ASME BPVC.SSC.X.II.V.XIII-2023



Summary of Significant Changes in the

2023 ASME Boiler and Pressure Vessel Code

Section X
Section II
Section V
Section XIII

ASME
SETTING THE STANDARD

ASME BPVC.SSC.X.II.V.XIII-2023

Summary of Significant Changes in the 2023 ASME Boiler and Pressure Vessel Code

Sections X, II, V, and XIII

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FOREWORD

This book is a companion to the 2023 ASME Boiler and Pressure Vessel Code (BPVC). It explains only significant changes to Code requirements that will be published in the 2023 Edition. It covers the following ASME BPVC Sections:

- Section X
- Section II, Parts A, B, and D
- Section V
- Section XIII

For each of the above Sections, an Introduction describes the historical background, scope of coverage, and commercial application of that Section. The list of changes follows the Introduction. The "Explanation" for each change provides the reason for the action and the value to the Code user. The sequence of the changes follows the order of the Code requirements.

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- Carlton R. Ramcharran, *S&C Project Engineering Manager*, Section V

ASME Press's *Online Companion Guide to the ASME Boiler and Pressure Vessel Codes: Criteria and Commentary on Select Aspects of the Boiler & Pressure Vessel and Piping Codes* (January 2020) provided source material for the Introduction preceding each list of changes. The complete Guide is available in the ASME Digital Collection at https://asmedigitalcollection.asme.org/ebooks/pages/onlinecompanionguide.

ASME gratefully acknowledges the members of the following volunteer committees, who are responsible for development of the ASME Boiler and Pressure Vessel Code Sections noted in this book:
- BPV Committee on Fiber-Reinforced Plastic Pressure Vessels (X)
- BPV Committee on Materials (II)
- BPV Committee on Nondestructive Examination (V)
- BPV Committee on Overpressure Protection (XIII)

SECTION X

Introduction

Section X is part of the ASME Boiler and Pressure Vessel Code (BPVC) and has been adopted by regulation in 37 jurisdictions of the United States and in the provinces of Canada. The scope of this Code covers pressure vessels constructed of thermosetting resin (e.g., epoxy, vinyl ester, polyester, furan, and phenolic) reinforced with glass fibers as well as pressure vessels reinforced with carbon or aramid fibers. The pressure range covered by Section X is 15 psig to 15,000 psig internal pressure, of which the upper limit depends on the size and construction of the vessel. In addition, Section X covers pressure vessels with external pressure from 0 psig to 15 psig.

The processes used to manufacture Section X pressure vessels include contact molding, bag molding, centrifugal casting, and filament winding.

Stress analysis of fiber-reinforced plastic (FRP) equipment involves plate-and-shell theory and lamination theory. Plate-and-shell theory is widely used by metal-vessel designers. Lamination theory is a branch of mechanics concerned with plates and shells made of layered material, where the layers are bonded together but have different elastic properties. Lamination theory is used in Section X and is essential to the engineering of FRP tanks and pressure vessels.

Acoustic-emission (AE) examination is a technology widely applied to new and in-service Section X FRP tanks and pressure vessels.

To ensure that pressure vessels fabricated according to Section X are capable of safely withstanding the operating conditions specified by the Design Specification, Section X

(a) gives minimum requirements for the materials of fabrication

(b) specifies test procedures for determining laminate mechanical properties

(c) defines methods of design qualification, as follows:

(1) Class I design is qualified by nondestructive qualification test.

(2) Class II design is qualified using mandatory design rules and acceptance testing by nondestructive evaluation methods.

(3) Class III design is qualified through the destructive test of a prototype.

(d) suggests nonmandatory design procedures for Class I vessels

(e) provides mandatory design procedures and acceptance testing for Class II vessels

(f) defines the general methods of fabrication that may be used

(g) limits the types of end closures, connections, and attachments that may be used and the means used to join them to the vessels

(h) stipulates the procedures to be used in proving that prototype vessels will withstand specified operating and test conditions

(i) establishes rules under which fabricating procedures for Class I and Class III prototype and production vessels are qualified, and defines what deviations from such procedures necessitate requalification

(j) provides requirements to ensure that no essential variation in qualified fabrication procedures has occurred

(k) establishes rules for acceptance testing, inspection, and reporting

(l) gives requirements for ASME Certification, stamping, and marking

When metallic components are an integral part of Section X fiber-reinforced plastic vessels, they comply with the requirements of Section VIII, Division 1.

Mandatory Appendix 9 requires that the fabricator establish the effective Code Edition, Addenda, and Code Cases for pressure vessels and replacement parts.