

ARTICLE IWA-2000

EXAMINATION AND INSPECTION

IWA-2100 GENERAL

A02 IWA-2110 DUTIES OF THE INSPECTOR

(a) The Inspector shall review the inspection plan and, as necessary, the implementation schedule (IWA-2420) prior to the start of preservice inspection and each inspection interval. The review shall cover any features that are affected by the requirements of this Division, as applicable, and shall include the following:

- (1) examination categories and items
- (2) test and examination requirements
- (3) examination methods
- (4) percentage of parts selected for examination
- (5) disposition of test results
- (6) test frequency
- (7) system pressure tests
- (8) sequence of successive examinations

Shop and field preservice examinations are exempt from prior review.

(b) The Inspector shall review any revisions to the inspection plan and, as necessary, the implementation schedule during the preservice inspection or the inspection interval.

(c) The Inspector shall submit a report to the Owner documenting review of the items identified in IWA-2110(a) and (b).

(d) The Inspector shall verify that the required examinations and system pressure tests have been performed and the results recorded.

(e) The Inspector shall verify that the required visual examinations have been performed and the results recorded.

(f) The Inspector shall perform any additional investigations necessary to verify that all applicable requirements of IWA-2110 have been met.

(g) The Inspector shall verify that the nondestructive examination methods used follow the techniques specified in this Division and that the examinations are performed in accordance with written qualified procedures and by personnel employed by the Owner or

the Owner's agent and qualified in accordance with IWA-2300.

(h) The Inspector may require, at any time, requalification of any procedure or operator if the Inspector has reason to believe that the requirements are not being met.

(i) The Inspector shall certify the examination records after verifying that the requirements have been met and that the records are correct.

(j) The Inspector shall verify that repair/replacement activities are performed in accordance with the requirements of the Owner's Repair/Replacement Program.

(k) The Inspector shall review the Repair/Replacement Program and its implementation.

IWA-2120 QUALIFICATION OF AUTHORIZED INSPECTION AGENCIES, INSPECTORS, AND SUPERVISORS

(a) The inspection required by this Division shall be performed:

(1) where the plant is in the United States, by an Inspector employed by a State or Municipality of the United States or an Inspector regularly employed by an insurance company authorized to write boiler and pressure vessel insurance in the United States;

(2) where the plant is in Canada, by an Inspector employed by a Canadian Province or, if authorized by the Province in which the plant is located, by an Inspector regularly employed by an insurance company licensed to write boiler and pressure vessel insurance in that Province;

(3) by an Inspector employed by other enforcement authorities in the United States or Canada having jurisdiction over the designated plant.

(b) The Authorized Inspection Agency, including its staff of Authorized Nuclear Inservice Inspector Supervisors and the Inspectors, shall meet the requirements of ASME QAI-1.

(c) The Authorized Inspection Agency shall be accredited by ASME in accordance with the provisions set forth in ASME QAI-1.

IWA-2130 ACCESS FOR INSPECTOR

The Owner shall arrange for an Inspector to have access to all parts of the plant as necessary to make the required inspections. The Owner shall keep the Inspector informed of the progress of the preparatory work necessary to permit inspections and shall notify the Inspector at a time reasonably in advance of when the components will be ready for inspection.

IWA-2200 EXAMINATION METHODS

(a) The three types of examinations used during inservice inspection are defined as visual, surface, and volumetric. The examination method to be used is specified in Tables IWB-, IWC-, IWD-, IWE-, IWF-, 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. Non-mandatory Appendix D may be used for such surface preparation.

A02 IWA-2210 VISUAL EXAMINATIONS

Visual examinations shall be conducted in accordance with Section V, Article 9, T-941 for Written Procedures, and T-990 for Report of Examination Results.

A03 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 examination shall meet the requirements specified in Table IWA-2211-1.

(e) It is not necessary to measure the illumination level 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 a battery-powered light is used, the adequacy of the illumination level 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 in accordance with Table IWA-2211-1. Additionally, the remote examination system shall be capable of distinguishing the colors applicable to the component examination being conducted.

IWA-2212 VT-2 Examination

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(a) VT-2 examination is conducted to detect evidence of leakage from pressure retaining components, with or without leakage collection systems, as required during the system pressure test.

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

IWA-2213 VT-3 Examination

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(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; to detect discontinuities and imperfections, such as loss of integrity at bolted or welded connections, loose or missing parts, debris, corrosion, wear, or erosion; and to detect conditions that could affect operability or functional adequacy of snubbers and constant load and spring-type supports.

(b) The VT-3 examination procedure shall be demonstrated capable of resolving characters in accordance with Table IWA-2211-1.

(c) There are no direct visual examination distance requirements, provided the examiner can resolve the characters specified in Table IWA-2211-1.

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

(e) It is not necessary to measure the illumination level on each examination surface when the same portable nonbattery-powered light source (e.g., drop

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A03TABLE IWA-2211-1
VISUAL EXAMINATIONS

| Visual Examination | Minimum Illumination, f_c [Note (1)] | Maximum Direct Examination Distance, ft (mm) | Maximum Height, in. (mm), for Procedure Demonstration Characters [Note (2)] |
|--------------------|---|--|---|
| VT-1 | 50 | 2 (600) | 0.044 (1.0) |
| VT-3 | 50 | N/A | 0.105 (3.0) |

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.

light) or similar installed lighting equipment is demonstrated to provide the illumination specified in Table IWA-2211-1 at the maximum examination distance.

(f) When a battery-powered light is used, the adequacy of the illumination level 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 in accordance with Table IWA-2211-1. Additionally, the remote visual examination system shall be capable of distinguishing the colors applicable to the component examinations being conducted.

IWA-2215 Replication

Surface replication methods may be used for VT-1 and VT-3 examinations when the surface resolution is at least equivalent to that of direct visual observation.

(c) Any flaw recorded by ultrasonic examination shall be compared to the volumetric examination acceptance standards of Table IWB-3514-1 or Table IWB-3514-2 for surface planar flaw.

IWA-2221 Magnetic Particle Examination

(a) Magnetic particle examination shall be conducted in accordance with Section V, Article 7.

(b) Magnetic particle examination of coated materials shall be conducted in accordance with Section V, Article 7, Appendix I.

IWA-2222 Liquid Penetrant Examination

Liquid penetrant examination shall be conducted in accordance with Section V, Article 6.

IWA-2223 Eddy Current Examination

Eddy current examination for detection of surface flaws shall be conducted in accordance with Appendix IV.

IWA-2224 Ultrasonic Examination

An ultrasonic examination performed from the inside surface of piping may be used as a surface examination method for Category B-J and B-F piping welds NPS 4 and larger. The ultrasonic examination technique shall be demonstrated capable of detecting an acceptable flaw having the greatest a/t ratio or a 0.50 aspect ratio at the surface being examined.

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IWA-2216 DELETED

01 **IWA-2220 SURFACE EXAMINATION**

(a) A surface examination indicates the presence of surface discontinuities. It may be conducted using a magnetic particle, liquid penetrant, eddy current, or ultrasonic method.

(b) Any linear indication detected by magnetic particle, liquid penetrant, or eddy current examination that exceeds the allowable linear surface flaw standards shall be recorded.

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IWA-2230 VOLUMETRIC EXAMINATION

A volumetric examination indicates the presence of discontinuities throughout the volume of material and may be conducted from either the inside or outside surface of a component.

IWA-2231 Radiographic Examination

Radiographic techniques, employing penetrating radiation such as X-rays, gamma rays, or thermalized

neutrons, may be utilized with appropriate image-recording devices, such as photographic film or papers, electrostatic systems, direct-image orthicons, or image converters. For radiographic examinations employing either X-ray equipment or radioactive isotopes and photographic films, the procedure shall be as specified in Article 2 of Section V.



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IWA-2232 Ultrasonic Examination

Ultrasonic examination shall be conducted in accordance with Appendix I.

IWA-2233 Eddy Current Examination

Eddy current examination shall be conducted in accordance with Section V, Article 8, Appendix II.

IWA-2234 Acoustic Emission Examination

Acoustic emission may be used in lieu of the successive inspections of IWB-2420(b) or IWC-2420(b) to monitor growth of flaws detected by other NDE methods. The flaws shall be sized by ultrasonic examination in accordance with Appendix I, Supplement 12, prior to initiating use of acoustic emission. Acoustic emission monitoring shall be initiated prior to resuming operation of the system. Acoustic emission shall be conducted in accordance with Section V, Article 13, with the following additional requirements.

(a) The following flaw growth calculation and acceptance criteria shall be used.

(1) Every two months during the current inspection period, calculate the flaw growth in accordance with Section V, Article 13, Appendix I. Using this growth rate, predict the flaw size at the end of the current inspection period.

(2) If the calculated flaw size at the end of the current inspection period meets the acceptance criteria of IWB-3600 or IWC-3600, as applicable, continue the two-month monitoring process described in (1) above.

(3) If the calculated flaw size at the end of the current inspection period does not meet the acceptance criteria of IWB-3600 or IWC-3600, as applicable, the following actions shall be performed.

(a) Calculate the flaw size at the end of the next two-month time span. If this calculated flaw size meets the acceptance criteria of IWB-3600 or IWC-3600, as applicable, continue the two-month monitoring process described in (1) above.

(b) If the calculated flaw size at the end of the next two-month time span does not meet the acceptance criteria of IWB-3600 or IWC-3600, as applicable, the component shall be corrected by repair/replacement activity in accordance with IWB-3130 or IWC-3120, as applicable.

(b) If no flaw growth is observed for one operating cycle, the component examination schedule may revert

to the original schedule of successive inspections of IWB-2410 or IWC-2410, as applicable.

IWA-2240 ALTERNATIVE EXAMINATIONS**A02**

Alternative examination methods, a combination of methods, or newly developed techniques may be substituted for the methods specified in the Construction Code or this Division, provided the Inspector is satisfied that the results are demonstrated to be equivalent or superior to those of the specified method.

**IWA-2300 QUALIFICATIONS OF
NONDESTRUCTIVE
EXAMINATION PERSONNEL****IWA-2310 GENERAL**

(a) Personnel performing nondestructive examinations (NDE) shall be qualified and certified using a written practice prepared in accordance with ANSI/ASNT CP-189, Standard for Qualification and Certification of Nondestructive Testing Personnel, as amended by the requirements of this Division. Certifications based on SNT-TC-1A, ANSI N45.2.6, or earlier editions of ANSI/ASNT CP-189 are valid until recertification is required. Recertification shall be in accordance with the edition of ANSI/ASNT CP-189 referenced in IWA-1600 as amended by the requirements of this Division. Outside agencies, as defined in Appendix VII, may be used to qualify NDE personnel; however, the Employer shall be solely responsible for the certification of Levels I, II, and III personnel. Nondestructive and visual examination personnel qualified and certified in accordance with the requirements of this Division are qualified and certified to perform examinations in accordance with the requirements of previous Editions and Addenda.

(b) As an alternative to a personnel qualification program based on CP-189, the ASNT Central Certification Program (ACCP) may be used. The supplemental requirements of this Division shall apply to qualification of personnel in accordance with the ACCP.

IWA-2311 Written Practice

(a) The Employer shall prepare a written practice in accordance with ANSI/ASNT CP-189.

(b) The written practice shall specify the duties and responsibilities of the Principal Level III.

IWA-2312 NDE Methods Listed in ANSI/ASNT CP-189

(a) Qualifications shall be based on the methods, techniques, procedures, and equipment used for the NDE required by this Division.

(b) Training, qualification, and certification of ultrasonic examination personnel shall also comply with the requirements of Appendix VII.

(c) Training, qualification, and certification of visual examination personnel shall comply with the requirements of Appendix VI.

(d) The visual examination training and experience hours specified in CP-189 shall be applied to the combined certification of an individual for VT-1, VT-2, and VT-3 visual examination. Certification in only one of the VT techniques is a limited certification, and the requirements of IWA-2350 apply.

IWA-2313 NDE Methods Not Listed in ANSI/ASNT CP-189

Personnel using NDE methods not addressed in ANSI/ASNT CP-189 shall be qualified as defined in ANSI/ASNT CP-189 or the ACCP and the Employer's written practice.

IWA-2314 Certification and Recertification

(a) Personnel shall be qualified by examination and shall be certified in accordance with ANSI/ASNT CP-189, except that the ASNT Level III certificate is not required. Levels I, II, and III personnel shall be recertified by qualification examinations every 5 years.

(b) Personnel qualified in accordance with the ACCP shall be recertified by examination every 5 years.

(c) An ACCP certificate with current endorsements obtained by examination satisfies the General and Practice Examination requirements for Levels I and II NDE personnel.

IWA-2315 Personnel Requirements For Eddy Current Examination of Steam Generator Tubing

Personnel performing analysis or evaluation of data shall be qualified by examination to perform analysis of multifrequency data and to use multiparameter signal combination techniques. The qualification shall include a practical examination that includes techniques used and the types of flaws that may be found during examination of steam generator tubing.

IWA-2316 Alternative Qualifications of VT-2 Visual Examination Personnel

(a) In lieu of the requirements of IWA-2310 through IWA-2314, VT-2 visual examination personnel may be qualified by satisfying the following requirements:

(1) at least 40 hr plant walkdown experience, such as that gained by licensed and nonlicensed operators, local leak rate personnel, system engineers, quality control personnel, and nondestructive examination personnel

(2) at least 4 hr of training in the Section XI requirements and plant-specific procedures for VT-2 visual examination

(3) the vision test requirements of IWA-2321

(b) These alternative qualification requirements shall be described in the Employer's written practice.

IWA-2317 Alternative Qualifications of VT-3 Visual Examination Personnel

(a) In lieu of the requirements of IWA-2310 through IWA-2314, VT-3 visual examination personnel may be qualified by satisfying the following requirements:

(1) at least 40 hours plant experience, such as that gained by plant personnel involved in installation, maintenance, or examination of pumps, valves, and supports, quality control personnel, and nondestructive examination personnel

(2) at least 8 hr of training in the Section XI requirements and plant-specific procedures for VT-3 visual examination

(3) the vision test requirements of IWA-2321

(b) The alternative qualification requirements shall be described in the Employer's written practice.

IWA-2320 QUALIFICATION EXAMINATIONS**IWA-2321 Vision Tests**

The following tests shall be administered annually to NDE personnel:

(a) Personnel shall demonstrate natural or corrected near-distance acuity of 20/25 or greater Snellen fraction, with at least one eye, by reading words or identifying characters on a near-distance test chart, such as a Jaeger chart, that meets the requirements of IWA-2322. Equivalent measures of near-distance acuity may be used. In addition, personnel performing VT-2 or VT-3 visual examinations shall demonstrate natural or corrected far-distance acuity of 20/30 or greater Snellen fraction or equivalent with at least one eye.

TABLE IWA-2322-1
NEAR-DISTANCE ACUITY TEST DISTANCES
AND CHARACTER HEIGHTS

| Test Distance, in. (mm) | Maximum Lower Case Character Height, in. (mm) |
|----------------------------|---|
| 12 (305) | 0.022 (0.56) |
| 13 (330) | 0.024 (0.61) |
| 14 (356) | 0.025 (0.63) |
| 15 (381) | 0.027 (0.68) |
| 16 (406) | 0.029 (0.73) |

NOTE: The test distances (eye to chart) and corresponding character heights provide a visual angle of 6.25 minutes, which is equivalent to a Snellen fraction of 20/25.

(b) Personnel shall demonstrate the capability to distinguish the colors applicable to the NDE methods for which certified and to differentiate contrast between these colors.

IWA-2322 Near-Distance Test Chart Qualification

A measurement of one of the near-distance test chart characters shall be made once before initial use, with an optical comparator (10X or greater) or other suitable instrument, to verify that the height of a representative lower case character, without an ascender or descender (e.g., a, c, e, o), for the selected type size, meets the requirements of Table IWA-2322-1. This measurement shall be documented and traceable to the test chart.

01 IWA-2323 Level III Personnel

The qualifications of Level III NDE personnel shall be evaluated using written examinations and a Demonstration Examination. The written examinations shall cover the Basic, Method, Specific, and Practical areas of knowledge as defined in IWA-2323(a), (b), (c), and (d). The Demonstration Examination shall be in accordance with ANSI/ASNT CP-189, Level II Practical Examination rules.

(a) The Basic Examination shall consist of at least 50 questions (required only once if certification is sought in more than one method):

(1) At least twenty (20) questions related to understanding of ANSI/ASNT CP-189.

(2) At least thirty (30) questions related to applicable materials, fabrication, and product technology.

(3) At least fifteen (15) questions that are similar to published Level II questions for other NDT methods.

(b) The Method Examination shall consist of at least 65 questions:

(1) At least thirty (30) questions related to fundamentals and principles that are similar to published ASNT Level III questions for each method.

(2) At least fifteen (15) questions related to application and establishment of procedures and techniques that are similar to published ASNT Level III questions for each method.

(3) At least twenty (20) questions related to capability for interpreting codes, standards, and specifications related to the method.

(c) The Specific Examination shall contain at least 30 questions covering equipment, techniques, procedures, and administration of the Employer's written practice. The Specific Examination shall also cover the NDE requirements of this Division, including acceptance standards and referenced codes and standards.

(d) The Practical Examination shall be in accordance with ANSI/ASNT CP-189 requirements.

(e) An ASNT Level III certificate with current endorsements obtained by examination for the applicable method satisfies the Basic and Method Examination requirements.

(f) When an outside agency administers the examination and only a pass or fail grade is issued, the Employer shall assign a grade of 80% for a pass grade.

(g) Level III personnel shall be recertified using the written Method, Specific, and Practical Examinations and the Demonstration Examination. Alternatively, Level III personnel may be recertified using only the written Method and Specific Examinations, provided the following conditions are met:

(1) The Level III candidate was previously certified or recertified using all the written examinations and the Demonstration Examination.

(2) The Level III candidate is not being recertified due to interrupted service as defined in the Employer's written practice.

(3) The Level III candidate is not being certified by a new Employer.

(h) For initial certification, the grades for the Basic, Method, Specific, Practical, and Demonstration Examinations shall be averaged to determine the overall grade. For recertification, the grades of applicable examinations administered in accordance with IWA-2323(g) shall be averaged to determine the overall grade.

(i) An ACCP certificate with current endorsements obtained by examination satisfies the Basic, Method,

Practical, and Demonstration examination requirements for Level III NDE personnel.

IWA-2330 LEVEL I RESPONSIBILITIES

Level I personnel shall use written procedures when performing specific setups, calibrations, and examinations and when recording data. These activities shall be conducted under the guidance of Level II or Level III personnel. Level I personnel shall not evaluate or accept the results of a nondestructive examination.

IWA-2340 LEVEL III EDUCATION

Level III candidates shall have high school or equivalent education.

IWA-2350 LIMITED CERTIFICATION

Limited certification in a method is permitted for personnel who are restricted to performing examinations of limited scope, i.e., limited operations or limited techniques within the method. Topics that are not relevant to the limited certification may be deleted from the ANSI/ASNT CP-189, Appendix VI, or Appendix VII training outline and may be accompanied by a corresponding reduction in training hours, examination content, and number of examination questions. Only questions related to the limited training are required. In addition, the required experience may be reduced by a corresponding amount. The specific methods and techniques covered by limited certification and the training, examination, and experience requirements for limited certification shall be defined in the written practice and documented in the individual's certification records.

IWA-2360 LEVEL I AND LEVEL II TRAINING AND EXPERIENCE

(a) A candidate may be qualified directly to Level II with no time as a Level I provided the required training and experience consists of the sum of the hours required for Level I and Level II certification.

(b) NDE training course outlines and materials shall be approved by a Level III. Previous training and experience may be accepted if verified by a Level III. The method of verification shall be documented in the candidate's certification records.

IWA-2370 LEVEL III EXPERIENCE

Candidates for Level III certification shall meet one of the following criteria:

(a) Graduate of a 4-year accredited engineering or science college or university with a degree in engineering or science, plus 1 year experience in NDE in an assignment comparable to that of a Level II in the examination method.

(b) Completion with a passing grade of at least the equivalent of 2 full years of engineering or science study at a university, college, or technical school, plus 2 years experience in an assignment comparable to that of a Level II in the examination method.

(c) Four years experience in an assignment comparable to that of a Level II in the examination method.

IWA-2380 NDE INSTRUCTOR

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In lieu of the requirements of CP-189, a candidate being considered for qualification as an NDE Instructor shall satisfy the Level III Basic and Method Examination requirements of IWA-2323 and shall meet one of the following requirements:

(a) maintain a current teacher or vocational instruction certificate issued by a state, municipal, provincial, or federal authority; or

(b) complete a minimum of 40 hr instruction in training and teaching techniques.

IWA-2400 INSPECTION PROGRAM

IWA-2410 APPLICATION OF CODE EDITION AND ADDENDA

The Code Edition and Addenda for preservice inspection and for initial and successive inservice inspection intervals shall be in accordance with 10CFR50, Section 50.55a.

IWA-2420 INSPECTION PLANS AND SCHEDULES

Inspection plans and schedules shall be prepared for the preservice inspection, the first inservice inspection interval, and subsequent inservice inspection intervals.

(a) Each inspection plan shall include the following:

(1) Inspection period and interval dates;

(2) the Edition and Addenda of this Division that apply to the required examinations and tests;

(3) the classification and identification of the components subject to examination and test;

(4) Code Cases proposed for use and the extent of their application.

(b) An implementation schedule for performance of examinations and tests shall be prepared for each inspection plan. The schedule shall include the following:

(1) identification of the components selected for examination and test, including successive exams from prior periods;

(2) the Code requirements by examination category and item number for each component and the examination or test to be performed and the extent of the examination or test;

(3) identification of drawings showing items that require examination;

(4) list of examination procedures;

(5) description of alternative examinations and identification of components to be examined using alternative methods;

(6) identification of calibration blocks used for ultrasonic examination of components.

IWA-2425 INSPECTION PLAN AND SCHEDULE SUPPORTING DOCUMENTS

Supporting documents necessary for inspection plan and schedule implementation such as diagrams or system drawings showing boundaries and system classifications, procedures, specifications, and other documents required for implementation of the inservice examinations and tests shall be available at the plant site.

IWA-2430 INSPECTION INTERVALS

(a) The inservice examinations and system pressure tests required by IWB, IWC, IWD, IWE, and inservice examinations and tests of IWF shall be completed during each of the inspection intervals for the service lifetime of the plant. The inspections shall be performed in accordance with the schedule of Inspection Program A of IWA-2431, or optionally, Inspection Program B of IWA-2432. It is not required that the inspection intervals of IWB, IWC, IWD, IWE, and IWF conform to the same inspection program.

(b) The inspection interval shall be determined by calendar years following placement of the plant into commercial service.

(c) For components inspected under Program A, the following shall apply:

(1) Each inspection interval may be extended by as much as 1 year. The 2nd, 3rd, and 4th inspection intervals may be reduced by as much as 1 year. Adjustments shall not cause successive intervals to be altered by more than 1 year from the original pattern of intervals. No credit shall be given for examinations conducted during the first year of commercial service.

(2) That portion of an inspection interval described as an inspection period may be reduced or extended by as much as 1 year to enable an inspection to coincide with a plant outage. This adjustment shall not alter the rules and requirements for scheduling inspection intervals.

(d) For components inspected under Program B, the following shall apply:

(1) Each inspection interval may be reduced or extended by as much as one year. Adjustments shall not cause successive intervals to be altered by more than one year from the original pattern of intervals. If an inspection interval is extended, neither the start and end dates nor the inservice inspection program for the successive interval need be revised.

(2) Examinations may be performed to satisfy the requirements of the extended interval in conjunction with examinations performed to satisfy the requirements of the successive interval. However, an examination performed to satisfy requirements of either the extended interval or the successive interval shall not be credited to both intervals.

(3) That portion of an inspection interval described as an inspection period may be reduced or extended by as much as one year to enable an inspection to coincide with a plant outage. This adjustment shall not alter the requirements for scheduling inspection intervals.

(4) The inspection interval for which an examination was performed shall be identified on examination records.

(e) In addition to IWA-2430(c) and (d), for plants that are out of service continuously for 6 months or more, the inspection interval during which the outage occurred may be extended for a period equivalent to the outage and the original pattern of intervals extended accordingly for successive intervals.

(f) The inspection intervals for items installed by repair/replacement activities shall coincide with remaining intervals, as determined by the calendar years of plant service at the time of the repair/replacement activities.

(g) The inspection program of IWA-2431 may be replaced by the inspection program of IWA-2432, and vice versa, during the first 3 years of the service lifetime of the plant.

(h) The inspection intervals for inservice examination of heat exchanger tubing shall be in accordance with the requirements of IWB-2413.

(i) The inspection intervals for inservice examination of Class CC components shall be in accordance with the requirements of IWL-2400.

IWA-2431 Inspection Program A

The inspection intervals shall comply with the following, except as may be modified by IWA-2430(c):

1st Inspection Interval — 3 years following initial start of plant commercial service

2nd Inspection Interval — 7 years following the 1st inspection interval

3rd Inspection Interval — 13 years following the 2nd inspection interval

4th Inspection Interval — 17 years following the 3rd inspection interval

Successive Inspection Intervals — follow IWA-2432

IWA-2432 Inspection Program B

The inspection intervals shall comply with the following, except as modified by IWA-2430(d):

1st Inspection Interval — 10 years following initial start of plant commercial service

Successive Inspection Intervals — 10 years following the previous inspection interval

IWA-2440 APPLICATION OF CODE CASES**IWA-2441 Section XI Code Cases**

(a) Code Cases to be used during a preservice or inservice inspection shall be identified in the Inspection Plan.

(b) Code Cases shall be applicable to the Edition and Addenda specified in the Inspection Plan.

(c) Code Cases shall be in effect at the time the Inspection Plan is filed with the regulatory and enforcement authorities having jurisdiction at the plant site except as provided in IWA-2441(d).

(d) Code Cases issued subsequent to filing the Inspection Plan may be proposed for use in amendments to the Inspection Plan.

(e) Superseded Code Cases approved for use in accordance with IWA-2441(a) through (d) may continue to be used.

(f) The use of any Code Case and revisions to previously approved Code Cases are subject to acceptance by the regulatory and enforcement authorities having jurisdiction at the plant site.

IWA-2442 Annulled Section XI Code Cases

Code Cases approved for use in accordance with IWA-2441 may be used after annulment for the duration of that Inspection Plan.

IWA-2500 EXTENT OF EXAMINATION

Requirements for examination of welds apply only to welds joining items and not welds correcting flaws in base material (including core closure welds in casting), unless otherwise stated.

IWA-2600 WELD REFERENCE SYSTEM**IWA-2610 GENERAL**

A reference system shall be established for all welds and areas subject to surface or volumetric examination. Each such weld and area shall be located and identified by a system of reference points. The system shall permit identification of each weld, location of each weld centerline, and designation of regular intervals along the length of the weld.

IWA-2620 PIPING

Requirements for piping are provided in III-4300. The rules of III-4300 may also be applied to piping not within the scope of III-1100.

IWA-2630 VESSELS

The requirements of Appendix A of Article 4 are acceptable for vessels examined in accordance with Article 4 of Section V.

IWA-2640 OTHER COMPONENTS

A reference system for component welds is given in IWA-2641. A different system may be used provided it meets the requirements of IWA-2610.

IWA-2641 Layout of Component Reference Points

The layout of the weld shall consist of placing reference points on the center line of the weld. The standard spacing of the reference points shall be 12 in. (305 mm). All points shall be identified with their numbers: 0, 1, 2, 3, 4, etc. The numbers of points, distance apart, and starting point shall be recorded on the reporting form. The weld center line shall be the divider for the two examination surfaces.

(a) *Circumferential (Girth) Welds.* The standard starting point shall be component 0 deg. The reference points shall be numbered clockwise as viewed from

the top of the component. The examination surfaces shall be identified as above or below the weld.

(b) *Longitudinal (Vertical) Welds.* Longitudinal welds shall be laid out from the center line of circumferential welds at the top end of the weld. The examination surface shall be identified as clockwise or counterclockwise as viewed from the top of the component.

(c) *Nozzle-to-Vessel Welds.* The external reference circle shall have a sufficient whole number of inches radius so that the circle falls on the vessel external surface beyond the weld fillet. The internal reference circle shall have a sufficient whole number of inches radius so that the circle falls within $\frac{1}{2}$ in. (13 mm)

of the weld centerline. Zero deg point on the weld shall be the top of the nozzle. The 0 deg point for welds of nozzles centered in heads shall be located at the 0 deg axis of the vessel. Angular layout of the weld shall be made clockwise on the external surface, counterclockwise on the internal surface. Zero, 90, 180, and 270 deg lines shall be marked on all nozzle welds examined; 30 deg increment lines shall be marked on nozzle welds greater than 4 in. (102 mm) radius; 15 deg increment lines shall be marked on nozzle welds greater than 12 in. (305 mm) radius; 5 deg increment lines shall be marked on nozzle welds greater than 24 in. (610 mm) radius.