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Nordic Innovation Centre

NORDTEST DOC GEN 010

EN 473/NORDTEST SCHEME

for examination and certification of non destructive testing personnel

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1 INTRODUCTION TO EN 473/NORDTEST SCHEME

The European standard EN 473, "Qualification and certification of NDT personnel – General principles" was at first issued in January 1993 and has now again been revised and issued as EN 473:2008.

This fifth edition of DOC GEN 010 and its Appendix 1 replaces all earlier editions, appendixes and amendments.

The Nordtest scheme for examination and certification of non-destructive testing personnel is the main scheme for certification of NDT-personnel in the Nordic countries. It provides a uniform level of qualifications of the personnel, which is acknowledged, accepted and sometimes demanded by authorities and users of NDT in most industrial areas.

EN 473 includes general requirements related to examination and certification. Requirements to the technical content, principles for judgement or level of quality in the examination are not precisely described in EN 473. It is therefore necessary to have additional documents defining the examinations. This fifth edition of NORDTEST DOC GEN 010 provides the detailed requirements, which assure a uniform performance of examinations and certification.

This edition of NORDTEST DOC GEN 010 includes only additional requirements of the EN 473/Nordtest scheme and some clarifications. The text of EN 473 standard is valid in all other cases as such also in the EN 473/Nordtest scheme. Specific requirements and descriptions are found in NORDTEST DOC GEN 010 and in the Handbook for Nordtest Certifying Bodies (in the following called the Handbook). The Handbook includes confidential material, which is handed over only to the Certifying Bodies.

EN 473 includes reference to ISO/EN 17024, which includes the requirements for accreditation of personnel certification bodies. This edition of NORDTEST DOC GEN 010 updates the scheme and complies with EN 473:2008 and also meets the accreditation requirements. The requirements for a procedure for certification and surveillance required by ISO/EN 17024 are fulfilled.

The requirements of examination and certification, as well as training before examination, have been developed to benefit the clients in all Nordic countries with regard to total quality.

The technical and economic development requires improvement of the EN 473/Nordtest scheme. New methods and techniques may be added and updating of the existing examinations and certification will take place. Changes will be included in revisions of this edition of DOC GEN 010 and in the Handbook. A list of valid documents is found in Chapter 5.

The basic documents of the EN 473/Nordtest scheme are prepared by the TG NDT.

The certification bodies are responsible for the adoption of the documents of the EN 473/Nordtest scheme. All documents used by the certification bodies must be in

accordance with the EN 473/Nordtest scheme, EN 473 and ISO/EN 17024.

This new EN 473/Nordtest scheme fulfils also international standard ISO 9712:2005 Non-destructive testing – Qualification and certification of personnel except for ET and LT where additional training hours are required. When candidate fulfils also these requirements, certification body may issue also ISO 9712 certificate to the candidate.

2 ORGANISATIONAL STRUCTURE OF EN473/ NORDTEST SCHEME

Organs and their tasks and duties in the EN473/Nordtest scheme are described below.

2.1 Nordic Innovation Centre Board and secretariat

The Nordic Innovation Centre (NICE) Board consists of members from Nordic countries. A governmental body in the respective Nordic country appoints each Board member. NICE has a secretariat that is lead by the director.

2.2 Nordtest Technical Group for NDT (TG NDT)

The Nordtest Technical Group consists of one or more representatives from the Nordic countries. Every Nordtest Certification Body have the right to be represented in the TG. The NICE Board appoints one of the representative(s) from each country to vote for the specific country.

TG NDT has in the EN 473/Nordtest scheme the following responsibilities:

- Approval of the basic documents of the EN 473/Nordtest scheme including the NORDTEST DOC GEN 010, its amendments and appendixes as well as the Handbook, which describes the certification scheme;
- Preparing the basic documents necessary for the operation of the EN 473/Nordtest scheme including the Handbook;
- Can recommend participants as technical experts for the initial accreditation audit of an organisation applying for accreditation as a certification body operating in accordance with the EN 473/Nordtest scheme. There should be a communication between the accrediting body and the TG NDT about the development of the EN 473/Nordtest scheme;
- Promoting and developing the EN 473/Nordtest scheme which may include new methods, techniques and developments within certification of NDT personnel on the international level;
- Collaborating with national and international bodies and preparing mutual recognition agreements by examining the equivalence and conformity with other NDT certification schemes and when relevant proposing approval of equivalence and conformity;

- f) Acting as a forum for discussions among the certification bodies concerning the operation and development of the EN 473/Nordtest scheme, co-ordinating and deciding upon matters regarding evaluation and interpretation of questions that need clarification;
- g) Preparing and maintaining a list of certification bodies operating according to the EN 473/Nordtest scheme with information about the scope of their certification (e.g. methods and levels);
- h) When new methods or techniques are introduced in the EN 473/Nordtest scheme level 3 NDT persons for examiners shall be appointed in accordance with rules established by the TG NDT.

2.3 Advisory board for the certification body

The certification body shall have an advisory (governing) board that by broad representativeness supports the certification process. The Advisory board may give suggestion for development of the system.

2.4 Certification body

Certification bodies operating according to the EN 473/Nordtest scheme must be accredited according to EN ISO/IEC 17024. The accreditation bodies shall use technical experts familiar with the EN 473/Nordtest scheme. TG NDT may be involved in the initial accreditation as described above.

The certification body shall provide a certificate to all certified persons. The certification body shall maintain sole ownership of the certificates.

In the EN 473/Nordtest scheme the certification body:

- a) shall initiate, promote, maintain and administer the certification scheme according to EN ISO/IEC 17024 and EN 473 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;
- j) shall initiate, promote, maintain and administer the certification scheme according to DOC GEN 010;
- k) review and approve applications for acceptance as a NTO;
- l) appoint examiners for participation in panels of examiners for exchange of experience, monitoring performance and development of the EN 473/Nordtest scheme;
- m) report annually to NICE about the certification activities as defined by TG NDT (number of certificates issued for each method and level);
- n) shall report the operation of the EN 473/Nordtest scheme to the advisory (governing) board.

Note: Clauses a – i are identical with EN 473:2008 standard.

Normally the certification bodies are also examination centres, which perform the examinations. It may be relevant to establish further examination centres controlled by the certification bodies to accommodate particular industrial sectors and applications as well as regional requirements. Authorized qualifying bodies are not used in the EN 473/Nordtest scheme.

2.5 Panels of Examiners

The certification bodies appoint panels of examiners for the supervision and grading of examinations. The panel consists of at least two examiners for each method. A uniform level of competence in the Nordic countries is maintained through meetings of examiners where they exchange practical experiences in the use of the EN 473/Nordtest scheme.

2.6 Nordtest Testing Organisation (NTO)

In order to issue the operating authorisation within the EN 473/Nordtest scheme, the organisation that the candidates work for must be registered by a certification body as a NDT organization that follows the EN 473/Nordtest scheme. Such an organisation is called a NTO.

NTO is an organisation performing NDT operations according to the EN 473/Nordtest scheme and is approved by a certification body. The NTO issues operating authorizations for its employees. The NTO may be a testing laboratory, an inspection company, a manufacturer's inspection department or an engineering company. To be accepted as an NTO the organisation must have or have access to a level 3 NDT person as responsible for its technical operations and a documented quality system for the NDT activities.

Every certification body shall establish a procedure for the approval of NTOs and keep a register of the NTOs it has approved. NDT organisations that are accredited according to EN/ISO 17025 or certified according to ISO EN 9001 and

fulfills the requirements of EA-04/15, can automatically be registered as NTOs by a certification body. Alternatively the certification body can accept and register an NDT organisation if the organisation can document its competence in other acceptable ways (covering among other things a quality system and personnel qualifications).

In the EN 473/Nordtest scheme the NTO is the employer of the NTO personnel. The NTO must fulfil the following:

- a) The NTO Level 3 NDT responsible shall be certified according the EN 473/Nordtest scheme;
- b) The NTO guarantees that its certified NDT operators follow the EN 473/Nordtest scheme;
- c) The NTO shall supervise the work of the certified NDT operators;
- d) The NTO must issue the operating authorisation annually by signing its NDT operators certificates. This verify that the demands which are stipulated in the EN 473/Nordtest scheme are fulfilled.

The issuing of the operating authorisation (signing of the certificate) for level 1 and 2 NDT personnel within the EN 473/Nordtest scheme is done under the responsibility of a appointed person. The operating authorisation for the level 3 NDT responsible persons shall be issued by the NTO management.

The operating authorization becomes invalid when the certified person terminates the employment.

Level 3 NDT responsible persons at an NTO shall:

- e) assure that the QA system for the NDT activities has been evaluated and is relevant;
- f) handle complaints including corrective actions in conjunction with NDT;
- g) record education, training, practical experience, continuous performance of duties and results of visual acuity test;
- h) act as an advisor with regard to selection, calibration and purchase of equipment.

For NTO's with a parttime Level 3 NDT person the following monthly hours are recommended, depended on the number of Level 1 and 2 NDT operators at the NTO:

- 1–2 operators: 4 hours
- 3–5 operators: 8 hours
- 6–9 operators: 16 hours.

A candidate who is employed by a NTO will have a EN473/Nordtest certificate issued. A candidate who is not an employee of a NTO may participate the Nordtest examinations, in this case a EN473 certificate will be issued for the candidate. This EN473 certificate can be changed to a EN473/Nordtest certificate when the candidate becomes an employee of a NTO.

3 ELIGIBILITY FOR CERTIFICATION

3.1 Training

The training courses must fulfill the requirements of CEN/ISO/TR 25107.

It is required for ET, RT og UT Level 2 that the candidate can set-up and calibrate the instrument before the level 2 training course.

In addition the Basic seminar for level 3 must include the following subjects:

Basic seminar (part A: General knowledge):

- EN 473 and the EN 473/Nordtest scheme
- testing standards and recommendations (national and international)
- general specifications, testing procedures and work instructions for testing
- quality assurance, quality control and quality inspection
- characteristics and comparison of test methods
- material fabrication and welding technology
- defect characteristics and evaluation
- introduction to fracture mechanics and acceptance standards.

Basic seminar (part B: NDT technique):

- methods
- instrumental techniques
- testing technique for specific products
- safety precautions
- standards and specifications for the method in question
- evaluation of defects and other imperfections
- other characteristics essential to the testing
- familiarity with other NDT methods.

3.2 Industrial NDT experience

It is recommended that at least 50 % of the required practical experience is gained before the examination.

4 EXAMINATION

The Handbook related to the EN 473/Nordtest scheme includes the detailed requirements regarding the content of the certifications, examinations, description of test specimens, grading of the examinations and interpretations of the EN 473/Nordtest scheme. The Handbook is approved by the TG NDT and is followed by all certification bodies.

Examinations may, upon request, be arranged outside the premises of the certification body. Such premises shall be approved by the certification body.

4.1 Re-examination

Re-examination must be agreed beforehand between the person responsible for the candidate and the certification body with regard to selection of product or industrial sectors to be used in the re-examination. Once the programme has been decided it must be followed.

4.2 Sectors for examination

The sectors in the EN 473/Nordtest scheme are as follows:

4.2.1 Product sectors

Castings (c)
 Forgings (f)
 Welds (w)
 Tubes and pipes (tp)
 Wrought products (wp)
 Composite structures (cs).

4.2.2 Industrial sectors

Industrial sectors are combining two or more product sectors. Test specimens shall be chosen taking the industrial sector into account.

Metal producing and metal manufacturing industry (IMA: comprising sectors c,f,w,tp,wp)
 Pre- and inservice testing of equipment, plant and structure (IPI: comprising sectors c,f,w,tp,wp)
 Aerospace (IAE: comprising sectors c,f,w,tp,wp)
 Railway maintenance (IRM: comprising sectors f and wp).

4.2.3 Multi sectors

Multi-sector (IMU: comprises all above mentioned industrial sectors).

The examinations for MT, PT, LT and VT are primarily done as multi-sectorial (IMU) for level 1. For level 2 and 3 the product, industrial or the multi sector (IMU) can be selected, for level 3 the sector for the level 2 certificate are continued.

The examinations for UT, RT and ET are primarily done as multi-sectorial (IMU) for levels 1. For level 2 the product or the industrial sectors can be selected. For level 3 the multi-sector can be selected if based on a level 2 certificate in sector IMA or IPI, otherwise the sector for the level 2 certificate are continued.

The examinations may be restricted to certain types of specimens, test method, product or industrial sectors provided the restricted qualification is clearly stated on the certificate, e.g. UT level 1, industrial sector IMA or MT level 2, product sector w, limited to yoke magnetisation.

New or addendum sectors (e.g. Phased Array or Digital radiography) can be added to an existing certificate level 2, provided that a supplemental examination corresponding to an additional sector are completed. All new or addendum sectors must be approved by TGNDT prior to examination.

4.3 Detailed examination requirements, theory, level 1 and 2

4.3.1 General examination

Required number of question for the general examination are:

30 multiple choice questions for the methods: MT, PT, LT and VT
 40 multiple choice questions for the methods: UT, RT and ET.

4.3.2 Specific examination

Required number of question for the specific examination are:

For one product sector: 20 questions, for 2 or more product sectors: 30 questions, at least 20 of these questions must be multiple choice questions.

For industrial and multi sectors: 30 questions, at least 20 of these questions must be multiple choice questions.

4.3.3 Number of objects requirements, practice, level 1 and 2

Number of objects for product and industrial sectors are described below. For combination of 2 or more sectors, the requirements are outlined in the Handbook.

4.3.3.1 Product Sectors

Required number of test specimens and allotted time for the practical examination in product sectors

Method	Sector	Level	Number of objects	Max. duration (hr)
All	All	1	2	3
ET, MT, PT, VT	all	2	3	3
RT	All	2	(1-2)*+18	(1-2)*+2,5
UT	All	2	3	6

For RT, 6 radiographs are considered as 1 object

*RT level 2 shall radiograph 2 volumes, except for candidates holding a level 1 certificate, where 1 volume is to be done by radiography. Allowed time for each volume is 1 hour.

4.3.3.2 Industrial and multi sectors

Required number of test specimens and allocated time for the practical examination in industrial sectors:

Method	Sector	Level	Number of specimens	Max. duration (hr)
ET, MT, PT, VT	all	1	3	3
UT, RT	all	1	3	5
MT, PT, VT	IMU, IPI, IMA	2	5	5
MT, PT, VT	IRM, IAE	2	4	4

ET	IPI, IMA	2	5	5
ET	IRM, IAE	2	4	4
UT	IPI, IMA	2	6	12
UT	IRM, IAE	2	4	8
RT	IPI, IMA	2	(1-2)*+30**	(1-2)*+3,5
RT	IRM, IAE	2	(1-2)*+18	(1-2)*+2,5

For RT, 6 radiographs are considered as 1 object

*RT level 2 shall radiograph 2 volumes, except for candidates holding a level 1 certificate, where 1 volume is to be done by radiography. Allowed time for each volume is 1 hour

**RT level 2: 30 radiographs, whereas 6 must be castings.

4.4 Detailed examination requirements, level 3

In the EN 473/Nordtest scheme the number of questions in level 3 basic examinations shall be as follows

Part	No. of questions	Subject
A	25	Materials, manufacturing, processes and defects
B	20	EN 473 and EN 473/Nordtest scheme (open book)
C	60	Among the methods (ET, LT, MT, PT, RT, UT and VT) RT or UT are mandatory

Part C of level 3 basic examinations must include at least four methods and all methods in which the candidate will be certified as level 3.

For MT, PT, LT and VT the sector for the level 2 certificate are continued.

For UT, RT and ET the multi-sector can be selected if based on a level 2 certificate in sector IMA or IPI (full examination without any limitations), otherwise the sector for the level 2 certificate are continued.

5 RECERTIFICATION

For the practical examination the number of specimens and allotted time will be half of the numbers required for the initial examination (all numbers rounded upwards). For RT, 6 radiographs are considered as 1 specimen.

Specific examination is part of the recertification, with the same number of questions as required for the initial examination.

5.1 Transition of old certificates to new system

A table for transition of old system to new system is listed below. The sectors will be introduced at renewal of certificates.

Old sectors			New sectors
Level	Sector	Method	
1	9	All	IMU (comprises all sectors)
2	9	All	IMU (comprises all sectors)
2	1	All	c
2	2	All	f
2	3	All	w
2	4	All	tp
2	5	All	wp
2	6	All	IMA (comprises c, f, tp and wp)
2	7	MT/PT/VT/LT	IPI (comprises w, tp and wp)
2	7	RT/UT	w + wp
2	7	ET	w+tp+wp
2	6 + 7 / 6 + 3	ET	IMA or IPI (comprises c, f, w, tp and wp)
2	7 + 1	RT/UT	IMA (comprises c, f, w, tp and wp)
3	9	all	IMU (comprises all sectors)

Transition of other combinations of sectors will be determined by the certification body.

6 CODE OF ETHICS

Individuals certified according to this Nordtest Doc Gen 010 shall recognize the precepts of personal integrity and professional competence according to international principles. Accordingly, certified individuals

- shall pursue their professional discipline and activities in a spirit of fairness to all concerned – employer, employees, customers and competitors – consistent with the high ideals of personal honour and integrity,
- shall perform their work in the highest professional manner, protecting the life, safety and health of their associates and of the general public,

3. shall in no circumstances perform their work influenced by drugs, alcohol, sedative medicine etc.,
4. shall undertake only those measurements and analysis for which they are competent by virtue of their training and experience and certification,
5. shall treat as confidential their knowledge of any business affairs or technical information of employers, clients or customers and to make no disclosure of such information without their express consent,
6. shall refrain from making unjustified statements or from performing unethical acts which would discredit the certification programme based on this Nordtest Doc Gen 010,
7. shall inform clients or employers of any business affiliations, interests or connections which might influence their fair judgment,
8. shall maintain and improve their competence and undertake technological tasks for others only if qualified by training or expertise and after full disclosure of pertinent limitations,
9. shall encourage others to advance their learning and competence and,
10. shall avoid conflicts of interest with any employer or client and, if any such conflicts should arise in the performance of work, shall inform the affected persons promptly of the circumstances.

7 VALID DOCUMENTS

EN 473:2008 Qualification and certification of NDT personnel – General principles.

NORDTEST DOC GEN 010, fifth edition.

Handbook for Nordtest certification bodies, fifth edition.

EA 04/15 Accreditation For Non-Destructive Testing.

EN ISO/IEC 17024:2003 Conformity assessment. General-requirements for bodies operating certification of persons.

EN ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories.

ISO 9712:2005 Non-destructive testing – Qualification and certification of personnel.



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Nordic Innovation Centre

The Nordic Innovation Centre initiates and finances activities that enhance innovation collaboration and develop and maintain a smoothly functioning market in the Nordic region.

The Centre works primarily with small and medium-sized companies (SMEs) in the Nordic countries. Other important partners are those most closely involved with innovation and market surveillance, such as industrial organisations and interest groups, research institutions and public authorities.

The Nordic Innovation Centre is an institution under the Nordic Council of Ministers. Its secretariat is in Oslo.

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