CODE CASES

NUCLEAR COMPONENTS

1986 ASME BOILER AND
PRESSURE VESSEL CODE

AN AMERICAN NATIONAL STANDARD

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

ASME BOILER AND PRESSURE VESSEL CODE
AN AMERICAN NATIONAL STANDARD

1986 CODE CASES

Nuclear Components

1986 EDITION

JULY 1, 1986

- All cases are in numeric sequence.
- Annulled cases follow the Annullment announcement sheet
- Cover sheets & instructions for Supp. 1-12 are at the end of all cases (follows N-473) The actual information from all Suppls. have been interfiled in numeric case sequence.

N.B. Cases N47, N71, N253, N409
Please read notes on guide sheets preceding the case

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
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1986 ASME
BOILER AND PRESSURE VESSEL CODE

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ADDENDA

Colored-sheet Addenda, which include additions and revisions to individual Sections of the Code, are published annually and will be sent automatically to purchasers of the applicable Sections up to the publication of the 1989 Code. The 1986 Code is available only in the loose-leaf format; accordingly, the Addenda will be issued in the loose-leaf, replacement-page format.

INTERPRETATIONS

ASME issues written replies to inquiries concerning interpretation of technical aspects of the Code. The Interpretations for each individual Section will be published separately and will be included as part of the update service to that Section. They will be issued semiannually (July and December) up to the publication of the 1989 Code. Interpretations of Section III, Divisions 1 and 2, will be included with the update service to Subsection NCA. Interpretations are not part of the Code or the Addenda.

CODE CASES

The Boiler and Pressure Vessel Committee meets 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 which have been adopted will appear in the appropriate 1986 Code Cases book: (1) Boilers and Pressure Vessels and (2) Nuclear Components. Supplements will be sent automatically to the purchasers of the Code Cases books up to the publication of the 1989 Code.

INDEX TO NEW AND REVISED CASES

Section III, Divisions 1 and 2, and Section XI

NOTES TO NUMERIC INDEX

- Code Cases automatically expire three years after their approval date unless reaffirmed, revised, or annulled, or an earlier expiration date is specified. When a Case is revised, a new expiration is scheduled.

  NOTE: Latest Approval Date is identified with an asterisk (*) and indicates the approval of an early expiration.

- Cases may be used beginning with the date of approval shown on the Case.

- Cases which are reaffirmed without change are not reprinted in Supplements. The Numeric Index provides the reaffirmation date and new expiration date of reaffirmed Cases.

- Annulled Cases will remain in the Numeric Index until the next Edition, at which time they will be deleted.

- 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
S = Superseded

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N-438	2-23-87	. . .	. . .	S	
N-438-1	3-8-89	. . .	. . .	3-8-92	. . .
N-439	2-23-87	. . .	. . .	2-23-90	. . .
N-440	2-23-87	. . .	. . .	2-23-90	. . .
N-441	2-23-87	. . .	. . .	2-23-90	. . .
N-442	2-23-87	. . .	. . .	2-23-90	. . .
N-443	5-7-87	. . .	. . .	S	
N-443-1	3-8-89	. . .	. . .	3-8-92	. . .
N-444	12-7-87	. . .	. . .	12-7-90	. . .
N-445	5-7-87	. . .	. . .	5-7-90	. . .
N-446	5-7-87	. . .	. . .	5-7-90	. . .
. . .	. . .	. . .	. . .	. . .	. . .
N-448	7-27-87	. . .	. . .	7-27-90	. . .

Case	Approval Date	Errata	Reaffirmed or *Latest App. Date	Expiration Date	Annulled
N-449	7-27-87	. . .	. . .	7-27-90	. . .
. . .	. . .	. . .	. . .	. . .	. . .
N-451	7-27-87	. . .	. . .	7-27-90	. . .
. . .	. . .	. . .	. . .	. . .	. . .
N-453	12-7-87	. . .	. . .	S	
N-453-1	11-30-88	. . .	. . .	11-30-91	. . .
N-454	12-7-87	. . .	. . .	12-7-90	. . .
N-455	12-7-87	. . .	. . .	12-7-90	. . .
. . .	. . .	. . .	. . .	. . .	. . .
N-457	12-7-87	. . .	. . .	12-7-90	. . .
. . .	. . .	. . .	. . .	. . .	. . .
N-459	5-4-88	. . .	. . .	5-4-91	. . .
N-460	7-27-88	. . .	. . .	7-27-91	. . .
N-461	11-30-88	. . .	. . .	11-30-91	. . .
N-462	7-27-88	. . .	. . .	7-27-91	. . .
N-463	11-30-88	1986-Supp. 12	. . .	11-30-91	. . .
N-464	3-8-89	. . .	. . .	3-8-92	. . .
N-465	11-30-88	. . .	. . .	11-30-91	. . .
N-466	3-8-89	. . .	. . .	3-8-92	. . .
. . .	. . .	. . .	. . .	. . .	. . .
. . .	. . .	. . .	. . .	. . .	. . .
N-469	3-8-89	. . .	. . .	3-8-92	. . .
N-470	3-8-89	. . .	. . .	3-8-92	. . .
. . .	. . .	. . .	. . .	. . .	. . .
N-472	3-8-89	. . .	. . .	3-8-92	. . .
N-473	3-8-89	. . .	. . .	3-8-92	. . .

SUBJECT INDEX

SECTION III — DIVISION 2
CONCRETE REACTOR VESSELS AND CONTAINERS

SECTION XI
INSERVICE INSPECTION OF NUCLEAR REACTOR COOLANT SYSTEMS

INDEX OF MATERIAL SPECIFICATIONS REFERRED TO IN CASES

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 No.	Title	Applicability	
		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	1974 Edition with the Summer 1975 Addenda
N-73	Partial Postponement of Category B-D Examinations for Class 1 Components	1974 Edition	1974 Edition with the Winter 1976 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 1976 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	1974 Edition with the Summer 1976 Addenda
N-118	Examination — 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

Code Case No.	Title	Applicability	
		From	Up To and Including
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-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-236-1	Repair and Replacement of Class MC Vessels	1974 Edition	1983 Edition
N-252	Low Energy Capacitive Discharge Welding Method for Temporary or Permanent Attachments to Components and Supports	1971 Edition	1980 Edition with the Winter 1981 Addenda
N-278	Alternative Ultrasonic Calibration Block Configuration, I-3131 and T-434.3		

Code Case No.	Title	Applicability	
		From	Up To and Including
N-278 (cont'd)	(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	1977 Edition with the Winter 1979 Addenda
N-288	Hydrostatic Test Requirements for Class 1 and 2 Components	1974 Edition	1977 Edition with the Summer 1977 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	1986 Edition with the 1986 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	1986 Edition with the 1986 Addenda
N-322	Examination Requirements for Integrally Welded or Forged Attachments to Class 1 Piping at Containment Penetrations	1977 Edition with the Summer 1978 Addenda	1986 Edition with the 1986 Addenda
N-323	Alternative Examinations for Integrally Welded Attachments to Vessels	1974 Edition	1974 Edition with the Winter 1976 Addenda
N-334	Examination Requirements for Integrally Welded or Forged Attachments to Class 2 Piping Containment Penetrations	1977 Edition with the Summer 1978 Addenda	1980 Edition with the Winter 1980 Addenda
N-335	Rules for Ultrasonic Examination of Similar and Dissimilar Metal Piping Welds	1974 Edition	1980 Edition with the Winter 1981 Addenda

Code Case No.	Title	Applicability	
		From	Up To and Including
N-335-1	Rules for Ultrasonic Examination of Similar and Dissimilar Metal Piping Welds	1974 Edition	1986 Edition with the 1986 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	Rules for Ultrasonic Examination of Bolts and Studs	1971 Edition	1983 Edition
N-389	Alternative Rules for Repairs, Replacements, or Modifications	1974 Edition with the Summer 1975 Addenda	1986 Edition with the 1986 Addenda
N-390	Evaluation Criteria for Flaws Located in a Flange or Shell Region Near a Structural Discontinuity	1974 Edition with the Summer 1975 Addenda	1986 Edition with the 1986 Addenda
N-401	Eddy Current Examination	1974 Edition with the Summer 1976 Addenda	1986 Edition with the 1986 Addenda
N-401-1	Eddy Current Examination	1974 Edition with the Summer 1974 Addenda	1986 Edition with the 1987 Addenda
N-402	Eddy Current Calibration Standard Material	1980 Edition with the Winter 1980 Addenda	1983 Edition with the Winter 1983 Addenda
N-406	Alternative Rules for Replacement	1977 Edition with the Summer 1978 Addenda	1986 Edition with the 1986 Addenda
N-408	Alternative Rules for Examination of Class 2 Piping	1974 Edition	1983 Edition

Code Case No.	Title	Applicability	
		From	Up To and Including
N-409	Procedure and Personnel Qualification for Ultrasonic Detection and Sizing of Intergranular Stress Corrosion Cracking in Austenitic Piping Welds	1974 Edition	1986 Edition with the 1986 Addenda
N-409-1	Procedure and Personnel Qualification for Ultrasonic Detection and Sizing of Intergranular Stress Corrosion Cracking in Austenitic Piping Welds	1974 Edition	1986 Edition with the 1986 Addenda
N-409-2	Procedure and Personnel Qualification Requirements for Ultrasonic Detection and Sizing of Intergranular Stress Corrosion Cracking in Austenitic Piping Welds	1974 Edition	1986 Edition with the 1987 Addenda
N-415	Alternative Rules for Testing Pressure Relief Devices	1974 Edition	1983 Edition with the Winter 1984 Addenda
N-416	Alternative Rules for Hydrostatic Testing of Repair or Replacement of Class 2 Piping	1974 Edition	1986 Edition with the 1986 Addenda
N-419	Extent of VT-1 Examinations, Category B-G-1 of Table IWB-2500-1	1977 Edition with the Summer 1978 Addenda	1983 Edition with the Winter 1984 Addenda
N-426	Extent of VT-1 Examinations, Category B-G-2 of Table IWB-2500-1	1977 Edition with the Summer 1978 Addenda and the 1980 Edition with Addendas	1983 Edition with the Winter 1984 Addenda
N-427	Code Cases in Inspection Plans	1971 Edition	1986 Edition
N-429	Alternate Rules for Ultrasonic Instrument Calibration	1980 Edition with the Winter 1980 Addenda	1983 Edition with the Winter 1983 Addenda
N-429-1	Alternative Rules for Ultrasonic Instrument Calibration	1980 Edition with the Winter 1980 Addenda	1986 Edition
N-432	Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temperbead Technique	1971 Edition with the Summer 1973 Addenda	1986 Edition with the 1986 Addenda
N-435	Alternative Examination Requirements for Vessels With Wall Thickness 2 in. or Less	1974 Edition with the Summer 1975 Addenda	1986 Edition with the 1986 Addenda

Code Case No.	Title	Applicability	
		From	Up To and Including
N-436	Alternative Methods for Evaluation of Flaws in Austenitic Piping	1983 Edition	1986 Edition
N-436-1	Alternative Methods for Evaluation of Flaws in Austenitic Piping	1983 Edition	1986 Edition
N-437	Use of Digital Readout and Digital Measurement Devices for Performing Pressure Tests	1974 Edition	1986 Edition
N-444	Preparation of Inspection Plans	1974 Edition with the Summer 1975 Addenda	1986 Edition with the 1986 Addenda
N-445	Use of Later Edition of SNT-TC-1A for Qualification of Nondestructive Examination Personnel	1977 Edition with the Summer 1978 Addenda	1986 Edition with the 1986 Addenda
N-446	Recertification of Visual Examination Personnel	1977 Edition with the Summer 1978 Addenda	1986 Edition with the 1986 Addenda
N-448	Qualification of VT-2 and VT-3 Visual Examination Personnel	1977 Edition with the Summer 1978 Addenda	1986 Edition with the 1986 Addenda
N-449	Qualification of VT-4 Visual Examination Personnel	1977 Edition with the Summer 1978 Addenda	1983 Edition with the Summer 1984 Addenda
N-457	Qualification Specimen Notch Location for Ultrasonic Examination of Bolts and Studs	1983 Edition with the Winter 1983 Addenda	1986 Edition with the 1986 Addenda
N-460	Alternative Examination Coverage for Class 1 and Class 2 Welds	1974 Edition	1986 Edition with the 1987 Addenda
N-461	Alternative Rules for Piping Calibration Block Thickness	1974 Edition through the Summer 1975 Addenda	1986 Edition with the 1987 Addenda
N-465	Alternative Rules for Pump Testing	1974 Edition with the Winter 1975 Addenda	1986 Edition with the 1987 Addenda
N-472	Use of Digital Readout and Digital Measurement Devices for Performing Pump Vibration Testing	1974 Edition	1986 Edition with the 1987 Addenda
N-473	Alternate Rules for Valve Testing	1974 Edition through the Summer 1975 Addenda	1986 Edition with the 1987 Addenda

NOTES:
(1) Applies to the 1974 Edition of Section V.
(2) Applies to the 1974 Edition with the Winter 1976 Addenda of Section V.
(3) Applies to the 1980 Edition of Section V.

Approval Date: July 13, 1981

See Numeric Index for expiration and any reaffirmation dates.

Case N-4-11
Special Type 403 Modified Forgings or Bars
Section III, Division 1, Class 1 and CS

Inquiry: May Special Type 403 Modified forgings or bars be used in the construction of Class 1 and CS components in accordance with Section III, Division 1, and what special requirements apply to this material?

Reply: It is the opinion of the Committee that Special Type 403, Modified, forgings or bars may be used for Section III Class 1 and CS components, and the following specified special requirements apply in addition to the applicable requirements specified in Section III.

Steel forgings or bars (AISI Type 403 Modified) conforming to the following chemical analysis, having specified minimum mechanical properties shown below, and complying with the specified additional requirements may be used in the construction.

(1) *Chemistry*

(AISI Type 403 Modified)

	Percent
Carbon	0.06 to 0.13
Manganese	0.25 to 0.80
Phosphorus, max.	0.03
Sulfur, max.	0.03
Chromium	11.50 to 13.00
Nickel	0.50
Silicon, max.	0.50

(2) Mechanical properties in the annealed condition as received shall conform to the following requirements:

Tensile strength, psi, min.	70,000
Yield strength, psi, min.	40,000
Elongation in 2 in., percent, min.	22.0
Reduction of area, percent, min.	50.0

(3) Mechanical properties, after an austenitizing heat treatment, followed by air cooling or quenching in liquid media, salt bath, or oil and air cooled to room temperature, and then tempered at 1125 F minimum for four hours, shall conform to the following requirements:

Tensile strength, psi, min.	110,000
Yield strength, psi, min.	90,000
Elongation in 2 in., percent, min.	16.0
Reduction in area, percent, min.	50.0
Hardness	Brinell 226 to 277 or equivalent

Toughness requirements shall be per NB-2300 for Class 1, and NG-2300 for Class CS, except that the drop-weight tests are not required. The acceptance standards of NB-2332 or NG-2331 and NG-2332 shall apply.

(4) The material shall conform to all other requirements of SA-182 Grade F6 for forgings, and ASTM A276-73 for bars.

(5) The maximum operating temperature shall not exceed 700 F.

(6) Design stress intensity and yield strength values as shown in Table 1 for the heat-treated condition may be used when the material has enhanced properties due to the special heat treatment described in (3), above.

(7) Where the method of fabrication requires welding after heat treatment, it shall be done by applying austenitic stainless steel or nickel alloy weld deposits prior to heat treatment and only on regions designed to the allowable stresses in Table 1 for annealed properties. The minimum thickness of this weld shall be 3/16 in., and the maximum ½ in. Such weld deposits shall be liquid penetrant examined. Attachments to these weld deposits may be made by austenitic stainless or nickel alloy welds subsequent to heat treatment, and the thickness shall not exceed that of the previously deposited weld. No welding on the ferritic base metal is permitted after heat treatment, and no welding is permitted at any time in the regions designed to allowable stresses higher than those given in Table 1 for annealed properties. All welding shall meet the requirements of Section IX except that the tests shall be made after final heat treatment of the specimen, and longitudinal bend test specimen of QW-160, Section IX, may be used.

(8) For Class 1, machined transitions between adjoining heavy and thin-walled sections shall consist of a taper of at least 3 to 1, with a radius at each end of at least twice the thickness of the thin wall. It is not the intent of this paragraph to eliminate integral flanges or other