

# Welding Inspection and Metallurgy

API RECOMMENDED PRACTICE 577  
FIRST EDITION, OCTOBER 2004



**Helping You  
Get The Job  
Done Right.<sup>SM</sup>**



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**Downstream Segment**

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# CONTENTS

	Page
1 SCOPE.....	1
2 REFERENCES .....	1
2.1 Codes and Standards .....	1
2.2 Other References .....	1
3 DEFINITIONS.....	2
4 WELDING INSPECTION .....	4
4.1 General.....	4
4.2 Tasks Prior to Welding.....	4
4.3 Tasks during Welding Operations .....	6
4.4 Tasks Upon Completion of Welding .....	7
4.5 Non-conformances and Defects .....	8
4.6 NDE Examiner Certification .....	8
4.7 Safety Precautions .....	9
5 WELDING PROCESSES .....	9
5.1 General.....	9
5.2 Shielded Metal Arc Welding (SMAW) .....	9
5.3 Gas Tungsten Arc Welding (GTAW).....	9
5.4 Gas Metal Arc Welding (GMAW).....	11
5.5 Flux Cored Arc Welding (FCAW).....	11
5.6 Submerged Arc Welding (SAW).....	14
5.7 Stud Arc Welding (SW).....	14
6 WELDING PROCEDURE .....	14
6.1 General.....	14
6.2 Welding Procedure Specification (WPS) .....	17
6.3 Procedure Qualification Record (PQR).....	17
6.4 Reviewing a WPS and PQR.....	18
7 WELDING MATERIALS .....	19
7.1 General.....	19
7.2 P-number Assignment to Base Metals .....	19
7.3 F-number Assignment to Filler Metals .....	19
7.4 AWS Classification of Filler Metals .....	19
7.5 A-number .....	19
7.6 Filler Metal Selection.....	20
7.7 Consumable Storage and Handling.....	20
8 WELDER QUALIFICATION .....	20
8.1 General.....	20
8.2 Welder Performance Qualification (WPQ) .....	20
8.3 Reviewing a WPQ .....	20
9 NON-DESTRUCTIVE EXAMINATION .....	21
9.1 Discontinuities .....	21
9.2 Materials Identification .....	26

	Page	
9.3	Visual Examination (VT) . . . . .	26
9.4	Magnetic Particle Examination (MT) . . . . .	27
9.5	Alternating Current Field Measurement (ACFM) . . . . .	36
9.6	Liquid Penetrant Examination (PT) . . . . .	36
9.7	Eddy Current Inspection (ET) . . . . .	37
9.8	Radiographic Inspection (RT) . . . . .	37
9.9	Ultrasonic Inspection (UT) . . . . .	49
9.10	Hardness Testing . . . . .	54
9.11	Pressure and Leak Testing (LT) . . . . .	54
9.12	Weld Inspection Data Recording . . . . .	54
10	METALLURGY . . . . .	55
10.1	General . . . . .	55
10.2	The Structure of Metals and Alloys . . . . .	55
10.3	Physical Properties . . . . .	58
10.4	Mechanical Properties . . . . .	59
10.5	Preheating . . . . .	61
10.6	Post-weld Heat Treatment . . . . .	61
10.7	Hardening . . . . .	62
10.8	Material Test Reports . . . . .	63
10.9	Weldability of Steels . . . . .	63
10.10	Weldability of High-alloys . . . . .	65
11	REFINERY AND PETROCHEMICAL PLANT WELDING ISSUES . . . . .	66
11.1	General . . . . .	66
11.2	Hot Tapping and In-service Welding . . . . .	67
11.3	Lack of Fusion with GMAW-S Welding Process . . . . .	69
APPENDIX A	TERMINOLOGY AND SYMBOLS . . . . .	71
APPENDIX B	ACTIONS TO ADDRESS IMPROPERLY MADE PRODUCTION WELDS . . . . .	77
APPENDIX C	WELDING PROCEDURE REVIEW . . . . .	79
APPENDIX D	GUIDE TO COMMON FILLER METAL SELECTION . . . . .	95
APPENDIX E	EXAMPLE REPORT OF RT RESULTS . . . . .	99

Figures

1	SMAW Welding . . . . .	10
2	SMAW Welding Electrode during Welding . . . . .	10
3	GTAW Welding Equipment . . . . .	12
4	GTAW Welding . . . . .	12
5	GMAW Equipment . . . . .	13
6	GMAW Welding . . . . .	13
7	FCAW Equipment . . . . .	15
8	FCAW Welding . . . . .	15
9	FCAW Welding, Self-shielded . . . . .	16
10	SAW Welding . . . . .	16
11	Typical Discontinuities Present in a Single Bevel Groove Weld in a Butt Joint . .	23
12	Direct Visual Examination Requirements . . . . .	26
13	Inspectors Kit . . . . .	28
14	Bridge Cam Gauge . . . . .	28
15	Adjustable Fillet Weld Gauge . . . . .	29
16	Skew—T Fillet Weld Gauge . . . . .	29

17	Weld Fillet Gauge	30
18	Weld Fillet Gauge	30
19	Weld Size Gauge	31
20	Hi-lo Gauge	31
21	Surface-breaking Discontinuity	32
22	Sub-surface Discontinuity	32
23	Weld Discontinuity	33
24	Flux Lines	33
25	Detecting Discontinuities Transverse to Weld	34
26	Detecting Discontinuities Parallel to the Weld	34
27	Pie Gauge	35
28	Florescent Penetrant Technique	36
29	IQI (Penetrameter) Common Hole Diameters	39
30	IQI (Penetrameter)	39
31	Single-wall Techniques	40
32	Double-wall Techniques	41
33	Incomplete or Lack of Penetration (LOP)	43
34	Interpass Slag Inclusions	43
35	Cluster Porosity	44
36	Lack of Side Wall Fusion	44
37	Elongated Slag (Wagon Tracks)	45
38	Burn-through	45
39	Offset or Mismatch with Lack of Penetration (LOP)	46
40	Excessive Penetration (Icicles, Drop-through)	46
41	Internal (Root) Undercut	47
42	Transverse Crack	47
43	Tungsten Inclusions	48
44	Root Pass Aligned Porosity	48
45	A-scan	50
46	B-scan	50
47	C-scan	51
48	DAC Curve for a Specified Reference Reflector	52
49	DAC Curve for an Unknown Reflector	52
A-1	Joint Types and Applicable Welds	72
A-2	Symbols for Various Weld Joint	73
A-3	Supplementary Symbols for Welds	73
A-4	Standard Weld Symbols	74
A-5	Groove Weld Nomenclature	74
A-6	SMAW Welding Electrode Identification System	75
A-7	GMAW/GTAW Welding Electrode Identification System	75
A-8	FCAW Welding Electrode Identification System	75
A-9	SAW Welding Electrode Identification System	76
B-1	Suggested Actions for Welds Made by an Incorrect Welder	77
B-2	Steps to Address Production Welds Made by an Improper Welding Procedure	78
C-1	Sample WPS #CS-1	80
C-2	Sample PQR #CS-1	82
C-3	Shielded Metal-Arc Welding (SMAW) Checklist	85
C-4	Example of Completed Shielded Metal-Arc Welding (SMAW) Checklist	88

## Tables

1	P-number Assignments . . . . .	19
2	Common Types of Discontinuities . . . . .	22
3	Commonly Used NDE Methods . . . . .	22
4	Capability of the Applicable Inspection Method for Weld Type Joints . . . . .	23
5	Capability of the Applicable Inspection Method vs. Discontinuity . . . . .	24
6	Discontinuities Commonly Encountered with Welding Processes . . . . .	25
7	ASTM E 142 IQIs (Penetrators) . . . . .	38
8	Conditions that May Exist in a Material or Product . . . . .	56
9	Results of Non-destructive Examination . . . . .	56
10	Results of Application of Acceptance/Rejection Criteria . . . . .	56
11	Brinell Hardness Limits for Steels in Refining Services . . . . .	63
12	Weld Crack Tests . . . . .	65
13	Hot Tapping/In-service Welding Hazards Associated with Some Particular Substances . . . . .	68
D-1	Common Welding Consumables for SMAW of Carbon and Low-alloy Steel . . .	95
D-2	Common Welding Consumables for SMAW of Stainless Steels . . . . .	96
D-3	Copper-nickel and Nickel-based Alloys . . . . .	97
D-4	Classification Changes in Low-alloy Filler Metal Designations . . . . .	98

# 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*

#### ASME<sup>1</sup>

- 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*

#### ASNT<sup>2</sup>

- 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*

#### AWS<sup>3</sup>

- 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*

#### CASTI<sup>4</sup>

- CASTI Guidebook to ASME Section IX—Welding Qualifications*

#### WRC<sup>5</sup>

- 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

<sup>1</sup>ASME International, 345 East 47th Street, New York, New York 10017. [www.asme.org](http://www.asme.org)

<sup>2</sup>American Society for Nondestructive Testing, Inc., 1711 Arlington Lane, P.O. Box 28518, Columbus, Ohio 43228-0518. [www.asnt.org](http://www.asnt.org)

<sup>3</sup>American Welding Society, 550 N.W. LeJeune Road, Miami, Florida 33135. [www.aws.org](http://www.aws.org)

<sup>4</sup>Codes and Standards Training Inc., Suite 210, 10544 106 Street, Edmonton AB T5H 2X6, Canada. [www.casti.ca](http://www.casti.ca)

<sup>5</sup>Welding Research Council, P.O. Box 1942, New York, New York 10056. [www.forengineers.org/wrc/](http://www.forengineers.org/wrc/)