Summary of Changes to

ASME Section IX, 2025 Edition

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Prepared by

Walter J. Sperko, P.E.
Sperko Engineering Services, Inc
4803 Archwood Drive
Greensboro, NC 27406 USA
Voice: 336-674-0600
FAX: 336-674-0202
walt@sperkoengineering.com
www.sperkoengineering.com

Changes to ASME Section IX, 2025 Edition

The following article by Walter J. Sperko, P.E. discusses significant changes in the 2025 edition of ASME Section IX; all changes can be found in the "Summary of Changes" in the front matter of Section IX. Opinions expressed in this article are Mr. Sperko's, not the official opinion of ASME BPV Standards Committee IX. These changes become mandatory for new qualifications January 1, 2026.

Part QG, General Requirements Changes

If you want to update your Welding Procedure Specifications (WPSs) to the current edition of Section IX using Procedure Qualification records (PQRs) qualified under an earlier edition, QG-108 now clarifies that all the essential and, when toughness qualification is applicable, the supplementary essential variables that are required by the current edition must be recorded on those old PQRs. The use of WPSs qualified to earlier editions is still permitted even though variables may have been changed in later editions; further, any qualification requirements of the applicable edition of the construction code (Section VIII, B31.3, etc.) must also be met.

Section IX has always had smaller discontinuity acceptance criteria for bend tests of overlay welds versus bend tests of groove welds. Unfortunately, both were contained in one paragraph, and code users occasionally missed that they were different. This edition gives the acceptance criteria for groove welds and overlay welds their own paragraphs, each with their own header.

For those who do diffusion welding, the acceptance criteria for porosity was changed from zero to permit a limited size and number of pores. This change was made because it is not possible to make a diffusion weld without some microscopic porosity on the bond lines.

Welding Procedures (QW-200)

There is a new supplementary essential variable, QW-410.92, limiting weaving when welding the test coupon. It says that if the welder weaves and the beads exceed 1 inch in width, you will have to measure the travel speed using the linear travel speed of the electrode as it moves transversely along the weld path rather than the traditional method of measuring parallel to the weld groove. That will result in much lower qualified heat input than if heat input is measured the traditional way.

To illustrate the difference, if your welder deposits 2 inches of weld bead in a minute, you would normally use 2 inches per minute of travel speed to calculate the heat input. If the welder weaves making 8 beads 1-1/4 inches wide over that 2-inch length of weld, the distance traveled is 8 X 1-1/4 X 2 = 20 inches of weld length per minute. This new variable requires you to use that travel speed to calculate the heat input. The difference might seem theoretical, but the heat affected zone (HAZ) of a test coupon made using a wide weave will be much narrower than the HAZ of one made using a stringer bead if both are made using the same heat input. See Figure 1. Wide HAZs result in more loss of toughness than narrow HAZs. Also, wide layers made depositing smaller weld beads results in more interbead tempering than large beads; this results in higher toughness weld metal than welds made with larger beads.

This new variable also allows you to use more than one heat input on a single test coupon using different techniques provided the toughness testing that is required by the referencing code, standard, or specification has been performed on material representing each set of variables.

The easiest way to deal with this variable when you qualify a WPS is to direct the welder to use a stringer bead, or to allow weaving but be sure that the beads do not exceed 1 inch in width. Document that on the PQR and you can specify the conventional method of measuring travel speed when you write your WPS.

NOTE: This variable was inadvertently applied to the Special Process Variables (corrosion-resistant and hardfacing overlay). It should not have been since the Special Process variables already take weave width into account in the heat input formula used to calculate heat input in QW-409.26. Section IX committee will correct this and issue a "Special Notice" after our August meeting to make it retroactive to the 2025 edition. See: https://cstools.asme.org/BPVErrataAndSpecialNotice.cfm?_gl=1*1tynhgt*_gcl_au*MTA4MzExMzQ5Mi4xNzQ4NDA1ODUy*_ga*MTcxODUwNjA3OC4xNzQ4NDA1ODUy*_ga_3DH4W3W6HS*czE3NTE2MDE2NjckbzE5JGcwJHQxNzUxNjAxNjY3JGo2MCRsMSRoMTUyMjQ4NTA1NQ..

When welds are heat treated below the lower transformation temperature for a long time, the weld and base metals will lose toughness. That is addressed in QW-407.2 which requires that the procedure qualification test coupon be heat treated for at least 80% of the time that the production weld will be heat treated. If the weld is heat treated above the upper transformation temperature, a phase change occurs, and a whole new microstructure is created as the weld cools back to room temperature. Consequently, the properties of the weld are not affected by the time that the weld is held above the upper transformation temperature. QW-407.2 was revised to make it clear that the 80% rule only applies to heat treatments below the lower transformation temperature.

QW-202.2 no longer refers you to QW-451 for the range of base metal thickness and maximum weld metal thickness qualified; instead, it now directs you to the table of variables for each welding process. While the reference to QW-451 was correct for the common welding processes, many processes such as electron beam, laser, friction, and diffusion welding have their own ranges of qualification for base metal and weld metal thickness, so the reference to QW-451 was inappropriate.

Note 1 of QW-433 allows you to use alternate base metals for welder qualification; it says that you can consider a filler metal whose chemical composition conforms to an A-number analysis to be F-number 6 even if that filler metal does not conform to an SFA specification. What that means is that a welder qualified with ER70S-2 is qualified to weld using coat hanger wire that has a chemical composition meeting A-number 1. This edition limits that rule to solid wire.

For those who do electron beam welding, QW-403.1 and QW-403.15 were both identified as essential variables and both addressed the base metals qualified. QW-403.15 was more restrictive, limiting materials qualified to the P-number and group number used on the qualification test coupon, not just to the P-numbers tested. QW-403.15 was moved into the supplementary essential variable column.

QW-202.3, Weld Repair and Buildup, was revised to make it clear that a WPS qualified by a groove weld test coupon may be used to make *all* repair welds. The previous wording only addressed repair of welds; it did not clearly allow repair of base metals -- although that was the intent.

For those who do weld metal overlay, Figure QW-452.5(a) was revised to allow the minimum qualified overlay thickness to be determined two ways. You can use either the current requirement to use the approximate weld metal/base metal interface as the reference plane or the fusion face, i.e., the original surface of the base metal. The PQR must record which reference plane was used, and the WPS must specify the minimum weld metal thickness that is required.

The acceptance criteria for tension testing has always allowed the tensile strength of the weld metal to be used as a basis for accepting tension test results when permitted by the applicable Section (e.g., Section VIII). This edition broadened that exception to whenever using the tensile strength of the weld metal is permitted by the referencing code, standard or specification. The only code that I am aware of that allows this is Section VIII, Division 2, paragraph 6.6.5.2 (c) which covers welding 9Ni, 8Ni, and 5Ni-1/4Mo steels that will be used in cryogenic service. The weld metal used to weld these materials is normally an austenitic material like ER309 which is not as strong as the base metal at room temperature but matches the strength of the base metal when cooled to cryogenic temperatures.

Section IX does not address the requirements for welding P-10H (duplex) materials for corrosion resistant applications since corrosion resistance is outside the scope of the Boiler Code. The 2025 edition has a Nonmandatory Appendix that provides guidance on optimizing corrosion-resistance when welding P-10H steels. Be aware that this nonmandatory appendix can be made mandatory when invoked by other code sections or by contract documents.

A number of Standard Welding Procedure Specifications listed in Appendix E were updated following revisions by AWS.

Personnel Qualification (QW-300)

Table QW-453 which covers thickness limits and testing requirements for hard-facing and corrosion-resistant overlays was broken up into two separate tables making the requirements easier to understand and follow. More importantly, there were no thickness limits on welding operator qualification except as stated in the WPS that the welder was following. When this edition becomes mandatory, the thickness limits of QW-453 will apply to welding operators.

QW-381 on performance qualification for overlay clarifies that diameter limitations only apply when the overlay is being applied circumferentially, not when the overlay is being applied along the length of pipe.

NDE personnel qualification requirements in QW-191.4 were modified to make it clear that those who perform RT or UT of welder qualifications of both production welds and of test coupons may be qualified to the current edition or any earlier edition of SNT-TC-1A that is being used on a project, or to any other NDE personnel qualification standard that is being used on a project.

The variables for machine welding operators were revised to direct you to QW-303 for the positions qualified instead of giving vague references to QW-120, QW-130 and QW-303.

Base Metals and Filler Metals

The following inquiry came before the committee:

> Background: API 5L specification list each individual base metal grade in two corresponding formats. One is prefixed by letter L (e.g. L450) and the corresponding one with letter X (e.g. X65). Table QW/QB-422 lists API 5L grades with the letter X prefix only.

Question: Is it the intent of ASME IX for API 5L grades identified by L designation to be considered having the same assigned P-Number and Group Number of the corresponding X designation listed in Table QW/QB-422?

Reply: Yes.

As a result, all API grades with an "L" prefix were added to the existing "X" format grades in QW-422.

The following were added to the P-Number table:

Specification	Grade	P-Number
SA-213[1]	TP310MoCbN	8 Group 3
SA-234	WP11, Cl. 2	4 Group 1
SA743	CF10SMnN	8 Group 1
SA-163	N08935	45
SB-150	63200	35
SA-240	S41003	7 Group 1
SB-265[1]	R54250	54
CSA Z245.16	241 through 620	1, Groups 1 to 4

Titanium Grade 38 R54250 (Ti4Al-2.5V-1.5Fe) was assigned to a new P-Number: 54.

Another new P-Number, 81, was also created for cobalt-based alloy R31233. It was previously assigned to P-Number 49 which no longer exists. If you are welding this alloy, you will need to revise your WPSs and PQRs to reflect the reassigned P-Number. While requalification is not required, the PQR should identify the basis for the revision (i.e., a change in the code), and the PQR needs to be recertified by signature. Because of these changes, P-Numbers 81 and 54 were also inserted in various variables and tables. The most notable of these is QW-423, which covers the ranges of base metals for which a welder is qualified. As of this edition, welders who qualify on P-No. 1 through P-No. 15F, P-No. 34, or P-No. 41through P-No. 46, or P-No. 81 will be qualified to weld on those alloys. Unless you are welding these new P-Number materials, there is no need to revise your existing welder qualification records that show the new range of P-Numbers qualified.

Since they have not been in Section IX since the 2010 edition, references to S-numbers were moved from QW-421 to the historical information in the Introduction. In 2010, S-number-assigned materials were administratively changed from S to P-number, so if you encounter a WPS that specified S-Numbers, just consider them to be the corresponding P-numbers.

AWS A5.25 2023 covering filler metals and fluxes for electroslag welding was adopted as SFA5.25.

Additive Manufacturing (QW-600)

[1] Several other product form specifications that include this UNS number were also added

A new variable was added to QW-651 to address when using weaving. It says that if the WPS is qualified using weaving over 0.5 in (13mm) wide, the layer widths specified in the WPS must be limited to the minimum and maximum layer widths used on the test coupons instead of the layer widths specified in QW-613.

Brazing (QB) Changes

Table QW-421 which deals with the range of base metal for which a brazer is qualified was expanded to largely match up with the ranges of base metal for which a brazer was qualified before the new brazing P-numbers took effect in 2023. This was an oversight that this edition corrected; for those who qualified brazer under the 2023 edition, you can update your records to allow brazers to braze on the expanded range of base metals.

I would like to thank Houston Dillinger and the guys at Contract Fabricators, Inc. for welding, testing and sectioning narrow and wide weave test coupons that I used to illustrate the technical aspects of QW-410.92 to the Committee.

ASME Code Committee meetings are open to the public; the schedule is available on my web site and, along with a lot of other links, at https://www.asme.org/codes-standards/publications-information/bpvc-resources. Boiler Code Committee meetings are at the bottom of the page.

Mr. Sperko is President of Sperko Engineering, a company that provides consulting services in welding, brazing, metallurgy, corrosion and ASME Code issues located at www.sperkoengineering.com. He also teaches publicly offered seminars sponsored by AWS on how to efficiently and competently use Section IX. See https://www.aws.org/community-and-events/conferences-and-events/asme/. He can be reached at 336-674-0600 and by e-mail at: walt@sperkoengineering.com.

Figure 1

Note the wide HAZs at the top and bottom of the weld where the weld beads are large compared to the narrow HAZ in the middle where wide weaving was used. This photograph was provided courtesy of Chris Wilson of Lincoln Electric Company who will be publishing a paper in the WJ showing comparisons of the toughness of the weld metal and HAZs in the three locations.