ASME Boiler
and Pressure Vessel Code
an American National Standard

section

VIII

1974 edition

division 1

pressure vessels

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ASME BOILER AND PRESSURE VESSEL CODE

An American National Standard

SECTION VIII

Rules For Construction Of Pressure Vessels

Division 1

1974 EDITION

July 1, 1974

ASME BOILER AND PRESSURE VESSEL COMMITTEE
SUBCOMMITTEE ON PRESSURE VESSELS

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
UNITED ENGINEERING CENTER
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1974 ASME BOILER AND PRESSURE VESSEL CODE

An American National Standard

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*Available in bound and loose-leaf versions. The bound version is necessary for ASME Certification.

Code Cases

The Boiler and Pressure Vessel Committee meets regularly to consider requests for interpretations of the Code and to consider rulings for conditions encountered requiring special provisions. Those which have been adopted are in the 1974 Case Book. Modifications will be sent automatically to the purchasers of the Case Book up to the publication of the 1977 Edition.

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 1977 Code. Purchasers of the bound versions of the Sections will receive bound Addenda. Purchasers of the loose-leaf versions of the Sections will receive replacement pages approximately 3 months after the bound version is published.

Addenda Color Legend

Pink	Summer 1974	Blue	Winter 1975
Green	Winter 1974	Salmon	Summer 1976
Yellow	Summer 1975	Gray	Winter 1976

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 unfired 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. Inquiries must be in writing and must give full particulars in order to receive consideration. Requests for interpretations which are of a routine nature may be executed by the Secretary of the Boiler and Pressure Vessel Committee without reference to a subcommittee. All other requests are first referred to the proper subcommittee for consideration and for recommendation of action by the Main Committee. 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.

Committee rulings of general interest are published in *Mechanical Engineering* as Code Cases, and inquirers are advised of the action taken. Code revisions approved by the Committee are published in *Mechanical Engineering* as proposed addenda to the Code to invite comments from all interested persons. After final approval by the Committee and adoption by the ASME Council, they are printed in the addenda supplements 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 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, method of fabrication, inspection, and safety devices. Permission may be granted to regulatory bodies and organizations publishing 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 ASME 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. Its function is clearly recognized and, as a result, inquiries received which bear on the administration or application of the rules are referred directly to the National Board. Such handling of this type of inquiry not only simplifies the work of the Boiler and Pressure Vessel Committee, but action on the problem for the inquirer is thereby expedited. Where an inquiry is neither clearly an interpretation of the rules nor a problem of application or administration, it may be considered both by the Boiler and Pressure Vessel Committee and the National Board.

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 ASME 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 Materials 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 designated as complying with the corresponding ASME Specification, provided the latter Specification is indicated to be identical with the ASTM Specification for the Grade, Class, or Type produced, and provided the material is confirmed as complying with the ASTM Specification by material test report or certification of compliance from the material manufacturer.

STATEMENT OF POLICY ON THE USE OF CODE SYMBOLS IN ADVERTISING

The American Society of Mechanical Engineers established a series of symbols for the marking of boilers, pressure vessels, and nuclear power plant components, such as vessels, piping, pumps and valves, and certain appurtenances which have been constructed and inspected in compliance with the ASME Boiler and Pressure Vessel Code. 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 that objective, the following policy has been established on the usage in advertising of facsimiles of the symbols and reference to Code construction.

The American Society of Mechanical Engineers does not "approve," "certify," "rate", or "endorse" any product or construction and there shall be no statements or implications which might so indicate. A manufacturer holding a Code Symbol and a Certificate of Authorization may state in advertising literature that its products "are built 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 name plates 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 products will carry the symbol. General usage is permitted only when *all* of a manufacturer's products are constructed under the Rules.

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INTRODUCTION

SCOPE

U-1 SCOPE[1]

(a) The rules in this Division of Section VIII of the Code cover minimum construction requirements for the design, fabrication, inspection, and certification of pressure vessels other than those covered by Section I, Section III, and Section IV. This Section of the Code does not cover Fired Process Tubular Heaters.

Division 1 of Section VIII is divided into three Subsections. Subsection A consists of Part UG covering the general requirements applicable to all pressure vessels. Subsection B covers the specific requirements that are applicable to the various methods used in the fabrication of pressure vessels. It consists of Parts UW, UR, UF, and UB, dealing with welded, riveted, forged, and brazed methods, respectively. Subsection C covers specific requirements applicable to the several classes of materials used in pressure vessel construction. It consists of Parts UCS, UNF, UHA, UCI, UCL, UCD, and UHT dealing with carbon and low-alloy steels, nonferrous metals, high-alloy steels, cast iron, clad and lined material, cast ductile iron, and ferritic steels with properties enhanced by heat treatment, respectively.

(b) The rules of this Division of Section VIII of the Code have been formulated on the basis of design principles and construction practices applicable to vessels designed for pressures not exceeding 3000 psi. For pressures above 3000 psi, deviations from and additions to these rules usually are necessary to meet the requirements of design principles and construction practices for these higher pressures. Only in the event that after having applied these additional design principles and construction practices the vessel still complies with all of the requirements of the Code may it be stamped with the Code symbol.

[1] In those applications where there are laws or regulations issued by Municipal, State, Provincial or Federal Authorities covering pressure vessels, 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 in this paragraph.

(c) It is intended that Code jurisdiction over piping external to a pressure vessel shall terminate at:

(1) The first circumferential joint for welding end connections;

(2) The face of the first flange in bolted flanged connections;

(3) The first threaded joint in that type of connection.

(d) The following classifications are not considered to be within the jurisdiction of this Division of Section VIII.

(1) Pressure vessels subject to Federal control;

(2) Vessels with a nominal water containing capacity of 120 gallons or less for containing water under pressure, including those containing air, the compression of which serves only as a cushion;

(3) A hot water supply storage tank heated by steam or any other indirect means when none of the following limitations is exceeded:

(a) A heat input of 200,000 Btu per hr,

(b) A water temperature of 200 F,

(c) A nominal water containing capacity of 120 gallons.

(4) Vessels having an internal or external operating pressure not exceeding 15 psi with no limitation on size (see UG-28(e));

(5) Vessels having an inside diameter not exceeding 6 in. with no limitation on pressure.

(e) Unfired steam boilers as defined in Section I shall be constructed in accordance with the rules of Section I or this Division of Section VIII (see UW-2(c)). The following pressure vessels in which steam is generated shall be constructed in accordance with the rules of 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.

(f) Pressure vessels not covered by U-1(e)(1) and (2) or by Sections I, III, and IV, and not excluded by