

SECTION III
Rules for Construction of
Nuclear Facility Components

2023 ASME Boiler and
Pressure Vessel Code
An International Code

Division 4
Fusion Energy Devices

Markings such as “ASME,” “ASME Standard,” or any other marking including “ASME,” ASME logos, 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 or Standard. Use of the ASME Single Certification Mark requires formal ASME certification; if no certification program is available, such ASME markings may not be used. (For Certification and Accreditation Programs, see <https://www.asme.org/certification-accreditation>.)

Items produced by parties not formally possessing an ASME Certificate may not be described, either explicitly or implicitly, as ASME certified or approved in any code forms or other document.

AN INTERNATIONAL CODE

2023 ASME Boiler & Pressure Vessel Code

2023 Edition

July 1, 2023



RULES FOR CONSTRUCTION OF NUCLEAR FACILITY COMPONENTS

Division 4

Fusion Energy Devices

ASME Boiler and Pressure Vessel Committee
on Construction of Nuclear Facility Components



The American Society of
Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: July 1, 2023

This international code or standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard. The standards committee that approved the code or standard was balanced to ensure that individuals from competent and concerned interests had an opportunity to participate. The proposed code or standard was made available for public review and comment, which provided an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not “approve,” “certify,” “rate,” or “endorse” any item, construction, proprietary device, or activity. ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor does ASME assume any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representatives or persons affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

The endnotes and preamble in this document (if any) are part of this American National Standard.



ASME Collective Membership Mark



ASME Single Certification Mark

“ASME” and the above ASME symbols are registered trademarks of The American Society of Mechanical Engineers.

No part of this document may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Library of Congress Catalog Card Number: 56-3934

Adopted by the Council of The American Society of Mechanical Engineers, 1914; latest edition 2023.

The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

Copyright © 2023 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All rights reserved
Printed in U.S.A.

| | | |
|--------------------------------|--|-----------|
| FAB-1200 | Magnetic Confinement | 16 |
| FAB-1300 | Vacuum Vessel | 18 |
| FAB-1400 | In-Vessel Components | 20 |
| SUBSECTION FB | PRESSURE BOUNDARY COMPONENTS | 21 |
| Subpart FBA | Magnets | 21 |
| Subpart FBB | Vacuum Vessel | 22 |
| Article FBB-1000 | Introduction | 22 |
| FBB-1100 | Functional Requirements | 22 |
| FBB-1200 | Vessel Shells | 22 |
| FBB-1300 | Port Structures | 23 |
| FBB-1400 | Supports and Mechanical Interfaces | 25 |
| FBB 1500 | VV Supports | 25 |
| FBB-1600 | Divertor Attachment | 26 |
| FBB-1700 | Port–Cryostat Interfaces | 26 |
| FBB-1800 | Cooling | 27 |
| FBB-1900 | Loading Conditions | 28 |
| Nonmandatory Appendix A | Topics in Development | 29 |
| | | |
| Figures | | |
| FAA-1300-1 | Typical Light Water Fission System | 3 |
| FAA-1300-2 | A Theoretical Magnetic Confinement–Based Fusion System | 4 |
| FAA-1300-3 | Categorization of Developing New Technologies | 5 |
| FAB-1210-1 | Vertical Cross Section of ARIES-AT Power Plant | 17 |
| | | |
| Table | | |
| FAA-7100-1 | Standards and Specifications Referenced in Division 4 | 13 |

LIST OF SECTIONS

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 Inspection and Testing of Components of Light-Water-Cooled Plants
 - 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, which 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. This 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.

This 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 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

* 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.

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 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 Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees). 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 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.

The words "shall," "should," and "may" are used in this Standard 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.

PERSONNEL

ASME Boiler and Pressure Vessel Standards Committees, Subgroups, and Working Groups

January 1, 2023

TECHNICAL OVERSIGHT MANAGEMENT COMMITTEE (TOMC)

| | |
|-------------------------------------|---|
| R. E. McLaughlin, <i>Chair</i> | W. M. Lundy |
| N. A. Finney, <i>Vice Chair</i> | D. I. Morris |
| S. J. Rossi, <i>Staff Secretary</i> | T. P. Pastor |
| G. Aurioles, Sr. | M. D. Rana |
| R. W. Barnes | S. C. Roberts |
| T. L. Bedeaux | F. J. Schaaf, Jr. |
| C. Brown | G. Scribner |
| D. B. DeMichael | W. J. Sperko |
| R. P. Deubler | D. Srnec |
| J. G. Feldstein | R. W. Swayne |
| G. W. Galanes | J. Vattappilly |
| J. A. Hall | M. Wadkinson |
| T. E. Hansen | B. K. Nutter, <i>Ex-Officio Member</i> |
| G. W. Hembree | M. J. Pischke, <i>Ex-Officio Member</i> |
| R. B. Keating | J. F. Henry, <i>Honorary Member</i> |
| B. Linnemann | |

Subgroup on Research and Development (TOMC)

| | |
|-------------------------------------|---------------------------------------|
| S. C. Roberts, <i>Chair</i> | R. B. Keating |
| S. J. Rossi, <i>Staff Secretary</i> | R. E. McLaughlin |
| R. W. Barnes | T. P. Pastor |
| N. A. Finney | D. Andrei, <i>Contributing Member</i> |
| W. Hoffelner | |

Subgroup on Strategic Initiatives (TOMC)

| | |
|-------------------------------------|------------------|
| N. A. Finney, <i>Chair</i> | M. H. Jawad |
| S. J. Rossi, <i>Staff Secretary</i> | R. B. Keating |
| R. W. Barnes | R. E. McLaughlin |
| T. L. Bedeaux | T. P. Pastor |
| G. W. Hembree | S. C. Roberts |

Task Group on Remote Inspection and Examination (SI-TOMC)

| | |
|-----------------------------|---|
| S. C. Roberts, <i>Chair</i> | M. Tannenbaum |
| P. J. Coco | J. Cameron, <i>Alternate</i> |
| N. A. Finney | A. Byk, <i>Contributing Member</i> |
| S. A. Marks | J. Pang, <i>Contributing Member</i> |
| R. Rockwood | S. J. Rossi, <i>Contributing Member</i> |
| C. Stevens | C. A. Sanna, <i>Contributing Member</i> |

Special Working Group on High Temperature Technology (TOMC)

| | |
|-------------------------|--------------|
| D. Dewees, <i>Chair</i> | B. F. Hantz |
| F. W. Brust | R. I. Jetter |
| T. D. Burchell | P. Smith |
| P. R. Donavin | |

ADMINISTRATIVE COMMITTEE

| | |
|-------------------------------------|-----------------|
| R. E. McLaughlin, <i>Chair</i> | M. J. Pischke |
| N. A. Finney, <i>Vice Chair</i> | M. D. Rana |
| S. J. Rossi, <i>Staff Secretary</i> | S. C. Roberts |
| J. Cameron | R. R. Stevenson |
| R. B. Keating | R. W. Swayne |
| B. Linnemann | M. Wadkinson |
| B. K. Nutter | |

MARINE CONFERENCE GROUP

| | |
|-------------------------------|----------------|
| J. Oh, <i>Staff Secretary</i> | H. N. Patel |
| J. G. Hungerbuhler, Jr. | N. Prokopuk |
| G. Nair | J. D. Reynolds |

CONFERENCE COMMITTEE

| | |
|--|--|
| R. D. Troutt — Texas, <i>Chair</i> | J. LeSage, Jr. — Louisiana |
| J. T. Amato — Ohio, <i>Secretary</i> | A. M. Lorimor — South Dakota |
| W. Anderson — Mississippi | M. Mailman — Northwest Territories, Canada |
| R. Becker — Colorado | W. McGivney — City of New York, New York |
| T. D. Boggs — Missouri | S. F. Noonan — Maryland |
| R. A. Boillard — Indiana | C. L. O'Guin — Tennessee |
| D. P. Brockerville — Newfoundland and Labrador, Canada | B. S. Oliver — New Hampshire |
| R. J. Bunte — Iowa | J. L. Oliver — Nevada |
| J. H. Burpee — Maine | P. B. Polick — Illinois |
| M. Carlson — Washington | J. F. Porcella — West Virginia |
| T. G. Clark — Oregon | B. Ricks — Montana |
| B. J. Crawford — Georgia | W. J. Ross — Pennsylvania |
| E. L. Creaser — New Brunswick, Canada | M. H. Sansone — New York |
| J. J. Dacanay — Hawaii | T. S. Seime — North Dakota |
| R. DeLury — Manitoba, Canada | C. S. Selinger — Saskatchewan, Canada |
| A. Denham — Michigan | J. E. Sharier — Ohio |
| C. Dinic — Ontario, Canada | R. Spiker — North Carolina |
| D. A. Ehler — Nova Scotia, Canada | D. Srnec — Alberta, Canada |
| S. D. Frazier — Washington | D. J. Stenrose — Michigan |
| T. J. Granneman II — Oklahoma | R. J. Stimson II — Kansas |
| S. Harder — Arizona | R. K. Sturm — Utah |
| M. L. Jordan — Kentucky | D. K. Sullivan — Arkansas |
| R. Kamboj — British Columbia, Canada | J. Taveras — Rhode Island |
| E. Kawa — Massachusetts | G. Teel — California |
| A. Khssassi — Quebec, Canada | D. M. Warburton — Florida |
| D. Kinney — North Carolina | M. Washington — New Jersey |
| K. S. Lane — Alaska | E. Wiggins — Alabama |

INTERNATIONAL INTEREST REVIEW GROUP

V. Felix
 Y.-G. Kim
 S. H. Leong
 W. Lin
 O. F. Manafa

C. Minu
 Y.-W. Park
 A. R. Reynaga Nogales
 P. Williamson

COMMITTEE ON POWER BOILERS (BPV I)

R. E. McLaughlin, *Chair*
 E. M. Ortman, *Vice Chair*
 U. D'Urso, *Staff Secretary*
 D. I. Anderson
 J. L. Arnold
 K. K. Coleman
 J. G. Feldstein
 S. Fincher
 G. W. Galanes
 T. E. Hansen
 J. S. Hunter
 M. Ishikawa
 M. Lemmons
 L. Moedinger
 Y. Oishi
 M. Ortolani
 A. Spangenberg
 D. E. Tompkins
 D. E. Tuttle

J. Vattappilly
 M. Wadkinson
 R. V. Wielgoszinski
 F. Zeller
 H. Michael, *Delegate*
 D. L. Berger, *Honorary Member*
 P. D. Edwards, *Honorary Member*
 D. N. French, *Honorary Member*
 J. Hainsworth, *Honorary Member*
 J. F. Henry, *Honorary Member*
 W. L. Lowry, *Honorary Member*
 J. R. MacKay, *Honorary Member*
 P. A. Molvie, *Honorary Member*
 J. T. Pillow, *Honorary Member*
 B. W. Roberts, *Honorary Member*
 R. D. Schueler, Jr., *Honorary Member*
 J. M. Tanzosh, *Honorary Member*
 R. L. Williams, *Honorary Member*
 L. W. Yoder, *Honorary Member*

Executive Committee (BPV I)

E. M. Ortman, *Chair*
 R. E. McLaughlin, *Vice Chair*
 D. I. Anderson
 J. L. Arnold
 J. R. Braun
 K. K. Coleman
 H. Dalal
 T. Dhanraj

U. D'Urso
 P. F. Gilston
 K. Hayes
 P. Jennings
 A. Spangenberg
 D. E. Tompkins
 M. Wadkinson

Subgroup on Design (BPV I)

D. I. Anderson, *Chair*
 L. S. Tsai, *Secretary*
 P. Becker
 L. Krupp
 C. T. McDaris

N. S. Ranck
 J. Vattappilly
 M. Wadkinson
 D. Dewees, *Contributing Member*
 J. P. Glaspie, *Contributing Member*

Subgroup on Fabrication and Examination (BPV I)

J. L. Arnold, *Chair*
 P. F. Gilston, *Vice Chair*
 P. Becker, *Secretary*
 K. K. Coleman
 S. Fincher
 G. W. Galanes
 T. E. Hansen

P. Jennings
 M. Lewis
 C. T. McDaris
 R. E. McLaughlin
 R. J. Newell
 Y. Oishi
 R. V. Wielgoszinski

Subgroup on General Requirements and Piping (BPV I)

D. E. Tompkins, *Chair*
 M. Wadkinson, *Vice Chair*
 M. Lemmons, *Secretary*
 R. Antoniuk
 T. E. Hansen
 M. Ishikawa
 R. E. McLaughlin
 L. Moedinger

B. J. Mollitor
 Y. Oishi
 E. M. Ortman
 D. E. Tuttle
 J. Vattappilly
 R. V. Wielgoszinski
 W. L. Lowry, *Contributing Member*

Subgroup on Locomotive Boilers (BPV I)

J. R. Braun, *Chair*
 S. M. Butler, *Secretary*
 G. W. Galanes
 D. W. Griner
 M. A. Janssen

S. A. Lee
 L. Moedinger
 G. M. Ray
 M. W. Westland

Subgroup on Materials (BPV I)

K. K. Coleman, *Chair*
 K. Hayes, *Vice Chair*
 M. Lewis, *Secretary*
 S. H. Bowes
 G. W. Galanes
 P. F. Gilston
 J. S. Hunter
 E. Liebl

F. Masuyama
 L. S. Nicol
 M. Ortolani
 D. W. Raho
 F. Zeller
 B. W. Roberts, *Contributing Member*
 J. M. Tanzosh, *Contributing Member*

Subgroup on Solar Boilers (BPV I)

P. Jennings, *Chair*
 R. E. Hearne, *Secretary*
 S. Fincher

J. S. Hunter
 P. Swarnkar

Task Group on Modernization (BPV I)

D. I. Anderson, *Chair*
 U. D'Urso, *Staff Secretary*
 J. L. Arnold
 D. Dewees
 G. W. Galanes
 J. P. Glaspie

T. E. Hansen
 R. E. McLaughlin
 E. M. Ortman
 D. E. Tuttle
 J. Vattappilly

Germany International Working Group (BPV I)

A. Spangenberg, *Chair*
 P. Chavdarov, *Secretary*
 B. Daume
 J. Fleischfresser
 C. Jaekel
 R. Kauer
 D. Koelbl
 S. Krebs
 T. Ludwig

R. A. Meyers
 H. Michael
 F. Miunske
 M. Sykora
 R. Helmholdt, *Contributing Member*
 J. Henrichsmeyer, *Contributing Member*
 B. Müller, *Contributing Member*

India International Working Group (BPV I)

| | |
|----------------------------------|-------------------|
| H. Dalal, <i>Chair</i> | S. Purkait |
| T. Dhanraj, <i>Vice Chair</i> | M. G. Rao |
| K. Thanupillai, <i>Secretary</i> | G. U. Shanker |
| P. Brahma | D. K. Shrivastava |
| S. Chakrabarti | K. Singha |
| A. Hantodkar | R. Sundararaj |
| A. J. Patil | S. Venkataramana |

Subgroup on International Material Specifications (BPV II)

| | |
|---------------------------------|---|
| M. Ishikawa, <i>Chair</i> | F. Zeller |
| P. Chavdarov, <i>Vice Chair</i> | C. Zhou |
| A. Chaudouet | O. Oldani, <i>Delegate</i> |
| H. Chen | H. Lorenz, <i>Contributing Member</i> |
| A. F. Garbolevsky | T. F. Miskell, <i>Contributing Member</i> |
| D. O. Henry | E. Uptis, <i>Contributing Member</i> |
| W. M. Lundy | |

COMMITTEE ON MATERIALS (BPV II)

| | |
|---|---|
| J. Cameron, <i>Chair</i> | L. S. Nicol |
| G. W. Galanes, <i>Vice Chair</i> | M. Ortolani |
| C. E. Rodrigues, <i>Staff Secretary</i> | D. W. Raho |
| A. Appleton | W. Ren |
| P. Chavdarov | E. Shapiro |
| K. K. Coleman | R. C. Sutherlin |
| D. W. Gandy | F. Zeller |
| J. F. Grubb | O. Oldani, <i>Delegate</i> |
| J. A. Hall | A. Chaudouet, <i>Contributing Member</i> |
| D. O. Henry | J. D. Fritz, <i>Contributing Member</i> |
| K. M. Hottle | W. Hoffelner, <i>Contributing Member</i> |
| M. Ishikawa | K. E. Orié, <i>Contributing Member</i> |
| K. Kimura | D. T. Peters, <i>Contributing Member</i> |
| M. Kowalczyk | B. W. Roberts, <i>Contributing Member</i> |
| D. L. Kurle | J. M. Tanzosh, <i>Contributing Member</i> |
| F. Masuyama | E. Uptis, <i>Contributing Member</i> |
| S. Neilsen | R. G. Young, <i>Contributing Member</i> |

Subgroup on Nonferrous Alloys (BPV II)

| | |
|---------------------------------|--|
| E. Shapiro, <i>Chair</i> | J. A. McMaster |
| W. MacDonald, <i>Vice Chair</i> | D. W. Raho |
| J. Robertson, <i>Secretary</i> | W. Ren |
| R. M. Beldyk | R. C. Sutherlin |
| J. M. Downs | R. Wright |
| J. F. Grubb | S. Yem |
| J. A. Hall | D. B. Denis, <i>Contributing Member</i> |
| D. Maitra | D. T. Peters, <i>Contributing Member</i> |

Subgroup on Physical Properties (BPV II)

| | |
|-------------------------------|---|
| P. K. Rai, <i>Chair</i> | R. D. Jones |
| S. Neilsen, <i>Vice Chair</i> | P. K. Lam |
| G. Aurioles, Sr. | D. W. Raho |
| D. Chandiramani | E. Shapiro |
| P. Chavdarov | D. K. Verma |
| H. Eshraghi | S. Yem |
| J. F. Grubb | D. B. Denis, <i>Contributing Member</i> |
| B. F. Hantz | |

Executive Committee (BPV II)

| | |
|---|--------------|
| J. Cameron, <i>Chair</i> | W. Hoffelner |
| C. E. Rodrigues, <i>Staff Secretary</i> | M. Ishikawa |
| A. Appleton | M. Ortolani |
| K. K. Coleman | P. K. Rai |
| G. W. Galanes | J. Robertson |
| J. F. Grubb | E. Shapiro |
| S. Guzey | |

Subgroup on Strength, Ferrous Alloys (BPV II)

| | |
|-------------------------------|---|
| M. Ortolani, <i>Chair</i> | M. Osterfoss |
| L. S. Nicol, <i>Secretary</i> | D. W. Raho |
| G. W. Galanes | S. Rosinski |
| J. A. Hall | M. Ueyama |
| M. Ishikawa | F. Zeller |
| S. W. Knowles | F. Abe, <i>Contributing Member</i> |
| F. Masuyama | R. G. Young, <i>Contributing Member</i> |

Subgroup on External Pressure (BPV II)

| | |
|-----------------------------------|------------------|
| S. Guzey, <i>Chair</i> | M. H. Jawad |
| E. Alexis, <i>Vice Chair</i> | S. Krishnamurthy |
| J. A. A. Morrow, <i>Secretary</i> | D. L. Kurle |
| L. F. Campbell | R. W. Mikitka |
| H. Chen | P. K. Rai |
| D. S. Griffin | M. Wadkinson |
| J. F. Grubb | |

Subgroup on Strength of Weldments (BPV II & BPV IX)

| | |
|--------------------------------|---|
| K. K. Coleman, <i>Chair</i> | J. Penso |
| K. L. Hayes, <i>Vice Chair</i> | D. W. Raho |
| S. H. Bowes, <i>Secretary</i> | W. J. Sperko |
| M. Denault | J. P. Swezy, Jr. |
| G. W. Galanes | M. Ueyama |
| D. W. Gandy | P. D. Flenner, <i>Contributing Member</i> |
| M. Ghahremani | B. W. Roberts, <i>Contributing Member</i> |
| W. F. Newell, Jr. | |

Subgroup on Ferrous Specifications (BPV II)

| | |
|---------------------------------|---|
| A. Appleton, <i>Chair</i> | S. G. Lee |
| K. M. Hottle, <i>Vice Chair</i> | W. C. Mack |
| C. Hyde, <i>Secretary</i> | J. Nickel |
| D. Amire-Brahimi | K. E. Orié |
| G. Cuccio | D. Poweleit |
| O. Elkadim | E. Uptis |
| D. Fialkowski | L. Watzke |
| J. F. Grubb | J. D. Fritz, <i>Contributing Member</i> |
| D. S. Janikowski | C. Meloy, <i>Contributing Member</i> |
| Y.-J. Kim | |

Working Group on Materials Database (BPV II)

| | |
|--|---|
| W. Hoffelner, <i>Chair</i> | J. Cameron, <i>Contributing Member</i> |
| C. E. Rodrigues, <i>Staff Secretary</i> | J. F. Grubb, <i>Contributing Member</i> |
| F. Abe | D. T. Peters, <i>Contributing Member</i> |
| W. MacDonald | W. Ren, <i>Contributing Member</i> |
| R. C. Sutherlin | B. W. Roberts, <i>Contributing Member</i> |
| D. Andrei, <i>Contributing Member</i> | E. Shapiro, <i>Contributing Member</i> |
| J. L. Arnold, <i>Contributing Member</i> | |

Working Group on Creep Strength Enhanced Ferritic Steels (BPV II)

| | |
|----------------------------------|---|
| M. Ortolani, <i>Chair</i> | T. Melfi |
| G. W. Galanes, <i>Vice Chair</i> | W. F. Newell, Jr. |
| P. Becker, <i>Secretary</i> | J. J. Sanchez-Hanton |
| S. H. Bowes | J. A. Siefert |
| K. K. Coleman | W. J. Sperko |
| K. Kimura | F. Zeller |
| M. Lang | F. Abe, <i>Contributing Member</i> |
| S. Luke | P. D. Flenner, <i>Contributing Member</i> |
| F. Masuyama | J. M. Tanzosh, <i>Contributing Member</i> |

Working Group on Data Analysis (BPV II)

| | |
|---------------------------|---|
| J. F. Grubb, <i>Chair</i> | M. J. Swindeman |
| W. Ren, <i>Vice Chair</i> | F. Abe, <i>Contributing Member</i> |
| K. Kimura | W. Hoffelner, <i>Contributing Member</i> |
| F. Masuyama | W. C. Mack, <i>Contributing Member</i> |
| S. Neilsen | D. T. Peters, <i>Contributing Member</i> |
| M. Ortolani | B. W. Roberts, <i>Contributing Member</i> |

China International Working Group (BPV II)

| | |
|-------------------------|----------------|
| T. Xu, <i>Secretary</i> | S. Tan |
| W. Cai | C. Wang |
| W. Fang | Jinguang Wang |
| Q. C. Feng | Jiongxian Wang |
| S. Huo | Q.-J. Wang |
| F. Kong | X. Wang |
| H. Leng | H.-C. Yang |
| Hli Li | J. Yang |
| Hongbin Li | L. Yin |
| J. Li | H. Zhang |
| S. Liu | X.-H. Zhang |
| Z. Rongcan | Y. Zhang |

COMMITTEE ON CONSTRUCTION OF NUCLEAR FACILITY COMPONENTS (BPV III)

| | |
|--------------------------------------|---|
| R. B. Keating, <i>Chair</i> | K. Matsunaga |
| T. M. Adams, <i>Vice Chair</i> | B. McGlone |
| D. E. Matthews, <i>Vice Chair</i> | S. McKillop |
| A. Maslowski, <i>Staff Secretary</i> | J. McLean |
| A. Appleton | J. C. Minichiello |
| S. Asada | M. N. Mitchell |
| R. W. Barnes | T. Nagata |
| W. H. Borter | J. B. Ossmann |
| M. E. Cohen | S. Pellet |
| R. P. Deubler | E. L. Pleins |
| P. R. Donavin | T.-L. Sham |
| A. C. Eberhardt | W. J. Sperko |
| J. V. Gardiner | W. Windes |
| J. Grimm | C. Basavaraju, <i>Alternate</i> |
| S. Hunter | C. T. Smith, <i>Contributing Member</i> |
| R. M. Jessee | W. K. Sowder, Jr., <i>Contributing Member</i> |
| R. I. Jetter | M. Zhou, <i>Contributing Member</i> |
| C. C. Kim | E. B. Branch, <i>Honorary Member</i> |
| G. H. Koo | G. D. Cooper, <i>Honorary Member</i> |
| D. W. Lewis | D. F. Landers, <i>Honorary Member</i> |
| M. A. Lockwood | C. Pieper, <i>Honorary Member</i> |
| K. A. Manoly | |

Executive Committee (BPV III)

| | |
|--------------------------------|----------------------------------|
| R. B. Keating, <i>Chair</i> | K. A. Manoly |
| A. Maslowski, <i>Secretary</i> | D. E. Matthews |
| T. M. Adams | S. McKillop |
| P. R. Donavin | J. McLean |
| J. V. Gardiner | T.-L. Sham |
| J. Grimm | W. K. Sowder, Jr. |
| D. W. Lewis | K. A. Kavanagh, <i>Alternate</i> |

Argentina International Working Group (BPV III)

| | |
|-------------------------------------|-----------------|
| M. F. Liendo, <i>Chair</i> | A. J. Dall'Osto |
| J. Fernández, <i>Vice Chair</i> | J. I. Duo |
| O. Martinez, <i>Staff Secretary</i> | M. M. Gamizo |
| O. A. Verastegui, <i>Secretary</i> | I. M. Guerreiro |
| E. H. Aldaz | I. A. Knorr |
| G. O. Anteri | D. E. Matthews |
| A. P. Antipasti | A. E. Pastor |
| D. O. Bordato | M. Rivero |
| G. Bourguigne | M. D. Vigliano |
| M. Brusa | P. Yamamoto |
| A. Claus | M. Zunino |
| R. G. Cocco | |

China International Working Group (BPV III)

| | |
|-------------------------|-------------|
| Y. Wang, <i>Chair</i> | C. Peiyin |
| H. Yu, <i>Secretary</i> | Z. Sun |
| L. Feng | G. Tang |
| J. Gu | L. Ting |
| L. Guo | F. Wu |
| C. Jiang | C. Yang |
| D. Kang | P. Yang |
| Y. Li | W. Yang |
| H. Lin | H. Yin |
| S. Liu | D. Yuangang |
| W. Liu | G. Zhang |
| J. Ma | D. Zhao |
| K. Mao | Z. Zhong |
| D. E. Matthews | Q. Zhou |
| J. Ming | H. Zhu |
| W. Pei | |

Germany International Working Group (BPV III)

| | |
|--------------------------------|-------------|
| J. Wendt, <i>Chair</i> | C. Kuschke |
| D. Koelbl, <i>Vice Chair</i> | H.-W. Lange |
| R. Gersinska, <i>Secretary</i> | T. Ludwig |
| P. R. Donavin | X. Pitoiset |
| R. Döring | M. Reichert |
| C. G. Frantescu | G. Roos |
| A. Huber | J. Rudolph |
| R. E. Hueggenberg | L. Sybertz |
| C. Huttner | I. Tewes |
| E. Iacopetta | R. Tiete |
| M. H. Koeppen | F. Wille |

India International Working Group (BPV III)

| | |
|----------------------------------|----------------------|
| R. N. Sen, <i>Chair</i> | R. Kumar |
| S. B. Parkash, <i>Vice Chair</i> | S. Kumar |
| A. D. Bagdare, <i>Secretary</i> | M. Lakshminarasimhan |
| S. Aithal | T. Mukherjee |
| S. Benhur | D. Narain |
| N. M. Borwankar | A. D. Paranjpe |
| M. Brijlani | J. R. Patel |
| H. Dalal | E. L. Pleins |
| S. K. Goyal | T. J. P. Rao |
| A. Johori | V. Sehgal |
| A. P. Kishore | S. Singh |
| D. Kulkarni | B. K. Sreedhar |

Korea International Working Group (BPV III)

| | |
|-----------------------------|--------------|
| G. H. Koo, <i>Chair</i> | Y.-S. Kim |
| O.-S. Kim, <i>Secretary</i> | D. Kwon |
| H. Ahn | B. Lee |
| S. Cho | D. Lee |
| G.-S. Choi | S. Lee |
| M.-J. Choi | S.-G. Lee |
| S. Choi | H. Lim |
| J. Y. Hong | I.-K. Nam |
| N.-S. Huh | C.-K. Oh |
| J.-K. Hwang | C.-Y. Oh |
| S. S. Hwang | E.-J. Oh |
| C. Jang | C. Park |
| I. I. Jeong | H. Park |
| S. H. Kang | Y. S. Pyun |
| J.-I. Kim | T. Shin |
| J.-S. Kim | S. Song |
| M.-W. Kim | W. J. Sperko |
| S.-S. Kim | J. S. Yang |
| Y.-B. Kim | O. Yoo |

Seismic Design Steering Committee (BPV III)

| | |
|-------------------------------|--------------|
| T. M. Adams, <i>Chair</i> | G. H. Koo |
| F. G. Abatt, <i>Secretary</i> | A. Maekawa |
| G. A. Antaki | K. Matsunaga |
| C. Basavaraju | J. McLean |
| D. Chowdhury | R. M. Pace |
| R. Döring | D. Watkins |

Task Group on Alternate Requirements (BPV III)

| | |
|--------------------------------|----------------|
| J. Wen, <i>Chair</i> | D. E. Matthews |
| R. R. Romano, <i>Secretary</i> | S. McKillop |
| P. J. Coco | B. P. Nolan |
| P. R. Donavin | J. B. Ossmann |
| J. V. Gardiner | E. C. Renaud |
| J. Grimm | M. A. Richter |
| R. S. Hill III | I. H. Tseng |
| M. Kris | Y. Wang |
| M. A. Lockwood | |

United Kingdom International Working Group (BPV III)

| | |
|-----------------------------------|--|
| C. D. Bell, <i>Chair</i> | G. Innes |
| P. M. James, <i>Vice Chair</i> | S. A. Jones |
| C. B. Carpenter, <i>Secretary</i> | B. Pellereau |
| T. M. Adams | C. R. Schneider |
| T. Bann | J. W. Stairmand |
| M. J. Chevalier | J. Sulley |
| A. J. Cole-Baker | J. Talamantes-Silva |
| M. Consonni | A. J. Holt, <i>Contributing Member</i> |
| M. J. Crathorne | |

Special Working Group on New Plant Construction Issues (BPV III)

| | |
|--------------------------------------|---|
| J. B. Ossmann, <i>Chair</i> | R. E. McLaughlin |
| A. Maslowski, <i>Staff Secretary</i> | E. L. Pleins |
| M. C. Buckley, <i>Secretary</i> | D. W. Sandusky |
| M. Arcaro | M. C. Scott |
| A. Cardillo | R. R. Stevenson |
| P. J. Coco | H. Xu |
| K. Harris | J. Yan |
| J. Honcharik | J. C. Minichiello, <i>Contributing Member</i> |
| M. Kris | |

Special Working Group on Editing and Review (BPV III)

| | |
|------------------------------|-------------------|
| D. E. Matthews, <i>Chair</i> | S. Hunter |
| R. P. Deubler | J. C. Minichiello |
| A. C. Eberhardt | J. F. Strunk |
| J. V. Gardiner | C. Wilson |

Special Working Group on HDPE Stakeholders (BPV III)

| | |
|--------------------------------|--------------------------|
| S. Patterson, <i>Secretary</i> | D. P. Munson |
| S. Choi | T. M. Musto |
| C. M. Faidy | J. E. O'Sullivan |
| M. Golliet | V. Rohatgi |
| R. M. Jessee | F. J. Schaaf, Jr. |
| J. Johnston, Jr. | R. Stakenborghs |
| M. Kuntz | M. Troughton |
| M. Lashley | B. Lin, <i>Alternate</i> |
| K. A. Manoly | |

Special Working Group on Honors and Awards (BPV III)

| | |
|---------------------------------|----------------|
| J. C. Minichiello, <i>Chair</i> | R. M. Jessee |
| A. Appleton | D. E. Matthews |
| R. W. Barnes | |

Special Working Group on International Meetings and IWG Liaisons (BPV III)

| | |
|--------------------------------------|---------------|
| D. E. Matthews, <i>Chair</i> | P. R. Donavin |
| A. Maslowski, <i>Staff Secretary</i> | E. L. Pleins |
| T. M. Adams | W. J. Sperko |
| R. W. Barnes | |

Joint ACI-ASME Committee on Concrete Components for Nuclear Service (BPV III)

J. McLean, *Chair*
L. J. Colarusso, *Vice Chair*
J. Cassamassino, *Staff Secretary*
A. Dinizulu, *Staff Secretary*
C. J. Bang
A. C. Eberhardt
B. D. Hovis
T. C. Inman
C. Jones
T. Kang
N.-H. Lee
J. A. Munshi
T. Muraki
J. S. Saini

J. F. Strunk
G. Thomas
A. Varma
S. Wang
A. Istar, *Alternate*
A. Adediran, *Contributing Member*
S. Bae, *Contributing Member*
J.-B. Domage, *Contributing Member*
P. S. Ghosal, *Contributing Member*
B. B. Scott, *Contributing Member*
M. R. Senecal, *Contributing Member*
Z. Shang, *Contributing Member*
M. Sircar, *Contributing Member*
C. T. Smith, *Contributing Member*

Special Working Group on Modernization (BPV III-2)

S. Wang, *Chair*
J. McLean, *Vice Chair*
A. Adediran
S. Malushte
J. S. Saini

A. Varma
F. Lin, *Contributing Member*
J. A. Pires, *Contributing Member*
I. Zivanovic, *Contributing Member*

Task Group on Steel-Concrete Composite Containments (BPV III-2)

A. Varma, *Chair*
S. Malushte
J. McLean

J. A. Pires
J. S. Saini

Working Group on Design (BPV III-2)

N.-H. Lee, *Chair*
S. Wang, *Vice Chair*
M. Allam
S. Bae
L. J. Colarusso
A. C. Eberhardt
B. D. Hovis
T. C. Inman
C. Jones
J. A. Munshi
T. Muraki
J. S. Saini

G. Thomas
A. Istar, *Alternate*
P. S. Ghosal, *Contributing Member*
S.-Y. Kim, *Contributing Member*
J. Kwon, *Contributing Member*
S. E. Ohler-Schmitz, *Contributing Member*
B. B. Scott, *Contributing Member*
Z. Shang, *Contributing Member*
M. Shin, *Contributing Member*
M. Sircar, *Contributing Member*

Working Group on Materials, Fabrication, and Examination (BPV III-2)

C. Jones, *Chair*
A. Eberhardt, *Vice Chair*
C. J. Bang
B. Birch
J.-B. Domage
T. Kang
N.-H. Lee

Z. Shang
J. F. Strunk
A. A. Aboelmagd, *Contributing Member*
P. S. Ghosal, *Contributing Member*
B. B. Scott, *Contributing Member*
I. Zivanovic, *Contributing Member*

Subcommittee on Design (BPV III)

P. R. Donavin, *Chair*
S. McKillop, *Vice Chair*
R. P. Deubler
M. A. Gray
R. I. Jetter
R. B. Keating
J.-I. Kim
K. A. Manoly
D. E. Matthews
M. N. Mitchell

B. Pellereau
T.-L. Sham
W. F. Weitzel
C. Basavaraju, *Alternate*
G. L. Hollinger, *Contributing Member*
M. H. Jawad, *Contributing Member*
W. J. O'Donnell, Sr., *Contributing Member*
K. Wright, *Contributing Member*

Subgroup on Component Design (SC-D) (BPV III)

D. E. Matthews, *Chair*
P. Vock, *Vice Chair*
S. Pellet, *Secretary*
T. M. Adams
D. J. Ammerman
G. A. Antaki
J. J. Arthur
S. Asada
J. F. Ball
C. Basavaraju
D. Chowdhury
N. A. Costanzo
R. P. Deubler
M. Kassar
D. Keck
T. R. Liszkai
K. A. Manoly
J. C. Minichiello

T. Mitsuhashi
D. Murphy
T. M. Musto
T. Nagata
G. Z. Tokarski
S. Willoughby-Braun
C. Wilson
A. A. Dermenjian, *Contributing Member*
P. Hirschberg, *Contributing Member*
R. B. Keating, *Contributing Member*
O.-S. Kim, *Contributing Member*
R. J. Masterson, *Contributing Member*
H. S. Mehta, *Contributing Member*
I. Saito, *Contributing Member*
J. P. Tucker, *Contributing Member*

Task Group to Improve Section III/XI Interface (SG-CD) (BPV III)

P. Vock, *Chair*
E. Henry, *Secretary*
G. A. Antaki
A. Cardillo
D. Chowdhury
J. Honcharik
J. Hurst
J. Lambin

C. A. Nove
T. Nuoffer
J. B. Ossmann
A. T. Roberts III
J. Sculli
A. Udyawar
S. Willoughby-Braun

Working Group on Core Support Structures (SG-CD) (BPV III)

D. Keck, *Chair*
R. Z. Ziegler, *Vice Chair*
R. Martin, *Secretary*
G. W. Delpont
L. C. Hartless
T. R. Liszkai
M. Nakajima

M. D. Snyder
R. Vollmer
T. M. Wiger
C. Wilson
Y. Wong
H. S. Mehta, *Contributing Member*

Working Group on Design of Division 3 Containment Systems (SG-CD) (BPV III)

D. J. Ammerman, *Chair*
S. Klein, *Secretary*
G. Bjorkman
V. Broz
D. W. Lewis
J. M. Piotter
A. Rigato
P. Sakalaukus, Jr.

D. Siromani
R. Sypulski
X. Zhai
X. Zhang
C. R. Sydnor, *Alternate*
J. C. Minichiello, *Contributing Member*

Working Group on HDPE Design of Components (SG-CD) (BPV III)

| | |
|---------------------------------|---|
| T. M. Musto, <i>Chair</i> | K. A. Manoly |
| J. B. Ossmann, <i>Secretary</i> | D. P. Munson |
| M. Brandes | F. J. Schaaf, Jr. |
| S. Choi | R. Stakenborghs |
| J. R. Hebeisen | M. T. Audrain, <i>Alternate</i> |
| P. Krishnaswamy | J. C. Minichiello, <i>Contributing Member</i> |
| M. Kuntz | |

Working Group on Valves (SG-CD) (BPV III)

| | |
|----------------------------|---------------------------|
| P. Vock, <i>Chair</i> | H. O'Brien |
| S. Jones, <i>Secretary</i> | J. O'Callaghan |
| M. C. Buckley | M. Rain |
| A. Cardillo | K. E. Reid II |
| G. A. Jolly | J. Sulley |
| J. Lambin | I. H. Tseng |
| T. Lippucci | J. P. Tucker |
| C. A. Mizer | Y. Wong, <i>Alternate</i> |

Working Group on Piping (SG-CD) (BPV III)

| | |
|----------------------------------|---|
| G. A. Antaki, <i>Chair</i> | J. O'Callaghan |
| G. Z. Tokarski, <i>Secretary</i> | K. E. Reid II |
| C. Basavaraju | D. Vlaicu |
| J. Catalano | S. Weindorf |
| F. Claeys | T. M. Adams, <i>Contributing Member</i> |
| C. M. Faidy | R. B. Keating, <i>Contributing Member</i> |
| R. G. Gilada | T. B. Littleton, <i>Contributing Member</i> |
| N. M. Graham | Y. Liu, <i>Contributing Member</i> |
| M. A. Gray | J. F. McCabe, <i>Contributing Member</i> |
| R. J. Gurdal | J. C. Minichiello, <i>Contributing Member</i> |
| R. W. Haupt | |
| A. Hirano | A. N. Nguyen, <i>Contributing Member</i> |
| P. Hirschberg | M. S. Sills, <i>Contributing Member</i> |
| M. Kassab | N. C. Sutherland, <i>Contributing Member</i> |
| J. Kawahata | |
| D. Lieb | E. A. Wais, <i>Contributing Member</i> |
| I.-K. Nam | C.-I. Wu, <i>Contributing Member</i> |

Working Group on Vessels (SG-CD) (BPV III)

| | |
|---------------------------------------|---|
| D. Murphy, <i>Chair</i> | T. J. Schriefer |
| S. Willoughby-Braun, <i>Secretary</i> | M. C. Scott |
| J. J. Arthur | P. K. Shah |
| C. Basavaraju | D. Vlaicu |
| M. Brijlani | C. Wilson |
| L. Constantinescu | R. Z. Ziegler |
| J. I. Kim | R. J. Huang, <i>Alternate</i> |
| O.-S. Kim | B. Basu, <i>Contributing Member</i> |
| D. E. Matthews | R. B. Keating, <i>Contributing Member</i> |
| T. Mitsuhashi | W. F. Weitze, <i>Contributing Member</i> |

Working Group on Pressure Relief (SG-CD) (BPV III)

| | |
|----------------------------------|---|
| K. R. May, <i>Chair</i> | K. Shores |
| R. Krithivasan, <i>Secretary</i> | I. H. Tseng |
| M. Brown | B. J. Yonsky |
| J. W. Dickson | Y. Wong, <i>Alternate</i> |
| S. Jones | J. Yu, <i>Alternate</i> |
| R. Lack | S. T. French, <i>Contributing Member</i> |
| D. Miller | D. B. Ross, <i>Contributing Member</i> |
| T. Patel | S. Ruesenberg, <i>Contributing Member</i> |

Subgroup on Design Methods (SC-D) (BPV III)

| | |
|----------------------------------|--|
| S. McKillop, <i>Chair</i> | W. D. Reinhardt |
| P. R. Donavin, <i>Vice Chair</i> | P. Smith |
| J. Wen, <i>Secretary</i> | R. Vollmer |
| K. Avrithi | W. F. Weitze |
| L. Davies | T. M. Adams, <i>Contributing Member</i> |
| M. A. Gray | C. W. Bruny, <i>Contributing Member</i> |
| J. V. Gregg, Jr. | S. R. Gosselin, <i>Contributing Member</i> |
| K. Hsu | H. T. Harrison III, <i>Contributing Member</i> |
| R. Kalnas | W. J. O'Donnell, Sr., <i>Contributing Member</i> |
| D. Keck | |
| J. I. Kim | K. Wright, <i>Contributing Member</i> |
| B. Pellereau | |

Working Group on Pumps (SG-CD) (BPV III)

| | |
|------------------------------------|---|
| D. Chowdhury, <i>Chair</i> | K. B. Wilson |
| J. V. Gregg, Jr., <i>Secretary</i> | Y. Wong |
| B. Busse | I. H. Tseng, <i>Alternate</i> |
| M. D. Eftychiou | X. Di, <i>Contributing Member</i> |
| R. A. Fleming | C. Gabhart, <i>Contributing Member</i> |
| K. J. Noel | R. Ladefian, <i>Contributing Member</i> |
| J. Sulley | |

Working Group on Supports (SG-CD) (BPV III)

| | |
|---------------------------------------|---|
| N. A. Costanzo, <i>Chair</i> | G. Thomas |
| U. S. Bandyopadhyay, <i>Secretary</i> | G. Z. Tokarski |
| K. Avrithi | L. Vandersip |
| N. M. Bisceglia | P. Wiseman |
| R. P. Deubler | R. J. Masterson, <i>Contributing Member</i> |
| N. M. Graham | |
| Y. Matsubara | J. R. Stinson, <i>Contributing Member</i> |
| S. Pellet | |

Special Working Group on Computational Modeling for Explicit Dynamics (SG-DM) (BPV III)

| | |
|-----------------------------------|-------------------------------------|
| G. Bjorkman, <i>Chair</i> | D. Siromani |
| D. J. Ammerman, <i>Vice Chair</i> | C.-F. Tso |
| V. Broz, <i>Secretary</i> | M. C. Yaksh |
| S. Kuehner | U. Zencker |
| D. Molitoris | X. Zhang |
| W. D. Reinhardt | Y. Wong, <i>Contributing Member</i> |

Working Group on Design Methodology (SG-DM) (BPV III)

B. Pellereau, *Chair*
 R. Vollmer, *Secretary*
 K. Avrithi
 C. Basavaraju
 F. Berkepille
 C. M. Faidy
 Y. Gao
 M. Kassar
 J. I. Kim
 T. R. Liszkai
 D. Lytle
 K. Matsunaga
 S. McKillop
 S. Ranganath
 W. D. Reinhardt
 P. K. Shah
 S. Wang
 W. F. Weitze

J. Wen
 T. M. Wiger
 K. Hsu, *Alternate*
 G. Banyay, *Contributing Member*
 D. S. Bartran, *Contributing Member*
 R. D. Blevins, *Contributing Member*
 M. R. Breach, *Contributing Member*
 C. W. Bruny, *Contributing Member*
 D. L. Caldwell, *Contributing Member*
 H. T. Harrison III, *Contributing Member*
 C. F. Heberling II, *Contributing Member*
 P. Hirschberg, *Contributing Member*
 R. B. Keating, *Contributing Member*
 A. Walker, *Contributing Member*
 K. Wright, *Contributing Member*

Working Group on Environmental Fatigue Evaluation Methods (SG-DM) (BPV III)

M. A. Gray, *Chair*
 W. F. Weitze, *Secretary*
 S. Asada
 K. Avrithi
 R. C. Cipolla
 T. M. Damiani
 C. M. Faidy
 A. Hirano
 P. Hirschberg
 K. Hsu
 J.-S. Park

B. Pellereau
 D. Vlaicu
 K. Wang
 R. Z. Ziegler
 S. Cuvilliez, *Contributing Member*
 T. D. Gilman, *Contributing Member*
 S. R. Gosselin, *Contributing Member*
 Y. He, *Contributing Member*
 H. S. Mehta, *Contributing Member*
 K. Wright, *Contributing Member*

Working Group on Fatigue Strength (SG-DM) (BPV III)

P. R. Donavin, *Chair*
 M. S. Shelton, *Secretary*
 R. S. Bass
 T. M. Damiani
 D. W. DeJohn
 C. M. Faidy
 P. Gill
 S. R. Gosselin
 R. J. Gurdal
 C. F. Heberling II
 C. E. Hinnant
 P. Hirschberg
 K. Hsu

J. I. Kim
 S. H. Kleinsmith
 B. Pellereau
 S. Ranganath
 Y. Wang
 W. F. Weitze
 Y. Zou
 S. Majumdar, *Contributing Member*
 H. S. Mehta, *Contributing Member*
 W. J. O'Donnell, Sr., *Contributing Member*
 K. Wright, *Contributing Member*

Working Group on Probabilistic Methods in Design (SG-DM) (BPV III)

M. Golliet, *Chair*
 R. Kalnas, *Vice Chair*
 K. Avrithi
 G. Brouette
 J. Hakii
 D. O. Henry

A. Hirano
 K. A. Manoly
 P. J. O'Regan
 B. Pellereau
 M. Yagodich
 R. S. Hill III, *Contributing Member*

Subgroup on Containment Systems for Spent Nuclear Fuel and High-Level Radioactive Material (BPV III)

D. W. Lewis, *Chair*
 D. J. Ammerman, *Vice Chair*
 S. Klein, *Secretary*
 G. Bjorkman
 V. Broz
 A. Rigato
 P. Sakalaukus, Jr.
 D. Siromani
 D. B. Spencer

R. Sypulski
 J. Wellwood
 X. J. Zhai
 X. Zhang
 D. Dunn, *Alternate*
 W. H. Borter, *Contributing Member*
 E. L. Pleins, *Contributing Member*
 N. M. Simpson, *Contributing Member*

Subgroup on Fusion Energy Devices (BPV III)

W. K. Sowder, Jr., *Chair*
 A. Maslowski, *Staff Secretary*
 M. Ellis, *Secretary*
 M. Bashir
 J. P. Blanchard
 T. P. Davis
 B. R. Doshi
 L. El-Guebaly
 G. Holtmeier
 D. Johnson
 I. Kimihiro

C. J. Lammi
 S. Lawler
 P. Mokaria
 D. J. Roszman
 F. J. Schaaf, Jr.
 P. Smith
 Y. Song
 C. Vangaasbeek
 I. J. Zatz
 R. W. Barnes, *Contributing Member*

Special Working Group on Fusion Stakeholders (BPV III-4)

T. P. Davis, *Chair*
 R. W. Barnes
 V. Chugh
 S. S. Desai
 F. Deschamps
 M. Hua
 S. Lawler

S. C. Middleburgh
 R. J. Pearson
 W. K. Sowder, Jr.
 D. A. Sutherland
 N. Young
 J. Zimmermann

Working Group on General Requirements (BPV III-4)

D. J. Roszman, *Chair*
 M. Ellis

P. Mokaria
 W. K. Sowder, Jr.

Working Group on In-Vessel Components (BPV III-4)

M. Bashir, *Chair*
 Y. Carin
 T. P. Davis

M. Kalsey
 S. T. Madabusi

Working Group on Magnets (BPV III-4)

W. K. Sowder, Jr., *Chair*

D. S. Bartran

Working Group on Materials (BPV III-4)

M. Porton, *Chair*
 T. P. Davis

P. Mummery

Working Group on Vacuum Vessels (BPV III-4)

I. Kimihiro, *Chair*
 L. C. Cadwallader
 B. R. Doshi

D. Johnson
 Q. Shijun
 Y. Song

Subgroup on General Requirements (BPV III)

| | |
|-------------------------------|---|
| J. V. Gardiner, <i>Chair</i> | E. C. Renaud |
| N. DeSantis, <i>Secretary</i> | T. N. Rezk |
| V. Apostolescu | J. Rogers |
| A. Appleton | R. Spuhl |
| S. Bell | D. M. Vickery |
| J. R. Berry | J. DeKleine, <i>Contributing Member</i> |
| G. Brouette | H. Michael, <i>Contributing Member</i> |
| G. C. Deleanu | D. J. Roszman, <i>Contributing Member</i> |
| J. W. Highlands | C. T. Smith, <i>Contributing Member</i> |
| E. V. Imbro | W. K. Sowder, Jr., <i>Contributing Member</i> |
| K. A. Kavanagh | G. E. Szabatura, <i>Contributing Member</i> |
| Y.-S. Kim | |
| B. McGlone | |

Subgroup on High Temperature Reactors (BPV III)

| | |
|---------------------------|---|
| T.-L. Sham, <i>Chair</i> | A. Mann |
| Y. Wang, <i>Secretary</i> | M. C. Messner |
| M. Ando | X. Wei |
| N. Broom | W. Windes |
| F. W. Brust | R. Wright |
| P. Carter | G. L. Zeng |
| M. E. Cohen | D. S. Griffin, <i>Contributing Member</i> |
| W. J. Geringer | X. Li, <i>Contributing Member</i> |
| B. F. Hantz | W. O'Donnell, Sr., <i>Contributing Member</i> |
| M. H. Jawad | L. Shi, <i>Contributing Member</i> |
| W. T. Jessup | R. W. Swindeman, <i>Contributing Member</i> |
| R. I. Jetter | |
| K. Kimura | |
| G. H. Koo | |

Special Working Group on General Requirements Consolidation (SG-GR) (BPV III)

| | |
|------------------------------|---|
| J. V. Gardiner, <i>Chair</i> | E. C. Renaud |
| J. Grimm, <i>Vice Chair</i> | J. L. Williams |
| G. C. Deleanu | C. T. Smith, <i>Contributing Member</i> |
| A. C. Eberhardt | |

Special Working Group on High Temperature Reactor Stakeholders (SG-HTR) (BPV III)

| | |
|---------------------------|--|
| M. E. Cohen, <i>Chair</i> | G. H. Koo |
| M. C. Albert | N. J. McTiernan |
| M. Arcaro | T. Nguyen |
| R. W. Barnes | K. J. Noel |
| N. Broom | T.-L. Sham |
| R. Christensen | B. Song |
| V. Chugh | X. Wei |
| W. Corwin | G. L. Zeng |
| G. C. Deleanu | T. Asayama, <i>Contributing Member</i> |
| R. A. Fleming | X. Li, <i>Contributing Member</i> |
| K. Harris | L. Shi, <i>Contributing Member</i> |
| R. I. Jetter | G. Wu, <i>Contributing Member</i> |
| Y. W. Kim | |

Working Group on General Requirements (SG-GR) (BPV III)

| | |
|----------------------------|---|
| B. McGlone, <i>Chair</i> | Y. K. Law |
| J. Grimm, <i>Secretary</i> | D. T. Meisch |
| V. Apostolescu | E. C. Renaud |
| A. Appleton | T. N. Rezk |
| S. Bell | J. Rogers |
| J. R. Berry | B. S. Sandhu |
| G. Brouette | R. Spuhl |
| P. J. Coco | J. F. Strunk |
| N. DeSantis | D. M. Vickery |
| Y. Diaz-Castillo | J. L. Williams |
| O. Elkadim | J. DeKleine, <i>Contributing Member</i> |
| J. Harris | S. F. Harrison, Jr., <i>Contributing Member</i> |
| J. W. Highlands | D. J. Roszman, <i>Contributing Member</i> |
| E. V. Imbro | G. E. Szabatura, <i>Contributing Member</i> |
| K. A. Kavanagh | |
| Y.-S. Kim | |

Task Group on Division 5 AM Components (SG-HTR) (BPV III)

| | |
|---------------------------|------------------|
| R. Wright, <i>Chair</i> | M. McMurtrey |
| R. Bass, <i>Secretary</i> | M. C. Messner |
| M. C. Albert | T. Patterson |
| R. W. Barnes | E. C. Renaud |
| F. W. Brust | D. Rudland |
| Z. Feng | T.-L. Sham |
| S. Lawler | I. J. Van Rooyen |
| X. Lou | X. Wei |

Working Group on General Requirements for Graphite and Ceramic Composite Core Components and Assemblies (SG-GR) (BPV III)

| | |
|------------------------------|--------------------------|
| W. J. Geringer, <i>Chair</i> | M. N. Mitchell |
| A. Appleton | J. Potgieter |
| J. R. Berry | E. C. Renaud |
| C. Cruz | R. Spuhl |
| Y. Diaz-Castillo | W. Windes |
| J. Lang | B. Lin, <i>Alternate</i> |

Working Group on Allowable Stress Criteria (SG-HTR) (BPV III)

| | |
|--------------------------------|---|
| R. Wright, <i>Chair</i> | W. Ren |
| M. McMurtrey, <i>Secretary</i> | T.-L. Sham |
| R. Bass | Y. Wang |
| K. Kimura | X. Wei |
| D. Maitra | M. Yoo, <i>Alternate</i> |
| R. J. McReynolds | R. W. Swindeman, <i>Contributing Member</i> |
| M. C. Messner | |
| J. C. Poehler | |

Working Group on Analysis Methods (SG-HTR) (BPV III)

| | |
|------------------------------|--|
| M. C. Messner, <i>Chair</i> | T.-L. Sham |
| H. Mahajan, <i>Secretary</i> | X. Wei |
| R. W. Barnes | S. X. Xu |
| J. A. Blanco | J. Young |
| P. Carter | M. R. Breach, <i>Contributing Member</i> |
| W. T. Jessup | T. Hassan, <i>Contributing Member</i> |
| R. I. Jetter | S. Krishnamurthy, <i>Contributing Member</i> |
| G. H. Koo | M. J. Swindeman, <i>Contributing Member</i> |
| H. Qian | |
| T. Riordan | |

Working Group on Creep-Fatigue and Negligible Creep (SG-HTR) (BPV III)

| | |
|-----------------------|--------------------------|
| Y. Wang, <i>Chair</i> | M. C. Messner |
| M. Ando | T. Nguyen |
| P. Carter | J. C. Poehler |
| M. E. Cohen | H. Qian |
| J. I. Duo | R. Rajasekaran |
| R. I. Jetter | T.-L. Sham |
| G. H. Koo | X. Wei |
| H. Mahajan | J. Young |
| M. McMurtrey | M. Yoo, <i>Alternate</i> |

Working Group on High Temperature Flaw Evaluation (SG-HTR) (BPV III)

| | |
|--------------------------------|--------------------------|
| C. J. Sallaberry, <i>Chair</i> | H. Qian |
| F. W. Brust | D. A. Scarth |
| P. Carter | D. J. Shim |
| S. Kalyanam | A. Udyawar |
| B.-L. Lyow | X. Wei |
| M. C. Messner | S. X. Xu |
| J. C. Poehler | M. Yoo, <i>Alternate</i> |

Working Group on Nonmetallic Design and Materials (SG-HTR) (BPV III)

| | |
|-----------------------------------|--|
| W. Windes, <i>Chair</i> | M. N. Mitchell |
| W. J. Geringer, <i>Vice Chair</i> | J. Parks |
| J. Potgieter, <i>Secretary</i> | T.-L. Sham |
| G. Beirnaert | A. Tzelepi |
| C. Chen | G. L. Zeng |
| A. N. Chereskin | M. Yoo, <i>Alternate</i> |
| V. Chugh | A. Appleton, <i>Contributing Member</i> |
| C. Contescu | R. W. Barnes, <i>Contributing Member</i> |
| N. Gallego | A. A. Campbell, <i>Contributing Member</i> |
| S. T. Gonczy | S.-H. Chi, <i>Contributing Member</i> |
| K. Harris | Y. Katoh, <i>Contributing Member</i> |
| M. G. Jenkins | A. Mack, <i>Contributing Member</i> |
| J. Lang | J. B. Ossmann, <i>Contributing Member</i> |
| M. P. Metcalfe | |

Subgroup on Materials, Fabrication, and Examination (BPV III)

| | |
|-----------------------------|--|
| J. Grimm, <i>Chair</i> | M. Kris |
| S. Hunter, <i>Secretary</i> | D. W. Mann |
| W. H. Bortner | T. Melfi |
| M. Brijlani | I.-K. Nam |
| G. R. Cannell | J. B. Ossmann |
| A. Cardillo | J. E. O'Sullivan |
| S. Cho | M. C. Scott |
| P. J. Coco | W. J. Sperko |
| R. H. Davis | J. R. Stinson |
| D. B. Denis | J. F. Strunk |
| B. D. Frew | W. Windes |
| D. W. Gandy | R. Wright |
| S. E. Gingrich | S. Yee |
| M. Golliet | H. Michael, <i>Delegate</i> |
| L. S. Harbison | A. L. Hiser, Jr., <i>Alternate</i> |
| R. M. Jessee | R. W. Barnes, <i>Contributing Member</i> |
| C. C. Kim | |

Task Group on Advanced Manufacturing (BPV III)

| | |
|-------------------------------|--------------------------------------|
| D. W. Mann, <i>Chair</i> | T. Melfi |
| D. W. Gandy, <i>Secretary</i> | E. C. Renaud |
| R. Bass | W. J. Sperko |
| D. Chowdhury | J. F. Strunk |
| P. J. Coco | J. Sulley |
| B. D. Frew | S. Tate |
| J. Grimm | S. Wolbert |
| A. L. Hiser, Jr. | H. Xu |
| J. Lambin | D. W. Pratt, <i>Alternate</i> |
| T. Lippucci | S. Malik, <i>Contributing Member</i> |
| K. Matsunaga | |

Joint Working Group on HDPE (SG-MFE) (BPV III)

| | |
|---------------------------------|--------------------------------------|
| M. Brandes, <i>Chair</i> | K. Manoly |
| T. M. Musto, <i>Chair</i> | D. P. Munson |
| J. B. Ossmann, <i>Secretary</i> | J. O'Sullivan |
| G. Brouette | V. Rohatgi |
| M. C. Buckley | F. Schaaf, Jr. |
| S. Choi | S. Schuessler |
| M. Golliet | R. Stakenborghs |
| J. Hebeisen | M. Troughton |
| J. Johnston, Jr. | P. Vibien |
| P. Krishnaswamy | J. Wright |
| M. Kuntz | T. Adams, <i>Contributing Member</i> |
| B. Lin | |

COMMITTEE ON HEATING BOILERS (BPV IV)

| | |
|--|--|
| M. Wadkinson, <i>Chair</i> | C. Dinic |
| J. L. Kleiss, <i>Vice Chair</i> | J. M. Downs |
| C. R. Ramcharran, <i>Staff Secretary</i> | J. A. Hall |
| B. Ahee | M. Mengon |
| L. Badziagowski | D. Nelson |
| T. L. Bedeaux | H. Michael, <i>Delegate</i> |
| B. Calderon | D. Picart, <i>Delegate</i> |
| J. P. Chicoine | P. A. Molvie, <i>Contributing Member</i> |

Executive Committee (BPV IV)

| | |
|--|----------------|
| M. Wadkinson, <i>Chair</i> | J. P. Chicoine |
| C. R. Ramcharran, <i>Staff Secretary</i> | J. A. Hall |
| L. Badziagowski | J. L. Kleiss |
| T. L. Bedeaux | |

Subgroup on Cast Boilers (BPV IV)

J. P. Chicoine, *Chair* J. A. Hall
J. M. Downs, *Vice Chair* J. L. Kleiss
C. R. Ramcharran, *Staff Secretary* M. Mengon
T. L. Bedeaux

Subgroup on Materials (BPV IV)

J. A. Hall, *Chair* T. L. Bedeaux
J. M. Downs, *Vice Chair* Y. Teng
C. R. Ramcharran, *Staff Secretary* M. Wadkinson
L. Badziagowski

Subgroup on Water Heaters (BPV IV)

J. L. Kleiss, *Chair* B. J. Iske
L. Badziagowski, *Vice Chair* M. Mengon
C. R. Ramcharran, *Staff Secretary* Y. Teng
B. Ahee T. E. Trant
J. P. Chicoine P. A. Molvie, *Contributing Member*
C. Dinic

Subgroup on Welded Boilers (BPV IV)

T. L. Bedeaux, *Chair* J. L. Kleiss
C. R. Ramcharran, *Staff Secretary* M. Mengon
B. Ahee M. Wadkinson
L. Badziagowski M. J. Melita, *Alternate*
B. Calderon D. Nelson, *Alternate*
J. P. Chicoine P. A. Molvie, *Contributing Member*
C. Dinic

Europe International Working Group (BPV IV)

L. Badziagowski, *Chair* E. Van Bruggen
D. Picart, *Vice Chair* G. Vicchi
R. Lozny A. Alessandrini, *Alternate*

COMMITTEE ON NONDESTRUCTIVE EXAMINATION (BPV V)

N. A. Finney, *Chair* B. D. Laite
C. May, *Vice Chair* P. B. Shaw
C. R. Ramcharran, *Staff Secretary* C. Vorwald
D. Bajula S. J. Akryn, *Contributing Member*
P. L. Brown J. E. Batey, *Contributing Member*
M. A. Burns A. S. Birks, *Contributing Member*
N. Carter N. Y. Faransso, *Contributing Member*
T. Clausing J. F. Halley, *Contributing Member*
C. Emslander R. W. Kruzic, *Contributing Member*
A. F. Garbolevsky L. E. Mullins, *Contributing Member*
P. T. Hayes F. J. Sattler, *Contributing Member*
G. W. Hembree H. C. Graber, *Honorary Member*
F. B. Kovacs T. G. McCarty, *Honorary Member*
K. Krueger

Executive Committee (BPV V)

C. May, *Chair* G. W. Hembree
N. A. Finney, *Vice Chair* F. B. Kovacs
C. R. Ramcharran, *Staff Secretary* K. Krueger
N. Carter E. Peloquin
V. F. Godinez-Azcuaga C. Vorwald
P. T. Hayes

Subgroup on General Requirements/Personnel Qualifications and Inquiries (BPV V)

C. Vorwald, *Chair* F. B. Kovacs
D. Bajula K. Krueger
N. Carter C. May
P. Chavdarov S. J. Akryn, *Contributing Member*
T. Clausing N. Y. Faransso, *Contributing Member*
C. Emslander J. F. Halley, *Contributing Member*
N. A. Finney D. I. Morris, *Contributing Member*
G. W. Hembree J. P. Swezy, Jr., *Contributing Member*

Project Team on Assisted Analysis (BPV V)

K. Hayes, *Chair* C. Hansen
J. Aldrin G. W. Hembree
J. Chen R. S. F. Orozco
N. A. Finney E. Peloquin
V. F. Godinez-Azcuaga T. Thulien

Subgroup on Volumetric Methods (BPV V)

C. May, *Chair* K. Krueger
P. T. Hayes, *Vice Chair* E. Peloquin
D. Adkins C. Vorwald
P. L. Brown S. J. Akryn, *Contributing Member*
N. A. Finney N. Y. Faransso, *Contributing Member*
A. F. Garbolevsky J. F. Halley, *Contributing Member*
R. W. Hardy R. W. Kruzic, *Contributing Member*
G. W. Hembree L. E. Mullins, *Contributing Member*
F. B. Kovacs F. J. Sattler, *Contributing Member*

Working Group on Radiography (SG-VM) (BPV V)

C. Vorwald, *Chair* T. R. Lerohl
D. M. Woodward, *Vice Chair* C. May
J. Anderson R. J. Mills
P. L. Brown J. F. Molinaro
C. Emslander T. Vidimos
A. F. Garbolevsky B. White
R. W. Hardy S. J. Akryn, *Contributing Member*
G. W. Hembree T. L. Clifford, *Contributing Member*
F. B. Kovacs N. Y. Faransso, *Contributing Member*
B. D. Laite R. W. Kruzic, *Contributing Member*

Working Group on Ultrasonics (SG-VM) (BPV V)

K. Krueger, *Chair* D. Tompkins
D. Bajula, *Vice Chair* D. Van Allen
D. Adkins J. Vinyard
C. Brown C. Vorwald
C. Emslander C. Wassink
N. A. Finney N. Y. Faransso, *Contributing Member*
P. T. Hayes J. F. Halley, *Contributing Member*
G. W. Hembree R. W. Kruzic, *Contributing Member*
B. D. Laite P. Mudge, *Contributing Member*
T. R. Lerohl L. E. Mullins, *Contributing Member*
C. May M. J. Quarry, *Contributing Member*
E. Peloquin F. J. Sattler, *Contributing Member*
J. Schoneweis J. Vanvelsor, *Contributing Member*

Working Group on Acoustic Emissions (SG-VM) (BPV V)

V. F. Godinez-Azcuaga, *Chair*
 J. Catty, *Vice Chair*
 S. R. Doctor

N. F. Douglas, Jr.
 R. K. Miller
 N. Y. Faransso, *Contributing Member*

Working Group on Full Matrix Capture (SG-VM) (BPV V)

E. Peloquin, *Chair*
 C. Wassink, *Vice Chair*
 D. Bajula
 D. Bellistri
 J. Catty
 N. A. Finney
 J. L. Garner
 R. T. Grotenhuis
 P. T. Hayes

G. W. Hembree
 K. Krueger
 M. Lozev
 R. Nogueira
 D. Richard
 M. Sens
 D. Tompkins
 J. F. Halley, *Contributing Member*
 L. E. Mullins, *Contributing Member*

Subgroup on Inservice Examination Methods and Techniques (BPV V)

P. T. Hayes, *Chair*
 E. Peloquin, *Vice Chair*
 M. A. Burns
 M. Carlson
 N. A. Finney
 V. F. Godinez-Azcuaga

G. W. Hembree
 K. Krueger
 C. May
 D. D. Raimander
 C. Vorwald

Subgroup on Surface Examination Methods (BPV V)

N. Carter, *Chair*
 B. D. Laite, *Vice Chair*
 R. M. Beldyk
 P. L. Brown
 T. Clausing
 C. Emslander
 N. Farenbaugh
 N. A. Finney
 A. F. Garbolevsky
 K. Hayes
 G. W. Hembree
 C. May

P. B. Shaw
 R. Tedder
 C. Vorwald
 C. Wassink
 D. M. Woodward
 S. J. Akryn, *Contributing Member*
 N. Y. Faransso, *Contributing Member*
 J. F. Halley, *Contributing Member*
 R. W. Kruzic, *Contributing Member*
 L. E. Mullins, *Contributing Member*
 F. J. Sattler, *Contributing Member*

Germany International Working Group (BPV V)

P. Chavdarov, *Chair*
 C. Kringe, *Vice Chair*
 H.-P. Schmitz, *Secretary*
 K.-H. Gischler

D. Kaiser
 S. Mann
 V. Reusch

India International Working Group (BPV V)

P. Kumar, *Chair*
 A. V. Bhagwat
 J. Chahwala
 S. Jobanputra
 D. Joshi

G. R. Joshi
 A. Relekar
 V. J. Sonawane
 D. B. Tanpure

Italy International Working Group (BPV V)

D. D. Raimander, *Chair*
 O. Oldani, *Vice Chair*
 C. R. Ramcharan, *Staff Secretary*
 P. Campli, *Secretary*
 M. Agostini
 T. Aldo
 F. Bresciani
 N. Caputo
 M. Colombo
 P. L. Dinelli
 F. Ferrarese

E. Ferrari
 M. A. Grimoldi
 G. Luoni
 U. Pappionetti
 P. Pedersoli
 A. Veroni
 M. Zambon
 V. Calo, *Contributing Member*
 G. Gobbi, *Contributing Member*
 A. Gusmaroli, *Contributing Member*
 G. Pontiggia, *Contributing Member*

COMMITTEE ON PRESSURE VESSELS (BPV VIII)

S. C. Roberts, *Chair*
 M. D. Lower, *Vice Chair*
 S. J. Rossi, *Staff Secretary*
 G. Auriolos, Sr.
 S. R. Babka
 R. J. Basile
 P. Chavdarov
 D. B. DeMichael
 J. F. Grubb
 B. F. Hantz
 M. Kowalczyk
 D. L. Kurle
 R. Mahadeen
 S. A. Marks
 P. Matkovics
 R. W. Mikitka
 B. R. Morelock
 T. P. Pastor
 D. T. Peters
 M. J. Pischke
 M. D. Rana
 G. B. Rawls, Jr.
 F. L. Richter

C. D. Rodery
 J. C. Sowinski
 D. Srnic
 D. B. Stewart
 P. L. Sturgill
 K. Subramanian
 D. A. Swanson
 J. P. Swezy, Jr.
 S. Terada
 E. Uptis
 A. Viet
 K. Xu
 P. A. McGowan, *Delegate*
 H. Michael, *Delegate*
 K. Oyamada, *Delegate*
 M. E. Pappionetti, *Delegate*
 A. Chaudouet, *Contributing Member*
 J. P. Glaspie, *Contributing Member*
 K. T. Lau, *Contributing Member*
 U. R. Miller, *Contributing Member*
 K. Mokhtarian, *Contributing Member*
 G. G. Karcher, *Honorary Member*
 K. K. Tam, *Honorary Member*

Executive Committee (BPV VIII)

M. D. Lower, *Chair*
 S. J. Rossi, *Staff Secretary*
 G. Auriolos, Sr.
 C. W. Cary
 J. Hoskinson
 M. Kowalczyk

S. A. Marks
 P. Matkovics
 S. C. Roberts
 J. C. Sowinski
 K. Subramanian
 K. Xu

Subgroup on Design (BPV VIII)

J. C. Sowinski, *Chair*
 C. S. Hinson, *Vice Chair*
 G. Aurioles, Sr.
 S. R. Babka
 O. A. Barsky
 R. J. Basile
 D. Chandiramani
 M. D. Clark
 M. Faulkner
 B. F. Hantz
 C. E. Hinnant
 M. H. Jawad
 S. Krishnamurthy
 D. L. Kurle
 K. Kuscu
 M. D. Lower
 R. W. Mikitka
 B. Millet

M. D. Rana
 G. B. Rawls, Jr.
 S. C. Roberts
 C. D. Rodery
 T. G. Seipp
 D. Srnic
 D. A. Swanson
 S. Terada
 J. Vattappilly
 K. Xu
 K. Oyamada, *Delegate*
 M. E. Papponetti, *Delegate*
 P. K. Lam, *Contributing Member*
 K. Mokhtarian, *Contributing Member*
 T. P. Pastor, *Contributing Member*
 S. C. Shah, *Contributing Member*
 K. K. Tam, *Contributing Member*
 E. Uptis, *Contributing Member*

Subgroup on General Requirements (BPV VIII)

J. Hoskinson, *Chair*
 M. Faulkner, *Vice Chair*
 N. Barkley
 R. J. Basile
 T. P. Beirne
 D. B. DeMichael
 M. D. Lower
 T. P. Pastor
 I. Powell
 G. B. Rawls, Jr.

F. L. Richter
 S. C. Roberts
 J. Rust
 J. C. Sowinski
 P. Speranza
 D. Srnic
 D. B. Stewart
 D. A. Swanson
 J. P. Glaspie, *Contributing Member*
 Y. Yang, *Contributing Member*

Task Group on Fired Heater Pressure Vessels (BPV VIII)

J. Hoskinson, *Chair*
 W. Kim
 S. Kirk
 D. Nelson
 T. P. Pastor

R. Robles
 J. Rust
 P. Shanks
 E. Smith
 D. Srnic

Working Group on Design-by-Analysis (BPV VIII)

B. F. Hantz, *Chair*
 T. W. Norton, *Secretary*
 D. A. Arnett
 J. Bedoya
 S. Guzey
 C. F. Heberling II
 C. E. Hinnant
 M. H. Jawad
 S. Kataoka
 S. Kilambi
 K. D. Kirkpatrick

S. Krishnamurthy
 A. Mann
 C. Nadarajah
 P. Prueter
 T. G. Seipp
 M. A. Shah
 S. Terada
 R. G. Brown, *Contributing Member*
 D. Dewees, *Contributing Member*
 K. Saboda, *Contributing Member*

Task Group on Subsea Applications (BPV VIII)

M. Sarzynski, *Chair*
 A. J. Grohmann, *Vice Chair*
 L. P. Antalffy
 R. C. Biel
 J. Ellens
 J. Hademenos
 J. Kaculi
 K. Karpanan
 F. Kirkemo

C. Lan
 P. Lutkiewicz
 N. McKie
 S. K. Parimi
 R. H. Patil
 M. P. Vaclavik
 R. Cordes, *Contributing Member*
 D. T. Peters, *Contributing Member*
 J. R. Sims, *Contributing Member*

Working Group on Elevated Temperature Design (BPV I and VIII)

A. Mann, *Chair*
 C. Nadarajah, *Secretary*
 D. Anderson
 D. Dewees
 B. F. Hantz
 M. H. Jawad
 R. I. Jetter
 S. Krishnamurthy

T. Le
 M. C. Messner
 M. N. Mitchell
 P. Prueter
 M. J. Swindeman
 J. P. Glaspie, *Contributing Member*
 N. McMurray, *Contributing Member*
 B. J. Mollitor, *Contributing Member*

Subgroup on Heat Transfer Equipment (BPV VIII)

P. Matkovic, *Chair*
 M. D. Clark, *Vice Chair*
 L. Bower, *Secretary*
 G. Aurioles, Sr.
 S. R. Babka
 J. H. Barbee
 O. A. Barsky
 T. Bunyarattaphantu
 A. Chaudouet
 D. L. Kurle

R. Mahadeen
 S. Mayeux
 S. Neilsen
 E. Smith
 A. M. Voytko
 R. P. Wiberg
 J. Pasek, *Contributing Member*
 D. Srnic, *Contributing Member*
 Z. Tong, *Contributing Member*

Subgroup on Fabrication and Examination (BPV VIII)

S. A. Marks, *Chair*
 D. I. Morris, *Vice Chair*
 T. Halligan, *Secretary*
 N. Carter
 J. Lu
 B. R. Morelock
 O. Mulet
 M. J. Pischke
 M. J. Rice
 J. Roberts
 C. D. Rodery

B. F. Shelley
 D. Smith
 P. L. Sturgill
 J. P. Swezy, Jr.
 E. Uptis
 C. Violand
 K. Oyamada, *Delegate*
 W. J. Bees, *Contributing Member*
 L. F. Campbell, *Contributing Member*
 R. Uebel, *Contributing Member*

Working Group on Plate Heat Exchangers (BPV VIII)

D. I. Morris, *Chair*
 S. R. Babka
 J. F. Grubb
 V. Gudge
 R. Mahadeen
 S. A. Marks

P. Matkovic
 M. J. Pischke
 P. Shanks
 E. Smith
 D. Srnic
 S. Sullivan

Subgroup on High Pressure Vessels (BPV VIII)

K. Subramanian, *Chair*
M. Sarzynski, *Vice Chair*
A. Dinizulu, *Staff Secretary*
L. P. Antalffy
J. Barlow
R. C. Biel
P. N. Chaku
L. Fridlund
D. Fuenmayor
J. Gibson
R. T. Hallman
K. Karpanan
J. Keltjens
A. K. Khare
G. T. Nelson
D. T. Peters
E. D. Roll
J. R. Sims
E. Smith
F. W. Tatar

S. Terada
Y. Xu
A. M. Clayton, *Contributing Member*
R. Cordes, *Contributing Member*
R. D. Dixon, *Contributing Member*
Q. Dong, *Contributing Member*
T. A. Duffey, *Contributing Member*
R. M. Hoshman, *Contributing Member*
F. Kirkemo, *Contributing Member*
R. A. Leishear, *Contributing Member*
G. M. Mital, *Contributing Member*
M. Parr, *Contributing Member*
M. D. Rana, *Contributing Member*
C. Romero, *Contributing Member*
C. Tipple, *Contributing Member*
K.-J. Young, *Contributing Member*
D. J. Burns, *Honorary Member*
G. J. Mraz, *Honorary Member*

Subgroup on Materials (BPV VIII)

M. Kowalczyk, *Chair*
P. Chavdarov, *Vice Chair*
S. Kilambi, *Secretary*
J. Cameron
J. F. Grubb
D. Maitra
D. W. Rahoi
J. Robertson
R. C. Sutherlin

E. Uptis
K. Xu
S. Yem
A. Di Rienzo, *Contributing Member*
J. D. Fritz, *Contributing Member*
M. Katcher, *Contributing Member*
W. M. Lundy, *Contributing Member*
J. Penso, *Contributing Member*

Subgroup on Toughness (BPV VIII)

K. Xu, *Chair*
T. Halligan, *Vice Chair*
T. Finn
C. S. Hinson
S. Kilambi
D. L. Kurle
T. Newman
J. Qu
M. D. Rana
F. L. Richter
K. Subramanian

D. A. Swanson
J. P. Swezy, Jr.
S. Terada
E. Uptis
J. Vattappilly
K. Oyamada, *Delegate*
L. Dong, *Contributing Member*
S. Krishnamurthy, *Contributing Member*
K. Mokhtarian, *Contributing Member*

Subgroup on Graphite Pressure Equipment (BPV VIII)

C. W. Cary, *Chair*
A. Viet, *Vice Chair*
G. C. Becherer
F. L. Brown
R. J. Bulgin

J. D. Clements
H. Lee, Jr.
S. Mehrez
T. Rudy
A. A. Stupica

Argentina International Working Group (BPV VIII)

A. Dominguez, *Chair*
R. Robles, *Vice Chair*
G. Glissenti, *Secretary*
M. M. Acosta
R. A. Barey
C. Alderetes
F. A. Andres
A. Antipasti
D. A. Bardelli
L. F. Bocanera
O. S. Bretones
A. Burgueno
G. Casanas
D. H. Da Rold
D. A. Del Teglia
J. I. Duo

M. Favareto
M. D. Kuhn
F. P. Larrosa
L. M. Leccese
C. Meinl
M. A. Mendez
J. J. Monaco
C. Parente
M. A. A. Pipponzi
L. C. Rigoli
A. Rivas
D. Rizzo
J. C. Rubeo
S. Schamun
G. Telleria
M. M. C. Tocco

China International Working Group (BPV VIII)

X. Chen, *Chair*
B. Shou, *Vice Chair*
Z. Fan, *Secretary*
Y. Chen
J. Cui
R. Duan
J.-G. Gong
B. Han
J. Hu
Q. Hu
H. Hui
K. Li
D. Luo
Y. Luo

C. Miao
L. Sun
C. Wu
J. Xiaobin
F. Xu
G. Xu
F. Yang
Y. Yang
Y. Yuan
Yanfeng Zhang
Yijun Zhang
S. Zhao
J. Zheng
G. Zhu

Germany International Working Group (BPV VIII)

R. Kauer, *Chair*
M. Sykora, *Vice Chair*
A. Aloui
P. Chavdarov
A. Emrich
J. Fleischfresser
C. Jaekel
D. Koelbl

S. Krebs
T. Ludwig
R. A. Meyers
H. Michael
S. Reich
A. Spangenberg
C. Stobbe
G. Naumann, *Contributing Member*

India International Working Group (BPV VIII)

D. Chandiramani, *Chair*
D. Kulkarni, *Vice Chair*
A. D. Dalal, *Secretary*
P. Arulkumar
B. Basu
P. Gandhi
U. Ganesan
S. K. Goyal
V. Jayabalan
V. K. Joshi

A. Kakumanu
V. V. P. Kumar
T. Mukherjee
P. C. Pathak
D. Prabhu
A. Sadasivam
M. P. Shah
R. Tiru
V. T. Valavan
M. Sharma, *Contributing Member*

Italy International Working Group (BPV VIII)

A. Teli, *Chair*
M. Millefanti, *Vice Chair*
P. Campli, *Secretary*
B. G. Alborali
P. Aliprandi
A. Avogadri
A. Camanni
N. Caputo
M. Colombo
P. Conti
D. Cortassa
P. L. Dinelli
F. Finco

M. Guglielmetti
A. F. Magri
P. Mantovani
L. Moracchioli
P. Pacor
S. Sarti
V. Calo, *Contributing Member*
G. Gobbi, *Contributing Member*
A. Gusmaroli, *Contributing Member*
G. Pontiggia, *Contributing Member*
D. D. Raimander, *Contributing Member*

Special Working Group on Bolted Flanged Joints (BPV VIII)

W. Brown, *Chair*
M. Osterfoss, *Vice Chair*
G. Aurioles, Sr.
D. Bankston, Jr.
H. Bouzid
A. Chaudouet
H. Chen
D. Francis
H. Lejeune
A. Mann

W. McDaniel
R. W. Mikitka
D. Nash
M. Ruffin
R. Wacker
E. Jamalyaria, *Contributing Member*
J. R. Payne, *Contributing Member*
G. Van Zyl, *Contributing Member*
J. Veiga, *Contributing Member*

Subgroup on Interpretations (BPV VIII)

G. Aurioles, Sr., *Chair*
J. Oh, *Staff Secretary*
S. R. Babka
J. Cameron
C. W. Cary
B. F. Hantz
M. Kowalczyk
D. L. Kurle
M. D. Lower
S. A. Marks
P. Matkovic
D. I. Morris
D. T. Peters
F. L. Richter
S. C. Roberts
C. D. Rodery
T. G. Seipp

J. C. Sowinski
D. B. Stewart
K. Subramanian
D. A. Swanson
J. P. Swezy, Jr.
J. Vattappilly
A. Viet
K. Xu
R. J. Basile, *Contributing Member*
D. B. DeMichael, *Contributing Member*
R. D. Dixon, *Contributing Member*
S. Kilambi, *Contributing Member*
R. Mahadeen, *Contributing Member*
T. P. Pastor, *Contributing Member*
P. L. Sturgill, *Contributing Member*

COMMITTEE ON WELDING, BRAZING, AND FUSING (BPV IX)

M. J. Pischke, *Chair*
P. L. Sturgill, *Vice Chair*
R. Rahaman, *Staff Secretary*
M. Bernasek
M. A. Boring
D. A. Bowers
N. Carter
J. G. Feldstein
P. Gilston
S. E. Gingrich
K. L. Hayes
R. M. Jessee
J. S. Lee
W. M. Lundy
D. W. Mann
S. A. Marks
T. Melfi
W. F. Newell, Jr.
E. G. Reichelt
M. J. Rice

M. B. Sims
W. J. Sperko
J. P. Swezy, Jr.
A. D. Wilson
E. W. Woelfel
D. Pojatar, *Delegate*
A. Roza, *Delegate*
M. Consonni, *Contributing Member*
P. D. Flenner, *Contributing Member*
S. A. Jones, *Contributing Member*
D. K. Peetz, *Contributing Member*
S. Raghunathan, *Contributing Member*
M. J. Stanko, *Contributing Member*
P. L. Van Fosson, *Contributing Member*
R. K. Brown, Jr., *Honorary Member*
M. L. Carpenter, *Honorary Member*
B. R. Newmark, *Honorary Member*
S. D. Reynolds, Jr., *Honorary Member*

Subgroup on Brazing (BPV IX)

S. A. Marks, *Chair*
E. W. Beckman
A. F. Garbolevsky
N. Mohr

M. J. Pischke
P. L. Sturgill
J. P. Swezy, Jr.

Subgroup on General Requirements (BPV IX)

N. Carter, *Chair*
P. Gilston, *Vice Chair*
J. P. Bell
D. A. Bowers
M. Heinrichs
A. Howard
R. M. Jessee
S. A. Marks
H. B. Porter

P. L. Sturgill
J. P. Swezy, Jr.
E. W. Woelfel
E. W. Beckman, *Contributing Member*
A. Davis, *Contributing Member*
D. K. Peetz, *Contributing Member*
B. R. Newmark, *Honorary Member*

Subgroup on Materials (BPV IX)

M. Bernasek, *Chair*
T. Anderson
L. Constantinescu
E. Cutlip
M. Denault
S. E. Gingrich
L. S. Harbison
M. James
R. M. Jessee
T. Melfi
S. D. Nelson

M. J. Pischke
A. Roza
C. E. Sainz
P. L. Sturgill
C. Zanfir
V. G. V. Giunto, *Delegate*
D. J. Kotecki, *Contributing Member*
B. Krueger, *Contributing Member*
W. J. Sperko, *Contributing Member*
M. J. Stanko, *Contributing Member*

Subgroup on Plastic Fusing (BPV IX)

K. L. Hayes, *Chair*
R. M. Jessee
J. Johnston, Jr.
J. E. O'Sullivan
E. G. Reichelt
M. J. Rice

S. Schuessler
M. Troughton
C. Violand
E. W. Woelfel
J. Wright

Subgroup on Welding Qualifications (BPV IX)

| | |
|---------------------------------|---|
| T. Melfi, <i>Chair</i> | E. G. Reichelt |
| A. D. Wilson, <i>Vice Chair</i> | M. J. Rice |
| K. L. Hayes, <i>Secretary</i> | M. B. Sims |
| M. Bernasek | W. J. Sperko |
| M. A. Boring | P. L. Sturgill |
| D. A. Bowers | J. P. Swezy, Jr. |
| R. Campbell | C. Violand |
| R. B. Corbit | D. Chandiramani, <i>Contributing Member</i> |
| L. S. Harbison | M. Consonni, <i>Contributing Member</i> |
| M. Heinrichs | M. Dehghan, <i>Contributing Member</i> |
| J. S. Lee | P. D. Flenner, <i>Contributing Member</i> |
| W. M. Lundy | T. C. Wiesner, <i>Contributing Member</i> |
| D. W. Mann | |
| W. F. Newell, Jr. | |

Argentina International Working Group (BPV IX)

| | |
|--|-----------------|
| A. Burgueno, <i>Chair</i> | M. Favareto |
| A. R. G. Frinchaboy, <i>Vice Chair</i> | J. A. Gandola |
| R. Rahaman, <i>Staff Secretary</i> | C. A. Garibotti |
| M. D. Kuhn, <i>Secretary</i> | J. A. Herrera |
| B. Bardott | M. A. Mendez |
| L. F. Boccanera | A. E. Pastor |
| P. J. Cabot | G. Telleria |
| J. Caprarulo | M. M. C. Tocco |

Germany International Working Group (BPV IX)

| | |
|------------------------------------|--|
| A. Roza, <i>Chair</i> | T. Ludwig |
| A. Spangenberg, <i>Vice Chair</i> | S. Wegener |
| R. Rahaman, <i>Staff Secretary</i> | F. Wodke |
| P. Chavadarov | J. Daldrup, <i>Contributing Member</i> |
| B. Daume | E. Floer, <i>Contributing Member</i> |
| J. Fleischfresser | R. Helmholdt, <i>Contributing Member</i> |
| P. Khwaja | G. Naumann, <i>Contributing Member</i> |
| S. Krebs | K.-G. Toelle, <i>Contributing Member</i> |

Italy International Working Group (BPV IX)

| | |
|------------------------------------|--|
| D. D. Raimander, <i>Chair</i> | L. Moracchioli |
| F. Ferrarese, <i>Vice Chair</i> | P. Pacor |
| R. Rahaman, <i>Staff Secretary</i> | P. Siboni |
| M. Bernasek | V. Calo, <i>Contributing Member</i> |
| A. Camanni | G. Gobbi, <i>Contributing Member</i> |
| P. L. Dinelli | A. Gusmaroli, <i>Contributing Member</i> |
| M. Mandina | G. Pontiggia, <i>Contributing Member</i> |
| A. S. Monastra | |

Spain International Working Group (BPV IX)

| | |
|--------------------------------------|--------------------------------------|
| F. J. Q. Pandelo, <i>Chair</i> | F. Manas |
| F. L. Villabrille, <i>Vice Chair</i> | B. B. Miguel |
| R. Rahaman, <i>Staff Secretary</i> | A. D. G. Munoz |
| F. R. Hermida, <i>Secretary</i> | A. B. Pascual |
| C. A. Celimendiz | S. Sevil |
| M. A. F. Garcia | G. Gobbi, <i>Contributing Member</i> |
| R. G. Garcia | |

COMMITTEE ON FIBER-REINFORCED PLASTIC PRESSURE VESSELS (BPV X)

| | |
|--------------------------------------|--|
| B. Linnemann, <i>Chair</i> | D. H. McCauley |
| D. Eisberg, <i>Vice Chair</i> | N. L. Newhouse |
| P. D. Stumpf, <i>Staff Secretary</i> | G. Ramirez |
| A. L. Beckwith | J. R. Richter |
| F. L. Brown | B. F. Shelley |
| J. L. Bustillos | G. A. Van Beek |
| B. R. Colley | S. L. Wagner |
| T. W. Cowley | D. O. Yancey, Jr. |
| I. L. Dinovo | P. H. Ziehl |
| J. Eihusen | D. H. Hodgkinson, <i>Contributing Member</i> |
| M. R. Gorman | D. L. Keeler, <i>Contributing Member</i> |
| B. Hebb | |
| L. E. Hunt | |

COMMITTEE ON NUCLEAR INSERVICE INSPECTION (BPV XI)

| | |
|---|---|
| R. W. Swayne, <i>Chair</i> | T. Nuoffer |
| D. W. Lamond, <i>Vice Chair</i> | J. Nygaard |
| A. T. Roberts III, <i>Vice Chair</i> | J. E. O'Sullivan |
| D. Miro-Quesada, <i>Staff Secretary</i> | N. A. Palm |
| J. F. Ball | G. C. Park |
| W. H. Bamford | D. A. Scarth |
| M. L. Benson | F. J. Schaaf, Jr. |
| J. M. Boughman | S. Takaya |
| C. Brown | D. Vetter |
| S. B. Brown | T. V. Vo |
| T. L. Chan | J. G. Weicks |
| R. C. Cipolla | M. Weis |
| D. R. Cordes | Y.-K. Chung, <i>Delegate</i> |
| H. Do | C. Ye, <i>Delegate</i> |
| E. V. Farrell, Jr. | B. Lin, <i>Alternate</i> |
| M. J. Ferlisi | R. O. McGill, <i>Alternate</i> |
| T. J. Griesbach | L. A. Melder, <i>Alternate</i> |
| J. Hakii | A. Udyawar, <i>Alternate</i> |
| M. L. Hall | E. B. Gerlach, <i>Contributing Member</i> |
| P. J. Hennessey | C. D. Cowfer, <i>Honorary Member</i> |
| D. O. Henry | R. E. Gimple, <i>Honorary Member</i> |
| K. Hojo | F. E. Gregor, <i>Honorary Member</i> |
| S. D. Kulat | R. D. Kerr, <i>Honorary Member</i> |
| C. Latiolais | P. C. Riccardella, <i>Honorary Member</i> |
| J. T. Lindberg | R. A. West, <i>Honorary Member</i> |
| H. Malikowski | C. J. Wirtz, <i>Honorary Member</i> |
| S. L. McCracken | R. A. Yonekawa, <i>Honorary Member</i> |
| S. A. Norman | |

Executive Committee (BPV XI)

| | |
|---|-----------------------------|
| D. W. Lamond, <i>Chair</i> | S. L. McCracken |
| R. W. Swayne, <i>Vice Chair</i> | T. Nuoffer |
| D. Miro-Quesada, <i>Staff Secretary</i> | N. A. Palm |
| M. L. Benson | G. C. Park |
| M. J. Ferlisi | A. T. Roberts III |
| S. D. Kulat | B. L. Lin, <i>Alternate</i> |
| J. T. Lindberg | |

Argentina International Working Group (BPV XI)

| | |
|-------------------------------------|-------------------|
| O. Martinez, <i>Staff Secretary</i> | F. J. Schaaf, Jr. |
| A. Claus | F. M. Schroeter |
| I. M. Guerreiro | P. Yamamoto |
| L. R. Miño | |

China International Working Group (BPV XI)

| | |
|------------------------------|-------------|
| J. H. Liu, <i>Chair</i> | S. Shuo |
| J. F. Cai, <i>Vice Chair</i> | Y. Sixin |
| C. Ye, <i>Vice Chair</i> | Y. X. Sun |
| M. W. Zhou, <i>Secretary</i> | G. X. Tang |
| H. Chen | Q. Wang |
| H. D. Chen | Q. W. Wang |
| Y. Cheng | Z. S. Wang |
| Y. B. Guo | L. Xing |
| Y. Hongqi | F. Xu |
| D. R. Horn | S. X. Xu |
| Y. Hou | Q. Yin |
| S. X. Lin | K. Zhang |
| Y. Nie | Y. Zhe |
| W. N. Pei | Z. M. Zhong |
| L. Shiwei | |

Germany International Working Group (BPV XI)

| | |
|----------------------------------|-------------|
| R. Döring, <i>Chair</i> | N. Legl |
| M. Hagenbruch, <i>Vice Chair</i> | T. Ludwig |
| R. Piel, <i>Secretary</i> | X. Pitoiset |
| A. Casse | M. Reichert |
| C. G. Frantescu | L. Sybertz |
| E. Iacopetta | I. Tewes |
| S. D. Kulat | R. Tiete |
| H.-W. Lange | J. Wendt |

India International Working Group (BPV XI)

| | |
|------------------------------|--------------|
| S. B. Parkash, <i>Chair</i> | N. Palm |
| D. Narain, <i>Vice Chair</i> | D. Rawal |
| K. K. Rai, <i>Secretary</i> | R. Sahai |
| Z. M. Mansuri | R. K. Sharma |
| M. R. Nadgouda | |

Special Working Group on Editing and Review (BPV XI)

| | |
|----------------------------|--------------|
| R. W. Swayne, <i>Chair</i> | M. Orihuela |
| R. C. Cipolla | D. A. Scarth |
| D. O. Henry | |

Task Group on Inspectability (BPV XI)

| | |
|------------------------------|----------------|
| J. T. Lindberg, <i>Chair</i> | J. Honcharik |
| E. Henry, <i>Secretary</i> | C. Latiolais |
| A. Bushmire | G. A. Lofthus |
| A. Cardillo | S. Matsumoto |
| K. Caver | D. E. Matthews |
| D. R. Cordes | P. J. O'Regan |
| P. Gionta | J. B. Ossmann |
| D. O. Henry | C. Thomas |

Working Group on Spent Nuclear Fuel Storage and Transportation Containment Systems (BPV XI)

| | |
|-------------------------------|--------------------------------------|
| K. Hunter, <i>Chair</i> | K. Mauskar |
| M. Orihuela, <i>Secretary</i> | R. M. Meyer |
| D. J. Ammerman | R. M. Pace |
| W. H. Borter | E. L. Pleins |
| J. Broussard | M. A. Richter |
| C. R. Bryan | B. Sarno |
| T. Carraher | R. Sindelar |
| S. Corcoran | M. Staley |
| D. Dunn | J. Wellwood |
| N. Fales | K. A. Whitney |
| R. C. Folley | X. J. Zhai |
| G. Grant | P.-S. Lam, <i>Alternate</i> |
| B. Gutherman | G. White, <i>Alternate</i> |
| M. W. Joseph | J. Wise, <i>Alternate</i> |
| M. Keene | H. Smith, <i>Contributing Member</i> |
| M. Liu | |

Task Group on Mitigation and Repair of Spent Nuclear Fuel Canisters (WG-SNFS & TCS) (BPV XI)

| | |
|-------------------------|-----------------|
| J. Tatman, <i>Chair</i> | M. Kris |
| D. J. Ammerman | M. Liu |
| J. Broussard | K. Mauskar |
| C. R. Bryan | S. L. McCracken |
| G. R. Cannell | M. Orihuela |
| K. Dietrich | M. Richter |
| D. Dunn | K. E. Ross |
| N. Fales | B. Sarno |
| R. C. Folley | R. Sindelar |
| D. Jacobs | J. Wellwood |
| N. Klymyshyn | A. Williams |

Subgroup on Evaluation Standards (SG-ES) (BPV XI)

| | |
|----------------------------|---|
| N. A. Palm, <i>Chair</i> | Y. S. Li |
| S. X. Xu, <i>Secretary</i> | R. O. McGill |
| W. H. Bamford | K. Miyazaki |
| M. Brumovsky | R. M. Pace |
| H. D. Chung | J. C. Poehler |
| R. C. Cipolla | S. Ranganath |
| C. M. Faidy | D. A. Scarth |
| M. M. Farooq | D. J. Shim |
| B. R. Ganta | A. Udyawar |
| T. J. Griesbach | T. V. Vo |
| K. Hasegawa | G. M. Wilkowski |
| K. Hojo | M. L. Benson, <i>Alternate</i> |
| D. N. Hopkins | H. S. Mehta, <i>Contributing Member</i> |
| D. R. Lee | |

Task Group on Evaluation of Beyond Design Basis Events (SG-ES) (BPV XI)

| | |
|----------------------------|---|
| R. M. Pace, <i>Chair</i> | K. Hojo |
| S. X. Xu, <i>Secretary</i> | S. A. Kleinsmith |
| F. G. Abatt | S. M. Moenssens |
| G. A. Antaki | T. V. Vo |
| P. R. Donavin | G. M. Wilkowski |
| R. G. Gilada | H. S. Mehta, <i>Contributing Member</i> |
| T. J. Griesbach | T. Weaver, <i>Contributing Member</i> |
| M. Hayashi | |

**Working Group on Flaw Evaluation
(SG-ES) (BPV XI)**

| | |
|-----------------------------|---|
| R. C. Cipolla, <i>Chair</i> | Y. S. Li |
| S. X. Xu, <i>Secretary</i> | C. Liu |
| W. H. Bamford | M. Liu |
| M. L. Benson | G. A. Miessi |
| M. Brumovsky | K. Miyazaki |
| H. D. Chung | S. Noronha |
| N. G. Cofie | R. K. Qashu |
| M. A. Erickson | S. Ranganath |
| C. M. Faidy | D. A. Scarth |
| M. M. Farooq | W. L. Server |
| B. R. Ganta | D. J. Shim |
| R. G. Gilada | S. Smith |
| C. Guzman-Leong | M. Uddin |
| P. H. Hoang | A. Udyawar |
| K. Hojo | T. V. Vo |
| D. N. Hopkins | K. Wang |
| S. Kalyanam | B. Wasiluk |
| Y. Kim | G. M. Wilkowski |
| V. Lacroix | H. S. Mehta, <i>Contributing Member</i> |
| D. R. Lee | |

**Working Group on Flaw Evaluation Reference Curves
(SG-ES) (BPV XI)**

| | |
|--------------------------------|---|
| A. Udyawar, <i>Chair</i> | V. Lacroix |
| D. A. Scarth, <i>Secretary</i> | K. Miyazaki |
| W. H. Bamford | B. Pellereau |
| M. L. Benson | S. Ranganath |
| F. W. Brust | D. J. Shim |
| R. C. Cipolla | S. Smith |
| M. M. Farooq | M. Uddin |
| A. E. Freed | T. V. Vo |
| P. Gill | G. White |
| K. Hasegawa | S. X. Xu |
| K. Hojo | H. S. Mehta, <i>Contributing Member</i> |

Working Group on Operating Plant Criteria (SG-ES) (BPV XI)

| | |
|-------------------------------|---|
| N. A. Palm, <i>Chair</i> | A. D. Odell |
| A. E. Freed, <i>Secretary</i> | R. M. Pace |
| W. H. Bamford | J. C. Poehler |
| M. Brumovsky | S. Ranganath |
| M. A. Erickson | W. L. Server |
| T. J. Griesbach | C. A. Tomes |
| M. Hayashi | A. Udyawar |
| R. Janowiak | T. V. Vo |
| M. Kirk | H. Q. Xu |
| S. A. Kleinsmith | H. S. Mehta, <i>Contributing Member</i> |
| H. Kobayashi | |

Task Group on Appendix L (WG-OPC) (BPV XI)

| | |
|------------------------------|--------------|
| N. Glunt, <i>Chair</i> | C.-S. Oh |
| R. M. Pace, <i>Secretary</i> | H. Park |
| J. I. Duo | S. Ranganath |
| A. E. Freed | A. Scott |
| M. A. Gray | D. J. Shim |
| T. J. Griesbach | S. Smith |
| H. Nam | A. Udyawar |
| A. Nana | T. V. Vo |
| A. D. Odell | |

Working Group on Pipe Flaw Evaluation (SG-ES) (BPV XI)

| | |
|-------------------------------|---|
| D. A. Scarth, <i>Chair</i> | Y. Kim |
| S. Kalyanam, <i>Secretary</i> | V. Lacroix |
| K. Azuma | Y. S. Li |
| W. H. Bamford | R. O. McGill |
| M. L. Benson | G. A. Miessi |
| M. Brumovsky | K. Miyazaki |
| F. W. Brust | S. M. Parker |
| H. D. Chung | S. H. Pellet |
| R. C. Cipolla | C. J. Sallaberry |
| N. G. Cofie | W. L. Server |
| C. M. Faidy | D. J. Shim |
| M. M. Farooq | S. Smith |
| B. R. Ganta | M. F. Uddin |
| R. G. Gilada | A. Udyawar |
| S. R. Gosselin | T. V. Vo |
| C. E. Guzman-Leong | K. Wang |
| K. Hasegawa | B. Wasiluk |
| P. H. Hoang | G. M. Wilkowski |
| K. Hojo | S. X. Xu |
| D. N. Hopkins | Y. Zou |
| E. J. Houston | K. Gresh, <i>Alternate</i> |
| R. Janowiak | H. S. Mehta, <i>Contributing Member</i> |
| K. Kashima | |

Task Group on Code Case N-513 (WG-PFE) (BPV XI)

| | |
|--------------------------------|---------------|
| R. O. McGill, <i>Chair</i> | E. J. Houston |
| S. M. Parker, <i>Secretary</i> | R. Janowiak |
| G. A. Antaki | S. H. Pellet |
| R. C. Cipolla | D. Rudland |
| M. M. Farooq | D. A. Scarth |
| K. Gresh | S. X. Xu |

**Task Group on Evaluation Procedures for Degraded Buried Pipe
(WG-PFE) (BPV XI)**

| | |
|----------------------------|--------------|
| R. O. McGill, <i>Chair</i> | R. Janowiak |
| S. X. Xu, <i>Secretary</i> | M. Kassar |
| F. G. Abatt | M. Moenssens |
| G. A. Antaki | D. P. Munson |
| R. C. Cipolla | R. M. Pace |
| R. G. Gilada | S. H. Pellet |
| K. Hasegawa | D. Rudland |
| K. M. Hoffman | D. A. Scarth |

Task Group on Flaw Evaluation for HDPE Pipe (WG-PFE) (BPV XI)

| | |
|---------------------------|--------------|
| S. Kalyanam, <i>Chair</i> | D. J. Shim |
| P. Krishnaswamy | M. Troughton |
| M. Moenssens | J. Wright |
| D. P. Munson | S. X. Xu |
| D. A. Scarth | |

Subgroup on Nondestructive Examination (SG-NDE) (BPV XI)

| | |
|--------------------------------|------------------------------|
| J. T. Lindberg, <i>Chair</i> | S. E. Cumblidge |
| D. O. Henry, <i>Vice Chair</i> | K. J. Hacker |
| T. Cinson, <i>Secretary</i> | J. Harrison |
| M. Briley | D. A. Kull |
| C. Brown | C. Latiolais |
| A. Bushmire | F. J. Schaaf, Jr. |
| T. L. Chan | R. V. Swain |
| D. R. Cordes | C. A. Nove, <i>Alternate</i> |

Working Group on Personnel Qualification and Surface Visual and Eddy Current Examination (SG-NDE) (BPV XI)

| | |
|-------------------------------|----------------|
| C. Brown, <i>Chair</i> | D. O. Henry |
| M. Orihuela, <i>Secretary</i> | J. T. Lindberg |
| J. Bennett | C. Shinsky |
| T. Cinson | R. Tedder |
| S. E. Cumblidge | T. Thulien |
| A. Diaz | J. T. Timm |
| N. Farenbaugh | |

Working Group on Procedure Qualification and Volumetric Examination (SG-NDE) (BPV XI)

| | |
|------------------------------|--------------------------|
| J. Harrison, <i>Chair</i> | C. Latiolais |
| D. A. Kull, <i>Secretary</i> | C. A. Nove |
| M. Briley | D. R. Slivon |
| A. Bushmire | R. V. Swain |
| D. R. Cordes | D. Van Allen |
| K. J. Hacker | J. Williams |
| R. E. Jacob | B. Lin, <i>Alternate</i> |
| W. A. Jensen | |

Subgroup on Reliability and Integrity Management Program (SG-RIM) (BPV XI)

| | |
|---------------------------------|---------------------|
| A. T. Roberts III, <i>Chair</i> | P. J. Hennessey |
| D. Vetter, <i>Secretary</i> | S. Kalyanam |
| T. Anselmi | D. R. Lee |
| M. T. Audrain | R. J. McReynolds |
| N. Broom | R. Meyer |
| F. W. Brust | M. Orihuela |
| V. Chugh | C. J. Sallaberry |
| S. R. Doctor | F. J. Schaaf, Jr. |
| J. D. Fletcher | H. M. Stephens, Jr. |
| J. T. Fong | R. W. Swayne |
| R. Grantom | S. Takaya |
| K. Harris | R. Vayda |

Working Group on MANDE (SG-RIM) (BPV XI)

| | |
|-----------------------------------|------------------|
| H. M. Stephens, Jr., <i>Chair</i> | J. T. Fong |
| S. R. Doctor, <i>Vice Chair</i> | D. O. Henry |
| M. Turnbow, <i>Secretary</i> | R. J. McReynolds |
| T. Anselmi | R. Meyer |
| M. T. Audrain | M. Orihuela |
| N. A. Finney | K. Yamada |

Task Group on Nonmetallic Component Degradation and Failure Monitoring (SG-RIM) (BPV XI)

| | |
|------------------------------|----------------|
| M. P. Metcalfe, <i>Chair</i> | W. J. Geringer |
| A. Tzelepi, <i>Secretary</i> | K. Harris |
| M. T. Audrain | J. Lang |
| G. Beirnaert | J. Potgieter |
| C. Chen | |

ASME/JSME Joint Working Group on RIM Processes and System-Based Code (SG-RIM) (BPV XI)

| | |
|-------------------------------------|--|
| S. Takaya, <i>Chair</i> | R. Meyer |
| R. J. McReynolds, <i>Vice Chair</i> | T. Muraki |
| M. T. Audrain | S. Okajima |
| K. Dozaki | A. T. Roberts III |
| J. T. Fong | C. J. Sallaberry |
| J. Hakii | F. J. Schaaf, Jr. |
| K. Harris | R. Vayda |
| M. Hayashi | D. Watanabe |
| S. Kalyanam | H. Yada |
| D. R. Lee | K. Yamada |
| H. Machida | T. Asayama, <i>Contributing Member</i> |

Subgroup on Repair/Replacement Activities (SG-RRA) (BPV XI)

| | |
|--------------------------------------|--------------------------|
| S. L. McCracken, <i>Chair</i> | L. A. Melder |
| E. V. Farrell, Jr., <i>Secretary</i> | S. A. Norman |
| J. F. Ball | G. T. Olson |
| M. Brandes | J. E. O'Sullivan |
| S. B. Brown | G. C. Park |
| R. Clow | R. R. Stevenson |
| S. J. Findlan | R. W. Swayne |
| M. L. Hall | D. J. Tilly |
| J. Honcharik | J. G. Weicks |
| A. B. Meichler | B. Lin, <i>Alternate</i> |

Working Group on Design and Programs (SG-RRA) (BPV XI)

| | |
|-------------------------------|-----------------|
| S. B. Brown, <i>Chair</i> | H. Malikowski |
| R. A. Patel, <i>Secretary</i> | A. B. Meichler |
| O. Bhatti | G. C. Park |
| R. Clow | M. A. Pyne |
| R. R. Croft | R. R. Stevenson |
| E. V. Farrell, Jr. | K. Sullivan |
| K. Harris | R. W. Swayne |
| B. Lin | |

Task Group on Repair and Replacement Optimization (WG-D&P) (BPV XI)

| | |
|---------------------------------|-----------------|
| S. L. McCracken, <i>Chair</i> | M. L. Hall |
| S. J. Findlan, <i>Secretary</i> | D. Jacobs |
| T. Basso | H. Malikowski |
| R. Clow | T. Nuoffer |
| K. Dietrich | G. C. Park |
| E. V. Farrell, Jr. | A. Patel |
| M. J. Ferlisi | R. R. Stevenson |
| R. C. Folley | J. G. Weicks |

Working Group on Nonmetals Repair/Replacement Activities (SG-RRA) (BPV XI)

| | |
|---------------------------------|--|
| J. E. O'Sullivan, <i>Chair</i> | T. M. Musto |
| S. Schuessler, <i>Secretary</i> | A. Pridmore |
| M. Brandes | F. J. Schaaf, Jr. |
| D. R. Dechene | R. Stakenborghs |
| M. Golliet | P. Vibien |
| J. Johnston, Jr. | M. P. Marohl, <i>Contributing Member</i> |
| B. Lin | |

**Task Group on HDPE Piping for Low Safety Significance Systems
(WG-NMRRRA) (BPV XI)**

M. Brandes, *Chair*
J. E. O'Sullivan, *Secretary*
M. Golliet
B. Lin

T. M. Musto
F. J. Schaaf, Jr.
S. Schuessler
R. Stakenborghs

**Task Group on Repair by Carbon Fiber Composites
(WG-NMRRRA) (BPV XI)**

J. E. O'Sullivan, *Chair*
S. F. Arnold
S. W. Choi
D. R. Dechene
M. Golliet
L. S. Gordon
P. Krishnaswamy
M. Kuntz
H. Lu
M. P. Marohl
L. Nadeau

C. A. Nove
R. P. Ojdrovic
A. Pridmore
S. Rios
C. W. Rowley
J. Sealey
R. Stakenborghs
N. Stoeva
M. F. Uddin
J. Wen
B. Davenport, *Alternate*

**Working Group on Welding and Special Repair Processes
(SG-RRRA) (BPV XI)**

J. G. Weicks, *Chair*
G. T. Olson, *Secretary*
D. Barborak
S. J. Findlan
R. C. Folley
M. L. Hall
J. Honcharik

D. Jacobs
M. Kris
S. E. Marlette
S. L. McCracken
L. A. Melder
J. E. O'Sullivan
D. J. Tilly

Task Group on Temper Bead Welding (WG-W&SRP) (BPV XI)

S. J. Findlan, *Chair*
D. Barborak
R. C. Folley
J. Graham
M. L. Hall
D. Jacobs
H. Kobayashi

S. L. McCracken
N. Mohr
G. T. Olson
J. E. O'Sullivan
A. Patel
J. Tatman
J. G. Weicks

Task Group on Weld Overlay (WG-W&SRP)(BPV XI)

S. L. McCracken, *Chair*
S. Hunter, *Secretary*
D. Barborak
S. J. Findlan
J. Graham
M. L. Hall
D. Jacobs

C. Lohse
S. E. Marlette
G. T. Olson
A. Patel
D. W. Sandusky
D. E. Waskey
J. G. Weicks

Subgroup on Water-Cooled Systems (SG-WCS) (BPV XI)

M. J. Ferlisi, *Chair*
J. Nygaard, *Secretary*
J. M. Boughman
S. T. Chesworth
J. Collins
H. Q. Do
K. W. Hall
P. J. Hennessey
A. E. Keyser

S. D. Kulat
D. W. Lamond
T. Nomura
T. Nuoffer
M. A. Pyne
H. M. Stephens, Jr.
R. Thames
M. Weis
I. A. Anchondo-Lopez, *Alternate*

Task Group on High Strength Nickel Alloys Issues (SG-WCS) (BPV XI)

H. Malikowski, *Chair*
C. Waskey, *Secretary*
E. Blackard
T. Cinson
J. Collins
K. Dietrich
P. R. Donavin

H. Kobayashi
S. E. Marlette
G. C. Park
C. Wax
G. White
K. A. Whitney

Working Group on Containment (SG-WCS) (BPV XI)

M. J. Ferlisi, *Chair*
R. Thames, *Secretary*
P. S. Ghosal
H. T. Hill
S. Johnson
A. E. Keyser
B. Lehman

P. Leininger
J. A. Munshi
M. Sircar
P. C. Smith
S. Walden
M. Weis
S. G. Brown, *Alternate*

**Working Group on Inspection of Systems and Components
(SG-WCS) (BPV XI)**

H. Q. Do, *Chair*
M. Weis, *Secretary*
I. A. Anchondo-Lopez
R. W. Blyde
K. Caver
C. Cueto-Felgueroso
M. J. Ferlisi
M. L. Garcia Heras
K. W. Hall

J. Howard
A. Keller
S. D. Kulat
E. Lantz
A. Maekawa
T. Nomura
J. C. Nygaard
S. Orita
A. W. Wilkens

Working Group on Pressure Testing (SG-WCS) (BPV XI)

J. M. Boughman, *Chair*
S. A. Norman, *Secretary*
T. Anselmi
M. J. Homiack
A. E. Keyser

D. W. Lamond
M. Moenssens
R. A. Nettles
C. Thomas
K. Whitney

Working Group on Risk-Informed Activities (SG-WCS) (BPV XI)

M. A. Pyne, *Chair*
S. T. Chesworth, *Secretary*
G. Brouette
C. Cueto-Felgueroso
R. Haessler
J. Hakii
K. W. Hall

M. J. Homiack
S. D. Kulat
D. W. Lamond
E. Lantz
P. J. O'Regan
N. A. Palm
D. Vetter

Working Group on General Requirements (BPV XI)

T. Nuoffer, *Chair*
J. Mayo, *Secretary*
J. F. Ball
T. L. Chan
P. J. Hennessey
K. A. Kavanagh
G. Ramaraj

T. N. Rezk
A. T. Roberts III
S. R. Scott
D. Vetter
S. E. Woolf
B. Harris, *Alternate*
R. S. Spencer, *Alternate*

COMMITTEE ON TRANSPORT TANKS (BPV XII)

| | |
|-------------------------------|---------------------------------------|
| N. J. Paulick, <i>Chair</i> | M. Pitts |
| M. D. Rana, <i>Vice Chair</i> | J. Roberts |
| J. Oh, <i>Staff Secretary</i> | T. A. Rogers |
| A. N. Antoniou | R. C. Sallash |
| K. W. A. Cheng | M. Shah |
| P. Chilukuri | S. Staniszewski |
| W. L. Garfield | A. P. Varghese |
| P. Miller | R. Meyers, <i>Contributing Member</i> |

Executive Committee (BPV XII)

| | |
|----------------------------------|-----------------|
| M. D. Rana, <i>Chair</i> | T. A. Rogers |
| N. J. Paulick, <i>Vice Chair</i> | R. C. Sallash |
| J. Oh, <i>Staff Secretary</i> | S. Staniszewski |
| M. Pitts | A. P. Varghese |

Subgroup on Design and Materials (BPV XII)

| | |
|-----------------------------|--|
| R. C. Sallash, <i>Chair</i> | S. Staniszewski |
| D. K. Chandiramani | A. P. Varghese |
| K. W. A. Cheng | K. Xu |
| P. Chilukuri | Y. Doron, <i>Contributing Member</i> |
| S. L. McWilliams | A. T. Duggleby, <i>Contributing Member</i> |
| N. J. Paulick | R. D. Hayworth, <i>Contributing Member</i> |
| M. D. Rana | B. E. Spencer, <i>Contributing Member</i> |
| T. J. Rishel | J. Zheng, <i>Contributing Member</i> |
| T. A. Rogers | |
| M. Shah | |

Subgroup on Fabrication, Inspection, and Continued Service (BPV XII)

| | |
|------------------------|--|
| M. Pitts, <i>Chair</i> | T. A. Rogers |
| K. W. A. Cheng | R. C. Sallash |
| P. Chilukuri | S. Staniszewski |
| M. Koprivnak | Y. Doron, <i>Contributing Member</i> |
| P. Miller | R. D. Hayworth, <i>Contributing Member</i> |
| O. Mulet | G. McRae, <i>Contributing Member</i> |
| T. J. Rishel | |
| J. Roberts | |

Subgroup on General Requirements (BPV XII)

| | |
|-------------------------------|--|
| S. Staniszewski, <i>Chair</i> | M. Pitts |
| A. N. Antoniou | R. C. Sallash |
| P. Chilukuri | Y. Doron, <i>Contributing Member</i> |
| H. Ebben III | T. J. Hitchcock, <i>Contributing Member</i> |
| J. L. Freiler | S. L. McWilliams, <i>Contributing Member</i> |
| W. L. Garfield | T. A. Rogers, <i>Contributing Member</i> |
| O. Mulet | D. G. Shelton, <i>Contributing Member</i> |
| B. F. Pittel | |

Subgroup on Nonmandatory Appendices (BPV XII)

| | |
|-----------------------------------|---|
| T. A. Rogers, <i>Chair</i> | R. C. Sallash |
| S. Staniszewski, <i>Secretary</i> | D. G. Shelton |
| P. Chilukuri | D. D. Brusewitz, <i>Contributing Member</i> |
| N. J. Paulick | Y. Doron, <i>Contributing Member</i> |
| M. Pitts | |
| T. J. Rishel | |

COMMITTEE ON OVERPRESSURE PROTECTION (BPV XIII)

| | |
|---|---|
| B. K. Nutter, <i>Chair</i> | R. W. Barnes, <i>Contributing Member</i> |
| A. Donaldson, <i>Vice Chair</i> | R. D. Danzy, <i>Contributing Member</i> |
| C. E. Rodrigues, <i>Staff Secretary</i> | A. Frigerio, <i>Contributing Member</i> |
| J. F. Ball | J. P. Gaspie, <i>Contributing Member</i> |
| J. Burgess | S. F. Harrison, Jr., <i>Contributing Member</i> |
| B. Calderon | A. Hassan, <i>Contributing Member</i> |
| D. B. DeMichael | P. K. Lam, <i>Contributing Member</i> |
| J. W. Dickson | M. Mengon, <i>Contributing Member</i> |
| J. M. Levy | J. Mize, <i>Contributing Member</i> |
| D. Miller | M. Mullavey, <i>Contributing Member</i> |
| T. Patel | S. K. Parimi, <i>Contributing Member</i> |
| B. F. Pittel | J. Phillips, <i>Contributing Member</i> |
| T. R. Tarbay | M. Reddy, <i>Contributing Member</i> |
| D. E. Tompkins | S. Ruesenberg, <i>Contributing Member</i> |
| Z. Wang | K. Shores, <i>Contributing Member</i> |
| J. A. West | D. E. Tezzo, <i>Contributing Member</i> |
| B. Engman, <i>Alternate</i> | A. Wilson, <i>Contributing Member</i> |
| H. Aguilar, <i>Contributing Member</i> | |

Executive Committee (BPV XIII)

| | |
|---|-----------------|
| A. Donaldson, <i>Chair</i> | D. B. DeMichael |
| B. K. Nutter, <i>Vice Chair</i> | K. R. May |
| C. E. Rodrigues, <i>Staff Secretary</i> | D. Miller |
| J. F. Ball | |

Subgroup on Design and Materials (BPV XIII)

| | |
|-----------------------------|--|
| D. Miller, <i>Chair</i> | J. A. West |
| T. Patel, <i>Vice Chair</i> | A. Williams |
| T. K. Acharya | D. J. Azukas, <i>Contributing Member</i> |
| C. E. Beair | R. D. Danzy, <i>Contributing Member</i> |
| W. E. Chapin | A. Hassan, <i>Contributing Member</i> |
| J. L. Freiler | R. Miyata, <i>Contributing Member</i> |
| B. Joergensen | M. Mullavey, <i>Contributing Member</i> |
| V. Kalyanasundaram | S. K. Parimi, <i>Contributing Member</i> |
| R. Krithivasan | G. Ramirez, <i>Contributing Member</i> |
| B. J. Mollitor | K. Shores, <i>Contributing Member</i> |
| T. R. Tarbay | |

Subgroup on General Requirements (BPV XIII)

A. Donaldson, *Chair*
 B. F. Pittel, *Vice Chair*
 J. M. Levy, *Secretary*
 R. Antoniuk
 D. J. Azukas
 J. F. Ball
 J. Burgess
 D. B. DeMichael
 S. T. French
 J. Grace
 C. Haldiman
 J. Horne
 R. Klimas, Jr.
 Z. E. Kumana
 P. K. Lam
 D. Mainiero-Cessna
 K. R. May
 J. Mize
 L. Moedinger
 M. Mullavey
 K. Shores

D. E. Tezzo
 D. E. Tompkins
 J. F. White
 B. Calderon, *Contributing Member*
 P. Chavdarov, *Contributing Member*
 T. M. Fabiani, *Contributing Member*
 J. L. Freiler, *Contributing Member*
 J. P. Glaspie, *Contributing Member*
 G. D. Goodson, *Contributing Member*
 B. Joergensen, *Contributing Member*
 C. Lasarte, *Contributing Member*
 M. Mengon, *Contributing Member*
 D. E. Miller, *Contributing Member*
 R. Miyata, *Contributing Member*
 B. Mruk, *Contributing Member*
 J. Phillips, *Contributing Member*
 M. Reddy, *Contributing Member*
 S. Ruesenberg, *Contributing Member*
 R. Sadowski, *Contributing Member*
 A. Swearingin, *Contributing Member*
 A. P. Varghese, *Contributing Member*

Subgroup on Nuclear (BPV XIII)

K. R. May, *Chair*
 J. F. Ball, *Vice Chair*
 R. Krithivasan, *Secretary*
 M. Brown
 J. W. Dickson
 S. Jones
 R. Lack
 D. Miller
 T. Patel

K. Shores
 I. H. Tseng
 B. J. Yonsky
 J. M. Levy, *Alternate*
 Y. Wong, *Alternate*
 J. Yu, *Alternate*
 S. T. French, *Contributing Member*
 D. B. Ross, *Contributing Member*

Subgroup on Testing (BPV XIII)

B. K. Nutter, *Chair*
 J. W. Dickson, *Vice Chair*
 R. Houk, *Secretary*
 T. P. Beirne
 M. Brown
 B. Calderon
 V. Chicola III
 B. Engman
 R. J. Garnett
 R. Lack
 M. Mengon

C. Sharpe
 J. R. Thomas, Jr.
 Z. Wang
 D. Nelson, *Alternate*
 J. Mize, *Contributing Member*
 M. Mullavey, *Contributing Member*
 S. Ruesenberg, *Contributing Member*
 K. Shores, *Contributing Member*
 A. Streckler, *Contributing Member*
 A. Wilson, *Contributing Member*

US TAG to ISO TC 185 Safety Devices for Protection Against Excessive Pressure (BPV XIII)

D. Miller, *Chair*
 C. E. Rodrigues, *Staff Secretary*
 J. F. Ball
 T. J. Bevilacqua
 D. B. DeMichael
 J. W. Dickson

B. K. Nutter
 T. Patel
 J. R. Thomas, Jr.
 D. Tuttle
 J. A. West
 J. F. White

COMMITTEE ON BOILER AND PRESSURE VESSEL CONFORMITY ASSESSMENT (CBPVCA)

R. V. Wielgoszinski, *Chair*
 G. Scribner, *Vice Chair*
 G. Moino, *Staff Secretary*
 M. Blankinship
 J. P. Chicoine
 T. E. Hansen
 W. Hibdon
 B. L. Krasiun
 L. E. McDonald
 N. Murugappan
 I. Powell
 D. E. Tuttle
 E. A. Whittle
 P. Williams

T. P. Beirne, *Alternate*
 N. Caputo, *Alternate*
 P. Chavdarov, *Alternate*
 J. M. Downs, *Alternate*
 P. D. Edwards, *Alternate*
 Y.-S. Kim, *Alternate*
 B. Morelock, *Alternate*
 M. Prefumo, *Alternate*
 R. Rockwood, *Alternate*
 K. Roewe, *Alternate*
 B. C. Turczynski, *Alternate*
 J. Yu, *Alternate*
 D. Cheetham, *Contributing Member*
 A. J. Spencer, *Honorary Member*

COMMITTEE ON NUCLEAR CERTIFICATION (CNC)

R. R. Stevenson, *Chair*
 M. A. Lockwood, *Vice Chair*
 S. Khan, *Staff Secretary*
 A. Appleton
 J. F. Ball
 G. Claffey
 N. DeSantis
 C. Dinic
 G. Gobbi
 J. W. Highlands
 K. A. Kavanagh
 J. C. Krane
 T. McGee
 E. L. Pleins
 T. E. Quaka
 T. N. Rezk
 D. M. Vickery
 E. A. Whittle

T. Aldo, *Alternate*
 M. Blankinship, *Alternate*
 G. Brouette, *Alternate*
 M. Burke, *Alternate*
 P. J. Coco, *Alternate*
 Y. Diaz-Castillo, *Alternate*
 P. D. Edwards, *Alternate*
 J. Grimm, *Alternate*
 K. M. Hottle, *Alternate*
 P. Krane, *Alternate*
 S. J. Montano, *Alternate*
 I. Olson, *Alternate*
 L. Ponce, *Alternate*
 M. Wilson, *Alternate*
 S. Yang, *Alternate*
 S. F. Harrison, Jr., *Contributing Member*

CORRESPONDENCE WITH THE COMMITTEE

General

ASME codes and standards are developed and maintained by committees with the intent to represent the consensus of concerned interests. Users of ASME codes and standards may correspond with the committees to propose revisions or cases, report errata, or request interpretations. Correspondence for this Section of the ASME Boiler and Pressure Vessel Code (BPVC) should be sent to the staff secretary noted on the Section's committee web page, accessible at <https://go.asme.org/CSCcommittees>.

NOTE: See ASME BPVC Section II, Part D for guidelines on requesting approval of new materials. See Section II, Part C for guidelines on requesting approval of new welding and brazing materials ("consumables").

Revisions and Errata

The committee processes revisions to this Code on a continuous basis to incorporate changes that appear necessary or desirable as demonstrated by the experience gained from the application of the Code. Approved revisions will be published in the next edition of the Code.

In addition, the committee may post errata and Special Notices at <http://go.asme.org/BPVCerrata>. Errata and Special Notices become effective on the date posted. Users can register on the committee web page to receive e-mail notifications of posted errata and Special Notices.

This Code is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

Cases

- (a) The most common applications for cases are
 - (1) to permit early implementation of a revision based on an urgent need
 - (2) to provide alternative requirements
 - (3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Code
 - (4) to permit use of a new material or process
- (b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Code.
- (c) The committee will consider proposed cases concerning the following topics only:
 - (1) equipment to be marked with the ASME Single Certification Mark, or
 - (2) equipment to be constructed as a repair/replacement activity under the requirements of Section XI
- (d) A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:
 - (1) a statement of need and background information
 - (2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)
 - (3) the Code Section and the paragraph, figure, or table number(s) to which the proposed case applies
 - (4) the edition(s) of the Code to which the proposed case applies
- (e) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Cases that have been approved will appear in the next edition or supplement of the Code Cases books, "Boilers and Pressure Vessels" or "Nuclear Components." Each Code Cases book is updated with seven Supplements.

Supplements will be sent or made available automatically to the purchasers of the Code Cases books until the next edition of the Code. Annulments of Code Cases become effective six months after the first announcement of the annulment in a Code Case Supplement or Edition of the appropriate Code Case book. The status of any case is available at <http://go.asme.org/BPVCCDatabase>. An index of the complete list of Boiler and Pressure Vessel Code Cases and Nuclear Code Cases is available at <http://go.asme.org/BPVCC>.

Interpretations

(a) Interpretations clarify existing Code requirements and are written as a question and reply. Interpretations do not introduce new requirements. If a revision to resolve conflicting or incorrect wording is required to support the interpretation, the committee will issue an intent interpretation in parallel with a revision to the Code.

(b) Upon request, the committee will render an interpretation of any requirement of the Code. An interpretation can be rendered only in response to a request submitted through the online Interpretation Submittal Form at <http://go.asme.org/InterpretationRequest>. Upon submitting the form, the inquirer will receive an automatic e-mail confirming receipt.

(c) ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Code requirements. If, based on the information submitted, it is the opinion of the committee that the inquirer should seek assistance, the request will be returned with the recommendation that such assistance be obtained. Inquirers may track the status of their requests at <http://go.asme.org/Interpretations>.

(d) ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME committee or subcommittee. ASME does not “approve,” “certify,” “rate,” or “endorse” any item, construction, proprietary device, or activity.

(e) Interpretations are published in the ASME Interpretations Database at <http://go.asme.org/Interpretations> as they are issued.

Committee Meetings

The ASME BPVC committees regularly hold meetings that are open to the public. Persons wishing to attend any meeting should contact the secretary of the applicable committee. Information on future committee meetings can be found at <http://go.asme.org/BCW>.

INTRODUCTION TO SECTION III, DIVISION 4

There is an ongoing effort within the ASME Boiler and Pressure Vessel Committee on Construction of Nuclear Facility Components (Section III) to develop rules for the construction of fusion energy devices. The Standards Committee of Section III, Division 4 and its Subgroup on Fusion Energy Devices are developing these new fusion Code rules. These rules cover fusion-energy-related components such as vacuum vessels, cryostats, and magnet structures and the interactions of these components. Related support structures, including metallic and nonmetallic materials; containment or confinement structures; and in-vessel components such as blankets, divertors, shield fusion-system piping, vessels, valves, pumps, and supports, are also covered. The rules include requirements for materials, design, fabrication, testing, examination, inspection, certification, and stamping.

ORGANIZATION OF SECTION III

1 GENERAL

Section III consists of Division 1, Division 2, Division 3, Division 4, and Division 5. These Divisions are broken down into Subsections and are designated by capital letters preceded by the letter “N” for Division 1, by the letter “C” for Division 2, by the letter “W” for Division 3, by the letter “F” for Division 4, and by the letter “H” for Division 5. Each Subsection is published separately, with the exception of those listed for Divisions 2, 3, 4, and 5.

- 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
 - Subsection CC — Concrete Containments
- Division 3 — Containment Systems for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Material
 - Subsection WA — General Requirements for Division 3
 - Subsection WB — Class TC Transportation Containments
 - Subsection WC — Class SC Storage Containments
 - Subsection WD — Class ISS Internal Support Structures
- Division 4 — Fusion Energy Devices
 - Subsection FA — Fusion Energy Device Facilities
 - Subsection FB — Pressure Boundary Components
- Division 5 — High Temperature Reactors
 - Subsection HA — General Requirements
 - Subpart A — Metallic Materials
 - Subpart B — Graphite Materials
 - Subpart C — Composite Materials
 - Subsection HB — Class A Metallic Pressure Boundary Components
 - Subpart A — Low Temperature Service
 - Subpart B — Elevated Temperature Service
 - Subsection HC — Class B Metallic Pressure Boundary Components
 - Subpart A — Low Temperature Service
 - Subpart B — Elevated Temperature Service
 - Subsection HF — Class A and B Metallic Supports
 - Subpart A — Low Temperature Service
 - Subsection HG — Class SM Metallic Core Support Structures
 - Subpart A — Low Temperature Service
 - Subpart B — Elevated Temperature Service
 - Subsection HH — Class SN Nonmetallic Core Components
 - Subpart A — Graphite Materials
 - Subpart B — Composite Materials

2 SUBSECTIONS

Subsections are divided into Articles, subarticles, paragraphs, and, where necessary, subparagraphs and subsubparagraphs.

3 ARTICLES

Articles are designated by the applicable letters indicated above for the Subsections followed by Arabic numbers, such as NB-1000. Where possible, Articles dealing with the same topics are given the same number in each Subsection, except NCA, in accordance with the following general scheme:

| Article Number | Title |
|----------------|---|
| 1000 | Introduction or Scope |
| 2000 | Material |
| 3000 | Design |
| 4000 | Fabrication and Installation |
| 5000 | Examination |
| 6000 | Testing |
| 7000 | Overpressure Protection |
| 8000 | Nameplates, Stamping With Certification Mark, and Reports |

The numbering of Articles and the material contained in the Articles may not, however, be consecutive. Due to the fact that the complete outline may cover phases not applicable to a particular Subsection or Article, the rules have been prepared with some gaps in the numbering.

4 SUBARTICLES

Subarticles are numbered in units of 100, such as NB-1100.

5 SUBSUBARTICLES

Subsubarticles are numbered in units of 10, such as NB-2130, and generally have no text. When a number such as NB-1110 is followed by text, it is considered a paragraph.

6 PARAGRAPHS

Paragraphs are numbered in units of 1, such as NB-2121.

7 SUBPARAGRAPHS

Subparagraphs, when they are *major* subdivisions of a paragraph, are designated by adding a decimal followed by one or more digits to the paragraph number, such as NB-1132.1. When they are *minor* subdivisions of a paragraph, subparagraphs may be designated by lowercase letters in parentheses, such as NB-2121(a).

8 SUBSUBPARAGRAPHS

Subsubparagraphs are designated by adding lowercase letters in parentheses to the *major* subparagraph numbers, such as NB-1132.1(a). When further subdivisions of *minor* subparagraphs are necessary, subsubparagraphs are designated by adding Arabic numerals in parentheses to the subparagraph designation, such as NB-2121(a)(1).

9 REFERENCES

References used within Section III generally fall into one of the following four categories:

(a) *References to Other Portions of Section III.* When a reference is made to another Article, subarticle, or paragraph, all numbers subsidiary to that reference shall be included. For example, reference to Article NB-3000 includes all material in Article NB-3000; reference to NB-3100 includes all material in subarticle NB-3100; reference to NB-3110 includes all paragraphs, NB-3111 through NB-3113.

(b) *References to Other Sections.* Other Sections referred to in Section III are the following:

(1) *Section II, Materials.* When a requirement for a material, or for the examination or testing of a material, is to be in accordance with a specification such as SA-105, SA-370, or SB-160, the reference is to material specifications in Section II. These references begin with the letter “S.”

(2) *Section V, Nondestructive Examination.* Section V references begin with the letter “T” and relate to the nondestructive examination of material or welds.

(3) *Section IX, Welding and Brazing Qualifications.* Section IX references begin with the letter “Q” and relate to welding and brazing requirements.

(4) *Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components.* When a reference is made to inservice inspection, the rules of Section XI shall apply.

(c) *Reference to Specifications and Standards Other Than Published in Code Sections*

(1) Specifications for examination methods and acceptance standards to be used in connection with them are published by the American Society for Testing and Materials (ASTM). At the time of publication of Section III, some such specifications were not included in Section II of this Code. A reference to ASTM E94 refers to the specification so designated by and published by ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

(2) Dimensional standards covering products such as valves, flanges, and fittings are sponsored and published by The American Society of Mechanical Engineers and approved by the American National Standards Institute.* When a product is to conform to such a standard, for example ASME B16.5, the standard is approved by the American National Standards Institute. The applicable year of issue is that suffixed to its numerical designation in Table NCA-7100-1, for example ASME B16.5-2003. Standards published by The American Society of Mechanical Engineers are available from ASME (<https://www.asme.org/>).

(3) Dimensional and other types of standards covering products such as valves, flanges, and fittings are also published by the Manufacturers Standardization Society of the Valve and Fittings Industry and are known as Standard Practices. When a product is required by these rules to conform to a Standard Practice, for example MSS SP-100, the Standard Practice referred to is published by the Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS), 127 Park Street, NE, Vienna, VA 22180. The applicable year of issue of such a Standard Practice is that suffixed to its numerical designation in Table NCA-7100-1, for example MSS SP-58-2009.

(4) Specifications for welding and brazing materials are published by the American Welding Society (AWS), 8669 NW 36 Street, No. 130, Miami, FL 33166. Specifications of this type are incorporated in Section II and are identified by the AWS designation with the prefix “SF,” for example SFA-5.1.

(5) Standards applicable to the design and construction of tanks and flanges are published by the American Petroleum Institute and have designations such as API-605. When documents so designated are referred to in Section III, for example API-605-1988, they are standards published by the American Petroleum Institute and are listed in Table NCA-7100-1.

(d) *References to Appendices.* Section III uses two types of appendices that are designated as either Section III Appendices or Subsection Appendices. Either of these appendices is further designated as either Mandatory or Nonmandatory for use. Mandatory Appendices are referred to in the Section III rules and contain requirements that must be followed in construction. Nonmandatory Appendices provide additional information or guidance when using Section III.

(1) Section III Appendices are contained in a separate book titled “Appendices.” These appendices have the potential for multiple subsection applicability. Mandatory Appendices are designated by a Roman numeral followed, when appropriate, by Arabic numerals to indicate various articles, subarticles, and paragraphs of the appendix, such as II-1500 or XIII-1210. Nonmandatory Appendices are designated by a capital letter followed, when appropriate, by Arabic numerals to indicate various articles, subarticles, and paragraphs of the appendix, such as D-1200 or Y-1440.

*The American National Standards Institute (ANSI) was formerly known as the American Standards Association. Standards approved by the Association were designated by the prefix “ASA” followed by the number of the standard and the year of publication. More recently, the American National Standards Institute was known as the United States of America Standards Institute. Standards were designated by the prefix “USAS” followed by the number of the standard and the year of publication. While the letters of the prefix have changed with the name of the organization, the numbers of the standards have remained unchanged.

(2) Subsection Appendices are specifically applicable to just one subsection and are contained within that subsection. Subsection-specific mandatory and nonmandatory appendices are numbered in the same manner as Section III Appendices, but with a subsection identifier (e.g., NF, NH, D2, etc.) preceding either the Roman numeral or the capital letter for a unique designation. For example, NF-II-1100 or NF-A-1200 would be part of a Subsection NF mandatory or nonmandatory appendix, respectively. For Subsection CC, D2-IV-1120 or D2-D-1330 would be part of a Subsection CC mandatory or nonmandatory appendix, respectively.

(3) It is the intent of this Section that the information provided in both Mandatory and Nonmandatory Appendices may be used to meet the rules of any Division or Subsection. In case of conflict between Appendix rules and Division/Subsection rules, the requirements contained in the Division/Subsection shall govern. Additional guidance on Appendix usage is provided in the front matter of Section III Appendices.

CROSS-REFERENCING IN THE ASME BPVC

Paragraphs within the ASME BPVC may include subparagraph breakdowns, i.e., nested lists. The following is a guide to the designation and cross-referencing of subparagraph breakdowns:

(a) Hierarchy of Subparagraph Breakdowns

- (1)* First-level breakdowns are designated as (a), (b), (c), etc.
- (2)* Second-level breakdowns are designated as (1), (2), (3), etc.
- (3)* Third-level breakdowns are designated as (-a), (-b), (-c), etc.
- (4)* Fourth-level breakdowns are designated as (-1), (-2), (-3), etc.
- (5)* Fifth-level breakdowns are designated as (+a), (+b), (+c), etc.
- (6)* Sixth-level breakdowns are designated as (+1), (+2), etc.

(b) Cross-References to Subparagraph Breakdowns. Cross-references within an alphanumerically designated paragraph (e.g., PG-1, UIG-56.1, NCD-3223) do not include the alphanumeric designator of that paragraph. The crossreferences to subparagraph breakdowns follow the hierarchy of the designators under which the breakdown appears. The following examples show the format:

- (1)* If X.1(c)(1)(-a) is referenced in X.1(c)(1), it will be referenced as (-a).
- (2)* If X.1(c)(1)(-a) is referenced in X.1(c)(2), it will be referenced as (1)(-a).
- (3)* If X.1(c)(1)(-a) is referenced in X.1(e)(1), it will be referenced as (c)(1)(-a).
- (4)* If X.1(c)(1)(-a) is referenced in X.2(c)(2), it will be referenced as X.1(c)(1)(-a).

SUBSECTION FA

FUSION ENERGY DEVICE FACILITIES

SUBPART FAA

GENERAL REQUIREMENTS

ARTICLE FAA-1000

INTRODUCTION

FAA-1100 GENERAL

FAA-1110 SCOPE

The rules of Subsection FA, Subpart FAA constitute the general requirements for fusion components used in the construction of fusion devices and their supporting systems. Only those fusion components that are serving a pressure boundary function or a structural integrity function (see [FAA-2120](#)), or both, are covered by these rules. Items that are specifically excluded are electrical components and superconducting strand. [Subpart FAA](#) documents rules for construction that are not adequately addressed within existing Divisions of Section III or other existing codes and standards used in the nuclear industry.

(a) The general requirements of Division 4 are provided in Subsection NCA, except for those paragraphs or subparagraphs (with number headers) replaced by corresponding numbered FAA paragraphs or subparagraphs or new numbered FAA paragraphs or subparagraphs.

(b) Section III, Division 1 terminology might differ from that in Division 4 (e.g., Class 1 and Class 2 versus Class A and Class B), but the application and use of Division 1 rules are identical for Division 4 construction except where otherwise noted.

FAA-1120 DEFINITIONS

Definitions of key terms specific to Division 4 are included in [Article FAA-9000](#) or noted within the applicable text. The definitions in [Article FAA-9000](#) shall prevail should a conflict exist with definitions found in Subsection NCA or in other documents referenced in Division 4. Unless a term is defined in [Article FAA-9000](#), the definition in [Article NCA-9000](#) shall apply.

FAA-1140 TEMPERATURE LIMITS

The rules of Subpart FAA shall not be used for items that are to be subjected to metal temperatures that exceed the temperature limit in the Design Specification.

FAA-1150 LIMITS OF THESE RULES

The rules of Division 4 for fusion components provide requirements for new construction and include consideration of mechanical and thermal stresses due to cyclic operation and high-temperature creep in tokamaks and similar fusion technologies (see [FAA-1300](#) for further detail). These rules currently do not evaluate different issues of concern for non-tokamak fusion systems or fusion systems using fuels other than tritium. These rules address the thermal and radiation effects on materials produced during the fusion activity. The rules do not explicitly address issues such as degradation of properties because of service conditions or environment. The rules do address the degradation of yield and ultimate tensile strengths due to long-time elevated temperature service. However, issues on environmental effects are highlighted in the Code, and it is the responsibility of the Owner and the Facility Operator to demonstrate to the jurisdictional regulatory body that these additional issues are adequately addressed by the design. Additional environmental testing to support Section III Appendices, Nonmandatory Appendix W is strongly encouraged.

The rules are not intended to be applicable to valve operators, controllers, position indicators, pump impellers, pump drivers, or other accessories and devices, unless such items are pressure-retaining parts or act as support structures or supports. If such items are in a support load path, the provisions of [FAA-1100](#) apply.