EN ISO/IEC 17024 and EN ISO 9712: As Team Players for an Accredited Certification Scheme

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Abstract

Certification schemes of accredited certification bodies for persons performing industrial non-destructive testing (NDT) must fulfill the requirements of EN ISO/IEC 17024:2012 and EN ISO 9712:2012. Both standards were published at the end of 2012, superseding EN ISO/IEC 17024:2003 and EN 473:2008 respectively. We have summarized the major changes in the new revisions of the standards and reviewed the requirements for certification schemes and certification process specified in EN ISO/IEC 17024:2012 with the requirements for qualification and certification of persons specified in EN ISO 9712:2012. The latter standard has been developed as a means of evaluating and documenting the competence of the persons who perform NDT, and contains many elements of the certification scheme and process requirements of the former. This reduces the number of tasks which otherwise would have to be performed by certification bodies themselves and therefore makes the two standards good team players.

Keywords: certification of persons, accreditation, certification scheme, certification process

1. Introduction

Persons performing non-destructive testing (NDT) have chosen a profession where they must do two things very often: the first, to try to explain friends, who haven’t heard NDT before, what they do for a living; the second, to provide documented proof to their employer, contract giver or another interested party, showing that they have the knowledge and ability to perform NDT successfully.

The documented proof is a certificate issued by a third-party certification body (CB), which is independent of all parties that have an interest on the certification of the person e.g. as a service provider or user [1]. Similar to the person performing NDT, the CB must also be in a position to show that it is working with adequate resources and that it has the competence, financial independency and fairness and impartiality in all its activities. This can be controlled by an accreditation body (AB), or a similar third-party organization, which issue a statement based on a decision following a review that fulfilment of specified requirements has been demonstrated by the CB and that the CB is competent to carry out specific conformity assessment tasks [2]. The requirements are given in technical documents (national, regional and/or international standards) which are developed by technical committees of experts with consensus and designed to be used as a rule or a guideline. They allow a repeatable way of doing something and ensure that the products are fit for their purpose.

EN and ISO standards defining the requirements for CBs, and for individuals who seek qualification and certification in NDT have existed since the end of 1980s but today the two standards, EN ISO/IEC 17024:2012 and EN ISO 9712:2012, are the state-of-the-art. This paper compares these standards with their predecessors by stressing the most important differences and explains how they complete each other and help CBs during the development of a certification scheme for NDT personnel.
2. General requirements for bodies operating certification of persons

2.1 ISO/IEC 17024 from 2003 to 2012

International standards and guidelines describing the general requirements for CBs have been developed by ISO and ISO committee on conformity assessment (ISO/CASCO) since the end of 1970s [3]. Conformity assessment is the demonstration that specified requirements relating to a product, process, system, person or body are fulfilled [1] and is the main task of a CB (also called conformity assessment body or CAB).

ISO/IEC 17024:2003, “Conformity assessment - General requirements for bodies operating certification of persons” was one of the standards developed by CASCO in collaboration with European Committee for Standardization (CEN) and European Committee for Electrotechnical Standardization (CENELEC), and its text was approved as EN ISO/IEC 17024:2003 without any modifications. It replaced EN 45013:1989, “General criteria for certification bodies operating certification of personnel” in Europe.

Objective of the standard was to achieve and promote a globally accepted benchmark for organizations operating certification of persons hence to harmonize certification process worldwide [4]. It provided the organizational and management system requirements for CBs and was designed to help them to develop and maintain a systematic plan for attaining certification of persons using objective criteria for assessment in order to ensure impartiality and reduce any conflict of interest. In the beginning, there had been some problems for CBs which were going through accreditation and a risk for a worldwide harmonization because of different interpretations of some important clauses of the standard. International Accreditation Forum (IAF) which took an important part in the development of the standard issued one year later a guidance document (IAF GD 24) on its application in an effort to help the ABs and CBs understanding the essence of the standard [5]. The document was updated several times and the latest version was issued in February 2009. These two technical documents were used by ABs to assess CBs until recently.

ISO/IEC 17024:2003 was due to a systematic review just like every ISO standard after 5 years and in 2008 ISO member bodies voted down for a revision. American National Standards Institute (ANSI) introduced a New Work Item proposal for a complete revision of the standard and it was accepted by member bodies in October 2008. A working group (WG 30) was formed in 2009 which revised the standard with the following goals [6]:

- Repair/rewrite areas of the standard that needed clarification or had been confusing.
- Incorporate all appropriate guidance from the IAF Guidance Document (IAF GD24) into the standard.
- Add additional clauses in some areas.
- Make the standard “look” like the other ISO standards.

Revision and approval processes took approximately 3 years, and the new standard was published on 1 July 2012. Its text was approved by CEN as EN ISO/IEC 17024:2012 without any modification. The European countries gave the status of a national standard before January 2013 and withdrew all conflicting standards. In Germany DIN EN ISO/IEC 17024:2012 was published in November 2012.
The standard itself does not define a transition period but there is an IAF Resolution (No: 2012-10) approved on 24 October 2012 which allows a transition period of three years from the date of publication (until 1 July 2015).

In United States ANSI announced on its website that new personnel certification body applicants for accreditation have to follow the new standard effective 1 January 2014 and that currently accredited programs need to demonstrate compliance with the new standard by 1 July 2015. The CBs had the opportunity to attend two-day workshops on the new standard which were held by ANSI several times in 2013. ANSI offers 3 more workshops in 2014 [7].

United Kingdom Accreditation Service (UKAS) explained on its website with a bulletin that starting from June 2013 all initial assessments will be conducted against the requirements of the new standard and that for existing accreditation the CBs could proceed directly with the transition assessment or defer this to the following scheduled visit until the end of March 2014 [8]. If the CB chooses to proceed with the transition assessment, it has to provide a gap analysis/implementation plan demonstrating how the organization has implemented the new requirements. This document will be used by UKAS to determine the compliance with the standard and to make recommendations regarding transition. If the CB chooses to defer then during the assessment within that time period the UKAS assessment team will identify where the CB does not currently meet the new requirements of the new standard and shall report these as recommended findings. Starting from 1st April 2014 all assessments are conducted against the requirements of the 2012 standard. Existing accreditation to ISO/IEC 17024: 2003 will remain valid until transition is achieved, or until 30 June 2015.

In Germany the national accreditation body (DAkkS) issued an audit checklist [9] for DIN EN ISO/IEC 17024:2012 on 25 March 2013 and started making assessments accordingly from the beginning of 2014 by request. Existing accreditations remain valid until 30 June 2015 but re-accreditation assessments are conducted according to the new standard. The assessment team of DAkkS informs the CB about the possible non-conformities during the last annual assessment before reaccreditation assessment.

In order to understand the reasons for the transition period of three years, the assessment procedures of the ABs and their intent on supporting CBs before the assessments, a review of the important changes after the revision is necessary.

2.2 EN ISO/IEC 17024:2012 – What are the important changes?

EN ISO/IEC 17024:2012 has 10 major sections and one informative annex about the principles for CBs and their certification activities. All important requirements for CBs are given in details under these major sections e.g. general requirements, structural requirements, resource requirements, records and information requirements, certification schemes, certification process requirements, and management system requirements. Table 1 shows a quantitative comparison of the contents of the two editions of the standard and a summary of the number and kind of changes after the revision. The details of the major sections, including a comparison with the old edition, are given in the following paragraphs.

Introduction section remained more or less the same. The phrase “Personnel certification body” is changed to “Certification body for persons”. The reason is that the term “personnel” is defined as employee and this definition often resulted in a wrong interpretation as
certification of one’s own employees. Interestingly, this term is used 31 times in the new edition whereas it was used only 4 times in the old one.

Table 1. Comparison of ISO/IEC 17024 editions

<table>
<thead>
<tr>
<th>ISO/IEC 17024</th>
<th>2003</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pages (Introduction-Annex A)</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>Words</td>
<td>~3500</td>
<td>~7000</td>
</tr>
<tr>
<td>Clauses, sub-clauses</td>
<td>86</td>
<td>186</td>
</tr>
</tbody>
</table>

With the revision:
- 20 slightly reworded
- 17 reworded
- 17 moved
- 17 deleted
- 12 same
- 03 changed

= 86

First remarkable change is in “Terms and definitions” section. It has 22 items and 13 of them are new. Only one of the old items remained the same, two of them were deleted and all others were reworded. A good example for rewording is the rewording of the term “competence”. The new edition defines competence as “ability to apply knowledge and skills to achieve intended results” whereas its predecessor defined it as “demonstrated ability to apply knowledge and/or skills, and where relevant demonstrated personal attributes, as defined in the certification scheme”. At first this change seems to be trivial, but since CBs for persons conduct competence assessments of persons against their scheme requirements, even using different words to define an existing term can force them to review their scheme and methods for assessments.

New terms and definitions in the standard are certification requirements, scheme owner, certificate, assessment, invigilator, personnel, applicant, impartiality, fairness, validity, reliability, interested party, and surveillance. Some of these terms were used in the old standard and often misunderstood, or they confused the users of the standard. CASCO attaches great importance to this section and issued recently a technical specification, ISO/IEC TS 17027:2014, “Vocabulary related to competence of persons used for certification of persons” with the objective of facilitating a common understanding among interested parties of the vocabulary associated with certification and competence of persons [2]. It has 80 items including the 22 items from ISO/IEC 17024:2012 six of which were slightly modified.

General requirements section has a more detailed clause for management of impartiality, or presence of objectivity [10]. It is an important aspect of third-party certification, but was a confusing part for most of the CBs (also for ABs) in the old edition. Under management of impartiality clause, following questions are answered: How may impartiality achieved? Must
there be an impartiality committee, or can it be demonstrated with other methods? How can CB prove that it is working impartial?

Structural requirements section has a new clause with more information about the structure of CB in relation to training. Training is seen as a threat to impartiality and is therefore critical for CBs which have certification schemes specifying recognition/approval of training as a requirement for certification. CBs must demonstrate the independence of the certification activities from training activities to ensure that the confidentiality, information security and impartiality of the certification activities are not compromised [10]. Trainers may not serve as examiners of candidates they have trained for a period of two years unless the CB can demonstrate how this does not compromise impartiality [10].

Resource requirements section has an emphasis on the personnel of the CB, since the competence of personnel ensures that certification activities are carried out correctly and impartially. Personnel is defined as individuals, internal or external, of the CB carrying out activities for the CB [10]. All personnel have to sign conflict of interest and confidentiality agreements. Requirements for examiners and for other personnel involved in the assessment e.g. invigilators and examination administrators are also given under this section.

Records and information requirements section describes the maintenance and use of collected information from applicant, candidate and certified person. It states that CBs must be able to demonstrate that the certification or recertification process has been effectively fulfilled, by use of appropriate records, and a balance must exist between the information that should be available to the public with and without request, and the information that must be kept confidential. There is a complete new clause about security for confidential candidate data and examination data, which requires the CB to develop policies and procedures that includes consideration of the location of the materials (transport, storage, exam centres, destruction, digital, etc.), the nature of the materials (electronic, paper, test equipment, etc.), and the steps in the life cycle of examinations (development, administration, results reporting, etc.).

Certification schemes and certification process requirement sections of the standard will be discussed in the following section of this article in connection with EN ISO 9712:2012.

Management system requirements section of the standard is completely new and defines two options for CBs: the first, to establish a general management system which fulfils the requirements of the standard; the second, and this is for CBs which already have a management system in accordance with the requirements of ISO 9001, to support and demonstrate the consistent fulfilment of the requirements of the standard. An ISO/PAS (Publicly Available Specification) document specifying principles and requirements for the element of management systems related to standards for conformity assessment were incorporated into the standard [11].

Principles section added in Annex A includes principles associated with impartiality, competence, confidentiality and openness, responsiveness to complaints and appeals and responsibility. These informative annex serve as the framework for the entire standard.
3. NDT Certification Schemes and Certification Processes Requirements

On a survey of ABs and CBs conducted by IAF in 2009, the development of certification scheme was cited as one of the most problematic areas of CB for persons [6]. The new EN ISO/IEC 17024 therefore provides clauses detailing the requirements for the contents of a scheme, detailed clauses for certification requirements that must be in a scheme, and detailed requirements for the development and review of the certification scheme. In addition, certification process requirements including the application process, assessment process, examination process, decision on certification, suspending, withdrawing or reducing the scope of certification, recertification process and the use of certificates, logos and marks are written in more detail.

Parallel to the revision of ISO/IEC 17024, the standards specifying requirements for principles for the qualification and certification of NDT personnel, ISO 9712 and EN 473, have also been revised. The result is a truly internationally harmonized standard, ISO 9712:2012. The development process of the standard and the important changes after the revision are discussed in the following section. The standard provides CBs a means of evaluating and documenting the competence of NDT personnel and helps them to develop their certification schemes accordingly.

3.1 EN ISO 9712:2012 - What are the important changes?

Qualification and certification of NDT personnel by third-party CBs were based on two well-known standards, ISO 9712 and EN 473. ISO 9712 was originally developed and issued by ISO Technical Committee 135 Sub Committee 7 (ISO/TC135/SC7) and issued in the beginning of 1990s with the idea of harmonizing the certification of NDT personnel throughout the world. It was the first international standard specifying a third-party certification. The second edition of the standard was published early in 2000, and the third edition was published in 2005. EN 473 was developed by CEN Technical Committee 138 (CEN/TC138) in an attempt to fulfil higher quality requirements of the European Union for NDT personnel and to make it obligatory for all its members. It was issued first in 1993. The second and third editions followed its international counterpart in 2000 and 2008. EN 473 was similar to ISO 9712 in many points but the differences did not allow using both standards interchangeably. This caused many problems and confusions worldwide. CEN and ISO established a joint WG to overcome this problem, and started examining both standards in 2009, revised ISO 9712:2005 in three years and finalized ISO 9712 in 2012 for publishing. ISO 9712:2012 was approved as a European Standard without any modifications and replaced EN473:2008.

Both ISO 9712:2005 and EN 473:2008 have been changed significantly during the revision. The most important changes that have a direct influence on certification schemes are the changes in number of training hours, required experience times and the possible reductions, the changes in duration of validity of examinations, rules for re-examinations, the content of recertification examinations in level 1 and 2, the requirement for providing appropriate documented evidence of continued practical competence for level 3 recertification, introduction of e-assessment systems and digital certificates. In addition, the responsibilities for the CBs, qualification body, examination centre, employer and candidate are also revised, which have an effect on the organization and resources of the CBs, and also on the certification processes.
3.2 EN ISO/IEC 17024:2012 and EN ISO 9712:2012 as team players

EN ISO/IEC 17024:2012 states that a certification scheme is required for each category of certification and gives a list of elements which it must contain e.g. scope, job and task description and required competence. EN ISO 9712:2012 provides information for each element including required physical abilities (vision) and requires CBs to publish a code of ethics which describes the ethical behaviour in accordance with the scheme.

According to EN ISO/IEC 17024:2012 the certification process requirements in a certification scheme are the criteria for initial certification and recertification and their assessment methods, the criteria for suspending and withdrawing certification, and, if applicable, the criteria for changing the scope and level of certification and applying surveillance methods. EN ISO 9712:2012 serves here well with its comprehensive criteria given under the clauses like eligibility, examinations, certification, validity and recertification.

EN ISO 9712:2012 divides the validity of certificates into two periods, each maximum five years long. Prior to the completion of the first period of validity and every 10 years thereafter renewal must be applied by the certificate holder. Renewal requires from certificate holder to produce documentary evidence of a satisfactory visual acuity examination taken within the preceding 12 months and verifiable documentary evidence of continued satisfactory work activity without significant interruption within the scope of the certificate. Renewal can be seen as a surveillance method, but since 5 years is a long period, many CBs are making annual surveillances for a randomly selected portion of their certificate holders in addition. Prior to the completion of each second period of validity (every 10 years), the certificate holder may be recertified by the CB, provided the holder meets the criterion for renewal and meets the applicable conditions (e.g. examinations) described under recertification clause of the standard.

EN ISO/IEC 17024:2012 requires that the CB must incorporate appropriate experts in a working environment where the interests of all parties are represented fairly, without any interest predominating, during the development and review of its certification scheme. The experts identify and align prerequisites and assessment mechanisms taking the competence requirements into consideration. An up-to-date job or practice analysis is necessary is required to identify the tasks, required competence, prerequisites, assessment mechanism and examination content and the requirements for recertification and its interval. EN ISO 9712:2012 defines completely, or at least the frame of, all stated requirements, hence the job is done mostly by the technical committees of standard development organizations. The periodical review of the standard (e.g. every five years by ISO) makes sure that the technical context is controlled and still serves the purpose. CBs decide if the certification scheme will adhere rigidly to the standard or additional requirements will be needed. They publish and maintain specifications for trainings that include the syllabi, identify the details of the tasks and prerequisites for candidates and prepare and maintain examination content including specimens, master reports, question banks, examination papers, etc. in each category of certification.

EN ISO 9712:2012 fulfils most of the requirements (some completely, some partially) of certification processes given in EN ISO/IEC 17024. Table 2 shows the additional tasks which CBs have to accomplish in order to comply fully with the standard. The standard does not contain sufficient information about use of certificates, logos and marks, appeals against
decisions on certification and complaints, which are the remaining certification process requirements of EN ISO/IEC 17024 that have to be fulfilled by CBs.

Table 2. Tasks for CBs which have a certification scheme for NDT personnel

<table>
<thead>
<tr>
<th>Certification Process Requirements (Clause in EN ISO/IEC 17024:2012)</th>
<th>Tasks in addition to responsibilities defined in EN ISO 9712:2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Process (9.1)</td>
<td>Preparing an application form ensuring all information required by EN ISO 9712 is provided by the applicant, giving an overview of the certification process, applicant's rights and the fees, notice to the applicant of his/her opportunity to declare, within reason, a request for accommodation of special needs</td>
</tr>
<tr>
<td>Assessment process (9.2)</td>
<td>Documenting and making publicly accessible without request the specific methods and mechanisms required to verify that certified persons comply with requirements when there is a change in the certification scheme which requires additional assessment (e.g. transition from EN 473 to EN ISO 9712). Verifying the methods for assessing candidates (ensuring fair and valid assessments). Verifying and accommodating special needs, within reason and where the integrity of the assessment is not violated</td>
</tr>
<tr>
<td>Examination process (9.3)</td>
<td>Collecting and maintaining statistical data of examinations in order to reaffirm periodically the fairness, validity, reliability and general performance of each examination. Ensure the comparability of results of each single examination, both in content and difficulty, including the validity of fail/pass decisions.</td>
</tr>
<tr>
<td>Decision on certification (9.4)</td>
<td>Preparing a procedure defining the criteria on which the decision to grant, suspend, revoke or reduce the scope of certification is based, taking the relevant clauses of EN ISO 9712:2012 into consideration.</td>
</tr>
<tr>
<td>Suspending, withdrawing or reducing the scope of certification (9.5)</td>
<td></td>
</tr>
<tr>
<td>Recertification process (9.6)</td>
<td>EN ISO 9712 has a detailed process for recertification.</td>
</tr>
</tbody>
</table>
3.3. What do the standards say?

EN ISO/IEC 17024:2012 and EN ISO 9712:2012 have approximately 7000 and 11000 words respectively, but some of these words are used more frequently. In order to have an idea of the emphases of the standards, a graphical representation [12] of frequency of words can be made by using the so called “word clouds”. Word clouds are generated from documents, and they give greater prominence to words that appear more frequently. In Figure 1, top 20 words of the two standards, excluding articles, prepositions and modal verbs like shall, can and may, are shown. Accordingly, most frequent words in ISO/IEC 17024 are certification (295), body (146), requirements (71), process (48), scheme (47), ensure (38), certified (38), management (36), examination (36), person (34), persons (32), and personnel (31). Other words shown in the graphic are repeated less than 30 times in the standard e.g. impartiality (25), and competence (20). Most frequent words in EN ISO 9712:2012 are certification (177), examination (157), level (132), NDT (130), body (100), method (83), candidate (65), testing (51), and sector (50). Other words are repeated less than 50 times in the standard e.g. experience (48), training (46), and qualification (40). There is one important address both standards are pointing: A certification body.

Figure 1. Word clouds – EN ISO/IEC 17024:2012 (top), EN ISO 9712:2012 (bottom)
4. Conclusions

EN ISO 9712:2012 specifies requirements for principles for the qualification and certification of personnel who perform NDT. It does not describe all the requirements and policies for certification schemes for persons or act as a substitute of a certification scheme that must be reviewed and validated by the CBs. The general requirements for CBs are specified in EN ISO/IEC 17024:2012 including the requirements for contents of a scheme, the development and review of the certification scheme, and certification processes from application to decision on certification. It is an important task of the CB, to bring the information in the two standards together, with the support of NDT professionals who are experts in their field, and fulfil the requirements of both standards for establishing an NDT certification scheme. EN ISO 9712:2012 supports the CBs for developing their schemes in many aspects, since it was developed with the idea of having a third-party CB for certification, and contains most of the elements of certification scheme and process requirements of EN ISO/IEC 17024:2012.

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