

Welding Inspection and Metallurgy

API RECOMMENDED PRACTICE 577
FIRST EDITION, OCTOBER 2004



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Welding Inspection and Metallurgy

1 Scope

This recommended practice provides guidance to the API authorized inspector on welding inspection as encountered with fabrication and repair of refinery and chemical plant equipment and piping. Common welding processes, welding procedures, welder qualifications, metallurgical effects from welding, and inspection techniques are described to aid the inspector in fulfilling their role implementing API 510, API 570, API Std 653 and API RP 582. The level of learning and training obtained from this document is not a replacement for the training and experience required to be an American Welding Society (AWS) Certified Welding Inspector (CWI).

This recommended practice does not require all welds to be inspected; nor does it require welds to be inspected to specific techniques and extent. Welds selected for inspection, and the appropriate inspection techniques, should be determined by the welding inspectors, engineers, or other responsible personnel using the applicable code or standard. The importance, difficulty, and problems that could be encountered during welding should be considered by all involved. A welding engineer should be consulted on any critical, specialized or complex welding issues.

2 References

2.1 CODES AND STANDARDS

The following codes and standards are referenced in this recommended practice. All codes and standards are subject to periodic revision, and the most recent revision available should be used.

API

- API 510 *Pressure Vessel Inspection Code: Maintenance, Inspection, Rating, Repair, and Alteration*
- API 570 *Piping Inspection Code: Inspection, Repair, Alteration, and Rerating of In-Service Piping Systems*
- RP 578 *Material Verification Program for New and Existing Alloy Piping Systems*
- RP 582 *Recommended Practice and Supplementary Welding Guidelines for the Chemical, Oil, and Gas Industries*
- Std 650 *Welded Steel Tanks for Oil Storage*
- Std 653 *Tank Inspection, Repair, Alteration, and Reconstruction*
- Publ 2201 *Procedures for Welding or Hot Tapping on Equipment in Service*

ASME¹

- B31.3 *Process Piping*
Boiler and Pressure Vessel Code Section V, Nondestructive Examination; Section VIII, Rules for Construction of Pressure Vessels, Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators
- Practical Guide to ASME Section IX—Welding Qualifications*

ASNT²

- ASNT Central Certification Program*
- CP-189 *Standard for Qualification and Certification of Nondestructive Testing Personnel*
- SNT-TC-1A *Personnel Qualification and Certification in Nondestructive Testing*

AWS³

- A2.4 *Standard Symbols for Welding, Brazing, and Nondestructive Examination*
- A3.0 *Standard Welding Terms and Definitions*
- A5.XX *Series of Filler Metal Specifications*
- B1.10 *Guide for the Nondestructive Inspection of Welds*

CASTI⁴

- CASTI Guidebook to ASME Section IX—Welding Qualifications*

WRC⁵

- Bulletin 342 *Stainless Steel Weld Metal: Prediction of Ferrite Content*

2.2 OTHER REFERENCES

The following codes and standards are not referenced directly in this recommended practice. Familiarity with these documents may be useful to the welding engineer or inspector as they provide additional information pertaining to this recommended practice. All codes and standards are subject to

¹ASME International, 345 East 47th Street, New York, New York 10017. www.asme.org

²American Society for Nondestructive Testing, Inc., 1711 Arlington Lane, P.O. Box 28518, Columbus, Ohio 43228-0518. www.asnt.org

³American Welding Society, 550 N.W. LeJeune Road, Miami, Florida 33135. www.aws.org

⁴Codes and Standards Training Inc., Suite 210, 10544 106 Street, Edmonton AB T5H 2X6, Canada. www.casti.ca

⁵Welding Research Council, P.O. Box 1942, New York, New York 10056. www.forengineers.org/wrc/