

ASME BOILER AND PRESSURE VESSEL CODE  
AN AMERICAN NATIONAL STANDARD

SECTION IV  
Rules for Construction of  
Heating Boilers

1983 EDITION

JULY 1, 1983



ASME BOILER AND PRESSURE VESSEL COMMITTEE  
SUBCOMMITTEE ON HEATING BOILERS

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS  
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# 1983 ASME

## BOILER AND PRESSURE VESSEL CODE

An American National Standard

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\*All Sections, except Section II, Parts A, B, and C, available in a separate SI Edition on October 1, 1983.

### ADDENDA

Colored-sheet Addenda, which include additions and revisions to individual Sections of the Code, are published twice a year and will be sent automatically to purchasers of the applicable Sections up to the publication of the 1986 Code. Both Editions of the 1983 Code are available only in the loose-leaf format; accordingly, the Addenda will be issued only in the loose-leaf, replacement-page format.

### Interpretations

ASME issues written replies to inquiries concerning interpretation of technical aspects of the Code. With the 1983 Edition, the Interpretations for each individual Section will be published separately and will be included with the Addenda service to that Section. Interpretations of Section III, Divisions 1 and 2, will be included with the Addenda service to Subsection NCA. Interpretations are not part of the Addenda to the Code.

### 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 which have been adopted appear in one or both of the 1983 Code Cases books: (1) Boilers and Pressure Vessels and (2) Nuclear Components. Supplements will be sent automatically to the purchasers of one or both the Code Cases books up to the publication of the 1986 Edition. The Code Cases books are not available in a separate SI Edition.

## 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 governing the design, fabrication, and inspection during construction of boilers and pressure vessels, and to interpret these rules when questions arise regarding their intent. 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 so as to give a reasonably long safe period of usefulness. Advancements in design and material and the evidence of experience have been recognized.

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 requests for interpretations and revisions of the rules, and to develop new rules as dictated by technological development. Inquiries must be addressed to the Secretary in writing and must give full particulars in order to receive consideration and a written interpretation. 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 the Council of the Society.

Proposed revisions to the Code approved by the Committee are submitted to the American National

Standards Institute and published in *Mechanical Engineering* to invite comments from all interested persons. After the allotted time for public review and final approval by ASME Council, revisions are published semiannually 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 the ASME Council.

After Code revisions are approved by Council they may be used beginning with the date of issuance shown on the Addenda. Revisions become mandatory as minimum requirements six months after such date of issuance, except for boilers or pressure vessels contracted for prior to the end of the six-month period.

Manufacturers and users of components are cautioned against making use of revisions and Cases that are less restrictive than former requirements without having assurance that they have been accepted by the proper authorities in the jurisdiction where the component is to be installed.

Each state and municipality in the United States and each province in the Dominion of Canada that adopts or accepts one or more Sections of the Boiler and Pressure Vessel Code is invited to appoint a representative to act on the Conference Committee to the Boiler and Pressure Vessel Committee. Since the members of the Conference Committee are in active contact with the administration and enforcement of the rules, the requirements for inspection in this Code correspond with those in effect in their respective jurisdictions. The required qualifications for an Authorized Inspector or an Authorized Nuclear Inspector under these rules may be obtained from the administrative authority of any state, municipality, or province which has adopted these rules.

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. Permission may be granted to regulatory bodies and organizations pub-

lishing safety standards to use a complete Section of the Code by reference. If usage of a Section, such as Section IX, involves exceptions, omissions, or changes in provisions, the intent of the Code might not be attained.

Where a state or other regulatory body, in the printing of any Section of the Boiler and Pressure Vessel Code, makes additions or omissions, it is recommended that such changes be clearly indicated.

The National Board of Boiler and Pressure Vessel Inspectors is composed of chief inspectors of states and municipalities in the United States and of provinces in the Dominion of Canada that have adopted the Boiler and Pressure Vessel Code. This Board, since its organization in 1919, has functioned to uniformly administer and enforce the rules of the Boiler and Pressure Vessel Code. The cooperation of that organization with the Boiler and Pressure Vessel Committee has been extremely helpful.

It should be pointed out that the state or municipality where the Boiler and Pressure Vessel Code has been made effective has definite jurisdiction over any particular installation. Inquiries dealing with problems of local character should be directed to the proper authority of such state or municipality. Such authority may, if there is any question or doubt as to the proper interpretation, refer the question to the Boiler and Pressure Vessel Committee.

The Specifications for base materials given in Section II, Parts A and B, are identical with or similar to those of The American Society for Testing and Materials. The Specifications for welding materials given in Section II, Part C, are identical with or similar to those of the American Welding Society. Use of the materials described in these Specifications is

covered by the rules in one or more Sections of the Boiler and Pressure Vessel Code. All materials allowed by these various Sections and used for construction within the scope of their rules shall be furnished in accordance with ASME Material Specifications contained in Section II 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; however, material produced under an ASTM Specification may be used in lieu of the corresponding ASME Specification, provided that the requirements of the ASTM Specification are identical (excluding editorial differences) or more stringent than the ASME Specification for the Grade, Class, or Type produced and provided that the material is confirmed as complying with the ASTM Specification. Material produced to an ASTM specification with requirements different from the requirements of the corresponding ASME Specification may also be used in accordance with the above, provided the material manufacturer or vessel manufacturer certifies with evidence acceptable to the Authorized Inspector or Authorized Nuclear Inspector that the corresponding ASME Specification requirements have been met. Material produced to an ASME or ASTM 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 which 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 Ameri-

can Society of Mechanical Engineers does not "approve," "certify," "rate," or "endorse" any item, construction, or activity and there shall be no statements or implications which 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.

## 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 which 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 which 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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## PREAMBLE

The rules of this Section of the Code cover minimum construction requirements for the design, fabrication, installation, and inspection of steam heating, hot water heating, hot water supply boilers which are directly fired with oil, gas, electricity, coal, or other solid or liquid fuels, and for operation at or below the pressure and temperature limits set forth in this document. Similar rules for potable water heaters are also included.

For Section IV application, the boiler proper or other vessels terminate at:

(a) the first circumferential joint for welding end connections;

(b) the face of the first flange in bolted flanged connections; or

(c) the first threaded joint in that type of connection.

The rules are divided into four major Parts: Part HG, applying to all materials of construction except as provided for in Part HLW; Part HF, applying to assemblies fabricated of wrought material, except as provided for in Part HLW; Part HC, applying to cast iron assemblies; and Part HLW, applying to potable water heaters. Part HF is further subdivided into Subpart HW, containing rules for welded construction, and Subpart HB, containing rules for brazed construction.

The Parts and Subparts of this Section are divided into

Articles. Each Article is given a number and a title, as for example, Part HG, Article 3, Design. Articles are divided into paragraphs which are given a three-digit number, the first of which corresponds to the Article number, thus, under Article 3 of Part HG will be found paragraph HG-307. Paragraphs are further subdivided into subparagraphs. Major subdivisions of paragraphs are designated by three- or four-digit numbers followed by a decimal point and a digit or digits. Where necessary, further subdivisions are represented by letters and then by figures in parentheses. Minor subdivisions of the paragraphs are also represented by letters. A reference to one of these paragraphs in the text of the Section includes all of the applicable rules in that paragraph. Thus, reference to HG-307 includes all the rules in HG-307.1 through HG-307.4.

This Section does not contain rules to cover all possible details of design and construction. Where complete details are not given, it is intended that the manufacturer, subject to the acceptance of the Authorized Inspector, shall provide details of design and construction which will be as safe as otherwise required by these rules.

When the strength of any part cannot be computed with a satisfactory assurance of safety, these rules provide procedures for establishing its maximum allowable working pressure.

# PART HG

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# ARTICLE 1

## SCOPE AND SERVICE RESTRICTIONS

### HG-100 SCOPE

The requirements of Part HG apply to steam heating boilers<sup>1</sup>, hot water heating boilers, hot water supply boilers, and to appurtenances thereto, and shall be used in conjunction with the specific requirements in Part HF, Boilers of Wrought Materials, and Part HC, Cast Iron Boilers, whichever is applicable. Part HG is not intended to apply to potable water heaters except as provided for in Part HLW.

<sup>1</sup>When used for services where periodic make-up is required, the user is cautioned that, normally, water treatment must be considered and usually extra provisions for cleanout are necessary.

### HG-101 SERVICE RESTRICTIONS

**HG-101.1 Service Restrictions.** The rules of this Section are restricted to the following services:

(a) steam boilers for operation at pressures not exceeding 15 psi;

(b) hot water heating boilers and hot water supply boilers for operating at pressures not exceeding 160 psi and/or temperatures not exceeding 250°F, at or near the boiler outlet.

**HG-101.2 Services in Excess of Those Covered by This Section.** For services exceeding the limits specified in HG-101.1, the rules of Section I shall apply.