

SECTION IX

Welding, Brazing, and Fusing Qualifications

2025

ASME Boiler and
Pressure Vessel Code
An International Code

Qualification Standard for
Welding, Brazing, and Fusing
Procedures; Welders; Brazers;
and Welding, Brazing, and
Fusing Operators

Currently in preview, click buy full version

Markings such as “ASME,” “ASME Standard,” or any other marking including “ASME,” ASME logos, or the ASME Single Certification Mark shall not be used on any item that is not constructed in accordance with all of the applicable requirements of the Code or Standard. Use of the ASME Single Certification Mark requires formal ASME certification; if no certification program is available, such ASME markings may not be used. (For Certification and Accreditation Programs, see <https://www.asme.org/certification-accreditation>.)

Items produced by parties not formally possessing an ASME Certificate may not be described, either explicitly or implicitly, as ASME certified or approved in any code forms or other document.

AN INTERNATIONAL CODE

2025 ASME Boiler & Pressure Vessel Code

2025 Edition

July 1, 2025

IX

QUALIFICATION STANDARD FOR WELDING, BRAZING, AND FUSING PROCEDURES; WELDERS; BRAZERS; AND WELDING, BRAZING, AND FUSING OPERATORS

ASME Boiler and Pressure Vessel Committee
on Welding, Brazing, and Fusing



The American Society of
Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: July 1, 2025

This international code or standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard. The standards committee that approved the code or standard was balanced to ensure that individuals from competent and concerned interests had an opportunity to participate. The proposed code or standard was made available for public review and comment, which provided an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large

ASME does not “approve,” “certify,” “rate,” or “endorse” any item, construction, proprietary device, or activity. ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor does ASME assume any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility

Participation by federal agency representatives or persons affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

The endnotes and preamble in this document (if any) are part of this American National Standard.



ASME Collective Membership Mark



ASME Single Certification Mark

All rights reserved. “ASME” and the above ASME symbols are registered trademarks of The American Society of Mechanical Engineers. No part of this document may be copied, modified, distributed, published, displayed, or otherwise reproduced in any form or by any means, electronic, digital, or mechanical, now known or hereafter invented, without the express written permission of ASME. No works derived from this document or any content therein may be created without the express written permission of ASME. Using this document or any content therein to train, create, or improve any artificial intelligence and/or machine learning platform, system, application, model, or algorithm is strictly prohibited.

Library of Congress Catalog Card Number: 56-3934

Adopted by the Council of The American Society of Mechanical Engineers, 1914; latest edition 2025.

The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

Copyright © 2025 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All rights reserved
Printed in U.S.A.

TABLE OF CONTENTS

List of Sections		xi
Foreword		iii
Statement of Policy on the Use of the ASME Single Certification Mark and Code Authorization in Advertising		xv
Statement of Policy on the Use of ASME Marking to Identify Manufactured Items		xv
Personnel		xvi
Correspondence With the Committee		xxxix
Introduction		xli
Summary of Changes		xliv
Cross-Referencing in the ASME BPVC		xlvii
Part QG	General Requirements	1
QG-100	Scope	1
QG-109	Definitions	5
Part QW	Welding	15
Article I	Welding General Requirements	15
QW-100	Scope	15
QW-110	Weld Orientation	15
QW-120	Test Positions for Groove Welds	15
QW-130	Test Positions for Fillet Welds	16
QW-140	Types and Purposes of Tests and Examinations	17
QW-150	Tension Tests	17
QW-160	Guided Bend Tests	18
QW-170	Penetration Tests	19
QW-180	Fillet-Weld Tests	20
QW-190	Other Tests and Examinations	21
Appendix I	Rounded Indication Charts	29
Article II	Welding Procedure Qualifications	30
QW-200	General	30
QW-210	Preparation of Test Coupon	33
QW-220	Hybrid Welding Procedure Variables	36
QW-250	Welding Variables	36
QW-250	Temper Bead Welding	71
Article III	Welding Performance Qualifications	75
QW-300	General	75
QW-310	Qualification Test Coupons	77
QW-320	Retests and Renewal of Qualification	78
QW-350	Welding Variables for Welders	79
QW-360	Welding Variables for Welding Operators	80

QW-380	Special Processes	81
Article IV	Welding Data	84
QW-400	Variables	84
QW-410	Technique	95
QW-420	P-Numbers	100
QW-430	F-Numbers	194
QW-440	Weld Metal Chemical Composition	206
QW-450	Specimens	207
QW-460	Graphics	212
QW-470	Etching — Processes and Reagents	251
Article V	Standard Welding Procedure Specifications (SWPSS)	253
QW-500	General	253
QW-510	Adoption of SWPSS	253
QW-520	Use of SWPSS Without Discrete Demonstration	253
QW-530	Forms	254
QW-540	Production Use of SWPSS	254
Article VI	Material Manufacturing Using Wire-Additive Welding	255
QW-600	General	255
QW-610	Qualification Variables for Wire-Additive Welding Procedures	255
QW-620	Specimen Testing and Acceptance Criteria for Wire-Additive Welding	256
QW-650	Welding Variables	257
Part QB	Brazing	259
Article XI	Brazing General Requirements	259
QB-100	Scope	259
QB-110	Braze Orientation	259
QB-120	Test Positions for Lap, Butt, Scarf, or Rabbet Joints	259
QB-140	Types and Purpose of Tests and Examinations	260
QB-150	Tension Tests	260
QB-160	Guided Bend Tests	261
QB-170	Peel Tests	262
QB-180	Seamless Tests and Workmanship Coupons	262
Article XII	Brazing Procedure Qualifications	263
QB-200	General	263
QB-210	Preparation of Test Coupon	265
QB-250	Brazing Variables	265
Article XIII	Brazing Performance Qualifications	269
QB-300	General	269
QB-310	Qualification Test Coupons	270
QB-320	Retests and Renewal of Qualification	270
QB-350	Brazing Variables for Brazers and Brazing Operators	270
Article XIV	Brazing Data	271
QB-400	Variables	271
QB-410	Technique	272
QB-420	P-Numbers	272
QB-430	F-Numbers	272

QB-450	Specimens	276
QB-460	Graphics	279
Part QF	Plastic Fusing	299
Article XXI	Plastic Fusing General Requirements	299
QF-100	Scope	299
QF-110	Fused Joint Orientation	299
QF-120	Test Positions	299
QF-130	Data Acquisition and Evaluation	299
QF-140	Examinations and Tests	300
Article XXII	Fusing Procedure Qualifications	306
QF-200	General	306
QF-220	Standard Fusing Procedure Specifications	309
QF-250	Fusing Variables	313
Article XXIII	Plastic Fusing Performance Qualifications	316
QF-300	General	316
QF-310	Qualification Test Coupons	317
QF-320	Retests and Renewal of Qualification	317
QF-360	Essential Variables for Performance Qualification of Fusing Operators	318
Article XXIV	Plastic Fusing Data	319
QF-400	Variables	319
QF-420	Material Groupings	320
QF-450	Pipe-Diameter Limits	321
QF-460	Graphics	322
QF-480	Forms	335
QF-490	Definitions	349
Nonmandatory Appendix B	Welding and Fusing Forms	350
B-100	Forms	350
Mandatory Appendix E	Permit to Standard Welding Procedure Specifications (SWPSs)	361
E-100	Introduction	361
E-200	Background	361
E-300	Instructions for Adoption	361
Mandatory Appendix F	Standard Units for Use in Equations	364
Mandatory Appendix G	Guidance for the Use of U.S. Customary and SI Units in the ASME Boiler and Pressure Vessel Code	365
G-100	Use of Units in Equations	365
G-200	Guidelines Used to Develop SI Equivalents	365
G-300	Soft Conversion Factors	367
Nonmandatory Appendix H	Waveform Controlled Welding	368
H-100	Background	368
H-200	Waveform Controlled Welding and Heat Input Determination	368
H-300	New Procedures Qualifications	368
H-400	Existing Qualified Procedures	369
H-500	Performance Qualifications	369
Mandatory Appendix J	Guideline for Requesting P-Number Assignments for Base Metals Not Listed in Table QW/QB-422	370
J-100	Introduction	370

J-200	Request Format	370
J-300	Submittals	370
Mandatory Appendix K	Guidance on Invoking Section IX Requirements in Other Codes, Standards, Specifications, and Contract Documents	371
K-100	Background and Purpose	371
K-200	Scope of Section IX and What Referencing Documents Must Address	371
K-300	Recommended Wording — General	371
Nonmandatory Appendix L	Welders and Welding Operators Qualified Simultaneously to (EN) ISO 9606-1, ISO 14732, and Section IX	371
L-100	Introduction	374
L-200	Administrative Requirements	374
L-300	Technical Requirements	374
L-400	Testing Requirements	374
Figures		
QG-109.2.1	Typical Single and Multibead Layers	14
QG-109.2.2	Typical Single Bead Layers	14
QW-191.1.2.2(b)(4)	Rounded Indication Charts	23
QW-461.1	Positions of Welds — Groove Welds	212
QW-461.2	Positions of Welds — Fillet Welds	213
QW-461.3	Groove Welds in Plate — Test Positions	214
QW-461.4	Groove Welds in Pipe — Test Positions	214
QW-461.5	Fillet Welds in Plate — Test Positions	214
QW-461.6	Fillet Welds in Pipe — Test Positions	215
QW-461.7	Stud Welds — Test Positions	216
QW-461.8	Stud Welds — Welding Positions	216
QW-461.10	Rotating Tool Electrode Characteristics (FSW) Referenced in QW-410	218
QW-462.1(a)	Tension — Reduced Section — Plate	219
QW-462.1(b)	Tension — Reduced Section — Pipe	220
QW-462.1(c)	Tension — Reduced Section Alternate for Pipe	220
QW-462.1(d)	Tension — Reduced Section — Turned Specimens	221
QW-462.1(e)	Tension — Full Section — Small Diameter Pipe	222
QW-462.2	Side Bend	223
QW-462.3(a)	Face and Root Bends — Transverse	224
QW-462.3(b)	Face and Root Bends — Longitudinal	224
QW-462.4(a)	Fillet Welds in Plate — Procedure	225
QW-462.4(b)	Fillet Welds in Plate — Performance	225
QW-462.4(c)	Fillet Welds in Pipe — Performance	226
QW-462.4(d)	Fillet Welds in Pipe — Procedure	226
QW-462.5(a)	Chemical Analysis and Hardness Specimen Corrosion-Resistant and Hard-Facing Weld Metal Overlay	227
QW-462.5(b)	Chemical Analysis Specimen, Hard-Facing Overlay Hardness, and Macro Test Location(s) for Corrosion-Resistant and Hard-Facing Weld Metal Overlay	228
QW-462.5(c)	Pipe Bend Specimen — Corrosion-Resistant Weld Metal Overlay	229
QW-462.5(d)	Plate Bend Specimens — Corrosion-Resistant Weld Metal Overlay	230

QW-462.5(e)	Plate Macro, Hardness, and Chemical Analysis Specimens — Corrosion-Resistant and Hard-Facing Weld Metal Overlay	231
QW-462.7.1	Resistance Seam Weld Test Coupon	231
QW-462.7.2	Seam Weld Section Specimen Removal	232
QW-462.7.3	Resistance Weld Nugget Section Test Specimens	232
QW-462.8.1	Spot Welds in Sheets	233
QW-462.8.2	Seam Weld Peel Test Specimen and Method	233
QW-462.9	Spot Welds in Sheet	235
QW-462.12	Nomenclature for Temper Bead Welding	235
QW-462.13	Measurement of Temper Bead Overlap	237
QW-463.1(a)	Plates — Less Than $\frac{3}{4}$ in. (19 mm) Thickness Procedure Qualification	237
QW-463.1(b)	Plates — $\frac{3}{4}$ in. (19 mm) and Over Thickness and Alternate From $\frac{3}{8}$ in. (10 mm) but Less Than $\frac{3}{4}$ in. (19 mm) Thickness Procedure Qualification	237
QW-463.1(c)	Plates — Longitudinal Procedure Qualification	237
QW-463.1(d)	Procedure Qualification	238
QW-463.1(e)	Procedure Qualification	238
QW-463.1(f)	Toughness Test Specimen Location	239
QW-463.2(a)	Plates — Less Than $\frac{3}{4}$ in. (19 mm) Thickness Performance Qualification	239
QW-463.2(b)	Plates — $\frac{3}{4}$ in. (19 mm) and Over Thickness and Alternate From $\frac{3}{8}$ in. (10 mm) but Less Than $\frac{3}{4}$ in. (19 mm) Thickness Performance Qualification	239
QW-463.2(c)	Plates — Longitudinal Performance Qualification	240
QW-463.2(d)	Performance Qualification	240
QW-463.2(e)	Performance Qualification	240
QW-463.2(f)	Pipe — NPS 10 (DN 250) Assembly Performance Qualification	241
QW-463.2(g)	NPS 6 (DN 150) and NPS 8 (DN 200) Assembly Performance Qualification	242
QW-463.2(h)	Performance Qualification	243
QW-464.1	Procedure Qualification Test Coupon and Test Specimens	244
QW-464.2	Performance Qualification Test Coupons and Test Specimens	245
QW-466.1	Assembly Jig Dimensions	246
QW-466.2	Guided-Bend Roller Jig	248
QW-466.3	Guided-Bend Wrap Around Jig	248
QW-466.4	Stud-Weld Bend Jig	249
QW-466.5	Torque Testing Arrangement for Stud Welds	250
QW-466.6	Suggested Type Tensile Test Figure for Stud Welds	250
QW-469.1	Butt Joint	250
QW-469.2	Alternative Butt Joint	251
QW-661(a)	Layer Width, W , $>\frac{1}{2}$ in. (13 mm) Procedure Qualification	258
QW-661(b)	Layer Width, W , $\leq\frac{1}{2}$ in. (13 mm) Procedure Qualification	258
QB-661.1	Flow Positions	279
QB-661.2	Test Flow Positions	280
QB-462.1(a)	Tension — Reduced Section for Butt and Scarf Joints — Plate	282
QB-462.1(b)	Tension — Reduced Section for Butt, Lap, and Scarf Joints — Pipe	283
QB-462.1(c)	Tension — Reduced Section for Lap and Rabbet Joints — Plate	284

QB-462.1(e)	Tension — Full Section for Lap, Scarf, and Butt Joints — Small Diameter Pipe	285
QB-462.1(f)	Support Fixture for Reduced-Section Tension Specimens	286
QB-462.2(a)	Transverse First and Second Surface Bends — Plate and Pipe	287
QB-462.2(b)	Longitudinal First and Second Surface Bends — Plate	287
QB-462.3	Lap Joint Peel Specimen	288
QB-462.4	Lap Joint Section Specimen (See QB-181)	288
QB-462.5	Workmanship Coupons	289
QB-463.1(a)	Plates Procedure Qualification	290
QB-463.1(b)	Plates Procedure Qualification	290
QB-463.1(c)	Plates Procedure Qualification	291
QB-463.1(d)	Plates Procedure Qualification	292
QB-463.1(e)	Pipe — Procedure Qualification	293
QB-463.2(a)	Plates Performance Qualification	294
QB-463.2(b)	Plates Performance Qualification	295
QB-463.2(c)	Pipe Performance Qualification	296
QB-466.1	Guided-Bend Jig	297
QB-466.2	Guided-Bend Roller Jig	298
QB-466.3	Guided-Bend Wrap Around Jig	298
QF-221.1	Required Minimum Melt Bead Size	311
QF-461.1	Fusing Positions	322
QF-461.2	Fusing Test Positions	323
QF-462(a)	Cross Section of Upset Bead for Butt-Fused PE Pipe	324
QF-462(b)	Cross Section of Upset Beads for Sidewall-Fused Fitting (Profile at Crotch of Fitting)	325
QF-463	Bend Test Specimen Removal, Configuration, and Testing	326
QF-464	HSTIT Specimen Configuration and Dimensions	328
QF-465	HSTIT Specimen Failure Examples	329
QF-466	Electrofusion Flush Test	330
QF-467	Electrofusion Bend Test	331
QF-468	Fusion Zone Void Criteria	332
QF-469	Electrofusion Peel Test	333
QF-470	Short-Term Hydrostatic Test Specimen	334
K-305	Proposed Code Case Template	373
 Tables		
QW-252	Welding Variables Procedure Specifications (WPS) — Oxyfuel Gas Welding (OFW)	38
QW-252.1	Welding Variables Procedure Specifications (WPS) — Oxyfuel Gas Welding (OFW)	39
QW-253	Welding Variables Procedure Specifications (WPS) — Shielded Metal-Arc Welding (SMAW)	40
QW-253.1	Welding Variables Procedure Specifications (WPS) — Shielded Metal-Arc Welding (SMAW)	41
QW-254	Welding Variables Procedure Specifications (WPS) — Submerged-Arc Welding (SAW)	42

QW-254.1	Welding Variables Procedure Specifications (WPS) — Submerged-Arc Welding (SAW)	44
QW-255	Welding Variables Procedure Specifications (WPS) — Gas Metal-Arc Welding (GMAW and FCAW)	45
QW-255.1	Welding Variables Procedure Specifications (WPS) — Gas Metal-Arc Welding (GMAW and FCAW)	47
QW-256	Welding Variables Procedure Specifications (WPS) — Gas Tungsten-Arc Welding (GTAW)	48
QW-256.1	Welding Variables Procedure Specifications (WPS) — Gas Tungsten-Arc Welding (GTAW)	50
QW-257	Welding Variables Procedure Specifications (WPS) — Plasma-Arc Welding (PAW)	51
QW-257.1	Welding Variables Procedure Specifications (WPS) — Plasma-Arc Welding (PAW)	53
QW-258	Welding Variables Procedure Specifications (WPS) — Electroslag Welding (ESW)	55
QW-258.1	Welding Variables Procedure Specifications (WPS) — Electroslag Welding (ESW)	56
QW-259	Welding Variables Procedure Specifications (WPS) — Electrogas Welding (EGW)	57
QW-260	Welding Variables Procedure Specifications (WPS) — Electron Beam Welding (EBW)	58
QW-261	Welding Variables Procedure Specifications (WPS) — Stud Welding	59
QW-262	Welding Variables Procedure Specifications (WPS) — Inertia and Continuous Drive Friction Welding	60
QW-263	Welding Variables Procedure Specifications (WPS) — Resistance Welding	61
QW-264	Welding Variables Procedure Specifications (WPS) — Laser Beam Welding (LBW)	62
QW-264.1	Welding Variables Procedure Specifications (WPS) — Laser Beam Welding (LBW)	63
QW-264.2	Welding Variables Procedure Specifications (WPS) — Low-Power Density Laser Beam Welding (LLBW)	64
QW-265	Welding Variables Procedure Specifications (WPS) — Flash Welding	66
QW-266	Welding Variables Procedure Specifications (WPS) — Diffusion Welding (DFW)	67
QW-267	Welding Variables Procedure Specifications — Friction Stir Welding (FSW)	68
QW-288.1	Essential Variables for Procedure Qualification of Tube-to-Tubesheet Welding (All Welding Processes Except Explosion Welding)	70
QW-288.2	Essential Variables for Procedure Qualification of Tube-to-Tubesheet Welding (Explosion Welding)	70
QW-290.4	Welding Variables for Temper Bead Procedure Qualification	72
QW-352	Oxyfuel Gas Welding (OFW) Essential Variables	79
QW-353	Shielded Metal-Arc Welding (SMAW) Essential Variables	79
QW-354	Semiautomatic Submerged-Arc Welding (SAW) Essential Variables	79
QW-355	Semiautomatic Gas Metal-Arc Welding (GMAW) [This Includes Flux-Cored Arc Welding (FCAW)] Essential Variables	79
QW-356	Manual and Semiautomatic Gas Tungsten-Arc Welding (GTAW) Essential Variables	80

QW-357	Manual and Semiautomatic Plasma-Arc Welding (PAW) Essential Variables	80
QW-358	Manual and Semiautomatic Laser Beam Welding (LBW)	80
QW-388	Essential Variables for Tube-to-Tubesheet Performance Qualification (All Welding Processes)	83
QW-416	Welding Variables Welder Performance	99
QW/QB-421.2	Base Metal Assignment Groups	101
QW/QB-422	Base Metal P-Numbers	102
QW-432	F-Numbers Grouping of Electrodes and Welding Rods for Qualification	194
QW-442	A-Numbers Classification of Ferrous Weld Metal Analysis for Procedure Qualification	206
QW-451.1	Groove-Weld Tension Tests and Transverse-Bend Tests	207
QW-451.2	Groove-Weld Tension Tests and Longitudinal-Bend Tests	208
QW-451.3	Fillet-Weld Tests	208
QW-451.4	Fillet Welds Qualified by Groove-Weld Tests	208
QW-452.1(a)	Test Specimens	209
QW-452.1(b)	Thickness of Weld Metal Qualified	209
QW-452.3	Groove-Weld Diameter Limits	209
QW-452.4	Small Diameter Fillet-Weld Test	210
QW-452.5	Fillet-Weld Test	210
QW-452.6	Fillet Qualification by Groove-Weld Tests	210
QW-453	Procedure and Performance Qualification Test Specimens and Thickness Limits for Corrosion-Resistant and Hard-Facing (Wear-Resistant) Overlays	211
QW-461.9	Performance Qualification — Position and Diameter Limitations (Within the Other Limitations of QW-303)	217
QW-473.3-1	Makeup of Equations for Aqua Regia and Lepito’s Etch	252
QW-613	Wire-Additive Welding Qualification Layer Width Limits	256
QW-651	Wire-Additive Welding Variables Procedure Specifications (WPS) — Gas Metal-Arc Welding (GMAW)	257
QB-252	Torch Brazing (TB)	265
QB-253	Furnace Brazing (FB)	266
QB-254	Induction Brazing (IB)	266
QB-255	Resistance Brazing (RB)	267
QB-256	Dip Brazing — Salt or Flux Bath (DB)	267
QB-257	Dip Brazing — Molten Metal Bath (DB)	268
QB-432	F-Numbers Grouping of Brazing Filler Metals for Procedure and Performance Qualification SFA-5.8	273
QB-451.1	Tension Tests and Transverse-Bend Tests — Butt and Scarf Joints . .	276
QB-451.2	Tension Tests and Longitudinal Bend Tests — Butt and Scarf Joints .	276
QB-451.3	Tension Tests and Peel Tests — LAP Joints	277
QB-451.4	Tension Tests and Section Tests — Rabbet Joints	277
QB-451.5	Section Tests — Workmanship Coupon Joints	277
QB-452.1	Peel or Section Tests — Butt, Scarf, Lap, Rabbet Joints	278
QB-452.2	Section Tests — Workmanship Specimen Joints	278
QB-461.3	Procedure and Performance Qualification Position Limitations (As Given in QB-203 and QB-303)	281

QF-144.2	Testing Speed Requirements	304
QF-144.2.3	304
QF-202.2.2	Electrofusion Procedure Qualification Test Coupons Required	309
QF-221.2	Maximum Heater Plate Removal Time for Pipe-to-Pipe Butt Fusing . .	312
QF-222.1	Electrofusion Material Combinations	312
QF-254	Fusing Variables Procedure Specification Polyethylene Pipe Butt Fusing	313
QF-255	Fusing Variables Procedure Specification Polyethylene Electrofusion .	314
QF-256	Manual Butt-Fusing Variables Procedure Specification Polyethylene Pipe Manual Butt Fusing	314
QF-257	Fusing Variables Procedure Specification Polyethylene Sidewall Fusing	315
QF-362	Essential Variables Applicable to Fusing Operators	318
QF-422	Material Grouping	320
QF-452.3	Pipe-Diameter Limits	321
F-100	Standard Units for Use in Equations	364
 Forms		
QF-482(a)	Suggested Format for Butt-Fusing Procedure Specifications (FPS or SFPS)	335
QF-482(b)	Suggested Format for Electrofusion Fusing Procedure Specification (FPS or MEFPS)	336
QF-482(c)	Suggested Format for Sidewall-Fusing Procedure Specification (FPS or SFPS)	337
QF-483(a)	Suggested Format for Butt-Fusing Procedure Qualification Records (PQR)	338
QF-483(b)	Suggested Format for Electrofusion Fusing Procedure Qualification Records (PQR)	340
QF-483(c)	Suggested Format for Sidewall-Fusing Procedure Qualification Records (PQR)	343
QF-484(a)	Suggested Format for Butt-Fusing Machine Operator Performance Qualifications (FPQ)	345
QF-484(b)	Suggested Format for Electrofusion Fusing Operator Performance Qualification (FPQ)	346
QF-484(c)	Suggested Format for Sidewall-Fusing Machine Operator Performance Qualifications (FPQ)	347
QF-485	Suggested Format for Plastic Pipe Fusing Data Acquisition Log Review	348
QW-482	Suggested Format for Welding Procedure Specifications (WPS)	351
QW-483	Suggested Format for Procedure Qualification Records (PQR)	353
QW-484A	Suggested Format A for Welder Performance Qualifications (WPQ) . .	355
QW-484B	Suggested Format B for Welding Operator Performance Qualifications (WOPQ)	356
QW-485	Suggested Format for Demonstration of Standard Welding Procedure Specifications (SWPS)	357
QB-482	Suggested Format for a Brazing Procedure Specification (BPS)	358
QB-483	Suggested Format for a Brazing Procedure Qualification Record (PQR)	359
QB-484	Suggested Format for a Brazer or Brazing Operator Performance Qualification (BPQ)	360

LIST OF SECTIONS

SECTIONS

- I Rules for Construction of Power Boilers
- II Materials
 - Part A — Ferrous Material Specifications
 - Part B — Nonferrous Material Specifications
 - Part C — Specifications for Welding Rods, Electrodes, and Filler Metals
 - Part D — Properties (Customary)
 - Part D — Properties (Metric)
- III Rules for Construction of Nuclear Facility Components
 - Subsection NCA — General Requirements for Division 1 and Division 2
 - Appendices
 - Division 1
 - Subsection NB — Class 1 Components
 - Subsection NCD — Class 2 and Class 3 Components
 - Subsection NE — Class MC Components
 - Subsection NF — Supports
 - Subsection NG — Core Support Structures
 - Division 2 — Code for Concrete Containments
 - Division 3 — Containment Systems for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Material
 - Division 4 — Fusion Energy Devices
 - Division 5 — High Temperature Reactors
- IV Rules for Construction of Heating Boilers
- V Nondestructive Examination
- VI Recommended Rules for the Care and Operation of Heating Boilers
- VII Recommended Guidelines for the Care of Power Boilers
- VIII Rules for Construction of Pressure Vessels
 - Division 1
 - Division 2 — Alternative Rules
 - Division 3 — Alternative Rules for Construction of High Pressure Vessels
- IX Welding, Brazing, and Fusing Qualifications
- X Fiber-Reinforced Plastic Pressure Vessels
- XI Rules for Inservice Inspection of Nuclear Reactor Facility Components
 - Division 1 — Rules for Inservice Inspection of Nuclear Power Plant Components
 - Division 2 — Requirements for Reliability and Integrity Management (RIM) Programs for Nuclear Reactor Facilities
- XII Rules for Construction and Continued Service of Transport Tanks
- XIII Rules for Overpressure Protection

FOREWORD*

(25)

In 1911, The American Society of Mechanical Engineers established the Boiler and Pressure Vessel Committee to formulate standard rules for the construction of steam boilers and other pressure vessels. In 2009, the Boiler and Pressure Vessel Committee was superseded by the following committees:

- (a) Committee on Power Boilers (I)
- (b) Committee on Materials (II)
- (c) Committee on Construction of Nuclear Facility Components (III)
- (d) Committee on Heating Boilers (IV)
- (e) Committee on Nondestructive Examination (V)
- (f) Committee on Pressure Vessels (VIII)
- (g) Committee on Welding, Brazing, and Fusing (IX)
- (h) Committee on Fiber-Reinforced Plastic Pressure Vessels (X)
- (i) Committee on Nuclear Inservice Inspection (XI)
- (j) Committee on Transport Tanks (XII)
- (k) Committee on Overpressure Protection (XIII)
- (l) Technical Oversight Management Committee (TOMC)

Where reference is made to “the Committee” in this Foreword, each of these committees is included individually and collectively.

The Committee’s function is to establish rules of safety relating to pressure integrity. The rules govern the construction** of boilers, pressure vessels, transport tanks, and nuclear components, and the inservice inspection of nuclear components and transport tanks. For nuclear items other than pressure-retaining components, the Committee also establishes rules of safety related to structural integrity. The Committee also interprets these rules when questions arise regarding their intent. The technical consistency of the Sections of the Code and coordination of standards development activities of the Committees is supported and guided by the Technical Oversight Management Committee. The Code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks, or nuclear components, or the inservice inspection of nuclear components or transport tanks. Users of the Code should refer to the pertinent codes, standards, laws, regulations, or other relevant documents for safety issues other than those relating to pressure integrity and, for nuclear items other than pressure-retaining components, structural integrity. Except for Sections XI and XII, and with a few other exceptions, the rules do not, of practical necessity, reflect the likelihood and consequences of deterioration in service related to specific service fluids or external operating environments. In formulating the rules, the Committee considers the needs of users, manufacturers, and inspectors of components addressed by the Code. The objective of the rules is to afford reasonably certain protection of life and property, and to provide a margin for deterioration in service to give a reasonably long, safe period of usefulness. Advancements in design and materials and evidence of experience have been recognized.

The Code contains mandatory requirements, specific prohibitions, and nonmandatory guidance for construction activities and inservice inspection and testing activities. The Code does not address all aspects of these activities and those aspects that are not specifically addressed should not be considered prohibited. The Code is not a handbook and cannot replace education, experience, and the use of engineering judgment. The phrase *engineering judgment* refers to technical judgments made by knowledgeable engineers experienced in the application of the Code. Engineering judgments must be consistent with Code philosophy, and such judgments must never be used to overrule mandatory requirements or specific prohibitions of the Code.

The Committee recognizes that tools and techniques used for design and analysis change as technology progresses and expects engineers to use good judgment in the application of these tools. The designer is responsible for complying with Code rules and demonstrating compliance with Code equations when such equations are mandatory. The Code neither requires nor prohibits the use of computers for the design or analysis of components constructed to the requirements of the Code. However, designers and engineers using computer programs for design or analysis are cautioned that they are

* The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI’s requirements for an ANS. Therefore, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Code.

** *Construction*, as used in this Foreword, is an all-inclusive term comprising materials, design, fabrication, examination, inspection, testing, certification, and overpressure protection.

responsible for all technical assumptions inherent in the programs they use and the application of these programs to their design.

The rules established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design, or as limiting in any way the manufacturer's freedom to choose any method of design or any form of construction that conforms to the Code rules.

The Committee meets regularly to consider revisions of the rules, new rules as dictated by technological development, Code cases, and requests for interpretations. Only the Committee has the authority to provide official interpretations of the Code. Requests for revisions, new rules, Code cases, or interpretations shall be addressed to the staff secretary in writing and shall give full particulars in order to receive consideration and action (see the Correspondence With the Committee page). Proposed revisions to the Code resulting from inquiries will be presented to the Committee for appropriate action. The action of the Committee becomes effective only after confirmation by ballot of the Committee and approval by ASME. Proposed revisions to the Code approved by the Committee are submitted to the American National Standards Institute (ANSI) and published at <http://go.asme.org/BPVCPublicReview> to invite comments from all interested persons. After public review and final approval by ASME, revisions are published at regular intervals in Editions of the Code.

The Committee does not rule on whether a component shall or shall not be constructed to the provisions of the Code. The scope of each Section has been established to identify the components and parameters considered by the Committee in formulating the Code rules.

Questions or issues regarding compliance of a specific component with the Code rules are to be directed to the ASME Certificate Holder (Manufacturer). Inquiries concerning the interpretation of the Code are to be directed to the Committee. ASME is to be notified should questions arise concerning improper use of the ASME Single Certification Mark.

When required by context in the Code, the singular shall be interpreted as the plural, and vice versa.

The words "shall," "should," and "may" are used in the Code as follows:

- *Shall* is used to denote a requirement.
- *Should* is used to denote a recommendation.
- *May* is used to denote permission, neither a requirement nor a recommendation.

STATEMENT OF POLICY ON THE USE OF THE ASME SINGLE CERTIFICATION MARK AND CODE AUTHORIZATION IN ADVERTISING

ASME has established procedures to authorize qualified organizations to perform various activities in accordance with the requirements of the ASME Boiler and Pressure Vessel Code. It is the aim of the Society to provide recognition of organizations so authorized. An organization holding authorization to perform various activities in accordance with the requirements of the Code may state this capability in its advertising literature.

Organizations that are authorized to use the ASME Single Certification Mark for marking items or constructions that have been constructed and inspected in compliance with the ASME Boiler and Pressure Vessel Code are issued Certificates of Authorization. It is the aim of the Society to maintain the standing of the ASME Single Certification Mark for the benefit of the users, the enforcement jurisdictions, and the holders of the ASME Single Certification Mark who comply with all requirements.

Based on these objectives, the following policy has been established on the usage in advertising of facsimiles of the ASME Single Certification Mark, Certificates of Authorization, and reference to Code construction. The American Society of Mechanical Engineers does not “approve,” “certify,” “rate,” or “endorse” any item, construction, or activity and there shall be no statements or implications that might so indicate. An organization holding the ASME Single Certification Mark and/or a Certificate of Authorization may state in advertising literature that items, constructions, or activities “are built (produced or performed) or activities conducted in accordance with the requirements of the ASME Boiler and Pressure Vessel Code,” or “meet the requirements of the ASME Boiler and Pressure Vessel Code.” An ASME corporate logo shall not be used by any organization other than ASME.

The ASME Single Certification Mark shall be used only for stamping and nameplates as specifically provided in the Code. However, facsimiles may be used for the purpose of fostering the use of such construction. Such usage may be by an association or a society, or by a holder of the ASME Single Certification Mark who may also use the facsimile in advertising to show that clearly specified items will carry the ASME Single Certification Mark.

STATEMENT OF POLICY ON THE USE OF ASME MARKING TO IDENTIFY MANUFACTURED ITEMS

The ASME Boiler and Pressure Vessel Code provides rules for the construction of boilers, pressure vessels, and nuclear components. This includes requirements for materials, design, fabrication, examination, inspection, and stamping. Items constructed in accordance with all of the applicable rules of the Code are identified with the ASME Single Certification Mark described in the governing Section of the Code.

Markings such as “ASME,” “ASME Standard,” or any other marking including “ASME” or the ASME Single Certification Mark shall not be used on any item that is not constructed in accordance with all of the applicable requirements of the Code.

Items shall not be described on ASME Data Report Forms nor on similar forms referring to ASME that tend to imply that all Code requirements have been met when, in fact, they have not been. Data Report Forms covering items not fully complying with ASME requirements should not refer to ASME or they should clearly identify all exceptions to the ASME requirements.