

ASME BPVC.II.D.M-2025

SECTION II
MATERIALS

2025

ASME Boiler and
Pressure Vessel Code
An International Code

Part D
Properties (Metric)



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AN INTERNATIONAL CODE

2025 ASME Boiler & Pressure Vessel Code

2025 Edition

July 1, 2025

II MATERIALS

Part D

Properties (Metric)

ASME Boiler and Pressure Vessel Committee
on Materials



The American Society of
Mechanical Engineers

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TABLE OF CONTENTS

List of Sections		xi
Foreword		iv
Statement of Policy on the Use of the ASME Single Certification Mark and Code Authorization in Advertising		i
Statement of Policy on the Use of ASME Marking to Identify Manufactured Items		xvi
Personnel		xvii
Correspondence With the Committee		xl
Summary of Changes		xlii
Cross-Referencing in the ASME BPVC		xlviii
Subpart 1	Stress Tables	1
	Statement of Policy on Information Provided in the Stress Tables	1
	Guideline on Locating Materials in Stress Tables, and in Tables of Mechanical and Physical Properties	3
Subpart 2	Physical Properties Tables	1155
	Introduction	1155
Subpart 3	Charts and Tables for Determining Shell Thickness of Components Under External Pressure	1196
Mandatory Appendix 1	Basis for Establishing Stress Values in Tables 1A and 1B	1326
1-100	Derivation of Allowable Stress Values	1326
Mandatory Appendix 2	Basis for Establishing Design Stress Intensity Values for Tables 2A, 2B, and 4, and Allowable Stress Values for Table 3	1328
2-100	Derivation of Stress Intensity Values	1328
Mandatory Appendix 3	Basis for Establishing External Pressure Charts	1331
3-100	General	1331
3-200	Basis of Charts in Subpart 3	1331
3-300	Use of Charts in Subpart 3	1331
3-400	Background and Development of Theory	1331
3-500	Design Basis	1331
3-600	Criteria for Allowable Stresses	1332
3-700	Procedure and Responsibility for Chart Development	1334
3-800	Alternate Procedure for Determining Allowable Compressive Stresses	1337
3-900	References	1337
Mandatory Appendix 5	Guidelines on the Approval of New Materials Under the ASME Boiler and Pressure Vessel Code	1338
5-100	Code Policy	1338
5-200	Application	1338
5-300	Chemical Composition	1340
5-400	Metallurgical Structure and Heat Treatment	1340
5-500	Mechanical Properties	1340
5-600	Definitions for Data Collection Purposes	1340
5-700	Required Sampling	1341
5-800	Time-Independent Properties	1341
5-900	Time-Dependent Properties	1341
5-1000	Low-Temperature Properties	1343
5-1100	Toughness Data	1343
5-1200	Stress-Strain Curves	1343

5-1300	Fatigue Data	1343
5-1400	Physical Properties	1344
5-1500	Data Requirements for Welds, Weldments, and Weldability	1344
5-1600	Long-Term Properties Stability	1346
5-1700	Requests for Additional Data	1346
5-1800	New Materials Checklist	1346
5-1900	Requirements for Recognized National or International Specifications	1346
5-2000	Publication of Recognized National or International Specifications	1347
5-2100	CEN Specifications	1347
Mandatory Appendix 6	Basis for Establishing Stress Values in Tables 6A, 6B, 6C, and 6D	1348
6-100	Derivation of Allowable Stress Values	1348
Mandatory Appendix 7	Guidelines on Multiple Marking of Materials	1350
7-100	Background	1350
7-200	Guidelines	1350
Mandatory Appendix 9	Standard Units for Use in Equations	1352
Mandatory Appendix 10	Basis for Establishing Maximum Allowable Stress Values in Tables 5A and 5B	1353
10-100	Derivation of Allowable Stress Values	1353
Nonmandatory Appendix A	Issues Associated With Materials Used in ASME Code Construction	1355
A-100	General	1355
A-200	Metallurgical Changes That Can Occur in Service	1356
A-300	Uniform Corrosion	1363
A-400	Localized Corrosion	1366
A-500	Metallurgically Influenced Corrosion	1367
A-600	Mechanically Assisted Corrosion	1368
A-700	Environmentally Induced Embrittlement and Cracking	1369
A-800	Mechanical Damage Mechanisms	1373
Nonmandatory Appendix B	Developing Nominal Composition Designations for ASME Code Materials	1375
B-100	Background	1375
B-200	General Guidelines for All Materials	1375
B-300	Guidelines for Developing Nominal Composition Designations for Ferrous Materials	1376
B-400	Guidelines for Developing Nominal Composition Designations for Nonferrous Materials	1376
B-500	Summary	1377
Nonmandatory Appendix C	Guidance for the Use of U.S. Customary and SI Units in the ASME Boiler and Pressure Vessel Code	1378
C-100	Use of Units in Equations	1378
C-200	Guidelines Used to Develop SI Equivalents	1378
C-300	Soft Conversion Factors	1380
Nonmandatory Appendix D	Guidelines for Rounding Minimum Specified Tensile and Yield Strength Values and for Establishing Anchor Points for Tensile and Yield Strength Trend Curves in Tables 1A, 1B, 2A, 2B, 3, 4, 5A, 5B, U, and Y-1	1381
D-100	Minimum Tensile Strength and Minimum Yield Strength Columns	1381
D-200	Selecting Anchor Point for Tensile and Yield Strength Trend Curves for All Situations in Which the Minimum RT Specified Values in One Unit System Are Not Precise Conversions of the Units in the Other System	1381
D-300	Significant Figures in the Allowable Stress, Tensile Strength, and Yield Strength Tables in Section II, Part D and in Code Cases	1382

Nonmandatory Appendix E	Material Data for Stress Analysis in the Time-Dependent Regime	1383
E-100	Introduction	1383

FIGURES

G	Geometric Chart for Components Under External or Compressive Loadings (for All Materials)	1197
CS-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Carbon or Low Alloy Steels With Specified Minimum Yield Strength Less Than 207 MPa	1199
CS-2	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Carbon or Low Alloy Steels With Specified Minimum Yield Strength 207 MPa and Higher	1200
CS-3	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Carbon Steel and Low Alloy Steels With Specified Minimum Yield Strength 260 MPa and Higher for Temperatures 150°C and Less	1201
CS-4	Chart for Determining Shell Thickness of Components Under External Pressure Developed for SA-537 Thickness 64 mm and Less	1202
CS-5	Chart for Determining Shell Thickness of Components Under External Pressure Developed for SA-508 Class 1, Grades 2 and 3; SA-508 Class 2, Grade 2; SA-533 Class 1, Grades A, B, C, and D; SA-533 Class 2, Grades A, B, C, and D; or SA-541 Grades 2 and 3	1203
CS-6	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Carbon Steel With Specified Minimum Yield Strength of 138 MPa	1204
HT-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Quenched and Tempered Low Alloy Steel With Specified Minimum Yield Strength of 689 MPa and Thickness 64 mm and Less	1205
HT-2	Chart for Determining Shell Thickness of Components Under External Pressure Developed for SA-508 Grade 4N, Class 2 or SA-543 Types B and C, Class 2 with Specified Minimum Yield Strength of 689 MPa	1206
HA-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 18Cr-8Ni, Type 304	1207
HA-2	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 16Cr-12Ni-2Mo, Type 316	1208
HA-3	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 18Cr-8Ni-0.035 Maximum Carbon, Type 304L	1209
HA-4	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 18Cr-8Ni-Mo-0.035 Maximum Carbon, Type 316L	1210
HA-5	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic-Ferritic Steel 18Cr-5Ni-3Mo S31500 and Austenitic-Ferritic Steel 25Cr-6Ni-Mo-N S32053	1211
HA-6	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 21Cr-11Ni-N S30815	1212
HA-7	Chart for Determining Shell Thickness of Components Under External Pressure Developed for SA-564 Type 30 H1150 (17Cr-4Ni-4Cu S17400)	1213
HA-8	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic-Ferritic Steel 25Cr-7Ni-3Mo-2W-0.28N S39274	1214
HA-9	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 25Cr-7.5Ni-3.5Mo-N-Cu-W S32760	1215
HA-10	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Stainless Steel 24Cr-17Ni-6Mn-4.5Mo-N S34565	1216
CI-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Cast Iron	1217
CD-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Cast Ductile Iron With a Specified Minimum Yield Strength of 275 MPa	1218
CD-2	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Cast Ductile Iron With a Specified Minimum Yield Strength of 200 MPa	1219
NFA-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 3003 in O Temper	1220
NFA-2	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 3003 in H14 Temper	1221

NFA-3	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 3004 in O Temper	1222
NFA-4	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 3004 in H34 Temper	1223
NFA-5	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5154 in O Temper	1224
NFA-6	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5454 in O Temper	1225
NFA-7	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 1060 in O Temper	1226
NFA-8	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5052 in O Temper	1227
NFA-9	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5086 in O Temper	1228
NFA-10	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5456 in O Temper	1229
NFA-11	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5083 in O Temper	1230
NFA-12	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Welded Aluminum Alloy 6061-T6	1231
NFA-13	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Welded Aluminum Alloy 6061-T4	1232
NFC-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Copper, Type DHP	1233
NFC-2	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Copper-Silicon Alloy C65500	1234
NFC-3	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed 90-10 Copper-Nickel Alloy	1235
NFC-4	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed 70-30 Copper-Nickel Alloy	1236
NFC-5	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Welded Copper-Iron Alloy Tube C1900 (SB-443 Welded)	1237
NFC-6	Chart for Determining Shell Thickness of Components Under External Pressure Developed for SB-75 and SB-111 Light Drawn Seamless Copper Tubes, Alloys C10200, C12000, C12200, and C14200	1238
NFC-7	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Copper, SB-75 UNS C12200, Temper O50	1239
NFC-8	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Bronze Alloy C61400	1240
NFN-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Low Carbon Nickel N02201	1241
NFN-2	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel N02200	1242
NFN-3	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel-Copper Alloy N04400	1243
NFN-4	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel-Chromium-Iron Alloy N06600	1244
NFN-5	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel-Molybdenum Alloy N10001	1245
NFN-6	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel-Molybdenum-Chromium-Iron Alloy N10003	1246
NFN-7	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel-Iron-Chromium-Molybdenum-Copper Alloy N08825	1247
NFN-8	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel-Iron-Chromium Alloy N08800	1248

NFN-9	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel–Iron–Chromium Alloy N08810	1249
NFN-10	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Low Carbon Nickel–Molybdenum–Chromium Alloy N10276	1250
NFN-11	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Solution Treated Nickel–Chromium–Iron–Molybdenum–Copper Alloy N06007	1251
NFN-12	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Chromium–Nickel–Iron–Molybdenum–Copper–Columbium Alloy N08020	1252
NFN-13	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Iron–Chromium–Silicon Alloy N08330	1253
NFN-14	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Chromium–Molybdenum Alloy N06455	1254
NFN-15	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum Alloy N06002	1255
NFN-16	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum Alloy N10665	1256
NFN-17	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel–Chromium–Molybdenum–Columbium Alloy N06625 (SA-44, SB-444, and SB-446)	1257
NFN-18	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum–Chromium–Iron–Copper Alloy N06985 Having a Minimum Yield Strength of 240 MPa	1258
NFN-19	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum–Chromium–Iron–Copper Alloy N06987 Having a Minimum Yield Strength of 207 MPa	1259
NFN-20	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Work-Hardened Nickel	1260
NFN-21	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Chromium–Iron Alloy N06600 (Specific Minimum Yield Strength 276 MPa)	1261
NFN-22	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Solution Annealed Ni–Cr–Mo–Cb Alloy, Grade 2 N06625	1262
NFN-23	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Cold Worked Nickel–Iron–Chromium Alloy N08800	1263
NFN-24	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel Alloy N06230	1264
NFN-25	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Stress Relieved Nickel Alloy N02200	1265
NFN-26	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Alloy S31277	1266
NFN-27	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Alloy N06005	1267
NFT-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Unalloyed Titanium Grade 3 (UNS R50550)	1268
NFT-2	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Unalloyed Titanium Grade 2 (UNS R50400)	1269
NFT-3	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Titanium Grade 1 (UNS R50250)	1270
NFT-4	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Titanium Grade 9 Alloy (UNS R56320)	1271
NFT-5	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Titanium Grade 12 Alloy (UNS R53400)	1272
NFT-6	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Titanium Grade 38 (UNS R54250)	1273
NFZ-1	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Zirconium Alloy (UNS R60702)	1274

NFZ-2	Chart for Determining Shell Thickness of Components Under External Pressure Developed for Zirconium Alloy (UNS R60705)	1275
3-500.1	Temperature Limits for Application of Section II External Pressure Charts for Cylinder Under External Pressure	1333
3-500.2	Temperature Limits for Application of Section II External Pressure Charts for Cylinder Under Axial Compression	1334
3-500.3	Temperature Limits for Application of Section II External Pressure Charts for Sphere Under External Pressure	1335
3-700.1	Normalization of Test σ - ϵ to σ_{ymin} and E_{code}	1336
E-100.2-1	Permissible Time/Temperature Conditions for Material That Has Been Cold Worked >5% and <20% and Subjected to Short-Time High Temperature Transients	1385
E-100.4-1	S_{mt} — Allowable Stress Intensity Values, MPa, Type 304 SS — 207-YS, 518-UTS (207-YS, 483-UTS)	1338
E-100.4-2	S_{mt} — Allowable Stress Intensity Values, MPa, Type 316 SS — 207-YS, 518-UTS (207-YS, 483-UTS)	1389
E-100.4-3	S_{mt} — Allowable Stress Intensity Values, MPa, Ni-Fe-Cr (Alloy 800H)	1390
E-100.4-4	S_{mt} — Allowable Stress Intensity Values, MPa, 2 $\frac{1}{4}$ Cr-1Mo	1392
E-100.4-5	S_{mt} — Allowable Stress Intensity Values, MPa, 9Cr-1Mo-V	1393
E-100.5-1	S_t — Allowable Stress Intensity Values, MPa, Type 304 SS	1394
E-100.5-2	S_t — Allowable Stress Intensity Values, MPa, Type 316 SS	1395
E-100.5-3	S_t — Allowable Stress Intensity Values, MPa, Ni-Fe-Cr (Alloy 800H)	1396
E-100.5-4	S_t — Allowable Stress Intensity Values, MPa, 2 $\frac{1}{4}$ Cr-1Mo	1397
E-100.5-5	S_t — Allowable Stress Intensity Values, MPa, 9Cr-1Mo-V	1398
E-100.7-1	Expected Minimum Stress-to-Rupture Values, MPa, Type 304 SS	1400
E-100.7-2	Expected Minimum Stress-to-Rupture Values, MPa, Type 316 SS	1401
E-100.7-3	Expected Minimum Stress-to-Rupture Values, MPa, Ni-Fe-Cr (Alloy 800H)	1402
E-100.7-4	Expected Minimum Stress-to-Rupture Values, MPa, 2 $\frac{1}{4}$ Cr-1Mo	1403
E-100.7-5	Expected Minimum Stress-to-Rupture Values, MPa, Ni-Cr-Fe-Mo-Cb (Alloy 718)	1404
E-100.7-6	Expected Minimum Stress-to-Rupture Values, MPa, 9Cr-1Mo-V	1405
E-100.15-1	S_{mt} — Allowable Stress Intensity, Type 304 SS, Bolting	1410
E-100.15-2	S_{mt} — Allowable Stress Intensity, Type 316 SS, Bolting	1411
E-100.15-3	S_{mt} — Allowable Stress Values, MPa, Alloy 718, Bolting	1412
E-100.16-1	Design Fatigue Strain Range, ϵ_f , for 304 SS	1413
E-100.16-2	Design Fatigue Strain Range, ϵ_f , for 316 SS	1414
E-100.16-3	Design Fatigue Strain Range, ϵ_f , for Ni-Fe-Cr Alloy 800H	1415
E-100.16-4	Design Fatigue Strain Range, ϵ_f , for 2 $\frac{1}{4}$ Cr-1Mo Steel	1416
E-100.16-5	Design Fatigue Strain Range, ϵ_f , for 9Cr-1Mo-V Steel	1417
E-100.17-1	Time-Temperature Limits for Application of Section II External Pressure Charts for Cylinder Under Axial Compression	1418
E-100.17-2	Time-Temperature Limits for Application of Section II External Pressure Charts for Sphere Under External Pressure	1419
E-100.17-3	Temperature Limits for Application of Section II External Pressure Charts for Cylinder Under External Pressure	1420
E-100.18-1	Average Isochronous Stress-Strain Curves for Type 304 SS at 427°C	1421
E-100.18-2	Average Isochronous Stress-Strain Curves for Type 304 SS at 454°C	1422
E-100.18-3	Average Isochronous Stress-Strain Curves for Type 304 SS at 482°C	1423
E-100.18-4	Average Isochronous Stress-Strain Curves for Type 304 SS at 510°C	1424
E-100.18-5	Average Isochronous Stress-Strain Curves for Type 304 SS at 538°C	1425
E-100.18-6	Average Isochronous Stress-Strain Curves for Type 304 SS at 566°C	1426
E-100.18-7	Average Isochronous Stress-Strain Curves for Type 304 SS at 593°C	1427
E-100.18-8	Average Isochronous Stress-Strain Curves for Type 304 SS at 621°C	1428
E-100.18-9	Average Isochronous Stress-Strain Curves for Type 304 SS at 649°C	1429
E-100.18-10	Average Isochronous Stress-Strain Curves for Type 304 SS at 677°C	1430
E-100.18-11	Average Isochronous Stress-Strain Curves for Type 304 SS at 704°C	1431
E-100.18-12	Average Isochronous Stress-Strain Curves for Type 304 SS at 732°C	1432
E-100.18-13	Average Isochronous Stress-Strain Curves for Type 304 SS at 760°C	1433

E-100.18-14	Average Isochronous Stress–Strain Curves for Type 304 SS at 788°C	1434
E-100.18-15	Average Isochronous Stress–Strain Curves for Type 304 SS at 816°C	1435
E-100.19-1	Average Isochronous Stress–Strain Curves for Type 316 SS at 427°C	1436
E-100.19-2	Average Isochronous Stress–Strain Curves for Type 316 SS at 454°C	1437
E-100.19-3	Average Isochronous Stress–Strain Curves for Type 316 SS at 482°C	1438
E-100.19-4	Average Isochronous Stress–Strain Curves for Type 316 SS at 510°C	1439
E-100.19-5	Average Isochronous Stress–Strain Curves for Type 316 SS at 538°C	1440
E-100.19-6	Average Isochronous Stress–Strain Curves for Type 316 SS at 566°C	1441
E-100.19-7	Average Isochronous Stress–Strain Curves for Type 316 SS at 593°C	1442
E-100.19-8	Average Isochronous Stress–Strain Curves for Type 316 SS at 621°C	1443
E-100.19-9	Average Isochronous Stress–Strain Curves for Type 316 SS at 649°C	1444
E-100.19-10	Average Isochronous Stress–Strain Curves for Type 316 SS at 677°C	1445
E-100.19-11	Average Isochronous Stress–Strain Curves for Type 316 SS at 704°C	1446
E-100.19-12	Average Isochronous Stress–Strain Curves for Type 316 SS at 732°C	1447
E-100.19-13	Average Isochronous Stress–Strain Curves for Type 316 SS at 760°C	1448
E-100.19-14	Average Isochronous Stress–Strain Curves for Type 316 SS at 788°C	1449
E-100.19-15	Average Isochronous Stress–Strain Curves for Type 316 SS at 816°C	1450
E-100.20-1	Average Isochronous Stress–Strain Curves for Alloy 800H at 427°C and 454°C	1451
E-100.20-2	Average Isochronous Stress–Strain Curves for Alloy 800H at 482°C	1452
E-100.20-3	Average Isochronous Stress–Strain Curves for Alloy 800H at 510°C	1453
E-100.20-4	Average Isochronous Stress–Strain Curves for Alloy 800H at 538°C	1454
E-100.20-5	Average Isochronous Stress–Strain Curves for Alloy 800H at 566°C	1455
E-100.20-6	Average Isochronous Stress–Strain Curves for Alloy 800H at 593°C	1456
E-100.20-7	Average Isochronous Stress–Strain Curves for Alloy 800H at 621°C	1457
E-100.20-8	Average Isochronous Stress–Strain Curves for Alloy 800H at 649°C	1458
E-100.20-9	Average Isochronous Stress–Strain Curves for Alloy 800H at 677°C	1459
E-100.20-10	Average Isochronous Stress–Strain Curves for Alloy 800H at 704°C	1460
E-100.20-11	Average Isochronous Stress–Strain Curves for Alloy 800H at 732°C	1461
E-100.20-12	Average Isochronous Stress–Strain Curves for Alloy 800H at 760°C	1462
E-100.21-1	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 371°C	1463
E-100.21-2	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 399°C	1464
E-100.21-3	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 427°C	1465
E-100.21-4	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 454°C	1466
E-100.21-5	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 482°C	1467
E-100.21-6	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 510°C	1468
E-100.21-7	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 538°C	1469
E-100.21-8	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 566°C	1470
E-100.21-9	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 593°C	1471
E-100.21-10	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 621°C	1472
E-100.21-11	Average Isochronous Stress–Strain Curves for Annealed 2 ¹ / ₄ Cr–1Mo at 649°C	1473
E-100.22-1	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 371°C	1474
E-100.22-2	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 399°C	1474
E-100.22-3	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 426°C	1475
E-100.22-4	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 454°C	1475
E-100.22-5	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 482°C	1476
E-100.22-6	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 510°C	1476
E-100.22-7	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 538°C	1477
E-100.22-8	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 566°C	1477
E-100.22-9	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 593°C	1478
E-100.22-10	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 621°C	1478
E-100.22-11	Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 649°C	1479

TABLES

1A	Section I; Section III, Classes 2 and 3; Section VIII, Division 1; and Section XII Maximum Allowable Stress Values, S , for Ferrous Materials	8
1B	Section I; Section III, Classes 2 and 3; Section VIII, Division 1; and Section XII Maximum Allowable Stress Values, S , for Nonferrous Materials	176
2A	Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m , and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S , for Ferrous Materials	308
2B	Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m , and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S , for Nonferrous Materials	402
3	Section III, Division 1, Classes 2 and 3; Section VIII, Divisions 1 and 2; and Section XII Maximum Allowable Stress Values, S , for Bolting Materials	430
4	Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m , and Section VIII, Division 2 Maximum Allowable Stress Values, S , for Bolting Materials	460
5A	Section VIII, Division 2, Class 2 Maximum Allowable Stress Values, S , for Ferrous Materials	472
5B	Section VIII, Division 2, Class 2 Maximum Allowable Stress Values, S , for Nonferrous Materials	534
6A	Section IV Maximum Allowable Stress Values, S , for Ferrous Materials	560
6B	Section IV Maximum Allowable Stress Values, S , for Nonferrous Materials	570
6C	Section IV Maximum Allowable Stress Values, S , for Lined Water Heater Materials	578
6D	Section IV Maximum Allowable Stress Values, S , for Unlined Water Heater Materials	584
U	Tensile Strength Values, S_u , for Ferrous and Nonferrous Materials	592
Y-1	Yield Strength Values, S_y , for Ferrous and Nonferrous Materials	818
Y-2	Factors for Limiting Permanent Strain in Austenitic Stainless Steels, High-Nickel Alloy Steels, Nickel, Nickel Alloys, Copper, and Copper Alloys	1154
TE-1	Thermal Expansion for Ferrous Materials	1156
TE-2	Thermal Expansion for Aluminum Alloys	1161
TE-3	Thermal Expansion for Copper Alloys	1162
TE-4	Thermal Expansion for Nickel Alloys	1163
TE-5	Thermal Expansion for Titanium Alloys	1173
TCD	Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD)	1174
TM-1	Moduli of Elasticity E of Ferrous Materials for Given Temperatures	1188
TM-2	Moduli of Elasticity E of Aluminum and Aluminum Alloys for Given Temperatures	1191
TM-3	Moduli of Elasticity E of Copper and Copper Alloys for Given Temperatures	1192
TM-4	Moduli of Elasticity E of High Nickel Alloys for Given Temperatures	1193
TM-5	Moduli of Elasticity E of Titanium and Zirconium for Given Temperatures	1194
PRD	Poisson's Ratio and Density of Materials	1194
G	Tabular Values for Figure G	1276
CS-1	Tabular Values for Figure CS-1	1278
CS-2	Tabular Values for Figure CS-2	1279
CS-3	Tabular Values for Figure CS-3	1280
CS-4	Tabular Values for Figure CS-4	1281
CS-5	Tabular Values for Figure CS-5	1281
CS-6	Tabular Values for Figure CS-6	1282
HT-1	Tabular Values for Figure HT-1	1282
HT-2	Tabular Values for Figure HT-2	1283
HA-1	Tabular Values for Figure HA-1	1283
HA-2	Tabular Values for Figure HA-2	1284
HA-3	Tabular Values for Figure HA-3	1285
HA-4	Tabular Values for Figure HA-4	1285
HA-5	Tabular Values for Figure HA-5	1286
HA-6	Tabular Values for Figure HA-6	1286
HA-7	Tabular Values for Figure HA-7	1287
HA-8	Tabular Values for Figure HA-8	1287

HA-9	Tabular Values for Figure HA-9	1288
HA-10	Tabular Values for Figure HA-10	1289
CI-1	Tabular Values for Figure CI-1	1290
CD-1	Tabular Values for Figure CD-1	1290
CD-2	Tabular Values for Figure CD-2	1290
NFA-1	Tabular Values for Figure NFA-1	1291
NFA-2	Tabular Values for Figure NFA-2	1292
NFA-3	Tabular Values for Figure NFA-3	1293
NFA-4	Tabular Values for Figure NFA-4	1294
NFA-5	Tabular Values for Figure NFA-5	1294
NFA-6	Tabular Values for Figure NFA-6	1295
NFA-7	Tabular Values for Figure NFA-7	1295
NFA-8	Tabular Values for Figure NFA-8	1296
NFA-9	Tabular Values for Figure NFA-9	1296
NFA-10	Tabular Values for Figure NFA-10	1297
NFA-11	Tabular Values for Figure NFA-11	1297
NFA-12	Tabular Values for Figure NFA-12	1298
NFA-13	Tabular Values for Figure NFA-13	1298
NFC-1	Tabular Values for Figure NFC-1	1298
NFC-2	Tabular Values for Figure NFC-2	1299
NFC-3	Tabular Values for Figure NFC-3	1299
NFC-4	Tabular Values for Figure NFC-4	1300
NFC-5	Tabular Values for Figure NFC-5	1300
NFC-6	Tabular Values for Figure NFC-6	1301
NFC-7	Tabular Values for Figure NFC-7	1301
NFC-8	Tabular Values for Figure NFC-8	1302
NFN-1	Tabular Values for Figure NFN-1	1302
NFN-2	Tabular Values for Figure NFN-2	1303
NFN-3	Tabular Values for Figure NFN-3	1303
NFN-4	Tabular Values for Figure NFN-4	1304
NFN-5	Tabular Values for Figure NFN-5	1304
NFN-6	Tabular Values for Figure NFN-6	1305
NFN-7	Tabular Values for Figure NFN-7	1305
NFN-8	Tabular Values for Figure NFN-8	1306
NFN-9	Tabular Values for Figure NFN-9	1307
NFN-10	Tabular Values for Figure NFN-10	1308
NFN-11	Tabular Values for Figure NFN-11	1308
NFN-12	Tabular Values for Figure NFN-12	1309
NFN-13	Tabular Values for Figure NFN-13	1309
NFN-14	Tabular Values for Figure NFN-14	1310
NFN-15	Tabular Values for Figure NFN-15	1311
NFN-16	Tabular Values for Figure NFN-16	1312
NFN-17	Tabular Values for Figure NFN-17	1313
NFN-18	Tabular Values for Figure NFN-18	1314
NFN-19	Tabular Values for Figure NFN-19	1315
NFN-20	Tabular Values for Figure NFN-20	1316
NFN-22	Tabular Values for Figure NFN-22	1316
NFN-23	Tabular Values for Figure NFN-23	1317
NFN-24	Tabular Values for Figure NFN-24	1317
NFN-25	Tabular Values for Figure NFN-25	1318
NFN-26	Tabular Values for Figure NFN-26	1318
NFN-27	Tabular Values for Figure NFN-27	1319
NFT-1	Tabular Values for Figure NFT-1	1320
NFT-2	Tabular Values for Figure NFT-2	1321
NFT-3	Tabular Values for Figure NFT-3	1321
NFT-4	Tabular Values for Figure NFT-4	1322

NFT-5	Tabular Values for Figure NFT-5	1323
NFT-6	Tabular Values for Figure NFT-6	1324
NFZ-1	Tabular Values for Figure NFZ-1	1325
NFZ-2	Tabular Values for Figure NFZ-2	1325
1-100	Criteria for Establishing Allowable Stress Values for Tables 1A and 1B	1327
2-100(a)	Criteria for Establishing Design Stress Intensity Values for Tables 2A and 2B	1329
2-100(b)	Criteria for Establishing Allowable Stress Values for Table 3	1330
2-100(c)	Criteria for Establishing Allowable Stress or Design Stress Intensity Values for Table 4	1330
5-100	Hot Isostatically Pressed Component Requirements for Austenitic Stainless Steels, Austenitic-Ferritic (Duplex) Stainless Steels, Martensitic Stainless Steels, Ferritic Steels, and Nickel Alloys	1339
5-800	ASTM Test Methods and Units for Reporting	1342
5-1500	Example of a Comparison of Allowable Stresses of Base Metals With Compositions Similar to Those of Selected Welding Consumables and the Proposed New Base Metal	1345
6-100(a)	Criteria for Establishing Allowable Stress Values for Tables 6A and 6B	1349
6-100(b)	Criteria for Establishing Allowable Stress Values for Table 6C	1349
6-100(c)	Criteria for Establishing Allowable Stress Values for Table 6D	1349
9-100	Standard Units for Use in Equations	1352
10-100	Criteria for Establishing Allowable Stress Values for Tables 5A and 5B	1354
E-100.1-1	Tensile Strength Values, S_u	1383
E-100.1-2	Tensile and Yield Strength Reduction Factor Due to Long Time Prior Elevated Temperature Service	1384
E-100.1-3	Yield Strength Reduction Factors for 2 ¹ / ₄ Cr-1Mo	1384
E-100.1-4	Tensile Strength Reduction Factors for 2 ¹ / ₄ Cr-1Mo	1384
E-100.1-5	Tensile Strength Reduction Factors for 9Cr-1Mo-V	1385
E-100.3-1	Permissible Base Materials for Structures Other Than Bolting	1386
E-100.3-2	Permissible Weld Materials	1387
E-100.3-3	S_o — Maximum Allowable Stress Intensity, MPa, for Design Condition Calculations	1387
E-100.6-1	Yield Strength Values, S_y , Versus Temperature	1399
E-100.8-1	Stress Rupture Factors for Type 304 Stainless Steel Welded With SFA-5.22 E308T and E308LT, SFA-5.4 E308 and E308L, and SFA-5.9 ER308 and ER308L	1406
E-100.8-2	Stress Rupture Factors for Type 304 Stainless Steel Welded With SFA-5.22 EXXXT-G (16-8-2 Chemistry), SFA-5.4 E16-8-2, and SFA-5.9 ER16-8-2	1406
E-100.8-3	Stress Rupture Factors for Type 304 Stainless Steel Welded With SFA-5.22 E316T and E316LT-1, -2, and -3; SFA-5.4 E316 and E316L; and SFA-5.9 ER316 and ER316L	1406
E-100.9-1	Stress Rupture Factors for Type 316 Stainless Steel Welded With SFA-5.22 E308T and E308LT, SFA-5.4 E308 and E308L, and SFA-5.9 ER308 and ER308L	1407
E-100.9-2	Stress Rupture Factors for Type 316 Stainless Steel Welded With SFA-5.22 EXXXT-G (16-8-2 Chemistry), SFA-5.4 E16-8-2, and SFA-5.9 ER16-8-2	1407
E-100.9-3	Stress Rupture Factors for Type 316 Stainless Steel Welded With SFA-5.22 E316T and E316LT-1 and -2, SFA-5.4 E316 and E316L, and SFA-5.9 ER316 and ER316L	1407
E-100.10-1	Stress Rupture Factors for Alloy 800H Welded With SFA-5.11 ENiCrFe-2 (INCO A)	1408
E-100.10-2	Stress Rupture Factors for Alloy 800H Welded With SFA-5.14 ERNiCr-3 (INCO 82)	1408
E-100.11-1	Stress Rupture Factors for 2 ¹ / ₄ Cr-1Mo (415/205) Welded With SFA-5.28 E90C-B3, SFA-5.28 ER90S-B3, SFA-5.5 E90XX-B3 (>0.05C), SFA-5.23 EB3, SFA-5.23 ECB3 (>0.05C), and SFA-5.29 E90T1-B3 (>0.05C)	1408
E-100.12-1	Stress Rupture Factors for 9Cr-1Mo-V Welded With SFA-5.28 ER90S-B9, SFA-5.5 E90XX-B9, and SFA-5.23 EB9	1409
E-100.13-1	Permissible Materials for Bolting	1409
E-100.14-1	S_o — Maximum Allowable Stress Intensity, MPa, for Design Condition Calculations of Bolting Materials	1410
E-100.23-1	Recommended Restrictions	1480
E-100.24-1	Cross-Reference Table of Section II, Part D and Section III, Subsection NH 2015 Edition	1480
ENDNOTES	1485

LIST OF SECTIONS

(25)

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^{*}

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

^{*} 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.

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 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.