CODES AND STANDARDS

Bridge Welding Code Updated for 2008

The American Association of State Highway and Transportation Officials (AASHTO) and the American Welding Society (AWS) jointly develop the AASHTO/AWS D1.5M-D1.5 *Bridge Welding Code*. The *Code* has been adopted by most states and transportation authorities (cities, tollways, etc.) to assure weld longevity in structures carrying millions of vehicles. The first edition was published in 1988, with revised editions in 1995, 1996, and 2002. AWS policy does not authorize interim changes, except for errata published in the *Welding Journal*, so there were no official changes between editions. The latest edition, 2008, is now available. Changes include:

➜ Providing welding guidance for two grades of high-performance steel—ASTM A709 (AASHTO M270) HPS 50W/HPS 345W and HPS 70W/HPS 485W—and deleting Gr. 70W/485W, a quenched and tempered Gr. 50W/345W. The HPS steels have higher toughness and better weldability and weathering characteristics, but their chemistry requires different welding consumables than Gr. 50W/345W or Gr. 70W/485W.

➜ Tables 4.1, 4.2 have been revised, including moving the increasingly popular metal-cored GMAW electrodes to Table 4.1, thereby reducing the need for procedure qualification testing under Section 5.13. In addition, minor changes have been made to Tables 4.3 (unpainted steel), 4.4 (preheat), and 4.5 (stress relief holding time).

➜ The suggested Weld Procedure Specification (WPS) and Procedure Qualification Test Record (PQR) forms provided in Annex III have been amended, based on input from fabricators, owners, and consumable producers. The PQR form now provides areas to document test parameters, witnesses, and results, reducing the potential for later questions or disputes. The WPS form now provides an area for listing all significant variables, clarifying expectations for welders and inspectors. Shops working for multiple owners may improve common acceptance with these updated forms.

➜ Illustrations for specifying and measuring intended camber have been included. These images better define the desired camber and how to assess post-welding acceptance tolerances.

➜ Machining and testing tolerances for performance test specimens are now included. These do not entail significant changes to test equipment or specimens; rather, they better define the geometry and finishing needed to ensure consistent test conditions and accurate results.

➜ Storage requirements for fracture-critical welding consumables have been amended. The absence of hydrogen is critical for weld soundness, and even small hydrogen-induced cracks can propagate under cyclic loading. Fracture-critical consumables must be certified "low-hydrogen" by the producer, and they must be handled and stored to remain that way. Requirements include GMAW and FCAW reels, and clarify drying SMAW electrodes.

➜ RT film type and scanning patterns for UT are now addressed in Section 6, and NDT qualifications have been correlated between Sections 6.1 and 12.8. Also, additional welder qualification requirements have been clarified between 12.8 and Section 5, Part B.

➜ A commentary was added for Section 4, and extensive changes were made for other sections, including moving notes and italicized items from the Code to commentary sections, and replacing mandatory language ("shall" and "must") with permissive ("may").

➜ Other clarifications and modifications include: welder grinding deficiencies during a PQR that also proves qualification; correcting weld-induced distortion; dimensional tolerances; plasma cutting joint faces; undermatching weld strength; and clarifying fillet soundness tests.

Some future expected changes include the following:

➜ AWS has adopted a policy permitting interim code changes before a subsequent edition. This will not be common practice, but may allow new technology or avoid problem details.

➜ Narrow gap improved electro-slag welding (NGIESW) is expected to be included in the next edition.

➜ Combining Tables 4.1 and 4.2, and merging the qualification test requirements of 5.12 (max or min-max heat input) and 5.13 (production) are also expected in the next edition.

➜ The use of partial joint penetration (PJP) welds perpendicular to tensile stress.

➜ Gr.50S/345S will be included to cover rolled beams.

The *Bridge Welding Code* has evolved over the past twenty years and will continue to change, reflecting owners' needs for confidence, fabricators' needs for consistency, and the ever-changing technology of welding.

—By Jon Edwards, former fabrication engineer with the Illinois Department of Transportation and advisor to the AWS D1.5M-D1.5 Subcommittee.

A Separate Standard

Bridge welding didn't always have its own code. It was originally covered in Section 9 in the AWS D1.1 Structure Welding Code – Steel. However, as AASHTO and individual states added requirements, fabricators found that they had to undergo separate, expensive qualification tests for different owners. So, in the early 1980s, AASHTO and AWS formed a joint committee to establish a document for all owners to adopt, resulting in AWS D1.5M-D1.5.

After the initial publication, subsequent editions incorporated changes in technology, clarified areas of confusion or contention, improved efficiency for fabricators, and ensured that owners were satisfied with results. Significant changes included the addition of metric to the U.S. Customary units, Section 12 for Fracture Critical Welding (replacing the AASHTO Fracture Critical Guide Specification—which became the Fracture Control Plan for non-redundant structures)—and commentaries for Sections 1, 2, 3, 5, 6, 7, and 12.

GALVANIZING

AGA Announces Informational Packets

The American Galvanizers Association recently released two new comprehensive informational packets intended to educate city/county and university officials on the benefits of using hot-dip galvanized steel in municipality and university projects.

The municipal packet, "Galvanize Your Community," touches on municipality projects, while the educational packet, "Galvanize Your University," focuses on educational institutions and university-based projects. Each packet contains a brochure that highlights many common considerations of any project, such as durability, sustainability, cost, and aesthetics, while explaining how the use of hot-dip galvanized steel meets these needs and more.

If you are interested in obtaining either of these free packets or have questions, please contact AGA Marketing Coordinator Robyn Burke at 720.554.0900, ext. 13 or rburke@galvanizeit.org.

EVENTS

FMA and TPA China Tours

The Fabricators & Manufacturers Association, International (FMA) and Tube & Pipe Association, International (TPA) have scheduled two tours to China in September that focus on sheet metal and tube and pipe, respectively. Each tour offers a unique opportunity to network with Chinese counterparts and witness China's capabilities firsthand.

The tube and pipe itinerary also includes a special visit to the All China-International Tube & Pipe Industry Trade Fair in Shanghai. Each tour includes:

- ✓ Visits to Chinese companies related to metal fabricating or tube and pipe, respectively, with current plans for plant tours in Guangzhou, Dongguan, and Shenzhen
- ✓ Meetings with China industry trade associations and government officials
- ✓ Transportation and accommodations in China (roundtrip airfare to China and an optional sightseeing tour are not included)

Dates for the sheet metal tour are September 13-20. Dates for the tube and pipe tour are September 20-27. For a complete itinerary, visit www.fmanet.org/china.

Deadline to reserve a place in either program is March 31. Space is limited.

Debatable Progress

Although Mr. Arnold's points ring true ("Are We Making Any Progress?", January, p. 82), one cannot help pointing out that our disposable society holds no value to people working as "tradesmen."

I spent 5½ years in a shop doing things the "old-fashioned" way, learning many skills that are now deemed obsolete. When you consider the options there are, who would choose to toil as my father did for over 37 years only to wind up with a meager pension (only propped up by Uncle Sam, since the company went out of business), instead of finding a more lucrative profession?

Also consider that since all of our friends in Congress have auctioned off much of what is left in our country, there is little incentive for younger people to aspire to labor in a shop, whether dark and grungy or bright and heated, only to be laid off after two years due to market inequities.

Gary Kiley

It's good to see this type of opinion piece ("Are We Making Any Progress?"). I would have preferred he had commented on how bad basic design plan quality and content has gotten in the last 15 or so years—and continues to worsen. I have taken a position in that period of time not to accept it, and the reaction has been generally negative from other professionals; so I concluded long ago that it was laziness.

As we work in most cases with basic structure, as is the case with the majority of commercial buildings, it is disoncerting that the functional quality of plans is so bad. We work with others' designs and do our own, and for more than 30 years have had a good method to critique ourselves. I believe it is as simple as caring about what you do.

It was probably 8-10 years ago that I wrote AISC about this issue. I recieved a letter in response that was generally favorable, relative to its content, but I have seen no appeal to the design professionals to get back on track.

Phil Fetzer, V.P. Sales
Florida Welding Fabricators & Erectors, Inc.

On Architects and Engineers

Your January Editor's Note column brings to mind architect Leopold Eidlitz's (1823–1908) critique of 19th Century American Beaux Arts "starchitecture."

American architecture is the art of covering one thing with a second to imitate a third, which, if genuine, would not be desirable. "Plus ça change, plus c'est la même chose."

Jeremy Scott Wood, AIA
Weston, Mass.

In response to Scott Melnick's insightful January Editor's Note, our experience with Gehry and Associates has been limited but positive. The architect's design for the Jay Prizker Pavilion trellis (an elaborate, open canopy) called for 570 tons of steel pipe as large as 20 in. in diameter to be curved in two planes with multiple radii.

Long before the design was finalized, engineers at Skidmore, Owings and Merrill consulted us about curving the steel pipe. Although Chicago Metal could have followed the original design concept, our architecturally trained estimator suggested that each arch be curved in only one plane, and that the radii—ranging from 100 ft to 1,000 ft—change at each nodal junction.

This design change simplified the geometry for curving, fabrication, and erection, thereby reducing cost and construction time without compromising aesthetics or function. Gehry and Associates agreed to the change and even added their own twist: Each arch has a slight sideways tilt.

John Zils of SOM said Chicago Metal's advice "was a significant contribution to the project." As the result of the cooperation and teamwork of all parties, the work was performed with such precision that the structural steel fabricator, Acme Structural; the erector, Danny's Construction; and the general contractor, Walsh Construction, all remarked how "the trellis pieces went together so well."

George Wendt, President
Chicago Metal Rolled Products

Good Tips

"59 Tips and More for Economical Design" (January, p. 57) was an excellent article. I know none of it is new, but I thought it was well presented, concise, and benefical to fabricators, detailers, and engineers. It is similar to a lot of sessions we have done previously, but this approach seems different. It would make a good session or even short course!

Larry W. Jeffords, President,
Jeffords Steel and Engineering Co.