

NDT CERTIFICATION - GLOBAL HARMONIZATION

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Abstract: The paper describes the historical development and current status of work on International Standard ISO 9712, “Non-destructive testing — Qualification and certification of personnel”. This is a certification scheme administered by a third-party – a neutral certification body that is independent of any single interest and has no direct involvement in either the employment or training of candidates for certification. The paper discusses several issues related to global harmonization of NDT certification. The roles of internationally recognized organizations such as the International Atomic Energy Agency (IAEA), the International Committee for Non-destructive Testing (ICNDT), the American Society of Mechanical Engineers (ASME), the Federal Aviation Administration (FAA) and the International Accreditation Forum (IAF) on the development and acceptance of ISO 9712 will be explained. The forces opposing harmonization will be examined. This paper will explore issues that remain to be addressed in order to achieve global harmonization of NDT certification. The status of other working groups within Subcommittee 7 (SC7) of ISO Technical Committee 135 will be discussed such as certification for limited applications (Working Group 5) and certification by performance demonstration (Working Group 7).

Introduction: By way of background, the first edition of the Standard, ISO 9712:1992, was published in May 1992, was 12 pages in length, covered 5 NDT methods, required 3 vision tests (distance/near/colour) and allowed an adopting country a transition period of 15 years to implement Levels 1 and 2. The second edition of the Standard, ISO 9712:1999, was published in May 1999, was 22 pages in length, covered the same 5 NDT methods, required only 2 vision tests (near/colour), defined industrial sectors, and allowed an adopting certification body a transition period of 5 years to implement Levels 1 and 2. The third edition of the standard, ISO 9712:2005, will likely be published in January 2005, is 25 pages in length, covers 10 NDT methods, requires 2 vision tests (near/colour), defines both product and industrial sectors, specifies the minimum number and type of specimens for Levels 1 and 2 practical examination, and has no transition period – implementation is upon adoption.

During development of successive editions of ISO 9712, a split developed between the needs of Europe and the rest of the world. In order to promote International harmonization of NDT certification, ISO 9712:1992 contained considerable flexibility to entice countries with existing schemes to changeover to ISO 9712 and to enable countries with no existing certification schemes to gradually meet all the ISO 9712 requirements. Thus ISO 9712:1992 allowed adopting countries a transition period of 15 years to implement Levels 1 and 2. In addition, the standard provided ‘guidance’ for minimum duration of training at Level 1 and 2. However, for harmonization within the European Union (EU), member countries needed a certification scheme that would apply fixed rules to all EU members immediately upon adoption of the standard. This meant that the 15 year transition period in ISO 9712:1992 was unacceptable. Similarly, the ‘guidance’ on training hours was too flexible. Taking ISO 9712 as a reference document, CEN (Comité Européen de Normalisation) amended ISO 9712 on those key points and produced the European Standard EN 473:1993. This split was carried into ISO 9712:1999 and EN 473:2000. The current ISO document allows an adopting certification body a transition period of 5 years to implement Levels 1 and 2 while adoption is immediate in the EN document. ISO 9712:1999 allows two examination-grading methods, either composite grading or minimum grading, while EN 473:2000 allows only composite grading. EN 473:2000 contains a normative requirement for the minimum number and type of specimens for Levels 1 and 2 practical examination while the ISO document has no such requirement. ISO 9712:1999 contains two suggested structured-credit systems for Level 3 recertification while EN 473:2000 contains one normative requirement.

In October 1999, at an ISO meeting in Vancouver Canada, industry representatives spoke of their frustration with having to pay for certification/qualification under several similar but different NDT standards. It was decided that what was needed was one truly global NDT standard – a fusion of ISO

9712 and EN 473 with the best of other recognized NDT Standards (e.g. SNT-TC-1A). Thus Working Group 6 (WG6) was created to begin work on the third edition of ISO 9712 with very close cooperation between the members of ISO, CEN, the European Federation for Non-Destructive Testing (EFNDT) and the International Committee for Nondestructive Testing (ICNDT) and International Atomic Energy Agency (IAEA).

Results: During the revision of ISO 9712, WG6 used four guiding principles:

1. Equal Same treatment for levels 1, 2 and 3
2. Normative Need more rules and less guidance
3. Simple Eliminate complexity
4. One-Way Eliminate options

WG6 and SC7 followed democratic principles throughout the revision process. All member bodies of SC7 had equal opportunity to submit written comments on ISO 9712. All member bodies of SC7 had equal opportunity to be present at the SC7 meetings in Madrid Spain and in Jeju Korea where they could freely express their opinions, exchange ideas and argue for their national points of view in an open forum. From the beginning, it was one of the intentions for ISO 9712 to converge with EN 473. All the changes made to ISO 9712:1999 began with a side-by-side and clause-by-clause comparisons with EN 473:2000. WG6 took the best of either standard - and incorporated the best of other standards as well into the drafting of ISO CD9712, ISO DIS9712, ISO DIS9712.2 and ISO FDIS 9712. The goal was to produce a truly global NDT standard - that was acceptable to Europe as well as the rest of the world. All changes were discussed and voted upon by member bodies of SC7. All changes were subject to review with the full and open participation of any country that cared to join in. All voices were fairly heard.

There were three meetings of Working Group 6: March 2000 in Birmingham Alabama USA, October 2000 in Rome Italy and May 2001 in Ottawa Canada. This last meeting produced a Committee Draft (CD) for vote by SC7 member bodies. Voting on the Committee Draft (ISO CD 9712) closed September 2001. Results were: 17 for, 1 against, 1 abstention. Eighty-three comments were received. The comments were reviewed by SC7 in October 2001 in Madrid, Spain. At this meeting, the Chair made a decision to include in the Draft International Standard (DIS) alternative non-examination options for recertification for Level 1 and 2.

In August 2002, the first Draft International Standard (ISO/DIS 9712) was issued for a five-month vote that closed in January 2002. During the voting period, it was discovered that ISO/IEC FDIS 17024 included a new section on recertification that contained requirements that could not be fulfilled by the non-examination options for recertification of Levels 1 and 2 included in ISO/DIS 9712. The Chairman of the ISO 17024 committee was contacted for guidance and he provided a written response stating that the non-examination options proposed in ISO DIS 9712 were not in compliance with ISO FDIS 17024. Following directions from ISO Central Secretariat, a meeting of WG6 was held in Orlando, Florida to examine the recertification-options issue and to review 97 comments received on the DIS. At the WG6 meeting, the section on recertification was revised to comply with the recertification requirements of ISO FDIS 17024. This revised recertification section was placed in the second DIS – ISO/DIS 9712.2.

In August 2003, a two-month voting period on ISO/DIS 9712.2 began but the period was extended to five months at the request of Germany. Voting ended in January 2004. Results of the vote were: 21 for, 2 against, 1 abstention. Ninety-six comments were received. In April 2003, ISO/IEC 17024:2003 was published - with the recertification section. In June of 2003, International Accreditation Forum (IAF) issued an IAF guidance document, "IAF Guidance on the Application of ISO/IEC17024:2003", that contained the following direction: 6.5.1). Where initial examination of competence includes a practical element, the re-certification process should also include a practical examination administered by the certification body.

In late October 2003, SC7 met in Jeju Korea and reviewed 80 comments on DIS2. The section on recertification was thoroughly discussed by the member bodies present. The wording of ISO DIS 9712.2

was further revised by SC7 to bring Level 3 into compliance with the requirement for a practical examination as described in the draft IAF Guidance on the Application of ISO/IEC17024:2003. e.g. Under ISO 9712, to attain Level 3 a candidate must pass the initial practical examination at Level 2. Further, clause 6.4.1 of ISO DIS 9712.2 lists one of the duties of the Level 3 as:

e) carry out and supervise all tasks at all levels.

This means the Level 3 must be capable of doing practical inspections just like a Level 2. Therefore, Level 3 recertification was revised by SC7 to include a practical examination.

In February 2004, the IAF published document IAF GD 24:2004, "IAF Guidance on the Application of ISO/IEC 17024:2003". Clause 6.5.1 was retained. This IAF document comes into force on April 01, 2005.

After revising the text of ISO DIS 9712.2, the document was submitted in late May 2004 to ISO Central Secretariat for the approval procedure as a Final Draft International Standard (FDIS). ISO has three months (until late August 2004) to distribute the document to all national bodies for a two-month vote (ending late October). At this final stage, National bodies may vote affirmative with no comments, negative stating technical reasons or abstain. Within two weeks after the end of the voting period, ISO will circulate the results of the vote. If the vote is successful, then the standard will be published within two months – approximately January 2005.

Discussion: Throughout the revision process, there has been considerable recognition and support for ISO 9712. Today, some 35 countries have National certification schemes based upon ISO 9712. The ISO standard is recognized and strongly supported by many prominent players in non-destructive testing.

In October 2001 at the Asia-Pacific NDT Conference in Dacha Bangladesh, the International Committee for Nondestructive Testing (ICNDT) and the International Atomic Energy Agency (IAEA) along with the Asia-Pacific Committee (APCNDT) promoted a Multilateral Recognition Agreement (MRA), based upon compliance with ISO 9712:1999. Ten countries (Australia, Bangladesh, India, Malaysia, Myanmar, New Zealand, Pakistan, Philippines, the Republic of Korea and Sri Lanka) signed this MRA.

In June 2002 in Barcelona Spain, during the 28th meeting of ICNDT, Giuseppe Nardoni, President of ICNDT, announced official ICNDT support in its strategic policy for ISO 9712 as primary reference for the certification of NDT personnel. At the same meeting, Isaac Einav, representative of the International Atomic Energy Agency (IAEA), stated that the IAEA would promote and financially support the establishment in developing countries of only one NDT standard - ISO 9712.

It is important to note that Annex B, "Guidance on training course content", of ISO FDIS 9712 references IAEA-TECDOC-628/Rev.1, 2002 edition, "Training Guidelines in Non-destructive Testing Techniques".

In April 2003, the Federal Aviation Administration of the US Department of Transport issued an FAA Advisory Circular (No: 65-31A) on the subject of training, qualification and certification of non-destructive testing personnel. The circular stated that, "Individuals who will provide equivalent competency to ensure satisfactory maintenance as set forth in relevant aviation regulations should: (3) Meet the criteria set forth in the following list of acceptable standards: (d) International Standards Organization (ISO) document: ISO 9712, Nondestructive Testing – Qualification and Certification of Personnel."

The July 2003 edition of ASME Boiler and Pressure Vessel Code, Section V, Article 1 contained a revision to the qualification and certification of NDT personnel for ASME code work, "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."

It is important to note that ISO FDIS 9712 now accommodates ASME-type requirements by including the following statement in the Scope, "Where required by regulatory requirements and codes, the authorization to operate must be given in writing by the employer in accordance with a quality procedure that defines any employer required job-specific training and examinations designed to verify

the certificate holder's knowledge of relevant industry code(s), standard(s), NDT procedures, equipment, and acceptance criteria for the tested products.”

The latest concerns of the International Accreditation Forum (IAF) are addressed via normative reference to ISO/IEC 17024:2003. The recertification requirements in ISO FDIS 9712 clearly comply with clause 6.5 of ISO/IEC 17024:2003 and clauses G.6.5.1 to 6.5.3 of February 2004 issue of IAF GD 24:2004, “IAF Guidance on the Application of ISO/IEC 17024:2003”

e.g. IAF GD 24:2004

6.5.1). Where initial examination of competence includes a practical element, the re-certification process should also include a practical examination administered by the certification body.

CEN and ISO are working jointly on the development of training criteria and curricula. It is hoped to reference this material in FDIS 9712.

There are forces opposing harmonization. One hears arguments such as, ‘ISO 9712 has no global relevance’. This seems a remarkable statement in light of the support above and the fact that 35 countries base their National certification schemes upon compliance with ISO 9712. One hears a second argument that ‘There are no codes or specifications that reference ISO 9712’. In many countries, national codes reference national NDT certification standards – that are now based upon ISO 9712. So while the code reference may not appear to be to ISO 9712, it is in fact a reference to ISO 9712. The recent inclusion of direct reference to ISO 9712 in an FAA document and reference to ‘international central certification programs’ in the ASME code overturns this argument. Most recently, in June 2004, the American Petroleum Institute published ANSI/API Specification 16A (API Specification 16A / ISO 13533 - based upon ISO 13533:2001), “Petroleum and Natural gas industries—Drilling and production equipment—Drill-through equipment”, that states:

“8.3.1 Non-destructive examination (NDE) personnel

NDE personnel shall be qualified in accordance with requirements specified in ISO 9712.

8.3.2 Visual examination personnel

Personnel performing visual examinations shall have an annual eye examination in accordance with ISO 9712.”

Thirdly, it has been said that, ‘ISO standards development is dominated by European countries’. I do not believe that this is true since ISO membership is open to all countries and each country has 1 vote. In the revision of ISO 9712, there was a strong presence of Japan, Australia, Canada, the USA, South Africa and recently Korea. The demands of all countries were dealt with fairly.

Finally, there are countries in which industrial concerns for reducing production costs appear to take precedence over regulatory-authority concerns for public safety. The industry-driven demands of some European countries are creating the potential for a serious de-harmonization between ISO 9712 and EN 473 in the area of recertification. There is move to seriously downgrade the recertification requirements of Level 1 and 2. Instead of requiring candidates for recertification to pass practical examinations based upon inspections of specimens controlled by the certification body, the intention is to permit in-company audits during which the certification body will only witness candidates for recertification performing company-specific tasks on company-specific products. This is more like a purchaser audit of a supplier than an independent assessment of the continuing competence of the inspector in the NDT method/sector. The obvious problem is that the candidate can rehearse selected company inspection procedures and train on the company specimens to be used in the recertification audit. Both training on examination specimens and direct employer involvement in the ‘qualification examination’ is disallowed in ISO 9712 and EN 473. This type of process is not permitted during the initial certification of the candidate, so how can it be considered for recertification? Subsequent to initial certification under ISO 9712 and EN 473, the employer may use such a process to evaluate the ‘individual’s suitability for a specific job’ or ‘job-specific knowledge, skill and physical ability for the specific task’ prior to issuing “operating authorization” to the candidate. However, ISO 9712:1999 clearly states that such job-specific “examination is outside the scope of this International Standard”.

To summarize, the revision of ISO 9712 into a truly global NDT standard has been progressing rapidly and democratically since October of 1999. The end may be sight – possible publication in January 2005.

Conclusions: In order to achieve global harmonization of NDT certification, certain issues remain to be addressed:

- Resolution of European proposals for company involvement in the recertification process.
- Standardized training curriculum for each of the main NDT methods.
- Standardized criteria for assessing training organizations implementing standardized curricula.
- Common product and/or industrial sectors (e.g. at the moment, most countries differ.)
- Standardized practical examination specimens (e.g. at the moment, most countries differ.)
(This is the next item on the SC7 agenda by resolution of TC 135 in Jeju Korea.)
- Common questions banks (e.g. perhaps a role here for ICNDT.)
- Simple guide to the establishment of a quality management system for certifying bodies (e.g. perhaps a role for ICNDT.)
- International accreditor for all certifying bodies to ensure that all national certifying bodies would be assessed in the same manner. (e.g. perhaps a role for ICNDT.)
- Automatic inspection systems (e.g. phased array ultrasonics, advanced eddy-current analysis)

References: It is appropriate to reference the work of other Working groups within SC7.

After 7 meetings, WG5 of SC7 completed its work with the publication in March 2004 of the first edition of ISO 20807:2004, “Non-destructive testing — Qualification of personnel for limited applications of non-destructive testing”. This International Standard establishes a system for the qualification of personnel who perform NDT applications of a limited, repetitive or automated nature, such as:

- a) eddy current and electromagnetic sorting of materials;
- b) eddy current and electromagnetic testing of tubular products during manufacture;
- c) normal beam ultrasonic testing of plate materials during manufacture;
- d) ultrasonic thickness testing.

Canada has already made use of this new ISO Standard in introducing in June 2004 a new program for the qualification and certification of operators of portable x-ray fluorescence analyzers.

Working Group 7 first met in March 2003 in Orlando, Florida. A second meeting took place in October 2003 in Jeju Korea at which two possible base documents were distributed and discussed. A third meeting of WG7 is scheduled in August 2004 in conjunction with the World Conference in Montreal Canada.