ICNDT

*The World Organisation for NDT*

# ICNDT Guide and Recommendations

for Qualification and Certification of NDT Personnel according to ISO 9712 and Aligned Standards

1 October 2009

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*ICNDT will update this document periodically and will provide the latest version online via its website www.icndt.org. Users of the document are strongly advised to check that they have the latest version of the document and the referenced Standards. Readers use the material herein at their own risk.*

# Contents

# Foreword by Chairman of ICNDT

The competence of those carrying out non-destructive testing is an essential pre-requisite for the achievement of quality and reliability. Qualification and Certification of NDT personnel in accordance with International Standards such as ISO 9712 (Non-destructive testing – Qualification and certification of personnel) and aligned standards helps to ensure that people are competent and assists global business and safety standards.

The ICNDT, with a track record of 45 years in international cooperation in NDT, is dedicated to supporting best practice in the implementation of these standards through this Guide, which will be available via the ICNDT website. It is intended that the schedules in the Guide will be regularly reviewed and updated. As Chairman, I express thanks to my colleagues in ICNDT for their assistance in preparing this document.

**Mike Farley**
Chairman, ICNDT

# Foreword by Chairman of ISO TC 135

Since the effectiveness of any application of non-destructive testing depends upon the capabilities of the persons who perform or who are responsible for the test, a procedure was developed to provide a means for evaluating and documenting the competence of personnel whose duties require the appropriate theoretical and practical knowledge of the non-destructive tests that they perform, specify, supervise, monitor or evaluate. An added incentive stems from the worldwide comparability of a wide range of industrial applications requiring common non-destructive testing approaches.

It is recognised that the efforts of ICNDT have made a valuable contribution to the implementation of the numerous schemes for qualification and certification of NDT personnel.

An extensive application of this Guide within industry will improve reliability of industrial products and safety of the world wide community.

**Professor Hatano**
ISO/TC 135 Chairman

# Foreword by Chairman of the Editorial Committee and PGP

The original Guide 'ICNDT Recommended Guidelines for Qualification and Certification of NDT Personnel according to ISO 9712' was published in June 2004 at the 16th WCNDT in Montreal – based on a first draft produced by Mr Nardoni and circulated for comment in June 2002. This update has been prepared following a mandate from the ICNDT Policy and General Purposes Meeting in Anaheim in March 2008, and was presented to the ICNDT meetings at the 17th WCNDT in Shanghai. It is approved for publication by an Editorial Committee comprising Douglas Marshall, Mike Farley, Giuseppe Nardoni, John Thompson, Wayne Holliday, Nori Ooka, Dave Barnett and Joao Conte.

ICNDT will update this document periodically and will provide the latest version online via its website, www.icndt.org. Users are strongly advised to check that they have the latest version of this document and the referenced Standards. Comments and suggestions are welcome and should be sent to the ICNDT Secretariat.

**Douglas Marshall**
Chairman PGP and Editorial Committee

# 1. Background

- The prime purpose of this Guide – which has been prepared under the auspices of the International Committee for Non-Destructive Testing (ICNDT) – is to promote best practice in the Qualification and Certification of NDT personnel according to the International Standard ISO 9712, as well as other aligned standards such as European standard EN 473 and ANSI/ASNT-CP-106. The competence of NDT personnel is a key element in achieving reliability of NDT and is vital to ensure the quality and safety of products and installations.
- The ICNDT Guide is of importance to all the tiers in the management of NDT operations – regulators, inspection bodies, certification bodies, industry, NDT service companies and supervisors of NDT personnel. Sections 2, 3, 4, 5 and 6, supplemented by Appendices 1 to 6, provide information and guidance on ISO 9712 and aligned standards. Section 7 provides specific recommendations from ICNDT. Appendices 7, 8 and 9 provide related information on ICNDT and methods of NDT.
- The ICNDT has promoted worldwide dissemination of NDT technologies and the harmonisation of personnel certification schemes for more than 45 years. The decision by ICNDT to promote the adoption of ISO 9712 as a basic standard for Third Party Qualification and Certification of NDT personnel arose from the need to achieve a more consistent standard of basic knowledge and practical competence. Such standardisation becomes ever more important as globalisation of trade increases.
- The central place of ISO 9712 among standards for Third Party Certification is explained in Section 4 and the historical development of NDT personnel certification and ICNDT's role is described in Appendix 7.
- Correct use of Third Party Qualification and Certification of NDT personnel is dependent on the Employer of personnel recognising his own responsibilities. This is important in terms of good quality management practices (outlined in ISO 9000 family of standards), product liability, meeting the requirements for accreditation and meeting the requirements of product standards and codes such as the ASME Boiler and Pressure Vessel Codes, and the European Pressure Equipment Directive (97/23/EC). An explanation of the Employer's responsibilities is given in Section 3.
- In each of the regions where ICNDT has members (Africa, the Americas, Europe, the Middle East and the Asia-Pacific region), ISO 9712 has been adopted as a basis for third party certification schemes. For example Brazil has an accredited Certification Scheme which complies with ISO 9712, and Canada has a Certification scheme based on the standard. In the USA, ASNT has introduced ANSI/ASNT Standard CP 106 which is closely aligned with ISO 9712. Many other countries in Latin America, Uruguay, Peru, Bolivia, Colombia and Venezuela are developing national schemes based on ISO 9712 and Argentina has also an accredited certification scheme which complies with ISO 9712. In the Asia-Pacific region, Australia, India, Japan, Indonesia and China, among many other countries, have introduced or are developing schemes based on ISO 9712. In Europe a large number of countries have schemes which comply with ISO 9712 and the closely aligned European Standard EN 473. A listing of Certification Schemes and their current status is provided in Appendix 3.
- The international NDT community is endeavouring to promote international recognition of Third Party Certification schemes. A number of recognition arrangements (unilateral, multilateral and bilateral) exist. Details are given in Appendix 4. In many countries in the world, Certification Bodies which provide ISO 9712 certification have gained Accreditation or Approval by government agencies or accreditation bodies in both voluntary and regulatory sectors. This is discussed in Section 5.
- It is hoped that, in due course, the presently separate ISO 9712 and EN 473 standards will merge into a single International/European standard but, in the meantime, many Certification Bodies choose to comply with both Standards in order to provide the maximum benefit to their stakeholders.
- Details of other approaches to NDT personnel certification are given in www.efndt.org/Services/EuropeanForumforNationalAerospaceNDT.Boards.aspx (for aerospace certification to EN 4179) and www.asnt.org (for in-company certification to SNT-TC-1A).

# 2. International Standard ISO 9712 (2005) Non-Destructive Testing – Qualification and Certification of Personnel and Aligned Standards

ISO 9712 qualification and certification is widely recognised as conferring a number of advantages. The Standard covers the qualification and certification of NDT personnel in one or more of ten NDT methods – acoustic emission testing, eddy current testing, infrared thermographic testing, leak testing (hydraulic pressure tests excluded), magnetic particle testing, penetrant testing, radiographic testing, strain testing, ultrasonic testing, visual testing (direct unaided visual tests and visual tests carried out during the application of another NDT method are excluded).

The responsibilities of the Certification Body, its Authorised Qualifying Bodies (where used) and Examination Centres are defined, and the role of the employer is clarified. Three levels of qualification are defined (Levels 1, 2 and 3). Qualification is 'specific' to a defined industrial or product sector(s).

Eligibility for certification is specified covering vision requirements for all levels, minimum training requirements, and required duration of industrial experience.

Qualification examinations are defined – comprising written and practical parts – for each level with minimum numbers of questions and, for Levels 1 and 2, test specimens specified.

Rules are specified governing administration of certification, including conditions for renewal and recertification.

The European Standard EN 473 follows exactly the same principles as ISO 9712 but has differences in detail. At the time of publication of these Guidelines, a third edition of EN 473 (2008) has been published by CEN.

In the USA, an American National Standard ANSI/ASNT CP-106 2008 – a modified version of ISO 9712:2005 – has been approved with derogations allowed by ISO/IEC Guide 21:1999, Adoption of International Standards as regional or national standards. Each difference is explained by means of a 'National explanatory note'. CP 106 follows exactly the same principles as ISO 9712 but has differences in training and experience requirements, and a number of other improvements and clarifications of language/terminology.

# 3. Requirements for technical knowledge of NDT personnel

## 3.1 Introduction

There has been a progressive development of training guidelines/syllabuses which attempt to define the body of knowledge and recommended training hours needed by NDT personnel. The earliest versions were produced by ASNT (1966) and the ICNDT (1985). Later training guidelines were produced by the IAEA (1986, updated 2002 and 2008) and more recently, a joint working group of CEN/TC 138/AHG8 and ISO/TC 135/WG 2 has produced document ISO/ TR 25107 Guidelines for Training Syllabuses, and ASNT has published ASNT CP-105-2006 ASNT Standard Training Outlines for Qualification of Non-destructive Testing Personnel.

In addition ISO/TR 25108 Non-destructive testing – Guidelines for NDT personnel training organizations was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TR 138, Non-destructive testing, in collaboration with Technical Committee ISO/TC-135, Non-destructive testing, in accordance with the Vienna Agreement on technical cooperation between ISO and CEN. The Technical Report sets out the criteria to be met by training organisations and will facilitate assessment and approval of such organisations by certification bodies.

Further information on the content of these documents is given below.

## 3.2 Current Guidelines

- **ISO/TR 25107 Guidelines for Training Syllabuses**

  This document, available from the standards bureaux of CEN members, covers the following NDT methods at Levels 1, 2 and 3: Radiographic Testing, Ultrasonic Testing, Eddy Current Testing, Penetrant Testing, Magnetic Particle Testing, Leak Testing, Acoustic Emission Testing and Visual Testing.

- **ASNT CP 105-2006**

  This document takes the NDT Method Training Outlines (Bodies of Knowledge) that historically have been appended to both ASNT Recommended Practice No. SNT-TC-1A and ANSI/ASNT CP-189 and creates a separate proposed American national Standard.

  The committees of the Technical and Education Council of ASNT have the responsibility to review comments on and objections to this proposed American national Standard and to submit the draft standard and responses to the Standards Development Committee (SDC). The CP-105 Review Subcommittee, a subcommittee of the SDC, has the responsibility to develop the training outlines for public comment using SDC procedures.

  Advice on updates will be posted on the ASNT website (www.asnt.org/publications/standards).

- **IAEA TECDOC-628 (2008)**

  The present publication is an updated version of IAEA-TECDOC-628/Rev 1. The modifications were made during a consultants meeting held in Vienna from 30 October to 2 November 2006. The participating experts at the meeting were from well known international bodies active in the qualification and certification of NDT personnel. The content of IAEA-TECDOC-628/Rev 1 has been revised, based on the experiences of the experts, as well as comments of the end user industries. The details of the topics on each subject have been expanded to include the latest developments in the respective method.

## 3.3 Normative status of Guidelines on Training Syllabuses

ISO 9712 : 2005 references only the IAEA Training Guidelines of 2002. (It was published before TR 25107 was agreed.)

EN 473 : 2008 references both TR 25107 and TR 25108 but includes *minimum* training hours that are somewhat less than the recommendations contained in TR 25107.

CP 105-2006 is referenced in ASNT documents including SNT-TC-1A (2006), CP106 (2008) and CP189 (2006).

**Reference:**

IAEA-TECDOC-628 Revision 2 (2008 edition): Training Guidelines in Non-destructive Testing Techniques. International Atomic Energy Agency, Wagrammerstrasse 5, PO Box 100, A-1400 Vienna, Austria, telephone +43-1-20601, telex 112645 Atom A, Facsimile +43-1-20607, e-mail IAEO@IAEA1.IAEA.OR.AT

## 3.4 Question Banks

### *3.4.1 Introduction*

Banks of questions are available from several sources, for use either by students, trainers, or examiners. Questions may be classified by NDT method, by level (1, 2, or 3) and sector. They may be validated or not. Users should check if the questions being used are designed to match the requirements of a particular training or examination syllabus and should select questions accordingly.

### *3.4.2 ASNT Specimen questions*

ASNT publish Question and Answer (Q&A) Books as supplements to SNT-TC-1A. The books are available for each test method and provide specimen questions and answers for Levels 1, 2 and 3.

### *3.4.3 EFNDT Question Bank*

EFNDT, through an action by BINDT, DGZfP and COFREND, has developed a confidential question bank, containing around 5000 multiple choice questions (covering 3 levels, 5 NDT methods). This is used by a number of Certification Bodies which participate in the EFNDT Multilateral Recognition Agreement (MRA) (see Appendix A4). It is also made available to other Certification Bodies subject to conditions.

# 4. Advantages of Third Party Qualification and Certification to ISO 9712 and Aligned Standards

Third Party qualification and certification is widely recognised as conferring a number of advantages:

- Complies with an internationally agreed ISO Standard which is increasingly being adopted worldwide.
- Utilises an internationally developed training syllabus.
- Examinations (theory and practical) are provided directly by certification bodies or through Authorised Qualifying Bodies and Authorised Examination Centres under the control of Certification Bodies (many of which are linked to national NDT societies).
- Provides a harmonised standard for training, qualification and certification for NDT personnel and can be used as the base level for more specific employer-based or third party certification relevant to particular products or installations.

The latest version of ISO 9712:2005 (the 3rd Edition) gives more detailed requirements for practical examinations (including details of practical examination specimens and their defect content) to determine the practical ability of the candidate and to better harmonise practical examinations, and provides guidance on the definition of industrial and product sectors to aid international harmonisation. Further harmonisation is possible by using the ISO/TR25107 'Guidelines for Training Syllabuses'.

# 5. Accreditation of Certification Bodies

ISO 9712:2005 requires that the certification system should be controlled and administered by a certification body which conforms to the requirements of the standard ISO/IEC 17024:2003 (Conformity assessment - General requirements for bodies operating certification of persons). This standard is designed to ensure that a Certification Body is itself competent, adequately qualified for its role and impartial. The ISO/IEC 17024 document references the ISO 9000 family of standards as normative references for compliance.

In many countries of the world Certification Bodies have gained Accreditation by independent agencies – many of which are government sponsored – generally known as Accreditation Bodies. There is an international grouping of Accreditation Bodies known as the International Accreditation Forum (IAF) and a European equivalent, European Accreditation of Certification (EAC), the latter having a Multilateral Agreement covering recognition of accreditation of personnel certification bodies. Some Accreditation Bodies operate outside their national boundaries. The Accreditation process is intended to increase the confidence of users in the status of a Certification Body.

Accreditation reduces risk for users of certification by ensuring that accredited certification bodies are competent to carry out the work they undertake within their scope of accreditation. Accreditation bodies which are members of the IAF and EAC are required to operate at the highest standard and to require the bodies they accredit to comply with appropriate international standards. The IAF has published general guidance (G24) to the application of ISO/IEC 17024. Building on this, the Certification Executive Committee of the European Federation for NDT (EFNDT) has prepared more specific guidance to accreditation bodies assessing personnel certification bodies for compliance with EN ISO/IEC 17024 whilst implementing EN 473 (ref. www.efndt.org). The guidance is also relevant to bodies implementing ISO 9712. At the time of writing, the EFNDT guidance is published as a CEN draft Technical Report (CEN/TC 138 N 883).

Accreditations granted by accreditation body members of the EAC Multilateral Agreement (MLA), based on regular surveillance to assure the equivalence of their accreditation programmes, allows companies and persons with an accredited conformity assessment certificate in one part of the world to have that certificate recognised by accreditation bodies operating elsewhere in the world.

The listing of organisations offering Certification to ISO 9712 and EN 473 in Appendix 3 includes an indication of whether or not the Certification Body claims accreditation.

# 6. Employer Responsibilities when using Third Party Certification

The Employer has important responsibilities when using Third Party Certification. These are similar to those when using in-house certification and should be reflected in the Employer's quality system.

This section of the Guide clarifies the Employer's responsibilities within the framework of ISO 9712, EN 473 and CP 106, and gives guidance on how the Employer should fulfil these. In this context the Employer (or responsible agency) is defined as 'the organisation for which the candidate works on a regular basis'. If the individual is self-employed he shall assume all responsibilities specified for the employer or responsible agency.

The responsibilities of the Employer are to:

- Retain overall responsibility for the results of NDT operations;
- Introduce the candidate to the Certification Body or the Authorised Qualifying Body and endorse the validity of the personal information provided. The documentation provided shall include the declaration of education, training and experience needed to establish the eligibility of the candidate;
- Be fully responsible for the authorisation to operate, including checking that NDT tasks to be carried out are within the scope of the individual's certification Method, Level, Sector, and if not organising additional job-specific training and/or examinations;
- Ensure annually that employees meet the visual acuity requirements;
- Maintain records of work experience necessary as a basis for confirming continuity of satisfactory work activity (to support renewal/recertification).

To fulfil these responsibilities the Employer must prepare and implement a Quality Procedure (or Written Practice) covering at least the above responsibilities and maintain adequate Records.

The Quality Procedure, which shall additionally cover the correct administration and control of NDT personnel in order to meet the quality requirements of the company, its customers and relevant international or national regulations, will include reference to:

- Applicable codes and standards;
- General responsibilities of Levels 1, 2 and 3;
- Certification required (Method, Level, Sector …);
- Persons designated by the Employer to be responsible for issuing the authorisation to operate;
- Control of in-house training and examination supplementary to that carried out during the ISO 9712 qualification and certification process. This will include job specific training for tasks outside the scope of the individual's certification and updating with respect to new equipment or techniques;
- Responsibility for maintenance of records.

The Employer must arrange to maintain records for each of his NDT personnel including:

- Training;
- Education;
- Work experience;
- Vision test results;
- Certification examination results.

If these are complete and acceptable, then the Employer issues the necessary authorisation to discharge the duties of Level 1, 2 or 3 in a defined area of competence.

The best way for this to be done is through an Employer's Certificate of Authority to Work and this should be signed by an appropriately designated person on behalf of the Employer (see Figures 1 & 2).

FIGURE 1

**EMPLOYER CERTIFICATION CHECKLIST**
**LEADING TO OPERATING AUTHORISATION TO WORK**

**COMPANY:** _____

**NAME OF OPERATOR:** _____

**METHOD:** _____ **LEVEL:** _____

| Requirement | Evidence | In File | Accepted |
|---|---|---|---|
| Valid test certificate for near vision acuity: | | | |
| Valid certificate of unimpaired colour vision: | | | |
| Work Experience (in months according to level): | | | |
| Training Hours (in hours according to level): | | | |
| Successful completion of qualification examination | | | |
| Awarded ISO 9712 / EN 473 / CP 106 certification | | | |
| Job specific training:<br>Product/materials | | | |
| NDT equipment/systems | | | |
| NDT Instructions/procedures | | | |
| Safety | | | |
| Level 3 Acceptance: | | | |

**If all Categories are acceptable, then the employer is satisfied that the above named employee is authorised to carry out work for this Company in respect of the Method and Level shown.**

_____ signed for the employer by the Company Authorised Person

Date: _____

Name: _____

Position: _____

FIGURE 2

**(COMPANY X)**

**AUTHORISATION TO PERFORM NON-DESTRUCTIVE TESTING**

**This Certificate is issued to:**

_____

**of**

**(COMPANY X)**

**who has demonstrated that he has successfully met the requirements of the Company Quality Procedure (COMPANY X – DOCUMENT REF) in respect of Education, Training, Work Experience and Examination and is authorised to perform NDT as follows:**

| Method | Technique | Level | Date of ISO 9712 Certification | Due Date of Renewal or Re-certification | Signature of authorised company representative | Date |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

# 7. ICNDT Recommendations

## 7.1 Recommendations to users of central, third party certification

- When central, third party certification is appropriate, regulators and industry are recommended to specify the use of NDT personnel who are certified in accordance with ISO 9712 or an aligned standard, where appropriate by a Certification Body accredited to ISO 17024.
- Regulators and users should recognise the importance of employers of NDT personnel properly fulfilling their responsibilities to authorise personnel to work (see Section 6) – after first confirming that their employees are adequately trained, experienced and qualified.

## 7.2 Recommendations to Certification Bodies

- Certification Bodies are urged to provide certification to both ISO 9712 and relevant aligned standards in order to maximise the value of their certification. In anticipation of future harmonisation, their training syllabuses should encompass the requirements of the documents ISO/TR 25107 and/or CP 105 which define the body of knowledge.

## 7.3 Recommendations to Standards Bodies

- Standards Bodies ISO, CEN and ANSI/ANST are urged to harmonise their standards for third party certification, whilst allowing within the Standard(s) some flexibility for national conditions.

## 7.4 Recommendations for future ICNDT activities

- ICNDT members should share experience on development and operation of multilateral recognition agreements, with a view towards a possible ICNDT initiative to achieve mutual recognition between the EFNDT and APCNDT agreements and extension to other regions.

# APPENDICES



## Appendix 1: ASME Recognition of ISO 9712 and aligned standards

ASME Boiler and Pressure Vessel include specific requirements for NDT and for the qualification or certification of NDT personnel. These codes are used all around the world, including in regions such as Europe where compliance with other regulations, e.g. the Pressure Equipment Directive, is facilitated by use of third party certification.

In 2003, following representations from EFNDT and the European Boilermakers' Association, each seeking to avoid unnecessary double-certification, to take advantage of the benefits of third party certification and to facilitate meeting the requirements of the PED, ASME advised a revision to the ASME Boiler and Pressure Vessel Code Section V Article 1. An amended paragraph T120 was approved and published in the 2003 Addenda – see Boxes 1 and 2.

This amendment allows use of national or international central certification programmes to fulfil the requirements of the Employer's Written Practice which must be in accordance with SNT-TC-1A or ANSI/ASNT CP-189.

Employers working to ASME codes who choose to follow this option now prepare a Written Practice which references certification in accordance with third party/central schemes which comply with ISO 9712 and/or EN 473. A reference to CP106 would also meet the specified requirement.

Employers must specify the additional training and examinations which are necessary to provide a bridge between the scheme's training and examinations and the specific ASME NDE Procedures and/or specific employer's needs (e.g. for the application of TOFD, or Phased Arrays).

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U.S.A.

July 7, 2003

To: Mr. Guiseppe Nardoni, I & T International
Mr. R. Roche, President, EFNDT
Mr. Bjarne Larsen, Vice President, EFNDT
Mr. John Thompson, Manager, Certification Services Division, BINDT
Dr. Reinhard Maab, European Boilermaker's Association
Mr. Helmut Salomon, European Boilermaker's Association

Subject: Revision to BPVC Section SC V Regarding NDE Personnel Qualifications

Gentlemen,

This letter is to advise that, in response to international interest in NDE requirements for qualification of personnel, the attached revision to ASME BPVC Section V, Article 1, paragraph T-120 was approved and published in the 2003 Addenda. In particular, I direct your attention to T-120(e) and (f), which provide for alternatives to be used by the manufacturer to fulfill the examination requirements of the documents listed in T-120(e).

Yours truly,

Ed Maradiaga
Secretary
SC V Subcommittee on Nondestructive Examination
Phone: 1-212-591-8056
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Email: Maradiagal@asme.org

Att: BPVC Section V, Article 1, Paragraph T-120

Cc (w/att): Jon Batey, Chair, SC V
Bruce Kovacs, Vice-Chair, SC V
Richard McGuire, Chair, SG Personnel Qualifications, SC V

The American Society o Mechanical Engineers

# ARTICLE 1 - GENERAL REQUIREMENTS

**T-120 GENERAL**

*(a)* Subsection A describes the methods of nondestructive examination to be used if referenced by other Code Sections or referencing documents.

*(b)* Subsection B lists Standards covering nondestructive examination methods which have been accepted as standards. These standards are nonmandatory unless specifically referenced in whole or in part in Subsection A or as indicated in other Code Sections or referencing document.

*(c)* Any reference to a paragraph of any Article in Subsection A of this Section includes all of the applicable rules in the paragraph.[1] In every case, reference to a paragraph includes all the subparagraphs and subdivisions under that paragraph.

*(d)* Reference to a standard contained in Subsection B is mandatory only to the extent specified.[2]

*(e)* For those documents that directly reference this Article for the qualification of NDE personnel, the qualification shall be in accordance with their employer's written practice which must be in accordance with one of the following documents:

*(1)* SNT-TC-1A[3], Personnel Qualification and Certification in Nondestructive Testing; or

*(2)* ANSI/ASNT CP-189[3], ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel

*(f)* National or international central certification programs, such as the ASNT Central Certification Program (ACCP), may be alternatively used to fulfill the examination requirements of the documents listed in T-120(e) as specified in the employer's written practice.

[1] For example, reference to T-270 includes all the rules contained in T-271 through T-277.3.

[2] For example, T-233 requires that Image Quality Indicators be manufactured and identified in accordance with the requirements or alternatives allowed in SE-747 or SE-1025, and Appendices, as appropriate for the style of IQI to be used. These are the only parts of either SE-747 or SE-1025 that are mandatory in Article 2.

[3] SNT-TC-1A (2001 Edition), "Personnel Qualification and Certification in Nondestructive Testing;" and ANSI/ASNT CP-189 (2001 Edition), "ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel;" published by the American Society for Nondestructive Testing, 1711 Arlingate Lane, P.O. Box 28518. Columbus, Ohio 43228-0518.

[4] In this Code Section, "Code User" is any organization conducting nondestructive examinations to the requirements of this Section. A03

# Appendix 2: Non-destructive testing under the European Pressure Equipment Directive

**Introduction**

The Pressure Equipment Directive – 97/23/EC – was formally adopted by the European Parliament and Council on 29th May 1997, and was published in the Official Journal of the European Communities No. L181 of 9th July (ISBN 011 916 0927). It entered into force on 29th November 1999 and compliance with its requirements is mandatory since 29th May 2002.

The purpose of the directive is to harmonise national laws regarding design, manufacture and conformity assessment of pressure equipment and assemblies (vessels, storage containers, heat exchangers, shell and water tube boilers, industrial pipework, safety devices and pressure accessories) subject to an internal pressure greater than 0.5 bar above atmospheric.

Equipment is categorised within four levels (I to IV) according to degree of hazard: category III and IV equipment will require conformity assessment by 'notified bodies' and 'recognised third party organisations'.

**Non-destructive Testing**

For pressure equipment, non-destructive tests of permanent joints must be carried out by 'suitably qualified personnel'. For pressure equipment in categories III and IV, NDT personnel must be approved by a 'Third Party Organisation' (RTPO) recognised by a member state pursuant to Article 13.

Certificates of competence in compliance with EN 473 and covering the testing of permanent joints (in effect, welds) are presumed to satisfy the requirements of the directive *because EN 473 is a harmonised standard*. But, there are alternative acceptable methods of fulfilling the requirements of the Directive, as detailed in the Guideline 6/13 and the CEN document referred to below.

**References**

97/23/EC: The Pressure Equipment Directive

WPG6/13 Guideline for RTPO approving NDT personnel – final version adopted 2004-03-17

CEN/TR 15589 (October2006) Non-Destructive Testing – Code of practice for the approval of NDT personnel by Recognised Third Party Organisations under the provisions of Directive 97/23/EC

Documents are available at www.efndt.org under the section 'Pressure Equipment'.

# Appendix 3: Listing of Certification Bodies offering ISO 9712 certification

A list of names and addresses of Certification Bodies which offer ISO 9712 certification is given below. Other Certification Bodies offer closely related EN 473 certification (ref. www.efndt.org). Certification Bodies which claim accreditation (see Section 9) are marked with an asterisk.

| | |
|---|---|
| **AUSTRALIA**<br>***Australian Institute for Non-Destructive Testing National Certification Board**<br>PO Box 52, Parkville VIC 3052, Australia<br>Tel: +(03) 9326 7550; Fax: +(03) 9326 7272<br>Email: certification@aindt.com.au | **AUSTRIA**<br>***ÖGfZP**<br>Krugerstrasse 16, A-1015 Wien, Austria<br>Tel: +43 1 798 6611-60<br>Fax: +43 1 798 6611-60<br>Email: aufricht@mittli.at |
| **BELARUS**<br>**(EN 473 only)*<br>**Belorussian Association on NDT & TD**<br>F Scorina Str 16, 220072 Minsk, Republic of Belarus<br>Tel: +7 01723 71535<br>Fax: +7 01723 76270<br>Email: | **BELGIUM**<br>***BANT**<br>Allee de la Cense Rouge 15, B-4031 Angleur, Belgium<br>Tel: +32 04 365 5892<br>Email: info@bant.be |
| **BRAZIL**<br>***ABENDE – Brazilian Society of NDT**<br>Rua Guapiaçu, nº 05, Vila Clementino<br>CEP: 04024-020 – São Paulo – SP – Brazil<br>Tel: 55 (11) 5586-3199; Fax: 55 (11) 5581-1164<br>Email: abende@abende.org.br | **BULGARIA**<br>**Certification Body for NDT Personnel**<br>Sofia 1113, Acad. G. Bonchev Str. Bl.4<br>Inst.of Mechanic-Bulgarian of Sciences<br>Office 502 - Bulgaria<br>Tel: +359 2 9797120<br>Fax: +359 2 9797120<br>Email: cert@ndt-bg-cert.org |
| **CANADA**<br>**Natural Resources Canada**<br>Non-destructive Testing Certification<br>Materials Technology Laboratory – CANMET<br>568 Booth Street, Ottawa, ON, K1A 0G1<br>Tel: (613)-943-0583; Fax: (613)-943-8297<br>Email: rvmurphy@nrcan.gc.ca | **CHINA**<br>**Certification Committee of The Chinese Society for Non-destructive Testing (ChSNDT)**<br>99 Handan Road, Shanghai 200437, People's Republic of China<br>Tel/Fax: 0086-21-65550277<br>Email: chsndt@public2.sta.net.cn |
| **CROATIA**<br>***CrSNDT**<br>10 000 Zagreb, I: Lucica 1, Croatia<br>Tel: +385 1 615 7129<br>Email: ana.lypolt@fsb.hr | **CZECH REPUBLIC**<br>***APC – Association of Personnel Certification**<br>Areál VÚ Běchovice, PO Box. 51, 190 11 Praha 9, Czech Republic<br>Tel: (+42 2) 67 06 20 52; Fax: (+42 2) 67 06 20 53<br>Email: apc@mbox.vol.cz |
| **DENMARK**<br>**(EN 473 only)*<br>**FORCE-Dantest Cert**<br>c/o FORCE Instituttet, Park Alle 345, 2605 Brøndby, Denmark<br>Tel: +45 75135900<br>Fax: +45 75450086<br>Email: bl@FORCE.dk | **FINLAND**<br>**(EN 473 only)*<br>**Inspecta OY**<br>PO Box 44, Sahaajankatu 20 D, FIN-00811 Helsinki, Finland<br>Tel: +358 10 521 611<br>Fax: +358 10 521 6222 |

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| **FRANCE**<br>***COFREND**<br>1 Rue Gaston Boissier, 75724 Paris CEDEX 15, France<br>Tel: +33 1 44 19 76 18<br>Fax: +33 1 44 19 75 04<br>Email: cofrend@cofrend.com | **GERMANY**<br>***DPZ**<br>c/o DGZfP<br>Max-Planck-Str. 6, 12489 Berlin, Germany<br>Tel: +49 303 8629910<br>Email: mail@dgzfp.de |
| **HUNGARY**<br>**HSNT**<br>NTUA, Zoografou 157 10 Athens, Greece<br>Tel: +30 210 772 1312<br>Email: prasian@central.ntua.gr | **INDIA**<br>**Indian Society for Non-Destructive Testing (ISNT)**<br>c/o Director, Materials, Chemical & Reprocessing Groups, Indira Gandhi Centre for Atomic Research, KALPAKKAM - 603 102, Tamil Nadu, India<br>Tel: +91(04114) 280234 (Office)<br>Fax : +91(04114) 280301 / 280356<br>Email: dmg@igcar.ernet.in |
| **ISRAEL**<br>***ISRACERT**<br>PO Box 73, Azur 58190, Israel<br>Tel: +972-3-9605559<br>Fax: +972-3-9604160<br>Email: yuron@netvision.net.il | **ITALY**<br>**(EN 473 only)*<br>**CICPND**<br>Via C. Pisacane 46, 20025 Legnano Mi, Italy<br>Tel:+39 0331545600<br>Fax: +39 0331543030<br>Email: mirko.crepaldi@cicpnd.it |
| **JAPAN**<br>**Japanese Society for Non-Destructive Inspection (JSNDI)**<br>MBR99 Bldg., 4th Fl., 67, Kanda-Sakumagashi, Chiyoda-ku, Tokyo 101-0026, Japan<br>Tel: +81-3-5821-5105; Fax: 81-3-3863-6524<br>Email: acd@jsndi.or.jp | **NETHERLANDS**<br>***SKO**<br>Boerhaavelaan 40, Postbus 190, 2700 AD Zoetermeer, The Netherlands<br>Tel: +31 7935 31206; Fax: +31 79531365<br>Email: ct@skocert.nl |
| **POLAND**<br>***Jednostka Certyfikująca UDT-CERT**<br>Szczęśliwicka 34, 02-353 Warsaw, Poland<br>Tel: +48 22 57 22 110<br>Email: cert@udt.gov.pl | **RUSSIA**<br>**SEC "KACHESTVO"**<br>102, Prospekt Mira, Moscow 129626, Russia<br>Tel: +7(495) 744-70-52<br>Fax: +7(495) 744-70-51<br>Email: kachestvo@umial.ru |
| **RUSSIA**<br>***Testing & Diagnostics**<br>109443 Moscow, Russia<br>Tel: (007) 095 175-6480; Fax: (007) 095 919-0511<br>Email: control@df.ru | **RUSSIA**<br>**(EN 473 only)*<br>**SERTINK**<br>Bauman MSTU Centre, 2 Bauman St., 5, 107005 Moscow, Russia<br>Tel: +007 095 263 67 83<br>Fax: +007 095 267 34 56<br>Email: sertink@dialup.ptt.ru |
| **SLOVAKIA**<br>***Reaktortest**<br>J.Bottu 2, 917 00 Trnava, Slovak Republic<br>Tel: 00421 33 5521 030 ; Fax: 00421 33 5521 144<br>Email: reaktortest@reaktortest.sk | **SPAIN**<br>***CERTIAEND**<br>Bocángel, 28 2º izquierda 28028 Madrid, Spain<br>Tel: + 34 91 3612585 ; Fax: +34 913614761<br>Email: r.rodríguez@aend.org |

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| **SWEDEN**<br>**(EN 473 only)*<br>**SAQ OFP Certifiering AB**<br>Box 49306, 100 29 Stockholm, Sweden<br>Tel: +46 86652400<br>Fax:+46 87829774<br>Email: | **SWEDEN**<br>**(EN 473 only)*<br>**ABB NDT Training Centre**<br>Björnövägen 20, 721 31 Västerås, Sweden<br>Tel: +46 86652400<br>Fax: +46 87829774<br>Email: |
| **SWEDEN**<br>**(EN 473 only)*<br>**Föreningen för Oförstörande Provning (FOP)**<br>NDT Training Centre, Regattagatan 23, SE-723 48 Vasteras, Sweden<br>Tel: +46 21 325000<br>Email: christer.karlsson@sis.se | **SWITZERLAND**<br>***SSNT, c/o EMPA**<br>Überlandstrasse 129, 8600 Dübendorf, Switzerland<br>Tel: +41 18235511<br>Fax: +41 18234579<br>Email: info@empa.ch |
| **UK**<br>***PCN, c/o BINDT**<br>1 Spencer Parade, Northampton NN1 5AA, United Kingdom<br>Tel: +44 1604 259056; Fax: +44 1604 231489<br>Email: pcn@bindt.org | **UKRAINE**<br>***Ukrainian Association of Independent Experts "Ukrexpert"**<br>Lyvarska str., 1a, 04073, Ukraine, Kyiv<br>for messages: 01023 Kyiv, post box 160<br>Tel/Fax: + 380 44 468-20-27<br>Email: assoc@i.kiev.ua |

Note: Whilst the above list included all responses to a survey of NDT Societies conducted prior to publication it is undoubtedly incomplete. The list will be updated on the ICNDT website (www.icndt.org). Alternatively interested parties should seek the advice of their national NDT Society (see ICNDT Directory).

# Appendix 4: Mutual recognition of Certification

## A4.1 Background

The publication ICNDT WH 85 'Recommendations on International Harmonisation of Training, Qualification and Certification of NDT personnel' (November 1985) included a model agreement (WH 23 - 85), on the mutual recognition of qualification and certification schemes for NDT personnel.

It was envisaged that what was initially a model *bilateral agreement* for use by two Certification Bodies might, due to the extension of such agreements between parties, effectively develop into a *multilateral agreement between several bodies*.

## A4.2 Bilateral Agreements

A number of bilateral recognition agreements, based upon the model in WH 23 – 85, emerged in the late 1980s and early 1990s. Some of these are still in force.

## A4.3 EFNDT Multilateral Recognition Agreement (MRA)

In Berlin on 21 October 1993, the European Committee on NDT (ECNDT) established a Working Group of European Union national NDT societies and their associated certification bodies. This was given a remit to establish a European-wide multilateral agreement on mutual recognition of certification. The group involved in this meeting became known as the European Working Group on Qualification and Certification.

At a meeting in Paris on 27 April 1994, the first draft of the European Multilateral Agreement was tabled. It was subsequently amended and ratified at the 6th European Conference on NDT in Nice, France, in October 1994. On this occasion the first 20 or so of the eventual 30-plus ECNDT members signed the very first truly multilateral agreement to mutually recognise certificates issued by Certification Bodies registered under the agreement.

Today, the European Federation for NDT (EFNDT) MRA has 28 signatories and over 20 registered Certification Bodies, all of which are accredited or approved as complying with International Standard EN ISO/IEC 17024 and issuing certification in compliance with EN 473 (and/or ISO 9712). The actual list of registered bodies can be viewed in the EFNDT MRA Schedule 2 online.

Since Version 8 of the Agreement (26 October 2002), participation is open to NDT Societies and Certification Bodies outside Europe providing either EN 473 or ISO 9712 Certification.

A copy of the Agreement, presently at issue 10, is published on the EFNDT website (www.efndt.org).

**Objectives**

The objectives of this Agreement are:

- To promote harmonisation of the operations of the independent NDT personnel certification schemes nominated by the national NDT societies of European Union (EU) and European Free Trade Association (EFTA) countries.
- To facilitate recognition of qualifications and certification of NDT personnel in Europe and internationally in order to facilitate the free movement of plant, equipment and personnel and to avoid uneconomic re-inspection.

**Who is eligible to participate?**

The Agreement is open to NDT Personnel Qualification and Certification schemes which are:

- Nominated by national NDT Societies that have signed the agreement;
- Accredited by an EFNDT recognised accreditation agency or government department; or
- Assessed and approved by the EFNDT against the applicable criteria.

Each scheme which is party to and a signatory of this Agreement accepts that each party registered under the Agreement meets the requirements of European Standards and associated technical documents for which they hold current accreditation.

**Does recognition imply equivalence?**

'Recognition' indicates that the signatories are satisfied that a Certification Scheme meets the requirements of the nominated standard (e.g. ISO 9712) and the Certification Body meets the requirements of ISO 17024, but it does not imply that all the recognised schemes are exactly equivalent. They may differ in breadth, scope, definitions of sectors, etc, and the user has to recognise this when considering what actions are necessary by the Employer (see section 6).

**Which certification bodies have registered?**

The NDT Personnel Certification Schemes/Bodies which have been accepted by the EFNDT Qualification and Certification Working Group as complying with the criteria set out in the EFNDT Agreement on Multilateral Recognition of NDT Personnel Certification Schemes and thus are recognised by the signatories to the Agreement are listed in Schedule 2 to the MRA, which is published at www.efndt.org.

## A4.4 Asia-Pacific Region Mutual Recognition Agreement

NDT Certification Bodies in IAEA/RCA member countries[1] have an agreement to harmonise their Certification Schemes in accordance with ISO 17024 and ISO 9712, and to achieve mutual recognition of NDT certified personnel by 2012. Draft Guidelines for Harmonisation of Qualification and Certification of Personnel for Non-Destructive Testing in the Asia-Pacific Region have been produced by the IAEA committee. The IAEA document provides clause by clause guidance on the application of ISO 9712.

[1]Australia, Bangladesh, China, India, Indonesia, Japan, Korea, Malaysia, Myanmar, New Zealand, Pakistan, Philippines, Outer Mongolia, Singapore, Sri Lanka, Thailand, Vietnam

# Appendix 5: Vienna Agreement between ISO and CEN

CEN and CENELEC are committed to the concept of the primacy of international standardisation: in simple terms, their work is designed to complement and not duplicate that of the international bodies, ISO and EEC, and wherever possible, European standards are based on either existing international reference documents or international agreements.

The political commitment of CEN to international standardisation was reflected in the conclusion of a technical cooperation agreement with ISO in 1989. Signed in Lisbon, it quickly became known as the Lisbon Agreement. The Lisbon Agreement encouraged closer cooperation between CEN and ISO through the exchange of information between the Central Secretariats and related European and international Technical Committees; however, the value of such limited cooperation soon became apparent at the technical level.

Subsequent negotiations between CEN and ISO led to the development of a far wider ranging technical cooperation agreement – the Vienna Agreement – signed in June 1991. Common ISO/CEN guidelines for its practical implementation were agreed in June 1992.

Under the Vienna Agreement (VA), cooperation can be achieved through the following routes:

1. *Cooperation by correspondence:* this allows for the exchange of information possible under the old Lisbon Agreement;
2. *Cooperation through mutual representation at meetings:* two representatives of the ISO technical committee may attend a meeting of a related CEN committee and vice versa. These representatives should be chosen from officers of the TC or Central Secretariat and represent the views of the nominating committee;
3. *Adoption of ISO standards by CEN:* the VA provides a mechanism through which the ISO/TC has the option to revise an existing ISO standard if it is not suitable for immediate application by CEN;
4. *Transfer of work from CEN to ISO:* CEN can offer to transfer a new European work item to ISO for development within an ISO/TC. If ISO is agreeable to transfer, draft standard is subject to parallel vote in both ISO and CEN;
5. *Allocation of ISO work to CEN:* ISO can defer the development of an approved work item to permit its development in CEN. The draft standard is again subject to parallel vote in both ISO and CEN;
6. *Simple adoption of European standards by ISO.*

The implementation of the VA is monitored by a joint coordinating group of the ISO and CEN Technical Boards (ISO/CEN JCG not to be confused with CEN/CENELEC/ETSI JCG) attended by three members nominated by the ISO/BT and three nominated by the CEN/BT.

# Appendix 6: Process for development and revision of ISO 9712 Standard

The process for development and revision of ISO 9712 follows the Directives of the International Organization for Standardization (ISO). The Technical Management Board is responsible for the establishment of Technical Committees (TC), including TC 135 Non-destructive Testing.

The Technical Committee (TC 135) can establish and dissolve Subcommittees (SC). Thus TC 135 established SC 7, Non-destructive Testing – Personnel Certification. SC 7 has 28 Participating countries and 12 Observer countries. ICNDT is a recognised 'International organisation in liaison'.

The parent Subcommittee can establish and dissolve Working Groups (WG). Thus, SC7 established WG 6, responsible for the development and revision of ISO 9712. A Working Group comprises a restricted number of technical experts.

All national bodies (member bodies of ISO) have the right to participate in the work of Technical Committees and Subcommittees. A national body may be a P-member with an obligation to vote on all questions within a Technical or Subcommittee and to participate in meetings. A national body may be an O-member with the right to submit comments and to attend meetings. A national body may be neither a P-member nor an O-member but still has the right to vote on draft International Standards (DIS) and on final draft International Standards (FDIS).

An ISO Standard is developed through several project stages:

| Stage | Work | Time Line |
|---|---|---|
| Preliminary | New work items are developed against no time deadlines | |
| Proposal | New work item proposal is submitted to the TC or SC | 0 months |
| Preparatory | Work to prepare a working draft (WD) | 6 months |
| Committee | Work to prepare a committee draft (CD) | 12 months |
| Enquiry | Work to prepare a draft International Standard (DIS) | 24 months |
| Approval | Work to prepare final draft International Standard (FDIS) | 33 months |
| Publication | Work to prepare a published Standard | 36 months |

Thus development of a new standard may take far more than 36 months, since the time clock does not begin until a new work item proposal is submitted. A major revision of an existing standard, starting at the Preparatory Stage, could require 36 months.

The present Chairman of TC-135 is Professor Hajime Hatano (Japan). At the time of preparation of these Guidelines (May 2008) the third edition of ISO 9712 is a Published document.

# Appendix 7: The role of ICNDT and Regional Groups in the harmonisation process for Training and Certification

## A7.1 Introduction

This Appendix summarises the history of 40 years dedicated by ICNDT to NDT. It references the documents produced on qualification and certification of NDT personnel, the liaison with ISO TC-135, and the ongoing work.

The roles of NDT societies and the Regional Groups of ICNDT in the certification process are highlighted.

## A7.2 Foundation of ICNDT

ICNDT is the World Organisation for Non-destructive Testing.

It was established in 1955 by a group of European countries, USA, Japan, China, India and the USSR. Its main objective was to gather scientists and technologists from all over the world in order that they could pool together their common experiences in promoting the development of the application of NDT, which was then in its very early stages.

In due course ICNDT broadened its horizons and defined the following objectives:

- To be the international organisation that acts as prime focus on Non-Destructive Testing for the benefit of the involved community and public in general.
- To promote international collaboration in all matters relating to NDT.
- To encourage the foundation, growth, development and cooperation of National and regional Societies.
- To assign the place and organisation of the World NDT Conference to an appropriate NDT Society or group of Societies, at intervals of four years.
- To establish with continental groupings of NDT Societies initiatives for implementing ICNDT policy.
- To encourage the formulation of International Standards on Non-Destructive Testing in collaboration with the International Standards Organisation (ISO), and other standards bodies.

## A7.3 World Conference on NDT (WCNDT)

The NDT World Conference organised by ICNDT was the first concrete expression of the desire to cooperate in dissemination of NDT. The first World Conference was held in Brussels in 1955 as a tribute to Gevaert, the producer of X-Ray film, which sponsored international meetings in Antwerp.

Subsequent World Conferences are listed in A7.9. Forthcoming conferences will be in South Africa 2012 and Munich 2016.

Besides the need to establish, improve and disseminate NDT techniques, the need for harmonisation of Qualification and Certification of NDT personnel has grown through the years with this topic becoming the focus of many ICNDT meetings and an important topic of discussion during the World Conferences.

**a) Montreal 1967 – Qualification and Certification of NDT Personnel**

In 1967 during 5th World NDT Conference held at Montreal, ICNDT adopted the following resolutions:

"The Committee agree that the appropriate time has arrived for the establishment of an 'International Recommendation on the Qualification of NDT Personnel' prepared by a Task group of ICNDT."

"All Delegates are requested to promote, through their National Standardisation Organisation, the importance of establishing an ISO for a Technical Committee to deal with NDT."

**b) Hanover 1970 – Discussions at World Conference**

The 1967 discussions had a strong impact on ICNDT. Three years later, at the 6th World Conference in Hanover 1970, the first contributions on the Qualification and Certification of NDT Personnel were given by France, Germany, Japan,

United Kingdom and the USA. At that meeting the following statement on Personnel Certification was made:

"Representatives of each country will submit statements on the qualification system prevailing in their country. These topics should form a topic for discussion at a specific session. In the meantime statements of the present position will be communicated to ICNDT members."

**c) Warsaw 1973 – Formation of Task Group**

In Warsaw in 1973, ICNDT, during its 10th meeting, appointed a Task Group for the preparation of Guidelines dealing with the Qualification and Certification of NDT Personnel.

**d) Cannes 1976 – ICNDT WH 76 – Liaison with ISO**

The first document of the ICNDT Task Group on Qualification and Certification of NDT Personnel was presented at the Round Table discussion in Cannes in 1976 during the 8th World Conference. The document was a comparison of all the existing schemes among members of ICNDT. This was the first step towards a more complete series of Guidelines on the Qualification and Certification of NDT Personnel. Recommendations were made to make ISO knowledgeable on the importance of a working group on NDT. It was agreed at this ICNDT meeting to forward the document to ISO-TC-135.

**e) Melbourne 1979 – Initiation of ICNDT Document on minimum technical requirements for Qualification and Certification of NDT Personnel**

In 1979 Melbourne during the 9th World Conference on NDT, a further step forward on the topic of the Qualification and Certification of NDT Personnel was made. Based on the Cannes document and the information available the following statements were made:

- *"Two types of certification schemes are present in the world: Independent Body Certification and Employer Based Certification. Mutual recognition of NDT Certificates may be possible and the working group shall try to facilitate this."*
- *"Three levels of Qualification are generally applied by the majority of the Country members."*

In the same meeting it was decided to prepare a document on the Minimum Technical Requirements for each level of Qualification relative to the different methods of NDT (RT, UT, PT, MT, ET, LT).

**f) Moscow 1982 – Review of draft Document WH-85**

After extensive work, in which all the main countries of the world were involved, the Minimum Technical Requirements for Qualification and Certification of NDT Personnel were presented in Moscow at 15th ICNDT Meeting. It received general consensus with minor changes made in order to give more completeness in the document.

**g) Las Vegas 1985 – Final approval of WH-85**

In 1985, in Las Vegas during the 11th World Conference, the document received final approval for publication as an ICNDT document:

**h) ICNDT WH-85**

The Complete Recommendations on International Harmonisation of Training, Qualification and Certification of NDT Personnel (November 1985).

The document was sent to ISO-TC-135 and was used as a reference in the preparation of the ISO 9712 standard on the Qualification and Certification of NDT Personnel, which was published in 1992.

**i) New Delhi 1996 – ISO 9712 standard**

The 24th ICNDT meeting highlighted the work carried out by ISO/TC-135 in editing the ISO 9712 Standard and its extensive application in the member countries. It was noted that implementation of ISO 9000 would encourage certification according ISO 9712.

**j) Copenhagen 1998 – ICNDT Seminar on ISO 9712**

In 1998 in Copenhagen during the 25th ICNDT meeting, it was decided to create a common framework, which would comply with ISO 9712. In addition, it was proposed to prepare a Guidance document for ISO 9712 application. Following these proposals it was decided at the ICNDT PGP meeting in China (Shantou) to organise the first ICNDT Seminar on ISO 9712 Certification during the World Conference in Rome.

**k) Rome 2000 – Updating ICNDT WH-85**

During the 27th ICNDT meeting in Rome a complete revision of the document ICNDT WH-85 relative to minimum technical requirement was handed directly to the ISO-TC 135 chairman. Many interesting items relative to global mutual recognition of NDT schemes emerged from the ISO 9712 seminar.

**l) Brisbane 2001 – ICNDT Recommended Guidelines for Qualification and Certification of NDT Personnel according to ISO 9712**

In the PGP meeting held in Brisbane, recognising that an increasing number of schemes are aligned to ISO 9712 (including EN 473, ACCP, etc), it was proposed to draft ICNDT Guidelines for Qualification and Certification of NDT Personnel based on ISO 9712.

**m) Montreal 2004 – ICNDT Recommended Guidelines for Qualification and Certification of NDT Personnel according to ISO 9712**

The first edition approved by an ICNDT Editorial Committee was published and circulated to delegates at the 16th WCNDT.

## A7.4 Role of NDT Societies

In most countries the major catalyst for establishing a certification scheme is the national NDT Society.

The Society provides a focus for information on NDT technologies, training and certification and, through the ICNDT, a link to the international NDT community. More than 62 countries have established NDT Societies (see www.icndt.org), and ICNDT continues to assist the formation of new societies.

## A7.5 Role of ICNDT Regional Groups

The Regional Groups within ICNDT have a primary role in the work of spreading the knowledge of NDT and providing information on how to set up an NDT Society.

Four Regional Groups are active:

- Asia Pacific Committee;
- Pan American Committee;
- European Federation for NDT – www.efndt.org;
- African Federation of NDT – www.afndt2008.com.tn.

They have their own constitutions which, in terms of both strategy and policy, are in line with that of ICNDT. Their Regional Conferences have become increasingly more and more important in the promotion of NDT.

## A7.6 IAEA/ICNDT Cooperation

In the promotion of NDT in developing countries, IAEA and ICNDT have forged a strong relationship based on mutual cooperation. ICNDT experts participate in IAEA projects for the training, qualification and certification of NDT Personnel.

## A7.7 ICNDT in 2008

In 2008, ICNDT was established as a non-profit international association registered in Vienna. NDT Societies from countries all around the world are full members. Other countries' NDT Societies are in the process of becoming full members. The current listing of members is given in Appendix 9.

An up-to-date list and contact addresses are given on the ICNDT website, www.icndt.org

## A7.8 ICNDT website

Information on all ICNDT activities is provided on the ICNDT web site (www.icndt.org). This site serves to improve and strengthen links between NDT Societies and Regional Groups. ICNDT also publishes a regular Journal.

## A7.9 World Conference on NDT – promoted by ICNDT

| Conference No. | Year | City | Country |
|---|---|---|---|
| 1st WCNDT | 1955 | BRUSSELS | Belgium |
| 2nd WCNDT | 1957 | CHICAGO | USA |
| 3rd WCNDT | 1960 | TOKYO | Japan |
| 4th WCNDT | 1963 | LONDON | Great Britain |
| 5th WCNDT | 1967 | MONTREAL | Canada |
| 6th WCNDT | 1970 | HANOVER | Germany |
| 7th WCNDT | 1973 | WARSAW | Poland |
| 8th WCNDT | 1976 | CANNES | France |
| 9th WCNDT | 1979 | MELBOURNE | Australia |
| 10th WCNDT | 1982 | MOSCOW | Russia |
| 11th WCNDT | 1985 | LAS VEGAS | USA |
| 12th WCNDT | 1989 | AMSTERDAM | The Netherlands |
| 13th WCNDT | 1992 | SAN PAULO | Brazil |
| 14th WCNDT | 1996 | NEW DELHI | India |
| 15th WCNDT | 2000 | ROME | Italy |
| 16th WCNDT | 2004 | MONTREAL | Canada |
| 17th WCNDT | 2008 | SHANGHAI | China |

## A7.10 Forthcoming World Conferences

| Conference No. | Year | City | Country |
|---|---|---|---|
| 18th WCNDT | 2012 | DURBAN | South Africa |
| 19th WCNDT | 2016 | MUNICH | Germany |

# Appendix 8: Basic principles of NDT methods covered by ISO 9712

- **Acoustic emission testing (AT)**

The principle of the method is based on the detection of acoustic waves emitted by a material due to its local stress/strain excitation, a crack initiation and/or crack propagation.

- **Eddy current testing (ET)**

A magnetic field, generated by a coil fed with alternating current produces induced currents (eddy current) in the test piece. Such currents affect the impedance of the coil that generates them. The presence of any discontinuity in the eddy current causes variations in their intensity and flow, and in turn the impedance of the coil. The corresponding signal fluctuation is represented on a meter or oscilloscope and may indicate the presence of a defect.

- **Infrared thermographic testing (IRT)**

Infrared thermography (Thermal Imaging) is a method of observing the appearance of an object in terms of its surface temperature. It is a non-contact, as well as non-destructive method of instantaneously determining minute variations of surface temperature that can be indicative of discontinuities at or below the surface scanned. The IRT method is particularly useful for plant and machinery condition monitoring, electrical systems condition monitoring and monitoring of buildings for insulation failure. It can be applied as a 'passive' or 'active' technique, the latter requiring the application of heat to the object under test, and the monitoring of the dissipation of that heat on the surface, which is influenced by sub-surface properties.

- **Leak testing (LT)**

When a penetrating flaw is present through a wall separating two environments at different pressure, the fluid at higher pressure passes to the lower-pressure environment at a flow rate which is proportional to its velocity. In some cases the turbulence caused at the point of flow generates wide band noise which can be detected by a transducer tuned to specific frequencies or, if a gas (typically helium) is injected, by a mass spectrometer.

- **Liquid penetrant testing (PT)**

The method is based on the phenomenon of capillary action, that is the tendency for a liquid to rise within a capillary tube, and on the physical properties of the liquid, viscosity and surface tension.

- **Magnetic particle testing (MT)**

The method is based on magnetic flux leakage at a discontinuity when a high intensity magnetic field is introduced into the test object – which must be ferromagnetic.

- **Radiographic testing (RT)**

The method is based on the change of attenuation of electromagnetic radiation (X, and gamma rays), caused by the presence of discontinuity or changes in material density when passing through the test material.

- **Strain Testing (ST)**

Strain testing covered by ISO 9712 is strain measurement using electric resistance strain gauges. When a test object is subjected to a strain, a strain gauge adhered to the test object is subjected to the same strain. This causes a change in the electrical resistance of the strain gauge. The change in resistance is detected as the change in output voltage of bridge circuit to which the strain gauge is connected.

- **Ultrasonic testing (UT)**

Ultrasonic testing is based on the phenomenon of acoustic wave reflection or diffraction upon encountering obstacles to propagation within a material. If the obstacle lies normal to the incident ultrasonic beam the wave is reflected back to its generating source. In the case of Time-of-Flight Diffraction (TOFD) waves are diffracted from the tips of cracks.

- **Visual testing (VT)**

Visual Testing is a non-destructive testing method applied using specialised equipment such as mirrors, magnifiers, borescopes, fibrescopes, gauges, closed-circuit television (CCTV) using light sources and special lighting, as well as computer-enhanced systems, imaging systems and special optical systems.

Note: most abbreviations are those adopted in ISO 9712.

# Appendix 9: ICNDT Membership Directory

## ICNDT Societies

| | *Country Name* | *Address* | *Phone* | *Fax* | *EMail* | *Home Page* |
|---|---|---|---|---|---|---|
| | Algeria | C.S.C.,Centre de Recherche Scientifique et Technique en Soudage en Controle, Route de Dely Ibrahim, BP64 Cheraga ALGER | +213 2 361 850 | +213 2 361 850 | zergougmourad@hotmail.com | |
| MEMBER | Argentina | AAENDE, Asociación Argentina de Ensayos No Destructivos y Estructurales, Av. General Paz 1499 - San Martin Pcia, 1650 Buenos Aires | +54 11 6772 7429 | +54 11 6772 7355 | info@aaende.org.ar | http://www.aaende.org.ar |
| MEMBER | Australia | AINDT, Australian Institute for NDT, PO Box 52, Parkville, Victoria 3052 | +612 9679 7999 | +612 9679 7888 | info@aindt.com.au | http://www.aindt.com.au |
| MEMBER | Austria | ÖGfZP, Austrian Society for NDT, Krugerstrasse 16, A-1015 Wien | +43 1 514 07 6011 | +43 1 514 07 7011 | office@oegfzp.at | http://www.oegfzp.at |
| MEMBER | Bangladesh | BSNDT, Bangladesh Society for NDT, c/o NDT Division, Atomic Energy Centre, 4 Kazi Nazrul Islam Avenue, Ramna, Dhaka-1000 Dhaka | +880 2 509 498 | +880 2 861 3051(att. BSNDT) | bsndt@dhaka.net | |
| MEMBER | Belarus | BANDT, Belorussian Association for NDT and Technical Diagnostic, Akademicheskaya Str 16, 220072 Minsk | +375 17 284 1794 | +375 17 284 1794 | migoun@iaph.bas-net.by | |
| MEMBER | Belgium | BANT, Belgian Association of NDT, Lange haagstraat 128, B-1700 Dilbeek | +32 2466 79 42 | +32 4 3656 615 | info@bant.be | http://www.bant.be |
| | Bosnia and Herzegovina | Bosnian and Herzegovinan Society for NDT, Tvomicka 3, 71000 Sarajevo-Ilidza, BiH | +387 71 543 370 | +387 71 543 370 | | |
| MEMBER | Brazil | ABENDE, Associação Brasileira de Ensaios Não Destrutivos, Rua Guapiaçu 5, Vila Clementino, 04024-020 Sao Paulo-SP | +55 11 5586 3199 | +55 11 5581 1164 | abende@abende.org.br | http://www.abende.org.br |
| MEMBER | Bulgaria | Bulgarian Association for NDT, Rakovsky str 108, 1000 Sofia | +359 2979 6445 | +359 2868 6719 | tabakova@tu-sofia.bg | |
| MEMBER | Canada | CINDE, Canadian Institute for NDE, 135 Fennel Avenue, Hamilton, Ontario L8N 3T2 | +11 905 387 1655 | +11 905 574 6080 | d.marshall@cinde.ca | http://www.cinde.ca |
| MEMBER | China, The People's Republic of | ChSNDT, The Chinese Society for NDT, 99 Handan Road, 200437 Shanghai | +86 21 6555 0277 | +86 21 6555 0277 | chsndt@public2.sta.net.cn | http://www.chsndt.com |
| MEMBER | Colombia | Instituto Colombiano de Normativa Tecnicas y Certification, Carrera 37 No. 52-95, Santafe de Bogota', D.C. | 0057 1 315 0377 | 0057 1 222 1435 / 315 2968 | cliente@icontec.org.co | |

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|---|---|---|---|---|---|---|
| | Costa Rica | National Committee for NDT, c/o Inst Tec Costa Rica, Apartado 159, Cartago | +506 552 5333 | +506 551 5348 | jmunoz@itcr.ac.cr | |
| MEMBER | Croatia | CrSNDT, Croatian Society for NDT, Ivana Lucica 1, 10000 Zagreb | +385 1 615 7129 | +385 1 615 7129 | vk@fsb.hr | http://www.hdkbr.hr |
| MEMBER | Czech Republic | Czech Society for NDT, c/o Brno University of Technology, Technickà 2, CZ 616 69 Brno | 420 5 4114 3229 | 420 5 4114 3231 | cndt@cndt.cz | http://www.cndt.cz |
| MEMBER | Denmark | The Danish Society for NDT, c/o Yxlon International AS, PO Box 1869, Halfdansgade 8, DK2300 Copehagen | 45 32 54 15 40 | 45 32 54 99 60 | | |
| | Ecuador | ESPOL, Escuela Politecnica del Litoral, PO Box 09-01-5863, Guayaquil | 593 422 80231 | 593 422 89 649 | oserrano@espol.edu.com | http://sendre@gye.satnet.net |
| | Egypt | Egyptian Society for Industrial Inspection, 3a Moaskar Romany Street, Rushdy, Alexandria | +203 546 4888 | +203 545 4299 | | |
| MEMBER | Finland | Finnish NDT Society, c/o Inspecta, PO Box 94, FI-02151 Espoo | +358 50 5666 380 | +358 10 521 6750 | juha.sillanpaa@inspecta.fi | |
| MEMBER | France | COFREND, 1 Rue Gaston Boissier, F-75724 Paris Cedex 15 | +33 144 197618 | +33 144 19 75 04 | cofrend@cofrend.asso.fr | http://www.cofrend.asso.fr |
| MEMBER | Germany | DGZfP, German Society for Non Destructive Testing, Max-Plank-Strasse 6, D-12489 Berlin | +49 30 67807 100 | +49 30 67807 109 | mail@dgzfp.de | http://www.dgzfp.de |
| MEMBER | Greece | Hellenic Society of NDT, PO Box 64066, Zografou, 15710 Athens Hellas | +301 772 1312 | +301 772 13 02 | hsnt@hsnt.gr | http://www.hsnt.gr |
| | Hungary | GTE-Scientific Society of Mechanical Engineering - NDT Division, 68 Fö str, 1027 Budapest | +36 1 202 0582 | +36 1 202 0252 | mail@gte.mtesz.hu | http://www.gte.mtesz.hu |
| MEMBER | India | ISNT, Indian Society for Non-Destructive Testing, IGCAR - Indira Gandhi Centre for Atomic Research, Kalpakkam, 603102 Tamil Nadu | +91 44 2748 0234 | +91 44 2748 0234 | dir@igcar.gov.in | http://www.isnt.org.in |
| MEMBER | Ireland | IIWEI, Irish Institute of Welding & Engineering Inspection, c/o Enterprise Ireland, Glasnevin, Dublin 9 | +353 1 808 2272 | +353 1 857 0452 | | http://www.iiwei.org |
| MEMBER | Israel | ISRANDT, Israeli National Society for NDT, 5 Eliau Shamir St, 50297 Mishmar Hashiva | 972 3 960 5559 | 972 3 960 4160 | yossi@gabishoef.co.il | |
| MEMBER | Italy | AIPnD, Italian Society for NDT, via Foresti No 5, 25127 Brescia | +39 030 37 39 173 | +39 030 37 39 176 | aipnd@numerica.it | http://www.aipnd.it |

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|---|---|---|---|---|---|---|
| MEMBER | Japan | JSNDI, The Japanese Society for Non-Destructive Inspection, MBR99 Bldg, 67 Kanda-Sakumagashi, Chiyoda-ku, 101- 0026 Tokyo | +81 3 5821 5105 | +81 3 3863 6524 | acd@jsndi.or.jp | http://www.soc.nii.ac.jp/jsndi |
| MEMBER | Kenya | NDTK, Non-Destructive Testing Society of Kenya, PO Box 34284, 00-100 Nairobi | +254 20 2721376 | +254 20 2721389 | engjk@ndtk.co.ke | http://www.ndtk.co.ke |
| MEMBER | Korea | KSNT, Korean Society for Nondestructive Testing, 635-4 Yeoksam-dong, KOFST Center Suite 710, Gangnam-gu, Seoul 137-703 | +82 2 583 7564 | +82 2 582 2743 | ksnt@hitel.net | http://www.ksnt.or.kr |
| MEMBER | Latvia | Latvian Society for NDT, 23 Klijanu Str, LV, 1012 Rega | +371 737 0391 | +371 782 0303 | kval@latnet.lv | |
| MEMBER | Lebanon | IRI, Industrial Research Institute, IRI Building, Lebanese University Campus, Hadath-Baabda, Lebanon | 00961 5467 831-7 | 00961 5467 831-7 | cls@iri.org.lb | http://www.iri.org.lb |
| MEMBER | Lithuania | Kaunas University of Technology, Studentu 50, 3031 Kaunas | 370 7 351 162 | 370 7 451 489 | rymantas.kazys@tef.ktu.lt | |
| MEMBER | Malaysia | MSNT, Malaysian Society for NDT, Industrial Technology Division (BTI), Malaysian Nuclear Agency, Bangi, Kajang | +60 16 7234936 | +60 7 5568918 | yeoyanteng@gmail.com | |
| MEMBER | Mexico | IMENDE, Instituto Mexicano De Ensayos No Destructivos A.C., Ruben M. Campos 2651, Villa de Cortes, D.F, CP03530 | +52 555 579 6629 | +52 555 579 9154 | agarciacueto@imende.com | http://www.imende.com |
| MEMBER | Moldova | ATND, Moldavian Society on NDT & Technical Diagnostics, 20 Meshterul Manole St, MD-2028-Moldova Kishinev | +3732 472 145 | +3732 473 528 | nercont@meganet.md | http://www.ndt.md |
| | Mongolia | MSNDT, Mongolian Society for NDT, MTU Campus-2, Room X302, Sukhbaatar Duureg, PO Box 46/943, Ulaan Baatar | 00 976 9919 2343 | 00 976 1 324121 | b.tumen@mtu.edu.mn | |
| MEMBER | Netherlands | KINT, Dutch Quality Surveillance and NDT Society, Herberg 28, 2264 KT Leidschendam | 070 327 1472 | 070 327 1472 | info@kint.nl | http://www.kint.nl |
| MEMBER | New Zealand | NZNDTA, New Zealand Nondestructive Testing Association Inc, PO Box 854, Blenheim 7321 | +64 3 570 5858 | +64 3 570 5854 | eondta@ndta.co.nz | http://www.ndta.org.nz |
| MEMBER | Nigeria | Nigerian Society for NDT, c/o Gammatec, Portharcourt | 234 846 11027 | | martessien@yahoo.com | |
| MEMBER | Norway | NSNDT, Norwegian NDT Society, Claude Monet alle 5, N-1338 Sandvika | +47 64 00 35 00 | | secretariat@ndt.no | http://www.ndt.no |

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|---|---|---|---|---|---|---|
| MEMBER | Pakistan | PASNT, Pakistan Society for NDT, c/o National Centre for NDT (NCNDT), SES Directorate, PO Box 1781, Islamabad | +92 51 444 6127 | +92 51 444 4126 | ncndt@isb.comsats.net.pk | http://www.paec.gov.pk/ncndt/ncndt-index.htm |
| MEMBER | Philippines | PSNDT, Philippine Society for NDT, c/o Philippine Nuclear Research Institute, Commonwealth Avenue, Diliman, Quezon City | (632) 491-63-53 | (632) 920-87-88 | engrajmateo@yahoo.com<br>acalayag@chevron.com | http://www.psnt-ndt.org |
| MEMBER | Poland | Polish Society for NDT and Technical Diagnostic - SIMP, Swietokrzyska 14a, 00-050 Warsaw | +48 22 826 45 55 | +48 22 826 03 54 | zg@ptbnidt.pl | http://www.ptbnidt.pl |
| | Portugal | RELACRE Associacao de Laboratorios Acreditados de Portugal, Rua Filipe Folque No 2-6, 1050-113 Lisboa | +351 213 139 840 | +351 213 139 841 | claudia.almeida@relacre.pt | http://www.relacre.pt |
| MEMBER | Romania | ARoENd, Romanian Association for NDT, 7 Soldanului St, Bl 137, SC.A, AP.4, Sector 4, 42042 Bucharest | 00 401 312 8220 | 0040 1 332 5843 | adrian_stanciu@aroend.ro | http://www.aroend.ro |
| MEMBER | Russia | The Russian Society for NDT and Technical Diagnostic, Usacheva st 35, 119048 Moscow | +70 95 245 5656 | +70 95 246 8888 | spektr@co.ru | http://www.rsnttd.ru |
| MEMBER | Serbia | Serbian Society for NDT, Grcica Milenka 67, 11000 Beograd | +381 11 2419 255 | +381 11 402 849 | sdibr@sdibr.org.yu | http://www.sdibr.org.yu |
| MEMBER | Singapore | Singapore Welding Society, 151 North Buona Vista Road Phase Z.Ro Technopreneur Park Block C, #02 - 03, 139347 Singapore | 6779 7706 | 6464 0186 | askwheng@ntu.edu.sg | http://www.sws.org.sg |
| MEMBER | Slovakia | Slovak Society for Nondestructive Testing, c/o WRI- Racianska 71, 83 259 Bratislava | +421 7 4924 6596 | +421 7 4445 2145 | ssndt@ssndt.sk | http://www.ssndt.sk |
| MEMBER | Slovenia | SSNDT, Slovenian Society for NDT, Aškerčeva 6, Faculty of Mechanical Engineering, University of Ljubljana, 1000 Ljubljana | +386 1 477 1203 | +386 1 477 1225 | janez.grum@fs.uni-lj.si | |
| MEMBER | South Africa | SAINT, South African Institute for NDT, PO Box 76068, 40 Lynnwood Ridge 0041 | +27 11 719-5717 | +27 12 807-3829 | saint@acenet.co.za | http://www.saint.co.za |
| MEMBER | Spain | AEND, Associacion Española de END, Calle Bocangel, 28, 2° izda, E-28028 Madrid | +34 91 361 25 85 | +34 91 361 47 61 | informacion@aend.org | http://www.aend.org |
| | Sri Lanka | SNDT, Society for Non Destructive Testing, Sri Lanka, c/o Atomic Energy Authority - 343, Lanka Tractors LTD. Bldg., Orugodawatta 60/460, Baseline Road | 94-1-533427-8 | 94-1-533448 | srlaea@slt.lk | |

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| MEMBER | Sudan | SSNDT, Sudanese Society for Non-Destructive Testing, SAEC, NDT Department PO Box 3001, Khartoum | +249 91222 8333 | +249 183 253942 | sudndt@yahoo.com | |
| MEMBER | Sweden | Swedish Society for NDT, c/o NDT Training, Center AB- Regattagatan 23, S-723 48 Vasteras | 46 21 164 440 | 46 21 164 444 | claes.eriksson@ndttraining.se | http://www.ndtsweden.com |
| MEMBER | Switzerland | SGZP, c/o Schweiz. Verein für Schweisstechnik/St. Alban Rheinweg 222, CH-4052 Basel | 061 317 84 84 | 061 317 84 80 | w.schmid@fh-aargau.ch | http://www.sgzp.ch |
| MEMBER | Taiwan | SNTCT, Nondestructive Testing Society of China-Taipei, 130, Kee-Lung Rd. Sec. 3, Taipei, Taiwan | +886 2 2363 0815 | +886 2 2366 0732 | sntct@snt.org.tw | http://www.snt.org.tw/ |
| MEMBER | Tunisia | COTEND, Tunisian Committee for NDT, Zi-GP7, Ksar Said, La Manduba 2010 | +216 7154 6318 | +216 7154 7337 | f.herelli@cetime.co.tn | http://www.cetime.ind.tn |
| MEMBER | Turkey | TURK NDT, The Turkish Society for Nondestructive Testing, Tahribatsiz Muayene Dernegi, Balgat, 23. Sokak No: 4/10 Ankara | +90 312 287 8316<br>+90 505 586 3626 | +90 312 287 8316 | info@turkndt.org | http://www.turkndt.org |
| MEMBER | Ukraine | Ukrainian Society for Nondestructive Testing, 11 Bozhenko St, 3680 Kiev | +380 44 227 2666 | +380 44 220 9482 | usndt@ukr.net | http://www.usndt.com.ua |
| MEMBER | United Kingdom | British Institute of Non-Destructive Testing, 1 Spencer Parade, Northampton NNI 5AA, United Kingdom | +44 1604 630124 | +44 1604 231489 | info@bindt.org | http://www.bindt.org |
| MEMBER | Uruguay | AENDUR, Asociaciòn Uruguaya de Ensayos No Destructivos, Plaza Independencia, 812 piso 2, 11100 Montevideo | +5982 901 20 48 | +5982 902 1681 | aendur@adinet.com.uy | |
| MEMBER | USA | ASNT, The American Society For NDT, 1711 Arlingate Lane, PO Box 28518, 43228-0518 Columbus, Ohio | +1 614 274 6003 | +1 614 274 6899 | wholliday@asnt.org | http://www.asnt.org |
| MEMBER | Venezuela | ASOVEND, Associacion Venezolana de Ensayos No Destructivos, Edif Fisica y CPD, Ciudad Universitaria, Los Chacuara - Nos Caracas, Apartado 47533, Caracas 1041 | +58 2 6933 323 | +58 2 6933 323 | info@asovend.org.ve | http://www.asovend.org |
| | Vietnam | VANDT, Vietnam Association for NDT, 46 Nguyen Van Ngoc, Ba Dinh, Ha Noi | +84 4 7661 796 | +84 4 7663 258 | vandt@iop.ncst.ac.vn | |

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