		55.0	15
134	127	120	113	106	101	94	89	84		50.0	15
123	116	110	104	98	93	87	82	78		45.0	15
116	110	105	99	93	88	83	79	74		42.0	15
148	140	132	124	117	111	104	98	92		55.0	12
135	128	121	114	108	101	96	90	85		50.0	12
122	116	110	103	98	92	87	82	77		45.0	12
110	105	99	94	88	83	79	75	70		40.0	12

SAFE LOADS IN THOUSANDS OF POUNDS FOR I-BEAMS USED AS COLUMNS WITH SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$. Safety factor 4.

Depth of beam	Weight per foot	Area of section	Least radius of gyration	Length in feet						
Ins.	Lbs.	Sq. Ins.	Ins.	2	3	4	5	6	7	8
12	35.00	10.29	.99	127	124	121	117	112	107	102
12	31.50	9.26	1.01	114	112	109	105	102	97	93
10	40.00	11.76	.90	144	141	136	131	125	118	112
10	35.00	10.29	.91	126	123	119	115	110	104	98
10	30.00	8.82	.93	108	106	103	99	94	90	85
10	25.00	7.37	.97	91	89	86	83	80	76	73
9	35.00	10.29	.84	126	122	118	112	107	101	95
9	30.00	8.82	.85	108	105	101	97	92	87	81
9	25.00	7.35	.88	90	88	85	81	78	73	69
9	21.00	6.31	.90	77	76	73	70	67	63	60
8	25.50	7.50	.80	91	88	84	80	76	71	66
8	22.00	6.76	.81	82	79	76	72	69	65	60
8	20.50	6.03	.82	73	71	68	65	61	58	54
8	18.00	5.33	.84	65	63	61	58	55	52	49
7	20.00	5.88	.74	71	69	66	62	58	54	50
7	17.50	5.15	.76	63	61	58	55	52	48	45
7	15.00	4.42	.78	54	52	50	47	45	42	39
6	17.25	5.07	.68	61	59	56	52	48	44	41
6	14.75	4.34	.69	52	51	48	45	42	39	35
6	12.25	3.61	.72	44	42	40	38	35	33	30
5	14.75	4.34	.63	52	50	47	43	40	36	33
5	12.25	3.60	.63	43	41	39	36	33	30	27
5	9.75	2.87	.65	35	33	31	29	27	24	22
4	10.50	3.09	.57	37	35	32	29	27	24	22
4	9.50	2.79	.58	33	31	29	27	24	22	20
4	8.50	2.50	.58	30	28	26	24	22	20	18
4	7.50	2.21	.59	26	25	23	21	20	18	16
3	7.50	2.21	.52	26	24	22	20	18	16	14
3	6.50	1.91	.52	23	21	19	17	16	14	12
3	5.50	1.63	.53	19	18	17	15	13	12	11

SAFE LOADS IN THOUSANDS OF POUNDS FOR I-BEAMS USED AS COLUMNS WITH SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{50\,000}{1 + \dfrac{(12\,L)^2}{36\,000\,r^2}}$. **Safety factor 4.**

Length in feet									Weight per foot in	Depth of beam
9	10	11	12	13	14	15	16	17	Pounds	Inches
97	91	86	81	76	72	67	63	59	35.00	12
88	83	78	74	69	65	61	58	54	31.50	12
105	98	92	86	80	74	69	65	...	40.00	10
92	87	81	76	71	66	62	57	...	35.00	10
80	75	71	66	62	58	54	50	...	30.00	10
68	65	61	57	54	50	47	44	...	25.00	10
88	82	76	71	66	61	56	...	...	35.00	9
76	71	66	61	57	53	49	...	...	30.00	9
65	60	57	53	49	46	43	...	...	25.00	9
56	53	49	46	43	40	37	...	...	21.00	9
61	57	53	49	45	42	...	...	...	25.50	8
56	52	48	45	41	38	...	...	...	23.00	8
50	47	43	40	37	34	...	...	...	20.50	8
46	43	40	37	34	31	...	...	...	18.00	8
46	43	39	36	33	...	...	...	...	20.00	7
41	38	35	32	30	...	...	...	...	17.50	7
36	33	31	28	26	...	...	...	...	15.00	7
37	34	31	28	...	...	...	...	...	17.25	6
32	29	27	25	...	...	...	...	...	14.75	6
28	25	23	21	...	...	...	...	...	12.25	6
30	27	24	...	...	...	...	...	...	14.75	5
25	22	20	...	...	...	...	...	...	12.25	5
20	18	17	...	...	...	...	...	...	9.75	5
19	17	...	...	...	...	...	...	...	10.50	4
18	16	...	...	...	...	...	...	...	9.50	4
16	14	...	...	...	...	...	...	...	8.50	4
14	13	...	...	...	...	...	...	...	7.50	4
13	...	...	...	...	...	...	...	...	7.50	3
11	...	...	...	...	...	...	...	...	6.50	3
9	...	...	...	...	...	...	...	...	5.50	3

SAFE LOADS IN THOUSANDS OF POUNDS FOR HOLLOW ROUND CAST IRON COLUMNS. SQUARE ENDS.

Based on Gordon's Formula, $P = \dfrac{10\,000}{1 + \dfrac{l^2}{800\,d^2}}$

P = safe load in pounds per square inch.
l = length of column in inches.
d = outside diameter of column in inches.
Ultimate compressive strength = 80,000 pounds per square inch.
Safety factor, 8.

Outside diam. in inches	Th'k-ness in ins.	Length of column in feet										Area of metal in sq. ins.	Weight per foot in pounds
		6	8	10	12	14	16	18	20	22	24		
6	¾	105	94	82	72	62	54	47	41	36	32	12.4	38.7
6	⅞	119	107	94	82	71	62	54	47	41	36	14.1	44.0
7	¾	130	119	108	96	86	76	67	60	53	47	14.7	46.0
7	⅞	149	136	123	110	98	87	77	68	61	54	16.8	52.6
8	¾	155	145	133	122	110	99	89	80	72	65	17.1	53.4
8	⅞	178	166	153	139	126	114	104	92	83	75	19.6	61.2
8	1	200	186	172	158	142	128	115	103	93	84	22.0	68.7
9	⅞	207	196	183	169	156	142	130	118	108	98	22.3	69.8
9	1	233	220	206	190	175	160	146	133	121	110	25.1	78.5
9	1⅛	258	244	228	211	194	177	162	147	134	122	27.8	87.0
10	⅞	235	225	212	199	185	172	158	146	134	123	25.1	78.4
10	1	265	254	240	224	209	194	178	164	151	139	28.3	88.4
10	1⅛	294	281	266	249	232	215	198	182	168	154	31.4	98.0
10	1¼	323	308	291	273	254	235	217	200	184	169	34.4	107.4
11	1	298	287	273	259	243	227	212	197	183	169	31.4	98.2
11	1⅛	330	319	304	287	270	253	235	219	203	188	34.9	109.1
11	1¼	363	350	333	315	296	277	258	240	223	206	38.3	119.7
11	1⅜	395	380	361	342	322	301	280	261	242	224	41.6	129.9
12	1⅛	368	356	342	326	309	291	274	256	239	223	38.4	120.1
12	1¼	404	391	375	358	339	320	300	281	263	245	42.2	131.9
12	1⅜	439	425	408	389	369	348	327	306	287	267	45.9	143.4
12	1½	473	458	440	419	397	375	352	330	308	288	49.5	154.6
13	1⅛	404	393	379	364	347	330	312	294	277	260	42.0	131.2
13	1¼	444	432	417	400	382	363	343	323	304	286	46.1	144.2
13	1⅜	484	470	454	435	415	395	373	352	331	311	50.2	156.9
13	1½	522	507	490	470	448	426	403	380	358	336	54.2	169.4
14	1¼	485	473	459	442	424	405	386	366	347	327	50.1	156.5
14	1⅜	528	515	499	482	462	441	420	399	378	357	54.5	170.4
14	1½	570	556	540	520	499	477	454	431	408	385	58.9	184.1
14	1⅝	612	597	579	558	535	511	487	462	437	413	63.2	197.4
15	1⅜	573	560	545	528	509	489	467	446	424	406	58.9	183.9
15	1½	618	605	589	570	550	528	505	482	459	439	63.6	198.8
15	1⅝	664	650	632	612	590	567	542	517	492	471	68.3	213.4
15	1¾	708	694	675	653	630	605	579	552	525	502	72.8	227.6
16	1½	666	654	638	620	600	579	557	533	510	486	68.3	213.5
16	1⅝	716	702	686	666	645	622	598	573	548	522	73.4	229.3
16	1¾	764	750	732	711	689	664	638	611	584	558	78.3	244.8
16	1⅞	811	796	777	756	731	705	678	649	621	592	83.2	260.0

SAFE LOADS IN THOUSANDS OF POUNDS FOR HOLLOW ROUND CAST IRON COLUMNS. SQUARE ENDS.

Based on Gordon's Formula $P = \dfrac{10\,000}{1 + \dfrac{l^2}{800\, d^2}}$

P = safe load in pounds per square inch.
l = length of column in inches.
d = outside diameter of column in inches.
Ultimate compressive strength = 80,000 pounds per square inch. Safety factor 8.

Outside diam. in inches	Th'k-ness in ins.	Length of column in feet										Area of metal in sq. ins.	Weight per foot in pounds
		14	16	18	20	22	24	26	28	30	32		
18	1⅝	754	732	708	684	659	633	608	596	557	533	83.6	261.2
18	1¾	806	782	757	732	704	677	650	637	596	569	89.3	279.2
18	1⅞	857	832	805	777	749	720	691	677	633	605	95.0	296.8
18	2	907	880	852	823	792	762	731	717	670	641	100.5	314.2
20	1¾	922	900	876	850	824	797	769	742	714	687	100.3	313.6
20	1⅞	981	957	932	905	877	848	819	789	760	731	106.8	333.6
20	2	1039	1014	987	958	929	898	867	836	805	774	113.1	353.4
20	2⅛	1097	1070	1041	1011	980	948	915	882	849	817	119.3	372.9
22	1⅞	1105	1082	1058	1032	1005	976	947	918	888	859	118.5	370.5
22	2	1171	1147	1122	1094	1065	1035	1004	974	941	910	125.7	392.7
22	2⅛	1239	1213	1186	1157	1126	1094	1062	1029	996	962	132.9	415.3
22	2¼	1301	1275	1246	1215	1183	1150	1116	1081	1046	1011	139.6	436.3
24	2	1303	1280	1241	1229	1201	1171	1141	1110	1079	1047	138.2	432.0
24	2⅛	1376	1352	1311	1298	1268	1238	1206	1173	1140	1106	146.0	456.4
24	2¼	1449	1423	1380	1367	1335	1303	1269	1235	1200	1165	153.7	480.4
24	2⅜	1520	1494	1448	1434	1402	1367	1332	1296	1259	1222	161.4	504.2
26	2⅛	1515	1492	1467	1440	1412	1382	1351	1319	1286	1252	159.4	498.1
26	2¼	1596	1572	1546	1517	1487	1456	1423	1389	1354	1319	167.9	524.6
26	2⅜	1675	1650	1623	1593	1562	1528	1494	1458	1422	1385	176.3	550.9
26	2½	1754	1728	1699	1668	1635	1600	1564	1527	1489	1450	184.6	576.8
28	2¼	1742	1719	1694	1667	1638	1608	1576	1542	1508	1474	182.0	568.8
28	2⅜	1829	1806	1780	1751	1721	1689	1655	1620	1584	1548	191.2	597.5
28	2½	1917	1892	1864	1834	1802	1769	1734	1697	1660	1622	200.3	625.9
28	2⅝	2002	1967	1948	1917	1883	1848	1811	1773	1734	1694	209.3	653.9
30	2⅜	1982	1961	1936	1909	1879	1848	1816	1782	1747	1711	206.1	644.1
30	2½	2078	2055	2028	2000	1969	1937	1903	1867	1830	1793	216.0	675.0
30	2⅝	2172	2148	2119	2090	2058	2024	1989	1952	1913	1874	225.8	705.5
30	2¾	2265	2240	2210	2180	2147	2111	2074	2035	1995	1954	235.4	735.7
32	2½	2239	2217	2192	2165	2135	2104	2071	2036	2000	1963	231.7	724.0
32	2⅝	2341	2318	2292	2264	2233	2200	2165	2129	2092	2053	242.2	757.0
32	2¾	2442	2418	2391	2361	2329	2295	2259	2221	2182	2141	252.7	789.7
32	2⅞	2542	2517	2489	2458	2424	2389	2351	2312	2271	2229	263.1	822.1
34	2⅝	2511	2488	2463	2436	2406	2374	2341	2306	2272	2232	258.7	808.6
34	2¾	2620	2596	2570	2542	2511	2478	2441	2406	2370	2329	270.0	843.7
34	2⅞	2728	2703	2676	2646	2614	2580	2544	2505	2468	2425	281.1	878.5
34	3	2835	2810	2781	2750	2717	2681	2643	2604	2565	2520	292.2	913.0
36	2¾	2796	2774	2749	2721	2692	2660	2626	2591	2553	2515	287.3	897.7
36	2⅞	2913	2889	2863	2834	2803	2770	2735	2698	2659	2619	299.2	935.0
36	3	3028	3003	2976	2946	2904	2880	2849	2805	2765	2723	311.0	971.9

STRENGTH OF ROUND AND RECTANGULAR CAST IRON COLUMNS.

$\frac{L}{d}$=Ratio of the length of the column divided by the minimum outside diameter of the column.

P=Ultimate strength of column in pounds per square inch

L=Length of column in feet.

d=Minimum outside diameter in inches.

The following values are based on Gordon's Formulae for square end columns:

Round hollow columns

$$P=\frac{80\,000}{1+\frac{(12L)^2}{800\,d^2}}$$

Rectangular hollow columns

$$P=\frac{80\,000}{1+\frac{(12L)^2}{1067\,d^2}}$$

$\frac{L}{d}$	Ultimate strength in lbs. per sq. in.		$\frac{L}{d}$	Ultimate strength in lbs. per sq. in.	
	Hollow round	Hollow rectangular		Hollow round	Hollow rectangular
1.0	67800	70487	2.5	37647	43396
1.1	65692	68770	2.6	36088	41834
1.2	63532	66983	2.7	34599	40326
1.3	61340	65142	2.8	33178	38871
1.4	59137	63265	2.9	31817	37471
1.5	56940	61366	3.0	30534	36123
1.6	54766	59458	3.1	29306	34829
1.7	52625	57553	3.2	28137	33586
1.8	50531	55660	3.3	27025	32393
1.9	48491	53792	3.4	25967	31249
2.0	46512	51954	3.5	24961	30152
2.1	44598	50151	3.6	24004	29101
2.2	42753	48391	3.7	23093	28094
2.3	40979	46676	3.8	22227	27130
2.4	39277	45011	3.9	21403	26206

The values given above are ultimate, and a suitable factor of safety must be assumed.

EXAMPLE :

To find the required safe load of a hollow rectangular column, the external dimensions of which are 6″ x 9″ and the thickness of the metal = 1″.

Length of column = 12′ 6″.

d = 6″

Factor of safety assumed to be 8.

Ratio of $\frac{L}{d}=\frac{12.5}{6}=2.1$ and the corresponding ultimate strength from the tables is 50151 pounds per square inch.

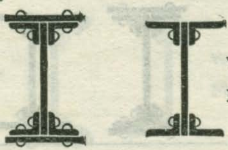
Net area of column = 6 x 9 — 4 x 7 = 26 square inches.

Therefore the safe load is $\frac{50151 \times 26}{8}$ = 162991 pounds.

SAFE UNIFORMLY DISTRIBUTED LOADS FOR PLATE GIRDERS IN THOUSANDS OF POUNDS.

Safe loads given below are based on an allowable fibre stress of 15,000 lbs. per square inch, deducting ⅞-inch diameter holes, and including weight of girder.

Web plate 48″ × ⅜″
Flange angles 6″ × 6″ × ¾″
Flange plates 14″



Web plate 48″ × ⅜″
Flange angles 6″ × 6″

Dist. center to center of bearings in feet	Thickness of flange plate in inches						Thickness of flange angles in inches		
	½	⅝	¾	⅞	1	1¼	½	⅝	¾
35	283	303	322	342	362	...	166	195	224
36	275	294	313	333	352	...	161	190	218
37	267	286	305	324	342	...	157	185	212
38	260	279	297	315	333	...	153	180	206
39	254	272	289	307	325	361	149	175	201
40	247	265	282	299	317	352	145	171	196
41	241	258	275	292	309	343	141	167	191
42	236	252	269	285	302	335	138	163	187
43	230	246	263	279	295	327	135	159	182
44	225	241	256	272	288	320	132	155	178
45	220	235	251	266	282	312	129	152	174
46	215	230	245	260	275	306	126	149	170
47	211	225	240	255	270	299	123	145	167
48	206	221	235	249	264	293	121	142	163
49	202	216	230	244	259	287	118	140	160
50	198	212	226	240	253	281	116	137	157
51	194	208	221	235	248	276	114	134	154
52	190	204	217	230	244	270	112	131	151
53	187	200	213	226	239	265	109	129	148
54	183	196	209	222	235	260	107	127	145
55	180	193	205	218	230	256	105	124	142
56	177	189	201	214	226	251	104	122	140
57	174	186	198	210	222	247	102	120	137
58	171	183	195	206	218	242	100	118	135
59	168	179	191	203	215	238	98	116	133
60	165	176	188	200	211	234	97	114	131
61	162	174	185	196	208	231	95	112	128
62	160	171	182	193	204	227	94	110	126
63	157	168	179	190	201	223	92	109	124
64	155	165	176	187	198	220	91	107	122
Weight per foot in pounds	232.3	244.2	256.2	268	279.9	303.7	142.5	160.9	178.9

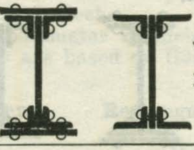
SAFE UNIFORMLY DISTRIBUTED LOADS FOR PLATE GIRDERS IN THOUSANDS OF POUNDS.

Safe loads given below are based on an allowable fibre stress of 15,000 lbs. per square inch, deducting 7/8-inch diameter holes, and including weight of girder.

Web plate 42 × 3/8″

Flange angles 6″ × 6″ × 3/4″

Flange plates 14″



Web plate 42 × 3/8″

Flange angles 6″ × 6″

Dist. center to center of bearings in feet	Thickness of flange plate in inches						Thickness of flange angles in inches		
	1/2	5/8	3/4	7/8	1	1 1/4	1/2	5/8	3/4
35	240	257	275	292	309	...	139	164	189
36	234	250	267	284	301	...	135	160	184
37	227	244	260	276	293	...	131	155	179
38	221	237	253	269	285	...	128	151	174
39	216	231	247	260	278	309	125	148	169
40	210	225	240	256	271	301	122	144	165
41	205	220	235	249	264	294	119	140	161
42	200	215	229	243	258	287	116	137	157
43	195	210	224	238	252	280	113	134	154
44	191	205	219	232	246	274	111	131	150
45	187	200	214	227	241	268	108	128	147
46	183	196	209	222	235	262	106	125	144
47	179	192	205	217	230	256	103	122	141
48	175	188	200	213	226	251	101	120	138
49	172	184	196	209	221	246	99	117	135
50	168	180	192	204	217	241	97	115	132
51	165	177	189	200	212	236	95	113	130
52	162	173	185	197	208	232	94	111	127
53	159	170	181	193	204	227	92	109	125
54	156	167	178	189	201	223	90	107	122
55	153	164	175	186	197	219	88	105	120
56	150	161	172	183	193	215	87	103	118
57	147	158	169	179	190	211	85	101	116
58	145	155	166	176	187	208	84	99	114
59	142	153	163	173	184	204	82	98	112
60	140	150	160	170	180	201	81	96	110
61	138	148	158	168	178	197	80	94	108
62	136	145	155	165	175	194	78	93	107
63	133	143	153	162	172	191	77	91	105
64	131	141	150	160	169	188	76	90	103
Weight per foot in pounds	224.7	236.6	248.5	260.4	272.3	296.1	134.9	153.3	171.3

Note.—When flange plates are thicker than 3/4-inch, use two plates

SAFE UNIFORMLY DISTRIBUTED LOADS FOR PLATE GIRDERS IN THOUSANDS OF POUNDS.

Safe loads given below are based on an allowable fibre stress of 15,000 lbs. per square inch, deducting ⅞-inch diameter holes, and including weight of girder.

Web plate 36″ × ⅜″

Flange angles 6″ × 6″ × ¾″

Flange plates 14″

Web plate 36″ × ⅜″

Flange angles 6″ × 6″

Dist. center to center of bearings in feet	Thickness of flange plate in inches					Thickness of flange angles in inches			
	½	⅝	¾	⅞	1	⅜	½	⅝	¾
30	238	255	...	...	...	108	134	159	183
31	230	247	264	...	...	104	130	154	177
32	223	239	256	...	...	101	125	149	171
33	216	232	248	264	...	98	122	144	166
34	210	225	241	256	...	95	118	140	161
35	204	219	234	249	264	92	115	136	157
36	198	213	227	242	257	90	112	132	152
37	193	207	221	235	250	87	109	129	148
38	188	201	215	229	243	85	106	125	144
39	183	196	210	223	237	83	103	122	141
40	178	191	205	218	231	81	100	119	137
41	174	187	200	213	225	79	98	116	134
42	170	182	195	207	220	77	96	113	131
43	166	178	190	203	215	75	93	111	128
44	162	174	186	198	210	74	91	108	125
45	158	170	182	194	205	72	89	106	122
46	155	166	178	189	201	70	87	104	119
47	152	163	174	185	197	69	85	101	117
48	149	160	171	182	193	67	84	99	114
49	146	156	167	178	189	66	82	97	112
50	143	153	164	174	185	65	80	95	110
51	140	150	160	171	181	63	79	93	108
52	137	147	157	168	178	62	77	92	106
53	135	144	154	164	174	61	76	90	104
54	132	142	152	161	171	60	74	88	102
55	130	139	149	158	168	59	73	87	100
56	127	137	146	156	165	58	72	85	98
57	125	134	144	153	162	57	70	84	96
58	123	132	141	150	159	56	69	82	95
59	121	130	139	148	157	55	68	81	93
Weight per foot in pounds	214.1	226	237.9	249.8	261.7	107.5	126.3	144.7	162.7

Note—When flange plates are thicker than ¾-inch, use two plates.

SAFE UNIFORMLY DISTRIBUTED LOADS FOR PLATE GIRDERS IN THOUSANDS OF POUNDS.

Safe loads given below are based on an allowable fibre stress of 15,000 lbs. per square inch, deducting ⅞-inch diameter holes, and including weight of girder.

Web plate
33″ × ⅜″

Flange angles
6″ × 3½″

Web plate
30″ × ⅜″

Flange angles
6″ × 3½″

Dist. center to center of bearings in feet	Thickness of flange angles in inches				Thickness of flange angles in inches			
	⅜	½	⅝	¾	⅜	½	⅝	¾
30	83	103	122	...	74	91	108	...
31	81	100	118	...	71	88	105	...
32	78	97	114	131	69	86	101	116
33	76	94	111	127	67	83	98	113
34	74	91	107	123	65	81	95	109
35	72	88	104	119	63	78	93	106
36	70	86	101	116	61	76	90	103
37	68	84	99	113	60	74	88	101
38	66	81	96	110	58	72	85	98
39	64	79	94	107	57	70	83	95
40	63	77	91	104	55	69	81	93
41	61	75	89	102	54	67	79	91
42	60	74	87	99	53	65	77	89
43	58	72	85	97	51	64	75	86
44	57	70	83	95	50	62	74	85
45	56	69	81	93	49	61	72	83
46	54	67	79	91	48	60	71	81
47	53	66	78	89	47	58	69	79
48	52	64	76	87	46	57	68	77
49	51	63	75	85	45	56	66	76
50	50	62	73	84	44	55	65	74
51	49	61	72	82	43	54	64	73
52	48	59	70	80	43	53	62	72
53	47	58	69	79	42	52	61	70
54	46	57	68	77	41	51	60	69
55	46	56	66	76	40	50	59	68
56	45	55	65	75	39	49	58	66
57	44	54	64	73	39	48	57	65
58	43	53	63	72	38	47	56	64
59	42	52	62	71	37	46	55	63
Weight per ft. in lbs.	90.8	105.2	119.6	133.6	87.0	101.4	115.8	129.8

SAFE UNIFORMLY DISTRIBUTED LOADS FOR PLATE GIRDERS IN THOUSANDS OF POUNDS.

Safe loads given below are based on an allowable fibre stress of 15,000 lbs. per square inch, deducting ⅞-inch diameter holes, and including weight of girder.

Web plate 27″ × ⅜″

Flange angles 5″ × 3½″

Web plate 24″ × ⅜″

Flange angles 5″ × 3½″

Dist. center to center of bearings in feet	Thickness of flange angles in inches				Thickness of flange angles in inches			
	⅜	½	⅝	¾	⅜	½	⅝	¾
25	69	85	101	..	59	74	87	..
26	67	82	97	..	57	71	84	..
27	64	79	93	..	55	68	81	92
28	62	76	90	103	53	66	78	89
29	60	74	87	99	51	63	75	86
30	58	71	84	96	50	61	73	83
31	56	69	81	93	48	59	70	80
32	54	67	79	90	46	57	68	78
33	53	65	76	87	45	56	66	75
34	51	63	74	85	44	54	64	73
35	50	61	72	82	42	53	62	71
36	48	59	70	80	41	51	60	69
37	47	58	68	78	40	50	59	67
38	46	56	66	76	39	48	57	66
39	44	55	65	74	38	47	56	64
40	43	53	63	72	37	46	54	62
41	42	52	61	70	36	45	53	61
42	41	51	60	69	35	44	52	59
43	40	50	59	67	35	43	51	58
44	39	49	57	65	34	42	49	57
45	39	47	56	64	33	41	48	55
46	38	46	55	63	32	40	47	54
47	37	45	54	61	32	39	46	53
48	36	44	53	60	31	38	45	52
49	35	44	51	59	30	38	44	51
50	35	43	50	58	30	37	44	50
51	34	42	49	57	29	36	43	49
52	33	41	48	55	29	35	42	48
53	33	40	48	54	28	35	41	47
54	32	40	47	53	28	34	40	46
Weight per ft. in lbs.	78	90.8	103.6	115.6	74.1	86.9	99.7	111.7

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting 13/16-inch diam. holes, and including weight of girder.

Dist. center to center of bearings in feet	Thickness of plates in inches For thicknesses greater than ¾-inch, use two plates										
	¾	13/16	⅞	15/16	1	1 1/16	1⅛	1 3/16	1¼	1 5/16	1⅜
15	396	411	427	442	458	473	489	505	520	536	551
16	371	386	400	415	429	444	458	473	488	502	517
17	349	363	377	390	404	418	431	445	459	473	487
18	330	343	356	369	381	394	407	421	433	446	460
19	312	325	337	349	361	374	386	398	411	423	435
20	297	308	320	332	343	355	367	379	390	402	414
21	283	294	305	316	327	338	349	361	372	383	394
22	270	280	291	302	312	323	333	344	355	365	376
23	258	268	278	288	299	309	319	329	339	349	360
24	247	257	267	276	286	296	306	315	325	335	345
25	237	247	256	265	275	284	293	303	312	321	331
26	228	237	246	255	264	273	282	291	300	309	318
27	220	228	237	246	254	263	272	280	289	298	306
28	212	220	229	237	245	254	262	270	279	287	295
29	205	213	221	229	237	245	253	261	269	277	285
30	198	206	213	221	229	237	244	252	260	268	276
31	192	199	206	214	222	229	237	244	252	259	267
32	186	193	200	207	215	222	229	237	244	251	258
33	180	187	194	201	208	215	222	229	236	244	251
34	175	181	188	195	202	209	216	223	229	236	243
35	170	176	183	190	196	203	210	216	223	230	236
36	165	171	178	184	191	197	204	210	217	223	230
37	160	167	173	179	186	192	198	205	211	217	224
38	156	162	168	175	181	187	193	199	205	211	218
39	152	158	164	170	176	182	188	194	200	206	212
Weight per ft. in pounds	255.7	263.3	271.0	278.6	286.2	293.9	301.5	309.2	316.8	324.5	332.1
Section modulus	593.7	616.9	640.1	663.4	686.7	710.0	733.3	757.1	780.2	803.6	827.1
Coef. of deflection	0.0000000983			0.0000000870			0.0000000778			0.0000000713	

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting 13/16-inch diam. holes, and including weight of girder.

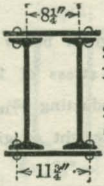
2-Plates 16″ wide

2-20″ I-Beams 80 lbs. per foot

Dist. center to center of bearings in feet	Thickness of plates in inches For thicknesses greater than ¾-inch, use two plates										
	¾	13/16	⅞	15/16	1	1 1/16	1 ⅛	1 3/16	1 ¼	1 5/16	1 ⅜
15	309	320	331	343	354	365	376	387	399	410	421
16	290	300	311	321	332	342	353	363	374	384	395
17	273	283	292	302	312	322	332	342	352	362	372
18	258	267	276	285	295	304	313	323	332	342	351
19	244	253	262	270	279	288	297	306	315	324	332
20	232	240	249	257	265	274	282	291	299	307	316
21	221	229	237	245	253	261	269	277	285	293	301
22	211	218	226	234	241	249	256	264	272	279	287
23	202	209	216	223	231	238	245	253	260	267	275
24	193	200	207	214	221	228	235	243	249	256	263
25	186	192	199	206	212	219	226	232	239	246	253
26	178	185	191	198	204	211	217	224	230	236	243
27	172	178	184	190	196	203	209	215	221	228	234
28	166	172	178	184	189	195	201	208	214	220	226
29	160	166	171	177	183	189	195	200	206	212	218
30	155	160	166	171	177	182	188	194	199	205	211
31	150	155	160	166	171	177	182	187	193	198	204
32	145	150	155	161	166	171	176	182	187	192	197
33	141	146	151	156	161	166	171	176	181	186	191
34	136	141	146	151	156	161	166	171	176	181	186
35	133	137	142	147	152	156	161	166	171	176	180
36	129	133	138	143	147	152	157	161	166	171	175
37	125	130	134	139	143	148	152	157	162	166	171
38	122	126	131	135	140	144	148	153	157	162	166
39	119	123	127	132	136	140	145	149	153	158	162
Weight per ft. in pounds	245.5	252.2	259.0	265.8	272.6	279.4	286.2	293.1	299.8	306.7	313.4
Section modulus	463.8	480.4	497.1	513.8	530.6	547.3	564.1	581.2	597.8	614.7	631.7
Coef. of deflection	0.000000149			0.000000133			0.000000119			0.000000110	

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting 13/16-inch diam. holes, and including weight of girder.



2-Plates 16″ wide

2-20″ I-Beams 65 lbs. per foot

Dist. center to center of bearings in feet	Thickness of plates in inches For thicknesses greater than 3/4-inch, use two plates										
	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8
15	275	286	297	308	320	331	343	354	365	377	388
16	257	268	279	289	300	310	321	332	343	350	364
17	242	252	262	272	282	292	302	312	322	333	343
18	229	238	248	257	266	276	285	295	305	314	324
19	217	226	235	244	252	261	270	280	288	298	307
20	206	214	223	231	240	248	257	266	274	283	291
21	196	204	212	220	228	237	245	253	261	269	277
22	187	195	203	210	218	226	234	241	249	257	265
23	179	186	194	201	209	216	223	231	238	246	253
24	172	179	186	193	200	207	214	221	228	236	243
25	165	171	178	185	192	199	206	212	219	226	233
26	158	165	171	178	184	191	198	204	211	217	224
27	153	159	165	171	178	184	190	197	203	209	216
28	147	153	159	165	171	177	184	190	196	202	208
29	142	148	154	160	165	171	177	183	189	195	201
30	137	143	149	154	160	166	171	177	183	188	194
31	133	138	144	149	155	160	166	171	177	182	188
32	129	134	139	145	150	155	161	166	171	177	182
33	125	130	135	140	145	151	156	161	166	171	177
34	121	126	131	136	141	146	151	156	161	166	171
35	118	122	127	132	137	142	147	152	157	162	166
36	114	119	124	129	133	138	143	148	152	157	162
37	111	116	120	125	130	134	139	144	148	153	157
38	108	113	117	122	126	131	135	140	144	149	153
39	106	110	114	119	123	127	132	136	141	145	149
Weight per ft. in pounds	215.5	222.2	229.0	235.8	242.6	249.4	256.2	263.1	269.8	276.7	283.4
Section modulus	411.8	428.7	445.7	462.7	479.7	496.7	513.8	531.2	548.1	565.3	582.5
Coef. of deflection	0.000000168			0.000000147			0.000000131			0.000000119	

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting 13⁄16-inch diam. holes, and including weight of girder.

2-Plates 16″ wide

2-18″ I-Beams 55 lbs. per foot

Dist. center to center of bearings in feet	Thickness of plates in inches For thicknesses greater than ¾-inch, use two plates										
	¾	13⁄16	⅞	15⁄16	1	1 1⁄16	1⅛	1 3⁄16	1¼	1 5⁄16	1⅜
15	227	237	247	258	268	278	289	299	309	320	330
16	213	222	232	242	251	261	271	280	290	300	310
17	200	209	218	227	237	246	255	264	273	282	291
18	189	198	206	215	223	232	241	249	258	267	275
19	179	187	195	203	212	220	228	236	244	253	261
20	170	178	186	193	201	209	217	224	232	240	248
21	162	169	177	184	191	199	206	214	221	228	236
22	155	162	169	176	183	190	197	204	211	218	225
23	148	155	161	168	175	182	188	195	202	209	215
24	142	148	155	161	168	174	180	187	193	200	206
25	136	142	148	155	161	167	173	179	186	192	198
26	131	137	143	149	155	161	167	173	179	185	191
27	126	132	137	143	149	155	160	166	172	178	183
28	122	127	133	138	144	149	155	160	166	171	177
29	117	123	128	133	139	144	149	155	160	165	171
30	113	119	124	129	134	139	144	150	155	160	165
31	110	115	120	125	130	135	140	145	150	155	160
32	106	111	116	121	126	130	135	140	145	150	155
33	103	108	112	117	122	127	131	136	141	145	150
34	100	105	109	114	118	123	127	132	137	141	146
35	97	102	106	110	115	119	124	128	133	137	142
36	95	99	103	107	112	116	120	125	129	133	138
37	92	96	100	104	109	113	117	121	125	130	134
38	90	94	98	102	106	110	114	118	122	126	130
39	87	91	95	99	103	107	111	115	119	123	127
Weight per ft. in pounds	195.5	202.2	209.0	215.8	222.6	229.4	236.2	243.1	249.8	256.7	263.4
Section modulus	340.5	355.8	371.2	386.6	402.1	417.5	433.0	448.6	464.2	479.8	495.4
Coef. of deflection	0.000000223			0.000000193			0.000000170			0.000000154	

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting 13/16-inch diam. holes, and including weight of girder.

2-Plates
15″ wide

2-15″ I-Beams
80 lbs. per foot

Dist. center to center of bearings in feet	Thickness of plates in inches For thicknesses greater than 3/4-inch, use two plates									
	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	1 3/16	1 1/4
10	300	311	322	334	345	357	368	380	391	403	414
11	272	283	293	303	314	324	335	345	356	366	377
12	250	259	269	278	288	297	307	316	326	336	345
13	231	239	248	257	265	274	283	292	301	310	319
14	214	222	230	238	247	255	263	271	279	288	296
15	200	207	215	222	230	238	245	253	261	269	276
16	187	194	201	209	216	223	230	237	244	252	259
17	176	183	190	196	203	210	217	223	230	237	244
18	167	173	179	185	192	198	204	211	217	224	230
19	158	164	170	176	182	188	194	200	206	212	218
20	150	156	161	167	173	178	184	190	196	201	207
21	143	148	154	159	164	170	175	181	186	192	197
22	136	141	147	152	157	162	167	173	178	183	188
23	130	135	140	145	150	155	160	165	170	173	180
24	125	130	134	139	144	149	153	158	163	168	173
25	120	124	129	133	138	143	147	152	156	161	166
26	115	120	124	128	133	137	142	146	150	155	159
27	111	115	119	124	128	132	136	141	145	149	153
28	107	111	115	119	123	127	131	136	140	144	148
29	103	107	111	115	119	123	127	131	135	139	143
30	100	104	107	111	115	119	123	127	130	134	138
31	97	100	104	108	111	115	119	122	126	130	134
32	94	97	101	104	108	111	115	119	122	126	130
33	91	94	98	101	105	108	112	115	119	122	126
34	88	91	95	98	102	105	108	112	115	118	122
Weight per ft. in pounds	227.6	234.0	240.4	246.7	253.1	259.5	265.8	272.2	278.6	285.0	291.4
Section modulus	299.7	311.0	322.4	333.7	345.1	356.6	368.1	379.6	391.2	402.8	414.4
Coef. of deflection	0.000000305			0.000000269			0.000000239			0.000000218	

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting 13/16-inch diam. holes, and including weight of girder.

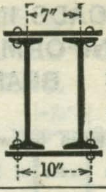
2-Plates 15" wide

2-15" I-Beams 60 lbs. per foot

Dist. center to center of bearings in feet	Thickness of plates in inches For thicknesses greater than ¾-inch, use two plates										
	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	1 3/16	1 1/4
10	259	271	282	294	306	318	329	341	353	365	377
11	236	246	257	267	278	289	299	310	321	332	342
12	216	226	235	245	255	265	274	284	294	304	314
13	199	208	217	226	235	244	253	262	272	281	290
14	185	193	202	210	218	227	235	244	252	261	269
15	173	181	188	196	204	212	220	227	235	243	251
16	162	169	177	184	191	198	206	213	221	228	235
17	152	159	166	173	180	187	194	201	208	215	222
18	144	150	157	163	170	176	183	190	196	203	209
19	136	143	149	155	161	167	173	180	186	192	198
20	130	135	141	147	153	159	165	171	176	182	188
21	123	129	134	140	146	151	157	162	168	174	179
22	118	123	128	134	139	144	150	155	160	166	171
23	113	118	123	128	133	138	143	148	153	159	164
24	108	113	118	123	127	132	137	142	147	152	157
25	104	108	113	118	122	127	132	136	141	146	151
26	100	104	109	113	118	122	127	131	136	140	145
27	96	100	105	109	113	118	122	126	131	135	140
28	93	97	101	105	109	113	118	122	126	130	135
29	89	93	97	101	105	109	114	118	122	126	130
30	86	90	94	98	102	106	110	114	118	122	126
31	84	87	91	95	99	102	106	110	114	118	122
32	81	85	88	92	96	99	103	107	110	114	118
33	79	82	86	89	93	96	100	103	107	111	114
34	76	80	83	87	90	93	97	100	104	107	111
Weight per ft. in pounds	187.6	194.0	200.4	206.7	213.1	219.5	225.8	232.2	238.6	245.0	251.4
Section modulus	259.2	270.8	282.4	294.1	305.8	317.5	329.3	341.1	353.0	364.9	376.8
Coef. of deflection	0.000000350			0.000000303			0.000000266			0.000000240	

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting $1\frac{3}{16}$-inch diam. holes, and including weight of girder.



2-Plates
14" wide
2-15" I-Beams
42 lbs. per foot

Dist. center to center of bearings in feet	Thickness of plates in inches. For thicknesses greater than ¾-inch, use two plates										
	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	1 3/16	1 1/4
10	212	223	234	245	256	267	278	289	300	312	323
11	193	203	213	223	233	243	253	263	273	283	293
12	177	186	195	204	213	223	232	241	250	260	269
13	163	172	180	188	197	205	214	223	231	240	248
14	151	159	167	175	183	191	199	207	215	223	231
15	141	149	156	163	171	178	185	193	200	208	215
16	133	139	146	153	160	167	174	181	188	195	202
17	125	131	138	144	151	157	164	170	177	183	190
18	118	124	130	136	142	148	155	161	167	173	179
19	112	117	123	129	135	141	146	152	158	164	170
20	106	112	117	122	128	134	139	145	150	156	161
21	101	106	111	117	122	127	132	138	143	148	154
22	96	101	106	111	116	121	126	131	137	142	147
23	92	97	102	107	111	116	121	126	131	135	140
24	88	93	98	102	107	111	116	121	125	130	135
25	85	89	94	98	102	107	111	116	120	125	129
26	82	86	90	94	98	103	107	111	116	120	124
27	79	83	87	91	95	99	103	107	111	115	120
28	76	80	84	88	91	95	99	103	107	111	115
29	73	77	81	84	88	92	96	100	104	107	111
30	71	74	78	82	85	89	93	96	100	104	108
31	68	72	75	79	83	86	90	93	97	101	104
32	66	70	73	77	80	83	87	90	94	97	101
33	64	68	71	74	78	81	84	88	91	94	98
34	62	66	69	72	75	79	82	85	88	92	95
Weight per ft. in pounds	147.3	153.3	159.3	165.2	171.1	177.1	183.0	189.0	194.9	200.9	206.8
Section modulus	212.1	223.0	234.0	245.0	256.0	267.1	278.2	289.3	300.5	311.6	322.8
Coef. of deflection	0.000000426			0.000000362			0.000000314			0.000000281	

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

2-Plates
14″ wide
2-12″ I-Beams
40 lbs. per foot

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting 13/16-inch diam. holes, and including weight of girder.

Dist. center to center of bearings in feet	Thickness of plates in inches. For thicknesses greater than ¾-inch, use two plates								
	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
10	147	155	164	173	181	190	199	208	217
11	133	141	149	157	165	173	181	189	197
12	122	129	137	144	151	158	166	173	181
13	113	119	126	133	140	146	153	160	167
14	105	111	117	123	130	136	142	148	155
15	98	104	109	115	121	127	133	139	144
16	92	97	102	108	113	119	124	130	135
17	86	91	96	102	107	112	117	122	127
18	81	86	91	96	101	106	111	115	120
19	77	82	86	91	95	100	105	109	114
20	73	78	82	86	91	95	99	104	108
21	70	74	78	82	86	91	95	99	103
22	67	71	75	78	82	86	90	94	99
23	64	68	71	75	79	83	87	90	94
24	61	65	68	72	76	79	83	87	90
25	59	62	66	69	73	76	80	83	87
26	56	60	63	66	70	73	77	80	83
27	54	58	61	64	67	70	74	77	80
28	52	55	59	62	65	68	71	74	77
29	51	54	57	60	63	66	69	72	75
30	49	52	55	58	60	63	66	69	72
31	47	50	53	56	59	61	64	67	70
32	46	49	51	54	57	59	62	65	68
33	44	47	50	52	55	58	60	63	66
34	43	46	48	51	53	56	59	61	64
Weight per foot in pounds	131.4	137.4	143.3	149.3	155.3	161.2	167.1	173.1	179.0
Section modulus	146.6	155.3	163.9	172.7	181.4	190.2	199.0	207.8	216.7
Coef. of deflection	0.000000763			0.000000635			0.000000539		

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

2-Plates
14" wide
2-12" I-Beams
31.5 lbs. per foot

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting 13/16-inch diam. holes, and including weight of girder.

Dist. center to center of bearings in feet	Thickness of plates in inches. For thicknesses greater than ¾-inch, use two plates								
	½	9/16	5/8	11/16	¾	13/16	7/8	15/16	1
10	132	141	150	159	167	176	185	194	203
11	120	128	136	144	152	160	168	177	185
12	110	117	125	132	140	147	154	162	169
13	102	108	115	122	129	136	143	149	156
14	94	101	107	113	120	126	132	139	145
15	88	94	100	106	112	118	123	129	135
16	83	88	94	99	105	110	116	121	127
17	78	83	88	93	98	104	109	114	120
18	73	78	83	88	93	98	103	108	113
19	70	74	79	83	88	93	98	102	107
20	66	70	75	79	84	88	93	97	102
21	63	67	71	76	80	84	88	92	97
22	60	64	68	72	76	80	84	88	92
23	57	61	65	69	73	77	81	84	88
24	55	59	62	66	70	73	77	81	85
25	53	56	60	63	67	71	74	78	81
26	51	54	58	61	64	68	71	75	78
27	49	52	55	59	62	65	69	72	75
28	47	50	53	57	60	63	66	69	73
29	46	49	52	55	58	61	64	67	70
30	44	47	50	53	56	59	62	65	68
31	43	45	48	51	54	57	60	63	66
32	41	44	47	50	52	55	58	61	64
33	40	43	45	48	51	53	56	59	62
34	39	41	44	47	49	52	54	57	60
Weight per foot in pounds	114.4	120.4	126.3	132.3	138.3	144.2	150.1	156.1	162.0
Section modulus	132.1	140.9	149.7	158.5	167.4	176.3	185.3	194.2	203.2
Coef. of deflection	0.000000842			0.000000688			0.000000577		

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN THOUSANDS OF POUNDS UNIFORMLY DISTRIBUTED FOR BEAM BOX GIRDERS.

2-Plates 12" wide
2-10" I-Beams 25 lbs. per foot

Safe loads given below are based on an allowable fibre stress of 15,000 pounds per square inch, deducting 13/16-inch diam. holes, and including weight of girder.

Dist. center to center of bearings in feet	Thickness of plates in inches. For thicknesses greater than ¾-inch, use two plates								
	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
10	90	96	102	109	115	121	127	134	140
11	82	87	93	99	104	110	116	121	127
12	75	80	85	90	96	101	106	111	117
13	69	74	79	84	88	93	98	103	108
14	64	69	73	78	82	86	91	95	100
15	60	64	68	72	77	81	85	89	93
16	56	60	64	68	72	70	80	83	87
17	53	57	60	64	68	71	75	79	82
18	50	53	57	60	64	67	71	74	78
19	47	51	54	57	60	64	67	70	74
20	45	48	51	54	57	60	64	67	70
21	43	46	49	52	55	58	61	64	67
22	41	44	47	49	52	55	58	61	64
23	39	42	45	47	50	53	55	58	61
24	38	40	43	45	48	50	53	56	58
25	36	38	41	43	46	48	51	53	56
26	35	37	39	42	44	47	49	51	54
27	33	36	38	40	43	45	47	49	52
28	32	34	37	39	41	43	45	48	50
29	31	33	35	37	40	42	44	46	48
30	30	32	34	36	38	40	42	45	47
31	29	31	33	35	37	39	41	43	45
32	28	30	32	34	36	38	40	42	44
33	27	29	31	33	35	37	39	40	42
34	26	28	30	32	34	36	37	39	41
Weight per foot in pounds	94.6	99.8	104.8	110.0	115.0	120.1	125.2	130.3	135.4
Section modulus	90.1	96.3	102.4	108.6	114.8	121.0	127.2	133.5	139.8
Coef. of deflection	0.00000145			0.00000118			0.00000098		

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAM 24-Inch 100 lbs.	95 lbs.	90 lbs.	85 lbs.	80 lbs.
10	211520	205240	198970	192700	185530
11	192290	186590	180880	175180	168660
12	176270	171040	165810	160580	154610
13	162710	157880	153050	148230	142720
14	151080	146600	142120	137640	132520
15	141010	136830	132650	128460	123690
16	132200	128280	124360	120430	115960
17	124420	120730	117040	113350	109140
18	117510	114020	110540	107050	103070
19	111330	108020	104720	101420	97650
20	105760	102620	99480	96350	92770
21	100720	97740	94750	91760	88350
22	96140	93290	90440	87590	84330
23	91960	89240	86510	83780	80670
24	88130	85520	82900	80290	77300
25	84610	82100	79590	77080	74210
26	81350	78940	76530	74110	71360
27	78340	76020	73690	71370	68720
28	75540	73300	71060	68820	66260
29	72940	70770	68610	66450	63980
30	70510	68410	66320	64230	61840
31	68230	66210	64180	62160	59850
32	66100	64140	62180	60220	57980
33	64100	62200	60290	58390	56220
34	62210	60370	58520	56680	54570
35	60430	58640	56850	55060	53010
36	58760	57010	55270	53530	51540

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weignt of beam.

Distance between supports in feet	STANDARD I-BEAM 20-Inch 100 lbs.	95 lbs.	90 lbs.	85 lbs.	80 lbs.
10	176600	171370	166140	160910	156410
11	160540	155790	151040	146280	142190
12	147160	142810	138450	134090	130340
13	135840	131820	127800	123780	120310
14	126140	122410	118670	114940	111720
15	117730	114250	110760	107270	104270
16	110370	107100	103840	100570	97750
17	103880	100800	97730	94650	92000
18	98110	95200	92300	89390	86890
19	92950	90190	87440	84690	82320
20	88300	85680	83070	80460	78200
21	84090	81600	79110	76620	74480
22	80270	77890	75520	73140	71090
23	76780	74510	72230	69960	68000
24	73580	71400	69220	67050	65170
25	70640	68550	66460	64360	62560
26	67920	65910	63900	61890	60160
27	65410	63470	61530	59600	57930
28	63070	61200	59340	57470	55860
29	60900	59090	57290	55490	53930
30	58870	57120	55380	53640	52140
31	56970	55280	53590	51910	50450
32	55190	53550	51920	50280	48880
33	53510	51930	50350	48760	47400
34	51940	50400	48860	47330	46000
35	50460	48960	47470	45970	44690
36	49050	47600	46150	44700	43450

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAMS						
	20-Inch			18-Inch			
	75 lbs.	70 lbs.	65 lbs.	70 lbs.	65 lbs.	60 lbs.	55 lbs.
10	135340	130110	124750	109180	104470	99770	94290
11	123040	118280	113410	99250	94980	90700	85720
12	112780	108430	103960	90980	87060	83140	78570
13	104110	100090	95960	83980	80360	76740	72530
14	96670	92940	89110	77990	74620	71260	67350
15	90230	86740	83170	72790	69560	66510	62860
16	84590	81320	77970	68240	65300	62360	58930
17	79610	76540	73380	64220	61460	58650	55460
18	75190	72280	69310	60660	58040	55430	52380
19	71230	68480	65660	57460	54990	52510	49630
20	67670	65060	62370	54590	52240	49880	47140
21	64450	61960	59400	51990	49750	47510	44900
22	61520	59140	56700	49630	47490	45350	42860
23	58840	56570	54240	47470	45420	43380	40990
24	56390	54210	51980	45490	43530	41570	39290
25	54140	52040	49900	43670	41790	39910	37720
26	52050	50040	47980	41990	40180	38370	36260
27	50130	48190	46200	40440	38690	36950	34920
28	48340	46470	44550	38990	37310	35630	33670
29	46670	44870	43020	37650	36030	34400	32510
30	45110	43370	41580	36390	34820	33260	31430
31	43660	41970	40240	35220	33700	32180	30420
32	42290	40660	38980	34120	32650	31200	29460
33	41010	39430	37800	33080	31660	30230	28570
34	39810	38270	36690	32110	30730	29340	27730
35	38670	37170	35640	31190	29850	28510	26940
36	37590	36140	34650	30330	29020	27710	26190

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAM 15-Inch				
	100 lbs.	95 lbs.	90 lbs.	85 lbs.	80 lbs.
10	127800	123880	119960	116030	112230
11	116180	112620	109050	105490	102030
12	106500	103230	99960	96700	93520
13	98310	95290	92270	89260	86330
14	91280	88480	85680	82880	80160
15	85200	82580	79970	77360	74820
16	79870	77420	74970	72520	70140
17	75180	72870	70560	68260	66020
18	71000	68820	66640	64460	62350
19	67260	65200	63130	61070	59070
20	63900	61940	59980	58020	56110
21	60860	58990	57120	55250	53440
22	58090	56310	54530	52740	51010
23	55560	53860	52150	50450	48800
24	53250	51620	49980	48350	46760
25	51120	49550	47980	46410	44890
26	49150	47650	46140	44630	43170
27	47330	45880	44430	42980	41570
28	45640	44240	42840	41440	40080
29	44070	42720	41360	40010	38700
30	42600	41290	39990	38680	37410
31	41230	39960	38700	37430	36200
32	39940	38710	37490	36260	35070
33	38730	37540	36350	35160	34010
34	37590	36430	35280	34130	33010
35	36510	35390	34270	33150	32070
36	35500	34410	33320	32230	31170

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAM			
	15-Inch			
	75 lbs.	70 lbs.	65 lbs.	60 lbs.
10	98310	94390	90470	86610
11	89370	85810	82240	78740
12	81920	78660	75390	72180
13	75620	72610	69590	66630
14	70220	67420	64620	61870
15	65540	62920	60310	57740
16	61440	58990	56540	54130
17	57830	55520	53220	50950
18	54620	52440	50260	48120
19	51740	49680	47610	45590
20	49150	47190	45230	43310
21	46810	44950	43080	41240
22	44690	42900	41120	39370
23	42740	41040	39330	37660
24	40960	39330	37690	36090
25	39320	37750	36190	34650
26	37810	36300	34790	33310
27	36410	34960	33510	32080
28	35110	33710	32310	30930
29	33900	32550	31200	29870
30	32770	31460	30160	28870
31	31710	30450	29180	27940
32	30720	29500	28270	27070
33	29790	28600	27410	26250
34	28910	27760	26610	25470
35	28090	26970	25850	24750
36	27310	26220	25130	24060

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAM 15-Inch 55 lbs.	50 lbs.	45 lbs.	42 lbs.
10	72670	68750	64830	62830
11	66070	62500	58940	57120
12	60560	57290	54030	52360
13	55900	52890	49870	48330
14	51910	49110	46310	44880
15	48450	45840	43220	41880
16	45420	42970	40520	39270
17	42750	40440	38140	36960
18	40370	38200	36020	34900
19	38250	36190	34120	33070
20	36340	34380	32420	31410
21	34610	32740	30870	29920
22	33030	31250	29470	28560
23	31600	29890	28190	27320
24	30280	28650	27010	26180
25	29070	27500	25930	25130
26	27950	26440	24940	24160
27	26920	25460	24010	23270
28	25960	24550	23150	22440
29	25060	23710	22360	21660
30	24220	22920	21610	20940
31	23440	22180	20910	20270
32	22710	21490	20260	19630
33	22020	20830	19650	19040
34	21370	20220	19070	18480
35	20760	19640	18520	17950
36	20190	19100	18010	17450

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAM					
	12-Inch					
	55 lbs.	50 lbs.	45 lbs.	40 lbs.	35 lbs.	31.5 lbs.
10	57070	53930	50790	47810	40580	38370
11	51880	49030	46180	43470	36890	34880
12	47560	44940	42330	39840	33820	31970
13	43900	41480	39070	36780	31220	29510
14	40760	38520	36280	34150	28990	27400
15	38040	35950	33860	31880	27050	25580
16	35670	33710	31750	29880	25360	23980
17	33570	31720	29880	28130	23870	22570
18	31700	29960	28220	26560	22540	21310
19	30040	28380	26730	25160	21360	20190
20	28530	26960	25400	23910	20290	19180
21	27170	25680	24190	22770	19320	18270
22	25940	24510	23090	21730	18450	17440
23	24810	23450	22080	20790	17640	16680
24	23780	22470	21160	19920	16910	15990
25	22830	21570	20320	19130	16230	15350
26	21950	20740	19540	18390	15610	14760
27	21140	19970	18810	17710	15030	14210
28	20380	19260	18140	17080	14490	13700
29	19680	18600	17510	16490	13990	13230
30	19020	17980	16930	15940	13530	12790
31	18410	17400	16380	15420	13090	12380
32	17830	16850	15870	14940	12680	11990
33	17290	16340	15390	14490	12300	11630
34	16780	15860	14940	14060	11940	11280
35	16300	15410	14510	13660	11590	10960
36	15850	14980	14110	13280	11270	10660

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAMS							
	10-Inch				9-Inch			
	40 lbs.	35 lbs.	30 lbs.	25 lbs.	35 lbs.	30 lbs.	25 lbs.	21 lbs.
8	.....	.....	.....	.....	33120	30180	27240	25160
9	.....	.....	.....	.....	29440	26830	24210	22370
10	33850	31240	28620	26050	26500	24150	21790	20130
11	30780	28400	26020	23680	24090	21950	19810	18300
12	28210	26030	23850	21710	22080	20120	18160	16770
13	26040	24030	22020	20040	20380	18570	16760	15480
14	24180	22310	20450	18610	18930	17250	15570	14380
15	22570	20830	19080	17360	17670	16100	14530	13420
16	21160	19520	17890	16280	16560	15090	13620	12580
17	19910	18380	16840	15320	15590	14200	12820	11840
18	18810	17350	15900	14470	14720	13410	12110	11180
19	17820	16440	15070	13710	13950	12710	11470	10590
20	16930	15620	14310	13020	13250	12070	10900	10060
21	16120	14880	13630	12400	12620	11500	10380	9590
22	15390	14200	13010	11840	12050	10980	9910	9150
23	14720	13580	12450	11320	11520	10500	9480	8750
24	14110	13020	11930	10850	11040	10060	9080	8390
25	13540	12500	11450	10420	10600	9660	8720	8050
26	13020	12020	11010	10020	10190	9290	8380	7740
27	12540	11570	10600	9650	9810	8940	8070	7460
28	12090	11160	10220	9300	9460	8620	7780	7190
29	11670	10770	9870	8980	9140	8330	7510	6940
30	11280	10410	9540	8680	8830	8050	7260	6710
31	10920	10080	9230	8400	8550	7790	7030	6490
32	10580	9760	8950	8140	.....	.....	.....	.....
33	10260	9470	8670	7890	.....	.....	.....	.....

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAMS						
	8-Inch				7-Inch		
	25.50 lbs.	23.00 lbs.	20.50 lbs.	18.00 lbs.	20 lbs.	17.5 lbs.	15 lbs.
4	45360	42740	40130	37920	32140	29850	27600
5	36290	34190	32100	30330	25710	23880	22080
6	30240	28500	26750	25280	21430	19900	18400
7	25920	24420	22930	21670	18370	17060	15770
8	22680	21370	20060	18960	16070	14930	13800
9	20160	19000	17830	16850	14280	13270	12270
10	18140	17100	16050	15170	12860	11940	11040
11	16490	15540	14590	13790	11690	10860	10040
12	15120	14250	13380	12640	10710	9950	9200
13	13960	13150	12350	11670	9890	9190	8490
14	12960	12210	11470	10830	9180	8530	7890
15	12100	11400	10700	10110	8570	7960	7360
16	11340	10690	10030	9480	8030	7460	6900
17	10670	10060	9440	8920	7560	7020	6490
18	10080	9500	8920	8430	7140	6630	6130
19	9550	9000	8450	7980	6770	6280	5810
20	9070	8550	8030	7580	6430	5970	5520
21	8640	8140	7640	7220	6120	5690	5260
22	8250	7770	7300	6890	5840	5430	5020
23	7890	7430	6980	6590	5590	5190	4800
24	7560	7120	6690	6320	5360	4980	4600
25	7260	6840	6420	6070	5140	4780	4420
26	6980	6580	6170	5830	4940	4590	4250
27	6720	6330	5940	5620	4760	4420	4090
28	6480	6110	5730	5420	4590	4260	3940
29	6260	5900	5530	5230	4430	4120	3810

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAMS					
	6-Inch			5-Inch		
	17.25 lbs.	14.75 lbs.	12.25 lbs.	14.75 lbs.	12.25 lbs.	9.75 lbs.
4	23280	21320	19370	16160	14520	12900
5	18620	17050	15490	12930	11620	10320
6	15520	14210	12910	10770	9680	8600
7	13300	12180	11070	9230	8300	7370
8	11640	10660	9680	8080	7260	6450
9	10350	9470	8610	7180	6460	5730
10	9310	8530	7750	6460	5810	5160
11	8460	7750	7040	5880	5280	4690
12	7760	7110	6460	5390	4840	4300
13	7160	6560	5960	4970	4470	3970
14	6650	6090	5530	4620	4150	3680
15	6210	5680	5160	4310	3870	3440
16	5820	5330	4840	4040	3630	3220
17	5480	5020	4560	3800	3420	3030
18	5170	4740	4300	3590	3230	2870
19	4900	4490	4080	3400	3060	2720
20	4660	4260	3870	3230	2900	2580
21	4430	4060	3690	3080	2770	2460
22	4230	3880	3520	2940	2640	2340
23	4050	3710	3370	2810	2530	2240
24	3880	3550	3230	2690	2420	2150
25	3720	3410	3100	2590	2320	2060
26	3580	3280	2980	2490	2230	1980
27	3450	3160	2870	2390	2150	1910
28	3330	3050	2770	....	....	...
29	3210	2940	2670	....	....	...

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA I-BEAMS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of beam.

Distance between supports in feet	STANDARD I-BEAMS						
	4-Inch				3-Inch		
	10.5 lbs.	9.5 lbs.	8.5 lbs.	7.5 lbs.	7.5 lbs.	6.5 lbs.	5.5 lbs.
4	9520	9000	8470	7950	5180	4780	4410
5	7610	7200	6780	6360	4140	3830	3530
6	6350	6000	5650	5300	3450	3190	2940
7	5440	5140	4840	4540	2960	2730	2520
8	4760	4500	4240	3980	2590	2390	2210
9	4230	4000	3770	3530	2300	2130	1960
10	3810	3600	3390	3180	2070	1910	1770
11	3460	3270	3080	2890	1880	1740	1600
12	3170	3000	2820	2650	1730	1590	1470
13	2930	2770	2610	2450	1590	1470	1360
14	2720	2570	2420	2270	1480	1370	1260
15	2540	2400	2260	2120	1380	1280	1180
16	2380	2250	2120	1990	1290	1200	1100
17	2240	2120	1990	1870	1220	1130	1040
18	2120	2000	1880	1770	1150	1060	980
19	2000	1890	1780	1670	1090	1010	930
20	1900	1800	1690	1590	1040	960	880
21	1810	1710	1610	1510	990	910	840

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA CHANNELS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of channel.

Distance between supports in feet	STANDARD CHANNEL					
	15-Inch					
	55 lbs.	50 lbs.	45 lbs.	40 lbs.	35 lbs.	33 lbs.
10	61190	57270	53350	49420	45500	44450
11	55630	52060	48500	44930	41370	40410
12	50990	47720	44460	41190	37920	37040
13	47070	44050	41040	38020	35000	34190
14	43710	40910	38100	35300	32500	31750
15	40790	38180	35560	32950	30340	29630
16	38240	35790	33340	30890	28440	27780
17	35990	33690	31380	29070	26770	26150
18	33990	31820	29640	27460	25280	24700
19	32210	30140	28080	26010	23950	23400
20	30590	28630	26670	24710	22750	22230
21	29140	27270	25400	23540	21670	21170
22	27810	26030	24250	22470	20680	20210
23	26600	24900	23190	21490	19780	19330
24	25500	23860	22230	20590	18960	18520
25	24480	22910	21340	19770	18200	17780
26	23530	22030	20520	19010	17500	17100
27	22660	21210	19760	18310	16850	16460
28	21850	20450	19050	17650	16250	15880
29	21100	19750	18400	17040	15690	15330
30	20400	19090	17780	16470	15170	14820

For safe loads given in above table the deflections will be less than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA CHANNELS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of channel.

Distance between supports in feet	STANDARD CHANNEL				
	12-Inch				
	40 lbs.	35 lbs.	30 lbs.	25 lbs.	20.5 lbs.
10	35010	31870	28740	25600	22780
11	31830	28980	26120	23270	20700
12	29180	26560	23950	21330	18980
13	26930	24520	22110	19690	17520
14	25010	22770	20530	18290	16270
15	23340	21250	19160	17070	15180
16	21880	19920	17960	16000	14230
17	20600	18750	16900	15060	13400
18	19450	17710	15970	14220	12650
19	18430	16780	15120	13470	11990
20	17510	15940	14370	12800	11390
21	16670	15180	13680	12190	10850
22	15910	14490	13060	11640	10350
23	15220	13860	12490	11130	9900
24	14590	13280	11970	10670	9490
25	14000	12750	11490	10240	9110
26	13470	12260	11050	9850	8760
27	12970	11810	10640	9480	8440
28	12500	11380	10260	9140	8130
29	12070	10990	9910	8830	7850
30	11670	10620	9580	8530	7590

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA CHANNELS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of channel.

Distance between supports in feet	STANDARD CHANNEL				
	10-Inch				
	35 lbs.	30 lbs.	25 lbs.	20 lbs.	15 lbs.
10	24640	22020	19410	16790	14270
11	22400	20020	17640	15270	12970
12	20530	18350	16170	14000	11890
13	18950	16940	14930	12920	10980
14	17600	15730	13860	12000	10190
15	16430	14680	12940	11200	9510
16	15400	13760	12130	10500	8920
17	14490	12950	11420	9880	8390
18	13690	12240	10780	9330	7930
19	12970	11590	10220	8840	7510
20	12320	11010	9700	8400	7130
21	11730	10490	9240	8000	6790
22	11200	10010	8820	7630	6490
23	10710	9580	8440	7300	6200
24	10270	9180	8090	7000	5940
25	9860	8810	7760	6720	5710
26	9480	8470	7460	6460	5490
27	9130	8160	7190	6220	5280
28	8800	7870	6930	6000	5100
29	8500	7590	6690	5790	4920
30	8210	7340	6470	5600	4760

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA CHANNELS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of channel.

Distance between supports in feet	STANDARD CHANNEL								
	9-Inch				8-Inch				
	25 lbs.	20 lbs.	15 lbs.	13.25 lbs.	21.25 lbs.	18.75 lbs.	16.25 lbs.	13.75 lbs.	11.25 lbs.
4	41900	36020	30130	28040	31840	29230	26610	24000	21530
5	33520	28810	24110	22430	25470	23380	21290	19200	17230
6	27930	24010	20090	18690	21230	19480	17740	16000	14360
7	23940	20580	17220	16020	18200	16700	15210	13710	12310
8	20950	18010	15070	14020	15920	14610	13310	12000	10770
9	18620	16010	13390	12460	14150	12990	11830	10670	9570
10	16760	14410	12050	11220	12740	11690	10650	9600	8610
11	15240	13100	10960	10200	11580	10630	9680	8730	7830
12	13970	12010	10040	9350	10610	9740	8870	8000	7180
13	12890	11080	9270	8630	9800	8990	8190	7380	6630
14	11970	10290	8610	8010	9100	8350	7600	6860	6150
15	11170	9600	8040	7480	8490	7790	7100	6400	5740
16	10470	9000	7530	7010	7960	7310	6650	6000	5380
17	9860	8470	7090	6600	7490	6880	6260	5650	5070
18	9310	8000	6700	6230	7080	6490	5910	5330	4790
19	8820	7580	6340	5900	6700	6150	5600	5050	4530
20	8380	7200	6030	5610	6370	5850	5320	4800	4310
21	7980	6860	5740	5340	6070	5570	5070	4570	4100
22	7620	6550	5480	5100	5790	5310	4840	4360	3920
23	7290	6260	5240	4880	5540	5080	4630	4170	3750
24	6980	6000	5020	4670	5310	4870	4440	4000	3590
25	6700	5760	4820	4490	5090	4680	4260	3840	3450

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA CHANNELS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of channel.

Distance between supports in feet	STANDARD CHANNELS								
	7-Inch					6-Inch			
	19.75 lbs.	17.25 lbs.	14.75 lbs.	12.25 lbs.	9.75 lbs.	15.5 lbs.	13 lbs.	10.5 lbs.	8 lbs.
4	25280	22990	20700	18410	16070	17360	15400	13440	11550
5	20220	18390	16560	14730	12850	13890	12320	10750	9240
6	16850	15330	13800	12280	10710	11570	10270	8960	7700
7	14440	13140	11830	10520	9180	9920	8800	7680	6600
8	12640	11490	10350	9210	8030	8680	7700	6720	5780
9	11230	10220	9200	8180	7140	7720	6840	5970	5130
10	10110	9200	8280	7370	6430	6940	6160	5380	4620
11	9190	8360	7530	6700	5840	6310	5600	4890	4200
12	8430	7660	6900	6140	5360	5790	5130	4480	3850
13	7780	7070	6370	5670	4940	5340	4740	4130	3550
14	7220	6570	5910	5260	4590	4960	4400	3840	3300
15	6740	6130	5520	4910	4280	4630	4110	3580	3080
16	6320	5750	5180	4600	4020	4340	3850	3360	2890
17	5950	5410	4870	4330	3780	4080	3620	3160	2720
18	5620	5110	4600	4090	3570	3860	3420	2990	2570
19	5320	4840	4360	3880	3380	3650	3240	2830	2430
20	5060	4600	4140	3680	3210	3470	3080	2690	2310
21	4810	4380	3940	3510	3060	3310	2930	2560	2200
22	4600	4180	3760	3350	2920	3160	2800	2440	2100
23	4400	4000	3600	3200	2790	3020	2680	2340	2010
24	4210	3830	3450	3070	2680	2890	2570	2240	1930
25	4040	3680	3310	2950	2570	2780	2460	2150	1850

For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings=1/360 span.

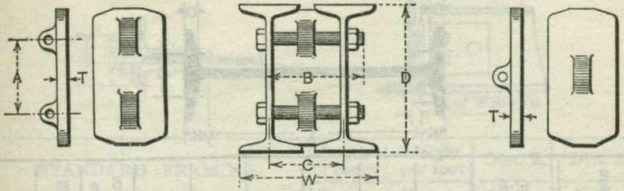
SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED FOR LACKAWANNA CHANNELS.

Safe loads below are figured for fibre stress of 16000 pounds per square inch and include weight of channel.

Distance between supports in feet	STANDARD CHANNELS								
	5-Inch			4-Inch			3-Inch		
	11.5 lbs.	9 lbs.	6.5 lbs.	7.25 lbs.	6.25 lbs.	5.25 lbs.	6 lbs.	5 lbs.	4 lbs.
4	11100	9460	7910	6090	5570	5060	3680	3290	2910
5	8880	7570	6330	4870	4450	4050	2940	2630	2330
6	7400	6310	5270	4060	3710	3370	2450	2190	1940
7	6340	5410	4520	3480	3180	2890	2100	1880	1660
8	5550	4730	3960	3050	2780	2530	1840	1640	1450
9	4930	4210	3520	2710	2470	2250	1630	1460	1290
10	4440	3790	3160	2440	2230	2020	1470	1310	1160
11	4040	3440	2880	2210	2020	1840	1340	1190	1060
12	3700	3150	2640	2030	1860	1690	1230	1100	970
13	3410	2910	2430	1870	1710	1560	1130	1010	890
14	3170	2700	2260	1740	1590	1440	1050	940	830
15	2960	2520	2110	1620	1480	1350	980	880	780
16	2770	2370	1980	1520	1390	1260	920	820	730
17	2610	2230	1860	1430	1310	1190	870	770	680
18	2470	2100	1760	1350	1240	1120	820	730	650
19	2340	1990	1670	1280	1170	1060	770	690	610
20	2220	1890	1580	1220	1110	1010	740	660	580
21	2110	1800	1510	1160	1060	960	700	630	550
22	2020	1720	1440	1110	1010	920	670	600	530
23	1930	1650	1380	1060	970	880	640	570	510
24	1850	1580	1320	1020	930	840	610	550	480
25	1780	1510	1270	970	890	810	590	530	470

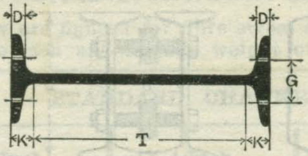
For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered ceilings = 1/360 span.

CAST IRON SEPARATORS FOR I-BEAMS.



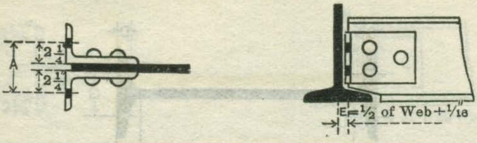
Beams				Separators			Bolts Square heads and hex. nuts				
Depth D	Weight per foot	Out to out of flanges of beams W	Center to center of beams C	Thickness T	Weight	Increase of weight for each inch additional spread of beams	Diameter	Center to center of bolts A	Length B	Weight of bolts and nuts	Increase of weight of bolts for each in. additional spread of beams
Ins.	Lbs.	Ins.	Ins.	In.	Lbs.	Lbs.	In.	Ins.	Ins.	Lbs.	Lbs.
SEPARATORS WITH ONE BOLT.											
3	5.5	5 5/16	3	3/8	1.1	.29	5/8		3 7/8	.94	.085
4	7.5	5 7/8	3 1/4	3/8	1.6	.38	3/4		4 1/4	.98	.123
5	9.75	6 1/2	3 1/2	3/8	2.0	.49	3/4		4 1/2	1.01	.123
6	12.25	7 5/16	4	1/2	3.3	.78	3/4		5	1.07	.123
7	15.0	7 7/8	4 1/4	1/2	3.9	.92	3/4		5 1/4	1.10	.123
8	18.0	8 1/2	4 1/2	1/2	4.7	1.06	3/4		5 5/8	1.15	.123
9	21.0	9 5/16	5	1/2	5.9	1.20	3/4		6 1/8	1.21	.123
10	25.0	9 7/8	5 1/4	1/2	6.8	1.33	3/4		6 3/8	1.24	.123
12	31.5	10 3/4	5 3/4	1/2	8.8	1.61	3/4		6 7/8	1.30	.123
12	40.0	11 1/4	6	1/2	8.9	1.58	3/4		7 1/4	1.35	.123
SEPARATORS WITH TWO BOLTS.											
12	31.5	10 3/4	5 3/4	1/2	9.5	1.61	3/4	6 1/2	6 7/8	2.61	.246
12	40.0	11 1/4	6	1/2	9.5	1.58	3/4	6 1/2	7 1/4	2.70	.246
15	42.0	11 3/4	6 1/4	1/2	12.5	2.02	3/4	7	7 1/2	2.76	.246
15	60.0	12 3/4	6 3/4	1/2	13.0	1.97	3/4	7	8 1/8	2.92	.246
15	80.0	13 5/8	7 1/4	1/2	13.2	1.91	3/4	7	8 7/8	3.10	.246
18	55.0	12 3/4	6 3/4	5/8	19.8	2.41	3/4	9	8	2.89	.246
20	65.0	13 1/4	7	5/8	22.9	3.37	7/8	10	8 3/8	4.20	.334
20	80.0	14 3/4	7 3/4	5/8	24.6	3.34	7/8	10	9 1/4	4.49	.334
24	80.0	14 3/4	7 3/4	5/8	30.3	4.07	7/8	12	9 1/8	4.45	.334

LACKAWANNA STANDARDS.



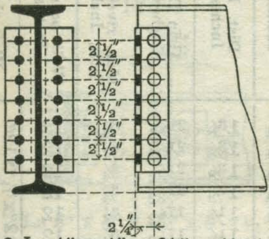
Depth of beam Inches	Weight per foot. Pounds	Flange Inches	Web Inches	Gauge G Inches	Tang. T Inches	Dist. K Inches	Grip D Inches	Max. rivet or bolt, Inches	Wall bearing Inches	Wall plate
24	100.00	7¼	¾	4	20¾	1⅝	27/32	⅞	16	16" x 1" x 16" wt. 73 lbs.
	95.00	7 3/16	11/16	4	20¾	1⅝	27/32	⅞	16	
	90.00	7⅛	⅝	4	20¾	1⅝	27/32	⅞	16	
	85.00	7 1/16	9/16	4	20¾	1⅝	27/32	⅞	16	
	80.00	7	½	4	20¾	1⅝	27/32	⅞	16	
20	100.00	7 9/32	⅞	4	16½	1¾	29/32	⅞	16	16" x 1" x 16" wt. 73 lbs.
	95.00	7 13/64	51/64	4	16½	1¾	29/32	⅞	16	
	90.00	7 9/64	47/64	4	16½	1¾	29/32	⅞	16	
	85.00	7 1/16	21/32	4	16½	1¾	29/32	⅞	16	
	80.00	7	19/32	4	16½	1¾	29/32	⅞	16	
	75.00	6 13/32	21/32	3½	17	1½	25/32	⅞	16	
	70.00	6 21/64	37/64	3½	17	1½	25/32	⅞	16	
	65.00	6¼	½	3½	17	1½	25/32	⅞	16	
18	70.00	6 17/64	23/32	3¼	15¼	1⅜	11/16	⅞	16	16" x 1" x 16" wt. 73 lbs.
	65.00	6 11/64	⅝	3¼	15¼	1⅜	11/16	⅞	16	
	60.00	6 3/32	35/64	3¼	15¼	1⅜	11/16	⅞	16	
	55.00	6	29/64	3¼	15¼	1⅜	11/16	⅞	16	
15	100.00	6 25/32	1 3/16	3¾	11	2	1 1/32	⅞	12	12" x ¾" x 16" wt. 41 lbs.
	95.00	6 43/64	1 5/64	3¾	11	2	1 1/32	⅞	12	
	90.00	6 37/64	63/64	3¾	11	2	1 1/32	⅞	12	
	85.00	6 31/64	57/64	3¾	11	2	1 1/32	⅞	12	
	80.00	6 13/32	13/16	3¾	11	2	1 1/32	⅞	12	
	75.00	6 19/64	57/64	3¼	11¾	1⅝	13/16	¾	12	
	70.00	6 3/16	25/32	3¼	11¾	1⅝	13/16	¾	12	
	65.00	6 3/32	11/16	3¼	11¾	1⅝	13/16	¾	12	
	60.00	6	19/32	3¼	11¾	1⅝	13/16	¾	12	
	55.00	5¾	21/32	3	12½	1¼	⅝	¾	12	
	50.00	5 41/64	35/64	3	12½	1¼	⅝	¾	12	
	45.00	5 35/64	29/64	3	12½	1¼	⅝	¾	12	
	42.00	5½	13/32	3	12½	1¼	⅝	¾	12	

LACKAWANNA STANDARDS.



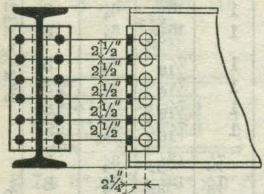
STANDARD FRAMING

24"



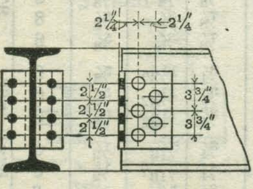
2 Ls 4" x 4" x ⅜" x 1'-6"
Wt. 37 lbs.

18" and 20"



2 Ls 4" x 4" x ⅜" x 1'-3½"
Wt. 32 lbs.

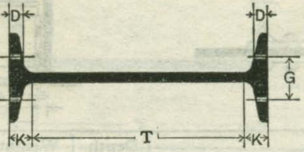
15"



2 Ls 6" x 4" x ⅜" x 0'-10"
Wt. 25 lbs.

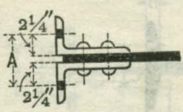
Depth of beam Inches	Weight per foot Pounds	Dist. E. Inches	Dist. A. Inches
	100.0	7/16	5¼
	95.0	7/16	5 3/16
24	90.0	⅜	5⅛
	85.0	⅜	5 1/16
	80.0	5/16	5
	100.0	½	5⅜
	95.0	½	5 5/16
	90.0	7/16	5¼
20	85.0	7/16	5 3/16
	80.0	⅜	5⅛
	75.0	7/16	5 3/16
	70.0	⅜	5 1/16
	65.0	5/16	5
	70.0	7/16	5¼
18	65.0	⅜	5⅛
	60.0	⅜	5 1/16
	55.0	5/16	5
	100.0	11/16	5 11/16
	95.0	⅝	5 9/16
	90.0	9/16	5½
	85.0	½	5⅜
	80.0	½	5 5/16
	75.0	½	5⅜
15	70.0	7/16	5¼
	65.0	7/16	5 3/16
	60.0	⅜	5⅛
	55.0	⅜	5⅛
	50.0	⅜	5 1/16
	45.0	5/16	5
	42.0	¼	4 15/16

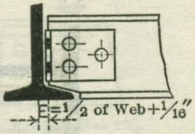
LACKAWANNA STANDARDS.

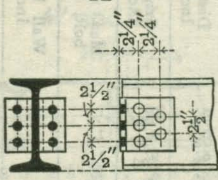
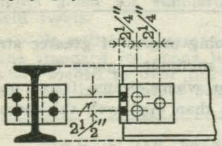
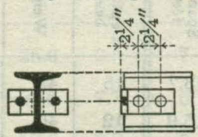


Depth of beam Inches	Weight per foot. Pounds	Flange Inches	Web Inches	Gauge G. Inches	Tang. T. Inches	Dist. K Inches	Grip D. Inches	Max. rivet or bolt, Inches	Wall bearing Inches	Wall plate
12	55.00	5 39/64	13/16	3	9 1/4	1 3/8	21/32	3/4	12	12"x3/4"x12" Wt. 31 lbs.
	50.00	5 31/64	11/16	3	9 1/4	1 3/8	21/32	3/4	12	
	45.00	5 23/64	9/16	3	9 1/4	1 3/8	21/32	3/4	12	
	40.00	5 1/4	29/64	3	9 1/4	1 3/8	21/32	3/4	12	
	35.00	5 3/32	7/16	2 3/4	9 3/4	1 1/8	17/32	3/4	12	
	31.50	5	11/32	2 3/4	9 3/4	1 1/8	17/32	3/4	12	
10	40.00	5 3/32	3/4	2 5/8	8	1	15/32	3/4	8	8"x5/8"x12" Wt. 17 lbs.
	35.00	4 61/64	39/64	2 5/8	8	1	15/32	3/4	8	
	30.00	4 13/16	15/32	2 5/8	8	1	15/32	3/4	8	
	25.00	4 21/32	5/16	2 5/8	8	1	15/32	3/4	8	
9	35.00	4 49/64	47/64	2 1/2	7	1	7/16	3/4	8	
	30.00	4 39/64	37/64	2 1/2	7	1	7/16	3/4	8	
	25.00	4 29/64	27/64	2 1/2	7	1	7/16	3/4	8	
	21.00	4 21/64	19/64	2 1/2	7	1	7/16	3/4	8	
8	25.50	4 17/64	17/32	2 1/4	6 1/4	7/8	13/32	3/4	8	8"x5/8"x8" Wt. 12 lbs.
	23.00	4 11/64	7/16	2 1/4	6 1/4	7/8	13/32	3/4	8	
	20.50	4 3/32	23/64	2 1/4	6 1/4	7/8	13/32	3/4	8	
	18.00	4	17/64	2 1/4	6 1/4	7/8	13/32	3/4	8	
7	20.00	3 7/8	15/32	2 1/4	5 1/4	7/8	3/8	5/8	8	
	17.50	3 49/64	23/64	2 1/4	5 1/4	7/8	3/8	5/8	8	
	15.00	3 21/32	1/4	2 1/4	5 1/4	7/8	3/8	5/8	8	
6	17.25	3 37/64	31/64	2	4 1/2	3/4	11/32	5/8	6	6"x1/2"x6" Wt. 5 lbs.
	14.75	3 29/64	23/64	2	4 1/2	3/4	11/32	5/8	6	
	12.25	3 21/64	15/64	2	4 1/2	3/4	11/32	5/8	6	
5	14.75	3 19/64	1/2	1 3/4	3 1/2	3/4	5/16	1/2	6	
	12.25	3 9/64	11/32	1 3/4	3 1/2	3/4	5/16	1/2	6	
	9.75	3	13/64	1 3/4	3 1/2	3/4	5/16	1/2	6	

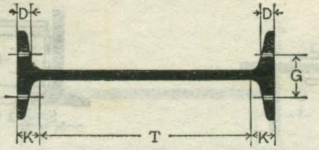
LACKAWANNA STANDARDS.





STANDARD FRAMING	Depth of beam Inches	Weight per foot Pounds	Dist. E. Inches	Dist. A. Inches
12″  2 Ls 6″ x 4″ x ⅜″ x 0′-7½″ Wt. 20 lbs.	12	55.0	½	5 5/16
		50.0	7/16	5 3/16
		45.0	⅜	5 1/16
		40.0	5/16	5
		35.0	5/16	4 15/16
		31.5	¼	4⅞
	10	40	7/16	5¼
		35	⅜	5⅛
		30	5/16	5
		25	¼	4 13/16
7″, 8″, 9″ and 10″  2 Ls 6″ x 4″ x ⅜″ x 0′-5″ Wt. 13 lbs.	9	35	7/16	5¼
		30	⅜	5 1/16
		25	5/16	4 15/16
		21	¼	4 13/16
	8	25.5	⅜	5 1/16
		20.5	¼	4⅞
		23.0	5/16	4 15/16
		18.0	3/16	4 13/16
5″ and 6″  2 Ls 6″ x 4″ x ⅜″ x 0′-2½″ Wt. 7 lbs.	7	20.0	5/16	5
		17.5	¼	4⅞
		15.0	3/16	4¾
	6	17.25	5/16	5
		14.75	¼	4⅞
		12.25	3/16	4¾
	5	14.75	5/16	5
		12.25	¼	4⅞
		9.75	3/16	4¾

LACKAWANNA STANDARDS.



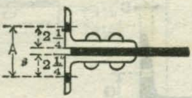
Depth of beam Inches	Weight per foot. Pounds	Flange Inches	Web Inches	Gauge G. Inches	Tang. T. Inches	Dist. K Inches	Grip D. Inches	Max. rivet or bolt, Inches	Wall bearing Inches	Wall plate
4	10.50	2 7/8	13/32	1 1/2	2 3/4	5/8	9/32	1/2	6	6" x 1/2" x 6" Wt. 5 lbs.
	9.5	2 13/16	11/32	1 1/2	2 3/4	5/8	9/32	1/2		
	8.5	2 47/64	17/64	1 1/2	2 3/4	5/8	9/32	1/2		
	7.5	2 21/32	3/16	1 1/2	2 3/4	5/8	9/32	1/2		
3	7.5	2 33/64	23/64	1 7/16	1 3/4	5/8	1/4	3/8	6	
	6.5	2 27/64	17/64	1 7/16	1 3/4	5/8	1/4	3/8		
	5.5	2 21/64	11/64	1 7/16	1 3/4	5/8	1/4	3/8		

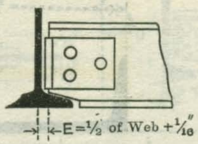
Note:—It will be necessary to use framing angles of greater strength than the standard for spans less than the minimums given below, when beams are loaded to their full capacities or where beams frame opposite to each other into another beam with less than 9/16" web thickness.

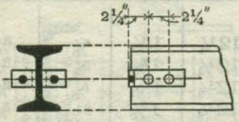
TABLE OF MINIMUM SPAN LENGTHS

Depth of beam	Weight	Span in feet	Depth of beam	Weight	Span in feet	Depth of beam	Weight	Span in feet
24	80	17.7	18	55	13.7	15	42	10.2
20	80	14.8	15	80	15.9	12	40	9.0
20	65	13.9	15	60	12.3	12	31.5	7.3

LACKAWANNA STANDARDS.





STANDARD FRAMING	Depth of beam Inches	Weight per foot Pounds	Dist. E. Inches	Dist. A. Inches
4″ and 3″	4	10.5	5/16	4 15/16
		9.5	¼	4⅞
		8.5	3/16	4¾
		7.5	3/16	4 11/16
				
2 Ls 6″ x 4″ x ⅜″ x 0′-1¾″	3	7.5	¼	4⅞
		6.5	3/16	4¾
Wt. 5 lbs.		5.5	3/16	4 11/16

Rivets = ¾″ Dia. } Holes = 13/16″ Dia. } in standard framing angles.

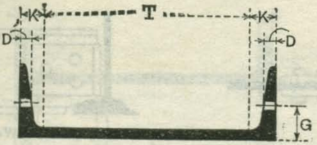
Weights given for standard framing angles include weight of shop and field rivets.

Note:—It will be necessary to use framing angles of greater strength than the standard for spans less than the minimums given below, when beams are loaded to their full capacities or where beams frame opposite to each other into another beam with less than 9/16″ web thickness.

TABLE OF MINIMUM SPAN LENGTHS

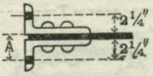
Depth of beam	Weight	Span in feet	Depth of beam	Weight	Span in feet	Depth of beam	Weight	Span in feet
10	25.0	9.3	7	15.0	4.9	4	7.5	2.8
9	21.0	7.7	6	12.25	5.6	3	5.5	1.7
8	18.0	6.2	5	9.75	4.1			

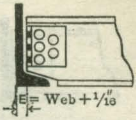
LACKAWANNA STANDARDS.

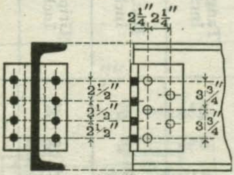
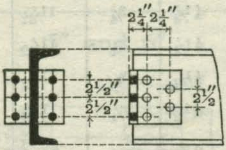
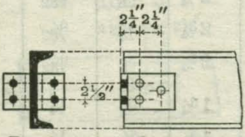


Depth of channel Inches	Weight per foot, Pounds	Flange Inches	Web Inches	Gauge G. Inches	Tang. T. Inches	Dist. K Inches	Grip D. Inches	Max. rivet or bolt, Inches
15	55.00	3 13/16	13/16	2¼	12¼	1⅜	⅝	¾
	50.00	3 23/32	23/32	2¼	12¼	1⅜	⅝	¾
	45.00	3⅝	⅝	2¼	12¼	1⅜	⅝	¾
	40.00	3 17/32	17/32	1⅞	12¼	1⅜	21/32	¾
	35.00	3 27/64	27/64	1⅞	12¼	1⅜	21/32	¾
	33.00	3 13/32	13/32	1⅞	12¼	1⅜	21/32	¾
12	40.00	3 27/64	49/64	2	10	1	15/32	¾
	35.00	3 19/64	41/64	2	10	1	15/32	¾
	30.00	3 11/64	33/64	2	10	1	15/32	¾
	25.00	3 3/64	25/64	1¾	10	1	15/32	¾
	20.50	2 15/16	9/32	1¾	10	1	15/32	¾
10	35.00	3 3/16	53/64	2	8¼	⅞	⅜	¾
	30.00	3 1/32	43/64	2	8¼	⅞	⅜	¾
	25.00	2 57/64	17/32	2	8¼	⅞	⅜	¾
	20.00	2 47/64	⅜	1½	8¼	⅞	7/16	¾
	15.00	2 19/32	15/64	1½	8¼	⅞	7/16	¾
9	25.00	2 13/16	39/64	1¾	7¼	⅞	⅜	¾
	20.00	2 21/32	29/64	1¾	7¼	⅞	⅜	¾
	15.00	2 31/64	9/32	1⅜	7¼	⅞	13/32	¾
	13.25	2 7/16	15/64	1⅜	7¼	⅞	13/32	¾
8	21.25	2⅝	37/64	1½	6¼	⅞	⅜	¾
	18.75	2 17/32	31/64	1½	6¼	⅞	⅜	¾
	16.25	2 7/16	25/64	1½	6¼	⅞	⅜	¾
	13.75	2 11/32	19/64	1¼	6¼	⅞	⅜	¾
	11.25	2 17/64	7/32	1¼	6¼	⅞	⅜	¾

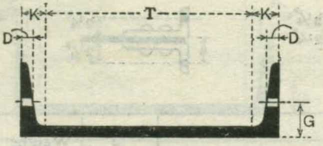
LACKAWANNA STANDARDS.





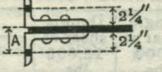
STANDARD FRAMING	Depth of channel. Inches	Weight per foot. Pounds	Dist. E. Inches	Dist. A. Inches
15″  2 Ls 6″ x 4″ x 3/8″ x 0′-10″ Wt. 25 lbs.	15	55.0	7/8	3 1/16
		50.0	13/16	3
		45.0	11/16	2 7/8
		40.0	5/8	2 3/4
		35.0	1/2	2 11/16
		33.0	1/2	2 5/8
12″  2 Ls 6″ x 4″ x 3/8″ x 0′-7½″ Wt. 20 lbs.	12	40.0	13/16	3
		35.0	11/16	2 7/8
		30.0	9/16	2 3/4
		25.0	7/16	2 5/8
		20.5	3/8	2 9/16
8″, 9″ and 10″  2 Ls 6″ x 4″ x 3/8″ x 0′-5″ Wt. 13 lbs.	10	35.0	7/8	3 1/16
		30.0	3/4	2 15/16
		25.0	5/8	2 3/4
		20.0	7/16	2 5/8
		15.0	5/16	2 1/2
	9	25.0	11/16	2 7/8
		20.0	1/2	2 3/4
		15.0	3/8	2 9/16
		13.25	5/16	2 1/2
	8	21.25	5/8	2 13/16
		18.75	9/16	2 3/4
		16.25	7/16	2 5/8
		13.75	3/8	2 9/16
		11.25	5/16	2 1/2

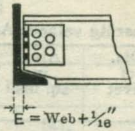
LACKAWANNA STANDARDS.

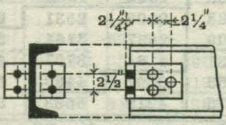
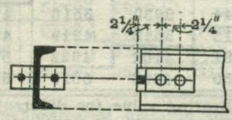
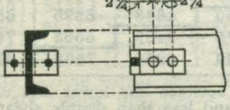


Depth of channel Inches	Weight per foot, Pounds	Flange Inches	Web Inches	Gauge G. Inches	Tang. T. Inches	Dist. K Inches	Grip D. Inches	Max. rivet or bolt, Inches
	19.75	2 33/64	5/8	1½	5½	¾	3/8	5/8
	17.25	2 13/32	33/64	1½	5½	¾	3/8	5/8
7	14.75	2 19/64	13/32	1¼	5½	¾	11/32	5/8
	12.25	2 13/64	5/16	1¼	5½	¾	11/32	5/8
	9.75	2 3/32	13/64	1¼	5½	¾	11/32	5/8
	15.50	2 9/32	9/16	1 3/8	4½	¾	11/32	5/8
6	13.00	2 5/32	7/16	1 3/8	4½	¾	11/32	5/8
	10.50	2 1/32	5/16	1 1/8	4½	¾	11/32	5/8
	8.00	1 59/64	13/64	1 1/8	4½	¾	11/32	5/8
	11.50	2 1/32	15/32	1¼	3¾	5/8	5/16	½
5	9.00	1 57/64	21/64	1¼	3¾	5/8	5/16	½
	6.50	1¾	3/16	1	3¾	5/8	5/16	½
	7.25	1 23/32	21/64	1	2¾	5/8	9/32	½
4	6.25	1 21/32	17/64	1	2¾	5/8	9/32	½
	5.25	1 37/64	3/16	1	2¾	5/8	9/32	½
	6.00	1 39/64	3/8	15/16	1¾	5/8	¼	3/8
3	5.00	1½	17/64	15/16	1¾	5/8	¼	3/8
	4.00	1 13/32	11/64	15/16	1¾	5/8	¼	3/8

LACKAWANNA STANDARDS.





STANDARD FRAMING	Depth of channel	Weight per foot	Dist. E.	Dist. A.
	Inches	Pounds	Inches	Inches
7″  2 Ls 6″ x 4″ x ⅜″ x 0′-5″ Wt. 13 lbs.	7	19.75	$\frac{11}{16}$	$2\frac{7}{8}$
		17.25	$\frac{9}{16}$	$2\frac{3}{4}$
		14.75	$\frac{1}{2}$	$2\frac{11}{16}$
		12.25	$\frac{3}{8}$	$2\frac{9}{16}$
		9.75	$\frac{1}{4}$	$2\frac{7}{16}$
5″ and 6″  2 Ls 6″ x 4″ x ⅜″ x 0′-3″ Wt. 7 lbs.	6	15.50	$\frac{5}{8}$	$2\frac{13}{16}$
		13.00	$\frac{1}{2}$	$2\frac{11}{16}$
		10.50	$\frac{3}{8}$	$2\frac{9}{16}$
		8.00	$\frac{1}{4}$	$2\frac{7}{16}$
	5	11.50	$\frac{9}{16}$	$2\frac{3}{4}$
		9.00	$\frac{3}{8}$	$2\frac{9}{16}$
		6.50	$\frac{1}{4}$	$2\frac{7}{16}$
4″ and 3″  2 Ls 6″ x 4″ x ⅜″ x 0′-1¾″ Wt. 5 lbs.	4	7.25	$\frac{3}{8}$	$2\frac{9}{16}$
		6.25	$\frac{5}{16}$	$2\frac{1}{2}$
		5.25	$\frac{1}{4}$	$2\frac{7}{16}$
	3	6.00	$\frac{7}{16}$	$2\frac{5}{8}$
		5.00	$\frac{5}{16}$	$2\frac{1}{2}$
		4.00	$\frac{1}{4}$	$2\frac{7}{16}$

SHEARING VALUE OF RIVETS AND BEARING VALUE OF RIVETED PLATES.

ALL DIMENSIONS IN INCHES

Shearing value = Area of rivet × Allowable shearing stress per square inch

Dia. of rivet	Area in sq. ins.	Single shear at 6000 lbs.	Double shear at 12,000 lbs.	Bearing value for different			
				¼	5/16	⅜	7/16
⅜	.1105	663	1325	1125	1406	1688	....
½	.1964	1178	2356	1500	1875	2250	2625
⅝	.3068	1841	3682	1875	2344	2813	3281
¾	.4418	2651	5301	2250	2813	3375	3938
⅞	.6013	3608	7216	2625	3281	3938	4594
1	.7854	4712	9425	3000	3750	4500	5250

Dia. of rivet	Area in sq. ins.	Single shear at 6750 lbs.	Double shear at 13,500 lbs.	Bearing value for different			
				¼	5/16	⅜	7/16
⅜	.1105	746	1491	1266	1582	1898	....
½	.1964	1325	2651	1688	2109	2531	2953
⅝	.3068	2071	4142	2109	2637	3164	3691
¾	.4418	2982	5964	2531	3164	3797	4430
⅞	.6013	4059	8118	2953	3691	4430	5168
1	.7854	5301	10603	3375	4219	5063	5906

Dia. of rivet	Area in sq. ins.	Single shear at 7500 lbs.	Double shear at 15,000 lbs.	Bearing value for different			
				¼	5/16	⅜	7/16
⅜	.1105	828	1657	1406	1758	2109	....
½	.1964	1473	2945	1875	2344	2813	3281
⅝	.3068	2301	4602	2344	2930	3516	4102
¾	.4418	3313	6627	2813	3516	4219	4922
⅞	.6013	4510	9020	3281	4102	4922	5742
1	.7854	5891	11781	3750	4688	5625	6563

Dia. of rivet	Area in sq. ins.	Single shear at 10,000 lbs.	Double shear at 20,000 lbs.	Bearing value for different			
				¼	5/16	⅜	7/16
⅜	.1105	1105	2209	1875	2344	2813	....
½	.1964	1964	3927	2500	3125	3750	4375
⅝	.3068	3068	6136	3125	3906	4688	5469
¾	.4418	4418	8836	3750	4688	5625	6563
⅞	.6013	6013	12026	4375	5469	6563	7656
1	.7854	7854	15708	5000	6250	7500	8750

In the above tables the bearing values between the lower and upper zigzag black lines are greater than single and less than double shear for the corresponding dimensions, so that in case of single shear, the single shearing value governs, and in case of double shear, the bearing value governs the design.

SHEARING VALUE OF RIVETS AND BEARING VALUE OF RIVETED PLATES.

ALL DIMENSIONS IN INCHES

Bearing value = Diameter of rivet × Thickness of plate × Allowable bearing stress per square inch

Thicknesses of plate in inches at 12000 pounds per square inch

½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
3000	.....	.....	.....	.....	....	......	......	......
3750	4219	4688	.....	.....	....	......	......	......
4500	5063	5625	6188	6750	....	......	......	......
5250	5906	6563	7219	7875	8531	9188	9844	......
6000	6750	7500	8250	9000	9750	10500	11250	12000

Thicknesses of plate in inches at 13500 pounds per square inch

½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
3375	.....	.....	.....	.....	.....	......	......	......
4219	4746	5273	.....	.....	.....	......	......	......
5063	5695	6328	6961	7594	.....	......	......	......
5906	6645	7383	8121	8859	9598	10336	11074	......
6750	7594	8438	9281	10125	10969	11813	12656	13500

Thicknesses of plate in inches at 15000 pounds per square inch

½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
3750	.....	.....	.....	.....	.....	......	......	......
4688	5273	5859	.....	.....	.....	......	......	......
5625	6328	7031	7734	8438	.....	......	......	......
6563	7383	8203	9023	9844	10664	11484	12305	......
7500	8438	9375	10313	11250	12188	13125	14063	15000

Thicknesses of plate in inches at 20000 pounds per square inch

½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
5000	.....	.....	.....	.....	.....	......	......	......
6250	7031	7813	.....	.....	.....	......	......	......
7500	8438	9375	10313	11250	.....	......	......	......
8750	9844	10938	12031	13125	14219	15313	16406	......
10000	11250	12500	13750	15000	16250	17500	18750	20000

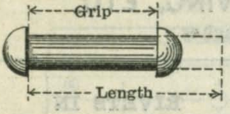
The bearing values above and to the right of the upper zigzag black lines are greater than double shear for the corresponding dimensions, so that in these cases the shearing values govern the design.

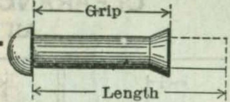
The bearing values below and to the left of the lower zigzag black lines are less than single shear, so that in these cases the bearing values govern the design.

AREA IN SQUARE INCHES DEDUCTED FOR ONE HOLE.

Thickness of metal in ins.	Diameter of hole in inches															
	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
1/16	.004	.008	.012	.016	.020	.023	.027	.031	.035	.039	.043	.047	.051	.055	.059	.063
1/8	.008	.016	.023	.031	.039	.047	.055	.063	.070	.078	.086	.094	.102	.109	.117	.125
3/16	.012	.023	.035	.047	.059	.070	.082	.094	.105	.117	.129	.141	.152	.164	.176	.188
1/4	.016	.031	.047	.063	.078	.094	.109	.125	.141	.156	.172	.188	.203	.219	.234	.250
5/16	.020	.039	.059	.078	.098	.117	.137	.156	.176	.195	.215	.234	.254	.273	.293	.313
3/8	.023	.047	.070	.094	.117	.141	.164	.188	.211	.234	.258	.281	.305	.328	.352	.375
7/16	.027	.055	.082	.109	.137	.164	.191	.219	.246	.273	.301	.328	.355	.383	.410	.438
1/2	.031	.063	.094	.125	.156	.188	.219	.250	.281	.313	.344	.375	.406	.438	.469	.500
9/16	.035	.070	.105	.141	.176	.211	.246	.281	.316	.352	.387	.422	.457	.492	.527	.563
5/8	.039	.078	.117	.156	.195	.234	.273	.313	.352	.391	.430	.469	.508	.547	.586	.625
11/16	.043	.086	.129	.172	.215	.258	.301	.344	.387	.430	.473	.516	.559	.602	.645	.688
3/4	.047	.094	.141	.188	.234	.281	.328	.375	.422	.469	.516	.563	.609	.656	.703	.750
13/16	.051	.102	.152	.203	.254	.305	.355	.406	.457	.508	.559	.609	.660	.711	.762	.813
7/8	.055	.109	.164	.219	.273	.328	.383	.438	.492	.547	.602	.656	.711	.766	.820	.875
15/16	.059	.117	.176	.234	.293	.352	.410	.469	.527	.586	.645	.703	.762	.820	.879	.938
1	.063	.125	.188	.250	.313	.375	.438	.500	.563	.625	.688	.750	.813	.875	.938	1.000
1 1/16	.066	.133	.199	.266	.332	.398	.465	.531	.598	.664	.730	.797	.863	.930	.996	1.063
1 1/8	.070	.141	.211	.281	.352	.422	.492	.563	.633	.703	.773	.844	.914	.984	1.055	1.125
1 3/16	.074	.148	.223	.297	.371	.445	.520	.594	.668	.742	.816	.891	.965	1.039	1.113	1.188
1 1/4	.078	.156	.234	.313	.391	.469	.547	.625	.703	.781	.859	.938	1.016	1.094	1.172	1.250
1 5/16	.082	.164	.246	.328	.410	.492	.574	.656	.738	.820	.902	.984	1.066	1.148	1.230	1.313
1 3/8	.086	.172	.258	.344	.430	.516	.602	.688	.773	.859	.945	1.031	1.117	1.203	1.289	1.375
1 7/16	.090	.180	.270	.359	.449	.539	.629	.719	.809	.898	.988	1.078	1.168	1.258	1.348	1.438
1 1/2	.094	.188	.281	.375	.469	.563	.656	.750	.844	.938	1.031	1.125	1.219	1.313	1.406	1.500

LENGTH OF RIVETS REQUIRED FOR VARIOUS GRIPS, INCLUDING AMOUNT NECESSARY TO FORM ONE HEAD.

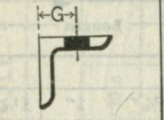


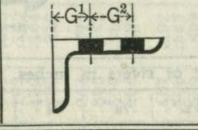


Grip of rivet in Inches	Diameter of rivets in inches ¼″	⅜″	½″	⅝″	¾″	⅞″	1″	1⅛″
½	1	1¼	1½	1¾	1⅞	2	2⅛	2¼
⅝	1⅛	1⅜	1⅝	1⅞	2	2⅛	2¼	2⅜
¾	1¼	1½	1¾	2	2⅛	2¼	2⅜	2½
⅞	1⅜	1⅝	1⅞	2⅛	2¼	2⅜	2½	2⅝
1	1½	1¾	2	2¼	2⅜	2½	2⅝	2¾
1⅛	1⅝	1⅞	2⅛	2⅜	2½	2⅝	2¾	2⅞
1¼	1¾	2	2¼	2½	2⅝	2¾	2⅞	3
1⅜	1⅞	2⅛	2⅜	2⅝	2⅞	3	3	3⅛
1½	2	2¼	2½	2¾	3	3⅛	3⅛	3¼
1⅝	2⅛	2⅜	2⅝	2⅞	3⅛	3¼	3¼	3½
1¾	2¼	2½	2¾	3	3¼	3⅜	3½	3⅝
1⅞	2⅜	2⅝	2⅞	3¼	3⅜	3½	3⅝	3¾
2	2½	2¾	3⅛	3⅜	3½	3⅝	3¾	3⅞
2⅛	2⅝	2⅞	3¼	3½	3⅝	3¾	3⅞	4
2¼	2¾	3	3⅜	3⅝	3¾	3⅞	4	4⅛
2⅜	2⅞	3⅛	3½	3¾	3⅞	4	4⅛	4¼
2½	3	3¼	3⅝	3⅞	4	4⅛	4¼	4⅜
2⅝	3⅛	3½	3¾	4	4⅛	4¼	4⅜	4½
2¾	3¼	3⅝	3⅞	4⅛	4¼	4⅜	4½	4⅝
2⅞	3⅜	3¾	4	4¼	4⅜	4½	4⅝	4¾
3	3½	3⅞	4⅛	4⅜	4½	4⅝	4¾	4⅞
3⅛	3⅝	4	4¼	4½	4¾	4¾	5	5
3¼	3¾	4⅛	4⅜	4¾	4⅞	5	5⅛	5¼
3⅜	3⅞	4¼	4½	4⅞	5	5⅛	5¼	5⅜
3½	4	4⅜	4⅝	5	5⅛	5¼	5⅜	5½
3⅝	4⅛	4½	4¾	5⅛	5¼	5⅜	5½	5⅝
3¾	4¼	4⅝	4⅞	5¼	5⅜	5½	5⅝	5¾
3⅞	4⅜	4¾	5	5⅜	5½	5⅝	5¾	5⅞
4	4½	4⅞	5⅛	5½	5⅝	5¾	5⅞	6
4⅛	4⅝	5	5¼	5⅝	5¾	5⅞	6	6⅛
4¼	4¾	5⅛	5½	5¾	5⅞	6	6⅛	6¼
4⅜	4⅞	5¼	5⅝	5⅞	6	6⅛	6¼	6⅜
4½	5	5⅜	5¾	6	6⅛	6¼	6⅜	6½
4⅝	5⅛	5½	5⅞	6⅛	6¼	6⅜	6½	6⅝
4¾	5¼	5⅝	6	6¼	6½	6⅝	6¾	6¾
4⅞	5⅜	5¾	6⅛	6½	6⅝	6¾	6⅞	6⅞
5	5½	5⅞	6¼	6⅝	6¾	6⅞	7	7
5⅛	5⅝	6	6⅜	6¾	6⅞	7	7⅛	7⅛
5¼	5¾	6⅛	6½	6⅞	7	7⅛	7¼	7¼
5⅜	5⅞	6¼	6⅝	7	7⅛	7¼	7⅜	7⅜
5½	6	6⅜	6¾	7⅛	7¼	7⅜	7½	7½
5⅝	6⅛	6½	6⅞	7¼	7⅜	7½	7⅝	7⅝
5¾	6¼	6¾	7	7⅜	7⅝	7⅝	7¾	7¾
5⅞	6⅜	6⅞	7⅛	7½	7¾	7¾	7⅞	7⅞
6	6½	7	7¼	7⅝	7⅞	7⅞	8	8⅛
AMOUNT IN INCHES TO BE SUBTRACTED FROM ABOVE LENGTHS FOR COUNTERSUNK HEADS								
	⅛	¼	½	½	⅝	¾	⅞	⅞

RIVET SPACING IN ANGLES, CLEARANCE FOR DRIVING, ETC.

All dimensions in inches



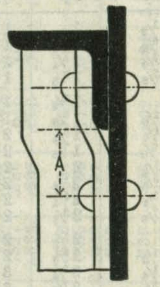


Leg	G	Max. rivets	Leg	G^1	G^2	Max. rivets
8	4½	⅞	8	3	3	⅞
7	4	⅞	7	2½	3	⅞
6	3½	⅞	6	2¼	2¼	⅞
5	3	⅞	5	2	1¾	⅞
4	2¼	⅞				
3½	2	⅞				
3	1¾	⅞				
2¾	1⅝	¾	When 6″ L exceeds ¾″			
2½	1⅜	⅝	6	2½	2¼	⅞
2¼	1¼	⅝				
2	1⅛	½				
1¾	1	½				
1½	⅞	⅜				
1¼	¾	⅜				
1	9/16	¼				

MINIMUM RIVET SPACING

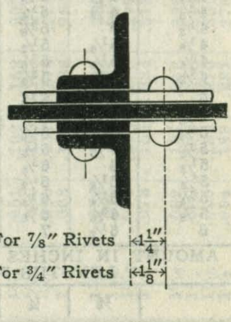
Size of rivet	¼	⅜	½	⅝	¾	⅞	1
Minimum distance	1	1¼	1¾	2	2¼	2⅝	3

RIVETS IN CRIMPED ANGLES



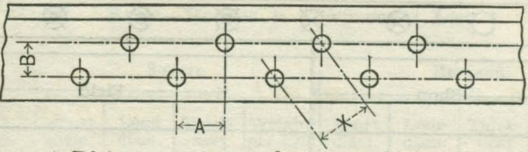
When angles are crimped, distance "A" should be 1½″ plus twice thickness of chord angles, but never less than 2″.

CLEARANCE FOR RIVETING



STAGGERING OF RIVETS.

All dimensions in inches.



Distance c. to c. of staggered rivets.

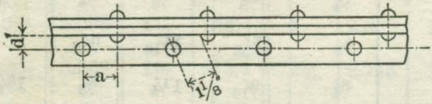
Values of "X" for varying values of "A" and "B"

Values of A	Values of B														Values of A
	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 3/8	2 1/2	
1 1/8	1 7/16	1 1/2	1 9/16	1 11/16	1 3/4	1 7/8	2	2 1/16	2 3/16	2 5/16	2 3/8	2 1/2	2 5/8	2 3/4	1 1/8
1 1/4	1 9/16	1 5/8	1 11/16	1 3/4	1 7/8	1 15/16	2 1/16	2 1/8	2 1/4	2 3/8	2 7/16	2 9/16	2 11/16	2 13/16	1 1/4
1 3/8	1 5/8	1 11/16	1 3/4	1 7/8	1 15/16	2	2 1/8	2 3/16	2 5/16	2 7/16	2 1/2	2 5/8	2 3/4	2 7/8	1 3/8
1 1/2	1 3/4	1 13/16	1 7/8	1 15/16	2	2 1/8	2 3/16	2 5/16	2 3/8	2 1/2	2 5/8	2 11/16	2 13/16	2 15/16	1 1/2
1 5/8	1 7/8	1 7/8	2	2 1/16	2 1/8	2 3/16	2 5/16	2 3/8	2 1/2	2 9/16	2 11/16	2 3/4	2 7/8	3	1 5/8
1 3/4	1 15/16	2	2 1/16	2 1/8	2 3/16	2 5/16	2 3/8	2 7/16	2 9/16	2 5/8	2 3/4	2 7/8	2 15/16	3 1/16	1 3/4
1 7/8	2 1/16	2 1/8	2 3/16	2 1/4	2 5/16	2 3/8	2 1/2	2 9/16	2 5/8	2 3/4	2 13/16	2 15/16	3	3 1/8	1 7/8
2	2 3/16	2 1/4	2 5/16	2 3/8	2 7/16	2 1/2	2 9/16	2 5/8	2 3/4	2 13/16	2 15/16	3	3 1/8	3 3/16	2
2 1/8	2 5/16	2 5/16	2 3/8	2 7/16	2 1/2	2 5/8	2 11/16	2 3/4	2 13/16	2 15/16	3	3 1/16	3 3/16	3 1/4	2 1/8
2 1/4	2 7/16	2 7/16	2 1/2	2 9/16	2 5/8	2 11/16	2 3/4	2 7/8	2 15/16	3	3 1/16	3 3/16	3 1/4	3 3/8	2 1/4
2 3/8	2 1/2	2 9/16	2 5/8	2 11/16	2 3/4	2 13/16	2 7/8	2 15/16	3	3 1/8	3 3/16	3 1/4	3 3/8	3 7/16	2 3/8
2 1/2	2 5/8	2 11/16	2 3/4	2 13/16	2 7/8	2 15/16	3	3 1/16	3 1/8	3 3/16	3 1/4	3 3/8	3 7/16	3 9/16	2 1/2

Note—Values below or to right of upper zigzag lines are large enough for 3/4" rivets.

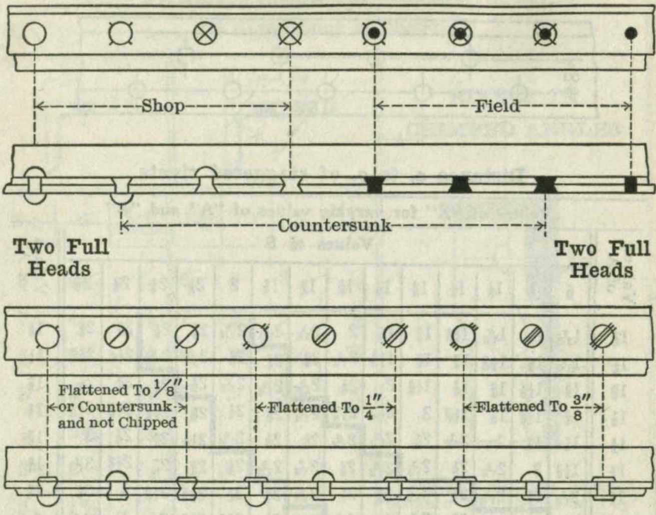
Values below or to right of lower zigzag lines are large enough for 7/8" rivets.

Minimum stagger for rivets.

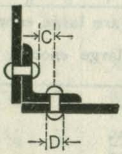


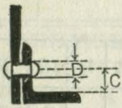
d		1 1/8	1 3/16	1 1/4	1 5/16	1 3/8	1 7/16	1 1/2	1 9/16	1 5/8	1 11/16	1 3/4
3/4" Diameter..	a	1 1/4	1 3/16	1 1/8	1 1/16	15/16	7/8	3/4	5/8	3/8	0	0
7/8" Diameter..	a	1 3/8	1 5/16	1 1/4	1 3/16	1 1/8	1	15/16	13/16	11/16	1/2	5/16

CONVENTIONAL SIGNS FOR RIVETING.



SIZES OF RIVET HEADS AND CLEARANCES FOR MACHINE DRIVING.





Size Diameter	Head Height	Head Diam. D.	Countersunk Depth	Countersunk Diam.	Minimum C
½	⅜	⅞	¼	¾	11/16
⅝	15/32	1 1/16	5/16	1	25/32
¾	9/16	1¼	⅜	1 3/16	⅞
⅞	21/32	1 7/16	7/16	1⅜	31/32
1	¾	1⅝	½	1 9/16	1 1/16

C should not be less than ½ D + ¼ inch

WEIGHTS AND DIMENSIONS OF BOLT HEADS.

Manufacturers' standard sizes
Basis—Hoopes & Townsend's List

Diam. of bolt	Square				Hexagon			
	Short diam.	Long diam.	Thick- ness	Weight per 100	Short diam.	Long diam.	Thick- ness	Weight per 100
Inches	Inches	Inches	Inch	Pounds	Inches	Inches	Inch	Pounds
¼	7/16	.619	3/16	1.0	7/16	.505	3/16	.9
5/16	½	.707	¼	1.7	½	.578	¼	1.5
⅜	19/32	.840	9/32	2.8	19/32	.686	9/32	2.4
7/16	11/16	.972	⅜	4.9	11/16	.794	⅜	4.3
½	¾	1.061	7/16	6.8	¾	.866	7/16	5.9
9/16	27/32	1.193	½	9.9	27/32	.974	½	8.6
⅝	15/16	1.326	17/32	13.0	15/16	1.083	17/32	11.2
¾	1⅛	1.591	⅝	22.0	1⅛	1.299	⅝	19.0
⅞	1 5/16	1.856	¾	34.8	1 5/16	1.516	¾	33.1
1	1½	2.122	⅞	54.7	1½	1.733	⅞	47.4
1⅛	1⅝	2.298	1	73.3	1⅝	1.877	1	63.5
1¼	1¾	2.475	1⅛	95.7	1¾	2.021	1⅛	82.9
1⅜	2⅛	3.006	1¼	156.8	2	2.309	1⅜	132.3
1½	2⅜	3.359	1⅜	215.4	2⅜	2.743	1½	203.5
1⅝	2½	3.536	1½	260.3	2½	2.888	1⅝	244.4
1¾	2¾	3.889	1⅝	341.3	2¾	3.176	1¾	318.4
1⅞	3	4.243	1¾	437.4	3	3.464	1⅞	408.2
2	3⅛	4.420	1⅞	508.5	3⅛	3.610	2	469.9

WEIGHTS AND DIMENSIONS OF SQUARE NUTS.

Manufacturers' standard sizes

Basis—Hoopes & Townsend's List

Diam. of bolt	Short diam.	Long diam.	Thick-ness	Diam. of rough hole	Plain		Cupped	
					Weight per 100	Number in 100 Pounds	Weight per 100	Number in 100 Pounds
Inches	Inches	Inches	Inches	Inch	Pounds		Pounds	
1/4	1/2	.707	1/4	7/32	1.5	6750	1.4	7200
5/16	5/8	.884	5/16	9/32	2.8	3540	2.5	4000
3/8	3/4	1.061	3/8	11/32	4.8	2100	4.2	2380
7/16	7/8	1.237	7/16	13/32	7.5	1330	6.8	1460
1/2	7/8	1.237	1/2	7/16	8.9	1120	8.1	1230
1/2	1	1.414	1/2	7/16	11.9	840	10.8	930
9/16	1 1/8	1.591	9/16	1/2	15.4	650	14.3	700
5/8	1 1/8	1.591	5/8	9/16	17.3	575	16.1	620
5/8	1 1/4	1.768	5/8	9/16	23.0	435	21.1	475
3/4	1 1/4	1.768	3/4	21/32	27.8	360	25.0	400
3/4	1 3/8	1.945	3/4	21/32	31.7	315	29.0	345
3/4	1 1/2	2.122	3/4	21/32	41.0	244	37.0	270
7/8	1 1/2	2.122	7/8	25/32	46.5	215	41.7	240
7/8	1 5/8	2.298	7/8	25/32	55.6	180	48.8	205
7/8	1 3/4	2.475	7/8	25/32	61.3	163	54.6	183
1	1 3/4	2.475	1	7/8	70.9	141	64.1	156
1	2	2.828	1	7/8	95.2	105	87.0	115
1 1/8	2	2.828	1 1/8	15/16	102.0	98	94.3	106
1 1/8	2 1/4	3.182	1 1/8	15/16	135.1	74	123.5	81
1 1/4	2 1/4	3.182	1 1/4	1 1/16	156.3	64	142.9	70
1 1/4	2 1/2	3.536	1 1/4	1 1/16	192.3	52	175.4	57
1 3/8	2 3/4	3.889	1 3/8	1 3/16	250.0	40	227.3	44
1 1/2	3	4.243	1 1/2	1 5/16	307.7	32 1/2	285.7	35
1 5/8	3 1/4	4.597	1 5/8	1 7/16	454.5	22	400.0	25
1 3/4	3 1/2	4.950	1 3/4	1 9/16	555.6	18	500.0	20
1 7/8	3 3/4	5.303	1 7/8	1 11/16	666.7	15	625.0	16
2	4	5.657	2	1 13/16	816.3	12 1/4	784.3	12 3/4

WEIGHTS AND DIMENSIONS OF HEXAGON NUTS.

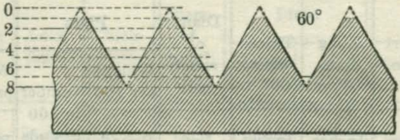
Manufacturers' standard sizes

Basis—Hoopes & Townsend's List

Diam. of bolt	Short diam.	Long diam.	Thick-ness	Diam. of rough hole	Plain: Weight per 100	Plain: Number in 100 Pounds	Cupped: Weight per 100	Cupped: Number in 100 Pounds
Inches	Inches	Inches	Inches	Inch	Pounds		Pounds	
1/4	1/2	.578	1/4	7/32	1.3	7800	1.2	8500
5/16	5/8	.722	5/16	9/32	2.3	4440	2.1	4790
3/8	3/4	.866	3/8	11/32	4.3	2330	4.0	2510
7/16	7/8	1.011	7/16	13/32	7.0	1430	6.3	1580
1/2	7/8	1.011	1/2	7/16	7.5	1330	6.9	1440
1/2	1	1.155	1/2	7/16	9.9	1010	9.2	1090
1/2	1	1.155	9/16	7/16	10.8	930	10.2	980
9/16	1 1/8	1.299	9/16	1/2	13.7	730	12.5	800
5/8	1 1/8	1.299	5/8	9/16	15.9	630	15.2	660
5/8	1 1/8	1.299	3/4	9/16	17.9	560	17.0	588
5/8	1 1/4	1.444	5/8	9/16	19.5	514	18.5	541
5/8	1 1/4	1.444	3/4	9/16	23.0	435	21.7	460
3/4	1 1/4	1.444	3/4	21/32	22.2	450	20.6	485
3/4	1 3/8	1.588	3/4	21/32	26.6	376	25.4	394
3/4	1 3/8	1.588	7/8	21/32	30.3	330	28.8	347
3/4	1 1/2	1.733	3/4	21/32	34.5	290	32.3	310
3/4	1 1/2	1.733	7/8	21/32	40.0	250	37.6	266
7/8	1 1/2	1.733	7/8	25/32	37.7	265	35.3	283
7/8	1 1/2	1.733	1	25/32	45.9	218	43.5	230
7/8	1 5/8	1.877	7/8	25/32	45.3	221	42.6	235
7/8	1 5/8	1.877	1	25/32	50.8	197	47.6	210
1	1 3/4	2.021	1	7/8	57.5	174	53.8	186
1	1 3/4	2.021	1 1/8	7/8	63.7	157	59.5	168
1 1/8	2	2.309	1 1/4	15/16	100.0	100	90.9	110
1 1/4	2 1/4	2.599	1 3/8	1 1/16	138.9	72	126.6	79
1 3/8	2 1/2	2.888	1 1/2	1 3/16	185.2	54	169.5	59
1 1/2	2 3/4	3.176	1 5/8	1 5/16	243.9	41	222.2	45
1 5/8	3	3.464	1 3/4	1 7/16	333.3	30	303.0	33
1 3/4	3 1/4	3.754	1 7/8	1 9/16	408.2	24 1/2	370.4	27
1 7/8	3 1/2	4.043	2	1 11/16	493.8	20 1/4	459.8	21 3/4
2	3 1/2	4.043	2	1 13/16	487.8	20 1/2	454.5	22
2	3 1/2	4.043	2 1/8	1 13/16	512.8	19 1/2	487.8	20 1/2

RULES FOR PROPORTIONS OF BOLTS AND NUTS.

Franklin Institute Standard



The dimensions of nuts and bolts are determined by the following rules, which apply to both square and hexagon.

Short diameter of rough nut $= 1\frac{1}{2} \times$ diameter of bolt $+ \frac{1}{8}$ in.

Short diameter of finished nut $= 1\frac{1}{2} \times$ diameter of bolt $+ \frac{1}{16}$ in.

Thickness of rough nut $=$ diameter of bolt.

Thickness of finished nut $=$ diameter of bolt $- \frac{1}{16}$ in.

Short diameter of rough head $= 1\frac{1}{2} \times$ diameter of bolt $+ \frac{1}{8}$ in.

Short diameter of finished head $= 1\frac{1}{2} \times$ diameter of bolt $+ \frac{1}{16}$ in.

Thickness of rough head $= \frac{1}{2}$ of short diameter of head.

Thickness of finished head $=$ diameter of bolt $- \frac{1}{16}$ in.

In 1864, a committee of the Franklin Institute recommended the above system of screw threads and bolts which was devised by Mr. William Sellers, of Philadelphia. This system as far as it relates to screw threads is generally used in the United States, but the proportions of bolt heads and nuts are not adhered to because the sizes of bar required to make the nuts are special and extra work is necessary to make the bolt heads. Sizes of nuts and bolt heads in accordance with the **Manufacturers' Standard** are given on pages 339, 340 and 341.

DIMENSIONS OF BOLTS AND NUTS.

Franklin Institute Standard

Bolts and threads						Rough nuts and heads				
Diameter of bolt	Threads per inch	Diameter at root of thread	Width of flat	Area of bolt body	Area of bolt at roof of thread	Short diameter of square and hexagon	Long diameter of square	Long diameter of hexagon	Thickness of nuts	Thickness of heads
Ins.	No.	Ins.	Ins.	Sq. ins.	Sq. ins.	Ins.	Ins.	Ins.	Ins.	Ins.
1/4	20	.185	.0062	.049	.027	1/2	.707	.577	1/4	1/4
5/16	18	.240	.0070	.077	.045	19/32	.840	.686	5/16	19/64
3/8	16	.294	.0078	.110	.068	11/16	.972	.794	3/8	11/32
7/16	14	.344	.0089	.150	.093	25/32	1.105	.902	7/16	25/64
1/2	13	.400	.0096	.196	.126	7/8	1.238	1.010	1/2	7/16
9/16	12	.454	.0104	.249	.162	31/32	1.370	1.119	9/16	31/64
5/8	11	.507	.0113	.307	.202	1 1/16	1.503	1.227	5/8	17/32
3/4	10	.620	.0125	.442	.302	1 1/4	1.768	1.443	3/4	5/8
7/8	9	.731	.0140	.601	.420	1 7/16	2.033	1.660	7/8	23/32
1	8	.837	.0156	.785	.550	1 5/8	2.298	1.876	1	13/16
1 1/8	7	.940	.0180	.994	.694	1 13/16	2.563	2.093	1 1/8	29/32
1 1/4	7	1.065	.0180	1.227	.893	2	2.829	2.309	1 1/4	1
1 3/8	6	1.160	.0210	1.485	1.057	2 3/16	3.094	2.526	1 3/8	1 3/32
1 1/2	6	1.284	.0210	1.767	1.295	2 3/8	3.359	2.742	1 1/2	1 3/16
1 5/8	5 1/2	1.389	.0227	2.074	1.515	2 9/16	3.624	2.959	1 5/8	1 9/32
1 3/4	5	1.490	.0250	2.405	1.744	2 3/4	3.889	3.175	1 3/4	1 3/8
1 7/8	5	1.615	.0250	2.761	2.048	2 15/16	4.154	3.392	1 7/8	1 15/32
2	4 1/2	1.712	.0280	3.142	2.302	3 1/8	4.420	3.608	2	1 9/16
2 1/4	4 1/2	1.962	.0280	3.976	3.023	3 1/2	4.950	4.042	2 1/4	1 3/4
2 1/2	4	2.175	.0310	4.909	3.715	3 7/8	5.480	4.475	2 1/2	1 15/16
2 3/4	4	2.425	.0310	5.940	4.619	4 1/4	6.011	4.908	2 3/4	2 1/8
3	3 1/2	2.629	.0357	7.069	5.428	4 5/8	6.541	5.341	3	2 5/16
3 1/4	3 1/2	2.879	.0357	8.296	6.510	5	7.071	5.774	3 1/4	2 1/2
3 1/2	3 1/4	3.100	.0384	9.621	7.548	5 3/8	7.602	6.207	3 1/2	2 11/16
3 3/4	3	3.317	.0410	11.045	8.641	5 3/4	8.132	6.640	3 3/4	2 7/8
4	3	3.567	.0410	12.566	9.993	6 1/8	8.662	7.073	4	3 1/16
4 1/4	2 7/8	3.798	.0435	14.186	11.329	6 1/2	9.193	7.506	4 1/4	3 1/4
4 1/2	2 3/4	4.028	.0460	15.904	12.743	6 7/8	9.723	7.939	4 1/2	3 7/16
4 3/4	2 5/8	4.255	.0480	17.721	14.220	7 1/4	10.253	8.372	4 3/4	3 5/8
5	2 1/2	4.480	.0500	19.635	15.763	7 5/8	10.784	8.805	5	3 13/16
5 1/4	2 1/2	4.730	.0500	21.648	17.572	8	11.314	9.238	5 1/4	4
5 1/2	2 3/8	4.953	.0526	23.758	19.267	8 3/8	11.844	9.671	5 1/2	4 3/16
5 3/4	2 3/8	5.203	.0526	25.967	21.262	8 3/4	12.375	10.104	5 3/4	4 3/8
6	2 1/4	5.423	.0555	28.274	23.098	9 1/8	12.905	10.537	6	4 9/16

WEIGHTS OF 100 MACHINE BOLTS WITH SQUARE HEADS AND HEXAGON NUTS.

Franklin Institute standard sizes
Basis—1 cubic foot iron=480 pounds

Length under head to point inches	DIAMETER OF BOLTS IN INCHES						
	¼	5/16	⅜	7/16	½	9/16	⅝
1½	4.9	8.2	12.2	17.5	24.0	31.8	41.1
1¾	5.3	8.7	13.0	18.5	25.3	33.5	43.2
2	5.6	9.2	13.8	19.6	26.7	35.2	45.3
2¼	6.0	9.8	14.5	20.6	28.1	37.0	47.5
2½	6.3	10.3	15.3	21.6	29.4	38.7	49.6
2¾	6.6	10.8	16.1	22.7	30.8	40.4	51.7
3	7.0	11.4	16.8	23.7	32.1	42.1	53.9
3¼	7.3	11.9	17.6	24.8	33.5	43.9	56.0
3½	7.7	12.4	18.4	25.8	34.9	45.6	58.1
3¾	8.0	13.0	19.1	26.9	36.2	47.3	60.3
4	8.3	13.5	19.9	27.9	37.6	49.0	62.4
4½	9.0	14.6	21.4	30.0	40.3	52.5	66.6
5	9.7	15.6	23.0	32.1	43.0	55.9	70.9
5½	10.4	16.7	24.5	34.2	45.8	59.4	75.2
6	11.1	17.8	26.0	36.2	48.5	62.8	79.4
6½	11.7	18.8	27.6	38.3	51.2	66.3	83.7
7	12.4	19.9	29.1	40.4	53.9	69.7	87.9
7½	13.1	21.0	30.6	42.5	56.7	73.2	92.2
8	13.8	22.0	32.2	44.6	59.4	76.6	96.5
8½	14.5	23.1	33.7	46.7	62.1	80.1	100.7
9	15.1	24.2	35.3	48.8	64.8	83.5	105.0
9½	15.8	25.2	36.8	50.8	67.6	87.0	109.2
10	16.5	26.3	38.3	52.9	70.3	90.4	113.5
10½	17.2	27.4	39.9	55.0	73.0	93.9	117.8
11	17.9	28.4	41.4	57.1	75.7	97.3	122.0
11½	18.5	29.5	42.9	59.2	78.5	100.8	126.3
12	.....	30.5	44.5	61.3	81.2	104.2	130.5
12½	.....	31.6	46.0	63.3	83.9	107.7	134.8
13	.....	32.7	47.5	65.4	86.6	111.1	139.1
13½	.....	33.7	49.1	67.5	89.4	114.6	143.3
14	.....	....	50.6	69.6	92.1	118.0	147.6
14½	.....	....	52.1	71.7	94.8	121.5	151.8
15	.....	....	53.7	73.8	97.5	124.9	156.1
15½	.....	....	55.2	75.9	100.3	128.4	160.4
16	.....	....	....	77.9	103.0	131.8	164.6
16½	.....	....	....	80.0	105.7	135.3	168.9
17	.....	....	....	82.1	108.4	138.7	173.1
17½	.....	....	....	84.2	111.2	142.2	177.4
18	.....	....	....	....	113.9	145.6	181.7
18½	.....	....	....	....	116.6	149.1	185.9
19	.....	....	....	....	119.3	152.5	190.2
19½	.....	....	....	....	122.1	156.0	194.4
20	.....	....	....	....	124.8	159.4	198.7
One inch in length of 100 bolts	1.36	2.13	3.07	4.18	5.45	6.90	8.52
To obtain weights with square nuts per 100: Add	.23	.41	.66	.99	1.42	1.96	2.62
Weight of 1 hex. nut	.0116	.020	.031	.046	.065	.088	.117
Weight of 1 hex. head	.0150	.025	.039	.057	.081	.109	.144
Weight of 1 sq. nut	.0139	.024	.038	.056	.079	.108	.143
Weight of 1 sq. head	.0173	.029	.045	.066	.093	.126	.167

Weights given are approximate

WEIGHTS OF 100 MACHINE BOLTS WITH SQUARE HEADS AND HEXAGON NUTS.

Franklin Institute standard sizes
Basis—1 cubic foot iron=480 pounds

Length under head to point inches	DIAMETER OF BOLTS IN INCHES						
	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
1 1/2	64.5	95.2	134	182	240	309	390
1 3/4	67.6	99.4	140	189	248	319	402
2	70.6	103.5	145	196	257	329	414
2 1/4	73.7	107.7	150	203	265	340	426
2 1/2	76.8	111.9	156	210	274	350	439
2 3/4	79.8	116.1	161	216	282	360	451
3	82.9	120.2	167	223	291	371	463
3 1/4	86.0	124.4	172	230	300	381	475
3 1/2	89.1	128.6	178	237	308	391	488
3 3/4	92.1	132.8	183	244	317	402	500
4	95.2	136.9	189	251	325	412	512
4 1/2	101.3	145.3	199	265	342	432	537
5	107.4	153.6	210	279	359	453	561
5 1/2	113.6	162.0	221	292	376	474	586
6	119.7	170.3	232	306	393	494	610
6 1/2	125.9	178.7	243	320	410	515	635
7	132.0	187.0	254	334	427	536	659
7 1/2	138.1	195.4	265	348	444	556	684
8	144.3	203.7	276	361	461	577	709
8 1/2	150.4	212.1	287	375	478	597	733
9	156.5	220.4	298	389	495	618	758
9 1/2	162.7	228.8	308	402	513	639	782
10	168.8	237.1	319	417	530	659	807
10 1/2	174.9	245.5	330	430	547	680	831
11	181.1	253.8	341	444	564	701	856
11 1/2	187.2	262.2	352	458	581	721	880
12	193.3	270.5	363	472	598	742	905
12 1/2	199.5	278.9	374	486	615	762	929
13	205.6	287.2	385	499	632	783	954
13 1/2	211.7	295.6	396	513	649	804	978
14	217.9	303.9	407	527	666	824	1003
14 1/2	224.0	312.3	417	541	683	845	1027
15	230.1	320.6	428	555	700	866	1052
15 1/2	236.3	329.0	439	568	717	886	1077
16	242.4	337.3	450	582	734	907	1101
16 1/2	248.5	345.7	461	596	751	927	1126
17	254.7	354.0	472	610	768	948	1150
17 1/2	260.8	362.4	483	624	785	969	1175
18	266.9	370.7	494	637	802	989	1199
18 1/2	273.1	379.1	505	651	819	1010	1224
19	279.2	387.4	516	665	836	1031	1248
19 1/2	285.3	395.8	526	679	853	1051	1273
20	291.5	404.1	537	693	870	1072	1297
One inch in length of 100 bolts	12.27	16.70	21.82	27.61	34.09	41.25	49.09
To obtain weights with square nuts per 100: Add	4.35	6.72	9.81	13.73	18.57	24.42	31.42
Weight of 1 hex. nut	.190	.289	.417	.579	.777	1.016	1.299
Weight of 1 hex. head	.235	.357	.516	.616	.962	1.259	1.611
Weight of 1 sq. nut	.234	.356	.515	.716	.963	1.260	1.614
Weight of 1 sq. head	.271	.412	.596	.827	1.111	1.453	1.860

Weights given are approximate

WEIGHTS OF 100 MACHINE BOLTS WITH SQUARE HEADS AND NUTS.

WROUGHT IRON

Manufacturers' standard sizes

Basis—Hoopes & Townsend's List

Length under head to point inches	DIAMETER OF BOLT IN INCHES							
	¼	5/16	⅜	7/16	½	9/16	⅝	¾
1½	3.4	6.0	9.2	13.6	19.1	26.0	33.8	55.3
2	4.1	7.1	10.8	15.7	21.8	29.5	38.1	61.5
2½	4.8	8.2	12.3	17.8	24.6	33.0	42.4	67.7
3	5.5	9.2	13.8	19.9	27.4	36.5	46.7	73.9
3½	6.2	10.3	15.3	21.8	29.8	40.0	51.0	80.1
4	6.9	11.4	16.9	24.0	32.6	43.5	55.4	86.3
4½	7.5	12.4	18.4	26.1	35.4	46.7	59.3	92.1
5	8.2	13.5	19.9	28.2	38.1	50.2	63.6	98.3
5½	8.9	14.6	21.5	30.3	40.9	53.7	67.9	104.5
6	9.6	15.6	23.0	32.4	43.7	57.2	72.3	110.7
6½	10.3	16.7	24.6	34.5	46.4	60.7	76.6	116.9
7	11.0	17.8	26.1	36.6	49.2	64.2	80.9	123.1
7½	11.7	18.9	27.7	38.8	51.9	67.6	85.2	129.4
8	12.4	20.0	29.2	40.9	54.7	71.1	89.5	135.6
9	13.7	22.1	32.4	44.9	60.0	77.8	97.8	147.5
10	15.1	24.3	35.5	49.1	65.5	84.8	106.4	160.0
11	16.5	26.4	38.6	53.4	71.0	91.8	115.1	172.4
12	17.9	28.6	41.7	57.6	76.5	98.8	123.7	148.8
13	19.3	30.7	44.8	61.8	82.0	105.5	132.0	197.2
14	20.6	32.9	47.9	66.0	87.6	112.5	140.6	209.7
15	22.0	35.1	51.0	70.3	93.1	119.5	149.2	222.1
16	23.4	37.2	54.1	74.5	98.6	126.4	157.9	234.5
17	24.8	39.4	57.2	78.7	104.1	133.4	166.5	246.9
18	26.2	41.5	60.3	82.9	109.7	140.4	175.1	259.4
19	27.5	43.7	63.4	87.2	115.2	147.4	183.7	271.8
20	28.9	45.8	66.5	91.4	120.7	154.4	192.4	284.2
21	30.3	48.0	69.6	95.6	126.2	161.4	201.0	296.6
22	31.7	50.2	72.7	99.9	131.7	168.4	209.6	309.1
23	33.1	52.3	75.8	104.1	137.3	175.4	218.3	321.5
24	34.4	54.5	78.9	108.3	142.8	182.4	226.9	333.9
25	35.8	56.6	82.1	112.5	148.3	189.3	235.5	346.3

WEIGHTS OF 100 MACHINE BOLTS WITH SQUARE HEADS AND NUTS.

WROUGHT IRON

Manufacturers' standard sizes

Basis—Hoopes & Townsend's List

Length under head to point Inches	DIAMETER OF BOLT IN INCHES							
	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2
1 1/2	83.4	.....	.....	......	....	....	....	....
2	91.8	129.0	184.5	......	....	....	....	....
2 1/2	99.7	140.1	198.4	264.8	....	....	....	....
3	108.1	151.1	212.4	282.0	350	470	....	....
3 1/2	116.6	162.2	226.4	299.3	370	495	....	....
4	125.0	173.2	240.4	316.6	390	520	720	....
4 1/2	132.9	182.7	253.3	332.6	410	525	753	....
5	141.3	193.7	267.3	349.9	430	570	786	1180
5 1/2	149.8	204.8	281.2	367.1	450	595	820	1225
6	158.2	215.8	295.2	384.4	470	620	854	1270
6 1/2	166.7	226.9	309.2	401.6	490	645	888	1315
7	175.1	237.9	323.7	418.9	510	670	922	1360
7 1/2	183.6	248.9	337.2	436.2	530	695	956	1405
8	192.0	260.0	351.1	453.4	550	725	990	1450
9	208.3	281.3	377.0	486.7	590	775	1058	1540
10	225.2	303.3	404.9	521.2	630	825	1126	1630
11	242.2	325.5	432.9	555.8	670	875	1194	1720
12	259.1	347.6	460.8	590.3	710	925	1262	1810
13	276.0	369.6	488.8	624.8	751	975	1330	1900
14	292.9	391.7	516.7	659.3	793	1025	1398	1990
15	309.8	413.8	544.7	693.8	835	1075	1468	2080
16	326.7	435.9	572.7	728.3	877	1125	1536	2170
17	343.6	458.0	600.6	762.8	919	1175	1604	2260
18	360.5	480.1	628.6	797.4	961	1225	1672	2350
19	377.5	502.2	656.5	831.9	1003	1275	1740	2440
20	394.4	524.3	684.5	866.4	1045	1325	1808	2530
21	411.3	546.4	712.4	900.9	1087	1375	1876	2620
22	428.2	568.4	740.4	935.4	1129	1425	1944	2710
23	445.1	590.5	768.3	969.9	1171	1475	2012	2800
24	462.0	612.6	796.3	1004.5	1213	1525	2080	2890
25	478.9	634.7	824.3	1039.0	1255	1575	2148	2980

Bolts from 1 1/8 to 2 inches, inclusive, are fitted with nuts made to U. S. Standard

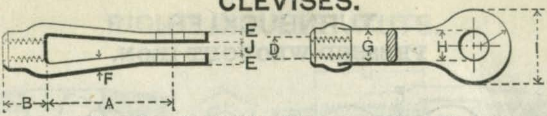
WEIGHTS OF 100 ROUND-HEADED RIVETS OR ROUND-HEADED BOLTS WITHOUT NUTS.

WROUGHT IRON

Basis—1 cubic foot iron=480 pounds

Length under head to point. Inches	DIAMETER OF RIVET IN INCHES						
	3/8	1/2	5/8	3/4	7/8	1	1 1/8
1	4.7	9.3	16.0	25.2	37.2	52.6	71.3
1 1/4	5.5	10.7	18.1	28.3	41.3	58.0	78.2
1 1/2	6.2	12.1	20.2	31.3	45.5	63.5	85.1
1 3/4	7.0	13.4	22.4	34.4	49.7	68.9	92.0
2	7.8	14.8	24.5	37.5	53.9	74.4	98.9
2 1/4	8.5	16.2	26.6	40.5	58.0	79.8	105.8
2 1/2	9.3	17.5	28.8	43.6	62.2	85.3	112.7
2 3/4	10.1	18.9	30.9	46.7	66.4	90.7	119.6
3	10.8	20.3	33.0	49.8	70.6	96.2	126.5
3 1/4	11.6	21.6	35.1	52.8	74.7	101.6	133.4
3 1/2	12.4	23.0	37.3	55.9	78.9	107.1	140.3
3 3/4	13.1	24.3	39.4	59.0	83.1	112.6	147.2
4	13.9	25.7	41.5	62.0	87.3	118.0	154.1
4 1/4	14.7	27.1	43.7	65.1	91.4	123.5	161.0
4 1/2	15.4	28.4	45.8	68.2	95.6	128.9	167.9
4 3/4	16.2	29.8	47.9	71.2	99.8	134.4	174.8
5	17.0	31.2	50.1	74.3	104.0	139.8	181.7
5 1/4	17.7	32.5	52.2	77.4	108.2	145.3	188.6
5 1/2	18.5	33.9	54.3	80.4	112.3	150.7	195.6
5 3/4	19.3	35.3	56.4	83.5	116.5	156.2	202.5
6	20.0	36.6	58.6	86.6	120.7	161.6	209.4
6 1/4	20.8	38.0	60.7	89.6	124.8	167.1	216.3
6 1/2	21.6	39.3	62.8	92.7	129.0	172.5	223.2
6 3/4	22.3	40.7	65.0	95.8	133.2	178.0	230.1
7	23.1	42.1	67.1	98.8	137.4	183.5	237.0
7 1/4	23.9	43.4	69.2	101.9	141.6	188.9	243.9
7 1/2	24.6	44.8	71.4	105.0	145.7	194.4	250.8
7 3/4	25.4	46.2	73.5	108.0	149.9	199.8	257.7
8	26.2	47.5	75.6	111.1	154.1	205.3	264.6
8 1/2	27.7	50.2	79.9	117.2	162.4	216.2	278.4
9	29.2	53.0	84.1	123.4	170.8	227.1	292.2
9 1/2	30.8	55.7	88.4	129.5	179.1	238.0	306.0
10	32.3	58.4	92.7	135.6	187.5	248.8	319.8
10 1/2	33.8	61.2	96.9	141.8	195.8	259.8	333.6
11	35.4	63.9	101.2	147.9	204.2	270.7	347.4
12	38.4	69.3	109.7	160.2	220.9	292.5	375.0
One inch in length of 100 rivets	3.07	5.45	8.52	12.27	16.70	21.82	27.61
Weight of 100 rivet heads	1.78	4.82	9.95	16.12	24.29	34.77	47.67

CLEVISES.

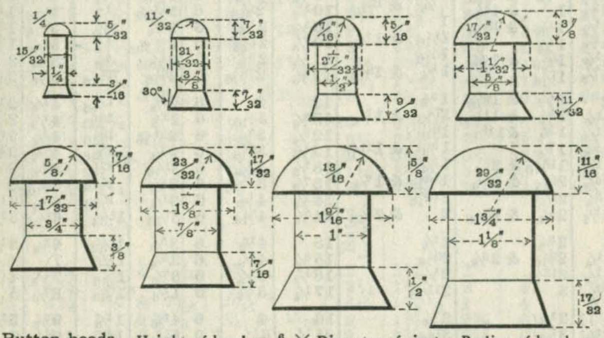


The Cleveland City Forge and Iron Co.

Diam. of screw	Length of fork	Length of thread	Diameter of pin in inches													Dimensions to be used with specified diameters			
D	A	B	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	I	G	F	E
Ins.	Ins.	Ins.	Diameter I in Inches													Ins.	Ins.	Ins.	Ins.
¾	5½	1⅛	2¾	2¾	2¾	3	..	..	..	..	..	..	..	..	..	2¾	1½	½	17/32
⅞	5½	1⅜	2¾	2¾	3	3	..	..	..	..	..	..	..	..	..	3	1⅝	½	17/32
1	6	1½	2¾	2¾	3	3¼	3½	..	..	..	..	..	..	..	..	3¼	1¾	9/16	19/32
1⅛	6	1¾	..	2¾	3	3¼	3½	3¾	..	..	..	..	..	..	..	3½	1⅞	9/16	19/32
1¼	6½	1⅞	..	3	3¼	3½	3½	3¾	..	..	..	..	..	..	..	3¾	2	⅝	21/32
1⅜	6½	2⅛	..	3¼	3½	3¾	4	4⅜	4⅜	..	..	..	..	..	..	4	2⅛	⅝	21/32
1½	7	2¼	..	..	3¾	4	4⅜	4⅜	4¾	..	..	..	..	..	..	4⅜	2¼	11/16	¾
1⅝	7	2½	..	..	3¾	4	4⅜	4¾	5¼	..	..	..	..	..	..	4¾	2½	23/32	25/32
1¾	8	2⅝	..	..	..	4⅜	4¾	5¼	5¼	5¼	..	..	..	..	..	5¼	2¾	13/16	⅞
1⅞	8	2⅞	..	..	..	..	5¼	5¼	5¼	5¾	..	..	..	..	..	5¾	3	27/32	15/16
2	9	3	..	..	..	..	5¼	5¼	5¾	5¾	6¾	..	..	..	..	6¾	3¼	15/16	1 1/16
2⅛	9	3¼	..	..	..	..	..	5¾	5¾	6¾	6¾	6¾	..	..	..	8	4	1 1/16	1¼
2¼	10	3¼	..	..	..	..	..	5¾	6¾	6¾	6¾	6¾	..	..	..	9	4½	1 5/16	1½
2⅜	10	3½	..	..	..	..	..	6¾	6¾	6¾	6¾	8	8	..	..				
2½	10	3¾	..	..	..	..	..	..	6¾	6¾	8	8	8	..	..				
2⅝	10	4	..	..	..	..	..	..	6¾	8	8	8	8	8	8				
2¾	12	4¼	..	..	..	..	..	..	8	8	8	8	8	8	8				
2⅞	12	4¼	..	..	..	..	..	..	..	8	8	8	8	9	9				
3	12	4½	..	..	..	..	..	..	..	..	8	8	9	9	9				

Dimension "H" is usually $\frac{1}{32}''$ larger than diameter of pin and "J" is made to suit the thickness of the pin plate. The above clevises are designed for use with medium steel rods of 60,000 to 68,000 pounds tensile strength per square inch. All clevis nuts with diameter "I" 8 inches or larger dimension "A" will be 12 inches.

DIMENSIONS OF RIVET HEADS AFTER DRIVING.

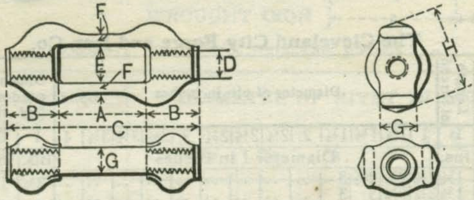


Button heads.—Height of head = $\frac{6}{10}$ × Diameter of rivet. Radius of head = ¾ Diameter of rivet + $\frac{1}{16}''$.

Countersunk heads.—Diameter of countersunk head same as button head. Angle of countersink = 30°. In figuring clearances for rivet heads allow for heights as follows: ⅝" for ¾" rivets, ¾" for ⅞" rivets.

TURNBUCKLES.

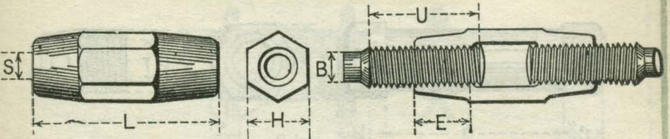
PRESSED WROUGHT IRON.



The Cleveland City Forge and Iron Co.

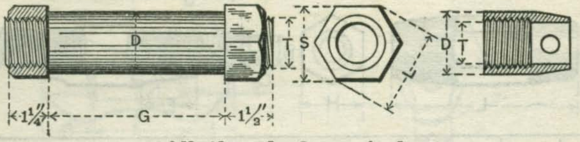
Dia. of screw D	Dimensions of bar: Diameter of bar	Dimensions of bar: Side of square bar	C	B	A	E	F	H	G
Ins.	Inches	Inches	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
3/8	....	....	7 1/8	9/16	6	9/16	3/16	1 1/16	1/2
7/16	....	....	7 5/16	21/32	6	5/8	1/4	1 3/8	5/8
1/2	....	....	7 1/2	3/4	6	5/8	1/4	1 3/8	5/8
9/16	....	....	7 11/16	27/32	6	13/16	5/16	1 9/16	3/4
5/8	....	....	7 7/8	15/16	6	13/16	5/16	1 9/16	3/4
3/4	1/2 & 9/16	1/2	8 1/4	1 1/8	6	1 1/16	11/32	2	7/8
7/8	5/8	9/16	8 5/8	1 5/16	6	1 1/4	3/8	2 1/4	1
1	11/16 & 3/4	5/8 & 11/16	9	1 1/2	6	1 5/16	7/16	2 7/16	1 1/4
1 1/8	13/16	3/4	9 3/8	1 11/16	6	1 7/16	1/2	2 9/16	1 1/4
1 1/4	7/8 & 15/16	13/16	9 3/4	1 7/8	6	1 9/16	1/2	2 3/4	1 1/2
1 3/8	1 & 1 1/16	7/8 & 15/16	10 1/8	2 1/16	6	1 11/16	1/2	3 1/16	1 5/8
1 1/2	1 1/8 & 1 3/16	1	10 1/2	2 1/4	6	1 3/4	5/8	3 3/16	1 3/4
1 5/8	1 1/4	1 1/16 & 1 1/8	10 7/8	2 7/16	6	2	5/8	3 1/2	1 7/8
1 3/4	1 5/16 & 1 3/8	1 3/16	11 1/4	2 5/8	6	2 1/8	5/8	3 3/4	2
1 7/8	1 7/16	1 1/4 & 1 5/16	11 5/8	2 13/16	6	2 3/16	11/16	3 7/8	2 1/8
2	1 1/2 & 1 9/16	1 3/8	12	3	6	2 3/8	11/16	4 1/4	2 1/4
2 1/8	1 5/8 & 1 11/16	1 7/16 & 1 1/2	12 3/8	3 3/16	6	2 1/2	23/32	4 1/2	2 1/2
2 1/4	1 3/4 & 1 13/16	1 9/16	12 3/4	3 3/8	6	2 11/16	13/16	4 3/4	2 1/2
2 3/8	1 7/8	1 5/8 & 1 11/16	13 1/8	3 9/16	6	2 3/4	13/16	4 7/8	2 3/4
2 1/2	1 15/16 & 2	1 3/4	13 1/2	3 3/4	6	3 1/16	27/32	5 3/8	3
2 5/8	2 1/16 & 2 1/8	1 13/16 & 1 7/8	13 7/8	3 15/16	6	3 1/8	15/16	5 9/16	3
2 3/4	2 3/16	1 15/16	14 1/4	4 1/8	6	3 1/4	15/16	5 3/4	3 1/4
2 7/8	2 1/4 & 2 5/16	2 & 2 1/16	14 5/8	4 5/16	6	3 7/16	1 1/32	6 1/16	3 1/4
3	2 3/8	2 1/8	15	4 1/2	6	3 5/8	1 1/32	6 3/8	3 1/2
3 1/4	2 9/16 & 2 5/8	2 5/16	15 3/4	4 7/8	6	3 3/4	1 1/4	7	4
3 1/2	2 13/16	2 1/2	16 1/2	5 1/4	6	3 7/8	1 5/16	7 1/2	4 1/2
3 3/4	3	2 11/16	17 1/4	5 5/8	6	4 1/8	1 7/16	8 3/8	5
4	3 1/4	2 7/8	18	6	6	4 5/8	1 5/8	9 3/8	5 1/8
4 1/4	3 1/2	3 1/16	21 1/2	6 1/4	9	5	1 5/8	10 1/8	6
4 1/2	3 5/8	3 1/4	22 1/2	6 3/4	9	5 3/8	1 3/4	10 7/8	6 1/2
4 3/4	3 7/8	3 3/8	23 1/2	7 1/4	9	5 1/2	2	11 3/8	6 1/2
5	4 1/8	3 7/16	24	7 1/2	9	5 7/8	2 1/4	12	6 1/2

RIGHT AND LEFT NUTS.



Diameter of screw	Length of upset	Diameter of bar	Side of square bar	Length of nut	Length of thread	Diameter of hex.	Weight of One nut	Weight of One nut and two screw ends
S	U	B	B	L	E	H		
Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Lbs.	Lbs.
				Ordinary lengths				
7/8	4 1/2	5/8	9/16	6	1 7/16	1 5/8	1 3/4	4 1/4
1	4 1/2	11/16 & 3/4	5/8 & 11/16	6	1 7/16	1 5/8	1 3/4	4 1/4
1 1/8	4 3/4	13/16	3/4	6 1/2	1 5/8	2	3	7 1/2
1 1/4	4 3/4	7/8 & 15/16	13/16	6 1/2	1 5/8	2	3	7 1/2
1 3/8	5	1 & 1 1/16	7/8 & 15/16	7	1 7/8	2 3/8	4 3/4	11 3/4
1 1/2	5	1 1/8 & 1 3/16	1	7	1 7/8	2 3/8	4 3/4	11 3/4
1 5/8	5 1/4	1 1/4	1 1/16 & 1 1/8	7 1/2	2 1/16	2 3/4	6 3/4	16 3/4
1 3/4	5 1/4	1 5/16 & 1 3/8	1 3/16	7 1/2	2 1/16	2 3/4	6 3/4	16 3/4
1 7/8	5 1/2	1 7/16	1 1/4 & 1 5/16	8	2 5/16	3 1/8	9 1/4	23 1/4
2	5 1/2	1 1/2 & 1 9/16	1 3/8	8	2 5/16	3 1/8	9 1/4	23 1/4
2 1/8	5 3/4	1 5/8 & 1 11/16	1 7/16 & 1 1/2	8 1/2	2 1/2	3 1/2	12 1/2	31 1/2
2 1/4	5 3/4	1 3/4 & 1 13/16	1 9/16	8 1/2	2 1/2	3 1/2	12 1/2	31 1/2
2 3/8	6	1 7/8	1 5/8 & 1 11/16	9	2 3/4	3 7/8	16 3/4	41 3/4
2 1/2	6	1 15/16 & 2	1 3/4	9	2 3/4	3 7/8	16 3/4	41 3/4
2 5/8	6 1/4	2 1/16 & 2 1/8	1 13/16 & 1 7/8	9 1/2	2 15/16	4 1/4	21 1/2	53 1/4
2 3/4	6 1/4	2 3/16	1 15/16	9 1/2	2 15/16	4 1/4	21 1/2	53 1/4
2 7/8	6 1/2	2 1/4 & 2 5/16	2 & 2 1/16	10	3 3/16	4 5/8	26 1/2	66 1/4
3	6 1/2	2 3/8	2 1/8	10	3 3/16	4 5/8	26 1/2	66 1/4
3 1/4	6 3/4	2 9/16 & 2 5/8	2 5/16	10 1/2	3 3/8	5	32	81
3 1/2	7	2 13/16	2 1/2	11	3 5/8	5 3/8	38 1/4	97 3/4
3 3/4	7 1/4	3	2 11/16	11 1/2	3 13/16	5 3/4	45	116
4	7 1/2	3 1/4	2 7/8	12	4 1/16	6 1/8	53 1/2	138
				Extra lengths				
1 1/4	4 3/4	7/8 & 15/16	13/16	12	2 1/8	2	....	....
1 1/8	4 3/4	13/16	3/4	8 1/2	1 5/8	2	4	9 3/4
1 1/4	4 3/4	7/8 & 15/16	13/16	8 1/2	1 5/8	2	4	9 3/4
1 3/8	5	1 & 1 1/16	7/8 & 15/16	9	1 7/8	2 3/8	6 1/4	15 1/4
1 1/2	5	1 1/8 & 1 3/16	1	9	1 7/8	2 3/8	6 1/4	15 1/4
1 5/8	5 1/4	1 1/4	1 1/16 & 1 1/8	9 1/2	2 1/16	2 3/4	8 3/4	21 1/2
1 3/4	5 1/4	1 5/16 & 1 3/8	1 3/16	9 1/2	2 1/16	2 3/4	8 3/4	21 1/2
1 7/8	5 1/2	1 7/16	1 1/4 & 1 5/16	10	2 5/16	3 1/8	12 1/4	29 3/4
2	5 1/2	1 1/2 & 1 9/16	1 3/8	10	2 5/16	3 1/8	12 1/4	29 3/4

BRIDGE PINS, NUTS AND PILOT NUTS.

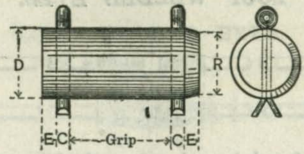


All threads 8 per inch

Nominal diameter of pin	Turned diameter of pin	Diameter of thread	Short diameter of nut	Long diameter of nut	Diameter of holes in eye bars
	D	T	S	L	
Inches	Inches	Inches	Inches	Inches	
1½	1$\frac{7}{16}$	1¼	2	2$\frac{5}{16}$	D + $\frac{1}{100}$
1¾	1$\frac{11}{16}$	1½	2½	2⅞	D + $\frac{1}{100}$
2	1$\frac{15}{16}$	1½	2½	2⅞	D + $\frac{1}{100}$
2¼	2$\frac{3}{16}$	1½	3	3½	D + $\frac{1}{100}$
2½	2$\frac{7}{16}$	2	3	3½	D + $\frac{2}{100}$
2¾	2$\frac{11}{16}$	2	3½	4$\frac{1}{16}$	D + $\frac{2}{100}$
3	2$\frac{15}{16}$	2	3½	4$\frac{1}{16}$	D + $\frac{2}{100}$
3¼	3$\frac{3}{16}$	2½	4	4$\frac{11}{16}$	D + $\frac{2}{100}$
3½	3$\frac{7}{16}$	2½	4	4$\frac{11}{16}$	D + $\frac{2}{100}$
3¾	3$\frac{11}{16}$	2¾	4½	5$\frac{3}{16}$	D + $\frac{2}{100}$
4	3$\frac{15}{16}$	3	4½	5$\frac{3}{16}$	D + $\frac{2}{100}$
4¼	4$\frac{3}{16}$	3½	5	5$\frac{13}{16}$	D + $\frac{2}{100}$
4½	4$\frac{7}{16}$	3½	5	5$\frac{13}{16}$	D + $\frac{2}{100}$
4¾	4$\frac{11}{16}$	4	5½	6⅜	D + $\frac{2}{100}$
5	4$\frac{15}{16}$	4	5½	6⅜	D + $\frac{3}{100}$
5¼	5$\frac{3}{16}$	4	6	6$\frac{15}{16}$	D + $\frac{3}{100}$
5½	5$\frac{7}{16}$	4	6	6$\frac{15}{16}$	D + $\frac{3}{100}$
5¾	5$\frac{11}{16}$	4	6½	7½	D + $\frac{3}{100}$
6	5$\frac{15}{16}$	4	6½	7½	D + $\frac{3}{100}$
6¼	6$\frac{3}{16}$	4	7	8⅛	D + $\frac{3}{100}$
6½	6$\frac{7}{16}$	4	7	8⅛	D + $\frac{3}{100}$
6¾	6$\frac{11}{16}$	4	7½	8$\frac{11}{16}$	D + $\frac{3}{100}$
7	6$\frac{15}{16}$	4	7½	8$\frac{11}{16}$	D + $\frac{3}{100}$

Allow $\frac{1}{16}$" excess for each eye bar packed on the pin.

COLD ROLLED STEEL PINS WITH COTTERS.

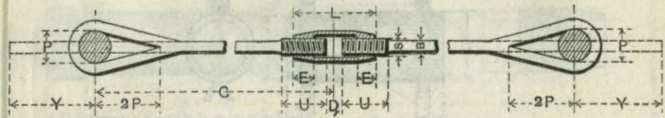


DIMENSIONS OF PIN IN INCHES

Diameter of pin	Diameter of reduced point	Lengths of ends	Diameter of cotter	Diameter of pin hole
D	R	E	C	
1	⅞	5/16	5/16	1 1/16
1¼	1⅛	5/16	5/16	1 5/16
1½	1¼	½	5/16	1 9/16
1¾	1½	½	5/16	1 13/16
2	1¾	½	⅜	2 1/16
2¼	2	½	⅜	2 5/16
2½	2¼	½	⅜	2 9/16
2¾	2½	½	⅜	2 13/16
3	2¾	⅞	½	3 1/16
3¼	3	⅞	½	3 5/16
3½	3¼	⅞	½	3 9/16
3¾	3½	⅞	½	3 13/16
4	3¾	⅞	½	4 1/16

COUNTER AND LATERAL RODS.

LOOP WELDED EYES.



Additional length of rod beyond center of pin required to make eye for square or round rods

Diameter or side of rod	Diameter of pin in inches										
Ins.	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4
1/2	5 3/4	6 3/4	7 1/2	8 1/2	9 1/2	10 1/4	11 1/4	12 1/4	13 1/4	14	15
5/8	6 1/4	7 1/4	8	9	10	10 3/4	11 3/4	12 3/4	13 1/2	14 1/2	15 1/2
3/4	6 3/4	7 1/2	8 1/2	9 1/2	10 1/4	11 1/4	12 1/4	13 1/4	14	15	16
7/8	...	8	9	10	10 3/4	11 3/4	12 3/4	13 1/2	14 1/2	15 1/2	16 1/2
1	...	8 1/2	9 1/2	10 1/4	11 1/4	12 1/4	13 1/4	14	15	16	16 3/4
1 1/8	...	...	10	10 3/4	11 3/4	12 3/4	13 1/2	14 1/2	15 1/2	16 1/2	17 1/4
1 1/4	...	...	10 1/4	11 1/4	12 1/4	13 1/4	14	15	16	16 3/4	17 3/4
1 3/8	...	...	....	11 3/4	12 3/4	13 1/2	14 1/2	15 1/2	16 1/2	17 1/4	18 1/4
1 1/2	...	...	....	12 1/4	13 1/4	14	15	16	16 3/4	17 3/4	18 3/4
1 5/8	...	...	....	....	13 1/2	14 1/2	15 1/2	16 1/2	17 1/4	18 1/4	19 1/4
1 3/4	...	...	....	....	14	15	16	16 3/4	17 3/4	18 3/4	19 1/2
1 7/8	...	...	....	....	....	15 1/2	16 1/2	17 1/4	18 1/4	19 1/4	20
2	...	...	....	....	....	16	16 3/4	17 3/4	18 3/4	19 1/2	20 1/2
2 1/8	...	...	....	....	....	....	17 1/4	18 1/4	19 1/4	20 1/4	21
2 1/4	...	...	....	....	....	....	18	18 3/4	19 3/4	20 3/4	21 1/2
2 3/8	...	...	....	....	....	....	....	19 1/4	20 1/4	21 1/4	22
2 1/2	...	...	....	....	....	....	....	19 3/4	20 3/4	21 3/4	22 3/4
2 5/8	...	...	....	....	....	....	....	....	21 1/4	22 1/4	23 1/4
2 3/4	...	...	....	....	....	....	....	....	21 3/4	22 3/4	23 3/4
2 7/8	...	...	....	....	....	....	....	....	....	23 1/4	24 1/4
3	...	...	....	....	....	....	....	....	....	23 3/4	24 3/4
3 1/8	...	...	....	....	....	....	....	....	....	....	25 1/4
3 1/4	...	...	....	....	....	....	....	....	....	....	25 3/4

Length in inches beyond center of pin required to form one eye = Y
B = Side or diameter of rod
P = Diameter of pin
Length of rod including amount required to form one eye = C — ½ D + Y.

Formulae:

When $\frac{B}{2} =$ or < 1

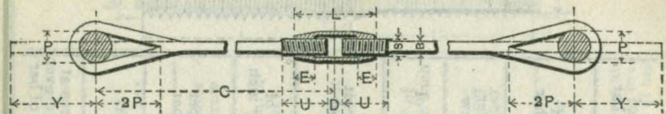
$$Y = 3.7\,[P + B] + 1$$

When $\frac{B}{2} = > 1$

$$Y = 3.7\,[P + B] + \frac{B}{2}$$

COUNTER AND LATERAL RODS.

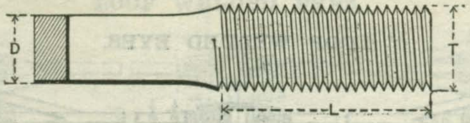
LOOP WELDED EYES.



Additional length of rod beyond center of pin required to make eye for square or round rods

Diameter or side of rod	Diameter of pin in inches										
Ins.	3½	3¾	4	4¼	4½	4¾	5	5¼	5½	5¾	6
½	16	16¾	17¾	18¾	19½	20½	21½	22½	23¼	24¼	25¼
⅝	16½	17¼	18¼	19¼	20	21	22	22¾	23¾	24¾	25¾
¾	16¾	17¾	18¾	19½	20½	21½	22½	23¼	24¼	25¼	26
⅞	17¼	18¼	19¼	20	21	22	22¾	23¾	24¾	25¾	26½
1	17¾	18¾	19½	20½	21½	22½	23¼	24¼	25¼	26	27
1⅛	18¼	19¼	20	21	22	22¾	23¾	24¾	25¾	26½	27½
1¼	18¾	19½	20½	21½	22½	23¼	24¼	25¼	26	27	28
1⅜	19¼	20	21	22	22¾	23¾	24¾	25¾	26½	27½	28½
1½	19½	20½	21½	22½	23¼	24¼	25¼	26	27	28	28¾
1⅝	20	21	22	22¾	23¾	24¾	25¾	26½	27½	28½	29¼
1¾	20½	21½	22½	23¼	24¼	25¼	26	27	28	28¾	29¾
1⅞	21	22	22¾	23¾	24¾	25¾	26½	27½	28½	29¼	30¼
2	21½	22½	23¼	24¼	25¼	26	27	28	28¾	29¾	30¾
2⅛	22	23	23¾	24¾	25¾	26½	27½	28½	29½	30¼	31¼
2¼	22½	23½	24¼	25¼	26¼	27¼	28	29	30	30¾	31¾
2⅜	23	24	25	25¾	26¾	27¾	28½	29½	30½	31¼	32¼
2½	23½	24½	25½	26½	27¼	28¼	29	30	31	32	32¾
2⅝	24	25	26	26¾	27¾	28¾	29¾	30½	31½	32½	33¼
2¾	24½	25½	26½	27½	28¼	29¼	30¼	31	32	33	33¾
2⅞	25¼	26	27	28	28¾	29¾	30¾	31½	32½	33½	34½
3	25¾	26½	27½	28½	29¼	30¼	31¼	32¼	33	34	35
3⅛	26¼	27	28	29	30	30¾	31¾	32¾	33½	34½	35½
3¼	26¾	27¾	28½	29½	30½	31¼	32¼	33¼	34	35	36
3⅜	27¼	28¼	29	30	31	31¾	32¾	33¾	34¾	35½	36½
3½	27¾	28¾	29½	30½	31½	32½	33¼	34¼	35¼	36	37

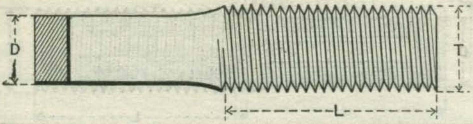
UPSET SCREW ENDS FOR SQUARE BARS.



Side of square bar D	Area of body of bar	Diameter of screw T	Length of upset L	Area at root of thread	Number of threads per inch	Weight per foot of bar	Add for upset	Excess of area at root of thread over that of body of bar
Ins.	Sq. ins.	Ins.	Ins.	Sq. ins.		Lbs.	Ins.	Per ct.
½	.250	¾	4¼	.302	10	.850	4	21
9/16	.316	⅞	4½	.420	9	1.076	5	33
⅝	.391	1	4½	.550	8	1.328	5¾	41
11/16	.473	1	4½	.550	8	1.607	3¾	17
¾	.563	1⅛	4¾	.694	7	1.913	4½	23
13/16	.660	1¼	4¾	.893	7	2.245	5	35
⅞	.766	1⅜	5	1.057	6	2.603	5¾	38
15/16	.879	1⅜	5	1.057	6	2.989	4¼	20
1	1.000	1½	5	1.295	6	3.400	4¾	29
1 1/16	1.129	1⅝	5¼	1.515	5½	3.838	5½	34
1⅛	1.266	1⅝	5¼	1.515	5½	4.303	4¼	20
1 3/16	1.410	1¾	5¼	1.744	5	4.795	4¾	24
1¼	1.563	1⅞	5½	2.048	5	5.312	5¼	31
1 5/16	1.723	1⅞	5½	2.048	5	5.851	4¼	19
1⅜	1.891	2	5½	2.302	4½	6.428	4½	22
1 7/16	2.066	2⅛	5¾	2.650	4½	7.026	5¼	28
1½	2.250	2⅛	5¾	2.650	4½	7.650	4¼	18
1 9/16	2.441	2¼	5¾	3.023	4½	8.300	4½	24
1⅝	2.641	2⅜	6	3.419	4½	8.978	5	30
1 11/16	2.848	2⅜	6	3.419	4½	9.682	4¼	20
1¾	3.063	2½	6	3.715	4	10.410	4½	21
1 13/16	3.285	2⅝	6¼	4.155	4	11.170	5	26
1⅞	3.516	2⅝	6¼	4.155	4	11.950	4¼	18
1 15/16	3.754	2¾	6¼	4.619	4	12.760	4½	23

Lengths of upset ends above are best adapted for use with turnbuckles of standard length, six inches between heads, as shown on page 350 and with clevises shown on page 349. Lengths of upset ends for use with ordinary right and left nuts, shown on page 351, may be one inch shorter than above.

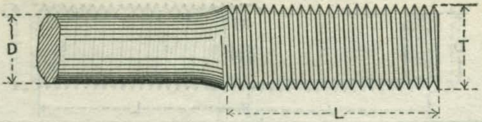
UPSET SCREW ENDS FOR SQUARE BARS.



Side of square bar D	Area of body of bar	Diameter of screw T	Length of upset L	Area at root of thread	Number of threads per inch	Weight per foot of bar	Add for upset	Excess of area at root of thread over that of body of bar
Ins.	Sq. ins.	Ins.	Ins.	Sq. ins.		Lbs.	Ins.	Per ct.
2	4.000	2 7/8	6 1/2	5.108	4	13.60	5	28
2 1/16	4.254	2 7/8	6 1/2	5.108	4	14.46	4 1/4	20
2 1/8	4.516	3	6 1/2	5.428	3 1/2	15.35	4 1/2	20
2 3/16	4.785	3 1/8	6 3/4	5.957	3 1/2	16.27	5	24
2 1/4	5.063	3 1/8	6 3/4	5.957	3 1/2	17.22	4 1/4	18
2 5/16	5.348	3 1/4	6 3/4	6.510	3 1/2	18.19	4 3/4	22
2 3/8	5.641	3 3/8	7	7.087	3 1/2	19.18	5 1/4	26
2 7/16	5.941	3 3/8	7	7.087	3 1/2	20.20	4 1/2	19
2 1/2	6.250	3 1/2	7	7.548	3 1/4	21.25	4 3/4	21
2 9/16	6.566	3 5/8	7 1/4	8.171	3 1/4	22.33	5 1/4	24
2 5/8	6.891	3 5/8	7 1/4	8.171	3 1/4	23.43	4 1/2	19
2 11/16	7.223	3 3/4	7 1/4	8.641	3	24.56	4 3/4	20
2 3/4	7.563	3 7/8	7 1/2	9.305	3	25.71	5 1/4	23
2 13/16	7.910	3 7/8	7 1/2	9.305	3	26.90	4 1/2	18
2 7/8	8.266	4	7 1/2	9.993	3	28.10	4 3/4	21
2 15/16	8.269	4 1/8	7 1/2	10.706	3	29.34	5	24
3	9.000	4 1/8	7 3/4	10.706	3	30.60	4 1/2	19
3 1/8	9.766	4 3/8	8	12.087	2 7/8	33.20	5 1/4	24
3 1/4	10.563	4 1/2	8	12.743	2 3/4	35.92	5	21
3 3/8	11.391	4 5/8	8 1/4	13.544	2 3/4	38.73	5	19
3 1/2	12.250	4 7/8	8 1/2	15.068	2 5/8	41.65	5 1/2	23
3 5/8	13.141	5	8 1/2	15.763	2 1/2	44.68	5 1/4	20
3 3/4	14.063	5 1/8	8 3/4	16.658	2 1/2	47.82	5	18
3 7/8	15.016	5 1/4	8 3/4	17.572	2 1/2	51.05	4 3/4	17
4	16.000	5 1/2	9	19.267	2 3/8	54.40	5 1/4	20

Lengths of upset ends above are best adapted for use with turnbuckles of standard length, six inches between heads, as shown on page 350 and with clevises shown on page 349. Lengths of upset ends for use with ordinary right and left nuts, shown on page 351, may be one inch shorter than above.

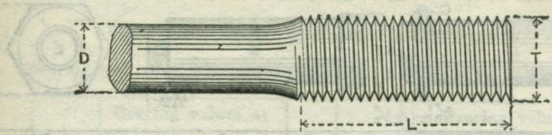
UPSET SCREW ENDS FOR ROUND BARS.



Diameter square bar D	Area of body of bar	Diameter of screw T	Length of upset L	Area at root of thread	Number of threads per inch	Weight per foot of bar	Add for upset	Excess of area at root of thread over that of body of bar
Ins.	Sq. ins.	Ins.	Ins.	Sq. ins.		Lbs.	Ins.	Per ct.
½	.196	¾	4¼	.302	10	.668	6½	54
9/16	.249	¾	4¼	.302	10	.845	4¼	21
⅝	.307	⅞	4½	.420	9	1.043	5½	37
11/16	.371	1	4½	.550	8	1.262	6¼	48
¾	.442	1	4½	.550	8	1.502	4½	25
13/16	.519	1⅛	4¾	.694	7	1.763	5½	34
⅞	.601	1¼	4¾	.893	7	2.044	6¼	49
15/16	.690	1¼	4¾	.893	7	2.347	4½	29
1	.785	1⅜	5	1.057	6	2.670	5¼	35
1 1/16	.887	1⅜	5	1.057	6	3.014	4¼	19
1⅛	.994	1½	5	1.295	6	3.379	4¾	30
1 3/16	1.108	1½	5	1.295	6	3.766	3¾	17
1¼	1.227	1⅝	5¼	1.515	5½	4.173	4½	23
1 5/16	1.353	1¾	5¼	1.744	5	4.600	5	29
1⅜	1.485	1¾	5¼	1.744	5	5.049	4	18
1 7/16	1.623	1⅞	5½	2.048	5	5.518	4¾	26
1½	1.767	2	5½	2.302	4½	6.008	5¼	30
1 9/16	1.918	2	5½	2.302	4½	6.520	4½	20
1⅝	2.074	2⅛	5¾	2.650	4½	7.051	5	28
1 11/16	2.237	2⅛	5¾	2.650	4½	7.604	4¼	18
1¾	2.405	2¼	5¾	3.023	4½	8.178	4¾	26
1 13/16	2.580	2¼	5¾	3.023	4½	8.773	4	17
1⅞	2.761	2⅜	6	3.419	4½	9.388	4½	24
1 15/16	2.948	2½	6	3.715	4	10.020	5	26

Lengths of upset ends above are best adapted for use with turnbuckles of standard length, six inches between heads, as shown on page 350 and with clevises shown on page 349. Lengths of upset ends for use with ordinary right and left nuts, shown on page 351, may be one inch shorter than above.

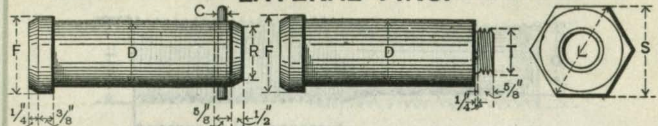
UPSET SCREW ENDS FOR ROUND BARS.



Diameter of bar D	Area of body of bar	Diameter of screw T	Length of upset L	Area at root of thread	Number of threads per inch	Weight per foot of bar	Add for upset	Excess of area at root of thread over that of body of bar
Ins.	Sq. ins.	Ins.	Ins.	Sq. ins.		Lbs.	Ins.	Per ct.
2	3.142	2½	6	3.715	4	10.68	4¼	18
2 1/16	3.341	2⅝	6¼	4.155	4	11.36	4¾	24
2⅛	3.547	2⅝	6¼	4.155	4	12.06	4	17
2 3/16	3.758	2¾	6¼	4.619	4	12.78	4½	23
2¼	3.976	2⅞	6½	5.108	4	13.52	5¼	28
2 5/16	4.200	2⅞	6½	5.108	4	14.28	4½	22
2⅜	4.430	3	6½	5.428	3½	15.07	4¾	23
2 7/16	4.666	3⅛	6¾	5.957	3½	15.86	5½	28
2½	4.909	3⅛	6¾	5.957	3½	16.69	4¾	21
2 9/16	5.157	3¼	6¾	6.510	3½	17.53	5¼	26
2⅝	5.412	3¼	6¾	6.510	3½	18.40	4½	20
2 11/16	5.673	3⅜	7	7.087	3½	19.29	5	25
2¾	5.940	3⅜	7	7.087	3½	20.20	4½	19
2 13/16	6.213	3½	7	7.548	3¼	21.12	4¾	22
2⅞	6.492	3⅝	7¼	8.171	3¼	22.07	5¼	26
2 15/16	6.777	3⅝	7¼	8.171	3¼	23.04	4¾	21
3	7.069	3¾	7¼	8.641	3	24.03	5	22
3⅛	7.670	3⅞	7½	9.305	3	26.08	5¼	21
3¼	8.296	4	7½	9.993	3	28.20	4¾	20
3⅜	8.946	4⅛	7¾	10.706	3	30.42	4¾	20
3½	9.621	4¼	8	11.329	2⅞	32.71	4½	18
3⅝	10.321	4½	8	12.743	2¾	35.09	5¼	23
3¾	11.045	4⅝	8¼	13.544	2¾	37.56	5¼	23
3⅞	11.793	4¾	8½	14.220	2⅝	40.10	5	21
4	12.566	5	8½	15.763	2½	42.73	5¼	25

Lengths of upset ends above are best adapted for use with turnbuckles of standard length, six inches between heads, as shown on page 350 and with clevises shown on page 349. Lengths of upset ends for use with ordinary right and left nuts, shown on page 351, may be one inch shorter than above.

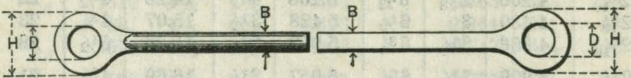
LATERAL PINS.



Rough diam. of pin F	Nominal diam. of pin	Finished diam. of pin D	Reduced point R	Short diam. of nut S	Long diam. of nut L	Diam. of thread T	Diam. of cotter pin C
Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
1½	1¼	1 3/16	1	1⅝	1⅞	1	5/16
1¾	1½	1 7/16	1¼	2	2 5/16	1¼	5/16
2	1¾	1 11/16	1½	2½	2⅞	1½	5/16
2¼	2	1 15/16	1¾	2½	2⅞	1½	5/16
2½	2¼	2 3/16	2	2½	2⅞	1½	⅜
2¾	2½	2 7/16	2¼	3½	4 1/16	2	⅜
3	2¾	2 11/16	2½	3½	4 1/16	2	⅜
3¼	3	2 15/16	2¾	3½	4 1/16	2	⅜
3½	3¼	3 3/16	3	4½	5 3/16	2½	⅜
3¾	3½	3 7/16	3¼	4½	5 3/16	2½	⅜
4	3¾	3 11/16	3½	4½	5 3/16	2½	⅜

COUNTER AND LATERAL RODS.

SOLID OR UPSET EYES



Round Bars				Square Bars			
Diam. of bar B	Diam. of largest head H	Diam. of largest pin D	Add for one head	Side of Sq. bar B	Diam. of largest head H	Diam. of largest pin D	Add for one head
Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
⅞	2¼	1¼	9	1	4¼	2½	16
1	4¼	2½	18	1⅛	4¼	2½	14
1⅛	4¼	2½	16	1¼	5	2¾	18½
1¼	5	2¾	20½	1⅜	5	2¾	16½
1⅜	5	2¾	18½	1½	5½	3	18
1½	5½	3	20	1⅝	5½	3	16½
1⅝	5½	3	18½	1¾	6	3¼	18
1¾	6	3¼	21	1⅞	6	3¼	16½
1⅞	6	3¼	19½	2	6½	3½	18½
2	6½	3½	21½	2⅛	6½	3½	17
2⅛	6½	3½	20	2¼	7½	4	21½
2¼	7½	4	24½	2⅜	7½	4	19¾
2⅜	7½	4	22¾	2½	8	4	22½
2½	8	4	25½	2⅝	8	4	21
2⅝	8	4	24	2¾	8	4	19½
2¾	8	4	22½	1⅛	5¼	3 3/16	23
...	...	...	....	1¼	5½	3 3/16	23
...	...	...	....	1⅜	5¾	3 3/16	20
...	...	...	....	1½	6	3 3/16	20
...	...	...	....	⅞	3½	2¼	....
...	...	...	....	1 3/16	4½	2½	18

BEARING VALUES OF PIN PLATES.

FOR ONE INCH THICKNESS OF PLATE

Bearing value = Diameter of pin × 1″ × stress per square inch

Dia. of pin	Area of pin	Bearing values at 12000 lbs. per sq. in.	13500 lbs. per sq. in.	15000 lbs. per sq. in.	Dia. of pin	Area of pin	Bearing values at 12000 lbs. per sq. in.	13500 lbs. per sq. in.	15000 lbs. per sq. in.
Ins.	Sq. ins.	Lbs.	Lbs.	Lbs.	Ins.	Sq. ins.	Lbs.	Lbs.	Lbs.
1	.785	12000	13500	15000	4½	15.90	54000	60750	67500
1⅛	.994	13500	15190	16880	4⅝	16.80	55500	62440	69380
1¼	1.227	15000	16880	18750	4¾	17.72	57000	64130	71250
1⅜	1.485	16500	18560	20630	4⅞	18.67	58500	65810	73130
1½	1.767	18000	20250	22500	5	19.64	60000	67500	75000
1⅝	2.074	19500	21940	24380	5⅛	20.63	61500	69190	76880
1¾	2.405	21000	23630	26250	5¼	21.65	63000	70880	78750
1⅞	2.761	22500	25310	28130	5⅜	22.69	64500	72560	80630
2	3.142	24000	27000	30000	5½	23.76	66000	74250	82500
2⅛	3.547	25500	28690	31880	5⅝	24.85	67500	75940	84380
2¼	3.976	27000	30380	33750	5¾	25.97	69000	77630	86250
2⅜	4.430	28500	32060	35630	5⅞	27.11	70500	79310	88130
2½	4.909	30000	33750	37500	6	28.27	72000	81000	90000
2⅝	5.412	31500	35440	39380	6⅛	29.46	73500	82690	91880
2¾	5.940	33000	37130	41250	6¼	30.68	75000	84380	93750
2⅞	6.492	34500	38810	43130	6⅜	31.92	76500	86060	95630
3	7.069	36000	40500	45000	6½	33.18	78000	87750	97500
3⅛	7.670	37500	42190	46880	6⅝	34.47	79500	89440	99380
3¼	8.296	39000	43880	48750	6¾	35.79	81000	91130	101250
3⅜	8.946	40500	45560	50630	6⅞	37.12	82500	92810	103130
3½	9.621	42000	47250	52500	7	38.48	84000	94500	105000
3⅝	10.32	43500	48940	54380	7½	44.18	90000	101250	112500
3¾	11.05	45000	50630	56250	8	50.27	96000	108000	120000
3⅞	11.79	46500	52310	58130	8½	56.75	102000	114750	127500
4	12.57	48000	54000	60000	9	63.62	108000	121500	135000
4⅛	13.36	49500	55690	61880	10	78.54	120000	135000	150000
4¼	14.19	51000	57380	63750	11	95.03	132000	148500	165000
4⅜	15.03	52500	59060	65360	12	113.10	144000	162000	180000

MAXIMUM BENDING MOMENTS ON PINS WITH EXTREME FIBRE STRESSES.

Varying from 15,000 to 25,000 pounds per square inch.

Diameter of pin in inches	Area of pin in sq. inches	Moments in inch-pounds for fibre stresses of				
		15000 lbs. per sq. inch	18000 lbs. per sq. inch	20000 lbs. per sq. inch	22500 lbs. per sq. inch	25000 lbs. per sq. inch
1	.785	1470	1770	1960	2210	2450
1⅛	.994	2100	2520	2800	3150	3490
1¼	1.227	2900	3450	3830	4310	4790
1⅜	1.485	3830	4590	5100	5740	6380
1½	1.767	4970	5960	6630	7460	8280
1⅝	2.074	6320	7580	8430	9480	10530
1¾	2.405	7890	9470	10520	11840	13150
1⅞	2.761	9710	11650	12940	14560	16180
2	3.142	11780	14140	15710	17670	19630
2⅛	3.547	14130	16960	18840	21200	23550
2¼	3.976	16770	20130	22370	25160	27960
2⅜	4.430	19730	23670	26300	29590	32880
2½	4.909	23010	27610	30680	34510	38350
2⅝	5.412	26640	31960	35520	39960	44400
2¾	5.940	30630	36750	40830	45940	51040
2⅞	6.492	34990	41990	46660	52490	58320
3	7.069	39730	47680	52970	59600	66200
3⅛	7.670	44940	53930	59920	67410	74900
3¼	8.296	50550	60660	67400	75830	84250
3⅜	8.946	56610	67940	75480	84920	94350
3½	9.621	63140	75770	84180	94710	105230
3⅝	10.321	70150	84180	93530	105220	116910
3¾	11.045	77660	93190	103540	116490	129430
3⅞	11.793	85690	102820	114250	128530	142810
4	12.566	94250	113100	125660	141370	157080
4⅛	13.364	103360	124040	137820	155040	172270
4¼	14.186	113050	135660	150730	169570	188410
4⅜	15.033	123320	147980	164420	184980	205530
4½	15.904	134190	161030	178920	201290	223650
4⅝	16.800	145690	174830	194250	218510	242810
4¾	17.721	157820	189390	210430	236740	263040
4⅞	18.665	170580	204740	227490	255920	284360
5	19.635	184080	220890	245440	276120	306800
5⅛	20.629	198230	237880	264310	297350	330390
5¼	21.648	213090	255710	284120	319640	355160
5⅜	22.691	228680	274420	304910	343020	381130
5½	23.758	245010	294010	326680	367510	408350
5⅝	24.850	262100	314510	349460	393140	436830
5¾	25.967	279960	335950	373280	419940	466600
5⅞	27.109	298620	358340	398160	447930	497700

MAXIMUM BENDING MOMENTS ON PINS WITH EXTREME FIBRE STRESSES.

Varying from 15,000 to 25,000 pounds per square inch.

Diameter of pin in inches	Area of pin in sq. inches	Moments in inch-pounds for fibre stresses of				
		15000 lbs. per sq. inch	18000 lbs. per sq. inch	20000 lbs. per sq. inch	22500 lbs. per sq. inch	25000 lbs. per sq. inch
6	28.274	318090	381700	424120	477130	530140
6⅛	29.465	338380	406060	451180	507580	563970
6¼	30.680	359530	431430	479370	539290	599210
6⅜	31.919	381530	457840	508710	572300	635890
6½	33.183	404420	485400	539230	606630	674030
6⅝	34.472	428200	513840	570940	642300	713670
6¾	35.785	452900	543480	603870	679350	754830
6⅞	37.122	478530	574240	638040	717800	797550
7	38.485	505110	606130	673480	757660	841850
7⅛	39.871	532650	639190	710210	798980	887760
7¼	41.282	561180	673420	748250	841780	935310
7⅜	42.718	590710	708860	787620	886070	984520
7½	44.179	621260	745510	828350	931890	1035440
7⅝	45.664	652850	783410	870460	979270	1088080
7¾	47.173	685480	822580	913980	1028220	1142470
7⅞	48.707	719190	863030	958920	1078780	1198650
8	50.265	753980	904780	1005310	1130970	1256640
8⅛	51.849	789880	947860	1053170	1184820	1316470
8¼	53.456	826900	992280	1102530	1240350	1378170
8⅜	55.088	865060	1038070	1153410	1297590	1441760
8½	56.745	904370	1085250	1205830	1356560	1507290
8⅝	58.426	944860	1133830	1259820	1417290	1574770
8¾	60.132	986540	1183850	1315390	1479810	1644240
8⅞	61.862	1029430	1235310	1372570	1544140	1715710
9	63.617	1073540	1288250	1431390	1610310	1789240
9⅛	65.397	1118900	1342680	1491860	1678340	1864830
9¼	67.201	1165510	1398610	1554010	1748270	1942520
9⅜	69.029	1213400	1456080	1617870	1820100	2022340
9½	70.882	1262590	1515110	1683450	1893880	2104310
9⅝	72.760	1313090	1575700	1750780	1969630	2188480
9¾	74.662	1364910	1637900	1819880	2047370	2274850
9⅞	76.590	1418090	1701700	1890780	2127130	2363480
10	78.540	1472620	1767150	1963500	2208930	2454370
10¼	82.516	1585850	1903020	2114470	2378780	2643090
10½	86.590	1704740	2045690	2272990	2557120	2841240
10¾	90.763	1829430	2195320	2439250	2744150	3049060
11	95.033	1960060	2352070	2613410	2940090	3266770
11¼	99.402	2096760	2516110	2795680	3145140	3494600
11½	103.869	2239670	2687610	2986230	3359510	3732790
12	113.098	2544690	3053630	3392920	3817040	4241150

GAUGES

United States Standard Gauge				Birmingham Gauge		
Number of gauge	Approximate thickness in fractions of an inch*	Approximate thickness in decimal parts of an inch	Weight per square foot in pounds avoirdupois steel	Number of gauge	Approximate thickness in decimal parts of an inch	Weight per square foot in pounds avoirdupois, steel
0000000	1/2	.5	20.4	7°	....	....
000000	15/32	.46875	19.125	6°	....	....
00000	7/16	.4375	17.85	5°	....	....
0000	13/32	.40625	16.575	4°	.454	18.5232
000	3/8	.375	15.3	3°	.425	17.3400
00	11/32	.34375	14.025	2°	.380	15.5040
0	5/16	.3125	12.75	0°	.340	13.8720
1	9/32	.28125	11.475	1	.300	12.2400
2	17/64	.265625	10.8375	2	.284	11.5872
3	1/4	.25	10.2	3	.259	10.5672
4	15/64	.234375	9.5625	4	.238	9.7104
5	7/32	.21875	8.925	5	.220	8.9760
6	13/64	.203125	8.2875	6	.203	8.2824
7	3/16	.1875	7.65	7	.180	7.3440
8	11/64	.171875	7.0125	8	.165	6.7320
9	5/32	.15625	6.375	9	.148	6.0384
10	9/64	.140625	5.7375	10	.134	5.4672
11	1/8	.125	5.1	11	.120	4.8960
12	7/64	.109375	4.4625	12	.109	4.4472
13	3/32	.09375	3.825	13	.095	3.8760
14	5/64	.078125	3.1875	14	.083	3.3864
15	9/128	.0703125	2.86875	15	.072	2.9376
16	1/16	.0625	2.55	16	.065	2.6520
17	9/160	.05625	2.295	17	.058	2.3664
18	1/20	.05	2.04	18	.049	1.9992
19	7/160	.04375	1.785	19	.042	1.7136
20	3/80	.0375	1.53	20	.035	1.4280
21	11/320	.034375	1.4025	21	.032	1.3056
22	1/32	.03125	1.275	22	.028	1.1424
23	9/320	.028125	1.1475	23	.025	1.0200
24	1/40	.025	1.02	24	.022	.8976
25	7/320	.021875	.8925	25	.020	.8160
26	3/160	.01875	.765	26	.018	.7344
27	11/640	.0171875	.70125	27	.016	.6528
28	1/64	.015625	.6375	28	.014	.5712
29	9/640	.0140625	.57375	29	.013	.5304
30	1/80	.0125	.51	30	.012	.4896
31	7/640	.0109375	.44625	31	.010	.4080
32	13/1280	.01015625	.414375	32	.009	.3672
33	3/320	.009375	.3825	33	.008	.3264
34	11/1280	.00859375	.350625	34	.007	.2856
35	5/640	.0078125	.31875	35	.005	.2040
36	9/1280	.00703125	.286875	36	.004	.1632
37	17/2560	.006640625	.2709375	....	....	....
38	1/150	.00625	.255	....	....	....

WEIGHT OF SHEETS OF WROUGHT IRON, STEEL, COPPER AND BRASS.

(From Haswell)

Weights per square foot. Thickness by Birmingham Gauge

No. of gauge	Thickness in inches	Iron	Steel	Copper	Brass
0000	.454	18.22	18.46	20.57	19.43
000	.425	17.05	17.28	19.25	18.19
00	.38	15.25	15.45	17.21	16.26
0	.34	13.64	13.82	15.40	14.55
1	.3	12.04	12.20	13.59	12.84
2	.284	11.40	11.55	12.87	12.16
3	.259	10.39	10.53	11.73	11.09
4	.238	9.55	9.68	10.78	10.19
5	.22	8.83	8.95	9.97	9.42
6	.203	8.15	8.25	9.20	8.69
7	.18	7.22	7.32	8.15	7.70
8	.165	6.62	6.71	7.47	7.06
9	.148	5.94	6.02	6.70	6.33
10	.134	5.38	5.45	6.07	5.74
11	.12	4.82	4.88	5.44	5.14
12	.109	4.37	4.43	4.94	4.67
13	.095	3.81	3.86	4.30	4.07
14	.083	3.33	3.37	3.76	3.55
15	.072	2.89	2.93	3.26	3.08
16	.065	2.61	2.64	2.94	2.78
17	.058	2.33	2.36	2.63	2.48
18	.049	1.97	1.99	2.22	2.10
19	.042	1.69	1.71	1.90	1.80
20	.035	1.40	1.42	1.59	1.50
21	.032	1.28	1.30	1.45	1.37
22	.028	1.12	1.14	1.27	1.20
23	.025	1.00	1.02	1.13	1.07
24	.022	.883	.895	1.00	.942
25	.02	.803	.813	.906	.856
26	.018	.722	.732	.815	.770
27	.016	.642	.651	.725	.685
28	.014	.562	.569	.634	.599
29	.013	.522	.529	.589	.556
30	.012	.482	.488	.544	.514
31	.01	.401	.407	.453	.428
32	.009	.361	.366	.408	.385
33	.008	.321	.325	.362	.342
34	.007	.281	.285	.317	.300
35	.005	.201	.203	.227	.214
Specific gravity.		7.704	7.806	8.698	8.218
Weight cubic foot		481.75	487.75	543.6	513.6
Weight cubic inch		.2787	.2823	.3146	.2972

WEIGHT OF SHEETS OF WROUGHT IRON, STEEL, COPPER AND BRASS.

(From Haswell)

Weights per square foot. Thickness by American (Browne & Sharpe's) Gauge

No. of gauge	Thickness in inches	Iron	Steel	Copper	Brass
0000	.46	18.46	18.70	20.84	19.69
000	.4096	16.44	16.66	18.56	17.53
00	.3648	14.64	14.83	16.53	15.61
0	.3249	13.04	13.21	14.72	13.90
1	.2893	11.61	11.76	13.11	12.38
2	.2576	10.34	10.48	11.67	11.03
3	.2294	9.21	9.33	10.39	9.82
4	.2043	8.20	8.31	9.26	8.74
5	.1819	7.30	7.40	8.24	7.79
6	.1620	6.50	6.59	7.34	6.93
7	.1443	5.79	5.87	6.54	6.18
8	.1285	5.16	5.22	5.82	5.50
9	.1144	4.59	4.65	5.18	4.90
10	.1019	4.09	4.14	4.62	4.36
11	.0907	3.64	3.69	4.11	3.88
12	.0808	3.24	3.29	3.66	3.46
13	.0720	2.89	2.93	3.26	3.08
14	.0641	2.57	2.61	2.90	2.74
15	.0571	2.29	2.32	2.59	2.44
16	.0508	2.04	2.07	2.30	2.18
17	.0453	1.82	1.84	2.05	1.94
18	.0403	1.62	1.64	1.83	1.73
19	.0359	1.44	1.46	1.63	1.54
20	.0320	1.28	1.30	1.45	1.37
21	.0285	1.14	1.16	1.29	1.22
22	.0253	1.02	1.03	1.15	1.08
23	.0226	.906	.918	1.02	.966
24	.0201	.807	.817	.911	.860
25	.0179	.718	.728	.811	.766
26	.0159	.640	.648	.722	.682
27	.0142	.570	.577	.643	.608
28	.0126	.507	.514	.573	.541
29	.0113	.452	.458	.510	.482
30	.0100	.402	.408	.454	.429
31	.0089	.358	.363	.404	.382
32	.0080	.319	.323	.360	.340
33	.0071	.284	.288	.321	.303
34	.0063	.253	.256	.286	.270
35	.0056	.225	.228	.254	.240

TABLE OF RIVET SPACING.

1 1/16″ to 1 9/16″

No. of spaces	Distance between rivets: 1 1/16″	1 1/8″	1 3/16″	1 1/4″	1 5/16″	1 3/8″	1 7/16″	1 1/2″	1 9/16″
2	2 1/8″	2 1/4″	2 3/8″	2 1/2″	2 5/8″	2 3/4″	2 7/8″	3″	3 1/8″
3	3 3/16″	3 3/8″	3 9/16″	3 3/4″	3 15/16″	4 1/8″	4 5/16″	4 1/2″	4 11/16″
4	4 1/4″	4 1/2″	4 3/4″	5″	5 1/4″	5 1/2″	5 3/4″	6″	6 1/4″
5	5 5/16″	5 5/8″	5 15/16″	6 1/4″	6 9/16″	6 7/8″	7 3/16″	7 1/2″	7 13/16″
6	6 3/8″	6 3/4″	7 1/8″	7 1/2″	7 7/8″	8 1/4″	8 5/8″	9″	9 3/8″
7	7 7/16″	7 7/8″	8 5/16″	8 3/4″	9 3/16″	9 5/8″	10 1/16″	10 1/2″	10 15/16″
8	8 1/2″	9″	9 1/2″	10″	10 1/2″	11″	11 1/2″	1′- 0″	1′- 0 1/2″
9	9 9/16″	10 1/8″	10 11/16″	11 1/4″	11 13/16″	1′- 0 3/8″	1′- 0 15/16″	1′- 1 1/2″	1′- 2 1/16″
10	10 5/8″	11 1/4″	11 7/8″	1′- 0 1/2″	1′- 1 1/8″	1′- 1 3/4″	1′- 2 3/8″	1′- 3″	1′- 3 5/8″
11	11 11/16″	1′- 0 3/8″	1′- 1 1/16″	1′- 1 3/4″	1′- 2 7/16″	1′- 3 1/8″	1′- 3 13/16″	1′- 4 1/2″	1′- 5 3/16″
12	1′- 0 3/4″	1′- 1 1/2″	1′- 2 1/4″	1′- 3″	1′- 3 3/4″	1′- 4 1/2″	1′- 5 1/4″	1′- 6″	1′- 6 3/4″
13	1′- 1 13/16″	1′- 2 5/8″	1′- 3 7/16″	1′- 4 1/4″	1′- 5 1/16″	1′- 5 7/8″	1′- 6 11/16″	1′- 7 1/2″	1′- 8 5/16″
14	1′- 2 7/8″	1′- 3 3/4″	1′- 4 5/8″	1′- 5 1/2″	1′- 6 3/8″	1′- 7 1/4″	1′- 8 1/8″	1′- 9″	1′- 9 7/8″
15	1′- 3 15/16″	1′- 4 7/8″	1′- 5 13/16″	1′- 6 3/4″	1′- 7 11/16″	1′- 8 5/8″	1′- 9 9/16″	1′-10 1/2″	1′-11 7/16″
16	1′- 5″	1′- 6″	1′- 7″	1′- 8″	1′- 9″	1′-10″	1′-11″	2′- 0″	2′- 1″
17	1′- 6 1/16″	1′- 7 1/8″	1′- 8 3/16″	1′- 9 1/4″	1′-10 5/16″	1′-11 3/8″	2′- 0 7/16″	2′- 1 1/2″	2′- 2 9/16″
18	1′- 7 1/8″	1′- 8 1/4″	1′- 9 3/8″	1′-10 1/2″	1′-11 5/8″	2′- 0 3/4″	2′- 1 7/8″	2′- 3″	2′- 4 1/8″
19	1′- 8 3/16″	1′- 9 3/8″	1′-10 9/16″	1′-11 3/4″	2′- 0 15/16″	2′- 2 1/8″	2′- 3 5/16″	2′- 4 1/2″	2′- 5 11/16″
20	1′- 9 1/4″	1′-10 1/2″	1′-11 3/4″	2′- 1″	2′- 2 1/4″	2′- 3 1/2″	2′- 4 3/4″	2′- 6″	2′- 7 1/4″
21	1′-10 5/16″	1′-11 5/8″	2′- 0 15/16″	2′- 2 1/4″	2′- 3 9/16″	2′- 4 7/8″	2′- 6 3/16″	2′- 7 1/2″	2′- 8 13/16″
22	1′-11 3/8″	2′- 0 3/4″	2′- 2 1/8″	2′- 3 1/2″	2′- 4 7/8″	2′- 6 1/4″	2′- 7 5/8″	2′- 9″	2′-10 3/8″
23	2′- 0 7/16″	2′- 1 7/8″	2′- 3 5/16″	2′- 4 3/4″	2′- 6 3/16″	2′- 7 5/8″	2′- 9 1/16″	2′-10 1/2″	2′-11 15/16″
24	2′- 1 1/2″	2′- 3″	2′- 4 1/2″	2′- 6″	2′- 7 1/2″	2′- 9″	2′-10 1/2″	3′- 0″	3′- 1 1/2″
25	2′- 2 9/16″	2′- 4 1/8″	2′- 5 11/16″	2′- 7 1/4″	2′- 8 13/16″	2′-10 3/8″	2′-11 15/16″	3′- 1 1/2″	3′- 3 1/16″
26	2′- 3 5/8″	2′- 5 1/4″	2′- 6 7/8″	2′- 8 1/2″	2′-10 1/8″	2′-11 3/4″	3′- 1 3/8″	3′- 3″	3′- 4 5/8″
27	2′- 4 11/16″	2′- 6 3/8″	2′- 8 1/16″	2′- 9 3/4″	2′-11 7/16″	3′- 1 1/8″	3′- 2 13/16	3′- 4 1/2″	3′- 6 3/16″
28	2′- 5 3/4″	2′- 7 1/2″	2′- 9 1/4″	2′-11″	3′- 0 3/4″	3′- 2 1/2″	3′- 4 1/4″	3′- 6″	3′- 7 3/4″
29	2′- 6 13/16″	2′- 8 5/8″	2′-10 7/16″	3′- 0 1/4″	3′- 2 1/16″	3′- 3 7/8″	3′- 5 11/16″	3′- 7 1/2″	3′- 9 5/16″
30	2′- 7 7/8″	2′- 9 3/4″	2′-11 5/8″	3′- 1 1/2″	3′- 3 3/8″	3′- 5 1/4″	3′- 7 1/8″	3′- 9″	3′-10 7/8″

TABLE OF RIVET SPACING.

1⅝" to 2⅛"

No. of spaces	Distance between rivets								
	1⅝"	1 11/16"	1¾"	1 13/16"	1⅞"	1 15/16"	2"	2 1/16"	2⅛"
2	3¼"	3⅜"	3½"	3⅝"	3¾"	3⅞"	4"	4⅛"	4¼"
3	4⅞"	5 1/16"	5¼"	5 7/16"	5⅝"	5 13/16"	6"	6 3/16"	6⅜"
4	6½"	6¾"	7"	7¼"	7½"	7¾"	8"	8¼"	8½"
5	8⅛"	8 7/16"	8¾"	9 1/16"	9⅜"	9 11/16"	10"	10 5/16"	10⅝"
6	9¾"	10⅛"	10½"	10⅞"	11¼"	11⅝"	1'- 0"	1'- 0⅜"	1'- 0¾"
7	11⅜"	11 13/16"	1'- 0¼"	1'- 0 11/16"	1'- 1⅛"	1'- 1 9/16"	1'- 2"	1'- 2 7/16"	1'- 2⅞"
8	1'- 1"	1'- 1½"	1'- 2"	1'- 2½"	1'- 3"	1'- 3½"	1'- 4"	1'- 4½"	1'- 5"
9	1 - 2⅝"	1'- 3 3/16"	1'- 3¾"	1'- 4 5/16"	1'- 4⅞"	1'- 5 7/16"	1'- 6"	1'- 6 9/16"	1'- 7⅛"
10	1'- 4¼"	1'- 4⅞"	1'- 5½"	1'- 6⅛"	1'- 6¾"	1'- 7⅜"	1'- 8"	1'- 8⅝"	1'- 9¼"
11	1'- 5⅞"	1'- 6 9/16"	1'- 7¼"	1'- 7 15/16"	1'- 8⅝"	1'- 9 5/16"	1'-10"	1'-10 11/16"	1'-11⅜"
12	1'- 7½"	1'- 8¼"	1'- 9"	1'- 9¾"	1'-10½"	1'-11¼"	2'- 0"	2'- 0¾"	2'- 1½"
13	1'- 9⅛"	1'- 9 15/16"	1'-10¾"	1 -11 9/16"	2'- 0⅜"	2'- 1 3/16"	2'- 2"	2'- 2 13/16"	2'- 3⅝"
14	1'-10¾"	1'-11⅝"	2'- 0½"	2'- 1⅜"	2'- 2¼"	2'- 3⅛"	2'- 4"	2'- 4⅞"	2'- 5¾"
15	2'- 0⅜"	2'- 1 5/16"	2'- 2¼"	2'- 3 3/16"	2'- 4⅛"	2'- 5 1/16"	2'- 6"	2'- 6 15/16"	2'- 7⅞"
16	2'- 2"	2'- 3"	2'- 4"	2'- 5"	2'- 6"	2'- 7"	2'- 8"	2'- 9"	2'-10"
17	2'- 3⅝"	2'- 4 11/16"	2'- 5¾"	2'- 6 13/16"	2'- 7⅞"	2'- 8 15/16"	2'-10"	2'-11 1/16"	3'- 0⅛"
18	2'- 5¼"	2'- 6⅜"	2'- 7½"	2'- 8⅝"	2'- 9¾"	2'-10⅞"	3'- 0"	3'- 1⅛"	3'- 2¼"
19	2'- 6⅞"	2'- 8 1/16"	2'- 9¼"	2'-10 7/16"	2'-11⅝"	3'- 0 13/16"	3'- 2"	3'- 3 3/16"	3'- 4⅜"
20	2'- 8½"	2'- 9¾"	2'-11"	3'- 0¼"	3'- 1½"	3'- 2¾"	3'- 4"	3'- 5¼"	3'- 6½"
21	2'-10⅛"	2'-11 7/16"	3'- 0¾"	3'- 2 1/16"	3'- 3⅜"	3'- 4 11/16"	3'- 6"	3'- 7 5/16	3'- 8⅝"
22	2'-11¾"	3'- 1⅛"	3'- 2½"	3'- 3⅞"	3'- 5¼"	3'- 6⅝"	3'- 8"	3'- 9⅜"	3'-10¾"
23	3'- 1⅜"	3'- 2 13/16"	3'- 4¼"	3'- 5 11/16"	3'- 7⅛"	3'- 8 9/16"	3'-10"	3'-11 7/16"	4'- 0⅞"
24	3'- 3"	3'- 4½"	3'- 6"	3'- 7½"	3'- 9"	3'-10½"	4'- 0"	4'- 1½"	4'- 3"
25	3'- 4⅝"	3'- 6 3/16"	3'- 7¾"	3'- 9 5/16"	3'-10⅞"	4'- 0 7/16"	4'- 2"	4'- 3 9/16"	4'- 5⅛"
26	3'- 6¼"	3'- 7⅞"	3'- 9½"	3'-11⅛"	4'- 0¾"	4'- 2⅜"	4'- 4"	4'- 5⅝"	4'- 7¼"
27	3'- 7⅞"	3'- 9 9/16"	3'-11¼"	4'- 0 15/16"	4'- 2⅝"	4'- 4 5/16"	4'- 6"	4'- 7 11/16"	4'- 9⅜"
28	3'- 9½"	3'-11¼"	4'- 1"	4'- 2¾"	4'- 4½"	4'- 6¼"	4'- 8"	4'- 9¾"	4'-11½"
29	3'-11⅛"	4'- 0 15/16"	4'- 2¾"	4'- 4 9/16"	4'- 6⅜"	4'- 8 3/16"	4'-10"	4'-11 13/16"	5'- 1⅝"
30	4'- 0¾"	4'- 2⅝"	4'- 4½"	4'- 6⅜"	4'- 8¼"	4'-10⅛"	5'- 0"	5'- 1⅞"	5'- 3¾"

TABLE OF RIVET SPACING.

2 3/16″ to 2 11/16″

No. of spaces	Distance between rivets								
	2 3/16″	2 1/4″	2 5/16″	2 3/8″	2 7/16″	2 1/2″	2 9/16″	2 5/8″	2 11/16″
2	4 3/8″	4 1/2″	4 5/8″	4 3/4″	4 7/8″	5″	5 1/8″	5 1/4″	5 3/8″
3	6 9/16″	6 3/4″	6 15/16″	7 1/8″	7 5/16″	7 1/2″	7 11/16″	7 7/8″	8 1/16″
4	8 3/4″	9″	9 1/4″	9 1/2″	9 3/4″	10″	10 1/4″	10 1/2″	10 3/4″
5	10 15/16″	11 1/4″	11 9/16″	11 7/8″	1′- 0 3/16″	1′- 0 1/2″	1′- 0 13/16″	1′- 1 1/8″	1′- 1 7/16″
6	1′- 1 1/8″	1′- 1 1/2″	1′- 1 7/8″	1′- 2 1/4″	1′- 2 5/8″	1′- 3″	1′- 3 3/8″	1′- 3 3/4″	1′- 4 1/8″
7	1′- 3 5/16″	1′- 3 3/4″	1′- 4 3/16″	1′- 4 5/8″	1′- 5 1/16″	1′- 5 1/2″	1′- 5 15/16″	1′- 6 3/8″	1′- 6 13/16″
8	1′- 5 1/2″	1′- 6″	1′- 6 1/2″	1′- 7″	1′- 7 1/2″	1′- 8″	1′- 8 1/2″	1′- 9″	1′- 9 1/2″
9	1′- 7 11/16″	1′- 8 1/4″	1′- 8 13/16″	1′- 9 3/8″	1′- 9 15/16″	1′-10 1/2″	1′-11 1/16″	1′-11 5/8″	2′- 0 3/16″
10	1′- 9 7/8″	1′-10 1/2″	1′-11 1/8″	1′-11 3/4″	2′- 0 3/8″	2′- 1″	2′- 1 5/8″	2′- 2 1/4″	2′- 2 7/8″
11	2′- 0 1/16″	2′- 0 3/4″	2′- 1 7/16″	2′- 2 1/8″	2′- 2 13/16″	2′- 3 1/2″	2′- 4 3/16″	2′- 4 7/8″	2′- 5 9/16″
12	2′- 2 1/4″	2′- 3″	2′- 3 3/4″	2′ 4 1/2″	2′- 5 1/4″	2′- 6″	2′ 6 3/4″	2′- 7 1/2″	2′- 8 1/4″
13	2′- 4 7/16″	2′- 5 1/4″	2′- 6 1/16″	2′- 6 7/8″	2′- 7 11/16″	2′- 8 1/2″	2′- 9 5/16″	2′-10 1/8″	2′-10 15/16″
14	2′- 6 5/8″	2′- 7 1/2″	2′- 8 3/8″	2′- 9 1/4″	2′-10 1/8″	2′-11″	2′-11 7/8″	3′- 0 3/4″	3′- 1 5/8″
15	2′- 8 13/16″	2′- 9 3/4″	2′-10 11/16″	2′-11 5/8″	3′- 0 9/16″	3′- 1 1/2″	3′- 2 7/16″	3′- 3 3/8″	3′- 4 5/16″
16	2′-11″	3′- 0″	3′- 1″	3′- 2″	3′- 3″	3′- 4″	3′- 5″	3′- 6″	3′- 7″
17	3′- 1 3/16″	3′- 2 1/4″	3′- 3 5/16″	3′- 4 3/8″	3′- 5 7/16″	3′- 6 1/2″	3′- 7 9/16″	3′- 8 5/8″	3′- 9 11/16″
18	3′ 3 3/8″	3′- 4 1/2″	3′- 5 5/8″	3′- 6 3/4″	3′- 7 7/8″	3′- 9″	3′-10 1/8″	3′-11 1/4″	4′- 0 3/8″
19	3′- 5 9/16″	3′- 6 3/4″	3′- 7 15/16″	3′- 9 1/8″	3′-10 5/16″	3′-11 1/2″	4′- 0 11/16″	4′- 1 7/8″	4′- 3 1/16″
20	3′- 7 3/4″	3′- 9″	3′-10 1/4″	3′-11 1/2″	4′- 0 3/4″	4′- 2″	4′- 3 1/4″	4′- 4 1/2″	4′- 5 3/4″
21	3′- 9 15/16″	3′-11 1/4″	4′- 0 9/16″	4′- 1 7/8″	4′- 3 3/16″	4′- 4 1/2″	4′- 5 13/16″	4′- 7 1/8″	4′- 8 7/16″
22	4′- 0 1/8″	4′- 1 1/2″	4′- 2 7/8″	4′- 4 1/4″	4′- 5 5/8″	4′- 7″	4′- 8 3/8″	4′- 9 3/4″	4′-11 1/8″
23	4′- 2 5/16″	4′- 3 3/4″	4′- 5 3/16″	4′- 6 5/8″	4′- 8 1/16″	4′- 9 1/2″	4′-10 15/16″	5′- 0 3/8″	5′- 1 13/16″
24	4′- 4 1/2″	4′- 6″	4′- 7 1/2″	4′- 9″	4′-10 1/2″	5′- 0″	5′- 1 1/2″	5′- 3″	5′- 4 1/2″
25	4′- 6 11/16″	4′- 8 1/4″	4′- 9 13/16″	4′-11 3/8″	5′- 0 15/16″	5′- 2 1/2″	5′- 4 1/16″	5′- 5 5/8″	5′- 7 3/16″
26	4′- 8 7/8″	4′-10 1/2″	5′- 0 1/8″	5′- 1 3/4″	5′- 3 3/8″	5′- 5″	5′- 6 5/8″	5′- 8 1/4″	5′- 9 7/8″
27	4′-11 1/16″	5′- 0 3/4″	5′- 2 7/16″	5′- 4 1/8″	5′- 5 13/16″	5′- 7 1/2″	5′- 9 3/16″	5′-10 7/8″	6′- 0 9/16″
28	5′- 1 1/4″	5′- 3″	5′- 4 3/4″	5′- 6 1/2″	5′- 8 1/4″	5′-10″	5′-11 3/4″	6′- 1 1/2″	6′- 3 1/4″
29	5′- 3 7/16″	5′- 5 1/4″	5′- 7 1/16″	5′- 8 7/8″	5′-10 11/16″	6′- 0 1/2″	6′- 2 5/16″	6′- 4 1/8″	6′- 5 15/16″
30	5′- 5 5/8″	5′- 7 1/2″	5′- 9 3/8″	5′-11 1/4″	6′- 1 1/8″	6′- 3″	6′- 4 7/8″	6′- 6 3/4″	6′- 8 5/8″

TABLE OF RIVET SPACING.

2¾" to 3¼"

No. of spaces	Distance between rivets								
	2¾"	2 13/16"	2⅞"	2 15/16"	3"	3 1/16"	3⅛"	3 3/16"	3¼"
2	5½"	5⅝"	5¾"	5⅞"	6"	6⅛"	6¼"	6⅜"	6½"
3	8¼"	8 7/16"	8⅝"	8 13/16"	9"	9 3/16"	9⅜"	9 9/16"	9¾"
4	11"	11¼"	11½"	11¾"	1'- 0"	1'- 0¼"	1'- 0½"	1'- 0¾"	1'- 1"
5	1'- 1¾"	1'- 2 1/16"	1'- 2⅜"	1'- 2 11/16"	1'- 3"	1'- 3 5/16"	1'- 3⅝"	1'- 3 15/16"	1'- 4¼"
6	1'- 4½"	1'- 4⅞"	1'- 5¼"	1'- 5⅝"	1'- 6"	1'- 6⅜"	1'- 6¾"	1'- 7⅛"	1'- 7½"
7	1'- 7¼"	1'- 7 11/16"	1'- 8⅛"	1'- 8 9/16"	1'- 9"	1'- 9 7/16"	1'- 9⅞"	1'-10 5/16"	1'-10¾"
8	1'-10"	1'-10½"	1'-11"	1'-11½"	2'- 0"	2'- 0½"	2'- 1"	2'- 1½"	2'- 2"
9	2'- 0¾"	2'- 1 5/16"	2'- 1⅞"	2'- 2 7/16"	2'- 3"	2'- 3 9/16"	2'- 4⅛"	2'- 4 11/16"	2'- 5¼"
10	2'- 3½"	2'- 4⅛"	2'- 4¾"	2'- 5⅜"	2'- 6"	2'- 6⅝"	2'- 7¼"	2'- 7⅞"	2'- 8½"
11	2'- 6¼"	2'- 6 15/16"	2'- 7⅝"	2'- 8 5/16"	2'- 9"	2'- 9 11/16"	2'-10⅜"	2'-11 1/16"	2'-11¾"
12	2'- 9"	2'- 9¾"	2'-10½"	2'-11¼"	3'- 0"	3'- 0¾"	3'- 1½"	3'- 2¼"	3'- 3"
13	2'-11¾"	3'- 0 9/16"	3'- 1⅜"	3'- 2 3/16"	3'- 3"	3'- 3 13/16"	3'- 4⅝"	3'- 5 7/16"	3'- 6¼"
14	3'- 2½"	3'- 3⅜"	3'- 4¼"	3'- 5⅛"	3'- 6"	3'- 6⅞"	3'- 7¾"	3'- 8⅝"	3'- 9½"
15	3'- 5¼"	3'- 6 3/16"	3'- 7⅛"	3'- 8 1/16"	3'- 9"	3'- 9 15/16"	3'-10⅞"	3'-11 13/16"	4'- 0¾"
16	3'- 8"	3'- 9"	3'-10"	3'-11"	4'- 0"	4'- 1"	4'- 2"	4'- 3"	4'- 4"
17	3'-10¾"	3'-11 13/16"	4'- 0⅞"	4'- 1 15/16"	4'- 3"	4'- 4 1/16"	4'- 5⅛"	4'- 6 3/16"	4'- 7¼"
18	4'- 1½"	4'- 2⅝"	4'- 3¾"	4'- 4⅞"	4'- 6"	4'- 7⅛"	4'- 8¼"	4'- 9⅜"	4'-10½"
19	4'- 4¼"	4'- 5 7/16"	4'- 6⅝"	4'- 7 13/16"	4'- 9"	4 -10 3/16"	4'-11⅜"	5'- 0 9/16"	5'- 1¾"
20	4'- 7"	4'- 8¼"	4'- 9½"	4'-10¾"	5'- 0"	5'- 1¼"	5'- 2½"	5'- 3¾"	5'- 5"
21	4' 9¾"	4'-11 1/16"	5'- 0⅜"	5'- 1 11/16"	5'- 3"	5'- 4 5/16"	5'- 5⅝"	5'- 6 15/16"	5'- 8¼"
22	5'- 0½"	5'- 1⅞"	5'- 3¼"	5'- 4⅝"	5'- 6"	5'- 7⅜"	5'- 8¾"	5'-10⅛"	5'-11½"
23	5'- 3¼"	5'- 4 11/16"	5'- 6⅛"	5'- 7 9/16"	5'- 9"	5'-10 7/16"	5'-11⅞"	6'- 1 5/16"	6'- 2¾"
24	5'- 6"	5'- 7½"	5'- 9"	5'-10½"	6'- 0"	6'- 1½"	6'- 3"	6'- 4½"	6'- 6"
25	5'- 8¾"	5'-10 5/16"	5'-11⅞"	6'- 1 7/16"	6'- 3"	6'- 4 9/16"	6'- 6⅛"	6'- 7 11/16"	6'- 9¼"
26	5'-11½"	6'- 1⅛"	6'- 2¾"	6'- 4⅜"	6'- 6"	6'- 7⅝"	6'- 9¼"	6'-10⅞"	7'- 0½"
27	6'- 2¼"	6'- 3 15/16"	6'- 5⅝"	6'- 7 5/16"	6'- 9"	6'-10 11/16"	7'- 0⅜"	7'- 2 1/16"	7'- 3¾"
28	6'- 5"	6'- 6¾"	6'- 8½"	6'-10¼"	7'- 0"	7'- 1¾"	7'- 3½"	7'- 5¼"	7'- 7"
29	6'- 7¾"	6'- 9 9/16"	6'-11⅜"	7'- 1 3/16"	7'-.3"	7'- 4 13/16"	7'- 6⅝"	7'- 8 7/16"	7'-10¼"
30	6'-10½"	7'- 0⅜"	7'- 2¼"	7'- 4⅛"	7'- 6"	7'- 7⅞"	7'- 9¾"	7'-11⅝"	8'- 1½"

TABLE OF RIVET SPACING.

3 5/16" to 3 13/16"

No. of spaces	Distance between rivets								
	3 5/16"	3 3/8"	3 7/16"	3 1/2"	3 9/16"	3 5/8"	3 11/16"	3 3/4"	3 13/16"
2	6 5/8"	6 3/4"	6 7/8"	7"	7 1/8"	7 1/4"	7 3/8"	7 1/2"	7 5/8"
3	9 15/16"	10 1/8"	10 5/16"	10 1/2"	10 11/16"	10 7/8"	11 1/16"	11 1/4"	11 7/16"
4	1'- 1 1/4"	1'- 1 1/2"	1'- 1 3/4"	1'- 2"	1'- 2 1/4"	1'- 2 1/2"	1'- 2 3/4"	1'- 3"	1'- 3 1/4"
5	1'- 4 9/16"	1'- 4 7/8"	1'- 5 3/16"	1'- 5 1/2"	1'- 5 13/16"	1'- 6 1/8"	1'- 6 7/16"	1'- 6 3/4"	1'- 7 1/16"
6	1'- 7 7/8"	1'- 8 1/4"	1'- 8 5/8"	1'- 9"	1'- 9 3/8"	1'- 9 3/4"	1'-10 1/8"	1'-10 1/2"	1'-10 7/8"
7	1'-11 3/16"	1'-11 5/8"	2'- 0 1/16"	2'- 0 1/2"	2'- 0 15/16"	2'- 1 3/8"	2'- 1 13/16"	2'- 2 1/4"	2'- 2 11/16"
8	2'- 2 1/2"	2'- 3"	2'- 3 1/2"	2'- 4"	2'- 4 1/2"	2'- 5"	2'- 5 1/2"	2'- 6"	2'- 6 1/2"
9	2'- 5 13/16"	2'- 6 3/8"	2'- 6 15/16"	2'- 7 1/2"	2'- 8 1/16"	2'- 8 5/8"	2'- 9 3/16"	2'- 9 3/4"	2'-10 5/16"
10	2'- 9 1/8"	2'- 9 3/4"	2'-10 3/8"	2'-11"	2'-11 5/8"	3'- 0 1/4"	3'- 0 7/8"	3'- 0 1/2"	3'- 2 1/8"
11	3'- 0 7/16"	3'- 1 1/8"	3'- 1 13/16"	3'- 2 1/2"	3'- 3 3/16"	3'- 3 7/8"	3'- 4 9/16"	3'- 5 1/4"	3'- 5 15/16"
12	3'- 3 3/4"	3'- 4 1/2"	3'- 5 1/4"	3'- 6"	3'- 6 3/4"	3'- 7 1/2"	3'- 8 1/4"	3'- 9"	3'- 9 3/4"
13	3'- 7 1/16"	3'- 7 7/8"	3'- 8 11/16"	3'- 9 1/2"	3'-10 5/16"	3'-11 1/8"	3'-11 15/16"	4'- 0 3/4"	4'- 1 9/16"
14	3'-10 3/8"	3'-11 1/4"	4'- 0 1/8"	4'- 1"	4'- 1 7/8"	4'- 2 3/4"	4'- 3 5/8"	4'- 4 1/2"	4'- 5 3/8"
15	4'- 1 11/16"	4'- 2 5/8"	4'- 3 9/16"	4'- 4 1/2"	4'- 5 7/16"	4'- 6 3/8"	4'- 7 5/16"	4'- 8 1/4"	4'- 9 3/16"
16	4'- 5"	4'- 6"	4'- 7"	4'- 8"	4'- 9"	4'-10"	4'-11"	5'- 0"	5'- 1"
17	4'- 8 5/16"	4'- 9 3/8"	4'-10 7/16"	4'-11 1/2"	5'- 0 9/16"	5'- 1 5/8"	5'- 2 11/16"	5'- 3 3/4"	5'- 4 13/16"
18	4'-11 5/8"	5'- 0 3/4"	5'- 1 7/8"	5'- 3"	5'- 4 1/8"	5'- 5 1/4"	5'- 6 3/8"	5'- 7 1/2"	5'- 8 5/8"
19	5'- 2 15/16"	5'- 4 1/8"	5'- 5 5/16"	5'- 6 1/2"	5'- 7 11/16"	5'- 8 7/8"	5'-10 1/16"	5'-11 1/4"	6'- 0 7/16"
20	5'- 6 1/4"	5'- 7 1/2"	5'- 8 3/4"	5'-10"	5'-11 1/4"	6'- 0 1/2"	6'- 1 3/4"	6'- 3"	6'- 4 1/4"
21	5'- 9 9/16"	5'-10 7/8"	6'- 0 3/16"	6'- 1 1/2"	6'- 2 13/16"	6'- 4 1/8"	6'- 5 7/16"	6'- 6 3/4"	6'- 8 1/16"
22	6'- 0 7/8"	6'- 2 1/4"	6'- 3 5/8"	6'- 5"	6'- 6 3/8"	6'- 7 3/4"	6'- 9 1/8"	6'-10 1/2"	6'-11 7/8"
23	6'- 4 3/16"	6'- 5 5/8"	6'- 7 1/16"	6'- 8 1/2"	6'- 9 15/16"	6'-11 3/8"	7'- 0 13/16"	7'- 2 1/4"	7'- 3 11/16"
24	6'- 7 1/2"	6'- 9"	6'-10 1/2"	7'- 0"	7'- 1 1/2"	7'- 3"	7'- 4 1/2"	7'- 6"	7'- 7 1/2"
25	6'-10 13/16"	7'- 0 3/8"	7'- 1 15/16"	7'- 3 1/2"	7'- 5 1/16"	7'- 6 5/8"	7'- 8 3/16"	7'- 9 3/4"	7'-11 5/16"
26	7'- 2 1/8"	7'- 3 3/4"	7'- 5 3/8"	7'- 7"	7'- 8 5/8"	7'-10 1/4"	7'-11 7/8"	8'- 1 1/2"	8'- 3 1/8"
27	7'- 5 7/16"	7'- 7 1/8"	7'- 8 13/16"	7'-10 1/2"	8'- 0 3/16"	8'- 1 7/8"	8'- 3 9/16"	8'- 5 1/4"	8'- 6 15/16"
28	7'- 8 3/4"	7'-10 1/2"	8'- 0 1/4"	8'- 2"	8'- 3 3/4"	8'- 5 1/2"	8'- 7 1/4"	8'- 9"	8'-10 3/4"
29	8'- 0 1/16"	8'- 1 7/8"	8'- 3 11/16"	8'- 5 1/2"	8'- 7 5/16"	8'- 9 1/8"	8'-10 15/16"	9'- 0 3/4"	9'- 2 9/16"
30	8'- 3 3/8"	8'- 5 1/4"	8'- 7 1/8"	8'- 9"	8'-10 7/8"	9'- 0 3/4"	9'- 2 5/8"	9'- 4 1/2"	9'- 6 3/8"

TABLE OF RIVET SPACING.

3 7/8″ to 4 3/8″

No. of spaces	Distance between rivets								
	3 7/8″	3 15/16″	4″	4 1/16″	4 1/8″	4 3/16″	4 1/4″	4 5/16″	4 3/8″
2	7 3/4″	7 7/8″	8″	8 1/8″	8 1/4″	8 3/8″	8 1/2″	8 5/8″	8 3/4″
3	11 5/8″	11 13/16″	1′- 0″	1′- 0 3/16″	1′- 0 3/8″	1′- 0 9/16″	1′- 0 3/4″	1′- 0 15/16″	1′- 1 1/8″
4	1′- 3 1/2″	1′- 3 3/4″	1′- 4″	1′- 4 1/4″	1′- 4 1/2″	1′- 4 3/4″	1′- 5″	1′- 5 1/4″	1′- 5 1/2″
5	1′- 7 3/8″	1′- 7 11/16″	1′- 8″	1′- 8 5/16″	1′- 8 5/8″	1′- 8 15/16″	1′- 9 1/4″	1′- 9 9/16″	1′- 9 7/8″
6	1′-11 1/4″	1′-11 5/8″	2′- 0″	2′- 0 3/8″	2′- 0 3/4″	2′- 1 1/8″	2′- 1 1/2″	2′- 1 7/8″	2′- 2 1/4″
7	2′- 3 1/8″	2′- 3 9/16″	2′- 4″	2′- 4 7/16″	2′- 4 7/8″	2′- 5 5/16″	2′- 5 3/4″	2′- 6 3/16″	2′- 6 5/8″
8	2′- 7″	2′- 7 1/2″	2′- 8″	2′- 8 1/2″	2′- 9″	2′- 9 1/2″	2′-10″	2′-10 1/2″	2′-11″
9	2′-10 7/8″	2′-11 7/16″	3′- 0″	3′- 0 9/16″	3′- 1 1/8″	3′- 1 11/16″	3′- 2 1/4″	3′- 2 13/16″	3′- 3 3/8″
10	3′- 2 3/4″	3′- 3 3/8″	3′- 4″	3′- 4 5/8″	3′- 5 1/4″	3′- 5 7/8″	3′- 6 1/2″	3′- 7 1/8″	3′- 7 3/4″
11	3′- 6 5/8″	3′- 7 5/16″	3′- 8″	3′- 8 11/16″	3′- 9 3/8″	3′-10 1/16″	3′-10 3/4″	3′-11 7/16″	4′- 0 1/8″
12	3′-10 1/2″	3′-11 1/4″	4′- 0″	4′- 0 3/4″	4′- 1 1/2″	4′- 2 1/4″	4′- 3″	4′- 3 3/4″	4′- 4 1/2″
13	4′- 2 3/8″	4′- 3 3/16″	4′- 4″	4′- 4 13/16″	4′- 5 5/8″	4′- 6 7/16″	4′- 7 1/4″	4′- 8 1/16″	4′- 8 7/8″
14	4′- 6 1/4″	4′- 7 1/8″	4′- 8″	4′- 8 7/8″	4′- 9 3/4″	4′-10 5/8″	4′-11 1/2″	5′- 0 3/8″	5′- 1 1/4″
15	4′-10 1/8″	4′-11 1/16″	5′- 0″	5′- 0 15/16″	5′- 1 7/8″	5′- 2 13/16″	5′- 3 3/4″	5′- 4 11/16″	5′- 5 5/8″
16	5′- 2″	5′- 3″	5′- 4″	5′- 5″	5′- 6″	5′- 7″	5′- 8″	5′- 9″	5′-10″
17	5′- 5 7/8″	5′- 6 15/16″	5′- 8″	5′- 9 1/16″	5′-10 1/8″	5′-11 3/16″	6′- 0 1/4″	6′- 1 5/16″	6′- 2 3/8″
18	5′- 9 3/4″	5′-10 7/8″	6′- 0″	6′- 1 1/8″	6′- 2 1/4″	6′- 3 3/8″	6′- 4 1/2″	6′- 5 5/8″	6′- 6 3/4″
19	6′- 1 5/8″	6′- 2 13/16″	6′- 4″	6′- 5 3/16″	6′- 6 3/8″	6′- 7 9/16″	6′- 8 3/4″	6′- 9 15/16″	6′-11 1/8″
20	6′- 5 1/2″	6′- 6 3/4″	6′- 8″	6′- 9 1/4″	6′-10 1/2″	6′-11 3/4″	7′- 1″	7′- 2 1/4″	7′- 3 1/2″
21	6′- 9 3/8″	6′-10 11/16″	7′- 0″	7′- 1 5/16″	7′- 2 5/8″	7′- 3 15/16″	7′- 5 1/4″	7′- 6 9/16″	7′- 7 7/8″
22	7′- 1 1/4″	7′- 2 5/8″	7′- 4″	7′- 5 3/8″	7′- 6 3/4″	7′- 8 1/8″	7′- 9 1/2″	7′-10 7/8″	8′- 0 1/4″
23	7′- 5 1/8″	7′- 6 9/16″	7′- 8″	7′- 9 7/16″	7′-10 7/8″	8′- 0 5/16″	8′- 1 3/4″	8′- 3 3/16″	8′- 4 5/8″
24	7′- 9″	7′-10 1/2″	8′- 0″	8′- 1 1/2″	8′- 3″	8′- 4 1/2″	8′- 6″	8′- 7 1/2″	8′- 9″
25	8′- 0 7/8″	8′- 2 7/16″	8′- 4″	8′- 5 9/16″	8′- 7 1/8″	8′- 8 11/16″	8′-10 1/4″	8′-11 13/16″	9′- 1 3/8″
26	8′- 4 3/4″	8′- 6 3/8″	8′- 8″	8′- 9 5/8″	8′-11 1/4″	9′- 0 7/8″	9′- 2 1/2″	9′- 4 1/8″	9′- 5 3/4″
27	8′- 8 5/8″	8′-10 5/16″	9′- 0″	9′- 1 11/16″	9′- 3 3/8″	9′- 5 1/16″	9′- 6 3/4″	9′- 8 7/16″	9′-10 1/8″
28	9′- 0 1/2″	9′- 2 1/4″	9′- 4″	9′- 5 3/4″	9′- 7 1/2″	9′- 9 1/4″	9′-11″	10′- 0 3/4″	10′- 2 1/2″
29	9′- 4 3/8″	9′- 6 3/16″	9′- 8″	9′- 9 13/16″	9′-11 5/8″	10′- 1 7/16″	10′- 3 1/4″	10′- 5 1/16″	10′- 6 7/8″
30	9′- 8 1/4″	9′-10 1/8″	10′- 0″	10′- 1 7/8″	10′- 3 3/4″	10′- 5 5/8″	10′- 7 1/2″	10′- 9 3/8″	10′-11 1/4″

TABLE OF RIVET SPACING.

4 7/16" to 4 15/16"

No. of spaces	Distance between rivets								
	4 7/16"	4 1/2"	4 9/16"	4 5/8"	4 11/16"	4 3/4"	4 13/16"	4 7/8"	4 15/16"
2	8 7/8"	9"	9 1/8"	9 1/4"	9 3/8"	9 1/2"	9 5/8"	9 3/4"	9 7/8"
3	1'- 1 5/16"	1'- 1 1/2"	1'- 1 11/16"	1'- 1 7/8"	1'- 2 1/16"	1'- 2 1/4"	1'- 2 7/16"	1'- 2 5/8"	1'- 2 13/16"
4	1'- 5 3/4"	1'- 6"	1'- 6 1/4"	1'- 6 1/2"	1'- 6 3/4"	1'- 7"	1'- 7 1/4"	1'- 7 1/2"	1'- 7 3/4"
5	1'-10 3/16"	1'-10 1/2"	1'-10 13/16"	1'-11 1/8"	1'-11 7/16"	1'-11 3/4"	2'- 0 1/16"	2'- 0 3/8"	2'- 0 11/16"
6	2'- 2 5/8"	2'- 3"	2'- 3 3/8"	2'- 3 3/4"	2'- 4 1/8"	2'- 4 1/2"	2'- 4 7/8"	2'- 5 1/4"	2'- 5 5/8"
7	2'- 7 1/16"	2'- 7 1/2"	2"- 7 15/16"	2'- 8 3/8"	2'- 8 13/16"	2'- 9 1/4"	2'- 9 11/16"	2'-10 1/8"	2'-10 9/16"
8	2'-11 1/2"	3'- 0"	3'- 0 1/2"	3'- 1"	3'- 1 1/2"	3'- 2"	3'- 2 1/2"	3'- 3"	3'- 3 1/2"
9	3'- 3 15/16"	3'- 4 1/2"	3'- 5 1/16"	3'- 5 5/8"	3'- 6 3/16"	3'- 6 3/4"	3'- 7 5/16"	3'- 7 7/8"	3'- 8 7/16"
10	3'- 8 3/8"	3'- 9"	3'- 9 5/8"	3'-10 1/4"	3'-10 7/8"	3'-11 1/2"	4'- 0 1/8"	4'- 0 3/4"	4'- 1 3/8"
11	4'- 0 13/16"	4'- 1 1/2"	4'- 2 3/16"	4'- 2 7/8"	4'- 3 9/16"	4'- 4 1/4"	4'- 4 15/16"	4'- 5 5/8"	4'- 6 5/16"
12	4'- 5 1/4"	4'- 6"	4'- 6 3/4"	4'- 7 1/2"	4'- 8 1/4"	4'- 9"	4'- 9 3/4"	4'-10 1/2"	4'-11 1/4"
13	4'- 9 11/16"	4'-10 1/2"	4'-11 5/16"	5'- 0 1/8"	5'- 0 15/16"	5'- 1 3/4"	5'- 2 9/16"	5'- 3 3/8"	5'- 4 3/16"
14	5'- 2 1/8"	5'- 3"	5'- 3 7/8"	5'- 4 3/4"	5'- 5 5/8"	5'- 6 1/2"	5'- 7 3/8"	5'- 8 1/4"	5'- 9 1/8"
15	5'- 6 9/16"	5'- 7 1/2"	5'- 8 7/16"	5'- 9 3/8"	5'-10 5/16"	5'-11 1/4"	6'- 0 3/16"	6'- 1 1/8"	6'- 2 1/16"
16	5'-11"	6'- 0"	6'- 1"	6'- 2"	6'- 3"	6'- 4"	6'- 5"	6'- 6"	6'- 7"
17	6'- 3 7/16"	6'- 4 1/2"	6'- 5 9/16"	6'- 6 5/8"	6'- 7 11/16"	6'- 8 3/4"	6'- 9 13/16"	6'-10 7/8"	6'-11 15/16"
18	6'- 7 7/8"	6'- 9"	6'-10 1/8"	6'-11 1/4"	7'- 0 3/8"	7'- 1 1/2"	7'- 2 5/8"	7'- 3 3/4"	7'- 4 7/8"
19	7'- 0 5/16"	7'- 1 1/2"	7'- 2 11/16"	7'- 3 7/8"	7'- 5 1/16"	7'- 6 1/4"	7'- 7 7/16"	7'- 8 5/8"	7'- 9 13/16"
20	7'- 4 3/4"	7'- 6"	7'- 7 1/4"	7'- 8 1/2"	7'- 9 3/4"	7'-11"	8'- 0 1/4"	8'- 1 1/2"	8'- 2 3/4"
21	7'- 9 3/16"	7'-10 1/2"	7'-11 13/16"	8'- 1 1/8"	8'- 2 7/16"	8'- 3 3/4"	8'- 5 1/16"	8'- 6 3/8"	8'- 7 11/16"
22	8'- 1 5/8"	8'- 3"	8'- 4 3/8"	8'- 5 3/4"	8'- 7 1/8"	8'- 8 1/2"	8'- 9 7/8"	8'-11 1/4"	9'- 0 5/8"
23	8'- 6 1/16"	8'- 7 1/2"	8'- 8 15/16"	8'-10 3/8"	8'-11 13/16"	9'- 1 1/4"	9'- 2 11/16"	9'- 4 1/8"	9'- 5 9/16"
24	8'-10 1/2"	9'- 0"	9'- 1 1/2"	9'- 3"	9'- 4 1/2"	9'- 6"	9'- 7 1/2"	9'- 9"	9'-10 1/2"
25	9'- 2 15/16"	9'- 4 1/2"	9'- 6 1/16"	9'- 7 5/8"	9'- 9 3/16"	9'-10 3/4"	10'- 0 5/16"	10'- 1 7/8"	10'- 3 7/16"
26	9'- 7 3/8"	9'- 9"	9'-10 5/8"	10'- 0 1/4"	10'- 1 7/8"	10'- 3 1/2"	10'- 5 1/8"	10'- 6 3/4"	10'- 8 3/8"
27	9'-11 13/16"	10'- 1 1/2"	10'- 3 3/16"	10'- 4 7/8"	10'- 6 9/16"	10'- 8 1/4"	10'- 9 15/16"	10'-11 5/8"	11'- 1 5/16"
28	10'- 4 1/4"	10'- 6"	10'- 7 3/4"	10'- 9 1/2"	10'-11 1/4"	11'- 1"	11'- 2 3/4"	11'- 4 1/2"	11'- 6 1/4"
29	10'- 8 11/16"	10'-10 1/2"	11'- 0 5/16"	11'- 2 1/8"	11'- 3 15/16"	11'- 5 3/4"	11'- 7 9/16"	11'- 9 3/8"	11'-11 3/16"
30	11'- 1 1/8"	11'- 3"	11'- 4 7/8"	11'- 6 3/4"	11'- 8 5/8"	11'-10 1/2"	12'- 0 3/8"	12'- 2 1/4"	12'- 4 1/8"

TABLE OF RIVET SPACING.

5″ to 5 1/2″

No. of spaces	Distance between rivets								
	5″	5 1/16″	5 1/8″	5 3/16″	5 1/4″	5 5/16″	5 3/8″	5 7/16″	5 1/2″
2	10″	10 1/8″	10 1/4″	10 3/8″	10 1/2″	10 5/8″	10 3/4″	10 7/8″	11″
3	1′- 3″	1′- 3 3/16″	1′- 3 3/8″	1′- 3 9/16″	1′- 3 3/4″	1′- 3 15/16″	1′- 4 1/8″	1′- 4 5/16″	1′- 4 1/2″
4	1′- 8″	1′- 8 1/4″	1′- 8 1/2″	1′- 8 3/4″	1′- 9″	1′- 9 1/4″	1′- 9 1/2″	1′- 9 3/4″	1′-10″
5	2′- 1″	2′- 1 5/16″	2′- 1 5/8″	2′- 1 15/16″	2′- 2 1/4″	2 - 2 9/16″	2′- 2 7/8″	2′- 3 3/16″	2 - 3 1/2″
6	2′- 6″	2′- 6 3/8″	2′- 6 3/4″	2′- 7 1/8″	2′- 7 1/2″	2′- 7 7/8″	2′- 8 1/4″	2′- 8 5/8″	2′- 9″
7	2′-11″	2′-11 7/16″	2′-11 7/8″	3′- 0 5/16″	3′- 0 3/4″	3′- 1 3/16″	3′- 1 5/8″	3′- 2 1/16″	3′- 2 1/2″
8	3′- 4″	3′- 4 1/2″	3′- 5″	3′- 5 1/2″	3′- 6″	3′- 6 1/2″	3′- 7″	3′- 7 1/2″	3′- 8″
9	3′- 9″	3′- 9 9/16″	3′-10 1/8″	3′-10 11/16″	3′-11 1/4″	3′-11 13/16″	4′- 0 3/8″	4′- 0 15/16″	4′- 1 1/2″
10	4′- 2″	4′- 2 5/8″	4′- 3 1/4″	4′- 3 7/8″	4′- 4 1/2″	4′- 5 1/8″	4′- 5 3/4″	4′- 6 3/8″	4′- 7″
11	4′- 7″	4′- 7 11/16″	4′- 8 3/8″	4′- 9 1/16″	4′- 9 3/4″	4′-10 7/16″	4′-11 1/8″	4′-11 13/16″	5′- 0 1/2″
12	5′- 0″	5′- 0 3/4″	5′- 1 1/2″	5′- 2 1/4″	5′- 3″	5′- 3 3/4″	5′- 4 1/2″	5′- 5 1/4″	5′- 6″
13	5′- 5″	5′- 5 13/16″	5′- 6 5/8″	5′- 7 7/16″	5′- 8 1/4″	5′- 9 1/16″	5′- 9 7/8″	5′-10 11/16″	5′-11 1/2″
14	5′-10″	5′-10 7/8″	5′-11 3/4″	6′- 0 5/8″	6′- 1 1/2″	6′- 2 3/8″	6′- 3 1/4″	6′- 4 1/8″	6′- 5″
15	6′- 3″	6′- 3 15/16″	6′- 4 7/8″	6′- 5 13/16″	6′- 6 3/4″	6′- 7 11/16″	6′- 8 5/8″	6′- 9 9/16″	6′-10 1/2″
16	6′- 8″	6′- 9″	6′-10″	6′-11″	7′- 0″	7′- 1″	7′- 2″	7′- 3″	7′- 4″
17	7′- 1″	7′- 2 1/16″	7′- 3 1/8″	7′- 4 3/16″	7′- 5 1/4″	7′- 6 5/16″	7′- 7 3/8″	7′- 8 7/16″	7′- 9 1/2″
18	7′- 6″	7′- 7 1/8″	7′- 8 1/4″	7′- 9 3/8″	7′-10 1/2″	7′-11 5/8″	8′- 0 3/4″	8′- 1 7/8″	8′- 3″
19	7′-11″	8′- 0 3/16″	8′- 1 3/8″	8′- 2 9/16″	8′- 3 3/4″	8′- 4 15/16″	8′- 6 1/8″	8′- 7 5/16″	8′- 8 1/2″
20	8′- 4″	8′- 5 1/4″	8′- 6 1/2″	8′- 7 3/4″	8′- 9″	8′-10 1/4″	8′-11 1/2″	9′- 0 3/4″	9′- 2″
21	8′- 9″	8′-10 5/16″	8′-11 5/8″	9′- 0 15/16″	9′- 2 1/4″	9′- 3 9/16″	9′- 4 7/8″	9′- 6 3/16″	9′- 7 1/2″
22	9′- 2″	9′- 3 3/8″	9′- 4 3/4″	9′- 6 1/8″	9′- 7 1/2″	9′- 8 7/8″	9′-10 1/4″	9′-11 5/8″	10′- 1″
23	9′- 7″	9′- 8 7/16″	9′- 9 7/8″	9′-11 5/16″	10′- 0 3/4″	10′- 2 3/16″	10′- 3 5/8″	10′- 5 1/16″	10′- 6 1/2″
24	10′- 0″	10′- 1 1/2″	10′- 3″	10′- 4 1/2″	10′- 6″	10′- 7 1/2″	10′- 9″	10′-10 1/2″	11′- 0″
25	10′- 5″	10′- 6 9/16″	10′- 8 1/8″	10′- 9 11/16″	10′-11 1/4″	11′- 0 13/16″	11′- 2 3/8″	11′- 3 15/16″	11′- 5 1/2″
26	10′-10″	10′-11 5/8″	11′- 1 1/4″	11′- 2 7/8″	11′- 4 1/2″	11′- 6 1/8″	11′- 7 3/4″	11′- 9 3/8″	11′-11″
27	11′- 3″	11′- 4 11/16″	11′- 6 3/8″	11′- 8 1/16″	11′- 9 3/4″	11′-11 7/16″	12′- 1 1/8″	12′- 2 13/16″	12′- 4 1/2″
28	11′- 8″	11′- 9 3/4″	11′-11 1/2″	12′- 1 1/4″	12′- 3″	12′- 4 3/4″	12′- 6 1/2″	12′- 8 1/4″	12′-10″
29	12′- 1″	12′- 2 13/16″	12′- 4 5/8″	12′- 6 7/16″	12′- 8 1/4″	12′-10 1/16″	12′-11 7/8″	13′- 1 11/16″	13′- 3 1/2″
30	12′- 6″	12′- 7 7/8″	12′- 9 3/4″	12′-11 5/8″	13′- 1 1/2″	13′- 3 3/8″	13′- 5 1/4″	13′- 7 1/8″	13′- 9″

TABLE OF RIVET SPACING.

5 9/16″ to 6 1/16″

No. of spaces	Distance between rivets								
	5 9/16″	5 5/8″	5 11/16″	5 3/4″	5 13/16″	5 7/8″	5 15/16″	6″	6 1/16″
2	11 1/8″	11 1/4″	11 3/8″	11 1/2″	11 5/8″	11 3/4″	11 7/8″	1′- 0″	1′- 0 1/8″
3	1′- 4 11/16″	1′- 4 7/8″	1′- 5 1/16″	1′- 5 1/4″	1′- 5 7/16″	1′- 5 5/8″	1′- 5 13/16″	1′- 6″	1′- 6 3/16″
4	1′-10 1/4″	1′-10 1/2″	1′-10 3/4″	1′-11″	1′-11 1/4″	1′-11 1/2″	1′-11 3/4″	2′- 0″	2′- 0 1/4″
5	2′- 3 13/16″	2′- 4 1/8″	2′- 4 7/16″	2′- 4 3/4″	2′- 5 1/16″	2′- 5 3/8″	2′- 5 11/16″	2′- 6″	2′- 6 5/16″
6	2 - 9 3/8″	2′- 9 3/4″	2′-10 1/8″	2′-10 1/2″	2′-10 7/8″	2′-11 1/4″	2′-11 5/8″	3′- 0″	3′- 0 3/8″
7	3′- 2 15/16″	3′- 3 3/8″	3′- 3 13/16″	3′- 4 1/4″	3′- 4 11/16″	3′- 5 1/8″	3′- 5 9/16″	3′- 6″	3′- 6 7/16″
8	3′- 8 1/2″	3′- 9″	3′- 9 1/2″	3′-10″	3′-10 1/2″	3′-11″	3′-11 1/2″	4′- 0″	4′- 0 1/2″
9	4′- 2 1/16″	4′- 2 5/8″	4′- 3 3/16″	4′- 3 3/4″	4′- 4 5/16″	4′- 4 7/8″	4′- 5 7/16″	4′- 6″	4′- 6 9/16″
10	4′- 7 5/8″	4′- 8 1/4″	4′- 8 7/8″	4′- 9 1/2″	4′-10 1/8″	4′-10 3/4″	4′-11 3/8″	5′- 0″	5′- 0 5/8″
11	5′- 1 3/16″	5′- 1 7/8″	5′- 2 9/16″	5′- 3 1/4″	5′- 3 15/16″	5′- 4 5/8″	5′- 5 5/16″	5′- 6″	5′- 6 11/16″
12	5′- 6 3/4″	5′- 7 1/2″	5′- 8 1/4″	5′- 9″	5′- 9 3/4″	5′-10 1/2″	5′-11 1/4″	6′- 0″	6′- 0 3/4″
13	6′- 0 5/16″	6′- 1 1/8″	6′- 1 15/16″	6′- 2 3/4″	6′- 3 9/16″	6′- 4 3/8″	6′- 5 3/16″	6′- 6″	6′- 6 13/16″
14	6′- 5 7/8″	6′- 6 3/4″	6′- 7 5/8″	6′- 8 1/2″	6′- 9 3/8″	6′-10 1/4″	6′-11 1/8″	7′- 0″	7′- 0 7/8″
15	6′-11 7/16″	7′- 0 3/8″	7′- 1 5/16″	7′- 2 1/4″	7′- 3 3/16″	7′- 4 1/8″	7′- 5 1/16″	7′- 6″	7′- 6 15/16″
16	7′- 5″	7′- 6″	7′- 7″	7′- 8″	7′- 9″	7′-10″	7′-11″	8′- 0″	8′- 1″
17	7′-10 9/16″	7′-11 5/8″	8′- 0 11/16″	8′- 1 3/4″	8′- 2 13/16″	8′- 3 7/8″	8′- 4 15/16″	8′- 6″	8′- 7 1/16″
18	8′- 4 1/8″	8′- 5 1/4″	8′- 6 3/8″	8′- 7 1/2″	8′- 8 5/8″	8′- 9 3/4″	8′-10 7/8″	9′- 0″	9′- 1 1/8″
19	8′- 9 11/16″	8′-10 7/8″	9′- 0 1/16″	9′- 1 1/4″	9′- 2 7/16″	9′- 3 5/8″	9′- 4 13/16″	9′- 6″	9′- 7 3/16″
20	9′- 3 1/4″	9′- 4 1/2″	9′- 5 3/4″	9′- 7″	9′- 8 1/4″	9′- 9 1/2″	9′-10 3/4″	10′- 0″	10′- 1 1/4″
21	9′- 8 13/16″	9′-10 1/8″	9′-11 7/16″	10′- 0 3/4″	10′- 2 1/16″	10′- 3 3/8″	10′- 4 11/16″	10′- 6″	10′- 7 5/16″
22	10′- 2 3/8″	10′- 3 3/4″	10′- 5 1/8″	10′- 6 1/2″	10′- 7 7/8″	10′- 9 1/4″	10′-10 5/8″	11′- 0″	11′- 1 3/8″
23	10′- 7 15/16″	10′- 9 3/8″	10′-10 13/16″	11′- 0 1/4″	11′- 1 11/16″	11′- 3 1/8″	11′- 4 9/16″	11′- 6″	11′- 7 7/16″
24	11′- 1 1/2″	11′- 3″	11′- 4 1/2″	11′- 6″	11′- 7 1/2″	11′- 9″	11′-10 1/2″	12′- 0″	12′- 1 1/2″
25	11′- 7 1/16″	11′- 8 5/8″	11′-10 3/16″	11′-11 3/4″	12′- 1 5/16″	12′- 2 7/8″	12′- 4 7/16″	12′- 6″	12′- 7 9/16″
26	12′- 0 5/8″	12′- 2 1/4″	12′- 3 7/8″	12′- 5 1/2″	12′- 7 1/8″	12′- 8 3/4″	12′-10 3/8″	13′- 0″	13′- 1 5/8″
27	12′- 6 3/16″	12′- 7 7/8″	12′- 9 9/16″	12′-11 1/4″	13′- 0 15/16″	13′- 2 5/8″	13′- 4 5/16″	13′- 6″	13′- 7 11/16″
28	12′-11 3/4″	13′- 1 1/2″	13′- 3 1/4″	13′- 5″	13′- 6 3/4″	13′- 8 1/2″	13′-10 1/4″	14′- 0″	14′- 1 3/4″
29	13′- 5 5/16″	13′- 7 1/8″	13′- 8 15/16″	13′-10 3/4″	14′- 0 9/16″	14′- 2 3/8″	14′- 4 3/16″	14′- 6″	14′- 7 13/16″
30	13′-10 7/8″	14′- 0 3/4″	14′- 2 5/8″	14′- 4 1/2″	14′- 6 3/8″	14′- 8 1/4″	14 -10 1/8″	15′- 0″	15′- 1 7/8″

TABLE OF RIVET SPACING.

6⅛" to 6⅝"

No. of spaces	Distance between rivets								
	6⅛"	6 3/16"	6¼"	6 5/16"	6⅜"	6 7/16"	6½"	6 9/16"	6⅝"
2	1'- 0¼"	1'- 0⅜"	1'- 0½"	1'- 0⅝"	1'- 0¾"	1'- 0⅞"	1'- 1"	1'- 1⅛"	1'- 1¼"
3	1'- 6⅜"	1'- 6 9/16"	1'- 6¾"	1'- 6 15/16"	1'- 7⅛"	1'- 7 5/16"	1'- 7½"	1'- 7 11/16"	1'- 7⅞"
4	2'- 0½"	2'- 0¾"	2'- 1"	2'- 1¼"	2'- 1½"	2'- 1¾"	2'- 2"	2'- 2¼"	2'- 2½"
5	2'- 6⅝"	2'- 6 15/16"	2'- 7¼"	2'- 7 9/16"	2'- 7⅞"	2'- 8 3/16"	2'- 8½"	2'- 8 13/16"	2'- 9⅛"
6	3'- 0¾"	3'- 1⅛"	3'- 1½"	3'- 1⅞"	3'- 2¼"	3'- 2⅝"	3'- 3"	3'- 3⅜"	3'- 3¾"
7	3'- 6⅞"	3'- 7 5/16"	3'- 7¾"	3'- 8 3/16"	3'- 8⅝"	3'- 9 1/16"	3'- 9½"	3'- 9 15/16"	3'-10⅜"
8	4'- 1"	4'- 1½"	4'- 2"	4'- 2½"	4'- 3"	4'- 3½"	4'- 4"	4'- 4½"	4'- 5"
9	4'- 7⅛"	4'- 7 11/16"	4'- 8¼"	4'- 8 13/16"	4 - 9⅜"	4'- 9 15/16"	4'-10½"	4'-11 1/16"	4'-11⅝"
10	5'- 1¼"	5'- 1⅞"	5'- 2½"	5'- 3⅛"	5'- 3¾"	5'- 4⅜"	5'- 5"	5'- 5⅝"	5'- 6¼"
11	5'- 7⅜"	5'- 8 1/16"	5'- 8¾"	5'- 9 7/16"	5'-10⅛"	5'-10 13/16"	5'-11½"	6'- 0 3/16"	6'- 0⅞"
12	6'- 1½"	6'- 2¼"	6'- 3"	6'- 3¾"	6'- 4½"	6'- 5¼"	6'- 6"	6'- 6¾"	6'- 7½"
13	6'- 7⅝"	6'- 8 7/16"	6'- 9¼"	6'-10 1/16"	6'-10⅞"	6'-11 11/16"	7'- 0½"	7'- 1 5/16"	7'- 2⅛"
14	7'- 1¾"	7'- 2⅝"	7'- 3½"	7'- 4⅜"	7'- 5¼"	7'- 6⅛"	7'- 7"	7'- 7⅞"	7'- 8¾"
15	7'- 7⅞"	7'- 8 13/16"	7'- 9¾"	7'-10 11/16"	7'-11⅝"	8'- 0 9/16"	8'- 1½"	8'- 2 7/16"	8'- 3⅜"
16	8'- 2"	8'- 3"	8'- 4"	8'- 5"	8'- 6"	8'- 7"	8'- 8"	8'- 9"	8'-10"
17	8'- 8⅛"	8'- 9 3/16"	8'-10¼"	8'-11 5/16"	9'- 0⅜"	9'- 1 7/16"	9'- 2½"	9'- 3 9/16"	9'- 4⅝"
18	9'- 2¼"	9'- 3⅜"	9'- 4½"	9'- 5⅝"	9'- 6¾"	9'- 7⅞"	9'- 9"	9 -10⅛"	9'-11¼"
19	9'- 8⅜"	9'- 9 9/16"	9' 10¾"	9'-11 15/16"	10'- 1⅛"	10'- 2 5/16"	10'- 3½"	10'- 4 11/16"	10'- 5⅞"
20	10'- 2½"	10'- 3¾"	10'- 5"	10'- 6¼"	10'- 7½"	10'- 8¾"	10'-10"	10'-11¼"	11'- 0½"
21	10'- 8⅝"	10'- 9 15/16"	10'-11¼"	11'- 0 9/16"	11'- 1⅞"	11'- 3 3/16"	11'- 4½"	11'- 5 13/16"	11'- 7⅛"
22	11'- 2¾"	11'- 4⅛"	11'- 5½"	11'- 6⅞"	11'- 8¼"	11'- 9⅝"	11'-11"	12'- 0⅜"	12'- 1¾"
23	11'- 8⅞"	11'-10 5/16"	11'-11¾"	12'- 1 3/16"	12'- 2⅝"	12'- 4 1/16"	12'- 5½"	12'- 6 15/16"	12'- 8⅜"
24	12'- 3"	12'- 4½"	12'- 6"	12'- 7½"	12'- 9"	12'-10½"	13'- 0"	13'- 1½"	13'- 3"
25	12'- 9⅛"	12'-10 11/16"	13'- 0¼"	13'- 1 13/16"	13'- 3⅜"	13'- 4 15/16"	13'- 6½"	13'- 8 1/16"	13'- 9⅝"
26	13'- 3¼"	13'- 4⅞"	13'- 6½"	13'- 8⅛"	13'- 9¾"	13'-11⅜"	14'- 1"	14'- 2⅝"	14'- 4¼"
27	13'- 9⅜"	13'-11 1/16"	14'- 0¾"	14'- 2 7/16"	14'- 4⅛"	14'- 5 13/16"	14'- 7½"	14'- 9 3/16"	14'-10⅞"
28	14'- 3½"	14'- 5¼"	14'- 7"	14'- 8¾"	14'-10½"	15'- 0¼"	15'- 2"	15'- 3¾"	15'- 5½"
29	14'- 9⅝"	14'-11 7/16"	15'- 1¼"	15'- 3 1/16"	15'- 4⅞"	15'- 6 11/16"	15'- 8½"	15'-10 5/16"	16'- 0⅛"
30	15'- 3¾"	15'- 5⅝"	15'- 7½"	15'- 9⅜"	15'-11¼"	16'- 1⅛"	16'- 3"	16'- 4⅞"	16'- 6¾"

SPECIFIC GRAVITIES AND WEIGHTS OF VARIOUS SUBSTANCES.

The Basis for specific gravities is pure water at 62 degrees Fah., Barometer 30 inches. Weight of one cubic foot, 62.355 pounds	Average specific gravity Water=1	Average weight of one cubic foot, Lbs.
Air, atmospheric at 60 degrees F., under pressure of one atmosphere, or 14.7 lbs. per square inch, weighs 1/815th as much as water	.00123	.0765
Aluminum	2.6	162
Anthracite, 1.3 to 1.84; of Penna., 1.3 to 1.7.	1.5	93.5
" broken, of any size, loose....	......	52 to 56
" " moderately shaken...	......	56 to 60
" " heaped bushel, loose, 77 to 83 pounds...	......	....
" " a ton loose occupies 40 to 43 cubic feet	......	....
Antimony, cast	6.70	418
" native	6.67	416
Ash, perfectly dry (see note p. 380)......	.752	47
" American White, dry (see note p. 380)	.61	38
Ashes of soft coal, solidly packed		40 to 45
Asphaltum, 1 to 1.8	1.4	87.3
Brass (copper and zinc), cast, 7.8 to 8.4..	8.1	504
" rolled	8.4	524
Brick, best pressed	......	150
" common and hard	......	125
" soft inferior	......	100
Brickwork, pressed brick, fine joints.....	......	140
" medium quality	......	125
" coarse, inferior, soft	......	100
" at 125 pounds per cubic foot, 1 cubic yard equals 1.507 tons, and 17.92 cubic feet equal 1 ton	......	....
Bronze, copper 8, tin 1 (gun metal)......	8.5	529
Cement, hydraulic. American, Rosendale, ground and loose	......	56
" hydraulic. American, Rosendale, U. S. struck bush., 70 pounds..	......	....
" hydraulic. American, Rosendale, Louisville bushel, 62 pounds..	......	....
" hydraulic. American, Cumberland, ground, loose	......	65
" hydraulic. American, Cumberland, ground, thoroughly shaken....	......	85
" hydraulic. English Portland (U. S. struck bushel, 100 to 128)..	......	81 to 102

SPECIFIC GRAVITIES AND WEIGHTS OF VARIOUS SUBSTANCES.

The basis for specific gravities is pure water at 62 degrees Fah., Barometer 30 inches Weight of one cubic foot, 62.355 pounds	Average specific gravity Water=1	Average weight of one cubic foot, Lbs.
Cement, hydraulic. English Portland, a barrel, 400 to 430 pounds.....	......	....
" hydraulic. American Portland, loose	......	88
" hydraulic. American Portland, thoroughly shaken	......	110
Charcoal of pines and oaks	......	15 to 30
Chalk	2.5	156
Cherry, perfectly dry (see note p. 380)..	.672	42
Clay, potters', dry, 1.8 to 2.1	1.9	119
" dry in lump, loose	......	63
Coal, bituminous, solid, 1.2 to 1.5	1.35	84
" bituminous, broken, of any size, loose	......	47 to 52
" bituminous, moderately shaken	......	51 to 56
" bituminous, a heaped bushel, loose, 70 to 78	......	....
" bituminous, 1 ton occupies 43 to 48 cubic feet	......	....
Coke, loose, good quality	......	23 to 32
" loose, a heaped bushel, 35 to 42....	......	....
" 1 ton occupies 80 to 97 cubic feet...	......	....
Corundum, pure, 3.8 to 4	3.9	....
Copper, cast, 8.6 to 8.8	8.7	542
" rolled, 8.8 to 9	8.9	555
Cork, dry (see note p. 380).............	.24	15
Earth, common loam, perfectly dry, loose..	......	72 to 80
" " " perfectly dry, shaken	......	82 to 92
" " " perfectly dry, rammed	......	90 to 100
" " " slightly moist, loose..	......	70 to 76
" " " more moist, loose....	......	66 to 68
" " " more moist, shaken..	......	75 to 90
" " " more moist, packed..	......	90 to 100
" " " as soft flowing mud..	......	104 to 112
" " " as soft flowing mud well pressed	......	110 to 120
Elm, perfectly dry (see note p. 380)....	.56	35
Flint	2.6	162
Glass, 2.5 to 3.45	2.98	186
" common window	2.52	157
Gneiss, common, 2.62 to 2.76	2.69	168
Gneiss, in loose piles	......	96

SPECIFIC GRAVITIES AND WEIGHTS OF VARIOUS SUBSTANCES.

The basis for specific gravities is pure water at 62 degrees Fah., Barometer 30 inches. Weight of one cubic foot, 62.355 pounds	Average specific gravity Water=1	Average weight of one cubic foot, Lbs.
Gold, cast, pure or 24 karat	19.258	1204
" pure, hammered	19.5	1217
Granite, 2.56 to 2.88	2.72	170
Greenstone, trap, 2.8 to 3.2	3.00	187
Gypsum, plaster of Paris, 2.24 to 2.30	2.27	141.6
Hickory, perfectly dry (see note p. 380)	.85	53
Ice, .917 to .922	.92	57.4
Iron, cast, 6.9 to 7.4	7.15	446
" grey foundry, cold	7.21	450
" " molten	6.94	433
" wrought	7.69	480
Lead, commercial	11.38	709.6
Lignumvitae (dry)	.65-1.33	41 to 83
Limestone and marble	2.6	164.4
Lime, quick	1.5	95
" quick, ground, well shaken, per struck bushel 80 pounds	....	64
" quick, ground, thoroughly shaken, per struck bushel 93¾ pounds	....	75
Locust, dry (see note p. 380)	.71	44
Mahogany, Spanish, dry (see note p. 380)	.85	53
" Honduras, dry (see note p. 380)	.56	35
Maple, dry (see note p. 380)	.79	49
Marble (see Limestone)		
Masonry of granite or limestone, well-dressed	....	165
" of granite, well-scabbled mortar rubble, about ⅕ of mass will be mortar	....	154
" of granite, well-scabbled dry rubble	....	138
" of granite, roughly-scabbled mortar rubble, about ¼ to ⅛ of mass will be mortar	....	150
" of granite, scabbled dry rubble		125
" of sandstone, ⅛ less than granite		....
Mercury, at 32 degrees Fah.	13.62	849
Mica, 2.75 to 3.1	2.93	183
Mortar, hardened, 1.4 to 1.9	1.65	103
Mud, dry, close	....	80 to 110
" wet, moderately pressed	....	110 to 130
" " fluid	....	104 to 120

SPECIFIC GRAVITIES AND WEIGHTS OF VARIOUS SUBSTANCES.

The basis for specific gravities is pure water at 62 degrees Fah., Barometer 30 inches. Weight of one cubic foot, 62.355 pounds	Average specific gravity Water=1	Average weight of one cubic foot, Lbs.
Oak, live, perfectly dry, .88-1.02 (see note below)	.95	59.3
" Red, Black, perfectly dry	......	32 to 45
Petroleum	.878	54.8
Pitch	1.15	71.7
Poplar, dry (see note below)	.47	29
Platinum	21.5	1342
Quartz	2.65	165
Rosin	1.10	68.6
Salt, coarse, (per struck bushel, Syracuse, N. Y., 56 pounds)	......	45
Sand, of pure quartz, perfectly dry and loose	......	90 to 106
" " " voids full of water	......	118 to 129
" " " very large and small grains, dry	......	117
Sandstone, 2.1 to 2.73, 131 to 171	2.41	151
" quarried and piled, 1 measure solid makes 1¾ (about) piled	......	86
Snow, fresh fallen	......	5 to 12
" moistened, compacted by rain	......	15 to 50
Sycamore, perfectly dry (see note below)	.59	37
Shales, red or black, 2.4 to 2.8	2.6	162
Silver	10.5	655
Slate, 2.7 to 2.9	2.8	175
Soapstone, 2.65 to 2.8	2.73	170
Steel	7.85	490
Sulphur	2.00	125
Tallow	.94	58.6
Tar	1	62.355
Tin, cast, 7.2 to 7.5	7.35	459
Walnut, Black, perfectly dry (see note below)	.61	38
Water, pure rain, distilled, at 32 degrees F., Bar. 30 inches	......	62.417
" " " at 62 degrees F., Bar. 30 inches	1	62.355
" " " at 212 degrees F., Bar. 30 inches	.....	59.7
" sea, 1.026 to 1.030	1.028	64.08
Zinc or spelter, 6.8 to 7.2	7.00	437.5

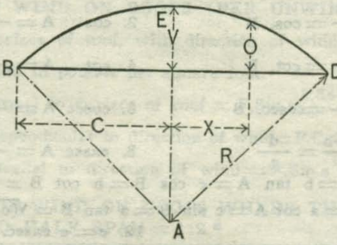
Note—Green timbers usually weigh from one-fifth to nearly one-half more than dry; ordinary building timbers, tolerably seasoned, one-sixth more.

MENSURATION.

LENGTH.

Circumference of circle = diameter $\times \pi$
Diameter of circle = circumference x .31831
Length of arc = number of degrees $\times$ radius $\times$ .017453
Degrees in an arc whose length = radius = 57° .2957795

$\pi = 3.14159265 +$



V = versed sine
C = half the chord.
R = radius
O = any ordinate.
X = distance of ordinate from centre.

$$O = \sqrt{R^2 - X^2} - (R - V).$$

$$R = \frac{V^2 + C^2}{2V} \text{ or diameter} = \frac{V^2 + C^2}{V}$$

$$V = R - \sqrt{R^2 - C^2}$$

$$X = \sqrt{R^2 - (O + R - V)^2}$$

AREA.

Area of triangle = base $\times$ half the perpendicular height.

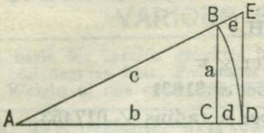
Area of circle $= \frac{\pi D^2}{4} = \pi R^2$ where **D** = diameter of circle. **R** = radius of circle.

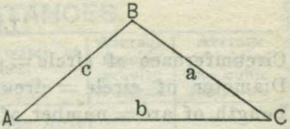
Area of sector of circle = Area **A B E D** = length of arc $\times$ half the radius

$$= \frac{\text{number of degrees in arc} \times \text{area of circle}}{360}$$

Area of segment of circle = Area **B D E** = area of sector less area of triangle.

Area of parabola = base $\times$ ⅔ height.





SOLUTION OF RIGHT TRIANGLES.

1. $\sin A = \frac{a}{c} = \cos. B$
2. $\cos A = \frac{b}{c} = \sin B$
3. $\tan A = \frac{a}{b} = \cot. B$
4. $\cot A = \frac{b}{a} = \tan. B$
5. $\sec A = \frac{c}{b} = \operatorname{cosec}. B$
6. $\operatorname{cosec} A = \frac{c}{a} = \sec. B$
7. $\operatorname{vers} A = \frac{c-b}{c} = \frac{d}{c}$
8. $\operatorname{exsec} A = \frac{e}{c}$
9. $a = c \sin A = b \tan A = c \cos B = b \cot B = \sqrt{(c+b)(c-b)}$
10. $b = c \cos A = a \cot A = c \sin B = a \tan B = \sqrt{(c+a)(c-a)}$
11. $d = c \operatorname{vers} A$
12. $e = c \operatorname{exsec}. A$
13. $c = \frac{a}{\cos B} = \frac{b}{\sin B} = \frac{a}{\sin A} = \frac{b}{\cos. A} = \frac{d}{\operatorname{vers} A} = \frac{e}{\operatorname{exsec} A}$

SOLUTION OF OBLIQUE TRIANGLES.

Given	Sought	Formulas
14. A, B, a	b, c	$b = \frac{a}{\sin A}.\ \sin B,\quad c = \frac{a}{\sin A} \sin (A+B)$
15. A, a, b	B, c	$\sin B = \frac{\sin A}{a}.\ b,\quad c = \frac{a}{\sin A}.\ \sin C.$
16. C, a, b	A—B	$\tan \frac{1}{2}(A-B) = \frac{a-b}{a+b} \tan \frac{1}{2}(A+B)$
17. a, b, c	A	Let $s = \frac{1}{2}(a+b+c)$; $\sin \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{bc}}$
18.		$\cos \frac{1}{2} A = \sqrt{\frac{s(s-a)}{bc}}$; $\tan \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$
19.		$\sin A = \frac{2\sqrt{s(s-a)(s-b)(s-c)}}{bc}$;
20.		$\operatorname{vers} A = \frac{\sqrt{2(s-b)(s-c)}}{bc}$
21.	area	$\text{area} = \sqrt{s(s-a)(s-b)(s-c)}$
22. A, B, C, a	area	$\text{area} = \frac{a^2 \sin B.\ \sin C}{2 \sin A}$
23. C, a, b	area	$\text{area} = \frac{1}{2} ab \sin C.$

NOTES ON ROOFS.

APPROXIMATE WEIGHTS, PER SQUARE FOOT OF GROUND AREA COVERED, FOR STEEL ROOF PRINCIPALS, WITH THE VARIOUS FORMS OF COVERING ENUMERATED BELOW:

Roof covered with corrugated sheets and steel purlins . . 7 to 9 lbs.
Roof covered with slates and steel purlins . . . . . 12 to 16 lbs.
Roof covered with slates, 1¼" boards and steel purlins . 15 to 20 lbs.

For large spans special calculations should be made.

PRESSURE OF WIND ON ROOFS (PER UNWIN'S FORMULAE)

a = Angle of surface of roof, with direction of wind.

F = Force of wind in pounds per square foot.

N = Pressure normal to surface of roof $= F.Sin.a^{1.84\ Cos.a—1.}$

V = Pressure perpendicular to direction of wind $= F.Cot.a.\ Sin.a^{1.84\ Cos.a.}$

H = Pressure parallel to direction of wind $= F.Sin.a^{1.84\ Cos.a.}$

PRESSURE OF WIND ON ROOFS WHERE THE PROPORTION OF HEIGHT TO HALF SPAN = 1:2.*

F. in lbs. per sq. ft.	5	10	15	20	25	30	35	40	45	50	55	60
N	2.95	5.9	8.85	11.8	14.75	17.7	20.65	23.6	26.55	29.5	32.45	35.4
V	2.65	5.3	7.95	10.6	13.25	15.9	18.55	21.2	23.85	26.5	29.15	31.8
H	1.35	2.7	4.05	5.4	6.75	8.1	9.45	10.8	12.15	13.5	14.85	16.2

PRESSURES OF WIND ON ROOFS

Angle of Roof a	5°	10°	20°	*26°34′	30°	40°	50°	60°	70°	80°	90°
N = F ×	.125	.24	.45	.59	.66	.83	.95	1.00	1.02	1.01	1.00
V = F ×	.122	.24	.42	.53	.57	.64	.61	.50	.35	.17	.00
H = F ×	.01	.04	.15	.27	.33	.53	.73	.85	.96	.99	1.00

PROPORTIONS OF ROOFS

Proportion of height to half span	Angle		Proportion of length of rafter		Proportion of height to half span	Angle		Proportion of length of rafter	
	Deg.	Min.	to height	to half span		Deg.	Min.	to height	to half span
1/1	45	0	1.41421	1.41421	*1/2	26	34	2.23607	1.11803
1/1.5	33	41	1.80277	1.20185	1/2.5	21	48	2.69258	1.07703
1/√3	30	0	2.00000	1.15470	1/3	18	26	3.16228	1.05409

*The proportion, 1:2, of height to half span, has been adopted as meeting general requirements.

ROOF TRUSSES.

Table of Co-efficients for the determination of stresses, and lengths of members, in roof trusses, for any span, the proportion of height to half the span being 1 : 2.

To find the stress in any member:

Let S=Span between the points of intersection of the rafter and tie.
L=Total dead load carried by the truss, including its own weight.
W=Total wind pressure resisted by the truss, acting on one side of roof, and normal to its surface.
f=Total stress required.

Then f=(L multiplied by co-efficient for dead load) + (W multiplied by co-efficient* for wind pressure).

* In trusses of larger spans it is sometimes advisable to provide for expansion, in which case the co-efficient for wind pressure corresponding to "one end free" should be used.

To find the length of any member between points of intersection:
Multiply S by the length co-efficient for that member.

Note.—The following stress co-efficients have been calculated on the assumption that the roof purlins occur over the points of intersection of the various members with the rafter; when such is not the case, bending is produced in the rafter which necessitates further calculation, or allowance being made when deciding its section.

	Member of truss	Stress co-efficients: Dead load	Normal wind pressure: Both ends fixed	Normal wind pressure: One end free	Length co-efficients
FIG. 1	ab	.838	.875	....	.27950
	bd	.727	.875	....	.27950
	bc	.223	.500	....	.13975
	ac	.750	.978	....	.31250
	ce	.500	.419	....	.18750
	cd	.250	.559	....	.31250
FIG. 2	ab	.932	1.042	....	.18634
	bd	.758	.820	....	.18634
	de	.783	1.042	....	.18634
	bc	.179	.401	....	.16797
	dc	.179	.401	....	.16797
	ac	.833	1.165	....	.31250
	cf	.500	.419	....	.18750
	ce	.333	.746	....	.31250
FIG. 3	ab	.978	1.125	1.125	.13975
	bd	.922	1.125	1.125	.13975
	df	.866	1.125	1.125	.13975
	fh	.811	1.125	1.125	.13975
	bc	.112	.250	.250	.06987
	fg	.112	.250	.250	.06987
	de	.224	.500	.500	.13975
	ac	.875	1.258	1.397	.15625
	ce	.750	.978	1.118	.15625
	ej	.500	.419	.559	.18750
	cd	.125	.279	.279	.15625
	dg	.125	.279	.279	.15625
	gh	.375	.838	.838	.15625
	eg	.350	.559	.559	.15625

FIG. 1

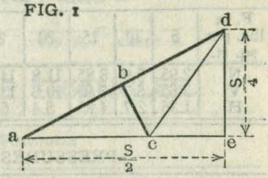


FIG. 2

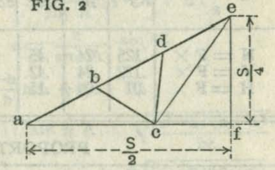
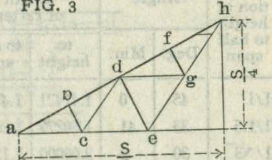


FIG. 3



Note—Heavy lines indicate compression and light lines tension members

ROOF TRUSSES.

Table of co-efficients for the determination of stresses, etc.

	Member of truss	Stress co-efficients: Dead loads	Normal wind pressure: Both ends fixed	Normal wind pressure: One end free	Length co-efficient
FIG. 4	a b	1.048	1.250	1.250	.06987
	b d	1.020	1.250	1.250	.06987
	d f	.992	1.250	1.250	.06987
	f h	.964	1.250	1.250	.06987
	h k	.936	1.250	1.250	.06987
	k m	.908	1.250	1.250	.06987
	m o	.880	1.250	1.250	.06987
	o q	.852	1.250	1.250	.06987
	b c	.056	.125	.125	.03494
	f g	.056	.125	.125	.03494
	k l	.056	.125	.125	.03494
	o p	.056	.125	.125	.03494
	d e	.112	.250	.250	.06987
	m n	.112	.250	.250	.06987
	h j	.224	.500	.500	.13975
	a c	.937	1.397	1.537	.07812
	c e	.875	1.258	1.397	.07812
	e j	.750	.978	1.118	.15625
	j r	.500	.419	.559	.18750
	c d	.062	.140	.140	.07812
	d g	.062	.140	.140	.07812
	l m	.062	.140	.140	.07812
	m p	.062	.140	.140	.07812
	g h	.187	.419	.419	.07812
	h l	.187	.419	.419	.07812
	e g	.125	.279	.279	.07812
	l n	.125	.279	.279	.07812
	p q	.437	.978	.978	.07812
	n p	.375	.838	.838	.07812
	j n	.250	.559	.559	.15625
FIG. 5	a b	1.025	1.208	1.208	.09317
	b d	.938	1.097	1.097	.09317
	d e	.950	1.208	1.208	.09317
	e g	.913	1.208	1.208	.09317
	g j	.826	1.097	1.097	.09317
	j k	.838	1.208	1.208	.09317
	b c	.090	.200	.200	.08398
	d c	.090	.200	.200	.08398
	g h	.090	.200	.200	.08398
	j h	.090	.200	.200	.08398
	e f	.224	.500	.500	.13975
	a c	.917	1.351	1.491	.15625
	c f	.750	.978	1.118	.15625
	f l	.500	.419	.559	.18750
	c e	.167	.373	.373	.15625
	e h	.167	.373	.373	.15625
	h k	.417	.932	.932	.15625
	f h	.250	.559	.559	.15625

FIG. 4

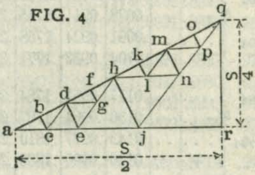
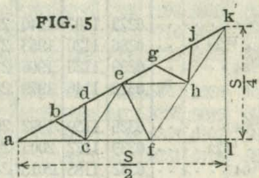


FIG. 5



Note—Heavy lines indicate compression and light lines tension members.

DECIMALS OF A FOOT FOR EACH 1/64TH OF AN INCH.

Inch	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	11″
.. 0	0	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167
1/64	.0013	.0846	.1680	.2513	.3346	.4180	.5013	.5846	.6680	.7513	.8346	.9180
.. 1/32	.0026	.0859	.1693	.2526	.3359	.4193	.5026	.5859	.6693	.7526	.8359	.9193
3/64	.0039	.0872	.1706	.2539	.3372	.4206	.5039	.5872	.6706	.7539	.8372	.9206
.. .. 1/16 ..	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219
5/64	.0065	.0898	.1732	.2565	.3398	.4232	.5065	.5898	.6732	.7565	.8398	.9232
.. 3/32	.0078	.0911	.1745	.2578	.3411	.4245	5078	.5911	.6745	.7578	.8411	.9245
7/64	.0091	.0924	.1758	.2591	.3424	.4258	.5091	.5924	.6758	.7591	.8424	.9258
.. .... 1/8	.0104	.0937	.1771	.2604	.3437	.4271	.5104	.5937	.6771	.7604	.8437	.9271
9/64	.0117	.0951	.1784	.2617	.3451	.4284	.5117	.5951	.6784	.7617	.8451	.9284
.. 5/32	.0130	.0964	.1797	.2630	.3464	.4297	.5130	.5964	.6797	.7630	.8464	.9297
11/64	.0143	.0977	.1810	.2643	.3477	.4310	.5143	.5977	.6810	.7643	.8477	.9310
.. .. 3/16 ..	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323
13/64	.0169	.1003	.1836	.2669	.3503	.4336	.5169	.6003	.6836	.7669	.8503	.9336
.. 7/32	.0182	.1016	.1849	.2682	.3516	.4349	.5182	.6016	.6849	.7682	.8516	.9349
15/64	.0195	.1029	.1862	.2695	.3529	.4362	.5195	.6029	.6862	.7695	.8529	.9362
.. .... 1/4	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375
17/64	.0221	.1055	.1888	.2721	.3555	.4388	.5221	.6055	.6888	.7721	.8555	.9388
.. 9/32	.0234	.1068	.1901	.2734	.3568	.4401	.5234	.6068	.6901	.7734	.8568	.9401
19/64	.0247	.1081	.1914	.2747	.3581	.4414	.5247	.6081	.6914	.7747	.8581	.9414
.. .. 5/16 ..	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427
21/64	.0273	.1107	.1940	.2773	.3607	.4440	.5273	.6107	.6940	.7773	.8607	.9440
.. 11/32	.0286	.1120	.1953	.2786	.3620	.4453	.5286	.6120	.6953	.7786	.8620	.9453
23/64	.0299	.1133	.1966	.2799	.3633	.4466	.5299	.6133	.6966	.7799	.8633	.9466
.. .... 3/8	.0312	.1146	.1979	.2812	.3646	.4479	.5312	.6146	.6979	.7812	.8646	.9479
25/64	.0326	.1159	.1992	.2826	.3659	.4492	.5326	.6159	.6992	.7826	.8659	.9492
.. 13/32	.0339	.1172	.2005	.2839	.3672	.4505	.5339	.6172	.7005	.7839	.8672	.9505
27/64	.0352	.1185	.2018	.2852	.3685	.4518	.5352	.6185	.7018	.7852	.8685	.9518
.. .. 7/16 ..	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531
29/64	.0378	.1211	.2044	.2878	.3711	.4544	.5378	.6211	.7044	.7878	.8711	.9544
.. 15/32	.0391	.1224	.2057	.2891	.3724	.4557	.5391	.6224	.7057	.7891	.8724	.9557
31/64	.0404	.1237	.2070	.2904	.3737	.4570	.5404	.6237	.7070	.7904	.8737	.9570
.. .... 1/2	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583

DECIMALS OF A FOOT FOR EACH 1/64th OF AN INCH.

Inch	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	11″
33/64	.0430	.1263	.2096	.2930	.3763	.4596	.5430	.6263	.7096	.7930	.8763	.9596
17/32	.0443	.1276	.2109	.2943	3776	.4609	.5443	.6276	.7109	.7943	.8776	.9609
35/64	.0456	.1289	.2122	.2956	.3789	.4622	.5456	.6289	.7122	.7956	.8789	.9622
9/16	.0469	.1302	.2135	.2969	.3802	.4635	.5469	.6302	.7135	.7969	.8802	.9635
37/64	.0482	.1315	.2148	.2982	.3815	.4648	.5482	.6315	.7148	.7982	.8815	.9648
19/32	.0495	.1328	.2161	.2995	.3828	.4661	.5495	.6328	.7161	.7995	.8828	.9661
39/64	.0508	.1341	.2174	.3008	.3841	.4674	.5508	.6341	.7174	.8008	.8841	.9674
5/8	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688
41/64	0534	.1367	.2201	.3034	.3867	.4701	.5534	.6367	.7201	.8034	.8867	.9701
21/32	.0547	.1380	.2214	.3047	.3880	.4714	.5547	.6380	.7214	.8047	.8880	.9714
43/64	.0560	.1393	.2227	.3060	.3893	.4727	.5560	.6393	.7227	.8060	.8893	.9727
11/16	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740
45/64	.0586	.1419	.2253	.3086	.3919	.4753	.5586	.6419	.7253	.8086	.8919	.9753
23/32	.0599	.1432	.2266	.3099	.3932	.4766	.5599	.6432	.7266	.8099	.8932	.9766
47/64	.0612	.1445	.2279	.3112	.3955	.4779	.5612	.6445	.7279	.8112	.8945	.9779
3/4	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792
49/64	.0638	.1471	.2305	.3138	.3971	.4805	.5638	.6471	.7305	.8138	.8971	.9805
25/32	.0651	.1484	.2318	.3151	.3984	.4818	.5651	.6484	.7318	.8151	.8984	.9818
51/64	.0664	.1497	.2331	.3164	.3997	.4831	.5664	.6497	.7331	.8164	.8997	.9831
13/16	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844
53/64	.0690	.1523	.2357	.3190	.4023	.4857	.5690	.6523	.7357	.8190	.9023	.9857
27/32	.0703	.1536	.2370	.3203	.4036	.4870	.5703	.6536	.7370	.8203	.9036	.9870
55/64	.0716	.1549	.2383	.3216	.4049	.4883	.5716	.6549	.7383	.8216	.9049	.9883
7/8	.0729	.1562	.2396	.3229	.4062	.4896	.5729	.6562	.7396	.8229	.9062	.9896
57/64	.0742	.1576	.2409	.3242	.4076	.4909	.5742	.6576	.7409	.8242	.9076	.9909
29/32	0755	.1589	.2422	.3255	.4089	.4922	.5755	.6589	.7422	.8255	.9089	.9922
59/64	.0768	.1602	.2435	.3268	.4102	.4935	.5768	.6602	.7435	.8268	.9102	.9935
15/16	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948
61/64	.0794	.1628	.2461	.3294	.4128	.4961	.5794	.6628	.7461	.8294	.9128	.9961
31/32	.0807	.1641	.2474	.3307	.4141	.4974	.5807	.6641	.7474	.8307	.9141	.9974
63/64	.0820	.1654	.2487	.3320	.4154	.4987	.5820	.6654	.7487	.8320	.9154	.9987
1	..	..	..	..	..	..	..	..	..	..	..	1.0000

DECIMAL EQUIVALENTS.

EXACT DECIMAL EQUIVALENTS OF THE FRACTION OF AN INCH

Fractions				Decimals	Fractions				Decimals
1/64	...	...	..	.015625	33/64	...	...	..	.515625
...	1/32	...	..	.03125	...	17/32	...	..	.53125
3/64	...	...	..	.046875	35/64	...	...	..	.546875
...	...	1/16	..	.0625	...	...	9/16	..	.5625
5/64	...	...	..	.078125	37/64	...	...	..	.578125
...	3/32	...	..	.09375	...	19/32	...	..	.59375
7/64	...	...	..	.109375	39/64	...	...	..	.609375
...	...	...	1/8	.125	...	...	...	5/8	.625
9/64	...	...	..	.140625	41/64	...	...	..	.640625
...	5/32	...	..	.15625	...	21/32	...	..	.65625
11/64	...	...	..	.171875	43/64	...	...	..	.671875
...	...	3/16	..	.1875	...	...	11/16	..	.6875
13/64	...	...	..	.203125	45/64	...	...	..	.703125
...	7/32	...	..	.21875	...	23/32	...	..	.71875
15/64	...	...	..	.234375	47/64	...	...	..	.734375
...	...	...	1/4	.25	...	...	...	3/4	.75
17/64	...	...	..	.265625	49/64	...	...	..	.765625
...	9/32	...	..	.28125	...	25/32	...	..	.78125
19/64	...	...	..	.296875	51/64	...	...	..	.796875
...	...	5/16	..	.3125	...	...	13/16	..	.8125
21/64	...	...	..	.328125	53/64	...	...	..	.828125
...	11/32	...	..	.34375	...	27/32	...	..	.84375
23/64	...	...	..	.359375	55/64	...	...	..	.859375
...	...	...	3/8	.375	...	...	...	7/8	.875
25/64	...	...	..	.390625	57/64	...	...	..	.890625
...	13/32	...	..	.40625	...	29/32	...	..	.90625
27/64	...	...	..	.421875	59/64	...	...	..	.921875
...	...	7/16	..	.4375	...	...	15/16	..	.9375
29/64	...	...	..	.453125	61/64	...	...	..	.953125
...	15/32	...	..	.46875	...	31/32	...	..	.96875
31/64	...	...	..	.484375	63/64	...	...	..	.984375
...	...	...	1/2	.5	...	...	...	1	1.00

AREAS AND CIRCUMFERENCES OF CIRCLES.

For diameters from 1/10 to 100, advancing by tenths.

Diam.	Area	Circum.	Diam.	Area	Circum.
0.0			4.0	12.5664	12.5664
.1	.007854	.31416	.1	13.2025	12.8805
.2	.031416	.62832	.2	13.8544	13.1947
.3	.070686	.94248	.3	14.5220	13.5088
.4	.12566	1.2566	.4	15.2053	13.8230
.5	.19635	1.5708	.5	15.9043	14.1372
.6	.28274	1.8850	.6	16.6190	14.4513
.7	.38485	2.1991	.7	17.3494	14.7655
.8	.50265	2.5133	.8	18.0956	15.0796
.9	.63617	2.8274	.9	18.8574	15.3938
1.0	.7854	3.1416	5.0	19.6350	15.7080
.1	.9503	3.4558	.1	20.4282	16.0221
.2	1.1310	3.7699	.2	21.2372	16.3363
.3	1.3273	4.0841	.3	22.0618	16.6504
.4	1.5394	4.3982	.4	22.9022	16.9646
.5	1.7671	4.7124	.5	23.7583	17.2788
.6	2.0106	5.0265	.6	24.6301	17.5929
.7	2.2698	5.3407	.7	25.5176	17.9071
.8	2.5447	5.6549	.8	26.4208	18.2212
.9	2.8353	5.9690	.9	27.3397	18.5354
2.0	3.1416	6.2832	6.0	28.2743	18.8496
.1	3.4636	6.5973	.1	29.2247	19.1637
.2	3.8013	6.9115	.2	30.1907	19.4779
.3	4.1548	7.2257	.3	31.1725	19.7920
.4	4.5239	7.5398	.4	32.1699	20.1062
.5	4.9087	7.8540	.5	33.1831	20.4204
.6	5.3093	8.1681	.6	34.2119	20.7345
.7	5.7256	8.4823	.7	35.2565	21.0487
.8	6.1575	8.7965	.8	36.3168	21.3628
.9	6.6052	9.1106	.9	37.3928	21.6770
3.0	7.0686	9.4248	7.0	38.4845	21.9911
.1	7.5477	9.7389	.1	39.5919	22.3053
.2	8.0425	10.0531	.2	40.7150	22.6195
.3	8.5530	10.3673	.3	41.8539	22.9336
.4	9.0792	10.6814	.4	43.0084	23.2478
.5	9.6211	10.9956	.5	44.1786	23.5619
.6	10.1788	11.3097	.6	45.3646	23.8761
.7	10.7521	11.6239	.7	46.5663	24.1903
.8	11.3411	11.9381	.8	47.7836	24.5044
.9	11.9459	12.2522	.9	49.0167	24.8186

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
8.0	50.2655	25.1327	12.0	113.0973	37.6991
.1	51.5300	25.4469	.1	114.9901	38.0133
.2	52.8102	25.7611	.2	116.8987	38.3274
.3	54.1061	26.0752	.3	118.8229	38.6416
.4	55.4177	26.3894	.4	120.7628	38.9557
.5	56.7450	26.7035	.5	122.7185	39.2699
.6	58.0880	27.0177	.6	124.6898	39.5841
.7	59.4468	27.3319	.7	126.6769	39.8982
.8	60.8212	27.6460	.8	128.6796	40.2124
.9	62.2114	27.9602	.9	130.6981	40.5265
9.0	63.6173	28.2743	13.0	132.7323	40.8407
.1	65.0388	28.5885	.1	134.7822	41.1549
.2	66.4761	28.9027	.2	136.8478	41.4690
.3	67.9291	29.2168	.3	138.9291	41.7832
.4	69.3978	29.5310	.4	141.0261	42.0973
.5	70.8822	29.8451	.5	143.1388	42.4115
.6	72.3823	30.1593	.6	145.2672	42.7257
.7	73.8981	30.4734	.7	147.4114	43.0398
.8	75.4296	30.7876	.8	149.5712	43.3540
.9	76.9769	31.1018	.9	151.7468	43.6681
10.0	78.5398	31.4159	14.0	153.9380	43.9823
.1	80.1185	31.7301	.1	156.1450	44.2965
.2	81.7128	32.0442	.2	158.3677	44.6106
.3	83.3229	32.3584	.3	160.6061	44.9248
.4	84.9487	32.6726	.4	162.8602	45.2389
.5	86.5901	32.9867	.5	165.1300	45.5531
.6	88.2473	33.3009	.6	167.4155	45.8673
.7	89.9202	33.6150	.7	169.7167	46.1814
.8	91.6088	33.9292	.8	172.0336	46.4956
.9	93.3132	34.2434	.9	174.3662	46.8097
11.0	95.0332	34.5575	15.0	176.7146	47.1239
.1	96.7689	34.8717	.1	179.0786	47.4380
.2	98.5203	35.1858	.2	181.4584	47.7522
.3	100.2875	35.5000	.3	183.8539	48.0664
.4	102.0703	35.8142	.4	186.2650	48.3805
.5	103.8689	36.1283	.5	188.6919	48.6947
.6	105.6832	36.4425	.6	191.1345	49.0088
.7	107.5132	36.7566	.7	193.5928	49.3230
.8	109.3588	37.0708	.8	196.0668	49.6372
.9	111.2202	37.3850	.9	198.5565	49.9513

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
16.0	201.0619	50.2655	20.0	314.1593	62.8319
.1	203.5831	50.5796	.1	317.3087	63.1460
.2	206.1199	50.8938	.2	320.4739	63.4602
.3	208.6724	51.2080	.3	323.6547	63.7743
.4	211.2407	51.5221	.4	326.8513	64.0885
.5	213.8246	51.8363	.5	330.0636	64.4026
.6	216.4243	52.1504	.6	333.2916	64.7168
.7	219.0397	52.4646	.7	336.5353	65.0310
.8	221.6708	52.7788	.8	339.7947	65.3451
.9	224.3176	53.0929	.9	343.0698	65.6593
17.0	226.9801	53.4071	21.0	346.3606	65.9734
.1	229.6583	53.7212	.1	349.6671	66.2876
.2	232.3522	54.0354	.2	352.9893	66.6018
.3	235.0618	54.3496	.3	356.3273	66.9159
.4	237.7871	54.6637	.4	359.6809	67.2301
.5	240.5282	54.9779	.5	363.0503	67.5442
.6	243.2849	55.2920	.6	366.4354	67.8584
.7	246.0574	55.6062	.7	369.8361	68.1726
.8	248.8456	55.9203	.8	373.2526	68.4867
.9	251.6494	56.2345	.9	376.6848	68.8009
18.0	254.4690	56.5487	22.0	380.1327	69.1150
.1	257.3043	56.8628	.1	383.5963	69.4292
.2	260.1553	57.1770	.2	387.0756	69.7434
.3	263.0220	57.4911	.3	390.5707	70.0575
.4	265.9044	57.8053	.4	394.0814	70.3717
.5	268.8025	58.1195	.5	397.6078	70.6858
.6	271.7163	58.4336	.6	401.1500	71.0000
.7	274.6459	58.7478	.7	404.7078	71.3142
.8	277.5911	59.0619	.8	408.2814	71.6283
.9	280.5521	59.3761	.9	411.8706	71.9425
19.0	283.5287	59.6903	23.0	415.4756	72.2566
.1	286.5211	60.0044	.1	419.0963	72.5708
.2	289.5292	60.3186	.2	422.7327	72.8849
.3	292.5530	60.6327	.3	426.3848	73.1991
.4	295.5925	60.9469	.4	430.0526	73.5133
.5	298.6477	61.2611	.5	433.7361	73.8274
.6	301.7186	61.5752	.6	437.4354	74.1416
.7	304.8052	61.8894	.7	441.1503	74.4557
.8	307.9075	62.2035	.8	444.8809	74.7699
.9	311.0255	62.5177	.9	448.6273	75.0841

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
24.0	452.3893	75.3982	28.0	615.7522	87.9646
.1	456.1671	75.7124	.1	620.1582	88.2788
.2	459.9606	76.0265	.2	624.5800	88.5929
.3	463.7698	76.3407	.3	629.0175	88.9071
.4	467.5946	76.6549	.4	633.4707	89.2212
.5	471.4352	76.9690	.5	637.9397	89.5354
.6	475.2916	77.2832	.6	642.4243	89.8495
.7	479.1636	77.5973	.7	646.9246	90.1637
.8	483.0513	77.9115	.8	651.4406	90.4779
.9	486.9547	78.2257	.9	655.9724	90.7920
25.0	490.8739	78.5398	29.0	660.5199	91.1062
.1	494.8087	78.8540	.1	665.0830	91.4203
.2	498.7592	79.1681	.2	669.6619	91.7345
.3	502.7255	79.4823	.3	674.2565	92.0487
.4	506.7075	79.7965	.4	678.8668	92.3628
.5	510.7052	80.1106	.5	683.4927	92.6770
.6	514.7185	80.4248	.6	688.1345	92.9911
.7	518.7476	80.7389	.7	692.7919	93.3053
.8	522.7924	81.0531	.8	697.4650	93.6195
.9	526.8529	81.3672	.9	702.1538	93.9336
26.0	530.9292	81.6814	30.0	706.8583	94.2478
.1	535.0211	81.9956	.1	711.5786	94.5619
.2	539.1287	82.3097	.2	716.3145	94.8761
.3	543.2521	82.6239	.3	721.0662	95.1903
.4	547.3911	82.9380	.4	725.8336	95.5044
.5	551.5459	83.2522	.5	730.6167	95.8186
.6	555.7163	83.5664	.6	735.4154	96.1327
.7	559.9025	83.8805	.7	740.2299	96.4469
.8	564.1044	84.1947	.8	745.0601	96.7611
.9	568.3220	84.5088	.9	749.9060	97.0752
27.0	572.5553	84.8230	31.0	754.7676	97.3894
.1	576.8043	85.1372	.1	759.6450	97.7035
.2	581.0690	85.4513	.2	764.5380	98.0177
.3	585.3494	85.7655	.3	769.4467	98.3319
.4	589.6455	86.0796	.4	774.3712	98.6460
.5	593.9574	86.3938	.5	779.3113	98.9602
.6	598.2849	86.7080	.6	784.2672	99.2743
.7	602.6282	87.0221	.7	789.2388	99.5885
.8	606.9871	87.3363	.8	794.2260	99.9026
.9	611.3618	87.6504	.9	799.2290	100.2168

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
32.0	804.2477	100.5310	36.0	1017.8760	113.0973
.1	809.2821	100.8451	.1	1023.5387	113.4115
.2	814.3322	101.1593	.2	1029.2172	113.7257
.3	819.3980	101.4734	.3	1034.9113	114.0398
.4	824.4796	101.7876	.4	1040.6211	114.3540
.5	829.5768	102.1018	.5	1046.3467	114.6681
.6	834.6897	102.4159	.6	1052.0880	114.9823
.7	839.8184	102.7301	.7	1057.8449	115.2965
.8	844.9628	103.0442	.8	1063.6176	115.6106
.9	850.1229	103.3584	.9	1069.4060	115.9248
33.0	855.2986	103.6726	37.0	1075.2101	116.2389
.1	860.4902	103.9867	.1	1081.0299	116.5531
.2	865.6973	104.3009	.2	1086.8654	116.8672
.3	870.9202	104.6150	.3	1092.7166	117.1814
.4	876.1588	104.9292	.4	1098.5835	117.4956
.5	881.4131	105.2434	.5	1104.4662	117.8097
.6	886.6831	105.5575	.6	1110.3645	118.1239
.7	891.9688	105.8717	.7	1116.2786	118.4380
.8	897.2703	106.1858	.8	1122.2083	118.7522
.9	902.5874	106.5000	.9	1128.1538	119.0664
34.0	907.9203	106.8142	38.0	1134.1149	119.3805
.1	913.2688	107.1283	.1	1140.0918	119.6947
.2	918.6331	107.4425	.2	1146.0844	120.0088
.3	924.0131	107.7566	.3	1152.0927	120.3230
.4	929.4088	108.0708	.4	1158.1167	120.6372
.5	934.8202	108.3849	.5	1164.1564	120.9513
.6	940.2473	108.6991	.6	1170.2118	121.2655
.7	945.6901	109.0133	.7	1176.2830	121.5796
.8	951.1486	109.3274	.8	1182.3698	121.8938
.9	956.6228	109.6416	.9	1188.4723	122.2080
35.0	962.1127	109.9557	39.0	1194.5906	122.5221
.1	967.6184	110.2699	.1	1200.7246	122.8363
.2	973.1397	110.5841	.2	1206.8742	123.1504
.3	978.6768	110.8982	.3	1213.0396	123.4646
.4	984.2296	111.2124	.4	1219.2207	123.7788
.5	989.7980	111.5265	.5	1225.4175	124.0929
.6	995.3822	111.8407	.6	1231.6300	124.4071
.7	1000.9821	112.1549	.7	1237.8582	124.7212
.8	1006.5977	112.4690	.8	1244.1021	125.0354
.9	1012.2290	112.7832	.9	1250.3617	125.3495

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
40.0	1256.6371	125.6637	44.0	1520.5308	138.2301
.1	1262.9281	125.9779	.1	1527.4502	138.5442
.2	1269.2348	126.2920	.2	1534.3853	138.8584
.3	1275.5573	126.6062	.3	1541.3360	139.1726
.4	1281.8955	126.9203	.4	1548.3025	139.4867
.5	1288.2493	127.2345	.5	1555.2847	139.8009
.6	1294.6189	127.5487	.6	1562.2826	140.1150
.7	1301.0042	127.8628	.7	1569.2962	140.4292
.8	1307.4052	128.1770	.8	1576.3255	140.7434
.9	1313.8219	128.4911	.9	1583.3705	141.0575
41.0	1320.2543	128.8053	45.0	1590.4313	141.3717
.1	1326.7024	129.1195	.1	1597.5077	141.6858
.2	1333.1663	129.4336	.2	1604.5999	142.0000
.3	1339.6458	129.7478	.3	1611.7077	142.3141
.4	1346.1410	130.0619	.4	1618.8313	142.6283
.5	1352.6520	130.3761	.5	1625.9705	142.9425
.6	1359.1786	130.6903	.6	1633.1255	143.2566
.7	1365.7210	131.0044	.7	1640.2962	143.5708
.8	1372.2791	131.3186	.8	1647.4826	143.8849
.9	1378.8529	131.6327	.9	1654.6847	144.1991
42.0	1385.4424	131.9469	46.0	1661.9025	144.5133
.1	1392.0476	132.2611	.1	1669.1360	144.8274
.2	1398.6685	132.5752	.2	1676.3852	145.1416
.3	1405.3051	132.8894	.3	1683.6502	145.4557
.4	1411.9574	133.2035	.4	1690.9308	145.7699
.5	1418.6254	133.5177	.5	1698.2272	146.0841
.6	1425.3092	133.8318	.6	1705.5392	146.3982
.7	1432.0086	134.1460	.7	1712.8670	146.7124
.8	1438.7238	134.4602	.8	1720.2105	147.0265
.9	1445.4546	134.7743	.9	1727.5696	147.3407
43.0	1452.2012	135.0885	47.0	1734.9445	147.6549
.1	1458.9635	135.4026	.1	1742.3351	147.9690
.2	1465.7415	135.7168	.2	1749.7414	148.2832
.3	1472.5352	136.0310	.3	1757.1634	148.5973
.4	1479.3446	136.3451	.4	1764.6012	148.9115
.5	1486.1697	136.6593	.5	1772.0546	149.2257
.6	1493.0105	136.9734	.6	1779.5237	149.5398
.7	1499.8670	137.2876	.7	1787.0086	149.8540
.8	1506.7392	137.6018	.8	1794.5091	150.1681
.9	1513.6272	137.9159	.9	1802.0254	150.4823

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
48.0	1809.5574	150.7964	52.0	2123.7166	163.3628
.1	1817.1050	151.1106	.1	2131.8926	163.6770
.2	1824.6684	151.4248	.2	2140.0843	163.9911
.3	1832.2475	151.7389	.3	2148.2917	164.3053
.4	1839.8423	152.0531	.4	2156.5149	164.6195
.5	1847.4528	152.3672	.5	2164.7537	164.9336
.6	1855.0790	152.6814	.6	2173.0082	165.2478
.7	1862.7210	152.9956	.7	2181.2785	165.5619
.8	1870.3786	153.3097	.8	2189.5644	165.8761
.9	1878.0519	153.6239	.9	2197.8661	166.1903
49.0	1885.7410	153.9380	53.0	2206.1834	166.5044
.1	1893.4457	154.2522	.1	2214.5165	166.8186
.2	1901.1662	154.5664	.2	2222.8653	167.1327
.3	1908.9024	154.8805	.3	2231.2298	167.4469
.4	1916.6543	155.1947	.4	2239.6100	167.7610
.5	1924.4218	155.5088	.5	2248.0059	168.0752
.6	1932.2051	155.8230	.6	2256.4175	168.3894
.7	1940.0041	156.1372	.7	2264.8448	168.7035
.8	1947.8189	156.4513	.8	2273.2879	169.0177
.9	1955.6493	156.7655	.9	2281.7466	169.3318
50.0	1963.4954	157.0796	54.0	2290.2210	169.6460
.1	1971.3572	157.3938	.1	2298.7112	169.9602
.2	1979.2348	157.7080	.2	2307.2171	170.2743
.3	1987.1280	158.0221	.3	2315.7386	170.5885
.4	1995.0370	158.3363	.4	2324.2759	170.9026
.5	2002.9617	158.6504	.5	2332.8289	171.2168
.6	2010.9020	158.9646	.6	2341.3976	171.5310
.7	2018.8581	159.2787	.7	2349.9820	171.8451
.8	2026.8299	159.5929	.8	2358.5821	172.1593
.9	2034.8174	159.9071	.9	2367.1979	172.4734
51.0	2042.8206	160.2212	55.0	2375.8294	172.7876
.1	2050.8395	160.5354	.1	2384.4767	173.1018
.2	2058.8742	160.8495	.2	2393.1396	173.4159
.3	2066.9245	161.1637	.3	2401.8183	173.7301
.4	2074.9905	161.4779	.4	2410.5126	174.0442
.5	2083.0723	161.7920	.5	2419.2227	174.3584
.6	2091.1697	162.1062	.6	2427.9485	174.6726
.7	2099.2829	162.4203	.7	2436.6899	174.9867
.8	2107.4118	162.7345	.8	2445.4471	175.3009
.9	2115.5563	163.0487	.9	2454.2200	175.6150

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
56.0	2463.0086	175.9292	60.0	2827.4334	188.4956
.1	2471.8129	176.2433	.1	2836.8660	188.8097
.2	2480.6330	176.5575	.2	2846.3143	189.1239
.3	2489.4687	176.8717	.3	2855.7784	189.4380
.4	2498.3201	177.1858	.4	2865.2582	189.7522
.5	2507.1873	177.5000	.5	2874.7536	190.0664
.6	2516.0701	177.8141	.6	2884.2648	190.3805
.7	2524.9687	178.1283	.7	2893.7917	190.6947
.8	2533.8830	178.4425	.8	2903.3343	191.0088
.9	2542.8129	178.7566	.9	2912.8925	191.3230
57.0	2551.7586	179.0708	61.0	2922.4666	191.6372
.1	2560.7200	179.3849	.1	2932.0563	191.9513
.2	2569.6971	179.6991	.2	2941.6617	192.2655
.3	2578.6899	180.0133	.3	2951.2828	192.5796
.4	2587.6984	180.3274	.4	2960.9196	192.8938
.5	2596.7227	180.6416	.5	2970.5722	193.2079
.6	2605.7626	180.9557	.6	2980.2404	193.5221
.7	2614.8182	181.2699	.7	2989.9244	193.8363
.8	2623.8896	181.5841	.8	2999.6241	194.1504
.9	2632.9766	181.8982	.9	3009.3394	194.4646
58.0	2642.0794	182.2124	62.0	3019.0705	194.7787
.1	2651.1979	182.5265	.1	3028.8173	195.0929
.2	2660.3321	182.8407	.2	3038.5798	195.4071
.3	2669.4820	183.1549	.3	3048.3580	195.7212
.4	2678.6475	183.4690	.4	3058.1519	196.0354
.5	2687.8289	183.7832	.5	3067.9616	196.3495
.6	2697.0259	184.0973	.6	3077.7869	196.6637
.7	2706.2386	184.4115	.7	3087.6279	196.9779
.8	2715.4670	184.7256	.8	3097.4847	197.2920
.9	2724.7112	185.0398	.9	3107.3571	197.6062
59.0	2733.9710	185.3540	63.0	3117.2453	197.9203
.1	2743.2465	185.6681	.1	3127.1492	198.2345
.2	2752.5378	185.9823	.2	3137.0687	198.5487
.3	2761.8448	186.2964	.3	3147.0040	198.8628
.4	2771.1675	186.6106	.4	3156.9550	199.1770
.5	2780.5058	186.9248	.5	3166.9217	199.4911
.6	2789.8599	187.2389	.6	3176.9041	199.8053
.7	2799.2297	187.5531	.7	3186.9023	200.1195
.8	2808.6152	187.8672	.8	3196.9161	200.4336
.9	2818.0165	188.1814	.9	3206.9456	200.7478

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
64.0	3216.9909	201.0620	68.0	3631.6811	213.6283
.1	3227.0518	201.3761	.1	3642.3704	213.9425
.2	3237.1285	201.6902	.2	3653.0753	214.2566
.3	3247.2208	202.0044	.3	3663.7960	214.5708
.4	3257.3289	202.3186	.4	3674.5324	214.8849
.5	3267.4527	202.6327	.5	3685.2845	215.1991
.6	3277.5922	202.9469	.6	3696.0523	215.5133
.7	3287.7474	203.2610	.7	3706.8358	215.8274
.8	3297.9183	203.5752	.8	3717.6351	216.1416
.9	3308.1049	203.8894	.9	3728.4500	216.4556
65.0	3318.3072	204.2035	69.0	3739.2807	216.7699
.1	3328.5253	204.5177	.1	3750.1270	217.0841
.2	3338.7590	204.8318	.2	3760.9890	217.3982
.3	3349.0084	205.1460	.3	3771.8668	217.7124
.4	3359.2736	205.4602	.4	3782.7603	218.0265
.5	3369.5545	205.7743	.5	3793.6695	218.3407
.6	3379.8510	206.0885	.6	3804.5944	218.6548
.7	3390.1633	206.4026	.7	3815.5349	218.9690
.8	3400.4913	206.7168	.8	3826.4913	219.2832
.9	3410.8350	207.0310	.9	3837.4633	219.5973
66.0	3421.1944	207.3451	70.0	3848.4510	219.9115
.1	3431.5695	207.6593	.1	3859.4544	220.2256
.2	3441.9603	207.9734	.2	3870.4735	220.5398
.3	3452.3668	208.2876	.3	3881.5084	220.8540
.4	3462.7891	208.6017	.4	3892.5589	221.1681
.5	3473.2270	208.9159	.5	3903.6252	221.4823
.6	3483.6807	209.2301	.6	3914.7072	221.7964
.7	3494.1500	209.5442	.7	3925.8048	222.1106
.8	3504.6351	209.8584	.8	3936.9182	222.4248
.9	3515.1359	210.1725	.9	3948.0473	222.7389
67.0	3525.6523	210.4867	71.0	3959.1921	223.0531
.1	3536.1845	210.8009	.1	3970.3526	223.3672
.2	3546.7324	211.1150	.2	3981.5288	223.6814
.3	3557.2960	211.4292	.3	3992.7208	223.9956
.4	3567.8753	211.7433	.4	4003.9284	224.3097
.5	3578.4704	212.0575	.5	4015.1517	224.6239
.6	3589.0811	212.3717	.6	4026.3908	224.9380
.7	3599.7075	212.6858	.7	4037.6455	225.2522
.8	3610.3497	213.0000	.8	4048.9160	225.5664
.9	3621.0075	213.3141	.9	4060.2022	225.8805

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
72.0	4071.5041	226.1947	76.0	4536.4598	238.7610
.1	4082.8216	226.5088	.1	4548.4057	239.0752
.2	4094.1549	226.8230	.2	4560.3673	239.3894
.3	4105.5039	227.1371	.3	4572.3446	239.7035
.4	4116.8687	227.4513	.4	4584.3376	240.0177
.5	4128.2491	227.7655	.5	4596.3464	240.3318
.6	4139.6452	228.0796	.6	4608.3708	240.6460
.7	4151.0570	228.3938	.7	4620.4110	240.9602
.8	4162.4846	228.7079	.8	4632.4668	241.2743
.9	4173.9278	229.0221	.9	4644.5384	241.5885
73.0	4185.3868	229.3363	77.0	4656.6257	241.9026
.1	4196.8615	229.6504	.1	4668.7287	242.2168
.2	4208.3518	229.9646	.2	4680.8474	242.5310
.3	4219.8579	230.2787	.3	4692.9818	242.8451
.4	4231.3797	230.5929	.4	4705.1319	243.1592
.5	4242.9172	230.9071	.5	4717.2977	243.4734
.6	4254.4704	231.2212	.6	4729.4792	243.7876
.7	4266.0393	231.5354	.7	4741.6765	244.1017
.8	4277.6240	231.8495	.8	4753.8894	244.4159
.9	4289.2243	232.1637	.9	4766.1180	244.7301
.74.0	4300.8403	232.4779	78.0	4778.3624	245.0442
.1	4312.4721	232.7929	.1	4790.6225	245.3584
.2	4324.1195	233.1062	.2	4802.8982	245.6725
.3	4335.7827	233.4203	.3	4815.1897	245.9867
.4	4347.4616	233.7345	.4	4827.4969	246.3009
.5	4359.1562	234.0487	.5	4839.8198	246.6150
.6	4370.8664	234.3628	.6	4852.1584	246.9292
.7	4382.5924	234.6770	.7	4864.5127	247.2433
.8	4394.3341	234.9911	.8	4876.8828	247.5575
.9	4406.0915	235.3053	.9	4889.2685	247.8717
75.0	4417.8647	235.6194	79.0	4901.6699	248.1858
.1	4429.6535	235.9336	.1	4914.0871	248.5000
.2	4441.4580	236.2478	.2	4926.5199	248.8141
.3	4453.2783	236.5619	.3	4938.9685	249.1283
.4	4465.1142	236.8761	.4	4951.4328	249.4425
.5	4476.9659	237.1902	.5	4963.9127	249.7566
.6	4488.8332	237.5044	.6	4976.4084	250.0708
.7	4500.7163	237.8186	.7	4988.9198	250.3849
.8	4512.6151	238.1327	.8	5001.4469	250.6991
.9	4524.5296	238.4469	.9	5013.9897	251.0133

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
80.0	5026.5482	251.3274	84.0	5541.7694	263.8938
.1	5039.1224	251.6416	.1	5554.9720	264.2079
.2	5051.7124	251.9557	.2	5568.1902	264.5221
.3	5064.3180	252.2699	.3	5581.4242	264.8363
.4	5076.9394	252.5840	.4	5594.6738	265.1504
.5	5089.5764	252.8982	.5	5607.9392	265.4646
.6	5102.2292	253.2124	.6	5621.2203	265.7787
.7	5114.8977	253.5265	.7	5634.5171	266.0929
.8	5127.5818	253.8407	.8	5647.8296	266.4071
.9	5140.2817	254.1548	.9	5661.1578	266.7212
81.0	5152.9973	254.4690	85.0	5674.5017	267.0354
.1	5165.7286	254.7832	.1	5687.8613	267.3495
.2	5178.4756	255.0973	.2	5701.2367	267.6637
.3	5191.2384	255.4115	.3	5714.6277	267.9779
.4	5204.0168	255.7256	.4	5728.0344	268.2920
.5	5216.8109	256.0398	.5	5741.4569	268.6062
.6	5229.6208	256.3540	.6	5754.8951	268.9203
.7	5242.4463	256.6681	.7	5768.3489	269.2345
.8	5255.2876	256.9823	.8	5781.8185	269.5486
.9	5268.1446	257.2964	.9	5795.3038	269.8628
82.0	5281.0172	257.6106	86.0	5808.8048	270.1770
.1	5293.9056	257.9248	.1	5822.3215	270.4911
.2	5306.8097	258.2389	.2	5835.8539	270.8053
.3	5319.7295	258.5531	.3	5849.4020	271.1194
.4	5332.6650	258.8672	.4	5862.9659	271.4336
.5	5345.6162	259.1814	.5	5876.5454	271.7478
.6	5358.5832	259.4956	.6	5890.1406	272.0619
.7	5371.5658	259.8097	.7	5903.7516	272.3761
.8	5384.5641	260.1239	.8	5917.3782	272.6902
.9	5397.5782	260.4380	.9	5931.0206	273.0044
83.0	5410.6079	260.7522	87.0	5944.6787	273.3186
.1	5423.6534	261.0663	.1	5958.3525	273.6327
.2	5436.7146	261.3805	.2	5972.0419	273.9469
.3	5449.7914	261.6947	.3	5985.7471	274.2610
.4	5462.8840	262.0088	.4	5999.4680	274.5752
.5	5475.9923	262.3230	.5	6013.2047	274.8894
.6	5489.1163	262.6371	.6	6026.9570	275.2035
.7	5502.2560	262.9513	.7	6040.7250	275.5177
.8	5515.4115	263.2655	.8	6054.5088	275.8318
.9	5528.5826	263.5796	.9	6068.3082	276.1460

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONTINUED)

Diam.	Area	Circum.	Diam.	Area	Circum.
88.0	6082.1234	276.4602	92.0	6647.6100	289.0265
.1	6095.9542	276.7743	.1	6662.0692	289.3407
.2	6109.8008	277.0885	.2	6676.5441	289.6548
.3	6123.6631	277.4026	.3	6691.0347	289.9690
.4	6137.5410	277.7168	.4	6705.5410	290.2832
.5	6151.4347	278.0309	.5	6720.0630	290.5973
.6	6165.3441	278.3451	.6	6734.6007	290.9115
.7	6179.2692	278.6593	.7	6749.1542	291.2256
.8	6193.2101	278.9734	.8	6763.7233	291.5398
.9	6207.1666	279.2876	.9	6778.3081	291.8540
89.0	6221.1388	279.6017	93.0	6792.9087	292.1681
.1	6235.1268	279.9159	.1	6807.5249	292.4823
.2	6249.1304	280.2301	.2	6822.1569	292.7964
.3	6263.1498	280.5442	.3	6836.8046	293.1106
.4	6277.1848	280.8584	.4	6851.4680	293.4248
.5	6291.2356	281.1725	.5	6866.1471	293.7389
.6	6305.3021	281.4867	.6	6880.8419	294.0531
.7	6319.3843	281.8009	.7	6895.5524	294.3672
.8	6333.4822	282.1150	.8	6910.2786	294.6814
.9	6347.5958	282.4292	.9	6925.0205	294.9956
90.0	6361.7251	282.7433	94.0	6939.7781	295.3097
.1	6375.8701	283.0575	.1	6954.5515	295.6239
.2	6390.0308	283.3717	.2	6969.3405	295.9380
.3	6404.2073	283.6858	.3	6984.1453	296.2522
.4	6418.3994	284.0000	.4	6998.9657	296.5663
.5	6432.6073	284.3141	.5	7013.8019	296.8805
.6	6446.8308	284.6283	.6	7028.6538	297.1947
.7	6461.0701	284.9425	.7	7043.5214	297.5088
.8	6475.3251	285.2566	.8	7058.4047	297.8230
.9	6489.5958	285.5708	.9	7073.3037	298.1371
91.0	6503.8822	285.8849	95.0	7088.2184	298.4513
.1	6518.1843	286.1991	.1	7103.1488	298.7655
.2	6532.5021	286.5132	.2	7118.0949	299.0796
.3	6546.8356	286.8274	.3	7133.0568	299.3938
.4	6561.1848	287.1416	.4	7148.0343	299.7079
.5	6575.5497	287.4557	.5	7163.0276	300.0221
.6	6589.9304	287.7699	.6	7178.0365	300.3363
.7	6604.3267	288.0840	.7	7193.0612	300.6504
.8	6618.7388	288.3982	.8	7208.1016	300.9646
.9	6633.1666	288.7124	.9	7223.1577	301.2787

AREAS AND CIRCUMFERENCES OF CIRCLES.

(CONCLUDED)

Diam.	Area	Circum.	Diam.	Area	Circum.
96.0	7238.2294	301.5929	98.0	7542.9639	307.8761
.1	7253.3169	301.9071	.1	7558.3656	308.1902
.2	7268.4201	302.2212	.2	7573.7830	308.5044
.3	7283.5391	302.5354	.3	7589.2161	308.8186
.4	7298.6737	302.8495	.4	7604.6648	309.1327
.5	7313.8240	303.1637	.5	7620.1293	309.4469
.6	7328.9901	303.4779	.6	7635.6095	309.7610
.7	7344.1718	303.7920	.7	7651.1054	310.0752
.8	7359.3693	304.1062	.8	7666.6170	310.3894
.9	7374.5824	304.4203	.9	7682.1443	310.7035
97.0	7389.8113	304.7345	99.0	7697.6874	311.0177
.1	7405.0559	305.0486	.1	7713.2461	311.3318
.2	7420.3162	305.3628	.2	7728.8205	311.6460
.3	7435.5921	305.6770	.3	7744.4107	311.9602
.4	7450.8838	305.9911	.4	7760.0166	312.2743
.5	7466.1913	306.3053	.5	7775.6381	312.5885
.6	7481.5144	306.6194	.6	7791.2754	312.9026
.7	7496.8532	306.9336	.7	7806.9284	313.2168
.8	7512.2077	307.2478	.8	7822.5971	313.5309
.9	7527.5780	307.5619	.9	7838.2815	313.8451
			100.0	7853.9816	314.1593

LOGARITHMS OF NUMBERS, FROM 0 TO 1000.

No	0	1	2	3	4	5	6	7	8	9
0	0	00000	30103	47712	60206	69897	77815	84510	90309	95424
10	00000	00432	00860	01284	01703	02119	02531	02938	03342	03743
11	04139	04532	04922	05308	05690	06070	06446	06819	07188	07555
12	07918	08279	08636	08991	09342	09691	10037	10380	10721	11059
13	11394	11727	12057	12385	12710	13033	13354	13672	13988	14301
14	14613	14922	15229	15534	15836	16137	16435	16732	17026	17319
15	17609	17898	18184	18469	18752	19033	19312	19590	19866	20140
16	20412	20683	20952	21219	21484	21748	22011	22272	22531	22789
17	23045	23300	23553	23805	24055	24304	24551	24797	25042	25285
18	25527	25768	26007	26245	26482	26717	26951	27184	27416	27646
19	27875	28103	28330	28556	28780	29003	29226	29447	29667	29885
20	30103	30320	30535	30750	30963	31175	31387	31597	31806	32015
21	32222	32428	32634	32838	33041	33244	33445	33646	33846	34044
22	34242	34439	34635	34830	35025	35218	35411	35603	35793	35984
23	36173	36361	36549	36736	36922	37107	37291	37475	37658	37840
24	38021	38202	38382	38561	38739	38917	39094	39270	39445	39620
25	39794	39967	40140	40312	40483	40654	40824	40993	41162	41330
26	41497	41664	41830	41996	42160	42325	42488	42651	42813	42975
27	43136	43297	43457	43616	43775	43933	44091	44248	44404	44560
28	44716	44871	45025	45179	45332	45484	45637	45788	45939	46090
29	46240	46389	46538	46687	46835	46982	47129	47276	47422	47567
30	47712	47857	48001	48144	48287	48430	48572	48714	48855	48996
31	49136	49276	49415	49554	49693	49831	49969	50106	50243	50379
32	50515	50651	50786	50920	51055	51188	51322	51455	51587	51720
33	51851	51983	52114	52244	52375	52504	52634	52763	52892	53020
34	53148	53275	53403	53529	53656	53782	53908	54033	54158	54283
35	54407	54531	54654	54777	54900	55023	55145	55267	55388	55509
36	55630	55751	55871	55991	56110	56229	56348	56467	56585	56703
37	56820	56937	57054	57171	57287	57403	57519	57634	57749	57864
38	57978	58093	58206	58320	58433	58546	58659	58771	58883	58995
39	59106	59218	59329	59439	59550	59660	59770	59879	59988	60097
40	60206	60314	60423	60531	60638	60746	60853	60959	61066	61172
41	61278	61384	61490	61595	61700	61805	61909	62014	62118	62221
42	62325	62428	62531	62634	62737	62839	62941	63043	63144	63246
43	63347	63448	63548	63649	63749	63849	63949	64048	64147	64246
44	64345	64444	64542	64640	64738	64836	64933	65031	65128	65225
45	65321	65418	65514	65610	65706	65801	65896	65992	66087	66181
46	66276	66370	66464	66558	66652	66745	66839	66932	67025	67117
47	67210	67302	67394	67486	67578	67669	67761	67852	67943	68034
48	68124	68215	68305	68395	68485	68574	68664	68753	68842	68931
49	69020	69108	69197	69285	69373	69461	69548	69636	69723	69810
50	69897	69984	70070	70157	70243	70329	70415	70501	70586	70672
51	70757	70842	70927	71012	71096	71181	71265	71349	71433	71517
52	71600	71684	71767	71850	71933	72016	72099	72181	72263	72346
53	72428	72509	72591	72673	72754	72835	72916	72997	73078	73159
54	73239	73320	73400	73480	73560	73640	73719	73799	73878	73957

LOGARITHMS OF NUMBERS, FROM 0 TO 1000.

(Continued)

No.	0	1	2	3	4	5	6	7	8	9
55	74036	74115	74194	74273	74351	74429	74507	74586	74663	74741
56	74819	74896	74974	75051	75128	75205	75282	75358	75435	75511
57	75587	75664	75740	75815	75891	75967	76042	76118	76193	76268
58	76343	76418	76492	76567	76641	76716	76790	76864	76938	77012
59	77085	77159	77232	77305	77379	77452	77525	77597	77670	77743
60	77815	77887	77960	78032	78104	78176	78247	78319	78390	78462
61	78533	78604	78675	78746	78817	78888	78958	79029	79099	79169
62	79239	79309	79379	79449	79518	79588	79657	79727	79796	79865
63	79934	80003	80072	80140	80209	80277	80346	80414	80482	80550
64	80618	80686	80754	80821	80889	80956	81023	81090	81158	81224
65	81291	81358	81425	81491	81558	81624	81690	81756	81823	81889
66	81954	82020	82086	82151	82217	82282	82347	82413	82478	82543
67	82607	82672	82737	82802	82866	82930	82995	83059	83123	83187
68	83251	83315	83378	83442	83506	83569	83632	83696	83759	83822
69	83885	83948	84011	84073	84136	84198	84261	84323	84386	84448
70	84510	84572	84634	84696	84757	84819	84880	84942	85003	85065
71	85126	85187	85248	85309	85370	85431	85491	85552	85612	85673
72	85733	85794	85854	85914	85974	86034	86094	86153	86213	86273
73	86332	86392	86451	86510	86570	86629	86688	86747	86806	86864
74	86923	86982	87040	87099	87157	87216	87274	87332	87390	87448
75	87506	87564	87622	87680	87737	87795	87852	87910	87967	88024
76	88081	88138	88196	88252	88309	88366	88423	88480	88536	88593
77	88649	88705	88762	88818	88874	88930	88986	89042	89098	89154
78	89209	89265	89321	89376	89432	89487	89542	89597	89653	89708
79	89763	89818	89873	89927	89982	90037	90091	90146	90200	90255
80	90309	90363	90417	90472	90526	90580	90634	90687	90741	90795
81	90849	90902	90956	91009	91062	91116	91169	91222	91275	91328
82	91381	91434	91487	91540	91593	91645	91698	91751	91803	91855
83	91908	91960	92012	92065	92117	92169	92221	92273	92324	92376
84	92428	92480	92531	92583	92634	92686	92737	92788	92840	92891
85	92942	92993	93044	93095	93146	93197	93247	93298	93349	93399
86	93450	93500	93551	93601	93651	93702	93752	93802	93852	93902
87	93952	94002	94052	94101	94151	94201	94250	94300	94349	94399
88	94448	94498	94547	94596	94645	94694	94743	94792	94841	94890
89	94939	94988	95036	95085	95134	95182	95231	95279	95328	95376
90	95424	95472	95521	95569	95617	95665	95713	95761	95809	95856
91	95904	95952	95999	96047	96095	96142	96190	96237	96284	96332
92	96379	96426	96473	96520	96567	96614	96661	96708	96755	96802
93	96848	96895	96942	96988	97035	97081	97128	97174	97220	97267
94	97313	97359	97405	97451	97497	97543	97589	97635	97681	97727
95	97772	97818	97864	97909	97955	98000	98046	98091	98137	98182
96	98227	98272	98318	98363	98408	98453	98498	98543	98588	98632
97	98677	98722	98767	98811	98856	98900	98945	98989	99034	99078
98	99123	99167	99211	99255	99300	99344	99388	99432	99476	99520
99	99564	99607	99651	99695	99739	99782	99826	99870	99913	99957

NATURAL SINES, COSECANTS, TANGENTS, ETC.

°	′	Sine	Cosecant	Tangent	Cotangent	Secant	Cosine	′	°
0	0	.000000	Infinite.	.000000	Infinite.	1.00000	1.000000	0	90
	10	.002909	343.77516	.002909	343.77371	1.00000	.999996	50	
	20	.005818	171.88831	.005818	171.88540	1.00002	.999983	40	
	30	.008727	114.59301	.008727	114.58865	1.00004	.999962	30	
	40	.011635	85.945609	.011636	85.939791	1.00007	.999932	20	
	50	.014544	68.757360	.014545	68.750087	1.00011	.999894	10	
1	0	.017452	57.298688	.017455	57.289962	1.00015	.999848	0	89
	10	.020361	49.114062	.020365	49.103881	1.00021	.999793	50	
	20	.023269	42.975713	.023275	42.964077	1.00027	.999729	40	
	30	.026177	38.201550	.026186	38.188459	1.00034	.999657	30	
	40	.029085	34.382316	.029097	34.367771	1.00042	.999577	20	
	50	.031992	31.257577	.032009	31.241577	1.00051	.999488	10	
2	0	.034899	28.653708	.034921	28.636253	1.00061	.999391	0	88
	10	.037806	26.450510	.037834	26.431600	1.00072	.999285	50	
	20	.040713	24.562123	.040747	24.541758	1.00083	.999171	40	
	30	.043619	22.925586	.043661	22.903766	1.00095	.999048	30	
	40	.046525	21.493676	.046576	21.470401	1.00108	.998917	20	
	50	.049431	20.230284	.049491	20.205553	1.00122	.998778	10	
3	0	.052336	19.107323	.052408	19.081137	1.00137	.998630	0	87
	10	.055241	18.102619	.055325	18.074977	1.00153	.998473	50	
	20	.058145	17.198434	.058243	17.169337	1.00169	.998308	40	
	30	.061049	16.380408	.061163	16.349855	1.00187	.998135	30	
	40	.063952	15.636793	.064083	15.604784	1.00205	.997357	20	
	50	.066854	14.957882	.067004	14.924417	1.00224	.997763	10	
4	0	.069756	14.335587	.069927	14.300666	1.00244	.997564	0	86
	10	.072658	13.763115	.072851	13.726738	1.00265	.997357	50	
	20	.075559	13.234717	.075776	13.196888	1.00287	.997141	40	
	30	.078459	12.745495	.078702	12.706205	1.00309	.996917	30	
	40	.081359	12.291252	.081629	12.250505	1.00333	.996685	20	
	50	.084258	11.868370	.084558	11.826167	1.00357	.996444	10	
5	0	.087156	11.473713	.087489	11.430052	1.00382	.996195	0	85
	10	.090053	11.104549	.090421	11.059431	1.00408	.995937	50	
	20	.092950	10.758488	.093354	10.711913	1.00435	.995671	40	
	30	.095846	10.433431	.096289	10.385397	1.00463	.995396	30	
	40	.098741	10.127522	.099226	10.078031	1.00491	.995113	20	
	50	.101635	9.8391227	.102164	9.7881732	1.00521	.994822	10	
6	0	.104528	9.5667722	.105104	9.5143645	1.00551	.994522	0	84
	10	.107421	9.3091699	.108046	9.2553035	1.00582	.994214	50	
	20	.110313	9.0651512	.110990	9.0098261	1.00614	.993897	40	83
°	′	Cosine	Secant	Cotangent	Tangent	Cosecant	Sine	′	°

For functions from 83°-40′ to 90° read from bottom of page upward.

NATURAL SINES, COSECANTS, TANGENTS, ETC.

°	′	Sine	Cosecant	Tangent	Cotangent	Secant	Cosine	′	°
6	30	.113203	8.8336715	.113936	8.7768874	1.00647	.993572	30	
	40	.116093	8.6137901	116883	8.5555468	1.00681	.993238	20	
	50	.118982	8.4045586	.119833	8.3449558	1.00715	.992896	10	
7	0	.121869	8.2055090	.122785	8.1443464	1.00751	.992546	0	83
	10	124756	8.0156450	.125738	7.9530224	1.00787	.992187	50	
	20	.127642	7.8344335	.128694	7.7703506	1.00825	.991820	40	
	30	.130526	7.6612976	.131653	7.5957541	1.00863	.991445	30	
	40	.133410	7.4957100	.134613	7.4287064	1.00902	.991061	20	
	50	.136292	7.3371909	.137576	7.2687255	1.00942	.990669	10	
8	0	139173	7.1852965	.140541	7.1153697	1.00983	.990268	0	82
	10	142053	7.0396220	.143508	6.9682335	1.01024	.989859	50	
	20	.144932	6.8997942	.146478	6.8269437	1.01067	.989442	40	
	30	.147809	6.7654691	.149451	6.6911562	1.01111	.989016	30	
	40	.150686	6.6363293	.152426	6.5605538	1.01155	.988582	20	
	50	.153561	6.5120812	.155404	6.4348428	1.01200	.988139	10	
9	0	.156434	6.3924532	.158384	6.3137515	1.01247	.987688	0	81
	10	.159307	6.2771933	.161368	6.1970279	1.01294	.987229	50	
	20	.162178	6.1660674	.164354	6.0844381	1.01342	.986762	40	
	30	.165048	6.0588980	.167343	5.9757644	1.01391	.986286	30	
	40	.167916	5.9553625	.170334	5.8708042	1.01440	.985801	20	
	50	.170783	5.8553921	.173329	5.7693688	1.01491	.985309	10	
10	0	.173648	5.7587705	.176327	5.6712818	1.01543	.984808	0	80
	10	.176512	5.6653331	.179328	5.5763786	1.01595	.984298	50	
	20	.179375	5.5749258	.182332	5.4845052	1.01649	.983781	40	
	30	.182236	5.4874043	.185339	5.3955172	1.01703	.983255	30	
	40	.185095	5.4026333	.188349	4.3092793	1.01758	.982721	20	
	50	.187953	5.3204860	.191363	5.2256647	1.01815	.982178	10	
11	0	.190809	5.2408431	.194380	5.1445540	1.01872	.981627	0	79
	10	.193664	5.1635924	.197401	5.0658352	1.01930	.981068	50	
	20	.196517	5.0886284	.200425	4.9894027	1.01989	.980500	40	
	30	.199368	5.0158317	.203452	4.9151570	1.02049	.979925	30	
	40	.202218	4.9451687	.206483	4.8430045	1.02110	.979341	20	
	50	.205065	4.8764907	.209518	4.7728568	1.02171	.978748	10	
12	0	.207912	4.8097343	.212557	4.7046301	1.02234	.978148	0	78
	10	.210756	4.7448206	.215599	4.6382457	1.02298	.977539	50	
	20	.213599	4.6816748	.218645	4.5736287	1.02362	.976921	40	
	30	.216440	4.6202263	.221695	4.5107085	1.02428	.976296	30	
	40	.219279	4.5604080	.224748	4.4494181	1.02494	.975662	20	
	50	.222116	4.5021565	.227806	4.3896940	1.02562	.975020	10	77
°	′	Cosine	Secant	Cotangent	Tangent	Cosecant	Sine	′	°

For functions from 77°-10′ to 83°-30′ read from bottom of page upward.

NATURAL SINES, COSECANTS, TANGENTS, ETC.

°	′	Sine	Cosecant	Tangent	Cotangent	Secant	Cosine	′	°
13	0	.224951	4.4454115	.230868	4.3314759	1.02630	.974370	0	77
	10	.227784	4.3901158	.233934	4.2747066	1.02700	.973712	50	
	20	.230616	4.3362150	.237004	4.2193318	1.02770	.973045	40	
	30	.233445	4.2836576	.240079	4.1652998	1.02842	.972370	30	
	40	.236273	4.2323943	.243158	4.1125614	1.02914	.971687	20	
	50	.239098	4.1823785	.246241	4.0610700	1.02987	.970995	10	
14	0	.241922	4.1335655	.249328	4.0107809	1.03061	.970296	0	76
	10	.244743	4.0859130	.252420	3.9616518	1.03137	.969588	50	
	20	.247563	4.0393804	.255517	3.9136420	1.03213	.968872	40	
	30	.250380	3.9939292	.258618	3.8667131	1.03290	.968148	30	
	40	.253195	3.9495224	.261723	3.8208281	1.03368	.967415	20	
	50	.256008	3.9061250	.264834	3.7759519	1.03447	.966675	10	
15	0	.258819	3.8637033	.267949	3.7320508	1.03528	.965926	0	75
	10	.261628	3.8222251	.271069	3.6890927	1.03609	.965169	50	
	20	.264434	3.7816596	.274195	3.6470467	1.03691	.964404	40	
	30	.267238	3.7419775	.277325	3.6058835	1.03774	.963630	30	
	40	.270040	3.7031506	.280460	3.5655749	1.03858	.962849	20	
	50	.272840	3.6651518	.283600	3.5260938	1.03944	.962059	10	
16	0	.275637	3.6279553	.286745	3.4874144	1.04030	.961262	0	74
	10	.278432	3.5915363	.289896	3.4495120	1.04117	.960456	50	
	20	.281225	3.5558710	.293052	3.4123626	1.04206	.959642	40	
	30	.284015	3.5209365	.296214	3.3759434	1.04295	.958820	30	
	40	.286803	3.4867110	.299380	3.3402326	1.04385	.957990	20	
	50	.289589	3.4531735	.302553	3.3052091	1.04477	.957151	10	
17	0	.292372	3.4203036	.305731	3.2708526	1.04569	.956305	0	73
	10	.295152	3.3880820	.308914	3.2371438	1.04663	.955450	50	
	20	.297930	3.3564900	.312104	3.2040638	1.04757	.954588	40	
	30	.300706	3.3255095	.315299	3.1715948	1.04853	.953717	30	
	40	.303479	3.2951234	.318500	3.1397194	1.04950	.952838	20	
	50	.306249	3.2653149	.321707	3.1084210	1.05047	.951951	10	
18	0	.309017	3.2360680	.324920	3.0776835	1.05146	.951057	0	72
	10	.311782	3.2073673	.328139	3.0474915	1.05246	.950154	50	
	20	.314545	3.1791978	.331364	3.0178301	1.05347	.949243	40	
	30	.317305	3.1515453	.334595	2.9886850	1.05449	.948324	30	
	40	320062	3.1243959	.337833	2.9600422	1.05552	.947397	20	
	50	.322816	3.0977363	.341077	2.9318885	1.05657	.946462	10	
19	0	.325568	3.0715535	.344328	2.9042109	1.05762	.945519	0	71
	10	.328317	3.0458352	.347585	2.8769970	1.05869	.944568	50	
	20	.331063	3.0205693	.350848	2.8502349	1.05976	.943609	40	70
°	′	Cosine	Secant	Cotangent	Tangent	Cosecant	Sine	′	°

For functions from 70°-40′ to 77°-0′ read from bottom of page upward.

NATURAL SINES, COSECANTS, TANGENTS, ETC.

°	′	Sine	Cosecant	Tangent	Cotangent	Secant	Cosine	′	°
19	30	.333807	2.9957443	.354119	2.8239129	1.06085	.942641	30	
	40	.336547	2.9713490	.357396	2.7980198	1.06195	.941666	20	
	50	.339285	2.9473724	.360680	2.7725448	1.06306	.940684	10	
20	0	.342020	2.9238044	.363970	2.7474774	1.06418	.939693	0	70
	10	.344752	2.9006346	.367268	2.7228076	1.06531	.938694	50	
	20	.347481	2.8778532	.370573	2.6985254	1.06645	.937687	40	
	30	.350207	2.8554510	.373885	2.6746215	1.06761	.936672	30	
	40	.352931	2.8334185	.377204	2.6510867	1.06878	.935650	20	
	50	.355651	2.8117471	.380530	2.6279121	1.06995	.934619	10	
21	0	.358368	2.7904281	.383864	2.6050891	1.07115	.933580	0	69
	10	.361082	2.7694532	.387205	2.5826094	1.07235	.932534	50	
	20	.363793	2.7488144	.390554	2.5604649	1.07356	.931480	40	
	30	.366501	2.7285038	.393911	2.5386479	1.07479	.930418	30	
	40	.369206	2.7085139	.397275	2.5171507	1.07602	.929348	20	
	50	.371908	2.6888374	.400647	2.4959661	1.07727	.928270	10	
22	0	.374607	2.6694672	.404026	2.4750869	1.07853	.927184	0	68
	10	.377302	2.6503962	.407414	2.4545061	1.07981	.926090	50	
	20	.379994	2.6316180	.410810	2.4342172	1.08109	.924989	40	
	30	.382683	2.6131259	.414214	2.4142136	1.08239	.923880	30	
	40	.385369	2.5949137	.417626	2.3944889	1.08370	.922762	20	
	50	.388052	2.5769753	.421046	2.3750372	1.08503	.921638	10	
23	0	.390731	2.5593047	.424475	2.3558524	1.08636	.920505	0	67
	10	.393407	2.5418961	.427912	2.3369287	1.08771	.919364	50	
	20	.396080	2.5247440	.431358	2.3182606	1.08907	.918216	40	
	30	.398749	2.5078428	.434812	2.2998425	1.09044	.917060	30	
	40	.401415	2.4911874	.438276	2.2816693	1.09183	.915896	20	
	50	.404078	2.4747726	.441748	2.2637357	1.09323	.914725	10	
24	0	.406737	2.4585933	.445229	2.2460368	1.09464	.913545	0	66
	10	.409392	2.4426448	.448719	2.2285676	1.09606	.912358	50	
	20	.412045	2.4269222	.452218	2.2113234	1.09750	.911164	40	
	30	.414693	2.4114210	.455726	2.1942997	1.09895	.909961	30	
	40	.417338	2.3961367	459244	2.1774920	1.10041	.908751	20	
	50	.419980	2.3810650	.462771	2.1608958	1.10189	.907533	10	
25	0	.422618	2.3662016	.466308	2.1445069	1.10338	.906308	0	65
	10	.425253	2.3515424	.469854	2.1283213	1.10488	.905075	50	
	20	.427884	2.3370833	.473410	2.1123348	1.10640	.903834	40	
	30	.430511	2.3228205	.476976	2.0965436	1.10793	.902585	30	
	40	.433135	2.3087501	.480551	2.0809438	1.10947	.901329	20	
	50	.435755	2.2948685	.484137	2.0655318	1.11103	.900065	10	64
°	′	Cosine	Secant	Cotangent	Tangent	Cosecant	Sine	′	°

For functions from 64°-10′ to 70°-30′ read from bottom of page upward.

NATURAL SINES, COSECANTS, TANGENTS, ETC.

°	′	Sine	Cosecant	Tangent	Cotangent	Secant	Cosine	′	°
26	0	.438371	2.2811720	.487733	2.0503038	1.11260	.898794	0	64
	10	.440984	2.2676571	.491339	2.0352565	1.11419	.897515	50	
	20	.443593	2.2543204	.494955	2.0203862	1.11579	.896229	40	
	30	.446198	2.2411585	.498582	2.0056897	1.11740	.894934	30	
	40	.448799	2.2281681	.502219	1.9911637	1.11903	.893633	20	
	50	.451397	2.2153460	.505867	1.9768050	1.12067	.892323	10	
27	0	.453990	2.2026893	.509525	1.9626105	1.12233	.891007	0	63
	10	.456580	2.1901947	.513195	1.9485772	1.12400	.889682	50	
	20	.459166	2.1778595	.516876	1.9347020	1.12568	.888350	40	
	30	.461749	2.1656806	.520567	1.9209821	1.12738	.887011	30	
	40	.464327	2.1536553	.524270	1.9074147	1.12910	.885664	20	
	50	.466901	2.1417808	.527984	1.8939971	1.13083	.884309	10	
28	0	.469472	2.1300545	.531709	1.8807265	1.13257	.882948	0	62
	10	.472038	2.1184737	.535547	1.8676003	1.13433	.881578	50	
	20	.474600	2.1070359	.539195	1.8546159	1.13610	.880201	40	
	30	.477159	2.0957385	.542956	1.8417708	1.13789	.878817	30	
	40	.479713	2.0845792	.546728	1.8290628	1.13970	.877425	20	
	50	.482263	2.0735556	.550515	1.8164892	1.14152	.876026	10	
29	0	.484810	2.0626653	.554309	1.8040478	1.14335	.874620	0	61
	10	.487352	2.0519061	.558118	1.7917362	1.14521	.873206	50	
	20	.489890	2.0412757	.561939	1.7795524	1.14707	.871784	40	
	30	.492424	2.0307720	.565773	1.7674940	1.14896	.870356	30	
	40	.494953	2.0203929	.569619	1.7555590	1.15085	.868920	20	
	50	.497479	2.0101362	.573478	1.7437453	1.15277	.867476	10	
30	0	.500000	2.0000000	.577350	1.7320508	1.15470	.866025	0	60
	10	.502517	1.9899822	.581235	1.7204736	1.15665	.864567	50	
	20	.505030	1.9800810	.585134	1.7090116	1.15861	.863102	40	
	30	.507538	1.9702944	.589045	1.6976631	1.16059	.861629	30	
	40	.510043	1.9606206	.592970	1.6864261	1.16259	.860149	20	
	50	.512543	1.9510577	.596908	1.6752988	1.16460	.858662	10	
31	0	.515038	1.9416040	.600861	1.6642795	1.16663	.857167	0	59
	10	.517529	1.9322578	.604827	1.6533663	1.16868	.855665	50	
	20	.520016	1.9230173	.608807	1.6425576	1.17075	.854156	40	
	30	.522499	1.9138809	.612801	1.6318517	1.17283	.852640	30	
	40	.524977	1.9048469	.616809	1.6212469	1.17493	.851117	20	
	50	.527450	1.8959138	.620832	1.6107417	1.17704	.849586	10	
32	0	.529919	1.8870799	.624869	1.6003345	1.17918	.848048	0	58
	10	.532384	1.8783438	.628921	1.5900238	1.18133	.846503	50	
	20	.534844	1.8697040	.632988	1.5798079	1.18350	.844951	40	57
°	′	Cosine	Secant	Cotangent	Tangent	Cosecant	Sine	′	°

For functions from 57°-40′ to 64°-0′ read from bottom of page upward.

NATURAL SINES, COSECANTS, TANGENTS, ETC.

°	′	Sine	Cosecant	Tangent	Cotangent	Secant	Cosine	′	°
32	30	.537300	1.8611590	.637079	1.5696856	1.18569	.843391	30	
	40	.539751	1.8527073	.641167	1.5596552	1.18790	.841825	20	
	50	.542197	1.8443476	.645280	1.5497155	1.19012	.840251	10	
33	0	.544639	1.8360785	.649408	1.5398650	1.19236	.838671	0	57
	10	.547076	1.8278985	.653531	1.5301025	1.19463	.837083	50	
	20	.549509	1.8198065	.657710	1.5204261	1.19691	.835488	40	
	30	.551937	1.8118010	.661886	1.5108352	1.19920	.833886	30	
	40	.554360	1.8038809	.666077	1.5013282	1.20152	.832277	20	
	50	.556779	1.7960449	.670285	1.4919039	1.20386	.830661	10	
34	0	.559193	1.7882916	.674509	1.4825610	1.20622	.829038	0	56
	10	.561602	1.7806201	.678749	1.4732983	1.20859	.827407	50	
	20	.564007	1.7730290	.683007	1.4641147	1.21099	.825770	40	
	30	.566406	1.7655173	.687281	1.4550090	1.21341	.824126	30	
	40	.568801	1.7580837	.691573	1.4459801	1.21584	.822475	20	
	50	.571191	1.7507273	.695881	1.4370268	1.21830	.820817	10	
35	0	.573576	1.7434468	.700208	1.4281480	1.22077	.819152	0	55
	10	.575957	1.7362413	.704552	1.4193427	1.22327	.817480	50	
	20	.578332	1.7291096	.708913	1.4106098	1.22579	.815801	40	
	30	580703	1.7220508	.713293	1.4019483	1.22833	.814116	30	
	40	.583069	1.7150639	.717691	1.3933571	1.23089	.812423	20	
	50	.585429	1.7081478	.722108	1.3848355	1.23347	.810723	10	
36	0	.587785	1.7013016	.726543	1.3763810	1.23607	.809017	0	54
	10	.590136	1.6945244	.730996	1.3679959	1.23869	.807304	50	
	20	.592482	1.6878151	.735469	1.3596764	1.24134	.805584	40	
	30	.594823	1.6811730	.739961	1.3514224	1.24400	.803857	30	
	40	.597159	1.6745970	.744472	1.3432331	1.24669	.802123	20	
	50	.599489	1.6680864	.749003	1.3351075	1.24940	.800383	10	
37	0	.601815	1.6616401	.753554	1.3270448	1.25214	.798636	0	53
	10	.604136	1.6552575	.758125	1.3190441	1.25489	.796882	50	
	20	.606451	1.6489376	.762716	1.3111046	1.25767	.795121	40	
	30	.608761	1.6426796	.767327	1.3032254	1.26047	.793353	30	
	40	.611067	1.6364828	.771959	1.2954057	1.26330	.791579	20	
	50	.613367	1.6303462	.776612	1.2876447	1.26615	.789798	10	
38	0	.615661	1.6242692	.781286	1.2799416	1.26902	.788011	0	52
	10	.617951	1.6182510	.785981	1.2722957	1.27191	.786217	50	
	20	.620235	1.6122908	.790698	1.2647062	1.27483	.784416	40	
	30	.622515	1.6063879	.795436	1.2571723	1.27778	.782608	30	
	40	.624789	1.6005416	.800196	1.2496933	1.28075	.780794	20	
	50	.627057	1.5947511	.804979	1.2422685	1.28374	.778973	10	51
°	′	Cosine	Secant	Cotangent	Tangent	Cosecant	Sine	′	°

For functions from 51°-10′ to 57°-30′ read from bottom of page upward.

NATURAL SINES, COSECANTS, TANGENTS, ETC.

°	′	Sine	Cosecant	Tangent	Cotangent	Secant	Cosine	′	°
39	0	.629320	1.5890157	.809784	1.2348972	1.28676	.777146	0	51
	10	.631578	1.5833318	.814612	1.2275786	1.28980	.775312	50	
	20	.633831	1.5777077	.819463	1.2203121	1.29287	.773472	40	
	30	.636078	1.5721337	.824336	1.2130970	1.29597	.771625	30	
	40	.638320	1.5666121	.829234	1.2059327	1.29909	.769771	20	
	50	.640557	1.5611424	.834155	1.1988184	1.30223	.767911	10	
40	0	.642788	1.5557238	.839100	1.1917536	1.30541	.766044	0	50
	10	.645013	1.5503558	.844069	1.1847376	1.30861	.764171	50	
	20	.647233	1.5450378	.849062	1.1777698	1.31183	.762292	40	
	30	.649448	1.5397690	.854081	1.1708496	1.31509	.760406	30	
	40	.651657	1.5345491	.859124	1.1639763	1.31837	.758514	20	
	50	.653861	1.5293773	.864193	1.1571495	1.32168	.756615	10	
41	0	.656059	1.5242531	.869287	1.1503684	1.32501	.754710	0	49
	10	.658252	1.5191759	.874407	1.1436326	1.32838	.752798	50	
	20	.660439	1.5141452	.879553	1.1369414	1.33177	.750880	40	
	30	.662620	1.5091605	.884725	1.1302944	1.33519	.748956	30	
	40	.664796	1.5042211	.889924	1.1236909	1.33864	.747025	20	
	50	.666966	1.4993267	.895151	1.1171305	1.34212	.745088	10	
42	0	.669131	1.4944765	.900404	1.1106125	1.34563	.743145	0	48
	10	.671289	1.4896703	.905685	1.1041365	1.34917	.741195	50	
	20	.673443	1.4849073	.910994	1.0977020	1.35274	.739239	40	
	30	.675590	1.4801872	.916331	1.0913085	1.35634	.737277	30	
	40	.677732	1.4755095	.921697	1.0849554	1.35997	.735309	20	
	50	.679868	1.4708736	.927091	1.0786423	1.36363	.733335	10	
43	0	.681998	1.4662792	.932515	1.0723687	1.36733	.731354	0	47
	10	.684123	1.4617257	.937968	1.0661341	1.37105	.729367	50	
	20	.686242	1.4572127	.943451	1.0599381	1.37481	.727374	40	
	30	.688355	1.4527397	.948965	1.0537801	1.37860	.725374	30	
	40	.690462	1.4483063	.954508	1.0476598	1.38242	.723369	20	
	50	.692563	1.4439120	.960083	1.0415767	1.38628	.721357	10	
44	0	.694658	1.4395565	.965689	1.0355303	1.39016	.719340	0	46
	10	.696748	1.4352393	.971326	1.0295203	1.39409	.717316	50	
	20	.698832	1.4309602	.976996	1.0235461	1.39804	.715286	40	
	30	.700909	1.4267182	.982697	1.0176074	1.40203	.713251	30	
	40	.702981	1.4225134	.988432	1.0117088	1.40606	.711209	20	
	50	.705047	1.4183454	.994199	1.0058348	1.41012	.709161	10	
45	0	.707107	1.4142136	1.000000	1.0000000	1.41421	.707107	0	45
°	′	Cosine	Secant	Cotangent	Tangent	Cosecant	Sine	′	°

For functions from 45°-0′ to 51°-0′ read from bottom of page upward.

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
1	1	1	1.0000000	1.0000000	1.000000000
2	4	8	1.4142136	1.2599210	.500000000
3	9	27	1.7320508	1.4422496	.333333333
4	16	64	2.0000000	1.5874011	.250000000
5	25	125	2.2360680	1.7099759	.200000000
6	36	216	2.4494897	1.8171206	.166666667
7	49	343	2.6457513	1.9129312	.142857143
8	64	512	2.8284271	2.0000000	.125000000
9	81	729	3.0000000	2.0800837	.111111111
10	100	1000	3.1622777	2.1544347	.100000000
11	121	1331	3.3166248	2.2239801	.090909091
12	144	1728	3.4641016	2.2894286	.083333333
13	169	2197	3.6055513	2.3513347	.076923077
14	196	2744	3.7416574	2.4101422	.071428571
15	225	3375	3.8729833	2.4662121	.066666667
16	256	4096	4.0000000	2.5198421	.062500000
17	289	4913	4.1231056	2.5712816	.058823529
18	324	5832	4.2426407	2.6207414	.055555556
19	361	6859	4.3588989	2.6684016	.052631579
20	400	8000	4.4721360	2.7144177	.050000000
21	441	9261	4.5825757	2.7589243	.047619048
22	484	10648	4.6904158	2.8020393	.045454545
23	529	12167	4.7958315	2.8438670	.043478261
24	576	13824	4.8989795	2.8844991	.041666667
25	625	15625	5.0000000	2.9240177	.040000000
26	676	17576	5.0990195	2.9624960	.038461538
27	729	19683	5.1961524	3.0000000	.037037037
28	784	21952	5.2915026	3.0365889	.035714286
29	841	24389	5.3851648	3.0723168	.034482759
30	900	27000	5.4772256	3.1072325	.033333333
31	961	29791	5.5677644	3.1413806	.032258065
32	1024	32768	5.6568542	3.1748021	.031250000
33	1089	35937	5.7445626	3.2075343	.030303030
34	1156	39304	5.8309519	3.2396118	.029411765
35	1225	42875	5.9160798	3.2710663	.028571429
36	1296	46656	6.0000000	3.3019272	.027777778
37	1369	50653	6.0827625	3.3322218	.027027027
38	1444	54872	6.1644140	3.3619754	.026315789
39	1521	59319	6.2449980	3.3912114	.025641026
40	1600	64000	6.3245553	3.4199519	.025000000
41	1681	68921	6.4031242	3.4482172	.024390244
42	1764	74088	6.4807407	3.4760266	.023809524
43	1849	79507	6.5574385	3.5033981	.023255814
44	1936	85184	6.6332496	3.5303483	.022727273
45	2025	91125	6.7082039	3.5568933	.022222222
46	2116	97336	6.7823300	3.5830479	.021739130
47	2209	103823	6.8556546	3.6088261	.021276596
48	2304	110592	6.9282032	3.6342411	.020833333
49	2401	117649	7.0000000	3.6593057	.020408163
50	2500	125000	7.0710678	3.6840314	.020000000
51	2601	132651	7.1414284	3.7084298	.019607843
52	2704	140608	7.2111026	3.7325111	.019230769
53	2809	148877	7.2801099	3.7562858	.018867925

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
54	2916	157464	7.3484692	3.7797631	.018518519
55	3025	166375	7.4161985	3.8029525	.018181818
56	3136	175616	7.4833148	3.8258624	.017857143
57	3249	185193	7.5498344	3.8485011	.017543860
58	3364	195112	7.6157731	3.8708766	.017241379
59	3481	205379	7.6811457	3.8929965	.016949153
60	3600	216000	7.7459667	3.9148676	.016666667
61	3721	226981	7.8102497	3.9364972	.016393443
62	3844	238328	7.8740079	3.9578915	.016129032
63	3969	250047	7.9372539	3.9790571	.015873016
64	4096	262144	8.0000000	4.0000000	.015625000
65	4225	274625	8.0622577	4.0207256	.015384615
66	4356	287496	8.1240384	4.0412401	.015151515
67	4489	300763	8.1853528	4.0615480	.014925373
68	4624	314432	8.2462113	4.0816551	.014705882
69	4761	328509	8.3066239	4.1015661	.014492754
70	4900	343000	8.3666003	4.1212853	.014285714
71	5041	357911	8.4261498	4.1408178	.014084507
72	5184	373248	8.4852814	4.1601676	.013888889
73	5329	389017	8.5440037	4.1793390	.013698630
74	5476	405224	8.6023253	4.1983364	.013513514
75	5625	421875	8.6602540	4.2171633	.013333333
76	5776	438976	8.7177979	4.2358236	.013157895
77	5929	456533	8.7749644	4.2543210	.012987013
78	6084	474552	8.8317609	4.2726586	.012820513
79	6241	493039	8.8881944	4.2908404	.012658228
80	6400	512000	8.9442719	4.3088695	.012500000
81	6561	531441	9.0000000	4.3267487	.012345679
82	6724	551368	9.0553851	4.3444815	.012195122
83	6889	571787	9.1104336	4.3620707	.012048193
84	7056	592704	9.1651514	4.3795191	.011904762
85	7225	614125	9.2195445	4.3968296	.011764706
86	7396	636056	9.2736185	4.4140049	.011627907
87	7569	658503	9.3273791	4.4310476	.011494253
88	7744	681472	9.3808315	4.4479602	.011363636
89	7921	704969	9.4339811	4.4647451	.011235955
90	8100	729000	9.4868330	4.4814047	.011111111
91	8281	753571	9.5393920	4.4979414	.010989011
92	8464	778688	9.5916630	4.5143574	.010869565
93	8649	804357	9.6436508	4.5306549	.010752688
94	8836	830584	9.6953597	4.5468359	.010638298
95	9025	857375	9.7467943	4.5629026	.010526316
96	9216	884736	9.7979590	4.5788570	.010416667
97	9409	912673	9.8488578	4.5947009	.010309278
98	9604	941192	9.8994949	4.6104363	.010204082
99	9801	970299	9.9498744	4.6260650	.010101010
100	10000	1000000	10.0000000	4.6415888	.010000000
101	10201	1030301	10.0498756	4.6570095	.009900990
102	10404	1061208	10.0995049	4.6723287	.009803922
103	10609	1092727	10.1488916	4.6875482	.009708738
104	10816	1124864	10.1980390	4.7026694	.009615385
105	11025	1157625	10.2469508	4.7176940	.009523810
106	11236	1191016	10.2956301	4.7326235	.009433962

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
107	11449	1225043	10.3440804	4.7474594	.009345794
108	11664	1259712	10.3923048	4.7622032	.009259259
109	11881	1295029	10.4403065	4.7768562	.009174312
110	12100	1331000	10.4880885	4.7914199	.009090909
111	12321	1367631	10.5356538	4.8058955	.009009009
112	12544	1404928	10.5830052	4.8202845	.008928571
113	12769	1442897	10.6301458	4.8345881	.008849558
114	12996	1481544	10.6770783	4.8488076	.008771930
115	13225	1520875	10.7238053	4.8629442	.008695652
116	13456	1560896	10.7703296	4.8769990	.008620690
117	13689	1601613	10.8166538	4.8909732	.008547009
118	13924	1643032	10.8627805	4.9048681	.008474576
119	14161	1685159	10.9087121	4.9186847	.008403361
120	14400	1728000	10.9544512	4.9324242	.008333333
121	14641	1771561	11.0000000	4.9460874	.008264463
122	14884	1815848	11.0453610	4.9596757	.008196721
123	15129	1860867	11.0905365	4.9731898	.008130081
124	15376	1906624	11.1355287	4.9866310	.008064516
125	15625	1953125	11.1803399	5.0000000	.008000000
126	15876	2000376	11.2249722	5.0132979	.007936508
127	16129	2048383	11.2694277	5.0265257	.007874016
128	16384	2097152	11.3137085	5.0396842	.007812500
129	16641	2146689	11.3578167	5.0527743	.007751938
130	16900	2197000	11.4017543	5.0657970	.007692308
131	17161	2248091	11.4455231	5.0787531	.007633588
132	17424	2299968	11.4891253	5.0916434	.007575758
133	17689	2352637	11.5325626	5.1044687	.007518797
134	17956	2406104	11.5758369	5.1172299	.007462687
135	18225	2460375	11.6189500	5.1299278	.007407407
136	18496	2515456	11.6619038	5.1425632	.007352941
137	18769	2571353	11.7046999	5.1551367	.007299270
138	19044	2628072	11.7473401	5.1676493	.007246377
139	19321	2685619	11.7898261	5.1801015	.007194245
140	19600	2744000	11.8321596	5.1924941	.007142857
141	19881	2803221	11.8743421	5.2048279	.007092199
142	20164	2863288	11.9163753	5.2171034	.007042254
143	20449	2924207	11.9582607	5.2293215	.006993007
144	20736	2985984	12.0000000	5.2414828	.006944444
145	21025	3048625	12.0415946	5.2535879	.006896552
146	21316	3112136	12.0830460	5.2656374	.006849315
147	21609	3176523	12.1243557	5.2776321	.006802721
148	21904	3241792	12.1655251	5.2895725	.006756757
149	22201	3307949	12.2065556	5.3014592	.006711409
150	22500	3375000	12.2474487	5.3132928	.006666667
151	22801	3442951	12.2882057	5.3250740	.006622517
152	23104	3511808	12.3288280	5.3368033	.006578947
153	23409	3581577	12.3693169	5.3484812	.006535948
154	23716	3652264	12.4096736	5.3601084	.006493506
155	24025	3723875	12.4498996	5.3716854	.006451613
156	24336	3796416	12.4899960	5.3832126	.006410256
157	24649	3869893	12.5299641	5.3946907	.006369427
158	24964	3944312	12.5698051	5.4061202	.006329114
159	25281	4019679	12.6095202	5.4175015	.006289308

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
160	25600	4096000	12.6491106	5.4288352	.006250000
161	25921	4173281	12.6885775	5.4401218	.006211180
162	26244	4251528	12.7279221	5.4513618	.006172840
163	26569	4330747	12.7671453	5.4625556	.006134969
164	26896	4410944	12.8062485	5.4737037	.006097561
165	27225	4492125	12.8452326	5.4848066	.006060606
166	27556	4574296	12.8840987	5.4958647	.006024096
167	27889	4657463	12.9228480	5.5068784	.005988024
168	28224	4741632	12.9614814	5.5178484	.005952381
169	28561	4826809	13.0000000	5.5287748	.005917160
170	28900	4913000	13.0384048	5.5396583	.005882353
171	29241	5000211	13.0766968	5.5504991	.005847953
172	29584	5088448	13.1148770	5.5612978	.005813953
173	29929	5177717	13.1529464	5.5720546	.005780347
174	30276	5268024	13.1909060	5.5827702	.005747126
175	30625	5359375	13.2287566	5.5934447	.005714286
176	30976	5451776	13.2664992	5.6040787	.005681818
177	31329	5545233	13.3041347	5.6146724	.005649718
178	31684	5639752	13.3416641	5.6252263	.005617978
179	32041	5735339	13.3790882	5.6357408	.005586592
180	32400	5832000	13.4164079	5.6462162	.005555556
181	32761	5929741	13.4536240	5.6566528	.005524862
182	33124	6028568	13.4907376	5.6670511	.005494505
183	33489	6128487	13.5277493	5.6774114	.005464481
184	33856	6229504	13.5646600	5.6877340	.005434783
185	34225	6331625	13.6014705	5.6980192	.005405405
186	34596	6434856	13.6381817	5.7082675	.005376344
187	34969	6539203	13.6747943	5.7184791	.005347594
188	35344	6644672	13.7113092	5.7286543	.005319149
189	35721	6751269	13.7477271	5.7387936	.005291005
190	36100	6859000	13.7840488	5.7488971	.005263158
191	36481	6967871	13.8202750	5.7589652	.005235602
192	36864	7077888	13.8564065	5.7689982	.005208333
193	37249	7189057	13.8924440	5.7789966	.005181347
194	37636	7301384	13.9283883	5.7889604	.005154639
195	38025	7414875	13.9642400	5.7988900	.005128205
196	38416	7529536	14.0000000	5.8087857	.005102041
197	38809	7645373	14.0356688	5.8186479	.005076142
198	39204	7762392	14.0712473	5.8284767	.005050505
199	39601	7880599	14.1067360	5.8382725	.005025126
200	40000	8000000	14.1421356	5.8480355	.005000000
201	40401	8120601	14.1774469	5.8577660	.004975124
202	40804	8242408	14.2126704	5.8674643	.004950495
203	41209	8365427	14.2478068	5.8771307	.004926108
204	41616	8489664	14.2828569	5.8867653	.004901961
205	42025	8615125	14.3178211	5.8963685	.004878049
206	42436	8741816	14.3527001	5.9059406	.004854369
207	42849	8869743	14.3874946	5.9154817	.004830918
208	43264	8998912	14.4222051	5.9249921	.004807692
209	43681	9129329	14.4568323	5.9344721	.004784689
210	44100	9261000	14.4913767	5.9439220	.004761905
211	44521	9393931	14.5258390	5.9533418	.004739336
212	44944	9528128	14.5602198	5.9627320	.004716981

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
213	45369	9663597	14.5945195	5.9720926	.004694836
214	45796	9800344	14.6287388	5.9814240	.004672897
215	46225	9938375	14.6628783	5.9907264	.004651163
216	46656	10077696	14.6969385	6.0000000	.004629630
217	47089	10218313	14.7309199	6.0092450	.004608295
218	47524	10360232	14.7648231	6.0184617	.004587156
219	47961	10503459	14.7986486	6.0276502	.004566210
220	48400	10648000	14.8323970	6.0368107	.004545455
221	48841	10793861	14.8660687	6.0459435	.004524887
222	49284	10941048	14.8996644	6.0550489	.004504505
223	49729	11089567	14.9331845	6.0641270	.004484305
224	50176	11239424	14.9666295	6.0731779	.004464286
225	50625	11390625	15.0000000	6.0822020	.004444444
226	51076	11543176	15.0332964	6.0911994	.004424779
227	51529	11697083	15.0665192	6.1001702	.004405286
228	51984	11852352	15.0996689	6.1091147	.004385965
229	52441	12008989	15.1327460	6.1180332	.004366812
230	52900	12167000	15.1657509	6.1269257	.004347826
231	53361	12326391	15.1986842	6.1357924	.004329004
232	53824	12487168	15.2315462	6.1446337	.004310345
233	54289	12649337	15.2643375	6.1534495	.004291845
234	54756	12812904	15.2970585	6.1622401	.004273504
235	55225	12977875	15.3297097	6.1710058	.004255319
236	55696	13144256	15.3622915	6.1797466	.004237288
237	56169	13312053	15.3948043	6.1884628	.004219409
238	56644	13481272	15.4272486	6.1971544	.004201681
239	57121	13651919	15.4596248	6.2058218	.004184100
240	57600	13824000	15.4919334	6.2144650	.004166667
241	58081	13997521	15.5241747	6.2230843	.004149378
242	58564	14172488	15.5563492	6.2316797	.004132231
243	59049	14348907	15.5884573	6.2402515	.004115226
244	59536	14526784	15.6204994	6.2487998	.004098361
245	60025	14706125	15.6524758	6.2573248	.004081633
246	60516	14886936	15.6843871	6.2658266	.004065041
247	61009	15069223	15.7162336	6.2743054	.004048583
248	61504	15252992	15.7480157	6.2827613	.004032258
249	62001	15438249	15.7797338	6.2911946	.004016064
250	62500	15625000	15.8113883	6.2996053	.004000000
251	63001	15813251	15.8429795	6.3079935	.003984064
252	63504	16003008	15.8745079	6.3163596	.003968254
253	64009	16194277	15.9059737	6.3247035	.003952569
254	64516	16387064	15.9373775	6.3330256	.003937008
255	65025	16581375	15.9687194	6.3413257	.003921569
256	65536	16777216	16.0000000	6.3496042	.003906250
257	66049	16974593	16.0312195	6.3578611	.003891051
258	66564	17173512	16.0623784	6.3660968	.003875969
259	67081	17373979	16.0934769	6.3743111	.003861004
260	67600	17576000	16.1245155	6.3825043	.003846154
261	68121	17779581	16.1554944	6.3906765	.003831418
262	68644	17984728	16.1864141	6.3988279	.003816794
263	69169	18191447	16.2172747	6.4069585	.003802281
264	69696	18399744	16.2480768	6.4150687	.003787879
265	70225	18609625	16.2788206	6.4231583	.003773585

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
266	70756	18821096	16.3095064	6.4312276	.003759398
267	71289	19034163	16.3401346	6.4392767	.003745318
268	71824	19248832	16.3707055	6.4473057	.003731343
269	72361	19465109	16.4012195	6.4553148	.003717472
270	72900	19683000	16.4316767	6.4633041	.003703704
271	73441	19902511	16.4620776	6.4712736	.003690037
272	73984	20123648	16.4924225	6.4792236	.003676471
273	74529	20346417	16.5227116	6.4871541	.003663004
274	75076	20570824	16.5529454	6.4950653	.003649635
275	75625	20796875	16.5831240	6.5029572	.003636364
276	76176	21024576	16.6132477	6.5108300	.003623188
277	76729	21253933	16.6433170	6.5186839	.003610108
278	77284	21484952	16.6733320	6.5265189	.003597122
279	77841	21717639	16.7032931	6.5343351	.003584229
280	78400	21952000	16.7332005	6.5421326	.003571429
281	78961	22188041	16.7630546	6.5499116	.003558719
282	79524	22425768	16.7928556	6.5576722	.003546099
283	80089	22665187	16.8226038	6.5654144	.003533569
284	80656	22906304	16.8522995	6.5731385	.003521127
285	81225	23149125	16.8819430	6.5808443	.003508772
286	81796	23393656	16.9115345	6.5885323	.003496503
287	82369	23639903	16.9410743	6.5962023	.003484321
288	82944	23887872	16.9705627	6.6038545	.003472222
289	83521	24137569	17.0000000	6.6114890	.003460208
290	84100	24389000	17.0293864	6.6191060	.003448276
291	84681	24642171	17.0587221	6.6267054	.003436426
292	85264	24897088	17.0880075	6.6342874	.003424658
293	85849	25153757	17.1172428	6.6418522	.003412969
294	86436	25412184	17.1464282	6.6493998	.003401361
295	87025	25672375	17.1755640	6.6569302	.003389831
296	87616	25934336	17.2046505	6.6644437	.003378378
297	88209	26198073	17.2336879	6.6719403	.003367003
298	88804	26463592	17.2626765	6.6794200	.003355705
299	89401	26730899	17.2916165	6.6868831	.003344482
300	90000	27000000	17.3205081	6.6943295	.003333333
301	90601	27270901	17.3493516	6.7017593	.003322259
302	91204	27543608	17.3781472	6.7091729	.003311258
303	91809	27818127	17.4068952	6.7165700	.003300330
304	92416	28094464	17.4355958	6.7239508	.003289474
305	93025	28372625	17.4642492	6.7313155	.003278689
306	93636	28652616	17.4928557	6.7386641	.003267974
307	94249	28934443	17.5214155	6.7459967	.003257329
308	94864	29218112	17.5499288	6.7533134	.003246753
309	95481	29503629	17.5783958	6.7606143	.003236246
310	96100	29791000	17.6068169	6.7678995	.003225806
311	96721	30080231	17.6351921	6.7751690	.003215434
312	97344	30371328	17.6635217	6.7824229	.003205128
313	97969	30664297	17.6918060	6.7896613	.003194888
314	98596	30959144	17.7200451	6.7968844	.003184713
315	99225	31255875	17.7482393	6.8040921	.003174603
316	99856	31554496	17.7763888	6.8112847	.003164557
317	100489	31855013	17.8044938	6.8184620	.003154574
318	101124	32157432	17.8325545	6.8256242	.003144654
319	101761	32461759	17.8605711	6.8327714	.003134796

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
320	102400	32768000	17.8885438	6.8399037	.003125000
321	103041	33076161	17.9164729	6.8470213	.003115265
322	103684	33386248	17.9443584	6.8541240	.003105590
323	104329	33698267	17.9722008	6.8612120	.003095975
324	104976	34012224	18.0000000	6.8682855	.003086420
325	105625	34328125	18.0277564	6.8753443	.003076923
326	106276	34645976	18.0554701	6.8823888	.003067485
327	106929	34965783	18.0831413	6.8894188	.003058104
328	107584	35287552	18.1107703	6.8964345	.003048780
329	108241	35611289	18.1383571	6.9034359	.003039514
330	108900	35937000	18.1659021	6.9104232	.003030303
331	109561	36264691	18.1934054	6.9173964	.003021148
332	110224	36594368	18.2208672	6.9243556	.003012048
333	110889	36926037	18.2482876	6.9313008	.003003003
334	111556	37259704	18.2756669	6.9382321	.002994012
335	112225	37595375	18.3030052	6.9451496	.002985075
336	112896	37933056	18.3303028	6.9520533	.002976190
337	113569	38272753	18.3575598	6.9589434	.002967359
338	114244	38614472	18.3847763	6.9658198	.002958580
339	114921	38958219	18.4119526	6.9726826	.002949853
340	115600	39304000	18.4390889	6.9795321	.002941176
341	116281	39651821	18.4661853	6.9863681	.002932551
342	116964	40001688	18.4932420	6.9931906	.002923977
343	117649	40353607	18.5202592	7.0000000	.002915452
344	118336	40707584	18.5472370	7.0067962	.002906977
345	119025	41063625	18.5741756	7.0135791	.002898551
346	119716	41421736	18.6010752	7.0203490	.002890173
347	120409	41781923	18.6279360	7.0271058	.002881844
348	121104	42144192	18.6547581	7.0338497	.002873563
349	121801	42508549	18.6815417	7.0405806	.002865330
350	122500	42875000	18.7082869	7.0472987	.002857143
351	123201	43243551	18.7349940	7.0540041	.002849003
352	123904	43614208	18.7616630	7.0606967	.002840909
353	124609	43986977	18.7882942	7.0673767	.002832861
354	125316	44361864	18.8148877	7.0740440	.002824859
355	126025	44738875	18.8414437	7.0806988	.002816901
356	126736	45118016	18.8679623	7.0873411	.002808989
357	127449	45499293	18.8944436	7.0939709	.002801120
358	128164	45882712	18.9208879	7.1005885	.002793296
359	128881	46268279	18.9472953	7.1071937	.002785515
360	129600	46656000	18.9736660	7.1137866	.002777778
361	130321	47045881	19.0000000	7.1203674	.002770083
362	131044	47437928	19.0262976	7.1269360	.002762431
363	131769	47832147	19.0525589	7.1334925	.002754821
364	132496	48228544	19.0787840	7.1400370	.002747253
365	133225	48627125	19.1049732	7.1465695	.002739726
366	133956	49027896	19.1311265	7.1530901	.002732240
367	134689	49430863	19.1572441	7.1595988	.002724796
368	135424	49836032	19.1833261	7.1660957	.002717391
369	136161	50243409	19.2093727	7.1725809	.002710027
370	136900	50653000	19.2353841	7.1790544	.002702703
371	137641	51064811	19.2613603	7.1855162	.002695418
372	138384	51478848	19.2873015	7.1919663	.002688172

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
373	139129	51895117	19.3132079	7.1984050	.002680965
374	139876	52313624	19.3390796	7.2048322	.002673797
375	140625	52734375	19.3649167	7.2112479	.002666667
376	141376	53157376	19.3907194	7.2176522	.002659574
377	142129	53582633	19.4164878	7.2240450	.002652520
378	142884	54010152	19.4422221	7.2304268	.002645503
379	143641	54439939	19.4679223	7.2367972	.002638522
380	144400	54872000	19.4935887	7.2431565	.002631579
381	145161	55306341	19.5192213	7.2495045	.002624672
382	145924	55742968	19.5448203	7.2558415	.002617801
383	146689	56181887	19.5703858	7.2621675	.002610966
384	147456	56623104	19.5959179	7.2684824	.002604167
385	148225	57066625	19.6214169	7.2747864	.002597403
386	148996	57512456	19.6468827	7.2810794	.002590674
387	149769	57960603	19.6723156	7.2873617	.002583979
388	150544	58411072	19.6977156	7.2936330	.002577320
389	151321	58863869	19.7230829	7.2998936	.002570694
390	152100	59319000	19.7484177	7.3061436	.002564103
391	152881	59776471	19.7737199	7.3123828	.002557545
392	153664	60236288	19.7989899	7.3186114	.002551020
393	154449	60698457	19.8242276	7.3248295	.002544529
394	155236	61162984	19.8494332	7.3310369	.002538071
395	156025	61629875	19.8746069	7.3372339	.002531646
396	156816	62099136	19.8997487	7.3434205	.002525253
397	157609	62570773	19.9248588	7.3495966	.002518892
398	158404	63044792	19.9499373	7.3557624	.002512563
399	159201	63521199	19.9749844	7.3619178	.002506266
400	160000	64000000	20.0000000	7.3680630	.002500000
401	160801	64481201	20.0249844	7.3741979	.002493766
402	161604	64964808	20.0499377	7.3803227	.002487562
403	162409	65450827	20.0748599	7.3864373	.002481390
404	163216	65939264	20.0997512	7.3925418	.002475248
405	164025	66430125	20.1246118	7.3986363	.002469136
406	164836	66923416	20.1494417	7.4047206	.002463054
407	165649	67419143	20.1742410	7.4107950	.002457002
408	166464	67917312	20.1990099	7.4168595	.002450980
409	167281	68417929	20.2237484	7.4229142	.002444988
410	168100	68921000	20.2484567	7.4289589	.002439024
411	168921	69426531	20.2731349	7.4349938	.002433090
412	169744	69934528	20.2977831	7.4410189	.002427184
413	170569	70444997	20.3224014	7.4470342	.002421308
414	171396	70957944	20.3469899	7.4530399	.002415459
415	172225	71473375	20.3715488	7.4590359	.002409639
416	173056	71991296	20.3960781	7.4650223	.002403846
417	173889	72511713	20.4205779	7.4709991	.002398082
418	174724	73034632	20.4450483	7.4769664	.002392344
419	175561	73560059	20.4694895	7.4829242	.002386635
420	176400	74088000	20.4939015	7.4888724	.002380952
421	177241	74618461	20.5182845	7.4948113	.002375297
422	178084	75151448	20.5426386	7.5007406	.002369668
423	178929	75686967	20.5669638	7.5066607	.002364066
424	179776	76225024	20.5912603	7.5125715	.002358491
425	180625	76765625	20.6155281	7.5184730	.002352941

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
426	181476	77308776	20.6397674	7.5243652	.002347418
427	182329	77854483	20.6639783	7.5302482	.002341920
428	183184	78402752	20.6881609	7.5361221	.002336449
429	184041	78953589	20.7123152	7.5419867	.002331002
430	184900	79507000	20.7364414	7.5478423	.002325581
431	185761	80062991	20.7605395	7.5536888	.002320186
432	186624	80621568	20.7846097	7.5595263	.002314815
433	187489	81182737	20.8086520	7.5653548	.002309469
434	188356	81746504	20.8326667	7.5711743	.002304147
435	189225	82312875	20.8566536	7.5769849	.002298851
436	190096	82881856	20.8806130	7.5827865	.002293578
437	190969	83453453	20.9045450	7.5885793	.002288330
438	191844	84027672	20.9284495	7.5943633	.002283105
439	192721	84604519	20.9523268	7.6001385	.002277904
440	193600	85184000	20.9761770	7.6059049	.002272727
441	194481	85766121	21.0000000	7.6116626	.002267574
442	195364	86350888	21.0237960	7.6174116	.002262443
443	196249	86938307	21.0475652	7.6231519	.002257336
444	197136	87528384	21.0713075	7.6288837	.002252252
445	198025	88121125	21.0950231	7.6346067	.002247191
446	198916	88716536	21.1187121	7.6403213	.002242152
447	199809	89314623	21.1423745	7.6460272	.002237136
448	200704	89915392	21.1660105	7.6517247	.002232143
449	201601	90518849	21.1896201	7.6574138	.002227171
450	202500	91125000	21.2132034	7.6630943	.002222222
451	203401	91733851	21.2367606	7.6687665	.002217295
452	204304	92345408	21.2602916	7.6744303	.002212389
453	205209	92959677	21.2837967	7.6800857	.002207506
454	206116	93576664	21.3072758	7.6857328	.002202643
455	207025	94196375	21.3307290	7.6913717	.002197802
456	207936	94818816	21.3541565	7.6970023	.002192982
457	208849	95443993	21.3775583	7.7026246	.002188184
458	209764	96071912	21.4009346	7.7082388	.002183406
459	210681	96702579	21.4242853	7.7138448	.002178649
460	211600	97336000	21.4476106	7.7194426	.002173913
461	212521	97972181	21.4709106	7.7250325	.002169197
462	213444	98611128	21.4941853	7.7306141	.002164502
463	214369	99252847	21.5174348	7.7361877	.002159827
464	215296	99897344	21.5406592	7.7417532	.002155172
465	216225	100544625	21.5638587	7.7473109	.002150538
466	217156	101194696	21.5870331	7.7528606	.002145923
467	218089	101847563	21.6101828	7.7584023	.002141328
468	219024	102503232	21.6333077	7.7639361	.002136752
469	219961	103161709	21.6564078	7.7694620	.002132196
470	220900	103823000	21.6794834	7.7749801	.002127660
471	221841	104487111	21.7025344	7.7804904	.002123142
472	222784	105154048	21.7255610	7.7859928	.002118644
473	223729	105823817	21.7485632	7.7914875	.002114165
474	224676	106496424	21.7715411	7.7969745	.002109705
475	225625	107171875	21.7944947	7.8024538	.002105263
476	226576	107850176	21.8174242	7.8079254	.002100840
477	227529	108531333	21.8403297	7.8133892	.002096436
478	228484	109215352	21.8632111	7.8188456	.002092050
479	229441	109902239	21.8860686	7.8242942	.002087683

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
480	230400	110592000	21.9089023	7.8297353	.002083333
481	231361	111284641	21.9317122	7.8351688	.002079002
482	232324	111980168	21.9544984	7.8405949	.002074689
483	233289	112678587	21.9772610	7.8460134	.002070393
484	234256	113379904	22.0000000	7.8514244	.002066116
485	235225	114084125	22.0227155	7.8568281	.002061856
486	236196	114791256	22.0454077	7.8622242	.002057613
487	237169	115501303	22.0680765	7.8676130	.002053388
488	238144	116214272	22.0907220	7.8729944	.002049180
489	239121	116930169	22.1133444	7.8783684	.002044990
490	240100	117649000	22.1359436	7.8837352	.002040816
491	241081	118370771	22.1585198	7.8890946	.002036660
492	242064	119095488	22.1810730	7.8944468	.002032520
493	243049	119823157	22.2036033	7.8997917	.002028398
494	244036	120553784	22.2261108	7.9051294	.002024291
495	245025	121287375	22.2485955	7.9104599	.002020202
496	246016	122023936	22.2710575	7.9157832	.002016129
497	247009	122763473	22.2934968	7.9210994	.002012072
498	248004	123505992	22.3159136	7.9264085	.002008032
499	249001	124251499	22.3383079	7.9317104	.002004008
500	250000	125000000	22.3606798	7.9370053	.002000000
501	251001	125751501	22.3830293	7.9422931	.001996008
502	252004	126506008	22.4053565	7.9475739	.001992032
503	253009	127263527	22.4276615	7.9528477	.001988072
504	254016	128024064	22.4499443	7.9581144	.001984127
505	255025	128787625	22.4722051	7.9633743	.001980198
506	256036	129554216	22.4944438	7.9686271	.001976285
507	257049	130323843	22.5166605	7.9738731	.001972387
508	258064	131096512	22.5388553	7.9791122	.001968504
509	259081	131872229	22.5610283	7.9843444	.001964637
510	260100	132651000	22.5831796	7.9895697	.001960784
511	261121	133432831	22.6053091	7.9947883	.001956947
512	262144	134217728	22.6274170	8.0000000	.001953125
513	263169	135005697	22.6495033	8.0052049	.001949318
514	264196	135796744	22.6715681	8.0104032	.001945525
515	265225	136590875	22.6936114	8.0155946	.001941748
516	266256	137388096	22.7156334	8.0207794	.001937984
517	267289	138188413	22.7376340	8.0259574	.001934236
518	268324	138991832	22.7596134	8.0311287	.001930502
519	269361	139798359	22.7815715	8.0362935	.001926782
520	270400	140608000	22.8035085	8.0414515	.001923077
521	271441	141420761	22.8254244	8.0466030	.001919386
522	272484	142236648	22.8473193	8.0517479	.001915709
523	273529	143055667	22.8691933	8.0568862	.001912046
524	274576	143877824	22.8910463	8.0620180	.001908397
525	275625	144703125	22.9128785	8.0671432	.001904762
526	276676	145531576	22.9346899	8.0722620	.001901141
527	277729	146363183	22.9564806	8.0773743	.001897533
528	278784	147197952	22.9782506	8.0824800	.001893939
529	279841	148035889	23.0000000	8.0875794	.001890359
530	280900	148877000	23.0217289	8.0926723	.001886792
531	281961	149721291	23.0434372	8.0977589	.001883239
532	283024	150568768	23.0651252	8.1028390	.001879699
533	284089	151419437	23.0867928	8.1079128	.001876173

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
534	285156	152273304	23.1084400	8.1129803	.001872659
535	286225	153130375	23.1300670	8.1180414	.001869159
536	287296	153990656	23.1516738	8.1230962	.001865672
537	288369	154854153	23.1732605	8.1281447	.001862197
538	289444	155720872	23.1948270	8.1331870	.001858736
539	290521	156590819	23.2163735	8.1382230	.001855288
540	291600	157464000	23.2379001	8.1432529	.001851852
541	292681	158340421	23.2594067	8.1482765	.001848429
542	293764	159220088	23.2808935	8.1532939	.001845018
543	294849	160103007	23.3023604	8.1583051	.001841621
544	295936	160989184	23.3238076	8.1633102	.001838235
545	297025	161878625	23.3452351	8.1683092	.001834862
546	298116	162771336	23.3666429	8.1733020	.001831502
547	299209	163667323	23.3880311	8.1782888	.001828154
548	300304	164566592	23.4093998	8.1832695	.001824818
549	301401	165469149	23.4307490	8.1882441	.001821494
550	302500	166375000	23.4520788	8.1932127	.001818182
551	303601	167284151	23.4733892	8.1981753	.001814882
552	304704	168196608	23.4946802	8.2031319	‘001811594
553	305809	169112377	23.5159520	8.2080825	.001808318
554	306916	170031464	23.5372046	8.2130271	.001805054
555	308025	170953875	23.5584380	8.2179657	.001801802
556	309136	171879616	23.5796522	8.2228985	.001798561
557	310249	172808693	23.6008474	8.2278254	.001795332
558	311364	173741112	23.6220236	8.2327463	.001792115
559	312481	174676879	23.6431808	8.2376614	.001788909
560	313600	175616000	23.6643191	8.2425706	.001785714
561	314721	176558481	23.6854386	8.2474740	.001782531
562	315844	177504328	23.7065392	8.2523715	.001779359
563	316969	178453547	23.7276210	8.2572633	.001776199
564	318096	179406144	23.7486842	8.2621492	.001773050
565	319225	180362125	23.7697286	8.2670294	.001769912
566	320356	181321496	23.7907545	8.2719039	.001766784
567	321489	182284263	23.8117618	8.2767726	.001763668
568	322624	183250432	23.8327506	8.2816355	.001760563
569	323761	184220009	23.8537209	8.2864928	.001757469
570	324900	185193000	23.8746728	8.2913444	.001754386
571	326041	186169411	23.8956063	8.2961903	.001751313
572	327184	187149248	23.9165215	8.3010304	.001748252
573	328329	188132517	23.9374184	8.3058651	.001745201
574	329476	189119224	23.9582971	8.3106941	.001742160
575	330625	190109375	23.9791576	8.3155175	.001739130
576	331776	191102976	24.0000000	8.3203353	.001736111
577	332929	192100033	24.0208243	8.3251475	.001733102
578	334084	193100552	24.0416306	8.3299542	.001730104
579	335241	194104539	24.0624188	8.3347553	.001727116
580	336400	195112000	24.0831891	8.3395509	.001724138
581	337561	196122941	24.1039416	8.3443410	.001721170
582	338724	197137368	24.1246762	8.3491256	.001718213
583	339889	198155287	24.1453929	8.3539047	.001715266
584	341056	199176704	24.1660919	8.3586784	.001712329
585	342225	200201625	24.1867732	8.3634466	.001709402
586	343396	201230056	24.2074369	8.3682095	.001706485

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
587	344569	202262003	24.2280829	8.3729668	.001703578
588	345744	203297472	24.2487113	8.3777188	.001700680
589	346921	204336469	24.2693222	8.3824653	.001697793
590	348100	205379000	24.2899156	8.3872065	.001694915
591	349281	206425071	24.3104916	8.3919423	.001692047
592	350464	207474688	24.3310501	8.3966729	.001689189
593	351649	208527857	24.3515913	8.4013981	.001686341
594	352836	209584584	24.3721152	8.4061180	.001683502
595	354025	210644875	24.3926218	8.4108326	.001680672
596	355216	211708736	24.4131112	8.4155419	.001677852
597	356409	212776173	24.4335834	8.4202460	.001675042
598	357604	213847192	24.4540385	8.4249448	.001672241
599	358801	214921799	24.4744765	8.4296383	.001669449
600	360000	216000000	24.4948974	8.4343267	.001666667
601	361201	217081801	24.5153013	8.4390098	.001663894
602	362404	218167208	24.5356883	8.4436877	.001661130
603	363609	219256227	24.5560583	8.4483605	.001658375
604	364816	220348864	24.5764115	8.4530281	.001655629
605	366025	221445125	24.5967478	8.4576906	.001652893
606	367236	222545016	24.6170673	8.4623479	.001650165
607	368449	223648543	24.6373700	8.4670001	.001647446
608	369664	224755712	24.6576560	8.4716471	.001644737
609	370881	225866529	24.6779254	8.4762892	.001642036
610	372100	226981000	24.6981781	8.4809261	.001639344
611	373321	228099131	24.7184142	8.4855579	.001636661
612	374544	229220928	24.7386338	8.4901848	.001633987
613	375769	230346397	24.7588368	8.4948065	.001631321
614	376996	231475544	24.7790234	8.4994233	.001628664
615	378225	232608375	24.7991935	8.5040350	.001626016
616	379456	233744896	24.8193473	8.5086417	.001623377
617	380689	234885113	24.8394847	8.5132435	.001620746
618	381924	236029032	24.8596058	8.5178403	.001618123
619	383161	237176659	24.8797106	8.5224321	.001615509
620	384400	238328000	24.8997992	8.5270189	.001612903
621	385641	239483061	24.9198716	8.5316009	.001610306
622	386884	240641848	24.9399278	8.5361780	.001607717
623	388129	241804367	24.9599679	8.5407501	.001605136
624	389376	242970624	24.9799920	8.5453173	.001602564
625	390625	244140625	25.0000000	8.5498797	.001600000
626	391876	245314376	25.0199920	8.5544372	.001597444
627	393129	246491883	25.0399681	8.5589899	.001594896
628	394384	247673152	25.0599282	8.5635377	.001592357
629	395641	248858189	25.0798724	8.5680807	.001589825
630	396900	250047000	25.0998008	8.5726189	.001587302
631	398161	251239591	25.1197134	8.5771523	.001584786
632	399424	252435968	25.1396102	8.5816809	.001582278
633	400689	253636137	25.1594913	8.5862047	.001579779
634	401956	254840104	25.1793566	8.5907238	.001577287
635	403225	256047875	25.1992063	8.5952380	.001574803
636	404496	257259456	25.2190404	8.5997476	.001572327
637	405769	258474853	25.2388589	8.6042525	.001569859
638	407044	259694072	25.2586619	8.6087526	.001567398
639	408321	260917119	25.2784493	8.6132480	.001564945

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
640	409600	262144000	25.2982213	8.6177388	.001562500
641	410881	263374721	25.3179778	8.6222248	.001560062
642	412164	264609288	25.3377189	8.6267063	.001557632
643	413449	265847707	25.3574447	8.6311830	.001555210
644	414736	267089984	25.3771551	8.6356551	.001552795
645	416025	268336125	25.3968502	8.6401226	.001550388
646	417316	269586136	25.4165301	8.6445855	.001547988
647	418609	270840023	25.4361947	8.6490437	.001545595
648	419904	272097792	25.4558441	8.6534974	.001543210
649	421201	273359449	25.4754784	8.6579465	.001540832
650	422500	274625000	25.4950976	8.6623911	.001538462
651	423801	275894451	25.5147016	8.6668310	.001536098
652	425104	277167808	25.5342907	8.6712665	.001533742
653	426409	278445077	25.5538647	8.6756974	.001531394
654	427716	279726264	25.5734237	8.6801237	.001529052
655	429025	281011375	25.5929678	8.6845456	.001526718
656	430336	282300416	25.6124969	8.6889630	.001524390
657	431649	283593393	25.6320112	8.6933759	.001522070
658	432964	284890312	25.6515107	8.6977843	.001519757
659	434281	286191179	25.6709953	8.7021882	.001517451
660	435600	287496000	25.6904652	8.7065877	.001515152
661	436921	288804781	25.7099203	8.7109827	.001512859
662	438244	290117528	25.7293607	8.7153734	.001510574
663	439569	291434247	25.7487864	8.7197596	.001508296
664	440896	292754944	25.7681975	8.7241414	.001506024
665	442225	294079625	25.7875939	8.7285187	.001503759
666	443556	295408296	25.8069758	8.7328918	.001501502
667	444889	296740963	25.8263431	8.7372604	.001499250
668	446224	298077632	25.8456960	8.7416246	.001497006
669	447561	299418309	25.8650343	8.7459846	.001494768
670	448900	300763000	25.8843582	8.7503401	.001492537
671	450241	302111711	25.9036677	8.7546913	.001490313
672	451584	303464448	25.9229628	8.7590383	.001488095
673	452929	304821217	25.9422435	8.7633809	.001485884
674	454276	306182024	25.9615100	8.7677192	.001483680
675	455625	307546875	25.9807621	8.7720532	.001481481
676	456976	308915776	26.0000000	8.7763830	.001479290
677	458329	310288733	26.0192237	8.7807084	.001477105
678	459684	311665752	26.0384331	8.7850296	.001474926
679	461041	313046839	26.0576284	8.7893466	.001472754
680	462400	314432000	26.0768096	8.7936593	.001470588
681	463761	315821241	26.0959767	8.7979679	.001468429
682	465124	317214568	26.1151297	8.8022721	.001466276
683	466489	318611987	26.1342687	8.8065722	.001464129
684	467856	320013504	26.1533937	8.8108681	.001461988
685	469225	321419125	26.1725047	8.8151598	.001459854
686	470596	322828856	26.1916017	8.8194474	.001457726
687	471969	324242703	26.2106848	8.8237307	.001455604
688	473344	325660672	26.2297541	8.8280099	.001453488
689	474721	327082769	26.2488095	8.8322850	.001451379
690	476100	328509000	26.2678511	8.8365559	.001449275
691	477481	329939371	26.2868789	8.8408227	.001447178
692	478864	331373888	26.3058929	8.8450854	.001445087
693	480249	332812557	26.3248932	8.8493440	.001443001

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
694	481636	334255384	26.3438797	8.8535985	.001440922
695	483025	335702375	26.3628527	8.8578489	.001438849
696	484416	337153536	26.3818119	8.8620952	.001436782
697	485809	338608873	26.4007576	8.8663375	.001434720
698	487204	340068392	26.4196896	8.8705757	.001432665
699	488601	341532099	26.4386081	8.8748099	.001430615
700	490000	343000000	26.4575131	8.8790400	.001428571
701	491401	344472101	26.4764046	8.8832661	.001426534
702	492804	345948408	26.4952826	8.8874882	.001424501
703	494209	347428927	26.5141472	8.8917063	.001422475
704	495616	348913664	26.5329983	8.8959204	.001420455
705	497025	350402625	26.5518361	8.9001304	.001418440
706	498436	351895816	26.5706605	8.9043366	.001416431
707	499849	353393243	26.5894716	8.9085387	.001414427
708	501264	354894912	26.6082694	8.9127369	.001412429
709	502681	356400829	26.6270539	8.9169311	.001410437
710	504100	357911000	26.6458252	8.9211214	.001408451
711	505521	359425431	26.6645833	8.9253078	.001406470
712	506944	360944128	26.6833281	8.9294902	.001404494
713	508369	362467097	26.7020598	8.9336687	.001402525
714	509796	363994344	26.7207784	8.9378433	.001400560
715	511225	365525875	26.7394839	8.9420140	.001398601
716	512656	367061696	26.7581763	8.9461809	.001396648
717	514089	368601813	26.7768557	8.9503438	.001394700
718	515524	370146232	26.7955220	8.9545029	.001392758
719	516961	371694959	26.8141754	8.9586581	.001390821
720	518400	373248000	26.8328157	8.9628095	.001388889
721	519841	374805361	26.8514432	8.9669570	.001386963
722	521284	376367048	26.8700577	8.9711007	.001385042
723	522729	377933067	26.8886593	8.9752406	.001383126
724	524176	379503424	26.9072481	8.9793766	.001381215
725	525625	381078125	26.9258240	8.9835089	.001379310
726	527076	382657176	26.9443872	8.9876373	.001377410
727	528529	384240583	26.9629375	8.9917620	.001375516
728	529984	385828352	26.9814751	8.9958829	.001373626
729	531441	387420489	27.0000000	9.0000000	.001371742
730	532900	389017000	27.0185122	9.0041134	.001369863
731	534361	390617891	27.0370117	9.0082229	.001367989
732	535824	392223168	27.0554985	9.0123288	.001366120
733	537289	393832837	27.0739727	9.0164309	.001364256
734	538756	395446904	27.0924344	9.0205293	.001362398
735	540225	397065375	27.1108834	9.0246239	.001360544
736	541696	398688256	27.1293199	9.0287149	.001358696
737	543169	400315553	27.1477439	9.0328021	.001356852
738	544644	401947272	27.1661554	9.0368857	.001355014
739	546121	403583419	27.1845544	9.0409655	.001353180
740	547600	405224000	27.2029410	9.0450417	.001351351
741	549081	406869021	27.2213152	9.0491142	.001349528
742	550564	408518488	27.2396769	9.0531831	.001347709
743	552049	410172407	27.2580263	9.0572482	.001345895
744	553536	411830784	27.2763634	9.0613098	.001344086
745	555025	413493625	27.2946881	9.0653677	.001342282
746	556516	415160936	27.3130006	9.0694220	.001340483

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
747	558009	416832723	27.3313007	9.0734726	.001338688
748	559504	418508992	27.3495887	9.0775197	.001336898
749	561001	420189749	27.3678644	9.0815631	.001335113
750	562500	421875000	27.3861279	9.0856030	.001333333
751	564001	423564751	27.4043792	9.0896392	.001331558
752	565504	425259008	27.4226184	9.0936719	.001329787
753	567009	426957777	27.4408455	9.0977010	.001328021
754	568516	428661064	27.4590604	9.1017265	.001326260
755	570025	430368875	27.4772633	9.1057485	.001324503
756	571536	432081216	27.4954542	9.1097669	.001322751
757	573049	433798093	27.5136330	9.1137818	.001321004
758	574564	435519512	27.5317998	9.1177931	.001319261
759	576081	437245479	27.5499546	9.1218010	.001317523
760	577600	438976000	27.5680975	9.1258053	.001315789
761	579121	440711081	27.5862284	9.1298061	.001314060
762	580644	442450728	27.6043475	9.1338034	.001312336
763	582169	444194947	27.6224546	9.1377971	.001310616
764	583696	445943744	27.6405499	9.1417874	.001308901
765	585225	447697125	27.6586334	9.1457742	.001307190
766	586756	449455096	27.6767050	9.1497576	.001305483
767	588289	451217663	27.6947648	9.1537375	.001303781
768	589824	452984832	27.7128129	9.1577139	.001302083
769	591361	454756609	27.7308492	9.1616869	.001300390
770	592900	456533000	27.7488739	9.1656565	.001298701
771	594441	458314011	27.7668868	9.1696225	.001297017
772	595984	460099648	27.7848880	9.1735852	.001295337
773	597529	461889917	27.8028775	9.1775445	.001293661
774	599076	463684824	27.8208555	9.1815003	.001291990
775	600625	465484375	27.8388218	9.1854527	.001290323
776	602176	467288576	27.8567766	9.1894018	.001288660
777	603729	469097433	27.8747197	9.1933474	.001287001
778	605284	470910952	27.8926514	9.1972897	.001285347
779	606841	472729139	27.9105715	9.2012286	.001283697
780	608400	474552000	27.9284801	9.2051641	.001282051
781	609961	476379541	27.9463772	9.2090962	.001280410
782	611524	478211768	27.9642629	9.2130250	.001278772
783	613089	480048687	27.9821372	9.2169505	.001277139
784	614656	481890304	28.0000000	9.2208726	.001275510
785	616225	483736625	28.0178515	9.2247914	.001273885
786	617796	485587656	28.0356915	9.2287068	.001272265
787	619369	487443403	28.0535203	9.2326189	.001270648
788	620944	489303872	28.0713377	9.2365277	.001269036
789	622521	491169069	28.0891438	9.2404333	.001267427
790	624100	493039000	28.1069386	9.2443355	.001265823
791	625681	494913671	28.1247222	9.2482344	.001264223
792	627264	496793088	28.1424946	9.2521300	.001262626
793	628849	498677257	28.1602557	9.2560224	.001261034
794	630436	500566184	28.1780056	9.2599114	.001259446
795	632025	502459875	28.1957444	9.2637973	.001257862
796	633616	504358336	28.2134720	9.2676798	.001256281
797	635209	506261573	28.2311884	9.2715592	.001254705
798	636804	508169592	28.2488938	9.2754352	.001253133
799	638401	510082399	28.2665881	9.2793081	.001251564
800	640000	512000000	28.2842712	9.2831777	.001250000
801	641601	513922401	28.3019434	9.2870440	.001248439

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
802	643204	515849608	28.3196045	9.2909072	.001246883
803	644809	517781627	28.3372546	9.2947671	.001245330
804	646416	519718464	28.3548938	9.2986239	.001243781
805	648025	521660125	28.3725219	9.3024775	.001242236
806	649636	523606616	28.3901391	9.3063278	.001240695
807	651249	525557943	28.4077454	9.3101750	.001239157
808	652864	527514112	28.4253408	9.3140190	.001237624
809	654481	529475129	28.4429253	9.3178599	.001236094
810	656100	531441000	28.4604989	9.3216975	.001234568
811	657721	533411731	28.4780617	9.3255320	.001233046
812	659344	535387328	28.4956137	9.3293634	.001231527
813	660969	537367797	28.5131549	9.3331916	.001230012
814	662596	539353144	28.5306852	9.3370167	.001228501
815	664225	541343375	28.5482048	9.3408386	.001226994
816	665856	543338496	28.5657137	9.3446575	.001225490
817	667489	545338513	28.5832119	9.3484731	.001223990
818	669124	547343432	28.6006993	9.3522857	.001222494
819	670761	549353259	28.6181760	9.3560952	.001221001
820	672400	551368000	28.6356421	9.3599016	.001219512
821	674041	553387661	28.6530976	9.3637049	.001218027
822	675684	555412248	28.6705424	9.3675051	.001216545
823	677329	557441767	28.6879766	9.3713022	.001215067
824	678976	559476224	28.7054002	9.3750963	.001213592
825	680625	561515625	28.7228132	9.3788873	.001212121
826	682276	563559976	28.7402157	9.3826752	.001210654
827	683929	565609283	28.7576077	9.3864600	.001209190
828	685584	567663552	28.7749891	9.3902419	.001207729
829	687241	569722789	28.7923601	9.3940206	.001206273
830	688900	571787000	28.8097206	9.3977964	.001204819
831	690561	573856191	28.8270706	9.4015691	.001203369
832	692224	575930368	28.8444102	9.4053387	.001201923
833	693889	578009537	28.8617394	9.4091054	.001200480
834	695556	580093704	28.8790582	9.4128690	.001199041
835	697225	582182875	28.8963666	9.4166297	.001197605
836	698896	584277056	28.9136646	9.4203873	.001196172
837	700569	586376253	28.9309523	9.4241420	.001194743
838	702244	588480472	28.9482297	9.4278936	.001193317
839	703921	590589719	28.9654967	9.4316423	.001191895
840	705600	592704000	28.9827535	9.4353880	.001190476
841	707281	594823321	29.0000000	9.4391307	.001189061
842	708964	596947688	29.0172363	9.4428704	.001187648
843	710649	599077107	29.0344623	9.4466072	.001186240
844	712336	601211584	29.0516781	9.4503410	.001184834
845	714025	603351125	29.0688837	9.4540719	.001183432
846	715716	605495736	29.0860791	9.4577999	.001182033
847	717409	607645423	29.1032644	9.4615249	.001180638
848	719104	609800192	29.1204396	9.4652470	.001179245
849	720801	611960049	29.1376046	9.4689661	.001177856
850	722500	614125000	29.1547595	9.4726824	.001176471
851	724201	616295051	29.1719043	9.4763957	.001175088
852	725904	618470208	29.1890390	9.4801061	.001173709
853	727609	620650477	29.2061637	9.4838136	.001172333
854	729316	622835864	29.2232784	9.4875182	.001170960
855	731025	625026375	29.2403830	9.4912200	.001169591

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
856	732736	627222016	29.2574777	9.4949188	.001168224
857	734449	629422793	29.2745623	9.4986147	.001166861
858	736164	631628712	29.2916370	9.5023078	.001165501
859	737881	633839779	29.3087018	9.5059980	.001164144
860	739600	636056000	29.3257566	9.5096854	.001162791
861	741321	638277381	29.3428015	9.5133699	.001161440
862	743044	640503928	29.3598365	9.5170515	.001160093
863	744769	642735647	29.3768616	9.5207303	.001158749
864	746496	644972544	29.3938769	9.5244063	.001157407
865	748225	647214625	29.4108823	9.5280794	.001156069
866	749956	649461896	29.4278779	9.5317497	.001154734
867	751689	651714363	29.4448637	9.5354172	.001153403
868	753424	653972032	29.4618397	9.5390818	.001152074
869	755161	656234909	29.4788059	9.5427437	.001150748
870	756900	658503000	29.4957624	9.5464027	.001149425
871	758641	660776311	29.5127091	9.5500589	.001148106
872	760384	663054848	29.5296461	9.5537123	.001146789
873	762129	665338617	29.5465734	9.5573630	.001145475
874	763876	667627624	29.5634910	9.5610108	.001144165
875	765625	669921875	29.5803989	9.5646559	.001142857
876	767376	672221376	29.5972972	9.5682982	.001141553
877	769129	674526133	29.6141858	9.5719377	.001140251
878	770884	676836152	29.6310648	9.5755745	.001138952
879	772641	679151439	29.6479342	9.5792085	.001137656
880	774400	681472000	29.6647939	9.5828397	.001136364
881	776161	683797841	29.6816442	9.5864682	.001135074
882	777924	686128968	29.6984848	9.5900939	.001133787
883	779689	688465387	29.7153159	9.5937169	.001132503
884	781456	690807104	29.7321375	9.5973373	.001131222
885	783225	693154125	29.7489496	9.6009548	.001129944
886	784996	695506456	29.7657521	9.6045696	.001128668
887	786769	697864103	29.7825452	9.6081817	.001127396
888	788544	700227072	29.7993289	9.6117911	.001126126
889	790321	702595369	29.8161030	9.6153977	.001124859
890	792100	704969000	29.8328678	9.6190017	.001123596
891	793881	707347971	29.8496231	9.6226030	.001122334
892	795664	709732288	29.8663690	9.6262016	.001121076
893	797449	712121957	29.8831056	9.6297975	.001119821
894	799236	714516984	29.8998328	9.6333907	.001118568
895	801025	716917375	29.9165506	9.6369812	.001117318
896	802816	719323136	29.9332591	9.6405690	.001116071
897	804609	721734273	29.9499583	9.6441542	.001114827
898	806404	724150792	29.9666481	9.6477367	.001113586
899	808201	726572699	29.9833287	9.6513166	.001112347
900	810000	729000000	30.0000000	9.6548938	.001111111
901	811801	731432701	30.0166620	9.6584684	.001109878
902	813604	733870808	30.0333148	9.6620403	.001108647
903	815409	736314327	30.0499584	9.6656096	.001107420
904	817216	738763264	30.0665928	9.6691762	.001106195
905	819025	741217625	30.0832179	9.6727403	.001104972
906	820836	743677416	30.0998339	9.6763017	.001103753
907	822649	746142643	30.1164407	9.6798604	.001102536
908	824464	748613312	30.1330383	9.6834166	.001101322
909	826281	751089429	30.1496269	9.6869701	.001100110

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
910	828100	753571000	30.1662063	9.6905211	.001098901
911	829921	756058031	30.1827765	9.6940694	.001097695
912	831744	758550528	30.1993377	9.6976151	.001096491
913	833569	761048497	30.2158899	9.7011583	.001095290
914	835396	763551944	30.2324329	9.7046989	.001094092
915	837225	766060875	30.2489669	9.7082369	.001092896
916	839056	768575296	30.2654919	9.7117723	.001091703
917	840889	771095213	30.2820079	9.7153051	.001090513
918	842724	773620632	30.2985148	9.7188354	.001089325
919	844561	776151559	30.3150128	9.7223631	.001088139
920	846400	778688000	30.3315018	9.7258883	.001086957
921	848241	781229961	30.3479818	9.7294109	.001085776
922	850084	783777448	30.3644529	9.7329309	.001084599
923	851929	786330467	30.3809151	9.7364484	.001083424
924	853776	788889024	30.3973683	9.7399634	.001082251
925	855625	791453125	30.4138127	9.7434758	.001081081
926	857476	794022776	30.4302481	9.7469857	.001079914
927	859329	796597983	30.4466747	9.7504930	.001078749
928	861184	799178752	30.4630924	9.7539979	.001077586
929	863041	801765089	30.4795013	9.7575002	.001076426
930	864900	804357000	30.4959014	9.7610001	.001075269
931	866761	806954491	30.5122926	9.7644974	.001074114
932	868624	809557568	30.5286750	9.7679922	.001072961
933	870489	812166237	30.5450487	9.7714845	.001071811
934	872356	814780504	30.5614136	9.7749743	.001070664
935	874225	817400375	30.5777697	9.7784616	.001069519
936	876096	820025856	30.5941171	9.7819466	.001068376
937	877969	822656953	30.6104557	9.7854288	.001067236
938	879844	825293672	30.6267857	9.7889087	.001066098
939	881721	827936019	30.6431069	9.7923861	.001064963
940	883600	830584000	30.6594194	9.7958611	.001063830
941	885481	833237621	30.6757233	9.7993336	.001062699
942	887364	835896888	30.6920185	9.8028036	.001061571
943	889249	838561807	30.7083051	9.8062711	.001060445
944	891136	841232384	30.7245830	9.8097362	.001059322
945	893025	843908625	30.7408523	9.8131989	.001058201
946	894916	846590536	30.7571130	9.8166591	.001057082
947	896809	849278123	30.7733651	9.8201169	.001055966
948	898704	851971392	30.7896086	9.8235723	.001054852
949	900601	854670349	30.8058436	9.8270252	.001053741
950	902500	857375000	30.8220700	9.8304757	.001052632
951	904401	860085351	30.8382879	9.8339238	.001051525
952	906304	862801408	30.8544972	9.8373695	.001050420
953	908209	865523177	30.8706981	9.8408127	.001049318
954	910116	868250664	30.8868904	9.8442536	.001048218
955	912025	870983875	30.9030743	9.8476920	.001047120
956	913936	873722816	30.9192497	9.8511280	.001046025
957	915849	876467493	30.9354166	9.8545617	.001044932
958	917764	879217912	30.9515751	9.8579929	.001043841
959	919681	881974079	30.9677251	9.8614218	.001042753
960	921600	884736000	30.9838668	9.8648483	.001041667
961	923521	887503681	31.0000000	9.8682724	.001040583
962	925444	890277128	31.0161248	9.8716941	.001039501
963	927369	893056347	31.0322413	9.8751135	.001038422
964	929296	895841344	31.0483494	9.8785305	.001037344

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS.

No.	Squares	Cubes	Sq. roots	Cube roots	Reciprocals
965	931225	898632125	31.0644491	9.8819451	.001036269
966	933156	901428696	31.0805405	9.8853574	.001035197
967	935089	904231063	31.0966236	9.8887673	.001034126
968	937024	907039232	31.1126984	9.8921749	.001033058
969	938961	909853209	31.1287648	9.8955801	.001031992
970	940900	912673000	31.1448230	9.8989830	.001030928
971	942841	915498611	31.1608729	9.9023835	.001029866
972	944784	918330048	31.1769145	9.9057817	.001028807
973	946729	921167317	31.1929479	9.9091776	.001027749
974	948676	924010424	31.2089731	9.9125712	.001026694
975	950625	926859375	31.2249900	9.9159624	.001025641
976	952576	929714176	31.2409987	9.9193513	.001024590
977	954529	932574833	31.2569992	9.9227379	.001023541
978	956484	935441352	31.2729915	9.9261222	.001022495
979	958441	938313739	31.2889757	9.9295042	.001021450
980	960400	941192000	31.3049517	9.9328839	.001020408
981	962361	944076141	31.3209195	9.9362613	.001019368
982	964324	946966168	31.3368792	9.9396363	.001018330
983	963289	949862087	31.3528308	9.9430092	.001017294
984	968256	952763904	31.3687743	9.9463797	.001016260
985	970225	955671625	31.3847097	9.9497479	.001015228
986	972196	958585256	31.4006369	9.9531138	.001014199
987	974169	961504803	31.4165561	9.9564775	.001013171
988	976144	964430272	31.4324673	9.9598389	.001012146
989	978121	967361669	31.4483704	9.9631981	.001011122
990	980100	970299000	31.4642654	9.9665549	.001010101
991	982081	973242271	31.4801525	9.9699095	.001009082
992	984064	976191488	31.4960315	9.9732619	.001008065
993	986049	979146657	31.5119025	9.9766120	.001007049
994	988036	982107784	31.5277655	9.9799599	.001006036
995	990025	985074875	31.5436206	9.9833055	.001005025
996	992016	988047936	31.5594677	9.9866488	.001004016
997	994009	991026973	31.5753068	9.9899900	.001003009
998	996004	994011992	31.5911380	9.9933289	.001002004
999	998001	997002999	31.6069613	9.9966656	.001001001
1000	1000000	1000000000	31.6227766	10.0000000	.001000000
1001	1002001	1003003001	31.6385840	10.0033322	.0009990010
1002	1004004	1006012008	31.6543836	10.0066622	.0009980040
1003	1006009	1009027027	31.6701752	10.0099899	.0009970090
1004	1008016	1012048064	31.6859590	10.0133155	.0009960159
1005	1010025	1015075125	31.7017349	10.0166389	.0009950249
1006	1012036	1018108216	31.7175030	10.0199601	.0009940358
1007	1014049	1021147343	31.7332633	10.0232791	.0009930487
1008	1016064	1024192512	31.7490157	10.0265958	.0009920635
1009	1018081	1027243729	31.7647603	10.0299104	.0009910803
1010	1020100	1030301000	31.7804972	10.0332228	.0009900990
1011	1022121	1033364331	31.7962262	10.0365330	.0009891197
1012	1024144	1036433728	31.8119474	10.0398410	.0009881423
1013	1026169	1039509197	31.8276609	10.0431469	.0009871668
1014	1028196	1042590744	31.8433666	10.0464506	.0009861933
1015	1030225	1045678375	31.8590646	10.0497521	.0009852217
1016	1032256	1048772096	31.8747549	10.0530514	.0009842520
1017	1034289	1051871913	31.8904374	10.0563485	.0009832842
1018	1036324	1054977832	31.9061123	10.0596435	.0009823183
1019	1038361	1058089859	31.9217794	10.0629364	.0009813543

WEIGHTS AND MEASURES.

SQUARE MEASURE

Sq. In.	Square feet	Square yards	Square poles	Roods	Acres	Square mile
1	.00694	.000772	......	......	....	....
144	1.	.11111	.003673	......	....	....
1296	9.	1.	.033058	.000826	....	....
..	272.25	30.25	1.	.025	.00625	....
..	10890.	1210.	40.	1.	.25	.0003906
..	43560.	4840.	160.	4.	1.	.0015615
..	......	3097600.	102400.	2560.	640.	1.

MEASURE OF CAPACITY

Pints	Quarts	Gallons	Pecks	Bushels	Quarters	Cubic in.
1	.5	.125	.0625	.015625	.001953125	34.683
2	1.	.25	.125	.03125	.00390625	69.366
8	4.	1.	.5	.125	.015625	277.463
16	8.	2.	1.	.25	.03125	554.926
64	32.	8.	4.	1.	.125	2219.704
512	256.	64.	32.	8.	1.	17757.632

AVOIRDUPOIS WEIGHT

Grains	Drams	Ounces	Pounds	Hundred-weights	Gross ton
1.	.03657	.002286	.000143	.00000128	.0000000637
27.34375	1.	.0625	.003906	.00003488	.000001744
437.5	16.	1.	.0625	.00055804	.00002790
7000.	256.	16.	1.	.0089286	.0004464
784000.	28672.	1792.	112.	1.	.05
15680000.	573440.	35840.	2240.	20.	1.

LINEAR MEASURE

Inches	Feet	Yards	Poles	Furlongs	Mile
1	.08333	.02778	.0050505	.00012626	.00001578
12	1.	.33333	.0606061	.00151515	.00018939
36	3.	1.	.1818182	.00454545	.00056818
198	16.5	5.5	1.	.025	.003125
7920	660.	220.	40.	1.	.125
63360	5280.	1760.	320.	8.	1.

METRIC MEASURES.

LINEAR MEASURE.

Millimetres	Centimetres	Decimetres	Metres	Dekametres	Hectometres	Kilometres
1	.1	.01	.001	.0001	.00001	.000001
10	1.	.1	.01	.001	.0001	.00001
100	10.	1.	.1	.01	.001	.0001
1000	100.	10.	1.	.1	.01	.001
10000	1000.	100.	10.	1.	.1	.01
100000	10000.	1000.	100.	10.	1.	.1
1000000	100000.	10000.	1000.	100.	10.	1.

SQUARE MEASURE.

Square centimetres	Square decimetres	Square metres	Ares or square decimetres	Hectare or square hectometre
1	.01	.00001	.00001	.00000001
100	1.	.01	.0001	.000001
10000	100.	1.	.01	.0001
1000000	10000.	100.	1.	.01
100000000	1000000.	10000.	100.	1.

CUBIC MEASURE.

Cubic centimetres	Cubic decimetres	Cubic metre
1	.001	.000001
1000	1.	.001
1000000	1000.	1.

METRIC MEASURES.

MEASURES OF CAPACITY.

Millilitres	Centilitres	Decilitres	Litres	Dekalitres	Hectolitres	Kilolitre
1	.1	.01	.001	.0001	.00001	.000001
10	1.	.1	.01	.001	.0001	.00001
100	10.	1.	.1	.01	.001	.0001
1000	100.	10.	1.	.1	.01	.001
10000	1000.	100.	10.	1.	.1	.01
100000	10000.	1000.	100.	10.	1.	.1
1000000	100000.	10000.	1000.	100.	10.	1.

WEIGHTS.

Milli-grammes	Centi-grammes	Deci-grammes	Grammes	Deka-grammes	Hecto-grammes	Kilo-grammes
1	.1	.01	.001	.0001	.00001	.000001
10	1.	.1	.01	.001	.0001	.00001
100	10.	1.	.1	.01	.001	.0001
1000	100.	10.	1.	.1	.01	.001
10000	1000.	100.	10.	1.	.1	.01
100000	10000.	1000.	100.	10.	1.	.1
1000000	100000.	10000.	1000.	100.	10.	1.

METRIC EQUIVALENTS OF BRITISH UNITS.

LINEAR MEASURE

British units	Metric equivalents	Metric units	British equivalents
1 inch =	2.5399541 centimetres	1 millimetre =	.03937 in.
1 inch =	.02539954 metres	1 centimetre =	.393708 in.
1 foot =	.30479449 metres	1 metre =	39.37079 in.
1 yard =	.91438348 metres	1 metre =	3.2808992 ft.
1 fathom =	1.82876696 metres	1 metre =	1.093633 yds.
1 pole =	5.02911 metres	1 kilometre =	1093.63306 yds.
1 chain =	20.116437 metres	1 kilometre =	49.71059 chains
1 furlong =	201.16437 metres	1 kilometre =	3280.89917 ft.
1 mile =	1609.31493 metres	1 kilometre =	.6213824 mile

SQUARE MEASURE

British units	Metric equivalents	Metric units	British equivalents
1 sq. in. =	6.451367 sq. centimetres	1 sq. centimetre =	.1550059 sq. in.
1 sq. ft. =	.09289968 sq. metre	1 sq. metre =	10.7642994 sq. ft.
1 sq. yd. =	.8360971 sq. metre	1 sq. metre =	1.960333 sq. yds
1 sq. yd. =	.008360971 are	1 are =	119.60333 sq. yds
1 acre =	.404671 hectare	1 hectare =	2.47114 acres
1 sq. m. =	258.98945 hectare	1 hectare =	.0038612 sq. m.

CUBIC MEASURE

British units	Metric equivalents	Metric units	British equivalents
1 cu. in. =	16.3861759 cu. centimetres	1 cu. cent. =	.06102705 cu. in.
1 cu. ft. =	.02831531 cu. metre	1 cu. metre =	35.31658074 cu. ft.
1 cu. yd. =	.76451342 cu. metre	1 cu. metre =	1.30802151 cu. yds.

CAPACITY

British units	Metric equivalents	Metric units	British equivalents
1 cu. in. =	16.386176 millilitres	1 millilitre =	.061027 cubic inch
1 cu. in. =	1.6386176 centilitres	1 centilitre =	.61027 cubic inch
1 gill =	14.1983 centilitres	1 centilitre =	.07043 gill
1 pint =	.567932 litres	1 litre =	1.76077 pints
1 quart =	1.135864 litres	1 litre =	.880387 quart
1 gallon =	4.543458 litres	1 litre =	.2200967 gallon
1 gallon =	.4543458 dekalitres	1 dekalitre =	2.20097 gallons
1 bushel =	3.634766 dekalitres	1 dekalitre =	.275121 bushel
1 bushel =	.3634766 hectolitre	1 hectolitre =	2.75121 bushels

METRIC EQUIVALENTS OF BRITISH UNITS.

WEIGHT

British units	Metric equivalents	Metric units	British equivalents
Avoirdupois			Avoirdupois
1 gr.	= 64.79895 milligrammes	1 milligramme	= .01543235 gr.
1 gr.	= 6.479895 centigrammes	1 centigramme	= .1543235 gr.
1 gr.	= .06479895 grammes	1 gramme	= 15.43235 grs.
1 oz.	= 28.34954 grammes	1 gramme	= .0352739 oz.
1 oz.	= .02834954 kilogrammes	1 kilogramme	= 35.27394 oz.
1 lb.	= .45359265 kilogrammes	1 kilogramme	= 2.20462125 lbs.
1 cwt.	= .50802377 quintals	1 quintal	= 1.96841 cwt.
1 ton	= 1.01604754 milliers or tonnes	1 millier or tonne	= .98420591 tons

MISCELLANEOUS COMPOUND MEASURES

British units	Metric equivalents	Metric units	British equivalents
1 foot per second	= .3048 metres per second	1 metre per second	= 3.2809 feet per second
1 foot per minute	= .3048 metres per minute	1 metre per minute	= 3.2809 feet per minute
1 mile per hour	= 1.6093 kilometres per hour	1 kilometre per hour	= .6214 miles per hour
1 pound per foot	= 1.48819 kilog. per metre	1 kilogramme per metre	= .67196 pounds per foot
1 pound per yard	= .49606 kilog. per metre	1 kilogramme per metre	= 2.01587 pounds per yard
1 pound per square in.	= .07031 kilog. per square centimetre	1 kilogramme per square centimetre	= 14.22282 pounds per square inch
1 pound per square ft.	= 4.88261 kilog. per square metre	1 kilogramme per square metre	= .20481 pounds per square foot
1 ton per square ft.	= 10.93704 tonnes per square metre	1 tonne per square metre	= .09143 tons per square foot
1 pound per cubic in.	= .02768 kilog. per cubic centimetre	1 kilogramme per cubic centimetre	= 36.1253 pounds per cubic inch
1 pound per cubic ft.	= 16.019 kilog. per cubic metre	1 kilogramme per cubic metre	= .0624245 pounds per cubic foot
1 pound per cubic yd.	= .5933 kilog. per cubic metre	1 kilogramme per cubic metre	= 1.68546 pounds per cubic yard
1 pound per gallon	= .09983 kilog. per litre	1 kilogramme per litre	= 10.0166 pounds per gallon

PROPERTIES AND PRINCIPAL DIMENSIONS OF STANDARD A. S. C. E. RAIL SECTIONS.

Section index	Weight per yard in pounds	Area in square inches	Height of center of gravity above base in inches (Y)	Axis x-x Moment of inertia I	Axis x-x Section modulus S	Axis x-x Radius of gyration r
1000	100	9.8	2.8	43.8	14.6	2.13
950	95	9.3	2.7	38.6	13.3	2.06
900	90	8.8	2.5	34.0	12.0	1.97
850	85	8.3	2.5	30.0	11.0	1.90
800	80	7.8	2.4	26.2	10.0	1.83
750	75	7.4	2.4	22.9	9.3	1.78
700	70	6.9	2.2	19.6	8.2	1.70
650	65	6.4	2.2	16.9	7.4	1.63
600	60	5.9	2.1	14.5	6.7	1.58
550	55	5.4	2.0	11.9	5.8	1.49
500	50	4.9	1.9	9.8	4.9	1.42

Axis x-x is taken through center of gravity parallel with rail base.

EQUIVALENTS IN MILLIMETRES.

OF INCHES AND FRACTIONS OF AN INCH ADVANCING BY 32nds

Inches	0″	1″	2″	3″	4″	5″
... ... 0	....	25.400	50.799	76.199	101.598	126.998
1/32	.794	26.193	51.593	76.992	102.392	127.791
... 1/16 ..	1.587	26.987	52.387	77.786	103.186	128.585
3/32	2.381	27.781	53.180	78.580	103.979	129.379
... ... 1/8	3.175	28.574	53.974	79.374	104.773	130.173
5/32	3.969	29.368	54.768	80.167	105.567	130.966
... 3/16 ..	4.762	30.162	55.561	80.961	106.361	131.760
7/32	5.556	30.956	56.355	81.755	107.154	132.554
... ... 1/4	6.350	31.749	57.149	82.549	107.948	133.348
9/32	7.144	32.543	57.943	83.342	108.742	134.141
... 5/16 ..	7.937	33.337	58.736	84.136	109.536	134.935
11/32	8.731	34.131	59.530	84.930	110.329	135.729
... ... 3/8	9.525	34.924	60.324	85.723	111.123	136.523
13/32	10.319	35.718	61.118	86.517	111.917	137.316
... 7/16 ..	11.112	36.512	61.911	87.311	112.710	138.110
15/16	11.906	37.306	62.705	88.105	113.504	138.904
... ... 1/2	12.700	38.099	63.499	88.898	114.298	139.697
17/32	13.494	38.893	64.293	89.692	115.092	140.491
... 9/16 ..	14.287	39.687	65.086	90.486	115.885	141.285
19/32	15.081	40.481	65.880	91.280	116.679	142.079
... ... 5/8	15.875	41.274	66.674	92.073	117.473	142.872
21/32	16.668	42.068	67.468	92.867	118.267	143.666
... 11/16 ..	17.462	42.862	68.261	93.661	119.060	144.460
23/32	18.256	43.655	69.055	94.455	119.854	145.254
... ... 3/4	19.050	44.449	69.849	95.248	120.648	146.047
25/32	19.843	45.243	70.642	96.042	121.442	146.841
... 13/16 ..	20.637	46.037	71.436	96.836	122.235	147.635
27/32	21.431	46.830	72.230	97.629	123.029	148.429
... ... 7/8	22.225	47.624	73.024	98.423	123.823	149.222
29/32	23.018	48.418	73.817	99.217	124.616	150.016
... 15/16 ..	23.812	49.212	74.611	100.011	125.410	150.810
31/32	24.606	50.005	75.405	100.804	126.204	151.604

12 Inches = 304.794 Millimetres

EQUIVALENTS IN MILLIMETRES.

OF INCHES AND FRACTIONS OF AN INCH ADVANCING BY 32NDS

Inches	6″	7″	8″	9″	10″	11″
...... 0	152.397	177.797	203.196	228.596	253.995	279.395
1/32	153.191	178.591	203.990	229.390	254.789	280.189
... 1/16 ..	153.985	179.384	204.784	230.183	255.583	280.982
3/32	154.778	180.178	205.578	230.977	256.377	281.776
...... 1/8	155.572	180.972	206.371	231.771	257.170	282.570
5/32	156.366	181.765	207.165	232.565	257.964	283.364
... 3/16 ..	157.160	182.559	207.959	233.358	258.758	284.157
7/32	157.953	183.353	208.752	234.152	259.552	284.951
...... 1/4	158.747	184.147	209.546	234.946	260.345	285.745
9/32	159.541	184.940	210.340	235.739	261.139	286.539
... 5/16 ..	160.335	185.734	211.134	236.533	261.933	287.332
11/32	161.128	186.528	211.927	237.327	262.727	288.126
...... 3/8	161.922	187.322	212.721	238.121	263.520	288.920
13/32	162.716	188.115	213.515	238.914	264.314	289.714
... 7/16 ..	163.510	188.909	214.309	239.708	265.108	290.507
15/32	164.303	189.703	215.102	240.502	265.901	291.301
...... 1/2	165.097	190.497	215.896	241.296	266.695	292.095
17/32	165.891	191.290	216.690	242.089	267.489	292.888
... 9/16 ..	166.684	192.084	217.484	242.883	268.283	293.682
19/32	167.478	192.878	218.277	243.677	269.076	294.476
...... 5/8	168.272	193.672	219.071	244.471	269.870	295.270
21/32	169.066	194.465	219.865	245.264	270.664	296.063
... 11/16 ..	169.859	195.259	220.659	246.058	271.458	296.857
23/32	170.653	196.053	221.452	246.852	272.251	297.651
...... 3/4	171.447	196.846	222.246	247.646	273.045	298.445
25/32	172.241	197.640	223.040	248.439	273.839	299.238
... 13/16 ..	173.034	198.434	223.833	249.233	274.633	300.032
27/32	173.828	199.228	224.627	250.027	275.426	300.826
...... 7/8	174.622	200.021	225.421	250.820	276.220	301.620
29/32	175.416	200.815	226.215	251.614	277.014	302.413
... 15/16 ..	176.209	201.609	227.008	252.408	277.807	303.207
31/32	177.003	202.403	227.802	253.202	278.601	304.001

12 Inches = 304.794 Millimetres

EQUIVALENTS OF MILLIMETRES IN INCHES.

Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches
1	.039	51	2.008	101	3.976	151	5.945	201	7.913
2	.079	52	2.047	102	4.016	152	5.984	202	7.953
3	.118	53	2.087	103	4.055	153	6.024	203	7.992
4	.157	54	2.126	104	4.095	154	6.063	204	8.032
5	.197	55	2.165	105	4.134	155	6.102	205	8.071
6	.236	56	2.205	106	4.173	156	6.142	206	8.110
7	.276	57	2.244	107	4.213	157	6.181	207	8.150
8	.315	58	2.283	108	4.252	158	6.221	208	8.189
9	.354	59	2.323	109	4.291	159	6.260	209	8.228
10	.394	60	2.362	110	4.331	160	6.299	210	8.268
11	.433	61	2.402	111	4.370	161	6.339	211	8.307
12	.472	62	2.441	112	4.409	162	6.378	212	8.347
13	.512	63	2.480	113	4.449	163	6.417	213	8.386
14	.551	64	2.520	114	4.488	164	6.457	214	8.425
15	.591	65	2.559	115	4.528	165	6.496	215	8.465
16	.630	66	2.598	116	4.567	166	6.535	216	8.504
17	.669	67	2.638	117	4.606	167	6.575	217	8.543
18	.709	68	2.677	118	4.646	168	6.614	218	8.583
19	.748	69	2.717	119	4.685	169	6.654	219	8.622
20	.787	70	2.756	120	4.724	170	6.693	220	8.661
21	.827	71	2.795	121	4.764	171	6.732	221	8.701
22	.866	72	2.835	122	4.803	172	6.772	222	8.740
23	.906	73	2.874	123	4.843	173	6.811	223	8.780
24	.945	74	2.913	124	4.882	174	6.850	224	8.819
25	.984	75	2.953	125	4.921	175	6.890	225	8.858
26	1.024	76	2.992	126	4.961	176	6.929	226	8.898
27	1.963	77	3.032	127	5.000	177	6.969	227	8.937
28	1.102	78	3.071	128	5.039	178	7.008	228	8.976
29	1.142	79	3.110	129	5.079	179	7.047	229	9.016
30	1.181	80	3.150	130	5.118	180	7.087	230	9.055
31	1.220	81	3.189	131	5.158	181	7.126	231	9.095
32	1.260	82	3.228	132	5.197	182	7.165	232	9.134
33	1.299	83	3.268	133	5.236	183	7.205	233	9.173
34	1.339	84	3.307	134	5.276	184	7.244	234	9.213
35	1.378	85	3.346	135	5.315	185	7.284	235	9.252
36	1.417	86	3.386	136	5.354	186	7.323	236	9.291
37	1.457	87	3.425	137	5.394	187	7.362	237	9.331
38	1.496	88	3.465	138	5.433	188	7.402	238	9.370
39	1.535	89	3.504	139	5.472	189	7.441	239	9.410
40	1.575	90	3.543	140	5.512	190	7.480	240	9.449
41	1.614	91	3.583	141	5.551	191	7.520	241	9.488
42	1.654	92	3.622	142	5.591	192	7.559	242	9.528
43	1.693	93	3.661	143	5.630	193	7.598	243	9.567
44	1.732	94	3.701	144	5.669	194	7.638	244	9.606
45	1.772	95	3.740	145	5.709	195	7.677	245	9.646
46	1.811	96	3.780	146	5.748	196	7.717	246	9.685
47	1.850	97	3.819	147	5.787	197	7.756	247	9.724
48	1.890	98	3.858	148	5.827	198	7.795	248	9.764
49	1.929	99	3.898	149	5.866	199	7.835	249	9.803
50	1.969	100	3.937	150	5.906	200	7.874	250	9.843

EQUIVALENTS OF MILLIMETRES IN INCHES.

Millimetres	Inches	Millimetres	Inches	Millimetres	Inches	Millimetres	Inches	Millimetres	Inches
251	9.882	301	11.850	351	13.819	401	15.788	451	17.756
252	9.921	302	11.890	352	13.858	402	15.827	452	17.795
253	9.961	303	11.929	353	13.898	403	15.866	453	17.835
254	10.000	304	11.969	354	13.937	404	15.906	454	17.874
255	10.039	305	12.008	355	13.977	405	15.945	455	17.914
256	10.079	306	12.047	356	14.016	406	15.984	456	17.953
257	10.118	307	12.087	357	14.055	407	16.024	457	17.992
258	10.158	308	12.126	358	14.095	408	16.063	458	18.032
259	10.197	309	12.165	359	14.134	409	16.103	459	18.071
260	10.236	310	12.205	360	14.173	410	16.142	460	18.110
261	10.276	311	12.244	361	14.213	411	16.181	461	18.150
262	10.315	312	12.284	362	14.252	412	16.221	462	18.189
263	10.354	313	12.323	363	14.291	413	16.260	463	18.229
264	10.394	314	12.362	364	14.331	414	16.299	464	18.268
265	10.433	315	12.402	365	14.370	415	16.339	465	18.307
266	10.473	316	12.441	366	14.410	416	16.378	466	18.347
267	10.512	317	12.480	367	14.449	417	16.417	467	18.386
268	10.551	318	12.520	368	14.488	418	16.457	468	18.425
269	10.591	319	12.559	369	14.528	419	16.496	469	18.465
270	10.630	320	12.599	370	14.567	420	16.536	470	18.504
271	10.669	321	12.638	371	14.606	421	16.575	471	18.543
272	10.709	322	12.677	372	14.646	422	16.614	472	18.583
273	10.748	323	12.717	373	14.685	423	16.654	473	18.622
274	10.787	324	12.756	374	14.725	424	16.693	474	18.662
275	10.827	325	12.795	375	14.764	425	16.732	475	18.701
276	10.866	326	12.835	376	14.803	426	16.772	476	18.740
277	10.906	327	12.874	377	14.843	427	16.811	477	18.780
278	10.945	328	12.913	378	14.882	428	16.851	478	18.819
279	10.984	329	12.953	379	14.921	429	16.890	479	18.858
280	11.024	330	12.992	380	14.961	430	16.929	480	18.898
281	11.063	331	13.032	381	15.000	431	16.969	481	18.937
282	11.102	332	13.071	382	15.040	432	17.008	482	18.977
283	11.142	333	13.110	383	15.079	433	17.047	483	19.016
284	11.181	334	13.150	384	15.118	434	17.087	484	19.055
285	11.221	335	13.189	385	15.158	435	17.126	485	19.095
286	11.260	336	13.228	386	15.197	436	17.166	486	19.134
287	11.299	337	13.268	387	15.236	437	17.205	487	19.173
288	11.339	338	13.307	388	15.276	438	17.244	488	19.213
289	11.378	339	13.347	389	15.315	439	17.284	489	19.252
290	11.417	340	13.386	390	15.354	440	17.323	490	19.292
291	11.457	341	13.425	391	15.394	441	17.362	491	19.331
292	11.496	342	13.465	392	15.433	442	17.402	492	19.370
293	11.536	343	13.504	393	15.473	443	17.441	493	19.410
294	11.575	344	13.543	394	15.512	444	17.480	494	19.449
295	11.614	345	13.583	395	15.551	445	17.520	495	19.488
296	11.654	346	13.622	396	15.591	446	17.559	496	19.528
297	11.693	347	13.662	397	15.630	447	17.599	497	19.567
298	11.732	348	13.701	398	15.669	448	17.638	498	19.606
299	11.772	349	13.740	399	15.709	449	17.677	499	19.646
300	11.811	350	13.780	400	15.748	450	17.717	500	19.685

EQUIVALENTS OF MILLIMETRES IN INCHES.

Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches
501	19.725	551	21.693	601	23.662	651	25.630	701	27.599
502	19.764	552	21.732	602	23.701	652	25.670	702	27.638
503	19.803	553	21.772	603	23.740	653	25.709	703	27.677
504	19.843	554	21.811	604	23.780	654	25.748	704	27.717
505	19.882	555	21.851	605	23.819	655	25.788	705	27.756
506	19.921	556	21.890	606	23.858	656	25.827	706	27.796
507	19.961	557	21.929	607	23.898	657	25.866	707	27.835
508	20.000	558	21.969	608	23.937	658	25.906	708	27.874
509	20.040	559	22.008	609	23.977	659	25.945	709	27.914
510	20.079	560	22.047	610	24.016	660	25.984	710	27.953
511	20.118	561	22.087	611	24.055	661	26.024	711	27.992
512	20.158	562	22.126	612	24.095	662	26.063	712	28.032
513	20.197	563	22.166	613	24.134	663	26.103	713	28.071
514	20.236	564	22.205	614	24.173	664	26.142	714	28.110
515	20.276	565	22.244	615	24.213	665	26.181	715	28.150
516	20.315	566	22.284	616	24.252	666	26.221	716	28.189
517	20.355	567	22.323	617	24.292	667	26.260	717	28.229
518	20.394	568	22.362	618	24.331	668	26.299	718	28.268
519	20.433	569	22.402	619	24.370	669	26.339	719	28.307
520	20.473	570	22.441	620	24.410	670	26.378	720	28.347
521	20.512	571	22.481	621	24.449	671	26.418	721	28.386
522	20.551	572	22.520	622	24.488	672	26.457	722	28.425
523	20.591	573	22.559	623	24.528	673	26.496	723	28.465
524	20.630	574	22.599	624	24.567	674	26.536	724	28.504
525	20.669	575	22.638	625	24.607	675	26.575	725	28.544
526	20.709	576	22.677	626	24.646	676	26.614	726	28.583
527	20.748	577	22.717	627	24.685	677	26.654	727	28.622
528	20.788	578	22.756	628	24.725	678	26.693	728	28.662
529	20.827	579	22.795	629	24.764	679	26.733	729	28.701
530	20.866	580	22.835	630	24.803	680	26.772	730	28.740
531	20.906	581	22.874	631	24.843	681	26.811	731	28.780
532	20.945	582	22.914	632	24.882	682	26.851	732	28.819
533	20.984	583	22.953	633	24.921	683	26.890	733	28.859
534	21.024	584	22.992	634	24.961	684	26.929	734	28.898
535	21.063	585	23.032	635	25.000	685	26.969	735	28.937
536	21.103	586	23.071	636	25.040	686	27.008	736	28.977
537	21.142	587	23.110	637	25.079	687	27.047	737	29.016
538	21.181	588	23.150	638	25.118	688	27.087	738	29.055
539	21.221	589	23.189	639	25.158	689	27.126	739	29.095
540	21.260	590	23.229	640	25.197	690	27.166	740	29.134
541	21.299	591	23.268	641	25.236	691	27.205	741	29.173
542	21.339	592	23.307	642	25.276	692	27.244	742	29.213
543	21.378	593	23.347	643	25.315	693	27.284	743	29.252
544	21.418	594	23.385	644	25.355	694	27.323	744	29.292
545	21.457	595	23.424	645	25.394	695	27.362	745	29.331
546	21.496	596	23.464	646	25.433	696	27.402	746	29.370
547	21.536	597	23.503	647	25.473	697	27.441	747	29.410
548	21.575	598	23.543	648	25.512	698	27.481	748	29.449
549	21.614	599	23.582	649	25.551	699	27.520	749	29.488
550	21.654	600	23.622	650	25.591	700	27.559	750	29.528

EQUIVALENTS OF MILLIMETRES IN INCHES.

Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches
751	29.567	801	31.536	851	33.504	901	35.473	951	37.441
752	29.607	802	31.575	852	33.544	902	35.512	952	37.481
753	29.646	803	31.614	853	33.583	903	35.552	953	37.520
754	29.685	804	31.654	854	33.622	904	35.591	954	37.559
755	29.725	805	31.693	855	33.662	905	35.630	955	37.599
756	29.764	806	31.733	856	33.701	906	35.670	956	37.638
757	29.803	807	31.772	857	33.740	907	35.709	957	37.677
758	29.843	808	31.811	858	33.780	908	35.748	958	37.717
759	29.882	809	31.851	859	33.819	909	35.788	959	37.756
760	29.922	810	31.890	860	33.859	910	35.827	960	37.796
761	29.961	811	31.929	861	33.898	911	35.866	961	37.835
762	30.000	812	31.969	862	33.937	912	35.906	962	37.874
763	30.040	813	32.008	863	33.977	913	35.945	963	37.914
764	30.079	814	32.048	864	34.016	914	35.985	964	37.953
765	30.118	815	32.087	865	34.055	915	36.024	965	37.992
766	30.158	816	32.126	866	34.095	916	36.063	966	38.032
767	30.197	817	32.166	867	34.134	917	36.103	967	38.071
768	30.236	818	32.205	868	34.174	918	36.142	968	38.111
769	30.276	819	32.244	869	34.213	919	36.181	969	38.150
770	30.315	820	32.284	870	34.252	920	36.221	970	38.189
771	30.355	821	32.323	871	34.292	921	36.260	971	38.229
772	30.394	822	32.362	872	34.331	922	36.300	972	38.268
773	30.433	823	32.402	873	34.370	923	36.339	973	38.307
774	30.473	824	32.441	874	34.410	924	36.378	974	38.347
775	30.512	825	32.481	875	34.449	925	36.418	975	38.386
776	30.551	826	32.520	876	34.488	926	36.457	976	38.426
777	30.591	827	32.559	877	34.528	927	36.496	977	38.465
778	30.630	828	32.599	878	34.567	928	36.536	978	38.504
779	30.670	829	32.638	879	34.607	929	36.575	979	38.544
780	30.709	830	32.677	880	34.646	930	36.615	980	38.583
781	30.748	831	32.717	881	34.685	931	36.654	981	38.622
782	30.788	832	32.756	882	34.725	932	36.693	982	38.662
783	30.827	833	32.796	883	34.764	933	36.733	983	38.701
784	30.866	834	32.835	884	34.803	934	36.772	984	38.741
785	30.906	835	32.874	885	34.843	935	36.811	985	38.780
786	30.945	836	32.914	886	34.882	936	36.851	986	38.819
787	30.985	837	32.953	887	34.922	937	36.890	987	38.859
788	31.024	838	32.992	888	34.961	938	36.929	988	38.898
789	31.063	839	33.032	889	35.000	939	36.969	989	38.937
790	31.103	830	33.071	890	35.040	940	37.008	990	38.977
791	31.142	841	33.111	891	35.079	941	37.048	991	39.016
792	31.181	842	33.150	892	35.118	942	37.087	992	39.055
793	31.221	843	33.189	893	35.158	943	37.126	993	39.095
794	31.260	844	33.229	894	35.197	944	37.166	994	39.134
795	31.299	845	33.268	895	35.237	945	37.205	995	39.174
796	31.339	846	33.307	896	35.276	946	37.244	996	39.213
797	31.378	847	33.347	897	35.315	947	37.284	997	39.252
798	31.418	848	33.386	898	35.355	948	37.323	998	39.292
799	31.457	849	33.425	899	35.394	949	37.363	999	39.331
800	31.496	850	33.465	900	35.433	950	37.402	1000	39.370

EQUIVALENTS OF METRES IN FEET.

1 Metre = 3.280899 Feet

Metres	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	3.2809	3.6090	3.9371	4.2652	4.5933	4.9213	5.2494	5.5775	5.9056	6.2337
2	6.5618	6.8899	7.2180	7.5461	7.8742	8.2022	8.5303	8.8584	9.1865	9.5146
3	9.8427	10.1708	10.4989	10.8270	11.1551	11.4831	11.8112	12.1393	12.4674	12.7955
4	13.1236	13.4517	13.7798	14.1079	14.4360	14.7640	15.0921	15.4202	15.7483	16.0764
5	16.4045	16.7326	17.0607	17.3888	17.7169	18.0449	18.3730	18.7011	19.0292	19.3573
6	19.6854	20.0135	20.3416	20.6697	20.9978	21.3258	21.6539	21.9820	22.3101	22.6382
7	22.9663	23.2944	23.6225	23.9506	24.2787	24.6067	24.9348	25.2629	25.5910	25.9191
8	26.2472	26.5753	26.9034	27.2315	27.5596	27.8876	28.2157	28.5438	28.8719	29.2000
9	29.5281	29.8562	30.1843	30.5124	30.8405	31.1685	31.4966	31.8247	32.1528	32.4809
10	32.8090	33.1371	33.4652	33.7933	34.1213	34.4494	34.7775	35.1056	35.4337	35.7618

EQUIVALENTS OF FEET IN METRES.

1 Foot = .3047945 of 1 Metre

Feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	.30480	.33527	.36575	.39623	.42671	.45719	.48767	.51815	.54863	.57911
2	.60959	.64007	.67055	.70103	.73151	.76199	.79247	.82294	.85342	.88390
3	.91438	.94486	.97534	1.00582	1.03630	1.06678	1.09726	1.12774	1.15822	1.18870
4	1.21918	1.24966	1.28014	1.31062	1.34110	1.37158	1.40205	1.43253	1.46301	1.49349
5	1.52397	1.55445	1.58493	1.61541	1.64589	1.67637	1.70685	1.73733	1.76781	1.79829
6	1.82877	1.85925	1.88973	1.92020	1.95068	1.98116	2.01164	2.04212	2.07260	2.10308
7	2.13356	2.16404	2.19452	2.22500	2.25548	2.28596	2.31644	2.34692	2.37740	2.40788
8	2.43836	2.46884	2.49931	2.52979	2.56027	2.59075	2.62123	2.65171	2.68219	2.71267
9	2.74315	2.77363	2.80411	2.83459	2.86507	2.89555	2.92603	2.95651	2.98699	3.01747
10	3.04794	3.07842	3.10890	3.13938	3.16986	3.20034	3.23082	3.26130	3.29178	3.32226

EQUIVALENTS OF SQUARE CENTIMETRES IN SQUARE INCHES.

1 Square centimetre = .1550059 of 1 Square inch

Square cent.	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	.15501	.17051	.18601	.20151	.21701	.23251	.24801	.26351	.27901	.29451
2	.31001	.32551	.34101	.35651	.37201	.38751	.40301	.41852	.43402	.44952
3	.46502	.48052	.49602	.51152	.52702	.54252	.55802	.57352	.58902	.60452
4	.62002	.63552	.65102	.66652	.68203	.69753	.71303	.72853	.74403	.75953
5	.77503	.79053	.80603	.82153	.83703	.85253	.86803	.88353	.89903	.91453
6	.93004	.94554	.96104	.97654	.99204	1.00754	1.02304	1.03854	1.05404	1.06954
7	1.08504	1.10054	1.11604	1.13154	1.14704	1.16254	1.17804	1.19355	1.20905	1.22455
8	1.24005	1.25555	1.27105	1.28655	1.30205	1.31755	1.33305	1.34855	1.36405	1.37955
9	1.39505	1.41055	1.42605	1.44156	1.45706	1.47256	1.48806	1.50356	1.51906	1.53456
10	1.55006	1.56556	1.58106	1.59656	1.61206	1.62756	1.64306	1.65856	1.67406	1.68956

EQUIVALENTS OF SQUARE INCHES IN SQUARE CENTIMETRES.

1 Square inch = 6.451367 Square centimetres

Square inches	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	6.4514	7.0965	7.7416	8.3868	9.0319	9.6770	10.3222	10.9673	11.6125	12.2576
2	12.9027	13.5479	14.1930	14.8381	15.4833	16.1284	16.7736	17.4187	18.0638	18.7090
3	19.3541	19.9992	20.6444	21.2895	21.9346	22.5798	23.2249	23.8701	24.5152	25.1603
4	25.8055	26.4506	27.0957	27.7409	28.3860	29.0312	29.6763	30.3214	30.9666	31.6117
5	32.2568	32.9020	33.5471	34.1922	34.8374	35.4825	36.1277	36.7728	37.4179	38.0631
6	38.7082	39.3533	39.9985	40.6436	41.2887	41.9339	42.5790	43.2242	43.8693	44.5144
7	45.1596	45.8047	46.4498	47.0950	47.7401	48.3853	49.0304	49.6755	50.3207	50.9658
8	51.6109	52,2561	52.9012	53.5463	54.1915	54.8366	55.4818	56.1269	56.7720	57.4172
9	58.0623	58.7074	59.3526	59.9977	60.6428	61.2880	61.9331	62.5783	63.2234	63.8685
10	64.5137	65.1588	65.8039	66.4491	67.0942	67.7394	68.3845	69.0296	69.6748	70.3199

EQUIVALENTS OF SQUARE METRES IN SQUARE FEET.

Square metre = 10.764299 Square feet

Square metres	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	10.764	11.841	12.917	13.994	15.070	16.146	17.223	18.299	19.376	20.452
2	21.529	22.605	23.681	24.758	25.834	26.911	27.987	29.064	30.140	31.216
3	32.293	33.369	34.446	35.522	36.599	37.675	38.751	39.828	40.904	41.981
4	43.057	44.134	45.210	46.286	47.363	48.439	49.516	50.592	51.669	52.745
5	53.821	54.898	55.974	57.051	58.127	59.204	60.280	61.356	62.433	63.509
6	64.586	65.662	66.739	67.815	68.892	69.968	71.044	72.121	73.197	74.274
7	75.350	76.427	77.503	78.579	79.656	80.732	81.809	82.885	83-962	85.038
8	86.114	87.191	88.267	89.344	90.420	91.497	92.573	93.649	94.726	95.802
9	96.879	97.955	99.032	100.108	101.184	102.261	103.337	104.414	105.490	106.567
10	107.643	108.719	109.796	110.872	111.949	113.025	114.102	115.178	116.254	117.331

EQUIVALENTS OF SQUARE FEET IN SQUARE METRES.

1 Square Foot = .0928997 of a Square metre

Square feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	.09290	.10219	.11148	.12077	.13006	.13935	.14864	.15793	.16722	.17651
2	.18580	.19509	.20438	.21367	,22296	.23225	.24154	.25083	.26012	.26941
3	.27870	.28799	.29728	.30657	.31586	.32515	.33444	.34373	.35302	.36231
4	.37160	.38089	.39018	.39947	.40876	.41805	.42734	.43663	.44592	.45521
5	.46450	.47379	.48308	.49237	.50166	.51095	.52024	.52953	.53882	.54811
6	.55740	.56669	.57598	.58527	.59456	.60385	.61314	.62243	.63172	.64101
7	.65030	.65959	.66888	.67817	.68746	.69675	.70604	.71533	.72462	.73391
8	.74320	.75249	.76178	.77107	.78036	.78965	.79894	.80823	.81752	.82681
9	.83610	.84539	.85468	.86397	.87326	.88255	.89184	.90113	.91042	.91971
10	.92900	.93829	.94758	.95687	.96616	.97545	.98474	.99403	1.00332	1.01261

EQUIVALENTS OF CUBIC CENTIMETRES IN CUBIC INCHES.

1 Cubic centimetre = .06102705 of a cubic inch

Cubic cent.	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	.061027	.067130	.073232	.079335	.085438	.091541	.097643	.103746	.109849	.115951
2	.122054	.128157	.134260	.140362	.146465	.152568	.158670	.164773	.170876	.176978
3	.183081	.189184	.195287	.201389	.207492	.213595	.219697	.225800	.231903	.238005
4	.244108	.250211	.256314	.262416	.268519	.274622	.280724	.286827	.292930	.299033
5	.305135	.311238	.317341	.323443	.329546	.335649	.341751	.347854	.353957	.360060
6	.366162	.372265	.378368	.384470	.390573	.396676	.402779	.408881	.414984	.421087
7	.427189	.433292	.439395	.445497	.451600	.457703	.463806	.469908	.476011	.482114
8	.488216	.494319	.500422	.506525	.512627	.518730	.524833	.530935	.537038	.543141
9	.549243	.555346	.561449	.567552	.573654	.579757	.585860	.591962	.598065	.604168
10	.610271	.616373	.622476	.628579	.634681	.640784	.646887	.652989	.659092	.665195

EQUIVALENTS OF CUBIC INCHES IN CUBIC CENTIMETRES.

1 Cubic inch = 16.386176 Cubic centimetres

Cubic inches	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	16.386	18.025	19.663	21.302	22.941	24.579	26.218	27.856	29.495	31.134
2	32.772	34.411	36.050	37.688	30.327	40.965	42.604	44.243	45 881	47.520
3	49.158	50.797	52.436	54.074	55.713	57.352	58.990	60.629	62.267	63.906
4	65.545	67.183	68.822	70.461	72.099	73.738	75.376	77.015	78.654	80.292
5	81.931	83.569	85.208	86.847	88.485	90.124	91.763	93.401	95.040	96.678
6	98.317	99.956	101.594	103.233	104.872	106.510	108.149	109.787	111.426	113.065
7	114.703	116.342	117.980	119.619	121.258	122.896	124.535	126.174	127.812	129.451
8	131.089	132.728	134.367	136.005	137.644	139.282	140.921	142.560	144.198	145.837
9	147.476	149.114	150.753	152.391	154.030	155.669	157.307	158.946	160.585	162.223
10	163.862	165.500	167.139	168.778	170.416	172.055	173.693	175.332	176.971	178.609

EQUIVALENTS OF CUBIC METRES IN CUBIC FEET.

1 Cubic metre = 35.31658 Cubic feet

Cubic metres	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	35.317	38.848	42.380	45.912	49.443	52.975	56.507	60.038	63.570	67.101
2	70.633	74.165	77.696	81.228	84.760	88.291	91.823	95.355	98.886	102.418
3	105.950	109.481	113.013	116.545	120.076	123.608	127.140	130.671	134.203	137.735
4	141.266	144.798	148.330	151.861	155.393	158.925	162.456	155.988	169.520	173.051
5	176.583	180.115	183.646	187.178	190.710	194.241	197.773	201.305	204.836	208.368
6	211.899	215.431	218.963	222.494	226.026	229.558	233.089	236.621	240.153	243.684
7	247.216	250.748	254.279	257.811	261.343	264.874	268.406	271.938	275.469	279.001
8	282.533	286.064	289.596	293.128	296.659	300.191	303.723	307.254	310.786	314.318
9	317.849	321.381	324.913	328.444	331.976	335.508	339.039	342.571	346.103	349.634
10	353.166	356.697	360.229	363.761	367.292	370.824	374.356	377.887	381.419	384.951

EQUIVALENTS OF CUBIC FEET IN CUBIC METRES.

1 Cubic Foot = .02831531 of a cubic metre

Cubic feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	.028315	.031147	.033978	.036810	.039641	.042473	.045304	.048136	.050968	.053799
2	.056631	.059462	.062294	.065125	.067957	.070788	.073620	.076451	.079283	.082114
3	.084946	.087777	.090609	.093441	.096272	.099104	.101935	.104767	.107598	.110430
4	.113261	.116093	.118924	.121756	.124587	.127419	.130250	.133082	.135913	.138745
5	.141577	.144408	.147240	.150071	.152903	.155734	.158566	.161397	.164229	.167060
6	.169892	.172723	.175555	.178386	.181218	.184050	.186881	.189713	.192544	.195376
7	.198207	.201039	.203870	.206702	.209533	.212365	.215196	.218028	.220859	.223691
8	.226522	.229354	.232186	.235017	.237849	.240680	.243512	.246343	.249175	.252006
9	.254838	.257669	.260501	.263332	.266164	.268995	.271827	.274659	.277490	.280322
10	.283153	.285985	.288816	.291648	.294479	.297311	.300142	.302974	.305805	.308637

EQUIVALENTS OF KILOGRAMMES IN POUNDS.

1 Kilogramme = 2.20462125 Pounds

Kilo-grammes	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	2.2046	2.4251	2.6455	2.8660	3.0865	3.3069	3.5274	3.7479	3.9683	4.1888
2	4.4092	4.6297	4.8502	5.0706	5.2911	5.5116	5.7320	5.9525	6.1729	6.3934
3	6.6139	6.8343	7.0548	7.2752	7.4957	7.7162	7.9366	8.1571	8.3776	8 5980
4	8.8185	9.0389	9.2594	9.4799	9.7003	9.9208	10.1413	10.3617	10.5822	10.8026
5	11.0231	11.2436	11.4640	11.6845	11.9050	12.1254	12.3459	12.5663	12.7868	13.0073
6	13.2277	13.4482	13.6687	13.8891	14.1096	14.3300	14.5505	14.7710	14.9914	15.2119
7	15.4323	15.6528	15.8733	16.0937	16.3142	16.5347	16.7551	16.9756	17.1960	17.4165
8	17.6370	17.8574	18.0779	18.2984	18.5188	18.7393	18.9597	19.1802	19.4007	19.6211
9	19.8416	20.0621	20.2825	20.5030	20.7234	20.9439	21.1644	21.3848	21.6053	21.8258
10	22.0462	22.2667	22.4871	22.7076	22.9281	23.1485	23.3690	23.5894	23.8099	24.0304

EQUIVALENTS OF POUNDS IN KILOGRAMMES.

1 Pound = .45359265 of a kilogramme

Pounds	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	.45359	.49895	.54431	.58967	.63503	.68039	.72575	.77111	.81647	.86183
2	.90719	.95254	.99790	1.04326	1.08862	1.13398	1.17934	1.22470	1.27006	1.31542
3	1.36078	1.40614	1.45150	1.49686	1.54222	1.58757	1.63293	1.67829	1.72365	1.76901
4	1.81437	1.85973	1.90509	1.95045	1.99581	2.04117	2.08653	2.13189	2.17724	2.22260
5	2.26796	2.31332	2.35868	2.40404	2.44940	2.49476	2.54012	2.58548	2.63084	2.67620
6	2.72156	2.76692	2.81227	2.85763	2.90299	2.94835	2.99371	3.03907	3.08443	3.12979
7	3.17515	3.22051	3.26587	3.31123	3.35659	3.40194	3.44730	3.49266	3.53802	3.58338
8	3.62874	3.67410	3.71946	3.76482	3.81018	3.85554	3.90090	3.94626	3.99162	4.03697
9	4.08233	4.12769	4.17305	4.21841	4.26377	4.30913	4.35449	4.39985	4.44521	4.49057
10	4.53593	4.58129	4.62664	4.67200	4.71736	4.76272	4.80808	4.85344	4.89880	4.94416

EQUIVALENTS OF KILOGRAMMES PER SQUARE CENTIMETRE IN POUNDS PER SQUARE INCH.

1 Kilogramme per square centimetre = 14.22282 Pounds per square inch

Kilogram'e per square centimetre	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	14.223	15.645	17.067	18.490	19.912	21.334	22.757	24.179	25.601	27.023
2	28.446	29.868	31.290	32.712	34.135	35.557	36.979	38.402	39.824	41.246
3	42.668	44.091	45.513	46.935	48.358	49.780	51.202	52.624	54.047	55.469
4	56.891	58.314	59.736	61.158	62.580	64.003	65.425	66.847	68.270	69.692
5	71.114	72.536	73.959	75.381	76.803	78.226	79.648	81.070	82.492	83.915
6	85.337	86.759	88.181	89.604	91.026	92.448	93.871	95.293	96.715	98.137
7	99.560	100.982	102.404	103.827	105.249	106.671	108.093	109.516	110.938	112.360
8	113.783	115.205	116.627	118.049	119.472	120.894	122.316	123.739	125.161	126.583
9	128.005	129.428	130.850	132.272	133.695	135.117	136.539	137.961	139.384	140.806
10	142.228	143.650	145.073	146.495	147.917	149.340	150.762	152.184	153.606	155.029

EQUIVALENTS OF POUNDS PER SQUARE INCH IN KILOGRAMMES PER SQUARE CENTIMETRE.

1 Pound per square inch = .07030954 of a kilogramme per square centimetre

Pounds	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	.070310	.077340	.084371	.091402	.098433	.105464	.112495	.119526	.126557	.133588
2	.140619	.147650	.154681	.161712	.168743	.175774	.182805	.189836	.196867	.203898
3	.210929	.217960	.224991	.232021	.239052	.246083	.253114	.260145	.267176	.274207
4	.281238	.288269	.295300	.302331	.309362	.316393	.323424	.330455	.337486	.344517
5	.351548	.358579	.365610	.372641	.379672	.386702	.393733	.400764	.407795	.414826
6	.421857	.428888	.435919	.442950	.449981	.457012	.464043	.471074	.478105	.485136
7	.492167	.499198	.506229	.513260	.520291	.527322	.534353	.541383	.548414	.555445
8	.562476	.569507	.576538	.583569	.590600	.597631	.604662	.611693	.618724	.625755
9	.632786	.639817	.646848	.653879	.660910	.667941	.674972	.682003	.689033	.696064
10	.703095	.710126	.717157	.724188	.731219	.738250	.745281	.752312	.759343	.766374

EQUIVALENTS OF KILOGRAMMES PER METRE IN POUNDS PER FOOT.

Kilogrammes per metre	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	.6720	.7392	.8063	.8735	.9407	1.0079	1.0751	1.1423	1.2095	1.2767
2	1.3439	1.4111	1.4783	1.5455	1.6127	1.6799	1.7471	1.8143	1.8815	1.9487
3	2.0159	2.0831	2.1503	2.2175	2.2847	2.3518	2.4190	2.4862	2.5534	2.6206
4	2.6878	2.7550	2.8222	2.8894	2.9566	3.0238	3.0910	3.1582	3.2254	3.2926
5	3.3598	3.4270	3.4942	3.5614	3.6286	3.6958	3.7630	3.8302	3.8973	3.9645
6	4.0317	4.0989	4.1661	4.2333	4.3005	4.3677	4.4349	4.5021	4.5693	4.6365
7	4.7037	4.7709	4.8381	4.9053	4.9725	5.0397	5.1069	5.1741	5.2413	5.3085
8	5.3757	5.4428	5.5100	5.5772	5.6444	5.7116	5.7788	5.8460	5.9132	5.9804
9	6.0476	6.1148	6.1820	6.2492	6.3164	6.3836	6.4508	6.5180	6.5852	6.6524
10	6.7196	6.7868	6.8540	6.9212	6.9883	7.0555	7.1227	7.1899	7.2571	7.3243

EQUIVALENTS OF POUNDS PER FOOT IN KILOGRAMMES PER METRE.

Pounds per foot	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	1.4882	1.6370	1.7858	1.9346	2.0835	2.2323	2.3811	2.5299	2.6787	2.8276
2	2.9764	3.1252	3.2740	3.4228	3.5717	3.7205	3.8693	4.0181	4.1669	4.3158
3	4.4646	4.6134	4.7622	4.9110	5.0599	5.2087	5.3575	5.5063	5.6551	5.8039
4	5.9528	6.1016	6.2504	6.3992	6.5480	6.6969	6.8457	6.9945	7.1433	7.2921
5	7.4410	7.5898	7.7386	7.8874	8.0362	8.1851	8.3339	8.4827	8.6315	8.7803
6	8.9292	9.0780	9.2268	9.3756	9.5244	9.6732	9.8221	9.9709	10.1197	10.2685
7	10.4173	10.5662	10.7150	10.8638	11.0126	11.1614	11.3103	11.4591	11.6079	11.7567
8	11.9055	12.0544	12.2032	12.3520	12.5008	12.6496	12.7984	12.9473	13.0961	13.2449
9	13.3937	13.5425	13.6914	13.8402	13.9890	14.1378	14.2866	14.4355	14.5843	14.7331
10	14.8819	15.0307	15.1796	15.3284	15.4772	15.6260	15.7748	15.9237	16.0725	16.2213

EQUIVALENTS OF MOMENTS OF INERTIA AND SECTION MODULI.

Moment of inertia in centimetre units = Moment of inertia in inch units × 41.62
Moment of inertia in inch units = Moment of inertia in centimetre units × .024
Section modulus in centimetre units = Section modulus in inch units × 16.386
Section modulus in inch units = Section modulus in centimetre units × .061

CONTRACTIONS GENERALLY ADOPTED.

Linear measure	Square measure	Cubic measure	Capacity	Weight
km=kilometre	km^2=sq. ki'metre	km^3=cub.kilo'tre	*hl*=hectol're	*t*=tonne=1000*kg*
m=metre	m^2=" metre	m^3=" metre	*l*=litre	*q*=q'intal=100*kg*
dm=decimetre	dm^2=" decim're	dm^3=" deci'etre	*dl*=decilitre	*kg*=kilogramme
cm=centimetre	cm^2=" centi'tre	cm^3=" centi'tre	*cl*=centilitre	*dkg*=dekagr'mme
mm=millimetre	mm^2=" milli'tre	mm^3=" milli'tre		*g*=gramme
	ha=hectare			*dg*=decigramme
	a=are			*cg*=centigramme
				mg=milligramme

ITALIC letters are used for these contractions, and no stop is used at the right of them.

The contractions succeed the figures to which they refer, on the same line and after the last decimal place, when decimals are used.

COMPARISON OF WEIGHTS OF STEEL PLATES TO 1 INCH THICK.

Divided into 32nds and 40ths of an inch and millimetres.

MILLIMETRES	WEIGHT IN LBS. PER SQ. FOOT	32NDS	16THS
25	40.80	32	16
	39.525	31	
24	38.25	30	15
23	36.975	29	
22	35.70	28	14
	34.425	27	
21	33.15	26	13
20	31.875	25	
19	30.60	24	12
18	29.325	23	
17	28.05	22	11
	26.775	21	
16	25.50	20	10
15	24.225	19	
14	22.95	18	9
13	21.675	17	
	20.40	16	8
12	19.125	15	
11	17.85	14	7
10	16.575	13	
9	15.30	12	6
	14.025	11	
8	12.75	10	5
7	11.475	9	
6	10.20	8	4
5	8.925	7	
	7.65	6	3
4	6.375	5	
3	5.10	4	2
2	3.825	3	
	2.55	2	1
1	1.275	1	

20THS	40THS	WEIGHT IN LBS. PER SQ. FOOT	MILLIMETRES
20	40	40.80	25
	39	39.78	
19	38	38.76	24
	37	37.74	
18	36	36.72	23
	35	35.70	22
17	34	34.68	
	33	33.66	21
16	32	32.64	
	31	31.62	20
15	30	30.60	19
	29	29.58	18
14	28	28.56	
	27	27.54	17
13	26	26.52	
	25	25.50	16
12	24	24.48	15
	23	23.46	
11	22	22.44	14
	21	21.42	13
10	20	20.40	
	19	19.38	12
9	18	18.36	
	17	17.34	11
8	16	16.32	10
	15	15.30	
7	14	14.28	9
	13	13.26	8
6	12	12.24	
	11	11.22	7
5	10	10.20	6
	9	9.18	
4	8	8.16	5
	7	7.14	
3	6	6.12	4
	5	5.10	3
2	4	4.08	
	3	3.06	2
1	2	2.04	1
	1	1.02	

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