

**ASME ANDE-1–2020**

**(Revision of ANDE-1–2015)**

# **ASME Nondestructive Examination and Quality Control Central Qualification and Certification Program**

---

ASMENORMDOC.COM : Click to view the full PDF of ASME ANDE-1 2020

**AN AMERICAN NATIONAL STANDARD**



**The American Society of  
Mechanical Engineers**

**ASME ANDE-1-2020**  
(Revision of ASME ANDE-1-2015)

# **ASME Nondestructive Examination and Quality Control Central Qualification and Certification Program**

---

ASMENORMDOC.COM : Click to view the full PDF of ASME ANDE-1 2020

**AN AMERICAN NATIONAL STANDARD**



**The American Society of  
Mechanical Engineers**

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: February 26, 2021

This Standard will be revised when the Society approves the issuance of a new edition.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the Committee web page and under <http://go.asme.org/InterpsDatabase>. Periodically certain actions of the ASME NDE (ANDE) Committee may be published as Cases. Cases are published on the ASME website under the Committee Pages at <http://cstools.asme.org/as> they are issued.

Errata to codes and standards may be posted on the ASME website under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The Committee Pages can be found at <http://cstools.asme.org/>. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting "Errata" in the "Publication Information" section.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not "approve," "rate," or "endorse" any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assume any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

No part of this document may be reproduced in any form,  
in an electronic retrieval system or otherwise,  
without the prior written permission of the publisher.

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

Copyright © 2021 by  
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS  
All rights reserved  
Printed in U.S.A.

# CONTENTS

Foreword .....	iv
Committee Roster .....	v
Correspondence With the ANDE Committee .....	vi
<b>Part 1</b>	
<b>General Requirements .....</b>	<b>1</b>
Section 1-1 Introduction .....	1
Section 1-2 Acronyms and Definitions .....	2
Section 1-3 Responsibilities .....	5
Section 1-4 Administration .....	6
Section 1-5 Eligibility .....	7
Section 1-6 Maintenance of Certification .....	7
Section 1-7 Documents and Records .....	8
Section 1-8 References .....	9
<b>Part 2</b>	
<b>NDE Personnel Qualification and Certification Requirements .....</b>	<b>10</b>
Section 2-1 NDE Methods and Levels of Qualification .....	10
Section 2-2 NDE Certification Examinations .....	11
<b>Part 3</b>	
<b>QC Personnel Qualification and Certification Requirements .....</b>	<b>14</b>
Section 3-1 QC Methods and Levels of Qualification .....	14
Section 3-2 QC Certification Examinations .....	14
<b>Mandatory Appendices</b>	
I NDE and QC Requirements for the Nuclear Sector .....	17
II NDE and QC Requirements for the Boiler and Pressure Vessel and Piping Sector .....	19
III Qualification and Certification of Nondestructive Testing Personnel to ISO 9712 .....	21
<b>Nonmandatory Appendix</b>	
A Guidance on Maintenance of the Standard .....	22
<b>Figure</b>	
A-2-1 Maintenance of the Standard .....	23
<b>Tables</b>	
2-2.2-1 NDE Written Examinations .....	13
3-2.2-1 QC Written Examinations .....	16

# FOREWORD

In 2010, an ASME Project Team was formed with the intent to write a written practice type of document for the qualification and certification of nondestructive examination (NDE) personnel. The written practice document would have been used to support ASME qualification and certification efforts. After much discussion, it was determined that a Standard was more appropriate for accomplishing the goals of the ASME Project Team. The Project Team was dissolved in May 2012 and merged into a Standards Writing Committee. The Standards Writing Committee is now called the "ASME NDE (ANDE) Committee on Qualification and Certification of Nondestructive Examination Personnel and Quality Control Technicians" and, as used in this Standard, is referenced as the "ANDE Committee." The ANDE Committee (consensus Committee), with its supporting Subcommittees, has the responsibility to write, maintain, and approve this Standard.

This Standard has been written to provide the requirements for a central qualification and certification program conducted by a third-party certification organization (certification body) for NDE and quality control (QC) personnel and uses both performance-based and prescriptive requirements that serve as the program core for these activities.

This Standard has been written to meet the needs of many different industries such as the aerospace and defense industry, the automotive industry, the construction and building industry, and the energy industry. The energy industry, which directly relates to many different specific industry sectors (SISs), such as power plants, fossil power, renewable energy, arctic engineering and offshore technology, nuclear power, and energy efficiency, includes many SIS activities that require NDE or QC to be performed by qualified and certified personnel. These SIS activities include manufacturing, fabrication, construction, installation, maintenance, preservice inspection, and inservice inspection. The use of performance-based requirements for qualification with a systematic approach to training (SAT) process in this Standard, along with the use of job task analyses (JTAs) for the qualification and certification of NDE and QC personnel, makes it unique and supports a goal of enhancing personnel capabilities to perform NDE and QC methods. These performance-based requirements are focused on training and true performance demonstration of the skills needed for personnel to perform specific job functions throughout initial qualification and certification and then during certification periods.

It is expected that with the use of this Standard, NDE and QC inspection reliability and qualification performance will be improved and that a larger pool of personnel will become available to support any industry or SIS that either requires or chooses to use this Standard.

This edition of the Standard may be used beginning with the date of issuance shown on the copyright page. After such date of issuance, this edition becomes the requirement for compliance with this Standard.

ANDE-1-2020 was approved as an American National Standard on November 5, 2020.

# **ASME NDE (ANDE) COMMITTEE**

## **Certification of Nondestructive Examination (NDE) Personnel and Quality Control (QC) Technicians**

### **STANDARDS COMMITTEE OFFICERS**

**H. Stephens, Jr.**, *Chair*  
**T. L. Clifford**, *Vice Chair*  
**P. Murray**, *Secretary*

### **STANDARDS COMMITTEE PERSONNEL**

**R. M. Beldyk**, BlueScope  
**C. Brown**, Idaho National Laboratory  
**T. L. Clifford**, Chattanooga State Community College  
**N. Finney**, Duke Energy  
**P. Fisher**, HSB Inspection and Insurance Co.  
**D. Henry**, Westinghouse Electric Co.  
**K. Kim**, Korea Institute of Nuclear Safety  
**P. Murray**, The American Society of Mechanical Engineers  
**H. Stephens, Jr.**, Consultant

**P. Sturgill**, Sturgill Welding and Code Consulting  
**M. L. Turnbow**, Consultant  
**T. Zavadil**, ATG (Advanced Technology Group), s.r.o.  
**J. L. Arnold**, *Contributing Member*, Niantic Bay Engineering, LLC  
**J. Hall**, *Contributing Member*, LMT, Inc.  
**L. Mullins**, *Contributing Member*, Zetec, Inc.  
**C. Smith**, *Contributing Member*, Smith Associates Consulting Group, LLC

# CORRESPONDENCE WITH THE ANDE COMMITTEE

**General.** ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, ANDE Standards Committee  
The American Society of Mechanical Engineers  
Two Park Avenue  
New York, NY 10016-5990  
<http://go.asme.org/Inquiry>

**Proposing Revisions.** Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

**Proposing a Case.** Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

**Interpretations.** Upon request, the ANDE Standards Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the ANDE Standards Committee.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at <http://go.asme.org/InterpretationRequest>. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the ANDE Standards Committee at the above address. The request for an interpretation should be clear and unambiguous. It is further recommended that the Inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry in one or two words.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. Please provide a condensed and precise question, composed in such a way that a "yes" or "no" reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of "Yes" or "No," with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in the format described above may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

Moreover, ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not “approve,” “certify,” “rate,” or “endorse” any item, construction, proprietary device, or activity.

**Attending Committee Meetings.** The ANDE Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the ANDE Standards Committee.

ASMENORMDOC.COM : Click to view the full PDF of ASME ANDE-1-2020

INTENTIONALLY LEFT BLANK

# Part 1

## General Requirements

### SECTION 1-1 INTRODUCTION

#### 1-1.1 Scope

(a) This Standard includes both performance-based and prescriptive requirements to be used for an ASME Nondestructive Examination (NDE) and Quality Control (QC) Central Qualification and Certification Program that applies to NDE personnel and QC inspection personnel.

(b) This Standard includes requirements for personnel education, training, experience, written examinations, and practical demonstrations. The requirements are based on a systematic approach to training (SAT) process that integrates the development of job task analyses (JTAs) and body of knowledge (BoK) requirements.

(c) This Standard is applied by a third-party certification organization, which is referred to within this Standard as a certification body (CB).

(d) This Standard classifies CB-certified individuals as Level I, Level II, or Level III.

(e) [Mandatory Appendices I and II](#) include requirements specific to the nuclear sector and the boiler and pressure vessel and piping (BPVP) industry sectors, respectively. [Mandatory Appendix III](#) includes requirements specific to the qualification and certification of nondestructive testing personnel to ISO 9712.

#### 1-1.2 Applicability

This Standard is applicable to any industry or industry sector that performs industry sector activities such as manufacturing, fabrication, construction, installation, maintenance, preservice inspection (PSI), and inservice inspection (ISI) that require NDE or QC inspections to be performed by qualified and certified NDE and QC inspection personnel.

#### 1-1.3 Use of This Standard

This Standard is required to be used when referenced by a user's code, standard, specification, procedure, or instruction, which the user has committed to meet or is required to meet. Optional use of this Standard is not prohibited, but when this Standard is used, all requirements are mandatory, including those in the applicable Mandatory Appendices, except where specific alternatives are provided in this Standard. Use of Nonmandatory

Appendices is optional, but when used, all the requirements within a Nonmandatory Appendix become mandatory unless the Nonmandatory Appendix is specified for guidance only. See [Nonmandatory Appendix A](#) for guidance on maintenance of the Standard.

#### 1-1.4 Involvement of Regulatory or Enforcement Authorities or Jurisdictions, or Authorized Inspection Agencies

When a referencing code or standard requires the involvement of regulatory or enforcement authorities or jurisdictions or an Authorized Inspection Agency (AIA), those authorities or agencies shall be provided the certified individual's written approval (see [para. 1-7.3](#)) to access any record of documentation, qualification, or certification activities performed to meet this Standard.

#### 1-1.5 Applications, Certification Forms, Job Task Analyses, Related Body of Knowledge Requirements, and Qualification/Continuity Cards

When the following documents, methods, or requirements are referenced in this Standard, the latest versions approved by the applicable specific industry sector (SIS) committee shall apply:

- (a) applications and related forms
- (b) JTAs for NDE or QC methods or endorsements
- (c) BoK for NDE or QC methods or endorsements
- (d) qualification/continuity cards and their instructions

#### 1-1.6 Eye Examinations

(a) In addition to maintaining certification, candidates shall demonstrate satisfactory visual acuity to perform NDE or QC methods, as applicable. The eye examination shall be given on an annual basis (i.e., certified personnel shall receive and successfully pass vision acuity examinations at intervals not to exceed 1 yr, which expire on the last day of the month of the expiration date, in order to maintain their certifications in an active status) in accordance with the following requirements:

- (1) *Near Vision Acuity.* The candidate shall demonstrate near vision acuity, natural or corrected, of Jaeger 1 or equivalent at a distance not less than 12 in. (30 cm) in at least one eye or shall meet the vision

requirements of the referencing code, standard, procedure, specification, or instruction. Testing methods that are capable of determining equivalent visual acuity may be used. (A medical professional who performs eye examinations shall determine equivalency.)

(2) *Far Vision Acuity.* Far vision acuity testing is required only when specified by the applicable SIS.

(3) *Color Differentiation/Contrast.* Personnel shall demonstrate the capability to distinguish the colors applicable to the test methods for which certified and to differentiate contrast between these colors. Accepted examination types include H-R-R Pseudoisochromatic, Ishihara, Dvorine, and Farnsworth. Equivalent examinations may be performed when equivalency by a qualified and licensed medical professional has been determined. Any limitation in color perception shall be evaluated in accordance with the employer's eye examination program by a qualified individual. Limitations shall be documented on the candidate's eye examination documents.

(4) *Vision Correction.* When vision correction is necessary to pass the visual acuity examinations, the same vision correction device shall be worn during all NDE and QC inspections. Candidates using different correction devices, such as eye lenses and contact lenses, during NDE and QC inspections shall complete a visual acuity examination for each correction device.

(b) *Responsibilities.* The Employer shall

(1) develop and maintain an eye examination program or written practice that complies with this Standard and any other requirements that may be required by a referencing code, standard, specification, procedure, or instruction

(2) ensure personnel conducting eye examinations are either medical professionals who perform eye examinations or other personnel trained to the employer's eye examination program or written practice

(3) maintain the ANDE-certified individual's eye examination records for the duration of the certification

## SECTION 1-2 ACRONYMS AND DEFINITIONS

### 1-2.1 General

The definitions in paras. 1-2.2 and 1-2.3 have been provided to ensure a uniform understanding of the acronyms and terms used in this Standard.

### 1-2.2 Acronyms

Acronym	Definition
AET	Acoustic emission testing
AIA	Authorized Inspection Agency
ANDE	American Society of Mechanical Engineers Nondestructive Examination
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers

Table continued

Acronym	Definition
BoK	Body of knowledge
BPV	Boiler and Pressure Vessel
CB	Certification body
DDA	Digital detector array
DTO	Designated test organization
ET	Electromagnetic (eddy current) testing
I&C	Instrumentation and control
ISI	Inservice inspection
JTA	Job task analysis
LT	Leak testing
MT	Magnetic particle testing
NDE	Nondestructive examination
NDI	Nondestructive inspection
NDT	Nondestructive testing
PSI	Preservice inspection
PT	Liquid penetrant testing
QA	Quality assurance
QC	Quality control
QC CIVIL	Civil inspection
QC ELECT	Electrical inspection
QC MECH	Mechanical inspection
QC RECPT	Receipt inspection
QC WELD	Weld inspection
RT	Radiographic testing
SAT	Systematic approach to training
SIS	Specific industry sector
SME	Subject matter expert
TOFD	Time-of-flight diffraction
UT	Ultrasonic testing
UV	Ultraviolet
VT	Visual testing

### 1-2.3 Definitions

*AIA inspection:* verification of the performance of examinations and the qualification and certification of NDE and QC Inspection personnel by an AIA Inspector.

*AI/ANI/ANII:* the Authorized Inspector, Authorized Nuclear Inspector, or Authorized Nuclear Inservice Inspector.

*Authorized Inspection Agency (AIA):* an organization that is empowered by an enforcement authority to provide inspection personnel and services as required by an applicable ASME BPVC Section. The AIA is accredited by ASME in accordance with the provisions set forth in ASME QAI-1.

*candidate:* an individual seeking certification to this Standard.

*certification*: written attestation that an individual is qualified in an NDE or QC method and has endorsements, as applicable, in accordance with the requirements as stated in this Standard.

*certification body (CB)*: a third-party certification organization that is an independent body, such as a nonprofit technical society, research organization, or government agency, that assesses and attests to the individual's level of qualification and certification in accordance with this Standard, separate from the organizations that use the NDE or QC personnel that it certifies and not owned by any organization that uses such certified personnel.

*defect*: as used in NDE and QC, a flaw or relevant condition (imperfection or unintentional discontinuity) of such size, shape, orientation, location, or properties as to be rejectable by a referencing code, standard, specification, procedure, or instruction.

*designated test organization (DTO)*: an organization with facilities, equipment, and personnel for administering examinations approved by the CB.

*documented*: describing information that is in a hard copy or electronic format that shows the existence or truth of evidence.

*education*:

- (a) the process of facilitating learning.
- (b) the acquisition of knowledge, skills, values, and beliefs.

*employer*: the legal entity, corporate, government, private, or public entity that employs NDE or QC personnel and is solely responsible for authorizing employees to perform NDE or QC inspection.

*endorsement*: the CB's approval of an individual's qualification to perform an NDE or QC technique that is not integral to the basic method certification. For example, individuals certified in the ultrasonic method would not be certified to perform phased-array testing technique unless they have a phased-array endorsement.

*enforcement authority*: a regional or local governing body, such as, a state or municipality of the United States or a province of Canada, empowered to enact and enforce legislation.

*evaluation*: a determination of the significance of an indication.

*examination, nondestructive (NDE)*: see *nondestructive examination (NDE)*.

*examination, qualification*: an assessment (e.g., written) conducted in accordance with a procedure or other specific requirements.

*examination center*: a center with facilities, equipment, and personnel used to administer examinations (see *designated test organization*).

*experience*: actual performance, simulations, or verifications conducted during work time resulting in the acquisition of skills and knowledge. Classroom training is not considered as experience.

*false call*: reporting a defect when none exists.

*flaw*: an imperfection or unintentional discontinuity detected by NDE or QC inspection.

*grading unit*: a section of a test sample. A grading unit can be of unequal length and spacing and either with or without relevant conditions or flaws.

*industry*: a distinct group of productive or profit-making enterprises that produces or supplies goods or services (e.g., the aircraft industry, the pipeline industry, the automotive industry, and the energy industry).

*inspection*: the observation of any operation performed on materials, components, or both to determine their acceptability in accordance with given criteria.

*instructor*: an individual who teaches, trains, or educates NDE or QC inspection personnel.

*job task analysis (JTA)*: the systematic process of identifying the content of a job, including the activities involved and the knowledge and skills required to perform the work.

*nondestructive examination (NDE)*: the development and application of nonintrusive methods to examine materials or components or both, in ways that do not impair future usefulness and serviceability in order to detect, locate, measure, interpret, and evaluate flaws or other defined attributes.

*NDE method*: one of the disciplines of NDE. All or any of the NDE methods listed below are addressed within ASME Codes and Standards and as applicable may be addressed within the requirements of this Standard. Use of the term "testing" in the acronyms of this definition intends to provide a universal term to describe nondestructive methods across all industries and industry sectors that may use this Standard, such as those that specify NDE methods, nondestructive testing (NDT) methods, or nondestructive inspection (NDI) methods:

- (a) acoustic emission testing (AE)
- (b) electromagnetic (eddy current) testing (ET)
- (c) leak testing (LT)
- (d) magnetic particle testing (MT)
- (e) liquid penetrant testing (PT)
- (f) radiographic testing (RT)
- (g) ultrasonic testing (UT)
- (h) visual testing (VT)

*NDE technique*: a specific way of utilizing an NDE method, e.g., use of a yoke for the MT examination method.

*outside agency*: an organization or individual providing support services to the CB.

*performance-based requirements:* for training, qualification, and certification of personnel, requirements for personnel to successfully demonstrate their ability to consistently perform tasks under real working conditions. This puts certification candidates in situations where they use their knowledge and demonstrate their skills in a manner that can quantitatively measure the elements that employers and certification organizations deem most important (i.e., job tasks, especially those requiring specialized skills, and knowledge to reliably detect relevant conditions and flaws).

*practical demonstration:* for Level I, Level II, and Level III candidates, a demonstration of an individual's ability to conduct NDE or QC methods.

*procedure:* a document containing written instructions used by personnel to perform NDE or QC methods.

*psychometric process:* the science and technology of measurement used to develop and analyze assessments of cognitive and skill ability.

*qualification, personnel:* the characteristics or abilities gained through education, training, or experience, as measured against established requirements, such as tests, that qualify an individual to perform a required function.

*qualification/continuity card:* a card used to show that an individual has documented evidence of their demonstrated ability to perform the attributes needed for NDE or QC methods and endorsements associated with certification, maintenance of certification, and recertification.

*quality control (QC):* those quality assurance actions that provide a means to evaluate and measure the characteristics of an item or process in accordance with established requirements.

*QC inspection:* a phase of quality control that by means of examination, verification, or measurement determines the conformance of materials, supplies, components, parts, appurtenances, systems, processes, or structures to predetermined quality requirements.

*QC method:* one of the disciplines of QC. All or any of the QC inspection methods listed below as addressed in referencing codes, standards, specifications, procedures, or instructions used as applicable may be addressed within the requirements of this Standard.

- (a) QC CIVIL — civil inspection
- (b) QC ELECT — electrical inspection
- (c) QC MECH — mechanical inspection
- (d) QC RECPT — receipt inspection
- (e) QC WELD — weld inspection

*regulatory authority:* an authority having jurisdiction that is empowered to issue and enforce regulations.

*relevant condition:* an observation during NDE or QC inspection that is evaluated as to its significance on the subject NDE or QC inspection results.

*specific industry sector (SIS):* a subdivision of an industry such as the energy industry, which includes such specific industry sectors as power plants, fossil power, renewable energy, arctic engineering, and offshore technology, nuclear power, and energy efficiency organizations. Activities that are needed to support a specific industry sector may include manufacturing, fabrication, construction, installation, repair/replacement activities, maintenance, and preservice inspection or inservice inspection.

*SIS activity requirements:* requirements in this Standard or those that are defined in a code, standard, specification, procedure, or instruction that are used to perform the SIS activity. These requirements shall apply to a particular area in a specific industry sector or technology where using NDE or QC methods that may require specific skills, knowledge, equipment, or training.

*subject matter expert (SME):* an individual with a definitive source of knowledge, technique, or expertise in a specific subject area, such as training or NDE or QC methods.

*systematic approach to training (SAT) process:* the methodology for design and development of the qualification and examination requirements in this Standard. It is an orderly and logical approach to determine what people need to know and do for their particular job in their certification area. The SAT process verifies that people are prepared for their work by having the necessary skills and knowledge to do their job. The SAT process includes five steps with a focus toward meeting the performance-based requirements of this Standard. The five steps are

- (a) analysis
- (b) design
- (c) development
- (d) implementation
- (e) evaluation

*testing:* the determination or verification of the capability of an item to meet specified requirements by subjecting the item to a set of physical, chemical, environmental, or operating conditions.

*test sample:* an example or a simulation of the component for which the NDE or QC method is qualified and, as appropriate, replicates size, geometry, and material properties, and contains attributes or deficiencies to be encountered on the job.

*training:* organized and documented program of activities designed to impart the skills and knowledge required to become qualified.

*written examination:* an examination that includes both general and specific knowledge questions based on the principles of a NDE or QC method applicable to codes, standards, specifications, instructions, procedures, and their acceptance criteria.

## SECTION 1-3 RESPONSIBILITIES

### 1-3.1 General

(a) This Section contains the requirements for the overall responsibility of the CB program for NDE and QC inspection personnel qualification and certification to this Standard.

(b) The ANDE Committee is responsible for the development and maintenance of this Standard.

(c) The CB QA program and the CB general administrative procedures for implementation of this Standard such as the operating procedures and instructions to candidates shall be made available to the applicable SIS committee for review and comment, and all comments shall be addressed prior to implementation by the CB.

(d) The applicable SIS committee shall approve all technical documents including JTAs; BoKs; qualification/continuity cards and their Instructions for use; technical procedures that include grading of written examinations; practical demonstrations; checklists; psychometric process instructions; and test samples and grading units.

### 1-3.2 Certification Body (CB)

The CB shall meet the following requirements:

(a) The CB shall have demonstrated experience in administration of programs for certification of personnel based on factors including training and examinations.

(b) The CB shall maintain a Quality Assurance (QA) program that meets the requirements of the latest edition of ISO 9000 or equivalent (e.g., ASME NQA-1, as applicable).

(c) The CB shall verify candidates' qualification and certify NDE and QC inspection personnel in accordance with the requirements of this Standard. This includes the Mandatory Appendices and maintaining the infrastructure for the certification program including development and maintenance of written examinations, test samples, and organizations providing services, such as DTOs.

(d) The CB shall maintain a database of certified individuals that is accessible for verification of certifications by regulatory or enforcement authorities, Authorized Inspection Agencies, owners, or employers, as applicable.

(e) The CB shall issue a certification form to those personnel satisfying the requirements for NDE or QC certification in accordance with this Standard and shall issue an examination record, which shall be maintained in a database.

(f) The CB shall mail or email to candidates the following notifications within 30 days of their issuances:

(1) acknowledgement of receipt of a candidate's application

(2) results of written examinations and practical demonstrations

(3) certification forms [see (e)]

(4) notice of revoked certification

Examination results shall not be given over the telephone.

(g) The CB certifies by issuing a certification form that the individual has satisfied the requirements of this Standard. However, the CB does not give authority or license to that individual to perform NDE or QC activities [see para. 1-3.5(a)(3)].

(h) The CB shall develop and maintain written examinations and practical demonstrations based on the psychometric process and other requirements of this Standard, including (1), (2), and (3).

(1) The CB shall develop and maintain a secure question bank, and written examinations shall be prepared based on the JTAs using a selection process that ensures no individual takes the same examination more than once.

(2) The CB or CB's approved outside agencies shall maintain a secure test sample bank containing a sufficient number of flawed samples to support the practical demonstrations.

(3) The CB shall ensure that the samples in the test sample bank shall be real or simulated with some flaws exceeding and others not exceeding the acceptance standards of the applicable referencing code, standard, specification, procedure, or instruction.

(i) The CB shall develop criteria and monitor implementation results to ensure program effectiveness for performance improvement.

### 1-3.3 Examination Centers

(a) Examination centers are responsible for administering examinations in accordance with this Standard.

(b) Examination centers shall establish a controlled environment to ensure the integrity of the examination process and the security of examination materials.

(c) Examination centers shall be operated directly by the CB or a CB-approved outside agency, e.g., a DTO.

### 1-3.4 Instructor

An NDE or QC instructor (see para. 1-4.5) shall have the skills and knowledge to plan, develop, organize, and professionally present classroom course materials and demonstrations, and conduct laboratory exercises. Course materials (classroom, e-learning training, demonstrations, structured laboratory exercises, and on-the-job training) presented shall be reviewed and approved by an NDE or QC Level III in the methods or endorsements being taught.

### 1-3.5 Employer

(a) The employer shall

(1) provide qualification records (i.e., training, experience, visual acuity, and other records related to certification) to the CB upon request, provided release

of such records is authorized by the certified individual or by the individual applying for certification

(2) report performance deficiencies to the CB

(3) authorize employees to perform NDE or QC inspections

(b) Self-employed individuals shall assume all employer responsibilities described herein.

### 1-3.6 Candidate

Personnel applying for certification in accordance with this Standard or certified by the CB and applying for recertification are responsible for providing complete and accurate records, obtaining an eye examination in accordance with the requirements of [para. 1-1.6](#), and submitting in a timely manner records required for maintenance of certifications.

### 1-3.7 Specific Industry Sector Committee

(a) Representatives from industry in cooperation with a CB shall establish a SIS committee. The SIS committee shall provide technical advice and support to the CB to ensure compliance with this Standard. The requirements for each SIS committee are contained in the Mandatory Appendices of this Standard.

(b) The SIS committees shall perform oversight of the CB as described in the CB's operating procedures. The oversight shall be based on detailed review and comment activities by the SIS committees to provide consistent, constructive, and collective results to the CB.

(c) The SIS committee shall have a balanced membership comprising SMEs or other representatives knowledgeable in various aspects of NDE or QC methods. The SIS committee shall coordinate implementation of the Standard requirements between interested and affected parties and the CB.

## SECTION 1-4 ADMINISTRATION

### 1-4.1 General

This Section contains the general requirements for the overall administration of the CB program for NDE and QC Inspection personnel qualification and certification to this Standard.

### 1-4.2 Application Process

Candidates shall prepare and submit an application form for examination to the CB. The application form documents their education, training, experience, and employment history. Candidates shall also submit a completed qualification/continuity card for each NDE or QC method including endorsement(s), if applicable, for which they are seeking certification. The form shall include contact information for individuals who can substantiate the validity of training and experience claims made by the candidate. In addition, the candidate

shall submit eye examination records showing compliance with the requirements of this Standard. The CB shall review the applications and notify candidates of their eligibility for examination.

### 1-4.3 Approval of Outside Agencies

The approval and use of outside agencies shall be controlled by the CB's QA program.

### 1-4.4 Qualification and Utilization of Designated Test Organizations

Designated test organizations (DTOs) shall be subject to evaluation and periodic audits in accordance with the CB QA program.

### 1-4.5 Instructor Qualifications

(a) *NDE Instructor.* An NDE instructor shall meet the following qualification requirements:

(1) be a certified NDE Level III in the NDE method that they instruct, or shall have passed an NDE Level III written examination in the NDE method they instruct

(2) shall meet one of the following requirements:

(-a) be a teacher or vocational instructor at a state, municipal, provincial, or federal learning institution

(-b) successfully complete a 40-hr course of instruction in training and teaching techniques

(b) *QC Instructor.* A QC instructor shall meet one of the following qualification requirements:

(1) be a certified QC Level III in the QC method that they instruct

(2) have instructor experience in conducting training related to the specific inspection task within the method being instructed

### 1-4.6 Preparation, Distribution, and Maintenance of Records

(a) The CB is responsible for the preparation of certificates, forms documenting results of the examinations it administers, and records of evaluation of a candidate's application.

(b) The records supporting the qualification and certification of an individual, including education, training and experience records, affidavits, degrees, certificates, etc., shall be maintained on file by the CB (see [para. 1-7.4](#)).

### 1-4.7 Access to Records

Access to an individual's certification records maintained by the CB shall be made available to the certified individual and other entities including Owners, ASME Certificate Holders, repair organizations, and support organizations as authorized by the certified individual and the CB.

### 1-4.8 Specific Industry Sector Activity Endorsement

A SIS activity endorsement applied to the certification in each method is based on the scope of the written examination and the practical demonstration evaluation as established by the SIS. A candidate can apply and be examined for multiple methods and endorsements.

## SECTION 1-5 ELIGIBILITY

### 1-5.1 General

This Section contains the eligibility requirements for examination and certification of NDE and QC inspection personnel.

### 1-5.2 Education

All Level I, Level II, or Level III candidates shall have a high school diploma, general education diploma, or equivalent education.

### 1-5.3 Training

(a) Candidates for NDE and QC personnel qualification and certification shall complete sufficient training to be familiar with the principles and practices of the applicable NDE or QC method including any endorsements being sought.

(b) Training for each NDE or QC method including any endorsements being sought shall be developed by a group of SMEs in accordance with the performance-based SAT process. Training may be provided in the classroom or laboratory or by means of a self-paced, computer-based, on-the-job training or distance-learning techniques. As an integral part of the SAT process, the JTA and BoK shall be used for the skills and knowledge required for training.

(c) An NDE or QC inspection Level III shall, in all cases, be ultimately responsible for the sequence, content, and depth of coverage for each training topic. Sufficient evaluation during the process of achieving training is essential to ensure comprehension prior to examination for qualification and certification.

(d) All training courses shall address the content contained in the applicable BoK, that is developed from the JTA, addressed in this Standard and shall be approved by an NDE or QC Level III certified individual (see para. 1-3.4).

### 1-5.4 Experience

(a) Experience shall be documented on the qualification/continuity card for each NDE or QC method.

(b) Completed qualification/continuity cards shall be submitted to the CB as part of the candidate's application.

### 1-5.5 Eye Examinations

A candidate shall have documented evidence of a current eye examination in accordance with para. 1-1.6 in order to be considered for certification.

### 1-5.6 Written Examinations

(a) A candidate shall be eligible to take the written examination upon completion of the education requirements in para. 1-5.2 and training requirements in para. 1-5.3.

(b) Upon successful completion of the written examination, the candidate shall be issued a certificate of completion. This certificate does not imply certification.

(c) The candidate has 1 yr to complete the experience requirements in para. 1-5.4 and successfully complete the practical demonstration.

### 1-5.7 Practical Demonstrations

A candidate shall be eligible to perform a practical demonstration upon completion of the following:

(a) eye examination requirements in para. 1-5.5

(b) experience requirements in para. 1-5.4

(c) successful completion of the written examination

The practical demonstration shall be successfully completed within 1 yr of successful completion of the written examination.

### 1-5.8 Re-Examinations

(a) Candidates who fail to pass either the written examination or the practical demonstration may be re-examined after a period of at least 30 days provided that documented evidence of additional training is submitted to the CB for review prior to the candidate being permitted to be re-examined.

(b) No candidate shall be re-examined more than twice within any continuous 12-month period.

## SECTION 1-6 MAINTENANCE OF CERTIFICATION

### 1-6.1 General

This Section contains requirements associated with continuity of certifications, expiration, recertification, and revocation of certifications for NDE and QC inspection personnel.

### 1-6.2 Continuity of Certification

(a) To maintain a certification in an NDE or QC method and applicable endorsement(s), the individual shall remain actively engaged in the method and applicable endorsement(s) certified. The individual shall complete a qualification/continuity card for each NDE or QC method and applicable endorsement(s) for which he or she is certified. An ANDE Level III shall sign the card,

and the individual shall submit it to the CB annually. The submittal shall occur at least 60 days, but no more than 90 days, before the anniversary date of each 12-month (365-day) period after initial certification. The CB shall notify the individual of the qualification/continuity card approval status before the certification anniversary date.

(b) An individual who has not performed the duties associated with his or her certification during any 12-month (365-day) period shall be considered to have interrupted service. Further, an individual who does not submit the qualification/continuity card within the designated period shall be considered to have interrupted service.

(c) An individual with interrupted service who wishes to reinstate his or her certification shall successfully demonstrate continued proficiency in the previously certified method(s) and applicable endorsement(s) before being allowed to perform NDE or QC inspection [see [para. 1-3.5\(a\)\(3\)](#)]. The individual shall complete a reduced-scope practical demonstration for each interrupted certification method and applicable endorsement. The individual shall successfully complete the reduced-scope practical demonstration no later than 90 days after the anniversary date of each 12-month (365-day) period. The CB shall document and maintain the results of the reduced-scope practical demonstration as part of the individual's CB certification records. The CB shall notify the individual of the results of the reduced-scope practical demonstration within 30 days of completion and, if the individual is successful, of the resumption of the ANDE Certification.

(d) The activities in (a) and (c) shall be performed in accordance with an applicable SIS committee-approved procedure.

### 1-6.3 Expiration

Certifications for all NDE and QC inspection personnel expire every 5 yr, and if these certifications are not renewed by recertification or by evidence of maintenance of continuity in accordance with [para. 1-6.4\(b\)](#), the certification shall expire.

### 1-6.4 Recertification

(a) Recertification is based on successful completion of the applicable written examinations required by [para. 2-2.2](#) and the practical demonstrations required by [para. 2-2.3](#) as applicable for NDE personnel and [paras. 3-2.2](#) and [3-2.3](#) as applicable for QC inspection personnel.

(b) Re-examination for NDE and QC Inspection personnel at the required expiration interval of 5 yr is not required provided that a new qualification/continuity card and reduced-scope practical demonstration have been submitted in accordance with [para. 1-6.2\(c\)](#) to and approved by the CB prior to the end of each 12-month period that the individual is certified. The CB

shall notify the individual of the approval status before the certification expiration date.

### 1-6.5 Revocation

The CB may revoke an individual's certification when any of the following occurs:

(a) The individual has not documented performance or continuity of the duties required to be performed for an NDE or QC method or endorsement for which the individual is certified during any continuous 24-month period. If this revocation occurs, then the requirements in [para. 1-6.4\(a\)](#) shall apply.

(b) The certified individual's performance is determined by the CB to be deficient in an NDE or QC method or an endorsement for specific documented reasons. If this revocation occurs, then the requirements of [para. 1-6.4\(a\)](#) shall apply.

(c) The CB determines that an individual has violated the CB's code of conduct.

## SECTION 1-7 DOCUMENTS AND RECORDS

### 1-7.1 General

This Section contains the requirements for compiling and retaining NDE and QC documents and records.

### 1-7.2 Types of Documents and Records

The following documents and records shall be included in the individual's files maintained by the CB:

(a) certification forms issued for each NDE or QC method, stating any endorsements, if applicable

(b) the results of examinations administered by the CB including examination checklists used for practical demonstrations

(c) the individual's application

(d) copies of documents and records supporting the verification of qualification of an individual, including education, training, and experience records; qualification/continuity cards; affidavits; eye examination records; degrees and certificates, etc.

(1) Training documents and records shall identify the history of the candidate's training, the organization providing the training, dates of the training, evidence of satisfactory completion, and the instructor's name, if available.

(2) Qualification/continuity cards shall be used as a record for verification by the CB for required initial qualification and annual continuity performance.

(3) Eye examination records shall show the test results that are used for qualification or certification.

### 1-7.3 Confidentiality

The CB shall keep an individual's documents and records confidential. The CB shall obtain the individual's written authorization before releasing the documents or records.

### 1-7.4 Record Retention

The CB shall retain documents and records for a minimum of 10 yr or for the period required by the SIS committee and specified in the CB QA program. The documents and records shall be subject to audit in accordance with the referencing code, standard, specification, procedure, or instruction and the CB QA program.

## SECTION 1-8 REFERENCES

### 1-8.1 General

This Section lists the references cited in this Standard. Individual SISs may also be subject to codes and standards not listed here. Users of this Standard shall refer to the regulatory and statutory requirements of their SIS to determine the applicable standards, editions, and addenda.

### 1-8.2 References

ASME Boiler and Pressure Vessel Code:  
 Section I, Rules for Construction of Power Boilers  
 Section II, Materials  
 Section III, Rules for Construction of Nuclear Facility Components, Divisions 1 and 2  
 Section IV, Rules for Construction of Heating Boilers  
 Section V, Nondestructive Examination  
 Section VIII, Rules for Construction of Pressure Vessels, Divisions 1, 2, and 3

Section IX, Welding, Brazing, and Fusing Qualifications  
 Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, Divisions 1 and 2

ASME NQA-1, Requirements for Quality Assurance Programs for Nuclear Facilities

ASME QAI-1, Qualifications for Authorized Inspection  
 Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016 ([www.asme.org](http://www.asme.org))

Code of Federal Regulations (CFR), Title 10, Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants

Publisher: Superintendent of Documents, U.S. Government Publishing Office (GPO), 732 N. Capitol Street, NW, Washington, DC 20401 ([www.govinfo.gov](http://www.govinfo.gov))

ISO 9000, Quality management systems — Fundamentals and vocabulary

ISO 9712, Non-destructive testing — Qualification and certification of NDT personnel

ISO/IEC 17024, Conformity assessment — General requirements for bodies operating certification of persons  
 Publisher: International Organization for Standardization (ISO), Central Secretariat, Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland ([www.iso.org](http://www.iso.org))

### 1-8.3 Other Related Standards

ASME B31.1, Power Piping

ASME B31.3, Process Piping

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016 ([www.asme.org](http://www.asme.org))

## Part 2

# NDE Personnel Qualification and Certification Requirements

### SECTION 2-1 NDE METHODS AND LEVELS OF QUALIFICATION

#### 2-1.1 General

This Section provides the descriptions and requirements for NDE levels of qualification and certification used in this Standard. These levels of qualification and certification currently apply to the following NDE methods:

- (a) electromagnetic (eddy current) testing (ET)
- (b) magnetic particle testing (MT)
- (c) liquid penetrant testing (PT)
- (d) radiographic testing (RT)
- (e) ultrasonic testing (UT)
- (f) visual testing (VT)

#### 2-1.2 Trainee

A trainee shall pursue qualification and certification under the direction of a certified Level I, Level II, or Level III personnel in the method while gaining appropriate experience in the applicable NDE method. Additionally, a trainee shall not independently conduct any examinations.

#### 2-1.3 Level I

(a) A certified Level I shall have received documented training and experience to demonstrate competence in setting up equipment, performing examinations, and recording results in accordance with written instructions. With prior documented Level III approval, a Level I may perform acceptance or rejection of indications in accordance with specific instructions, unless restricted by SIS requirements as listed in the Mandatory Appendices of this Standard or by a referenced code, standard, specification, procedure, or instruction.

(b) In addition to basic UT straight beam and angle beam techniques, a Level I qualified and certified in the basic UT method shall be capable of performing thickness measurements with either a digital ultrasonic thickness gauge or an A-scan instrument for manual conventional applications. This includes all longitudinal 0-deg examinations and thickness measurements.

#### 2-1.4 Level II

A certified Level II shall have received documented training and experience to demonstrate competence in performing NDE in the method certified, including acceptance or rejection of indications in accordance with Level III approved procedures. The Level II shall be capable of

- (a) developing instructions
- (b) conducting training of trainees and Level I's under the direction of the Level III
- (c) setting up or verifying equipment
- (d) performing examinations
- (e) supervising trainees and Level I's
- (f) interpreting indications and evaluating to acceptance standards of codes, standards, and approved procedures

#### 2-1.5 Level III

The NDE Level III shall be qualified and hold previous Level II certifications in all endorsements within each method for which the individual is certified. A certified Level III shall have demonstrated competence in performing NDE in the method certified, including evaluation of indications in accordance with applicable requirements and the following:

- (a) develop procedures and instructions
- (b) evaluate and apply applications and examination results in terms of existing codes, standards, specifications, procedures, or instructions
- (c) specify an examination method, procedure, or instruction to be used
- (d) provide training, direct field experience (administer qualification/continuity cards), and examine NDE personnel in the NDE methods for which the Level III is qualified per the requirements of [para. 1-5.3](#)
- (e) develop NDE techniques and assist in establishing acceptance criteria where none are otherwise available, based on sufficient practical knowledge of applicable materials, fabrication, processes, and product technology.

## SECTION 2-2 NDE CERTIFICATION EXAMINATIONS

### 2-2.1 General

(a) This Section contains requirements for written examinations and practical demonstrations used to certify NDE personnel to this Standard.

(b) This Section requires the use of JTAs that can be applied to a set of duties, a group of tasks, a job, or an occupation. The purpose of the JTA is to get data to support the development of performance-based examinations. The data is used to develop BoKs, written examinations, and practical demonstrations that are developed by SMEs and criteria to judge experience.

### 2-2.2 Written Examinations

(a) The written examination shall be developed to evaluate the individual's knowledge of the NDE method and applicable endorsement. The examination shall meet the personnel qualification requirements of the applicable SIS contained in the Mandatory Appendices.

(b) Candidates for Level I, Level II, or Level III NDE certification shall take written examinations developed and administered by the CB.

(c) A candidate shall take a written examination for each basic NDE method and for any endorsements (see [Table 2-2.2-1](#)) for which certification is sought.

(d) The CB shall develop the written examinations using the JTAs and psychometric process approved by the applicable SIS committee.

(e) The CB shall approve, administer, and grade the written examinations in accordance with the procedures approved by the applicable SIS committee.

(f) Written examinations shall include questions addressing the following topics:

(1) physical principles and theory of the method and any applicable endorsements

(2) codes, standards, specifications, procedures, instructions, and their interpretations

(3) practical applications and problems encountered in implementation

(g) Written examinations shall be closed-book examinations, although the CB may allow use of specific reference materials during the examination.

(h) The passing grade for each basic/endorsement written examination shall be 80%.

(i) Written examinations shall be approved, administered, and graded by the CB in accordance with specific procedures approved by the applicable SIS committee.

### 2-2.3 Practical Demonstrations

(a) *Performance Requirements.* Practical demonstrations shall be performed that evaluate an individual's skills and knowledge in a particular NDE method and applicable endorsement as specified in the JTA.

(b) *NDE Procedure Qualification.* To ensure effective and consistent evaluation of personnel, the NDE procedures used for practical demonstrations shall be approved by the applicable SIS committee. The procedure qualification shall demonstrate the capability to resolve detectable flaws under representative conditions.

(c) *Level-Specific Requirements.* The Level I, Level II, and Level III requirements for practical demonstrations are as follows:

(1) *Level I Practical Demonstration Requirements.* The Level I practical demonstration shall be a proficiency demonstration requiring examination of test samples in the NDE method and endorsement for which certification is being sought. The practical demonstration shall include documenting the results of the examination.

(-a) The test samples to be used shall be representative of those encountered in the performance of NDE for the SIS activities that the Level I is seeking to qualify.

(-b) The Level I practical demonstration shall include performance of the tasks representative of the Level I capabilities as described in [para. 2-1.3](#) and any additional capabilities required in the applicable Mandatory Appendices.

(-c) The passing grade for the practical demonstration shall be 80%.

(2) *Level II Practical Demonstration Requirements.* In addition to the requirements for a Level I practical demonstration in (1), the Level II practical demonstration shall include interpreting, evaluating, and documenting the results of examinations performed.

(-a) The test samples used shall be representative of the components encountered in the performance of NDE for the applicable SIS activities for which the Level II is seeking qualification.

(-b) The SIS shall specify the targeted flaw sizes and types to be detected, in consultation with the regulator, original equipment manufacturer, or design authority where appropriate, using applicable codes, standards, and engineering principles.

(-c) The flaws in the representative test samples required in (-a) may be actual or simulated flaws and shall range in size from below the minimum acceptable flaw size required by the applicable code, standard, procedure, or instruction and not more than the maximum size specified by the SIS committee. Tolerances for reporting flaw dimensions by candidates shall also be established.

(-d) All test samples and grading units shall be approved by the applicable SIS committee.

(-e) Visual examination test samples may be made up of items other than welds. The test samples are to provide examples of relevant conditions for evaluation as part of the practical demonstration for visual examination (e.g., general, detailed, bare metal visual, etc.).

(-f) Test samples shall have sufficient volumes or areas of materials to minimize spurious indications that may interfere with the interpretation.

(-g) The test sample grading unit set for each practical demonstration shall be assembled from the test sample bank using a selection process that addresses the difficulty level of each flaw or set of flaws including geometric reflectors within a test sample to establish multiple practical demonstration sets of approximately equal difficulty.

(-h) Test samples with unflawed grading units or flawed grading units shall be included in the test sample sets so that no more than one-third of the test samples or grading units in the sets contain flaws required to be detected.

(-i) The unique identification of test samples or grading units with or without flaws shall be masked such that either cannot be identified.

(-j) The passing grade for the practical demonstration shall be 80%.

(3) *Level III Practical Demonstration Requirements.* The Level III practical demonstration shall have met the requirements of the Level II practical demonstration as described in (2) above.

(4) *Standardized Checklist Requirements.* A standardized checklist approved by the applicable SIS committee shall be used in grading of Level I, Level II, or Level III practical demonstrations. This checklist becomes part of the candidate's certification records and shall be maintained by the CB.

(5) *Grading of Practical Demonstrations.* All practical demonstrations shall be graded by the CB in accordance with the applicable SIS committee-approved procedures.

ASMENORMDOC.COM : Click to view the full PDF of ASME ANDE-1-2020

Table 2-2.2-1 NDE Written Examinations

Written Examinations Based on Competency		Recommended Minimum Number of Questions for Levels I, II, and III [Note (1)]		
Method	Basic/Endorsements [Notes (2) and (3)]	I [Note (4)]	II [Note (4)]	III [Note (5)]
Ultrasonic	Basic <sup>UT</sup> , includes principles, product forms, failure mechanisms, and applications based wholly on thickness gauges and A-scan instruments for manual conventional application. Includes all Longitudinal 0-degree exams, thickness, and manual conventional (fixed angle) ultrasonics	70	70	145
	Manual phased array	Note (6)	Note (6)	145
	Encoded/computer recorded — fixed probe	Note (6)	Note (6)	145
	Encoded/computer recorded — phased array	Note (6)	Note (6)	145
	Encoded/computer recorded — time-of-flight diffraction (TOFD)	Note (6)	Note (6)	145
Radiographic	Basic <sup>RT</sup> , radiation sources and media interpretation, product forms, failure mechanisms, and film	70	70	145
	Computed	Note (6)	Note (6)	145
	Digital detector array (DDA)	Note (6)	Note (6)	145
Liquid penetrant	Basic <sup>PT</sup> , principles, product forms, failure mechanisms, visible systems, UV systems, and solvent removable	60	60	145
	Water washable	Note (6)	Note (6)	145
	Post emulsifiable	Note (6)	Note (6)	145
Magnetic particle	Basic <sup>MT</sup> , principles, product forms, failure mechanisms, visible systems, UV systems, and indirect continuous (yoke)	60	60	145
	Bench — includes coils, head shot, and central conductor	Note (6)	Note (6)	145
	Portable equipment — includes prods and head shot and coil wraps	Note (6)	Note (6)	145
Eddy current	Basic <sup>ET</sup> , principles, product forms, and failure mechanisms, and includes material sorting and plate/weld crack detection	70	70	145
	Tubing (steam generator)	Note (6)	Note (6)	145
	Tubing (balance of plant)	Note (6)	Note (6)	145
Visual	Pressure testing	60	60	145
	Welds	Note (6)	Note (6)	145
	Components, i.e., mechanical measurement, valves, pumps, vessels, and supports	Note (6)	Note (6)	145

## NOTES:

- (1) The CB shall determine the actual number of examination questions using psychometric processes approved by the applicable SIS committee.
- (2) Each BASIC<sup>METHOD</sup> is the required knowledge and examination required for all techniques of the method.
- (3) Endorsements are for techniques that are subcategories of a “basic” NDE method. The subcategories require examination of the basic physics and theory applicable to the NDE technique endorsement.
- (4) This includes general and specific examination questions.
- (5) This includes NDE basic (minimum 95) and method examination (minimum 50) questions. Candidates who have passed the basic within 5 yr and maintained certification(s) are not required to take the basic examination questions for additional methods.
- (6) The CB shall determine the minimum number of endorsement questions using psychometric processes approved by the applicable SIS committee.

## Part 3

# QC Personnel Qualification and Certification Requirements

### SECTION 3-1 QC METHODS AND LEVELS OF QUALIFICATION

#### 3-1.1 General

(a) This Section provides the descriptions and requirements for QC levels of qualification and certification used in this Standard. These levels of qualification and certification currently apply to the following QC methods:

- (1) QC CIVIL — civil inspection
- (2) QC ELECT — electrical inspection
- (3) QC MECH — mechanical inspection
- (4) QC RECPT — receipt inspection
- (5) QC WELD — weld inspection

(b) Written examination and practical demonstration requirements shall be applied to Level II and Level III QC inspection personnel.

(c) Trainee or Level I personnel shall be addressed in the employer's written practice or procedures and are not within the scope of this Standard.

#### 3-1.2 Level II

Level II QC personnel shall have all the capabilities for performing the method, specific inspection, examination, or test category as required by the referencing code, standard, specification, procedure, or instruction.

Additionally, Level II personnel shall have demonstrated capabilities in planning inspections, examinations, and tests; in setting up tests including preparation and setup of related equipment, as appropriate; in documenting and reporting inspection, examination, and testing results; and in evaluating the validity and acceptability of inspection, examination, and test results.

#### 3-1.3 Level III

A QC Level III shall be qualified and hold previous Level II certification in all endorsements within each method that the individual is certified. This Level III shall also be qualified to perform Level III functions needed to

- (a) establish techniques
- (b) evaluate and apply codes, standards, specifications, procedures, and instructions
- (c) designate inspection tasks to be used
- (d) verify the adequacy of procedures

(e) conduct or direct the training and testing of QC inspection personnel in the methods for which the individual is qualified

(f) have general familiarity with other QC inspection methods

### SECTION 3-2 QC CERTIFICATION EXAMINATIONS

#### 3-2.1 General

(a) This Section contains requirements for certification examinations of QC inspection personnel to this Standard.

(b) This Section requires the use of JTAs that can be applied to a set of duties, a group of tasks, a job, or an occupation. The purpose of the JTA for data to support the development of performance-based examinations. The data is used to develop BoKs, written examinations, and practical demonstrations that are developed by SMEs' criteria to judge experience.

#### 3-2.2 Written Examinations

(a) The written examination shall evaluate the individual's knowledge of the QC method and applicable endorsement. The examination shall meet the personnel qualification requirements of the applicable SIS contained in the Mandatory Appendices.

(b) Candidates for Level II or Level III QC certification shall take written examinations developed and administered by a CB.

(c) A candidate shall take a written examination for each QC inspection method and for any endorsements (see [Table 3-2.2-1](#)) for which certification is sought.

(d) The CB shall develop the written examinations using the JTAs and psychometric process approved by the applicable SIS committee. The CB shall approve, administer, and grade the written examinations in accordance with the procedures approved by the applicable SIS committee.

(e) Written examinations shall include questions addressing the following topics:

- (1) physical principles and theory of the method and any applicable endorsements
- (2) codes, standards, specifications, procedures, instructions, and their interpretations
- (3) practical applications and problems encountered in implementation

(f) Written examinations shall be closed-book examinations, although the CB may allow the use of specific reference materials during the examination.

(g) The passing grade for each basic/endorsement written examination shall be 80%.

### 3-2.3 Practical Demonstrations

(a) Practical demonstrations shall be performed that evaluate an individual's skills and knowledge within an endorsement that is a subcategory in a particular QC method as specified in the JTA.

(b) The passing grade for the practical demonstration shall be 80%.

(c) Test samples for QC Level II and Level III practical demonstrations shall include a secure test sample bank containing at least five attributes for evaluation. Defects in the test sample bank may be actual defects or simulated defects. The test samples or grading units used for each practical demonstration shall be randomly assembled from the test sample bank defined by the psychometric process. Blank (nondefective) test samples or defective test sample grading units shall be included in the sample set so that no more than one-

third of the test samples or defective grading units in the set contain defects required to be detected.

(d) *Level II Practical Demonstration Requirement.* The candidate shall demonstrate proficiency by performing QC inspections for the endorsement qualification and certification being sought and by passing a practical demonstration that has been developed based on the requirements of the applicable JTA.

(e) *Level III Practical Demonstration Requirements.* The Level III candidate may be required to perform QC inspections or evaluate examination results. This practical demonstration shall include demonstrations of the candidate's ability to perform the required activity by passing a Level II practical demonstration as specified in (d).

(f) The CB shall use a standardized checklist approved by the applicable SIS committee in grading the Level II and Level III practical demonstrations, and this checklist becomes part of the candidate's certification records and shall be maintained by the CB.

(g) Practical demonstrations shall be graded by the CB in accordance with the applicable SIS committee approved procedures.

**Table 3-2.2-1 QC Written Examinations**

Written Examinations Based on Competency		Recommended Minimum Number of Questions for Levels II and III [Note (1)]	
Method	Basic/Endorsements [Notes (2)-(4)]	II	III
All QC inspection methods	Basic QC inspection	X	X
Civil inspection [Note (5)]	Concrete and grout preplacement	X	X
	Concrete placement	X	X
	Grout placement	X	X
	Concrete field testing	X	X
	Laboratory testing of concrete/grout materials	X	X
	Protective coatings	X	X
	Firestops and seals/fire rated barriers	X	X
	Structural and miscellaneous steel	X	X
	Backfill	X	X
	Performing Level III functions	...	X
Electrical inspection [Note (5)]	Cables/raceway	X	X
	Electrical equipment	X	X
	Instrumentation and control (I&C)	X	X
	Performing Level III functions	...	X
Mechanical inspection [Note (5)]	Dimensional inspection	X	X
	Piping and tubing	X	X
	Mechanical equipment and components	X	X
	Supports	X	X
	Performing Level III functions	X	X
Receipt inspection	Item receiving inspection	X	X
	Storage area inspection	X	X
	Perform Level III functions	X	X
Weld inspection	Welding inspection	X	X
	Performing Level III functions	X	X

## NOTES:

- (1) X = the recommended minimum number of examination questions, which shall be determined by the CB using psychometric processes approved by the applicable SIS committee.
- (2) The written examination for each Basic QC inspection is the required knowledge and examination for all inspection tasks of all QC methods and shall be administered with the first endorsement examination in that method. Additionally, the Basic QC inspection method examination is only required for the first endorsement to be obtained.
- (3) Endorsements — are for inspection tasks that are subcategories of a QC method. The subcategories are activities that include all the parameters and theory for that task and shall be examined and certified within each method.
- (4) Performing Level III Functions — endorsements shall be gained after the candidate has obtained all method Level II endorsements and has successfully completed the method Level III examination.
- (5) Common tasks within endorsements include the following: torquing and tensioning, anchor inspection, and rigid supports.

# MANDATORY APPENDIX I

## NDE AND QC REQUIREMENTS FOR THE NUCLEAR SECTOR

### I-1 GENERAL

(a) This Appendix contains the SIS requirements that are additional to those in [Part 1](#), [Part 2](#), or [Part 3](#), as applicable, of this Standard or its Cases.

(b) This industry sector shall set up a SIS committee that provides technical guidance and oversight to the CB in accordance with this Standard.

(c) Within this Appendix, the para. titles under each set of requirements for this SIS begin with the title of the corresponding Section in the Standard, such as [Section 1-3](#), Responsibilities, or [Section 1-4](#), Administration, where the requirements in this Appendix shall be applied.

### I-2 SECTOR REQUIREMENTS

This Section of this Appendix contains specific requirements for NDE and QC personnel qualification and certification activities required by the Nuclear Sector.

#### I-2.1 Far Vision Acuity

(a) The candidate shall demonstrate far vision acuity, natural or corrected, of at least 20/30 (Snellen) or equivalent in at least one eye, as required for certification to ASME BPVC Section XI. Vision testing methods that are capable of determining equivalent visual acuity may be used. (A medical professional who performs eye examinations shall determine equivalency.)

(b) ASME BPVC Section III does not require far vision acuity for certification to ASME BPVC Section III.

#### I-2.2 Responsibilities — ASME Certificate Holders, Owners, and Repair Organizations NDE and QC

As required by the ASME BPV Code of record, ASME “N” Certificate Holders, Owners, and Repair Organizations shall verify CB certifications of personnel performing examinations. This shall include the following:

(a) checking the status of certifications through the certification database maintained by the CB

(b) reviewing and approving experience records for NDE personnel consistent with their project work assignments

(c) establishing a procedure in accordance with the ASME Code of record meeting the requirements of this Standard for qualification and certification of NDE and QC personnel

#### I-2.3 Responsibilities — Authorized Inspection Agencies

Authorized Nuclear Inspectors and Authorized Nuclear Inservice Inspectors shall verify the qualifications of NDE and QC personnel in accordance with the referencing Nuclear BPVC Section. Verification includes, but is not limited to, monitoring of examinations and reviewing the status of certifications through the certification database maintained by the CB.

#### I-2.4 Responsibilities — Specific Industry Sector Committee for NDE or QC Inspection Personnel Qualification and Certification

(a) This SIS committee establishes qualification and certification requirements for specific industry applications and directs the CB on all technical and procedural matters concerning qualification and certification requirements.

(b) Certifications shall be divided into three categories

(1) fabrication/construction

(2) inservice inspection

(3) fabrication/construction and inservice inspection

(c) This SIS committee shall oversee CB activities performed in accordance with this Standard. The oversight shall be accomplished by an announced or unannounced audit, assessment, or surveillance at a frequency determined by this SIS committee.

(d) This SIS committee shall review the results of audits of the CB.

#### I-2.5 Responsibilities — Quality Assurance Program NDE and QC

(a) A CB that performs the Nuclear Sector activities contained in the ASME BPVC, Section III, Division 1; or Section XI, Divisions 1 and 2, shall have a QA program that meets the requirements of the Code of Federal Regulations, Title 10, Part 50, Appendix B; or ASME NQA-1, as applicable.