

# Non-destructive testing — Qualification and certification of NDT personnel — General principles

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## National foreword

This British Standard is the UK implementation of EN 473:2008. It supersedes BS EN 473:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/46, Non-destructive testing.

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

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Zerstörungsfreie Prüfung - Qualifizierung und Zertifizierung von Personal der zerstörungsfreien Prüfung - Allgemeine Grundlagen

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## **Foreword**

This document (EN 473:2008) has been prepared by Technical Committee CEN/TC 138 "Non-destructive testing", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by December 2008, and conflicting national standards shall be withdrawn at the latest by December 2008.

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 will supersede EN 473:2000.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

## **1 Scope**

This European Standard establishes principles for the qualification and certification of personnel who perform industrial non-destructive testing (NDT). The term 'industrial' implies the exclusion of applications in the field of medicine.

The system described in this European Standard can also apply to other NDT methods, or to new techniques within an established NDT method, provided a comprehensive scheme of certification exists and the method or technique is covered by European, international or national standards, or the new NDT method or technique has been demonstrated as effective through a formal qualification carried out in accordance with CEN/TR 14748.

NOTE 1 Wherever gender specific words such as "his", "her", "he" or "she" appear in this standard, the other gender is also applicable.

When certification of NDT personnel is defined in product standards, regulations, codes or specifications, it is recommended to certify the personnel in accordance with this European Standard.

NOTE 2 The methodology for "Approval" of NDT personnel is not specified in Directive 97/23/EC [4] and it was agreed that guidance was required in order to ensure a consistent approach to the application of the Directive and the implementation of Working Group Pressure guideline 6/13 [5] by Recognised Third Party Organisations (RTPO). As a result a Code of Practice was developed as Technical Report CEN/TR 15589 [3].

The certification covers proficiency in one or more of the following methods:

- a) acoustic emission testing;
- b) eddy current testing;
- c) leak testing (hydraulic pressure tests excluded);
- d) magnetic particle testing;
- e) penetrant testing;
- f) radiographic testing;
- g) ultrasonic testing;
- h) visual testing (direct unaided visual tests and visual tests carried out during the application of another NDT method are excluded).

## **2 Normative references**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CEN/TR 14748:2004, *Non-destructive testing – Methodology for qualification of non-destructive tests*

CEN/TS 15053:2005, *Non-destructive testing – Recommendations for discontinuities-types in test specimens for examination*

EN ISO/IEC 17024:2003, *Conformity assessment – General requirements for bodies operating certification of persons (ISO/IEC 17024:2003)*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

#### 3.1

##### **authorized qualifying body**

body, independent of the employer, authorized by the certification body to prepare and administer qualification examinations

#### 3.2

##### **basic examination**

written examination, at level 3, which demonstrates the candidate's knowledge of the materials science and process technology and types of discontinuities, the qualification and certification system according to this European Standard, and the basic principles of NDT methods as required for level 2

NOTE For an explanation of the three levels of qualification, see Subclause 5.3.

#### 3.3

##### **candidate**

individual seeking qualification and certification who gains experience under the supervision of suitably qualified personnel

#### 3.4

##### **certificate**

document issued by the certification body under the provisions of this European Standard, indicating that the named person has demonstrated the competence(s) defined on the certificate

#### 3.5

##### **certification**

procedure used by the certification body to confirm that the qualification requirements for a method, level and sector have been fulfilled, leading to the issuing of a certificate

#### 3.6

##### **certification body**

body that administers procedures for certification according to the requirements of this European Standard and which fulfils the requirements of EN ISO/IEC 17024

#### 3.7

##### **employer**

organization for which the candidate works on a regular basis; an employer can also be a candidate at the same time

#### 3.8

##### **examination centre**

centre approved by the certification body where qualification examinations will be carried out

#### 3.9

##### **examiner**

person certified to level 3 in the method and product or industrial sector for which he is authorized by the certification body to conduct, supervise and grade the qualification examination

#### 3.10

##### **general examination**

written examination, at level 1 or 2, concerned with the principles of an NDT method

**3.11**

**industrial experience**

experience, acceptable to the certification body, gained under qualified supervision, in the application of the NDT method in the sector concerned, needed to acquire the skill and knowledge to fulfil the provisions of qualification

**3.12**

**invigilator**

person authorized by the certification body to supervise examinations

**3.13**

**job-specific training**

training, provided by the employer (or his agent) to the certificate holder in those aspects of non-destructive testing specific to the employer's products, NDT equipment, NDT procedures, and applicable codes, standards, specifications and procedures, leading to the award of operating authorizations

**3.14**

**main-method examination**

written examination, at level 3, which demonstrates the candidate's general and specific knowledge, and the ability to write NDT procedures for the NDT method as applied in the industrial or product sector(s) for which certification is sought

**3.15**

**multiple-choice examination question**

wording of a question giving rise to four potential replies, only one of which is correct, the remaining three being incorrect or incomplete

**3.16**

**NDT instruction**

written description of the precise steps to be followed in testing to an established standard, code, specification or NDT procedure

**3.17**

**NDT method**

discipline applying a physical principle in non-destructive testing

EXAMPLE Ultrasonic testing.

**3.18**

**NDT procedure**

written description of all essential parameters and precautions to be applied when non-destructively testing products in accordance with standard(s), code(s) or specification(s)

**3.19**

**NDT technique**

specific way of utilizing an NDT method

EXAMPLE Immersion ultrasonic testing.

**3.20**

**NDT training**

process of instruction in theory and practice in the NDT method in which certification is sought, which takes the form of training courses to a syllabus approved by the certification body

**3.21**

**operating authorization**

written statement issued by the employer, based upon the scope of certification, authorizing the individual to carry out defined tasks

NOTE Such authorization can be dependent on the provision of job-specific training.

**3.22**

**practical examination**

assessment of practical skills, in which the candidate demonstrates familiarity with, and the ability to perform,



the test

### 3.23

#### **qualification**

demonstration of physical attributes, knowledge, skill, training and experience required to properly perform NDT tasks

### 3.24

#### **qualification examination**

examination, administered by the certification body or the authorized qualifying body, which assesses the general, specific and practical knowledge and the skill of the candidate

### 3.25

#### **qualified supervision**

supervision of candidates gaining experience by NDT personnel certified to this European Standard or by non-certified personnel who, in the opinion of the certification body, possess the knowledge, skill, training and experience required to properly perform such supervision

### 3.26

#### **sector**

particular section of industry or technology where specialized NDT practices are used, requiring specific product-related knowledge, skill, equipment or training

NOTE A sector can be interpreted to mean a product (welded products, castings) or an industry (aerospace, in-service testing). See Annex A.

### 3.27

#### **significant interruption**

absence or change of activity which prevents the certified individual from practising the duties corresponding to the level in the method and the sector(s) within the certified scope, for either a continuous period in excess of one year or two or more periods for a total time exceeding two years

NOTE Legal holidays or periods of sickness or courses of less than thirty days are not taken into account when calculating the interruption.

### 3.28

#### **specific examination**

written examination, at level 1 or 2, concerned with testing techniques applied in a particular sector(s), including knowledge of the product(s) tested and of codes, standards, specifications, procedures and acceptance criteria

### 3.29

#### **specification**

document stating requirements

### 3.30

#### **specimen**

sample used in practical examinations, possibly including radiographs and data sets, which is representative of products typically tested in the applicable sector

NOTE It can include more than one area or volume to be tested.

### 3.31

#### **specimen master report**

model answer, indicating the optimum result for a practical examination given a defined set of conditions (equipment type, settings, technique, specimen, etc.) against which the candidate's test report will be graded

### **3.32**

#### **supervision**

act of directing the application of NDT performed by other NDT personnel, which includes the control of actions involved in the preparation of the test, performance of the test and reporting of the results

### **3.33**

#### **validation**

act of demonstrating that a verified procedure will work in practice and fulfil its intended function, normally achieved by actual witnessing, demonstration, field or laboratory tests or selected trials

## **4 Methods and symbols**

For the purposes of this European Standard, the following symbols are used to identify the NDT methods.

**Table 1 – Methods and symbols**

<b>NDT Method</b>	<b>Symbol</b>
Acoustic emission testing	AT
Eddy current testing	ET
Leak testing	LT
Magnetic particle testing	MT
Penetrant testing	PT
Radiographic testing	RT
Ultrasonic testing	UT
Visual testing	VT

## **5 General principles**

### **5.1 General**

The certification system, which shall be controlled and administered by a certification body (with the assistance, where necessary, of authorized qualifying bodies), includes all procedures necessary to demonstrate the qualification of an individual to carry out tasks in a specific NDT method and product or industrial sector, leading to certification of competence.

**5.1.1** The certification body shall fulfil the requirements of EN ISO/IEC 17024.

**5.1.2** Where established, the authorised qualifying body shall:

- a) work under the control of the certification body;
- b) have the resources needed to administer examinations at examination centres, including the calibration and control of equipment;
- c) prepare and supervise examinations under the responsibility of an examiner authorised by the certification body;
- d) be independent of any single predominant interest;
- e) apply a documented quality management system approved by the certification body;
- f) have the resources and expertise necessary to establish examination centres;
- g) ensure that test specimens are not in use for training purposes.

When an authorised qualifying body covers a sector, the authorised qualifying body shall be comprised of more than one company active in the sector concerned.

If there are no authorised qualifying bodies, the certification body shall fulfil the requirements of the qualifying body.

**5.1.3** The examination centre shall:

- a) work under the control of the certification body or authorised qualifying body;
- b) apply a documented quality procedure approved by the certification body;
- c) have the resources needed to administer examinations, including the calibration and control of equipment;
- d) prepare and conduct examinations under responsibility of an examiner authorised by the certification body;
- e) ensure that test specimens are not in use for training purposes.

## **5.2 Duties and responsibilities**

### **5.2.1 Certification body**

The certification body:

- a) shall initiate, promote, maintain and administer the certification scheme according to EN ISO/IEC 17024 and this European Standard;
- b) may delegate, under its direct responsibility, the detailed administration of qualification to authorised qualifying bodies, to which it should issue specifications and/or quality procedures covering facilities, personnel, calibration and control of NDT equipment, examination materials, specimens, conduct of examinations, examination grading, records, etc;
- c) shall approve properly staffed and equipped examination centres which it shall monitor on a periodic basis;
- d) shall establish an appropriate system for the maintenance of records, which shall be retained for at least one certification cycle (10 years);
- e) shall be responsible for the issue of all certificates;
- f) shall be responsible for the definition of sectors (see Annex A);
- g) shall ensure that test specimens are not in use for training purposes;
- h) shall monitor, in accordance with a documented procedure, all delegated functions;
- i) shall require all candidates and certificate holders to give a signed undertaking to abide by a code of ethics which it shall develop for the purpose and publish.

### **5.2.2 Authorised qualifying bodies**

**5.2.2.1** Where established, authorised qualifying bodies shall:

- a) work under the control of and, where applicable, apply the specifications issued by the certification body;
- b) work within a documented quality management system approved by the certification body;
- c) have the resources needed to prepare, supervise and administer examinations under the responsibility of an examiner authorised by the certification body at examination centres established for the purpose;
- d) maintain appropriate qualification and examination records according to the requirements of the certification body.

**5.2.2.2** If there are no authorised qualifying bodies, the certification body shall fulfil the requirements of the qualifying body.

### **5.2.3 Examination centre**

**5.2.3.1** An examination centre can be situated at an employer's premises. In this case, examinations shall be conducted only in the presence of, and under the control of, an authorised representative of the certification body.

**5.2.3.2** When more than one examination centre exists, each shall have test specimens of comparable test difficulty containing similar discontinuities. Under no circumstances shall test specimens be used for training purposes.

**5.2.3.3** Examination centres shall apply a documented quality procedure approved by the certification body, and:

- a) work under the control of the certification body or authorised qualifying body, and have adequate qualified staff, premises and equipment to ensure satisfactory qualification examinations for the levels, methods, and sectors concerned;
- b) prepare and conduct examinations under responsibility of an examiner authorised by the certification body, using only those examination questionnaires and specimens established or approved by the certification body for that purpose;
- c) have the resources needed to administer examinations, including the calibration and control of equipment;
- d) maintain appropriate qualification and examination records according to the requirements of the certification body.

### **5.2.4 Employer**

**5.2.4.1** The employer shall introduce the candidate to the certification body or the authorised qualifying body and document the validity of the personal information provided, including the declaration of education, training and experience required for the eligibility of the candidate, but shall not be directly involved in the qualification examination.

**5.2.4.2** With regard to certificated persons, the employer shall be responsible for:

- a) providing job-specific training, if necessary;
- b) issuing the written operating authorisation;
- c) verifying annually the NDT employee's visual acuity in accordance with 6.4, and
- d) verifying continuity in the application of the NDT method without significant interruption.

It is recommended that these responsibilities be described in a documented procedure.

**5.2.4.3** A self employed individual shall assume all responsibilities ascribed to the employer.

### **5.2.5 Candidate**

Candidates, either employed or unemployed shall:

- a) provide documentary evidence of satisfactory completion of a course of training approved by the Certification Body;
- b) provide verifiable documentary evidence that the required experience has been gained under qualified supervision;
- c) provide documentary evidence of vision satisfying the requirements of 6.4;
- d) undertake to abide by a code of ethics published by the certification body for candidates and certificates holders.

### **5.2.6 Certificate holders**

Certificate holders shall:

- a) abide by a code of ethics published by the certification body;
- b) submit to an annual test of visual acuity, and submit the results of tests to the employer;
- c) notify the certification body and the employer in the event that the conditions for validity of certification are not fulfilled.

### **5.3 Levels of qualification**

An individual certificated in accordance with this European Standard shall be classified in one or more of the three following levels, depending upon his respective qualification.

#### **5.3.1 Level 1**

**5.3.1.1** An individual certificated to level 1 has demonstrated competence to carry out NDT according to written instructions and under the supervision of level 2 or level 3 personnel. Within the scope of the competence defined on the certificate, level 1 personnel may be authorised by the employer to:

- a) set up NDT equipment;
- b) perform the tests;
- c) record and classify the results of the tests in terms of written criteria;
- d) report the results.

**5.3.1.2** Level 1 certificated personnel shall not be responsible for the choice of test method or technique to be used, nor for the assessment of test results.

#### **5.3.2 Level 2**

An individual certificated to level 2 has demonstrated competence to perform non-destructive testing according to established or recognised procedures. Within the scope of the competence defined on the certificate, level 2 personnel may be authorised by the employer to:

- a) select the NDT technique for the testing method to be used;
- b) define the limitations of application of the testing method;
- c) translate NDT standards and specifications into NDT instructions;
- d) set up and verify equipment settings;
- e) perform and supervise tests;
- f) interpret and evaluate results according to applicable standards, codes or specifications;
- g) prepare written NDT instructions;
- h) carry out and supervise all tasks at or below level 2;
- i) provide guidance for personnel at or below level 2, and
- j) organise and report the results of non-destructive tests.

### **5.3.3 Level 3**

**5.3.3.1** An individual certificated to level 3 has demonstrated competence to perform and direct non-destructive testing operations for which he is certificated. Within the scope of the competence defined on certificate, level 3, personnel may be authorised to:

- a) assume full responsibility for a test facility or examination centre and staff;
- b) establish and validate NDT instructions and procedures;
- c) interpret standards, codes, specifications and procedures;
- d) designate the particular test methods, procedures and NDT instructions to be used;
- e) carry out and supervise all level 1 and level 2 duties, and
- f) provide guidance for NDT personnel at all levels.

**5.3.3.2** Level 3 personnel have demonstrated:

- a) the competence to evaluate and interpret results in terms of existing standards, codes and specifications;
- b) sufficient practical knowledge of applicable materials, fabrication and product technology to select NDT methods, establish NDT techniques, and assist in establishing acceptance criteria where none are otherwise available; and
- c) a general familiarity with other NDT methods.

## **6 Eligibility**

### **6.1 General**

The candidate shall fulfil the minimum requirements of vision and training prior to the qualification examination and shall fulfil the minimum requirements for industrial experience prior to certification.

### **6.2 Training**

The candidate shall provide documentary evidence that he has satisfactorily completed a course of training, in the method and level for which the certification is sought, which is in accordance with the syllabus content of CEN ISO/TR 25107 [1].

For candidates seeking certification in more than one method (e.g. VT, MT, PT) or already certificated and seeking further certification, when the training syllabus duplicates certain aspects (e.g. product technology) the certification body can accept reduction of the total number of training hours for these methods (e.g. VT, PT, MT) in line with the training syllabuses CEN ISO/TR 25107 [1].

It is recommended that the NDT personnel training organisations follow the guidelines given in CEN ISO/TR 25108 [2].

The minimum duration of training undertaken by the candidate for certification shall be as defined in Table 2 for the applicable NDT method.

This duration is based upon candidates possessing adequate mathematical skills and prior knowledge of materials and processes.

Training hours include both practical and theory courses.

Table 2 - Minimum training requirements

NDT Method		Level 1 (hours) <sup>b e g</sup>	Level 2 (hours) <sup>a b e g</sup>	Level 3 (hours) <sup>e g</sup>
AT		64	64	48
ET		40	40	40
LT	A - Basic knowledge	8	8	8
	B - Pressure method	16	24	24 <sup>c, d</sup>
	C - Tracer gas method	16	32	32 <sup>c, d</sup>
MT		16	24	32
PT		16	24	24
RT		72	80 <sup>f</sup>	72 <sup>c, d</sup>
UT		64	80	72 <sup>c, d</sup>
VT		16	24	24
Basic knowledge (direct access to level 3)		-	-	80
<p><sup>a</sup> Direct access to level 2 examination requires the total hours shown for level 1 and level 2.</p> <p><sup>b</sup> Training duration may be reduced by up to 50 % when the certification sought is limited:</p> <ul style="list-style-type: none"> <li>- in application (e.g. automated ET, MT, UT of bar, tube and rod, or normal beam ultrasonic thickness and lamination testing of rolled steel plate);</li> <li>- in technique (e.g. RT using only Radioscopy);</li> <li>- for RT and UT, level 1, in only one product sector.</li> </ul> <p><sup>c</sup> Training duration may be reduced by up to 50 % when the candidate is a certified level 2 in the method.</p> <p><sup>d</sup> Up to 50 % of the required training duration may be acquired by practical training agreed by the certification body.</p> <p><sup>e</sup> A reduction of up to 50 % in the total required number of training hours may be accepted by the Certification Body for candidates who have graduated from technical college or university, or have completed at least two years of engineering or science study at college or university.</p> <p><sup>f</sup> When certification is restricted to the film interpretation and to only one product sector, a minimum training requirement of 56 h applies for direct access. Footnote a is not applicable.</p> <p><sup>g</sup> Maximum reduction may be 50 %.</p>				

## 6.3 Industrial NDT experience

### 6.3.1 General

In the event that a part of the experience is sought following successful examination, the results of the examination shall remain valid for two years.

Documentary evidence of experience shall be confirmed by the employer and submitted to the certification body or authorised qualifying body.

### 6.3.2 Level 1 and level 2

The minimum period of experience to be gained in the appropriate sector prior to examination may be defined by certification body (a fraction or percentage of the total requirement of Table 3). The appropriate sector is the sector where the candidate is seeking certification.

Table 3 - Minimum industrial experience

NDT Method		Experience (months) <sup>a c d e f</sup>		
		Level 1	Level 2 <sup>b</sup>	Level 3 <sup>gh</sup>
AT		3	9	18
ET		3	9	18
LT	Total experience	3	9	18
	Partial experience for pressure method only	3	9	18
	Partial experience for tracer gas method only	3	9	18
MT		1	3	12
PT		1	3	12
RT		3	9	18
UT		3	9	18
VT		1	3	12

<sup>a</sup> Work experience in months is based on a nominal 40 hours/week or the legal week of work. When an individual is working in excess of 40 hours per week, he may be credited with experience based on the total hours, but he shall be required to produce evidence of this experience.

<sup>b</sup> For level 2 certification, the intent of this European Standard is that work experience consists of time as a level 1. If the individual is being qualified directly to level 2, with no time at level 1, the experience shall consist of the sum of the times required for level 1 and level 2.

<sup>c</sup> Experience duration may be reduced by up to 50 % but shall not be less than one month when the certification sought is limited in application (e.g. automated testing).

<sup>d</sup> Credit for work experience may be gained simultaneously in two or more of the NDT methods covered by this European Standard, with the reduction of total required experience as follows:

- two testing methods - reduction of total required time by 25 %;
- three testing methods - reduction of total required time by 33 %;
- four or more testing methods - reduction of total required time by 50 %.

In all cases the candidate shall be required to show that for each of the testing methods for which he seeks certification, he has at least half of the time required in Table 3.

<sup>e</sup> Up to 50 % of the practical experience time may be achieved by an appropriate practical course, the duration of which may be weighted by a maximum factor of five (5). This procedure shall not be used in conjunction with that described in <sup>c</sup>. The course shall be concentrated on practical solutions of frequently occurring testing problems, and the programme shall be approved by the certification body or the authorised qualifying body.

<sup>f</sup> Maximum reduction may be 50 %

<sup>g</sup> For level 3 certification, the intent of this European Standard is that work experience consists of time as a level 2. If the individual is being qualified directly to level 3, with no time at level 2, the experience shall consist of the sum of the times required for level 2 and level 3. No reduction in the period of experience specified above shall be allowed.

<sup>h</sup> These values assume that candidates have successfully completed a technical school or at least two years of engineering or science study at an accredited college or university. In the event that this is not the case, the duration has to be multiplied by a factor of 2.

### 6.3.3 Level 3

Level 3 responsibilities require knowledge beyond the technical scope of any specific NDT method. This broad knowledge may be acquired through a variety of combinations of education, training and experience. Table 3 (see footnote h) details minimum experience related to formal education.



A candidate seeking certification in a product sector is exempted from passing the level 2 practical examination provided he fulfils one of the following conditions:

- he is level 2 in the same sector;
- he has successfully passed the level 2 practical examination in an industrial sector covering the product sector for which he is seeking certification (see Annex A for the definition of the industrial sector).

#### **6.4 Vision requirements - all levels**

The candidate shall provide documentary evidence of satisfactory vision in accordance with the following requirements:

- a) near vision acuity shall permit reading a minimum of Jaeger number 1 or Times Roman N 4.5 or equivalent letters (having a height of 1,6 mm) at not less than 30 cm with one or both eyes, either corrected or uncorrected;
- b) colour vision shall be sufficient that the candidate can distinguish and differentiate contrast between the colours or shades of grey used in the NDT method concerned as specified by the employer.

The documented tests of visual acuity according to 6.4 a) shall be carried out at least annually.

### **7 Qualification examination**

#### **7.1 General**

An examiner shall not be permitted to examine any candidate that he has trained for the examination, or who is employed in the same facility as the candidate.

#### **7.2 Examination content and grading for level 1 and level 2**

The written tests of the "general" and "specific" examinations are assessed by comparing the replies given by the candidate against answer keys approved by the certification body. Each correct reply scores 1 point and the mark attributed to the test is equal to the sum of points obtained. For the final calculation, the mark of each test is expressed as a percentage.

##### **7.2.1 General examination**

**7.2.1.1** The general examination shall include only questions selected in an unpredictable way from the Certification Body's or authorised qualifying body's collection of basic knowledge questions valid at the date of examination. The candidate shall be required, as a minimum, to give answers to the number of multiple choice questions shown in Table 4.

**7.2.1.2** The time allowed to the candidates for completion of each examination shall be based upon the number and difficulty of the questions. The average time allowed shall be no less than one minute nor longer than two minutes per multiple choice question.

**7.2.1.3** Where not otherwise addressed by national regulations, there shall be an additional examination on radiation safety for the radiographic test method.

**7.2.1.4** Examinations on the radiographic test method may include either X- or gamma-radiation, or both, depending upon the procedure of the Certification Body.

**Table 4 - Required minimum number of questions - General examinations**

<b>NDT method</b>	<b>Number of questions</b>
AT, ET, RT, UT	40
LT, MT, PT, VT	30

**7.2.2 Specific examination**

**7.2.2.1** The specific examination shall include only questions selected from the certification body's or authorised qualifying body's current collection of specific questions related to the sector(s) concerned.

**7.2.2.2** The time allowed to the candidates for completion of each examination shall be based upon the number and difficulty of the questions. The average time allowed for multiple choice questions shall be no longer than three minutes per question. The average time allowed for individual answers shall be determined by the certification body.

**7.2.2.3** During the specific examination, the candidate shall be required to give answers to at least 20 multiple-choice questions, including questions involving calculations, written procedures and questions on codes, standards and specifications.

**7.2.2.4** If the specific examination covers two or more sectors, the minimum number of questions shall be at least 30, evenly spread between the sectors concerned.

**7.2.3 Practical examination**

**7.2.3.1** The practical examination shall involve applying the test to prescribed test specimens, recording (and, for level 2 candidates, interpreting) the resulting information to the degree required, and reporting the results in the required format. Specimens used for training purposes shall not be used for examination.

**7.2.3.2** Each test specimen shall be uniquely identified and have a master report which includes all of the equipment settings used to detect specified discontinuities contained within the specimen. The master report shall be compiled based upon at least two independent tests, and shall be validated by an authorised level 3 certificate holder for use in grading examinations. The independent test reports from which the master report is compiled shall be retained as records.

**7.2.3.3** Test specimens shall contain discontinuities characteristic of those which occur during manufacturing or in service. They may be natural, artificial or implanted. For RT, the test specimen need not contain discontinuities since these will be exhibited in the radiographs for interpretation.

Each test specimen introduced following the publication of this European Standard shall contain one or more discontinuities defined in CEN/TS 15053.

**7.2.3.4** The requirements for the number of specimens to be tested in the levels 1 and 2 practical examinations are given in Annex B.

**7.2.3.5** The level 1 candidate shall follow the NDT instruction(s) provided by the examiner.

**7.2.3.6** The level 2 candidate shall select the applicable NDT technique and determine the operating conditions related to a given code, standard, or specification.

**7.2.3.7** For those examinations, where discontinuities are normally replaced by artificial sources or data, the level 1 candidate shall demonstrate the ability to install the equipment, verify its sensitivity and record the test data; the level 2 candidate shall also demonstrate the ability to interpret and evaluate previously recorded test data.

**7.2.3.8** The average allowed time shall be defined by the certification body. The time allowed for the examination depends on the number of test specimens and on their complexity. The recommended maximum time allowed for each area or volume tested is:

- a) for level 1, two hours;
- b) for level 2, three hours.

**7.2.3.9** Level 2 candidates shall draft at least one NDT Instruction suitable for level 1 personnel. The recommended maximum time allowed for this part of the examination is two hours.

## 7.2.4 Grading of the level 1 and level 2 qualification examination

**7.2.4.1** An examiner shall be responsible for the grading of the examinations by comparison with model answers. The general, specific and practical examinations shall be graded separately.

**7.2.4.2** The grading of the practical examination shall be based on items 1 through 4 in Table 5, with the recommended weighting factors in relation to the level and method as applicable.

**7.2.4.3** The detailed items given in Table D.1 should be taken into account as applicable by the examiner.

**Table 5 - Subjects and weighting factors for grading - practical examination**

Item	Subject	Weighting factor	
		Level 1	Level 2
1	Knowledge of the NDT apparatus, including the function and verification of the setting of the apparatus.	20 %	10 %
2	The application of NDT to the test specimen. This consists of the following parts: a) for level 2, selection of the techniques and determination of the operating conditions; b) the preparation (surface condition) and visual examination of the test piece; c) the setting up of the apparatus; d) the performance of the test; and e) the operations after the test.	35 %	20 %
3	The detection and reporting of the discontinuities and, for level 2, their characterisation (position, orientation, dimensions and type) and evaluation.	45 %	55 %
4	For level 2, the written instruction for level 1.	--	15 %

**7.2.4.4** To be eligible for certification the candidate shall obtain a minimum grade of 70 % in each part of the examination (general, specific and practical). In addition, for the practical examination, a minimum grade of 70 % shall be obtained for each specimen tested, and for the NDT instruction as applicable.

**7.2.4.5** The level 2 candidate is required to produce an NDT instruction, suitable for level 1 personnel, for a specimen selected by the examiner.

The specimen for which the instruction is produced shall be graded with an overall grade of 100 in accordance with Table D.1. The other specimens (without instruction) shall be graded with an overall grade of 85 in accordance with Table D.1, and the final grade shall be calculated in multiplying by 100/85.

For AT the required test instruction may deal with test specimen, which will not be tested during the practical examination.

**7.3 Examination content and grading for level 3**

**7.3.1 General**

All candidates for level 3 certification in any NDT method shall have successfully completed (with a grade of  $\geq 70\%$ ) the practical examination for level 2 in the relevant sector and method, except for the drafting of NDT instructions for level 1 (see 7.2.3.9). A candidate who is level 2 in the same NDT method and product sector, or has successfully passed a level 2 practical examination for the NDT method in an industrial sector as defined in Annex A, is exempt from passing again the level 2 practical examination. This exemption is only valid for the product sectors covered by the industrial sector concerned and, in any other circumstances, the relevant sector is the sector in which the candidate seeks level 3 certification.

**7.3.2 Basic examination**

**7.3.2.1** This written examination shall assess the candidate’s knowledge of the basic subjects using at least the number of questions shown in Table 6. Examination questions shall be selected from the current collection of questions approved by the certification body at the time of the examination.

**Table 6 - Minimum required number of basic examination questions**

<b>Part</b>	<b>Subject</b>	<b>Number of questions</b>
A	Technical knowledge in materials science and process technology.	25
B	Knowledge of the certification body’s qualification and certification system based on this European Standard. This may be an open book examination.	10
C	General knowledge of at least four methods as required for level 2 and chosen by the candidate from the methods given in Clause 1 which shall include at least one volumetric method (UT or RT).	15 for each test method (total 60)

**7.3.2.2** It is recommended that the basic examination be passed first and remain valid, provided that the first main method examination is passed within five years after passing the basic examination. A candidate holding a valid level 3 certificate is exempt from the need to retake the basic examination.

**7.3.3 Main method examination**

This written examination shall assess the candidate’s knowledge of the main method subjects using the minimum required number of questions shown in Table 7. Examination questions are multiple choice questions and shall be selected from the certification body’s or authorised qualifying body’s current collection at the time of the examination.

**Table 7 - Minimum required number of main method examination questions**

Part	Subject	Number of Questions
D	Level 3 knowledge relating to the test method applied.	30
E	Application of the NDT method in the sector concerned, including the applicable codes, standards and specifications. This may be an open book examination in relation to codes, standards and specifications.	20
F	Drafting of one or more NDT procedures in the relevant sector. The applicable codes, standards and specifications shall be available to the candidate.  For a candidate who has already drafted an NDT procedure in a successfully passed level 3 examination, the certification body may replace the drafting of a procedure with the critical analysis of an existing NDT procedure covering the relevant method and sector, and containing errors and/or omissions.	--

#### 7.3.4 Grading of level 3 qualification examinations

The grading of the basic and main method examinations shall be done separately. To be eligible for certification, a candidate shall pass both the basic and main method examinations.

The three parts A, B and C of the basic examination and parts D and E of the main method examination are graded by comparing the replies given by the candidate against answer keys approved by the certification body. Each correct reply scores 1 point and the mark attributed to the tests is the sum of the points obtained. For the final calculation the mark of each test is expressed over 100.

##### 7.3.4.1 Basic examination

In order to pass the basic examination, the candidate shall obtain a minimum grade of 70 % in each of parts A, B and C.

##### 7.3.4.2 Main method examination

In order to pass the main method examination, the candidate shall obtain a minimum grade of 70 % in each of parts D, E and F.

See Table D.2 for the recommended weighing of the procedure writing examination (Part 6).

#### 7.4 Conduct of examinations

**7.4.1** All examinations shall be conducted in examination centres established, approved and monitored by the certification body, either directly or through an authorised qualifying body.

**7.4.2** At the examination, the candidate shall have in his possession valid proof of identification and an official notification of the examination, which shall be shown to the examiner or invigilator upon demand.

**7.4.3** Any candidate who, during the course of the examination, does not abide by the examination rules or who perpetrates, or is an accessory to, fraudulent conduct shall be excluded from further participation.

**7.4.4** Examinations shall be approved by an examiner. The examination shall be invigilated and evaluated by an examiner, or by one or more trained and authorised invigilators placed under the examiner's responsibility.

**7.4.5** An examiner shall be responsible for grading the examination in accordance with procedures established by the certification body. It is recommended that level 3 examination be set and graded by two examiners.

**7.4.6** With the approval of the certification body, a candidate for a practical examination may use his own apparatus.

**7.4.7** Candidates shall not be permitted to bring into the examination area any items, unless specifically authorized to do so by the examiner. If authorized, these items shall be provided by the examiner.

## **7.5 Re-examination**

**7.5.1** A candidate failing for reasons of unethical behaviour shall wait at least 12 months before reapplying.

**7.5.2** A candidate who fails to obtain the pass grade for any examination part (general, specific or practical), may be re-examined twice in the failed part(s), provided that the re-examination takes place not sooner than one month, unless further training acceptable to the certification body is satisfactorily completed, nor later than twelve months after the original examination.

**7.5.3** A candidate failing all permitted re-examination shall apply for and take the examination in accordance with the procedure established for new candidates.

## **7.6 Examination exemptions**

**7.6.1** A certificated level 1 or level 2 seeking certification in a new sector for the same NDT method shall be required to take only the new sector specific and practical examinations for that method.

**7.6.2** The certificated level 3 seeking certification in a new sector for the same NDT method is exempt the need to retake the basic examination and the level 3 part D of the main method examination (see Table 7).

# **8 Certification**

## **8.1 Administration**

A candidate fulfilling all conditions for certification shall be issued with a certificate and/or corresponding wallet card by the certification body.

## **8.2 Certificates and/or wallet cards**

Certificates and/or corresponding wallet cards shall include at least:

- a) the family name and forename of the certificated individual;
- b) the date of issue of the certification;
- c) the date upon which certification expires;
- d) the level of certification;
- e) the name of the certification body;
- f) the NDT method(s);
- g) the applicable sector(s);
- h) a unique personal identification number;
- i) the signature of the certificated individual;
- j) a photograph of the certificated individual in the case of the wallet card;

- k) a device to prevent falsification of the wallet card, e.g. use of a cold seal, welding into plastic, etc;
- l) the signature of a designated representative of the certification body.

**NOTE** There may be a special space on either or both the certificate and the wallet card for a statement of limitations and for the signature and stamp of the employer authorising the holder of the certificate to operate, and taking responsibility for test results (see 3.21).

## **8.3 Validity**

### **8.3.1 General**

The maximum period of validity of the certificate is five years. The initial period of validity shall commence when all of the requirements for certification (training, experience, satisfactory vision test, success in examination) are fulfilled.

Certification becomes invalid:

- a) at the option of the certification body, e.g. after reviewing evidence of behaviour incompatible with the certification procedures, or failure to abide by a code of ethics;
- b) if the individual becomes physically incapable of performing his duties based upon failure of the visual acuity examination taken annually under the responsibility of his employer;
- c) if a significant interruption (see 3.27) takes place in the method for which the individual is certificated;
- d) if the individual fails recertification, until such time as the individual meets the requirements for recertification or initial certification.

### **8.3.2 Revalidation**

The certification body shall define the conditions for revalidation in the case of 8.3.1, a) and b).

For revalidation of the certification after a significant interruption, the individual shall pass a recertification examination. The certification is revalidated for a new period of validity of five years from the date of the revalidation.

## **9 Renewal**

**9.1** Upon expiry of the first period of validity and every ten years thereafter, certification may be renewed by the certification body for a new period of five years on production of:

- a) verifiable documentary evidence of a satisfactory visual acuity examination taken within the preceding 12 months;
- b) verifiable documentary evidence of continued satisfactory work activity without significant interruption (see 3.27) in the method and sector for which certificate renewal is sought.

If the criterion 9.1 b) for renewal is not met, the individual shall follow the same rules as for recertification (see Clause 10).

**9.2** Failure in this recertification examination shall result in the individual being considered an initial candidate for certification in the sector, method and level concerned.

**9.3** It is the responsibility of the certificate holder to initiate the procedure required for renewal. The renewal files shall be presented within six months before the date of expiration of the certification. As an exception, and based upon decision of the certification body, files presented within twelve months after the date of expiration may be considered. Over this period, no exception is admitted and the candidate shall be permitted to attempt a recertification examination.

## **10 Recertification**

### **10.1 General**

Upon completion of each second period of validity (every ten years), the certified individual may be recertified by the certification body for a new period of five years, on the basis of the following requirements:

### **10.2 Level 1 and 2**

**10.2.1** Levels 1 and 2 certificate holders seeking recertification shall meet the criteria of 9.1 a) and b) for renewal and satisfy 10.2.2. In the case of operators carrying out repetitive testing in sectors dealing with mass production, 10.2.3 may be used instead of 10.2.2. This alternative route will only allow recertification with a limited scope as defined by the certification body in an approved certification scheme.

**10.2.2** Successfully complete a practical examination organised to a simplified procedure which demonstrates continued competence within the scope defined on the certificate. This shall include testing test specimens appropriate to the scope of certification to be revalidated and in addition, for level 2, the production of a written instruction suitable for the use of level 1 personnel (see 7.2.3.9). If the individual fails to achieve a grade of at least 70 % for each specimen attempted (weighted according to the guidance in Table 5), one retest of the whole recertification examination shall be allowed after at least 7 days and before 6 months. In the event of failure in the one allowable retest, the certificate shall not be revalidated and, to regain certification for that level, sector and method, the candidate shall apply for new certification. In this case, no examination exemptions shall be awarded by virtue of any other valid certification held.

**10.2.3** Successfully demonstrate, during an audit conducted in the work place by the Certification Body with the employer's written consent, continued competence in the work performed. The audit shall be carried out by an examiner authorised and appointed by the Certification Body and shall comprise the witnessing of the satisfactory implementation by the certificate holder of a range of tasks covering the scope of the certificate. The examiner shall produce a fully documented report with recommendations regarding limitation of the scope of certification. The extent and scope of the recertification shall be determined by the Certification Body based on this report. A candidate who applies for and does not meet the requirements of 10.2.3 shall be permitted one attempt at recertification under 10.2.2.

### **10.3 Level 3**

**10.3.1** Level 3 certificate holders seeking recertification shall meet the 9.1 a) criteria for renewal and, depending on the choice of the certificated individual, either successfully complete a written examination which includes a minimum of 20 questions on the application of the test method in the sector(s) concerned (at least 4 of which shall require narrative answers which demonstrate an understanding of current NDT techniques, standards, codes or specifications, and applied technology) and, at the option of the Certification Body, a minimum of 5 questions on the requirements of the certification scheme, or meet the requirements of a structured credit system (given in Annex C). Consequently the certification body shall provide the two possibilities: written examination or requirements for structured credit system.

**10.3.2** If the individual fails to achieve a grade of at least 70 % in the recertification examination, one further attempt at the whole recertification examination shall be allowed after 7 days and before 6 months. In the event of failure in the one allowable retest, the certificate shall not be revalidated and, to regain certification for that sector and method the candidate shall be required to achieve success in the appropriate main method examination. A candidate who does not meet the requirements of the credit system shall be permitted one attempt at the written recertification examination.

**10.3.3** It is the responsibility of the certificate holders to initiate the procedures required to obtain recertification.

### **10.4 Recertification for more than 12 months after expiry of the period of validity**

If the recertification is applied for more than 12 months after expiry of the period of validity, a complete examination (general, specific and practical) for level 1 and level 2 and a main method examination for level 3 shall again be passed successfully.



## 11 Files

The certification body or its authorised qualifying bodies shall maintain, either in hard copy, microfilm or read only digitised form:

- a) an updated list of all certificated individuals classified according to level, test method and sector;
- b) individual file(s) for each certificated individual and for each individual whose certification has lapsed containing:
  - 1) application forms;
  - 2) examination documents, such as questionnaires, answers, description of specimens, records, results of test, written procedures, and grade sheets;
  - 3) renewal and recertification documents, including evidence of visual acuity and continuous activity.

Individual files shall be kept under suitable conditions of safety and confidentiality for as long as the certificate remains valid and for at least ten years after the certification has lapsed.

## 12 Transition period

The aim of this paragraph is to permit the initiation of the system when a certification body applies the certification scheme to an NDT method, which is not yet covered within its scheme, or when a new sector is created. The certification body may appoint duly qualified personnel as examiners during a period not exceeding five years. The five-year implementation period is not to be used by the certification body as a means to certify candidates who do not meet all the qualification and certification requirements of this European Standard.

For a maximum period of five years after the publication of this standard, demonstration of fulfillment of the training requirement in Table 2 may be waived for level 3 candidates who have successfully passed the basic examination but have not passed the other required examinations (as permitted in 7.3.2.2).

NOTE 'Duly qualified personnel' means that such personnel:

- have the knowledge of the principles of NDT and the specific knowledge in relation to the sector;
- have industrial experience of the application of the NDT method;
- have the ability to conduct examinations;
- can interpret the questionnaire and results of examinations.

## **Annex A** **(normative)**

### **Sectors**

When creating a sector, it is recommended that the certification body takes into consideration the following reference list of sectors:

#### **Product sectors**

- castings (c);
- forgings (f);
- welded products (w);
- tubes and pipes, including flat products for the manufacturing of welded pipes (t);
- wrought products (wp);
- composite materials.

#### **Industrial sectors**

Sectors combining a number of product sectors including all or some products or defined materials (e.g. ferrous and non-ferrous materials, or non-metals such as ceramics, plastics and composites):

- metal manufacturing (combining c, f, t, w and wp);
- pre and in-service testing of equipment, plant and structure (combining c, f, w, t, wp and other product sectors);
- railway maintenance (combining f, wp and other product sectors);
- aerospace (combining c, f, w, t, wp and other product sectors).

When creating an industrial sector, the certification body shall precisely define in its published documentation the chosen combination of sectors from the above list of product sectors.

An individual certificated in an industrial sector shall be regarded also as holding certification in the individual sectors from which the industrial sector is composed.

Sector certification may be available at all three levels of competence in all NDT methods, or may be limited to particular methods or levels. However arranged, the scope of certification shall be defined on the certificate.

For composite materials, the certification body shall define the requirements for qualification examination.

**Annex B**  
(normative)

**Minimum number and type of test specimens for the levels 1 and 2 practical examination**

**Table B1 - Minimum number and type of test specimens for the levels 1 and 2 practical examination**

METHOD/LEVEL PRODUCT SECTORS	UT1	UT2	RT1	RT2	ET1	ET2	MT1	MT2	PT1	PT2	LT1	LT2	VT1	VT2	AT1	AT2
<b>CASTINGS</b>	2	2	2	2 + 12 radiographs	2	2	2	2	2	2	2	2	2	2	1	1 + 2 datasets
<b>FORGINGS</b>	2	2	2	2 + 12 radiographs	2	2	2	2	2	2	2	2	2	2	1	1 + 2 datasets
<b>WELDED PRODUCTS</b>	2	2	2	2 + 12 radiographs	2	2	2	2	2	2	2	2	2	2	1	1 + 2 datasets
<b>TUBES and PIPES</b>	2	2	2	2 + 12 radiographs	2	2	2	2	2	2	2	2	2	2	1	1 + 2 datasets
<b>WROUGHT PRODUCTS</b>	2	2	2	2 + 12 radiographs	2	2	2	2	2	2	2	2	2	2	1	1 + 2 datasets
<b>INDUSTRIAL SECTORS (combining 2 or more product sectors)</b>	<b>UT1</b>	<b>UT2</b>	<b>RT1</b>	<b>RT2</b>	<b>ET1</b>	<b>ET2</b>	<b>MT1</b>	<b>MT2</b>	<b>PT1</b>	<b>PT2</b>	<b>LT1</b>	<b>LT2</b>	<b>VT1</b>	<b>VT2</b>	<b>AT1</b>	<b>AT2</b>
<b>METAL MANUFACTURING</b>	2	2	2	2 + 12 radiographs	2	2	2	2	2	2	2	2	2	2	1	1 + 2 datasets
<b>PRE and IN-SERVICE TESTING of EQUIPMENT PLANT and STRUCTURE</b>	3 c/f w	3 c/f w	2 c w	2 cw +24 radiographs	3 t w	3 t w	3 c/f w	3 c/f w	3 c/f w	3 c/f w	3	3	3 c/f w	3 c/f w	1 c/f t w	1 + 2 datasets c/f t w
<b>RAILWAY MAINTENANCE</b>	2	2			2	2	2	2	2	2			2	2		
<b>AEROSPACE</b>	3	3	2	2 + 12 radiographs	3	3	2	2	2	2			2	2	1	1 + 2 datasets

- Where the practical examination requires the testing of more than one specimen, the second or any subsequent specimens shall be different in character, e.g. in product form, material specification, shape, size and discontinuity type, from those tested previously.
- Where, after the number of test specimens required, product sectors are indicated by appropriate letters, this means that specimens from these sectors shall be included in the practical examination.
- For radiographic examination, level 1 and level 2 candidates shall radiograph at least two volumes - except for level 2 candidates holding level 1 certification, where at least one volume is to be radiographed.
- For leak testing certification involving both pressure change and tracer gas, at least one specimen shall be tested for each.
- Where a sector examination involves the testing of more than one product type, then the specimens tested shall be representative of all products, or shall be selected at random by the examiner from the product range or materials which make up the sector.
- X radiographs are considered as one specimen.

Key c = casting; f = forging; w = weld; t = tube; c/f = casting or forging

## Annex C (normative)

### Structured credit system for level 3 recertification

In this system, the level 3 candidate gains credit for participation, during the five years prior to recertification, in the various NDT activities shown in the Table C.1. Limits are placed on the maximum number of points which can be gained in each year, and in any activity over the five years, to ensure an even spread of activities.

To be eligible for recertification:

- a minimum of 70 points shall be accrued during the five year validity of the certificate;
- a maximum of 25 points per year will be accepted.

In addition to the recertification application, the candidate shall submit evidence of satisfying the criteria of Table C.1 as follows:

- agenda and list of attendees for the meetings under items 1 to 4;
- a brief description of research and development under item 5;
- references of technical or scientific publications authored under item 5;
- a summary of training delivered under item 6;
- for each certificate, evidence of work activity per year under item 7.

Table C.1 – Structured credit system for level 3 recertification

Item	Activity	Points accorded for each item (or function)	Maximum points per year per item	Maximum points per 5 year period per item
1	Membership of an NDT society, attendance at seminars, symposia, conferences and/or courses covering NDT and related sciences and technologies	1	3	8 <sup>a</sup>
2.1	Attendance at international and national standardization committees	1	3	8 <sup>a</sup>
2.2	Convenorship of standardization committees	1	3	8 <sup>a,b</sup>
3.1	Attendance at sessions of other NDT committees	1	3	8 <sup>a</sup>
3.2	Convenorship of sessions of other NDT committees	1	3	8 <sup>a,b</sup>
4.1	Attendance at sessions of NDT related working groups	1	5	15 <sup>a</sup>
4.2	Convenorship of NDT related working groups	1	5	15 <sup>a,b</sup>
5.1	NDT related technical/scientific contributions or publications	3	6	20 <sup>c,d</sup>
5.2	NDT related research work published	3	6	15 <sup>c,d</sup>
5.3	NDT research activity	3	6	15 <sup>c,d</sup>
6	NDT technical instructor (per 2 hours) and/or NDT examiner (per examination)	1	10	30 <sup>d</sup>
7	Industrial activity			
7.1	NDT method in an examination centre or for Engineering of NDT (for each full year)	10	10	40 <sup>d</sup>
7.2	Dealing with disputes referring to clients	1	5	15 <sup>d</sup>
7.3	Development of NDT applications	1	5	15 <sup>d</sup>
<p><sup>a</sup> Maximum points for items 1 to 4: 20.</p> <p><sup>b</sup> Points to be given for both convenorship and attendance.</p> <p><sup>c</sup> If there is more than one author, the lead author shall define points for the other authors.</p> <p><sup>d</sup> Maximum points for each of items 5 and 6: 30, and 7: 50.</p>				

**Annex D**  
(normative)

**Grading Practical examination**

**D.1 Grading of level 1 and 2 practical examination - guidance on the percentile weighting**

**Table D.1 – Guidance on the percentile weighting for levels 1 and 2 practical examination**

<b>Subject (item of EN 473, Table 5)</b>	<b>Level 1</b>	<b>Level 2</b>
<b>Part 1: Knowledge of the NDT apparatus.</b>		
a) System control and functional checks	10	5
b) Verification of settings	10	5
<b>Total</b>	<b>20</b>	<b>10</b>
<b>Part 2: Application of the NDT method.</b>		
a) Preparation of the test piece (e.g. surface condition), including visual examination	5	2
b) For level 2, the selection of the NDT technique and determination of operating conditions	n/a	7
c) Setting up of the NDT apparatus	15	5
d) Performance of the test	10	5
e) Post test procedures (e.g. demagnetisation, cleaning, preservation)	5	1
<b>Total</b>	<b>35</b>	<b>20</b>
<b>Part 3: Detection of discontinuities and reporting<sup>1</sup></b>		
a) Detection of mandatory reportable discontinuities	20	15
b) Characterisation (type, position, orientation, apparent dimensions, etc.)	15	15
c) Level 2 evaluation against code, standard, specification or procedure criteria	n/a	15
d) Production of the test report	10	10
<b>Total</b>	<b>45</b>	<b>55</b>
<b>Part 4: NDT instruction writing (level 2 candidates)<sup>2</sup></b>		
a) Foreword (scope, reference documents)		1
b) Personnel		1
c) Apparatus to be used, including settings		3
d) Product (description or drawing, including area of interest and purpose of the test)		2
e) Test conditions, including preparation for testing		2
f) Detailed instructions for application of the test		3
g) Recording and classifying the results of test		2
h) Reporting the results		1
<b>Total</b>		<b>15</b>
<b>Overall grade for practical specimen</b>	<b>100 %</b>	<b>100 %</b>

<sup>1</sup> The candidate failing to report a discontinuity specified on the specimen master report as 'mandatory for candidates to report' when performing the test in the conditions specified in the master report shall be awarded zero marks for part 3 of the practical examination related to the specimen tested. For RT, this condition applies to radiographic interpretation i.e. failing one "mandatory to report" discontinuity on one radiograph leads to zero mark for the set of radiographs in part 3.

<sup>2</sup> The level 2 candidate is required to produce an NDT instruction, suitable for level 1 personnel, for a specimen selected by the examiner. When the level 2 candidate is testing a specimen for which no NDT instruction is required, the grade is calculated as a percentage of the 85 remaining marks.



## D.2 Grading of level 3 practical examination - guidance on percentile weighting

Table D.2 - Guidance on the percentile weighting for the level 3 practical examination (drafting of an NDT procedure)

Subject	% maximum
<b>Part 1: General</b>	
a) Scope (field of application, product)	2
b) Document control	2
c) Normative references and complementary information	4
<b>Sub-total</b>	<b>8</b>
<b>Part 2: NDT Personnel</b>	<b>2</b>
<b>Part 3: Material required to conduct the test</b>	
a) Main NDT equipment (including defining calibration status and pre-test serviceability checks)	10
b) Ancillary equipment (reference and calibration blocks, consumables, measuring equipment, viewing aids, etc.)	10
<b>Sub-total</b>	<b>20</b>
<b>Part 4: Test piece</b>	
a) Physical condition and surface preparation (temperature, access, removal of protective coatings, roughness, etc.)	1
b) Description of area or volume to be tested, including reference datum	1
c) Discontinuities sought	3
<b>Sub-total</b>	<b>5</b>
<b>Part 5: Performance of the test</b>	
a) NDT method(s) and technique(s) to be used	10
b) Setting up the apparatus	10
c) Conducting the test (including reference to NDT instructions)	10
d) Characterisation of discontinuities	10
<b>Sub-total</b>	<b>40</b>
<b>Part 6: Acceptance criteria</b>	<b>7</b>
<b>Part 7: Post test procedure</b>	
a) Disposition of non-conforming product (labelling, segregation)	2
b) Restoration of protective coatings (where required)	1
<b>Sub-total</b>	<b>3</b>
<b>Part 8: Production of the test report</b>	<b>5</b>
<b>Part 9: Overall presentation</b>	<b>10</b>
<b>Grand Total</b>	<b>100</b>

## Annex ZA (informative)

### Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 97/23/EC (PED).

Once this European Standard is cited in the official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this European Standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

**Table ZA.1: Relation between this European Standard and Directive 97/23/EC**

<b>Clauses/Subclauses of this European Standard</b>	<b>Essential requirements of Directive 97/23/EC</b>	<b>Comments/Notes</b>
Clauses 6, 7, 8.3, 9 and 10	Annex I, Clause 3.1.3 <i>Non-destructive testing</i>	

**WARNING:** Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

## **Bibliography**

- [1] CEN ISO/TR 25107:2006, Non-destructive testing – Guidelines for NDT training syllabuses (ISO/TR 25107:2006)
- [2] CEN ISO/TR 25108:2006, Non-destructive testing – Guidelines for NDT personnel training organizations (ISO/TR 25108:2006)
- [3] CEN/TR 15589:2006, Non-destructive testing – Code of practice for the approval of NDT personnel by recognised third party organizations under the provisions of Directive 97/23/EC
- [4] Directive 97/23/EC of the European Parliament and of the Council of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment
- [5] Guideline 6/13 Adopted by Working Group Pressure

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