

BS EN 4179:2017



BSI Standards Publication

# Aerospace series — Qualification and approval of personnel for non-destructive testing

**National foreword**

This British Standard is the UK implementation of EN 4179:2017. It supersedes BS EN 4179:2009 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/61/-/5, Non - Destructive Testing of Metallic Materials for Aerospace Purposes.

A list of organizations represented on this committee can be obtained on request to its secretary.

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EUROPEAN STANDARD

**EN 4179**

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English Version

## Aerospace series - Qualification and approval of personnel for non-destructive testing

Série aérospatiale - Qualification et agrément du  
personnel pour les essais non destructifs

Luft- und Raumfahrt - Qualifizierung und Zulassung  
des Personals für zerstörungsfreie Prüfungen

This European Standard was approved by CEN on 22 July 2016.

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## European foreword

This document (EN 4179:2017) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2017, and conflicting national standards shall be withdrawn at the latest by July 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 4179:2009.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## **1. SCOPE**

### **1.1 PURPOSE**

This European 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 required by this standard when specified by local or regulatory requirements. The term “certification” as defined in 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 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). 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 NAS410 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)
Thermography	(IRT)
Shearography	(ST)
Eddy current	(ET)
Ultrasonic	(UT)
Radiography	(RT)



### **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 6.4 and shall be documented by the employer.

## **2. REFERENCE DOCUMENTS**

### **2.1 STANDARDS**

The following documents are referenced in this standard:

EN 4179, Aerospace Series - "Qualification and Approval of Personnel for Nondestructive Testing"

ISO 18490 – Nondestructive Testing – Evaluation of Vision Acuity of NDT Personnel

NAS 410 - "Certification and Qualification of Nondestructive Test Personnel"

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.

### **3.5 DIRECT READOUT INSTRUMENT**

Instruments that physically display measurements in dimensional or electrical units (e.g. inches, millimeters or %IACS.) 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**

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 to administer all or part of the qualification process 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.

### **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.

### **3.16 INSTRUCTOR**

An individual designated or approved by the Responsible Level 3 or Examiner to provide training for NDT personnel.

### **3.17 INTERPRETATION**

The determination of whether indications are relevant or non-relevant.

### **3.18 METHOD**

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

### **3.19 NATIONAL AEROSPACE NDT BOARD (NANDTB)**

An independent 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 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.

### **3.21 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.

### **3.22 OPEN BOOK EXAMINATION**

An examination administered with access to specific reference material that is provided with or referenced in the examination.

**3.23** 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.

**3.24** 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.

**3.25** 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.

**3.26** PRIME CONTRACTOR

An organization having overall responsibility for design, control and delivery of a system, component or product.

**3.27** PROCEDURE

A written general "how to" instruction for conducting a given process. Procedures are then used to develop work instructions, as defined in 3.34.

**3.28** QUALIFICATION

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

**3.29** 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.

**3.30** 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.

**3.31** 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.

**3.32** TECHNIQUE

A category within a method; for example, ultrasonic immersion testing or ultrasonic contact testing.

### **3.33** 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.

### **3.34** 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 3.27.

### **3.35** WRITTEN

Retrievable electronic or hard copy.

### **3.36** WRITTEN PRACTICE

A 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 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:

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

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.

#### **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.

#### **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.

#### **4.1.3 TRAINING OUTLINES**

The written practice shall reference or include the NDT training outlines used by the employer. If an outside agency 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 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 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

## **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 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.

### **4.4.1**     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 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.

### **4.4.2**     NATIONAL AEROSPACE NDT BOARD (NANDTB)

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

Where an NANDTB is used to provide such services, it shall develop processes and procedures that shall ensure full compliance 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. For countries where no NANDTB exists, the services of other NANDTB's may be used, but are not required to do so, unless specified by local or regulatory requirements.

#### **4.4.3 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 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 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:

- 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.
- Obtain experience under the direct observation of a Level 2 or Level 3 in the same method.
- Obtain experience under the direct observation of a Level 1 or instructor only when approved by the responsible Level 3.
- Not make accept or reject decisions.
- Not independently conduct tests.
- Not independently perform any other NDT function.



### 5.1.2 **LEVEL 1-LIMITED**

Level 1-Limited is a limited certification allowing only the performance of a specific NDT test on a specified part, part feature, or assembly. In the test technique and method in which certified, Level 1-Limited personnel shall:

- Be able to follow work instructions.
- Receive guidance or supervision from a certified Level 2 or Level 3 in the method when necessary.
- Have the skills and knowledge to process parts, document results and perform equipment standardization in accordance with approved work instructions.
- Have the skills and knowledge to carry out any necessary preparation of parts before or after inspection in accordance with approved work instructions.
- When specified in the written practice and when the cognizant engineering organization allows, have the skills and knowledge to evaluate test results and perform acceptance or rejection of a specific part, part feature, or assembly in accordance with approved work instructions, and within the limitations documented by the Responsible Level 3.

### 5.1.3 **LEVEL 1**

In the method in which certified, Level 1 individuals shall:

- Be able to follow work instructions.
- Have the skills and knowledge to process parts, document results and perform equipment standardization in accordance with approved work instructions.
- Have the skills and knowledge to carry out any necessary preparation of parts before or after inspection in accordance with approved work instructions.
- Have the skills and knowledge to conduct system performance checks in accordance with the applicable process standard.
- Receive guidance or supervision from a certified Level 2 or Level 3 in that method when necessary.
- When specified in the written practice and approved by the Responsible Level 3, may perform interpretations and evaluations of specific product(s) or product form(s) for acceptance or rejection in accordance with approved work instructions.

### 5.1.4 **LEVEL 2**

In the method in which certified, Level 2 individuals shall:

- Have the skills and knowledge to set up and standardize equipment, process parts, interpret and evaluate for acceptance or rejection, and document results.
- Be thoroughly familiar with the scope and limitations of the technique/method.
- Have the skills and knowledge to conduct system performance checks in accordance with the applicable process standard.
- Be capable of providing the necessary guidance and/or supervision to trainees and Level 1 personnel.
- Be familiar with the codes, standards, and other contractual documents that control the method as used by the employer.
- When specified in the written practice, be capable of developing work instructions from approved general procedures. Such work instructions shall require final approval by a Level 3 certified in the method.
- Have a basic knowledge of relevant product manufacturing and inspection technology.
- When specified in the written practice, have a basic knowledge of aircraft or vehicle maintenance.

### 5.1.5 **LEVEL 3**

In the method in which certified, Level 3 individuals shall:

- Have the skills and knowledge to interpret codes, standards, and other contractual documents that control the NDT method(s).
- Be capable of assuming technical responsibility for the NDT facility and staff.
- Be capable of selecting the method and technique for a specific inspection.
- Be capable of preparing and verifying the adequacy of procedures and work instructions.
- Approve NDT procedures and work instructions for technical adequacy.
- Have a general knowledge of other NDT methods and product manufacturing and inspection technologies used by the employer.
- When specified in the written practice, have a basic knowledge of aircraft or vehicle maintenance.
- Be capable of providing or directing training, examination, and certification of personnel.
- Conduct NDT for the acceptance of parts and document the results if a demonstration of proficiency in this ability was included in the practical examination.
- When required by the written practice, be capable of auditing outside agencies to ensure the requirements of the written practice are met.

### 5.1.6 **AUDITOR**

Personnel performing technical NDT audits, surveys or assessments shall have the training, skills and knowledge to understand the processes and procedures utilized in the application of NDT processes. The individual shall be familiar with the applicable codes, standards, and other contractual documents that control the applicable method(s).

## **6. TRAINING AND EXPERIENCE**

### **6.1 TRAINING**

Candidates for certification to all levels shall complete sufficient formal training to become proficient with the principles and practices of the applicable test method and technique(s) and be capable of carrying out the duties specified in Section 5. Formal training shall be conducted prior to, or in conjunction with, on-the-job training. All completed NDT training shall be documented.

The minimum training hours for Level 1 and Level 2 are provided in Table I and Table IA for the specified NDT methods. The minimum training hours for Level 1-Limited shall be determined and documented by the Responsible Level 3, but Level 1-Limited hours shall not be less than 25% of those required for Level 1 in the applicable method. Individuals cannot certify to Level 3 without prior certification to Level 2 in the method.

40 additional hours of training is required for current certified Level 3 radiography personnel transitioning to either film or non-film radiography.

General, specific and practical training may be obtained with the employer or outside agency but shall always be supplemented by practical on-the-job training with the employer.

**TABLE I – MINIMUM FORMAL TRAINING HOURS FOR LEVEL 1 & LEVEL 2**

Method	Level 1	Level 2 with previous Level 1 certification	Level 2 without previous Level 1 certification
PT	16	16	32
MT	16	16	32
IRT	20	40	60
ST	20	40	60
ET	40	40	80
UT	40	40	80
RT Film or NonFilm	40	40	80
RT Film & NonFilm	60	60	120

**TABLE IA – RT FORMAL TRAINING HOURS FOR TRANSITION TO FILM AND NONFILM**

Additional Formal Training Hours		
Current Level 1	Current Level 2	Current Level 1 to Level 2 Film & NonFilm
20	40	80

### 6.1.1 **TRAINING OUTLINES**

All training shall be conducted in accordance with a detailed course outline approved by the Responsible Level 3. The outline shall include a list of references from which the training material is derived. As a minimum the training shall include:

- Basic theory
- Test principles, including choice of NDT methods, relevance to different materials and part and test variables
- Product forms and materials; defect formation and characterization
- Equipment operation and standardization
- The importance of process controls
- The importance of appropriate processing steps and parameters
- Safety
- Applicable techniques and the advantages and disadvantages of each
- Limitations and capabilities of each method and technique
- Applicable specifications, codes, operating procedures and work instructions
- If applicable, evaluation, interpretation and documentation of inspection results.

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.

### **6.1.2 PREVIOUS TRAINING**

For personnel credited with previous training, or personnel not certified within 12 months of their training, refresher training must be provided. Previous training must be documented to be accepted by the employer. As a minimum, refresher training shall cover products, equipment set-up, operation and standardization, specific operating procedures, applicable techniques, interpretation and evaluation of NDT results, safety, and applicable codes, standards and specifications. For documentation of previous training, records other than original records may be accepted if adequacy and equivalency have been determined to be acceptable by the Responsible Level 3 or Examiner.

### **6.1.3 EQUIVALENT TRAINING**

For personnel previously certified under NAS410, EN 4179 or other recognized NDT qualification program, the adequacy and equivalency of their previous training to the requirements of Table I and Table IA shall be determined and documented by the Responsible Level 3 or Examiner. All or a portion of previous hours may be accepted as applicable.

### **6.1.4 HEALTH AND SAFETY TRAINING**

All regulations relating to hazardous substances, accident prevention and safe working practices shall be strictly adhered to. Safety-related training requirements shall be determined in accordance with local codes and regulations. Prior to certification, all candidates seeking radiography qualification shall have received instruction on the hazards and safety requirements associated with ionizing radiation and be knowledgeable of, and comply with, the applicable regulations and laws.

### **6.1.5 TRAINING FACILITIES**

Training facilities and classrooms shall provide an environment conducive to learning and shall be sufficiently well equipped with equipment and training aids, models, samples, etc., to ensure that all aspects of the training course requirements are met. In addition, a sufficient number of representative test samples containing natural or artificial features and/or flaws shall be available to cover the range of testing to be conducted by the candidate. Test samples used for practical examinations shall not be used for training purposes. To ensure the candidate fully benefits from the practical exercises, equipment used for training shall be sufficiently comparable to that which the candidate will use in the performance of their job. Production parts and NDT equipment may be used for training.

## **6.2 TRAINING AND EXAMINATION PERSONNEL**

The Responsible Level 3 shall maintain overall control and cognizance over the NDT training program, including designating or approving qualified Examiners, instructors and outside agencies.

### **6.2.1 EXAMINERS**

When necessary, Examiners shall be designated or approved in writing by the Responsible Level 3. All Examiners shall be certified in accordance with this standard. As determined and documented by the Responsible Level 3, an Examiner can prepare, administer and grade written or practical NDT examinations, and administer all or part of the qualification process in the method in which he/she is certified.

### **6.2.2 INSTRUCTORS**

Instructors shall have the skills and knowledge to plan, organize, and present classroom training and practical exercises in accordance with approved course outlines. Instructors shall be designated or approved by the Responsible Level 3.

### **6.2.3 OUTSIDE AGENCIES**

When an outside agency is used, the outside agency shall provide the employer with the names, evidence of qualifications and, if applicable, evidence of certifications held by the personnel conducting the training and examination.

## **6.3 EXPERIENCE**

Candidates for certification to Level 1-Limited, Level 1, Level 2 or Level 3 shall have sufficient practical experience to assure that they are capable of performing the duties of the level for which certification is sought. The minimum experience requirements for Level 1 and Level 2 are provided in Table II and Table IIA, as applicable. The requirements for Level 3 are in Table III and 6.4.2, as applicable. Experience requirements for Level 1-Limited shall be determined and documented by the Responsible Level 3, but shall not be less than 10% of those required for Level 1 in the applicable method. As documented in the written practice, on-the-job training for the purpose of gaining experience shall be overseen by personnel certified in accordance with this standard. For trainees gaining experience, documentation shall be available for review to indicate individual, date, task, hours, and certified personnel providing direct observation.

Additional experience requirements for current Level 3 radiography personnel transitioning to either film or non-film radiography are 240 hours with guidance or supervision from an examiner, instructor, or outside agency.

### **6.3.1 PREVIOUS EXPERIENCE**

A candidate's experience with a previous employer may be accepted by the current employer only if such experience is documented and approved by the Responsible Level 3 or Examiner. All or a portion of previous hours may be accepted as applicable. For documentation of previous experience, records other than original records may be accepted if adequacy and equivalency have been determined to be acceptable by the Responsible Level 3 or Examiner.

### **6.3.2 EQUIVALENT EXPERIENCE**

For personnel previously certified under NAS 410, EN 4179 or other recognized NDT qualification program, the adequacy and equivalency of their previous experience to the requirements of Table II, Table IIA, or Table III shall be determined and documented by the Responsible Level 3 or Examiner.

**TABLE II – MINIMUM EXPERIENCE REQUIREMENTS FOR LEVEL 1 & LEVEL 2**

Method	Experience Time in Hours		
	Level 1 (Trainee experience)	Level 2 with previous Level 1 certification	Level 2 without previous Level 1 certification
PT	130	270	400
MT	130	400	530
IRT	200	600	800
ST	200	600	800
ET	200	600	800
UT	200	600	800
RT Film or NonFilm	200	600	800
RT Film & NonFilm	220	780	1000

**TABLE IIA – RT EXPERIENCE REQUIREMENTS FOR TRANSITION TO FILM AND NONFILM**

Additional Minimum Experience Time in Hours		
Current Level 1	Current Level 2	Current Level 1 to Level 2 Film & NonFilm
20	200	800

**TABLE III – MINIMUM EXPERIENCE REQUIREMENTS FOR LEVEL 3 IN COMMON METHODS**

College or University	Level 2 Experience
None	4 years
Two years of engineering or science study at a technical school, college or university	2 years
3-4 year science or engineering undergraduate degree	1 year

## **6.4** EMERGING NDT METHODS

The minimum required training and experience hours for methods used by the employer that are not listed in 1.3, Table I, and Table II shall be established by the Responsible Level 3.

### **6.4.1** LEVELS 1 AND 2

When determining training or experience hours for new methods not listed in Tables I and II, the minimum hours shall be based on the requirements for a method of similar complexity listed in Table I and II. This only applies to “other” or emerging methods as defined in 1.3.1 and cannot be applied to penetrant, magnetic particle, ultrasonic, radiography, thermography, shearography or eddy current testing.

### 6.4.2 **LEVEL 3**

When approved by the cognizant engineering organization and authorized by the employer's written practice, an employer may qualify and certify its first Level 3 in a new NDT method not listed in 1.3 provided:

- The applicable NADTDB does not have a process for qualifying a Level 3 in the new method. If the applicable NADTDB has such a process, it shall be used.
- The candidate has the skill and ability to carry out the Level 3 responsibilities in 5.1.5.
- All of the requirements in Table IV are met.

The requirements of 6.4, 6.4.1 and 6.4.2 only apply to "other" or emerging methods as defined in 1.3.1 and cannot be applied to penetrant, magnetic particle, ultrasonic, radiography, thermography, shearography or eddy current testing.

**TABLE IV – MINIMUM REQUIREMENTS FOR FIRST LEVEL 3 IN AN EMERGING NDT METHOD**

College or University	Instruction/ Study	Experience	Other NDT Certifications
No engineering or science study at a technical school, college or university	80 hours	300 hours	At least one previous Level 3 or two Level 2 certifications held
Two years of engineering or science study at a technical school, college or university	60 hours	200 hours	At least one previous Level 3 or two Level 2 certifications held
3-4 year science or engineering undergraduate degree	40 hours	200 hours	At least one previous Level 2 certification held.

## 7. **EXAMINATIONS**

### 7.1 **PURPOSE**

Examinations to verify the technical qualifications of candidates shall consist of a general, specific and practical examination for each method in which the candidate is to be certified. An examination for visual acuity shall also be conducted prior to the candidate's first certification and periodically thereafter. The requirements for the vision examination, the questions or question database used for the general and specific examinations and the checklist for the practical examination shall be available for review by the employer's customers. Examinations and test samples shall be made available to the candidates only during administration of the examinations. An oral or verbal translation of written examinations is not permitted.

#### 7.1.1 **VISION**

The vision examination for trainee, Level 1-Limited, Level 1, Level 2, and Level 3 personnel shall assure that the applicant's near vision and color perception meet the requirements of Table V.

Vision requirements do not apply to instructors or auditors. Near vision tests shall be administered annually and color perception tests shall be administered at least every 5 years. The employer shall ensure the flow-down of the Table V vision requirements to all necessary personnel and/or facilities. Snellen and Jaeger tests shall be administered by trained personnel designated by the Responsible Level 3 or by qualified medical personnel. ISO 18490 tests shall be administered in accordance with the requirements therein. When vision correction is necessary to pass the visual acuity exam, vision correction shall be worn during all testing/inspections. Any limitations in color perception shall be evaluated by the Responsible Level 3 prior to certification and must be approved in writing.

**TABLE V - VISION REQUIREMENTS**

Examination Requirements	
Near Vision Options	<ul style="list-style-type: none"> <li>• Tumbling E in accordance with ISO 18490</li> <li>• 20/25 (Snellen) at 16" (40.64 cm) ) +/- 1" (2.54 cm)*</li> <li>• Jaeger No. 1 at not less than 12" (30.48 cm) *</li> </ul>
Color Perception	Personnel shall be capable of adequately distinguishing and differentiating colors used in the process involved

\* In at least one eye, natural or corrected

**7.1.2 GENERAL**

The general examination for all levels shall be a closed book examination covering the cross-section of the applicable method at the appropriate level. A minimum of 10 questions shall be administered for the general examination for Level 1-Limited. A minimum of 40 questions shall be administered for the general examination at Levels 1, 2 or 3. For Level 3, the general examination questions shall address the general knowledge of other methods as defined within this standard as well as the method for which certification is sought. Passing a "basic" examination covering the other NDT methods used before passing any NDT method examination shall be considered satisfactory evidence the other NDT methods have been satisfactorily covered. Possession of a current ASNT or ISO 9712 NDT certificate at the appropriate level by the candidate may be satisfactory evidence that the general examination requirement is satisfied as defined in the employer's written practice.

**7.1.3 SPECIFIC**

The specific examination for all levels shall be an open book examination covering the requirements and use of the specifications, codes, equipment, operating procedures and test techniques the candidate may use in the performance of his/her duties with the employer. A minimum of 8 questions shall be administered for the specific examination for Level 1-Limited. A minimum of 30 questions shall be administered for the specific examination at Levels 1, 2, and 3. Reference material, as determined by the Responsible Level 3 or Examiner, such as specifications, tables, formulas, etc. shall be provided. Questions utilizing such material shall require understanding of the information contained therein rather than merely finding its location.

Where an NANDTB is used, the specific examination may cover a wider scope within the method used within the aerospace industry and may use examinations which cover more than the employer's requirements. When a wider scope is used by the NANDTB, the employer is



responsible for administering a supplemental examination representative of the employer's processes.

#### **7.1.4 PRACTICAL**

The practical examination shall consist of a demonstration of proficiency in performing tasks that are typical of those to be accomplished in the performance of the candidate's duties. If the candidate is required to demonstrate proficiency in the application of the process as well as interpretation of results, hardware test samples shall be used. The candidate shall not be familiar with the test sample and the location of the defects located therein. If the candidate is only required to interpret the results and not perform the process of generating the image, the test samples may be images, such as radiographs or other resultant test data. A written checklist covering the topics detailed in the following sub-paragraphs shall be developed and completed by the Responsible Level 3 or Examiner to assure adequate coverage and to assist in the administration and grading of the examination. In addition to using the checklist, the Responsible Level 3 or Examiner shall determine and document how the examination results obtained by the candidate are to be documented (e.g. part maps, drawings, sketches, written descriptions, etc.). All such documentation shall become part of the examination and filed accordingly.

Where an NANDTB is used, the practical examination may cover a wider scope within the method used within the aerospace industry. When a wider scope is used by the NANDTB, the employer is responsible for administering a supplemental examination representative of the employer's products.

##### **7.1.4.1 LEVEL 1-LIMITED**

The candidate shall demonstrate proficiency by using a work instruction to process and, if approved to accept hardware, examine at least one test sample for each technique and part configuration for which certification is sought. The test samples shall meet the definition in 3.33 and be representative of the specific product to be encountered by the candidate in the performance of his/her duties with the employer. If approval to accept or reject hardware is to be granted by the Responsible Level 3, the candidate shall interpret and document the results of the inspection of the test samples. The checklist shall include proficiency in the use and standardization of equipment and materials, adherence to procedural details and, if applicable proficiency in the interpretation and evaluation of indications.

##### **7.1.4.2 LEVEL 1**

The candidate shall demonstrate proficiency by using a work instruction to process at least 2 test samples of differing configurations for each method, with at least one test sample for each technique for which certification is sought. When only one configuration of hardware is to be inspected upon certification, both test samples may be of the same configuration. The test samples shall meet the definition in 3.33 and shall be representative of the products to be encountered by the candidate in the performance of his/her duties with the employer. If approval to accept or reject hardware is to be granted by the Responsible Level 3, the candidate shall interpret and document the results of the inspection of the test samples. The checklist shall include proficiency in the use and standardization of equipment and materials, adherence to procedural details and, if applicable proficiency in the interpretation and evaluation of indications.

#### **7.1.4.3 LEVEL 2**

The candidate shall demonstrate proficiency by inspecting at least 2 test samples of differing configurations for each method, with at least one test sample for each technique for which certification is sought. When only one configuration is to be inspected upon certification, both test samples may be of the same configuration. The test samples shall meet the definition in 3.33 and shall be representative of the products to be encountered by the candidate in the performance of his/her duties with the employer. In addition to the two minimum known and documented test samples with discontinuities, specimens without discontinuities may be included. The candidate shall document the NDT results in accordance with the applicable acceptance criteria. The checklist shall include proficiency in the use and standardization of equipment and materials, adherence to procedural details, the accuracy and completeness of interpretation and evaluation of indications.

#### **7.1.4.4 LEVEL 3**

The candidate shall demonstrate proficiency by preparing an NDT procedure or work instruction appropriate to the employer's current requirements for the method. The procedure or work instruction shall be developed in conjunction with the general and/or specific examination(s) required for certification or recertification, as applicable. The results of the practical examination shall be documented and a checklist shall be used to address the technical accuracy, technical content, and clarity of the procedures or written instructions prepared by the candidate. When the candidate's duties will include processing and/or acceptance or rejection of products, proficiency in performing such tasks shall be demonstrated by a hands-on practical examination equivalent to Level 2 in accordance with 7.1.4.3.

### **7.2 ADMINISTRATION OF EXAMINATIONS**

The administration and grading of all examinations shall be the responsibility of the Responsible Level 3 or Examiner. The Responsible Level 3 or Examiner may delegate in writing the administration and grading of examinations using multiple choice or true/false type questions to non-Examiner personnel. All practical examinations shall be administered by the Responsible Level 3 or Examiner. Responses to essay and fill-in questions must be evaluated by the Responsible Level 3 or Examiner to verify the candidate's adequate understanding of the subject matter. In no case can an examination be administered by one's self or by a subordinate.

#### **7.2.1 ADMINISTRATION BY AN OUTSIDE AGENCY**

When an outside agency is used to administer examinations, the employer shall ensure that all individuals involved in the administration of the examinations meet the requirements of this standard. In all cases, the ultimate responsibility for compliance to this standard shall remain with the employer.

#### **7.2.2 SCORING**

The candidate for certification must achieve a minimum score of 70 % on each individual examination. In addition, the candidate must detect all discontinuities, flaws or conditions specified by the Level 3 during the practical examination and achieve a minimum score of 70%. The candidate must have an average score of no less than 80 % in order to be eligible for certification. All examination scores shall be of equal weight in determining the average score. For example, if only specific and practical examinations are administered for recertification, only those scores shall be factored into the average score. If a general examination is also given for recertification, the general score shall also be factored into the average score. For a Level 3 recertified using Annex A.1, the score for the hands-on practical, if administered, will be used as the average score. Scores for ASNT or ISO 9712 NDT certificates scored as "pass/fail" and used in lieu of the general examination per 7.1.2 shall be assigned a value of 80%.

### **7.2.3 RE-EXAMINATION**

Candidates failing any general, specific or practical examination shall receive additional training as determined and documented by the Responsible Level 3 or Examiner before attempting re-examination of the failed exam. The additional training shall be documented and shall address those areas found deficient in the candidate's skills or knowledge. The re-examination shall not use the same written tests or test samples that were used in the failed examination. The re-examination test must contain a minimum of 25% new questions. A current certification shall be suspended if an individual fails an examination for recertification.

## **8. CERTIFICATION**

### **8.1 GENERAL**

Personnel who have demonstrated that they possess the appropriate qualifications are eligible for certification by their employer in accordance with the employer's written practice. Certification is not required for trainees, instructors, NDT auditors, or personnel performing specialized inspections using direct readout instruments.

### **8.2 RECORDS**

The employer shall maintain personnel certification records as long as the certification is in effect. The records maintained by the employer shall include, as a minimum:

- a. Name of the certified individual.
- b. Level, method, and technique(s) for which individual is certified.
- c. The latest written and practical examinations and the scores from the immediately previous exams.
- d. If Annex A is used, documentation of credit points used for Level 3 recertification. Last written and practical examinations need not be maintained.
- e. Date and expiration of current certification(s). Suspended or revoked certification(s) shall be documented for reason and date. If applicable, date and action to reinstate certification(s) shall also be documented.
- f. NDT training history that identifies the source, type of training, dates of training and course hours, and, if applicable, the documentation required by 6.1.2 and 6.1.3
- g. NDT experience history, including any previous certifications, both with current and previous employers sufficient to justify satisfaction of experience requirements for qualification, and, if applicable, the documentation required by 6.3.1 and 6.3.2
- h. Results of the most-recent (i.e. current) visual acuity and color perception examinations.
- i. Extent and documentation of formal education when used to meet qualification requirements.
- j. The name and signature of the employer's representative authorizing the certification.
- k. For Level 1-Limited certifications, the case-by-case justification, the cognizant engineering organization's approval, the training and experience hours, the length of the certification (up to 1 year), the specific NDT test to be performed, the specific hardware to be tested, and, if applicable, the approval to accept or reject hardware.

#### **8.2.1 RECORD AVAILABILITY**

All training, qualification, and certification records shall be maintained in accordance with the employer's written practice and shall be made available for audit. When an NANDTB is used, the scores for the latest written and practical examinations shall be kept by the employer but actual examinations may be kept by the NANDTB. All such records, except for actual examinations, shall be made available to the applicable employee upon request or upon leaving the company for any reason.

### **8.3**     LOSS OF CERTIFICATION

NDT certifications may expire, be suspended, or be revoked.

#### **8.3.1**    EXPIRATION

Certifications shall expire when the certification interval has lapsed with no recertification issued. Certification, annual maintenance, and vision examinations are considered to expire at the end of the corresponding month in which the event began.

#### **8.3.2**    SUSPENSION

Certification shall be suspended when:

- Vision examination is expired.
- Individual does not perform in the method certified for at least 12 consecutive months.
- Individual fails recertification examination.
- Individual's performance is found to be deficient in any manner.
- Annual maintenance is expired

#### **8.3.3**    REVOCAION

Certification shall be revoked when the individual does not perform in the certified method for the employer for at least 24 consecutive months, when employment has been terminated, or when the individual's conduct is found to be unethical or incompetent. When an individual is re-hired by the same employer within 24 months, certification may be considered as suspended.

### **8.4**     REINSTATEMENT OF CERTIFICATION

Certifications that have been suspended may be reinstated up to the original certification date when the cause for the suspension has been corrected and the correction verified by the employer or the individual's proficiency is verified by the Responsible Level 3 or Examiner. Certifications that have expired or been revoked may only be reinstated by specific and practical examination equivalent to initial certification. Current NANDTB certificates may be utilized for new employment provided that the new employer administers specific and practical examinations that are representative of their processes and product per 7.1.3 and 7.1.4.

### **8.5**     RECERTIFICATION

Personnel are eligible for recertification as follows:

#### **8.5.1**    LEVEL 1-LIMITED, LEVEL 1 AND LEVEL 2

Level 1-Limited personnel shall be re-certified for each certification held at intervals not to exceed one year. Level 1 and 2 personnel certified to this standard shall be recertified at intervals not to exceed five years.

Recertification shall at least be accomplished by successful completion of practical and specific examinations equivalent to those required for initial certification.

## **8.5.2** **LEVEL 3**

Level 3 personnel certified to this standard shall be recertified at intervals not to exceed five years. Recertification shall be accomplished in accordance with Annex A or by successful completion of specific and practical examinations equivalent to initial certification.

### **8.5.2.1** **HANDS-ON PRACTICAL EXAMINATION**

If equipment operation or accepting hardware is required as a part of the Level 3's duties, an additional hands-on practical examination equivalent to Level 2 is required.

## **8.6** **ANNUAL MAINTENANCE**

The employer shall develop and implement a documented annual process to verify technical proficiency for each method during the certification cycle for all levels of personnel processing or inspecting hardware.

## Annex A

### Credit System for Recertification of Level 3 NDT Personnel

#### A.1 SCOPE

A.1.1 This annex specifies the requirements for recertification of Level 3 NDT personnel using the credit system. It applies only to those persons holding a valid Level 3 NDT certification at the time of recertification.

#### A.2 REQUIREMENTS

A.2.1 Documentation for recertification shall be submitted to the Responsible Level 3 or NANDTB at least 14 days prior to the expiration date of the certification. Application for recertification of the Responsible Level 3 shall be made directly to the applicable regulatory agency, NANDTB, or employer for review by a designated Level 3.

A.2.2 The candidate shall have been employed in a Level 3 function for a minimum of 36 months (at least 12 of which are in the last 24 months) within the previous five years in the method(s) for which recertification is sought. The number of months is cumulative and does not need to be consecutive months for validation purposes.

A.2.3 Continuity in the method shall be demonstrated. The candidate shall provide a list of 8 verifiable Level 3 tasks in each NDT method for which recertification is sought covering the 5 year period.

A.2.4 Candidates shall provide objective evidence that they have kept up to date with current NDT technology in the method(s) for which they are seeking recertification by obtaining a minimum of 24 points during the five year period of certification, irrespective of the number of certifications (methods) obtained, by engaging in a combination of activities listed in Table A.1.

A.2.5 The approval of Annex A activity documentation shall be determined and documented by the Responsible Level 3 or NANDTB as defined within the employer's written practice. Annex A recertification for the Responsible Level 3 shall be determined and documented by the employer. A single event shall only be used for one award credit activity during a five year period.

#### A.3 DEFINITIONS

A.3.1 COMMITTEE OR PANEL MEETINGS: Meetings, conferences, symposia, seminars, trade association meetings, panels, etc. organized or sponsored by a regional, national or international NDT organization or technical society. Foreign or international meetings qualify if the sponsor(s) are national or international.

A.3.2 COMMITTEE PROJECTS: Specific identifiable official activities of regional or national technical societies, committees or work groups, such as round robins or individual studies, preparation of guidelines, appendices, specifications, recommended practices, procedures, codes or standards, etc. Documentation may include memos or reports, drafts of committee output documents, or official written comments submitted by the candidate on such documents.

**TABLE A.1 – LEVEL 3 AWARDED CREDIT ACTIVITY**

ACTIVITY	CRITERIA	POINT ALLOCATION	Max points per 5 years
Authoring or co-authoring technical NDT papers, presentations, or white papers	Sole Author	8	8
	Co-author	4	
Authoring or co-authoring for company or industry NDT specifications or standards	Each Standard/Specification	2	8
Attending NDT technical sessions, committee or panel meetings organized by: a) National or international technical societies, associations and institutes b) Inter-company NDT teams comprised of members from several locations	1 day or 1 meeting	1	8
	2 days	2	
	3 or more days	4	
NDT instructor teaching academic courses, or courses designed to prepare students for NDT qualification	For each 8 hours of instruction	4	8
Participating in technical courses or seminars	For every 8 hours of documented instruction	2	8
Participating in technical courses or seminars for which academic credit is given	For actual Continuing Education Units (CEUs) or academic credit earned	Actual CEUs/credit awarded	8
Obtaining an initial * Level 3 certificate from a recognized industry source (applicable only to initial professional certification. * This does not apply to professional recertification)	For each method obtained	4	4

**TABLE A.1 – LEVEL 3 AWARDED CREDIT ACTIVITY (CONTINUED)**

ACTIVITY	CRITERIA	POINT ALLOCATION	MAX POINTS PER 5 YEARS
Nondestructive testing Examiner	For each qualification examination	1	6
NDT related technical and/or scientific publications published either internally or externally	For each published paper	4	8
Documented NDT contributions to company, technical society, or industry committee projects	For each documented contribution	4	8
Documented participation in NDT-related studies, developments, or investigations.	For each documented contribution	4	8
Documented continuous satisfactory performance as a Level 3.	Written testament for each method in the certification period	1	4
Attend NDT equipment or trade show	For each show attended	1	4
Conduct external NDT audits	For each external audit conducted	2	6
Development of new NDT processes, facilities, or systems	For each documented contribution	4	8
Submitting and/or obtaining a patent for an NDT product or process.	Sole inventor	8	8
	Co-inventor	4	





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