Summary of Changes in

ASME Section IX, 2001 Addenda

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Changes to ASME Section IX, 2001 Edition

The following is a summary of the changes that appear in the 2001 edition (which includes the 2001 addenda) of ASME Section IX. These changes and related discussion are reported by Walter J. Sperko, P.E., Vice-chairman of Subcommittee IX; readers are advised that the opinions expressed in this article are those of Mr. Sperko and not the official opinion of Subcommittee IX.

Standard Welding Procedures

It has come to the writer's attention that contractors using AWS Standard Welding Procedures Specifications (SWPSs) are not complying with the requirements that are listed in Article V (QW-500). Highlights of those requirements are:

- Not all AWS SWPSs are permitted.
- A demonstration test coupon must be welded and tested; QW-520 lists specific information that must be recorded as part of the demonstration.
- SWPSs must be used exactly as they are written; there are no "nonessential variables" when using SWPSs.
- The applicable fabrication document (i.e., construction code, customer specification, etc.) and the demonstration test number must be shown on the SPWS, and it must be signed and dated by the manufacturer or contractor.

Those using SWPSs are advised to read Article V closely -- and follow the rules!

Changes in the 2001 Edition

The 2001 Edition contains metric units. Old readers may recall that ASME published an SI version of the Boiler Code in 1986; when nobody bought it, ASME stopped publishing it. This edition contains metric units as secondary units (i.e., they are in parentheses and are a conversion of the US customary units rather than real metric units). Due to the extra time needed to add the metric units, the 2001 Edition hit the streets later than the July 1 official publication date.

In the 2000 addenda, ASME Section I specifically permitted use of SWPSs. In the 2001 edition, Section VIII will do the same. Subcommittee III's position is that specific words are not needed since Section III's existing words simply require that one follow Section IX. The B31 Code sections are in the process of adding words to specifically allow use of SWPSs.

Welding Procedure (QW-200) Rule Changes

There has been an historical requirement when qualifying a WPS for welding P-11 base metal (over 100,000 psi tensile strength, quenched and tempered steel) that a fillet weld test must be conducted in addition to the required groove weld test. This test was originally intended to show that the welding process, materials and techniques used would not result in underbead cracking. With the advent of low-

hydrogen electrodes and a better understanding of the effects of hydrogen during welding, the Subcommittee no longer considered the extra fillet weld test to be meaningful, so QW-202.2(d) was deleted. It should be noted that QW-213 requires that, if thermal cutting and/or backgouging will be used in production welding of P-11 materials, these have to be included as part of the procedure qualification test coupon.

When welding dissimilar thickness base metals, QW-202.4(b) permits the use of test coupons as thin as 1/4 inch to be used to support welding on unlimited thickness when welding austenitic stainless steel (P-8), Nickel alloys (P-41 through P-47), titanium (P-51 through P-53) and zirconium alloys (P-61 and 62). This allowance was only permitted when impact testing of these metals was not required. Based on the fact that toughness is degraded more easily when welding thin materials than when welding thick materials, it was agreed that the impact testing limit was not necessary, so it was deleted.

For those who weld on impact tested metals, there is a requirement to qualify using single-pass welds if single-pass welds are going to be made in production (QW-410.9). Its purpose was to address the fact that single-pass welds have not been tempered by subsequent weld passes that would improve the toughness of the previous passes. This has always been a requirement for the other common welding processes, but it was somehow overlooked for SMAW. That oversight has been corrected in these addenda. Those who have existing SMAW qualifications allowing welding using a single pass per side on impact-tested materials without this qualification do not need to panic and make additional tests since this rule change only applies to new qualifications; see QW-100.3, fifth paragraph.

A recent development in autogenous GTAW is a flux that is painted on the outside of a square butt joint after fit-up. This flux changes the thermally-induced circulation of the weld pool such that the depth of penetration is significantly increased, enabling single-pass welding on materials of 1/4 inch (6 mm) thick and greater with good control of the final weld geometry. QW-404.50 has been added to address use of these fluxes. Since tests indicate that these fluxes have no effect on mechanical properties of the weld, the variable is nonessential; this, of course, means that it does not have to documented on the PQR, but it does have to be addressed on the WPS.

QW-283, which deals with welds made “with buttering,” has been expanded. “Buttered” welds are typically groove welds in which the end preparation of one member is “buttered” with a layer of weld metal, then that member is heat treated, then it is welded to the other member. A typical application for “buttering” is for joints between chrome-moly steels (e.g., P-5A) and stainless steel (P-8) where heat treatment of the P-5A is required, but heat treatment of the P-8 is not desirable. In this situation, one can “butter” the P-5A weld end preparation with about 3/16 in. (5mm)

of a suitable austenitic stainless steel or nickel-alloy filler metal, heat treat the buttered piece, then weld the joint without additional heat treatment.

Historically, the provisions of this paragraph addressed the situation where buttering was done by one organization and the joint was made by another. When this occurred, the second organization was permitted to use a PQR in which the buttered side of the joint was represented by a base metal that matched the chemical analysis of the buttering in lieu of making up a weld joint with buttering. This provision is now permitted for the first organization also.

Several years ago, AWS published A5.32 which deals with shielding gas. It provides standard designations for shielding gas that can be used in lieu of specifying nominal composition. In addition, the specification controls the tolerance on composition and the purity level, making it superior to purchasing gas by nominal composition alone. In these addenda, AWS A5.32 was adopted as an SFA specification, and QW-408.2 was modified to permit use of shielding gas designations in accordance with SFA5.32 to be used in lieu of nominal composition. Although other variables that deal with gas composition were not similarly modified at this time, they are on the agenda to be revised. In the interim, inclusion of SFA 5.32 in QW-408.2 sets a precedent that could reasonably applied to the other variables dealing with gas composition.

The definitions for “oscillation” and “weave bead” were modified to make it clear that “oscillation” only applies to machine and automatic welding and that “weave bead” only applies to manual and semi-automatic welding. This change is primarily for the benefit of the Subcommittee when considering use of these terms in the code, and this should make coming revisions to requirements for control of weave and oscillation more understandable.

Welder Qualification (QW-300) Changes

For those who do corrosion resistant and hardfacing weld metal overlay, QW-381 and QW-382 were clarified to permit welders qualified to deposit overlay to deposit overlay of unlimited thickness. In addition, it was clarified that the welder had to qualify for welding small-diameter pipe only when the overlay is applied in the circumferential direction. The latter provision has been deleted from QW-403.16.

A big change was made in the nonmandatory forms; QW-484, which was for documenting welder and welding operator qualifications, was separated into QW-484A for welders and QW-484B for welding operators. Although the old form worked well for welders, it was incomplete and confusing for welding operators. Readers should recall that these forms are nonmandatory, so it is not necessary to transfer existing qualification records to them. These new forms are available on the writer’s web site,

Brazing (QB) Changes

Qualification of brazers was made easier. Previously, brazers had to qualify by brazing test coupons with each base metal P-number that they would braze in production. When brazing combinations of base metals, brazers had to braze combination test coupons. This was more restrictive than was required for qualification of procedures. These addenda allow brazers qualified on more than one P-number using a single set of process, filler metal, flux, etc. to braze those P-number base metal in combination without requalification.

Another simplifying change was to allow section tests on pipe between 1 and 3 in. OD to be polished on both halves of one longitudinal section instead of requiring removal of a slice from two locations as shown in QB-463.2(c). The orientation of the longitudinal cut relative to the testing position was also clarified.

Several years ago, Subcommittee IX adopted AWS A5.31, *Specification fo Fluxes for Brazing and Braze Welding*, but never incorporated any provisions to use the specification under Section IX. QB-406.1 was revised to allow the use of the AWS flux classification as an alternate to specifying the trade name or the nominal chemical composition of the flux.

Coming Attractions

Exciting things that are in the works by Subcommittee IX include reassignment of nickel alloys into a more useful and rational grouping system, the addition of non-essential variables for corrosion-resistant and hardfacing overlay and modifications of the new welder and operator qualification forms to address the number of layers of weld metal. Readers should be aware that ASME Code Committee meetings are open to the public; the schedule is available on the writer's web site.

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