Changes to *T*, *k* and k_1 Dimensions for W-Shapes

The maximum dimension of the radius between the web and flange of some W-shapes has increased. These changes are generally conservative for steel design. However, for steel detailing, these changes may affect the fit-up of some parts, such as web doubler plates, transverse stiffeners and other fittings that are located near the fillet radius.

Steel producers determine the size of the fillet radius used between the web and flange of W-shapes based upon individual mill rolling and straightening practices. These practices and the fillet radii chosen depend upon the equipment used in the various mills, among other parameters. Since equipment and practices vary between mills, the radii also vary as recognized in ASTM A6/A6M paragraph 13.3.1, which states that "radii of fillets and toes of shape profiles vary with individual manufacturers and therefore are not specified."

In the continuing process of improving rolling practices, some producers have increased the radius they use on some sections. As a result, the *T*-distance for some wide-flange shapes is smaller than that listed in the AISC *Manual of Steel Construction*. Additionally, the current *k* and k_1 dimensions for those same wide-flange shapes are larger than those listed in the AISC *Manual of Steel Construction*.

For steel detailing, revised values of *T*, *k* and k_1 (see Figure 1) are shown in the tables on the following pages. In the most notable change, the maximum fillet radius for 14-inch column shapes 90 lbs/ft. and heavier has increased by $^5/_8$". This increases the corresponding values for *k* and k_1 by $^5/_8$", and decreases the corresponding value of *T* by $1^1/_4$".

The *k* dimension is also used in the calculation of the strength for the limit-state of local web yielding in Chapter K of the AISC *Specification for Structural Steel Buildings*. Additionally, the clear web depth is used in Section B.5 and Appendix G of the AISC Specification. For these design purposes, it is the minimum fillet radius that is of interest, not the maximum fillet radius upon which the *k* dimension is based. Although the minimum radius has not changed appreciably, the range of radii used on W-shapes now being supplied is too large to continue the use of the detailing values of *k* in strength calculations.

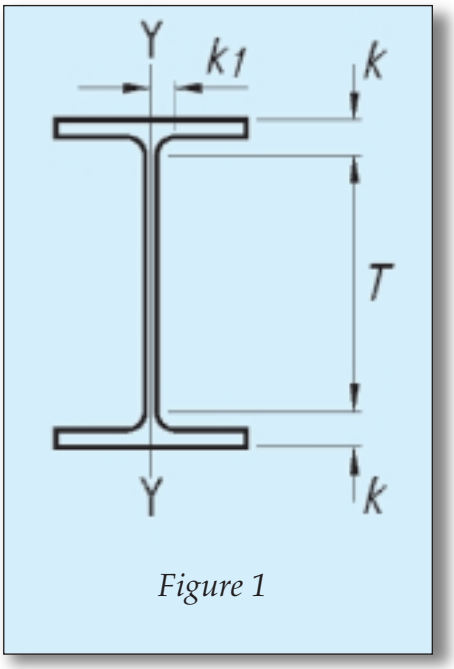

Figure 1

Accordingly, two values are given for *k* in Table 1: a value in decimal form for steel design and a value in fractional form for steel detailing. Since these values are determined based upon the minimum and maximum fillet radii, respectively, the decimal and fraction values for *k* will often differ. The tabulated values are valid for use with W-shapes produced by any mill that participates in the AISC survey of shape dimensions as listed below:

- Ameristeel;
- Bayou Steel Corporation;
- Corus (formerly known as British Steel);
- J&L Structural Inc.;
- North Star Steel;
- Northwestern Steel and Wire Inc.;
- Nucor Steel, Nucor-Yamato Steel Company;
- Roanoke Electric Steel Company;
- SMI Steel Inc.;
- TradeARBED; and
- TXI Chaparral Steel Company.

The revised values of *T*, *k* and k_1, given in this advisory should be used immediately and supercede the values given in the 1994 AISC *LRFD Manual of Steel Construction*, the 1989 AISC *ASD Manual of Steel Construction* and all previous versions.

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Shape	*k*			
	Design	Detailing	k_1	*T*
	in.	in.	in.	in.
W44x335	2.56	2 5/8	1 5/16	38 3/4
W44x290	2.37	2 7/16	1 1/4	38 3/4
W44x262	2.21	2 1/4	1 3/16	38 3/4
W44x230	2.01	2 1/16	1 3/16	38 3/4
W40x593	4.41	4 1/2	2 1/8	34
W40x503	3.94	4	2	34
W40x431	3.54	3 5/8	1 7/8	34
W40x397	3.38	3 1/2	1 13/16	34
W40x372	3.23	3 5/16	1 13/16	34
W40x362	3.19	3 1/4	1 3/4	34
W40x324	2.99	3 1/16	1 11/16	34
W40x297	2.83	2 15/16	1 11/16	34
W40x277	2.76	2 7/8	1 5/8	34
W40x249	2.60	2 11/16	1 9/16	34
W40x215	2.40	2 1/2	1 9/16	34
W40x199	2.25	2 5/16	1 9/16	34
W40x392	3.70	3 13/16	1 15/16	34
W40x331	3.31	3 3/8	1 13/16	34
W40x327	3.31	3 3/8	1 13/16	34
W40x278	2.99	3 1/16	1 3/4	34
W40x264	2.91	3	1 11/16	34
W40x235	2.76	2 7/8	1 5/8	34
W40x211	2.60	2 11/16	1 9/16	34
W40x183	2.40	2 1/2	1 9/16	34
W40x167	2.21	2 5/16	1 9/16	34
W40x149	2.01	2 1/8	1 1/2	34
W36x798	5.24	5 9/16	2 3/8	30 7/8
W36x650	4.49	4 13/16	2 3/16	30 7/8
W36x527	3.86	4 3/16	2	30 7/8
W36x439	3.39	3 11/16	1 7/8	30 7/8
W36x393	3.15	3 7/16	1 13/16	30 7/8
W36x359	2.96	3 1/4	1 3/4	30 7/8
W36x328	2.80	3 1/8	1 3/4	30 7/8
W36x300	2.63	2 15/16	1 11/16	30 7/8
W36x280	2.52	2 13/16	1 5/8	30 7/8
W36x260	2.39	2 11/16	1 5/8	30 7/8
W36x245	2.30	2 5/8	1 5/8	30 7/8
W36x230	2.21	2 1/2	1 9/16	30 7/8
W36x256	2.48	2 5/8	1 5/16	32 1/8
W36x232	2.32	2 1/2	1 1/4	32 1/8
W36x210	2.11	2 5/16	1 1/4	32 1/8
W36x194	2.01	2 3/16	1 3/16	32 1/8
W36x182	1.93	2 1/8	1 3/16	32 1/8
W36x170	1.85	2	1 3/16	32 1/8
W36x160	1.77	1 15/16	1 1/8	32 1/8
W36x150	1.69	1 7/8	1 1/8	32 1/8
W36x135	1.54	1 11/16	1 1/8	32 1/8

Shape	k			
	Design	Detailing	k_1	T
	in.	in.	in.	in.
W33x354	2.88	2 15/16	1 3/8	29 5/8
W33x318	2.68	2 3/4	1 5/16	29 5/8
W33x291	2.52	2 5/8	1 5/16	29 5/8
W33x263	2.36	2 7/16	1 1/4	29 5/8
W33x241	2.19	2 1/4	1 1/4	29 5/8
W33x221	2.06	2 1/8	1 3/16	29 5/8
W33x201	1.94	2	1 3/16	29 5/8
W33x169	1.92	2 1/8	1 3/16	29 5/8
W33x152	1.76	1 15/16	1 1/8	29 5/8
W33x141	1.66	1 13/16	1 1/8	29 5/8
W33x130	1.56	1 3/4	1 1/8	29 5/8
W33x118	1.44	1 5/8	1 1/8	29 5/8
W30x391	3.23	3 3/8	1 1/2	26 1/2
W30x326	2.84	2 15/16	1 3/8	26 1/2
W30x292	2.64	2 3/4	1 5/16	26 1/2
W30x261	2.44	2 9/16	1 5/16	26 1/2
W30x235	2.29	2 3/8	1 1/4	26 1/2
W30x211	2.10	2 1/4	1 3/16	26 1/2
W30x191	1.97	2 1/16	1 3/16	26 1/2
W30x173	1.85	2	1 1/8	26 1/2
W30x148	1.83	2 1/16	1 1/8	26 1/2
W30x132	1.65	1 7/8	1 1/8	26 1/2
W30x124	1.58	1 13/16	1 1/8	26 1/2
W30x116	1.50	1 3/4	1 1/8	26 1/2
W30x108	1.41	1 11/16	1 1/8	26 1/2
W30x99	1.32	1 9/16	1 1/16	26 1/2
W30x90	1.26	1 1/2	1 1/16	26 1/2
W27x539	4.33	4 7/16	1 13/16	23 5/8
W27x368	3.27	3 3/8	1 1/2	23 5/8
W27x336	3.07	3 3/16	1 7/16	23 5/8
W27x307	2.88	3	1 7/16	23 5/8
W27x281	2.72	2 13/16	1 3/8	23 5/8
W27x258	2.56	2 11/16	1 5/16	23 5/8
W27x235	2.40	2 1/2	1 5/16	23 5/8
W27x217	2.29	2 3/8	1 1/4	23 5/8
W27x194	2.13	2 1/4	1 3/16	23 5/8
W27x178	1.98	2 1/16	1 3/16	23 5/8
W27x161	1.87	2	1 3/16	23 5/8
W27x146	1.76	1 7/8	1 1/8	23 5/8
W27x129	1.70	2	1 1/8	23 5/8
W27x114	1.53	1 13/16	1 1/8	23 5/8
W27x102	1.43	1 3/4	1 1/16	23 5/8
W27x94	1.34	1 5/8	1 1/16	23 5/8
W27x84	1.24	1 9/16	1 1/16	23 5/8

Shape	k		k_1	T
	Design	Detailing		
	in.	in.	in.	in.
W24x370	3.22	3 5/8	1 9/16	20 3/4
W24x335	2.98	3 3/8	1 1/2	20 3/4
W24x306	2.78	3 3/16	1 7/16	20 3/4
W24x279	2.59	3	1 7/16	20 3/4
W24x250	2.39	2 13/16	1 3/8	20 3/4
W24x229	2.23	2 5/8	1 5/16	20 3/4
W24x207	2.07	2 1/2	1 1/4	20 3/4
W24x192	1.96	2 3/8	1 1/4	20 3/4
W24x176	1.84	2 1/4	1 3/16	20 3/4
W24x162	1.72	2 1/8	1 3/16	20 3/4
W24x146	1.59	2	1 1/8	20 3/4
W24x131	1.46	1 7/8	1 1/8	20 3/4
W24x117	1.35	1 3/4	1 1/8	20 3/4
W24x104	1.25	1 5/8	1 1/16	20 3/4
W24x103	1.48	1 7/8	1 1/8	20 3/4
W24x94	1.38	1 3/4	1 1/16	20 3/4
W24x84	1.27	1 11/16	1 1/16	20 3/4
W24x76	1.18	1 9/16	1 1/16	20 3/4
W24x68	1.09	1 1/2	1 1/16	20 3/4
W24x62	1.19	1 1/2	1 1/16	20 3/4
W24x55	1.11	1 7/16	1	20 3/4
W21x201	2.13	2 1/2	1 5/16	18
W21x182	1.98	2 3/8	1 1/4	18
W21x166	1.86	2 1/4	1 3/16	18
W21x147	1.65	2	1 3/16	18
W21x132	1.54	1 15/16	1 1/8	18
W21x122	1.46	1 13/16	1 1/8	18
W21x111	1.38	1 3/4	1 1/8	18
W21x101	1.30	1 11/16	1 1/16	18
W21x93	1.43	1 5/8	15/16	18 3/8
W21x83	1.34	1 1/2	7/8	18 3/8
W21x73	1.24	1 7/16	7/8	18 3/8
W21x68	1.19	1 3/8	7/8	18 3/8
W21x62	1.12	1 5/16	13/16	18 3/8
W21x55	1.02	1 3/16	13/16	18 3/8
W21x48	0.930	1 1/8	13/16	18 3/8
W21x57	1.15	1 5/16	13/16	18 3/8
W21x50	1.04	1 1/4	13/16	18 3/8
W21x44	0.950	1 1/8	13/16	18 3/8
W18x175	1.99	2 7/16	1 1/4	15 1/8
W18x158	1.84	2 5/16	1 1/4	15 1/8
W18x143	1.72	2 3/16	1 3/16	15 1/8
W18x130	1.60	2 1/16	1 3/16	15 1/8
W18x119	1.46	1 15/16	1 3/16	15 1/8
W18x106	1.34	1 13/16	1 1/8	15 1/8
W18x97	1.27	1 3/4	1 1/8	15 1/8
W18x86	1.17	1 5/8	1 1/16	15 1/8
W18x76	1.08	1 9/16	1 1/16	15 1/8

Shape	k		k_1	T
	Design	Detailing		
	in.	in.	in.	in.
W18x71	1.21	1 1/2	7/8	15 1/2
W18x65	1.15	1 7/16	7/8	15 1/2
W18x60	1.10	1 3/8	13/16	15 1/2
W18x55	1.03	1 5/16	13/16	15 1/2
W18x50	0.972	1 1/4	13/16	15 1/2
W18x46	1.01	1 1/4	13/16	15 1/2
W18x40	0.927	1 3/16	13/16	15 1/2
W18x35	0.827	1 1/8	3/4	15 1/2
W16x100	1.69	1 7/8	1 1/8	13 1/4
W16x89	1.58	1 3/4	1 1/16	13 1/4
W16x77	1.47	1 5/8	1 1/16	13 1/4
W16x67	1.37	1 9/16	1	13 1/4
W16x57	1.12	1 3/8	7/8	13 5/8
W16x50	1.03	1 5/16	13/16	13 5/8
W16x45	0.967	1 1/4	13/16	13 5/8
W16x40	0.907	1 3/16	13/16	13 5/8
W16x36	0.832	1 1/8	3/4	13 5/8
W16x31	0.842	1 1/8	3/4	13 5/8
W16x26	0.747	1 1/16	3/4	13 5/8
W14x808	5.72	6 7/16	3 1/16	10
W14x730	5.51	6 3/16	2 3/4	10
W14x665	5.12	5 13/16	2 5/8	10
W14x605	4.76	5 7/16	2 1/2	10
W14x550	4.42	5 1/8	2 3/8	10
W14x500	4.10	4 13/16	2 5/16	10
W14x455	3.81	4 1/2	2 1/4	10
W14x426	3.63	4 5/16	2 1/8	10
W14x398	3.44	4 1/8	2 1/8	10
W14x370	3.26	3 15/16	2 1/16	10
W14x342	3.07	3 3/4	2	10
W14x311	2.86	3 9/16	1 15/16	10
W14x283	2.67	3 3/8	1 7/8	10
W14x257	2.49	3 3/16	1 13/16	10
W14x233	2.32	3	1 3/4	10
W14x211	2.16	2 7/8	1 11/16	10
W14x193	2.04	2 3/4	1 11/16	10
W14x176	1.91	2 5/8	1 5/8	10
W14x159	1.79	2 1/2	1 9/16	10
W14x145	1.69	2 3/8	1 9/16	10
W14x132	1.63	2 5/16	1 9/16	10
W14x120	1.54	2 1/4	1 1/2	10
W14x109	1.46	2 3/16	1 1/2	10
W14x99	1.38	2 1/16	1 7/16	10
W14x90	1.31	2	1 7/16	10
W14x82	1.45	1 11/16	1 1/16	10 7/8
W14x74	1.38	1 5/8	1 1/16	10 7/8
W14x68	1.31	1 9/16	1 1/16	10 7/8
W14x61	1.24	1 1/2	1	10 7/8

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Shape	k		k_1	T
	Design	Detailing		
	in.	in.	in.	in.
W14x53	1.25	1 1/2	1	10 7/8
W14x48	1.19	1 7/16	1	10 7/8
W14x43	1.12	1 3/8	1	10 7/8
W14x38	0.915	1 1/4	13/16	11 5/8
W14x34	0.855	1 3/16	3/4	11 5/8
W14x30	0.785	1 1/8	3/4	11 5/8
W14x26	0.820	1 1/8	3/4	11 5/8
W14x22	0.735	1 1/16	3/4	11 5/8
W12x336	3.55	3 7/8	1 11/16	9 1/8
W12x305	3.30	3 5/8	1 5/8	9 1/8
W12x279	3.07	3 3/8	1 5/8	9 1/8
W12x252	2.85	3 1/8	1 1/2	9 1/8
W12x230	2.67	2 15/16	1 1/2	9 1/8
W12x210	2.50	2 13/16	1 7/16	9 1/8
W12x190	2.33	2 5/8	1 3/8	9 1/8
W12x170	2.16	2 7/16	1 5/16	9 1/8
W12x152	2.00	2 5/16	1 1/4	9 1/8
W12x136	1.85	2 1/8	1 1/4	9 1/8
W12x120	1.70	2	1 3/16	9 1/8
W12x106	1.59	1 7/8	1 1/8	9 1/8
W12x96	1.50	1 13/16	1 1/8	9 1/8
W12x87	1.41	1 11/16	1 1/16	9 1/8
W12x79	1.33	1 5/8	1 1/16	9 1/8
W12x72	1.27	1 9/16	1 1/16	9 1/8
W12x65	1.20	1 1/2	1	9 1/8
W12x58	1.24	1 1/2	15/16	9 1/4
W12x53	1.17	1 3/8	15/16	9 1/4
W12x50	1.14	1 1/2	15/16	9 1/4
W12x45	1.08	1 3/8	15/16	9 1/4
W12x40	1.02	1 3/8	7/8	9 1/4
W12x35	0.820	1 3/16	3/4	10 1/8
W12x30	0.740	1 1/8	3/4	10 1/8
W12x26	0.680	1 1/16	3/4	10 1/8
W12x22	0.725	15/16	5/8	10 3/8
W12x19	0.650	7/8	9/16	10 3/8
W12x16	0.565	13/16	9/16	10 3/8
W12x14	0.525	3/4	9/16	10 3/8
W10x112	1.75	1 15/16	1	7 1/2
W10x100	1.62	1 13/16	1	7 1/2
W10x88	1.49	1 11/16	15/16	7 1/2
W10x77	1.37	1 9/16	7/8	7 1/2
W10x68	1.27	1 7/16	7/8	7 1/2
W10x60	1.18	1 3/8	13/16	7 1/2
W10x54	1.12	1 5/16	13/16	7 1/2
W10x49	1.06	1 1/4	13/16	7 1/2

Shape	k		k_1	T
	Design	Detailing		
	in.	in.	in.	in.
W10x45	1.12	1 5/16	13/16	7 1/2
W10x39	1.03	1 3/16	13/16	7 1/2
W10x33	0.935	1 1/8	3/4	7 1/2
W10x30	0.810	1 1/8	11/16	8 1/4
W10x26	0.740	1 1/16	11/16	8 1/4
W10x22	0.660	15/16	5/8	8 1/4
W10x19	0.695	15/16	5/8	8 3/8
W10x17	0.630	7/8	9/16	8 3/8
W10x15	0.570	13/16	9/16	8 3/8
W10x12	0.510	3/4	9/16	8 3/8
W8x67	1.33	1 5/8	15/16	5 3/4
W8x58	1.20	1 1/2	7/8	5 3/4
W8x48	1.08	1 3/8	13/16	5 3/4
W8x40	0.954	1 1/4	13/16	5 3/4
W8x35	0.889	1 3/16	13/16	5 3/4
W8x31	0.829	1 1/8	3/4	5 3/4
W8x28	0.859	15/16	5/8	6 1/8
W8x24	0.794	7/8	9/16	6 1/8
W8x21	0.700	7/8	9/16	6 1/2
W8x18	0.630	13/16	9/16	6 1/2
W8x15	0.615	13/16	9/16	6 1/2
W8x13	0.555	3/4	9/16	6 1/2
W8x10	0.505	11/16	1/2	6 1/2
W6x25	0.754	15/16	9/16	4 1/2
W6x20	0.664	7/8	9/16	4 1/2
W6x15	0.559	3/4	9/16	4 1/2
W6x16	0.655	7/8	9/16	4 1/2
W6x12	0.530	3/4	9/16	4 1/2
W6x9	0.465	11/16	1/2	4 1/2
W6x8.5	0.444	11/16	1/2	4 1/2
W5x19	0.730	13/16	7/16	3 1/2
W5x16	0.660	3/4	7/16	3 1/2
W4x13	0.595	3/4	1/2	2 5/8