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2007 ASME Boiler & Pressure Vessel Code

2008a Addenda

July 1, 2008

VIII

Division 2

Alternative Rules

RULES FOR CONSTRUCTION OF PRESSURE VESSELS

ASME Boiler and Pressure Vessel Committee
Subcommittee on Pressure Vessels



The American Society of
Mechanical Engineers



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2007 ASME

BOILER AND PRESSURE VESSEL CODE

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ADDENDA

Colored-sheet Addenda, which include additions and revisions to individual Sections of the Code, are published annually and will be sent automatically to purchasers of the applicable Sections up to the publication of the 2010 Code. The 2007 Code is available only in the loose-leaf format; accordingly, the Addenda will be issued in the loose-leaf, replacement-page format.

INTERPRETATIONS

ASME issues written replies to inquiries concerning interpretation of technical aspects of the Code. The Interpretations for each individual Section will be published separately and will be included as part of the update service to that Section. Interpretations of Section III, Divisions 1 and 2, will be included with the update service to Subsection NCA.

Interpretations of the Code are distributed annually in July with the issuance of the edition and subsequent addenda. Interpretations posted in January at www.cstools.asme.org/interpretations are included in the July distribution.

CODE CASES

The Boiler and Pressure Vessel Committee meets 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 2007 Code Cases book: “Boilers and Pressure Vessels” and “Nuclear Components.” Supplements will be sent automatically to the purchasers of the Code Cases books up to the publication of the 2010 Code.

SUMMARY OF CHANGES

Addenda to the 2007 Edition of the Code are issued in the form of replacement pages. Revisions, additions, or deletions are incorporated directly into the affected pages. It is advisable, however, that all replaced pages be retained for reference.

Replace or insert the pages listed. Changes given below are identified on the pages by a vertical line placed next to the affected area.

For the listing below, the *Page* references the affected area. A vertical line placed next to the heading indicates *Location*. Revisions are listed under *Change*.

Record Numbers listed below are explained in more detail in "List of Changes in Record Number Order" following the Summary of Changes.

Page	Location	Change (Record Number)
xxiii–xxxiii	Roster	Updated to reflect 2008 Addenda
1-3	1.2.1.2.b	Removed word Local (07-255)
1-4	1.2.4.1	Removed word Local (07-255)
1-8	Table 1.1	Adopt SNT-TC-1A-2006 and CP-189-2006 (07-1679)
1-8	Table 1.1	Include ASME PCC-1 (07-301)
1-13	1.B.2.7	Removed word Local (07-255)
1-14	1.B.2.13	Added definition of "Specified Design Pressure" (07-246)
1-14	1.B.2.14	Paragraph renumbered (07-246)
2-4	2.2.2.1.d).1	Added reference to paragraph 4.1.5.2.a) (07-246)
2-4	2.2.2.1(f)	Revised paragraph to require the user to evaluate design conditions of 5.5.2.2 (a) through (f). (07-285)
2-5	2.2.2.1.g.3	Revised paragraph by adding consideration of filler material by user (07-318)
2-7	2.3.5	Revised paragraph to require Manufacturer to maintain records for a duration per Annex 2C. (06-1202)
2-8	2.4.2	Remove ' (07-1572)
2-17	2.C.3	Renumbered paragraphs (06-1202)
2-17	2.C.3.1.d.7	Revise paragraph (08-79)
2-17	2.C.3.2	Revised paragraph 2.C.3 to add new requirement for maintaining radiographic films. (06-1202)
3-1	Parts Contents	Page Number Change
3-8	3.2.9.1	Revised paragraph (03-1231)
3-8	3.2.9.1.b.5	Added definition of Round, Hexagonal and Octagonal Solid Forgings (03-1231)
3-15	3.7.4	Revised Paragraph to provided more specific guidance on the use of washers. (07-301)
3-25	3.11.2.4.b	Add material SA-723 (06-198)
3-32	3.11.7.1.b	Correct paragraph reference (07-1252)
3-34	3.11.8.1	Correct table reference (08-11)
3-39	Table 3.4	Correct Low Alloy Bolting diameter for SA-193 B7 (07-579)
3-53	Notes for Figures 3.3, 3.3M, 3.4, and 3.4M	Update notes regarding the impact test requirements for SA-723 (06-198)
3-55	Figure 3.6 and 3.6M	Revised Figures to incorporate new toughness requirement for materials having UTS > 95 ksi (07-303)

Page	Location	Change (Record Number)
3-60	Material Assignment Table for Figures 3.7, 3.7M, 3.8, 3.8M	Revised table for materials SA-182 Gr. 21 and Gr. 22 to Gr. F21 and F22 to correct the grade designations in Note a). For Materials SA-336 and SA-387 Added "liquid quenched and tempered" in Notes c) and d) for Revised Note h) to clarify the intent of this note to prevent the same material to also be considered as Curve C material. (07-1334)
3-65	Figure 3.12M	Correct punctuation on x axis
3-76	Table 3.A.1	Correct UNS number for material specification SA-738 (08-11)
3-98	Equation 3.D.1	Replace the variable "epsilon sub ts" with "epsilon sub t" (08-109)
3-99	Equation 3.D.15	Replace the variable partial derivative of "sigma" with partial derivative of "sigma sub t" (08-109)
3-100	Equation 3.D.16- 3.D.19	Replace the variable "sigma" with "sigma sub t" (08-109)
3-101	Nomenclature	Add the variable "epsilon sub t" and define as "total true strain" . Replace the definitions of "epsilon sub ta" and "epsilon sub tr" with "total true strain amplitude" and "total true strain range", respectively. Delete the definition of "sigma". (08-109)
4-2	Part Contents	Pages renumbered
4-7	4.1.5.2.a	Modified definition of design pressure. (07-246)
4-8	4.1.5.2.b	Inserted the word specified Modified definition of design pressure. (07-246)
4-48	4.3.2.2.a	Added formed head knuckle radius tolerance (07-1368)
4-54	Equation 4.3.36	Move $\cos \theta$ inside outer bracket in numerator (08-11)
4-55	Equation 4.3.40	Remove subscript i from D in denominator (08-11)
4-55	Equation 4.3.43	Revised to be preceded by a negative sign (07-1990)
4-55	Equation 4.3.44	Remove the joint efficiency factor, E (07-1990)
4-57	4.3.11.5.f	Correct reference to 4.4.12.2.h (08-11)
4-87	Equation 4.4.39	Correct constant to 0.063 (08-11)
4-87	Equation 4.4.41	Correct constant to 5.33 (08-11)
4-89	Equation 4.4.50	Correct equation for α (08-11)
4-115	Equation 4.5.4	Revised equation for Lr1 (07-1991)
4-115	Equation 4.5.10	Insert equation for LH2 for nozzle abutting the vessel wall and renumbered subsequent equations (07-1991)
4-115	Equation 4.5.19	Revise equation for λ (07-1991)
4-116	Equation 4.5.20	Clarify limits of applicability for variable thickness openings (07-1991)
4-116	Equation 4.5.21	Clarify limits of applicability for variable thickness openings and uniform thickness openings (07-1991)
4-116	Equation 4.5.28	Insert equation for a5b for nozzle abutting the vessel wall and renumbered subsequent equations (07-1991)
4-116	4.5.5.1.f	Insert word shell (07-1991)
4-117	4.5.5.1.j	Revise equation references and remove definition of allowable stress for vessels under external pressure (07-1991)
4-119	4.5.9.1	Revise paragraph reference to 4.5.8 (07-1991)
4-119	4.5.9.2	Revise paragraph reference to 4.5.8 (07-1991)

Page	Location	Change (Record Number)
4-120	Equation 4.5.73 and 4.5.74	Replace equation for Lh with 2 separate equations, one for nozzles inserted through the vessel wall and one for nozzles abutting the vessel wall and renumber subsequent equations (07-1991)
4-121	4.5.10.1.c	Revise equation references (07-1991)
4-121, 4-122	4.5.10.1.e	Revise equation references (07-1991)
4-121	Equation 4.5.85	Clarify limits of applicability for variable thickness openings (07-1991)
4-121	Equation 4.5.86	Clarify limits of applicability for variable thickness openings and uniform thickness openings (07-1991)
4-122	Equation 4.5.93	Insert equation for a5b for nozzles abutting the vessel wall and renumber subsequent equations (07-1991)
4-123	4.5.10.1.j	Revise equation references (07-1991)
4-125	4.5.12.1.d	Revise equation references (07-1991)
4-127	4.5.14.2.d	Revise equation references (07-1991)
4-128	4.5.14.3.b.1	Revise equation references (07-1991)
4-128	4.5.14.3.b.2	Revise equation references (07-1991)
4-129	4.5.14.3.b.3	Revise equation references (07-1991)
4-135	Figure 4.5.1	Add tw1 and tw2, remove equations for variable definitions (07-1991)
4-136	Figure 4.5.2	Add tw1 (07-1991)
4-312, 4-313	Table 4.16.1	Replace the term "asbestos" with "mineral fiber". (07-1030)
5-3	5.1.1.2	Delete Paragraph 5.1.1.2.a. and renumber paragraphs (08-109)
5-8	5.2.3.2.b	Added an example of a commonly used component, i.e. pipe elbow, which can experience a loss of stiffness due to deformation depending on the loading condition. (07-284)
5-15	5.5.2.2	Revised paragraph to indicate fatigue exemption is addressed in the Users Design Specification. (07-285)
5-56	5.A.1	deleted the incorrect reference to Appendix B1 (07-1709)
5-57	5.A.3.c	deleted the incorrect reference to Appendix B1 (07-1709)
6-5	6.1.2.5.c	Correct reference to Table 6.3 (08-79)
6-7	6.1.3.1.d.1	Correct word Detail (08-79)
6-9	6.1.6.2	Deleted word shall (08-79)
6-10	6.2.2.2	Corrected reference to QW-201 (08-79)
6-15	6.2.5.8	Remove phrase owner user or agent (07-318)
6-17	6.4.2.2.e.8	Add P-No. 10C Group 1 (08-79)
6-18	6.4.3.1	Add reference to WRC Bulletin 452, "Recommended Practices for Local Heating of Welds in Pressure Vessels" (07-344)
6-19	6.4.3.5	Add word provided (08-79)
6-19	6.4.3.6	Replace word this with the (08-79)
6-21	6.4.5.2.f.3	Replace word assure with ensure (08-79)
6-22	6.4.6.2	Correct reference to inch (08-79)
6-26	6.6.5.4.b.1	Correct spacing (08-79)
6-32	6.7.7.2.c	Remove words types of (07-354)

Page	Location	Change (Record Number)
6-33	6.7.8.5	Revised paragraph to allow the provisions of 6.7.8.4 for repairs to defects in welds in forgings with a carbon content exceeding 0.35% (07-357)
6-33	6.7.9.2	Correct reference to NPS 8 (08-79)
6-33	6.7.10.1.a	Replace word manufacture with manufacturing (08-79)
6-35	6.8.4.2.b	Delete 0.875 replace with 7/8 (08-79)
6-43	Table 6.5	Delete extra line (08-79)
6-46 - 6-61	Tables 6.8 - 6.15	Corrections to cooling rates, thicknesses, paragraph references (08-79)
6-59	Table 6.15	Added PWHT requirements for P-No 10C Group 1 materials (08-297)
6-62	Table 6.16	Corrections to format (08-79)
6-63	Table 6.17	Corrections to title and cooling rate (08-79)
6-71	Figure 6.6	Correct dimensioning for df (08-79)
7-1,7-2	Part Contents	Added paragraph 7.3.6
7-4	7.3.6	Add paragraph on qualification of NDE personnel (05-1376)
7-12	7.5.3.1.a	Correct reference to paragraph 2.3.5 (06-1202)
7-12	7.5.3.1.b	Revise to be consistent with paragraph 7.3.6 (05-1376)
7-13	7.5.3.2.a.3	new subparagraph iii) to address acceptance criteria for aligned linear indications. (08-259)
7-13	7.5.3.2.b.1.i	Revised to complete the definition of rounded indications. (08-269)
7-14	7.5.4.1.b	Revise to be consistent with paragraph 7.3.6 (05-1376)
7-16	7.5.5.1.g	Revise to be consistent with paragraph 7.3.6 (05-1376)
7-16	7.5.5.1.j.3	Revise to be consistent with paragraph 7.3.6 (05-1376)
7-18	7.5.6.1.b	Revise to be consistent with paragraph 7.3.6 (05-1376)
7-19	7.5.7.1.b	Revise to be consistent with paragraph 7.3.6 (05-1376)
7-19	7.5.8.1.b	Revise to be consistent with paragraph 7.3.6 (05-1376)
7-22	7.5.9.b	Revised paragraph 7.5.9(b) for greater clarity. (07-372)
7-24	Table 7.1	Correct reference to Annex 3.A (08-79)
7-25 - 7-27	Table 7.2	Revised for improved clarity, appearance and readability. Added joint types under Categories C, D and E. (06-1204)
7-45	Figure 7.11	Revised signs in Figure 7.11 sketches (b) and (c) to be consistent with Code Case 2235-9 (07-205)
7-51	7.A.3.1.a.1	Revised paragraph to remove redundancy (06-1207)
7-53,7-54	Table 7.A.1	Revise to be consistent with paragraph 7.3.6 (05-1376)

NOTE:

Volume 58 of the Interpretations to Section VIII, Division 2, of the ASME Boiler and Pressure Vessel Code follows the last page of this Addenda.

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
03-1231	Revised paragraph 3.2.9.1 Added to paragraph 3.2.9.1.b.5 definition of Round, Hexagonal and Octagonal Solid Forgings
05-1376	Added new paragraph 7.3.6 on qualification of NDE personnel Revised paragraphs 7.5.3.1, 7.5.4.1, 7.5.5.1, 7.5.6.1, 7.5.7.1, 7.5.8.1, and Table 7.A.1 to be consistent with new paragraph 7.3.6
06-198	Revised paragraph 3.11.2.4.b to add SA-723 Revised Notes for Figure 3.3, Figure 3.3M, Figure 3.4, and Figure 3.4M regarding the impact test requirements for SA-723.
06-1202	Revised paragraph 7.5.3.1a to refer user to paragraph 2.3.5. Revised paragraph 2.3.5 to require Manufacturer to maintain records for a duration per Annex 2C. Revised paragraph 2.C.3 to add new requirement for maintaining radiographic films.
06-1204	Revised Table 7.2 for improved clarity, appearance and readability. Added joint types under Categories C, D and E.
06-1207	Revised paragraph 7.A.3.1.a.1
07-205	Revised signs in Figure 7.11 sketches (b) and (c) to be consistent with Code Case 2235-9
07-246	Paragraph 1.B.2.13 added definition of "Specified Design Pressure" Renumbered paragraph 1.B.2.14 Paragraph 2.2.2.1.d.1) Added reference to paragraph 4.1.5.2.a) Paragraph 4.1.5.2.a) Modified definition of design pressure.
07-255	Revised Paragraph 1.2.1.2 b), 1.2.4.1 and Annex 1B by removing the word "local" from "Local Jurisdictional Authority"
07-284	Added an example, in paragraph 5.2.3.2(b), of a commonly used component, i.e. pipe elbow, which can experience a loss of stiffness due to deformation depending on the loading condition.
07-285	Revised paragraph 5.5.2.2 to indicate fatigue exemption is addressed in the Users Design Specification. Revised paragraph 2.2.2.1(f) to require the user to evaluate design conditions of 5.5.2.2 (a) through (f).
07-301	Revised Table 1.1 to include ASME PCC-1 Revised Paragraph 3.7.4 to provided more specific guidance on the use of washers.
07-303	Revised Figure. 3.6 Figure 3.6M to incorporate new toughness requirement for materials having UTS > 95 ksi

Record Number	Change
07-318	Revised paragraph 2.2.2.1(g)(3) by adding consideration of filler material by user Revised paragraph 6.2.5.8 by changing Owner-User to user or agent
07-344	Revised paragraph 6.4.3.1 to add reference to WRC Bulletin 452, "Recommended Practices for Local Heating of Welds in Pressure Vessels"
07-354	Revised paragraph 6.7.7.2.c to remove reference to types of welding.
07-357	Revised paragraph 6.7.8.5 to allow the provisions of 6.7.8.4 for repairs to defects in welds in forgings with a carbon content exceeding 0.35%
07-372	Revised paragraph 7.5.9(b) for greater clarity.
07-579	Revise Low Alloy Bolt Diameter for SA-193 B7 in Table 3.4
07-1030	Revised Table 4.16.1 to replace the term "asbestos" with "mineral fiber".
07-1334	Revised Material Assignment Table for Figures 3.7, 3.7M, 3.8, 3.8M for materials SA-182 Gr. 21 and Gr. 22 to Gr. F21 and F22 to correct the grade designations in Note a). For Materials SA-336 and SA-387 Added "liquid quenched and tempered" in Notes c) and d) for Revised Note h) to clarify the intent of this note to prevent the same material to also be considered as Curve C material.
07-1368	Paragraph 4.3.2.2.a). added formed head knuckle radius tolerance
07-1572	Errata Figure 7.11 correct to $s > a$ Paragraph 2.4.2 Remove ' Paragraph 3.11.7.1.b correct paragraph reference Paragraph 6.1.2.5.c
07-1679	Revised Table 1.1 to adopt SNT-TC-1A-2006 and CP-189-2006.
07-1709	Paragraphs 5.A.1 and 5.A.3(c) deleted the incorrect reference to Appendix B1
07-1990	Equation 4.3.43 was revised to be preceded by a negative sign Equation 4.3.44 the joint efficiency factor, E, was removed
07-1991	Revised equation 4.5.4 for $Lr1$ Insert equation 4.5.10 for LH2 for nozzle abutting the vessel wall and renumbered subsequent equations Revise equation 4.5.19 for λ Clarify limits of applicability for variable thickness openings in equation 4.5.20 Clarify limits of applicability for variable thickness openings and uniform thickness openings in equation 4.5.21 Insert equation 4.5.28 for $a5b$ for nozzle abutting the vessel wall and renumbered subsequent equations Insert word shell in paragraph 4.5.5.1.f Revise equation references and remove definition of allowable in paragraph 4.5.5.1.j stress for vessels under external pressure Revise paragraph reference to 4.5.8 in paragraph 4.5.9.1 Revise paragraph reference to 4.5.8 in paragraph 4.5.9.2 Replace equation for Lh with 2 separate equations, 4.5.73 and 4.5.74 one for nozzles inserted through the vessel wall and one for nozzles abutting the vessel wall and renumber subsequent equations Revise equation references in paragraph 4.5.10.1.c Revise equation references in paragraph 4.5.10.1.e Clarify limits of applicability for variable thickness openings in equation 4.5.85 Clarify limits of applicability for variable thickness openings and uniform thickness openings in equation 4.5.86 Insert equation for $a5b$ for nozzles abutting the vessel wall equation 4.5.93 and renumber subsequent equations Revise equation references in paragraph 4.5.10.1.j

Record Number	Change
	Revise equation references in paragraph 4.5.12.1.d Revise equation references in paragraph 4.5.14.2.d Revise equation references in paragraph 4.5.14.3.b.1 Revise equation references in paragraph 4.5.14.3.b.2 Revise equation references in paragraph 4.5.14.3.b.3 Add tw1 and tw2, remove equations for variable definitions in Figure 4.5.1 Add tw1 in Figure 4.5.2
08-11	<i>Correct table reference in paragraph 3.11.8.1</i> <i>Correct UNS number for material specification SA-738 in Table 3.A.1</i> <i>In Equation 4.3.36 Move $\cos \theta$ inside outer bracket in numerator</i> <i>In Equation 4.3.40 Remove subscript i from D in denominator</i> <i>Paragraph 4.3.11.5.f correct reference to 4.4.12.2.h</i> <i>In Equation 4.4.39 Correct constant to 0.063</i> <i>In Equation 4.4.41 Correct constant to 5.33</i> <i>In Equation 4.4.50 Correct equation for α</i>
08-79	Miscellaneous Errata in Paragraph 6.1.2.5.c Correct reference to Table 6.3 Paragraph 6.1.3.1.d.1 Correct word Detail Paragraph 6.1.6.2 Deleted word shall Paragraph 6.2.2.2 Corrected reference to QW-201 Paragraph 6.4.2.2.e.8 Add P-No. 10C Group 1 Paragraph 6.4.3.5 Add word provided Paragraph 6.4.3.6 Replace word this with the Paragraph 6.4.5.f.3 Replace word assure with ensure Paragraph 6.4.6.2 Correct reference to inch Paragraph 6.6.5.4.b.1 Correct spacing Paragraph 6.7.9.2 Correct reference to NPS 8 Paragraph 6.7.10.1.a Replace word manufacture with manufacturing Paragraph 6.8.4.2.b Delete 0.875 replace with 7/8 Table 6.5 Delete extra line Table 6.8 Corrections to cooling rates, thicknesses, paragraph references Table 6.9 Corrections to cooling rates, thicknesses, paragraph references Table 6.10 Corrections to cooling rates, thicknesses, paragraph references Table 6.11 Corrections to cooling rates, thicknesses, paragraph references Table 6.11A Corrections to cooling rates, thicknesses, paragraph references Table 6.12 Corrections to cooling rates, thicknesses, paragraph references Table 6.13 Corrections to cooling rates, thicknesses, paragraph references Table 6.14 Corrections to cooling rates, thicknesses, paragraph references Table 6.15 Corrections to cooling rates, thicknesses, paragraph references Table 6.16 Corrections to format Table 6.17 Corrections to title and cooling rate Figure 6.6 Correct dimensioning for df Paragraph 2.C.3.d.7 Table 7.1 Correct reference to Annex 3.A
08-109	Equation 3.D.1 Replace the variable "epsilon sub ts" with "epsilon sub t" Equation 3.D.15 Replace the variable partial derivative of "sigma" with partial derivative of "sigma sub t" Equations 3.D.16 through 3.D.19 Replace the variable "sigma" with "sigma sub t" Paragraph 3.D.6 Nomenclature, Add the variable "epsilon sub t" and define as "total true strain" . Replace the definitions of "epsilon sub ta" and "epsilon sub tr" with "total true strain amplitude" and "total true strain range", respectively.

Record Number	Change
	Delete the definition of "sigma". Delete Paragraph 5.1.1.2.a.
08-259	Added new subparagraph iii) to paragraph 7.5.3.2.a.2 to address acceptance criteria for aligned linear indications.
08-269	Revised 7.5.3.2.b.1.i to complete the definition of rounded indications.
08-297	Table 6.15. Added PWHT requirements for P-No 10C Group 1 materials

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FOREWORD

The American Society of Mechanical Engineers set up a committee in 1911 for the purpose of formulating standard rules for the construction of steam boilers and other pressure vessels. This committee is now called the Boiler and Pressure Vessel Committee.

The Committee's function is to establish rules of safety, relating only to pressure integrity, governing the construction¹ of boilers, pressure vessels, transport tanks and nuclear components, and inservice inspection for pressure integrity of nuclear components and transport tanks, and to interpret these rules when questions arise regarding their intent. This code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks and nuclear components, and the inservice inspection of nuclear components and transport tanks. The user of the Code should refer to other pertinent codes, standards, laws, regulations, or other relevant documents. With few 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. Recognizing this, the Committee has approved a wide variety of construction rules in this Section to allow the user or his designee to select those which will provide a pressure vessel having a margin for deterioration in service so as to give a reasonably long, safe period of usefulness. Accordingly, it is not intended that this Section be used as a design handbook; rather, engineering judgment must be employed in the selection of those sets of Code rules suitable to any specific service or need.

This Code contains mandatory requirements, specific prohibitions, and nonmandatory guidance for construction activities. The Code does not address all aspects of these activities and those aspects which 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 designers 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.

¹ *Construction*, as used in this Foreword, is an all-inclusive term comprising materials, design, fabrication, examination, inspection, testing, certification, and pressure relief.

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

The Code does not fully address tolerances. When dimensions, sizes, or other parameters are not specified with tolerances, the values of these parameters are considered nominal and allowable tolerances or local variances may be considered acceptable when based on engineering judgment and standard practices as determined by the designer.

The Boiler and Pressure Vessel Committee deals with the care and inspection of boilers and pressure vessels in service only to the extent of providing suggested rules of good practice as an aid to owners and their inspectors.

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 Boiler and Pressure Vessel Committee meets regularly to consider revisions of the rules, new rules as dictated by technological development, Code Cases, and requests for interpretations. Only the Boiler and Pressure Vessel 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 Mandatory Appendix covering preparation of technical inquiries). Proposed revisions to the Code resulting from inquiries will be presented to the Main Committee for appropriate action. The action of the Main Committee becomes effective only after confirmation by letter 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 and published at <http://cstools.asme.org/csconnect/public/index.cfm?PublicReview=Revisions> to invite comments from all interested persons. After the allotted time for public review and final approval by ASME, revisions are published annually in Addenda to the Code.

Code Cases may be used in the construction of components to be stamped with the ASME Code symbol beginning with the date of their approval by ASME.

After Code revisions are approved by ASME, they may be used beginning with the date of issuance shown on the Addenda. Revisions, except for revisions to material specifications in Section II, Parts A and B, become mandatory six months after such date of issuance, except for boilers or pressure vessels contracted for prior to the end of the six-month period. Revisions to material specifications are originated by the American Society for Testing and Materials (ASTM) and other recognized national or international organizations, and are usually adopted by ASME. However, those revisions may or may not have any effect on the suitability of material, produced to earlier editions of specifications, for use in ASME construction. ASME material specifications approved for use in each construction Code are listed in the Guidelines for Acceptable ASTM Editions in Section II, Parts A and B. These Guidelines list, for each specification, the latest edition adopted by ASME, and earlier and later editions considered by ASME to be identical for ASME construction.

The Boiler and Pressure Vessel Committee in the formulation of its rules and in the establishment of maximum design and operating pressures considers materials, construction, methods of fabrication, inspection, and safety devices.

The Code 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 ASME Boiler and Pressure Vessel Committee.

ASME is to be notified should questions arise concerning improper use of an ASME Code symbol.

The specifications for materials given in Section II are identical with or similar to those of specifications published by ASTM, AWS, and other recognized national or international organizations. When reference is made in an ASME material specification to a non-ASME specification for which a companion ASME specification exists, the reference shall be interpreted as applying to the ASME material specification. Not all materials included in the material specifications in Section II have been adopted for Code use. Usage is limited to those materials and grades adopted by at least one of the other Sections of the Code for application under rules of that Section. All materials allowed by these various Sections and used for construction within the scope of their rules shall be furnished in accordance with material specifications contained in Section II or referenced in the Guidelines for Acceptable ASTM Editions in Section II, Parts A and B, except where otherwise provided in Code Cases or in the applicable Section of the Code. Materials covered by these specifications are acceptable for use in items covered by the Code Sections only to the degree indicated in the applicable Section. Materials for Code use should preferably be ordered, produced, and documented on this basis; Guideline for Acceptable ASTM Editions in Section II, Part A and Guideline for Acceptable ASTM Editions in Section II, Part B list editions of ASME and year dates of specifications that meet ASME requirements and which may be used in Code construction. Material produced to an acceptable specification with requirements different from the requirements of the corresponding specifications listed in the Guideline for Acceptable ASTM Editions in Part A or Part B may also be used in accordance with the above, provided the material manufacturer or vessel manufacturer certifies with evidence acceptable to the Authorized Inspector that the corresponding requirements of specifications listed in the Guideline for Acceptable ASTM Editions in Part A or Part B have been met. Material produced to an acceptable material specification is not limited as to country of origin.

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 CODE SYMBOLS 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 Code Symbols 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 Code Symbols for the benefit of the users, the enforcement jurisdictions, and the holders of the symbols who comply with all requirements.

Based on these objectives, the following policy has been established on the usage in advertising of facsimiles of the symbols, 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 a Code Symbol 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.”

The ASME Symbol 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 a Code Symbol who may also use the facsimile in advertising to show that clearly specified items will carry the symbol. General usage is permitted only when all of a manufacturer’s items are constructed under the rules.

The ASME logo, which is the cloverleaf with the letters ASME within, shall not be used by any organization other than ASME.

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 Code Symbol Stamp described in the governing Section of the Code.

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

Symbols 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.

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The Equity Engineering Group, Inc.
The Material Properties Council, Inc.
The National Board of Boiler and Pressure Vessel Inspectors
The Pressure Vessel Research Council
UOP, LLC

To ensure that the 2007 edition of Section VIII, Division 2 addresses user requirements, Section VIII, Division 2 Certificate Holders listed below performed a beta test analysis of the new Section VIII, Division 2, by using it to design a vessel previously designed using the 2004 edition of Section VIII, Division 2. The testing process was critical in establishing the final quality of the new code. ASME would like to thank these organizations for performing this analysis.

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SUMMARY OF CHANGES

The 2007 Edition of this Code has been revised in its entirety. This edition, as described in the Foreword, becomes mandatory six months after the publication date of the 2007 Edition. To invoke this revision before the mandatory date, use the designation "2007 Edition" in documentation required by this Code. If you choose not to invoke this revision before the mandatory date, use the designation "2004 Edition through the 2006 Addenda" in documentation required by this Code.

NOTE: Volume 57 of the Interpretations to Section VIII-2 of the ASME Boiler and Pressure Vessel Code follows the last page of this Edition.

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PART 1

GENERAL REQUIREMENTS

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1.1 General

1.1.1 Introduction

1.1.1.1 This Division contains mandatory requirements, specific prohibitions, and non-mandatory guidance for the design, materials, fabrication, examination, inspection, testing, and certification of pressure vessels and their associated pressure relief devices.

1.1.1.2 The Code does not address all aspects of these activities. Those aspects that are not specifically addressed should not be considered prohibited and shall be addressed by appropriate engineering judgment. Engineering judgment shall be consistent with the philosophy of this Division, and such judgments shall never be used to overrule mandatory requirements or specific prohibitions of this Division.

1.1.2 Organization

1.1.2.1 The requirements of this Division are contained in the nine Parts listed below. Each of these Parts and Annexes is composed of paragraphs that are identified by an alphanumeric numbering system in accordance with the ISO Standard Template for the Preparation of Normative-Type Documents. References to paragraphs are made directly by reference to the paragraph number. For example, the Scope is referenced as paragraph 1.2.

- a) Part 1 – General Requirements, provides the scope of this division and establishes the extent of coverage
- b) Part 2 – Responsibilities and Duties, sets forth the responsibilities of the user and Manufacturer, and the duties of the Inspector
- c) Part 3 – Materials Requirements, provides the permissible materials of construction, applicable material specification and special requirements, physical properties, allowable stresses, and design fatigue curves
- d) Part 4 – Design By Rule Requirements, provides requirements for design of vessels and components using rules
- e) Part 5 – Design By Analysis Requirements, provides requirements for design of vessels and components using analytical methods
- f) Part 6 – Fabrication Requirements, provides requirements governing the fabrication of vessels and parts
- g) Part 7 – Examination and Inspection Requirements, provides requirements governing the examination and inspection of vessels and parts
- h) Part 8 – Pressure Testing Requirements, provides pressure testing requirements
- i) Part 9 – Pressure Vessel Overpressure Protection, provides rules for pressure relief devices

1.1.2.2 Mandatory and non-mandatory requirements are provided as normative and informative annexes, respectively, to the specific Part under consideration. The Normative Annexes address specific subjects not covered elsewhere in this Division and their requirements are mandatory when the subject covered is included in construction under this Division. Informative Annexes provide information and suggested good practices.

1.1.2.3 The materials, design, fabrication, examination, inspection, testing, and certification of pressure vessels and their associated pressure relief devices shall satisfy all applicable Parts and Normative Annexes shown above in order to qualify the construction in accordance with this Division.

1.1.3 Definitions

The definitions for the terminology used in this Part are contained in Annex 1.B.

1.2 Scope

1.2.1 Overview

1.2.1.1 In the scope of this division, pressure vessels are containers for the containment of pressure, either internal or external. This pressure may be obtained from an external source or by the application of heat from a direct or indirect source as a result of a process, or any combination thereof.

1.2.1.2 The rules of this Division may be used for the construction of the following pressure vessels.

- a) Vessels to be installed at a fixed (stationary) location for a specific service where operation and maintenance control is retained during the useful life of the vessel by the user and is in conformance with the User's Design Specification required by Part 2.
- b) Pressure vessels installed in ocean-going ships, barges, and other floating craft or used for motor vehicle or rail freight. For these applications it is necessary that prior written agreement with the jurisdictional authority be established covering operation and maintenance control for a specific service. This operation and maintenance control must be retained during the useful life of the pressure vessel by the user in conformance with the User's Design Specification required in Part 2. Such a pressure vessel as described above may be constructed and stamped within the scope of this Division provided it meets all other requirements as specified with the following additional provisions.
 - 1) Loading conditions imposed by movement of the pressure vessel during operation and by relocation of the pressure vessel between work sites or due to loading and discharge, as applicable, shall be considered in the design.
 - 2) The User's Design Specification shall include the agreements that define those aspects of operation and maintenance control unique to the particular pressure vessel.
- c) Pressure vessels or parts subject to direct firing from the combustion of fuel (solid, liquid, or gaseous), that are not within the scope of Sections I, III, or IV may be constructed in accordance with the rules of this Division.
- d) Unfired steam boilers shall be constructed in accordance with the rules of Section I or Section VIII, Division 1.
- e) The following pressure vessels in which steam is generated shall be constructed in accordance with the rules of Section VIII, Division 1 or this Division:
 - 1) Vessels known as evaporators or heat exchangers;
 - 2) Vessels in which steam is generated by the use of heat resulting from operation of a processing system containing a number of pressure vessels such as used in the manufacture of chemical and petroleum products; and
 - 3) Vessels in which steam is generated but not withdrawn for external use.

1.2.1.3 The scope of this Division has been established to identify components and parameters considered in formulating the rules given in this Division. Laws or regulations issued by municipality, state, provincial, federal, or other enforcement or regulatory bodies having jurisdiction at the location of an installation establish the mandatory applicability of the Code rules, in whole or in part, within the jurisdiction. Those laws or regulations may require the use of this Division of the Code for vessels or components not considered to be within its scope. These laws or regulations should be reviewed to determine size or service limitations of the coverage which may be different or more restrictive than those given here.