

SECTION VIII

Rules for Construction of Pressure Vessels

2017

ASME Boiler and
Pressure Vessel Code
An International Code

Division 3

Alternative Rules for Construction
of High Pressure Vessels

Markings such as “ASME,” “ASME Standard,” or any other marking including “ASME,” ASME logos, or the 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 ASME’s name, logos, or 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/shop/certification-accreditation>.)

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

AN INTERNATIONAL CODE

2017 ASME Boiler & Pressure Vessel Code

2017 Edition

July 1, 2017

VIII

RULES FOR CONSTRUCTION OF PRESSURE VESSELS

Division 3

Alternative Rules for Construction of High Pressure Vessels

ASME Boiler and Pressure Vessel Committee
on Pressure Vessels



The American Society of
Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: July 1, 2017

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 assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not “approve,” “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 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 representative(s) or person(s) 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



Certification Mark

The above ASME symbol is registered in the U.S. Patent Office.

“ASME” is the trademark of The American Society of Mechanical Engineers.

No part of this document may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Library of Congress Catalog Card Number: 56-3934
Printed in the United States of America

Adopted by the Council of The American Society of Mechanical Engineers, 1914; latest edition 2017.

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

Copyright © 2017 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All rights reserved

TABLE OF CONTENTS

List of Sections	xvi
Foreword	xviii
Statement of Policy on the Use of the Certification Mark and Code Authorization in Advertising	xx
Statement of Policy on the Use of ASME Marking to Identify Manufactured Items	xx
Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees	xxi
Personnel	xxiv
Summary of Changes	xliii
List of Changes in Record Number Order	xlix
Cross-Referencing and Stylistic Changes in the Boiler and Pressure Vessel Code	lii
Part KG	
General Requirements	1
Article KG-1	
Scope and Jurisdiction	1
KG-100 Scope	1
KG-110 Geometric Scope of This Division	1
KG-120 Classifications Outside the Scope of This Division	2
KG-130 Assembly and Testing of Vessels at Field or Intermediate Sites	2
KG-140 Standards Referenced by This Division	3
KG-150 Units of Measurement	3
KG-160 Tolerances	4
Article KG-2	
Organization of This Division	5
KG-200 Organization	5
Article KG-3	
Responsibilities and Duties	6
KG-300 General	6
KG-310 User's Responsibility	6
KG-320 Manufacturer's Responsibility	8
KG-330 Designer	10
Article KG-4	
General Rules for Inspection	12
KG-400 General Requirements for Inspection and Examination	12
KG-410 Manufacturer's Responsibilities	12
KG-420 Certification of Subcontracted Services	13
KG-430 The Inspector	13
KG-440 Inspector's Duties	13
Article KG-5	
Additional General Requirements for Composite Reinforced Pressure Vessels (CRPV)	15
KG-500 General Requirements	15
KG-510 Scope	15
KG-520 Supplemental General Requirements for CRPV	16
Part KM	
Material Requirements	17
Article KM-1	
General Requirements	17
KM-100 Materials Permitted	17
Article KM-2	
Mechanical Property Test Requirements for Metals	21
KM-200 General Requirements	21
KM-210 Procedure for Obtaining Test Specimens and Coupons	21
KM-220 Procedure for Heat Treating Separate Test Specimens	24
KM-230 Mechanical Testing Requirements	24

KM-240	Heat Treatment Certification/Verification Tests for Fabricated Components	26
KM-250	Supplementary Toughness Requirements for Pressure-Retaining Component Materials	27
KM-260	Retests	28
KM-270	Notch Tensile Testing Procedure and Acceptance Criterion	28
Article KM-3	Supplementary Requirements for Bolting	29
KM-300	Requirements for All Bolting Materials	29
Article KM-4	Material Design Data	30
KM-400	Contents of Tables of Material Design Data	30
Article KM-5	Requirements for Laminate Materials	53
Part KD	Design Requirements	54
Article KD-1	General	54
KD-100	Scope	54
KD-110	Loadings	54
KD-120	Design Basis	55
KD-130	Design Criteria	56
KD-140	Fatigue Evaluation	56
Article KD-2	Basic Design Requirements	57
KD-200	Scope	57
KD-210	Terms Relating to Stress Analysis	57
KD-220	Equations for Cylindrical and Spherical Shells	59
KD-230	Elastic-Plastic Analysis	60
Article KD-3	Fatigue Evaluation	68
KD-300	Scope	68
KD-310	Stress Analysis for Fatigue Evaluation	68
KD-320	Calculated Number of Design Cycles	71
KD-330	Calculated Cumulative Effect Number of Design Cycles	73
KD-340	Fatigue Assessment of Welds — Elastic Analysis and Structural Stress	73
KD-350	Histogram Development and Cycle Counting for Fatigue Analysis	77
KD-360	Cyclic Stress-Strain Curve	79
KD-370	Welded Joint Design Fatigue Curves	79
Article KD-4	Fracture Mechanics Evaluation	106
KD-400	Scope	106
KD-410	Crack Size Criteria	106
KD-420	Stress Intensity Factor K_I Calculation	107
KD-430	Calculation of Crack Growth Rates	107
KD-440	Calculated Number of Design Cycles	108
Article KD-5	Design Using Autofrettage	109
KD-500	Scope	109
KD-510	Limits on Autofrettage Pressure	110
KD-520	Calculation of Residual Stresses	110
KD-530	Design Calculations	112
Article KD-6	Design Requirements for Closures, Integral Heads, Threaded Fasteners, and Seals	113
KD-600	Scope	113
KD-620	Threaded Fasteners and Components	113
KD-630	Load-Carrying Shell With Single Threaded End Closures	114
KD-640	Integral Heads	115
KD-650	Quick-Actuating Closures	115
KD-660	Requirements for Closures and Seals	116

Article KD-7	Design Requirements for Attachments, Supports, and External Heating and Cooling Jackets	117
KD-700	General Requirements	117
KD-710	Materials for Attachments	117
KD-720	Welds Attaching Nonpressure Parts to Pressure Parts	117
KD-730	Design of Attachments	119
KD-740	Design of Supports	119
KD-750	Jacketed Vessels	119
Article KD-8	Special Design Requirements for Layered Vessels	120
KD-800	General	120
KD-810	Rules for Shrink-Fit Layered Vessels	121
KD-820	Rules for Concentrically Wrapped and Welded Layered Vessels	122
KD-830	Design of Welded Joints	124
KD-840	Openings and Their Reinforcement	124
KD-850	Supports	124
Article KD-9	Special Design Requirements for Wire-Wound Vessels and Wire-Wound Frames	131
KD-900	Scope	131
KD-910	Stress Analysis	131
KD-920	Stress Limits	133
KD-930	Fatigue Evaluation	133
Article KD-10	Special Requirements for Vessels in Hydrogen Service	136
KD-1000	Scope	136
KD-1010	Fracture Mechanics Evaluation	137
KD-1020	Fracture Mechanics Properties	137
KD-1030	Fatigue Life Calculation	138
KD-1040	Test Method for K_{IH} Determination	138
KD-1050	Fatigue Crack Growth Rate Tests	139
Article KD-11	Design Requirements for Welded Vessels	141
KD-1100	Scope	141
KD-1110	Types of Joints Permitted	141
KD-1120	Transition Joints Between Sections of Unequal Thickness	141
KD-1130	Nozzle Attachments	142
Article KD-12	Experimental Design Verification	147
KD-1200	General Requirements	147
KD-1210	Types of Tests	147
KD-1220	Strain Measurement Test Procedure	147
KD-1230	Photoelastic Test Procedure	148
KD-1240	Test Procedures	148
KD-1250	Interpretation of Results	148
KD-1260	Experimental Determination of Allowable Number of Operating Cycles ...	149
KD-1270	Determination of Fatigue Strength Reduction Factors	153
Article KD-13	Additional Design Requirements for Composite Reinforced Pressure Vessels (CRPV)	154
KD-1300	Scope	154
KD-1310	General	154
Part KF	Fabrication Requirements	156
Article KF-1	General Fabrication Requirements	156
KF-100	General	156
KF-110	Material	156
KF-120	Material Forming	157
KF-130	Tolerances for Cylindrical and Spherical Shells and Heads	158

Article KF-2	Supplemental Welding Fabrication Requirements	159
KF-200	General Requirements for All Welds	159
KF-210	Welding Qualifications and Records	159
KF-220	Weld Joints Permitted and Their Examination	160
KF-230	Requirements During Welding	161
KF-240	Repair of Weld Defects	163
Article KF-3	Fabrication Requirements for Materials With Protective Linings	164
KF-300	Scope	164
KF-310	Qualification of Welding Procedures	164
KF-320	Integrally Clad Materials	165
KF-330	Postweld Heat Treatment of Linings	165
KF-340	Examination Requirements	165
KF-350	Inspection and Tests	165
KF-360	Stamping and Reports	166
Article KF-4	Heat Treatment of Weldments	167
KF-400	Heat Treatment of Weldments	167
KF-410	Heating Procedures for Postweld Heat Treatment	168
KF-420	Postweld Heat Treatment After Repairs	171
Article KF-5	Additional Fabrication Requirements for Autofrettagged Vessels	172
KF-500	General	172
KF-510	Examination and Repair	172
KF-520	Autofrettage Procedures	172
KF-530	Examination After Autofrettage	172
KF-540	Repair of Defects After Autofrettage	172
KF-550	Stamping and Reports	172
Article KF-6	Additional Fabrication Requirements for Quenched and Tempered Steels	173
KF-600	General	173
KF-610	Welding Requirements	173
KF-620	Temporary Welds Where Not Prohibited	174
KF-630	Postweld Heat Treatment	174
KF-640	Examination and Testing	175
KF-650	Stamping and Reports	175
Article KF-7	Supplementary Requirements for Materials With Welding Restrictions	176
KF-700	Scope	176
KF-710	Repair of Defects	176
KF-720	Methods of Forming Forged Heads	176
Article KF-8	Specific Fabrication Requirements for Layered Vessels	177
KF-800	Scope	177
KF-810	Rules for Shrink-Fit Vessels	177
KF-820	Rules for Concentrically Wrapped Welded Layered Vessels	177
KF-830	Heat Treatment of Weldments	184
Article KF-9	Special Fabrication Requirements for Wire-Wound Vessels and Frames	185
KF-900	Scope	185
KF-910	Fabrication Requirements	185
Article KF-10	Additional Fabrication Requirements for Aluminum Alloys	186
Article KF-11	Additional Fabrication Requirements for Welding Age-Hardening Stainless Steels	187
KF-1100	Scope	187
KF-1110	Welding Requirements	187
KF-1120	Base Metal Heat Treatment Condition	187

KF-1130	Temporary Welds Where Not Prohibited	187
KF-1140	Postweld Heat Treatment	187
KF-1150	Production Weld Testing	187
KF-1160	Examination and Testing	188
KF-1170	Repair Welding	188
KF-1180	Postweld Heat Treatment After Weld Repairs	188
Article KF-12	Additional Fabrication Requirements for Composite Reinforced Pressure Vessels (CRPV)	189
KF-1200	Scope	189
KF-1210	Welding	189
Part KR	Pressure Relief Devices	191
Article KR-1	General Requirements	191
KR-100	Protection Against Overpressure	191
KR-110	Definitions	191
KR-120	Types of Overpressure Protection	192
KR-130	Size of Openings and Nozzles	193
KR-140	Intervening Stop Valves	193
KR-150	Permissible Overpressures	193
KR-160	Set Pressures	193
Article KR-2	Requirements for Rupture Disk Devices	195
KR-200	General Requirements	195
KR-210	Capacity Requirements	195
KR-220	Rupture Disk Devices Used in Combination With Flow Capacity Certified Pressure Relief Valves	195
KR-230	Mechanical Requirements	196
KR-240	Material Requirements	196
KR-250	Inspection of Manufacturing of Rupture Disk Devices	196
KR-260	Production Testing by Manufacturers	197
KR-270	Design Requirements	197
Article KR-3	Requirements for Pressure Relief Valves	198
KR-300	General Requirements	198
KR-310	Design Requirements	198
KR-320	Material Selection	199
KR-330	Inspection of Manufacturing and/or Assembly of Pressure Relief Valves ..	199
KR-340	Production Testing by Manufacturers and Assemblers	199
Article KR-4	Certification Mark	201
KR-400	Marking	201
KR-410	Use of Certification Mark	202
Article KR-5	Certification of Flow Capacity of Pressure Relief Valves	203
KR-500	Flow Capacity Certification Tests	203
KR-510	Recertification Testing	203
KR-520	Procedures for Flow Capacity Certification Tests	203
KR-530	Flow Capacity Conversions	205
KR-540	Flow Capacity Certification Testing Requirements for Test Facilities	207
KR-550	Test Data Reports	207
KR-560	Certification of Flow Capacity of Pressure Relief Valves in Combination With Rupture Disk Devices	207
KR-570	Optional Testing of Rupture Disk Devices and Pressure Relief Valves	207
Article KR-6	Requirements for Power-Actuated Pressure Relief Systems	208
KR-600	General Requirements	208
KR-610	System Requirements	208
KR-620	Flow Capacity Testing	208

Part KE	Examination Requirements	210
Article KE-1	Requirements for Examination Procedures and Personnel	
	Qualification	210
KE-100	General	210
KE-110	Qualification and Certification of Nondestructive Examination Personnel ..	210
Article KE-2	Requirements for Examination and Repair of Material	213
KE-200	General Requirements	213
KE-210	General Requirements for Repair of Defects	213
KE-220	Examination and Repair of Plate	214
KE-230	Examination and Repair of Forgings and Bars	214
KE-240	Examination and Repair of Seamless and Welded (Without Filler Metal) Tubular Products and Fittings	216
KE-250	Examination and Repair of Tubular Products and Fittings Welded With Filler Metal	217
KE-260	Examination of Bolts, Studs, and Nuts	218
Article KE-3	Examination of Welds and Acceptance Criteria	219
KE-300	Examination of Welds and Weld Overlay	219
KE-310	Examination of Weld Edge Preparation Surfaces	227
KE-320	Types of Welds and Their Examination	227
KE-330	Acceptance Standards	228
Article KE-4	Final Examination of Vessels	230
KE-400	Surface Examination After Hydrotest	230
KE-410	Inspection of Lined Vessel Interior After Hydrotest	230
Article KE-5	Additional Examination Requirements for Composite Reinforced Pres- sure Vessels (CRPV)	231
KE-500	Scope	231
Part KT	Testing Requirements	232
Article KT-1	Testing Requirements	232
KT-100	Scope	232
KT-110	Requirements for Sample Test Coupons	232
Article KT-2	Impact Testing for Welded Vessels	233
KT-200	Impact Tests	233
KT-210	Location and Orientation of Specimens	233
KT-220	Impact Tests for Welding Procedure Qualifications	233
KT-230	Impact Test of Production Test Plates	233
KT-240	Basis for Rejection	234
Article KT-3	Hydrostatic Tests	235
KT-300	Scope	235
KT-310	Limits of Hydrostatic Test Pressure	235
KT-320	Fluid Media for Hydrostatic Tests	236
KT-330	Test Procedure	236
KT-340	Exemption for Autofrettaged Vessels	236
Article KT-4	Pressure Test Gages and Transducers	237
KT-400	Type and Number of Gages or Transducers	237
KT-410	Pressure Range of Test Gages and Transducers	237
KT-420	Calibration of Test Gages and Transducers	237
Article KT-5	Additional Testing Requirements for Composite Reinforced Pressure Vessels (CRPV)	238
KT-500	Responsibility	238
KT-510	Testing Requirements	238

Part KS	Marking, Stamping, Reports, and Records	239
Article KS-1	Contents and Method of Stamping	239
KS-100	Required Marking for Vessels	239
KS-110	Application of Certification Mark	240
KS-120	Part Marking	240
KS-130	Application of Markings	240
KS-140	Attachment of Nameplate or Tag	241
KS-150	Special Stamping Requirements for Composite Reinforced Pressure Vessels (CRPV)	241
Article KS-2	Obtaining and Using Certification Marks	242
KS-200	Certification Mark Bearing Official Symbol	242
KS-210	Application for Certificate of Authorization	242
KS-220	Issuance of Authorization	242
KS-230	Designated Oversight	242
KS-240	Quality Control System	242
KS-250	Evaluation of the Quality Control System	242
KS-260	Code Construction Before Receipt of Certificate of Authorization	242
KS-270	Special Requirements Regarding Manufacturer's Certificates for Manufacture of Composite Reinforced Pressure Vessels (CRPV)	242
Article KS-3	Report Forms and Maintenance of Records	243
KS-300	Manufacturer's Data Reports	243
KS-310	Maintenance of Radiographs	244
KS-320	Maintenance of Records	244
Mandatory Appendix 1	Nomenclature	245
1-100	Nomenclature	245
Mandatory Appendix 2	Quality Control System	252
2-100	General	252
2-110	Outline of Features to Be Included in the Written Description of the Quality Control System	252
2-111	Authority and Responsibility	252
2-112	Organization	252
2-113	Drawings, Design Calculations, and Specification Control	253
2-114	Material Control	253
2-115	Examination and Inspection Program	253
2-116	Correction of Nonconformities	253
2-117	Welding	253
2-118	Nondestructive Examination	253
2-119	Heat Treatment	253
2-120	Calibration of Measurement and Test Equipment	253
2-121	Records Retention	253
2-122	Sample Forms	253
2-123	Inspection of Vessels and Vessel Parts	253
2-124	Inspection of Pressure Relief Devices	254
2-125	Certifications	254
Mandatory Appendix 4	Acceptance of Testing Laboratories and Authorized Observers for Capacity Certification of Pressure Relief Devices	255
Mandatory Appendix 5	Adhesive Attachment of Nameplates	256
5-100	Scope	256
5-200	Nameplate Application Procedure Qualification	256
Mandatory Appendix 6	Rounded Indications Charts Acceptance Standard for Radiographically Determined Rounded Indications in Welds	257
6-100	Applicability of These Standards	257

6-110	Terminology	257
6-120	Acceptance Criteria	257
Mandatory Appendix 7	Standard Units for Use in Equations	266
Mandatory Appendix 8	Establishing Governing Code Editions and Cases for Pressure Vessels and Parts	267
8-100	General	267
8-200	Construction	267
8-300	Materials	267
Mandatory Appendix 9	Linear Elastic Analysis	268
9-100	General	268
9-200	Derivation of Stress Intensities	268
9-210	Stress Limits	268
9-220	Primary Membrane and Bending Stresses	268
9-230	Pure Shear Stress	270
9-240	Bearing Stress	270
9-250	Secondary Stresses	270
9-260	Simplified Elastic-Plastic Analysis	270
9-270	Thermal Stress Ratcheting Assessment	270
9-280	Triaxial Stresses	270
9-300	Principal Stresses in Monobloc Vessels	271
Nonmandatory Appendix A	Guide for Preparing Manufacturer's Data Reports	272
A-100	Introduction	272
Nonmandatory Appendix B	Suggested Practice Regarding Extending Life Beyond the Cyclic Design Life	290
B-100	Extending Allowed Cyclic Limits While in Operation	290
Nonmandatory Appendix C	Guide to Information Appearing on Certificate of Authorization	291
Nonmandatory Appendix D	Fracture Mechanics Calculations	294
D-100	Scope	294
D-200	Crack Location and Stressing	294
D-300	Crack Orientation and Shape	294
D-400	Methods for Determining Stress Intensity Factor	296
D-500	Calculation of Fatigue Crack Growth Rates	301
D-600	Fracture Toughness Correlations	304
D-700	References	304
Nonmandatory Appendix E	Construction Details	305
E-100	Integral Heads (Blind Ends)	305
E-110	Thick Wall Proportions	305
E-120	Thin Wall Proportions	306
E-200	Threaded End Closures	306
E-210	Nomenclature (See Figures E-210.1 , E-210.2 , and E-210.3)	306
E-220	Thread Load Distribution	307
Nonmandatory Appendix G	Design Rules for Clamp Connections	312
G-100	Scope	312
G-200	Materials	312
G-300	Nomenclature	316
G-400	Bolt Loads	320
G-500	Longitudinal Loads	321
G-600	Hub Moments	322
G-700	Calculation of Hub Stresses	322
G-800	Calculation of Clamp Stresses	322
G-900	Allowable Design Stresses for Clamp Connections	322

Nonmandatory Appendix H	Openings and Their Reinforcement	323
H-100	Scope	323
H-110	Circular Openings Not Requiring Reinforcement	323
H-120	Reinforcement for Openings in Shells and Formed Heads	323
H-130	Reinforcement for Openings in Flat Heads	325
H-140	Limits of Reinforcement	325
H-150	Metal Available for Reinforcement	326
Nonmandatory Appendix I	Guidance for the Use of U.S. Customary and SI Units in the ASME Boiler and Pressure Vessel Code	328
I-100	Use of Units in Equations	328
I-200	Guidelines Used to Develop SI Equivalents	328
I-300	Soft Conversion Factors	330
Nonmandatory Appendix J	Stress Concentration Factors for Cross-Bores in Closed-End Cylinders and Square Blocks	331
J-100	Scope	331
J-110	Methodology	331
Nonmandatory Appendix L	Linearization of Stress Results for Stress Classification	334
L-100	Scope	334
L-110	General	334
L-200	Selection of Stress Classification Lines	334
L-300	Stress Integration Method	338
L-310	Continuum Elements	338
L-320	Shell Elements	338
L-400	Structural Stress Method Based on Nodal Forces	338
L-410	Continuum Elements	340
L-500	Structural Stress Method Based on Stress Integration	340
FIGURES		
KG-510.1	CRPV General Arrangement	15
KG-510.2	Laminate Termination	16
KG-510.3	Laminate Step	16
KM-212	Examples of Acceptable Impact Test Specimens	23
KD-320.1	Design Fatigue Curves $S_a = f(N_f)$ for Nonwelded Machined Parts Made of Forged Carbon or Low Alloy Steels for Temperatures Not Exceeding 700°F	81
KD-320.1M	Design Fatigue Curves $S_a = f(N_f)$ for Nonwelded Machined Parts Made of Forged Carbon or Low Alloy Steels for Temperatures Not Exceeding 371°C	84
KD-320.2	Design Fatigue Curve $S_a = f(N_f)$ for Nonwelded Parts Made of Carbon or Low Alloy Steels for Temperatures Not Exceeding 700°F and UTS Less Than 90 ksi	87
KD-320.2M	Design Fatigue Curve $S_a = f(N_f)$ for Nonwelded Parts Made of Carbon or Low Alloy Steels for Temperatures Not Exceeding 371°C and UTS Less Than 620 MPa	88
KD-320.3	Design Fatigue Curve for Nonwelded Austenitic Stainless Steels for Temperatures Not Exceeding 800°F	89
KD-320.3M	Design Fatigue Curve for Nonwelded Austenitic Stainless Steels for Temperatures Not Exceeding 427°C	90
KD-320.4	Design Fatigue Curve $S_a = f(N_f)$ for Nonwelded Machined Parts Made of 17-4PH/15-5PH Stainless Steel Bar or Forgings, for Temperatures Not Exceeding 550°F	91
KD-320.4M	Design Fatigue Curve $S_a = f(N_f)$ for Nonwelded Machined Parts Made of 17-4PH/15-5PH Stainless Steel Bar or Forgings, for Temperatures Not Exceeding 290°C	92
KD-320.5	Design Fatigue Curve for High-Strength Steel Bolting for Temperatures Not Exceeding 700°F	93
KD-320.5M	Design Fatigue Curve for High-Strength Steel Bolting for Temperatures Not Exceeding 371°C	94
KD-320.6(a)	Roughness Factor K_r Versus Average Surface Roughness R_a (μin.) AA	95
KD-320.6M(a)	Roughness Factor K_r Versus Average Surface Roughness R_a (μm) AA	96
KD-320.6(b)	Roughness Factor K_r Versus Maximum Surface Roughness R_{max} (μin.)	97

KD-320.6M(b)	Roughness Factor K_r , Versus Maximum Surface Roughness R_{max} (μm)	98
KD-320.7	Design Fatigue Curve for Nonwelded 6061-T6 and 6061-T651 Aluminum for Temperatures Not Exceeding 225°F	100
KD-320.7M	Design Fatigue Curve for Nonwelded 6061-T6 and 6061-T651 Aluminum for Temperatures Not Exceeding 107°C	101
KD-372.1	Burr Grinding of Weld Toe	105
KD-700	Some Illustrative Weld Attachment Details	118
KD-812	Diameters and Layer Numbers for Concentric Shrink-Fit Layered Cylinder	122
KD-830.1	Acceptable Layered Shell Types	124
KD-830.2	Some Acceptable Solid-to-Layered Attachments	125
KD-830.3	Some Acceptable Flat Heads With Hubs Joining Layered Shell Sections	126
KD-830.4	Some Acceptable Flanges for Layered Shells	127
KD-830.5	Some Acceptable Welded Joints of Layered-to-Layered and Layered-to-Solid Sections	128
KD-830.6	Some Acceptable Nozzle Attachments in Layered Shell Sections	129
KD-850	Some Acceptable Supports for Layered Vessels	130
KD-900	Wire-Wound Vessel and Frame Construction	132
KD-911	Nomenclature for Wire-Wound Cylinders	133
KD-932	Derivation of Design Fatigue Curve From Wire Fatigue Curve	135
KD-1112	Typical Pressure Parts With Butt-Welded Hubs	142
KD-1121	Joints Between Formed Heads and Shells	143
KD-1122	Nozzle Necks Attached to Piping of Lesser Wall Thickness	144
KD-1130	Some Acceptable Welded Nozzle Attachments	145
KD-1131	An Acceptable Full-Penetration Welded Nozzle Attachment Not Readily Radiographable	146
KD-1260.1	Construction of Testing Parameter Ratio Diagram	151
KD-1260.2	Construction of Testing Parameter Ratio Diagram for Accelerated Tests	152
KF-131	Examples of Differences Between Maximum and Minimum Diameters in Cylindrical Shells	158
KF-822(a)	Solid-to-Layered and Layered-to-Layered Test Plates	179
KF-822(b)	Test Specimens for Weld Procedure Qualification	180
KF-825.4(a)	Indications of Layer Wash	181
KF-825.4(b)	Angled Radiographic Technique for Detecting Layer Wash	182
KF-826	Gap Area Between Layers	183
KR-401	Official New Certification Mark to Denote the American Society of Mechanical Engineers' Standard	201
KR-523.3	Constant C for Gas Versus Specific Heat Ratio (U.S. Customary Units)	205
KR-523.3M	Constant C for Gas Versus Specific Heat Ratio (SI Units)	206
KE-242.1	Axial Propagation of Sound in Tube Wall	216
KE-301-1	Single Indications	222
KE-301-2	Multiple Planar Flaws Oriented in Plane Normal to Pressure-Retaining Surface	223
KE-301-3	Parallel Planar Flaws	224
KE-301-4	Nonaligned Coplanar Flaws in Plane Normal to Pressure-Retaining Surface (Illustrative Flaw Configurations)	225
KE-301-5	Multiple Aligned Planar Flaws	226
KE-321	Illustration of Welded Joint Locations Typical of Categories A, B, C, and D	228
KS-100	Official New Certification Mark to Denote the American Society of Mechanical Engineers' Standard	239
KS-132	Form of Stamping	241
6-1	Aligned Rounded Indications	258
6-2	Groups of Aligned Rounded Indications	259
6-3.1	Charts for t $\frac{1}{8}$ in. (3 mm) to $\frac{1}{4}$ in. (6 mm), Inclusive	260
6-3.2	Charts for t Over $\frac{1}{4}$ in. (6 mm) to $\frac{3}{8}$ in. (10 mm), Inclusive	261
6-3.3	Charts for t Over $\frac{3}{8}$ in. (10 mm) to $\frac{3}{4}$ in. (19 mm), Inclusive	262
6-3.4	Charts for t Over $\frac{3}{4}$ in. (19 mm) to 2 in. (50 mm), Inclusive	263
6-3.5	Charts for t Over 2 in. (50 mm) to 4 in. (100 mm), Inclusive	264
6-3.6	Charts for t Over 4 in. (100 mm)	265
9-200-1	Stress Categories and Limits of Stress Intensity	269
C-1	Sample Certificate of Authorization	293

D-200	Typical Crack Types	295
D-300	Idealizations of a Crack Propagating From a Cross-Bore Corner	296
D-403.1	Magnification Factors for Circumferential Crack	301
D-403.2	Polynomial Representation of Stress Distribution	302
D-403.3	Method of Correcting K_I at Discontinuities Between Regions	303
E-110	Thick Wall Blind End Proportions Not Requiring Detailed Analysis	305
E-120	Thin Wall Blind End Proportions Not Requiring Detailed Analysis	306
E-210.1	Typical Threaded End Closure	308
E-210.2	Thread Loading Distribution	309
E-210.3	Detail of First Thread	309
G-100.1	Clamp Nomenclature	313
G-100.2	Typical Clamp Lug Configurations	314
G-100.3	Typical Hub Design With the Bolts Contained Within the Body of the Clamp	315
G-300	Typical Self-Energizing Gaskets Used in This Division, Showing Diameter at Location of Gasket Load Reaction G	320
G-300.1	Values of f	321
H-101	Straight Drill Connections for Thick-Walled Cylinders	324
H-120.1	Chart for Determining Value of F	325
H-142	Nozzle Nomenclature and Dimensions	327
J-110-1	Geometries of Square Blocks and Cylinders With Cross-Bores	332
J-110-2	Tangential Stress Concentration Factors for Openings in Cylinders	332
J-110-3	Tangential Stress Concentration Factors for Openings in Square Cross-Section Blocks	333
L-110.1	Stress Classification Line (SCL) and Stress Classification Plane (SCP)	335
L-110.2	Stress Classification Lines (SCLs)	336
L-200.1	Stress Classification Line Orientation and Validity Guidelines	337
L-311.1	Computation of Membrane and Bending Equivalent Stress Integration Method Using the Results From a Finite Element Model With Continuum Elements	339
L-400.1	Continuum Finite Element Model Stress Classification Line for the Structural Stress Method	341
L-410.1	Computation of Membrane and Bending Equivalent Stresses by the Structural Stress Method Using Nodal Force Results From a Finite Element Model With Continuum Elements ...	343
L-410.2	Processing Nodal Force Results With the Structural Stress Method Using the Results From a Finite Element Model With Three-Dimensional Second Order Continuum Elements	344
L-410.3	Processing Structural Stress Method Results for a Symmetric Structural Stress Range	345
L-411.1	Computation of Membrane and Bending Equivalent Stresses by the Structural Stress Method Using the Results From a Finite Element Model With Shell Elements	347
L-411.2	Processing Nodal Force Results With the Structural Stress Method Using the Results From a Finite Element Model With Three-Dimensional Second Order Shell Elements	348
L-500.1	Element Sets for Processing Finite Element Nodal Stress Results With the Structural Stress Method Based on Stress Integration	349
TABLES		
KG-141	Referenced Standards in This Division and Year of Acceptable Edition	4
KM-212	Charpy Impact Test Temperature Reduction Below Minimum Design Metal Temperature .	22
KM-234.2(a)	Minimum Required Charpy V-Notch Impact Values for Pressure-Retaining Component Materials	26
KM-234.2(b)	Minimum Required Charpy V-Notch Impact Values for Bolting Materials	26
KM-400-1	Carbon and Low Alloy Steels	31
KM-400-1M	Carbon and Low Alloy Steels (Metric)	37
KM-400-2	High Alloy Steels	44
KM-400-2M	High Alloy Steels (Metric)	47
KM-400-3	Nickel and Nickel Alloys	50
KM-400-3M	Nickel and Nickel Alloys (Metric)	51
KM-400-4	Aluminum Alloys	52
KM-400-4M	Aluminum Alloys (Metric)	52
KD-230.1	Loads and Load Cases to Be Considered in Design	61
KD-230.2	Load Descriptions	62

KD-230.3	Combination for Analysis Exemption of Hydrostatic Test Criterion	63
KD-230.4	Load Combinations and Load Factors for an Elastic–Plastic Analysis	64
KD-230.5	Tabular Values for Coefficients	65
KD-320.1	Tabulated Values of S_a , ksi, From Figures Indicated	82
KD-320.1M	Tabulated Values of S_a , MPa, From Figures Indicated	85
KD-320.7	Tabulated Values of S_a Alternating Stress Intensity From Figures KD-320.7 and KD-320.7M	98
KD-322.1	Fatigue Penalty Parameters	101
KD-360.1	Cyclic Stress–Strain Curve Data	102
KD-360.1M	Cyclic Stress–Strain Curve Data	103
KD-370.1	Coefficients for the Welded Joint Fatigue Curves	104
KD-370.1M	Coefficients for the Welded Joint Fatigue Curves	105
KD-430	Crack Growth Rate Factors (U.S. Customary Units)	108
KD-430M	Crack Growth Rate Factors (SI Units)	108
KF-234	Maximum Allowable Offset in Welded Joints	163
KF-402.1	Requirements for Postweld Heat Treatment of Pressure Parts and Attachments (U.S. Customary Units)	168
KF-402.1M	Requirements for Postweld Heat Treatment of Pressure Parts and Attachments (SI Units)	169
KF-630	Postweld Heat Treatment Requirements for Quenched and Tempered Materials in Table KM-400-1 (U.S. Customary Units)	174
KF-630M	Postweld Heat Treatment Requirements for Quenched and Tempered Materials in Table KM-400-1M (SI Units)	175
KF-1211	Permitted Weld Reinforcement	189
KE-101	Thickness, Image Quality Indicator Designations, Essential Holes, and Wire Diameters (U.S. Customary Units)	211
KE-101M	Thickness, Image Quality Indicator Designations, Essential Holes, and Wire Diameters (SI Units)	212
KE-301-1	Flaw Acceptance Criteria for 1 in. (25 mm) to 12 in. (300 mm) Thick Weld	221
KE-301-2	Flaw Acceptance Criteria for Larger Than 12 in. (300 mm) Thick Weld	221
KE-332	Radiographic Acceptance Standards for Rounded Indications (Examples Only)	229
7-1	Standard Units for Use in Equations	266
A-100.1	Instructions for the Preparation of Manufacturer’s Data Reports	278
A-100.2	Supplementary Instructions for the Preparation of Manufacturer’s or Assembler’s Certificate of Conformance Form K-4	281
A-100.3	Supplementary Instructions for the Preparation of Manufacturer’s Certificate of Conformance Form K-5	283
A-100.4	Instructions for the Preparation of Manufacturer’s Data Reports Form CRPV-1A	286
D-401.1	Coefficients G_0 Through G_3 for Surface Crack at Deepest Point	298
D-401.2	Coefficients G_0 Through G_3 for Surface Crack at Free Surface	299
D-500	Crack Growth Rate Factors	303
E-222.1	Continuous Thread Example	310
E-222.2	Interrupted Thread Example	311
G-900	Allowable Design Stress for Clamp Connections	322
J-110-2	Tangential Stress Concentration Factors for Openings in Cylinders (Tabulated Values From Figure J-110-2)	333
J-110-3	Tangential Stress Concentration Factors for Openings in Square Cross-Section Blocks (Tabulated Values From Figure J-110-3)	333
L-410.1	Structural Stress Definitions for Continuum Finite Elements	342
L-411.1	Structural Stress Definitions for Shell or Plate Finite Elements	346
FORMS		
KG-311.15	Typical Certification of Compliance of the User’s Design Specification	9
KG-324.1	Typical Certification of Compliance of the Manufacturer’s Design Report	11
K-1	Manufacturer’s Data Report for High Pressure Vessels	273
K-2	Manufacturer’s Partial Data Report for High Pressure Vessels	275
K-3	Manufacturer’s Data Report Supplementary Sheet	277
K-4	Manufacturer’s or Assembler’s Certificate of Conformance for Pressure Relief Valves	280

K-5	Manufacturer's Certificate of Conformance for Rupture Disk Devices	282
CRPV-1A	Manufacturer's Data Report for Composite Reinforced Pressure Vessels	284
CRPV-2A	Recommended Form for Qualifying the Laminate Design and the Laminate Procedure Specification Used in Manufacturing Composite Reinforced Pressure Vessels	288
ENDNOTES	351

(17)

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 NC — Class 2 Components
 - Subsection ND — 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 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 Power Plant Components

- XII Rules for Construction and Continued Service of Transport Tanks

^{*} The 2015 Edition of Section III was the last edition in which Section III, Division 1, Subsection NH, *Class 1 Components in Elevated Temperature Service*, was published. The requirements located within Subsection NH were moved to Section III, Division 5, Subsection HB, Subpart B for the elevated temperature construction of Class A components.

INTERPRETATIONS

Interpretations are issued in real time in ASME's Interpretations Database at <http://go.asme.org/Interpretations>. Historical BPVC interpretations may also be found in the Database.

CODE CASES

The Boiler and Pressure Vessel Code committees meet regularly to consider proposed additions and revisions to the Code and to formulate Cases to clarify the intent of existing requirements or provide, when the need is urgent, rules for materials or constructions not covered by existing Code rules. Those Cases that have been adopted will appear in the appropriate 2017 Code Cases book: "Boilers and Pressure Vessels" or "Nuclear Components." Supplements will be sent or made available automatically to the purchasers of the Code Cases books up to the publication of the 2019 Code.

FOREWORD*

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) 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 only to pressure integrity, which govern the construction** of boilers, pressure vessels, transport tanks, and nuclear components, and the inservice inspection of nuclear components and transport tanks. 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. This 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. 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 pressure vessels. 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.

This 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

* 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 pressure relief.

requirements of the Code. However, designers and engineers using computer programs for design or analysis are cautioned that they are 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 this Code. Requests for revisions, new rules, Code Cases, or interpretations shall be addressed to the Secretary in writing and shall give full particulars in order to receive consideration and action (see Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees). 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 an ASME Certification Mark.

When required by context in this Section, the singular shall be interpreted as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as such other gender as appropriate.

STATEMENT OF POLICY ON THE USE OF THE 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 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 Certification Mark for the benefit of the users, the enforcement jurisdictions, and the holders of the 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 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 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 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 Certification Mark who may also use the facsimile in advertising to show that clearly specified items will carry the Certification Mark. General usage is permitted only when all of a manufacturer’s items are constructed under the rules.

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 official Certification Mark described in the governing Section of the Code.

Markings such as “ASME,” “ASME Standard,” or any other marking including “ASME” or the 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.

SUBMITTAL OF TECHNICAL INQUIRIES TO THE BOILER AND PRESSURE VESSEL STANDARDS COMMITTEES (17)

1 INTRODUCTION

(a) The following information provides guidance to Code users for submitting technical inquiries to the applicable Boiler and Pressure Vessel (BPV) Standards Committee (hereinafter referred to as the Committee). See the guidelines on approval of new materials under the ASME Boiler and Pressure Vessel Code in Section II, Part D for requirements for requests that involve adding new materials to the Code. See the guidelines on approval of new welding and brazing materials in Section II, Part C for requirements for requests that involve adding new welding and brazing materials (“consumables”) to the Code.

Technical inquiries can include requests for revisions or additions to the Code requirements, requests for Code Cases, or requests for Code Interpretations, as described below:

(1) *Code Revisions.* Code revisions are considered to accommodate technological developments, to address administrative requirements, to incorporate Code Cases, or to clarify Code intent.

(2) *Code Cases.* Code Cases represent alternatives or additions to existing Code requirements. Code Cases are written as a Question and Reply, and are usually intended to be incorporated into the Code at a later date. When used, Code Cases prescribe mandatory requirements in the same sense as the text of the Code. However, users are cautioned that not all regulators, jurisdictions, or Owners automatically accept Code Cases. The most common applications for Code Cases are as follows:

(-a) to permit early implementation of an approved Code revision based on an urgent need

(-b) to permit use of a new material for Code construction

(-c) to gain experience with new materials or alternative requirements prior to incorporation directly into the Code

(3) *Code Interpretations*

(-a) Code Interpretations provide clarification of the meaning of existing requirements in the Code and are presented in Inquiry and Reply format. Interpretations do not introduce new requirements.

(-b) If existing Code text does not fully convey the meaning that was intended, or conveys conflicting requirements, and revision of the requirements is required to support the Interpretation, an Intent Interpretation will be issued in parallel with a revision to the Code.

(b) Code requirements, Code Cases, and Code Interpretations established by the Committee are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or Owners to choose any method of design or any form of construction that conforms to the Code requirements.

(c) Inquiries that do not comply with the following guidance or that do not provide sufficient information for the Committee’s full understanding may result in the request being returned to the Inquirer with no action.

2 INQUIRY FORMAT

Submittals to the Committee should include the following information:

(a) *Purpose.* Specify one of the following:

(1) request for revision of present Code requirements

(2) request for new or additional Code requirements

(3) request for Code Case

(4) request for Code Interpretation

(b) *Background.* The Inquirer should provide the information needed for the Committee’s understanding of the Inquiry, being sure to include reference to the applicable Code Section, Division, Edition, Addenda (if applicable), paragraphs, figures, and tables. Preferably, the Inquirer should provide a copy of, or relevant extracts from, the specific referenced portions of the Code.