

NAS CERTIFICATION & QUALIFICATION OF NONDESTRUCTIVE TEST PERSONNEL

1. SCOPE

1.1 PURPOSE: This standard establishes the minimum requirements for the qualification and certification of personnel performing nondestructive testing (NDT), nondestructive inspection (NDI), or nondestructive evaluation (NDE) in the aerospace manufacturing, service, maintenance and overhaul industries. For the purposes of this standard, the term NDT will be used and will be considered equivalent to NDI and NDE.

In Europe, the term “approval” is used to denote a written statement by an employer that an individual has met specific requirements and has operating approval. Certification per EN ISO/CEI 17024 is ~~not~~ required by this standard ~~unless-when~~ specified by local or regulatory requirements. The term “certification” as defined in ~~paragraph-3.1~~ is used throughout this standard as a substitute for the term “approval”. Except when otherwise specified in the written practice, certification in accordance with this standard includes operating approval.

1.2 APPLICABILITY: This standard applies to personnel using NDT methods to test and/or accept materials, products, components, assemblies or sub-assemblies. This standard also applies to personnel: directly responsible for the technical adequacy of the NDT methods used, who ~~write~~ approve NDT procedures and/or work instructions, who audit NDT facilities, or who provide technical NDT support or training.

This standard does not apply to individuals who only have administrative or supervisory authority over NDT personnel or to research personnel developing NDT technology for subsequent implementation and approval by a certified Level 3. Personnel performing specialized inspections using certain direct readout instruments as determined by a Level 3 certified in the method, do not require qualification or certification to this standard.

1.2.1 IMPLEMENTATION: This standard addresses the use of a National Aerospace NDT Board (NANDTB). ~~NANTDBs~~ NANDTBs are only used as specified herein and it is not mandatory to have such a board for compliance with this document. Personnel certified to previous revisions of NAS 410 or EN 4179 need not recertify to the requirements of this standard until their current certification expires.

1.3 COMMON METHODS: This standard contains detailed requirements for the following common NDT methods:

Liquid penetrant	(PT)
Magnetic particle	(MT)
<u>Thermography</u>	<u>(IRT)</u>
<u>Shearography</u>	<u>(ST)</u>
Eddy current	(ET)
Ultrasonic	(UT)
Radiography	(RT)
~~Thermography~~	~~(IRT)~~
~~Shearography~~	~~(ST)~~

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1.3.1 OTHER METHODS: When invoked by engineering, quality, cognizant engineering organization or prime contractor requirements, this standard applies to other current and emerging NDT methods used to determine the acceptability or suitability for intended service of a material, part, component, sub-assembly or assembly. Such methods may include, but are not limited to, acoustic emission, neutron radiography, leak testing and holography. The requirements for personnel training, experience, and examination for these other methods shall be established in accordance with ~~paragraph~~ 6.4 and shall be documented by the employer.

2. REFERENCE DOCUMENTS

2.1 STANDARDS: The following documents are referenced in this standard:

~~EN 473—Qualification and Certification of NDT Personnel—General Principles~~

EN 4179, Aerospace Series - "Qualification and Approval of Personnel for Nondestructive Testing"
(current revision)

[ISO 18490, Nondestructive Testing – Evaluation of Vision Acuity of NDT Personnel](#)

NAS-410, "Certification and Qualification of Nondestructive Test Personnel" (current revision)

EN ISO/CEI 17024, Conformity Assessment- General Requirements for Bodies Operating Certification of Persons

ISO 9712, Non-Destructive Testing - Qualification and Certification of Personnel

2.2 ORDER OF PRECEDENCE: In the event of a conflict between the text of this document and the references cited herein, the requirements of this document take precedence. Nothing in this document supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS AS APPLIED TO THIS STANDARD

3.1 CERTIFICATION: A written statement by an employer that an individual has met the applicable requirements of this standard.

3.2 CLOSED BOOK EXAMINATION: An examination administered without access to any reference materials.

3.3 COGNIZANT ENGINEERING ORGANIZATION: The engineering or NDT organization of the prime contractor, [OEM \(Original Equipment Manufacturer\)](#), or end user authorized to make NDT-related decisions and give NDT-related approvals.

3.4 DIRECT OBSERVATION: Direct observation is when the observer is able to come to the immediate aid of the trainee and remains within a distance that permits uninterrupted, unaided visual and verbal contact with the trainee.

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3.5 DIRECT READOUT INSTRUMENT: Instruments that physically display measurements in dimensional or electrical units (e.g. inches, millimeters or %IACS, ~~etc.~~) either as digital readout or an analog display, such as a scale/pointer configuration and do not require special skills or knowledge to set up the instrument and do not involve adjusting signal displays such as gates, delays, gain, or phase to obtain measurements. For example, common direct readout instruments include basic ultrasonic thickness gauges without an oscilloscope display, and eddy current coating thickness gauges.

3.6 DOCUMENTED: The condition of being recorded in written or electronic form.

3.7 EMPLOYER: ~~A government, prime contractor, sub-contractor, supplier, or outside agency~~
An organization employing or contracting the services of one or more individuals who perform NDT. Self-employed individuals are included in this definition.

3.8 EVALUATION: A review following interpretation of the indications noted during an NDT inspection to determine whether the indications meet specified acceptance criteria or to determine the significance of the indication.

3.9 EXAMINATION: Formal, controlled, documented testing conducted in accordance with a documented written practice to verify a candidate's visual capability, skill or knowledge of an NDT method.

3.10 EXAMINER: A Level 3 certified to this standard and designated by the Responsible Level 3 ~~or NANDTB~~ to administer all or part of the qualification ~~and certification~~ process, ~~excluding vision examinations~~, in the NDT method(s) in which the Examiner is certified.

3.11 EXPERIENCE: Actual performance of an NDT method conducted in the work environment resulting in the acquisition of knowledge and skill. This does not include formal classroom training, but may include laboratory and on-the-job training as defined by the employer's written practice.

3.12 FORMAL EDUCATION: Engineering or science studies at a technical school, college, or university.

~~3.13~~ FORMAL TRAINING: An organized and documented program of learning activities designed to impart the knowledge and skills necessary to be qualified to this standard. Formal training may be a mix of classroom, practical and programmed self-instruction as approved by the Responsible Level 3, or Examiner, ~~or NANDTB.~~

~~3.14~~ GENERAL EXAMINATION: A written examination addressing the basic principles and theory of an NDT method.

~~3.15~~ INDICATION: The response or evidence of a condition resulting from an NDT inspection that requires interpretation, ~~to determine its significance.~~

~~3.16~~ INSTRUCTOR: An individual designated or approved by the Responsible Level 3 or ~~NANDTB Examiner~~ to provide training for NDT personnel.

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3.1~~76~~ INTERPRETATION: The determination of whether indications are relevant or non-relevant.

3.1~~87~~ METHOD: One of the disciplines of nondestructive testing (e.g. ultrasonic, radiography, etc.) within which different techniques may exist.

3.1~~98~~ NATIONAL AEROSPACE NDT BOARD (NANDTB): An independent ~~national~~ aerospace organization representing a nation's aerospace industry that is chartered by the participating prime contractors and recognized by the nation's regulatory agencies to provide or support NDT qualification, ~~and/or~~ examination, ~~and/or certification~~ services in accordance with 4.4.2 of this standard.

3.20 NON-FILM RADIOGRAPHY: Radiographic imaging that does not use a film based recording medium. Non-Film radiography includes, but may not be limited to, Computed Radiography, Digital Radiography, Radioscopy, and Computed Tomography.

3.2~~149~~ ON-THE-JOB TRAINING: Training in the work environment to gain experience in learning instrument set-up, equipment operation, applying the process, and recognition, interpretation and evaluation of indications under appropriate technical guidance.

3.2~~20~~ OPEN BOOK EXAMINATION: An examination administered with access to specific reference material that is provided with or referenced in the examination.

3.2~~34~~ OPERATING APPROVAL: Written statement issued by the employer, based upon the scope of certification, authorizing the individual to carry out defined tasks. Such authorization can be dependent on the employer having provided job or task-specific training.

3.2~~42~~ OUTSIDE AGENCY: An independent company or organization outside the employer who provides NDT services to implement the requirements of this standard, such as training and examination of NDT personnel. Consultants and self-employed individuals are included in this definition.

3.2~~53~~ PRACTICAL EXAMINATION: An examination to demonstrate an individual's ability to conduct an NDT method as used by the employer. Questions and answers need not be written, but a checklist must be used and observations and results must be documented.

3.2~~64~~ PRIME CONTRACTOR: An organization having overall responsibility for design, control and delivery of a system, component or product.

3.2~~75~~ PROCEDURE: A written general "how to" instruction for conducting a given process. Procedures are then used to develop work instructions, as defined in 3.3~~42~~.

3.2~~86~~ QUALIFICATION: The skills, training, knowledge, examinations, experience and visual capability required for personnel to properly perform to a particular level.

3.2~~97~~ RESPONSIBLE LEVEL 3: A Level 3 designated by the employer with the responsibility and authority to ensure that the requirements of this standard are met and to act on behalf of the employer.

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Documents

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- 3.3028 SPECIFIC EXAMINATION: A written examination to determine an individual's understanding of operating procedures, codes, standards, product technology, test techniques, equipment and specifications for an NDT method as used by the employer.
- 3.3129 SUB-CONTRACTOR: An organization responsible to the prime contractor for the manufacture or maintenance of aerospace products. For the purposes of this standard, this includes suppliers and processors.
- 3.3230 TECHNIQUE: A category within a method; for example, ultrasonic immersion testing or ultrasonic contact testing. ~~testing of composites. Specific techniques within a method are defined by the employer or NANDTB.~~
- 3.331 TEST SAMPLE: A part or image containing one or more known and documented natural or artificial discontinuities, flaws or conditions used in the practical examination to demonstrate the candidate's proficiency in an NDT method. Test samples can refer to actual hardware, fabricated test parts, or, when applicable, images of actual hardware such as radiographs.
- 3.342 WORK INSTRUCTION: A document detailing the NDT technique and testing parameters to be used for the inspection of a specific component, group of parts (e.g. "aluminum extrusions" or "steel brackets"), or assembly. These are sometimes referred to in the industry as "technique sheets" or "data cards". Such work instructions are based on procedures defined in 3.275.
- 3.353 WRITTEN: Retrievable electronic or hard copy.
- 3.364 WRITTEN PRACTICE: A ~~procedure document~~ that describes an employer's requirements and methodology for controlling and administering the NDT personnel qualification and certification process.
- 4. GENERAL REQUIREMENTS**

4.1 WRITTEN PRACTICE: The employer shall develop and maintain a written practice for the qualification and certification of ~~their~~ NDT personnel that meets the requirements of this standard. The written practice shall address the procedural details necessary for the employer to implement an NDT qualification and certification program and shall include, either directly or by reference, the details of the NDT qualification and certification process, including:

- ~~t~~The levels of qualification and certification used by the employer
- ~~p~~Personnel duties and responsibilities
- ~~t~~Training and experience requirements
- ~~e~~Certification and recertification requirements
- ~~r~~Records and record keeping requirements
- ~~r~~Requirements for expiration, suspension, revocation and reinstatement of certifications
- Process for annual maintenance

~~The employer's written practice may reference this standard in whole or in part to meet these requirements provided the written practice includes the requirements in paragraphs 4.1.1 through 4.1.6.~~ The written practice shall be approved by the Responsible Level 3. The written practice and applicable NANDTB procedures shall be available for review by the employer's customer(s) and regulatory agencies.

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4.1.1 ADDITIONAL REQUIREMENTS: The written practice shall include any additional requirements levied by the employer or cognizant engineering organization, such as additional certification levels or increased experience requirements. ~~This includes those areas of this standard that specify documentation in the employer's written practice for implementation.~~

4.1.2 NDT TECHNIQUES: The written practice shall include the specific technique(s) within each method and the actions to be taken concerning additional training and experience, as well as the written and practical testing, when additional techniques are introduced for a currently certified individual. ~~as defined by the employer or NANDTB.~~

4.1.3 TRAINING OUTLINES: The written practice shall reference or include the NDT training outlines used by the employer. ~~The amount of time to be spent on each subject area shall be documented.~~ If an outside agency ~~or NANDTB~~ is used to provide training, the Responsible Level 3 shall verify that the training meets the employer's requirements.

4.1.4 EXAMINATION PRACTICES: The written practice shall include the designation of the individual(s) or organization(s) responsible for administering examinations, the number of examination questions to be administered, and the specific visual acuity examination method to be used. If required, the use of a general examination for recertification shall be documented in the written practice.

4.1.5 ADMINISTRATION: The written practice shall include the identification of the individual(s) or organization(s) responsible for administering and maintaining all or part of the employer's certification program.

4.1.6 RECORDS: The written practice shall include the designation of the individual(s) or organization(s) responsible for maintaining the qualification and certification records and where such records shall be kept.

4.2 METHODS: For the common methods listed in ~~paragraph~~ 1.3, the minimum requirements for training, experience and examination are detailed in Sections 6, and 7 of this standard. These requirements shall serve as a guideline for other current or emerging methods as defined in ~~paragraph~~ 1.3.1.

4.3 LEVEL 1-LIMITED: When authorized by the cognizant engineering organization and the employer's written practice, the performance of a specific NDT test on a specified part, feature, or assembly may be performed by personnel certified to Level 1-Limited. Each use of Level 1-Limited is a separate certification and shall be approved by the cognizant engineering organization. An individual shall not possess more than three Level 1-Limited certifications at any given time. The following shall be documented and be made available for review by the employer's customers and regulatory agencies:

- ~~†~~The case-by-case justification for using Level 1-Limited
- ~~†~~The cognizant engineering organization approval
- ~~†~~The training and experience hours and the number of examination questions
- ~~†~~The specific NDT test to be performed
- ~~†~~The specific hardware to be tested
- ~~†~~The authority to accept or ~~reject~~ hardware, if applicable

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4.4 RESPONSIBILITY: The employer is responsible for the implementation of, and compliance with, this standard and for certifying qualified personnel. In addition, the prime contractor shall be responsible for compliance to this standard by their ~~suppliers and~~ sub-contractors. Employers using outside agencies shall be responsible for assuring that the appropriate requirements of this standard are met. The employer is solely responsible for the certification of its employees and cannot certify for another employer. Individuals cannot qualify themselves. Self-employed individuals may certify themselves provided they have a written practice and have been qualified to the requirements of this standard by another individual certified to Level 3 in accordance with this standard.

4.4.15 RESPONSIBLE LEVEL 3: The employer shall identify in writing a “Responsible Level 3” to act on its behalf in matters regarding the NDT qualification and certification process. The Responsible Level 3 shall be certified in accordance with this standard as a Level 3 in one or more NDT methods and shall have a thorough knowledge of the written instructions, codes, specifications and standards used by the employer. He/she shall also have a thorough knowledge of the materials, components, product technologies, NDT methods and NDT techniques used by the employer. Additional ~~Level 3~~ Examiners as defined in this standard may be identified and delegated in writing as necessary to provide coverage for all methods used by the employer. The Responsible Level 3 may be an outside agency but in this case he/she can only qualify personnel, as only the employer can certify personnel. The Responsible level 3 shall be responsible for implementation of this standard and the overall administration of the qualification and certification program.

4.4.25.1 ~~WHEN A NATIONAL AEROSPACE NDT BOARD (NANDTB) IS NOT USED: When an NANDTB is not used, the Responsible Level 3 shall be responsible for the implementation of this standard and the overall administration of the qualification and certification program.~~
The organization has a constitution, a deciding entity, and governed according to administrative and working procedures. The voting members in the deciding entity are NDT Level 3 personnel and are from participating prime contractors or type certificate holders as a minimum. Other members may be co-opted as voting or non-voting members as necessary to support the NANDTB. Regulatory agencies for civilian and/or defense have the right to be included as observer members.

The Responsible Level 3 may use an NANDTB to:

- Develop training course outlines and training material
- Create examination questions and administer examinations
- Approve outside and/or internal organizations providing training and/or examination services
- Define requirements for qualification of NDT personnel in emerging NDT methods
- Retain written and practical examinations
- Designate Examiners and/or instructors at outside or internal organizations providing training and examination services

4.5.2 ~~WHEN A NATIONAL AEROSPACE NDT BOARD (NANDTB) IS USED: When~~ Where an NANDTB is used to provide such services, it shall develop processes and procedures that shall ensure full

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~~compliance~~ ~~administer procedures for qualification and certification of NDT personnel in accordance with~~ the requirements of this standard. The activities, processes, procedures, technique catalogs, etc. undertaken/developed by an NANDTB shall be made available for review by prime contractors and regulatory agencies. ~~It is entitled, in conjunction with the employer, to recognize equivalencies of qualification and certification, and may be requested to provide general guidelines in accordance with this standard regarding facilities for NDT training, course outlines, examination questions and examination procedures.~~

~~The procedures of the NANDTB shall clearly define what role and tasks, as applicable, are to be performed by the Responsible Level 3. The employer shall designate a Responsible Level 3 in accordance with paragraph 4.5. The Responsible Level 3 is designated by the employer to ensure the requirements of this standard and NANDTB procedures are met and to act on behalf of the employer for those tasks designated here in for the Responsible Level 3.~~

~~NANDTBs described in this standard apply solely to boards meeting the definition of paragraph 3.18 of this standard. Other agencies performing examination, qualification and/or training activities shall be considered outside agencies as defined in paragraph 3.22. For countries where no NANDTB exists, countries may use the services of other NANDTB's~~ may be used, but are not required to do so, unless specified by local or regulatory requirements.

4.4.36 OUTSIDE AGENCY: An employer may use a Level 3 certified in accordance with this standard from an outside agency to develop a certification program, act as the Responsible Level 3, examine NDT personnel or perform any other qualification or ~~certification~~ Level 3 function. An outside agency may qualify, but not certify personnel. The employer shall document the suitability of any outside agency selected to perform any function in meeting the requirements of this standard. This documentation shall be of sufficient detail to justify the outside agency's ability to perform the required Level 3 function(s).

5. QUALIFICATION AND CERTIFICATION LEVELS

5.1 LEVELS OF QUALIFICATION AND CERTIFICATION: The four basic levels of certification are Level 1-Limited, Level 1, Level 2 and Level 3. The employer may subdivide, add or limit levels as appropriate, but cannot eliminate or reduce the minimum requirements for each level. If the employer does not wish to use all of the ~~following~~ levels, those levels to be used shall be documented in the employer's written practice. Where other variations or subdivisions are implemented, the requirements and responsibilities shall also be detailed in the employer's written practice.

NDT personnel shall not independently perform the functions listed in 5.1.2, 5.1.3, 5.1.4 and 5.1.5 if not certified to the appropriate level in the applicable technique/method.

5.1.1 TRAINEE: An individual who is documented as participating in a training program for an NDT method and is in the process of becoming qualified for certification to Level 1, Level 1-Limited or directly to Level 2 shall be considered a trainee. In the technique/method in which they are preparing for certification, trainees shall:

- ~~b~~Be documented as a trainee and be actively participating in a training program for a stated NDT method for a limited and specified period of time.
- ~~e~~Obtain experience under the direct observation of a Level 2 or Level 3 in the same method.

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