

Note to Editor: Need to list all Tables (Table IWB-2500-1 (B-A) through Table IWB-2500-1 (B-Q)) along with titles individually.

IWB-2500-14	Welded Attachment	107
IWB-2500-15	Welded Attachment	108
IWB-2500-18	Control Rod Drive and Instrument Nozzle Housing Welds	109
IWB-2500-20	Extent of Weld Examination	110
IWB-3610-1	Characterization and Proximity Rules for Analytical Evaluation of Clad Components	126
IWB-3662-1	Definition of Circumferential Orientation for Flaw Characterization	128
IWC-2500-1	Vessel Circumferential Welds	142
IWC-2500-2	Typical Tubesheet-to-Shell Circumferential Welds	143
IWC-2500-3	Nozzle-to-Vessel Welds	144
IWC-2500-4	Nozzle-to-Vessel Welds	145
IWC-2500-5	Welded Attachments	148
IWC-2500-6	Pressure Retaining Bolting	149
IWC-2500-7	Welds in Piping	150
IWC-2500-9	Branch Connection Welds	151
IWC-2500-10	Pipe Branch Connection	152
IWC-2500-11	Pipe Branch Connection	153
IWC-2500-12	Pipe Branch Connection	154
IWC-2500-13	Pipe Branch Connection	155
IWD-2500-1	Welded Attachments	172
IWE-2500-1	Examination Areas for Moisture Barriers	184
IWF-1300-1	Illustrations of Typical Support Examination Boundaries	190

Tables

IWA-1600-1	Referenced Standards and Specifications	3
IWA-2211-1	Visual Examinations	5
IWA-2322-1	Near-Distance Acuity Test Distances and Character Heights	9
IWA-4461.1-1	Minimum Preheat Temperature, °F (°C)	35
IWA-4662.1-1	Depth Limitations for Underwater Welding Qualification	53
IWA-4662.1-2	Procedure and Performance Qualification – Position Limitations	53
IWA-5210-1	Reference Paragraphs for System Pressure Tests and Visual Examinations (VT-2) Requirements	64
✓ IWB-2411-1	Inspection Program	75
IWB-2500-1	Examination Categories	78
IWB-3410-1	Acceptance Standards	114
IWB-3510-1	Allowable Planar Flaws	115
IWB-3510-2	Allowable Laminar Flaws	115
IWB-3510-3	Allowable Linear Flaws	116
IWB-3512-1	Allowable Planar Flaws	116
IWB-3512-2	Component Thickness Vs Flaw Location	117
IWB-3514-1	Allowable Planar Flaws	118
IWB-3514-2	Allowable Linear Flaws	119
IWB-3514-3	Allowable Laminar Flaws	119
IWB-3514-4	Allowable Linear Flaws	120
IWB-3515-1	Allowable Planar Flaws	121
IWB-3519.2-1	Allowable Planar Flaws	122
IWB-3519.2-2	Allowable Planar Flaws	123
IWB-3663-1	Reactor Vessel Head Penetration Nozzle Acceptance Criteria	129
IWB-5230-1	Test Pressure	130
IWC-2411-1	Inspection Program	133
IWC-2500-1	Examination Categories	136
IWC-3410-1	Acceptance Standards	158
IWC-3510-1	Allowable Planar Flaws	159
IWC-3510-2	Allowable Laminar Flaws	159
IWC-3510-3	Allowable Linear Flaws	159
IWC-3511-1	Allowable Planar Flaws	160
IWC-3511-2	Allowable Linear Flaws	160

Note to Editor: Need to list all Tables (Table IWC-2500-1 (C-A) through Table IWC-2500-1 (C-H)) along with titles individually.

Note to Editor: Need to list both Tables (Table IWD-2500-1 (D-A) and Table IWD-2500-1 (D-B)) along with titles individually.

IWC-3513-1	Allowable Planar Flaws	161
IWC-3514-1	Allowable Planar Flaws	163
IWD-2411-1	Inspection Program	168
IWD-2500-1	Examination Categories	171
IWE-2411-1	Inspection Program	180
IWE-2500-1	Examination Categories	182
IWF-2410-1	Inspection Program	192
IWF-2500-1	Examination Categories	194
IWL-2500-1	Examination Categories Examination Category L-A, Concrete	202
IWL-2521-1	Number of Tendons for Examination	204
IWL-2521-2	Augmented Examination Requirements Following Post-Tensioning System Repair/Replacement Activities	204
IWL-2525-1	Corrosion Protection Medium Analysis	206
Forms		
NIS-1	Owner's Report for Inservice Inspections	222
NIS-2	Owner's Report for Repair/Replacement Activity	225
RRA-1	Report of Contracted Repair/Replacement Activity	484

Notes to Editor:

- Need to list all Tables (Table IWE-2500-1 (E-A), Table IWE-2500-1 (E-C) and Table IWE-2500-1 (E-G)) along with titles individually.

- Table IWF-2500-1 will become Table IWF-2500-1 (F-A) and change title.

- Table IWL-2500-1 will become Table IWL-2500-1 (L-A) and Table IWL-2500-1 (L-B) along with title changes.

IWB-2500-1 (B-A) through IWB-2500-1 (B-Q), IWC-2500-1 (C-A) through IWC-2500-1 (C-H), IWD-2500-1 (D-A) through IWD-2500-1 (D-B), IWE-2500-1 (E-A) through IWE-2500-1 (E-G), IWF-2500-1 (F-A), and IWL-2500-1 (L-A) through IWL-2500-1 (L-B).

specified in Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWE-2500-1, IWF-2500-1, and IWL-2500-1. If a component must be examined in a high radiation area, remotely controlled equipment may be advisable.

(b) When preparation of a surface for nondestructive examination is required, the preparation shall be by a mechanical method. Such surfaces shall be blended into the surrounding area as may be required to perform the examination. The wall thickness shall not be reduced below the minimum thickness required by design. Nonmandatory Appendix D may be used for such surface preparation.

(c) All nondestructive examinations of the required examination surface or volume shall be conducted to the maximum extent practical. When performing VT-1, surface, radiographic, or ultrasonic examination on a component with defined surface or volume, essentially 100% of the required surface or volume shall be examined. Essentially 100% coverage is achieved when the applicable examination coverage is greater than 90%; however, in no case shall the examination be terminated when greater than 90% coverage is achieved, if additional coverage of the required examination surface or volume is practical. Nonmandatory Appendix S provides guidance that may be used for evaluating examination coverage.

IWA-2210 VISUAL EXAMINATION

Visual examination shall be conducted in accordance with the written procedure requirements of Section V, Article 9, T-921 and T-941, and the examination report requirements of T-990.

IWA-2211 VT-1 Examination

(a) VT-1 examination is conducted to detect discontinuities and imperfections on the surface of components, including such conditions as cracks, wear, corrosion, or erosion.

(b) The VT-1 examination procedure shall be demonstrated capable of resolving characters in accordance with Table IWA-2211-1.

(c) Direct visual examination distance requirements shall be as specified in Table IWA-2211-1.

(d) Illumination for examinations shall meet the requirements specified in Table IWA-2211-1.

(e) It is not necessary to measure illumination levels on each examination surface when the same portable nonbattery-powered light source (e.g., drop light) or similar installed lighting equipment is demonstrated to provide the illumination specified at the maximum examination distance.

(f) When battery powered lights are used, the adequacy of illumination levels shall be checked before and after each examination or series of examinations, not to exceed 4 hr between checks.

(g) Remote visual examination may be substituted for direct examination. The remote examination procedure shall be demonstrated capable of resolving characters as specified in Table IWA-2211-1. Additionally, the remote examination system shall have the capability of distinguishing and differentiating between the colors applicable to the component examination being conducted.

IWA-2212 VT-2 Examination

(a) VT-2 examination is conducted to detect evidence of leakage from pressure retaining components, as required during the conduct of system pressure test.

(b) VT-2 examination shall be conducted in accordance with IWA-5000.

IWA-2213 VT-3 Examination

(a) VT-3 examination is conducted to determine the general mechanical and structural condition of components and their supports by verifying parameters such as clearances, settings, and physical displacements; and to detect discontinuities and imperfections, such as loss of

**Table IWA-2211-1
Visual Examinations**

Visual Examination	Minimum Illumination, fc (lux) [Note (1)]	Maximum Direct Examination Distance, ft (mm)	Maximum Height for Procedure Demonstration Characters, in. (mm) [Note (2)]
VT-1	50 (550)	2 (600)	0.044 (1.1)
VT-3	50 (550)	n/a	0.105 (2.7)

NOTES:

- (1) Resolution of the specified characters can be used in lieu of illumination measurement to verify illumination adequacy.
- (2) For procedure demonstration, a test chart or card containing text with some lowercase characters, without an ascender or descender (e.g., a, c, e, o), that meet the specified height requirements is required. Measurements of the test chart or card shall be made once before its initial use with an optical comparator (10X or greater) or other suitable instrument to verify that the height of the lowercase characters without an ascender or descender meets the specified requirements.

in Tables IWB-2500-1 (B-P), IWC-2500-1 (C-H), and IWD-2500-1 (D-B).

ARTICLE IWA-5000 SYSTEM PRESSURE TESTS

IWA-5100 GENERAL

IWA-5110 PERIODIC SYSTEM PRESSURE TESTS

(a) System pressure tests shall be conducted in accordance with the Examination Categories identified in Table IWB-2500-1, Category B-P; Table IWC-2500-1, Category C-H; and Table IWD-2500-1, Category D-B.

(b) The pressure testing requirements for Class MC and CC components are identified in Articles IWE and IWL, respectively.

(c) Piping that penetrates a containment vessel is exempt from the periodic system pressure test when the piping and isolation valves perform a containment function and the balance of the piping system is outside the scope of this Division.

IWA-5200 SYSTEM TEST REQUIREMENT

IWA-5210 TEST

IWA-5211 Test Description

Pressure retaining components within each system boundary shall be subject to the following applicable system pressure tests referenced in Table IWA-5210-1 under which conditions a VT-2 visual examination is performed in accordance with IWA-5240 to detect leakage:

(a) a system leakage test conducted while the system is in operation, during a system operability test, or while the system is at test conditions using an external pressurization source;

(b) a system hydrostatic test conducted during a plant shutdown at an elevated test pressure as specified in IWB-5230, IWC-5230, or IWD-5230; and

(c) a system pneumatic test conducted in lieu of either of the above system pressure tests for Class 2 or Class 3 components as permitted by IWC-5000 or IWD-5000. The requirements for system leakage and hydrostatic tests are applicable to pneumatic tests.

IWA-5212 Pressure and Temperature

(a)

(a) System leakage tests and system hydrostatic tests shall be conducted at the pressure and temperature specified in IWB-5000, IWC-5000, and IWD-5000. The system hydrostatic test pressure shall not exceed the maximum allowable test pressure of any component within the system pressure test boundary.

(b) When conducting a system leakage test described in IWA-5211(a), system pressure shall be verified by normal system instrumentation, test instrumentation, or through performance of the system operating or surveillance procedure.

(c) The system test conditions shall be maintained during the course of the visual examination, except as provided in IWA-5245.

(d) When conducting system pressure tests described in IWA-5211(b) and IWA-5211(c), the requirements of IWA-5260 shall be met.

(e) When portions of a system are subject to system pressure tests associated with two different system functions, the visual examination need only be performed

Table IWA-5210-1
Reference Paragraphs for System Pressure Tests and Visual Examinations (VT-2) Requirements

System Pressure Tests	Test Temperature and Pressure	Tests for Repair/Replacement Activities	Visual Examinations VT-2	Inspector Duties	Corrective Actions
IWA-5211(a)	IWA-5212	IWA-4500	IWA-2212	IWA-2110	IWA-5250
IWA-5211(b)	IWA-5213		IWA-5240		
IWB-5210	IWB-5220 IWB-5240	IWA-4500	IWA-2212 IWA-5240	IWA-2110	IWA-5250
IWC-5210	IWC-5220 IWC-5240	IWA-4500	IWA-2212 IWA-5240	IWA-2110	IWA-5250
IWD-5210	IWD-5220 IWD-5240	IWA-4500	IWA-2212 IWA-5240	IWA-2110	IWA-5250

IWB-2500-1 (B-P),
IWC-2500-1 (C-H), or
IWD-2500-1 (D-B)

ASME 2011a SECTION XI

IWC-2500-1 (C-H)

during the test conducted at the higher of the test pressures of the respective system function, except as permitted in IWA-5222.

(f) A system hydrostatic test [IWA-5211(b)] and accompanying visual examination are acceptable in lieu of the system leakage test [IWA-5211(a)] and visual examination.

(g) The system test pressure and temperature may be obtained by using any means that comply with the plant Technical Specifications.

IWA-5213 Test Condition Holding Time

The holding time after pressurization to test conditions, before the visual examinations commence, shall be as follows.

(a) For the system leakage tests required by Tables IWB-2500-1, IWC-2500-1, or IWD-2500-1 the following shall be met.

(1) For Class 1 components IWB-2500-1, Examination Category B-P, no holding time is required after attaining test pressure.

(2) For Class 2 IWC-2500-1, Examination Category C-H and Class 3 IWD-2500-1, Examination Category D-B components not required to operate during normal plant operation, a 10 min holding time is required after attaining test pressure.

(3) For Class 2 IWC-2500-1, Examination Category C-H and Class 3 IWD-2500-1, Examination Category D-B components required to operate during normal plant operation, no holding time is required, provided the system has been in operation for at least 4 hr for insulated components or 10 min for noninsulated components.

(b) For system pressure tests required by IWA-4540, a 10 min holding time for noninsulated components, or 4 hr for insulated components, is required after attaining test pressure.

(c) For system pneumatic tests, a 10 min holding time is required after attaining test pressure.

IWA-5214 Preservice Test

A preservice system pressure test is not required by this Article, except following repair/replacement activities as required by IWA-4540.

IWA-5220 TEST PRESSURIZATION BOUNDARIES¹⁶

IWA-5221 System Leakage Test Boundary

The boundary subject to test pressurization during a system leakage test [IWA-5211(a)] includes the pressure retaining components to be tested in accordance with IWB-5222, IWC-5222, and IWD-5222.

IWA-5222 System Hydrostatic Test Boundary

(a) The boundary subject to test pressurization during a system hydrostatic test [IWA-5211(b)] shall be defined by the system boundary (or each portion of the boundary)

within which the components have the same minimum required classification and are designed to the same pressure rating as governed by the system function and the internal fluid operating conditions, respectively.

(b) Systems which share safety functions for different modes of plant operation, and within which the component classifications differ, shall be subject to separate system hydrostatic tests of each portion of the system boundary having the same minimum required design pressure ratings.

(c) Systems designed to operate at different pressures under several modes of plant operation or post-accident conditions shall be subject to a system hydrostatic test within the test boundary defined by the operating mode with the higher pressure.

(d) Where the respective system design pressure ratings on the suction and discharge sides of system pumps differ, the system hydrostatic test boundary shall be divided into two separate boundaries (such as suction side and discharge side test boundaries). In the case of positive displacement pumps, the boundary interface shall be considered as the pump. In the case of centrifugal pumps, the boundary interface shall be the first shutoff valve on the discharge side of the pump.

IWD-2500-1 (D-B)

IWA-5240 VISUAL EXAMINATION

IWA-5241 Insulated and Noninsulated Components

(a) The VT-2 visual examination shall be conducted by examining the accessible external exposed surfaces of pressure retaining components for evidence of leakage.

(b) For components whose external surfaces are inaccessible for direct VT-2 visual examination, only the examination of the surrounding area (including floor areas or equipment surfaces located underneath the components) for evidence of leakage shall be required.

(c) Components within rooms, vaults, etc., where access cannot be obtained, may be examined using remote visual equipment or installed leakage detection systems.

(d) Essentially vertical surfaces need only be examined at the lowest elevation where leakage may be detected.

(e) Discoloration or residue on surfaces shall be examined for evidence of boric acid accumulations from borated reactor coolant leakage.

(f) For insulated components in systems borated for the purpose of controlling reactivity, insulation shall be removed from pressure retaining bolted connections for VT-2 visual examination. Insulation removal and VT-2 visual examination of insulated bolted connections may be deferred until the system is depressurized. When corrosion-resistant bolting material with a chromium content of at least 10%, such as SA-564 Grade 630 H1100, SA-453 Grade 660, SB-637 Type 718, or SB-637 Type 750, is used, it is permissible to perform the VT-2 visual examination without insulation removal.

ARTICLE IWB-2000 EXAMINATION AND INSPECTION

Tables IWB-2500-1 (B-L-2) and IWB-2500-1 (B-M-2))

IWB-2200 PRESERVICE EXAMINATION

(a) Examinations required by this Article (with the exception of Examination Category B-P, and the visual VT-3 examination of the internal surfaces of Categories B-L-2 and B-M-2, of Table IWB-2500-1) shall be completed prior to initial plant startup. In addition, these preservice examinations shall be extended to include essentially 100% of the pressure retaining welds in all Class 1 components, except in those components exempted from examination by IWB-1220(a), IWB-1220(b), or IWB-1220(c). However, in the case of Examination Category B-O (Table IWB-2500-1), the examination shall be extended to include essentially 100% of the welds in the installed peripheral control rod drive housings only.

(b) Shop and field examinations may serve in lieu of the on-site preservice examinations provided:

(1) in the case of vessels only, the examination is performed after the hydrostatic test required by Section II has been completed;

(2) such examinations are conducted under conditions and with equipment and techniques equivalent to those that are expected to be employed for subsequent inservice examinations;

(3) the shop and field examination records are, or can be, documented and identified in a form consistent with those required in IWA-6000.

(c) Steam generator tube examination shall be governed by the plant Technical Specification.

(4) examinations deferred until disassembly of a component for maintenance, repair/replacement activity, or volumetric examination, as allowed by Examination Categories B-G-1, B-G-2, B-L-2, and B-M-2

(5) welded attachments examined as a result of component support deformation under Examination Category B-K

If there are less than three items or welds to be examined in an Examination Category, the items or welds may be examined in any two periods, or in any one period if there is only one item or weld, in lieu of the percentage requirements of Table IWB-2411-1.

(b) If items or welds are added to the Inspection Program, during the service lifetime of a plant, examination shall be scheduled as follows:

(1) When items or welds are added during the first period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item Number for the added items or welds shall be performed during each of the second and third periods of that interval. Alternatively, if deferral of the examinations is permitted for the Examination Category and Item Number, the second period examinations may be deferred to the third period and at least 50% of the examinations required by the applicable Examination Category and Item Number for the added items or welds shall be performed during the third period.

Table IWB-2500-1
(B-O)

IWB-2400 INSPECTION SCHEDULE

IWB-2410 INSPECTION PROGRAM

Inservice examinations and system pressure tests may be performed during plant outages such as refueling shutdowns or maintenance shutdowns.

IWB-2411 Inspection Program

(a) The required percentage of examinations in each Examination Category shall be completed in accordance with Table IWB-2411-1, with the following exceptions:

(1) Examination Categories B-N-1, B-P, and B-Q

(2) examinations partially deferred to the end of an inspection interval, as allowed by Examination Categories B-A, B-D, and B-F

(3) examinations deferred to the end of an inspection interval, as allowed by Examination Categories B-A, B-N-2, B-N-3, and B-O

**Table IWB-2411-1
Inspection Program**

Inspection Interval	Inspection Period, Calendar Years of Plant Service Within the Interval	Minimum Examinations Completed, %	Maximum Examinations Credited, %
All	3	16	50
	7	50[Note (1)]	75
	10	100	100

NOTE:

(1) If the first period completion percentage for any examination category exceeds 34%, at least 16% of the required examinations shall be performed in the second period.

(2) When items or welds are added during the second period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item Number for the added items or welds shall be performed during the third period of that interval.

(3) When items or welds are added during the third period of an interval, examinations shall be scheduled in accordance with (a) for successive intervals.

IWB-2413 Inspection Program for Steam Generator Tubing

The examinations shall be governed by the plant Technical Specification.

IWB-2420 SUCCESSIVE INSPECTIONS

(a) The sequence of component examinations which was established during the first inspection interval shall be repeated during each successive inspection interval, to the extent practical. The sequence of component examinations may be modified in a manner that optimizes scaffolding, radiological, insulation removal, or other considerations, provided that the percentage requirements of Table IWB-2411-1 are maintained.

(b) If a component is accepted for continued service in accordance with IWB-3132.3 or IWB-3142.4, the areas containing flaws or relevant conditions shall be reexamined during the next three inspection periods listed in the schedule of the Inspection Program of IWB-2400. Alternatively, acoustic emission may be used to monitor growth of existing flaws in accordance with IWA-2234.

(c) If the reexaminations required by (b) reveal that the flaws or relevant conditions remain essentially unchanged, or that the flaw growth is within the growth predicted by the analytical evaluation, for three successive inspection periods, then the component examination schedule may revert to the original schedule of successive inspections or the inspection interval defined by the analytical evaluation, whichever is limiting.

(d) If the reexaminations required by (b) above reveal new flaws or relevant conditions that exceed the applicable acceptance standards of Table IWB-3410-1, or growth of existing flaws in excess of the growth predicted by the analytical evaluation, then

(1) the entire weld, area, or part²⁰ shall be examined during the current outage

(2) additional examinations shall be performed in accordance with IWB-2430

(e) For steam generator tubing, the successive examinations shall be governed by the plant Technical Specification.

(f) If welded attachments are examined as a result of identified component support deformation, and the results of these examinations exceed the acceptance standards of Table IWB-3410-1, successive examinations shall be performed, if determined necessary, based on an evaluation by the Owner. The evaluation shall be documented and shall include the cause of the welded

attachment damage if known. If the cause of the welded attachment damage could recur or is unknown, successive examinations shall be performed in accordance with the requirements of (b) above. No successive examinations are required if either of the following applies:

(1) There are no other welded attachments subject to the same apparent or root cause conditions.

(2) The degradation mechanism no longer exists.

IWB-2430 ADDITIONAL EXAMINATIONS

(10)

(a) Examinations performed in accordance with ~~Table IWB-2500-1, except for Examination Category B-P,~~ that reveal flaws or relevant conditions exceeding the acceptance standards of Table IWB-3410-1 shall be extended to include additional examinations during the current outage in accordance with (1) or (2) below.

(1) Additional examinations shall be performed in accordance with the following requirements:

(-a) The additional examinations shall include an additional number of welds, areas, or parts²⁰ included in the inspection item²¹ equal to the number of welds, areas, or parts included in the inspection item that were scheduled to be performed during the present inspection period. The additional examinations shall be selected from welds, areas, or parts of similar material and service. This additional selection may require inclusion of piping systems other than the one containing the flaws or relevant conditions.

(-b) If the additional examinations required by (-a) above reveal flaws or relevant conditions exceeding the acceptance standards of Table IWB-3410-1, the examinations shall be further extended to include additional examinations during the current outage. These additional examinations shall include the remaining number of welds, areas, or parts of similar material and service subject to the same type of flaws or relevant conditions.

(2) Additional examinations shall be performed in accordance with the following requirements:

(-a) An engineering evaluation shall be performed. Topics to be addressed in the engineering evaluation shall include the following:

(-1) a determination of the cause of the flaws or relevant conditions

(-2) an evaluation of applicable service conditions and degradation mechanisms to establish that the affected welds, areas, or parts²⁰ will perform their intended safety functions during subsequent operation

(-3) a determination of which additional welds, areas, or parts²⁰ are subject to the same service conditions and degradation mechanisms that caused the flaws or relevant conditions

(-b) Additional examinations shall be performed on all those welds, areas, or parts²⁰ subject to the same service conditions and degradation mechanisms that caused the flaws or relevant conditions. This additional selection might require inclusion of piping systems other

Tables IWB-2500-1(B-A)
through IWB-2500-1 (B-Q)

than the one containing the original flaws or relevant conditions. No additional examinations are required if the engineering evaluation concludes that

(-1) there are no additional welds, areas, or parts subject to the same service conditions that caused the flaws or relevant conditions or

(-2) no degradation mechanism exists

(-c) The engineering evaluation shall be retained in accordance with IWA-6000.

(b) The examination method for additional examinations may be limited to the examination method that originally identified the flaws or relevant conditions, provided use of the method is supported by an engineering evaluation. The engineering evaluation shall determine the cause of the flaws or relevant conditions and the appropriate method to be used as part of the additional examination scope. The engineering evaluation shall be retained in accordance with IWA-6000.

(c) For the inspection period following the period in which the examinations of (a) were completed, the examinations shall be performed as originally scheduled in accordance with IWB-2400.

(d) For steam generator tubing, additional examinations shall be governed by plant Technical Specifications.

(e) If welded attachments are examined as a result of identified component support deformation, and the results of these examinations exceed the acceptance standards of Table IWB-3410-1, additional examinations shall be performed, if determined necessary, based on an evaluation by the Owner. The evaluation shall be documented and shall include the cause of the welded attachment damage if known. If the cause of the welded attachment damage could recur or is unknown, additional examinations shall be performed in accordance with the requirements of (a) above. No additional examinations are required if either of the following applies:

(1) There are no other welded attachments subject to the same apparent or root cause conditions.

(2) The degradation mechanism no longer exists.

IWB-2500 EXAMINATION AND PRESSURE TEST REQUIREMENTS

(a) Components shall be examined and tested as specified in Table IWB-2500-1. The method of examination for the components and parts of the pressure retaining boundaries shall comply with those tabulated in Table IWB-2500-1 except where alternate examination methods are used that meet the requirements of IWA-2240.

(b) Table IWB-2500-1 is organized as follows.

change "is" to "are"

Examination Category	Examination Area
B-A	Pressure Retaining Welds in Reactor Vessel
B-B	Pressure Retaining Welds in Vessels Other Than Reactor Vessels
B-D	Full Penetration Welded Nozzles in Vessels
B-F	Pressure Retaining Dissimilar Metal Welds in Vessel Nozzles
B-G-1	Pressure Retaining Bolting, Greater Than 2 in. (50 mm) in Diameter
B-G-2	Pressure Retaining Bolting, 2 in. (50 mm) and Less in Diameter
B-J	Pressure Retaining Welds in Piping
B-K	Welded Attachments for Vessels, Piping, Pumps, and Valves
B-L-2	Pump Casings
B-M-2	Valve Bodies
B-N-1	Interior of Reactor Vessel
B-N-2	Welded Core Support Structures and Interior Attachments to Reactor Vessels
B-N-3	Removable Core Support Structures
B-O	Pressure Retaining Welds in Control Rod Drive and Instrument Nozzle Housings
B-P	All Pressure Retaining Components
B-Q	Steam Generator Tubing

(c) Alternatively, for Examination Categories B-F and B-J, the provisions of Appendix R may be applied to all Class 1 piping or to one or more individual piping systems.

Table IWB-2500-1 (B-A)
Examination Category B-A, Pressure Retaining Welds in Reactor Vessel

(a)(10)

Table IWB-2500-1
Examination Categories

EXAMINATION CATEGORY B-A, PRESSURE RETAINING WELDS IN REACTOR VESSEL							
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
B1.10	Shell welds		Volumetric	IWB-3510	All welds [Note (2)]	Same as for first interval	Permissible
B1.11	Circumferential	IWB-2500-1					
B1.12	Longitudinal	IWB-2500-2					
B1.20	Head welds		Volumetric	IWB-3510	Accessible length of all welds [Note (2)]	Same as for first interval	Permissible
B1.21	Circumferential	IWB-2500-3					
B1.22	Meridional						
B1.30	Shell-to-flange weld	IWB-2500-4	Volumetric	IWB-3510	Weld [Note (2)]	Same as for first interval	Permissible [Note (3)], [Note (5)]
B1.40	Head-to-flange weld	IWB-2500-5	Volumetric and surface	IWB-3510	Weld [Note (2)]	Same as for first interval	Permissible [Note (4)], [Note (5)]
B1.50	Repair welds [Note (1)]	IWB-2500-1 and IWB-2500-2	Volumetric	IWB-3510	All weld repair areas	Same as for first interval	Permissible
B1.51	Beltline region						

Notes 1, 2, 3, 4, and 5 go here.

Note to Editor: The start of the notes for ALL tables begins with:

NOTES: (for tables with multiple notes) or

NOTE: (for tables with single note)

Table IWB-2500-1 (B-B)
Examination Category B-B, Pressure Retaining Welds in Vessel Other Than Reactor Vessels

(a)(10)

Table IWB-2500-1 Examination Categories (Cont'd)						
EXAMINATION CATEGORY B-B, PRESSURE RETAINING WELDS IN VESSELS OTHER THAN REACTOR VESSELS						
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination	
					First Inspection Interval	Successive Inspection Intervals [Note (8)]
	Pressurizer				Fig. IWB-2500-20(a)	Fig. IWB-2500-20(b)
B2.10	Shell-to-Head					
B2.11	Circumferential	IWB-2500-1	Volumetric	IWB-3510	Both welds [Note (2)]	Both welds [Note (2)]
B2.12	Longitudinal	IWB-2500-2			1 ft (300 mm) of all welds [Note (7)]	1 ft (300 mm) of one weld [Note (7)] per head
B2.20	Head Welds					
B2.21	Circumferential	IWB-2500-3	Volumetric	IWB-3510	All welds [Note (2)]	One weld per head
B2.22	Meridional					
	Steam Generators (Primary Side)					
B2.30	Head Welds					
B2.31	Circumferential	IWB-2500-3	Volumetric		IWB-2500-20(c) welds [Note (2)]	Fig. IWB-2500-20(d) One weld [Note (6)] per head
B2.32	Meridional					
B2.40	Tubesheet-To-Head Weld	IWB-2500-6	Volumetric	IWB-3510	Weld [Note (2)]	Weld [Note (2)], [Note (6)]
	Heat Exchangers (Primary Side) — Head					
B2.50	Head Welds					
B2.51	Circumferential	IWB-2500-1, IWB-2500-3	Volumetric	IWB-3510	Fig. IWB-2500-20(e) All welds [Note (2)]	Fig. IWB-2500-20(f) One weld [Note (6)] per head
B2.52	Meridional	IWB-2500-3				
	Heat Exchangers (Primary Side) — Shell					
B2.60	Tubesheet-to-Head Welds	IWB-2500-6	Volumetric	IWB-3510	Weld [Note (2)]	Weld [Note (2)], [Note (6)]
B2.70	Longitudinal Welds	IWB-2500-2	Volumetric	IWB-3510	1 ft of all welds [Note (7)] at each end of shell	1 ft of one weld [Note (6)], [Note (7)] at each end of shell
B2.80	Tubesheet-to-Shell Welds	IWB-2500-6	Volumetric	IWB-3510	Welds [Note (2)] each end	Welds [Note (2)], [Note (6)] each end

Change "Note (8)" to "Note (3)"

Change "Note (2)" to "Note (4)"

Change "Note (7)" to "Note (2)"

Change "Note (6)" to "Note (1)"

Change "Note (2)" to "Note (4)"

Change "Note (2), Note (6) to "Note (1), Note (4)"

Notes 6, 7, 8 and 2 go here, re-numbered to Notes 1, 2, 3, and 4.

Change "Note (7)" to "Note (2)"

Change "Note (6), Note (7)" to "Note (1), Note (2)"

Notes 9, 10, 11, 12, and 13 go here, re-numbered to Notes 1, 2, 3, 4, and 5.

Table IWB-2500-1 (B-D)
Examination Category B-D, Full Penetration Welded Nozzles In Vessels

(a)(10)

Table IWB-2500-1 Examination Categories (Cont'd)							
EXAMINATION CATEGORY B-D, FULL PENETRATION WELDED NOZZLES IN VESSELS							
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral or Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals [Note (11)]	
Reactor Vessel							
B3.90	Nozzle-to-Vessel Welds	IWB-2500-7 [Note (12)]	Volumetric	IWB-3512	All nozzles [Note (9)]	Same as for 1st Interval	See [Note (10)], [11] [13]
B3.100	Nozzle Inside Radius Section	IWB-2500-7 [Note (12)]	Volumetric	IWB-3512	All nozzles [Note (9)]	Same as for 1st Interval	See [Note (10)], [13]
Pressurizer							
B3.110	Nozzle-to-Vessel W	IWB-2500-7 [Note (12)]	Volumetric		nozzles [Note (9)]		Not permissible
Steam Generators (Primary Side)							
B3.130	Nozzle-to-Vessel Welds	IWB-2500-7 [Note (12)]	Volumetric	IWB-3512	All nozzles [Note (9)]	Same as for 1st Inte	
Heat Exchangers (Primary Side)							
B3.150	Nozzle-to-Vessel Welds	WB-2500-7 [Note (12)]	Volumetric	IWB-3512	All nozzles [Note (9)]	Same as for 1st Interval	Not permissible
B3.160	Nozzle Inside Radius Section	IWB-2500-7 [Note (12)]	Volumetric	IWB-3512	All nozzles [Note (9)]	Same as for 1st Interval	Not permissible
EXAMINATION CATEGORY B-F, PRESSURE RETAINING DISSIMILAR METAL WELDS IN VESSEL NOZZLES							
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
Reactor Vessel							
B5.10	NPS 4 (DN 100) or Larger Nozzle-to-Safe End Butt Welds	IWB-2500-8	Volumetric and surface	IWB-3514	All welds	Same as for 1st interval	See [Note (13)], [14]
B5.11	NPS 4 (DN 100) or Larger Nozzle-to-Component Butt Welds	IWB-2500-8	Volumetric and surface	IWB-3514	All welds	Same as for 1st interval	Not permissible
B5.20	Less Than NPS 4 (DN 100) Nozzle-to-Safe End Butt Welds	IWB-2500-8	Surface		All welds	Same as for 1st interval	See [Note (14)]
B5.30	Nozzle-to-Safe End Socket Welds	IWB-2500-8	Surface		All welds	Same as for 1st interval	See [Note (14)]
Pressurizer							
B5.40	NPS 4 (DN 100) or Larger Nozzle-to-Safe End Butt Welds	IWB-2500-8	Volumetric and surface	IWB-3514	All welds	Same as for 1st interval	Not permissible
B5.50	Less Than NPS 4 (DN 100) Nozzle-to-Safe End Butt Welds	IWB-2500-8	Surface	IWB-3514	All welds	Same as for 1st interval	Not permissible

ASME 2011a SECTION XI

Change "Note (11)" to "Note (3)"

Change "(13)" to "(5)"

Change "Note (10)" to "Note (2)"

Change "Note (12)" to "Note (4)"

Change "Note (9)" to "Note (1)"

Change "Note (13), (14)" to "[Notes (1), (2)]"

Change "Note (14)" to "Note (1)"

New Table

Table IWB-2500-1 (B-F)
Examination Category B-F, Pressure Retaining Dissimilar Metal Welds In Vessel Nozzles

Delete this header, rest of table will be continuation of Table IWB-2500-1 (B-F)

(a)(10)

**Table IWB-2500-1
Examination Categories (Cont'd)**

EXAMINATION CATEGORY B-F, PRESSURE RETAINING DISSIMILAR METAL WELDS IN VESSEL NOZZLES

Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
	Pressurizer						(Cont'd)
B5.60	Nozzle-to-Safe End Socket Welds	IWB-2500-8	Surface	IWB-3514	All welds	Same as for 1st interval	Not permissible
	Steam Generator						
B5.70	NPS 4 (DN 100) or Larger Nozzle-to-Safe End Butt Welds	IWB-2500-8	Volumetric and surface	IWB-3514	All welds	Same as for 1st interval	Not permissible
B5.71	NPS 4 (DN 100) or Larger Nozzle-to-Component Butt Welds	IWB-2500-8	Volumetric and surface	IWB-3514	All welds	Same as for 1st interval	Not permissible
B5.80	Less Than NPS 4 (DN 100) Nozzle-to-Safe End Butt Welds	IWB-2500-8	Surface	IWB-3514	All welds	Same as for 1st interval	Not permissible
B5.90	Nozzle-to-Safe End Socket Welds	IWB-2500-8	Surface	IWB-3514	All welds	Same as for 1st interval	Not permissible
	Heat Exchangers						
B5.100	NPS 4 (DN 100) or Larger Nozzle-to-Safe End Butt Welds	IWB-2500-8	Volumetric and surface	IWB-3514	All welds	Same as for 1st interval	Not permissible
B5.110	Less Than NPS 4 (DN 100) Nozzle-to-Safe End Butt Welds	IWB-2500-8	Surface	IWB-3514	All welds	Same as for 1st interval	Not permissible
B5.120	Nozzle-to-Safe End Socket Welds	IWB-2500-8	Surface	IWB-3514	All welds	Same as for 1st interval	Not permissible

Notes 14 and 13 go here, re-numbered to Notes 1 and 2.

ASME 2011a SECTION XI

New Table

EXAMINATION CATEGORY B-G-1, PRESSURE RETAINING BOLTING, GREATER THAN 2 in. (50 mm) IN DIAMETER

Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
	Reactor Vessel						
B6.10	Closure Head Nuts	Surfaces	Visual, VT-1	IWB-3517	All bolts, studs, nuts, bushings, threads in flange stud holes	Same as for 1st interval	Permissible
B6.20	Closure Studs	IWB-2500-12	Volumetric	IWB-3515			
B6.40	Threads in Flange	IWB-2500-12	Volumetric	IWB-3515			
B6.50	Closure Washers, Bushings	Surfaces	Visual, VT-1	IWB-3517			
	Pressurizer						
B6.60	Bolts and Studs		Volumetric	IWB-3515	All bolts, studs, nuts, bushings and flange surfaces	Same as for 1st interval	Permissible
B6.70	Flange Surface, when connection disassembled	Surfaces	Visual, VT-1	IWB-3517			
B6.80	Nuts, Bushings, and Washers	Surfaces	Visual, VT-1	IWB-3517			

Change "Note (15)" to "Note (1)"

Change "Note (20)" to "Note (6)"

Change "Note (21)" to "Note (7)"

Change "[Note (16)], (19)" to "[Notes (2), (5)]"

**Table IWB-2500-1 (B-G-1)
Examination Category B-G-1, Pressure Retaining Bolting, Greater Than 2 in. (50 mm) in Diameter**

Delete this header, rest of table will be continuation of Table IWB-2500-1 (B-G-1)

(a)(10)

Table IWB-2500-1 Examination Categories (Cont'd)							
EXAMINATION CATEGORY B-G-1, PRESSURE RETAINING BOLTING, GREATER THAN 2 in. (50 mm) IN DIAMETER							
Item No.	Parts Examined [Note (15)]	Examination Requirements/ Figure No.	Examination Method [Note (21)]	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval [Note (16)], (19)	Successive Inspection Intervals [Note (16)], (19)	
Steam Generators							
B6.90	Bolts and Studs	IWB-2500-12	Volumetric	IWB-3515	All bolts, studs, nuts, bushings, and flange surfaces	Same as for 1st interval	Permissible
B6.100	Flange Surface, [Note (20)] when connection disassembled	Surfaces	Visual, VT-1	IWB-3517			
B6.110	Nuts, Bushings, and Washers	Surfaces	Visual, VT-1	IWB-3517			
Heat Exchangers							
B6.120	Bolts and Studs	IWB-2500-12	Volumetric	IWB-3515	All bolts, studs, nuts, bushings, and flange surfaces, (17), (18)	Same as for 1st interval, (17), (18)	Permissible
B6.130	Flange Surface, [Note (20)] when connection disassembled	Surfaces	Visual, VT-1	IWB-3517			
B6.140	Nuts, Bushings, and Washers	Surfaces	Visual, VT-1	IWB-3517			
Piping							
B6.150	Bolts and Studs	IWB-2500-12	Volumetric	IWB-3515	All bolts, studs, nuts, bushings, and flange surfaces	Same as for 1st interval	Permissible
B6.160	Flange Surface, [Note (20)] when connection disassembled	Surfaces	Visual, VT-1	IWB-3517			
B6.170	Nuts, Bushings, and Washers	Surfaces	Visual, VT-1	IWB-3517			
Pumps							
B6.180	Bolts and Studs	IWB-2500-12	Volumetric	IWB-3515	All bolts, studs, [Note (17)], (18) nuts, bushings, and flange surfaces	Same as for 1st interval (17), (18)	Permissible
B6.190	Flange Surface, [Note (20)] when connection disassembled	Surfaces	Visual, VT-1	IWB-3517			
B6.200	Nuts, Bushings, and Washers	Surfaces	Visual, VT-1	IWB-3517			
Valves							
B6.210	Bolts and Studs	IWB-2500-12	Volumetric	IWB-3515	All bolts, studs, [Note (17)], (18) nuts, bushings, and flange surfaces	Same as for 1st interval, (17), (18)	Permissible
B6.220	Flange Surface, [Note (20)] when connection disassembled	Surfaces	Visual, VT-1	IWB-3517			
B6.230	Nuts, Bushings, and Washers	Surfaces	Visual, VT-1	IWB-3517			

Change "Note (20)"
to "Note (6)"

Change "(17), (18)" to [Notes (3),
(4)]

Change "[Note (17)], (18)" to
"[Notes (3), (4)]"

Notes 15, 16, 17, 18, 19, 20, and 21 go here, re-numbered to Notes 1, 2, 3, 4, 5, 6, and 7

Table IWB-2500-1 (B-G-2)
Examination Category B-G-2, Pressure Retaining Bolting, 2 in. (50 mm) And Less In Diameter

Notes 22, 23, and 24 go here, re-numbered to Notes 1, 2, and 3

(a)(10)

Table IWB-2500-1 Examination Categories (Cont'd)							
EXAMINATION CATEGORY B-G-2, PRESSURE RETAINING BOLTING, 2 in. (50 mm) AND LESS IN DIAMETER							
Item No.	Parts Examined [Note (22)]	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval [Note (23)], (24)	Successive Inspection Intervals [Note (23)], (24)	
	Reactor Vessel						
B7.10	Bolts, Studs, and Nuts	Surface	Visual, VT-1	IWB-3517	All bolts, studs, and nuts	Same as for 1st interval	Not permissible
	Pressurizer						
B7.20	Bolts, Studs, and Nuts	Surface	Visual, VT-1	IWB-3517	All bolts, studs, and nuts	Same as for 1st interval	Not permissible
	Steam Generators						
B7.30	Bolts, Studs, and Nuts	Surface	Visual, VT-1	IWB-3517	All bolts, studs, and nuts	Same as for 1st interval	Not permissible
	Heat Exchangers						
B7.40	Bolts, Studs, and Nuts	Surface	Visual, VT-1	IWB-3517	All bolts, studs, and nuts	Same as for 1st interval	Not permissible
	Piping						
B7.50	Bolts, Studs, and Nuts	Surface	Visual, VT-1	IWB-3517	All bolts, studs, and nuts	Same as for 1st interval	Not permissible
	Pumps						
B7.60	Bolts, Studs, and Nuts	Surface	Visual, VT-1	IWB-3517	All bolts, studs, and nuts	Same as for 1st interval	Not permissible
	Valves						
B7.70	Bolts, Studs, and Nuts	Surface	Visual, VT-1	IWB-3517	All bolts, studs, and nuts	Same as for 1st interval	Not permissible
EXAMINATION CATEGORY B-J, PRESSURE RETAINING WELDS IN PIPING							
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals [Note (8)]	
B9.10	NPS 4 or larger (DN 100)			IWB-3514	Welds [Notes (2), (25), (26), (27), (28)]	Same as for first interval	Not permissible
B9.11	Circumferential welds						
B9.20	Less than NPS 4 (DN 100)						
B9.21	Circumferential welds other than PWR high pressure safety injection systems	Surface		IWB-3514	Welds [Notes (2), (25), (26)]	Same as for first interval	Not permissible
B9.22	Circumferential welds of PV injection systems				Welds [Notes (2), (27), (28), (29)]		
B9.30	Branch pipe connection welds						
B9.31	NPS 4 or larger (DN 100)				Welds [Notes (2), (25), (26), (27), (28)]	Same as for first interval	Not permissible
B9.32	Less than NPS 4 (DN 100)	IWB-2500-10, and IWB-		IWB-3514	Welds [Notes (2), (25), (26)]		
B9.40	Socket welds	IWB-2500-8	Surface	IWB-3514	Welds [Notes (2), (25)]	Same as for first interval	Not permissible

Notes 8, 25, 2, 26, 27, 28, and 29 go here, re-numbered to Notes 1, 2, 3, 4, 5, 6, and 7

Table IWB-2500-1 (B-J)
Examination Category B-J, Pressure Retaining Welds In Piping

ASME 2011a SECTION XI

New Table

83

Table IWB-2500-1 (B-K)
Examination Category B-K, Welded Attachments For Vessels, Pumps, And Valves

Notes 30, 31, 32, 33, 34, 35, and 36 go here, re-numbered to Notes 1, 2, 3, 4, 5, 6, and 7

(a)(10)

Table IWB-2500-1 Examination Categories (Cont'd)							
EXAMINATION CATEGORY B-K, WELDED ATTACHMENTS FOR VESSELS, PIPING, PUMPS, AND VALVES							
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
	Pressure Vessels						
B10.10	Welded attachments	IWB-2500-13, Fig. IWB-2500-14, and IWB-2500-15	Surface	IWB-3516	Each welded attachment and each identified occurrence [33]	Same as for first interval	Not permissible
	Piping						
B10.20	Welded attachments	IWB-2500-13, Fig. IWB-2500-14, and IWB-2500-15	Surface		Each welded attachment and each identified occurrence [34]	Same as for first interval	Not permissible
	Pumps						
B10.30	Welded attachments	IWB-2500-13, Fig. IWB-2500-14, and IWB-2500-15	Surface	IWB-3516	Each welded attachment and each identified occurrence [34]	Same as for first interval	Not permissible
	Valves						
B10.40	Welded attachments	IWB-2500-13, Fig. IWB-2500-14, and IWB-2500-15	Surface	IWB-3516	Each welded attachment and each identified occurrence [34]	Same as for first interval	Not permissible
EXAMINATION CATEGORY B-L-2, PUMP CASINGS; B-M-2, VALVE BODIES							
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
	Pumps						
B12.20	Pump casing (B-L-2)			519	Internal surface [37]	Same as for first interval	See [Note (38)]
	Valves						
B12.50	Valve body, exceeding NPS 4 (DN 100) (B-M-2)			519	Internal surface [39]	Same as for first interval	See [Note (38)]

ASME 2014 SECTION XI

New Table

Notes 37, 38, and 39 go here, re-numbered to Notes 1, 2, and 3

Table IWB-2500-1 (B-L-2, B-M-2)
Examination Categories B-L-2, Pump Casings; B-M-2, Valves Bodies

Table IWB-2500-1 (B-N-1, B-N-2, B-N-3)

Examination Categories B-N-1, Interior Of Reactor Vessel; B-N-2, Welded Core Support Structures And Interior Attachments To Reactor Vessels; B-N-3, Removable Core Support Structures

Notes 40, 41, and 42 go here, re-numbered to Notes 1, 2, and 3

(a)(10)

**Table IWB-2500-1
Examination Categories (Cont'd)**

~~EXAMINATION CATEGORY B-N-1, INTERIOR OF REACTOR VESSEL; B-N-2, WELDED CORE SUPPORT STRUCTURES AND INTERIOR ATTACHMENTS TO REACTOR VESSELS; B-N-3, REMOVABLE CORE SUPPORT STRUCTURES~~

Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
	Reactor Vessel			IWB-3520.2	Refueling outages	Each	Change "Note (42)" to "Note (3)"
B13.10	Vessel interior (B-N-1)	Accessible areas [Note (40)]	Visual, VT-3		[Note (42)]		
	Reactor Vessel (BWR)			IWB-3520.2	Welds	Same as for first interval	Permissible
B13.20	Interior attachments within beltline region (B-N-2)	Accessible welds	Visual, VT-1				
B13.30	Interior attachments beyond beltline region (B-N-2)	Accessible welds	Visual, VT-3	IWB-3520.2	Welds	Same as for first interval	Permissible
B13.40	Core support structure (B-N-2)	Accessible surfaces	Visual, VT-3	IWB-3520.2	Surfaces	Same as for first interval	Permissible
	Reactor Vessel (PWR)			IWB-3520.1	Welds	Same as for first interval	Permissible
B13.50	Interior attachments within beltline region (B-N-2)	Accessible welds	Visual, VT-1				
B13.60	Interior attachments beyond beltline region (B-N-2)	Accessible welds	Visual, VT-3	IWB-3520.2	Welds	Same as for first interval	Permissible
B13.70	Core support structure [Note (41)] (B-N-3)	Accessible surfaces	Visual, VT-3	IWB-3520.2	Surfaces	Same as for first interval	Permissible

EXAMINATION CATEGORY B-O, PRESSURE RETAINING WELDS IN CONTROL ROD DRIVE AND INSTRUMENT NOZZLE HOUSINGS

Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
B14.10	Reactor Vessel (BWR)	IWB-2500-18	Volumetric or surface	IWB-3523	10% peripheral CRD housings	Same as for first interval	Permissible
	Welds in Control Rod Drive (CRD) housing						
B14.20	Reactor Vessel (PWR)	IWB-2500-18	Volumetric or surface [Note (43)]	IWB-3523	10% CRD housings	Same as for first interval	Permissible
	Welds in Control Rod Drive (CRD) Housings						
B14.21	Welds in In-Core Instrumentation Nozzle (ICI) Housings > NPS 2 (DN50)	IWB-2500-18	Volumetric or surface [Note (43)]	IWB-3523	10% ICI housings	Same as for first interval	Permissible

Note 43 goes here, re-numbered to Note 1

ASME 2011a SECTION XI

85

New Table

Table IWB-2500-1 (B-O)

Examination Category B-O, Pressure Retaining Welds In Control Rod Drive And Instrument Nozzle Housings

Table IWB-2500-1 (B-P)
Examination Category B-P, All Pressure Retaining Components

Notes 44, 45, and 46 go here, re-numbered to Notes 1, 2, and 3

(a)(10)

Table IWB-2500-1
Examination Categories (Cont'd)

Change "Note (46)" to "Note (3)"

~~EXAMINATION CATEGORY B-P, ALL PRESSURE RETAINING COMPONENTS~~

Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
B15.10	Pressure retaining components	System leakage test (IWB-5220)	Visual, VT-2	IWB-3522	Each refueling outage	Same as for first interval	Not permissible
B15.20	Pressure retaining components [IWB-5222(b)]	System leakage test (IWB-5220)		3522	Once per interval	Same as for first interval	See [Note (46)]

Change "Note (44)" to "Note (1)"

Change "Note (45)" to "Note (2)"

[Note (45)]

[Note (46)]

[Note (46)]

EXAMINATION CATEGORY B-Q, STEAM GENERATOR TUBING

Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Examination to End of Interval
					First Inspection Interval	Successive Inspection Intervals	
B16.10	Steam Generator Tubing in Straight Tube Design	Entire tubing			[Note (47)]	[Note (47)]	
	Tubing side, U-bend portion and optionally cold leg side	Volume		521	[Note (47)]	[Note (47)]	

Change "Note (48)" to "Note (2)"

Change "Note (47)" to "Note (1)"

[Note (48)]

[Note (47)]

[Note (47)]

[Note (47)]

[Note (47)]

Notes 47 and 48 go here, re-numbered to Notes 1 and 2

Table IWB-2500-1 (B-Q)
Examination Category B-Q, Steam Generator Tubing

NOTES:

- (1) Material (base metal) weld repairs where repair depth exceeds 10% nominal of the vessel wall. If the location of the repair is not positively and accurately known, then the individual shell plate, forging, or shell course containing the repair shall be included.
- (2) Includes essentially 100% of the weld length.
- (3) The shell-to-flange weld examination may be performed during the first and third periods, in which case 50% of the shell-to-flange weld shall be examined by the end of the first period, and the remainder by the end of third period. During the first period, the examination need only be performed from the flange face, provided this same portion is examined from the shell during the third period.
- (4) During the first and second periods, the examination may be performed from the flange face, provided these same portions are examined from the head during the third period.
- (5) Deferral in the first inspection interval is not permitted. Deferral in successive inspection intervals is permitted provided that
 - (a) no welded repair/replacement activities have been performed either on the shell-to-flange weld or head-to-flange weld or head-to-flange weld; and
 - (b) neither the shell-to-flange weld nor the head-to-flange weld contains identified flaws or relevant conditions that require successive inspections in accordance with IWB-2420(b).
- (6) The examination may be limited to one vessel among the group of vessels performing a similar function.
- (7) The weld selected for examination is that weld intersecting the circumferential weld.
- (8) The initially selected welds are to be examined in the same sequence during successive inspection intervals, to the extent practical.
- (9) Includes nozzles with full penetration welds to vessel shell (or head) and integrally cast nozzles, but excludes manways and handholes either welded to or integrally cast in vessel.
- (10) At least 25% but not more than 50% of the nozzles shall be examined by the end of the first inspection period, and the remainder by the end of the inspection interval.
- (11) If the nozzle weld is examined by the straight beam ultrasonic method from inside the nozzle bore, the remaining examinations required from the shell inside diameter may be performed at or near the end of the interval.
- (12) The examination volumes shall apply to the applicable Figure shown in Figs. IWB-2500-7(a) through IWB-2500-7(d).

Delete, redundant text

Notes 9, 10, 11, and 12 moved to Table IWB-2500-1 (B-D)

Note 8 moved to Table IWB-2500-1 (B-B) and (B-J)

Notes 6 and 7 moved to Table IWB-2500-1 (B-B)

Note 2 moved to Table IWB-2500-1 (B-A), (B-B), and (B-J)

Notes 1, 2, 3, 4 and 5 moved to Table IWB-2500-1 (B-A)

ASME 2010 SECTION XI

Notes 15, 16, 17, 18, 19, 20, and 21 moved to Table IWB-2500-1 (B-G-1)

Note 14 moved to Table IWB-2500-1 (B-F)

Note 13 moved to Table IWB-2500-1 (B-D) and (B-F)

Notes 22, 23, and 24 moved to Table IWB-2500-1 (B-G-2)

(a)(10)

**Table IWB-2500-1
Examination Categories (Cont'd)**

NOTES (CONT'D):

(13) For PWRs in the second and successive inspection intervals, these examinations may be deferred to the end of the interval, provided no repair/replacement activities have been performed on the examination item, and no flaws or relevant conditions requiring successive inspections in accordance with IWB-2420(b) are contained in the examination item.

(14) Deferral is not permissible during the first interval. However, during successive intervals, the examinations may be performed coincident with the vessel nozzle examinations required by Examination Category B-D.

(15) Bolting may be examined:

- (a) in place under tension;
- (b) when the connection is disassembled;
- (c) when the bolting is removed.

(16) Bushings are required to be examined only when the bolting is removed. Bushings may be examined in place.

(17) Volumetric examination of bolting for heat exchangers, pumps, or valves may be conducted on one heat exchanger, one pump, or one valve among a group of heat exchangers, pumps, or valves that are similar in design, type, and function. In addition, when the component to be examined contains a group of bolted connections of similar design and size, such as flanged connections, the examination may be conducted on one bolted connection among the group.

(18) Visual examination of bolting for heat exchangers, pumps, or valves is required only when the component is examined under Examination Category B-B, B-L-2, or B-M-2. Examination of a bolted connection is required only once during the interval.

(19) The examination of flange bolting in piping systems may be limited to one bolted connection among a group of bolted connections that are similar in design, size, function, and service.

(20) Examination includes 1 in. (25 mm) annular surface of flange surrounding each stud.

(21) When bolts or studs are removed for examination, surface examination meeting the acceptance standards of IWB-3515 may be substituted for volumetric examination.

(22) Bolting is required to be examined only when a connection is disassembled or bolting is removed.

(23) For components other than piping, examination of bolting is required only when the component is examined under Examination Category B-A, B-B, B-L-2, or B-M-2. Examination of bolted connection is required only once during the interval.

(24) The examination of flange bolting in piping systems may be limited to one bolted connection among a group of bolted connections that are similar in design, size, function, and service. Examination is required only when a flange is disassembled. Examination of a bolted connection is required only once during the interval.

(25) Examinations shall include the following:

- (a) All terminal ends in each pipe or branch run connected to vessels.
- (b) All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed either of the following limits under loads associated with specific seismic events and operational conditions:
 - (1) primary plus secondary stress intensity range of $2.4 S_m$ for ferritic steel and austenitic steel
 - (2) cumulative usage factor U of 0.4
- (c) All dissimilar metal welds not covered under Category B-F.
- (d) Additional piping welds so that the total number of circumferential butt welds (or branch connection or socket welds) selected for examination equals 25% of the circumferential butt welds (or branch connection or socket welds) in the reactor coolant piping system. This total does not include welds exempted by IWB-1220 or welds in Item No. B9.22. These additional welds may be located as follows:
 - (1) For PWR plants
 - (-a) one hot-leg and one cold-leg in one reactor coolant piping loop
 - (-b) one branch, representative of an essentially symmetric piping configuration among each group of branch runs that are connected to reactor coolant loops and that perform similar system functions
 - (-c) each piping and branch run exclusive of the categories of loop and runs that are part of system piping of (-a) and (-b) above
 - (2) For BWR plants
 - (-a) one reactor coolant recirculation loop (where a loop or run branches, only one branch)
 - (-b) one branch run representative of an essentially symmetric piping configuration among each group of branch runs that are connected to a loop and that perform similar system functions
 - (-c) one steam line run representative of an essentially symmetric piping configuration among the runs
 - (-d) one feedwater line run representative of an essentially symmetric piping configuration among the runs (where a loop or run branches, only one branch)

ASME 2011a SECTION XI

Note 25 moved to Table
IWB-2500-1 (B-J)

Notes 25, 26, 27, 28, and 29 moved to Table IWB-2500-1 (B-J)

Notes 30, 31, 32, 33, 34, 35 and 36 moved to Table IWB-2500-1 (B-K)

(a)(10)

**Table IWB-2500-1
Examination Categories (Cont'd)**

Change "Note [Note (4)]" to "Note (5)". Note to Editor: Deleting redundant text and brackets.

NOTES (CONT'D):

- (-e) each piping and branch exclusive of the categories of loops and runs that are part of the system piping of (-a) through (-d) above
- (26) For circumferential welds with intersecting longitudinal welds, surface examination of the longitudinal piping welds is required for those portions of the welds within the examination boundaries of intersecting Examination Category B-F and B-J circumferential welds.
- (27) For circumferential welds with intersecting longitudinal welds, volumetric examination of the longitudinal piping welds is required for those portions of the welds within the examination boundaries of intersecting Examination Category B-F and B-J circumferential welds. The following requirements shall also be met:
- (a) When longitudinal welds are specified and locations are known, examination requirements shall be met for both transverse and parallel flaws at the intersection of the welds and for that length of longitudinal weld within the circumferential weld examination volume.
- (b) When longitudinal welds are specified but locations are unknown, or the existence of longitudinal welds is uncertain, the examination requirements shall be met for both transverse and parallel flaws within the entire examination volume of intersecting circumferential welds.
- (28) For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need to be examined by the ultrasonic method for reflectors transverse to the weld length direction except that circumferential welds with intersecting longitudinal welds shall meet ~~Note [Note (4)]~~.
- (29) A 10% sample of PWR high pressure safety injection system circumferential welds in piping \geq NPS 1½ (DN 40) and $<$ NPS 4 (DN 100) shall be selected for examination. This sample shall be selected from locations determined by the Owner as most likely to be subject to thermal fatigue. Thermal fatigue may be caused by conditions such as valve leakage or turbulence effects.
- (30) Weld buildup on nozzles that is in compression under normal conditions and provides only component support is excluded from examination. Examination is limited to those welded attachments that meet the following conditions:
- (a) the attachment is on the outside surface of the pressure retaining component;
- (b) the attachment provides component support as defined in NF-1110;
- (c) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component, and
- (d) the attachment weld is full penetration, fillet, or partial penetration, either continuous or intermittent.
- (31) The extent of the examination includes essentially 100% of the length of the attachment weld at each attachment subject to examination.
- (32) Selected samples of welded attachments shall be examined each inspection interval.
- (33) For multiple vessels of similar design, function and service, only one welded attachment of only one of the multiple vessels shall be selected for examination. For single vessels, only one welded attachment shall be selected for examination. The attachment selected for examination on one of the multiple vessels or the single vessel, as applicable, shall be an attachment under continuous load during normal system operation, or an attachment subject to a potential intermittent load (seismic, water hammer, etc.) during normal system operation if an attachment under continuous load does not exist.
- (34) For piping, pumps, and valves, a sample of 10% of the welded attachments associated with the component supports selected for examination under IWF-2510 shall be examined.
- (35) Examination is required whenever component support member deformation, e.g., broken, bent, or pulled out parts, is identified during operation, refueling, maintenance, examination, or testing.
- (36) For the configurations shown in Figs. IWB-2500-13 and IWB-2500-14, a surface examination from an accessible side of the attachment weld shall be performed. Alternatively, for the configuration shown in Fig. IWB-2500-14, a volumetric examination of volume A-B-C-D from an accessible side of the attachment weld may be performed in lieu of the surface examination of surfaces A-B or C-D.
- (37) Examinations are limited to at least one pump in each group of pumps performing similar functions in the system, e.g., recirculating coolant pumps.
- (38) Examination is required only when a pump or valve is disassembled for maintenance, or repair. Examination of the internal pressure boundary shall include the internal pressure retaining surfaces made accessible for examination by disassembly. If a partial examination is performed and a subsequent disassembly of that pump or valve allows a more extensive examination, an examination shall be performed during the subsequent disassembly. A complete examination is required only once during the interval.
- (39) Examinations are limited to at least one valve within each group of valves that are of the same size, structural design (such as globe, gate, or check valves), and manufacturing method, and that perform similar functions in the system (such as containment isolation and system overpressure protection).
- (40) Areas to be examined shall include the spaces above and below the reactor core that are made accessible for examination by removal of components during normal refueling outages.
- (41) The structure shall be removed from the reactor vessel for examination.
- (42) At 1st refueling outage, and subsequent refueling outages at approximately 3 year intervals.
- (43) The surface examination method shall be performed on the inside diameter of the penetration nozzle housing welds as shown in Fig. IWB-2500-18 for examination surface area C-D.
- (44) Visual examination of IWA-5240.
- (45) The system leakage test (IWB-5220) shall be conducted prior to plant startup following a reactor refueling outage.

ASME 2011a SECTION XI

Notes 40, 41, and 42 moved to Table IWB-2500-1 (B-N-1, B-N-2, B-N-3)

Notes 44 and 45 moved to Table IWB-2500-1 (B-P)

Note 43 moved to Table IWB-2500-1 (B-O)

Notes 37, 38, and 39 moved to Table IWB-2500-1 (B-L-2, B-M-2)

(a)(10)

**Table IWB-2500-1
Examination Categories (Cont'd)**

NOTES (CONT'D):

(46) The system leakage test (IWB-5220) of the boundary of IWB-5222(b) shall be performed at or near the end of the interval.

(47) The extent and frequency of examination shall be governed by the plant Technical Specification.

(48) In the course of preparation.

Note 46 moved to Table
IWB-2500-1 (B-P)

Notes 47 and 48 moved to
Table IWB-2500-1 (B-Q)

ARTICLE IWB-5000 SYSTEM PRESSURE TESTS

IWB-2500-1 (B-P)

IWB-5200 SYSTEM TEST REQUIREMENTS

IWB-5210 TEST

(a) Pressure retaining components shall be tested at the frequency stated in, and visually examined by the method specified in Table IWB-2500-1, Examination Category B-P.

(b) The system pressure tests and visual examinations shall be conducted in accordance with IWA-5000 and this Article. The contained fluid in the system shall serve as the pressurizing medium.

IWB-5220 SYSTEM LEAKAGE TEST

IWB-5221 Pressure

(a) The system leakage test shall be conducted at a pressure not less than the pressure corresponding to 100% rated reactor power.

(b) The system test pressure and temperature shall be attained at a rate in accordance with the heat-up limitations specified for the system.

IWB-5222 Boundaries

(a) The pressure retaining boundary during the system leakage test shall correspond to the reactor coolant boundary, with all valves in the position required for normal reactor operation startup. The visual examination shall, however, extend to and include the second closed valve at the boundary extremity.

(b) The Class 1 pressure retaining boundary which is not pressurized when the system valves are in the position required for normal reactor startup shall be pressurized and examined at or near the end of the inspection interval. This boundary may be tested in its entirety or in portions and testing may be performed during the testing of the boundary of (a).

IWB-5230 HYDROSTATIC TEST

(a) The hydrostatic test may be conducted at any test pressure specified in Table IWB-5230-1 corresponding to the selected test temperature, provided the requirements of IWB-5240 are met for all ferritic steel components within the boundary of the system (or portion of system) subject to the test pressure (see IWA-5245).

(b) Whenever a hydrostatic test is conducted in which the reactor vessel contains nuclear fuel and the vessel is within the system test boundary, the test pressure shall not exceed the limiting conditions specified in the plant Technical Specifications.

IWB-5240 TEMPERATURE

(a) The minimum test temperature for either the system leakage or system hydrostatic test shall not be lower than the minimum temperature for the associated pressure specified in the plant Technical Specifications.

(b) The system test temperature shall be modified as required by the results obtained from each set of material surveillance specimens withdrawn from the reactor vessel during the service lifetime.

(c) For tests of systems or portions of systems constructed entirely of austenitic steel, test temperature limitations are not required to meet fracture prevention criteria. In cases where the components of the system are constructed of ferritic and austenitic steels that are nonisolable from each other during a system leakage or system hydrostatic test, the test temperature shall be in accordance with IWB-5230(a).

**Table IWB-5230-1
Test Pressure**

Test Temperature, °F (°C)	Test Pressure[Note (1)], [Note (2)]
100 (40) or less	1.10 P_o
200 (95)	1.08 P_o
300 (150)	1.06 P_o
400 (200)	1.04 P_o
500 (260) or greater	1.02 P_o

NOTES:

- (1) P_o is the nominal operating pressure corresponding to 100% rated reactor power.
 (2) Linear interpolation at intermediate test temperatures is permissible.

Table IWC-2500-1 (C-H)

ARTICLE IWC-2000 EXAMINATION AND INSPECTION

IWC-2200 PRESERVICE EXAMINATION

(a) All examinations required by this Article (with the exception of Examination Category C-H of Table IWC-2500-1) for those components initially selected for examination in accordance with the Inspection Program and not exempt from inservice examinations by IWC-1220 shall be completed prior to initial plant startup.

(b) Shop and field examinations may serve in lieu of the on-site preservice examinations, provided

(1) in the case of vessels only, the hydrostatic test required by Section III has been completed

(2) such examinations are conducted under conditions and with equipment and techniques equivalent to those which are expected to be employed for subsequent inservice examinations

(3) the shop and field examination records are, or can be, documented and identified in a form consistent with those required in Article IWA-6000

IWC-2400 INSPECTION SCHEDULE

IWC-2410 INSPECTION PROGRAM

Inservice examinations and system pressure tests may be performed during either system operation or plant outages.

IWC-2411 Inspection Program

(a) The required examinations in each examination category shall be completed during each inspection interval in accordance with Table IWC-2411-1, with the exceptions of Category C-H and of welded attachments examined as a result of component support deformation under Examination Category C-C. If there are less than three items or welds to be examined in an Examination Category, the items or welds may be examined in any two periods, or in any one period if there is only one item or weld, in lieu of the percentage requirements of Table IWC-2411-1.

(b) If items or welds are added to the Inspection Program, during the service lifetime of a plant, examination shall be scheduled as follows:

(1) When items or welds are added during the first period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item

Number for the added items or welds shall be performed during each of the second and third periods of that interval.

(2) When items or welds are added during the second period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item Number for the added items or welds shall be performed during the third period of that interval.

(3) When items or welds are added during the third period of an interval, examinations shall be scheduled in accordance with (a) for successive intervals.

IWC-2420 SUCCESSIVE INSPECTIONS

(a) The sequence of component examinations which was established during the first inspection interval shall be repeated during each successive inspection interval, to the extent practical. The sequence of component examinations may be modified in a manner that optimizes scaffolding, radiological, insulation removal, or other considerations, provided that the percentage requirements of Table IWC-2411-1 are maintained.

(b) If a component is accepted for continued service in accordance with IWC-3122.3 or IWC-3132.3, the areas containing flaws or relevant conditions shall be reexamined during the next inspection period listed in the schedule of the Inspection Program of IWC-2400. Alternatively, acoustic emission may be used to monitor growth of existing flaws in accordance with IWA-2234.

(c) If the reexaminations required by (b) above reveal that the flaws or relevant conditions remain essentially unchanged, or that the flaw growth is within the growth

**Table IWC-2411-1
Inspection Program**

Inspection Interval	Inspection Period, Calendar Years of Plant Service Within the Interval	Minimum Examinations Completed, %	Maximum Examinations Credited, %
All	3	16	50
	7	50 [Note (1)]	75
	10	100	100

NOTE:

(1) If the first period completion percentage for any examination category exceeds 34%, at least 16% of the required examinations shall be performed in the second period.

predicted by the analytical evaluation, for the next inspection period, then the component examination schedule may revert to the original schedule of successive inspections or the inspection interval defined by the analytical evaluation, whichever is limiting.

(d) If the reexaminations required by (b) above reveal new flaws or relevant conditions that exceed the applicable acceptance standards of Table IWC-3410-1, or growth of existing flaws in excess of the growth predicted by the analytical evaluation, then

(1) the entire weld, area, or part³² shall be examined during the current outage

(2) additional examinations shall be performed in accordance with IWC-2430

(e) If welded attachments are examined as a result of identified component support deformation and the results of these examinations exceed the acceptance standards of Table IWC-3410-1 successive examinations shall be performed, if determined necessary, based on an evaluation by the Owner. The evaluation shall be documented and shall include the cause of the welded attachment damage if known. If the cause of the welded attachment damage could recur or is unknown, successive examinations shall be performed in accordance with the requirements of (b) above. No successive examinations are required if either of the following applies:

(1) There are no other welded attachments subject to the same apparent or root cause conditions.

(2) The designation mechanism no longer exists.

(10) **IWC-2430 ADDITIONAL EXAMINATIONS**

(a) Examinations performed in accordance with Table IWC-2500-1, ~~except for Examination Category C-H,~~ that reveal flaws or relevant conditions exceeding the acceptance standards of Table IWC-3410-1 shall be extended to include additional examinations during the current outage in accordance with (1) or (2) below.

(1) Additional examinations shall be performed in accordance with the following requirements:

(-a) The additional examinations shall include an additional number of welds, areas, or parts³² included in the inspection item³³ equal to 20% of the number of welds, areas, or parts included in the inspection item that are scheduled to be performed during the interval. The additional examinations shall be selected from welds, areas, or parts of similar material and service. This additional selection may require inclusion of piping systems other than the one containing the flaws or relevant conditions.

(-b) If the additional examinations required by (-a) above reveal flaws or relevant conditions exceeding the acceptance standards of Table IWC-3410-1, the examinations shall be further extended to include additional examinations during the current outage. These additional examinations shall include the remaining number of welds, areas, or parts of similar material and service subject to the same type of flaws or relevant conditions.

(2) Additional examinations shall be performed in accordance with the following requirements:

(-a) An engineering evaluation shall be performed. Topics to be addressed in the engineering evaluation shall include the following:

(-1) a determination of the cause of the flaws or relevant conditions

(-2) an evaluation of applicable service conditions and degradation mechanisms to establish that the affected welds, areas, or parts³² will perform their intended safety functions during subsequent operation

(-3) a determination of which additional welds, areas, or parts³² are subject to the same service conditions and degradation mechanisms that caused the flaws or relevant conditions

(-b) Additional examinations shall be performed on all those welds, areas, or parts³² subject to the same service conditions and degradation mechanisms that caused the flaws or relevant conditions. This additional selection might require inclusion of piping systems other than the one containing the original flaws or relevant conditions. No additional examinations are required if the engineering evaluation concludes that

(-1) there are no additional welds, areas, or parts subject to the same service conditions that caused the flaws or relevant conditions or

(-2) no degradation mechanism exists

(-c) The engineering evaluation shall be retained in accordance with Article IWA-6000.

(b) The examination method for additional examinations may be limited to the examination method that originally identified the flaws or relevant conditions, provided use of the method is supported by an engineering evaluation. The engineering evaluation shall determine the cause of the flaws or relevant conditions and the appropriate method to be used as part of the additional examination scope. The engineering evaluation shall be retained in accordance with Article IWA-6000.

(c) For the inspection period following the period in which the examinations of (a) were completed, the examinations shall be performed as originally scheduled in accordance with IWC-2400.

(d) If welded attachments are examined as a result of identified component support deformation and the results of these examinations exceed the acceptance standards of Table IWC-3410-1 additional examinations shall be performed, if determined necessary, based on an evaluation by the Owner. The evaluation shall be documented and shall include the cause of the welded attachment damage if known. If the cause of the welded attachment damage could recur or is unknown, additional examinations shall be performed in accordance with the requirements of (a) above. No additional examinations are required if either of the following applies:

(1) There are no other welded attachments subject to the same apparent or root cause conditions.

(2) The degradation mechanism no longer exists.

Tables IWC-2500-1 (C-A) through
IWC-2500-1 (C-F-2)

**IWC-2500 EXAMINATION AND PRESSURE
TEST REQUIREMENTS**

(a) Components shall be examined and pressure tested as specified in Table IWC-2500-1. The method of examination for the components and parts of the pressure retaining boundaries shall comply with those tabulated in Table IWC-2500-1, except where alternate examination methods are used that meet the requirements of IWA-2240.

(b) Table IWC-2500-1 is organized as follows.

Examination Category	Examination Area
C-A	Pressure Retaining Welds in Pressure Vessels Pressure Retaining Nozzle Welds in Pressure
C-B	Vessels
C-C	Welded Attachments for Pressure Vessels, Piping, Pumps, and Valves

Table continued

Examination Category	Examination Area
C-D	Pressure Retaining Bolting Greater Than 2 in. (50 mm) in Diameter
C-F-1	Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping
C-F-2	Pressure Retaining Welds in Carbon or Low Alloy Steel Piping
C-H	All Pressure Retaining Components

(c) Alternatively, for Examination Categories C-F-1 and C-F-2, the provisions of Appendix R may be applied to all Class 2 piping or to one or more individual piping systems.

change "is" to "are"

Tables IWC-2500-1 (C-A) through
IWC-2500-1 (C-H)

Table IWC-2500-1 (C-A)
Examination Category C-A, Pressure Retaining Welds In Pressure Vessels [Note (1)]

Notes 1, 2, 3, 4, and 5 go here
Note to Editor: The start of the notes for ALL tables begins with:
NOTES: (for tables with multiple notes) or
NOTE: (for tables with single note)

Table IWC-2500-1
Examination Categories

EXAMINATION CATEGORY C-A, PRESSURE RETAINING WELDS IN PRESSURE VESSELS [Note (1)]						
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method [Note (2)]	Acceptance Standard	Extent of Examination [Note (3)], [Note (4)]	Frequency of Examination [Note (5)]
C1.10	Shell Circumferential Welds	IWC-2500-1	Volumetric	IWC-3510	Cylindrical-shell-to-conical- shell- junction welds and shell (or head)- to-flange welds	Each inspection interval
C1.20	Head Circumferential Welds	IWC-2500-1	Volumetric	IWC-3510	Head-to-shell weld	Each inspection interval
C1.30	Tubesheet-to-Shell Weld	IWC-2500-2	Volumetric	IWC-3510	Tubesheet-to-shell weld	Each inspection interval
EXAMINATION CATEGORY C-B, PRESSURE RETAINING NOZZLE WELDS IN PRESSURE VESSELS [Note (1)]						
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent of Examination [Note (4)]	Frequency of Examination [Note (6)]
C2.10	Nozzles in Vessels $\leq \frac{1}{2}$ in. (13 mm) Nominal Thickness					
C2.11	Nozzle-to-Shell (Nozzle to Head or Nozzle to Nozzle) Weld	IWB-2500-3	Surface	IWC-3511	All nozzles at terminal ends of piping runs [Note (8)]	Each inspection interval
C2.20	Nozzles Without Reinforcing Plate in Vessels $> \frac{1}{2}$ in. (13 mm) Nominal Thickness					
C2.21	Nozzle-to-Shell (Nozzle to Head or Nozzle to Nozzle) Weld	IWB-2500-7(a), IWB-2500-7(b), or IWB-2500-7(d)	Surface and volumetric	IWC-3511	All nozzles at terminal ends of piping runs [Note (8)]	Each inspection interval
C2.22	Nozzle Inside Radius Section	IWB-2500-7(a), IWB-2500-7(b), or IWB-2500-7(d)	Volumetric		All nozzles at terminal ends of piping runs [Note (8)]	Each inspection interval
C2.30	Nozzles With Reinforcing Plate in Vessels $> \frac{1}{2}$ in. (13 mm) Nominal Thickness					
C2.31	Reinforcing Plate Welds to Nozzle and Vessel	IWC-2500-4	Surface	IWC-3511	All nozzles at terminal ends of piping runs [Note (8)]	Each inspection interval
C2.32	Nozzle-to-Shell (Nozzle to Head or Nozzle to Nozzle) Welds When Inside of Vessel is Accessible	IWC-2500-4	Volumetric	IWC-3511	All nozzles at terminal ends of piping runs [Note (8)]	Each inspection interval
C2.33	Nozzle-to-Shell (Nozzle to Head or Nozzle to Nozzle) Welds When Inside of Vessel Is Inaccessible	[Note (9)]		No leakage	All nozzles at terminal ends of piping runs [Note (8)]	Each inspection period

Notes 1, 4, 6, 7, 8, and 9 go here, re-numbered to Notes 1, 2, 3, 4, 5, and 6.

Table IWC-2500-1 (C-B)
Examination Category C-B, Pressure Retaining Nozzle Welds In Pressure Vessels [Note (1)]

Change "Note (6)" to "Note (3)"

Change to "IWC-2500-3"

Change "Note (8)" to "Note (5)"

Change to "IWC-2500-4(a), (b), or (d)" in two places (for C2.21 and C2.22).

Change "Note (9)" to "Note (6)"

Change "Note (7)" to "Note (4)"

SME 2011a SECT 1

Table IWC-2500-1 (C-C)
Examination Category C-C, Welded Attachments For Pressure Vessels [Note (1)], Piping, Pumps, and Valves

Notes 1, 10, 11, 12, 13, 14, and 15 go here. Re-numbered as Notes 1, 2, 3, 4, 5, 6, and 7.

Table IWC-2500-1 Examination Categories (Cont'd)						
EXAMINATION CATEGORY C-C, WELDED ATTACHMENTS FOR PRESSURE VESSELS [Note (1)], PIPING, PUMPS, AND VALVES						
Item No.	Parts Examined [Note (10)]	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent of Examination [Note (11)], [Note (12)]	Frequency of Examination [Note (13)]
	Pressure Vessels					
C3.10	Welded Attachments	IWC-2500-5			% of required areas of each welded attachment	Each identified occurrence and each inspection interval [Note (14)]
	Piping					
C3.20	Welded Attachments	IWC-2500-5	Surface		100% of required areas of each	Each identified occurrence and each inspection interval [Note (15)]
	Pumps					
C3.30	Welded Attachments	IWC-2500-5	Surface	IWC-3511	s of each	Each identified occurrence and each inspection interval [Note (15)]
	Valves					
C3.40	Welded Attachments	IWC-2500-5	Surface	IWC-3512	100% of required areas of each welded attachment	Each identified occurrence and each inspection interval [Note (15)]
EXAMINATION CATEGORY C-D, PRESSURE RETAINING BOLTING GREATER THAN 2 in. (50 mm) IN DIAMETER						
Item No.	Parts Examined [Note (16)]	Examination Requirements/ Figure No.	Examination Method [Note (17)]	Acceptance Standard	Extent of Examination [Note (16)], [Note (18)], [Note (19)]	Frequency of Examination [Note (20)]
	Pressure Vessels [Note (1)]					
C4.10	Bolts and Studs	IWC-2500-6	Volumetric	IWC-3513	100% bolts and studs at each bolted connection of components required to be inspected	Each inspection interval
C4.20	Bolts and Studs	IWC-2500-6	Volumetric	IWC-3513		Each inspection interval
	Pumps					
C4.30	Bolts and Studs	IWC-2500-6	Volumetric	IWC-3513	connection of components required to be inspected	Each inspection interval
	Valves					
C4.40	Bolts and Studs	IWC-2500-6	Volumetric	IWC-3513	100% bolts and studs at each bolted connection of components required to be inspected	Each inspection interval

Notes 16, 17, 18, 19, 20 and 1 go here, re-numbered to Notes 1, 2, 3, 4, 5, and 6.

Table IWC-2500-1 (C-D)
Examination Category C-D, Pressure Retaining Bolting Greater Than 2 in. (50 mm) In Diameter

ASME 2011a SECTION XI

Change "Note (20)" to "Note (5)"

Change "Note (16)" to "Note (1), "Note (18)" to "Note (3)" and "Note (19)" to "Note (4)"

Change "Note (17)" to "Note (2)"

Change "Note (16)" to "Note (1)"

Change "Note (1)" to "Note (6)"

Change "Note (11)" to "Note (3)" and "Note (12)" to "Note (4)"

Change "Note (13)" to "Note (5)"

Change "Note (14)" to "Note (6)"

Change "Note (15)" to "Note (7)"

New Table

Change "Note (10)" to "Note (2)"

Table IWC-2500-1 (C-F-1)

Examination Category C-F-1, Pressure Retaining Welds In Austenitic Stainless Steel or High Alloy Piping

Notes 21, 22, 23, 24, 25, and 26 go here. Re-numbered as Notes 1, 2, 3, 4, 5, and 6.

Table IWC-2500-1
Examination Categories (Cont'd)

Change "Note (22)" to "Note (2)"

~~EXAMINATION CATEGORY C-F-1, PRESSURE RETAINING WELDS IN AUSTENITIC STAINLESS STEEL OR HIGH ALLOY PIPING~~

Item No.	Parts Examined [Note (21)]	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent of Examination [Note (22)]	Frequency of Examination [Note (24)]
C5.10	Piping Welds $\geq \frac{3}{8}$ in. (10 mm) Nominal Wall Thickness for Piping \geq NPS 4 (DN 100)					
C5.11	Circumferential Weld	C-2500-7	Surface and Volumetric	IWC-3514	100% of each weld requiring examination [Note (25)], [Note (26)]	Each inspection interval
C5.20	Piping Welds $> \frac{1}{5}$ in. (5 mm) Nominal Wall Thickness for Piping \geq NPS 2 (DN 50) and \leq NPS 4 (DN 100)					
C5.21	Circumferential Weld	IWC-2500-7	Surface and volumetric	IWC-3514	100% of each weld requiring examination [Note (25)], [Note (26)]	Each inspection interval
C5.30	Socket Welds	IWC-2500-7	Surface	IWC-3514	100% of each weld requiring examination	Each inspection interval
C5.40	Pipe Branch Connections of Branch Piping \geq NPS 2 (DN 50)					
C5.41	Circumferential Weld	IWC-2500-9 to IWC-2500-13, inclusive	Surface	IWC-3514	100% of each weld requiring examination [Note (25)]	Each inspection interval

Change "Note
(21)" to "Note
(1)"Change "Note (25)" to "Note (5)" and
"Note (26)" to "Note (6)"

Change "Note (25)" to "Note (5)"

EXAMINATION CATEGORY C-F-2, PRESSURE RETAINING WELDS IN CARBON OR LOW ALLOY STEEL PIPING

Item No.	Parts Examined [Note (21)]	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent of Examination [Note (27)], [Note (28)]	Frequency of Examination [Note (24)]
C5.50	Piping Welds $\geq \frac{3}{8}$ in. (10 mm) Nominal Wall Thickness for Piping \geq NPS 4 (DN 100)					
C5.51	Circumferential Weld	IWC-2500-7	Surface and volumetric	IWC-3514	% of each weld requiring examination [Note (25)], [Note (26)]	Each inspection interval
C5.60	Piping Welds $> \frac{1}{5}$ in. (5 mm) Nominal Wall Thickness for Piping \geq NPS 2 (DN 50) and \leq NPS 4 (DN 100)					

Change "Note
(21)" to "Note (1)"Change "Note (27)" to "Note
(2)" and "Note (28)" to "Note
(5)"Change "Note (25)" to "Note (6)"
and "Note (26)" to "Note (7)"Change "Note
(24)" to "Note (4)"

ASME 2011a SECTION XI

138

New Table

Table IWC-2500-1 (C-F-2)

Examination Category C-F-2, Pressure Retaining Welds In Carbon or Low Alloy Steel Piping

Delete this header, continuation of Table-2500-1 (C-F-2)

Table IWC-2500-1 (C-H)
Examination Category C-H, All Pressure Retaining Components

Notes 21, 27, 23, 24, 28, 25 and 26 go here, re-numbered to Notes 1, 2, 3, 4, 5, 6 and 7.

Table IWC-2500-1 Examination Categories (Cont'd)						
EXAMINATION CATEGORY C-F-2, PRESSURE RETAINING WELDS IN CARBON OR LOW ALLOY STEEL PIPING						
Item No.	Parts Examined [Note (21)]	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent of Examination [Note (27)], [Note (28)]	Frequency of Examination [Note (24)]
C5.61	Circumferential Weld	IWC-2500-7	Surface and volumetric	IWC-3514	100% of each weld requiring examination [Note (25)], [Note (26)]	Each inspection interval
C5.70	Socket Welds	IWC-2500-7	Surface	IWC-3514	100% of each weld requiring examination	Each inspection interval
C5.80	Pipe Branch Connections of Branch Piping \geq NPS 2 (DN 50)					
C5.81	Circumferential Weld	IWC-2500-9 to IWC-2500-13, inclusive	Surface	IWC-3514	100% of each weld requiring examination [Note (25)]	Each inspection interval
EXAMINATION CATEGORY C-H, ALL PRESSURE RETAINING COMPONENTS						
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method [Note (29)]	Acceptance Standard		Frequency of Examination
C7.10	Pressure retaining components	System leakage test (IWC-5220)	Visual, VT-2	IWC-3516	Pressure retaining boundary	Each inspection period

Note 29 goes here, re-numbered to Note 1

(1) These requirements do not apply to atmospheric or 0 psig to 15 psig (0 kPa to 100 kPa) storage tanks.

(2) For welds in vessels with nominal wall thickness of 0.2 in. (5 mm) or less, a surface examination may be applied in lieu of a volumetric examination. The examination shall include the weld and 0.5 in. (13 mm) on either side of the weld. The acceptance standards for the examination shall be those specified for piping in IWC-3514.

(3) Includes essentially 100% of the weld length.

(4) In the case of multiple vessels of similar design, size, and service (such as steam generators, heat exchangers), the required examinations may be limited to one vessel or distributed among the vessels.

(5) The vessel areas selected for the initial examination shall be reexamined in the same sequence over the service lifetime of the component, to the extent practical.

(6) The nozzles selected initially for examination shall be reexamined in the same sequence over the service lifetime of the component, to the extent practical.

(7) Includes nozzles welded to or integrally cast in vessels that connect to piping runs (manways and handholes are excluded).

(8) Includes only those piping runs selected for examination under Examination Category C-F.

(9) The telltale hole in the reinforcing plate shall be examined for evidence of leakage while vessel is undergoing the system leakage test (IWC-5220) as required by Examination Category C-H.

(10) Examination is limited to those welded attachments that meet the following conditions:

(a) the attachment is on the outside surface of the pressure retaining component;

(b) the attachment provides component support as defined in NF-1110;

(c) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component; and

(d) the attachment weld is full penetration, fillet, or partial penetration, either continuous or intermittent.

(11) The extent of the examination includes essentially 100% of the length of the attachment weld at each attachment subject to examination.

(12) Selected samples of welded attachments shall be examined each inspection interval.

(13) Examination is required whenever component support member deformation, e.g., broken, bent, or pulled out parts, is identified during operation, refueling, maintenance, examination, or testing.

ASME 2011a SECTION XI

139

Notes 10, 11, 12 and 13 moved to Table IWC-2500-1 (C-C)

Notes 6, 7, 8, and 9 moved to Table IWC-2500-1 (C-B)

Notes 2, 3, and 5 moved to Table IWC-2500-1 (C-A)

Note 4 moved to Tables IWC-2500-1 (C-A) and (C-B)

Note 1 moved to Tables IWC-2500-1 (C-A), (C-B), (C-C) and (C-D)

Notes 16, 17, 18, 19, and 20 moved to Table IWC-2500-1 (C-D)

Notes 14 and 15 moved to Table IWC-2500-1 (C-C)

Table IWC-2500-1
Examination Categories (Cont'd)

NOTES (CONT'D):

- (14) For multiple vessels of similar design, function, and service, only one welded attachment of only one of the multiple vessels shall be selected for examination. For single vessels, only one welded attachment shall be selected for examination. The attachment selected for examination on one of the multiple vessels or the single vessel, as applicable, shall be an attachment under continuous load during normal system operation, or an attachment subject to a potential intermittent load (seismic, water hammer, etc.) during normal system operation if an attachment under continuous load does not exist.
- (15) For piping, pumps, and valves, a sample of 10% of the welded attachments associated with the component supports selected for examination under IWF-2510 shall be examined.
- (16) The examination may be performed on bolting in place under load or upon disassembly of the connection.
- (17) When bolts or studs are removed for examination, surface examination meeting the acceptance standards of IWB-3515 may be substituted for volumetric examination.
- (18) The examination of bolting for vessels, pumps, or valves may be conducted on one vessel, one pump, or one valve among a group of vessels, pumps, or valves that are similar in design, size, function, and service. In addition, when the component to be examined contains a group of bolted connections of similar design and size (such as flanged connections or manway covers), the examination may be conducted on one bolted connection among the group.
- (19) The examination of flange bolting in piping systems may be limited to one bolted connection among a group of bolted connections that are similar in design, size, function, and service.
- (20) The areas selected for the initial examination shall be reexamined in the same sequence over the service lifetime of the component, to the extent practical.
- (21) Requirements for examination of welds in piping \leq NPS 4 (DN 100) apply to PWR high pressure safety injection and auxiliary feedwater systems in accordance with the exemption criteria of IWC-1220.
- (22) The welds selected for examination shall include 7.5%, but not less than 28 welds, of all dissimilar metal, austenitic stainless steel or high alloy welds not exempted by IWC-1220. (Some welds not exempted by IWC-1220 are not required to be nondestructively examined per Examination Category C-F-1. These welds, however, shall be included in the total weld count to which the 7.5% sampling rate is applied.) The examinations shall be distributed as follows:
- (a) the examinations shall be distributed among the Class 2 systems prorated, to the degree practicable, on the number of nonexempt dissimilar metal, austenitic stainless steel, or high alloy welds in each system (i.e., if a system contains 30% of the nonexempt welds, then 30% of the nondestructive examinations required by Examination Category C-F-1 should be performed on that system);
 - (b) within a system, the examinations shall be distributed among terminal ends, dissimilar metal welds, and structural discontinuities [See [Note (23)]] prorated, to the degree practicable, on the number of nonexempt terminal ends, dissimilar metal welds, and structural discontinuities in that system; and
 - (c) within each system, examinations shall be distributed between line sizes prorated to the degree practicable.
- (23) Structural discontinuities include pipe weld joints to vessel nozzles, valve bodies, pump casings, pipe fittings (such as elbows, tees, reducers, flanges, etc., conforming to ANSI B16.9), and pipe branch connections and fittings.
- (24) The welds selected for examination shall be reexamined in the same sequence, during subsequent inspection intervals over the service lifetime of the piping component, to the extent practical.
- (25) For circumferential welds with intersecting longitudinal welds, surface examination of the longitudinal piping welds is required for those portions of the welds within the examination boundaries of intersecting circumferential welds.
- (26) For circumferential welds with intersecting longitudinal welds, volumetric examination of the longitudinal piping welds is required for those portions of the welds within the examination boundaries of intersecting circumferential welds. The following requirements shall also be met:
- (a) When longitudinal welds are specified and locations are known, examination requirements shall be met for both transverse and parallel flaws at the intersection of the welds and for that length of longitudinal weld within the circumferential weld examination volume.
 - (b) When longitudinal welds are specified but locations are unknown, or the existence of longitudinal welds is uncertain, the examination requirements shall be met for both transverse and parallel flaws within the entire examination volume of intersecting circumferential welds.
- (27) The welds selected for examination shall include 7.5%, but not less than 28 welds, of all carbon and low alloy steel welds not exempted by IWC-1220. (Some welds not exempted by IWC-1220 are not required to be nondestructively examined per Examination Category C-F-2. These welds, however, shall be included in the total weld count to which the 7.5% sampling rate is applied.) The examinations shall be distributed as follows:
- (a) the examinations shall be distributed among the Class 2 systems prorated, to the degree practicable, on the number of nonexempt carbon and low alloy steel welds in each system (i.e., if a system contains 30% of the nonexempt welds, then 30% of the nondestructive examinations required by Examination Category C-F-2 should be performed on that system);
 - (b) within a system, the examinations shall be distributed among terminal ends and structural discontinuities [See [Note (23)]] prorated, to the degree practicable, on the number of nonexempt terminal ends and structural discontinuities in that system; and
 - (c) within each system, examinations shall be distributed between line sizes prorated to the degree practicable.

Notes 21, 23,
24, 25, and 26
moved to
Table
IWC-2500-1
(C-F-1) and
(C-F-2)

ASME 2011a SECTION XI

Change "[See
[Note (23)]]" to
"[See Note (3)]"
Note to Editor:
Deleting
redundant
brackets.

Note 27 moved to Table IWC-2500-1 (C-F-2)

Note 22 moved to Table IWC-2500-1 (C-F-1)

Note 28 moved to Table IWC-2500-1 (C-F-2)



**Table IWC-2500-1
Examination Categories (Cont'd)**

NOTES (CONT'D):
(28) Only those welds showing reportable preservice transverse indications need to be examined by the ultrasonic method for reflectors transverse to the weld length direction, except that circumferential welds with intersecting longitudinal weld shall meet [Note (26)]

(29) Visual examination of IWA-5240.



Note 29 moved to Table IWC-2500-1 (C-H)

Change "[Note (26)]" to "Note (7)"
Note to Editor: Deleting unnecessary brackets.



**Table IWC-3410-1
Acceptance Standards**

Examination Category	Component and Part Examined	Acceptance Standard
C-A	Welds in pressure vessels	IWC-3510
C-B	Vessel nozzle welds	IWC-3511
C-C	Welded attachments for vessels, piping, pumps, and valves	IWC-3512
C-D	Bolting	IWC-3513
C-F-1, C-F-2	Welds in piping	IWC-3514
C-H	Pressure retaining components	IWC-3516

IWC-3430 ACCEPTABILITY

Flaws that meet the requirements of IWC-3500 for the respective examination category shall be acceptable.

IWC-3500 ACCEPTANCE STANDARDS**IWC-3510 STANDARDS FOR EXAMINATION CATEGORY C-A, PRESSURE RETAINING WELDS IN PRESSURE VESSELS****IWC-3510.1 Allowable Planar Flaws.**

(a) The size of allowable planar flaws within the boundary of the examination volumes specified in Figs. IWC-2500-1 and IWC-2500-2 shall not exceed the limits specified in Table IWC-3510-1.

(b) Where a flaw extends beyond the examination volumes, or separate flaws lie both within and beyond the boundaries but are characterized as a single flaw by IWA-3400, the overall size of the flaw shall not exceed the limits specified in Table IWC-3510-1.

(c) Any two or more coplanar aligned flaws characterized as separate flaws by IWA-3330 are allowable, provided the requirements of IWA-3390 are met.

IWC-3510.2 Allowable Laminar Flaws. The areas of allowable laminar flaws within the boundary of the examination zone delineated in the applicable figures specified in IWC-3510.1(a) shall not exceed the limits specified in Table IWC-3510-2.

IWC-3510.3 Conditionally Allowable Laminar Flaws.

(a) Laminar flaws that exceed the standards specified in IWC-3510.2 shall be considered conditionally allowable laminar flaws. In such cases, these laminar flaws shall be included as additional areas of the component subject to examination under the applicable examination categories of Table IWC-2500-1.

(b) Laminar flaws that join with a planar flaw shall be governed by the standards of IWC-3510.1.

Table IWC-2500-1 (C-A)

IWC-3510.4 Allowable Linear Flaws.

(a) The size of allowable linear flaws as detected by either a surface examination (MT/PT) or volumetric examination (RT) within the boundary of the examination volumes shown in Figs. IWC-2500-1 and IWC-2500-2 and within the boundaries of the examination surfaces shown in Fig. IWC-2500-5[see IWC-3512.1(a)] shall not exceed the limits specified in Table IWC-3510-3.

(b) Where a flaw extends beyond the examination boundaries, or separate linear flaws lie both within and beyond the boundaries but are characterized as a single flaw by IWA-3400, the overall flaw size shall be compared with the standards of Table IWC-3510-3.

IWC-3511 Standards for Examination Category C-B, Pressure Retaining Welds of Nozzles in Vessels**IWC-3511.1 Allowable Planar Flaws.**

(a) The size of allowable planar flaws in the nozzle and weld areas within the boundary of the examination volume specified in Fig. IWC-2500-4 shall not exceed the limits specified in Table IWC-3511-1, for ferritic steels. For austenitic steels, the standards are in the course of preparation; the acceptance standards of Table IWB-3514-2 may be used.

(b) The size of allowable planar flaws in the vessel shell (or head) material adjoining the nozzle and weld areas and within the boundary of the examination volumes specified in Fig. IWC-2500-4 shall not exceed the limits of Table IWC-3510-1, for ferritic steels. For austenitic steels, the standards are in the course of preparation; the acceptance standards of Table IWB-3514-2 may be used.

(c) Any two or more coplanar aligned flaws characterized as separate flaws by IWA-3300 are allowable, provided the requirements of IWA-3390 are met.

IWC-3511.2 Allowable Linear Flaws.

(a) The size of allowable linear flaws, as detected by either a surface (PT/MT) or volumetric examination (RT), within the boundary of the examination surfaces and volumes shown in Figs. IWC-2500-3 and IWC-2500-4 shall not exceed the limits specified in Table IWC-3511-2, for

ARTICLE IWC-5000 SYSTEM PRESSURE TESTS

IWC-2500-1 (C-H)

IWC-5200 SYSTEM TEST REQUIREMENTS

IWC-5210 TEST

(a) Pressure retaining components shall be tested at the frequency stated in, and visually examined by the methods specified in Table IWC-2500-1, Examination Category C-H.

(b)

(1) The system pressure tests and visual examinations shall be conducted in accordance with IWA-5000 and this Article. The contained fluid in the system shall serve as the pressurizing medium.

(2) Alternatively, steam systems may use either water or gas as the pressurizing medium. When gas is the pressurizing medium, the test procedure shall include methods for detection and location of through-wall leakage from components of the system tested.

IWC-5220 SYSTEM LEAKAGE TEST

IWC-5221 Pressure

The system leakage test shall be conducted at the system pressure obtained while the system, or portion of the system, is in service performing its normal operating function or at the system pressure developed during a test conducted to verify system operability (e.g., to demonstrate system safety function or satisfy technical specification surveillance requirements).

IWC-5222 Boundaries

(a) The pressure retaining boundary includes only those portions of the system required to operate or support the safety function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required.

(b) Items outside the boundaries of (a), and open ended discharge piping, are excluded from the examination requirements.

IWC-5230 HYDROSTATIC TEST

(a) The hydrostatic test pressure shall be at least 1.10 times the system pressure P_{sv} for systems with Design Temperature of 200°F (95°C) or less, and at least 1.25 times the system pressure P_{sv} for systems with Design Temperature above 200°F (95°C). The system pressure P_{sv} shall be the lowest pressure setting among the number of safety or relief valves provided for overpressure protection within the boundary of the system to be tested. For

systems (or portions of systems) not provided with safety or relief valves, the system design pressure P_d shall be substituted for P_{sv} .

(b) The test pressure for a pneumatic test conducted in accordance with IWA-5211(c) shall be the system leakage test pressure of IWC-5221.

(c) In the case of atmospheric storage tanks, the nominal hydrostatic pressure, developed with the tank filled to its design capacity, shall be acceptable as the system test pressure.

(d) For 0–15 psi (0–100 kPa) storage tanks, the test pressure shall be 1.1 P_G , Design Pressure of vapor or gas space above liquid level for which overpressure protection is provided by relief valves.

(e) The hydrostatic test of the Class 2 portion of the Main Steam System in Boiling Water Reactor (BWR) plants may be performed in conjunction with the hydrostatic test of the Class 1 portion, when the Class 2 portion is not capable of being isolated from the Class 1 portion by the boundary valve. The hydrostatic test of the Class 2 portion shall meet the requirements of IWA-5000 and IWB-5230.

(f) For the purpose of the test, open ended portions of a suction or drain line from a storage tank extending to the first shutoff valve shall be considered as an extension of the storage tank.

(g) For open ended portions of discharge lines beyond the last shutoff valve in nonclosed systems (e.g., containment spray header), demonstration of an open flow path test shall be performed in lieu of the system hydrostatic test. Test personnel need not be qualified for VT-2 visual examination.

(h) Open ended vent and drain lines extending beyond the last shutoff valve and open ended safety or relief valve discharge lines are exempt from hydrostatic testing.

(i) The pressure measuring instrument used for measuring system hydrostatic or pneumatic test pressure shall meet the requirements of IWA-5260.

IWC-5240 TEMPERATURE

(a) The system test temperature during a system hydrostatic test in systems containing ferritic steel components shall meet the requirements specified by fracture prevention criteria.

(b) In systems containing ferritic steel components for which fracture toughness requirements were neither specified nor required in the construction of the components, the system test temperature shall be determined by the Owner.

ARTICLE IWD-2000 EXAMINATION AND INSPECTION

IWD-2200 PRESERVICE EXAMINATION

All examinations required by this Article (with the exception of Examination Category D-B of Table IWD-2500-1) shall be performed completely, once, as a preservice examination requirement prior to initial plant startup.

Table IWD-2500-1 (D-B))

IWD-2400 INSPECTION SCHEDULE

IWD-2410 INSPECTION PROGRAM

Inservice examinations and system pressure tests may be performed during either system operation or plant outages.

IWD-2411 Inspection Program

(a) The required examinations in each examination category shall be completed during each inspection interval in accordance with Table IWD-2411-1, with the exceptions of Category D-B and of welded attachments examined as a result of component support deformation under Examination Category D-A. If there are less than three items to be examined in an Examination Category, the items may be examined in any two periods, or in any one period if there is only one item, in lieu of the percentage requirements of Table IWD-2411-1.

Table IWD-2411-1 Inspection Program			
Inspection Interval	Inspection Period, Calendar Years of Plant Service Within the Interval	Minimum Examinations Completed, %	Maximum Examinations Credited, %
All	3	16	50
	7	50 [Note (1)]	75
	10	100	100
NOTE: (1) If the first period completion percentage for any examination category exceeds 34%, at least 16% of the required examinations shall be performed in the second period.			

(b) If items are added to the Inspection Program, during the service lifetime of a plant, examination shall be scheduled as follows:

(1) When items are added during the first period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item Number for the added items shall be performed during each of the second and third periods of that interval.

(2) When items are added during the second period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item Number for the added items shall be performed during the third period of that interval.

(3) When items are added during the third period of an interval, examinations shall be scheduled in accordance with (a) for successive intervals.

IWD-2420 SUCCESSIVE INSPECTIONS

(a) The sequence of component examinations which was established during the first inspection interval shall be repeated during each successive inspection interval, to the extent practical. The sequence of component examinations may be modified in a manner that optimizes scaffolding, radiological, insulation removal, or other considerations, provided that the percentage requirements of Table IWD-2411-1 are maintained.

(b) If components are accepted for continued service by evaluation in accordance with IWD-3000, the areas containing flaws or relevant conditions shall be reexamined during the next inspection period listed in the schedule of the Inspection Program of IWD-2400.

(c) If the reexaminations required by (b) above reveal that the flaws or relevant conditions remain essentially unchanged, or that the flaw growth is within the growth predicted by the analytical evaluation, for the next inspection period, then the component examination schedule may revert to the original schedule of successive inspections or the inspection interval defined by the analytical evaluation, whichever is limiting.

(d) If the reexaminations required by (b) above reveal new flaws or relevant conditions that exceed the applicable acceptance standards of IWD-3400, or growth of existing flaws in excess of the growth predicted by the analytical evaluation, then

(1) the entire weld, area, or part³⁴ shall be examined during the current outage

(2) additional examinations shall be performed in accordance with IWD-2430

(e) If welded attachments are examined as a result of identified component support deformation and the results of these examinations exceed the acceptance standards of IWD-3000, successive examinations shall be performed, if determined necessary based on an evaluation by the Owner. The evaluation shall be documented and shall include the cause of the welded attachment damage if known. If the cause of the welded attachment damage could recur or is unknown, successive examinations shall be performed in accordance with the requirements of (b) above. No successive examinations are required if either of the following applies:

- (1) There are no other welded attachments subject to the same apparent or root cause conditions.
- (2) The degradation mechanism no longer exists.

(10) IWD-2430 ADDITIONAL EXAMINATIONS

(a) Examinations performed in accordance with Table IWD-2500-1, except for Examination Category D-B, that reveal flaws or relevant conditions exceeding the acceptance standards of IWD-3000 shall be extended to include additional examinations during the current outage in accordance with (1) or (2) below.

(1) Additional examinations shall be performed in accordance with the following requirements:

(-a) The additional examinations shall include an additional number of welds, areas, or parts³⁴ included in the inspection item³⁵ equal to 20% of the number of welds, areas, or parts included in the inspection item that are scheduled to be performed during the interval. The additional examinations shall be selected from welds, areas, or parts of similar material and service. This additional selection may require inclusion of piping systems other than the one containing the flaws or relevant conditions.

(-b) If the additional examinations required by (-a) above reveal flaws or relevant conditions exceeding the acceptance standards of Article IWD-3000, the examinations shall be further extended to include additional examinations during the current outage. These additional examinations shall include the remaining number of welds, areas, or parts of similar material and service subject to the same type of flaws or relevant conditions.

(2) Additional examinations shall be performed in accordance with the following requirements:

(-a) An engineering evaluation shall be performed. Topics to be addressed in the engineering evaluation shall include the following:

- (-1) a determination of the cause of the flaws or relevant conditions
- (-2) an evaluation of applicable service conditions and degradation mechanisms to establish that the affected welds, areas, or parts³⁴ will perform their intended safety functions during subsequent operation

(-3) a determination of which additional welds, areas, or parts³⁴ are subject to the same service conditions and degradation mechanisms that caused the flaws or relevant conditions

(-b) Additional examinations shall be performed on all those welds, areas, or parts³⁴ subject to the same service conditions and degradation mechanisms that caused the flaws or relevant conditions. This additional selection might require inclusion of piping systems other than the one containing the original flaws or relevant conditions. No additional examinations are required if the engineering evaluation concludes that

(-1) there are no additional welds, areas, or parts subject to the same service conditions that caused the flaws or relevant conditions or

(-2) no degradation mechanism exists

(-c) The engineering evaluation shall be retained in accordance with Article IWA-6000.

(b) The examination method for additional examinations may be limited to the examination method that originally identified the flaws or relevant conditions, provided use of the method is supported by an engineering evaluation. The engineering evaluation shall determine the cause of the flaws or relevant conditions and the appropriate method to be used as part of the additional examination scope. The engineering evaluation shall be retained in accordance with Article IWA-6000.

(c) For the inspection period following the period in which the examinations of (a) were completed, the examinations shall be performed as originally scheduled in accordance with IWD-2400.

(d) If welded attachments are examined as a result of identified component support deformation, and the results of these examinations exceed the acceptance standards of IWD-3000, additional examinations shall be performed, if determined necessary, based on an evaluation by the Owner. The evaluation shall be documented and shall include the cause of the welded attachment damage if known. If the cause of the welded attachment damage could recur or is unknown, additional examinations shall be performed in accordance with the requirements of (a) above. No additional examinations are required if either of the following applies:

- (1) There are no other welded attachments subject to the same apparent or root cause conditions.
- (2) The degradation mechanism no longer exists.

IWD-2500 EXAMINATION AND PRESSURE TEST REQUIREMENTS

(a) Components shall be examined and pressure tested as specified in Table IWD-2500-1. The method of examination for the components and parts of the pressure retaining boundaries shall comply with those tabulated in Table IWD-2500-1 except where alternate examination methods are used that meet the requirements of IWA-2240.

Tables IWD-2500-1 (D-A) and
IWD-2500-1 (D-B)

replace "is" with "are"

(b) Table IWD-2500-1 is organized as follows.

Examination Category	Examination Area
D-A	Welded Attachments for Pressure Vessels, Piping, Pumps, and Valves
D-B	All Pressure Retaining Components

Table IWD-2500-1 (D-A)
Examination Category D-A, Welded Attachments for Pressure Vessels [Note (1)], Piping, Pumps, and Valves

Table IWD-2500-1
Examination Categories

<div>EXAMINATION CATEGORY D-A, WELDED ATTACHMENTS FOR PRESSURE VESSELS [Note (1)], PIPING, PUMPS, AND VALVES</div>						
Item No.	Parts Examined [Note (2)]	Examination Requirements/ Fig. No.	Examination Method	Acceptance Standard	Extent of Examination [Note (3)], [Note (4)]	Frequency of Examination [Note (4)], [Note (5)]
	Pressure Vessels	IWD-2500-1	Visual, VT-1	IWD-3000	100% of required areas of each welded attachment	Each identified occurrence and each inspection interval
D1.10	Welded Attachments					
	Piping	IWD-2500-1	Visual, VT-1	IWD-3000	100% of required areas of each welded attachment	Each identified occurrence and each inspection interval
D1.20	Welded Attachments					
	Pumps	IWD-2500-1	Visual, VT-1	IWD-3000	100% of required areas of each welded attachment	Each identified occurrence and each inspection interval
D1.30	Welded Attachments					
	Valves	IWD-2500-1	Visual, VT-1	IWD-3000	100% of required areas of each welded attachment	Each identified occurrence and each inspection interval
D1.40	Welded Attachments					
<div>EXAMINATION CATEGORY D-B, WELDED ATTACHMENTS FOR VESSELS, PIPING, PUMPS, AND VALVES</div>						
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent of Examination	Frequency of Examination
D2.10	Pressure retaining components	System leakage test (IWD-5220)	Visual, VT-2	IWD-3000	Pressure retaining boundary	Each inspection period

NOTES:

- (1) These requirements do not apply to atmospheric or 0 psig to 15 psig (0 kPa to 100 kPa) storage tanks.
- (2) Examination is limited to those welded attachments that meet the following conditions:
 - (a) the attachment is on the outside surface of the pressure retaining component;
 - (b) the attachment provides component support as defined in NF-1110;
 - (c) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component; and
 - (d) the attachment weld is full penetration, fillet, or partial penetration, either continuous or intermittent.
- (3) The extent of the examination includes essentially 100% of the length of the attachment weld at each attachment subject to examination.
- (4) Selected samples of welded attachments shall be examined each inspection interval. All welded attachments selected for examination shall be those most subject to corrosion, as determined by the Owner, such as the welded attachments of the Service Water or Emergency Service Water systems. For multiple vessels of similar design, function and service, the welded attachments of only one of the multiple vessels shall be selected for examination. For single vessels, only one welded attachment shall be selected for examination. The attachment selected for examination on one of the multiple vessels or the single vessel, as applicable, shall be an attachment under continuous load during normal system operation, or an attachment subject to a potential intermittent load (seismic, water hammer, etc.) during normal system operation if an attachment under continuous load does not exist. For welded attachments of piping, pumps, and valves, a 10% sample shall be selected for examination. This percentage sample shall be proportional to the total number of nonexempt welded attachments connected to the piping, pumps, and valves in each system subject to these examinations.
- (5) Examination is required whenever component support member deformation, e.g., broken, bent, or pulled out parts, is identified during operation, refueling, maintenance, examination, or testing.

Notes 1-5 to be moved to
Table IWD-2500-1 (D-A)

Table IWD-2500-1 (D-B)
Examination Category D-B, All Pressure Retaining Components

Note to Editor: The title was incorrectly shown as "Welded Attachments for Pressure Vessels, Piping, Pumps, and Valves" in 2011 Addenda.

New Table

ASME 2011a SECTION XI

ARTICLE IWD-5000 SYSTEM PRESSURE TESTS

IWD-2500-1 (D-B)

IWD-5200 SYSTEM TEST REQUIREMENTS

IWD-5210 TEST

(a) Pressure retaining components shall be tested at the frequency stated in, and visually examined by the methods specified in Table IWD-2500-1, Examination Category D-B.

(b)

(1) The system pressure tests and visual examinations shall be conducted in accordance with IWA-5000 and this Article. The contained fluid in the system shall serve as the pressurizing medium.

(2) Alternatively, steam systems may use either water or gas as the pressurizing medium. When gas is the pressurizing medium, the test procedure shall include methods for detection and location of through-wall leakage from components of the system tested.

IWD-5220 SYSTEM LEAKAGE TEST

IWD-5221 Pressure

The system leakage test shall be conducted at the system pressure obtained while the system, or portion of the system, is in service performing its normal operating function or at the system pressure developed during a test conducted to verify system operability (e.g., to demonstrate system safety function or satisfy technical specification surveillance requirements).

IWD-5222 Boundaries

(a) The pressure-retaining boundary for closed systems includes only those portions of the system required to operate or support the safety-related function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required.

(b) The pressure-retaining boundary for nonclosed systems (e.g., service water systems) includes only those portions of the system required to operate or support the safety function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required. Open-ended discharge piping is included in the pressure-retaining boundary, provided it is periodically pressurized to conditions described in IWD-5221.

(c) The following portions of systems are excluded from examination requirements:

- (1) items outside the boundaries of (a)
- (2) items outside the boundaries of (b)

(3) open-ended discharge piping that is not periodically pressurized to conditions described in IWD-5221

(4) portions of systems that are associated with a spray header or are normally submerged in its process fluid such that the external surfaces of the pressure-retaining boundary are normally wetted during its pressurized conditions

IWD-5230 HYDROSTATIC TEST

(a) The system hydrostatic test pressure shall be at least 1.10 times the system pressure P_{sv} for systems with Design Temperature of 200°F (95°C) or less, and at least 1.25 times the system pressure P_{sv} for systems with Design Temperature above 200°F (95°C). The system pressure P_{sv} shall be the lowest pressure setting among the number of safety or relief valves provided for overpressure protection within the boundary of the system to be tested. For systems (or portions of systems) not provided with safety or relief valves, the system design pressure P_d shall be substituted for P_{sv} .

(b) The test pressure for a pneumatic test conducted in accordance with IWA-5211(c) shall be the system leakage test pressure of IWD-5221.

(c) In the case of atmospheric storage tanks, the hydrostatic head, developed with the tank filled to its design capacity, shall be acceptable as the test pressure.

(d) For 0 psi to 15 psi (0 kPa to 100 kPa) storage tanks, the test pressure shall be $1.1P_G$, Design Pressure of vapor or gas space above liquid level for which overpressure protection is provided by relief valve.

(e) For the purpose of the test, open ended³⁶ portions of suction or drain lines from a storage tank extending to the first shutoff valve shall be considered as an extension of the storage tank.

(f) For open ended portions of discharge lines beyond the last shutoff valve in nonclosed systems (e.g., service water systems), confirmation of adequate flow during system operation shall be acceptable in lieu of system hydrostatic test. Test personnel need not be qualified for VT-2 visual examination.

(g) Open ended vent and drain lines from components extending beyond the last shutoff valve and open ended safety or relief valve discharge lines, including safety or relief valve piping which discharges into the containment pressure suppression pool, shall be exempt from hydrostatic test.

(3) the vessel is leak rate tested after completion of construction or repair/replacement activities to the leak rate requirements of the Design Specifications.

(b) Portions of Class CC metallic shell and penetration liners that are embedded in concrete or otherwise made inaccessible during construction or as a result of repair/replacement activities are exempted from examination, provided:

(1) all welded joints that are inaccessible for examination are examined in accordance with CC-5520 and, prior to being covered or otherwise obstructed by adjacent structures, components, parts, or appurtenances, are tested for leak tightness in accordance with CC-5536; and

(2) the containment is leak rate tested after completion of construction or repair/replacement activities to the leak rate requirements of the Design Specifications;

(c) Surface areas of Class MC containment vessels, parts and appurtenances, and surface areas of Class CC metallic shell and penetration liners are considered inaccessible if visual access by line of sight from permanent vantage points is obstructed by permanent plant structures, equipment, or components, provided these surface areas do not require examination in accordance with the inspection plan or IWE-1240.

IWE-1240 SURFACE AREAS REQUIRING AUGMENTED EXAMINATION

IWE-1241 Examination Surface Areas

Surface areas subject to accelerated degradation and aging require the augmented examinations identified in Table IWE-2500-1, Examination Category E-C. Such areas include the following:

(a) interior and exterior containment surface areas that are subject to accelerated corrosion with no or minimal corrosion allowance or areas where the absence or repeated loss of protective coatings has resulted in substantial corrosion and pitting. Typical locations of such areas are those exposed to standing water, repeated wetting and drying, persistent leakage, and those with geometries that permit water accumulation, condensation, and microbiological attack. Such areas may include penetration sleeves, stiffeners, surfaces wetted during refueling, concrete-to-steel shell or liner interfaces, embedment zones, leak chase channels, drain areas, or sump liners.

(b) interior and exterior containment surface areas that are subject to excessive wear from abrasion or erosion that causes a loss of protective coatings, deformation, or material loss. Typical locations of such areas are those subject to substantial traffic, sliding pads or supports, pins or clevises, shear lugs, seismic restraints, surfaces exposed to water jets from testing operations or safety relief valve discharges, and areas that experience wear from frequent vibrations.

(c) interior and exterior containment surface areas identified in accordance with IWE-2420(b).

IWE-1242 Identification of Examination Surface Areas

Surface areas requiring augmented examination shall be determined in accordance with IWE-1241, and shall be identified in the Owner's Inspection Program.

Examination methods shall be in accordance with IWE-2500(b).

IWE-2500-1 (E-C)

ARTICLE IWE-2000 EXAMINATION AND INSPECTION

IWE-2100 GENERAL

(a) The requirements of IWA-2000 apply except as follows:

(1) The requirements of IWA-2210 and IWA-2300 do not apply to general visual examination, except as required by IWE-2330(b).

(2) The requirements of IWA-2500 and IWA-2600 do not apply.

Tables IWE-2500-1 (E-A), IWE-2500-1 (E-C), and IWE-2500-1 (E-G)

IWE-2200 PRESERVICE EXAMINATION

(a) Examinations listed in Table IWE-2500-1 shall be completed prior to initial plant startup. These preservice examinations shall include the pressure retaining portions of components not exempted by IWE-1220.

(b) When visual examinations are required, these examinations shall be performed in accordance with IWE-2600, following the completion of the pressure test required by the Construction Code and after application of protective coatings (e.g., paint) when such coatings are required.

(c) When a vessel or liner is subjected to a repair/replacement activity during the service lifetime of a plant, the preservice examination requirements for the portion of the vessel or liner affected by the repair/replacement activity shall be met as follows:

(1) The examination requirements of Table IWE-2500-1 apply.

(2) The preservice examination shall be performed upon completion of the repair/replacement activity. If the plant is not in service, the preservice examination shall be performed prior to resumption of service.

(3) When a system pressure test is required by IWE-5220 following completion of the repair/replacement activity, the preservice examination shall be performed during, or upon completion of, the pressure test.

(d) Welds made as part of repair/replacement activities shall be examined in accordance with the requirements of IWA-4000, except that for welds joining Class MC or Class CC components to items designed, constructed, and installed to the requirements of Section III, Class 1, 2, or 3, the examination requirements of IWB-2000, IWC-2000, or IWD-2000, as applicable, shall also apply.

Tables IWE-2500-1 (E-A), IWE-2500-1 (E-C), and IWE-2500-1 (E-G)

(e) Preservice examination for a repair/replacement activity may be conducted prior to installation provided:

(1) the examination is performed after the pressure test required by the Construction Code has been completed;

(2) the examination is conducted under conditions and with equipment and techniques equivalent to those that are expected to be employed for subsequent inservice examinations; and

(3) the shop or field examination records are, or can be, documented and identified in a form consistent with that required by IWA-6000.

IWE-2300 VISUAL EXAMINATION, PERSONNEL QUALIFICATION, AND RESPONSIBLE INDIVIDUAL

IWE-2310 VISUAL EXAMINATIONS

(10)

The following requirements apply to IWE-2311, IWE-2312, and IWE-2313.

(a) Painted or coated areas shall be visually examined for evidence of flaking, blistering, peeling, discoloration, and other signs of distress.

(b) Noncoated areas shall be examined for evidence of cracking, discoloration, wear, pitting, corrosion, gouges, surface discontinuities, dents, and other signs of surface irregularities.

(c) Visual examinations shall be performed, either directly or remotely, by line of sight from floors, platforms, walkways, ladders, or other permanent vantage points, unless temporary access is required by the inspection plan.

IWE-2311 General Visual Examinations

(10)

General visual examinations shall be performed in accordance with IWE-2500 and Table IWE-2500-1, Examination Category E-A, to determine the general condition of containment surfaces and detect evidence of degradation.

IWE-2312 VT-3 Visual Examinations

(10)

VT-3 visual examinations shall be performed in accordance with IWE-2500 and Table IWE-2500-1, Examination Category E-A, to determine the condition of wetted surfaces of submerged areas and determine the condition of vent system surfaces of BWR containments.

IWE-2500-1 (E-A)

IWE-2500-1 (E-C)**IWE-2313 VT-1 Visual Examinations**

VT-1 visual examinations shall be performed
(a) in accordance with IWE-2500 and Table IWE-2500-1, Examination Category E-C,

(1) to assess the initial condition of surfaces requiring augmented examinations in accordance with IWE-1241 and to determine the magnitude and extent of any deterioration and distress of these surfaces during subsequent augmented examinations;

(2) to determine the condition of inaccessible areas [IWE-1232(c)] when conditions are initially detected in accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas; and

(b) in accordance with IWE-2500 and Table IWE-2500-1, Examination Category E-C, to assess the condition of containment pressure retaining bolting.

IWE-2320 RESPONSIBLE INDIVIDUAL

(a) The Responsible Individual shall be knowledgeable in the requirements for design, inservice inspection, and testing of Class MC and metallic liners of Class CC components.

(b) The Responsible Individual shall be responsible for the following:

- (1) development of plans and procedures for general visual examination of containment surfaces
- (2) instruction, training, and approval of general visual examination personnel
- (3) performance or direction of general visual examinations
- (4) evaluation of general visual examination results and documentation

IWE-2330 PERSONNEL QUALIFICATION

(a) Personnel performing VT-1 and VT-3 visual examinations shall meet the qualification requirements of IWA-2300.

(b) Personnel performing general visual examinations shall meet the vision test requirements of IWA-2321(a).

IWE-2400 INSPECTION SCHEDULE**IWE-2410 INSPECTION PROGRAM**

Inservice examinations and system pressure tests may be performed during plant outages such as refueling shutdowns or maintenance shutdowns. The requirements of the Inspection Program shall be met.

IWE-2411 Inspection Program

(a) With the exception of the examinations that may be deferred until the end of an inspection interval, as specified in Table IWE-2500-1, the required examinations shall be completed during each successive inspection interval, in accordance with Table IWE-2411-1.

**Table IWE-2411-1
Inspection Program**

Inspection Interval	Inspection Period, Calendar Years of Plant Service Within the Interval	Minimum Examinations Completed, %	Maximum Examinations Credited, %
All	3	16	50
	7	50 [Note (1)]	75
	10	100	100

NOTE:

(1) If the first period completion percentage for any examination category exceeds 34%, at least 16% of the required examinations shall be performed in the second period.

IWE-2500-1 (E-G)

(b) If items or welds are added to the Inspection Program, examination shall be scheduled as follows.

(1) When items or welds are added during the first period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item Number for the added items or welds shall be performed during each of the second and third periods of that interval. Alternatively, if deferral of the examinations is permitted for the Examination Category and Item Number, the second period examinations may be deferred to the third period and at least 50% of the examinations required by the applicable Examination Category and Item Number for the added items or welds shall be performed during the third period.

(2) When items or welds are added during the second period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item Number for the added items or welds shall be performed during the third period of that interval.

(3) When items or welds are added during the third period of an interval, examinations shall be scheduled in accordance with (a) above for successive intervals.

IWE-2420 SUCCESSIVE INSPECTIONS

(a) The sequence of component examinations established during the first inspection interval shall be repeated during each successive inspection interval, to the extent practical. The sequence of component examinations may be modified in a manner that optimizes scaffolding, radiological, insulation removal, or other considerations, provided that the percentage requirements of Table IWE-2411-1 are maintained.

(b) When examination results detect flaws, areas of degradation, or conditions that require an engineering evaluation in accordance with IWE-3000 or IWE-2500(d), and the component is acceptable for continued service, the areas containing such flaws, areas of degradation, or conditions shall be reexamined during the next inspection period listed in the schedule of the Inspection Program of IWE-2411, in accordance with Table IWE-2500-1, Examination Category E-C.

Tables IWE-2500-1 (E-A) and IWE-2500-1 (E-G)

180 IWE-2500-1 (E-C)

(c) When the evaluation of examination results identifies conditions that could indicate the presence of, or result in, flaws or degradation in inaccessible areas [as defined in IWE-1232(c)], the inaccessible areas shall be examined, to the extent possible, for evidence of flaws and degradation. If the examination results detect flaws or areas of degradation requiring engineering evaluation in accordance with IWE-3000, and the component is acceptable for continued service, the requirement of (b) shall be met.

(d) When the reexaminations required by (b) reveal that the flaws or areas of degradation remain essentially unchanged for the next inspection period, these areas no longer require augmented examination in accordance with Table IWE-2500-1, Examination Category E-C.

(4) Ultrasonic thickness measurements shall be used to determine the minimum wall thickness within each grid. The location of the minimum wall thickness within each grid shall be marked or recorded such that periodic reexamination can be performed in accordance with the requirements of Table IWE-2500-1, Examination Category E-C. A sampling plan may be used to determine the number and location of ultrasonic thickness measurement grids within each contiguous examination area provided.

(-a) Acceptance of the examination area is based on a statistical confidence level of at least 95% that 95% of all grids within the examination area will meet the acceptance standards of IWE-3500; and

(-b) Ultrasonic thickness measurements shall be performed at random

(c) Pressure test requirements for components and parts of the pressure retaining boundary shall comply with the requirements of IWE-5000.

(d) When conditions exist in accessible areas that could indicate the presence of, or result in, degradation in an inaccessible area, an engineering evaluation shall be performed to determine the acceptability of the inaccessible area. Such areas are subject to the requirements of IWE-2420(b) and IWE-2420(c).

(a) **IWE-2500 EXAMINATION AND PRESSURE TEST REQUIREMENTS**

(a) Examination methods shall comply with those tabulated in Table IWE-2500-1 except when alternate examination methods are used that meet the requirements of IWA-2240.

(b) Methods for augmented examination of surface areas identified in IWE-1242 shall comply with the following criteria:

(1) Surface areas requiring augmented examination that are accessible for visual examination shall be visually examined using a VT-1 visual examination method.

(2) Surface areas requiring augmented examination that are not accessible for visual examination on the side requiring augmented examination shall be examined for wall thinning using an ultrasonic thickness measurement method in accordance with Appendix I.

(3) When ultrasonic thickness measurements are performed, grids not exceeding one foot square shall be used. The number and location of the grids shall be determined by the Owner.

IWE-2600 CONDITION OF SURFACE TO BE EXAMINED

(a) When a containment vessel or liner is painted or coated to protect surfaces from corrosion, preservice and inservice visual examinations shall be performed without the removal of the paint or coating.

(b) When removal of paint or coating is required, it shall be removed in a manner that will not reduce the base metal or weld thickness below the design thickness.

Tables IWE-2500-1 (E-A), IWE-2500-1 (E-C), and IWE-2500-1 (E-G)

Note 4 goes here, re-numbered as Note 1.

Notes 1, 2, and 3 go here.

Table IWE-2500-1 (E-A)
Examination Category E-A, Containment Surfaces

(a)(10)

**Table IWE-2500-1
Examination Categories**

EXAMINATION CATEGORY E-A, CONTAINMENT SURFACES							
Item No.	Parts Examined	Examination Requirements/ Fig. No. [Note (1)]	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Inspection to End of Interval
					1st Inspection Interval	Successive Inspection Intervals	
E1.10	Containment Vessel Pressure Retaining Boundary [Note (1)]	IWE-2310	General visual	IWE-3510	100% During each Inspection Period	100% During each Inspection Period	N/A
E1.11	Accessible Surface Areas						
E1.12	Wetted Surfaces of Submerged Areas	IWE-2310	VT-3	IWE-3510	100%	100%	Permissible
E1.20	BWR Vent System Accessible Surface Areas [Note (1)], [Note (2)]	IWE-2310	VT-3	IWE-3510	100%	100%	Permissible
E1.30	Moisture Barriers [Note (3)]	IWE-2310, Fig. IWE-2500-1	General visual	IWE-3510	100% During each Inspection Period	100% During each Inspection Period	N/A
EXAMINATION CATEGORY E-C, CONTAINMENT SURFACES REQUIRING AUGMENTED EXAMINATION							
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Inspection to End of Interval
					1st Inspection Interval	Successive Inspection Intervals	
E4.10	Containment Surface Areas [Note (4)]	IWE-2310, IWE-2500(b)(1)	VT-1	IWE-3520	100% of surface areas identified by IWE-1242 [Note (4)]	100% of surface areas identified by IWE-1242	Not permissible
E4.11	Visible Surfaces						
E4.12	Surface Area Grid Minimum Wall Thickness Locations	IWE-2500(b)(2), (b)(3), (b)(4)	Ultrasonic thickness	IWE-3520	100% of minimum wall thickness locations during each inspection period, established in accordance with IWE-2500(b)(3) and (b)(4)	100% of minimum wall thickness locations during each inspection period, established in accordance with IWE-2500(b)(3) and (b)(4)	Not permissible
EXAMINATION CATEGORY E-G, PRESSURE RETAINING BOLTING							
Item No.	Parts Examined	Examination Requirements/ Figure No.	Examination Method	Acceptance Standard	Extent and Frequency of Examination		Deferral of Inspection to End of Interval
					1st Inspection Interval	Successive Inspection Intervals	
E8.10	Bolted Connections [Note (5)]	IWE-2310	VT-1	IWE-3530	100% of each bolted connection [Note (6)]	100% of each bolted connection [Note (6)]	Permissible

New Table

ASME 2011a SECTION XI

New Table

Change "Note (4)" to "Note (1)"

Change "Note (5)" to "Note (1)"

Change "Note (6)" to "Note (2)"

Notes 5 and 6 go here, re-numbered at Notes 1 and 2

Table IWE-2500-1 (E-G)
Examination Category E-G, Pressure Retaining Bolting

Table IWE-2500-1 (E-C)
Examination Category E-C, Containment Surfaces Requiring Augmented Examination

(a)(10)

**Table IWE-2500-1
Examination Categories (Cont'd)**

NOTES:

- (1) Examination shall include all accessible interior and exterior surfaces of Class MC components, parts, and appurtenances, and metallic shell and penetration liners of Class CC components. The following items shall be examined:
- (a) integral attachments and structures that are parts of reinforcing structure, such as stiffening rings, manhole frames, and reinforcement around openings.
 - (b) surfaces of attachment welds between structural attachments and the pressure retaining boundary or reinforcing structure, except for nonstructural or temporary attachments as defined in NE-4435 and minor permanent attachments as defined in CC-4543.4.
 - (c) surfaces of containment structural and pressure boundary welds, including longitudinal welds (Category A), circumferential welds (Category B), flange welds (Category C), and nozzle-to-shell welds (Category D) as defined in NE-3351 for Class MC and CC-3840 for Class CC; and surfaces of Flued Head and Bellows Seal Circumferential Welds joined to the Penetration.
 - (d) pressure-retaining bolted connections, including bolts, studs, nuts, bushings, washers, and threads in base material and flange ligaments between fastener holes. Bolted connections need not be disassembled for performance of examinations.
- (2) Includes flow channeling devices within containment vessels.
- (3) Examination shall include moisture barrier materials intended to prevent intrusion of moisture against inaccessible areas of the pressure retaining metal containment shell or liner at concrete-to-metal interfaces and at metal-to-metal interfaces which are not seal-welded. Containment moisture barrier materials include caulking, flashing, and other sealants used for this application.
- (4) Containment surface areas requiring augmented examination are those identified in IWE-1240.
- (5) Examination shall include bolts, studs, nuts, bushings, washers, and threads in base material and flange ligaments between fastener holes.
- (6) Examination may be performed with the connection assembled and bolting in place under tension, provided the connection is not disassembled during the interval. If the bolted connection is disassembled for any reason during the interval, the examination shall be performed with the connection disassembled.

Notes 5 and 6 moved to Table IWE-2500-1 (E-G). Re-numbered as Notes 1 and 2.

Note 4 moved to Table IWE-2500-1 (E-C). Re-numbered as Note 1.

Notes 1, 2, and 3 moved to Table IWE-2500-1 (E-A)

Tables IWE-2500-1 (E-A), IWE-2500-1 (E-C), and IWE-2500-1 (E-G)

IWE-3130 INSERVICE VISUAL EXAMINATIONS

A component whose visual examination as specified in Table IWE-2500-1 detects areas that are suspect, shall be unacceptable for continued service unless, following verification of the suspect areas by the supplemental examination as required by IWE-3200, the requirements of IWE-3120 are satisfied.

IWE-3200 SUPPLEMENTAL EXAMINATIONS

Examinations that detect flaws or evidence of degradation that require evaluation in accordance with the requirements of IWE-3100 may be supplemented by other examination methods and techniques (IWA-2240) to determine the character of the flaw (i.e., size, shape, and orientation) or degradation. Visual examinations that detect surface flaws or areas that are suspect shall be supplemented by either surface or volumetric examination, when specified as a result of the engineering evaluation performed in IWE-3122.3

IWE-3400 STANDARDS

IWE-3410 ACCEPTANCE STANDARDS

The acceptance standards of IWE-3500 shall be applied to evaluate the acceptability of the component for service following the preservice examination and each inservice examination.

IWE-3430 ACCEPTABILITY

Flaws or areas of degradation that do not exceed the allowable acceptance standards of IWE-3500 for the respective examination category shall be acceptable.

IWE-3500 ACCEPTANCE STANDARDS

IWE-3510 STANDARDS FOR EXAMINATION CATEGORY E-A, CONTAINMENT SURFACES

(10) IWE-3511 General Visual Examination of Coated and Noncoated Areas

The condition of the examined area is acceptable if the Responsible Individual determines that there is no evidence of damage or degradation requiring further evaluation or performance of a repair/replacement activity. Suspect conditions shall be evaluated to the extent necessary to determine that the component function is not impaired.

IWE-3512 General Visual Examination of Moisture Barriers

Moisture barriers with wear, damage, erosion, tear, surface cracks, or other defects that permit intrusion of moisture against inaccessible areas of the pressure retaining surfaces of the metal containment shell or liner shall be corrected by corrective measures.

IWE-3513 Visual Examination, VT-3 (10)

The following relevant conditions²⁴ shall require correction or evaluation to meet the requirements of IWE-3122 prior to continued service:

- (a) pressure-retaining component corrosion or erosion that exceeds 10% of the nominal wall thickness;
- (b) loose, missing, cracked, or fractured parts, bolting, or fasteners; or
- (c) structural distortion or displacement of parts to the extent that the component function is impaired.

IWE-3520 STANDARDS FOR EXAMINATION CATEGORY E-C, CONTAINMENT SURFACES REQUIRING AUGMENTED EXAMINATION

IWE-3521 Visual Examination, VT-1 (10)

The following relevant conditions²⁴ shall require correction or evaluation to meet the requirements of IWE-3122 prior to continued service:

- (a) pressure-retaining component corrosion or erosion that exceeds 10% of the nominal wall thickness
- (b) loose, missing, cracked, or fractured parts
- (c) bolting or fastener relevant conditions listed in IWB-3517.1
- (d) structural distortion or displacement of parts to the extent that component function is impaired
- (e) moisture barrier conditions that fail to meet the acceptance standards of IWE-3512

IWE-3522 Ultrasonic Examination

Examinations of Class MC pressure-retaining components and of metallic shell and penetration liners of Class CC pressure-retaining components that detect material loss in a local area exceeding 10% of the nominal wall thickness, or material loss in a local area projected to exceed 10% of the nominal wall thickness prior to the next examination, shall be documented. Such local areas shall be accepted by engineering evaluation or corrected by repair/replacement activities in accordance with IWE-3122. Supplemental examinations in accordance with IWE-3200 shall be performed when specified as a result of the engineering evaluation.

ARTICLE IWF-2000 EXAMINATION AND INSPECTION

IWF-2100 SCOPE

The requirements of this Article apply to the examination and inspection of component supports.

Table IWF-2500-1 (F-A)

IWF-2200 PRESERVICE EXAMINATION

IWF-2210 INITIAL EXAMINATION

(a) All examinations listed in Table IWF-2500-1 shall be performed completely, once, as a preservice examination. These preservice examinations shall be extended to include 100% of all supports not exempted by IWF-1230.

(b) Examinations for systems that operate at a temperature greater than 200°F (95°C) during normal plant operation shall be performed during or following initial system heatup and cooldown. Other examinations may be performed prior to initial system heatup and cooldown.

Table IWF-2500-1 (F-A)

IWF-2220 ADJUSTMENT AND REPAIR/ REPLACEMENT ACTIVITIES

(a) Prior to return of the system to service, the applicable examinations listed in Table IWF-2500-1 shall be performed on component supports that have been adjusted in accordance with IWF-3000 or corrected by repair/replacement activities.

(b) For systems that operate at a temperature greater than 200°F (95°C) during normal plant operation, the Owner shall perform an additional preservice examination on the affected component supports during or following the subsequent system heatup and cooldown cycle unless determined unnecessary by evaluation. This examination shall be performed during operation or at the next refueling outage.

IWF-2400 INSPECTION SCHEDULE

IWF-2410 INSPECTION PROGRAM

(a) Inservice examinations shall be performed either during normal system operation or plant outages.

(b) The required examinations shall be completed in accordance with the inspection schedule provided in Table IWF-2410-1.

(c) If component supports are added to the Inspection Program during the service lifetime of a plant, examination shall be scheduled as follows:

(1) When component supports are added during the first period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item Number for the added component supports shall be performed during each of the second and third periods of that interval.

(2) When component supports are added during the second period of an interval, at least 25% of the examinations required by the applicable Examination Category and Item Number for the added component supports shall be performed during the third period of that interval.

(3) When component supports are added during the third period of an interval, examinations shall be scheduled in accordance with (b) for successive intervals.

IWF-2420 SUCCESSIVE INSPECTIONS

(a) The sequence of component support examinations established during the first inspection interval shall be repeated during each successive inspection interval, to the extent practical. The sequence of component support examinations may be modified in a manner that optimizes scaffolding, radiological, insulation removal, or other considerations, provided that the percentage requirements of Table IWF-2410-1 are maintained.

**Table IWF-2410-1
Inspection Program**

Inspection Interval	Inspection Period, Calendar Years of Plant Service, Within the Interval	Minimum Examinations Completed, %	Maximum Examinations Credited, %
All	3	16	50
	7	50 [Note (1)]	75
	10	100	100

NOTE:

(1) If the first period completion percentage for any examination category exceeds 34%, at least 16% of the required examinations shall be performed in the second period.

(b) When a component support is accepted for continued service in accordance with IWF-3112.2 or IWF-3122.2, the component support shall be reexamined during the next inspection period listed in the schedule of the Inspection Programs of IWF-2410.

(c) When the examinations required by (b) do not require additional corrective measures during the next inspection period, the inspection schedule may revert to the requirements of (a).

(10) **IWF-2430 ADDITIONAL EXAMINATIONS**

(a) Component support examinations performed in accordance with Table IWF-2500-1 that reveal flaws or relevant conditions exceeding the acceptance standards of IWF-3400, and that require corrective measures, shall be extended, during the current outage in accordance with (1) or (2) below.

(1) Additional examinations shall be performed in accordance with the following requirements:

(-a) Examinations shall be extended to include the components supports immediately adjacent to those components supports for which corrective measures are required. The additional examinations shall be extended, during the current outage, to include additional supports within the system, equal in number and of the same type and function as those scheduled for examination during the inspection period.

(-b) When the additional examinations required by (-a) above reveal flaws or relevant conditions exceeding the acceptance standards of IWF-3400, and that require corrective measures, the examinations shall be further extended to include additional examinations during the current outage. These additional examinations shall include the remaining component supports within the system of the same type and function.

(-c) When the additional examinations required by (-b) above reveal flaws or relevant conditions exceeding the acceptance standards of IWF-3400, and that require corrective measures, the examinations shall be extended, during the current outage, to include all nonexempt supports potentially subject to the same failure modes that required corrective measures in accordance with (-a) and (-b) above. Also, these additional examinations shall include nonexempt component supports in other systems when the support failures requiring corrective actions indicate non-system-related support failure modes.

(-d) When the additional examinations required by (-c) above reveal flaws or relevant conditions exceeding the acceptance standards of IWF-3400, and that require corrective measures, the Owner shall examine, during the current outage, those exempt component supports that could be affected by the same observed failure modes and could affect nonexempt components.

(2) Additional examinations shall be performed in accordance with the following requirements:

(-a) An engineering evaluation shall be performed. Topics to be addressed in the engineering evaluation shall include the following:

(-1) a determination of the cause of the flaws or relevant conditions

(-2) an evaluation of applicable service conditions and degradation mechanisms to establish that the affected supports will perform their intended safety functions during subsequent operation

(-3) a determination of which additional supports are subject to the same service conditions and degradation mechanisms that caused the flaws or relevant conditions

(-b) Examinations shall be extended to include the components supports immediately adjacent to those components supports for which corrective measures are required.

(-c) Additional examinations shall be performed on all those supports subject to the same service conditions and degradation mechanisms that caused the flaws or relevant conditions. This additional selection may require inclusion of piping systems other than the one containing the original flaws or relevant conditions. No additional examinations are required if the engineering evaluation concludes that either

(-1) there are no supports subject to the same service conditions that caused the flaws or relevant conditions or

(-2) no degradation mechanism exists

(-d) The engineering evaluation shall be retained in accordance with IWA-6000.

(b) The examination method for additional examinations may be limited to the examination method that originally identified the flaws or relevant conditions, provided use of the method is supported by an engineering evaluation. The engineering evaluation shall determine the cause of the flaws or relevant conditions and the appropriate method to be used as part of the additional examination scope. The engineering evaluation shall be retained in accordance with IWA-6000.

IWF-2500 EXAMINATION REQUIREMENTS

The following shall be examined in accordance with Table IWF-2500-1:

(a) mechanical connections⁴⁰ to pressure retaining components and building structure

(b) weld connections to building structure

(c) weld and mechanical connections at intermediate joints in multiconnected integral and nonintegral supports

(d) clearances of guides and stops, alignment of supports, and assembly of support items

(e) hot or cold settings of spring supports and constant load supports

(f) accessible sliding surfaces

Table IWF-2500-1 (F-A)
Examination Category F-A, Supports



**Table IWF-2500-1
Examination Categories**

EXAMINATION CATEGORY F-A, SUPPORTS						
Item No. [Note (1)]	Support Types Examined	Examination Requirements [Note (2)]/ Fig. No.	Examination Method	Acceptance Standard	Extent and Examination	Frequency of Examination [Note (3)]
F1.10	Class 1 Piping Supports	IWF-1300-1	Visual, VT-3	IWF-3410	25% of Class 1 [Note (4)]	Each inspection interval
F1.20	Class 2 Piping Supports	IWF-1300-1	Visual, VT-3	IWF-3410	15% of Class 2 [Note (4)]	Each inspection interval
F1.30	Class 3 Piping Supports	IWF-1300-1	Visual, VT-3	IWF-3410	10% of Class 3 [Note (4)]	Each inspection interval
F1.40	Supports Other Than Piping Supports (Class 1, 2, 3, and MC)	IWF-1300-1	Visual, VT-3	IWF-3410	100% of the supports [Note (5)]	Each inspection interval

NOTES:

- (1) Item numbers shall be categorized to identify support types by component support function (e.g., A = supports such as one directional rod hangers; B = supports such as multi-directional restraints; and C = supports that allow thermal movement, such as springs).
- (2) Examination may be limited to portions of supports that are accessible for examination without disassembly or removal of support members.
- (3) To the extent practical, the same supports selected for examination during the first inspection interval shall be examined during each successive inspection interval.
- (4) The total percentage sample shall be comprised of supports from each system (such as Main Steam, Feedwater, or RHR), where the individual sample sizes are proportional to the total number of non-exempt supports of each type and function within each system.
- (5) For multiple components other than piping, within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

**IWF-2510 SUPPORTS SELECTED FOR
EXAMINATION**

Supports not exempted by IWF-1230 shall be examined
in accordance with Table IWF-2500-1.

IWF-2520 METHOD OF EXAMINATION

The methods of examination shall comply with those
in Table IWF-2500-1. Alternative methods of examination
meeting the requirements of IWA-2240 may be used.



ARTICLE IWF-3000

STANDARDS FOR EXAMINATION EVALUATIONS

IWF-3100 EVALUATION OF EXAMINATION RESULTS

IWF-3110 PRESERVICE EXAMINATIONS

IWF-3111 General

The preservice examinations performed to meet the requirements of IWF-2200 shall be evaluated by comparing the examination results with the acceptance standards specified in IWF-3400.

IWF-3112 Acceptance

IWF-3112.1 Acceptance by Examination. Component supports whose examinations do not reveal conditions described in IWF-3410(a) shall be acceptable for service.

IWF-3112.2 Acceptance by Corrective Measures or Repair/Replacement Activity. A support whose examination detects conditions described in IWF-3410(a) is unacceptable for service until such conditions are corrected by one or more of the following:

(a) adjustment and reexamination in accordance with IWF-2200 for conditions such as

- (1) detached or loosened mechanical connections;
- (2) improper hot or cold settings of spring supports and constant load supports;
- (3) misalignment of supports; or
- (4) improper displacement settings of guides and stops

(b) repair/replacement activities in accordance with IWA-4000 and reexamination in accordance with IWF-2200.

IWF-3112.3 Acceptance by Evaluation or Test.

(a) As an alternative to the requirements of IWF-3112.2, a component support or a portion of a component support containing relevant conditions that do not meet the acceptance standards of IWF-3410 shall be acceptable for service without corrective actions if an evaluation or test demonstrates that the component support is acceptable for service.

(b) If a component support or a portion of a component support has been evaluated or tested and determined to be acceptable for service in accordance with (a), the Owner may perform corrective measures to restore the component support to its original design condition. The requirements of IWF-2220 are not applicable after corrective measures of IWF-3112.2(a) are performed.

(c) Records and reports shall meet the requirements of IWA-6000.

IWF-3120 INSERVICE EXAMINATIONS

IWF-3121 General

Inservice nondestructive examinations performed during or at the end of successive inspection intervals to meet the requirements of Table IWF-2500-1 and conducted in accordance with the procedures of IWA-2200 shall be evaluated by comparing the results of examinations with the acceptance standards specified in IWF-3400.

IWF-3122 Acceptance

IWF-3122.1 Acceptance by Examination. Component supports whose examinations do not reveal conditions described in IWF-3410(a) shall be acceptable for continued service. Verified changes of conditions from prior examinations shall be recorded in accordance with IWA-6230.

IWF-3122.2 Acceptance by Corrective Measures or Repair/Replacement Activity. A support whose examination detects conditions described in IWF-3410(a) is unacceptable for continued service until such conditions are corrected by one or more of the following:

(a) adjustment and reexamination in accordance with IWF-2200 for conditions such as

- (1) detached or loosened mechanical connections;
- (2) improper hot or cold settings of spring supports and constant load supports;
- (3) misalignment of supports; or
- (4) improper displacement settings of guides and stops.

(b) repair/replacement activities in accordance with IWA-4000 and reexamination in accordance with IWF-2200.

IWF-3122.3 Acceptance by Evaluation or Test.

(a) As an alternative to the requirements of IWF-3122.2, a component support or a portion of a component support containing relevant conditions that do not meet the acceptance standards of IWF-3410 shall be acceptable for service without corrective actions if an evaluation or test demonstrates that the component support is acceptable for service.

(b) If a component support or a portion of a component support has been evaluated or tested and determined to be acceptable for service in accordance with (a), the Owner may perform corrective measures to restore the

Table IWF-2500-1 (F-A)

of the concrete cannot be completed within this time interval, examination of those portions may be deferred until the next regularly scheduled plant outage.

(a) **IWL-2420 UNBONDED POST-TENSIONING SYSTEMS**

(a) Unbonded post-tensioning systems shall be examined in accordance with IWL-2520 at 1, 3, and 5 years following the completion of the containment Structural Integrity Test and every 5 years thereafter.

(b) The 1-, 3-, and 5-year examinations shall commence not more than 6 months prior to the specified dates and shall be completed not more than 6 months after such dates. If plant operating conditions are such that examination of portions of the post-tensioning system cannot be completed within this stated time interval, examination of those portions may be deferred until the next regularly scheduled plant outage.

(c) The 10-year and subsequent examinations shall commence not more than 1 year prior to the specified dates and shall be completed not more than 1 year after such dates. If plant operating conditions are such that examination of portions of the post-tensioning system cannot be completed within this stated time interval, examination of those portions may be deferred until the next regularly scheduled plant outage.

(d) Tendons affected by repair/replacement activities shall be examined in accordance with the requirements of IWL-2521.2.

(a)(10) **IWL-2421 Sites With Multiple Plants**

(a) For sites with multiple plants, the requirements of IWL-2420 may be modified if the containments utilize the same prestressing system and are essentially identical in design, if post-tensioning operations for each subsequent containment constructed at the site were completed not more than 2 years apart, and if the containments are similarly exposed to or protected from the outside environment.

(b) When the conditions of (a) are met, the inspection dates and examination requirements may be as follows.

(1) For the containment with the first Structural Integrity Test, all examinations required by IWL-2520 shall be performed at 1, 3, and 10 years and every 10 years thereafter. In addition, the examinations required by IWL-2524 and IWL-2525 shall be performed at 5 and 15 years and every 10 years thereafter.

(2) For each subsequent containment constructed at the site, all examinations required by IWL-2520 shall be performed at 1, 5, and 15 years and every 10 years thereafter. In addition, the examinations required by IWL-2524 and IWL-2525 shall be performed at 3 and 10 years and every 10 years thereafter.

IWL-2500 EXAMINATION REQUIREMENTS

Examination shall be performed in accordance with the requirements of Table IWL-2500-1.

IWL-2510 SURFACE EXAMINATION

IWL-2511 Accessible Areas

(10)

(a) Concrete surface areas, including coated areas, except those exempted by IWL-1220(b) through IWL-1220(d), shall be visually examined in accordance with IWL-2310(a) for evidence of conditions indicative of damage or degradation, such as described in ACI 201.1R and ACI 349.3R. Areas not meeting the criteria established in concrete surface examination procedures [IWL-2330(a)] shall be visually examined in accordance with IWL-2310(b). If the Responsible Engineer determines that observed suspect conditions indicate the presence of, or could result in, degradation of inaccessible areas, the requirements of IWL-2512(a) shall be met.

(b) Concrete surfaces at tendon anchorage areas, including coated areas, except those exempted by IWL-1220(a), shall be visually examined in accordance with IWL-2310(a) for evidence of conditions indicating damage or degradation, such as described in ACI 201.1R and ACI 349.3R. Areas not meeting the criteria established in concrete surface examination procedures [IWL-2330(a)] shall be visually examined in accordance with IWL-2310(b).

(c) For containments with unbonded post-tensioning systems, the concrete surfaces and tendon end anchorage areas shall be examined for corrosion protection medium leakage, and the tendon end caps shall be examined for deformation. Tendon end caps shall be removed for this examination if there is evidence of tendon end cap deformation.

(d) The examinations shall be performed by, or under the direction of, the Responsible Engineer.

(e) Visual examinations may be performed from floors, roofs, platforms, walkways, ladders, ground surface, or other permanent vantage points, unless temporary close-in access is required by the inspection plan.

IWL-2512 Inaccessible Areas

(a) The Responsible Engineer shall evaluate suspect conditions and shall specify the type and extent of examinations, if any, required to be performed on inaccessible surface areas exempted by IWL-1220(c) and IWL-1220(d).

(b) Concrete surfaces exposed to foundation soil, backfill, or ground water shall be evaluated to determine susceptibility of the concrete to deterioration and the ability to perform the intended design function under conditions anticipated until the structure no longer is required to fulfill its intended design function. The technical evaluation shall be performed and documented

Table IWL-2500-1 (L-A)

Delete redundant text

Table IWL-2500-1

Examination Categories Examination Category L-A, Concrete

Item No.	Parts Examined	Test or Examination Requirement	Test or Examination Method	Acceptance Standard	Extent of Examination	Frequency of Examination	Deferral of Examination
L1.10	Concrete surface	IWL-2510	General visual	IWL-3210	IWL-2510	IWL-2410	NA
L1.11	All accessible surface areas [Note (1)]						
L1.12	Suspect areas		Detailed visual				
L1.13	Inaccessible Below-Grade Areas [Note (2)]	IWL-2512(c)	IWL-2512(c) [Note (3)]	IWL-3210	IWL-2512(a)	IWL-2512(c)	NA

New Table

EXAMINATION CATEGORY L-B, UNBONDED POST-TENSIONING SYSTEM

Item No.	Parts Examined	Test or Examination Requirement	Test or Examination Method	Acceptance Standard	Extent of Examination	Frequency of Examination	Deferral of Examination
L2.10	Tendon	IWL-2522	IWL-2522	IWL-3221.1	IWL-2521	IWL-2420	NA
L2.20	Wire or strand	IWL-2523	IWL-2523.2	IWL-3221.2	IWL-2523.1	IWL-2420	NA
L2.30	Anchorage hardware and surrounding concrete	IWL-2524	Detailed visual	IWL-3221.3	IWL-2524.1	IWL-2420	NA
L2.40	Corrosion protection medium	IWL-2525, IWL-2526	IWL-2525.2(a), IWL-2526	IWL-3221.4	IWL-2525.1(a), IWL-2526	IWL-2420	NA
L2.50	Free water	IWL-2525	IWL-2525.2(b)		IWL-2525.1(b)	IWL-2420	NA

NOTES:

- (1) Includes concrete surfaces at tendon anchorage areas not selected by IWL-2521 or exempted by IWL-1220(a).
 (2) Concrete surfaces exposed to foundation soil, backfill, or ground water.
 (3) Method of examination as defined by the Responsible Engineer, based on IWL-2512(b) evaluation.

ASME 2011a SECTION XI

Table IWL-2500-1 (L-B)
Examination Category L-B, Unbonded Post-Tensioning SystemNotes 1, 2, and 3
to be moved to
Table IWL-2500-1
(L-A)

(a)

Table IWL-2521-1
Number of Tendons for Examination

Inspection Period	Percentage [Note (1)], [Note (2)] of all Tendons of Each Type [Note (3)]	Required Minimum [Note (1)] Number of Each Type	Maximum Required Number of Each Type
1st year	4	4	10
3rd year	4	4	10
5th year	4	4	10
10th year [Note (4)]	2	3	5

NOTES:

- (1) Fractional tendon numbers shall be rounded to the next higher integer. Actual number examined shall not be less than the minimum required number and need not be more than the maximum required number.
- (2) The reduced sample size listed for the 10th year and subsequent inspections is applicable only if the acceptance criteria of IWL-3221.1 have been met for the last three inspections.
- (3) A tendon type is defined by its geometry and position in the containment: e.g., hoop, vertical, dome, helical, and inverted U.
- (4) The number and percentage of tendons to be examined every fifth year thereafter shall remain the same.

(a)

Table IWL-2521-2
Augmented Examination Requirements Following Post-Tensioning System Repair/Replacement Activities

Examination Frequency	Number (N) of Tendons of Each Type [Note (1)] Affected by Repair/ Replacement Activity	Required Minimum Percentage of Tendons of Each Type [Note (1)] Affected by Repair/ Replacement Activity To Be Examined	Augmented Examination Requirement [Note (2)], [Note (3)]
Initial Inspection: 1 year (±3 months) following completion of the Repair/ Replacement Activity [Note (4)]	3 < N < 5%	4% [Note (5)]	L2.10, L2.30, L2.40, & L2.50
	N ≥ 5%	Lesser of 4% or 10 tendons	L2.10, L2.20, L2.30, L2.40, & L2.50
Subsequent Inservice Inspections scheduled to coincide with IWL-2420 [Note (6)] following completion of the Repair/Replacement Activity	3 < N < 5%	4%	L2.10, L2.30, L2.40, & L2.50
	N ≥ 5%	Lesser of 4% or 10 tendons	L2.10, L2.20, L2.30, L2.40, & L2.50

NOTES:

- (1) The tendon type is defined by its geometry and position in the containment: e.g., hoop, vertical, dome, helical, and inverted U. If more than one type of repair/replacement activity (e.g., tendon replacement, detensioning, retensioning) is performed on a group of tendons, each type of repair/replacement activity need not be considered separately when calculating the number (N) of tendons affected.
- (2) A common tendon need not be selected for examination as specified in IWL-2521(b).
- (3) Examination requirements are identified in **Table IWL-2500-1**.
- (4) If plant operating conditions are such that examination of portions of the post-tensioning system cannot be completed within this stated time interval, examination of those portions may be deferred until the next regularly scheduled plant outage.
- (5) Where the minimum number of tendons is given as a percentage, fractional tendon numbers shall be rounded to the next highest integer and shall be considered the minimum number of tendons to be examined. The percentage is to be applied separately to each type of tendon affected.
- (6) The required minimum number of affected tendons of each type to be examined may be reduced to the lesser of 2% or five tendons, if the acceptance criteria of IWL-3221.1 have been met for the last two inspections.

Table IWL-2500-1 (L-B)

- (b) how PFM-calculated probabilities are used in the piping segment risk calculations
- (c) capabilities and limitations of the PFM model
- (d) expertise and type of information required, including applicable sources
- (e) how potential degradation mechanisms are considered and combined
- (f) the importance of each input parameter on each degradation mechanism and failure mode
- (g) examples of PFM model use for different degradation mechanisms and failure modes
- (h) how detailed PFM input (e.g., uncertainty) is developed

Tables IWC-2500-1 (C-F-1) and IWC-2500-1 (C-F-2)

3.0 BOUNDARY REQUIREMENTS

3.1 Boundary Identification.

(a) The Owner shall define the system boundaries included in the scope of the risk-informed inspection program evaluation. Within each system boundary, the risk-informed evaluation may include Class 1, 2, or 3 piping defined in the deterministic inservice inspection program, if applicable, and piping outside the current deterministic program examination boundaries, if applicable. Piping, or portions thereof, included for evaluation shall be based on the deterministic program Class 1, 2, or 3 examination boundaries, if applicable, determined in accordance with the requirements of IWA-1320, and limited by exemptions of IWB-1220, IWC-1220, and IWD-1220. When Examination Category C-F-1 or C-F-2 piping is included, the piping exempt from NDE under the requirements of Table IWC-2500-1 due to nominal wall thickness limitations shall be evaluated.

(b) Piping, or portions thereof, within the Class 1, 2, or 3 boundaries [including exempt piping in (a)], if applicable, and known from PRA insights to have a high consequence contribution, shall be included.

3.2 Use of the Applicable PRA. The boundary requirements of 3.1 shall be used to identify the piping systems, or portions thereof, to be considered for risk-informed selections of HSS and Low Safety Significant (LSS) piping segments and piping structural elements in accordance with this process. The Owner's PRA and its evaluated safety functions which consist of core damage protection, large early release protection, and the risk measures associated with these safety functions (core damage frequency and large early release frequency), provide the necessary information for the piping system PRA boundaries to be used in this process.

4.0 RISK-INFORMED PROCESS

4.1 General. *

The risk-informed selection of nuclear power plant piping segments and piping structural elements shall be performed using the process described in this Supplement. The final result of this process is to identify those

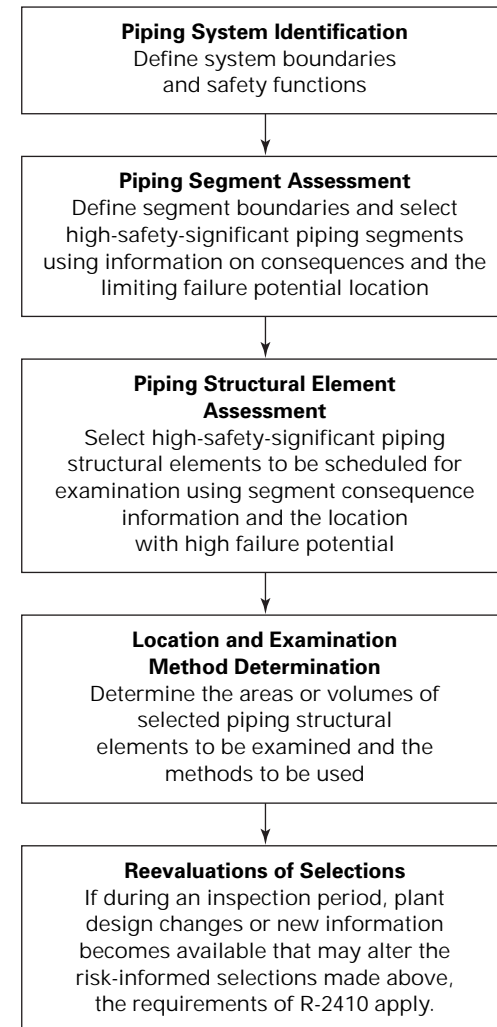
HSS piping structural elements that will be examined in accordance with Table R-2500-1. The basic overview of this process is provided in Fig. R-S1-1.

4.2 Quantitative Approach

4.2.1 General. The process for this quantitative approach uses risk-based ranking calculational methods, with established threshold values, and risk-informed considerations of operational and deterministic insights to select a final list of HSS piping structural elements to be included in a risk-informed inspection program. This approach is divided into four major tasks.

(a) Identify and define the piping system boundaries and portions that will be considered in this risk-informed selection process in accordance with the boundary requirements of 3.0.

**Figure R-S1-1
Overview Risk-Informed Selection Process**



(c) Examination results (e.g., discovery of leakage or flaws)

(d) Piping failures (e.g., plant-specific or industry occurrences of through-wall or through-weld leakage, failure due to a new degradation mechanism, or a nonpostulated mechanism)

(e) PRA updates (e.g., new initiating events, new system functions, more detailed model used, initiating event and failure data changes)

5.2 Periodic Updates.

(a) If the periodic reevaluations of 5.1 indicate that piping structural elements, systems, or portions of systems may now be HSS, and the risk-informed inspection program needs to be updated, the Owner shall update the program by adding examination selections in accordance with the requirements for HSS piping structural elements in 4.2.8, or by using the applicable portions of the same risk-informed selection process previously used to establish the risk-informed inspection program. This reevaluation of the selections shall be performed by inserting the new information at the appropriate level of the analysis. It may not be necessary to reperform the entire risk-informed selection process, but the evaluation for the changes to the selections that occur shall be documented.

(b) If the reevaluations indicate that piping structural elements, systems, or portions of systems may now be LSS, the risk-informed inspection program may remain unchanged, or examination selections may be deleted by using the applicable portions of the same risk-informed selection process that previously established the risk-informed inspection program. This reevaluation of the selections shall be performed by inserting the new information at the appropriate level of the analysis. It may not be necessary to reperform the entire risk-informed selection process, but the evaluation for the changes to the selections that occur shall be documented.

(c) If any portion of the risk-informed selection process is reperformed, a change-in-risk evaluation shall be completed in accordance with 4.2.9.

5.3 Interval Updates. If changes occur during periodic updates, based on qualitative reevaluation results, those changes shall be cumulatively evaluated for inclusion in the subsequent inspection interval update. The subsequent inspection interval update shall include a reevaluation using the applicable portions of the same risk-informed selection process used to establish the risk-informed inspection program. This reevaluation of the selections shall be performed by inserting the new information at the appropriate level of the analysis. It may not be necessary to reperform the entire risk-informed selection process, but the evaluation for the changes to the piping selections that occur shall be documented. The inspection interval update shall meet the requirements of IWA-2400, and a change-in-risk evaluation shall be completed in accordance with 4.2.9.

SUPPLEMENT 2 RISK INFORMED SELECTION PROCESS — METHOD B

1.0 INTRODUCTION

This Supplement provides the risk-informed selection process to be used for selection of piping segments and piping structural elements (including connections) for preservice and inservice inspection. This selection process is based on the risk-significance of locations within an individual system. Fig. R-S2-1 illustrates the evaluation process that is summarized in the following text.

1.1 System Identification. Systems shall be selected for analysis and system boundaries, and functions shall be identified.

1.2 Segment Risk Assessment. Each selected system shall be divided into piping segments determined to have similar consequence of failure and potential for failure (common degradation mechanisms, etc.). These segments shall be placed into risk categories based on combinations of consequence and failure potential. Risk-significant segments shall be identified.

1.3 Element Assessment. Potential locations (elements) within the risk-significant segments shall be selected for inspection based on the specific degradation mechanism identified in the segment.

1.4 Inspection Volume and Examination Methods. The inspection volume and method used for each element shall be determined based on the degradation mechanism associated with the element.

1.5 Documentation. The results of this alternative selection process shall be documented. This process shall include a review incorporating plant-specific and industry experience, as well as the results of plant-specific inspections.

2.0 BOUNDARY IDENTIFICATION

The Owner shall define the system boundaries included in the scope of the risk-informed inspection program evaluation. Within each system boundary, the risk-informed evaluation may include Class 1, 2, or 3 piping defined in the deterministic inservice inspection program, if applicable, and piping outside the current deterministic program examination boundaries, if applicable. Piping, or portions thereof, included for evaluation shall be based on the deterministic program Class 1, 2, or 3, examination boundaries, if applicable, determined in accordance with the requirements of IWA-1320, and limited by exemptions of IWB-1220, IWC-1220, and IWD-1220. When Examination Category C-F-1 or C-F-2 piping is included, the piping exempt from NDE under the requirements of Table IWC-2500-1 due to nominal wall thickness limitations shall be evaluated.

ARTICLE S-2000 EXAMINATION COVERAGE

S-2100 APPLICABILITY

This Appendix is applicable for the examinations required by IWA-2200, excluding VT-2 and VT-3 visual examination, General Visual examination (IWE-2000), and eddy current examination.

S-2200 DEFINITIONS

examination coverage: percentage of the examination surface or volume obtained during the performance of the examination.

examination surface: surface area of the weld or base material required to be examined.

examination volume: volume of the weld or base material required to be examined.

scan limitation: inability to manipulate an ultrasonic search unit on the surface because of interference, obstruction, or geometrical configuration.

surface limitation: inability to perform an examination of the required surface, because of interference, obstruction, or geometrical configuration

volumetric limitation: inability to examine the required volume because of interference, obstruction, geometrical configuration, or metallurgical condition of material being examined.

S-2300 GENERAL REQUIREMENTS

(a) During performance of a preservice or inservice examination, essentially 100% coverage is required of the examination surface for surface and visual examination and of the examination volume for volumetric examination.

(b) Examination coverage requirements are contained in Tables IWB/IWC/IWD/IWE/IWF-2500, the associated figures, and Appendix I-3000. These requirements may be further augmented by 10 CFR 50.55a, Code Cases, risk-informed programs, or the applicable examination procedure.

(c) Data supporting the coverage evaluation (e.g., required examination surface or volume and any associated limitations) should be documented.

(d) The method used to evaluate coverage should be documented for each examination procedure, including all applicable qualification limitations.

Note to Editor: This is acceptable as currently shown.

ASME
Tables IWB-2500-1 (B-A) through
IWB-2500-1 (B-O) and Table
IWB-2500-1 (B-Q)

- 20 Welds, areas, or parts are those described or intended in a particular inspection item of Table IWB-2500-1.
- 21 An inspection item, as listed in Table IWB-2500-1, may comprise a number of welds, areas, or parts of a component required to be examined in accordance with the inspection plan and schedule (IWA-2420).
- 22 For structural factors included in the acceptance standards, refer to report listed under 8(f)(1) of the Organization of Section XI.
- 23 The standards apply to accessible surfaces of bolting when examined in place, and to all surfaces when bolting is removed for examination.
- 24 Relevant conditions are defined in IWA-9000; they do not include fabrication marks, scratches, surface abrasion, material roughness, and any other conditions acceptable by material, design, and manufacturing specifications.
- 25 Relevant conditions are defined in IWA-9000; they do not include fabrication marks, material roughness, casting irregularities, and other conditions acceptable by material, design, and manufacturing specifications of the component.
- 26 Wall thickness is determined either from design information, construction drawings, or by measurement on the component.
- 27 Relevant conditions are defined in IWA-9000; they do not include fabrication marks, material roughness, and other conditions acceptable by material, design, and manufacturing specifications of the component.
- 28 Cross-sectional area is determined either from design information, construction drawings, or by measurement on the weld.
- 29 Relevant conditions are defined in IWA-9000; they do not include conditions that result in condensation on components, normal collection of fluid in sumps, and drips from open drains.
- 30 RHR, ECC, and CHR systems are the Residual Heat Removal, Emergency Core Cooling, and Containment Heat Removal Systems, respectively.
- 31 Statically pressurized, passive safety injection systems of pressurized water reactor plants are typically called:
(a) accumulator tank and associated system
(b) safety injection tank and associated system
(c) core flooding tank and associated system
- 32 Welds, areas, or parts are those described or intended in a particular inspection item of Table IWC-2500-1.
- 33 An inspection item, as listed in Table IWC-2500-1, may ~~comprise a number of welds, areas, or parts of a component~~ required to be examined in accordance with the inspection plan and schedule (IWA-2420).
- 34 Welds, areas, or parts are those described or intended in a particular inspection item of Table IWD-2500-1.
- 35 An inspection item, as listed in Table IWD-2500-1, may ~~comprise a number of welds, areas, or parts of a component~~ required to be examined in accordance with the inspection plan and schedule (IWA-2420).
- 36 Discharge lines to structural compartments (e.g., service water pump intake structures) and collection tanks, sumps, and basins that are open (or may become open) to the atmosphere are considered open ended.
- 37 The standards apply to accessible surfaces of bolting and the bolted connection when examined in place, and to all surfaces when the bolting or bolted connection is disassembled for examination.
- 38 Examination and test requirements for snubbers can be found in the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code).
- 39 Attachment portion includes welds, bolting, pins, clamps, etc.
- 40 For pipe-clamp-type supports, the mechanical connection to the pressure boundary includes the bolting, pins, and their interface to the clamp, but does not include the component-to-clamp interface.
- 41 An aggressive below-grade environment is defined as having a pH of less than 5.5, chlorides in excess of 500 ppm, or sulfates in excess of 1,500 ppm.

Table IWD-2500-1 (D-A)

Tables IWC-2500-1 (C-A) through (C-F-2)