

ASME BPVC.II.B-2017

**SECTION II**  
MATERIALS

2017

ASME Boiler and  
Pressure Vessel Code  
An International Code

**Part B**  
Nonferrous Material  
Specifications

  
**ASME**  
SETTING THE STANDARD

Markings such as “ASME,” “ASME Standard,” or any other marking including “ASME,” ASME logos, or the 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 ASME’s name, logos, or 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/shop/certification-accreditation>.)

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

AN INTERNATIONAL CODE

# 2017 ASME Boiler & Pressure Vessel Code

2017 Edition

July 1, 2017

## II MATERIALS

### Part B

---

## Nonferrous Material Specifications

ASME Boiler and Pressure Vessel Committee  
on Materials



The American Society of  
Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: July 1, 2017

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 assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not “approve,” “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 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 representative(s) or person(s) 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



Certification Mark

The above ASME symbol is registered in the U.S. Patent Office.

“ASME” is the trademark of The American Society of Mechanical Engineers.

The Specifications published and copyrighted by the American Society for Testing and Materials are reproduced with the Society’s permission.

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  
Printed in the United States of America

Adopted by the Council of The American Society of Mechanical Engineers, 1914; latest edition 2017.

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

Copyright © 2017 by  
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS  
All rights reserved





SB-169/SB-169M	Specification for Aluminum Bronze Sheet, Strip, and Rolled Bar . . . . .	243
SB-171/SB-171M	Specification for Copper-Alloy Plate and Sheet for Pressure Vessels, Con- densers, and Heat Exchangers . . . . .	249
SB-187/SB-187M	Specification for Copper, Bus Bar, Rod, and Shapes and General Purpose Rod, Bar, and Shapes . . . . .	257
SB-209	Specification for Aluminum and Aluminum-Alloy Sheet and Plate . . . . .	269
SB-210	Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes . . . . .	295
SB-211	Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire . . . . .	307
SB-221	Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes . . . . .	317
SB-234	Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Condensers and Heat Exchangers . . . . .	333
SB-241/SB-241M	Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube . . . . .	341
SB-247	Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forg- ings, and Rolled Ring Forgings . . . . .	361
SB-248	Specification for General Requirements for Wrought Copper and Copper- Alloy Plate, Sheet, Strip, and Rolled Bar . . . . .	379
SB-249/SB-249M	Specification for General Requirements for Wrought Copper and Copper- Alloy Rod, Bar, Shapes, and Forgings . . . . .	393
SB-251	Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube . . . . .	407
SB-265	Specification for Titanium and Titanium Alloy Strip, Sheet, and Plate . . . . .	415
SB-271	Specification for Copper-Base Alloy Centrifugal Castings . . . . .	425
SB-283	Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed) . . . . .	433
SB-308/SB-308M	Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles . . . . .	443
SB-315	Specification for Seamless Copper Alloy Pipe and Tube . . . . .	449
SB-333	Specification for Nickel-Molybdenum Alloy Plate, Sheet, and Strip . . . . .	463
SB-335	Specification for Nickel-Molybdenum Alloy Rod . . . . .	469
SB-338	Specification for Seamless and Welded Titanium and Titanium Alloy Tubes for Condensers and Heat Exchangers . . . . .	475
SB-348	Specification for Titanium and Titanium Alloy Bars and Billets . . . . .	485
SB-359/SB-359M	Specification for Copper and Copper-Alloy Seamless Condenser and Heat Exchanger Tubes with Integral Fins . . . . .	493
SB-363	Specification for Seamless and Welded Unalloyed Titanium and Titanium Alloy Welding Fittings . . . . .	505
SB-366	Specification for Factory-Made Wrought Nickel and Nickel Alloy Fittings . . . . .	511
SB-367	Specification for Titanium and Titanium Alloy Castings . . . . .	521
SB-369	Specification for Copper-Nickel Alloy Castings . . . . .	529
SB-381	Specification for Titanium and Titanium Alloy Forgings . . . . .	535
SB-395/SB-395M	Specification for U-Bend Seamless Copper and Copper Alloy Heat Exchanger and Condenser Tubes . . . . .	543
SB-407	Specification for Nickel-Iron-Chromium Alloy Seamless Pipe and Tube . . . . .	559
SB-408	Specification for Nickel-Iron-Chromium Alloy Rod and Bar . . . . .	569
SB-409	Specification for Nickel-Iron-Chromium Alloy Plate, Sheet, and Strip . . . . .	575
SB-423	Specification for Nickel-Iron-Chromium-Molybdenum-Copper Alloy (UNS N08825 and N08221) Seamless Pipe and Tube . . . . .	581
SB-424	Specification for Ni-Fe-Cr-Mo-Cu Alloy (UNS N08825, UNS N08221, and UNS N06845) Plate, Sheet, and Strip . . . . .	587
SB-425	Specification for Ni-Fe-Cr-Mo-Cu Alloy (UNS N08825 and UNS N08221) Rod and Bar . . . . .	593
SB-434	Specification for Nickel-Molybdenum-Chromium-Iron Alloys (UNS N10003, UNS N10242) Plate, Sheet, and Strip . . . . .	601
SB-435	Specification for UNS N06002, UNS N06230, UNS N12160, and UNS R30556 Plate, Sheet, and Strip . . . . .	605

SB-443	Specification for Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) and Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219) Plate, Sheet, and Strip . . . . .	611
SB-444	Specification for Nickel-Chromium-Molybdenum-Columbium Alloys (UNS N06625 and UNS N06852) and Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219) Pipe and Tube . . . . .	623
SB-446	Specification for Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625), Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219), and Nickel-Chromium-Molybdenum-Tungsten Alloy (UNS N06650) Rod and Bar . . . . .	627
SB-462	Specification for Forged or Rolled UNS N06030, UNS N06022, UNS N06035, UNS N06200, UNS N06059, UNS N10362, UNS N06686, UNS N08020, UNS N08024, UNS N08026, UNS N08367, UNS N10276, UNS N10665, UNS N10675, UNS N10629, UNS N08031, UNS N06045, UNS N06025, and UNS R20033 Alloy Pipe Flanges, Forged Fittings, and Valves and Parts for Corrosive High-Temperature Service . . . . .	633
SB-463	Specification for UNS N08020, UNS N08026, and UNS N08024 Alloy Plate, Sheet, and Strip . . . . .	639
SB-464	Specification for Welded UNS N08020, N08024, and N08026 Alloy Pipe . .	645
SB-466/SB-466M	Specification for Seamless Copper-Nickel Pipe and Tube . . . . .	649
SB-467	Specification for Welded Copper-Nickel Pipe . . . . .	657
SB-468	Specification for Welded UNS N08020, N08024, and N08026 Alloy Tubes .	667
SB-473	Specification for UNS N08020, UNS N08024, and UNS N08026 Nickel Alloy Bar and Wire . . . . .	671
SB-493/SB-493M	Specification for Zirconium and Zirconium Alloy Forgings . . . . .	681
SA-494/SA-494M	Specification for Castings, Nickel and Nickel Alloy . . . . .	685
SB-505/SB-505M	Specification for Copper Alloy Continuous Castings . . . . .	695
SB-511	Specification for Nickel-Iron-Chromium-Silicon Alloy Bars and Shapes . . . .	705
SB-514	Specification for Welded Nickel-Iron-Chromium Alloy Pipe . . . . .	715
SB-515	Specification for Welded UNS N08120, UNS N08800, UNS N08810, and UNS N08811 Alloy Tubes . . . . .	719
SB-516	Specification for Welded Nickel-Chromium-Iron Alloy (UNS N06600, UNS N06603, UNS N06025, and UNS N06045) Tubes . . . . .	723
SB-517	Specification for Welded Nickel-Chromium-Iron Alloy (UNS N06600, UNS N06603, UNS N06025, and UNS N06045) Pipe . . . . .	727
SB-523/SB-523M	Specification for Seamless and Welded Zirconium and Zirconium Alloy Tubes . . . . .	731
SB-535	Specification for Nickel-Iron-Chromium-Silicon Alloys (UNS N08330 and N08332) Seamless Pipe and Tube . . . . .	737
SB-536	Specification for Nickel-Iron-Chromium-Silicon Alloys (UNS N08330 and N08332) Plate, Sheet, and Strip . . . . .	741
SB-543/SB-543M	Specification for Welded Copper and Copper-Alloy Heat Exchanger Tube .	753
SB-548	Test Method for Ultrasonic Inspection of Aluminum-Alloy Plate for Pressure Vessels . . . . .	767
SB-550/SB-550M	Specification for Zirconium and Zirconium Alloy Bar and Wire . . . . .	773
SB-551/SB-551M	Specification for Zirconium and Zirconium Alloy Strip, Sheet, and Plate . . .	779
SB-564	Specification for Nickel Alloy Forgings . . . . .	791
SB-572	Specification for UNS N06002, UNS N06230, UNS N12160, and UNS R30556 Rod . . . . .	801
SB-573	Specification for Nickel-Molybdenum-Chromium-Iron Alloys (UNS N10003, N10242) Rod . . . . .	807
SB-574	Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Molybdenum-Chromium, Low-Carbon Nickel-Molybdenum-Chromium-Tantalum, Low-Carbon Nickel-Chromium-Molybdenum-Copper, and Low-Carbon Nickel-Chromium-Molybdenum-Tungsten Alloy Rod . . . . .	813

SB-575	Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Chromium-Molybdenum-Copper, Low-Carbon Nickel-Chromium-Molybdenum-Tantalum, Low-Carbon Nickel-Chromium-Molybdenum-Tungsten, and Low-Carbon Nickel-Molybdenum-Chromium Alloy Plate, Sheet, and Strip .....	819
SB-581	Specification for Nickel-Chromium-Iron-Molybdenum-Copper Alloy Rod ..	825
SB-582	Specification for Nickel-Chromium-Iron-Molybdenum-Copper Alloy Plate, Sheet, and Strip .....	831
SB-584	Specification for Copper Alloy Sand Castings for General Applications ....	835
SB-599	Specification for Nickel-Iron-Chromium-Molybdenum-Columbium Stabilized Alloy (UNS N08700) Plate, Sheet, and Strip .....	843
SB-619	Specification for Welded Nickel and Nickel-Cobalt Alloy Pipe .....	857
SB-620	Specification for Nickel-Iron-Chromium-Molybdenum Alloy (UNS N08320) Plate, Sheet, and Strip .....	865
SB-621	Specification for Nickel-Iron-Chromium-Molybdenum Alloy (UNS N08320) Rod .....	869
SB-622	Specification for Seamless Nickel and Nickel-Cobalt Alloy Pipe and Tube ..	873
SB-625	Specification for UNS N08904, UNS N08925, UNS N08031, UNS N08932, UNS N08926, and UNS R20033 Plate, Sheet, and Strip .....	881
SB-626	Specification for Welded Nickel and Nickel-Cobalt Alloy Tube .....	895
SB-637	Specification for Precipitation-Hardening Nickel Alloy Bars, Forgings, and Forging Stock for High-Temperature Service .....	901
SB-649	Specification for Ni-Fe-Cr-Mo-Cu, Low-Carbon Alloy (UNS N08904), Ni-Fe-Cr-Mo-Cu-N Low Carbon Alloys (UNS N08925, UNS N08031, and UNS N08926), and Cr-Ni-Fe-N Low-Carbon Alloy (UNS R20033) Bar and Wire .....	911
SB-653/SB-653M	Specification for Seamless and Welded Zirconium and Zirconium Alloy Welding Fittings .....	923
SB-658/SB-658M	Specification for Seamless and Welded Zirconium and Zirconium Alloy Pipe .....	927
SB-668	Specification for UNS N08028 Seamless Tubes .....	933
SB-672	Specification for Nickel-Iron-Chromium-Molybdenum-Columbium Stabilized Alloy (UNS N08700) Bar and Wire .....	937
SB-673	Specification for UNS N08904, UNS N08925, and N08926 Welded Pipe ...	945
SB-674	Specification for UNS N08925, UNS N08354, and UNS N08926 Welded Tube .....	951
SB-675	Specification for UNS N08367 Welded Pipe .....	955
SB-676	Standard Specification for UNS N08367 Welded Tube .....	959
SB-677	Specification for UNS N08904, UNS N08925, and UNS N08926 Seamless Pipe and Tube .....	963
SB-688	Specification for Chromium-Nickel-Molybdenum-Iron (UNS N08366 and UNS N08367) Plate, Sheet, and Strip .....	969
SB-690	Specification for Iron-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS N08367) Seamless Pipe and Tube .....	979
SB-691	Specification for Iron-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS N08367) Rod, Bar, and Wire .....	987
SB-704	Specification for Welded UNS N06625, UNS N06219, and UNS N08825 Alloy Tubes .....	995
SB-705	Specification for Nickel-Alloy (UNS N06625, N06219 and N08825) Welded Pipe .....	999
SB-706	Specification for Seamless Copper Alloy (UNS NO. C69100) Pipe and Tube .....	1003
SB-709	Specification for Iron-Nickel-Chromium-Molybdenum Alloy (UNS N08028) Plate, Sheet, and Strip .....	1011
SB-710	Specification for Nickel-Iron-Chromium-Silicon Alloy Welded Pipe .....	1023
SB-729	Specification for Seamless UNS N08020, UNS N08026, and UNS N08024 Nickel-Alloy Pipe and Tube .....	1027
SB-751	Specification for General Requirements for Nickel and Nickel-Alloy Welded Tube .....	1031



SB-775	Specification for General Requirements for Nickel and Nickel-Alloy Welded Pipe .....	1039
SB-804	Specification for UNS N08367 and UNS N08926 Welded Pipe .....	1045
SB-815	Specification for Cobalt-Chromium-Nickel-Molybdenum-Tungsten Alloy (UNS R31233) Rod .....	1053
SB-818	Specification for Cobalt-Chromium-Nickel-Molybdenum-Tungsten Alloy (UNS R31233) Plate, Sheet, and Strip .....	1057
SB-824	Specification for General Requirements for Copper Alloy Castings .....	1061
SB-829	Specification for General Requirements for Nickel and Nickel Alloys Seamless Pipe and Tube .....	1067
SB-858	Test Method for Ammonia Vapor Test for Determining Susceptibility to Stress Corrosion Cracking in Copper Alloys .....	1075
SB-861	Specification for Titanium and Titanium Alloy Seamless Pipe .....	1079
SB-862	Specification for Titanium and Titanium Alloy Welded Pipe .....	1089
SB-906	Specification for General Requirements for Flat-Rolled Nickel and Nickel Alloys Plate, Sheet, and Strip .....	1101
SB-928/SB-928M	Specification for High Magnesium Aluminum-Alloy Sheet and Plate for Marine Service and Similar Environments .....	1119
SB-956	Specification for Welded Copper and Copper-Alloy Condenser and Heat Exchanger Tubes with Integral Fins .....	1133
SF-467	Specification for Nonferrous Nuts for General Use .....	1143
SF-467M	Specification for Nonferrous Nuts for General Use [Metric] .....	1155
SF-468	Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use .....	1165
SF-468M	Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use [Metric] .....	1179
SB/EN 1706	Aluminum and Aluminum Alloys — Castings — Chemical Composition and Mechanical Properties .....	1191
<b>Mandatory Appendix I</b>	<b>Standard Units for Use in Equations</b> .....	1193
<b>Mandatory Appendix II</b>	<b>Basis for Use of Acceptable ASME, ASTM, and Non-ASTM Editions</b> ....	1194
II-100	Materials Adopted for Use in Construction Codes .....	1194
II-200	Acceptable Editions .....	1194
II-300	Other Acceptable Specifications .....	1195
II-400	References to ASTM Specifications .....	1195
II-500	Country of Origin .....	1195
<b>Mandatory Appendix III</b>	<b>Guidelines on Multiple Marking of Materials</b> .....	1203
III-100	Background .....	1203
III-200	Guidelines .....	1203
<b>Mandatory Appendix IV</b>	<b>Guidelines on the Approval of New Materials Under the ASME Boiler and Pressure Vessel Code</b> .....	1205
IV-100	Code Policy .....	1205
IV-200	Application .....	1205
IV-300	Chemical Composition .....	1206
IV-400	Metallurgical Structure and Heat Treatment .....	1206
IV-500	Mechanical Properties .....	1206
IV-600	Definitions for Data Collection Purposes .....	1206
IV-700	Required Sampling .....	1206
IV-800	Time-Independent Properties .....	1206
IV-900	Time-Dependent Properties .....	1207
IV-1000	Low-Temperature Properties .....	1209
IV-1100	Toughness Data .....	1209
IV-1200	Stress–Strain Curves .....	1209
IV-1300	Fatigue Data .....	1209
IV-1400	Physical Properties .....	1209

IV-1500	Data Requirements for Welds, Weldments, and Weldability .....	1209
IV-1600	Long-Term Properties Stability .....	1210
IV-1700	Requests for Additional Data .....	1210
IV-1800	New Materials Checklist .....	1210
IV-1900	Requirements for Recognized National or International Specifications ....	1212
IV-2000	Publication of Recognized National or International Specifications .....	1212
IV-2100	CEN Specifications .....	1212
<b>Nonmandatory Appendix A</b>	<b>Sources of Standards</b> .....	<b>1213</b>
 <b>TABLES</b>		
I-1	Standard Units for Use in Equations .....	1193
II-200-1	Other Acceptable ASTM Editions .....	1196
II-200-2	Other Acceptable Non-ASTM Specifications .....	1202
IV-800-1	ASTM Test Methods and Units for Reporting .....	1208
IV-1500-1	Example of a Comparison of Allowable Stresses of Base Metals With Compositions Similar to Those of Selected Welding Consumables and the Proposed New Base Metal .....	1211

# LIST OF SECTIONS

(17)

## 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<sup>\*</sup>
    - Subsection NB — Class 1 Components
    - Subsection NC — Class 2 Components
    - Subsection ND — 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 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 Power Plant Components
- XII Rules for Construction and Continued Service of Transport Tanks

---

<sup>\*</sup> The 2015 Edition of Section III was the last edition in which Section III, Division 1, Subsection NH, *Class 1 Components in Elevated Temperature Service*, was published. The requirements located within Subsection NH were moved to Section III, Division 5, Subsection HB, Subpart B for the elevated temperature construction of Class A components.

## **INTERPRETATIONS**

Interpretations are issued in real time in ASME's Interpretations Database at <http://go.asme.org/Interpretations>. Historical BPVC interpretations may also be found in the Database.

## **CODE CASES**

The Boiler and Pressure Vessel Code committees meet regularly to consider proposed additions and revisions to the Code and to formulate Cases to clarify the intent of existing requirements or provide, when the need is urgent, rules for materials or constructions not covered by existing Code rules. Those Cases that have been adopted will appear in the appropriate 2017 Code Cases book: "Boilers and Pressure Vessels" or "Nuclear Components." Supplements will be sent or made available automatically to the purchasers of the Code Cases books up to the publication of the 2019 Code.

# 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) 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 only 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. 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. 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 pressure vessels. The objective of the rules is to afford reasonably certain protection of life and property, and to provide a margin for deterioration in service 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

---

\* 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 pressure relief.

requirements of the Code. However, designers and engineers using computer programs for design or analysis are cautioned that they are responsible for all technical assumptions inherent in the programs they use and 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 an ASME 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.



## **STATEMENT OF POLICY ON THE USE OF THE 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 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 Certification Mark for the benefit of the users, the enforcement jurisdictions, and the holders of the 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 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 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 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 Certification Mark who may also use the facsimile in advertising to show that clearly specified items will carry the Certification Mark. General usage is permitted only when all of a manufacturer’s items are constructed under the rules.

## **STATEMENT OF POLICY ON THE USE OF ASME MARKING TO IDENTIFY MANUFACTURED ITEMS**

The ASME Boiler and Pressure Vessel Code provides rules for the construction of boilers, pressure vessels, and nuclear components. This includes requirements for materials, design, fabrication, examination, inspection, and stamping. Items constructed in accordance with all of the applicable rules of the Code are identified with the official Certification Mark described in the governing Section of the Code.

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

# (17) SUBMITTAL OF TECHNICAL INQUIRIES TO THE BOILER AND PRESSURE VESSEL STANDARDS COMMITTEES

## 1 INTRODUCTION

(a) The following information provides guidance to Code users for submitting technical inquiries to the applicable Boiler and Pressure Vessel (BPV) Standards Committee (hereinafter referred to as the Committee). See the guidelines on approval of new materials under the ASME Boiler and Pressure Vessel Code in Section II, Part D for requirements for requests that involve adding new materials to the Code. See the guidelines on approval of new welding and brazing materials in Section II, Part C for requirements for requests that involve adding new welding and brazing materials (“consumables”) to the Code.

Technical inquiries can include requests for revisions or additions to the Code requirements, requests for Code Cases, or requests for Code Interpretations, as described below:

(1) *Code Revisions.* Code revisions are considered to accommodate technological developments, to address administrative requirements, to incorporate Code Cases, or to clarify Code intent.

(2) *Code Cases.* Code Cases represent alternatives or additions to existing Code requirements. Code Cases are written as a Question and Reply, and are usually intended to be incorporated into the Code at a later date. When used, Code Cases prescribe mandatory requirements in the same sense as the text of the Code. However, users are cautioned that not all regulators, jurisdictions, or Owners automatically accept Code Cases. The most common applications for Code Cases are as follows:

(-a) to permit early implementation of an approved Code revision based on an urgent need

(-b) to permit use of a new material for Code construction

(-c) to gain experience with new materials or alternative requirements prior to incorporation directly into the Code

(3) *Code Interpretations*

(-a) Code Interpretations provide clarification of the meaning of existing requirements in the Code and are presented in Inquiry and Reply format. Interpretations do not introduce new requirements.

(-b) If existing Code text does not fully convey the meaning that was intended, or conveys conflicting requirements, and revision of the requirements is required to support the Interpretation, an Intent Interpretation will be issued in parallel with a revision to the Code.

(b) Code requirements, Code Cases, and Code Interpretations established by the Committee 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 requirements.

(c) Inquiries that do not comply with the following guidance or that do not provide sufficient information for the Committee’s full understanding may result in the request being returned to the Inquirer with no action.

## 2 INQUIRY FORMAT

Submittals to the Committee should include the following information:

(a) *Purpose.* Specify one of the following:

(1) request for revision of present Code requirements

(2) request for new or additional Code requirements

(3) request for Code Case

(4) request for Code Interpretation

(b) *Background.* The Inquirer should provide the information needed for the Committee’s understanding of the Inquiry, being sure to include reference to the applicable Code Section, Division, Edition, Addenda (if applicable), paragraphs, figures, and tables. Preferably, the Inquirer should provide a copy of, or relevant extracts from, the specific referenced portions of the Code.

(c) *Presentations.* The Inquirer may desire to attend or be asked to attend a meeting of the Committee to make a formal presentation or to answer questions from the Committee members with regard to the Inquiry. Attendance at a BPV Standards Committee meeting shall be at the expense of the Inquirer. The Inquirer's attendance or lack of attendance at a meeting will not be used by the Committee as a basis for acceptance or rejection of the Inquiry by the Committee. However, if the Inquirer's request is unclear, attendance by the Inquirer or a representative may be necessary for the Committee to understand the request sufficiently to be able to provide an Interpretation. If the Inquirer desires to make a presentation at a Committee meeting, the Inquirer should provide advance notice to the Committee Secretary, to ensure time will be allotted for the presentation in the meeting agenda. The Inquirer should consider the need for additional audiovisual equipment that might not otherwise be provided by the Committee. With sufficient advance notice to the Committee Secretary, such equipment may be made available.

### 3 CODE REVISIONS OR ADDITIONS

Requests for Code revisions or additions should include the following information:

(a) *Requested Revisions or Additions.* For requested revisions, the Inquirer should identify those requirements of the Code that they believe should be revised, and should submit a copy of, or relevant extracts from, the appropriate requirements as they appear in the Code, marked up with the requested revision. For requested additions to the Code, the Inquirer should provide the recommended wording and should clearly indicate where they believe the additions should be located in the Code requirements.

(b) *Statement of Need.* The Inquirer should provide a brief explanation of the need for the revision or addition.

(c) *Background Information.* The Inquirer should provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request, that will allow the Committee to adequately evaluate the requested revision or addition. Sketches, tables, figures, and graphs should be submitted, as appropriate. The Inquirer should identify any pertinent portions of the Code that would be affected by the revision or addition and any portions of the Code that reference the requested revised or added paragraphs.

### 4 CODE CASES

Requests for Code Cases should be accompanied by a statement of need and background information similar to that described in 3(b) and 3(c), respectively, for Code revisions or additions. The urgency of the Code Case (e.g., project underway or imminent, new procedure) should be described. In addition, it is important that the request is in connection with equipment that will bear the Certification Mark, with the exception of Section XI applications. The proposed Code Case should identify the Code Section and Division, and should be written as a Question and a Reply, in the same format as existing Code Cases. Requests for Code Cases should also indicate the applicable Code Editions and Addenda (if applicable) to which the requested Code Case applies.

### 5 CODE INTERPRETATIONS

(a) Requests for Code Interpretations should be accompanied by the following information:

(1) *Inquiry.* The Inquirer should propose a condensed and precise Inquiry, omitting superfluous background information and, when possible, composing the Inquiry in such a way that a "yes" or a "no" Reply, with brief limitations or conditions, if needed, can be provided by the Committee. The proposed question should be technically and editorially correct.

(2) *Reply.* The Inquirer should propose a Reply that clearly and concisely answers the proposed Inquiry question. Preferably, the Reply should be "yes" or "no," with brief limitations or conditions, if needed.

(3) *Background Information.* The Inquirer should provide any need or background information, such as described in 3(b) and 3(c), respectively, for Code revisions or additions, that will assist the Committee in understanding the proposed Inquiry and Reply.

If the Inquirer believes a revision of the Code requirements would be helpful to support the Interpretation, the Inquirer may propose such a revision for consideration by the Committee. In most cases, such a proposal is not necessary.

(b) Requests for Code Interpretations should be limited to an Interpretation of a particular requirement in the Code or in a Code Case. Except with regard to interpreting a specific Code requirement, the Committee is not permitted to consider consulting-type requests such as the following:

(1) a review of calculations, design drawings, welding qualifications, or descriptions of equipment or parts to determine compliance with Code requirements

- (2) a request for assistance in performing any Code-prescribed functions relating to, but not limited to, material selection, designs, calculations, fabrication, inspection, pressure testing, or installation
- (3) a request seeking the rationale for Code requirements

## 6 SUBMITTALS

(a) *Submittal.* Requests for Code Interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at <http://go.asme.org/InterpretationRequest>. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt. If the Inquirer is unable to use the online form, the Inquirer may mail the request to the following address:

Secretary  
ASME Boiler and Pressure Vessel Committee  
Two Park Avenue  
New York, NY 10016-5990

All other Inquiries should be mailed to the Secretary of the BPV Committee at the address above. Inquiries are unlikely to receive a response if they are not written in clear, legible English. They must also include the name of the Inquirer and the company they represent or are employed by, if applicable, and the Inquirer's address, telephone number, fax number, and e-mail address, if available.

(b) *Response.* The Secretary of the appropriate Committee will provide a written response, via letter or e-mail, as appropriate, to the Inquirer, upon completion of the requested action by the Committee. Inquirers may track the status of their Interpretation Request at <http://go.asme.org/Interpretations>.

# PERSONNEL

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

January 1, 2017

### TECHNICAL OVERSIGHT MANAGEMENT COMMITTEE (TOMC)

T. P. Pastor, <i>Chair</i>	J. F. Henry
S. C. Roberts, <i>Vice Chair</i>	R. S. Hill III
J. S. Brzuszkiewicz, <i>Staff Secretary</i>	G. G. Karcher
R. W. Barnes	W. M. Lundy
R. J. Basile	G. C. Park
T. L. Bedeaux	M. D. Rana
D. L. Berger	R. F. Reedy, Sr.
D. A. Canonico	B. W. Roberts
A. Chaudouet	F. J. Schaaf, Jr.
D. B. DeMichael	B. F. Shelley
R. P. Deubler	W. J. Sperko
P. D. Edwards	D. Srnic
J. G. Feldstein	R. W. Swayne
R. E. Gimple	C. Withers
T. E. Hansen	J. E. Batey, <i>Contributing Member</i>
G. W. Hembree	

### HONORARY MEMBERS (MAIN COMMITTEE)

F. P. Barton	W. G. Knecht
T. M. Cullen	J. LeCoff
G. E. Feigel	T. G. McCarty
O. F. Hedden	G. C. Millman
M. H. Jawad	R. A. Moen
A. J. Justin	R. F. Reedy, Sr.

### ADMINISTRATIVE COMMITTEE

T. P. Pastor, <i>Chair</i>	J. F. Henry
S. C. Roberts, <i>Vice Chair</i>	R. S. Hill III
J. S. Brzuszkiewicz, <i>Staff Secretary</i>	G. C. Park
R. W. Barnes	M. D. Rana
T. L. Bedeaux	B. F. Shelley
D. L. Berger	W. J. Sperko
G. W. Hembree	

### MARINE CONFERENCE GROUP

H. N. Patel, <i>Chair</i>	G. Pallichadath
J. S. Brzuszkiewicz, <i>Staff Secretary</i>	N. Prokopuk
J. G. Hungerbuhler, Jr.	J. D. Reynolds

### CONFERENCE COMMITTEE

D. A. Douin — Ohio, <i>Secretary</i>	J. LeSage, Jr. — Louisiana
M. J. Adams — Ontario, Canada	A. M. Lorimor — South Dakota
J. T. Amato — Minnesota	M. Mailman — Northwest Territories, Canada
W. Anderson — Mississippi	D. E. Mallory — New Hampshire
R. D. Austin — Arizona	W. McGivney — City of New York, New York
R. J. Brockman — Missouri	S. V. Nelson — Colorado
J. H. Burpee — Maine	A. K. Oda — Washington
M. Byrum — Alabama	M. Poehlmann — Alberta, Canada
C. B. Cantrell — Nebraska	J. F. Porcella — West Virginia
S. Chapman — Tennessee	C. F. Reyes — City of Los Angeles, California
D. C. Cook — California	M. J. Ryan — City of Chicago, Illinois
B. J. Crawford — Georgia	D. Sandfoss — Nevada
E. L. Creaser — New Brunswick, Canada	M. H. Sansone — New York
J. J. Dacanay — Hawaii	A. S. Scholl — British Columbia, Canada
C. Dautrich — North Carolina	T. S. Seime — North Dakota
R. Delury — Manitoba, Canada	C. S. Selinger — Saskatchewan, Canada
P. L. Dodge — Nova Scotia, Canada	J. E. Sharier — Ohio
D. Eastman — Newfoundland and Labrador, Canada	N. Smith — Pennsylvania
J. J. Esch — Delaware	R. Spiker — North Carolina
A. G. Frazier — Florida	D. J. Stenrose — Michigan
T. J. Granneman II — Oklahoma	R. J. Stimson II — Kansas
D. R. Hannon — Arkansas	R. K. Sturm — Utah
E. G. Hilton — Virginia	S. R. Townsend — Prince Edward Island, Canada
C. Jackson — City of Detroit, Michigan	R. D. Trout — Texas
M. L. Jordan — Kentucky	M. C. Vogel — Illinois
E. Kawa, Jr. — Massachusetts	T. Waldbillig — Wisconsin
A. Khssassi — Quebec, Canada	M. Washington — New Jersey
J. Klug — City of Milwaukee, Wisconsin	
K. J. Kraft — Maryland	
K. S. Lane — Alaska	
L. C. Leet — City of Seattle, Washington	

### INTERNATIONAL INTEREST REVIEW GROUP

V. Felix	C. Minu
Y.-G. Kim	T. S. G. Narayannan
S. H. Leong	Y.-W. Park
W. Lin	A. R. R. Nogales
O. F. Manafa	P. Williamson

**COMMITTEE ON POWER BOILERS (BPV I)**

D. L. Berger, <i>Chair</i>	Y. Oishi
R. E. McLaughlin, <i>Vice Chair</i>	E. M. Ortman
U. D'Urso, <i>Staff Secretary</i>	J. T. Pillow
J. L. Arnold	M. Slater
D. A. Canonico	J. M. Tanzosh
K. K. Coleman	D. E. Tompkins
P. D. Edwards	D. E. Tuttle
J. G. Feldstein	J. Vattappilly
G. W. Galanes	R. V. Wielgoszinski
T. E. Hansen	F. Zeller
J. F. Henry	Y. Li, <i>Delegate</i>
J. S. Hunter	H. Michael, <i>Delegate</i>
G. B. Komora	B. W. Roberts, <i>Contributing Member</i>
W. L. Lowry	
F. Massi	D. N. French, <i>Honorary Member</i>
L. Moedinger	T. C. McGough, <i>Honorary Member</i>
P. A. Molvie	R. L. Williams, <i>Honorary Member</i>

**Subgroup on Design (BPV I)**

J. Vattappilly, <i>Chair</i>	P. A. Molvie
D. I. Anderson, <i>Secretary</i>	L. S. Tsai
D. Dewees	M. Wadkinson
H. A. Fonzi, Jr.	C. F. Jeerings, <i>Contributing Member</i>
J. P. Glaspie	S. V. Torkildson, <i>Contributing Member</i>
G. B. Komora	

**Subgroup on Fabrication and Examination (BPV I)**

J. L. Arnold, <i>Chair</i>	T. E. Hansen
P. Becker	C. T. McDaris
D. L. Berger	R. E. McLaughlin
S. Fincher	R. J. Newell
G. W. Galanes	Y. Oishi
P. F. Gilston	J. T. Pillow
J. Hainsworth	R. V. Wielgoszinski

**Subgroup on General Requirements and Piping (BPV I)**

E. M. Ortman, <i>Chair</i>	R. E. McLaughlin
D. Tompkins, <i>Vice Chair</i>	B. J. Mollitor
F. Massi, <i>Secretary</i>	J. T. Pillow
P. Becker	D. E. Tuttle
D. L. Berger	M. Wadkinson
P. D. Edwards	R. V. Wielgoszinski
G. W. Galanes	C. F. Jeerings, <i>Contributing Member</i>
T. E. Hansen	S. V. Torkildson, <i>Contributing Member</i>
M. Lemmons	
W. L. Lowry	R. Uebel, <i>Contributing Member</i>

**Subgroup on Locomotive Boilers (BPV I)**

L. Moedinger, <i>Chair</i>	S. D. Jackson
S. M. Butler, <i>Secretary</i>	M. A. Janssen
P. Boschan	S. A. Lee
J. R. Braun	G. M. Ray
R. C. Franzen, Jr.	R. B. Stone
G. W. Galanes	M. W. Westland
D. W. Griner	

**Subgroup on Materials (BPV I)**

G. W. Galanes, <i>Chair</i>	F. Masuyama
J. F. Henry, <i>Vice Chair</i>	D. W. Rahoi
M. Lewis, <i>Secretary</i>	J. M. Tanzosh
S. H. Bowes	J. Vattappilly
D. A. Canonico	F. Zeller
K. K. Coleman	M. Gold, <i>Contributing Member</i>
K. L. Hayes	B. W. Roberts, <i>Contributing Member</i>
J. S. Hunter	
O. X. Li	

**Subgroup on Solar Boilers (BPV I)**

E. M. Ortman, <i>Chair</i>	P. Jennings
R. E. Hearne, <i>Secretary</i>	D. J. Koza
H. A. Fonzi, Jr.	F. Massi
G. W. Galanes	S. V. Torkildson, <i>Contributing Member</i>
J. S. Hunter	

**Germany International Working Group (BPV I)**

H. Michael, <i>Chair</i>	T. Ludwig
H. P. Schmitz, <i>Secretary</i>	R. A. Meyers
M. Bremicker	F. Miunske
P. Chavdarov	P. Paluszkiwicz
B. Daume	H. Schroeder
J. Fleischfresser	A. Spangenberg
E. Helmholdt	M. Sykora
R. Kauer	J. Henrichsmeyer, <i>Contributing Member</i>
S. Krebs	

**India International Working Group (BPV I)**

U. Revisanakaran, <i>Chair</i>	G. V. S. Rao
A. J. Patil, <i>Vice Chair</i>	M. G. Rao
H. Dalal, <i>Secretary</i>	N. Satheesan
K. Asokkumar	G. U. Shanker
M. R. Kalahasthi	D. Shrivastava
I. Kalyanasundaram	S. Venkataramana
A. R. Patil	

**Task Group on Modernization of BPVC Section I**

D. I. Anderson, <i>Chair</i>	R. E. McLaughlin
U. D'Urso, <i>Staff Secretary</i>	P. A. Molvie
J. L. Arnold	E. M. Ortman
D. Dewees	J. T. Pillow
G. W. Galanes	B. W. Roberts
J. P. Glaspie	D. E. Tuttle
T. E. Hansen	J. Vattappilly
J. F. Henry	



**COMMITTEE ON MATERIALS (BPV II)**

J. F. Henry, *Chair*  
 J. F. Grubb, *Vice Chair*  
 C. E. O'Brien, *Staff Secretary*  
 F. Abe  
 A. Appleton  
 J. Cameron  
 D. A. Canonico  
 A. Chaudouet  
 D. B. Denis  
 J. R. Foulds  
 D. W. Gandy  
 M. H. Gilkey  
 J. A. Hall  
 K. M. Hottle  
 M. Ishikawa  
 O. X. Li  
 F. Masuyama  
 R. K. Nanstad  
 K. E. Orié  
 D. W. Rahoí  
 E. Shapiro  
 M. J. Slater  
 R. C. Sutherlin  
 R. W. Swindeman

J. M. Tanzosh  
 R. G. Young  
 F. Zeller  
 O. Oldani, *Delegate*  
 H. D. Bushfield, *Contributing Member*  
 M. Gold, *Contributing Member*  
 W. Hoffelner, *Contributing Member*  
 M. Katcher, *Contributing Member*  
 M. L. Nayyar, *Contributing Member*  
 E. G. Nisbett, *Contributing Member*  
 D. T. Peters, *Contributing Member*  
 B. W. Roberts, *Contributing Member*  
 E. Thomas, *Contributing Member*  
 E. Uptis, *Contributing Member*  
 T. M. Cullen, *Honorary Member*  
 W. D. Edsall, *Honorary Member*  
 G. C. Hsu, *Honorary Member*  
 R. A. Moen, *Honorary Member*  
 C. E. Spaeder, Jr., *Honorary Member*  
 A. W. Zeuthen, *Honorary Member*

**Executive Committee (BPV II)**

J. F. Henry, *Chair*  
 C. E. O'Brien, *Staff Secretary*  
 A. Appleton  
 A. Chaudouet  
 J. R. Foulds  
 M. Gold

J. F. Grubb  
 R. W. Mikitka  
 B. W. Roberts  
 M. J. Slater  
 R. C. Sutherlin  
 R. W. Swindeman

**Subgroup on External Pressure (BPV II)**

R. W. Mikitka, *Chair*  
 D. L. Kurle, *Vice Chair*  
 J. A. A. Morrow, *Secretary*  
 L. F. Campbell  
 H. Chen  
 D. S. Griffín  
 J. F. Grubb  
 S. Guzey

J. R. Harris III  
 M. H. Jawad  
 C. R. Thomas  
 M. Wadkinson  
 M. Katcher, *Contributing Member*  
 C. H. Sturgeon, *Contributing Member*

**Subgroup on Ferrous Specifications (BPV II)**

A. Appleton, *Chair*  
 K. M. Hottle, *Vice Chair*  
 P. Wittenbach, *Secretary*  
 H. Chen  
 B. M. Dingman  
 M. J. Dosdourian  
 O. Elkadim  
 J. D. Fritz  
 M. Gold  
 T. Graham  
 J. M. Grocki  
 J. F. Grubb  
 J. Gundlach

C. Hyde  
 D. S. Janikowski  
 L. J. Lavezzi  
 S. G. Lee  
 W. C. Mack  
 A. S. Melilli  
 K. E. Orié  
 J. Shick  
 E. Uptis  
 J. D. Wilson  
 R. Zawierucha  
 E. G. Nisbett, *Contributing Member*

**Subgroup on International Material Specifications (BPV II)**

A. Chaudouet, *Chair*  
 A. R. Nywening, *Vice Chair*  
 T. F. Miskell, *Secretary*  
 D. A. Canonico  
 H. Chen  
 A. F. Garbolevsky  
 D. O. Henry

M. Ishikawa  
 O. X. Li  
 W. M. Lundy  
 E. Uptis  
 F. Zeller  
 O. Oldani, *Delegate*  
 H. Lorenz, *Contributing Member*

**Subgroup on Nonferrous Alloys (BPV II)**

R. C. Sutherlin, *Chair*  
 M. H. Gilkey, *Vice Chair*  
 J. Calland  
 D. B. Denis  
 J. F. Grubb  
 T. Hartman  
 A. Heino  
 M. Katcher  
 J. A. McMaster  
 L. Paul

D. W. Rahoí  
 W. Ren  
 J. Robertson  
 E. Shapiro  
 M. H. Skillingberg  
 J. Weritz  
 R. Wright  
 S. Yem  
 D. T. Peters, *Contributing Member*

**Subgroup on Physical Properties (BPV II)**

J. F. Grubb, *Chair*  
 D. B. Denis, *Vice Chair*  
 E. Shapiro

H. D. Bushfield, *Contributing Member*

**Subgroup on Strength, Ferrous Alloys (BPV II)**

M. J. Slater, *Chair*  
 S. W. Knowles, *Secretary*  
 F. Abe  
 D. A. Canonico  
 A. Di Rienzo  
 J. R. Foulds  
 J. A. Hall  
 J. F. Henry  
 K. Kimura  
 F. Masuyama  
 T. Ono

M. Ortolani  
 D. W. Rahoí  
 M. S. Shelton  
 R. W. Swindeman  
 J. M. Tanzosh  
 R. G. Young  
 F. Zeller  
 M. Gold, *Contributing Member*  
 M. Nair, *Contributing Member*  
 B. W. Roberts, *Contributing Member*

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

W. F. Newell, Jr., *Chair*  
 S. H. Bowes  
 K. K. Coleman  
 M. Denault  
 P. D. Flenner  
 J. R. Foulds  
 D. W. Gandy  
 M. Ghahremani  
 K. L. Hayes

J. F. Henry  
 E. Liebl  
 J. Penso  
 D. W. Rahoí  
 B. W. Roberts  
 W. J. Sperko  
 J. P. Swezy, Jr.  
 J. M. Tanzosh  
 M. Gold, *Contributing Member*

**Working Group on Materials Database (BPV II)**

R. W. Swindeman, *Chair*  
 C. E. O'Brien, *Staff Secretary*  
 F. Abe  
 J. R. Foulds  
 J. F. Henry  
 M. J. Slater  
 R. C. Sutherlin  
 D. Andrei, *Contributing Member*

J. L. Arnold, *Contributing Member*  
 J. Grimes, *Contributing Member*  
 W. Hoffelner, *Contributing Member*  
 T. Lazar, *Contributing Member*  
 D. T. Peters, *Contributing Member*  
 W. Ren, *Contributing Member*  
 B. W. Roberts, *Contributing Member*

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

J. F. Henry, <i>Chair</i>	W. F. Newell, Jr.
J. A. Siefert, <i>Secretary</i>	M. Ortolani
F. Abe	J. Parker
S. H. Bowes	W. J. Sperko
D. A. Canonico	R. W. Swindeman
K. K. Coleman	J. M. Tanzosh
P. D. Flenner	R. H. Worthington
J. R. Foulds	R. G. Young
G. W. Galanes	F. Zeller
M. Gold	G. Cumino, <i>Contributing Member</i>
F. Masuyama	B. W. Roberts, <i>Contributing Member</i>
T. Melfi	

**Working Group on Data Analysis (BPV II)**

J. F. Grubb, <i>Chair</i>	W. Ren
F. Abe	M. Subanovic
J. R. Foulds	M. J. Swindeman
M. Gold	R. W. Swindeman
J. F. Henry	B. W. Roberts, <i>Contributing Member</i>
M. Katcher	
F. Masuyama	

**China International Working Group (BPV II)**

B. Shou, <i>Chair</i>	X. Wang
A. T. Xu, <i>Secretary</i>	F. Yang
W. Fang	G. Yang
Q. C. Feng	H.-C. Yang
S. Huo	R. Ye
F. Kong	L. Yin
H. Li	D. Zhang
J. Li	H. Zhang
S. Li	X.-H. Zhang
Z. Rongcan	Yingkai Zhang
S. Tan	Yong Zhang
C. Wang	Q. Zhao
J. Wang	S. Zhao
Q.-J. Wang	J. Zou

**COMMITTEE ON CONSTRUCTION OF NUCLEAR FACILITY COMPONENTS (BPV III)**

R. S. Hill III, <i>Chair</i>	M. Morishita
R. B. Keating, <i>Vice Chair</i>	D. K. Morton
J. C. Minichiello, <i>Vice Chair</i>	T. Nagata
A. Byk, <i>Staff Secretary</i>	R. F. Reedy, Sr.
T. M. Adams	I. Saito
A. Appleton	S. Sham
R. W. Barnes	C. T. Smith
W. H. Borter	W. K. Sowder, Jr.
C. W. Bruny	W. J. Sperko
T. D. Burchell	J. P. Tucker
R. P. Deubler	K. R. Wichman
A. C. Eberhardt	C. S. Withers
R. M. Jessee	Y. H. Choi, <i>Delegate</i>
R. I. Jetter	T. Ius, <i>Delegate</i>
C. C. Kim	H.-T. Wang, <i>Delegate</i>
G. H. Koo	M. Zhou, <i>Contributing Member</i>
V. Kostarev	E. B. Branch, <i>Honorary Member</i>
K. A. Manoly	G. D. Cooper, <i>Honorary Member</i>
D. E. Matthews	D. F. Landers, <i>Honorary Member</i>
R. P. McIntyre	R. A. Moen, <i>Honorary Member</i>
M. N. Mitchell	C. J. Pieper, <i>Honorary Member</i>

**Executive Committee (BPV III)**

R. S. Hill III, <i>Chair</i>	J. C. Minichiello
A. Byk, <i>Staff Secretary</i>	M. Morishita
T. M. Adams	D. K. Morton
C. W. Bruny	J. A. Munshi
P. R. Donavin	C. A. Sanna
R. M. Jessee	S. Sham
R. B. Keating	W. K. Sowder, Jr.
R. P. McIntyre	

**Subcommittee on Design (BPV III)**

P. R. Donavin, <i>Chair</i>	M. N. Mitchell
D. E. Matthews, <i>Vice Chair</i>	W. J. O'Donnell, Sr.
G. L. Hollinger, <i>Secretary</i>	E. L. Pleins
T. M. Adams	S. Sham
R. L. Bratton	J. P. Tucker
C. W. Bruny	W. F. Weitze
R. P. Deubler	K. Wright
R. I. Jetter	T. Yamazaki
C. Jonker	J. Yang
R. B. Keating	R. S. Hill III, <i>Contributing Member</i>
K. A. Manoly	M. H. Jawad, <i>Contributing Member</i>
R. J. Masterson	

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

T. M. Adams, <i>Chair</i>	T. M. Musto
R. B. Keating, <i>Vice Chair</i>	T. Nagata
S. Pellet, <i>Secretary</i>	A. N. Nguyen
G. A. Antaki	E. L. Pleins
S. Asada	I. Saito
J. F. Ball	G. C. Slagis
C. Basavaraju	J. R. Stinson
R. P. Deubler	G. Z. Tokarski
P. Hirschberg	J. P. Tucker
O.-S. Kim	P. Vock
R. Klein	C. Wilson
H. Kobayashi	J. Yang
K. A. Manoly	C. W. Bruny, <i>Contributing Member</i>
R. J. Masterson	A. A. Dermenjian, <i>Contributing Member</i>
D. E. Matthews	J. C. Minichiello
J. C. Minichiello	D. K. Morton
D. K. Morton	K. R. Wichman, <i>Honorary Member</i>

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

J. Yang, <i>Chair</i>	M. Nakajima
J. F. Kielb, <i>Secretary</i>	M. D. Snyder
L. C. Hartless	A. Tsirigotis
D. Keck	R. Vollmer
T. Liszkai	R. Z. Ziegler
H. S. Mehta	J. T. Land, <i>Contributing Member</i>

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

D. K. Morton, <i>Chair</i>	E. L. Pleins
D. J. Ammerman	C. J. Temus
G. Bjorkman	X. Zhai
V. Broz	I. D. McInnes, <i>Contributing Member</i>
S. Horowitz	H. P. Shrivastava, <i>Contributing Member</i>
D. W. Lewis	
J. C. Minichiello	

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

T. M. Musto, <i>Chair</i>	P. Krishnaswamy
J. Ossmann, <i>Secretary</i>	K. A. Manoly
T. M. Adams	M. Martin
T. A. Bacon	J. C. Minichiello
M. Brandes	D. P. Munson
D. Burwell	F. J. Schaaf, Jr.
S. Choi	R. Stakenborghs
J. R. Hebeisen	H. E. Svetlik

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

P. Vock, <i>Chair</i>	C. A. Mizer
S. Jones, <i>Secretary</i>	J. O'Callaghan
M. C. Buckley	H. O'Brien
R. Farrell	K. E. Reid II
G. A. Jolly	J. Sulley
J. Klein	I. H. Tseng
T. Lippucci	J. P. Tucker

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

G. A. Antaki, <i>Chair</i>	R. B. Keating
G. Z. Tokarski, <i>Secretary</i>	V. Kostarev
T. M. Adams	D. Lieb
T. A. Bacon	T. B. Littleton
C. Basavaraju	Y. Liu
J. Catalano	J. F. McCabe
F. Claeys	J. C. Minichiello
C. M. Faidy	I.-K. Nam
R. G. Gilada	M. S. Sills
N. M. Graham	G. C. Slagis
M. A. Gray	N. C. Sutherland
R. J. Gurdal	C.-I. Wu
R. W. Haupt	A. N. Nguyen, <i>Contributing Member</i>
A. Hirano	N. J. Shah, <i>Contributing Member</i>
P. Hirschberg	E. A. Wais, <i>Contributing Member</i>
M. Kassar	E. C. Rodabaugh, <i>Honorary Member</i>
J. Kawahata	

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

D. E. Matthews, <i>Chair</i>	T. J. Schriefer
C. Wilson, <i>Secretary</i>	M. C. Scott
C. Basavaraju	P. K. Shah
J. V. Gregg, Jr.	J. Shupert
M. Kassar	C. Turylo
R. B. Keating	D. Vlaicu
D. Keck	W. F. Weitze
J. Kim	T. Yamazaki
O.-S. Kim	R. Z. Ziegler
T. Mitsuhashi	A. Kalnins, <i>Contributing Member</i>
M. Nair	

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

C. W. Bruny, <i>Chair</i>	D. Keck
S. McKillop, <i>Secretary</i>	M. N. Mitchell
K. Avrithi	W. J. O'Donnell, Sr.
W. Culp	P. J. O'Regan
P. R. Donavin	W. D. Reinhardt
J. V. Gregg, Jr.	P. Smith
H. T. Harrison III	S. D. Snow
K. Hsu	W. F. Weitze
C. Jonker	K. Wright
M. Kassar	

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

J. F. Ball, <i>Chair</i>	A. L. Szeplin
K. R. May	D. G. Thibault
D. Miller	I. H. Tseng

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

R. Klein, <i>Chair</i>	M. Higuchi
D. Chowdhury, <i>Secretary</i>	R. Ladefian
P. W. Behnke	W. Lienau
R. E. Cornman, Jr.	K. J. Noel
X. Di	R. A. Patrick
M. D. Eftychiou	J. Sulley
A. Fraser	R. Udo
C. Gabhart	A. G. Washburn
R. Ghanbari	

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

J. R. Stinson, <i>Chair</i>	S. Pellet
U. S. Bandyopadhyay, <i>Secretary</i>	I. Saito
K. Avrithi	H. P. Srivastava
T. H. Baker	C. Stirzel
F. J. Birch	G. Z. Tokarski
R. P. Deubler	P. Wiseman
N. M. Graham	C.-I. Wu
R. J. Masterson	

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

S. D. Snow, <i>Chair</i>	J. F. McCabe
C. F. Heberling II, <i>Secretary</i>	S. McKillop
K. Avrithi	S. Ranganath
C. Basavaraju	W. D. Reinhardt
D. L. Caldwell	D. H. Roarty
D. Dewees	P. K. Shah
C. M. Faidy	R. Vollmer
R. Farrell	S. Wang
H. T. Harrison III	W. F. Weitze
P. Hirschberg	J. Wen
M. Kassar	T. M. Wiger
R. B. Keating	K. Wright
J. Kim	J. Yang
H. Kobayashi	R. D. Blevins, <i>Contributing Member</i>
T. Liszkai	M. R. Breach, <i>Contributing Member</i>

**Working Group on Environmental Effects (SG-DM) (BPV III)**

C. Jonker, <i>Chair</i>	J. Kim
B. D. Frew, <i>Secretary</i>	J. E. Nestell
W. Culp	M. Osterfoss
P. J. Dobson	T. J. Schriefer

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

K. Wright, <i>Chair</i>	S. R. Gosselin
M. A. Gray, <i>Vice Chair</i>	Y. He
W. F. Weitzel, <i>Secretary</i>	P. Hirschberg
T. M. Adams	H. S. Mehta
S. Asada	T. Metais
K. Avrithi	J.-S. Park
R. C. Cipolla	D. H. Roarty
T. M. Damiani	I. Saito
C. M. Faigy	D. Vlaicu
T. D. Gilman	R. Z. Ziegler

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

P. R. Donavin, <i>Chair</i>	S. H. Kleinsmith
M. S. Shelton, <i>Secretary</i>	S. Majumdar
T. M. Damiani	S. N. Malik
D. Dewees	S. Mohanty
C. M. Faigy	D. H. Roarty
S. R. Gosselin	A. Tsirigotis
R. J. Gurdal	K. Wright
C. F. Heberling II	H. H. Ziada
C. E. Hinnant	W. J. O'Donnell, Sr., <i>Contributing Member</i>
P. Hirschberg	
K. Hsu	

**Working Group on Graphite and Composites Design  
(SG-DM) (BPV III)**

M. N. Mitchell, <i>Chair</i>	S. T. Gonczy
M. W. Davies, <i>Vice Chair</i>	M. G. Jenkins
T. D. Burchell, <i>Secretary</i>	Y. Katoh
A. Appleton	J. Ossmann
S. R. Cadell	M. Roemmler
S.-H. Chi	S. Yu
W. J. Geringer	G. L. Zeng

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

M. Golliet, <i>Chair</i>	M. Morishita
T. Asayama	P. J. O'Regan
K. Avrithi	N. A. Palm
D. O. Henry	I. Saito
R. S. Hill III	

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

G. Bjorkman, <i>Chair</i>	W. D. Reinhardt
D. J. Ammerman, <i>Vice Chair</i>	P. Y.-K. Shih
V. Broz, <i>Secretary</i>	S. D. Snow
M. R. Breach	C.-F. Tso
J. M. Jordan	M. C. Yaksh
S. Kuehner	U. Zencker
D. Molitoris	

**Subgroup on Elevated Temperature Design (SC-D) (BPV III)**

S. Sham, <i>Chair</i>	G. H. Koo
T. Asayama	S. Majumdar
C. Becht IV	J. E. Nestell
F. W. Brust	W. J. O'Donnell, Sr.
P. Carter	R. W. Swindeman
B. F. Hantz	D. S. Griffin, <i>Contributing Member</i>
A. B. Hull	W. J. Koves, <i>Contributing Member</i>
M. H. Jawad	D. L. Marriott, <i>Contributing Member</i>
R. I. Jetter	

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

R. W. Swindeman, <i>Chair</i>	D. Maitra
R. Wright, <i>Secretary</i>	S. N. Malik
J. R. Foulds	J. E. Nestell
C. J. Johns	W. Ren
K. Kimura	B. W. Roberts
T. Le	M. Sengupta
M. Li	S. Sham

**Working Group on Analysis Methods (SG-ETD) (BPV III)**

P. Carter, <i>Chair</i>	T. Krishnamurthy
M. J. Swindeman, <i>Secretary</i>	T. Le
M. R. Breach	S. Sham
M. E. Cohen	D. K. Williams
R. I. Jetter	

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

T. Asayama, <i>Chair</i>	T. Le
F. W. Brust	B.-L. Lyow
P. Carter	S. N. Malik
R. I. Jetter	H. Qian
G. H. Koo	S. Sham

**Working Group on Elevated Temperature Construction (SG-ETD)  
(BPV III)**

M. H. Jawad, <i>Chair</i>	M. N. Mitchell
A. Mann, <i>Secretary</i>	B. J. Mollitor
D. I. Anderson	C. Nadarajah
R. G. Brown	P. Prueter
D. Dewees	M. J. Swindeman
B. F. Hantz	J. P. Glaspie, <i>Contributing Member</i>
R. I. Jetter	S. L. Marriott, <i>Contributing Member</i>
S. Krishnamurthy	
T. Le	

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

F. W. Brust, <i>Chair</i>	H. Qian
N. Broom	D. L. Rudland
P. Carter	P. J. Rush
T. Le	D.-J. Shim
S. N. Malik	S. X. Xu

**Special Working Group on Inelastic Analysis Methods (SG-ETD)  
(BPV III)**

S. Sham, *Chair*  
S. X. Xu, *Secretary*  
R. W. Barnes  
J. A. Blanco  
B. R. Ganta

T. Hassan  
G. H. Koo  
B.-L. Lyow  
M. J. Swindeman  
G. L. Zeng

**Subgroup on General Requirements (BPV III)**

R. P. McIntyre, *Chair*  
L. M. Plante, *Secretary*  
V. Apostolescu  
A. Appleton  
S. Bell  
J. R. Berry  
J. DeKleine  
J. V. Gardiner  
J. W. Highlands  
E. V. Imbro  
K. A. Kavanagh  
Y.-S. Kim

E. C. Renaud  
J. Rogers  
D. J. Roszman  
C. T. Smith  
W. K. Sowder, Jr.  
R. Spuhl  
G. E. Szabatura  
D. M. Vickery  
C. S. Withers  
H. Michael, *Delegate*  
G. L. Hollinger, *Contributing Member*

**Working Group on Duties and Responsibilities (SG-GR) (BPV III)**

J. V. Gardiner, *Chair*  
G. L. Hollinger, *Secretary*  
D. Arrigo  
S. Bell  
J. R. Berry  
P. J. Coco  
M. Cusick  
J. DeKleine  
N. DeSantis

Y. Diaz-Castillo  
K. A. Kavanagh  
J. M. Lyons  
L. M. Plante  
D. J. Roszman  
B. S. Sandhu  
E. M. Steuck  
J. L. Williams

**Working Group on Quality Assurance, Certification, and Stamping  
(SG-GR) (BPV III)**

C. T. Smith, *Chair*  
C. S. Withers, *Secretary*  
V. Apostolescu  
A. Appleton  
O. Elkadim  
S. M. Goodwin  
J. Grimm  
J. W. Highlands  
Y.-S. Kim  
B. McGlone  
R. P. McIntyre

D. T. Meisch  
R. B. Patel  
E. C. Renaud  
T. Rezk  
J. Rogers  
W. K. Sowder, Jr.  
R. Spuhl  
J. F. Strunk  
G. E. Szabatura  
D. M. Vickery  
C. A. Spletter, *Contributing Member*

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

J. V. Gardiner, *Chair*  
C. T. Smith, *Vice Chair*  
S. Bell  
M. Cusick  
Y. Diaz-Castillo  
J. Grimm  
J. M. Lyons  
B. McGlone  
R. Patel  
E. C. Renaud  
T. Rezk

J. Rogers  
D. J. Roszman  
B. S. Sandhu  
G. J. Solovey  
R. Spuhl  
G. E. Szabatura  
J. L. Williams  
C. S. Withers  
S. F. Harrison, *Contributing Member*

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

R. M. Jessee, *Chair*  
B. D. Frew, *Vice Chair*  
S. Hunter, *Secretary*  
W. H. Borter  
T. D. Burchell  
G. R. Cannell  
P. J. Coco  
M. W. Davies  
R. H. Davis  
D. B. Denis  
G. B. Georgiev  
S. E. Gingrich  
M. Golliet  
J. Grimm  
L. S. Harbison

J. Johnston, Jr.  
C. C. Kim  
M. Lashley  
T. Melfi  
H. Murakami  
J. Ossmann  
J. E. O'Sullivan  
M. C. Scott  
W. J. Sperko  
J. R. Stinson  
J. F. Strunk  
R. Wright  
S. Yee  
H. Michael, *Delegate*  
R. W. Barnes, *Contributing Member*

**Working Group on Graphite and Composite Materials (SG-MFE)  
(BPV III)**

T. D. Burchell, *Chair*  
M. W. Davies, *Vice Chair*  
M. N. Mitchell, *Secretary*  
A. Appleton  
R. L. Bratton  
S. R. Cadell  
S.-H. Chi  
A. Covac  
S. W. Doms  
S. F. Duffy

W. J. Geringer  
S. T. Gonzy  
M. G. Jenkins  
Y. Katoh  
J. Ossmann  
M. Roemmler  
N. Salstrom  
T. Shibata  
S. Yu  
G. L. Zeng

**Working Group on HDPE Materials (SG-MFE) (BPV III)**

M. Golliet, *Chair*  
M. A. Martin, *Secretary*  
W. H. Borter  
G. Brouette  
M. C. Buckley  
J. Hakii  
J. Johnston, Jr.  
P. Krishnaswamy

D. P. Munson  
T. M. Musto  
S. Patterson  
S. Schuessler  
R. Stakenborghs  
M. Troughton  
B. Hauger, *Contributing Member*

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

J. A. Munshi, *Chair*  
J. McLean, *Vice Chair*  
A. Byk, *Staff Secretary*  
K. Verderber, *Staff Secretary*  
C. J. Bang  
L. J. Colarusso  
A. C. Eberhardt  
F. Farzam  
P. S. Ghosal  
B. D. Hovis  
T. C. Inman  
C. Jones  
O. Jovall  
N.-H. Lee

N. Orbovic  
C. T. Smith  
J. F. Strunk  
T. Tonyan  
S. Wang  
T. J. Ahl, *Contributing Member*  
J. F. Artuso, *Contributing Member*  
J.-B. Domage, *Contributing Member*  
J. Gutierrez, *Contributing Member*  
T. Kang, *Contributing Member*  
T. Muraki, *Contributing Member*  
B. B. Scott, *Contributing Member*  
M. R. Senecal, *Contributing Member*

**Working Group on Design (BPV III-2)**

N.-H. Lee, *Chair*  
M. Allam  
S. Bae  
L. J. Colarusso  
A. C. Eberhardt  
F. Farzam  
P. S. Ghosal  
B. D. Hovis  
T. C. Inman  
C. Jones  
O. Jovall

J. A. Munshi  
T. Muraki  
S. Wang  
M. Diaz, *Contributing Member*  
S. Diaz, *Contributing Member*  
A. Istar, *Contributing Member*  
B. R. Laskewitz, *Contributing Member*  
B. B. Scott, *Contributing Member*  
Z. Shang, *Contributing Member*  
M. Sircar, *Contributing Member*

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

P. S. Ghosal, *Chair*  
T. Tonyan, *Vice Chair*  
M. Allam  
C. J. Bang  
J.-B. Domage  
A. C. Eberhardt  
C. Jones  
T. Kang

N. Lee  
C. T. Smith  
J. F. Strunk  
D. Ufuk  
J. F. Artuso, *Contributing Member*  
J. Gutierrez, *Contributing Member*  
B. B. Scott, *Contributing Member*  
Z. Shang, *Contributing Member*

**Special Working Group on Modernization (BPV III-2)**

J. McLean, *Chair*  
N. Orbovic, *Vice Chair*  
A. Adediran  
O. Jovall  
C. T. Smith  
M. A. Ugalde

S. Wang  
S. Diaz, *Contributing Member*  
J.-B. Domage, *Contributing Member*  
F. Lin, *Contributing Member*  
N. Stoeva, *Contributing Member*

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

D. K. Morton, *Chair*  
D. J. Ammerman, *Vice Chair*  
G. R. Cannell, *Secretary*  
G. Bjorkman  
V. Broz  
S. Horowitz  
D. W. Lewis  
E. L. Pleins  
R. H. Smith  
G. J. Solovey

C. J. Temus  
W. H. Borter, *Contributing Member*  
R. S. Hill III, *Contributing Member*  
P. E. McConnell, *Contributing Member*  
A. B. Meichler, *Contributing Member*  
T. Saegusa, *Contributing Member*  
N. M. Simpson, *Contributing Member*

**Subgroup on Fusion Energy Devices (BPV III)**

W. K. Sowder, Jr., *Chair*  
D. Andrei, *Staff Secretary*  
D. J. Roszman, *Secretary*  
L. C. Cadwallader  
B. R. Doshi  
M. Higuchi  
G. Holtmeier  
M. Kalsey  
K. A. Kavanagh  
K. Kim  
I. Kimihira  
S. Lee

G. Li  
X. Li  
P. Mokaria  
T. R. Muldoon  
M. Porton  
F. J. Schaaf, Jr.  
P. Smith  
Y. Song  
M. Trosen  
C. Waldon  
I. J. Zatz  
R. W. Barnes, *Contributing Member*

**Working Group on General Requirements (BPV III-4)**

D. J. Roszman, *Chair*  
W. K. Sowder, Jr.

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

M. Kalsey, *Chair*  
Y. Carin

**Working Group on Magnets (BPV III-4)**

S. Lee, *Chair*  
K. Kim, *Vice Chair*

**Working Group on Materials (BPV III-4)**

M. Porton, *Chair*  
P. Mummery

**Working Group on Vacuum Vessels (BPV III-4)**

I. Kimihira, *Chair*  
L. C. Cadwallader

B. R. Doshi

**Subgroup on High Temperature Reactors (BPV III)**

M. Morishita, *Chair*  
R. I. Jetter, *Vice Chair*  
S. Sham, *Secretary*  
N. Broom  
T. D. Burchell  
M. W. Davies  
S. Downey

G. H. Koo  
D. K. Morton  
J. E. Nestell  
G. L. Zeng  
X. Li, *Contributing Member*  
L. Shi, *Contributing Member*

**Working Group on High Temperature Gas-Cooled Reactors (BPV III-5)**

J. E. Nestell, *Chair*  
M. Sengupta, *Secretary*  
N. Broom  
T. D. Burchell  
M. W. Davies  
R. S. Hill III  
E. V. Imbro  
R. I. Jetter  
Y. W. Kim

T. Le  
T. R. Lupold  
S. N. Malik  
D. L. Marriott  
D. K. Morton  
S. Sham  
G. L. Zeng  
X. Li, *Contributing Member*  
L. Shi, *Contributing Member*

**Working Group on High Temperature Liquid-Cooled Reactors (BPV III-5)**

S. Sham, *Chair*  
T. Asayama, *Secretary*  
M. Arcaro  
R. W. Barnes  
P. Carter  
M. E. Cohen  
A. B. Hull

R. I. Jetter  
G. H. Koo  
T. Le  
S. Majumdar  
M. Morishita  
J. E. Nestell  
G. Wu, *Contributing Member*



**Argentina International Working Group (BPV III)**

O. Martinez, *Staff Secretary*  
 A. Acrogliano  
 W. Agrelo  
 G. O. Anteri  
 M. Anticoli  
 C. A. Araya  
 J. P. Balbiani  
 A. A. Betervide  
 D. O. Bordato  
 G. Bourguigne  
 M. L. Cappella  
 A. Claus  
 R. G. Cocco  
 A. Coleff  
 A. J. Dall'Osto  
 L. M. De Barberis  
 D. P. Delfino  
 D. N. Dell'Erba  
 F. G. Diez  
 A. Dominguez  
 S. A. Echeverria  
 J. Fernández  
 E. P. Fresquet

M. M. Gamizo  
 A. Gomez  
 I. M. Guerreiro  
 I. A. Knorr  
 M. F. Liendo  
 L. R. Miño  
 J. Monte  
 R. L. Morard  
 A. E. Pastor  
 E. Pizzichini  
 A. Politi  
 J. L. Racamato  
 H. C. Sanzi  
 G. J. Scian  
 G. G. Sebastian  
 M. E. Szarko  
 P. N. Torano  
 A. Turrin  
 O. A. Verastegui  
 M. D. Vigliano  
 P. Yamamoto  
 M. Zunino

**China International Working Group (BPV III)**

J. Yan, *Chair*  
 W. Tang, *Vice Chair*  
 C. A. Sanna, *Staff Secretary*  
 Y. He, *Secretary*  
 L. Guo  
 Y. Jing  
 D. Kang  
 Y. Li  
 B. Liang  
 H. Lin  
 S. Liu  
 W. Liu  
 J. Ma  
 K. Mao  
 W. Pei

G. Sun  
 Z. Sun  
 G. Tang  
 L. Ting  
 Y. Tu  
 Y. Wang  
 H. Wu  
 X. Wu  
 S. Xue  
 Z. Yin  
 G. Zhang  
 W. Zhang  
 W. Zhao  
 Y. Zhong  
 Z. Zhong

**Germany International Working Group (BPV III)**

C. Huttner, *Chair*  
 H.-R. Bath, *Secretary*  
 B. Arndt  
 M. Bauer  
 G. Daum  
 R. Doring  
 L. Gerstner  
 G. Haenle  
 K.-H. Herter  
 R. E. Hueggenberg  
 E. Iacopetta  
 U. Jendrich  
 D. Koelbl  
 G. Kramarz

C. Krumb  
 W. Mayinger  
 D. Moehring  
 D. Ostermann  
 G. Roos  
 J. Rudolph  
 C. A. Sanna  
 H. Schau  
 R. Trieglaff  
 P. Völlmecke  
 J. Wendt  
 F. Wille  
 M. Winter  
 N. Wirtz

**India International Working Group (BPV III)**

B. Basu, *Chair*  
 G. Mathivanan, *Vice Chair*  
 C. A. Sanna, *Staff Secretary*  
 S. B. Parkash, *Secretary*  
 A. D. Bagdare  
 V. Bhasin

S. Kovalai  
 D. Kulkarni  
 M. Ponnusamy  
 R. N. Sen  
 K. R. Shah  
 A. Sundararajan

**Korea International Working Group (BPV III)**

G. H. Koo, *Chair*  
 S. S. Hwang, *Vice Chair*  
 O.-S. Kim, *Secretary*  
 H. S. Byun  
 G.-S. Choi  
 S. Choi  
 J. Y. Hong  
 N.-S. Huh  
 J.-K. Hwang  
 C. Jang  
 I. I. Jeong  
 H. J. Kim  
 J. Kim  
 J.-S. Kim  
 K. Kim  
 M.-W. Kim  
 Y.-B. Kim  
 Y.-S. Kim

D. Kwon  
 B. Lee  
 D. Lee  
 Sanghoon Lee  
 Sangil Lee  
 S.-G. Lee  
 H. Lim  
 I.-K. Nam  
 B. Noh  
 C.-K. Oh  
 C. Park  
 H. Park  
 J.-S. Park  
 T. Shin  
 S. Song  
 J. S. Yang  
 O. Yoo

**Special Working Group on Editing and Review (BPV III)**

D. E. Matthews, *Chair*  
 R. L. Bratton  
 R. P. Deubler  
 A. C. Eberhardt  
 J. C. Minichiello

D. K. Morton  
 L. M. Plante  
 R. F. Reedy, Sr.  
 C. Wilson

**Special Working Group on HDPE Stakeholders (BPV III)**

D. Burwell, *Chair*  
 S. Patterson, *Secretary*  
 T. M. Adams  
 M. Brandes  
 S. Bruce  
 S. Choi  
 C. M. Faidy  
 M. Golliet  
 J. Grimes  
 R. M. Jessee  
 J. Johnston, Jr.

D. Keller  
 M. Lashley  
 K. A. Manoly  
 D. P. Munson  
 T. M. Musto  
 J. E. O'Sullivan  
 V. Rohatgi  
 F. J. Schaaf, Jr.  
 R. Stakenborghs  
 M. Troughton

**Special Working Group on Honors and Awards (BPV III)**

R. M. Jessee, *Chair*  
 A. Appleton  
 R. W. Barnes

D. E. Matthews  
 J. C. Minichiello

**Special Working Group on Industry Experience for New Plants  
(BPV III & BPV XI)**

J. T. Lindberg, <i>Chair</i>	O.-S. Kim
E. L. Pleins, <i>Chair</i>	Y.-S. Kim
J. Ossmann, <i>Secretary</i>	K. Matsunaga
T. L. Chan	D. E. Matthews
H. L. Gustin	R. E. McLaughlin
P. J. Hennessey	D. W. Sandusky
D. O. Henry	T. Tsuruta
J. Honcharik	R. M. Wilson
E. V. Imbro	S. M. Yee
C. G. Kim	

**Special Working Group on International Meetings (BPV III)**

C. T. Smith, <i>Chair</i>	R. S. Hill III
A. Byk, <i>Staff Secretary</i>	M. N. Mitchell
T. D. Burchell	R. F. Reedy, Sr.
S. W. Cameron	C. A. Sanna
R. L. Crane	

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

E. L. Pleins, <i>Chair</i>	M. Kris
M. C. Scott, <i>Secretary</i>	J. C. Minichiello
A. Byk	D. W. Sandusky
A. Cardillo	R. R. Stevenson
P. J. Coco	R. Troficanto
J. Honcharik	M. L. Wilson
E. V. Imbro	J. Yan
O.-S Kim	

**Special Working Group on Regulatory Interface (BPV III)**

E. V. Imbro, <i>Chair</i>	K. Matsunaga
P. Malouines, <i>Secretary</i>	D. E. Matthews
S. Bell	B. McGlone
A. Cardillo	A. T. Roberts III
P. J. Coco	R. R. Stevenson
J. Grimm	M. L. Wilson
J. Honcharik	

**COMMITTEE ON HEATING BOILERS (BPV IV)**

J. A. Hall, <i>Chair</i>	G. Scribner
T. L. Bedeaux, <i>Vice Chair</i>	R. D. Troutt
G. Moino, <i>Staff Secretary</i>	M. Wadkinson
B. Calderon	R. V. Wielgoszinski
J. Calland	H. Michael, <i>Delegate</i>
J. P. Chicoine	D. Picart, <i>Delegate</i>
J. M. Downs	A. Heino, <i>Contributing Member</i>
B. J. Iske	S. V. Voorhees, <i>Contributing Member</i>
J. Klug	J. L. Kleiss, <i>Alternate</i>
P. A. Molvie	

**Subgroup on Care and Operation of Heating Boilers (BPV IV)**

M. Wadkinson, <i>Chair</i>	J. A. Hall
T. L. Bedeaux	P. A. Molvie
J. Calland	C. Lasarte, <i>Contributing Member</i>
J. M. Downs	

**Subgroup on Cast Boilers (BPV IV)**

J. P. Chicoine, <i>Chair</i>	J. A. Hall
T. L. Bedeaux, <i>Vice Chair</i>	J. L. Kleiss
J. M. Downs	

**Subgroup on Materials (BPV IV)**

M. Wadkinson, <i>Chair</i>	J. A. Hall
J. Calland	A. Heino
J. M. Downs	B. J. Iske

**Subgroup on Water Heaters (BPV IV)**

J. Calland, <i>Chair</i>	R. E. Olson
L. Badziagowski	M. A. Taylor
J. P. Chicoine	T. E. Trant
C. Dinic	R. D. Troutt
B. J. Iske	

**Subgroup on Welded Boilers (BPV IV)**

P. A. Molvie, <i>Chair</i>	J. L. Kleiss
L. Badziagowski	R. E. Olson
T. L. Bedeaux	G. Scribner
B. Calderon	R. D. Troutt
J. Calland	M. Wadkinson
C. Dinic	R. V. Wielgoszinski

**COMMITTEE ON NONDESTRUCTIVE EXAMINATION (BPV V)**

G. W. Hembree, <i>Chair</i>	R. W. Kruzic
F. B. Kovacs, <i>Vice Chair</i>	C. May
J. S. Brzuszkiewicz, <i>Staff Secretary</i>	A. B. Nagel
S. J. Akryn	T. L. Plasek
J. E. Batey	F. J. Sattler
P. L. Brown	P. B. Shaw
M. A. Burns	G. M. Gatti, <i>Delegate</i>
B. Caccamise	X. Guiping, <i>Delegate</i>
C. Emslander	A. S. Birks, <i>Contributing Member</i>
N. Y. Faransso	J. Bennett, <i>Alternate</i>
N. A. Finney	H. C. Graber, <i>Honorary Member</i>
A. F. Garbolevsky	O. F. Hedden, <i>Honorary Member</i>
J. F. Halley	J. R. MacKay, <i>Honorary Member</i>
J. W. Houf	T. G. McCarty, <i>Honorary Member</i>
S. A. Johnson	

**Executive Committee (BPV V)**

F. B. Kovacs, <i>Chair</i>	N. Y. Faransso
G. W. Hembree, <i>Vice Chair</i>	N. A. Finney
J. S. Brzuszkiewicz, <i>Staff Secretary</i>	S. A. Johnson
J. E. Batey	A. B. Nagel
B. Caccamise	

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

C. Emslander, <i>Chair</i>	S. A. Johnson
J. W. Houf, <i>Vice Chair</i>	F. B. Kovacs
S. J. Akryn	D. I. Morris
J. E. Batey	A. B. Nagel
N. Carter	A. S. Birks, <i>Contributing Member</i>
N. Y. Faransso	J. P. Swezy, Jr., <i>Contributing Member</i>
N. A. Finney	
G. W. Hembree	

**Special Working Group on NDE Resource Support (SG-GR/PQ & I)  
(BPV V)**

N. A. Finney, <i>Chair</i>	R. Kelso
D. Adkins	C. Magruder
J. Anderson	J. W. Mefford, Jr.
D. Bajula	K. Page
J. Bennett	D. Tompkins
C. T. Brown	D. Van Allen
T. Clausing	T. Vidimos
J. L. Garner	R. Ward
K. Hayes	M. Wolf

**Subgroup on Surface Examination Methods (BPV V)**

S. A. Johnson, <i>Chair</i>	G. W. Hembree
J. Halley, <i>Vice Chair</i>	R. W. Kruzic
S. J. Akrin	B. D. Laite
J. E. Batey	C. May
P. L. Brown	L. E. Mullins
B. Caccamise	A. B. Nagel
N. Carter	F. J. Sattler
N. Y. Faransso	P. B. Shaw
N. Farenbaugh	G. M. Gatti, <i>Delegate</i>
N. A. Finney	A. S. Birks, <i>Contributing Member</i>

**Subgroup on Volumetric Methods (BPV V)**

A. B. Nagel, <i>Chair</i>	G. W. Hembree
N. A. Finney, <i>Vice Chair</i>	S. A. Johnson
S. J. Akrin	F. B. Kovacs
J. E. Batey	R. W. Kruzic
P. L. Brown	C. May
B. Caccamise	L. E. Mullins
J. M. Davis	T. L. Plasek
N. Y. Faransso	F. J. Sattler
A. F. Garbolevsky	C. Vorwald
J. F. Halley	G. M. Gatti, <i>Delegate</i>
R. W. Hardy	

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

N. Y. Faransso, <i>Chair</i>	S. R. Doctor
J. E. Batey, <i>Vice Chair</i>	R. K. Miller

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

B. Caccamise, <i>Chair</i>	G. W. Hembree
F. B. Kovacs, <i>Vice Chair</i>	S. A. Johnson
S. J. Akrin	R. W. Kruzic
J. E. Batey	B. D. Laite
P. L. Brown	C. May
C. Emslander	R. J. Mills
N. Y. Faransso	A. B. Nagel
A. F. Garbolevsky	T. L. Plasek
R. W. Hardy	B. White

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

N. A. Finney, <i>Chair</i>	R. W. Kruzic
J. F. Halley, <i>Vice Chair</i>	B. D. Laite
B. Caccamise	C. May
J. M. Davis	L. E. Mullins
C. Emslander	A. B. Nagel
N. Y. Faransso	F. J. Sattler
P. T. Hayes	C. Vorwald
S. A. Johnson	

**Working Group on Guided Wave Ultrasonic Testing (SG-VM) (BPV V)**

N. Y. Faransso, <i>Chair</i>	S. A. Johnson
J. E. Batey, <i>Vice Chair</i>	G. M. Light
D. Alleyne	P. Mudge
N. Amir	M. J. Quarry
J. F. Halley	J. Vanvelsor

**Italy International Working Group (BPV V)**

P. L. Dinelli, <i>Chair</i>	M. A. Grimoldi
A. Veroni, <i>Secretary</i>	G. Luoni
R. Bertolotti	O. Oldani
F. Bresciani	P. Pedersoli
G. Campos	A. Tintori
N. Caputo	M. Zambon
M. Colombo	G. Gobbi, <i>Contributing Member</i>
F. Ferrarese	G. Pontiggia, <i>Contributing Member</i>
E. Ferrari	

**COMMITTEE ON PRESSURE VESSELS (BPV VIII)**

R. J. Basile, <i>Chair</i>	G. B. Rawls, Jr.
S. C. Roberts, <i>Vice Chair</i>	F. L. Richter
E. Lawson, <i>Staff Secretary</i>	C. D. Rodery
S. J. Rossi, <i>Staff Secretary</i>	E. Soltow
G. Aurioles, Sr.	J. C. Sowinski
J. Cameron	D. B. Stewart
A. Chaudouet	D. A. Swanson
D. B. DeMichael	J. P. Swezy, Jr.
J. P. Glaspie	S. Terada
J. F. Grubb	E. Uptis
L. E. Hayden, Jr.	R. Duan, <i>Delegate</i>
G. G. Karcher	P. A. McGowan, <i>Delegate</i>
D. L. Kurle	H. Michael, <i>Delegate</i>
K. T. Lau	K. Oyamada, <i>Delegate</i>
M. D. Lower	M. E. Papponetti, <i>Delegate</i>
R. Mahadeen	X. Tang, <i>Delegate</i>
R. W. Mikitka	M. Gold, <i>Contributing Member</i>
U. R. Miller	W. S. Jacobs, <i>Contributing Member</i>
B. R. Morelock	K. Mokhtarian, <i>Contributing Member</i>
T. P. Pastor	
D. T. Peters	
M. J. Pischke	C. C. Neely, <i>Contributing Member</i>
M. D. Rana	K. K. Tam, <i>Honorary Member</i>

**Subgroup on Design (BPV VIII)**

D. A. Swanson, <i>Chair</i>	M. D. Rana
J. C. Sowinski, <i>Vice Chair</i>	G. B. Rawls, Jr.
M. Faulkner, <i>Secretary</i>	S. C. Roberts
G. Aurioles, Sr.	C. D. Rodery
S. R. Babka	T. G. Seipp
O. A. Barsky	D. Srnica
R. J. Basile	S. Terada
M. R. Breach	J. Vattappilly
F. L. Brown	R. A. Whipple
D. Chandiramani	K. Xu
B. F. Hantz	K. Oyamada, <i>Delegate</i>
C. E. Hinnant	M. E. Papponetti, <i>Delegate</i>
C. S. Hinson	W. S. Jacobs, <i>Contributing Member</i>
M. H. Jawad	P. K. Lam, <i>Contributing Member</i>
D. L. Kurle	K. Mokhtarian, <i>Contributing Member</i>
M. D. Lower	
R. W. Mikitka	
U. R. Miller	S. C. Shah, <i>Contributing Member</i>
T. P. Pastor	K. K. Tam, <i>Contributing Member</i>

**Working Group on Design-By-Analysis (BPV VIII)**

B. F. Hantz, <i>Chair</i>	S. Krishnamurthy
T. W. Norton, <i>Secretary</i>	A. Mann
R. G. Brown	G. A. Miller
D. Dewees	C. Nadarajah
R. D. Dixon	P. Prueter
Z. Gu	M. D. Rana
C. F. Heberling II	T. G. Seipp
C. E. Hinnant	M. A. Shah
R. Jain	S. Terada
M. H. Jawad	D. Arnett, <i>Contributing Member</i>

**Task Group on U-2(g) (BPV VIII)**

G. Aurioles, Sr.	R. F. Reedy, Sr.
S. R. Babka	S. C. Roberts
R. J. Basile	M. A. Shah
D. K. Chandiramani	D. Srnic
R. Mahadeen	D. A. Swanson
U. R. Miller	J. P. Swezy, Jr.
T. W. Norton	R. Uebel
T. P. Pastor	K. K. Tam, <i>Contributing Member</i>

**Subgroup on Fabrication and Examination (BPV VIII)**

J. P. Swezy, Jr., <i>Chair</i>	B. F. Shelley
D. I. Morris, <i>Vice Chair</i>	P. L. Sturgill
E. A. Whittle, <i>Vice Chair</i>	E. Upitis
B. R. Morelock, <i>Secretary</i>	K. Oyamada, <i>Delegate</i>
N. Carter	W. J. Bees, <i>Contributing Member</i>
S. Flynn	L. F. Campbell, <i>Contributing Member</i>
S. Heater	W. S. Jacobs, <i>Contributing Member</i>
O. Mulet	J. Lee, <i>Contributing Member</i>
M. J. Pischke	R. Uebel, <i>Contributing Member</i>
M. J. Rice	
C. D. Rodery	

**Subgroup on Heat Transfer Equipment (BPV VIII)**

G. Aurioles, Sr., <i>Chair</i>	U. R. Miller
S. R. Babka, <i>Vice Chair</i>	D. Srnic
P. Matkovichs, <i>Secretary</i>	A. M. Voytko
D. Angstadt	R. P. Wiberg
M. Bahadori	I. G. Campbell, <i>Contributing Member</i>
J. H. Barbee	I. Garcia, <i>Contributing Member</i>
O. A. Barsky	J. Mauritz, <i>Contributing Member</i>
L. Bower	T. W. Norton, <i>Contributing Member</i>
A. Chaudouet	F. Osweiller, <i>Contributing Member</i>
M. D. Clark	J. Pasek, <i>Contributing Member</i>
S. Jeyakumar	R. Tiwari, <i>Contributing Member</i>
G. G. Karcher	S. Yokell, <i>Contributing Member</i>
D. L. Kurle	S. M. Caldwell, <i>Honorary Member</i>
R. Mahadeen	
S. Mayeux	

**Subgroup on General Requirements (BPV VIII)**

M. D. Lower, <i>Chair</i>	K. T. Lau
J. P. Glaspie, <i>Vice Chair</i>	T. P. Pastor
F. L. Richter, <i>Secretary</i>	S. C. Roberts
R. J. Basile	J. C. Sowinski
D. T. Davis	P. Speranza
D. B. DeMichael	D. B. Stewart
M. Faulkner	D. A. Swanson
F. Hamtak	R. Uebel
L. E. Hayden, Jr.	C. C. Neely, <i>Contributing Member</i>

**Task Group on Plate Heat Exchangers (BPV VIII)**

P. Matkovichs, <i>Chair</i>	R. Mahadeen
S. R. Babka	D. I. Morris
K. Devlin	M. J. Pischke
S. Flynn	C. M. Romero
J. F. Grubb	E. Soltow
F. Hamtak	D. Srnic

**Task Group on Subsea Applications (BPV VIII)**

R. Cordes, <i>Chair</i>	F. Kirkemo
L. P. Antalffy	C. Lan
R. C. Biel	N. McKie
P. Bunch	S. K. Parimi
J. Ellens	M. Sarzynski
S. Harbert	Y. Wada
X. Kaculi	D. T. Peters, <i>Contributing Member</i>
K. Karpanan	

**Subgroup on High Pressure Vessels (BPV VIII)**

D. T. Peters, <i>Chair</i>	E. A. Rodriguez
G. M. Mital, <i>Vice Chair</i>	E. D. Roll
A. P. Maslowski, <i>Staff Secretary</i>	K. C. Simpson, Jr.
L. P. Antalffy	J. R. Sims
R. C. Biel	D. L. Stang
P. N. Chaku	F. W. Tatar
R. Cordes	S. Terada
R. D. Dixon	J. L. Traud
L. Fridlund	R. Wink
R. T. Hallman	K.-J. Young
A. H. Honza	R. M. Hoshman, <i>Contributing Member</i>
J. A. Kapp	D. J. Burns, <i>Honorary Member</i>
J. Keltjens	D. M. Fryer, <i>Honorary Member</i>
A. K. Khare	G. J. Mraz, <i>Honorary Member</i>
N. McKie	E. H. Perez, <i>Honorary Member</i>
S. C. Mordre	
G. T. Nelson	

**Task Group on UG-20(f) (BPV VIII)**

S. Krishnamurthy, <i>Chair</i>	B. R. Macejko
T. Anderson	J. Penso
K. Bagnoli	M. Prager
R. P. Deubler	M. D. Rana
B. F. Hantz	

**Subgroup on Materials (BPV VIII)**

J. Cameron, <i>Chair</i>	D. W. Raho
P. G. Wittenbach, <i>Vice Chair</i>	R. C. Sutherlin
K. Xu, <i>Secretary</i>	E. Upitis
A. Di Rienzo	G. S. Dixit, <i>Contributing Member</i>
J. D. Fritz	M. Gold, <i>Contributing Member</i>
J. F. Grubb	M. Katcher, <i>Contributing Member</i>
M. Kowalczyk	J. A. McMaster, <i>Contributing Member</i>
W. M. Lundy	E. G. Nisbett, <i>Contributing Member</i>
J. Penso	

**Italy International Working Group (BPV VIII)**

G. Pontiggia, <i>Chair</i>	M. Guglielmetti
A. Veroni, <i>Secretary</i>	P. Mantovani
B. G. Alborali	M. Massobrio
P. Angelini	L. Moracchioli
R. Boatti	C. Sangaletti
A. Camanni	S. Sarti
P. Conti	A. Teli
P. L. Dinelli	I. Venier
F. Finco	G. Gobbi, <i>Contributing Member</i>

**Subgroup on Toughness (BPV II & BPV VIII)**

D. L. Kurle, <i>Chair</i>	J. P. Swezy, Jr.
K. Xu, <i>Vice Chair</i>	S. Terada
N. Carter	E. Upitis
W. S. Jacobs	J. Vattappilly
K. E. Ori	K. Oyamada, <i>Delegate</i>
M. D. Rana	K. Mokhtarian, <i>Contributing Member</i>
F. L. Richter	C. C. Neely, <i>Contributing Member</i>
K. Subramanian	
D. A. Swanson	

**Special Working Group on Bolted Flanged Joints (BPV VIII)**

R. W. Mikitka, <i>Chair</i>	J. R. Payne
W. Brown	G. B. Rawls, Jr.
H. Chen	M. S. Shelton
W. J. Koves	

**Subgroup on Graphite Pressure Equipment (BPV VIII)**

A. Viet, <i>Chair</i>	C. W. Cary
G. C. Becherer	E. Soltow
F. L. Brown	A. A. Stupica

**Working Group on Design (BPV VIII Div. 3)**

E. D. Roll, <i>Chair</i>	J. R. Sims
C. Becht V	D. L. Stang
R. C. Biel	K. Subramanian
R. Cordes	S. Terada
R. D. Dixon	J. L. Traud
L. Fridlund	R. Wink
R. T. Hallman	Y. Xu
K. Karpanan	F. Kirkemo, <i>Contributing Member</i>
J. Keltjens	D. J. Burns, <i>Honorary Member</i>
N. McKie	D. M. Fryer, <i>Honorary Member</i>
G. M. Mital	G. J. Mraz, <i>Honorary Member</i>
S. C. Mordre	E. H. Perez, <i>Honorary Member</i>
G. T. Nelson	
D. T. Peters	

**China International Working Group (BPV VIII)**

X. Chen, <i>Chair</i>	D. Luo
B. Shou, <i>Vice Chair</i>	Y. Luo
Z. Fan, <i>Secretary</i>	C. Miao
Y. Chen	X. Qian
Z. Chen	B. Wang
J. Cui	F. Xu
R. Duan	F. Xuan
W. Guo	K. Zhang
B. Han	Y. Zhang
J. Hu	S. Zhao
Q. Hu	J. Zheng
H. Hui	G. Zhu

**Working Group on Materials (BPV VIII Div. 3)**

F. W. Tatar, <i>Chair</i>	J. A. Kapp
L. P. Antalffy	A. K. Khare
P. N. Chaku	

**Germany International Working Group (BPV VIII)**

P. Chavdarov, <i>Chair</i>	D. Koelbl
A. Spangenberg, <i>Vice Chair</i>	S. Krebs
H. P. Schmitz, <i>Secretary</i>	T. Ludwig
B. Daume	R. A. Meyers
A. Emrich	H. Michael
J. Fleischfresser	P. Paluszkiewicz
A. Gastberg	H. Schroeder
R. Helmholdt	M. Sykora
R. Kauer	

**Task Group on Impulsively Loaded Vessels (BPV VIII)**

E. A. Rodriguez, <i>Chair</i>	R. A. Leishear
G. A. Antaki	P. O. Leslie
J. K. Asahina	F. Ohlson
D. D. Barker	C. Romero
A. M. Clayton	N. Rushton
J. E. Didlake, Jr.	J. H. Stofleth
T. A. Duffey	Q. Dong, <i>Contributing Member</i>
B. L. Haroldsen	H.-P. Schildberg, <i>Contributing Member</i>
K. Hayashi	J. E. Shepherd, <i>Contributing Member</i>
D. Hilding	M. Yip, <i>Contributing Member</i>
K. W. King	
R. Kitamura	

**Subgroup on Interpretations (BPV VIII)**

U. R. Miller, <i>Chair</i>	D. I. Morris
E. Lawson, <i>Staff Secretary</i>	D. T. Peters
G. Aurioles, Sr.	S. C. Roberts
R. J. Basile	C. D. Rodery
J. Cameron	D. B. Stewart
R. D. Dixon	P. L. Sturgill
M. Kowalczyk	D. A. Swanson
D. L. Kurle	J. P. Swezy, Jr.
M. D. Lower	J. Vattappilly
R. Mahadeen	P. G. Wittenbach
G. M. Mital	T. P. Pastor, <i>Contributing Member</i>

**Subgroup on Plastic Fusing (BPV IX)**

E. W. Woelfel, <i>Chair</i>	J. E. O'Sullivan
D. Burwell	E. G. Reichelt
M. Ghahremani	M. J. Rice
K. L. Hayes	S. Schuessler
R. M. Jessee	M. Troughton
J. Johnston, Jr.	J. Wright

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

D. A. Bowers, <i>Chair</i>	W. J. Sperko
M. J. Pischke, <i>Vice Chair</i>	M. J. Stanko
S. J. Rossi, <i>Staff Secretary</i>	P. L. Sturgill
M. Bernasek	J. P. Swezy, Jr.
M. A. Boring	P. L. Van Fosson
J. G. Feldstein	E. W. Woelfel
P. D. Flenner	A. Roza, <i>Delegate</i>
S. E. Gingrich	M. Consonni, <i>Contributing Member</i>
K. L. Hayes	S. A. Jones, <i>Contributing Member</i>
R. M. Jessee	A. S. Olivares, <i>Contributing Member</i>
J. S. Lee	S. Raghunathan, <i>Contributing Member</i>
W. M. Lundy	R. K. Brown, Jr., <i>Honorary Member</i>
T. Melfi	M. L. Carpenter, <i>Honorary Member</i>
W. F. Newell, Jr.	B. R. Newmark, <i>Honorary Member</i>
D. K. Peetz	S. D. Reynolds, Jr., <i>Honorary Member</i>
E. G. Reichelt	
M. J. Rice	
M. B. Sims	

**Subgroup on Welding Qualifications (BPV IX)**

M. J. Rice, <i>Chair</i>	E. G. Reichelt
J. S. Lee, <i>Vice Chair</i>	M. B. Sims
M. Bernasek	W. J. Sperko
M. A. Boring	S. A. Sprague
D. A. Bowers	P. L. Sturgill
R. B. Corbit	J. P. Swezy, Jr.
P. D. Flenner	P. L. Van Fosson
L. S. Harbison	T. C. Wiesner
K. L. Hayes	A. D. Wilson
W. M. Lundy	D. Chandiramani, <i>Contributing Member</i>
T. Melfi	M. Consonni, <i>Contributing Member</i>
W. F. Newell, Jr.	M. Degan, <i>Contributing Member</i>
B. R. Newton	
S. Raghunathan	

**Subgroup on Brazing (BPV IX)**

M. J. Pischke, <i>Chair</i>	A. F. Garbolevsky
E. W. Beckman	N. Mohr
L. F. Campbell	A. R. Nywening
M. L. Carpenter	J. P. Swezy, Jr.

**Italy International Working Group (BPV IX)**

A. Camanni, <i>Chair</i>	N. Maestri
A. Veroni, <i>Secretary</i>	M. Mandina
P. Angelini	M. Massobrio
R. Boatti	L. Moracchioli
P. L. Dinelli	G. Pontiggia
F. Ferrarese	S. Verderame
A. Ghidini	A. Volpi
E. Lazzari	G. Gobbi, <i>Contributing Member</i>
L. Lotti	

**Subgroup on General Requirements (BPV IX)**

P. L. Sturgill, <i>Chair</i>	R. M. Jessee
E. W. Beckman	D. Mobley
J. P. Bell	D. K. Peetz
D. A. Bowers	J. Pillow
G. Chandler	H. B. Porter
P. R. Evans	J. P. Swezy, Jr.
S. Flynn	K. R. Willens
P. Gilston	E. W. Woelfel
F. Hamtak	E. Molina, <i>Delegate</i>
A. Howard	B. R. Newmark, <i>Honorary Member</i>

**Subgroup on Materials (BPV IX)**

M. Bernasek, <i>Chair</i>	M. J. Pischke
T. Anderson	A. Roza
J. L. Arnold	C. E. Sainz
E. Cutlip	W. J. Sperko
S. S. Fiore	M. J. Stanko
S. E. Gingrich	P. L. Sturgill
L. S. Harbison	J. Warren
R. M. Jessee	C. Zanfir
T. Melfi	

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

D. Eisberg, <i>Chair</i>	D. H. Hodgkinson
B. F. Shelley, <i>Vice Chair</i>	L. E. Hunt
P. D. Stumpf, <i>Staff Secretary</i>	D. L. Keeler
A. L. Beckwith	B. M. Linnemann
D. Bentley	D. H. McCauley
F. L. Brown	N. L. Newhouse
J. L. Bustillos	D. J. Painter
B. R. Colley	A. A. Pollock
T. W. Cowley	G. Ramirez
I. L. Dinovo	J. R. Richter
M. R. Gorman	D. O. Yancey, Jr.
B. Hebb	P. H. Ziehl
M. J. Hendrix	



**COMMITTEE ON NUCLEAR INSERVICE INSPECTION (BPV XI)**

G. C. Park, *Chair*  
 S. D. Kulat, *Vice Chair*  
 R. W. Swayne, *Vice Chair*  
 L. Powers, *Staff Secretary*  
 V. L. Armentrout  
 J. F. Ball  
 W. H. Bamford  
 S. B. Brown  
 T. L. Chan  
 R. C. Cipolla  
 D. R. Cordes  
 D. D. Davis  
 R. L. Dyle  
 E. V. Farrell, Jr.  
 M. J. Ferlisi  
 P. D. Fisher  
 E. B. Gerlach  
 T. J. Griesbach  
 J. Hakii  
 D. O. Henry  
 W. C. Holston  
 D. W. Lamond  
 D. R. Lee  
 G. A. Lofthus  
 E. J. Maloney  
 G. Navratil

S. A. Norman  
 J. E. O'Sullivan  
 R. K. Rhyne  
 A. T. Roberts III  
 D. A. Scarth  
 F. J. Schaaf, Jr.  
 J. C. Spanner, Jr.  
 D. J. Tilly  
 D. E. Waskey  
 J. G. Weicks  
 H. D. Chung, *Delegate*  
 C. Ye, *Delegate*  
 R. E. Gimple, *Contributing Member*  
 R. D. Kerr, *Contributing Member*  
 B. R. Newton, *Contributing Member*  
 R. A. West, *Contributing Member*  
 R. A. Yonekawa, *Contributing Member*  
 M. L. Benson, *Alternate*  
 J. T. Lindberg, *Alternate*  
 R. O. McGill, *Alternate*  
 C. J. Wirtz, *Alternate*  
 C. D. Cowfer, *Honorary Member*  
 F. E. Gregor, *Honorary Member*  
 O. F. Hedden, *Honorary Member*  
 P. C. Riccardella, *Honorary Member*

**China International Working Group (BPV XI)**

J. H. Liu, *Chair*  
 Y. Nie, *Vice Chair*  
 C. Ye, *Vice Chair*  
 M. W. Zhou, *Secretary*  
 J. F. Cai  
 D. X. Chen  
 H. Chen  
 H. D. Chen  
 Y. B. Guo  
 Y. Hou  
 D. M. Kang  
 S. W. Li  
 X. Y. Liang  
 S. X. Lin  
 L. Q. Liu

Y. Liu  
 W. N. Pei  
 C. L. Peng  
 G. X. Tang  
 Q. Wang  
 Q. W. Wang  
 Z. S. Wang  
 L. Wei  
 F. Xu  
 Z. Y. Xu  
 Q. Yin  
 K. Zhang  
 X. L. Zhang  
 Y. Zhang  
 Z. M. Zhong

**Germany International Working Group (BPV XI)**

H.-R. Bath  
 R. Doring  
 B. Erhard  
 M. Hagenbruch  
 B. Hoffmann  
 E. Iacopetta

U. Jendrich  
 H. Schau  
 H.-J. Scholtka  
 X. Schuler  
 J. Wendt

**Special Working Group on Editing and Review (BPV XI)**

R. W. Swayne, *Chair*  
 C. E. Moyer  
 K. R. Rao

J. E. Staffiera  
 D. J. Tilly  
 C. J. Wirtz

**Executive Committee (BPV XI)**

S. D. Kulat, *Chair*  
 G. C. Park, *Vice Chair*  
 L. Powers, *Staff Secretary*  
 W. H. Bamford  
 R. L. Dyle  
 M. J. Ferlisi  
 E. B. Gerlach

W. C. Holston  
 D. W. Lamond  
 J. T. Lindberg  
 R. K. Rhyne  
 J. C. Spanner, Jr.  
 R. W. Swayne  
 M. L. Benson, *Alternate*

**Task Group on Inspectability (BPV XI)**

J. T. Lindberg, *Chair*  
 M. J. Ferlisi, *Secretary*  
 W. H. Bamford  
 A. Cardillo  
 D. R. Cordes  
 D. O. Henry  
 E. Henry  
 J. Honcharik  
 J. Howard  
 R. Klein  
 C. Latiolais

D. Lieb  
 G. A. Lofthus  
 D. E. Matthews  
 P. J. O'Regan  
 J. Ossmann  
 R. Rishel  
 S. A. Sabo  
 P. Sullivan  
 C. Thomas  
 J. Tucker

**Argentina International Working Group (BPV XI)**

O. Martinez, *Staff Secretary*  
 D. A. Cipolla  
 A. Claus  
 D. Costa  
 D. P. Delfino  
 D. N. Dell'Erba  
 A. Dominguez  
 S. A. Echeverria  
 E. P. Fresquet  
 M. M. Gamizo  
 I. M. Guerreiro  
 M. F. Liendo  
 F. Llorente

R. J. Lopez  
 M. Magliocchi  
 L. R. Miño  
 J. Monte  
 M. D. Pereda  
 A. Politi  
 C. G. Real  
 F. M. Schroeter  
 G. J. Scian  
 M. J. Solari  
 P. N. Torano  
 O. A. Verastegui  
 P. Yamamoto

**Task Group on ISI of Spent Nuclear Fuel Storage and Transportation Containment Systems (BPV XI)**

K. Hunter, *Chair*  
 A. Alleshwaram, *Secretary*  
 D. J. Ammerman  
 W. H. Bortor  
 J. Broussard  
 S. Brown  
 C. R. Bryan  
 T. Carraher  
 D. Dunn  
 N. Fales  
 R. C. Folley  
 B. Gutherman  
 S. Horowitz  
 M. W. Joseph  
 H. Jung  
 M. Liu

R. M. Meyer  
 B. L. Montgomery  
 M. Moran  
 T. Nuoffer  
 M. Orihuela  
 R. Pace  
 E. L. Pleins  
 R. Sindelar  
 H. Smith  
 J. C. Spanner, Jr.  
 C. J. Temus  
 G. White  
 X. J. Zhai  
 P.-S. Lam, *Alternate*  
 J. Wise, *Alternate*

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

W. H. Bamford, <i>Chair</i>	Y. S. Li
N. A. Palm, <i>Secretary</i>	R. O. McGill
H. D. Chung	H. S. Mehta
R. C. Cipolla	K. Miyazaki
R. L. Dyle	R. Pace
C. M. Faidy	J. C. Poehler
B. R. Ganta	S. Ranganath
T. J. Griesbach	D. A. Scarth
K. Hasegawa	T. V. Vo
K. Hojo	K. R. Wichman
D. N. Hopkins	S. X. Xu
K. Koyama	M. L. Benson, <i>Alternate</i>
D. R. Lee	T. Hardin, <i>Alternate</i>

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

R. Pace, <i>Chair</i>	S. A. Kleinsmith
K. E. Woods, <i>Secretary</i>	H. S. Mehta
G. A. Antaki	D. V. Sommerville
P. R. Donavin	T. V. Vo
R. G. Gilada	K. R. Wichman
T. J. Griesbach	G. M. Wilkowski
H. L. Gustin	S. X. Xu
M. Hayashi	T. Weaver, <i>Contributing Member</i>
K. Hojo	

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

R. C. Cipolla, <i>Chair</i>	D. R. Lee
S. X. Xu, <i>Secretary</i>	Y. S. Li
W. H. Bamford	M. Liu
M. L. Benson	H. S. Mehta
B. Bezensek	G. A. A. Miessi
M. Brumovsky	K. Miyazaki
H. D. Chung	R. K. Qashu
T. E. Demers	S. Ranganath
C. M. Faidy	P. J. Rush
B. R. Ganta	D. A. Scarth
R. G. Gilada	W. L. Server
H. L. Gustin	D.-J. Shim
F. D. Hayes	A. Udyawar
P. H. Hoang	T. V. Vo
K. Hojo	B. Wasiluk
D. N. Hopkins	K. R. Wichman
Y. Kim	G. M. Wilkowski
K. Koyama	D. L. Rudland, <i>Alternate</i>
V. Lacroix	

**Task Group on Crack Growth Reference Curves (BPV XI)**

D. A. Scarth, <i>Chair</i>	D. N. Hopkins
H. I. Gustin, <i>Secretary</i>	K. Kashima
W. H. Bamford	K. Koyama
M. L. Benson	D. R. Lee
F. W. Brust	H. S. Mehta
R. C. Cipolla	K. Miyazaki
R. L. Dyle	S. Ranganath
K. Hasegawa	T. V. Vo

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

R. O. McGill, <i>Chair</i>	G. A. A. Miessi
S. X. Xu, <i>Secretary</i>	M. Moenssens
G. A. Antaki	D. P. Munson
R. C. Cipolla	R. Pace
K. Hasegawa	P. J. Rush
K. M. Hoffman	D. A. Scarth

**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. Pace
V. Marthandam, <i>Secretary</i>	J. C. Poehler
K. R. Baker	S. Ranganath
W. H. Bamford	W. L. Server
M. Brumovsky	D. V. Sommerville
T. L. Dickson	C. A. Tomes
R. L. Dyle	A. Udyawar
S. R. Gosselin	T. V. Vo
T. J. Griesbach	D. P. Weakland
M. Hayashi	K. E. Woods
S. A. Kleinsmith	H. Q. Xu
H. Kobayashi	T. Hardin, <i>Alternate</i>
H. S. Mehta	

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

D. A. Scarth, <i>Chair</i>	E. J. Houston
G. M. Wilkowski, <i>Secretary</i>	R. Janowiak
K. Azuma	S. Kalyanam
W. H. Bamford	K. Kashima
M. L. Benson	V. Lacroix
M. Brumovsky	Y. S. Li
F. W. Brust	R. O. McGill
H. D. Chung	H. S. Mehta
R. C. Cipolla	G. A. A. Miessi
N. G. Cofie	K. Miyazaki
J. M. Davis	S. H. Pellet
T. E. Demers	H. Rathbun
C. M. Faidy	P. J. Rush
B. R. Ganta	D.-J. Shim
S. R. Gosselin	A. Udyawar
C. E. Guzman-Leong	T. V. Vo
K. Hasegawa	B. Wasiluk
P. H. Hoang	S. X. Xu
K. Hojo	A. Alleshwaram, <i>Alternate</i>
D. N. Hopkins	

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

J. C. Spanner, Jr., <i>Chair</i>	J. T. Lindberg
D. R. Cordes, <i>Secretary</i>	G. A. Lofthus
T. L. Chan	G. R. Perkins
S. E. Cumblidge	S. A. Sabo
F. E. Dohmen	F. J. Schauf, Jr.
K. J. Hacker	R. V. Swain
J. Harrison	C. J. Wirtz
D. O. Henry	C. A. Nove, <i>Alternate</i>

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

J. T. Lindberg, *Chair*  
J. E. Aycock, *Secretary*  
C. Brown, *Secretary*  
S. E. Cumblidge  
A. Diaz  
N. Farenbaugh

D. O. Henry  
J. W. Houf  
C. Shinsky  
J. C. Spanner, Jr.  
J. T. Timm  
C. J. Wirtz

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

G. A. Lofthus, *Chair*  
J. Harrison, *Secretary*  
G. R. Perkins, *Secretary*  
M. T. Anderson  
M. Briley  
A. Bushmire  
D. R. Cordes  
M. Dennis  
S. R. Doctor

F. E. Dohmen  
K. J. Hacker  
D. A. Kull  
C. A. Nove  
D. Nowakowski  
S. A. Sabo  
R. V. Swain  
S. J. Todd  
D. K. Zimmerman

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

E. B. Gerlach, *Chair*  
E. V. Farrell, Jr., *Secretary*  
J. F. Ball  
S. B. Brown  
R. Clow  
P. D. Fisher  
K. J. Karwoski  
S. L. McCracken  
B. R. Newton

J. E. O'Sullivan  
S. Schuessler  
R. R. Stevenson  
R. W. Swayne  
D. J. Tilly  
D. E. Waskey  
J. G. Weicks  
P. Raynaud, *Alternate*

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

D. E. Waskey, *Chair*  
D. J. Tilly, *Secretary*  
D. Barborak  
S. J. Findlan  
P. D. Fisher  
M. L. Hall  
K. J. Karwoski  
C. C. Kim

M. Kris  
S. L. McCracken  
D. B. Meredith  
B. R. Newton  
J. E. O'Sullivan  
D. Segletes  
J. G. Weicks

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

J. E. O'Sullivan, *Chair*  
S. Schuessler, *Secretary*  
J. Johnston, Jr.  
M. Lashley  
M. P. Marohl

T. M. Musto  
P. Patterson  
A. Pridmore  
P. Raynaud  
F. J. Schaaf, Jr.

**Task Group on Repair by Carbon Fiber Composites (WGN-MRR) (BPV XI)**

J. E. O'Sullivan, *Chair*  
B. Davenport  
M. Golliet  
L. S. Gordon  
M. P. Marohl  
N. Meyer  
R. P. Ojdrovic  
D. Peguero  
A. Pridmore

P. Raynaud  
C. W. Rowley  
V. Roy  
J. Sealey  
N. Stoeva  
M. F. Uddin  
J. Wen  
T. Jimenez, *Alternate*  
G. M. Lupia, *Alternate*

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

S. B. Brown, *Chair*  
A. B. Meichler, *Secretary*  
O. Bhatti  
R. Clow  
R. R. Croft  
E. V. Farrell, Jr.  
E. B. Gerlach

H. Malikowski  
M. A. Pyne  
P. Raynaud  
R. R. Stevenson  
R. W. Swayne  
R. Turner

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

D. W. Lamond, *Chair*  
G. Navratil, *Secretary*  
J. M. Agold  
V. L. Armentrout  
J. M. Boughman  
S. B. Brown  
S. T. Chesworth  
D. D. Davis  
H. Q. Do  
M. J. Ferlisi

K. W. Hall  
P. J. Hennessey  
K. Hoffman  
S. D. Kulat  
T. Nomura  
T. Nuoffer  
G. C. Park  
H. M. Stephens, Jr.  
M. J. Homiack, *Alternate*

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

R. L. Dyle, *Chair*  
B. L. Montgomery, *Secretary*  
W. H. Bamford  
P. R. Donavin  
K. Hoffman  
K. Koyama  
C. Lohse

H. Malikowski  
S. E. Marlette  
G. C. Park  
G. R. Poling  
J. M. Shuping  
J. C. Spanner, Jr.  
D. P. Weakland

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

H. M. Stephens, Jr., *Chair*  
S. G. Brown, *Secretary*  
P. S. Ghosal  
H. T. Hill  
R. D. Hough  
B. Lehman

J. McIntyre  
J. A. Munshi  
M. Sircar  
S. Walden, *Alternate*  
T. J. Herrity, *Alternate*

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

M. J. Ferlisi, *Chair*  
N. Granback, *Secretary*  
J. M. Agold  
R. W. Blyde  
C. Cueto-Felgueroso  
H. Q. Do  
K. W. Hall  
K. M. Hoffman

S. D. Kulat  
A. Lee  
G. J. Navratil  
T. Nomura  
J. C. Nygaard  
R. Rishel  
J. C. Younger

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

J. M. Boughman, <i>Chair</i>	A. E. Keyser
S. A. Norman, <i>Secretary</i>	D. W. Lamond
T. Anselmi	J. K. McClanahan
Y.-K. Chung	B. L. Montgomery
M. J. Homiack	C. Thomas

**Task Group on Buried Components Inspection and Testing (WG-PT) (BPV XI)**

D. W. Lamond, <i>Chair</i>	B. Davenport
J. M. Boughman, <i>Secretary</i>	A. Hiser
M. Moenssens, <i>Secretary</i>	J. Ossmann
T. Anselmi	

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

M. A. Pyne, <i>Chair</i>	D. W. Lamond
S. T. Chesworth, <i>Secretary</i>	R. K. Mattu
J. M. Agold	A. McNeill III
C. Cueto-Felgueroso	G. J. Navratil
R. Haessler	P. J. O'Regan
J. Hakii	N. A. Palm
K. W. Hall	D. Vetter
M. J. Homiack	J. C. Younger
S. D. Kulat	

**Working Group on General Requirements (BPV XI)**

R. K. Rhyne, <i>Chair</i>	P. J. Hennessey
C. E. Moyer, <i>Secretary</i>	E. J. Maloney
J. F. Ball	R. K. Mattu
T. L. Chan	T. Nuoffer

**Special Working Group on Reliability and Integrity Management Program (BPV XI)**

F. J. Schaaf, Jr., <i>Chair</i>	D. M. Jones
A. T. Roberts III, <i>Secretary</i>	A. L. Krinzman
N. Broom	D. R. Lee
S. R. Doctor	R. K. Miller
S. Downey	M. N. Mitchell
J. D. Fletcher	R. Morrill
J. T. Fong	T. Roney
T. Graham	R. W. Swayne
N. Granback	S. Takaya
J. Grimm	

**JSME/ASME Joint Task Group for System-Based Code (SWG-RIM) (BPV XI)**

T. Asayama, <i>Chair</i>	D. R. Lee
S. R. Doctor	H. Machida
K. Dozaki	M. Morishita
S. R. Gosselin	A. T. Roberts III
M. Hayashi	F. J. Schaaf, Jr.
D. M. Jones	S. Takaya
Y. Kamishima	D. Watanabe
A. L. Krinzman	

**COMMITTEE ON TRANSPORT TANKS (BPV XII)**

M. D. Rana, <i>Chair</i>	M. Pitts
N. J. Paulick, <i>Vice Chair</i>	T. A. Rogers
R. Lucas, <i>Staff Secretary</i>	S. Staniszewski
A. N. Antoniou	A. P. Varghese
P. Chilukuri	J. A. Byers, <i>Contributing Member</i>
W. L. Garfield	R. Meyers, <i>Contributing Member</i>
G. G. Karcher	M. R. Ward, <i>Contributing Member</i>

**Executive Committee (BPV XII)**

N. J. Paulick, <i>Chair</i>	M. D. Rana
R. Lucas, <i>Staff Secretary</i>	S. Staniszewski
M. Pitts	A. P. Varghese

**Subgroup on Design and Materials (BPV XII)**

A. P. Varghese, <i>Chair</i>	T. A. Rogers
R. C. Sallash, <i>Secretary</i>	S. Staniszewski
D. K. Chandiramani	K. Xu
P. Chilukuri	A. T. Duggleby, <i>Contributing Member</i>
Y. Doron	T. J. Hitchcock, <i>Contributing Member</i>
R. D. Hayworth	M. R. Ward, <i>Contributing Member</i>
G. G. Karcher	J. Zheng, <i>Contributing Member</i>
S. L. McWilliams	
N. J. Paulick	
M. D. Rana	

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

M. Pitts, <i>Chair</i>	L. Selensky
P. Chilukuri, <i>Secretary</i>	S. Staniszewski
R. D. Hayworth	S. E. Benet, <i>Contributing Member</i>
K. Mansker	J. A. Byers, <i>Contributing Member</i>
G. McRae	A. S. Olivares, <i>Contributing Member</i>
O. Mulet	L. H. Strouse, <i>Contributing Member</i>
T. A. Rogers	S. V. Voorhees, <i>Contributing Member</i>
M. Rudek	
R. C. Sallash	

**Subgroup on General Requirements (BPV XII)**

S. Staniszewski, <i>Chair</i>	P. Chilukuri, <i>Contributing Member</i>
B. F. Pittel, <i>Secretary</i>	K. L. Gilmore, <i>Contributing Member</i>
A. N. Antoniou	T. J. Hitchcock, <i>Contributing Member</i>
Y. Doron	G. McRae, <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>
M. Pitts	L. H. Strouse, <i>Contributing Member</i>
T. Rummel	M. R. Ward, <i>Contributing Member</i>
R. C. Sallash	
L. Selensky	

**Subgroup on Nonmandatory Appendices (BPV XII)**

N. J. Paulick, <i>Chair</i>	D. G. Shelton
S. Staniszewski, <i>Secretary</i>	S. E. Benet, <i>Contributing Member</i>
P. Chilukuri	D. D. Brusewitz, <i>Contributing Member</i>
R. D. Hayworth	T. J. Hitchcock, <i>Contributing Member</i>
K. Mansker	A. P. Varghese, <i>Contributing Member</i>
S. L. McWilliams	M. R. Ward, <i>Contributing Member</i>
N. J. Paulick	
M. Pitts	
T. A. Rogers	
R. C. Sallash	

**Subcommittee on Safety Valve Requirements (SC-SVR)**

D. B. DeMichael, <i>Chair</i>	W. F. Hart
C. E. O'Brien, <i>Staff Secretary</i>	D. Miller
J. F. Ball	B. K. Nutter
J. Burgess	T. Patel
S. Cammeresi	M. Poehlmann
J. A. Cox	Z. Wang
R. D. Danzy	J. A. West
J. P. Glaspie	S. R. Irvin, Sr., <i>Alternate</i>
S. F. Harrison	

**COMMITTEE ON OVERPRESSURE PROTECTION (BPV XIII)**

D. B. DeMichael, <i>Chair</i>	S. F. Harrison
C. E. O'Brien, <i>Staff Secretary</i>	W. F. Hart
J. F. Ball	D. Miller
J. Burgess	B. K. Nutter
S. Cammeresi	T. Patel
J. A. Cox	M. Poehlmann
R. D. Danzy	Z. Wang
J. P. Glaspie	J. A. West

**Subgroup on Design (SC-SVR)**

D. Miller, <i>Chair</i>	T. Patel
C. E. Bear	J. A. West
B. Joergensen	R. D. Danzy, <i>Contributing Member</i>
B. J. Mollitor	

**COMMITTEE ON BOILER AND PRESSURE VESSEL CONFORMITY ASSESSMENT (CBPVCA)**

P. D. Edwards, <i>Chair</i>	D. Cheetham, <i>Contributing Member</i>
L. E. McDonald, <i>Vice Chair</i>	T. P. Beirne, <i>Alternate</i>
K. I. Baron, <i>Staff Secretary</i>	J. B. Carr, <i>Alternate</i>
M. Vazquez, <i>Staff Secretary</i>	J. W. Dickson, <i>Alternate</i>
J. P. Chicoine	J. M. Downs, <i>Alternate</i>
D. C. Cook	B. J. Hackett, <i>Alternate</i>
T. E. Hansen	B. L. Krasium, <i>Alternate</i>
K. T. Lau	D. W. Linaweaver, <i>Alternate</i>
D. Miller	P. F. Martin, <i>Alternate</i>
B. R. Morelock	I. Powell, <i>Alternate</i>
J. D. O'Leary	R. Rockwood, <i>Alternate</i>
G. Scribner	L. Skarin, <i>Alternate</i>
B. C. Turczynski	R. D. Troutt, <i>Alternate</i>
D. E. Tuttle	S. V. Voorhees, <i>Alternate</i>
R. Uebel	P. Williams, <i>Alternate</i>
E. A. Whittle	A. J. Spencer, <i>Honorary Member</i>
R. V. Wielgoszinski	

**Subgroup on General Requirements (SC-SVR)**

J. F. Ball, <i>Chair</i>	J. P. Glaspie
G. Brazier	B. F. Pittel
J. Burgess	M. Poehlmann
D. B. DeMichael	D. E. Tuttle
S. T. French	J. White

**Subgroup on Testing (SC-SVR)**

W. F. Hart, <i>Chair</i>	A. Donaldson
T. P. Beirne	G. D. Goodson
J. E. Britt	B. K. Nutter
J. Buehrer	C. Sharpe
S. Cammeresi	Z. Wang
J. A. Cox	A. Wilson
J. W. Dickson	S. R. Irvin, Sr., <i>Alternate</i>

**COMMITTEE ON NUCLEAR CERTIFICATION (CNC)**

R. R. Stevenson, <i>Chair</i>	S. F. Harrison, <i>Contributing Member</i>
J. DeKleine, <i>Vice Chair</i>	S. Andrews, <i>Alternate</i>
E. Suarez, <i>Staff Secretary</i>	D. Arrigo, <i>Alternate</i>
G. Gobbi	J. Ball, <i>Alternate</i>
S. M. Goodwin	P. J. Coco, <i>Alternate</i>
J. W. Highlands	P. D. Edwards, <i>Alternate</i>
K. A. Huber	D. P. Gobbi, <i>Alternate</i>
J. C. Krane	K. M. Hottle, <i>Alternate</i>
M. A. Lockwood	K. A. Kavanagh, <i>Alternate</i>
R. P. McIntyre	P. Krane, <i>Alternate</i>
L. M. Plante	D. Nenstiel, <i>Alternate</i>
H. B. Prasse	M. Paris, <i>Alternate</i>
T. E. Quaka	G. Szabatura, <i>Alternate</i>
C. T. Smith	A. Torosyan, <i>Alternate</i>
C. Turylo	S. V. Voorhees, <i>Alternate</i>
D. M. Vickery	S. Yang, <i>Alternate</i>
E. A. Whittle	
C. S. Withers	

**U.S. Technical Advisory Group ISO/TC 185 Safety Relief Valves**

T. J. Bevilacqua, <i>Chair</i>	D. Miller
C. E. O'Brien, <i>Staff Secretary</i>	B. K. Nutter
J. F. Ball	T. Patel
G. Brazier	J. A. West
D. B. DeMichael	

# ASTM PERSONNEL

(Cooperating in the Development of the Specifications Herein)  
As of January 12, 2017

## B2 COMMITTEE ON NONFERROUS METALS AND ALLOYS

B. L. Potts, <i>Chair</i>	K. M. Hottle, <i>Member-at-Large</i>
J. P. Malmgreen, <i>First Vice Chair</i>	T. J. Mach, <i>Member-at-Large</i>
E. R. Boes, <i>Second Vice Chair</i>	M. J. Pratt, <i>Member-at-Large</i>
J. L. Mincey, <i>Membership Secretary</i>	J. Adkins, <i>Staff Manager</i>
G. Anderson, <i>Member-at-Large</i>	M. McKeever, <i>Administrative Assistant</i>
K. W. Doughy, <i>Member-at-Large</i>	J. Wright, <i>Editor</i>
S. M. Goodwin, <i>Member-at-Large</i>	

## B5 COMMITTEE ON COPPER AND COPPER ALLOYS

C. B. Blanton, <i>Chair</i>	A. E. Estelle, <i>Membership Secretary</i>
J. H. Michel, <i>First Vice Chair</i>	J. Rodgers, <i>Staff Manager</i>
M. J. Buyarski, <i>Second Vice Chair</i>	B. Lake, <i>Administrative Assistant</i>
M. J. Hogan, <i>Secretary</i>	F. Otero, <i>Editor</i>

## B7 COMMITTEE ON LIGHT METALS AND ALLOYS

J. A. Towers, <i>Chair</i>	J. A. Enriquez, <i>Membership Secretary</i>
C. S. Potts, <i>First Vice Chair</i>	K. Straiton, <i>Staff Manager</i>
M. Niedzinski, <i>Second Vice Chair</i>	J. Diccio, <i>Administrative Assistant</i>
F. Bovard, <i>Recording Secretary</i>	D. Fiorelli, <i>Editor</i>

## B10 COMMITTEE ON REACTIVE AND REFRACTORY METALS AND ALLOYS

J. A. McMaster, <i>Chair</i>	J. R. Pierce, <i>Member-at-Large</i>
S. Sweet, <i>Vice Chair</i>	C. E. Wilson, <i>Member-at-Large</i>
K. Niang, <i>Recording Secretary</i>	M. McKeever, <i>Staff Manager</i>
R. D. Mejia, <i>Membership Secretary</i>	J. Wright, <i>Editor</i>
J. G. Banker, <i>Member-at-Large</i>	

# PREFACE

(17)

The American Society of Mechanical Engineers (ASME) and the American Society for Testing and Materials (ASTM) have cooperated for more than fifty years in the preparation of material specifications adequate for safety in the field of pressure equipment for ferrous and nonferrous materials, contained in Section II (Part A — Ferrous and Part B — Nonferrous) of the ASME Boiler and Pressure Vessel Code.

The evolution of this cooperative effort is contained in Professor A. M. Greene's "History of the ASME Boiler Code," which was published as a series of articles in *Mechanical Engineering* from July 1952 through August 1953 and is now available from ASME in a special bound edition. The following quotations from this history, which was based upon the minutes of the ASME Boiler and Pressure Vessel Committee, will help focus on the cooperative nature of the specifications found in Section II, Material Specifications.

*"General discussion of material specifications comprising Paragraphs 1 to 112 of Part 2 and the advisability of having them agree with ASTM specifications," (1914).*

*"ASME Subcommittee appointed to confer with ASTM," (1916).*

*"Because of this cooperation the specifications of the 1918 Edition of the ASME Boiler Code were more nearly in agreement with ASTM specifications. In the 1924 Edition of the Code, 10 specifications were in complete agreement with ASTM specifications, 4 in substantial agreement and 2 covered materials for which ASTM had no corresponding specifications."*

*"In Section II, Material Specifications, the paragraphs were given new numbers beginning with S-1 and extending to S-213," (1925).*

*"Section II was brought into agreement with changes made in the latest ASTM specifications since 1921," (1932).*

*"The Subcommittee on Material Specifications arranged for the introduction of the revisions of many of the specifications so that they would agree with the latest form of the earlier ASTM specifications...," (1935).*

From the preceding, it is evident that many of the material specifications were prepared by the Boiler and Pressure Vessel Code Committees, then subsequently, by cooperative action, modified and identified as ASTM specifications. Section II, Parts A and B, currently contain many material specifications that are identical with the corresponding ASTM specifications and some that have been modified for Code usage. Many of these specifications are published in dual format. That is, they contain both U.S. Customary units and SI units. The metrication protocols followed in the specifications are those adopted by ASTM, and are usually to the rules of IEEE/ASTM SI 10-1997, Standard for the Use of the International System of Units (SI): The Modern Metric System.

In 1969, the American Welding Society began publication of specifications for welding rods, electrodes, and filler metals, hitherto issued by ASTM. The Boiler and Pressure Vessel Committee has recognized this new arrangement, and is now working with AWS on these specifications. Section II, Part C, contains the welding material specifications approved for Code use.

In 1992, the ASME Board of Pressure Technology Codes and Standards endorsed the use of non-ASTM material for Boiler and Pressure Vessel Code applications. It is the intent to follow the procedures and practices currently in use to implement the adoption of non-ASTM materials.

All identical specifications are indicated by the ASME/originating organization symbols. The specifications prepared and copyrighted by ASTM, AWS, and other originating organizations are reproduced in the Code with the permission of the respective Society. The ASME Boiler and Pressure Vessel Committee has given careful consideration to each new and revised specification, and has made such changes as they deemed necessary to make the specification adaptable for Code usage. In addition, ASME has furnished ASTM with the basic requirements that should govern many proposed new specifications. Joint action will continue an effort to make the ASTM, AWS, and ASME specifications identical.

To assure that there will be a clear understanding on the part of the users of Section II, ASME publishes both the identical specifications and those amended for Code usage every 2 years.

The ASME Boiler and Pressure Vessel Code has been adopted into law by 50 states and many municipalities in the United States and by all of the Canadian provinces.

## SPECIFICATIONS LISTED BY MATERIALS

### Aluminum and Aluminum Alloys

SB-26/SB-26M	Specification for Aluminum-Alloy Sand Castings .....	1
SB-108	Specification for Aluminum-Alloy Permanent Mold Castings .....	65
SB-209	Specification for Aluminum and Aluminum-Alloy Sheet and Plate .....	269
SB-210	Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes .....	295
SB-211	Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire .....	307
SB-221	Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes .....	317
SB-234	Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Condensers and Heat Exchangers .....	333
SB-241/SB-241M	Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube .....	341
SB-247	Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings .....	361
SB-308/SB-308M	Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles .....	443
SB-548	Test Method for Ultrasonic Inspection of Aluminum-Alloy Plate for Pressure Vessels ....	767
SB-928/SB-928M	Specification for High Magnesium Aluminum-Alloy Sheet and Plate for Marine Service and Similar Environments .....	1119
SB/EN 1706	Aluminum and Aluminum Alloys — Castings — Chemical Composition and Mechanical Properties .....	1191

### Cobalt Alloys

SB-815	Specification for Cobalt-Chromium-Nickel-Molybdenum-Tungsten Alloy (UNS R31233) Rod	1053
SB-818	Specification for Cobalt-Chromium-Nickel-Molybdenum-Tungsten Alloy (UNS R31233) Plate, Sheet, and Strip .....	1057

### Copper Alloy Castings

SB-61	Specification for Steam or Valve Bronze Castings .....	33
SB-62	Specification for Composition Bronze or Ounce Metal Castings .....	37
SB-148	Specification for Aluminum-Bronze Sand Castings .....	115
SB-271	Specification for Copper-Base Alloy Centrifugal Castings .....	425
SB-369	Specification for Copper-Nickel Alloy Castings .....	529
SB-505/SB-505M	Specification for Copper Alloy Continuous Castings .....	695
SB-584	Specification for Copper Alloy Sand Castings for General Applications .....	835
SB-824	Specification for General Requirements for Copper Alloy Castings .....	1061

### Copper and Copper Alloy Pipe and Tubes

SB-42	Specification for Seamless Copper Pipe, Standard Sizes .....	15
SB-43	Specification for Seamless Red Brass Pipe, Standard Sizes .....	25
SB-75	Specification for Seamless Copper Tube .....	41
SB-111/SB-111M	Specification for Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock .	83
SB-135	Specification for Seamless Brass Tube .....	107
SB-251	Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube .....	407
SB-315	Specification for Seamless Copper Alloy Pipe and Tube .....	449



SB-359/SB-359M	Specification for Copper and Copper-Alloy Seamless Condenser and Heat Exchanger Tubes with Integral Fins	493
SB-395/SB-395M	Specification for U-Bend Seamless Copper and Copper Alloy Heat Exchanger and Condenser Tubes	543
SB-466/SB-466M	Specification for Seamless Copper-Nickel Pipe and Tube	649
SB-467	Specification for Welded Copper-Nickel Pipe	657
SB-543/SB-543M	Specification for Welded Copper and Copper-Alloy Heat Exchanger Tube	753
SB-706	Specification for Seamless Copper Alloy (UNS NO. C69100) Pipe and Tube	1003
SB-956	Specification for Welded Copper and Copper-Alloy Condenser and Heat Exchanger Tubes with Integral Fins	1133

**Copper and Copper Alloy Plate, Sheet, Strip, and Rolled Bar**

SB-96/SB-96M	Specification for Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General Purposes and Pressure Vessels	53
SB-152/SB-152M	Specification for Copper Sheet, Strip, Plate, and Rolled Bar	135
SB-169/SB-169M	Specification for Aluminum Bronze Sheet, Strip, and Rolled Bar	243
SB-171/SB-171M	Specification for Copper-Alloy Plate and Sheet for Pressure Vessels, Condensers, and Heat Exchangers	249
SB-248	Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar	379
SB-283	Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)	433

**Copper and Copper Alloy Rod, Bar, and Shapes**

SB-98/SB-98M	Specification for Copper-Silicon Alloy Rod, Bar, and Shapes	59
SB-150/SB-150M	Specification for Aluminum Bronze Rod, Bar, and Shapes	121
SB-151/SB-151M	Specification for Copper-Nickel-Zinc Alloy (Nickel Silver) and Copper-Nickel Rod and Bar	129
SB-187/SB-187M	Specification for Copper, Bus Bar, Rod, and Shapes and General Purpose Rod, Bar, and Shapes	257
SB-249/SB-249M	Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes, and Forgings	393

**Copper Test Method**

SB-858	Test Method for Ammonia Vapor Test for Determining Susceptibility to Stress Corrosion Cracking in Copper Alloys	1075
--------	---	------

**Nickel Alloy Castings**

SA-494/SA-494M	Specification for Castings, Nickel and Nickel Alloy	685
----------------	---	-----

**Nickel and Nickel Alloy Fittings**

SB-366	Specification for Factory-Made Wrought Nickel and Nickel Alloy Fittings	511
--------	---	-----

**Nickel and Nickel Alloy Pipe and Tubes**

SB-161	Specification for Nickel Seamless Pipe and Tube	153
SB-163	Specification for Seamless Nickel and Nickel Alloy Condenser and Heat-Exchanger Tubes	175
SB-165	Specification for Nickel-Copper Alloy (UNS N04400) Seamless Pipe and Tube	201
SB-167	Specification for Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06603, N06690, N06693, N06025, and N06045) and Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617) Seamless Pipe and Tube	219
SB-407	Specification for Nickel-Iron-Chromium Alloy Seamless Pipe and Tube	559
SB-423	Specification for Nickel-Iron-Chromium-Molybdenum-Copper Alloy (UNS N08825 and N08221) Seamless Pipe and Tube	581
SB-444	Specification for Nickel-Chromium-Molybdenum-Columbium Alloys (UNS N06625 and UNS N06852) and Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219) Pipe and Tube	623

SB-462	Specification for Forged or Rolled UNS N06030, UNS N06022, UNS N06035, UNS N06200, UNS N06059, UNS N10362, UNS N06686, UNS N08020, UNS N08024, UNS N08026, UNS N08367, UNS N10276, UNS N10665, UNS N10675, UNS N10629, UNS N08031, UNS N06045, UNS N06025, and UNS R20033 Alloy Pipe Flanges, Forged Fittings, and Valves and Parts for Corrosive High-Temperature Service .....	633
SB-464	Specification for Welded UNS N08020, N08024, and N08026 Alloy Pipe .....	645
SB-468	Specification for Welded UNS N08020, N08024, and N08026 Alloy Tubes .....	667
SB-514	Specification for Welded Nickel-Iron-Chromium Alloy Pipe .....	715
SB-515	Specification for Welded UNS N08120, UNS N08800, UNS N08810, and UNS N08811 Alloy Tubes .....	719
SB-516	Specification for Welded Nickel-Chromium-Iron Alloy (UNS N06600, UNS N06603, UNS N06025, and UNS N06045) Tubes .....	723
SB-517	Specification for Welded Nickel-Chromium-Iron Alloy (UNS N06600, UNS N06603, UNS N06025, and UNS N06045) Pipe .....	727
SB-535	Specification for Nickel-Iron-Chromium-Silicon Alloys (UNS N08330 and N08332) Seamless Pipe and Tube .....	737
SB-619	Specification for Welded Nickel and Nickel-Cobalt Alloy Pipe .....	857
SB-622	Specification for Seamless Nickel and Nickel-Cobalt Alloy Pipe and Tube .....	873
SB-626	Specification for Welded Nickel and Nickel-Cobalt Alloy Tube .....	895
SB-668	Specification for UNS N08028 Seamless Tubes .....	933
SB-673	Specification for UNS N08904, UNS N08925, and N08926 Welded Pipe .....	945
SB-674	Specification for UNS N08925, UNS N08354, and UNS N08926 Welded Tube .....	951
SB-675	Specification for UNS N08367 Welded Pipe .....	955
SB-676	Standard Specification for UNS N08367 Welded Tube .....	959
SB-677	Specification for UNS N08904, UNS N08925, and UNS N08926 Seamless Pipe and Tube ..	963
SB-690	Specification for Iron-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS N08367) Seamless Pipe and Tube .....	979
SB-704	Specification for Welded UNS N06625, UNS N06219, and UNS N08825 Alloy Tubes .....	995
SB-705	Specification for Nickel-Alloy (UNS N06625, N06219 and N08825) Welded Pipe .....	999
SB-710	Specification for Nickel-Iron-Chromium-Silicon Alloy Welded Pipe .....	1023
SB-729	Specification for Seamless UNS N08020, UNS N08026, and UNS N08024 Nickel-Alloy Pipe and Tube .....	1027
SB-751	Specification for General Requirements for Nickel and Nickel-Alloy Welded Tube .....	1031
SB-775	Specification for General Requirements for Nickel and Nickel-Alloy Welded Pipe .....	1039
SB-804	Specification for UNS N08367 and UNS N08926 Welded Pipe .....	1045
SB-829	Specification for General Requirements for Nickel and Nickel Alloys Seamless Pipe and Tube .....	1067

**Nickel and Nickel Alloy Plate, Sheet, and Strip**

SB-127	Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip .....	97
SB-162	Specification for Nickel Plate, Sheet, and Strip .....	159
SB-168	Specification for Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06603, N06690, N06693, N06025, and N06045) and Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617) Plate, Sheet, and Strip .....	227
SB-333	Specification for Nickel-Molybdenum Alloy Plate, Sheet, and Strip .....	463
SB-409	Specification for Nickel-Iron-Chromium Alloy Plate, Sheet, and Strip .....	575
SB-424	Specification for Ni-Fe-Cr-Mo-Cu Alloy (UNS N08825, UNS N08221, and UNS N06845) Plate, Sheet, and Strip .....	587
SB-434	Specification for Nickel-Molybdenum-Chromium-Iron Alloys (UNS N10003, UNS N10242) Plate, Sheet, and Strip .....	601
SB-435	Specification for UNS N06002, UNS N06230, UNS N12160, and UNS R30556 Plate, Sheet, and Strip .....	605
SB-443	Specification for Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) and Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219) Plate, Sheet, and Strip .....	611
SB-463	Specification for UNS N08020, UNS N08026, and UNS N08024 Alloy Plate, Sheet, and Strip .....	639

SB-536	Specification for Nickel-Iron-Chromium-Silicon Alloys (UNS N08330 and N08332) Plate, Sheet, and Strip .....	741
SB-575	Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Chromium-Molybdenum-Copper, Low-Carbon Nickel-Chromium-Molybdenum-Tantalum, Low-Carbon Nickel-Chromium-Molybdenum-Tungsten, and Low-Carbon Nickel-Molybdenum-Chromium Alloy Plate, Sheet, and Strip .....	819
SB-582	Specification for Nickel-Chromium-Iron-Molybdenum-Copper Alloy Plate, Sheet, and Strip .....	831
SB-599	Specification for Nickel-Iron-Chromium-Molybdenum-Columbium Stabilized Alloy (UNS N08700) Plate, Sheet, and Strip .....	843
SB-620	Specification for Nickel-Iron-Chromium-Molybdenum Alloy (UNS N08320) Plate, Sheet, and Strip .....	865
SB-625	Specification for UNS N08904, UNS N08925, UNS N08031, UNS N08932, UNS N08926, and UNS R20033 Plate, Sheet, and Strip .....	881
SB-688	Specification for Chromium-Nickel-Molybdenum-Iron (UNS N08366 and UNS N08367) Plate, Sheet, and Strip .....	969
SB-709	Specification for Iron-Nickel-Chromium-Molybdenum Alloy (UNS N08028) Plate, Sheet, and Strip .....	1011
SB-906	Specification for General Requirements for Flat-Rolled Nickel and Nickel Alloys Plate, Sheet, and Strip .....	1101

**Nickel and Nickel Alloy Rod, Bar, and Wire**

SB-160	Specification for Nickel Rod and Bar .....	143
SB-164	Specification for Nickel-Copper Alloy Rod, Bar, and Wire .....	187
SB-166	Specification for Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06603, N06690, N06693, N06025, N06045, and N06696) and Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617) Rod, Bar, and Wire .....	207
SB-335	Specification for Nickel-Molybdenum Alloy Rod .....	469
SB-408	Specification for Nickel-Iron-Chromium Alloy Rod and Bar .....	569
SB-425	Specification for Ni-Fe-Cr-Mo-Cu Alloy (UNS N08825 and UNS N08221) Rod and Bar ....	593
SB-446	Specification for Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625), Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219), and Nickel-Chromium-Molybdenum-Tungsten Alloy (UNS N06650) Rod and Bar .....	627
SB-473	Specification for UNS N08020, UNS N08024, and UNS N08026 Nickel Alloy Bar and Wire .....	671
SB-511	Specification for Nickel-Iron-Chromium-Silicon Alloy Bars and Shapes .....	705
SB-564	Specification for Nickel Alloy Forgings .....	791
SB-572	Specification for UNS N06002, UNS N06230, UNS N12160, and UNS R30556 Rod .....	801
SB-573	Specification for Nickel-Molybdenum-Chromium-Iron Alloys (UNS N10003, N10242) Rod .....	807
SB-574	Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Molybdenum-Chromium, Low-Carbon Nickel-Molybdenum-Chromium-Tantalum, Low-Carbon Nickel-Chromium-Molybdenum-Copper, and Low-Carbon Nickel-Chromium-Molybdenum-Tungsten Alloy Rod .....	813
SB-581	Specification for Nickel-Chromium-Iron-Molybdenum-Copper Alloy Rod .....	825
SB-621	Specification for Nickel-Iron-Chromium-Molybdenum Alloy (UNS N08320) Rod .....	869
SB-637	Specification for Precipitation-Hardening Nickel Alloy Bars, Forgings, and Forging Stock for High-Temperature Service .....	901
SB-649	Specification for Ni-Fe-Cr-Mo-Cu, Low-Carbon Alloy (UNS N08904), Ni-Fe-Cr-Mo-Cu-N Low Carbon Alloys (UNS N08925, UNS N08031, and UNS N08926), and Cr-Ni-Fe-N Low-Carbon Alloy (UNS R20033) Bar and Wire .....	911
SB-672	Specification for Nickel-Iron-Chromium-Molybdenum-Columbium Stabilized Alloy (UNS N08700) Bar and Wire .....	937
SB-691	Specification for Iron-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS N08367) Rod, Bar, and Wire .....	987

**Other**

SF-467	Specification for Nonferrous Nuts for General Use .....	1143
SF-467M	Specification for Nonferrous Nuts for General Use [Metric] .....	1155
SF-468	Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use .....	1165
SF-468M	Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use [Metric] ..	1179

**Titanium and Titanium Alloys**

SB-265	Specification for Titanium and Titanium Alloy Strip, Sheet, and Plate .....	415
SB-338	Specification for Seamless and Welded Titanium and Titanium Alloy Tubes for Condensers and Heat Exchangers .....	475
SB-348	Specification for Titanium and Titanium Alloy Bars and Billets .....	485
SB-363	Specification for Seamless and Welded Unalloyed Titanium and Titanium Alloy Welding Fittings .....	505
SB-367	Specification for Titanium and Titanium Alloy Castings .....	521
SB-381	Specification for Titanium and Titanium Alloy Forgings .....	535
SB-861	Specification for Titanium and Titanium Alloy Seamless Pipe .....	1079
SB-862	Specification for Titanium and Titanium Alloy Welded Pipe .....	1089

**Zirconium and Zirconium Alloys**

SB-493/SB-493M	Specification for Zirconium and Zirconium Alloy Forgings .....	681
SB-523/SB-523M	Specification for Seamless and Welded Zirconium and Zirconium Alloy Tubes .....	731
SB-550/SB-550M	Specification for Zirconium and Zirconium Alloy Bar and Wire .....	773
SB-551/SB-551M	Specification for Zirconium and Zirconium Alloy Strip, Sheet, and Plate .....	779
SB-653/SB-653M	Specification for Seamless and Welded Zirconium and Zirconium Alloy Welding Fittings ..	923
SB-658/SB-658M	Specification for Seamless and Welded Zirconium and Zirconium Alloy Pipe .....	927

## SPECIFICATION REMOVAL

From time to time, it becomes necessary to remove specifications from this Part of Section II. This occurs because the sponsoring society (e.g., ASTM, AWS, CEN) has notified ASME that the specification has either been replaced with another specification, or that there is no known use and production of a material. Removal of a specification from this Section also results in concurrent removal of the same specification from Section IX and from all of the ASME Boiler and Pressure Vessel Construction Codes that reference the material. This action effectively prohibits further use of the material in ASME Boiler and Pressure Vessel construction.

The following specifications will be dropped from this Section in the next Edition, unless information concerning current production and use of the material is received before December 1 of this year:

None in this Edition.

If you are currently using and purchasing new material to this specification for ASME Boiler and Pressure Vessel Code construction, and if discontinuance of this specification would present a hardship, please notify the Secretary of the ASME Boiler and Pressure Vessel Committee, at the address shown below:

Secretary  
ASME Boiler and Pressure Vessel Committee  
Two Park Avenue  
New York, NY 10016-5990

## SUMMARY OF CHANGES

Errata to the BPV Code may be posted on the ASME Web site to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in the BPV Code. Such Errata shall be used on the date posted.

Information regarding Special Notices and Errata is published by ASME at <http://go.asme.org/BPVCerrata>.

Changes given below are identified on the pages by a margin note, **(17)**, placed next to the affected area.

The Record Numbers listed below are explained in more detail in “List of Changes in Record Number Order” following this Summary of Changes.

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
ix	List of Sections	Updated
xiv	Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees	Revised in its entirety (13-2222)
xvii	Personnel	Updated
xxxvi	ASTM Personnel	Updated
xxxvii	Preface	Ninth and penultimate paragraphs editorially revised
xxxviii	Specifications Listed by Materials	Updated
83	SB-111/SB-111M	Revised in its entirety (09-907)
143	SB-160	Corrected maximum carbon value for UNS N02200 in Table 2 (16-2930)
407	SB-251	Revised in its entirety (16-395)
521	SB-367	Revised in its entirety (14-1220)
753	SB-543/SB-543M	Revised in its entirety (09-923)
813	SB-574	Revised in its entirety (14-1998)
819	SB-575	Revised in its entirety (14-1999)
865	SB-620	Revised in its entirety (07-1590)
951	SB-674	Revised in its entirety (07-1317)
1003	SB-706	Added (13-1369)
1119	SB-928/SB-928M	Revised in its entirety (14-1152)
1191	SB/EN 1706	Revised (12-1062)
1196	Table II-200-1	Updated
1202	Table II-200-2	(1) Updated (12-1062) (2) General Note corrected by errata and Note (1) added (15-288, 15-2466)

## LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
07-1317	Adopted ASTM B674-05 as SB-674.
07-1590	Adopted ASTM B620-2003(R2013) as SB-620.
09-907	Adopted ASTM B111/B111M-11 as SB-111/SB-111M..
09-923	Adopted ASTM B543/B543M-12 as SB-543/SB-543M..
12-1062	Added additional requirements on material test reports for SB/EN 1706 specification.
13-1369	Adopted ASTM B706-00(R11) as SB-706.
13-2222	Revised the front guidance on interpretations in its entirety.
14-1152	Adopted ASTM B928/B928M-13 as SB-928/SB-928M.
14-1220	Adopted ASTM B367-13 as SB-367.
14-1998	Adopted ASTM B574-10 as SB-574.
14-1999	Adopted ASTM B575-14 as SB-575.
15-288	In Mandatory Appendix II, added new Note (1) to Table II-200-2 indicating that "Other Acceptable Editions" refers exclusively to non-ASTM and non-ASME specifications.
15-2466	Corrected typographical error in General Note of Table II-200-2.
16-395	Adopted ASTM B251-10 as SB-251.
16-2930	Corrected the maximum carbon value for UNS N02200 to "0.15" in Table 2 of SB-160.

# CROSS-REFERENCING AND STYLISTIC CHANGES IN THE BOILER AND PRESSURE VESSEL CODE

There have been structural and stylistic changes to BPVC, starting with the 2011 Addenda, that should be noted to aid navigating the contents. The following is an overview of the changes:

## Subparagraph Breakdowns/Nested Lists Hierarchy

- First-level breakdowns are designated as (a), (b), (c), etc., as in the past.
- Second-level breakdowns are designated as (1), (2), (3), etc., as in the past.
- Third-level breakdowns are now designated as (-a), (-b), (-c), etc.
- Fourth-level breakdowns are now designated as (-1), (-2), (-3), etc.
- Fifth-level breakdowns are now designated as (+a), (+b), (+c), etc.
- Sixth-level breakdowns are now designated as (+1), (+2), etc.

## Footnotes

With the exception of those included in the front matter (roman-numbered pages), all footnotes are treated as endnotes. The endnotes are referenced in numeric order and appear at the end of each BPVC section/subsection.

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

*Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees* has been moved to the front matter. This information now appears in all Boiler Code Sections (except for Code Case books).

## Cross-References

It is our intention to establish cross-reference link functionality in the current edition and moving forward. To facilitate this, cross-reference style has changed. Cross-references within a subsection or subarticle will not include the designator/identifier of that subsection/subarticle. Examples follow:

- *(Sub-)Paragraph Cross-References.* The cross-references to subparagraph breakdowns will follow the hierarchy of the designators under which the breakdown appears.
  - If subparagraph (-a) appears in X.1(c)(1) and is referenced in X.1(c)(1), it will be referenced as (-a).
  - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.1(c)(2), it will be referenced as (1)(-a).
  - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.1(e)(1), it will be referenced as (c)(1)(-a).
  - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.2(c)(2), it will be referenced as X.1(c)(1)(-a).
- *Equation Cross-References.* The cross-references to equations will follow the same logic. For example, if eq. (1) appears in X.1(a)(1) but is referenced in X.1(b), it will be referenced as eq. (a)(1)(1). If eq. (1) appears in X.1(a)(1) but is referenced in a different subsection/subarticle/paragraph, it will be referenced as eq. X.1(a)(1)(1).



# SPECIFICATION FOR ALUMINUM-ALLOY SAND CASTINGS



**SB-26/SB-26M**

(Identical with ASTM Specification B26/B26M-11 except that certification and test reports have been made mandatory, and ASME welding requirements are invoked.)

# Standard Specification for Aluminum-Alloy Sand Castings

## 1. Scope

1.1 This specification covers aluminum-alloy sand castings designated as shown in Table 1.

1.2 This specification is not intended for aluminum-alloy sand castings used in aerospace applications.

1.3 Alloy and temper designations are in accordance with ANSI H35.1/H35.1M. Unified Numbering System alloy designations are in accordance with Practice E527.

1.4 Unless the order specifies the "M" specification designation, the material shall be furnished to the inch-pound units.

1.5 For acceptance criteria for inclusion of new aluminum and aluminum alloys and their properties in this specification, see Annex A1 and Annex A2.

1.6 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein:

### 2.2 ASTM Standards:

B179 Specification for Aluminum Alloys in Ingot and Molten Forms for Castings from All Casting Processes

B275 Practice for Codification of Certain Nonferrous Metals and Alloys, Cast and Wrought  
 B557 Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products  
 B557M Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products (Metric)  
 B660 Practices for Packaging/Packing of Aluminum and Magnesium Products  
 B881 Terminology Relating to Aluminum- and Magnesium-Alloy Products  
 B917/B917M Practice for Heat Treatment of Aluminum-Alloy Castings from All Processes  
 D3951 Practice for Commercial Packaging  
 E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications  
 E34 Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys  
 E94 Guide for Radiographic Examination  
 E155 Reference Radiographs for Inspection of Aluminum and Magnesium Castings  
 E165 Practice for Liquid Penetrant Examination for General Industry  
 E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)  
 E607 Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point to Plane Technique Nitrogen Atmosphere  
 E716 Practices for Sampling and Sample Preparation of Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spectrochemical Analysis  
 E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry  
 E2422 Digital Reference Images for Inspection of Aluminum Castings  
 IEEE/ASTM SI 10 Standard for Use of the International System of Units (SI): The Modern Metric System  
 2.3 AMS Standard:  
 AMS 2771 Heat Treatment of Aluminum Alloy Castings