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REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 1.147

INSERVICE INSPECTION CODE CASE ACCEPTABILITY ASME SECTION XI DIVISION 1

A. INTRODUCTION

Section 50.55a, "Codes and Standards," of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires, in part, that each operating license for a boiling or pressurized water-cooled nuclear power facility and each construction permit for a utilization facility be subject to the conditions in paragraph (g), "Inservice Inspection Requirements," of § 50.55a. Paragraph (g) requires, in part, that Classes 1, 2, and 3 components and their supports meet the requirements of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components,"[1] of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code or equivalent quality standards. Paragraph 50.55a(b), in part, references the latest editions and addenda in effect of Section XI of the Code and any supplementary requirements to that section of the Code. Footnote 6 to § 50.55a states that the use of specific Code Cases may be authorized by the Commission upon request pursuant to paragraph 50.55a(a)(2)(ii), which requires that proposed alternatives to the described requirements or portions thereof provide an acceptable level of quality and safety.

General Design Criterion 1, "Quality Standards and Records," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, in part, that structures, systems, and components important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be performed. Where generally recognized codes and standards are used, Criterion 1 requires that they be identified and evaluated to determine their applicability, adequacy, and sufficiency and be supplemented or modified as necessary to ensure a quality product in keeping with the required safety function.

This regulatory guide lists those Section XI ASME Code Cases that are generally acceptable to the NRC staff for implementation in the inservice inspection of light-water-cooled nuclear power plants.

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Part 50, which provides the regulatory basis for this guide. The information collection requirements in 10 CFR Part 50 have been cleared under OMB Clearance No. 3150-0011.

B. DISCUSSION

The ASME Boiler and Pressure Vessel Committee publishes a document entitled "Code Cases."[1] Generally, the individual Code Cases that make up this document explain the intent of Code rules or provide for alternative requirements under special circumstances.

Most Code Cases are eventually superseded by revision of the Code and then are annulled by action of the ASME. In such instances, the intent of the annulled Code Case becomes part of the revised Code, and therefore continued use of the Code Case intent is sanctioned under the rules of the Code. In

[1]Copies may be obtained from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.

USNRC REGULATORY GUIDES

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This guide was issued after consideration of comments received from the public. Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience.

Written comments may be submitted to the Regulatory Publications Branch, DFIPS, ADM, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

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other instances, the Code Case is annulled because it is no longer acceptable or there is no further requirement for it. A Code Case that was approved for a particular situation and not for a generic application should be used only for the approved situation because annulment of such a Code Case could result in situations that would not meet Code requirements. The ASME considers the use of Code Cases to be optional for the user and not a mandatory requirement.

The Code Cases listed in this guide are limited to those cases applicable to Section XI of the Code.

All published Code Cases that are applicable to Section XI of the Code and were in effect on * March 8, 1989, were reviewed for inclusion in this guide. Code Cases that are not listed herein are either not endorsed or will require supplementary provisions on an individual plant basis to attain endorsement status.

The endorsement of a Code Case by this guide constitutes acceptance of its technical position for applications not precluded by regulatory or other requirements or by the recommendations in this or other regulatory guides. Contingent endorsement if applicable is indicated in regulatory position 1 for specific cases. However, it is the responsibility of the user to make certain that no regulatory requirements are violated and that there are no conflicts with other recommended limitations resulting from Code Case usage.

Acceptance or endorsement by the NRC staff applies only to those Code Cases or Code Case revisions with the date of ASME approval as shown in the regulatory position of this guide. Earlier or later revisions of a Code Case are not endorsed by this guide. New Code Cases will require evaluation by the NRC staff to determine if they qualify for inclusion in the approved list. Because of the continuing change in the status of Code Cases, it is planned that this guide will require periodic updating to accommodate new Code Cases and any revision of existing Code Cases.

C. REGULATORY POSITION

1. The Section XI ASME Code Cases[2] listed below (by number, date of ASME approval,[3] and title) are acceptable to the NRC staff for application in the inservice inspection of components and their supports for water-cooled nuclear power plants. Their use is acceptable within the limitations stated in the "Inquiry" and "Reply" sections of each individual Code Case, within the limitations of such NRC or other requirements as may exist, and within the additional limitations recommended by the NRC staff and given with the individual Code Case in the list.

1705-1	3-1-76	Ultrasonic Examination—
N-98	11-20-78	Calibration Block Tolerances,
	1-21-82	Section XI
	12-5-84	
	12-5-87	
N-113-1	12-13-82	Basic Calibration Block for
	2-14-85	Ultrasonic Examination of
	2-14-88	Welds 10 in. to 14 in. Thick, Section XI, Division 1
1738	12-22-75	Examination — Acceptance
N-118	11-20-78	Standards for Surface Indica-
	1-21-82	tions in Cladding, Section XI
	1-21-85	
	1-21-88	

Code Case 1738 (N-118) is acceptable subject to the following condition in addition to those conditions specified in the Code Case. The last sentence of the "Reply" should be replaced with the following: The provisions of this Code Case may not be applied for the examination of clad surfaces of nozzles, including the inner surface of the nozzle-to-vessel insert welds.

N-211[4]	7-13-81	Recalibration of Ultrasonic
	7-13-84	Equipment Upon Change of
	5-7-87	Personnel, Section XI, Division 1
N-216	3-10-78	Alternative Rules for Reactor
	7-13-81	Vessel Closure Stud Examina-
	7-13-84	tion, Section XI, Division 1
	5-7-87	
N-234	1-8-79	Time Between Ultrasonic
	1-21-82	Calibration Checks, Section
	12-5-84	XI, Division 1
	12-5-87	
N-235	1-8-79	Ultrasonic Calibration Checks
	4-2-82	per Section V, Section XI, Di-
	2-14-85	vision 1
	2-14-88	
N-236-1	9-5-85	Repair and Replacement of
	9-5-88	Class MC Vessels, Section XI, Division 1

Code Case N-236-1 is acceptable subject to the following conditions in addition to those conditions specified in the Code Case:

*Lines indicate substantive changes from Revision 7.

[2]A numerical listing of the Code Cases appears in the appendix.

[3]When more than one date is given, the earlier date is that on which the Code Case was approved by the ASME, and the later date (or dates) is that on which the Code Case was reaffirmed by the ASME.

[4]The Code Case was annulled on 3-20-81 (ASME mandatory annulment date). It was reinstated on 7-13-81. Because there was no change in the Code Case, the NRC considers that the Case was in effect during the period 3-20-81 through 7-13-81.

a. In paragraph 1.0(a), second sentence—the phrase, "while the plant is not in service," refers to a refueling outage.

b. In paragraph 1.0(a), third sentence—the phrase, "the next scheduled plant outage," refers to the next scheduled refueling outage.

For clarification, Repair and Replacement of Class MC Vessels means Repair and Replacement of Class MC Vessels and Components (systems). Acceptance of this Code Case in no way infers NRC approval to violate the technical specification or any NRC requirements with regard to breach of containment during repair and replacement procedures while the plant is in operation.

Where a numbered Code paragraph is not identified by a particular edition of the Code, the Code in effect at the time of the ASME meeting (11-3-78) that approved the Code Case should be governing.

N-278	3-17-80 3-17-83[5] 5-25-83[5] 2-19-86 2-19-89	Alternative Ultrasonic Calibration Block Configuration I-3131 and T-434.3, Section XI, Division 1

Code Case N-278 is acceptable subject to the following conditions in addition to those conditions specified in the Code Case: When a universal calibration block is used and some or all of the reference holes are larger than the reflector holes at comparable depths recommended by Article IV, Section V, 1980 edition of the ASME Code, a correction factor should be used to adjust the DAC level to compensate for the larger reflector holes. Also, if the reactor pressure vessel was previously examined by using a conventional block, a ratio between the DAC curves obtained from the two blocks should be noted (for reference) with the significant indication data.

N-306	1-15-81 4-5-84 5-7-87	Calibration Block Material Selection, Appendix 1, 1-3121, Section XI, Division 1
N-307-1	12-5-84 12-5-87	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, Section XI, Division 1
N-308	9-30-81 9-30-84 9-30-87	Documentation of Repairs and Replacements of Components in Nuclear Power Plants, Section XI, Division 1
N-311	5-11-81 4-5-84 5-7-87	Alternative Examination of Outlet Nozzle on Secondary Side of Steam Generators, Section XI, Division 1

Code Case N-311 is acceptable subject to the following condition in addition to those conditions specified in the Code Case: The applicant should indicate in the Safety Analysis Report that the stress analysis of the nozzle inside-corner region meets the Code Case stipulations for the state of stress in this region.

N-335-1	6-20-85 6-20-88	Rules for Ultrasonic Examination of Similar and Dissimilar Metal Piping Welds, Section XI, Division 1
N-343	4-2-82 2-14-85 2-14-88	Alternative Scope of Examination of Attachment Welds for Examination Categories B-H, B-K-1, and C-C, Section XI, Division 1
N-355	7-16-82 2-14-85 2-14-88	Calibration Block for Angle Beam Ultrasonic Examination of Large Fittings in Accordance with Appendix III-3410, Section XI, Division 1
N-356	7-1-88[6] 10-23-88	Certification Period for Level III NDE Personnel, Section XI, Division 1, 2 and 3
N-375-2	4-5-84 5-7-87	Rules for Ultrasonic Examination of Bolts and Studs, Section XI, Division 1
N-389	7-25-83 5-14-86 5-14-89	Alternative Rules for Repairs, Replacements, or Modifications, Section XI, Division 1

Code Case N-389 is acceptable subject to the following condition in addition to those conditions specified in the Code Case: The applicant should submit for approval the appropriate edition and addenda of the Code that is to be used for the repair, replacement, or modification before start of the work.

[5]Code Case N-278 was inadvertently allowed to expire because of an ASME administrative error on 3-17-83, its mandatory annulment date. The Code Case without any technical changes was reinstated on 5-25-83. Because of these circumstances, the Code Case is considered to be in effect during that period of time.

[6]July 1, 1988, is the date that the conditions of the Code Case were acceptable to the NRC.

N-401-1	5-4-88	Eddy Current Examination, Section XI, Division 1
N-402	2-20-84 2-23-87	Eddy Current Calibration Standard Material, Section XI, Division 1
N-406	4-5-84 5-7-87	Alternative Rules for Replacement, Section XI, Division 1
N-408-1	3-8-89	Alternative Rules for Examination of Class 2 Piping, Section XI, Division 1

Code Case N-408-1 is acceptable subject to the following condition in addition to those conditions specified in the Code Case: The applicant for an operating license should define the Class 2 piping subject to volumetric and surface examination in the Preservice Inspection for determination of acceptability by the NRC staff.

N-409-2	7-27-88	Procedure and Personnel Qualification Requirements for Ultrasonic Detection and Sizing of Flaws in Piping Welds, Section XI, Division 1

Code Case N-409-2 is acceptable subject to the following condition in addition to those conditions specified in the Code Case: The applicant should give prior notification to the NRC of the intention to use the Code Case.

N-415	9-5-85 9-5-88	Alternative Rules for Testing Pressure Relief Devices, Section XI, Division 1
N-416	12-5-85 12-5-87	Alternative Rules for Hydrostatic Testing of Repair or Replacement of Class 2 Piping, Section XI, Division 1
N-419	7-18-85 7-18-88	Extent of VT-1 Examinations, Category B-G-1 of Table IWB-2500-1, Section XI, Division 1
N-426	7-18-85 7-18-88	Extent of VT-1 Examinations, Category B-G-2 of Table IWB-2500-1, Section XI, Division 1
N-427	12-5-85 12-5-88	Code Cases in Inspection Plans, Section XI, Division 1

Code Case N-427 is acceptable subject to the following condition in addition to those conditions specified in the Code Case. The sentence under (b)(1) should be replaced with the following: Code Cases that were superseded with revised Code Cases and had been approved for use in accordance with (a) may continue to be used.

N-429-1	2-23-87	Alternative Rules for Ultrasonic Instrument Calibration, Section XI, Division 1
N-432	2-20-86 2-20-89	Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temperbead Technique, Section XI, Division 1
N-435-1	7-30-86 7-30-89	Alternative Examination Requirements for Vessels with Wall Thickness 2 in. or less, Section XI, Division 1
N-436-1	12-7-87	Alternative Methods for Evaluation of Flaws in Austenitic Piping, Section XI, Division 1
N-437	7-30-86 7-30-89	Use of Digital Readout and Digital Measurement Devices for Performing Pressure Tests, Section XI, Division 1
N-444[7]	12-7-87	Preparation of Inspection Plans, Section XI, Division 1
N-445	5-7-87	Use of Later Editions of SNT-TC-1A for Qualification of Nondestructive Examination Personnel, Section XI, Division 1, 2, and 3
N-446	5-7-87	Recertification of Visual Examination Personnel, Section XI, Division 1
N-448	7-27-87	Qualification of VT-2 and VT-3 Visual Examination Personnel, Section XI, Division 1
N-449	7-27-87	Qualification of VT-4 Visual Examination Personnel, Section XI, Division 1
N-457	12-7-87	Qualification Specimen Notch Location for Ultrasonic Examination of Bolts and Studs, Section XI, Division 1
N-460	7-27-88	Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1
N-461	11-30-88	Alternative Rules for Piping Calibration Block Thickness, Section XI, Division 1

Code Case N-461 is acceptable subject to the following condition in addition to those conditions specified in the Code Case: Thickness measurements and weld joint contour of the

[7]Valve stroke times may be documented outside of the IST program. However, if included within the IST program and it becomes necessary to revise the maximum stroke time required by "Supplement 4—Content of IWV Valve Test Tables," it is not necessary to submit a revised IST program to the NRC solely to document a revision in valve stroke time.

pipe/component must be known and used by the inspector who conducts the UT examination.

N-463	11-30-88	Evaluation Procedures and Acceptance Criteria for Flaws in Class 1 Ferritic Piping That Exceed the Acceptance Standards of IWB-3514.2, Section XI, Division 1
N-465	11-30-88	Alternative Rules for Pump Testing, Section XI, Division 1
N-472	3-8-89	Use of Digital Readout and Digital Measurement Devices for Performing Pump Vibration Testing, Section XI, Division 1

2. Code Cases that were endorsed by the NRC in a prior version of this guide and were later annulled by action of the ASME should be considered as deleted from the list of acceptable Code Cases as of the date of the ASME action that approved the annulment. Such Code Cases that were annulled on or after November 1, 1978, are listed below by number, effective dates,[8] and title.

1551	11-6-72	Inservice Inspection of Welds
N-34	11-20-78	on Nuclear Components, Sec-
	11-20-81	tion XI
1646	8-12-74	Partial Postponement of Cate-
N-72	11-20-78	gory B-C Examination for
	1-1-81	Class 1 Components, Section XI
1647	8-12-74	Partial Postponement of Cate-
N-73	11-20-78	gory B-D Examination for
	1-1-81	Class 1 Components, Section XI
1730	11-3-75	Acceptance Standards for
N-112	7-1-79	Class 2 and 3 Components, Section XI, Division 1
1804	1-14-77	Minimum Section Thickness
N-167	1-14-80	Requirements for Repair of Nozzles, Section XI, Division 1
N-210	3-20-78	Exemption to Hydrostatic
	3-20-81	Tests After Repairs, Section XI, Division 1

Code Case N-210 was acceptable subject to the following condition in addition to those conditions specified in the Code Case. Paragraph (3) of the "Reply" should be replaced with the following: Repairs to piping, pumps, and valves where the depth of the repaired cavity does not exceed 25 percent of the wall thickness.

N-211	3-20-78	Recalibration of Ultrasonic
	3-20-81	Equipment Upon Change of Personnel, Section XI, Division 1
N-252	11-19-79	Low Energy Capacitive Dis-
	7-16-82	charge Welding Method for Temporary or Permanent Attachments to Components and Supports, Section III, Division 1, and XI

Code Case N-252 was acceptable subject to the following condition in addition to those conditions specified in the Code Case: The applicant should indicate in the Safety Analysis Report the application, the material, and the thickness of the material to which the strain gage or thermocouple will be attached by CD welding.

N-288	8-25-80	Hydrostatic Test Require-
	5-25-83	ments for Class 1 and Class 2 Components, Section XI, Division 1
N-424	7-18-85	Qualification of Visual Exami-
	7-18-88	nation Personnel, Section XI, Division 1

3. Code Cases that were endorsed by the NRC in a prior version of this guide and were superseded by revised Code Cases on or after November 1, 1978, should be considered as not endorsed as of the date of the ASME action that approved the revised version of the Code Cases. These Code Cases that are no longer endorsed are listed in the following by number, effective dates,[9] and title.

1731	11-3-75	Basic Calibration Block for
N-113	11-20-78	Ultrasonic Examination of
	1-21-82	Welds 10 in. to 13 in. Thick,
	12-13-82	Section XI, Division 1
N-236	1-8-79	Repair and Replacement of
	1-21-82	Class MC Vessels, Section XI,
	12-5-84	Division 1
	9-5-85	

Code Case N-236 was acceptable subject to the following conditions in addition to those conditions specified in the Code Case:

a. In paragraph 1.0(a), second sentence--the phrase, "while the plant is not in service," refers to a refueling outage.

b. In paragraph 1.0(a), third sentence--the phrase, "the next scheduled plant outage," refers to the next scheduled refueling outage.

[8]Earlier date—date Code Case was approved by ASME; later date—date Code Case was annulled. Where more than two dates appear, the last date is the date that the Code Case was annulled. The middle date (or dates) was the date of reaffirmation of the Code Case.

[9]Earlier date—date Code Case was approved by ASME; later date—date revision of Code Case was approved by ASME. Where more than two dates appear, the last date is the date on which the Code Case was revised. The middle date (or dates) was the date of reaffirmation of the Code Case.

For clarification, Repair and Replacement of Class MC Vessels means Repair and Replacement of Class MC Vessels and Components (systems). Acceptance of this Code Case in no way infers NRC approval to violate the technical specification or any NRC requirements with regard to breach of containment during repair and replacement procedures while the plant is in operation.

Where a numbered Code paragraph is not identified by a particular edition of the Code, the Code in effect at the time of the ASME meeting (11-3-78) that approved the Code Case should be governing.

N-307	1-15-81 4-5-84 12-5-84	Revised Ultrasonic Examination Volume for Class 1 Bolting, Examination Category B-G-1, When the Examinations Are Conducted from the Center-Drilled Hole, Section XI, Division 1
N-335	4-2-82 2-14-85 6-20-85	Rules for Ultrasonic Examination of Similar and Dissimilar Metal Piping Welds, Section XI, Division 1
N-375[10]	2-14-83 4-14-83	Rules for Ultrasonic Examination of Bolts and Studs, Section XI, Division 1
N-375-1	4-14-83 4-5-84	Rules for Ultrasonic Examination of Bolts and Studs, Section XI, Division 1
N-401	2-20-84 2-23-87 5-4-88	Eddy Current Examination, Section XI, Division 1
N-408	7-12-84 5-7-87 3-8-89	Alternative Rules for Examination of Class 2 Piping, Section XI, Division 1
N-409	12-5-84 12-7-87	Procedure and Personnel Qualification for Ultrasonic Detection and Sizing of Intergranular Stress Corrosion Cracking in Austenitic Piping Welds, Section XI, Division 1
N-409-1	12-7-87 7-27-88	Procedure and Personnel Qualification Requirements for Ultrasonic Detection and Sizing of Flaws in Piping Welds, Section XI, Division 1

Code Case N-409-1 was acceptable subject to the following condition in addition to those conditions specified in the Code Case: The applicant should give prior notification to the NRC of the intention to use the Code Case.

N-429	12-5-85 2-23-87	Alternative Rules for Ultrasonic Instrument Calibration, Section XI, Division 1
N-435	5-14-86 7-30-86	Alternative Examination Requirements for Vessels with Wall Thickness 2 in. or Less, Section XI, Division 1
N-436	5-14-86 12-7-87	Alternative Methods for Evaluation of Flaws in Austenitic Piping, Section XI, Division 1

4. Code Cases that are not on the approved list of this guide (paragraph C.1) or other regulatory guides, or for which authorization by the Commission has not been granted, are not acceptable on a generic basis.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants regarding the use of this regulatory guide.

1. Except for those Code Cases that have been annulled by action of the ASME, the NRC staff has found the Code Cases listed in this regulatory guide under regulatory position C.1 acceptable for appropriate use. Other Code Cases may be considered for use in accordance with footnote 6 of the Codes and Standards rule, § 50.55a of 10 CFR Part 50.

2. Code Cases to be applied during an inspection interval or Code Cases for a preservice inspection need not be changed because a subsequent revision of the Code Case is listed as the approved version in this guide.

3. Code Cases to be applied during an inspection interval or Code Cases for a preservice inspection that were previously approved for use need not be changed because the Code Case has been subsequently annulled.

4. Code Cases on the approved list may be applied to procedures for an inspection interval and procedures for the inservice inspection that were established prior to the effective date of the Code Case within the limits specified in the Code Case and applicable regulations or recommended in other regulatory guides.

[10]Code Case N-375 was not listed prior to Revision 3 of this regulatory guide.

APPENDIX

NUMERICAL LISTING OF CODE CASES

N-98 (1705-1)
N-113-1
N-118 (1738)
N-211
N-216
N-234
N-235
N-236-1
N-278
N-306
N-307-1
N-308
N-311
N-335-1
N-343
N-355
N-356
N-375-2
N-389
N-401-1
N-402
N-406
N-408-1
N-409-2
N-415
N-416
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N-427
N-429-1
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N-435-1
N-436-1
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