

	<h2 style="margin: 0;">WELDER QUALIFICATION FOR IN-SERVICE WELDING</h2>	<h2 style="margin: 0;">D-30.4</h2>
Department: Gas System Maintenance and Technical Support Approved by: B. D. Davis	Section: System Integrity Approved by: XXXXXXXXXX	Date: 11-29-01
Rev. #01: This document replaces Revision #00. For a description of the changes, see Page 3.		

Purpose and Scope

This gas standard provides the required qualifications for welders who conduct welding in accordance with Gas Standards D-23 and D-23.1.

Acronyms

- API: American Petroleum Institute
- GMAW: gas metal arc welding
- gpm: gallons per minute
- kJ/inch kilojoules per inch
- OD: outside diameter
- psig: pounds per square inch gauge
- SMAW: shielded metal arc welding
- SMYS: specified minimum yield strength

References

	Gas Standard
In-Service Welding	D-23
Direct Deposition Welding	D-23.1
Arc Welder Qualification for Working on Pipelines that Operate at Over 20% of SMYS	D-30.2
Weld Inspection	D-40

General Information

1. A welder qualified under this standard may perform in-service welding within the limitations of his/her qualifications as established in Gas Standard D-30.2. Separate qualifications exist for in-service welding when using the controlled-heat-input and temper-bead techniques.
2. To be qualified to perform direct deposition welding on pressurized pipelines, welders shall successfully complete the qualification test for temper-bead welding, and the direct deposition, mock-up test, as described in this standard.

Qualification for Controlled-Heat-Input Welding

1. This test may be given for either SMAW or GMAW.
2. The welder shall make a sleeve weld on an X-42, 12" nominal OD, or larger pipe with a 1/2" thick by 12" long A242 or A572 sleeve. The welder shall make one circumferential weld. The test coupon shall be in the 5G position.
3. The test pipe shall be filled with water flowing at a minimum rate of 10 gpm while the test is conducted.
4. During deposition of the circumferential weld, the welder shall demonstrate the ability to maintain a minimum heat input of 40 kJ/inch.
5. For SMAW, the heat input shall be verified by measuring the "run-out ratio" during welding.

$$Run-Out Ratio = \frac{Weld Length}{Original Electrode Length - Stub Length}$$

6. The run-out ratio for 1/8", type XX18 electrodes with a minimum heat input of 40 kJ/inch is 0.38.

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7. For GMAW, the heat input shall be calculated after measuring the amperage, arc voltage, and travel speed.

$$\text{Heat Input (kJ/inch)} = \frac{\text{Amperage} \times \text{Voltage} \times 60}{\text{Travel Speed (inch/minute)}}$$

8. Four nick-break specimens shall be removed from the circumferential weld on the completed assembly and be tested per API 1107.

9. The weld shall meet the visual inspection requirements of Gas Standard D-40.

Qualification for Temper-Bead Welding

1. This test may be given for either SMAW or GMAW.
2. The welder shall make a sleeve weld on an X-42, 12" nominal OD, or larger pipe with a 1/2" thick by 12" long A242 or A572 sleeve. The welder shall make one circumferential weld. The test coupon shall be in the 5G position.
3. The test pipe shall be filled with water flowing at a minimum rate of 10 gpm while the test is conducted.
4. During deposition of the circumferential weld, the welder shall demonstrate the ability to deposit and properly position weld beads in the proper sequence and at the minimum heat-input levels described in the welding procedure.
5. Four nick-break specimens shall be removed from the circumferential weld on the completed assembly and be tested per API 1107.
6. The weld shall meet the visual inspection requirements of Gas Standard D-40.

Qualification Using Direct Deposition Mock-Up

1. This test may be given for SMAW only.
2. The test coupon shall be created from a 6" nominal OD, or larger pipe with a wall thickness of 0.250" maximum. Grind or machine a 3" long by 4" wide minimum area to a maximum remaining wall thickness of 0.156" to simulate corrosion damage.
3. The test coupon shall be positioned so that the simulated corrosion is in the overhead position. The test coupon shall be pressurized with 100 psig of air.
4. While repairing the corroded area, the welder shall demonstrate an understanding of the requirements of the repair procedure, and an ability to deposit weld metal in the proper sequence and at the desired heat-input levels.
5. Any burn-through during welding of the mock-up shall constitute a test failure.
6. The completed weld shall be visually inspected in accordance with Gas Standard D-40.

Retesting and Records

1. Welders who fail a qualification test shall undergo further training or practice before retesting. The extent of training or practice required shall be determined by the welding inspector.
2. Records of all welders qualified under this gas standard shall be retained as outlined below:
 - A. All "Employee Qualification and Requalification" records must be retained for a minimum of 5 years.
 - B. All "Employee Qualification and Requalification" records must be retained through temporary lapses in a welder's qualification.
 - C. The record shall be created by filling out Exhibit 1 of Gas Standard D-30.2. Indicate that the record is for in-service welding or direct deposition welding, as appropriate.

Welder Qualification for In-Service Welding

Revision Notes

Revision 01 has the following changes:

1. Added the "References" section.
2. Added to the scope of this standard the qualifications required to perform direct deposition welding; added the "Qualification Using Direct Deposition Mock-Up" section; modified the "General Information," "Qualification for Controlled-Heat-Input Welding," "Qualification for Temper-Bead Welding," and "Retesting and Records" sections, accordingly.
3. This document is part of Change 50.