



SLOVENSKI STANDARD
SIST EN 4179:2001
01-januar-2001

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

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

Luft- und Raumfahrt - Qualifikation und Zulassung des Personals für zerstörungsfreie Prüfung

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

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Ta slovenski standard je istoveten z: EN 4179:2000

ICS:

03.100.30	Vodenje ljudi	Management of human resources
19.100	Neporušitveno preskušanje	Non-destructive testing
49.020	Letala in vesoljska vozila na splošno	Aircraft and space vehicles in general

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 4179

March 2000

ICS 49.020

English version

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This European Standard was approved by CEN on 23 October 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries 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 AECMA, 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 September 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This standard specifies the minimum requirements for the qualification and approval of personnel involved in the application of non-destructive testing (NDT). These requirements include training, experience and examination within the aerospace industry (manufacture and service).

2 Applicability

This standard is applicable to personnel using NDT methods to inspect materials, products, systems, sub-systems and components. It is also applicable to those individuals directly responsible for the technical adequacy of the NDT methods used as well as those providing the technical training or supervision (see annex A) for NDT personnel.

2.1 General

This standard is not applicable to individuals who only have administrative authority over NDT personnel or to research personnel developing technology for use by qualified and approved NDT personnel.

2.2 Common methods

This standard contains detailed requirements for the applicable training, experience, and examination in the methods given in table 1:

Table 1 - Methods

Method	Symbol
Penetrant testing	PT
Magnetic testing	MT
Eddy current testing	ET
Ultrasonic testing	UT
Radiography	RT

2.3 Other methods

This standard may apply to other (NDT methods, for example, leak testing, thermography, holography, computed tomography).

The requirements for personnel training, experience, and examination for these other methods shall be:

- established by the responsible Level 3 appointed by the employer or by the National aerospace NDT board;
- in accordance with the guidelines established for the common methods.

3 Definitions

For the purposes of this standard the following definitions apply:

3.1

approval

a written statement by an employer that an individual has met the applicable requirements of this standard

3.2

basic education

the minimum standard of education required for qualification

3.3

employer

the organization for which the candidate works on a regular basis

3.4

examination

formal procedures to verify the candidate's knowledge of the applicable NDT methods

3.5

examiner

an individual approved to Level 3 in the method for which he/she is to conduct, supervise and grade examinations

The examiner may be assisted by one or more examination invigilators placed under his responsibility.

3.6

experience

actual performance or observation conducted during work time resulting in the acquisition of knowledge and skill

This does not include classroom or laboratory training but does include on-the-job training.

3.7

general examination

a written examination addressing the basic principles of the applicable NDT method

3.8

instructor

an individual providing classroom or laboratory training for NDT personnel

3.9

method

one of the disciplines of non-destructive inspection or testing, e.g. radiography

3.10

national aerospace NDT board

independent national aerospace organization representing the national aerospace industry

3.11

on-the-job training

training, during work time, in learning instrumentation setup, equipment operation, recognition of indications, and interpretation under the technical guidance of a responsible Level 2 or Level 3

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3.12**outside agency**

an independent organization appointed by the employer in accordance with the relevant applicable national regulations to be responsible for applying the requirements of this standard

3.13**personnel training record (PTR)**

a document where training and experience times are formally recorded

3.14**practical examination**

the examination used to demonstrate the candidate's ability to perform the NDT methods on the employer's products

3.15**prime contractor**

the organization responsible for the manufacture and/or maintenance of aerospace products

3.16**qualification**

the proven ability of NDT personnel to meet the requirements of this standard in terms of physical requirements, training, knowledge and experience necessary to perform the applicable NDT method

3.17**subcontractor**

an organization responsible to the prime contractor for the manufacture or maintenance of aerospace products

3.18**specific examination**

the written examination to determine the candidate's understanding of operating procedures, codes, standards, product technology, test techniques, equipment and specifications for a given method used by the employer

3.19**technique**

a specific way of using an NDT method, for example: ultrasonic immersion

3.20**test samples**

parts containing known defects and used in the practical examination to demonstrate the candidate's proficiency in using a particular method

3.21**training**

instruction developed to impart knowledge and skill necessary to achieve qualification

3.22**written instruction**

a procedure detailing the NDT technique used for the inspection of a specific component or assembly

3.23**written practice**

procedures that describe the control and administration of NDT personnel qualification and approval

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4 General requirements

4.1 Written practice

4.1.1 General

All employers involved in any aspect of NDT shall develop and maintain a procedure for the qualification and approval of their NDT personnel. This procedure shall be in accordance with the requirements of this standard.

A subcontractor may work to the same written practice as the prime contractor, or may prepare a written practice of his own which shall be approved by the prime contractor.

As a minimum, the written practice shall include the items specified in 4.1.2 to 4.1.9.

4.1.2 Levels of qualification and approval

The written practice shall include identification of the levels of qualification and approval. The employer may subdivide levels where appropriate see 5.1. Under no circumstances shall the employer eliminate or reduce the minimum requirements of this standard in the qualification and approval procedure.

Specific techniques concerning specific materials, parts and assemblies may be performed by Level 1 or 2 limited category personnel. For this personnel, the number of training hours, experience hours and examination questions may be reduced at the discretion of the responsible Level 3 and in accordance with the employer's written practice.

4.1.3 Personnel duties and responsibilities

They shall include the identification of the duties and responsibilities for the different levels of qualification and the NDT management structure.

4.1.4 Training programme

It shall include outlines of the training provided by the employer as well as outside agencies including details of training hours required for each method and level of qualification.

4.1.5 Experience requirements

They shall include the techniques within the method and the minimum amount of time for each technique.

4.1.6 Examination practices

They shall include the designation of the individuals or organizations performing the examinations. It shall also include details of the numbers of examination questions and the grading of the examination results.

4.1.7 Administrative records and documentation

They shall include the description of the details to be recorded for each approved individual and identification of the individuals responsible for developing, administering, and maintaining the employer's qualification and approval programme.

4.1.8 Educational requirements

They shall define any educational requirements which are used to establish the eligibility of a candidate.

4.1.9 Re-approval requirements

They shall include the employer's requirements for re-approval of personnel.

4.2 Personnel

Personnel performing, specifying, reviewing, monitoring, supervising, or evaluating NDT functions shall be approved to the appropriate requirements of this standard.

For personnel conducting technical audits of subcontractors the following shall be applied.

For initial evaluation of NDT functions the personnel shall be approved to the appropriate requirements of this standard. Subsequent reviews may be carried out by non approved NDT personnel providing the approved personnel is involved.

4.3 Methods

For the common methods listed in 2.2 of this standard, the requirements for training, experience and examination are detailed in 6 and 7 of this standard.

4.4 Compliance

Prime contractors shall ensure compliance with this standard by their subcontractors. Those organizations utilizing an outside agency for training or examination of their personnel shall be responsible for assuring that the appropriate requirements of this standard are met. The employer shall solely be responsible for the approval of his employees. Individuals shall not approve themselves.

4.5 Responsibilities of National aerospace NDT board (where established)

This board shall administer procedures for qualification and approval of NDT personnel according to the requirements of this standard. It is entitled, in conjunction with the employer, to recognize equivalences of qualification and approval and may be requested to provide general guidelines in accordance with this standard regarding: facility for NDT training, course outlines, examination questions and examination procedures.

NOTE 1 For countries where no National aerospace NDT board exists, the employer may use the services of other National aerospace NDT boards.

NOTE 2 Where an employer uses the services of a foreign NDT board as an outside agency in preference to his own National aerospace NDT board, then equivalence to their procedures shall be established by the National aerospace NDT board and agreed by the employer.

5 Requirements for levels of qualification and approval

5.1 General

There are three basic levels which these may be further subdivided by the employer for specific situations. Where such subdivisions are implemented, the requirements and responsibilities shall be detailed within the employer's written practice.

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5.2 Level 1

Level 1 personnel shall be able to, with the aid of written instructions and guidance by a Level 2 or Level 3 individual:

- a) set up and calibrate the equipment;
- b) perform individual tests;
- c) interpret and evaluate for acceptance or rejection provided this is included in the written practice and/or written instruction;
- d) report on the results.

5.3 Level 2

In addition to fulfilling the requirements for Level 1, a Level 2 individual shall/shall be able to:

- a) choose the technique to be used for the test method;
- b) be thoroughly familiar with the scope and limitations of the method;
- c) understand NDT standards and specifications and translate them into practical testing instructions adapted to the actual working conditions;
- d) interpret and evaluate results according to applicable standards, codes or specifications;
- e) supervise the tests;
- f) prepare written instructions provided this is specified in the written practice;
- g) supervise all Level 1 personnel duties;
- h) train or guide personnel;
- i) organize the NDT tests and report on their results;
- j) have a basic knowledge of product technology.

5.4 Level 3

Personnel approved to Level 3 is qualified to direct any NDT operation for which he is approved and shall/shall be able to:

- a) assume NDT technical responsibility for a test facility and staff;
- b) establish and authorize methods, techniques, written instructions and procedures;
- c) interpret standards, codes, specifications and procedures;
- d) have sufficient knowledge and practical background in applicable product technology to assist in establishing tests methods to be used, including acceptance and rejection criteria;
- e) have sufficient knowledge in other NDT inspection methods associated with his area of responsibility and recognize appropriate use thereof;
- f) audit an outside agency to ensure it meets the requirements of the written practice;
- g) train, examine and approve all levels of NDT personnel.

6 Training and experience

6.1 Basic education

Basic education required to establish the eligibility of a candidate for training shall be in accordance with the employer's written practice.

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6.2 Training

Candidates for Level 1 or Level 2 approval shall complete sufficient organized training to become familiar with the principles and practices of the applicable test methods and techniques. The training courses shall be approved by the Level 3, responsible for administering the training in accordance with the employer's written practice, this approval may be delegated to a National aerospace NDT Board, where one exists.

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

The training shall cover basic principles, products, equipment, operating procedures and techniques, and the applicable specifications, codes and instructions used by the employer.

6.3 Designation of instructors

Instructors shall be designated by the responsible Level 3 for the employer's qualification and approval procedure or by the outside agency in charge of training.

6.4 Requirements for outside agency

An employer may utilize an outside agency to develop a programme, train and examine NDT personnel and perform any other Level 3 function. The employer shall document the suitability of any outside agency selected to perform any function to meet the requirements of this standard. This documentation shall be sufficient to justify that the outside agency is capable of performing the required Level 3 functions in accordance with this standard.

6.5 Minimum required training hours

The minimum training hours for Levels 1 and 2 shall be as given in table 2 for the basic NDT methods.

The minimum training hours for those methods and levels not covered by table 2 shall be as determined by the responsible Level 3.

NOTE Table 2 does not include "on-the-job training"

Table 2 - Minimum training hours for Levels 1 and 2

Method	Time in hours		
	Level 1	Level 2 (Level 1 experience)	Level 2 (direct access)
PT	16	16	32
MT	16	16	32
ET	40	40	80
UT	40	40	80
RT	40	40	80

6.6 Previous training

Documented evidence of training obtained from a previous employer may be accepted by the current employer. For personnel credited with training from a previous employer or those not approved within the 12 months following their training, documented refresher training shall be provided according to a programme determined by the responsible Level 3.

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