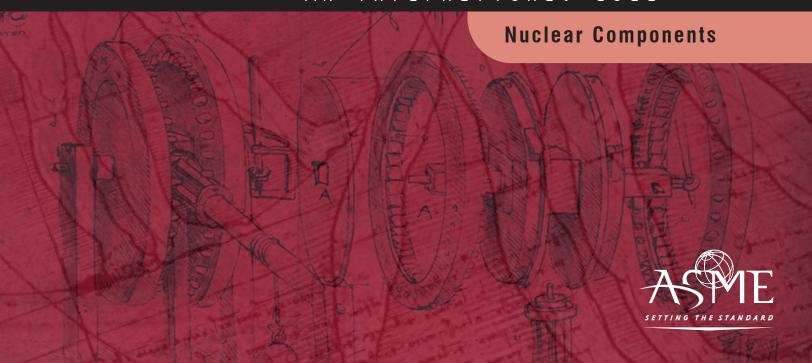


2023 ASME Boiler and Pressure Vessel Code An International Code



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AN INTERNATIONAL CODE

2023 ASME Boiler & Pressure Vessel Code

2023 Edition July 1, 2023

CODE CASES

Nuclear Components



Date of Issuance: July 1, 2023

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

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Library of Congress Catalog Card Number: 56-3934

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

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

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CORRESPONDENCE WITH THE COMMITTEE

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General

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

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

Revisions and Errata

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

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

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

Cases

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

annulment in a Code Case Supplement or Edition of the appropriate Code Case book. The status of any case is available at http://go.asme.org/BPVCCDatabase. An index of the complete list of Boiler and Pressure Vessel Code Cases and Nuclear Code Cases is available at http://go.asme.org/BPVCC.

Interpretations

- (a) Interpretations clarify existing Code requirements and are written as a question and reply. Interpretations do not introduce new requirements. If a revision to resolve conflicting or incorrect wording is required to support the interpretation, the committee will issue an intent interpretation in parallel with a revision to the Code.
- (b) Upon request, the committee will render an interpretation of any requirement of the Code. An interpretation can be rendered only in response to a request submitted through the online Interpretation Submittal Form at http://go.asme.org/InterpretationRequest. Upon submitting the form, the inquirer will receive an automatic e-mail confirming receipt.
- (c) ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Code requirements. If, based on the information submitted, it is the opinion of the committee that the inquirer should seek assistance, the request will be returned with the recommendation that such assistance be obtained. Inquirers may track the status of their requests at http://go.asme.org/Interpretations.
- (d) ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME committee or subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.
- (e) Interpretations are published in the ASME Interpretations Database at http://go.asme.org/Interpretations as they are issued.

Committee Meetings

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

SUMMARY OF CHANGES

The 2023 Edition of the Code Cases includes Code Case actions published through Supplement 7 to the 2021 Edition.

Changes listed below are identified on the pages by a margin note, (23), placed next to the affected area. Errata, if any, are identified by a margin note, (E), placed next to the affected area.

| Page | Location | Change |
|-------------|---|---|
| iv | List of Sections | (1) Under Section III, Division 4 added(2) Title of Section XI and subtitle of Section XI, Division 2 revised(3) Information on interpretations and Code cases moved to "Correspondence With the Committee" |
| v | Correspondence With the Committee | Added |
| ix | Cross-Referencing in the ASME BPVC | Updated |
| x | Notes to Numeric Index | Updated |
| xi | Numeric Index | Updated |
| xvii | Subject Index | Updated |
| xxiii | Index of Material Specifications Referred to in Cases | Updated |
| xxvii | Applicability Index for Section XI Cases | Updated |
| xlvii | Guideline for Cross-Referencing Section XI Cases | (1) In Table 1, first column heading revised from "E17" to "E17-E21" (2) In Table 1, General Notes (a), (d), and (f) revised |
| 1 (N-504-4) | N-504-4 | Annulled |
| 1 (N-532-6) | N-532-6 | Revised |
| 1 (N-666-3) | N-666-3 | Revised |
| 1 (N-778-1) | N-778-1 | Revised |
| 1 (N-801-4) | N-801-4 | Revised |
| 1 (N-830-1) | N-830-1 | In eq. (5c), "- $\Delta J_{IC(US)}$ " inserted at end of equation by errata |
| 1 (N-888-1) | N-888-1 | Revised |
| 1 (N-892-1) | N-892-1 | Revised |
| 1 (N-898-1) | N-898-1 | Revised |
| 1 (N-909-1) | N-909-1 | Revised |
| 1 (N-924) | N-924 | (1) In I-8, six instances of " $\dot{\varepsilon}_C$ " corrected to " $\dot{\varepsilon}_V$ " by errata (2) In I-8, two instances of " $\dot{\varepsilon}$ " corrected to " $\dot{\varepsilon}_V$ " by errata |

| Page | Location | Change |
|-----------|----------|--------|
| 1 (N-928) | N-928 | Added |
| 1 (N-929) | N-929 | Added |
| 1 (N-930) | N-930 | Added |
| 1 (N-931) | N-931 | Added |

CROSS-REFERENCING IN THE ASME BPVC

(23)

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

- (a) Hierarchy of Subparagraph Breakdowns
 - (1) First-level breakdowns are designated as (a), (b), (c), etc.
 - (2) Second-level breakdowns are designated as (1), (2), (3), etc.
 - (3) Third-level breakdowns are designated as (-a), (-b), (-c), etc.
 - (4) Fourth-level breakdowns are designated as (-1), (-2), (-3), etc.
 - (5) Fifth-level breakdowns are designated as (+a), (+b), (+c), etc.
 - (6) Sixth-level breakdowns are designated as (+1), (+2), etc.
- (b) Cross-References to Subparagraph Breakdowns. Cross-references within an alphanumerically designated paragraph (e.g., PG-1, UIG-56.1, NCD-3223) do not include the alphanumerical designator of that paragraph. The cross-references to subparagraph breakdowns follow the hierarchy of the designators under which the breakdown appears. The following examples show the format:
 - (1) If X.1(c)(1)(-a) is referenced in X.1(c)(1), it will be referenced as (-a).
 - (2) If X.1(c)(1)(-a) is referenced in X.1(c)(2), it will be referenced as (1)(-a).
 - (3) If X.1(c)(1)(-a) is referenced in X.1(e)(1), it will be referenced as (c)(1)(-a).
 - (4) If X.1(c)(1)(-a) is referenced in X.2(c)(2), it will be referenced as X.1(c)(1)(-a).

(23)

NOTES TO NUMERIC INDEX

- All Code Cases remain available for use until annulled by the ASME Boiler and Pressure Vessel Standards Committees. Code Cases will be reviewed routinely for possible incorporation into the body of the ASME Boiler and Pressure Vessel Code.
- Supplement 7 is the last supplement published for the 2021 edition. Supplement 8 is incorporated into the 2023 edition.
- Cases may be used beginning with the date of approval shown on the Case.
- Annulled Cases will remain in the Numeric Index and Subject Index until the next Edition, at which time they will be
 deleted
- Newly revised cases supersede previous versions. Previous code case number will be added in the "Annulled Date/ Supersedes" column next to the newly revised code case.
- The digit following a Case Number is used to indicate the number of times a Case has been revised.
- The Cases are arranged in numerical order, and each page of a Case is identified at the top with the appropriate Case Number.

Legend of Abbreviations
Supp. = Supplement
R = Reinstated

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| D4253. N-806 AWS Specifications D4354. N-806 A4.3 N-763 D4541 N-871 A5.1 N-807 D4787. N-589 A5.5 N-807 D5162. N-589 A5.18 N-807 D5868 N-871 A5.20 N-807 D7290 N-871 A5.28 N-807 D7616 N-871 A5.29 N-807 E38 N-840 D1.1 N-793, 794, 796 E39 N-840 D3.6M-99 N-803 E76 N-840 International Specifications E185-82 N-519 JIS G4303 N-708 E354 N-840 JIS G 0595 N-860 E384-16 N-881 CHARTS FOR VESSELS UNDER EXTERNAL PRESSURE E354-93 N-576 Figure 1 Chart for Determining Shell E813 N-871 Thickness of Cylindrical and Spherical E831 N-871 Shell Under External Pressure When E1640 N-871 Constructed of High Alloy UNS S32760 | D3983 | N-589 | F1216 | N-589 |
| D4354 N-806 A4.3 N-763 D4541 N-871 A5.1 N-807 D4787 N-589 A5.5 N-807 D5162 N-589 A5.18 N-807 D5868 N-871 A5.20 N-807 D7290 N-871 A5.28 N-807 D7616 N-871 A5.29 N-807 E38 N-840 D1.1 N-793, 794, 796 E39 N-840 D3.6M-99 N-803 E76 N-840 International Specifications E185-82 N-519 JIS G4303 N-708 E354 N-840 JIS G5955 N-860 E384-16 N-881 CHARTS FOR VESSELS UNDER EXTERNAL PRESSURE E354-93 N-576 Figure 1 Chart for Determining Shell E813 N-871 Thickness of Cylindrical and Spherical E831 N-871 Shell Under External Pressure When E1640 N-871 Constructed of High Alloy UNS S32760 E1820 N-830 and UNS J93380 <t< td=""><td>D4018</td><td>N-871</td><td>F2880</td><td>N-891</td></t<> | D4018 | N-871 | F2880 | N-891 |
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| | E1640 | N-871 | Constructed of High Alloy UNS S32760 | |
| E1921 N-830 | E1820 | N-830 | and UNS J93380 | N-564 |
| | E1921 | N-830 | | |



APPLICABILITY INDEX FOR SECTION XI CASES

This Index provides the range of Section XI Editions and Addenda applicable to each Section XI Case.

| Code Case | | Applicability | | |
|-----------|--|--|--|--|
| No. | Title | From | Up to and Including | |
| N-34 | Inservice Inspection of Welds on Nuclear Components | 1970 Edition | 1971 Edition with the Summer 1973 Addenda | |
| N-72 | Partial Postponement of Category B-C Examinations for Class 1 Components | 1974 Edition | 1977 Edition with the Winter 1977 Addenda | |
| N-73 | Partial Postponement of Category B-D Examinations for Class 1 Components | 1974 Edition | 1977 Edition with the Winter 1977 Addenda | |
| N-98 | Ultrasonic Examination — Calibration Block Tolerances [Note (1)]: | | | |
| | (a) For Division 1 | 1974 Edition | 1977 Edition with the Summer 1978 Addenda | |
| | (b) For Division 2 | 1974 Edition with the Winter 1975 Addenda | Not applicable | |
| N-112 | Acceptance Standards Class 2 and 3 Components | 1974 Edition | 1974 Edition with the Winter 1975 Addenda | |
| N-113 | Basic Calibration Block for Ultrasonic Examination of Welds 10 in. to 13 in. Thick | 1971 Edition with the Summer 1973 Addenda | 1974 Edition with the Summer 1976 Addenda | |
| N-113-1 | Basic Calibration Block for Ultrasonic Examination of Welds 10 in. to 14 in. Thick | 1971 Edition with the Summer 1973 Addenda | 2001 Edition | |
| N-118 | $\label{eq:continuous} \textbf{Examination} - \textbf{Acceptance Standards for Surface Indications in Cladding}$ | 1974 Edition with the Summer 1974 Addenda | 1974 Edition with the Winter 1975 Addenda | |
| N-166 | Reference by Section XI to N626.1-1975 for Qualification and Duties of Authorized Nuclear Inservice Inspection | 1974 Edition | 1977 Edition | |
| N-167 | Minimum Section Thickness Requirements for Repair of Nozzles | 1974 Edition | 1977 Edition with the Winter 1977 Addenda | |
| N-198 | Exemption From Examination for ASME Class 2 Piping Located at Containment Penetrations | 1974 Edition with the Summer 1976 Addenda | 1977 Edition with the Winter 1977 Addenda | |
| N-198-1 | Exemption From Examination for ASME Class 1 and 2 Piping Located at Containment Penetrations | 1974 Edition with the Summer 1976 Addenda | 1992 Edition with the 1993 Addenda | |
| N-209 | Conditional Acceptance of Identifiable Isolated or Random Rounded Indications | | | |
| | (a) For Class 1 Systems | 1974 Edition | 1980 Edition with the Winter 1980 Addenda | |
| | (b) For Class 2 Systems | 1974 Edition with the Summer 1976 Addenda | 1983 Edition | |
| N-210 | Exemptions to Hydrostatic Test After Repairs | 1974 Edition | 1977 Edition with the Winter 1977 Addenda | |
| N-211 | Recalibration of Ultrasonic Equipment Upon Change of Personnel | | | |
| | (a) To meet requirements of I-4230 | 1971 Edition with the Summer 1973 Addenda | 1974 Edition with the Summer 1976 Addenda | |
| | (b) To meet requirements of III-3330 | 1977 Edition | 1980 Edition | |
| N-216 | Alternative Rules for Reactor Vessel Closure Stud Examination | 1977 Edition | 1977 Edition with the Winter 1977 Addenda | |
| N-234 | Time Between Ultrasonic Calibration Checks | | | |
| | (a) To meet requirements of I-4230 | 1971 Edition with the Summer 1973 Addenda | 1974 Edition with the Summer 1976 Addenda | |
| | (b) To meet requirements of III-3330 | 1977 Edition | 1980 Edition | |
| N-235 | Ultrasonic Calibration Checks per Section V | 1974 Edition with the Winter 1976 Addenda | 1977 Edition with the Summer 1979 Addenda | |
| N-236 | Repair and Replacement of Class MC Vessels | 1974 Edition | 1983 Edition with the Winter 1984 Addenda | |

| Code Case | | Appl | licability |
|------------------|--|---|--|
| No. | Title | From | Up to and Including |
| N-236-1 | Repair and Replacement of Class MC Vessels | 1974 Edition | 1989 Edition with the 1990 Addenda |
| N-252 | Low Energy Capacitive Discharge Welding Method for Temporary or Permanent Attachments to Components and Supports | 1971 Edition | 1980 Edition with the Winter 1980 Addenda |
| N-278 | Alternative Ultrasonic Calibration Block Configuration, I-3131 and T-434.3 | | |
| | (a) To meet requirements of I-3131 | 1974 Edition | 1974 Edition with the Summer 1976 Addenda |
| | (b) To meet requirements of T-434.3 | 1977 Edition | 1983 Edition with the Winter 1984 Addenda |
| N-288 | Hydrostatic Test Requirements for Class 1 and 2 Components | 1974 Edition | 1980 Edition with the Winter 1980 Addenda |
| N-306 | Calibration Block Material Selection, Appendix I, I-3121 [Note (2)] | 1974 Edition with the Summer 1975 Addenda | 1974 Edition with the Summer 1976 Addenda |
| N-307 | Revised Ultrasonic Examination Volume for Class 1 Bolting, Examination Category B-G-1, When the Examinations Are Conducted From the Center- Drilled Hole | 1974 Edition | 1983 Edition with the Winter 1984 Addenda |
| N-307-1 | Revised Ultrasonic Examination Volume for Class 1 Bolting, Table IWB-2500-1, Examination Category B-G-1, When the Examinations Are Conducted From the Center-Drilled Hole | 1974 Edition | 1998 Edition with the 1999 Addenda |
| N-307-2 | Revised Ultrasonic Examination Volume for Class 1 Bolting, Table IWB-2500-1, Examination Category B-G-1, When the Examinations Are Conducted From the End of the Bolt or Stud or From the Center- Drilled Hole | 1974 Edition | 1998 Edition with the 1999 Addenda |
| N-307-3 | Ultrasonic Examination of Class 1 Bolting, Table IWB-2500-1, Examination Category B-G-1 | 1974 Edition | 1998 Edition with the 1999 Addenda |
| N-308 | Documentation of Repairs and Replacements of Components in Nuclear Power Plants | 1974 Edition | 1980 Edition with the Winter 1981 Addenda |
| N-311 | Alternative Examination of Outlet Nozzle on Secondary Side of Steam Generators | 1977 Edition with the Winter 1977 Addenda | 2004 Edition |
| N-322 | Examination Requirements for Integrally Welded or Forged Attachments to Class 1 Piping at Containment Penetrations | 1977 Edition with the Summer 1978 Addenda | 1992 Edition with the 1993 Addenda |
| N-323 | Alternative Examinations for Integrally Welded Attachments to Vessels | 1974 Edition | 1974 Edition with the Winter 1976 Addenda |
| N-323-1 | Alternative Examination for Welded Attachments to Pressure Vessels | 1980 Edition with the Winter 1981 Addenda | 1995 Edition with the 1996 Addenda |
| N-334 | Examination Requirements for Integrally Welded or Forged Attachments to Class 2 Piping at Containment Penetrations | 1977 Edition with the Summer 1978 Addenda | 1980 Edition with the Summer 1980 Addenda |
| N-335 | Rules for Ultrasonic Examination of Similar and Dissimilar Metal Piping Welds | 1974 Edition | 1980 Edition with the Winter 1981 Addenda |
| N-335-1 | Rules for Ultrasonic Examination of Similar and Dissimilar Metal Piping Welds | 1974 Edition | 1980 Edition with the Winter 1981 Addenda |
| N-343 | Alternative Scope of Examination of Attachment Welds for Examination Categories B-H, B-K-1, and C-C | 1974 Edition | 1980 Edition with the Winter 1981 Addenda |
| N-355 | Calibration Block for Angle Beam Ultrasonic Examination of Large Fittings in Accordance With Appendix III-3410 [Note (3)] | 1974 Edition with the Winter 1975 Addenda | 1983 Edition |
| N-356 | Certification Period for Level III NDE Personnel | 1977 Edition with the Winter 1977 Addenda | 1983 Edition |
| N-375 | Rules for Ultrasonic Examination of Bolts and Studs | 1980 Edition | 1980 Edition with the Winter 1981 Addenda |
| N-375-1 | Rules for Ultrasonic Examination of Bolts and Studs | 1980 Edition | 1980 Edition with the Winter 1981 Addenda |
| N-375-2 N-389 | Rules for Ultrasonic Examination of Bolts and Studs Alternative Rules for Repairs, Replacements, or Modifications | 1971 Edition 1974 Edition with the | 1983 Edition 1986 Edition with the 1987 |
| N-389-1 | Alternative Rules for Repairs, Replacements, or Modifications | Summer 1975 Addenda 1974 Edition with the Summer 1975 Addenda | Addenda 1992 Edition with the 1993 Addenda |
| N-390 | Evaluation Criteria for Flaws Located in a Flange or Shell Region Near a Structural Discontinuity | | 1983 Edition with the Summer 1983 Addenda |