AASHTO/AWS D1.5M/D1.5:2025
An American National Standard

Bridge Welding Code

A Joint Publication of

American Association of State Highway and Transportation Officials

AASHTO

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Bridge Welding Code

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Prepared by the
American Welding Society (AWS) D1 Committee on Structural Welding

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This code covers the welding requirements for welded bridges made from carbon and low-alloy constructional steels and designed to AASHTO or AREMA requirements. This 2025 edition contains dimensions in metric SI Units and U.S. Customary Units. Clauses 1 through 9 constitute a body of rules for the regulation of welding in steel construction. Clauses 10 and 11 do not contain provisions, as their analogue D1.1/D1.1M sections are not applicable to the D1.5 code. Clause 12 contains the requirements for fabricating fracture-critical members.

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This standard is subject to revision at any time by the AWS D1 Committee on Structural Welding. It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn. Comments (recommendations, additions, or deletions) and any pertinent data that may be of use in improving this standard are requested and should be addressed to AWS Headquarters. Such comments will receive careful consideration by the AWS D1 Committee on Structural Welding and the author of the comments will be informed of the Committee's response to the comments. Guests are invited to attend all meetings of the AWS D1 Committee on Structural Welding to express their comments verbally. Procedures for appeal of an adverse decision concerning all such comments are provided in the Rules of Operation of the Technical Activities Committee. A copy of these Rules can be obtained from the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

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Foreword

This foreword is not part of this standard but is included for informational purposes only.

The original preparation of this specification was undertaken in response to a need for a common welding specification for the fabrication of steel highway bridges across the country. Prior to its publication, the departments of highways and transportation that make up the American Association of State Highway and Transportation Officials (AASHTO) had routinely used other specifications of the American Welding Society (AWS) Structural Welding Committee, with various unique modifications, to produce contract documents suitable for the construction of bridges. The proliferation of disparate requirements resulted in the need for a single specification that could facilitate uniformity and improved economy in steel bridge fabrication, while at the same time addressing the issues of structural integrity and public safety.

The first AWS code for *Fusion Welding and Gas Cutting in Building Construction* was published in 1928. In 1934, a committee was appointed to prepare specifications for the design, construction, alteration, and repair of highway and railway bridges. The first bridge specification was published in 1936. Until 1963, there were separate AWS committees for bridges and buildings. These two committees joined in 1963 to form the Structural Welding Committee of the American Welding Society. The committee has since promulgated standards for the application of welding to the design and construction of structures.

The Federal Highway Administration of the United States Department of Transportation requires states using federal funds for the construction of welded highway bridges to conform to specified standards for design and construction. Conformance to the AWS *Specification for Welded Highway and Railway Bridges* was first specified in the third edition of the AASHTO *Standard Specifications for Highway Bridges* in 1941. In 1962, the Bureau of Public Roads, now the Federal Highway Administration (FHWA), required conformance to a Circular Memorandum, dated November 13, 1962, which transmitted additional provisions for welding A36 steel pending publication of an AWS specification which would contain certain essential provisions not then in the code. Another Circular Memorandum, dated February 11, 1965, specified requirements for CVN testing, and a further Circular Memorandum, dated August 19, 1966, modified provisions of the 1966 Edition of AWS D2.0-66, *Specification for Welded Highway and Railway Bridges*.

In 1974, AASHTO published the first edition of the *Standard Specification for Welding of Structural Steel Highway Bridges*. The Eleventh Edition of the AASHTO *Standard Specifications for Highway Bridges*, dated 1977, directed "Welding shall conform to the requirements of the AASHTO *Standard Specifications for Welding of Structural Steel Highway Bridges* 1974 and subsequent interim specifications. . ." AASHTO published the Second and Third editions of the *Standard Specifications for Welding of Structural Steel Highway Bridges* in 1977 and 1981. All AASHTO specifications were required to be part of the Contract Documents as modifications or additions to the AWS *Structural Welding Code—Steel.* This was a cumbersome procedure.

In 1982, a subcommittee was formed jointly by AASHTO and AWS, with equal representation from both organizations, to seek accommodation between the separate and distinct requirements of bridge owners and existing provisions of AWS D1.1/D1.1M. The *Bridge Welding Code* is the result of an agreement between AASHTO and AWS to produce a joint AASHTO/AWS *Bridge Welding Code* for steel bridges that addresses essential AASHTO needs and makes AASHTO revisions mandatory.

The first edition of the *Bridge Welding Code*, published in 1988, provided for the qualification of welding procedures by test to ensure welds have the strength, ductility, and toughness necessary for use in redundant structures. Fracture-critical bridge members were not provided for in the first edition of the code. While qualification of welding procedures is required, a major effort has been made to specify the minimum number of tests and the simplest tests that give reasonable assurance of required mechanical properties. Efforts are made to discourage individual States from requiring duplication of weld testing unless that testing is specified in the bid documents. Special attention is directed to avoidance of unnecessary hardening of base metal HAZs and the avoidance of hydrogen and other items that can lead to weld or base-metal cracking.

While the D1.5-88 document has a superficial resemblance to AWS D1.1/D1.1M in its general format, there are significant differences that users should be aware of, among them the lack of provisions relating to statically loaded structures, tubular construction or the modification of existing structures. Users are encouraged to develop their own requirements for these applications or use existing documents (e.g., AWS D1.1/D1.1M) with the appropriate modifications.

The evolution of AASHTO/AWS D1.5M/D1.5, *Bridge Welding Code*, is shown below:

ANSI/AASHTO/AWS D1.5-88	*Bridge Welding Code*
ANSI/AASHTO/AWS D1.5-95	*Bridge Welding Code*
ANSI/AASHTO/AWS D1.5-96	*Bridge Welding Code*
AASHTO/AWS D1.5M/D1.5:2002	*Bridge Welding Code*
AASHTO/AWS D1.5M/D1.5:2009	*Bridge Welding Code*
AASHTO/AWS D1.5M/D1.5:2010	*Bridge Welding Code*
AASHTO/AWS D1.5M/D1.5:2015	*Bridge Welding Code*
AASHTO/AWS D1.5M/D1.5:2015-AMD1	*Bridge Welding Code*
AASHTO/AWS D1.5M/D1.5:2020	*Bridge Welding Code*
AASHTO/AWS D1.5M/D1.5:2025	*Bridge Welding Code*

Changes in Code Requirements. Underlined text in the clauses, subclauses, tables, figures, or forms indicates a change from the 2020 edition. A vertical line in the margin of a table or figure also indicates a change from the 2020 edition.

The publication of AASHTO/AWS D1.5M/D1.5:2025 was justified by the need to monitor, revise, and update code provisions based on the needs of AASHTO member states and industry. The following is a list of the most significant revisions in the 2025 edition:

Summary of Changes

Clause/Table/Figure/Annex	Modification
Clause 1	New provisions for unlisted base metals.
Clause 2	Reference titles updated to reflect current titles.
Clause 3	Removed terms and definitions already defined in AWS A3.0M/A3.0, *Standard Welding Terms and Definitions*.
Clause 4	Addition of flare-bevel groove welds as well as revisions made to stay consistent with AASHTO language.
Clause 5	Provisions for prohibition of welding on coated surfaces and undercut repair.
Clause 6	Shielding gas flow rate; maximum interpass temperature
Clause 7	Provisions for unlisted base metals, fillet weld qualification, postweld heat treatment, commentary on SMAW restrictions; qualifying PJPs not conforming to Figure 4.5.
Clause 8	Provisions for undercut tolerances
Clause 9	Minor editorial revisions made in this clause.
Clause 10	There is no Clause 10 (Tubulars) in the code.
Clause 11	There is no Clause 11 (Strengthening and Repairing Existing Structures) in the code.
Clause 12	Clarification of fracture critical welding personnel qualification; postweld heat treatment moved to Clause 7; tack remelting provisions modified to align with D1.5:2020 revisions to Clause 5.
Annex A	Effective throat figures revised.
Annex B	Minor editorial revision made.
Annex C	Minor editorial revisions made.
Annex D	Minor editorial revision made.
Annex E	Minor editorial revision made.
Annex F	Minor editorial revisions made.

(Continued)

Summary of Changes (Continued)

Clause/Table/Figure/Annex	Modification
Annex G	Minor editorial revision made.
Annex H	Minor editorial revisions made.
Annex I	No provisions revised in this annex.
Annex J	Provisions revised to align with AWS D1.1/D.1M.
Annex K	No provisions revised in this annex.
Annex L	No provisions revised in this annex.
Annex M	No provisions revised in this annex.
Annex N	New Form N-5 on Procedure Qualification Record (PQR) for fillet welds.
Annex O	No provisions revised in this annex.
Annex P	New annex for informative references.
Commentary	Provisions revised to fall in line with associated language within Clause 1 through Annex P.

Commentary. The Commentary is nonmandatory and is intended only to provide insightful information into provision rationale.

Normative Annexes. These annexes address specific subjects in the code and their requirements are mandatory requirements that supplement the code provisions.

Informative Annexes. These annexes are not code requirements but are provided to clarify code provisions by showing examples, providing information, or suggesting alternative good practices.

Index. As in previous codes, the entries in the Index are referred to by subclause number rather than by page number. This should enable the user of the Index to locate a particular item of interest in minimum time.

Errata. It is the Structural Welding Committee's Policy that all errata should be made available to users of the code. Therefore, any significant errata will be published in the Society News Section of the *Welding Journal* and posted on the AWS web site at: https://www.aws.org/standards/page/errata.

Suggestions. Your comments for improving AASHTO/AWS D1.5M/D1.5:2025, *Bridge Welding Code* are welcome. Submit comments to the Managing Director, Standards Development, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166; telephone (305) 443-9353; fax (305) 443-5951; e-mail info@aws.org; or via the AWS website <http://www.aws.org>.

Table of Contents

Page No.

Personnel v
Foreword ix
List of Tables xviii
List of Figures xix
List of Forms xxi

1. General Requirements 1
1.1 Scope 1
1.2 Units of Measurement 1
1.3 Safety 1
1.4 Base Metal 2
1.5 Welding Processes 3
1.6 Fabricator Requirements 3
1.7 Welding Symbols 3
1.8 Welding Procedure Specifications (WPSs) 4
1.9 Mechanical Testing 4
1.10 Reference Documents 4

2. Normative References 5

3. Terms and Definitions 8

4. Design of Welded Connections 12

Part A—General Requirements 12
4.1 Drawings 12
4.2 Design Stresses 13
4.3 Effective Weld Areas, Lengths, Throats, and Sizes 13

Part B—Structural Details 14
4.4 General 14
4.5 Welded Filler Plates 14
4.6 PJP Groove Welds 14

Part C—Details of Welded Joints 15
4.7 Joint Qualification 15
4.8 Details of Fillet Welds 15
4.9 Details of Plug and Slot Welds 15
4.10 Lap Joints 16
4.11 Corner and T-Joints 16
4.12 CJP Groove Welds 16
4.13 PJP Groove Welds 16
4.14 Prohibited Types of Joints and Welds 17
4.15 Combinations of Welds 17
4.16 Welds in Combination with Rivets and Bolts 17
4.17 Connection Details 17

5. Workmanship 60
5.1 General Requirements 60

Page No.

5.2 Preparation of Base Metal 60
5.3 Assembly 64
5.4 Control of Distortion and Shrinkage 66
5.5 Dimensional Tolerances 67
5.6 Weld Profiles 69
5.7 Repairs 70
5.8 Peening 72
5.9 Caulking 72
5.10 Arc Strikes 72
5.11 Weld Cleaning 73
5.12 Weld Termination 73
5.13 Weld Backing 73

6. Technique 78

Part A—General Requirements 78
6.1 Filler Metal Requirements 78
6.2 Preheat and Interpass Temperature Requirements 80
6.3 Heat Input Control for Grade HPS 690W [HPS 100W] Steel 81
6.4 Stress Relief Heat Treatment 81

Part B—Shielded Metal Arc Welding (SMAW) 81
6.5 Electrodes for SMAW 81
6.6 Procedures for SMAW 82

Part C—Submerged Arc Welding (SAW) 83
6.7 General Requirements 83
6.8 Electrodes and Fluxes for SAW 83
6.9 Procedures for SAW with a Single Electrode 84
6.10 Procedures for SAW with Parallel and Multiple Electrodes 84

Part D—Gas Metal Arc Welding (GMAW) and Flux Cored Arc Welding (FCAW) 85
6.11 GMAW/FCAW Electrodes 85
6.12 Shielding Gas 85
6.13 Procedures for GMAW and FCAW with a Single Electrode 85

Part E—Electrogas Welding (EGW) 86
6.14 Qualification of Process, WPSs, and Joint Details 86
6.15 Condition of Electrodes and Guide Tubes 86
6.16 Shielding Gas 86
6.17 Procedures for EGW 86

Part F—Electroslag Welding (ESW) 87
6.18 Qualification of Processes, WPSs, and Joint Details 87
6.19 Condition of Electrodes and Consumable Guides 88
6.20 Condition of Flux 88
6.21 Consumable Guide Electrical Insulators 88
6.22 Procedures for ESW 88

Part G—Plug and Slot Welds 90
6.23 Plug Welds 90
6.24 Slot Welds 90
6.25 Plug and Slot Welds 90

Part H—Control of Production Welding Variables 90
6.26 Tests 90
6.27 Control of Variables 90
6.28 Calibration of Equipment 91
6.29 Current Control 91

Page No.

7. Qualification 97
7.0 Scope 97

Part A—Welding Procedure Specification (WPS) Qualification 97
7.1 Approval 97
7.2 Qualification Responsibility 97
7.3 Duration 97
7.4 Base Metal 98
7.5 Welding Consumables 98
7.6 Test Plate Thickness 98
7.7 General Requirements for WPS Qualification 99
7.8 Position of Test Welds 100
7.9 Options for WPS Qualification or Prequalification 100
7.10 Fillet Weld WPS Qualification 101
7.11 Prequalified WPS 101
7.12 Heat Input Qualifications 102
7.13 Electrogas Welding 104
7.14 Electroslag Welding 104
7.15 Type of Tests and Purpose 104
7.16 Weld Specimens—Number, Type, and Preparation 105
7.17 Nondestructive Testing (NDT) 106
7.18 Method of Testing Specimens 106
7.19 Test Results Required 106
7.20 Retests 107

Part B—Welder, Welding Operator, and Tack Welder Qualification 108
7.21 General Requirements 108
7.22 Production Welding Positions Qualified 108
7.23 Qualification Tests Required 109
7.24 Limitations of Variables 110
7.25 Test Specimens: Number, Type, and Preparation 111
7.26 Method of Testing Specimens 111
7.27 Test Results Required 112
7.28 Retests 113

8. Inspection 149

Part A—General Requirements 149
8.1 General 149
8.2 Inspection of Materials 150
8.3 Inspection of WPS Qualification and Equipment 150
8.4 Inspection of Welder, Welding Operator, and Tack Welder Qualifications 150
8.5 Inspection of Work and Records 151
8.6 Obligations of the Contractor 151
8.7 Nondestructive Testing (NDT) 152

Part B—Radiographic Testing (RT) of Groove Welds in Butt Joints 154
8.8 Extent of Testing 154
8.9 General 154
8.10 RT Procedure 154
8.11 Acceptability of Welds 157
8.12 Examination, Report, and Disposition of Radiographs 157

Part C—Ultrasonic Testing (UT) of Groove Welds 158
8.13 General 158

Page No.

8.14 Extent of Testing . . . 158
8.15 UT Equipment . . . 158
8.16 Reference Standards . . . 159
8.17 Equipment Qualification . . . 159
8.18 Calibration for Testing . . . 160
8.19 Testing Procedures . . . 160
8.20 Preparation and Disposition of Reports . . . 162
8.21 Calibration of the UT Unit with IIW or Other Approved Reference Blocks . . . 162
8.22 Equipment Qualification Procedures . . . 163
8.23 Discontinuity Size Evaluation Procedures . . . 165
8.24 Scanning Patterns . . . 165
8.25 Examples of dB Accuracy Certification . . . 166

Part D—Weld Acceptance Criteria . . . 166
8.26 Quality of Welds . . . 166

9. Stud Welding . . . 188
9.1 Scope . . . 188
9.2 General Requirements . . . 188
9.3 Mechanical Requirements . . . 188
9.4 Workmanship . . . 189
9.5 Technique . . . 189
9.6 Stud Application Qualification Requirements . . . 190
9.7 Production Control . . . 191
9.8 Inspection Requirements . . . 192

10. Tubular Structures (No Applications within this code) . . . 197

11. Strengthening and Repairing Existing Structures (No Applications within this code) . . . 198

12. AASHTO/AWS Fracture Control Plan (FCP) for Nonredundant Members . . . 199
12.1 General Provisions . . . 199
12.2 Definitions . . . 199
12.3 Contract Documents . . . 199
12.4 Base Metal Requirements . . . 200
12.5 Welding Processes . . . 200
12.6 Consumable Requirements . . . 200
12.7 Welding Procedure Specification (WPS) . . . 203
12.8 Certification and Qualification . . . 204
12.9 As-Received Inspection of Base Metal . . . 204
12.10 Thermal Cutting . . . 204
12.11 Repair of Base Metal . . . 205
12.12 Straightening, Curving, and Cambering . . . 205
12.13 Tack Welds and Temporary Welds . . . 205
12.14 Preheat and Interpass Temperature Control . . . 205
12.15 Hydrogen Diffusion Postheat . . . 206
12.16 Weld Inspection . . . 206
12.17 Repair Welding . . . 207

Annex A (Normative)—Effective Throat . . . 215
Annex B (Normative)—Effective Throats of Fillet Welds in Skewed T-Joints . . . 219
Annex C (Normative)—Flatness of Girder Webs—Bridges . . . 221
Annex D (Normative)—Manufacturer's Stud Base Qualification Requirements . . . 227
Annex E (Normative)—Part A—Qualification and Calibration of the UT Unit with Other Approved Reference Blocks . . . 231
Part B—UT Equipment Qualification Procedures . . . 232

Page No.

Annex F (Normative)—Guidelines on Alternative Methods for Determining Preheat 239
Annex G (Normative)—Welding Requirements for Conventional, Non-fracture-Critical M 270M/M 270 (A709/A709M) HPS 485W [HPS 70W] Components with Reduced Preheat and Interpass Temperature 251
Annex H (Normative)—ESW Consumable Requirements 253
Annex I (Normative)—Guidelines for the Acceptance of Alternative ESW Processes 255
Annex J (Normative)—Advanced Ultrasonic Examination 257
Annex K (Normative)—Weld Quality Requirements for Tension Joints 273
Annex L (Informative)—Description of Common Weld and Base Metal Discontinuities 275
Annex M (Informative)—Short Circuiting Transfer 285
Annex N (Informative)—Suggested Sample Welding Forms 287
Annex O (Informative)—Guide for Use of Electroslag Welding—Narrow Gap (ESW-NG) 303
Annex P (Informative)—Informative References 315
Annex Q (Informative)—Requesting an Official Interpretation on this Joint AASHTO/AWS Standard 317

Commentary on Bridge Welding Code 319
Foreword 321

Index 467

List of AWS Documents on Structural Welding 481

List of Tables

Table		Page No.
4.1	Minimum Fillet Weld Size	19
4.2	Minimum Effective Weld Size for PJP Groove Welds	19
4.3	Size of Flare-Groove Welds Filled Flush (see 4.3.1.4)	19
5.1	Limits on Acceptability and Repair of Cut Edge Discontinuities of Material	74
5.2	Camber Tolerance for Typical Girder	75
5.3	Camber Tolerance for Girders without a Designed Concrete Haunch	75
6.1	Matching Filler Metals for WPSs	92
6.2	Filler Metal Requirements for Exposed Bare Application of M 270M/M 270 (A709/A709M) Gr. 345W [50W] and Gr. HPS 345W [HPS 50W] Steels	94
6.3	Minimum Preheat and Interpass Temperature, °C [°F]	94
6.4	Maximum Preheat and Interpass Temperature, °C [°F]	94
6.5	Minimum Holding Time	95
6.6	Alternate Stress-Relief Heat Treatment	95
6.7	Allowable Atmospheric Exposure of Low-Hydrogen SMAW Electrodes	95
6.8	Required Voltage for ESW	95
7.1	Base Metal Options for WPS Qualification Test Plates [AASHTO M 270M/M 270 (ASTM A709/A709M) Grades	114
7.2	AASHTO and ASTM Equivalent Base Metal Grades	114
7.3	Test Requirements for WPSs Qualified in Conformance with 5.12	115
7.4	WPS Qualification Requirements for Consumables	116
7.5	WPS Qualification or Prequalification Options	116
7.6	Essential Variable Changes for WPSs Qualified per 7.12.5 or 7.10	117
7.7	Additional PQR Essential Variable Changes Requiring WPS Requalification for EGW	120
7.8	PQR Essential Variable Changes Requiring WPS Requalification for ESW	121
7.9	Required Number of Test Specimens—WPS Qualification	121
7.10	Welder Qualification—Type and Position Limitations	121
7.11	Number and Type of Specimens and Range of Thickness Qualified—Welder and Welding Operator Qualification	122
7.12	Amperage Limits for Heat Input Welding Procedure Qualification	123
8.1	NDT Methods and Frequency	169
8.2A	Hole-Type IQI Requirements	170
8.2B	Wire IQI Requirements	170
8.3	Testing Angle	171
8.4	UT Acceptance-Rejection Criteria-Tensile Stress	173
8.5	UT Acceptance-Rejection Criteria-Compressive Stress	174
9.1	Mechanical Property Requirements for Studs	194
9.2	Minimum Fillet Weld Size for Small Diameter Studs	194
12.1	CVN Test Values of Weld Metal with Matching Strength	210
12.2	Limits on Acceptability and Repair of Cut Edge Discontinuities of Material	210
12.3	Tack Weld Requirements	210
12.4	M 270M (A709M) Gr. 250, 345, 345S Minimum Preheat and Interpass Temperatures, °C	211
12.5	M 270 (A709) Gr. 36, 50, 50S Minimum Preheat and Interpass Temperatures, °F	211
12.6	M 270M (A709M) Gr. 345W, HPS 485W Minimum Preheat and Interpass Temperatures, °C	211
12.7	M 270 (A709) Gr. 50W, HPS 50W, HPS 70W Minimum Preheat and Interpass Temperatures, °F	212

Table **Page No.**

12.8 M 270M/M 270 (A709/A709M) Grade HPS 690W [HPS 100W] Minimum and Maximum Preheat/Interpass Temperature, °C [°F] 212
B.1 Equivalent Fillet Weld Leg Size Factors for Skewed T-Joints, R = 0 219
F.1 Susceptibility Index Grouping as Function of Hydrogen Level "H" and Composition Parameter P_{cm} 242
F.2 Minimum Preheat and Interpass Temperatures for Three Levels of Restraint 244
G.1 Minimum Preheat and Interpass Temperature for M 270M/M 270 (A709/A709M) HPS 485W [HPS 70W], °C [°F] 252
G.2 Filler Metals for Use with the Reduced Preheat of Table H.1, Diffusible Hydrogen Levels 4 mL/100 g Maximum 252
H.1 Required Filler Metal Chemical Composition for ESW 254
H.2 Maximum Alloy Limits for ESW Consumable Guide 254
J.1 Essential Variables for PAUT 267
J.2 PAUT Acceptance Criteria 267
J.3 Discontinuity Classification 267
L.1 Common Types of Discontinuities 279
M.1 Typical Current Ranges for Short Circuiting Transfer Gas Metal Arc Welding of Steel (GMAW-S) 286
O.1 Example ESW-NG Consumable Guide Configurations 311
O.2 Example Operating Conditions for ESW-NG of ASTM M 270M/M 270 (A709/A709M) Grades 250 [36], 345 [50], 345S [50S], and 345W [50W] 311

List of Figures

Figure **Page No.**

4.1 Filler Plates Less Than 6 mm [1/4 in] Thick 20
4.2 Filler Plates 6 mm [1/4 in] or Thicker 20
4.3 Details for Fillet Welds 21
4.4 Details of Welded Joints for CJP Groove Welds 23
4.5 Details of Welded Joints for PJP Groove Welds 43
4.6 Fillet Welds on Opposite Sides of a Common Plane of Contact 57
4.7 Transition of Thickness at Butt Joints of Parts Having Unequal Thickness 58
4.8 Transition of Width at Butt Joints of Parts Having Unequal Width 59
4.9 Minimum Length of Longitudinal Fillet Welds at End of Plate or Flat Bar Members 59
5.1 Discontinuities in Cut Plate 75
5.2 Workmanship Tolerances in Assembly of Groove Welded Joints 76
5.3 Flange Offset for Box Girders 76
5.4 Acceptable and Unacceptable Weld Profiles 77
6.1 Weld Bead in Which Depth and Width Exceed the Width of the Weld Face 96
7.1 WPS Qualification or Pretest—Test Plate A 124
7.2 WPS Verification—Test Plate B 125
7.3 Weld Soundness Test Plate for Details Not Conforming to Figure 2.4 or 2.5—Test Plate C 126
7.4 Positions of Fillet Welds 127
7.5 Positions of Groove Welds 128
7.6 Position of Test Plates for Groove Welds 129
7.7 Position of Test Plates for Fillet Welds 130
7.8 Position of Fillet Weld Soundness Test (Macroetch) for WPS Qualification—Test Plate D 131
7.9 Standard Round All-Weld-Metal Tension Specimen 132
7.10 Reduced Section Tension Specimen 132
7.11 Side-Bend Specimen 133
7.12 Face- and Root-Bend Specimen 133

Figure **Page No.**

7.13 CVN Test Specimen . . . 134
7.14 Guided Bend Test Jig . . . 135
7.15 Alternate Wraparound Guided Bend Test Jig . . . 136
7.16 Alternate Roller-Equipped Guided Bend Test Jig for Bottom Ejection of Test Specimen . . . 137
7.17 Test Plate for Unlimited Thickness—Welder Qualification . . . 138
7.18 Optional Test Plate for Unlimited Thickness—Horizontal Position—Welder Qualification . . . 139
7.19 Test Plate for Limited Thickness—All Positions—Welder Qualification . . . 140
7.20 Optional Test Plate for Limited Thickness—Horizontal Position—Welder Qualification . . . 140
7.21 Fillet-Weld-Break and Macroetch Test Plate—Welder Qualification—Option 1 . . . 141
7.22 Fillet Weld Root-Bend Test Plate—Welder Qualification—Option 2 . . . 142
7.23 Plug Weld Macroetch Test Plate—Welder Qualification . . . 143
7.24 Test Plate for Unlimited Thickness—Welding Operator Qualification . . . 144
7.25 Butt Joint for Welding Operator Qualification—ESW and EGW . . . 145
7.26 Fillet-Weld-Break and Macroetch Test Plate—Welding Operator Qualification—Option 1 . . . 146
7.27 Fillet Weld Root Bend Test Plate—Welding Operator Qualification—Option 2 . . . 147
7.28 Fillet-Weld-Break Specimen—Tack Welder Qualification . . . 148
7.29 Method of Rupturing Specimen—Tack Welder Qualification . . . 148
8.1A Radiographic Identification and Hole-Type or Wire IQI Locations on Approximately Equal Thickness Joints 250 mm [10 in] and Greater in Length . . . 175
8.1B Radiographic Identification and Hole-Type or Wire IQI Locations on Approximately Equal Thickness Joints Less than 250 mm [10 in] in Length . . . 175
8.1C Radiographic Identification and Hole-Type or Wire IQI Locations on Transition Joints 250 mm [10 in] and Greater in Length . . . 176
8.1D Radiographic Identification and Hole-Type or Wire IQI Locations on Transition Joints Less than 250 mm [10 in] in Length . . . 176
8.1E Hole-Type IQI Design . . . 177
8.1F Wire-Type IQI . . . 178
8.2 RT Edge Block Placement . . . 179
8.3 Transducer Crystal . . . 180
8.4 Qualification Procedure of Search Unit Using IIW Reference Block . . . 180
8.5A International Institute of Welding (IIW) UT Reference Blocks . . . 181
8.5B Other Approved UT Reference Blocks . . . 182
8.6 Transducer Positions (Typical) . . . 184
8.7 Plan View of UT Scanning Patterns . . . 185
8.8 Weld Quality Requirements for Discontinuities Occurring in Tension Welds (Limitations of Porosity and Fusion Discontinuities) . . . 186
8.9 Weld Requirements for Discontinuities Occurring in Compression Welds (Limitations of Porosity or Fusion Type Discontinuities) . . . 187
9.1 Dimension and Tolerances of Standard-Type Shear Connectors . . . 195
9.2 Typical Tension Test Fixture . . . 195
9.3 Torque Testing Arrangement and Table of Testing Torques . . . 196
A.1 Fillet Weld . . . 215
A.2 Bevel Groove Weld with Reinforcing Fillet Weld . . . 216
A.3 Bevel Groove Weld with Reinforcing Fillet Weld . . . 217
A.4 Flare Bevel Groove Weld with Reinforcing Fillet Weld . . . 218
D1.A Bend Testing Device . . . 229
D1.B Suggested Type of Device for Qualification Testing of Small Studs . . . 230
E.1 Example of the Use of Form F-1 UT Unit Certification . . . 233
E.2 Example of Form F-2 . . . 234
E.3 Example of the Use of Form F-2 . . . 235
E.4 Example of Form F-3 . . . 236
E.5 Example of the Use of Form F-3 . . . 237
E.6 Form F-4—Report of UT of Welds . . . 238

Figure **Page No.**

F.1 Zone Classification of Steels . . . 245
F.2 Critical Cooling Rate for 350 HV and 400 HV . . . 245
F.3 Charts to Determine Cooling Rates for Single-Pass Submerged Arc Fillet Welds . . . 246
F.4 Relation Between Fillet Weld Size and Energy Input . . . 249
J.1 Phased Array Imaging Views . . . 268
J.2A Example of a Supplemental Reference Block (Dimensions in Millimeters) . . . 268
J.2B Example of a Supplemental Reference Block (Dimensions in Inches) . . . 269
J.3 Example Standard Reflector Locations in Weld Mockup . . . 269
J.4 Sensitivity Levels . . . 270
J.5 Linearity Verification Report Form . . . 271
J.6 Example of Time Based Linearity Verification . . . 272
L.1 Weld in Butt Joint . . . 280
L.2 Weld in Corner Joint . . . 281
L.3 Weld in T-Joint . . . 282
L.4 Weld in Lap Joint . . . 283
L.5 Single-Pass Fillet Weld in T-Joint . . . 283
L.6 Single-V-Groove Weld in Butt Joint . . . 284
M.1 Oscillograms and Sketches of Short Circuiting Transfer . . . 286
O.1 ESW Single and Multiple Guide Configurations . . . 312
O.2 ESW Welded and Single Piece Sumps . . . 312
O.3 ESW Sump and Run-Off Tab Illustration . . . 313
O.4 Allowable Operating Ranges for ESW-NG . . . 314

Commentary
C-4.1 Details of Alternative Groove Preparations for Corner Joints . . . 342
C-5.1 Examples of Unacceptable Reentrant Corners . . . 365
C-5.2 Examples of Good Practice for Cutting Copes . . . 365
C-5.3 Permissible Offset in Abutting Members . . . 365
C-5.4 Typical Method to Determine Variations in Girder Web Flatness . . . 366
C-5.5 Illustration of Camber Tolerances for Steel Beams . . . 367
C-5.6 Measurement of Flange Warpage and Tilt . . . 368
C-5.7 Tolerances at Bearing Points . . . 369
C-5.8 Undercut before Grinding . . . 370
C-5.9 Weld after Grinding, Undercut Removed, and Base Metal Smooth . . . 370
C-8.1 Examples of Applications of Undercut Limits in 8.26.1.5 . . . 435

List of Forms

Form **Page No.**

N-1 Certificate of Conformance to Requirements for Welding Electrodes . . . 288
N-2 Sample Welding Procedure Specification . . . 289
N-3 (PQR) for Qualification, Pretest, and Verification Results for Groove Welds . . . 290
N-4 Procedure Qualification Record (PQR) Worksheet . . . 291
N-5 Procedure Qualification Record (PQR) for Fillet Welds . . . 292
N-6 Welder and Welding Operator Qualification Record . . . 293
N-7 Report of Radiographic Examination of Welds . . . 294
N-8 Report of Magnetic Particle Examination of Welds . . . 295
N-9 ESW-NG Procedure Qualification Record . . . 296
N-10 ESW-NG Welding Procedure Specification . . . 300

Bridge Welding Code

1. General Requirements

1.1 Scope

1.1.1 This code covers welding fabrication requirements applicable to welded highway bridges. The code is applicable to both shop and field fabrication of steel bridges and bridge components. The code is to be used in conjunction with the applicable AASHTO design specifications (AASHTO *Standard Specification for Highway Bridges* or AASHTO *LRFD Bridge Design Specifications*).

The code is not intended to be used for the following:

(1) Steels with a minimum specified yield strength greater than 690 MPa [100 ksi]

(2) Pressure vessels or pressure piping

(3) Base metals other than carbon or low-alloy steels

(4) Structures composed of structural tubing

Fabrication of structures or components not specifically addressed by this code shall be performed in conformance with contract documents or in conformance with the written directives of the Engineer who may choose to reference an alternate applicable welding standard.

1.1.2 The fundamental premise of the code is to provide general stipulations applicable to any routine bridge situation. Acceptance criteria for production welds different from those described in the code may be used for a particular application, provided they are suitably documented by the proposer and approved by the Engineer.

Such alternate acceptance criteria may be based on the evaluation of suitability for service using past experience, experimental evidence, or engineering analysis considering material type, service load effects, and environmental factors.

1.1.3 The term *Engineer* as used in this code shall mean the State Bridge Engineer or the Bridge Engineer's designated representative. The Engineer acts on behalf of the State or Owner and unless otherwise specified, shall be the Owner's official representative. All references to acceptance or approval shall mean acceptance or approval by the Engineer.

1.1.4 The term *Contractor* as used in this code indicates the party responsible for performing the work as required by the contract documents. The term Contractor is used collectively to mean contractor, manufacturer, fabricator, erector, or other party performing the work.

1.2 Units of Measurement

This standard makes use of both the International System of Units (SI) and U.S. Customary Units. The latter are shown within brackets ([ ]) or in appropriate columns in tables and figures. The measurements may not be exact equivalents; therefore, each system must be used independently.

1.3 Safety

Safety and health issues and concerns are beyond the scope of this standard and therefore are not addressed herein. Safety and health information is available from the following sources:

American Welding Society:

(1) ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*

(2) AWS Safety and Health Fact Sheets

(3) Other safety and health information on the AWS website

Material or Equipment Manufacturers:

(1) Safety Data Sheets supplied by materials manufacturers

(2) Operating Manuals supplied by equipment manufacturers

Applicable Regulatory Agencies

Work performed in accordance with this standard may involve the use of materials that have been deemed hazardous, and may involve operations or equipment that may cause injury or death. This standard does not purport to address all safety and health risks that may be encountered. The user of this standard should establish an appropriate safety program to address such risks as well as to meet applicable regulatory requirements. ANSI Z49.1 should be considered when developing the safety program.

1.4 Base Metal

1.4.1 Specified Base Metal. The contract documents shall designate the specification and classification of base metals to be used.

1.4.2 Listed Base Metals. Base metals to be welded under this code shall meet the requirements of the latest edition of AASHTO M 270M/M 270 (ASTM A709/A709M) for the following grades:

(1) 250 [36],

(2) 345 [50] (Type 1, 2, or 3),

(3) 345S [50S],

(4) 345W [50W],

(5) HPS 345W [HPS 50W],

(6) HPS 485W [HPS 70W], or

(7) HPS 690W [HPS 100W]

1.4.3 Unlisted Base Metals. The use of a base metal not listed in 1.4.2 shall be at the discretion of the Engineer, subject to the requirements of 1.4.3.1 through 1.4.3.4. When selected by the Engineer, the unlisted base metal shall be specified in the contract documents. When the Contractor requests the use of an unlisted base metal, the Engineer shall use his or her discretion to approve or disapprove the request.

1.4.3.1 The Engineer shall determine the suitability of the unlisted base metal for the intended application and purpose.

1.4.3.2 The Engineer shall specify or approve the mechanical property requirements for WPS qualification.

1.4.3.3 The Engineer shall specify or approve the applicable fabrication requirements that are not specified in this code for the unlisted base metal.

1.4.3.4 The Engineer shall specify any NDT requirements not specified in this code that are required for the unlisted base metal.

1.4.4 Thickness Limitations. The provisions of this code do not apply to welding base metals less than 3 mm [1/8 in] thick. Where base metals thinner than 3 mm [1/8 in] are to be welded, the requirements of AWS D1.3/D1.3M, *Structural Welding Code—Sheet Steel*, should apply. When used in conjunction with AWS D1.3/D1.3M, the applicable provisions of this code shall be observed.