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Guidebook for Establishing a Sustainable and Accredited System for Qualification and Certification of Personnel for Non-Destructive Testing

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GUIDEBOOK FOR ESTABLISHING A SUSTAINABLE AND ACCREDITED SYSTEM FOR QUALIFICATION AND CERTIFICATION OF PERSONNEL FOR NON-DESTRUCTIVE TESTING

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FOREWORD

Non-destructive testing (NDT) methods are used for detection, location and sizing of surface and internal defects (in welds, castings, forging, composite materials, concrete and many more). Various NDT methods are also used in preventive maintenance (nuclear power plants, aircraft, bridges, etc.). NDT methods are essential to the inspection of raw materials and half-finished products. They are applied to finished products and to in-service inspection, as well as for the design and development of new products and for plant life assessment studies. Thus NDT technology contributes significantly to the protection of life, public health and the environment through assurance of the quality and integrity of critical equipment and facilities. It is especially important in the developing Member States where the consequences of failure may be particularly severe, resulting in social, financial and environmental impacts.

The IAEA has supported developing Member States for capacity building in utilization of NDT technology by providing experts, equipment, training opportunities and scientific visits. It was recognized early that NDT operator qualification and certification deserved special attention as the Member States began to apply NDT technology to local industrial problems. A series of meetings, workshops and publications have been dedicated to this issue. These efforts have led to a stage of maturity and self-sufficiency in many countries, especially in the field of training and certification of personnel, and in the provision of services to industries.

ISO 9712, the international standard for qualification and certification of NDT personnel, has been adopted as the cornerstone for carrying out the training and certification activities. In 2005, a revised version of the standard, ISO 9712:2005, was published. There are some significant differences in this standard from previous editions, particularly in reference to an accreditation standard, ISO/IEC 17024:2003 (2003): Conformity assessment-General requirements for bodies operating certification of persons.

To analyse the impact of these new standards, a meeting of experts was convened in Vienna, Austria, in July 2005. These specialists have recognized the importance of having national NDT qualification and certification schemes harmonized at the regional and international levels.

This guidebook, which was prepared by this group and further improved and reviewed during the last two years, provides guidance to the Member States in the development of national schemes which comply with ISO 9712:2005 and ISO/IEC 17024:2003. It describes principles and practical aspects of implementing a national scheme for the certification of NDT personnel. It is important for Member States to realize that this publication is a guide to the steps to implementing such a national scheme. Such implementation will help them to upgrade their existing qualification and certification schemes and bring these to a uniform level where national and international accreditations can be sought.

The IAEA thanks all contributors to this publication for their valuable input. The IAEA officers responsible for this publication were I. Einav, Joon-Ha Jin and A.A. Khan.

EDITORIAL NOTE

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CONTENTS

1. INTRODUCTION

1.1. IMPORTANCE OF NON-DESTRUCTIVE TESTING EDUCATION, TRAINING AND CERTIFICATION

Education of personnel engaged in non-destructive inspection, including formal training, and certification, is probably the greatest single factor affecting the quality of non-destructive inspection. The objective of most (NDT) methods is to detect internal defects with respect to their nature, size and location. This is done by different methods, depending upon their inherent capability or sensitivity for flaw detection. The sensitivity of flaw detection for different NDT methods depends upon a number of variable factors which usually include type of specimen, its geometry and surface condition; nature, type and location of defects; characteristics of NDT equipment and parameters of relevant NDT methods and operator's eyesight, qualifications, experience and integrity.

Looking at the numerous variable factors influencing the sensitivity and quality of non-destructive testing, as listed above, the factor common to all the NDT methods is the operator, the person responsible for executing the tests and reporting the results. It is through the operator that the results of NDT tests are compiled for further consideration and critical decisions about the fate of the tested part. In many cases he himself holds the responsibility of passing a judgement on the acceptance or rejection of the part. It is the operator through whom the results of NDT can be falsified. If the operator is not properly knowledgeable, trained and experienced he might totally misjudge the results of NDT and reject the parts which are sound and capable of performing in service. On the other hand he might send the faulty parts into service which may become a source of premature failure. In both the cases the consequences are going to be adverse. In the first case the organization is going to suffer undue production losses while in the second the premature failure may lead to even bigger losses. Of no less importance is the integrity of the operator in view of his ability to falsify the results intentionally.

Non-destructive testing, in radiography, uses hazardous radiation sources. There is a danger of undue radiation exposures to the radiographers as well as to the general public if the radiographer is either ignorant or careless about these hazards. It is therefore essential to properly train all the radiographers in the use of radiations, and the radiation monitoring and handling equipment. All such persons should be properly certified and such certificates in fact should be cancelled in case their holders are found to be indulging in any malpractices or negligence regarding the safe use of radiation sources.

With the advent of new space-age materials and complex systems, engineers will be able to pursue structures and systems that require lower weight, greater strength, higher performance, less maintenance, and greater reliability to meet the competitive engineering and social challenges of the future. Each step of this scenario requires quality-control usually through NDT procedures and applications. Recognizing that NDT expertise is a key resource for the current and future needs of industry, industrialists are becoming more aware and concerned that such expertise is not taught to every undergraduate science and engineering student. These same individuals in industry perceive that it is not just the technical discipline of NDT that is missing; it is the whole philosophy of NDT, which must become a part of the new engineering curriculum. This then brings out the need for making NDT a part of the entire educational programme in addition to training the operators for specific jobs.

The need for effective qualification and certification schemes has been recognized as a significant part of the technology since the early 1960s. Over the last few decades, international organizations including IAEA, ISO and ICNDT have dedicated considerable

efforts to designing systems for credible and harmonized systems of qualifying the individuals who carry out the tests. Many product standards, codes of construction and contract documents recognize that the human element is critical to the reliability of the test and mandate formal certification of the NDT personnel performing the test.

1.2. INTERNATIONAL EDUCATION, TRAINING AND CERTIFICATION IN NDT

The NDT community has been conscious of this very important aspect of the technology and almost simultaneous with the development of NDT the training and certification of NDT personnel has been given due attention. Thus in the developed countries where NDT is being extensively practised, there is a sound network of places and institutions for imparting training to the NDT personnel. It is taught in many universities mainly as a part of other disciplines of education curriculum such as physics, electrical engineering, welding engineering, mechanical engineering, materials science and quality control. It also makes a part of the programmes of colleges and vocational training schools.

The training of personnel who are actually supposed to perform NDT is specially organized very carefully. This is mostly being done either by private NDT schools or institutions run by or in collaboration with professional NDT societies. These places have well qualified and experienced NDT trainers and a good collection of NDT test pieces with known defects. Their clear objective is to prepare the personnel for certification examinations which are separately organized.

The certification of NDT personnel is mostly being either done by the professional societies in various countries, by the regulatory or technical education bodies or by certifying bodies specifically created for this purpose. Each country has a national standard on the subject of training and certification of NDT personnel laying down the requirements of basic education and experience of the persons intending to take certification examinations. These standards also contain the procedure for conducting certification examinations and the responsibilities of various persons. Currently popular trend in training and certification in NDT is through a centrally controlled, non-profit third party. This has overcome many of the shortcomings of the other systems. ISO 9712:2005 [1] standard basically promotes this type of system and its current version is the one issued in 2005.

1.3. REQUIREMENTS FOR DEVELOPMENT OF TRAINING AND CERTIFICATION OF NDT PERSONNEL

For implementation of ISO 9712:2005 countries need to establish separate systems both for training and certification. Figure 1 outlines the essentially needed items for training while those for certification are shown in Fig. 2.

It may not be possible for all countries to establish separate and fully capable systems for training and certification at once. These will undoubtedly pass through different stages. Such stages in the development of national Qualification and Certification programmes for NDT personnel can be as follows:

(a) Capable of general alignment with the qualification and certification principles of ISO 9712:2005, recognizing that full compliance may not yet be possible with either this standard or its normative reference, ISO/IEC 17024:2003 [2], due to shortage of qualified personnel and other related facilities available nationally (depends on state of NDT development);

(b) Capable of fully complying with qualification and certification criteria of ISO 9712:2005, but not yet capable of achieving full compliance with ISO/IEC 17024:2003;

(c) Fully compliant with ISO 9712:2005 and ISO/IEC 17024:2003, capable of gaining/maintaining accreditation by IAF member body, and/or fulfilling conditions for mutual/multilateral recognition.

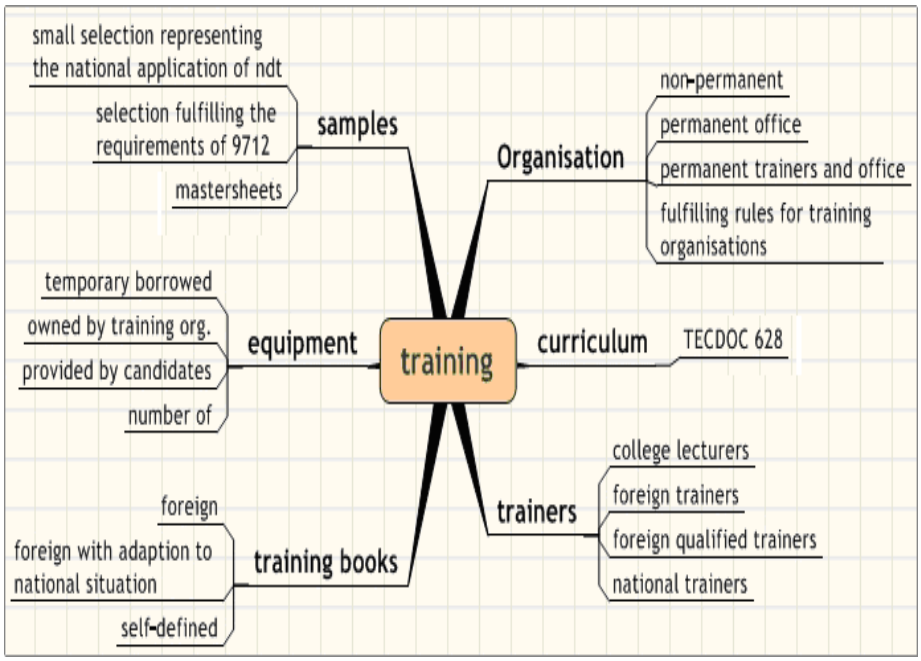


FIG. 1. Essential requirements for training.

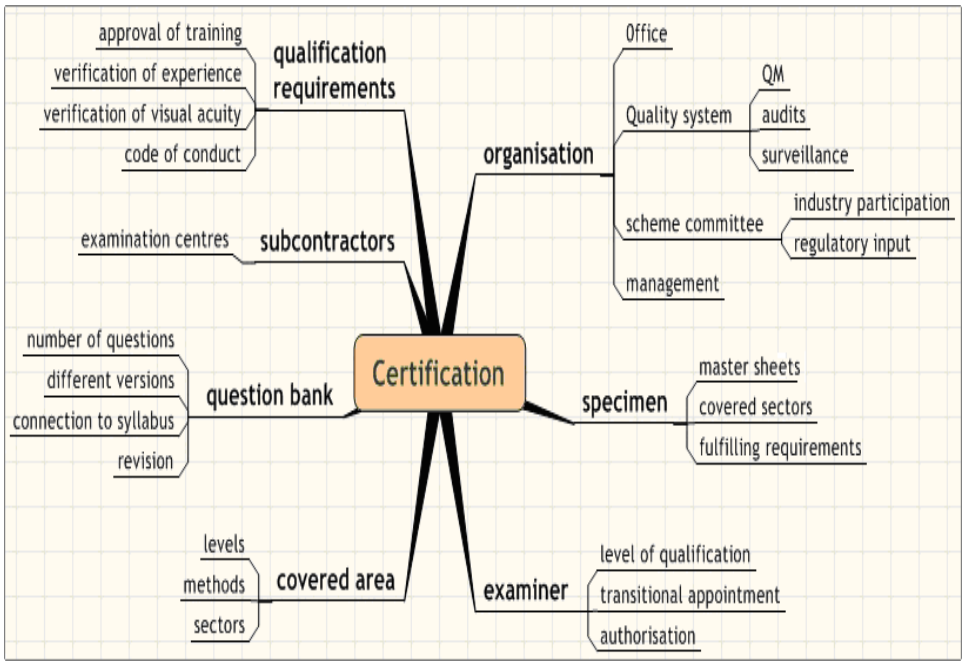


FIG. 2. Essential requirements for certification.

The stage of development of NDT qualification and certification within each Member State can be determined using matrix in Table 1. This matrix generally considers the state of the art of non-destructive testing in the Member State, and assesses the distance traversed along the path to complete an independent personnel qualification. This matrix, described in Table 1 as an 'index of development', could become a useful tool for the initiation, classification and evaluation of national NDT development. Table 2 gives further development of the definitions and parameters of this index.

Having established a framework for discussion, it is possible to proceed with a clause by clause review of three international standards, ISO 9712:2005, ISO/IEC 17024:2003 and ISO 9000, to select clauses where further guidance, based on the experience of Member States with active and recognized certification schemes, may be considered to be most useful. Such review is presented in subsequent chapters.

1.4. IAEA'S ROLE FOR PROMOTION OF EDUCATION, TRAINING AND CERTIFICATION OF NDT PERSONNEL[1]

From 1967 to 1974, the Organization of American States (OAS) had been sponsoring fellowships through its Multinational Metallurgy Programme, and NDT formed a part of these. Students attending these OAS programmes from throughout Latin America, thus exposed to the technology and application of NDT, returned to their own countries and began asking the UN agencies including the IAEA for assistance in NDT. IAEA spent two years evaluating the need for a regional project. In 1982, with the support of UNDP, IAEA, the United Nations Financing System for Science and Technology for Development (UNFSSTD), and the United Nations Industrial Development Organization (UNIDO), six countries started the Regional Non-Destructive Testing Project for Latin America and the Caribbean. By 1985, an additional eleven countries had joined, and three countries, Italy, Canada, and Germany, had become active donors of equipment, expertise and funds.

TABLE 1. INDEX OF DEVELOPMENT FOR TRAINING AND CERTIFICATION

Stage	A	B	C
	Training	Certification	Accreditation
1	Foreign	Foreign	Foreign
2	National Level 1 and 2	National Level 1 and 2	National (not IAF MLA)*
3	National Level 3	National Level 3	National (IAF MLA signatory)

* IAF-MLA refers to International Accreditation Federation Multilateral Agreement.

[1] The material in section derives from Training Course Series No. 9 Non-destructive Testing: A Guidebook for Industrial Management and Quality Control Personnel [5].

TABLE 2. INDICATORS OF DEVELOPMENT: TRAINING AND CERTIFICATION

	State of NDT development in country	Training	Certification	Status
1	NDT applications in national industry, but main sources of NDT expertise are imported;	Provided by foreign or foreign qualified trainers; Early discussion takes place on establishing indigenous training and/or certification systems; National training systems in early stage of development?	Certification presently provided by foreign certification body; Indigenous organisation adopts or follows IAEA guidance; National certification systems in early stage of development.	As a measure of development, would not yet be capable of gaining accreditation or registration under multi-lateral agreement (MLA)
2	Small cadre of indigenous Level 3 NDT personnel, possibly qualified and certificated by foreign certification bodies; National training and certification system in early stage of implementation.	Follows guidance of ISO/TR 25108 [3] on training bodies and IAEA-TECDOC-628 [4] syllabi; Implements TR 25108 and IAEA-TECDOC-628; National training programmes 'recognised' by emerging certification body;	Implementing IAEA guidelines; Capable of general alignment with the qualification and certification principles of ISO 9712:2005, recognising that full compliance may not yet be possible with either this standard or its normative reference, ISO/IEC 17024:2003, due to shortage of qualified personnel; Capable of fully complying with qualification and certification criteria of ISO 9712:2005, but not yet capable of achieving full compliance with ISO/IEC 17024:2003;	As a measure of development, would now be working towards being capable of gaining accreditation or registration under MLA
3	Significant number of indigenous Level 3 NDT personnel certified to ISO 9712:2005 sufficient to fully satisfy relevant criteria.		Fully compliant with ISO 9712:2005 and ISO/IEC 17024:2003, capable of gaining/maintaining accreditation by IAF member body, and/or fulfilling conditions for mutual/multilateral recognition.	As a measure of development, would now be capable of gaining accreditation or registration under MLA

While the sponsoring agencies and donor countries were contributing expertise, travel funds and equipment, it was also recognized by all that there needed to be a yardstick by which to measure the adequacy of the training, and that this training had to be harmonized within the region. A Regional Working Group on Training and Qualification was established, composed of one representative from each country in the region, selected for his experience, knowledge and competence in NDT. This group addressed the issues of regional guidelines for training and qualification, developing a draft regional standard for qualification and certification of personnel based on the existing Argentine standard, and a set of training guidelines for three levels in each of the five basic methods.

In early 1984 the IAEA convened a meeting of international experts in Vancouver, and asked their advice on the status of international harmonization. Following the recommendations of this meeting, IAEA decided to support the work of ISO/TC135/SC7 and to recommend its draft for use in all IAEA projects, closely monitoring developments and keeping open the option of developing its own document if progress appeared to be too slow. As another result of this meeting, the IAEA became an active member of ISO/ TC135/SC7 and contributed strongly to its work.

In the Latin America and Caribbean region, the participating countries then agreed to use the latest version of the ISO draft as a model for the national standards being processed through their respective approval systems. The countries in the Asia and Pacific regional project also agreed and, along with donor countries of Japan and Australia, began the process of harmonizing their respective national standards to the ISO model. As a particular contribution, the Latin America and Caribbean Regional Working Group's Training Guidelines were published by IAEA as its IAEA-TECDOC-407 [6] and included by reference in the ISO Draft Proposal.

Encouraged by the results of the project in Latin America and the Caribbean, IAEA in 1981 incorporated an NDT sub-project in its Regional Cooperation Agreement (RCA) for Asia and the Pacific which was looking at a much wider field of radiation technology which included radiotracers, radiation processing and nucleonic control systems. Seventeen countries of the region were members of the agreement while Japan and Australia were the donor countries. A large number of trainees have been trained as a result of the project. This training has been imparted following the syllabi guidelines of IAEA-TECDOC-628 (previous IAEA-TECDOC-407) and the text books developed under the project. Many of the countries have established the national certifying bodies or equivalent technical training boards in accordance with the requirements of ISO 9712:2005 and have formed the professional NDT societies. Other projects along similar lines have been started for the African, West Asian and Arab countries. Through these regional as well some individual country Technical Co-operation (TC) projects some 85 developing Member States are currently benefiting from the IAEA’s NDT programme. The main focus is to develop core groups of personnel able to undertake training and certification of personnel and provide NDT services to industries. IAEA-TECDOC-628 has been accepted internationally as one of the defining documents of the body of knowledge which serves as a basis for training programmes. Thus the role of IAEA for promoting international harmonization for training and certification of NDT personnel through the use of ISO 9712:2005 standard and establishment of professional NDT societies and strengthening the ICNDT has been remarkable. Other key organizations involved in personnel qualification and certification are the ISO, which has a technical committee (TC135) on NDT and sub-committee SC 7 on qualification and certification, and the International Committee for NDT (ICNDT), an association of national NDT societies, which has long been involved in developing guidelines for training of personnel

1.5. HARMONISATION OF QUALIFICATION AND CERTIFICATION IN NDT

ISO 9712-2005 emphasizes the central certification for each country supervised and controlled by a national certifying body (NCB) which should be constituted such as to have representatives from all interests related to NDT. However, issuance of a standard by ISO is not the ultimate in assuring international harmonization; it is the beginning. It has to be seen how faithfully and honestly the standard is practically implemented by each country. In this regard following steps could be useful as a means to ensuring the achievement of harmonization. These will supplement the information given in Figures 1 and 2:

(a) There should be well defined syllabi for various levels of certification in the NDT methods as listed in ISO 9712:2005. This has been done by the International Atomic Energy Agency (IAEA) in its IAEA-TECDOC publication, the current version of which is the IAEA-TECDOC-628 Rev1 (2002). This lays down detailed syllabi for Liquid Penetrant Testing (PT), Magnetic Particle Testing (MT), Eddy Current Testing (ET), Radiographic Testing (RT) and Ultrasonic Testing (UT), Visual Testing (VT), Leak Testing (LT). In addition brief outlines are given for possible topics to be addressed in Acoustic Emission Testing (AT), Neutron Radiographic Testing (NT), Thermal/Infrared Testing and Vibration Analysis. In view of rapid developments that are taking place in the field of technology and also the commensurate testing methods, revision 2 of the IAEA-TECDOC has been prepared and will soon be published. ICNDT has published similar syllabi published as its Recommendations ICNDT-WH-85 rev. 01 [7].

(b) Following the syllabi development of training materials, text books are the next important steps. The IAEA has started to work in this area as well. The text books on PT, MT, UT and RT, have been issued which follow the syllabus of IAEA-TECDOC-628 and can be used for training of personnel at the first two levels. The text books for the other methods are also proposed to be similarly developed. Related to these it would be appropriate if the books are updated following the revision of syllabi. Also at some stage the IAEA may send them for comments to various well known certification bodies around the world such as those in USA, Canada, United Kingdom, France, Germany, Italy, Japan, Australia and China with a view to achieving uniformity in the teaching materials.

(c) The next important step for achieving harmonization is uniformity in the content of practical work aimed at various levels of certification as well as uniformity in the standard test pieces containing known defects which are used for training and examinations for certification. The IAEA-TECDOC-628 contains some guidelines about the practical content of various training courses for different levels and different NDT methods. Guidelines about the practical content and the procedure for conducting and assessing the practical examinations were also developed at a regional workshop on qualification and certification of NDT personnel organized by IAEA in 1987. There, however, remains the need to put it in a format such that it is suitable for circulation to and inviting comments from the international NDT community. IAEA has conducted numerous workshops on the methodology of production of standard test pieces. The main emphasis was on welding. A guidebook on the subject has been published. There is a need to expand this exercise to other sectors of technology such as casting, forging, concrete and other ceramic materials. Also guidelines should be prepared as to what sort of standard test pieces are needed for specific sectors as outlined in ISO 9712:2005. Then their designs and possible methods of fabrication should be given.

The standard test pieces presently available from various manufacturers around the world along with their designs and tolerances on defects should next be reviewed. The IAEA and ICNDT can then consider persuading various training and certification agencies to use such recommended test pieces for their training and certification programmes.

(d) The uniformity in the standard of examinations and examination questions should be considered as the next important step towards achieving harmonization. Various certifying bodies in the developed countries maintain a bank of questions for conducting certification examinations. An example of this is the 'questions bank of ASNT'. Some other bodies, perhaps, also have similar published questions. The possibility of combining all of these and adding new ones such as to cover all the topics given in IAEA-TECDOC-628 for each method should be explored. The IAEA through experts' meetings has compiled such examination questions for Levels 1, 2 and 3. These when published will be available to the national certifying bodies especially in the developing countries so that they could initiate the process of conducting such examinations locally. A computer programme aimed at storage, retrieval and random selection of the questions could be a very helpful aid combined with the collection of questions.

(e) NDT is being practised and developed in many countries and English is understood not in all of these. Therefore, for spreading the message for harmonization far and wide the essential ingredients such as text books, guidelines detailing practical work and the questions will need to be translated. As a first step the translations could be made for the UNO-recognized languages and later into other languages if the need be.

(f) The modern trends of teaching are increasingly utilizing the video camera and the video cassettes. For example, ASNT has already produced video cassettes for a number of NDT methods. Such efforts could also be made to produce video cassettes related to teaching the materials according to IAEA-TECDOC-628 and distributed to the NDT training agencies around the world.

(g) Rightly motivated and educated teachers and trainers in NDT can play an important role in bringing about uniformity in teaching and training ultimately bringing uniformity in NDT practices. IAEA realized this from the beginning by issuing the train-the-trainer guidelines. This concept needs to be further developed and incorporated and practised by the well known training and certifying bodies. If at least one premier training institute is selected in each country and its teachers motivated to adopt a certain methodology of teaching using same text books and identical test pieces, we would have advanced fairly well towards achieving harmonization.

(h) The specific sectors for certification need to be defined in narrower and clearer terms. Only then would harmonization be meaningful because persons trained and certified in well defined specific sectors in one country would mean to have same knowledge and competence as in other countries.

(i) There is a need to assess as to how far the requirements of ISO 9712:2005 are being met by each country. ISO itself is trying to promote a new concept of harmonization at the world level in the filed of NDT. In fact the need for such an assessment has now been included within the ISO 9712:2005 standard by referring to an accreditation standard ISO/IEC 17024:2003 (2003): Conformity assessment-General requirements for bodies operating certification of persons. In this Guidebook a mechanism for such a

conformance assessment has been proposed through the national or international accreditation bodies which are in turn members of International Accreditation Forum (IAF). Societies and institutions found to be satisfactory should be issued a conformance certificate just as, for example, the ISO 9000 conformance certificate. The NDT certificates issued by societies and institutions conforming to ISO 9712:2005 and ISO 17024:2003 should then be acceptable at the international level and their holders considered qualified and competent to work in the area of their certification in any country of the world.

(j) There is a need to have closer collaboration between various national and international organizations which have an interest in the promotion and harmonization of training and certification of NDT personnel. Such organizations include, for example, the IAEA, ICNDT, EFNDT, ISO, ASNT, Pan Pacific Organization of NDT, etc. The IAEA has already taken the initiative of promoting such a collaboration by inviting relevant persons from these organizations into its regional coordination, Experts Advisory and Consultants' meetings on the one hand and participation in some of their meetings on the other. Such collaboration needs to be continued and strengthened.

(k) Finally the harmonization process has to be formalized and documented. This can be achieved through Multilateral Recognition Agreements (MRA) signed between the relevant bodies of countries on a bilateral or regional basis. A good example of such agreement is that signed between members of EFNDT. IAEA is seriously planning to take this up and promote this concept in all its regional programmes. Following the example and guidelines of ICNDT and the EFNDT Consultants' Meetings have been convened to prepare drafts for Multilateral Recognition Agreements (MRA) of various certification schemes among the countries of Africa and Asia. The agreement between African Member States has already been signed. The objectives of such agreements are:

i. To promote harmonization of the personnel certification schemes operated by Member States in particular and other countries in general.

ii. To facilitate world-wide recognition and acceptance of certificates of competence as issued by the respective country's Certification Bodies and which conform to the International Standards ISO 9712:2005 and ISO/IEC 17024:2003.

iii. To create an incentive for Member States to upgrade the levels of competence of their NDT personnel to achieve the standard applicable for harmonization.

iv. To offer guidelines and working models to achieve this target.

v. To promote co-operation between National Certification Bodies within the regions and outside.

2. CERTIFICATION OF NDT PERSONNEL

2.1. PERSONNEL CERTIFICATION AND QUALITY ASSURANCE

In any manufacturing, fabrication or production process, the quality of the structure or component produced (or service provided) is a key factor in the long term economic and engineering success of that process. Increasing awareness of the importance of quality in every area of technology has resulted from sensitivity to growing pressure of international competition, more discriminating demands from the marketplace and stricter consumer protection and product liability legislation.

Quality control can be defined as the controls applied at each manufacturing stage to consistently produce a quality product or in another way it is said to be the applications of operational techniques and activities which sustain quality of a product or service that will satisfy given needs. The concept of total quality control is defined as a system for defining, controlling and integrating all company activities which enable economic production of goods or services that will give full customer satisfaction. The word 'control' represents a management tool with four basic steps, namely, setting quality standards, checking conformance with the standards, acting when the standards are not met and assessing the need for changes in the standards.

In brief the objective of quality control is to provide the customer with the best product at minimum cost. The factors affecting product quality can be divided into two major groups. First one is the technological which includes machines, materials and processes and second the human which includes operators, foremen and other personnel. The latter is the more important. Because the human factor is of great importance in the quality control operation, special attention must be paid to the personnel in the organization. They need to be educated to the benefits of quality control, they need to feel involved in the quality control process and they must be able to communicate with other personnel on quality control. This allows them to develop a quality control spirit and improved morale necessary to the success of any quality control programme.

Quality assurance is the taking of all those planned and systematic technical and administrative actions necessary to assure that the item is being produced to optimum quality level and it will, with adequate confidence, perform satisfactorily in service. Quality assurance is aimed at doing things right the first time and involves a continuing evaluation of the adequacy and effectiveness of the overall quality control programme with a view to having corrective measures initiated where necessary. For a specific product or service this involves verification audits and evaluation of quality factors that affect the production or use of the product or service. Quality assurance is quality control of the quality control system.

Non-destructive testing and inspection are vital functions in achieving the goals of efficiency and quality at an acceptable cost. In many cases, these functions are highly critical; painstaking procedures are adopted to provide the necessary degree of quality assurance. The consequences of failure of engineering materials, components and structures are well known and can be disastrous.

It is an increasing requirement of quality assurance systems that a company's engineers, technicians and craftsmen are able to demonstrate that they have the required level of knowledge and skill. This is particularly so since NDT and inspection activities are very operator dependent and those in authority have to place great reliance on the skill, experience, judgement and integrity of the personnel involved. Indeed, during fabrication, NDT and

inspection provides the last line of defence before the product enters service, whilst once a product or structure enters service, in-service NDT is often the only line of defence against failure.

2.2. PERSONNEL CERTIFICATION — THE OPTIONS

2.2.1. Routes to qualifying NDT personnel

(a) In-company (or second party) certification

In-company certification means that the scheme for examining and certifying inspection and test personnel is controlled by a company procedure. This procedure is usually produced and operated by an independently qualified person who may be employed by the company or be an external consultant. The main advantage of this system is that companies with unusual inspection requirements can ensure that their personnel are qualified only in areas specific to the inspection task.

(b) Independent central (or third party) certification

Third-party certification means that personnel are required to pass examinations which are devised and set by professional examiners authorized by a Certifying Body which has overall control over the certification process which it operates. The Certifying Body normally works within the national standards system; ideally it is accredited for the service it is providing.

The main advantage of such a system is that independently awarded verifiable qualifications carry wider recognition and acceptance.

IAEA has supported this form of certification since it was introduced in a draft ISO standard and has continued to encourage Member States to develop credible central qualification and certification systems that withstand the test of international acceptance. This Guidebook focuses on third-party certification.

2.2.2. General requirements for NDT personnel certification

NDT personnel certification should be an industry led initiative with regulator input and support. The driving force for a national NDT qualification and certification system should be the affected industries and institutions. Those who have critical equipment, such as nuclear power plants or aircraft operations, need to rely heavily on inspection personnel, and it is in their economic interest to draw on local or national resources, and thus to establish a system to ensure that those resources are dependable.

The policy under which a certification scheme is operated should be determined by an independently constituted body with organizational members representing industry, regulatory authorities and professional societies within the country concerned.

The certification scheme must be designed to set and maintain the highest standards for the proficiency of NDT personnel through independent examination and assessment. It should also satisfy, as a minimum, the criteria specified in relevant international standards, i.e., ISO 9712:2005 and its normative reference, ISO/IEC 17024:2003.

2.2.3. Certification levels

NDT personnel are generally certified to 3 different levels of competence. A level is valid for a single method and may depend on the product to be tested and the industrial field of application.

Level 1 is the introductory level. Level 1 personnel are qualified to perform tests according to written instructions and to report the results. There should be close supervision and direction by higher level personnel.

Level 2 is the operator level of qualification. Level 2 personnel are allowed to prepare and perform tests and especially to interpret and evaluate results. Their task is also the preparation of test instructions and the guidance of NDT personnel.

Level 3 is the supervisor level. The Level 3 may hold the overall responsibility for a test facility or a laboratory and is also able to carry out all tasks of Level 1 and 2. Selection of test method, validation of instructions and supervision of personnel are major tasks.

2.2.4. Procedure of certification

The procedure to assure the competence of NDT personnel includes:

(a) Collection of practical experience under the supervision of qualified people.

(b) Documented theoretical and practical training to gain knowledge.

(c) Passing of theoretical and practical examinations under independent supervision.

(d) Documentation of regular vision testing.

(e) Authorization by the employer to perform tests.

(f) Issue of a certificate with limited validation by the independent certification body.

(g) Regularly recertification based on practical examination.

2.2.5. Training

Certification to ISO 9712:2005 is based on documented theoretical and practical training. It has to be provided at a well organized training facility, with qualified instructors, working according to an accepted syllabus--all acceptable to the certification body. Every candidate has to provide documented evidence that he has received the minimum training hours defined in the standard.

Such a training facility needs a quality system, text books, qualified trainers, test equipment and a wide selection of samples as described in this document.

2.2.6. Examination

To check knowledge and skills, an objective and independent examination is required. This examination is divided into theoretical and practical parts. An examination centre has to provide examination questions, specimens and examiners.

It is possible to use the rooms and the equipment of a training centre, but the selection of examination questions has to be unpredictable by the candidate. The specimens shall not be known to the students before the examination and examiners should not be involved in the training of the candidates.

The minimum number of questions and specimens is defined in ISO 9712:2005.

2.2.7. Certification

The organisation responsible for issuing of the certificates is the independent certification body. It checks the fulfilment of every precondition for certification including experience, training, examination, vision test and employer authorisation. The certification body provides a file for the candidate containing all of this information and prints and validates the certificate.

After no more than 5 years, the certificate becomes invalid and has to be renewed. Renewal includes verifying that vision requirements are still met, and verifying that the individual has maintained continued satisfactory work activity, relevant to the certification, without significant interruption. The certificate may be issued for another 5 years.

At the end of this second five year period, the individual must be recertified. The fulfilment of all conditions for renewal is checked and additionally the passing of a practical examination at an independent examination centre is required.

At least every 5 years the certificate becomes invalid and an activity is required: renewal followed by recertification followed by renewal and so on. In other words, every 10 years an independent examination supports the confidence in the skills of a candidate.

2.2.8. Recognition

The use of ISO 9712:2005 as a base for a national certification programme does not automatically guarantee international recognition of certificates issued according to this standard.

To gain recognition, it is important that the certification body and the examination centre are strictly following the requirements given in ISO/IEC 17024:2003 and that this is checked and stated by an internationally accepted organisation like an accreditation body or an international NDT organisation.

2.2.9. Organization options

The actual organisation that exists or is developed in the Member State to handle personnel qualification will depend to a great extent on the local circumstances. If the programme is well supported by industry, it will likely be possible to establish a new standalone not for profit certification body, supported by examination fees, volunteers and donations from suppliers, government and industry. On the other hand, if the qualification programme is being developed by government to meet some specific concerns of regulators or for public safety, then the organisation could be part of a government department. If there is an active technical society which engages NDT personnel from all interests, then this society might establish a qualification arm, keeping in mind that there needs to be a distinct separation between training and qualification.

3. STAGES OF DEVELOPMENT OF QUALIFICATION AND CERTIFICATION SYSTEMS

3.1. INTRODUCTION

The three stages in the development of national qualification and certification programmes for NDT personnel are described as follows:

3.2. STAGE 1

Capable of general alignment with the qualification and certification principles of ISO 9712:2005, recognising that full compliance may not yet be possible with either this standard or its normative reference, ISO/IEC 17024:2003, due to shortage of qualified personnel and other related facilities available nationally (depends on state of NDT development). In this stage, the MS relies on certification processes external to the country, and is working to establishing its own national certifying body.

3.3. STAGE 2

Capable of fully complying with qualification and certification criteria of ISO 9712:2005, but not yet capable of achieving full compliance with ISO/IEC 17024:2003. In this stage, the MS has level 3 personnel involved in setting up a national certification scheme, yet it does not have a structure, perhaps due to a shortage of Level 3 personnel, which would enable the MS national certifying body to demonstrate complete independence. The MS would depend on expertise from outside the country to evaluate the certification body and its activities to achieve international credibility.

3.4. STAGE 3

Fully compliant with ISO 9712:2005 and ISO/IEC 17024:2003, capable of gaining/maintaining accreditation by IAF member body, and/or fulfilling conditions for mutual/multilateral recognition. At this stage, the MS has the personnel and the infrastructure to demonstrate independence in the certification of personnel, has all of the procedures in place to show that, not only is the national certifying body independent, it is seen to be independent without international participation.

4. INTERNATIONAL STANDARDS RELATED TO QUALIFICATION AND CERTIFICATION OF NDT PERSONNEL

4.1. DEVELOPMENT OF INTERNATIONAL STANDARD ISO 9712

The system of all the countries having their independent and different certification standards presents certain problems at the international level especially in the case of multi-national companies who most of the times insist on having the NDT personnel qualified to their own standards instead of accepting the certification standards of the host countries. This is neither beneficial to the companies nor to the host countries. Had the standards of training and certification been uniform this problem would have been resolved. Varied certifications also present a problem to the movement of the NDT personnel from one country to another while this is not so for many other professions. But whenever such a move has to be made the NDT person has to obtain multiple approvals from different countries. The difference in certification

standards sometimes leads to difficulties in reaching bilateral or international agreements thus presenting trade barriers.

The NDT community was quite aware of the problems and a concern was shown at every international gathering of the community members. The International Committee on Non Destructive Testing (ICNDT), at its meeting in Warsaw in 1973, recognized the need for international harmonization in training, qualification and certification and formed a Working Group whose objective was to develop proposals for such harmonization. Between 1973 and ICNDT's meeting in Melbourne in 1979, this working group attempted to critically review and compare different national systems. A long discussion in Melbourne resulted in a new approach and agreement upon some common basic rules followed by development of detailed syllabi for each method.

At the time of 10th World Conference on NDT in Moscow in 1982, ICNDT's Working Group submitted a recommended syllabus for ultrasonic testing and reported on parallel and coordinated activities within the European Working Group for Harmonization of Training and Qualification of NDT Personnel.

On the basis of the work of a combined International and European workgroup, ICNDT eventually adopted the following principles in Moscow in 1982.

(a) Basic training and qualification of NDT personnel will be related to the testing methods.

(b) Training and qualification be divided into three levels.

(c) According to qualification requirements, the necessary knowledge and skills to be demonstrated will be harmonized and defined on a world-wide basis.

(d) Qualification examinations are to be carried out in the different countries by neutral (independent) organizations.

(e) Agreement on mutual recognition of the essential objectives of qualification is an effective means of international co-operation.

On the basis of these guidelines, an ICNDT working group started to compose the minimum requirements for the 'general theoretical' part of six methods. It became clear that there was also a need for formulating in more detail the common denominator of the qualification procedure. This led to a document on 'Basic Requirements for National Personnel Qualification and Certification Schemes' In essence, this document defines various terms and formulated guidelines, such as examination independent of employer and trainer (training institute) and under supervision of a national non-profit, independent body, a theoretical and practical hands-on examination for all levels; and possibility of performing additional job-specific examinations. These 'minimum' requirements and 'basic' requirements were adopted by ICNDT at the World Conference for Non-destructive Testing, Las Vegas, Nevada in 1985.

A subsequent review of progress by IAEA's group of consultants in May 1986 resulted in a recommendation that the IAEA and its member countries should continue to support the ISO developments, using the latest revision of the draft standard as the basis to establish national qualification and certification schemes.

In the meantime, Canada in 1980 became the secretariat of ISO/TC 135/SC 7 on the qualification of NDT personnel. This subcommittee first convened in Sept. 1983 in Ottawa. A second meeting took place in 1985 in Paris, where various systems were compared and common aspects determined. At this meeting, a small workgroup was formed, which, with the input of ICNDT, IAEA and many other organizations came up with a draft of an ISO standard. With only minor modifications, the draft obtained great support in the sub-committee meeting in Milan, in 1986. At the last meeting of the SC7 held in Philadelphia in 1987 the Draft Proposal was reviewed and it became apparent that the draft had the support of a substantial majority of the SC7's voting members (22 to 4). Unanimity of views amongst members was at last achieved in 1989 at the Berlin meeting and the draft was submitted to ISO. After that the formal procedure of ISO for issuance of standards was followed and standard 'ISO 9712: Non-destructive testing – Qualification and certification of personnel' issued in 1992.

Simultaneously a standard on the subject was issued by the European Committee for Standardization (CEN), namely EN 473 (1993): Qualification and certification of NDT personnel – general principles [8]. This was agreed upon as the common standard accepted by European Council for NDT (ECNDT). In a meeting convened during the 6th European Conference on NDT in France in 1994, a declaration was signed showing the intent to develop an agreement for a Multilateral Mutual Recognition of Certification (MRA) within ECNDT. The MRA document was signed in Berlin in 1996 by 23 European countries. The ECNDT was reconstituted as EFNDT (European Federation of NDT Societies) in 1997. In April 1999, a meeting of the Policy and General Purpose (PGP) Committee of ICNDT met in Birmingham, Great Britain in parallel with an international conference on qualification and certification of NDT personnel.

The ISO 9712 standard was updated in 1999 to smooth out the differences between this and the other standards. As a consequence the standards ISO 9712 and EN 473 became similar around the year 2002. Both the standards have been revised in 2005 and 2008, respectively. It is hoped that these two standards will play an important role for a harmonized training and certification of NDT personnel throughout the world.

In the USA the ASNT has now started ACCP (ASNT Central Certification Program) which includes certification according to ISO 9712 along with other international standards such as EN 473 and ANSI/ASNT CP-189 [9].

ISO 9712:2005 is now a widely used standard for the qualification and certification of NDT personnel and is providing a basis for achieving the global harmonization in this field.

4.2. CONTENTS OF STANDARD ISO 9712:2005

4.2.1. Introduction

ISO 9712:2005 standard has been developed by Subcommittee 7 'Personnel Qualification' of ISO's TC 135 'Non-Destructive Testing'. It provides 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.

In summary ISO 9712:2005 makes formal training as a pre-requisite for seeking certification. It recommends the syllabi which may be followed for these formal training courses. It establishes

the experience needed to qualify for certification. The methods for conducting certification examinations and the type and minimum number of questions to be asked are laid down. The method of marking the papers, weightage and pass percentages required for obtaining certification are laid down. It recommends three levels of certification, level-3 being the highest and defines responsibilities for each level. The type and validity of certificates is fixed and so is the procedure for their renewal. The requirements of sound physical fitness specially the eyesight have been included. Finally the standard lays down requirements for keeping proper records of the certified personnel. More details of individual sections of the standard are given below.

4.2.2. Scope (Section 1 of ISO 9712:2005)

It enumerates the NDT methods that can be covered by a certification body (CB).

4.2.3. Normative references (Section 2 of ISO 9712:2005)

Here other relevant standards have been listed.

4.2.4. Terms and definitions (Section 3 of ISO 9712:2005)

In this Section are given terms and definitions used in the standard ISO 9712:2005 and which define the exact requirements to which a certain certification scheme is operated. The terms are required to be used for the meanings and purposes for which they are defined.

4.2.5. Symbols and abbreviations (Section 4 of ISO 9712:2005)

The abbreviations used for the names of different NDT methods are given.

4.2.6. Responsibilities (Section 5 of ISO 9712:2005)

It lays down the functions and responsibilities of various organisations and institutes which form a part of the system for qualification and certification under this standard. These include, for example, the certification body, authorised qualifying bodies, examination centres and employer, etc.

4.2.7. Levels of qualification (Section 6 of ISO 9712:2005)

In this Section three levels of qualification are defined level 1 being the lowest and level 3 the highest. The competence or capability expected from each level is defined.

4.2.8. Eligibility (Section 7 of ISO 9712:2005)

Here the minimum requirements to be fulfilled by the candidate prior to qualification examination are laid down. These include the requirements of vision, training hours and industrial experience.

4.2.9. Qualification examination-content and grading (Section 8 of ISO 9712:2005)

The minimum number of questions to be asked for Level 1 and Level 2 general and specific examinations are specified. The practical examination content for these two levels is also defined. Grading and weighting factors for practical examination are laid down.

The minimum number of questions to be asked for Level 3 basic examination and main method examination are given along with the method of grading.

4.2.10. Qualification examination-conduct (Section 9 of ISO 9712:2005)

The procedure for conducting of qualification examinations and the appointment of examiners and invigilators is described. Also the procedure for re-examination and the permitted exemptions are mentioned.

4.2.11. Certification (Section 10 of ISO 9712:2005)

The method of issuance of certificates and the information to be recorded in the certificate are given. Certificate validity, its renewal procedure and procedure for recertification are described.

4.2.12. Files (Section 11 of ISO 9712:2005)

The procedure and conditions for maintenance of files and records of certified personnel are given.

4.2.13. Transition period (Section 12 of ISO 9712:2005)

This applies to certification in an NDT method which is not covered under an existing certification scheme or when a new sector is created. The procedure for appointment of examiners for such situations is described.

4.2.14. Sectors (Annex A of ISO 9712:2005)

Here guidelines are provided for selection of sectors for which the certification is to be done by the certification body. Two broad categories, namely, product sectors and industrial sectors are suggested.

4.2.15. Technical knowledge of NDT personnel (Annex B of ISO 9712:2005)

This Annex provides a bibliography of international publications detailing course content according to the minimum hours of training recommended to confirm eligibility for examinations for certification.

4.2.16. Specimen master reports (Annex C of ISO 9712:2005)

The method of producing authenticated test reports for the specimens to be used for conducting practical examinations is described along with the minimum information to be contained in such reports.

4.2.17. Level 1 and 2 specimens (Annex D of ISO 9712:2005)

The minimum number and type of specimens for Level 1 and 2 practical examinations are laid down.

4.2.18. Weighting of Levels 1 and 2 practical examinations (Annex E of ISO 9712:2005)

This Annex provides guidance on the percentile weighting for Levels 1 and 2 practical examinations.

4.2.19. Weighting of Level 3 NDT procedure examination (Annex F of ISO 9712:2005)

This Annex provides guidance on the percentile weighting for Level 3 NDT procedure writing examination.

4.2.20. Structured credit system for Level 3 recertification (Annex G of ISO 9712:2005)

In this Annex a system for collecting of various credit points to qualify for Level 3 recertification is described. The minimum number of required credit points and procedure for their acquisition and verification are laid down.

4.3. CONTENTS OF STANDARD ISO 17024:2003

4.3.1. Introduction

This standard provides a benchmark for organisations operating certification of persons and provides a basis for accreditation of such organisations. It lays down requirements which ensure that certification bodies operating certification schemes for persons operate in a consistent, comparable and reliable manner. It should be the basis for the recognition of the certification bodies and their certification schemes in order to facilitate their acceptance at the national and international levels. Only the harmonisation of the system for developing and maintaining certification schemes for persons can establish the environment for mutual recognition and global exchange of personnel and this standard provides the basis for that.

4.3.2. Scope (Section 1 of ISO 17024:2003)

The objective of the standard is specified, namely, specifying requirements for a certification body.

4.3.3. Normative references (Section 2 of ISO 17024:2003)

It refers to two other standards being necessary for application of this standard. These are:

(a) ISO Guide 2:1996, Standardization and related activities-General vocabulary.

(b) ISO 9000:2000, Quality management systems-Fundamentals and vocabulary.

4.3.4. Terms and definitions (Section 3 of ISO 17024:2003)

It states that for the purposes of this standard the terms and definitions as given in ISO Guide 2 and ISO 9000 apply. Some additional terms and definitions are also specified.

4.3.5. Requirements for certification (Section 4 of ISO 17024:2003)

In this Section the requirements for establishment and operation of certification bodies have been listed under different headings such as certification body, organisational structure, development and maintenance of a certification scheme, management system, subcontracting, records, confidentiality and security. In brief the certification body should have written policies and procedures for performing various functions; it must comply with all applicable regulatory and statutory requirements; it must define the policies and procedures used in certification; it must have documented organisational structure; it must appoint a scheme committee; it must have financial resources whose records are properly maintained and finally all the related bodies must not compromise confidentiality and impartiality.

4.3.6. Requirements for persons employed or contracted by a certification body (Section 5 of ISO 17024:2003)

In this Section the requirements to be fulfilled by all types of persons employed or contracted by a certification body are laid down. These include requirements for employing competent persons and maintaining complete data and record of all personnel including examiners and invigilators working for or on behalf of the certification body. All such persons must sign a code of ethics and confidentiality clauses and must have clearly defined job descriptions.

4.3.7. Certification process (Section 6 of ISO 17024:2003)

Here the requirements for various essential steps which form part of the overall certification process are given. These include the requirements for receiving applications on proper forms, evaluation of candidates, decision on suitability for certification of the applicants, surveillance of certified personnel based on maintained records, recertification as per established rules and regulations and use of certificates and logos/marks.

4.3.8. Development and maintenance of a certification scheme for persons (Annex A of ISO 17024:2003)

Here some guidelines are provided for establishment and maintenance of a certification scheme. Broadly these include establishing a justification for setting up the scheme, need for consulting all interests related to the field of certification, periodic survey and analysis of the persons requiring certification, employment of competent persons to prepare various mechanisms for the certification scheme, requirements for quality of examinations and definition of controls for rotation or revision of examinations in order to maintain their objectivity and confidentiality.

4.3.9. Bibliography (Bibliography in ISO 17024:2003)

In this bibliography three references are cited. These are ISO 9001:2000 [10], ISO 9004:2000 [11] and ISO 19011:2002 [12].

4.4. USEFUL WEB SITES

Some useful websites with information regarding training, qualification and certification are:

International Committee for Non-destructive Testing	www.icndt.org
American Society for Non-destructive Testing	www.asnt.org
British Institute of Non-Destructive Testing	www.bindt.org
Canadian Institute for NDE	www.cinde.ca
German Society of Non-Destructive Testing	www.dgzfp.de
Italian Association for Non-destructive Testing	www.aipnd.it
Spanish Association for Non-destructive Testing	www.aend.org

Japanese Society for Non-Destructive Inspection	www.soc.nii.ac.jp/jsndi
European Federation for Non-Destructive Testing	www.efndt.org
Korean Society for Non-destructive Testing	www.ksnt.org
Russian Society for Non-destructive Testing	www.ndt-russia.ru
NDT Worldwide	www.ricoh.co.jp/net-messena/ndtww.html
On-Line Journal of NDT	www.ndt.net
Natural Resources Canada	ndt.nrcan.gc.ca

5. MEANS OF COMPLIANCE WITH INTERNATIONAL STANDARD ISO 9712:2005

5.1. INTRODUCTION

Any MS considering the implementation of a national certification scheme which is in compliance with ISO 9712:2005 must consider whether this newly implemented scheme will be accepted as equivalent internationally. Compliance with ISO 17024:2003 provides a basis for comparison with other national schemes.

In summary, the certification scheme must comply with ISO 9712:2005 rules; the organization which oversees the certification scheme must comply with ISO 17024:2003.

To assist the MS establishing a new scheme or changing a scheme to meet the requirements of ISO 9712:2005, there are two matrices of compliance, each of which comments on specific critical clauses in one of the two standards, and emphasizes conditions which are most important.

5.2. MATRIX OF COMPLIANCE ISO 9712:2005

This document is a commentary based on the referenced international standard. It is not intended as a replacement for that standard, and the reader is directed to the published version of ISO 9712:2005 for authoritative wording.

In reviewing this matrix of compliance, one should note that the left column quotes a clause from the standard. The right column contains comments that provide additional guidance to the organization implementing the standard.

The clauses are presented in logical order, and may or may not follow the same order as in the standard, thus the clause numbers may not be in sequence.

ISO 9712:2005	Means of compliance
1 Scope 1.1 The certification covers proficiency in one or more of the following methods: a) acoustic emission testing; b) eddy current testing; c) infrared thermographic testing; d) leak testing (hydraulic pressure tests excluded); e) magnetic particle testing; f) penetrant testing; g) radiographic testing; h) strain testing; i) ultrasonic testing; j) visual testing (direct unaided visual tests and visual tests carried out during the application of another NDT method are excluded). 1.2 Certification to this International Standard provides an attestation of general competence of the NDT operator. This certification does not represent an authorization to operate since this remains the responsibility of the employer, and the certified employee may require additional specialized knowledge of parameters such as equipment, NDT procedures, materials and products of the employer. NOTE: Wherever gender specific words such as 'his', 'her', 'he' or 'she' appear in this International Standard the other gender is also applicable	As a starting point, a national organization should select those methods for which there is most demand in the country, and use these methods as the base for developing the qualification and certification structure. National organizations are cautioned not to attempt to establish programmes for all ten methods from the outset; additional methods are more easily added to an established structure. Most likely, the first certification system will include magnetic particle inspection, penetrant testing, radiographic testing, and ultrasonic testing. For safety reasons, radiographic testing (RT) may need to be given highest priority. The scope limits the responsibility of the certification body to the attestation of general competence of the operator and states that the employer maintains responsibility for the authorization to operate and for any specialized knowledge related to tests carried out by the certificated person.

ISO 9712:2005	Means of compliance
2 Normative references The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards. ISO/IEC 17024:2003: *Conformity assessment – General requirements for bodies operating certification of persons*	Authorized possession of ISO 9712:2005 is an essential prerequisite to the implementation of a qualification and certification scheme for NDT personnel. There is a normative reference to ISO/IEC 17024:2003 and an authorized copy of this standard shall be available. National bodies are urged to acquire a copy of the IAF Guide 24 [13] which contains detailed information for organizations seeking compliance with ISO/IEC 17024:2003.
3.8 Examination centre Centre approved by the certification body where qualification examinations will be carried out	Note that the Certifying Body (CB) must approve the examination centre(s) – even if operated by an Authorized Qualifying Body (AQB). In early stages of development of a certification system, CBs will not delegate or subcontract certification activities to AQBs.
3.9 Examiner A person certified to Level 3 in the method and product or industrial sector for which he is authorized by the certification body to conduct, supervise and grade the qualification examination	Examiners shall be Level 3, certified not only in the NDT method, but also in the appropriate sector. ISO/IEC 17024:2003 sets additional requirements for examiners. Authorization by the CB is required.
3.11 Industrial experience Experience, acceptable to the certification body, gained under qualified supervision, in the application of the NDT method in the sector concerned, needed to acquire the skill and knowledge to fulfil the provisions of qualification	Experience is a critical part of the certification programme and its validity should be verified. It shall be gained under *qualified* supervision (see definition). The CB should make such inquiries as deemed necessary to verify experience claims.

ISO 9712:2005	Means of compliance
3.14 Main method examination Written examination, at Level 3, which demonstrates the candidate's general and specific knowledge, and the ability to write NDT procedures for the NDT method as applied in the industrial or product sector(s) for which certification is sought	The written procedure is required to be sector specific.
3.20 NDT training A process of instruction in theory and practice in the NDT method in which certification is sought, which takes the form of training courses to a syllabus approved by the Certification Body, but which does not include the use of the specimens used in qualification examinations	There is a wide variety of training courses but in a certification programme the course syllabus shall be approved by the CB.
3.25 Qualified supervision Supervision of candidates gaining experience by NDT personnel certified to this International Standard or by non-certified personnel who, in the opinion of the certification body, possess the knowledge, skill, training and experience required to properly perform such supervision	It is assumed that supervisors will hold certification to ISO 9712:2005 level 2 or 3, but the CB has some latitude in accepting alternative evidence of qualification. In such cases, the approval of the certification body should be sought concerning the suitability of such supervisors. In addition to the supervisor, a certified sponsor (level 2 or 3) may be requested to verify the type and level of experience of the candidate.
3.26 Sector Particular section of industry or technology where specialized NDT practices are used requiring specific product related knowledge, skill, equipment or training. NOTE: A sector can be interpreted to mean a product (welded products, castings) or an industry (aerospace, in-service testing) [see Annex A]	The competences described in ISO 9712:2005 are based on sectors described in Annex A. This concept should be applied to training and experience prerequisites. In early stages of development, CBs should limit the number of sectors to sectors or products which are important in their respective countries.

ISO 9712:2005	Means of compliance
3.27 Significant interruption Absence or change of activity which prevents the certified individual from practising the duties corresponding to the level in the method and the sector(s) within the certified scope, for (a) a continuous period in excess of one year or (b) two or more periods for a total time exceeding two years NOTE: Legal holidays, or periods of sickness or courses of less than thirty days are not taken into account when calculating the interruption.	This standard assumes that personnel are fully employed in NDT. Occasionally this employment will be interrupted. The CB should include in the code of conduct a clause requiring the certificate holder to report any significant interruption to his continuous employment. [ISO 17024:2003 Clauses 4.2.6 and 6.1.1] There is an exception for legal holidays, sickness and courses.
3.28 Specific examination Written examination, at Level 1 or Level 2, concerned with testing techniques applied in a particular sector(s), including knowledge of the product(s) tested, and of codes, standards, specifications, procedures and acceptance criteria	Authorized copies of product standards used in the country covering the products being tested and NDT methods being used shall be available and used in the examinations.
3.30 Specimen A sample used in practical examinations, which may include radiographs and data sets, and should be representative of products typically tested in the applicable sector and can include more than one area or volume to be tested	Specimens are a critical part of the qualification system; ISO/IEC 17024:2003 provides direction on the handling, security and documentation of examination materials. Some certification programmes may be based on data sets which include digital storage of inspection results (eg Digital RT, TOFD, AUT).
3.31 Specimen master report Model answer, indicating the optimum result for a practical examination given a defined set of conditions (equipment type, settings, technique, specimen, etc.), against which the candidate's test report will be graded	Annex B of ISO 9712:2005 gives details of the requirements of the specimen master report.

ISO 9712:2005	Means of compliance
3.32 Supervision Act of directing the application of NDT performed by other NDT personnel, which includes the control of actions involved in the preparation of the test, performance of the test and reporting of the results	The definition of *qualified supervision* should be considered. (Clause 3.25 of ISO 9712:2005)
3.33 Validate Act of demonstrating that a verified procedure will work in practice, do what it is supposed to do, normally achieved by actual witnessing, demonstration, field or laboratory tests or selected trials	A Level 3 candidate may be required to *validate* a procedure, as an alternative to writing one from scratch (ISO 9712:2005 table 5)]
6 Levels of qualification **6.1 General** An individual certified in accordance with this standard shall be classified in one or more of the three following levels.	All employers and potential employers should be advised of the scope of the competencies of all certified personnel. Specific radiation safety training is required for the operation of radiographic testing equipment. [Clause 8.2.2]
6.2 Level 1 **6.2.1** An individual certified to Level 1 has demonstrated competence to carry out NDT according to NDT instructions and under the supervision of Level 2 or Level 3 personnel. Within the scope of the competence defined on the certificate, Level 1 personnel may be authorized by the employer to perform the following in accordance with NDT instructions: a) set up NDT equipment; b) perform the tests; c) record and classify the results of the tests; d) report the results. **6.2.2** Level 1 certified personnel shall not be responsible for the choice of test method or technique to be used, nor for the assessment of test results.	Level 1 personnel are limited to working under the supervision of level 2 or level 3 personnel.

ISO 9712:2005	Means of compliance
6.3 Level 2 **6.3.1** An individual certified to Level 2 has demonstrated competence to perform non-destructive testing according to established procedures. Within the scope of the competence defined on the certificate, Level 2 personnel may be authorized by the employer to: a) select the NDT technique for the test method to be used; b) define the limitations of application of the testing method; c) translate NDT codes, standards, specifications and procedures into NDT instructions adapted to the actual working conditions; d) set up and verify equipment settings; e) perform and supervise tests; f) interpret and evaluate results according to applicable codes, standards, specifications or procedures; g) prepare NDT instructions; h) carry out and supervise all tasks at or below Level 2; i) provide guidance for personnel at or below Level 2, and j) report the results of non-destructive tests.	Level 2 personnel are usually the key operating level for inspection and are expected to have the competencies listed in this Clause. A level 2 may supervise more than one level 1 however such assignment is subject to local regulations and work practices.

ISO 9712:2005	Means of compliance
6.4 Level 3 **6.4.1** An individual certified to Level 3 has demonstrated competence to perform and direct non-destructive testing operations for which he is certified. Within the scope of the competence defined on the certificate, an individual certified to Level 3 may be authorized by the employer to: a) assume full responsibility for a test facility or examination centre and staff; b) establish, review for editorial and technical correctness and validate NDT instructions and procedures; c) interpret codes, standards, specifications and procedures; d) designate the particular test methods, procedures and NDT instructions to be used; e) carry out and supervise all tasks at all levels, and f) provide guidance for personnel at all levels.	An appropriately qualified level 3 shall validate and authorize all procedures and otherwise accept the responsibilities listed in clause 6.4.1. He may be employed or retained from outside the organization.
6.4.2 Level 3 personnel have demonstrated: a) the competence to evaluate and interpret results in terms of existing codes, standards, specifications and procedures; b) sufficient practical knowledge of applicable materials, fabrication and process technology to select NDT methods, establish NDT techniques, and assist in establishing acceptance criteria where none are otherwise available; c) a general familiarity with other NDT methods.	As part of his qualification, the level 3 shall have demonstrated practical competence at level 2.

ISO 9712:2005	Means of compliance
5 Responsibilities **5.1 General** The certification system, which shall be controlled and administered by a certification body (with the assistance, where necessary, of authorized qualifying bodies), includes all procedures necessary to demonstrate the qualification of an individual to carry out tasks in a specific NDT method and product or industrial sector, which leads to certification of competence.	This clause implies that certification is of *competence*, rather than compliance with the standard.
5.2 Certification body 5.2.1 The certification body shall conform to the requirements of ISO/IEC 17024:2003. It should have no direct involvement in training of NDT personnel and it should be recognized by the NDT community or the ISO member body of the country concerned. 5.2.2 The certification body shall be supported by a technical committee composed of representatives of interested parties, for example: NDT societies, committees, users, suppliers and government departments as appropriate. This committee shall be responsible for setting and maintaining the technical standards of examination. Its members shall be qualified for the tasks by an appropriate combination of NDT certification and/or experience.	This clause defines the certification body, and details the recognition and support it should have in the country. The CB has no 'direct involvement' in training of NDT personnel. This concept can be difficult to apply in Member States in early development stages because resources (qualified trainers/examiners and specimens) are limited. Administrative structures should be developed to ensure this separation of function from the beginning of the programme.

6. MEANS OF COMPLIANCE WITH INTERNATIONAL STANDARD ISO/IEC 17024:2003

6.1. INTRODUCTION

This document may be used by aspirant certifying body to identify, in column 3, where, within their quality management system, the particular requirement of the international standard has been addressed. This document is a commentary based on the referenced international standard. It is not intended as a replacement for that standard, and the reader is directed to the published version of ISO/IEC 17024:2003 for authoritative wording.

Contained in sections below are a series of examples which have been referenced in Section 6.2 and which are included to provide a basis for the development of procedures and other supporting documents. They are currently used by organizations providing NDT qualification and certification services. They are provided for guidance only to assist Member States in drafting similar documentation specific to their respective national programmes**.**

6.2. MATRIX OF COMPLIANCE WITH ISO/IEC 17024:2003

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
This first edition of ISO/IEC 17024:2003 is based on EN 45013:1989 [14].	**G 3.1** The following definition applies to the IAF Guidance in this document: **Accredited certificate:** A certificate issued by a certification body in accordance with the conditions of its accreditation and bearing an accreditation mark or statement.	
2 Normative references		It is considered essential for any personnel certification body to obtain authorized copies of ISO/IEC 17024:2003 and the normative references.
4 Requirements for certification bodies		
4.1 Certification body		
4.1.1 **4.1.2** **4.1.3**	**G.4.1.1** If there is any exception to the application of policies and/or procedures, it should be justified and documented.	Authorized copies of ISO 9712:2005 and any applicable national regulations

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	G.4.1.2 The certification body should be able to demonstrate to the accreditation body that it has evaluated applicable regulatory and statutory compliance and that action has been taken in cases of non-compliance with relevant regulations and statutory requirements.	are considered indispensable. Public certification documents should be clear and unambiguous.
4.2 Organizational structure		
4.2.1	**G.4.2.1** Accreditation shall only be granted to a body which is a legal entity as referenced in clause 4.2.1 d) of ISO/IEC 17024:2003, and will be confined to declared scopes, activities and locations. If the certification activities are carried out by a legal entity which is part of a larger organization, the links with other parts of the larger organization shall be clearly defined and should demonstrate that no conflict of interest exists as defined in guidance G.4.2.6 to G.4.2.8. Relevant information on activities performed by the other parts of the larger organization shall be given by the certification body to the accreditation body and shall be maintained up-to-date. **G.4.2.2** Demonstration that a certification body is a legal entity, as required under clause 4.2.1 d) of ISO/IEC 17024:2003 means that if an applicant certification body is not itself a legal entity but is part of a larger legal entity, accreditation shall only be granted to the entire legal entity. In such a situation, the structure of the entire legal entity may be subject to audit by the accreditation body in order to pursue specific audit trails and/or review records relating to the	The primary organisation and structure should be clearly defined in a quality manual. Public documents should be made available to demonstrate to interested parties the reporting relationships, and responsibilities (transparency). See ISO 9712:2005 clause 5.2. The decision to certificate may be assigned to a specified authorized representative of the CB, whereas decisions to revoke or withdraw must be made by a specified committee. Section 6.3 provides a basic outline for a quality manual that would meet the requirements of ISO9712:2005. Section 6.4 shows

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	certification body. The part of the legal entity that forms the actual certification body may trade under a distinctive name which together with the name of the legal entity should also appear on the accreditation certificate. **G.4.2.3** For the purposes of clause 4.2.1 d) of ISO/IEC 17024:2003, certification bodies which are part of government, or are government departments, will be deemed to be legal entities on the basis of their governmental status. Such bodies' status and structure shall be formally documented and the bodies shall comply with all the requirements of ISO/IEC 17024:2003. **G.4.2.12** If the decision to issue, withhold or withdraw certification in accordance with clause 4.2.1.c) 3) of ISO/IEC 17024:2003 is taken by a committee comprising, among others, representatives with a vested interest in the person subject for decision, the operational procedures of the certification body should ensure that these representatives declare a conflict of interest and do not participate in the certification decision. **G.4.2.16** Impartiality and independence of the certification body should be established at all levels including: • structure of the organization; • policies and procedures; • evaluation; • decisions and appeals on certification.	typical organization structures that are used by Certifying Bodies.

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
4.2.2	**G.4.2.17** The certification body shall not engage in activities that could compromise its impartiality. **G.4.2.4** Clause 4.2.2 of ISO/IEC 17024:2003 provides that the certification body should not allow commercial or other considerations to influence the confidentiality, objectivity or impartiality of the certification process. Conformity with this clause is particularly relevant when the financial resources to set up a certification body has been provided by a particular interest that predominates in the shareholding and/or the board of directors. **G.4.2.9** Clause 4.2.2 of ISO/IEC 17024:2003, requires that the documented structure of the certification body has built into it provision for the participation of all the significantly concerned parties in the different sectors in which it operates, including the consideration of public interest. This should normally be through some kind of committee. This structure shall be formally established at the highest level within the organization either in the documentation that establishes the certification body's legal status or by some other means that prevents it being changed in a manner that compromises the safeguarding of impartiality. Any change in this structure should take into account advice from the committee, or equivalent, referred to in clause 4.2.2 of ISO/IEC 17024:2003. **G.4.2.10** Application of clause 4.2.2 of ISO/IEC 17024:2003 requires judgement on whether all parties significantly concerned in the system are able to participate.	These items would be included in the Quality Manual

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	What is essential is that all identifiable major interests should be given the opportunity to participate, and that a balance of interests, where no single interest predominates, is achieved. For practical reasons there may be a need to restrict the number of members. **G.4.2.11** On request of the committee or equivalent referred to in clause 4.2.2 of ISO/IEC 17024:2003, the management responsible for the various functions described in clause 4.2.1 c) of ISO/IEC 17024:2003 should provide to that committee or equivalent all the necessary information, including the reasons for all significant decisions, actions, and the selection of persons responsible for particular activities, in respect of certification, to enable the certification body to ensure proper and impartial certification. If the advice of this committee or equivalent is not respected in these matters by the management, the committee or equivalent shall take appropriate measures, which may include informing the accreditation body. **G.4.2.14** The committee or equivalent referred to in clause 4.2.2 of ISO/IEC 17024:2003, may also be the scheme committee provided it has the required technical competence to also act as a scheme committee for one or more schemes as appropriate.	
4.2.3	**G.4.2.15** A common scheme committee for certification schemes could be established for certification schemes that are international or national or schemes	However the Certifying Body is structured, a committee must be allocated the

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	that are used by more than one certification body in its country or region. The certification body should have procedures and resources to demonstrate that it is actively involved in the activities of any relevant common scheme committee in its country or region.	responsibilities defined in ISO 9712:2005 clause 5.2.2. Terms of Reference should be defined for the Scheme Committee(s) responsible for policy and possibly technical aspects. Technical requirements may be developed by separate committee(s) covering product/industry sectors and/or NDT methods.
4.2.4	**G 4.2.5** The requirement for financial resources referred to in clause 4.2.4 a) of ISO/IEC 17024:2003 requires the certification body to demonstrate that it has a reasonable expectation of being able to continue to provide the accredited service in accordance with its contractual obligations. Certification bodies are responsible for providing the accreditation body with sufficient evidence to demonstrate viability, e.g. management reports or minutes, annual reports, financial audit reports, or financial plans. Accreditation bodies should not attempt any direct audit of the financial accounts of certification bodies. **G.4.2.6** A related body is one which is linked to the certification body by common ownership in whole or part and has common members of the board of directors, contractual	

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	arrangements, common names, common staff, informal understanding or other means such that the related body has a vested interest in any certification decision or has a potential ability to influence the process. **G.4.2.7** Although there is no specific restriction on the services or activities that a related body may provide, the certification body should analyze and document their relationship to determine the possibilities for any known conflicts of interest with provision of certification. The certification body should identify those bodies and their activities that could, if not subject to appropriate controls, affect confidentiality, objectivity or impartiality. **G.4.2.8** Certification bodies shall demonstrate how they manage their certification business and any other activities so as to eliminate actual conflict of interest and minimize any identified risk to impartiality. The demonstration shall cover all potential sources of conflict of interest, whether they arise from within the certification body or from the activities of related bodies. Accreditation bodies will expect certification bodies to open these processes for audit. This may include, to the extent practicable and justified, pursuit of audit trails, to review records of both the certification body and its related body for the activity under consideration. In considering the extent of such audit trails, account should be taken of the certification body's history of impartial certification. If evidence of failure to maintain impartiality is found,	

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	there may be a need to extend the audit trail back into related bodies to provide assurance that control over potential conflicts of interest has been re-established.	
4.2.5	**G.4.2.19** The requirements of clause 4.2.5 and clause 5.1.2 of ISO/IEC 17024:2003 mean that personnel should not be allowed to conduct an evaluation as part of the certification process if they have been involved in related training activities associated with the evaluation of the candidate in question, within the last two years. **G.4.2.24** The certification body should require all evaluation subcontractors or external examiners to give assurances regarding the marketing and provision of any activities under clause 4.2.4 c) of ISO/IEC 17024:2003 equivalent to those required by guidance G.4.2.25 and G.4.2.26. **G.4.2.25** Information regarding education and training may be provided in literature by the certification body if they are used as pre-requisites for being eligible for certification or part of an examination preparation booklet. All known education and training prerequisites related to the certification scheme should be listed and publicly available. However, nothing should be said or indicated by a certification body that would suggest that certification would be simpler, easier or less expensive if any specified education/training services were used. **G.4.2.26** Where the certification body provides certification and	It is not unusual to find NDT societies establishing certification schemes providing NDT training. It may also be found that a society's governing committee is predominated by training interests. It is important in such cases to ensure the impartiality and freedom from vested interests of the examination and certification functions of the NDT society. This can be achieved in numerous ways, for example by creating a subsidiary company as the certification body, or by ensuring that an impartial scheme committee is established in a way that it cannot be controlled by the governing committee of the society. However it is achieved, the measures taken to preserve and safeguard impartiality and

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	education/training services, it shall ensure that no impression is given that the use of both services would bring any advantage to the applicant, so that the certification process remains, and is seen to remain, impartial. **G.4.2.27** The certification body is allowed to explain its findings and/or clarify the requirements of the normative documents but shall not give prescriptive advice or training as part of an evaluation. This does not preclude normal exchange of information with the applicant or candidate and other interested parties.	freedom from vested interests must be clearly described in the quality management system and in public documents (transparency). The organization charts provided in Section 6.4 show possible arrangements for an NDT society running a Certifying Body to achieve impartiality and freedom from vested interest
4.2.6	**G.4.2.13** Clause 4.2.1 b) of ISO/IEC 17024:2003 requires the certification body to be responsible for certification decisions. Any appeal procedure (clause 4.2.6) should therefore be within the control of the certification body, but any appeal panel or committee shall be independent in their recommendations except as required by international or national law. **G.4.2.28** The policies and procedures referred to in 4.2.6 of ISO/IEC 17024:2003 should ensure that all appeals and complaints are dealt with in a constructive and timely manner. Where operation of such procedures has not resulted in the acceptable resolution of the matter, or where the proposed procedure is unacceptable to the complainant or other parties involved, the certification body's procedures shall provide for an appeals process. The appeals procedure should include provision	This should be covered in the quality manual. An example of a complaints and appeals procedure is included in Section 6.8.

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	for the following: • the opportunity for the appellant to formally present its case; • provision of an independent element or other means to ensure the impartiality of the appeals process; • provision to the appellant of a written statement of the appeal findings including the reasons for the decisions reached; • clear definition of the time limit for the appeal process. The certification body shall ensure that all interested parties are made aware, as and when appropriate, of the existence of the appeals process and the procedures to be followed. **G.4.2.29** Personnel, including those acting in a managerial capacity, should not be allowed to decide on any appeal or complaint if they have been involved in the certification process for that applicant or candidate, or in training or education activities towards the applicant or candidate within the last two years, or had any previous involvement in any activities leading to the appeal or complaint in question. **G.4.2.30** Appeals and complaints represent a source of information as to possible nonconformity. On receipt of a complaint the certification body shall establish, and, where appropriate, take action on the cause of any nonconformity found. **G.4.2.31** The certification body should use such investigations to perform correction and/or corrective action, which should include	

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	measures for: • minimizing the consequences of any nonconformity; • restoring conformity with certification requirements as quickly as practicable; • preventing recurrence of the nonconformity; • assessing the effectiveness of the correction or corrective measures adopted.	
4.2.7	**G.4.2.18** A certification body should not certify a person it employs unless no appropriate accredited third party exists in its own country or is available in practice to undertake the certification. Where such cases could arise, a certification body shall demonstrate to the accreditation body the procedures it has adopted in order to maintain independence and impartiality in such circumstances. These could include: • maintaining the same standards of evaluation and confidentiality towards all candidates; • the use of independent examiners; • independent monitoring of the certification process. **G.4.2.20** The certification body shall require examiners to declare any information that may reveal a conflict of interest regarding the impartiality of the candidate's examination. The certification body has the responsibility to identify and evaluate such situations and to assign responsibilities and tasks so as to ensure that impartiality is not compromised.	Examination staff are required to declare any interest in any candidate in whose examination they are involved in any capacity. An examiner or invigilator is prohibited from direct involvement in any examination of a candidate in whom they may have an interest by virtue of: ▪ having a common employer — now or within the preceding two years; ▪ having provided training within the preceding two years; ▪ being employed by an organisation which has an interest in the outcome of examinations; ▪ personal

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	G.4.2.21 The responsible management, staff and/or personnel mentioned in clause 4.2.7 of ISO/IEC 17024:2003 need not be exclusively engaged by the certification body, but their other employment shall not be such as to compromise their impartiality. **G.4.2.22** The term 'personnel' can include individual persons who work for the certification body on a contract basis, or other external resources. The certification body shall be in a position to manage, control and be responsible for the performance of all its resources and maintain comprehensive records controlling the suitability of all the staff it uses in particular areas, whether they are employees, employed on contract or provided by external bodies. **G.4.2.23** The certification body should be responsible for ensuring that neither related bodies, nor sub-contractors, nor external examiners operate in breach of the undertakings that they have given. It should also be responsible for implementing appropriate corrective action in the event that such a breach is identified.	relationship; ▪ any other circumstance which may potentially threaten impartiality. Examination and certification staff should be required to sign a document (e.g. code of conduct) covering the above, which must be retained on file.
4.3 Development and maintenance of a certification scheme		
4.3.1		Covered by ISO 9712:2005
4.3.2	**G.4.3.4** Validation is a process that collects objective evidence through mechanisms such as interviews with experts, surveys of the populations determined by the certification body and /or generally accepted normative documents which support the content of the scheme*.	*ISO 9712:2005

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
4.3.3	**G.4.3.5** Policies and procedures are needed for periodic review and amendments to the scheme(s), implementing the changes, and for notification of stakeholders. **G.4.3.6** Records of periodic evaluation of the examinations should be retained to ensure equity, validity and reliability.	Certification and or technical documents initially approved by a committee shall, if amended, be re-submitted to the same committee for subsequent approval. *This may occur when a revision of normative criteria, e.g. ISO 9712:2005, is published; The CB must advise all existing certificate holders what effect any revision to the standard will have on their certification.
4.3.4	**G.4.3.3** A systematic process should be utilized by the scheme committee to determine the competence of certified persons. Evidence should be provided that criteria are consistent with professionally accepted standards and practices and legal requirements. Where national or international standards for the development of valid and reliable examinations are available for competence assessment, they should be considered*.	This must be addressed in the Certifying Body's Quality Manual. *ISO 9712:2005.
4.3.5	**G.4.3.1** Successful completion of an approved training course means that if the certification body approves a training course as part of the certification scheme requirements, it should require the training provider to ensure that those who successfully complete the course will have met the learning objectives relevant to the knowledge and skills prescribed in the certification scheme.	Where a CB assesses and approves provision of training by one or more organisations, the approval system must be available to any training organisation meeting published prerequisites. Assessment and approval of training

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	G.4.3.2 Pre-requisites, eligibility and other requirements shall be documented and indicate that they are based on data and/or expert opinion related to the certification scheme to ensure that they are fair and equitable.	should be addressed in a documented procedure.
4.3.6		This should be addressed in a documented quality procedure. An example is provided in Section 6.6.
4.4 Management system		
4.4.1		The note refers to an ISO 9001 based system as a means of satisfying this requirement.
4.4.2		This is covered in the quality manual which documents the quality management system.
4.4.3		There must be procedures covering document control, internal audit and management review within the CB quality management system.
4.5 Subcontracting		A clear statement in the quality manual or a procedure such as that shown in Section 6.5 would meet this requirement
4.5.1	**G.4.5.1** A certification body may issue certificates on the basis of subcontracted work (e.g. administration, examination	It should be noted that the NDT personnel certifying body shall issue all

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	development or examination delivery) carried out by another body, provided that the arrangement with the subcontracted body requires it to comply with all relevant requirements of ISO/IEC 17024:2003. The documented agreement should contain, as a minimum, the following: • a detailed description of the services and outcomes; • the control measures required to deliver the service, and maintain impartiality, confidentiality and integrity; • the internal monitoring requirements to be undertaken by the subcontractor; • the assessment processes to be carried out by the certification body or other appropriate agencies; • the names of any personnel authorized by the certification body to fulfil responsibilities specified in the documented agreement, e.g. examiners; • the name(s) and signatures of the representatives approving the agreement. Records should be available regarding assessment and monitoring activities that have been conducted to ensure that the subcontractor meets all relevant requirements.	certificates (ISO 9712:2005 5.2.3 (e) refers). The essential content of NDT personnel certificates is described in ISO 9712:2005 clause 10.5.2.
4.5.2	**G.4.5.3** In the event that examinations are subcontracted to a training provider, special care should be taken regarding separation of training and examination as part of the certification process (clause 4.2.5 ISO/IEC 17024).	

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	G.4.5.2 Where joint assessment of a subcontractor is undertaken by two or more certification bodies, each certification body shall satisfy itself that the whole of the assessment has been satisfactorily undertaken.	
4.6 Records		ISO 9712:2005 clause 11 refers to this requirement.
4.6.1	**G.4.6.1** As a means to confirm the status of a certified person, the certification body should maintain the following minimum information and respond to enquiries relative to the status of certified persons without restriction or discrimination: • effective date of certification and date of expiry; • name and certification number of the certified person; • scope of certification including the normative documents to which the person is certified.	In the context of ISO/IEC 17024:2003 surveillance equates to certificate renewal in ISO 9712:2005.
4.6.2	**G.4.6.2** Records should be: • maintained in such a manner that ensures retrievability; • stored in a manner that prevents damage and deterioration; • uniquely identified.	
4.7 Confidentiality	**G.4.7.1** The requirement regarding confidentiality includes anyone who might gain access to information within the certification body. Subcontracted personnel shall also be required to maintain all such information confidential, particularly from fellow employees and from their other employers.	Section 6.7 is an example of a confidentiality form that is used by Certifying Bodies. There may be applicable national or regional regulations pertaining to the

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	G.4.7.2 Policies and procedures and/or regulatory requirements for the maintenance and release of information shall be maintained.	protection and publication of personal data. If no such regulations exist, the CB should define its policies and procedures on such matters.
4.8 Security	**G.4.8.1** The certification body should determine measures necessary to ensure security throughout the certification system, including arrangements for the transport and handling of examination material. **G.4.8.2** Security measures may include: • secure storage of the examination bank; • protection of electronic data. **G.4.8.3** The certification body should exercise special care if it subcontracts examinations to training providers as it has inherent risk of compromising impartiality and/or security. Special care may include e.g. procedures for separation between examination materials and training materials.	ISO 9712:2005 clause 5.2.3 (f) states that the CB is responsible for ensuring the security of all examination materials (such as specimens, master reports, question banks, examination papers.);
5 Requirements for persons employed or contracted by a certification body		
5.1 General		
5.1.1	**G.5.1.1** A certification body shall have personnel competent to: • review applications; • authorize and select examiners; • prepare, administer, monitor, grade and evaluate examinations;	The requirements for qualifications of examiners is defined in ISO 9712:2005 : 2005 clauses: 3.9 (examiner), and 12 (transitional arrangements)

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	• assess subcontractors, e.g. examination centres; • handle nonconformities, appeals and complaints; • decide on certification; • implement and maintain a management system. **G.5.1.2** The management of the certification body shall have the resources and procedures to determine whether its individuals are competent for the tasks they are required to perform within the scope of certification in which they are operating. The competence of individuals may be established by verified background experience, specific training or briefing. The certification body should be able to communicate effectively with all those whose services it uses.	
5.1.2		Section 6.7 is an example of a confidentiality form that is used by Certifying Bodies.
5.1.3	**G.5.1.3** The certification body should have a program to ensure that its personnel have the information to perform their assigned duties and responsibilities. A system should be established that identifies and documents the training needs of personnel and how those training needs are met.	The CB should identify the competence criteria for each person or group of persons, identify the education, training and experience necessary to satisfy those competence criteria, and implement and record the job specific training provided.

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
5.1.4		In particular, the NDT personnel CB should develop and implement a system to ensure the effective maintenance of the appropriate Level 3 certification of examiners.
5.2 Requirements for examiners		
5.2.1	**G.5.2.1** The extent of fluency in written and spoken language required of the examiner may vary. The certification body should have a process to pre-determine the language competence for achieving the desired evaluation outcome. **G.5.2.2** The certification body should assess and monitor the conduct and performance of examiners. Such assessment and monitoring should include witnessing the activities of the examiners during all relevant parts of the certification process. **G.5.2.3** Personnel who monitor and support the conduct of examinations (proctors, monitors, invigilators), as distinct from the examiner, shall meet criteria as defined by the certification body.	Where examination material is translated from the national language into another language, the translated material should be technically and grammatically validated by a Level 3 having verifiable fluency in the language concerned. The use of un-notified dual marking of completed written narrative examination papers as well as practical examination reports for a stated percentage of each examiner's work would be deemed to satisfy this requirement.
5.2.2		Covered under guidance for clause 4.2.7 of the standard.
6 Certification process		
6.1 Application		

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
6.1.1	**G.6.1.1** The detailed description of the certification process may include: a. competence requirements for certified persons; b. pre-qualification criteria where applicable; c. application requirements; d. type and nature of the examination(s) and evaluation process; e. conditions for granting, maintaining, renewing, expanding and reducing certification; f. conditions for suspending or withdrawing certification.	Such documentation may be published on a website maintained by the CB, or in hard copy made available upon request. Section 6.9 includes an example of a Code of Conduct.
6.1.2		Various examples of examination application forms may be obtained from the websites of existing NDT CB (Section 4.4)
6.2 Evaluation		
6.2.1	**G.6.2.1** Policies and procedures for determining reasonable accommodations (e.g. assistance with reading, extended length of time for examination, large print examination questions) shall be documented and available to all interested parties and meet any governmental requirements. The certification body should ensure that it is able to provide examination of individuals with special needs unless the applicant's disability would prohibit certification under the scheme for the certified person.	

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
6.2.2		ISO 9712:2005 defines the competence criteria required for each level, and the examination content necessary to determine competence.
6.2.3		See above.
6.2.4	**G.6.2.2** Reports regarding the performance of candidates should be sufficiently detailed to provide guidance to the candidate preparing for future examinations, taking into account G.4.2.27.	In the context of ISO 9712:2005, the CB should indicate in which examination parts (general, specific and/or practical) the candidate was unsuccessful. In the case of the practical examination that is multi-sector, the candidate may be advised which product(s) were unsuccessfully tested.
6.3 Decision on certification		
6.3.1	**G.6.3.1** The information gathered during the certification process should be sufficient: • for the certification body to be able to make an informed decision on certification; • for traceability to be available in the event, for example, of an appeal or a complaint; • to ensure continued conformity with certification requirements. **G.6.3.2** Any information on which a decision is based which comes from any source other than the	

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	evaluation process should be made known to the candidate along with information on the evaluation process. The candidate should be given the opportunity to comment on it. **G.6.3.3** The person(s), who decides on granting/withdrawing a certificate within the certification body, shall have a level of knowledge and experience sufficient to evaluate the information obtained from the certification process.	
6.3.2	**G.6.3.4** Certification shall not be granted until all requirements for certification are fulfilled and verified by the certification body. Completions and/or corrections and their resolution done during the evaluation should be documented by the certification body. **G.6.3.5** In cases where the certification body takes into account work previously performed by another body, it shall have all relevant reports and records to demonstrate conformity with the requirements established by the certification body and in ISO/IEC 17024:2003. **G.6.3.6** For a certificate to be recognised as meeting IAF's requirements for conformity assessment, it shall be issued by a certification body in accordance with the scope and conditions of its accreditation, and unambiguously identify the accreditation body and the issuing certification body. **G.6.3.7** Where a certification body holds more than one accreditation covering the scope of the certification, the accredited	ISO 9712:2005 clause 10.2 covers this topic.

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	certificate shall identify at least one of the accreditation bodies.	
6.3.3		ISO 9712:2005 refers to this subject in Clause 10.2
6.4 Surveillance		
6.4.1	**G.6.4.1** Surveillance is the periodic monitoring, between the periods of certification, of a certified person's performance to ensure continued compliance with the certification scheme.	ISO 9712:2005 replaces the term surveillance with the term renewal. These are considered equivalent.
6.4.2	**G.6.4.2** In accordance with the certification scheme, surveillance by the certification body may include but is not limited to: • on site assessment; • information from regulatory authorities; • professional development with an examination component; • complaints and information from interested parties; • structured interviews; • legal actions taken in regard to the certified person; • confirmation of continuing satisfactory work and work experience record; • examination; • checks on physical capability. **G.6.4.3** Certification bodies should have procedures specifying the circumstances and conditions in which certificates will be withdrawn if competence is not confirmed during surveillance. **G.6.4.4** The methods and frequency established for surveillance should	ISO 9712:2005 clause 10.4 refers.

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	be determined by the scheme committee and shall be appropriate to the purpose of surveillance (see G.6.4.1).	
6.5 Recertification		
6.5.1	**G.6.5.1** Re-certification is a process of confirming conformity with current certification requirements. The scheme committee of the certification body should establish the rationale for the re-certification period. The rationale may be based on the consideration of: • the maturity of the industry and associated risks in which the scheme is delivered; • changing body of knowledge; • survey data; • requirements of stakeholders; • expert opinions; • regulatory requirements.	ISO 9712:2005 clause 10.5 refers.
6.5.2	**G.6.5.2** In accordance with the certification scheme, re-certification by the certification body may include but is not limited to: a. on site assessment; b. professional development with an examination component; c. structured interviews; d. confirmation of continuing satisfactory work and work experience record; e. examination; f. checks on physical capability. **G.6.5.3** The methods and frequency established for re-certification should be determined by the scheme	ISO 9712:2005 refers to this subject in clauses 10.3 and 10.5.

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	committee, taking into account any applicable normative criteria, and shall be appropriate to the purpose of re-certification (see G.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.	
6.6 Use of certificates and logos/marks		
6.6.1	**G.6.6.1** The certification body should avoid using the same mark to indicate different conformity assessment systems, and should avoid confusion between the meaning of its marks if there is more than one. This does not exclude the use of the same corporate logo in different marks for different systems of conformity.	
6.6.2	**G.6.6.2** The certification body should have documented procedures for the use of its mark, and for the procedures it is to follow in case of misuse, including false claims as to certification and false use of its marks. **G.6.6.3** If a certification body incorrectly claims accredited status for certificates issued before appropriate accreditation has been granted, the accreditation body shall require it subsequently to withdraw them. **G.6.6.4** A certification body should have procedures to ensure that its certified persons do not use its mark in a way that may be likely to confuse employers or other parties. **G.6.6.5** Where the certification body makes use of a mark, which it	An example of a Code of Conduct is included in Section 6.9

ISO/IEC 17024:2003 criteria	IAF G24 guidance	Means of Compliance
	has been assigned by another body, e.g. the owner of the mark, its agreement with that body shall ensure conformity with the intent of all sections of this clause.	
6.6.3		This is covered in the Code of Conduct.

6.3.OUTLINE FOR A QUALITY MANUAL

To meet the requirements of ISO 9712:2005 and ISO/IEC 17024:2003, it is essential that the Certifying Body have documented procedures that cover all aspects of the qualification and certification activity. These documented procedures provide assurance to any external observer or auditor that the service provided is consistent, fair and meaningful. The collection of these documented procedures makes up the Quality Management System, and the Quality Management System is typically defined in a Quality Manual.

Since the Quality Manual is specific to the way the Certifying Body operates, it must be developed in step with the procedures. In this sense, a detailed template could conflict with local practices, and it is considered preferable to develop and document a system that conforms to the requirements of the three ISO standards as decisions are made on how to comply. It has been suggested that a quality system that conforms to ISO 9001:2000 would be acceptable; this standard provides specific guidance on the elements of a quality system.

A general outline of a quality manual is as follows:

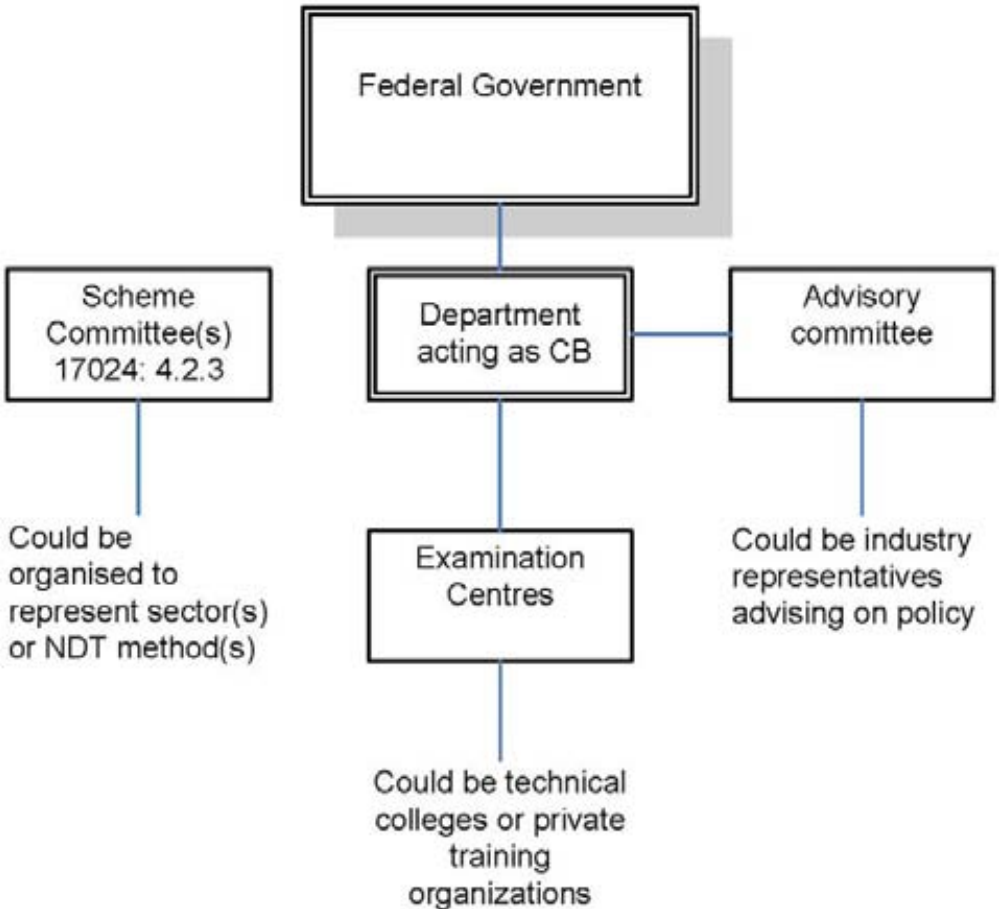
- Scope
- Quality Policy
- Objectives
- Terms and Definitions
- Related/referenced documents
- Responsibilities
    - Certification Body
    - Authorized Qualifying Body
    - Examination centres
    - Certification of other commitments (if any)
    - Individuals (Course director, Examiner, etc.)

- Detail
- Records and formats
- References

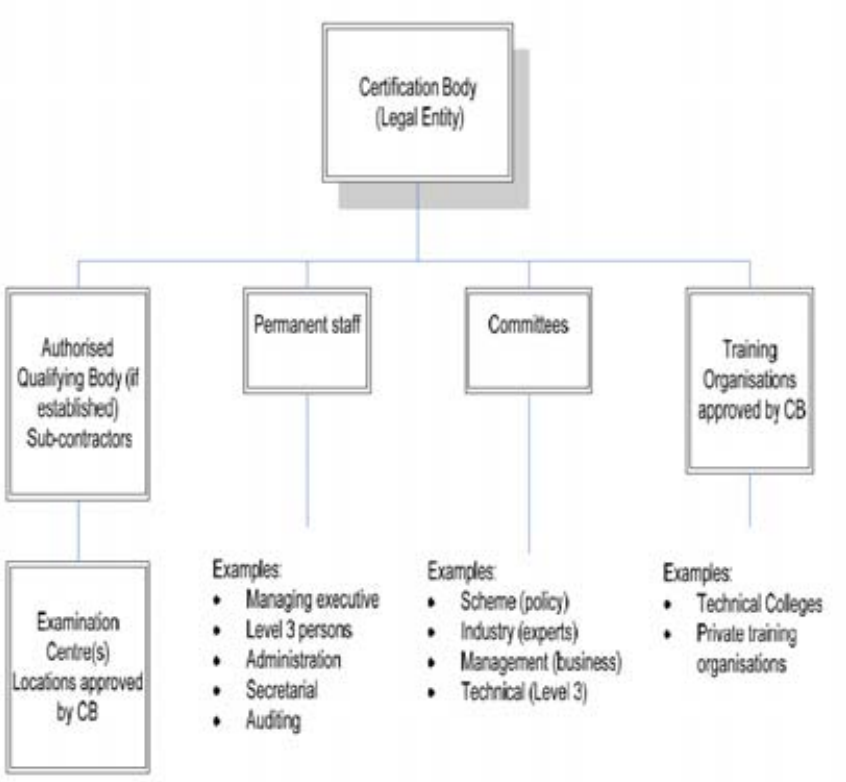
The quality manual would have controlled and uncontrolled versions. Controlled versions which have restricted circulation (defined in the manual) dwell on specific details of the organization while the uncontrolled version (copy of which would be available to all personnel identified in the base document in that organization) dwells on the general guidelines, objectives, scope, formats, etc.

6.4. SAMPLE ORGANIZATION CHARTS

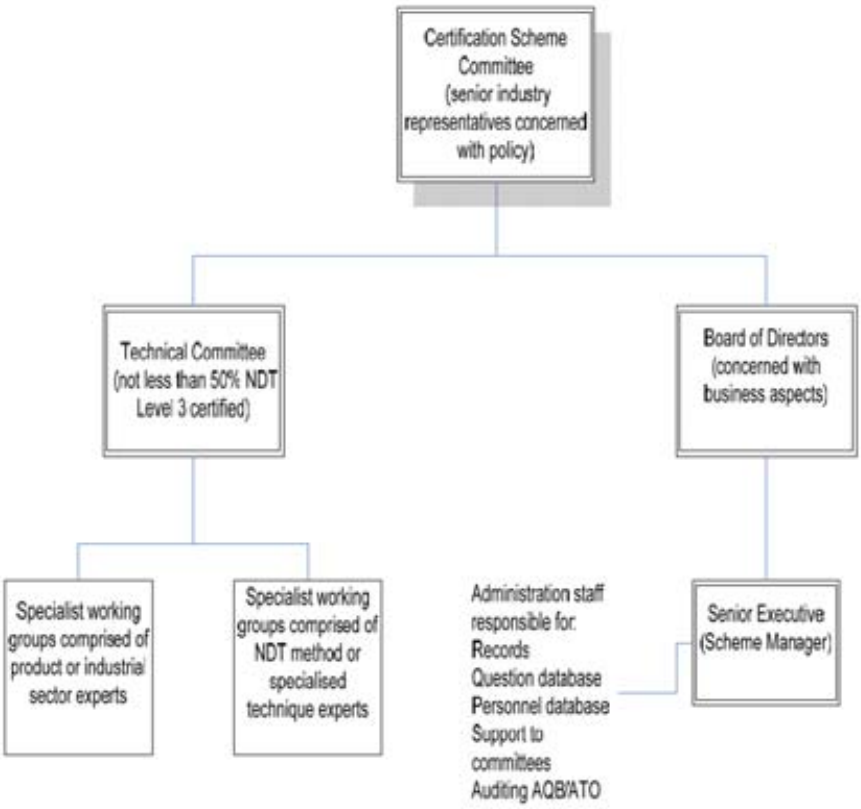
6.4.1. A governmental department acting as an ISO 9712:2005 certification body satisfying ISO/IEC 17024:2003 criteria



6.4.2. An ISO 9712:2005 certifying body organization which satisfies ISO/IEC 17024:2003 criteria



6.4.3. Structure for an ISO 9712:2005 certification body within another organization which satisfies ISO/IEC 17024:2003 criteria



6.5. PROCEDURE FOR THE CONTROL OF SUBCONTRACTORS (AUTHORIZED QUALIFYING BODIES)

6.5.1. Scope

This document, which is implemented with effect from <DATE>, prescribes the requirements which aspirant and existing Authorised Qualifying Bodies are to satisfy in order to gain and maintain authorisation to conduct qualification examinations leading to the award of certification by the Certification Body.

Requirements are detailed in respect of facilities, resources, quality systems, staff and records.

Prospective AQBs are encouraged to seek advice through <NAME & ADDRESS>.

Information contained in other Certification Scheme documents is not necessarily repeated herein.

ASSOCIATED DOCUMENTS (not included)

- Procedure for the conduct of qualification examinations
- Grading certification scheme practical examinations
- List of published certification scheme documents
- Scope of certification available
- Form for recording pre-certification training
- Form for recording pre-certification experience
- Examination application form

(a) Introduction and definition of terms

The <Certification Body> operates the <Certification Scheme> in accordance with the provisions of a range of international standards.

Certification policy is overseen by a Scheme Committee, widely representative of industry, and the Certification Scheme is administered by a Scheme Manager in accordance with the policy agreed by the Scheme Committee.

The Scheme Manager is responsible for setting, maintaining and reviewing competency standards for applicants and approved Authorised Qualifying Bodies (AQB) and will report to the Scheme Committee on the justification for allowing any particular AQB to conduct Certification Scheme qualification examinations.

The Certification Body requires assurance at all times that AQBs are conducting examinations correctly and consistently, and this document sets out the conditions of initial and continued approval of organisations conducting examinations within the Certification Scheme.

The following terms and definitions will be used in this document.

Certification Body: Any reference to Certification Body, in the context of this document, means the <Legal name of organisation>.

Authorised Qualifying Body (AQB): An organisation approved by the Certification Body following a successful formal audit to conduct and administer Certification Scheme examinations strictly in accordance with published requirements.

Examination Centre: A location where Certification Scheme examinations will be carried out strictly in accordance with published requirements under the supervision of authorised examiners. An examination centre, which shall be approved by the Certification Body, may be situated at an NDT personnel employer's facility or an AQB.

Co-ordinator: A person appointed by an approved AQB and authorised by the Certification Body to control and administer Certification Scheme examination(s) conducted under the auspices of the AQB. A Co-ordinator need not possess current valid certification, but should have a level of knowledge or experience in non-destructive testing which is acceptable to the Certification Body.

Examiner: An individual certified to level 3 in the method and sector for which he or she is to conduct, supervise and grade Certification Scheme examinations and who is authorised so to do by the Certification Body on the basis of an acceptable curriculum vitae after having received appropriate training by the AQB. All level 3 certified and Certification Body authorised examiners are permitted to mark and grade any Certification Scheme level 3 Basic Examination, irrespective of whether they hold the certification for the sector/method concerned, since the content of the Basic Examination is common, regardless of the scope of the intended Main Method examination.

Invigilator: An individual trained by the AQB in the process of examination invigilation to Certification Body requirements, particularly with respect to the points to be observed during a practical examination. Invigilators, who will be named as such within the AQB quality documentation and on the AQB approval certificate, are authorised by the AQB Co-ordinator and supervised by an examiner. The term supervised, in this context, means that invigilation is effectively controlled by an authorised examiner who is available and contactable by the appointed invigilator at all times when Certification Scheme examinations are being conducted.

Accredited Training Organisation (ATO): An organisation assessed and approved to provide validated training courses specified by Certification Body for personnel intending to attempt a qualification examination.

Trainer: An individual trained and authorised by an ATO to lecture in a Certification Body validated training course. Such individuals will hold relevant certification at the same or higher level to the training which they are authorised to provide.

Product: Interpreted to mean examination material (practical specimens, questions, equipment and consumables) for use in Certification Scheme examinations.

Examination: The evaluation, by written and/or practical tests, of the competence of an individual to apply a defined non-destructive testing process.

Customer or client: The individual or organisation paying examination fees.

Appropriately qualified person: An individual carrying out supervision of candidates for certification holding ISO9712:2005 compliant certification issued by a Certification Body

meeting the requirements of ISO/IEC 17024:2003. The certification concerned must cover the same NDT method and industry sector as that which is the subject of surveillance.

Where there are insufficient appropriately qualified persons in the country concerned, supervision of candidates for certification may be carried out by persons holding relevant qualification and/or certification issued by an agency independent of the employer of the supervised candidate. AQBs should obtain prior approval of Certification Body before accepting qualification or certification awarded by an employer, if holders of such certification are expected to be treated as appropriately qualified persons.

6.5.2. Examination resources required

(a) Staff

i. General

All AQB staff involved in any aspect of the administration or conduct of Certification Scheme examinations shall be appropriately trained and qualified for their functions within the organisation. Records of training and qualifications shall be made available to Certification Body appointed assessors at initial and surveillance audits.

The AQB shall nominate for approval by CB an employee of the AQB who shall be known as the AQB Co-ordinator and who shall be responsible for the control and administration of the quality system and be the primary contact between the AQB and Certification Body. Being the AQB Co-ordinator need not preclude the individual from holding another appointment within the organisation.

The primary function of the AQB Co-ordinator is to ensure that the AQB at all times complies with the requirements of Certification Body and that the AQB evolves and implements appropriate systems and procedures so as to ensure the consistency of Certification Scheme examination standards.

It is required of the AQB Co-ordinator to inform the Certification Body of any abuse of the Certification Scheme of which he may become aware, as well as AQB non-compliance and corrective action. All instances of non-compliance with requirements shall be recorded.

ii. Examination Personnel

Certification Scheme examinations shall be conducted only by those personnel named in the AQB quality system and on the AQB authorisation as examiners. Existing Certification Scheme examiners are required to maintain their curriculum vitae, and to provide Certification Body with an up to date copy if changed.

AQBs will not directly involve in Certification Scheme examinations the sub-contract examiners or invigilators, or any other sub-contract personnel, where such personnel have access to examination material, if their other employment is such as to threaten the impartiality of the examination process or to significantly threaten the security of Certification Scheme examination material.

AQBs may not conduct examinations for candidates employed by the same organisation that owns the AQB, or who are employed by an organisation having a commercial interest in the AQB.

The AQB shall appoint a Level 3 certified individual who shall be responsible for the provision of all facilities for examination, and for the preparation, conduct and standards of examination and who shall be designated Chief Examiner on the AQB's certificate of authorisation.

The AQB shall permit only those personnel named in the Certification Body approved quality management system and on the AQB authorisation as examiners or invigilators to supervise the conduct of Certification Scheme qualification examinations. Invigilators of practical examinations shall hold relevant Certification Scheme certification (or certification recognised by Certification Body), otherwise, the AQB shall demonstrate to the satisfaction of Certification Body that the invigilator has received appropriate training in the points to be observed and recorded during practical examinations.

All examination staff are required to declare any interest in any candidate in whose examination they are involved in any capacity. An examiner or invigilator is prohibited from direct involvement in any examination of a candidate in whom they may have an interest by virtue of:

— having a common employer — now or within the preceding two years;

— having provided training within the preceding two years;

— being employed by an organisation which has an interest in the outcome of examinations;

— any other circumstance which may potentially threaten impartiality.

Administrative and examination staff shall be designated as such in the quality management system, and shall be provided with terms of reference and/or a job description. They shall be able to demonstrate familiarity with all requirements, rules and regulations relevant to their tasks, and the AQB quality management system shall define how they are trained in those tasks and the system for recording such training.

The AQB quality management system shall describe in detail the measures, such as delegation of responsibilities for management and administration, to be taken in the absence of key staff.

(b) Premises

The AQB must provide quiet examination rooms supplied with all necessary services (heat, power, lighting, etc.), and all facilities provided shall comply with all relevant statutory health and safety legislation requirements.

Examination invigilators must ascertain that the examination conditions are to the satisfaction of all candidates prior to the commencement of Certification Scheme examinations. This includes provisions for acceptable levels of comfort (lighting, temperature etc).

This may be achieved verbally or by the prominent positioning of a notice in the examination room which states that it is the candidate's responsibility to inform the examination invigilator if they feel that the prevailing conditions are such that they may adversely affect the examination result.

In the event that, after an examination has started, examination conditions deteriorate to a level below that required by the Certification Body, the examination must be terminated or suspended and not restarted until such time as the conditions are restored to a standard conducive to maintaining the candidate's concentration and to the conduct of Certification Scheme examinations.

Where premises are shared between training and examination, there shall be no joint usage of the facilities, i.e. examinations shall not take place whilst the facilities are being used for training or vice versa.

Where the AQB offers Certification Scheme examinations at one or more remote examination centres on a permanent or frequent basis, there shall be a documented procedure covering the conduct of examinations at each examination centre. This procedure will address all of the requirements contained within this document and will be subject to audit on site at the discretion of the Certification Body.

(c) Examination questions

The Certification Body provides a central bank of validated multi-choice examination questions from which centrally issued examination papers are constructed. All AQBs are required to contribute questions, which shall subsequently be validated and added to the central question bank.

Once approved for Certification Scheme examinations, examination material shall be used for no purpose other than Certification Scheme examinations. No questions which have been used for training purposes during the preceding twelve months shall be utilised within Certification Scheme examinations.

There shall be a documented AQB procedure for a system by which candidate's replies to examination questions are periodically reviewed in order to detect those questions which consistently elicit incorrect answers from candidates. This procedure will require the Certification Body to be notified of any such examination questions.

(d) Examination Specimens

The minimum number of practical specimens to be available for each permanently established examination centre operated by an AQB that will enable the conduct of examinations for a stated maximum number of candidates at any examination sitting is specified in Section 6.2 of this document. Examination specimens shall meet the relevant specification (where one exists) before use in Certification Scheme examinations.

Where an appendix does not yet exist for a particular category of examination specimens, the AQB shall provide for Certification Body approval a list of specimens proposed for use, including a description of each, and shall not conduct examinations in the category concerned until authorisation has been issued.

Once approved for Certification Scheme examinations, examination specimens shall be used for no purpose other than Certification Scheme examinations. No specimens which have been used for training purposes during the preceding twelve months shall be utilised within Certification Scheme examinations.

A list of Certification Scheme examination specimens and their disposition shall be submitted to the Certification Body during initial authorisation and, subsequently, upon request. All reductions and any significant increase in examination specimen holdings must be reported to the Certification Body in writing. During assessment and surveillance visits, Certification Body assessors will select specimens at random and audit for compliance with requirements.

Each practical specimen shall be uniquely identified by an appropriate permanent marking to ensure that it is completely traceable. Such marking shall not interfere with the practical NDT of the specimen and shall, wherever practicable, be concealed from the candidate whilst the specimen is being used for examination.

The AQB quality management system shall document procedures for the procurement, production, maintenance, rotation, disposal and introduction of new examination specimens. the Certification Body may at any time require AQBs to remove from service a particular test specimen, or to obtain or procure and introduce specimens with specific natural or artificial flaws.

There shall be a documented procedure for the production of master reports of flaws in each specimen. The master report shall be based only on the method and the particular technique to be applied to the specimen by examination candidates.

All examination specimens, in order to gain approval of Certification Body, must be evaluated independently by two personnel holding relevant valid level 2 certification. Where there is significant disagreement between the two evaluations concerning defect content, location and/or characterisation, the exercise shall be repeated until there is agreement in the result. From these separate evaluations, a master report will be generated and this will be signed by the AQB Chief Examiner initially and at each review. Records of such evaluations will be maintained for a minimum of ten years beyond the date when the specimen ceases to be used for Certification Scheme examinations.

The AQB shall have in place a procedure whereby examination specimen master reports are periodically reviewed against actual reports produced by examination candidates. If a significant number of candidates fail to correctly report any defects in the specimen, it is to be re-evaluated for suitability as a Certification Scheme examination specimen.

(e) Test equipment

The AQB shall hold sufficient relevant test equipment, probes, reference blocks, calibration blocks, etc., to enable the conduct of Certification Scheme examinations for a stated number of candidates at any one practical examination sitting. Minimum equipment holdings for AQBs are given in Section 6.5.6 of this Guidebook. Details of designated examination equipment must be submitted to the Certification Body upon request.

The AQB shall, as far as practicable, maintain all such equipment in a serviceable condition and provide for its maintenance, overhaul and replacement as necessary.

Existing AQBs are to record any changes in equipment holdings. If a significant reduction in equipment holdings is planned, this may result in a change in the scope of AQB authorisation and must be notified to the Certification Body beforehand.

(f) Consumables

The test centre shall ensure an adequate supply of all consumable materials necessary for Certification Scheme examination requirements. A documented procedure is required to ensure that consumables are properly disposed of strictly in accordance with an appropriate regulation.

Maintenance of process capability for processes involving consumable materials (e.g. liquid penetrants, magnetic inks, radiographic processing chemicals) is to be covered by a process control procedure.

(g) Security

Examination materials, including questions and practical specimens, and information on candidates, require handling with a high degree of security, confidentiality, integrity and impartiality. If data at AQBs are computerised, a documented procedure shall cover, as a minimum, general security, authorisation for access, and measures to prevent loss of hard copy and/or computerised data.

Only authorised personnel from the AQB and Certification Body representatives authorised in writing by the Certification Body shall have access to examination material and records.

Secure lockable storage facilities shall be provided for all examination material including questions, answers, specimens and techniques. These must be located in an area to which candidates do not have unsupervised access. A secure facility for the retention of candidates' records and results shall also be provided.

Where examination material is stored at a location not under the constant supervision of AQB staff, e.g. at a site remote from any permanently established and staffed examination centre, the AQB shall notify the Certification Body management of the location and measures in place to safeguard the security and confidentiality of examination material. the Certification Body reserves the right to audit such storage facilities and to direct that specific measures be in place to safeguard security and confidentiality.

6.5.3. Quality management systems

(a) General

The AQB shall provide the Certification Body with formal quality management system documentation (and maintain this documentation up-to-date) giving details of the scope of examinations, and applicable management and staff structures, together with documentation giving details of its facilities, equipment, specimens, control arrangements and procedures, which shall be shown to comply fully with these requirements and be adequate to maintain a consistent standard of Certification Scheme examinations. The documented quality system shall include a statement of the AQB's safety policy and shall also include terms of reference for staff.

The quality management systems requirements are those of the current edition of the international standard ISO 9001:2000. Appropriate interpretations of the requirements of the international standard, where needed, are provided in the following text.

(b) Scheme review

The AQB is required to document and implement a procedure for a management review, conducted at least annually, covering all aspects of its quality system to ensure continuing compliance with these requirements. The agenda for the management review meeting (which shall be recorded in minutes — with actions allocated where appropriate) shall include, but not be limited to, the following:

i. Overall quality performance
ii. Results of external audit
iii. Results of internal audit
iv. Effectiveness of corrective and preventive action
v. Complaints
vi. Records of internal audit and management review shall be retained for not less than seven years.

(c) Quality system

The AQB shall devise and maintain a fully documented quality system, including operating procedures, covering all aspects of the organisation and control of Certification Scheme examinations. The intent of the quality system shall be to ensure the effective control of, and consistency within, the examinations conducted on behalf of the Certification Body. The quality system shall cover each of the elements of the international standard as well as specific requirements for the Certification Body authorisation of AQBs. The latter will cover, as a minimum, the following:

i. AQB organisation;
ii. Co-ordinator’s duties and responsibilities;
iii. Chief examiner's duties and responsibilities;
iv. Examiner's duties and responsibilities;
v. Invigilator's duties and responsibilities;
vi. Staff training and qualifications;
vii. Examination facilities, including premises, specimens and equipment;
viii. Examination procedural data;
ix. Conduct of examinations;
x. Grading of examinations;
xi. Examination records;
xii. Consistency of examination standard;
xiii. Security (of specimens, records and information);
xiv. Facilities for visiting representatives of the Certification Body.

(d) Document and data control

The AQB shall establish and maintain a procedure to control all documents essential to the provision of an AQB service, e.g. Certification Scheme documents, quality system, standards and specifications.

A procedure will ensure that staff can readily ascertain from a master list the current status of any document in use. Superseded or withdrawn documents shall be destroyed or, if retained for historical reasons, shall be clearly stamped 'SUPERSEDED' or 'WITHDRAWN'.

Responsibility for embodiment of changes to documentation shall be allocated within the quality management system, and a documented procedure must ensure that relevant personnel are aware when change has occurred.

The AQB Co-ordinator shall ensure that all necessary technical and procedural data is available to enable staff to comply with requirements.

The AQB shall devise all necessary procedures for the adequate control of Certification Scheme examinations for which it is authorised, and shall ensure that such procedures are implemented by all appropriate staff.

The AQB Co-ordinator is required to advise the Certification Body of any apparent error or discrepancy in Certification Scheme documentation.

The AQB Co-ordinator will ensure the correct use of the Certification Scheme logo and the Certification Body accreditation mark, as described in Certification Scheme document on any internal documents or other devices originated within the organisation.

(e) Candidate eligibility and identification

The AQB will have a documented procedure for ensuring that candidates satisfy all requirements, particularly in terms of examination eligibility and identification, which includes a minimum of 5% verification of experience and supervision information provided by the candidate. The procedure will describe in detail, but not be limited to, the following points:

i. Registration

   Candidates will complete and submit prior to examination a correctly completed standard application form.

ii. Pre-certification training

   For level 1 and level 2 candidates, AQBs should require evidence of satisfactory completion of a course of training conducted by an ATO to the relevant Certification Scheme syllabus. Where additional on-the-job training supplements the approved training, AQBs may accept a signed declaration from the applicant, endorsed by his employer, that this has been carried out, but should implement a system of random checks to verify such statements.

iii. Pre-certification experience

   Proper form may be used for recording experience, including supervision by an appropriately qualified person. The form also provides guidance on acceptable

qualification and certification of persons providing supervision of Certification Scheme candidates.

iv. Annual vision test

The candidate must provide documented evidence of satisfactory vision for the first time examination and of satisfactory annual vision tests for subsequent examinations.

v. Identification of candidate

For those candidates already in possession of a centrally issued Certification Scheme wallet card, AQBs must request sight of this to confirm the candidate's bona fides. If a candidate cannot produce a wallet card or photographs, then the AQB must either be in a position to offer a passport photograph service, or refuse examination until such photographs are supplied and can be attached to a new wallet card, signed by the candidate, for transmission to Certification Body with the result notice. In the latter case, the AQB must be in a position to witness that the supplied photographs are of the individual attending for examination, and must witness the individual signing the reverse of the photographs or must ascertain (using Certification Scheme form) that the signature on the reverse of the photographs is the same as the individual attending for examination.

(f) Conduct of Certification Scheme examinations

The AQB shall have in place an operating procedure which ensures that candidates are, at all times during examination, closely supervised by a suitably qualified and authorised examiner or invigilator who will ensure that no candidate is permitted an unfair advantage or to collude with other candidates.

A procedure for invigilation is to be covered in the AQB quality management system, and is to define appropriate training in invigilation techniques including, where necessary, specific points to be noted during practical examinations. An invigilator need not be an examiner, but must:

i. be appropriately qualified if invigilating practical examinations;

ii. required to ensure that secure examination conditions are maintained at all times;

iii. ensure that any infringement of examination conditions by any candidate is recorded, and reported without delay to the Chief Examiner or AQB Co-ordinator;

iv. declare an interest in any candidate.

A Certification Scheme examination may be interrupted or curtailed provided, in the opinion of the responsible Examiner or Invigilator, a valid reason exists. In the event of an interrupted or curtailed Certification Scheme examination the AQB Co-ordinator shall advise the Certification Body of the interruption or curtailment.

In the event that a Certification Scheme examination is suspended or interrupted by the AQB before completion, the candidate may return to complete the examination without further charge at the same AQB within thirty days of the commencement of the original examination.

Any completed examination parts may be held over pending re-commencement, but shall not be marked (and the candidate shall not be given any indication of the result) until such time as all examination parts are completed.

Any part completed examination papers shall be retained with the candidate's file as an examination record, but shall not be considered as a part of the completed examination. In respect of any part not completed, the candidate shall be given an entirely different paper upon re-commencement.

In the event of a subsequent re-examination, the earliest date allowable for the re-examination shall be calculated from the date of examination re-commencement.

All staff involved with examinations shall ensure that no examination material is removed by any candidate. This includes any rough notes, sketches, etc. that the candidate may have made during the examination.

The use of programmable calculators is prohibited in Certification Scheme examinations, as is the use of digital NDT equipment with storage facilities — unless the equipment concerned is of a type authorised by the Certification Body and which is inspected by AQB staff before and after use in an examination.

There shall be a documented procedure which ensures that all candidates are adequately prepared on the day of the examination. This will cover, as a minimum, provision of correct examination papers, codes and standards, examination equipment and materials, information on breaks during examination and the consequences of cheating.

An extension of up to 25% is authorised in the time allowed in Certification Scheme written examinations for candidates suffering from conditions such as dyslexia who are likely to experience difficulty in completing examinations in the published time allowed. AQBs may allow this additional time at their discretion provided traceable documentary evidence of the condition is retained with the examination records. Arrangements should also be made for an examiner to be present in order to supplement the written examination with oral questions if necessary to establish that the candidate has a firm grasp of the topic being examined.

Candidates shall be prohibited from using red ink or correction fluid when completing Certification Scheme examination papers. Candidates will be required to initial beside any corrections they may make on examination papers. In the event that a candidate does use red ink, AQBs should take effective steps to ensure that the responsible examiner's remarks and annotations are made in a manner that will not result in confusion in the event that a Certification Scheme moderator or assessor should audit the examination in question.

Mobile phones and other electronic communications devices are a potential source of cheating and may disturb other candidates if they should be activated during examinations. Consequently mobile phones and any other electronic communications devices shall be barred from written and practical examination facilities when Certification Scheme examinations are being conducted.

(g) Consistency of Certification Scheme examinations

The AQB is to make every effort to ensure that its standard of Certification Scheme examination(s) is consistent and at all times complies with requirements.

The examination system is to be defined by written procedures which shall include a documented system for the periodic double scrutiny or moderation of random samples of

candidates' examination papers. The procedure for double scrutiny should be such that the first examiner is unable to forecast when double scrutiny will occur.

Any significant difference between the initial marks awarded and those awarded by the second examiner or moderator shall be investigated and appropriate action taken within the AQB system to restore consistency.

When double scrutiny or moderation takes place, it is to be recorded on the candidate's AQB records and on the examination result notice.

The double scrutiny or moderation must take place before the candidate is informed of examination results. Any discrepancy discovered after the results have been sent out shall not be cause to change the 'published' result, unless a particular examination result has been investigated in the course of a formal Certification Body appeals procedure.

The AQB is to ensure that a candidate is not given the same examination paper in any subsequent examination he may take. This will include re-examination and recertification examination(s).

(h) Grading of Certification Scheme examinations

Marking schedules for all possible solutions are to be produced for all narrative answer questions and are to include key points and marks for answers. These shall be prepared by an authorised Examiner with appropriate certification, and shall be approved and signed by the Chief Examiner.

The conduct of practical examinations is to be defined by written procedures which shall include assessment and marking schedules for all possible solutions, observation of the candidate for compliance with safety notes and notices, and selection and correct usage of test equipment. Practical examination marking schedules shall be prepared by an authorised Examiner with appropriate certification, and signed by the Chief Examiner.

AQBs will grade Certification Scheme practical examinations according to the provisions of ISO 9712:2005.

All examination marking is to be carried out using red ink.

Examination results notices shall be posted to the Certification Body, the candidate and the individual paying the examination fee not later than 21 days (though it is desirable that this period shall be less than 7 days) from the date of the examination and, in the case of failure in the examination, should include an explanation of the reason for failure which is useful to the candidate in preparing for re-examination. The results notice will serve as a recommendation to the Certification Body to certify competence.

The Certification Body reserves the right to require further evidence of competence before issuing a certificate.

(i) Control of inspection, measuring and test equipment

The AQB shall establish and maintain a documented calibration procedure for all inspection, test and measuring equipment, traceable to national standards where these exist. Such procedures shall include details of equipment type, identification, location, frequency of checks, method of check, allocation of responsibility and actions to be taken when results are unsatisfactory.

(j) Non conformity

All instances of non-conformity with Certification Body or Certification Scheme requirements are to be reported by the AQB to the Certification Body, together with intended corrective actions.

(k) Preventive action

In the event that the AQB discovers the potential for non-conformity, the Co-ordinator is to advise the Certification Body and propose appropriate preventive action.

(l) Control of quality records

The AQB is required to maintain for at least seven years comprehensive records as evidence of compliance with these requirements. Such records shall include, but not be limited to, results of:

i. continuous monitoring and internal audit;
ii. staff re-appraisal;
iii. equipment maintenance reviews and recalibration;
iv. periodic reviews of marking schemes, procedures and documentation.

The AQB is also required to maintain comprehensive examination records (including precise details of which questions each candidate was set for each initial examination and re-examination) in secure lockable storage. Except for radiographs produced by candidates in radiography examinations, which must be retained for at least one year, examination records shall normally be retained for a period of 11 years but, in any case, shall not be disposed of without prior consultation with the Certification Body.

All records shall be available for scrutiny by authorised Certification Body representatives.

In the event that an AQB ceases trading, or where authority to conduct Certification Scheme examinations is relinquished or withdrawn, all Certification Scheme examination records will become the property of the Certification Body.

Records may be in the form of any type of media, such as hard copy or electronic media.

(m) Internal quality audits

The AQB is required to devise and implement a system of continuous monitoring and periodic internal audits of all aspects of Certification Scheme examination procedures.

The AQB quality management system will include a documented schedule for internal audit which will cover the whole of the quality system at least once in each calendar year.

6.5.4. Application for approval as an authorised qualifying body

(a) Introduction

Laid down here are the requirements for AQBs that should be completed and submitted to the Certification Body (CB). Once all quality and technical requirements have been met, a contract between the CB and the AQB will be drawn up and signed by representatives of both

parties. A draft of the contract will be made available in confidence to applicant AQBs at an appropriate stage in the approval process.

Prospective and existing approved AQBs shall comply with all of the published requirements and of this document. Actual demonstration of compliance is a prerequisite to the award of any authorisation.

The prospective AQB will indicate an intention to comply with these requirements by returning a completed application form (Section 6.5.5) to the CB. The applicant organisation must state clearly, referring to appropriate personnel certification requirements, the scope of the examinations it offers or intends to offer. The completed form, together with any subsequently issued certificate of authorisation or approval, will form a part of the contract between the CB and the AQB.

(b) Procedure

A controlled copy of the documented quality system must be submitted to the CB prior to being considered for initial approval. The precise format and coverage of the quality documentation will be agreed between the CB and the applicant AQB during pre-assessment discussions. The documented quality system will form the basis of approval by the CB of the AQB, which shall be deemed to have accepted the requirement to maintain and adhere to such staffing arrangements, facility and resource requirements, control arrangements and procedures defined in the Quality Manual of AQB.

Upon receipt of an application the CB will instigate a pre-assessment visit during which a paperwork evaluation of the documented procedures for compliance with the published criteria will be undertaken, as will a review of technical and administrative facilities for the provision of CB examinations.

The initial application fee provides for the pre-assessment, but does not include provision for reasonable expenses (travel, subsistence, accommodation, etc.), which are to be reimbursed by the applicant AQB before the pre-assessment report is released.

The appointed assessor will comment upon the readiness for formal assessment. If, in the opinion of the CB, the organisation is adequately prepared for initial assessment, a mutually agreeable assessment date will be set and an audit timetable circulated.

During the formal initial assessment, the CB appointed assessors will fully evaluate the applicant's quality management system, resources and the suitability of the applicant organisation to conduct CB examinations. The Assessor will need to be assured of the effectiveness of working practices and this will involve witnessing the conduct of actual examinations.

An initial assessment fee at the current rate will be payable by the applicant AQB prior to the assessment visit. The applicant AQB will be invoiced after the assessment for any reasonable expenses (travel, subsistence, accommodation, etc.).

When satisfied with the suitability of the systems and facilities, a formal recommendation regarding AQB approval will be made to the CB by the appointed lead assessor and, if approved, a certificate of authorisation, which must be issued before an organisation is permitted to conduct CB examinations, will be issued to the applicant organisation.

The certificate of authorisation, which will describe in detail the scope of the authorisation, and will name the co-ordinator, chief examiner, other examiners and invigilators within the

organisation, will be valid for three years, during which period the organisation will be subject to surveillance through periodic audits conducted by the CB authorised assessors.

The CB must be advised immediately of any change in the personnel named on the certificate of authorisation and will reserve the right to review continuation of approval consequent upon such changes.

After approval is granted, a controlled copy of the AQB's documented quality system will be retained by the CB and a further copy will be maintained by the AQB and supplied upon demand for use by the appointed Lead Assessor.

After approximately 3 months of operation, the newly approved organisation will be re-assessed by the CB and, if no major non-compliances are found, approval will be reaffirmed.

AQBs which fail to satisfy the CB appointed lead assessor that they meet specified requirements, during the first re-assessment and any subsequent surveillance, may have their approval suspended or withdrawn. In the latter case, the organisation concerned may appeal (the CB appeals procedure is described in Section 6.8) against the decision or reapply for the CB approval as an initial applicant.

Existing approval shall be subject to continuing satisfactory annual surveillance and three yearly full assessment. Continued approval depends upon the organisation being found to comply with requirements during surveillance and reassessment and at all other times.

Minor deficiencies found during reassessment or surveillance must be corrected by the AQB within three calendar months, or within a period which shall be defined in the assessors report and recommendations. The corrective action for such deficiencies shall be subject to lead assessor and the CB approval. This may be achieved by correspondence, but could involve a further visit by the CB appointed assessors.

(c) Normal assessment and surveillance schedules

Following schedules may be applied:

i. Initial full assessment within 6 months of receipt of acceptable application.

ii. First reassessment: approximately 3 months after initial full assessment.

iii. Surveillance: 12 months after most recent full assessment.

iv. Surveillance: 24 months after most recent full assessment.

v. Reassessment — 36 months after most recent full assessment.

Existing approved organisations wishing to extend the scope of the approvals they hold shall be assessed for compliance with requirements in respect of the examinations they wish to add to their approval. This may involve a site visit and, if so, an assessment fee at the current rate will be payable by the organisation prior to any visit to assess the proposed extension to scope.

Application for extension or reduction of approved scope, which will be considered at any time, must be made in the same manner as for initial approval.

Representatives of the CB, authorised in writing, shall have access to an approved AQB at all reasonable times to verify any aspect of its operation applicable to the requirements. The CB reserves the right to visit any approved AQB without notice.

The AQB shall meet all reasonable requests to provide access, accommodation and facilities for authorised representatives of the CB at any time.

The CB reserves the right to withdraw any AQB authorisation, wholly or in part, at any time.

6.5.5. Application for approval as an authorised qualifying body

The following form is an example of an application form to be submitted by a prospective authorised qualifying body to the Certifying Body.

The information provided by the applicant will be treated strictly as *commercial in confidence*. Please answer all questions fully.

APPLICANT ORGANISATION:

BUSINESS ADDRESS:

TELEPHONE: FAX: E-MAIL:

CONTACT NAME:

PROPOSED EXAMINATION CENTRES:

LIST PERSONNEL CERTIFICATION REQUIREMENTS DOCUMENTS COVERING EXAMINATIONS FOR WHICH APPROVAL IS SOUGHT

(If the applicant organisation is not seeking approval to conduct all qualification examinations detailed in a personnel certification requirements document, it should list here the examinations relevant to the desired scope of approval. These are given under the heading 'certification available' in requirements documents).

DETAILS OF ANY APPROVALS CURRENTLY HELD:

RESPONSIBLE PERSONNEL

(Please name the AQB co-ordinator, chief examiner, other examiners, invigilators and administrative staff (defining responsibilities), and provide a curriculum vitae in respect of the co-ordinator and each examiner and invigilator).

DECLARATION:

I undertake, on behalf of the applicant organisation, to comply with the requirements set out in document <REF>, and understand that, when completed, this form, together with any subsequently issued authorisation or certificate of approval, will form a part of the contract between the applicant organisation and the CB. I enclose the current AQB application fee (detailed in document <REF>) and the documentation required in support of this application (see notes below).

SIGNATURE:

DATE:

NAME AND POSITION OF INDIVIDUAL COMPLETING APPLICATION:

NOTES:

1. Information may be provided on separate sheets if insufficient space is available on this form. Where more than one examination centre is listed, the personnel responsible for each must be mentioned.
2. This application must be accompanied by:
   - a controlled copy of the organisation's documented quality manual and procedures
   - the minutes from the most recent management review meeting
   - the current application fee (for initial applicants).
3. The likely time on initial assessment will be estimated during the pre-assessment visit.
4. The completed application should be sent to the address at the head of this document marked: 'In confidence for the attention of the Certification Scheme Manager'.

6.5.6. Minimum equipment holdings for authorised qualifying bodies

This document prescribes the minimum equipment holdings essential for the operation of an examination centre offering qualification examinations to candidates.

The AQB shall hold sufficient relevant test equipment, probes, reference blocks, calibration blocks, etc., to enable the conduct of examinations for a stated number of candidates at any one practical examination sitting.

Details of designated examination equipment must be submitted to CB upon request.

The AQB shall, as far as practicable, maintain all such equipment in a serviceable condition and provide for its maintenance, overhaul and replacement as necessary.

Existing AQBs are to record any changes in equipment holdings to the CB. If a significant reduction in equipment holdings is planned, this may result in a change in the scope of AQB authorisation and must be notified beforehand.

(a) Ultrasonic Testing

At least one analogue ultrasonic flaw detector and a full range of probes appropriate to the tests to be conducted, including any special purpose probes where required.

Calibration blocks and reference blocks appropriate to the tests to be carried out.

i. Time of Flight Diffraction

   TOFD data collection instrument, including specific connecting cables for data to be displayed on a computer.

   Computer with compatible software to interact where necessary with the TOFD instrument and read the TOFD data.

   TOFD scanner to include probe jig and line encoder.

   A pair of 5 MHz transducers with matching wedges producing centre beam refracted angles of 45°, 60° and 70°.

   BS 2704 type A2 or BS EN 12223 calibration block no. 1.

   Connecting cables for all parts of the equipment

   Water-based couplant.

   Where necessary the equipment may be loaned by the equipment manufacturer for use during CB exams, with the exception of the computers, which shall be solely owned and controlled by the AQB to ensure confidentiality of CB data.

ii. Phased Array (PA)

   PA data collection instrument, including specific connecting cables for data to be displayed on a computer.

Computer with compatible software to interact where necessary with the PA instrument and read the PA data

PA scanner to include probe jig and line encoder

BS EN 12223 calibration block no. 1

Connecting cables for all parts of the equipment

Water based couplant

Minimum spec transducers:	32 element 5 MHz	1 mm pitch
	32 element 2.5 MHz	
	64 element 5 MHz	1 mm pitch

Appropriate wedges and adaptors

(b) Radiography

At least one X ray tube with a kV range appropriate to the materials to be tested.

For gamma radiography (where appropriate) an Iridium 192 source, with suitable container and projection mechanism.

An X ray beam centering device.

A range of image quality indicators (IQI).

Lead letters and numbers.

Blocking off compounds and liquids.

Copper and lead filters.

Densitometer.

Film viewers, including at least one high intensity viewer.

Radiation monitor.

Stepped blocks for making exposure curves.

Caliper or other device for measuring material thickness

Separate darkrooms for film processing and film preparation/viewing.

Viewing aids, such as magnifiers.

A manual or automatic processing unit incorporating thermostatically controlled developing tank, stop bath, rinsing, fixing and washing tanks.

Thermostatically controlled drying cabinet.

Viewer with wet film attachment.

Channel and clip type film hangers in the common sizes.

Lead and calcium tungstate screens in the common sizes.

Flexible and rigid type cassettes.

Darkroom timer.

Safelights.

Trimmer to accommodate largest size of films.

(c) Eddy Current Testing

i. Wrought and Welds

At least one standard single frequency impedance plane instrument and one analogue meter display instrument.

Where examinations incorporate bolt hole testing, one dynamic rotating probe assembly and compatible instrument.

Where examinations are offered for multi frequency boiler tube inspection, one dual frequency impedance plane instrument suitable for testing of the examination samples held.

Absolute and differentially wound standard and shielded pencil and spade probes, suitable for testing ferritic and austenitic steels and aluminium alloys.

A selection of encircling, internal, bolthole and comparative coil types.

Calibration blocks, appropriate to all probe and material types.

Where examination of specific components, ie. automated/semi-automated testing of steel tubes/condenser tubes, coils/probes and test equipment together with reference test pieces containing relevant holes/notches.

ii. Tube Testing

One impedance plane, dual frequency two-channel flaw detector with the ability to mix channels manually. The flaw detector to carry a valid annual certificate of calibration.

One two-channel chart recorder having a minimum chart width of 50 mm, with a speed of between 25-50 mm/sec and a nominal 500 Hz frequency response.

Calibration tubes type A, B and D from draft inspection ESI 98-15 and produced in test sample material. Tubes to be 25 mm external diameter and 18 g thickness.

Eddy current probes of the air cored bobbin type. A minimum of one of each of:

Diameter 20 mm minimum 24 kHz nominal frequency and differential mode.

Diameter – appropriate to be a sliding fit through a plastic inlet insert and having a flexible (brush type) centring device. 24 kHz nominal frequency and absolute.

Appropriate cabling.

(d) Magnetic Particle Testing

A 1500 Amp bench or freestanding transformer with AC or DC output (and half wave rectified AC) with a current flow adapter and prods, magnetic flux flow adapter and an ink reservoir with feed.

AC/DC Electromagnetic Yokes with articulated legs and pole pieces.

Permanent magnets with pole piece adapters suitable for all applications.

Various rigid and flexible coils, threading bars, etc.

Inspection area or Booth equipped with black out facilities for visible and UV(A) viewing of samples.

Independent or combined photometer & radiometer for measuring the intensity of visible and black light.

Demagnetising equipment.

Flux measuring and comparison gauges to BS recommendations.

Sutherland Flask or Crowe Receiver for measuring solid content of magnetic ink.

Powder dispensers

Supplies of detection media including non-fluorescent, fluorescent and dry powder.

Artificially or naturally cracked blocks/specimens for performance checking.

(e) Liquid Penetrant Testing

An effective component cleaning/degreasing facility for thorough cleaning of specimens.

A penetrant line comprising:

Water washable penetrant tank

Post emulsifiable penetrant tank

Emulsifier tank

Water rinsing station with spray nozzle

Drying station

Dust storm cabinet

Aerosol liquid penetrant inspection kits comprising:

Penetrant remover/degreaser

Fluorescent penetrant

Colour contrast dye penetrant

Developer

Inspection area or Booth equipped with black out facilities for visible and UV(A) viewing of samples.

Independent or combined photometer & radiometer for measuring the intensity of visible and black light.

Artificial flaws (TAM panel) or other means of process control of penetrant line.

(f) Visual Testing

Surface table (of suitable size for largest measurement).

V blocks.

Block mounted pointers/sensors.

In addition the following shall be provided in adequate quantities (dependent on the number of trainees)

Squares, rules, protractors.

Micrometers.

Verniers.

External calipers.

Dial reading bore gauge.

Hand magnifiers (X2, X5)

Lupes with metric scales no greater than X7.

Mirrors – various sizes up to 50 mm diameter with fixed and articulating heads.

Light sources – penlights, flashlights, bespoke sources to power intrascope and fibrescope.

Indirect viewer – either fibrescope or endoscope with forward and side viewing lenses.

Photometer.

Weld gauges, weld profiles, surface comparator.

(g) Alternating Current Field Measurement

At least one calibrated ACFM Crack Microgauge.

QFM Version 2.0 Real Time Data Acquisition and Analysis Software Program.

Laptop Computer, Colour Display, Windows 95 and TSC software installed.

A full range of ACFM probes appropriate to the tests to be conducted, including any special purpose probes where required.

Weld Check Block.

(h) Rail Testing

Portable ultrasonic flaw detector suitable for manual use and in conjunction with an 070 test rig.

Calibration blocks: CB91M, CB87M, Test Rail Section master block (STD2).

Rail test rig incorporating a combined laterally adjustable 070 probe array and automatic couplant.

Tandem probe rig (for testing alumino-thermic welds) incorporating 2 matched 2.5 MHz 45° single crystal probes.

A range of Railtrack approved single crystal probes:

2.5 MHz 0° (40/058640)

2.5 MHz 40° (40/058641)

2.5 MHz 70° (40/058643)

2.5 MHz 45° (40/058642)

2 matched 2.5 MHz 45° (40/058642)

4 MHz 70° miniature (82/998192)

A range of Railtrack approved double crystal probes:

5 MHz 0° (40/058644)

Ancillary equipment: steel rules, couplant, wire brushes, scrapers, etc.

Hand held permanent and electromagnetic yokes.

(i) Railway Axles and Wheelsets

Approved mains or portable ultrasonic flaw detector (BR2000, BR77 or acceptable commercial alternative)

CB88M and CB88I calibration blocks

Reference block APT B1 (Drg No. GB/8312)

A range of compatible 2.5 MHz rail vehicle axle testing probes:

double crystal: 0°, 5°, 7.5°, 10°, 12.5°, 15°, 17.5°, 37° (hollow ground), 52° (hollow ground)

double crystal horizontal ellipse: 5°, 7.5°, 10°, 12.5°, 15°, 17.5°

single crystal: 37° and 52°, (hollow ground).

(j) Welding Inspection

The following shall be provided in adequate quantities (dependent on the number of trainees or candidates)

Rules.

Hand magnifiers (X2, X5)

Lupes with metric scales no greater than X7.

Mirrors – various sizes up to 50 mm diameter with fixed and articulating heads.

Light sources – penlights, flashlights.

Weld gauges, weld profiles, surface comparator.

6.6. PROCEDURE FOR THE CONTROL OF EXAMINATION QUESTION PAPERS

6.6.1. Scope

The following procedure defines the methods and practices for the procurement, review and storage of multiple choice questions, together with the methods and practices for the preparation, validation, amendment and distribution of centrally issued examination papers for use by CB Authorised Qualifying Bodies. The procedure also identifies responsibilities and the documentation used at each stage of the process.

6.6.2. Procurement of examination questions

To facilitate the preparation and availability of central examination papers, Authorised Qualifying Bodies are required to submit to the Scheme Manager copies of all question papers used for CB examinations prior to the issue of central CB papers. Where an AQB is newly approved, or has recently received an extension to scope to conduct CB examinations in additional Sectors, Methods or Levels, they are required to produce and submit to the Scheme Manager, two question papers for each (written) examination module covered by the scope of approval.

6.6.3. Receipt and filing of question papers

On receipt of question papers the Scheme Manager shall complete a registration form (Section 6.6.15) and file it together with the relevant question papers.

6.6.4. Review of questions and entry to the CB database

The Scheme Manager with the advice of a Level 3 shall be responsible for review of all questions held on file prior to their entry into the CB computer database. Review of questions shall take into account:

- Duplication.
- Conformity with the relevant CB examination syllabus.
- Grammatical correctness and ambiguity.
- Technical accuracy of questions and answers.

For record purposes the following marking system shall be used during review of question papers — questions that are selected for entry into the database shall be marked with a tick, duplicate questions with the abbreviation 'DUP' and questions that are considered unsuitable for other reasons, with a diagonal line through the question. All marking shall be in red ink. The Scheme Manager shall be responsible for signing and dating the foot of each question paper on completion of the review and retaining a copy of the marked up question paper on file.

6.6.5. Rectification of unsuitable questions

At the discretion of the CB Scheme Manager and dependent on the number of questions already held in the database, a further review may be carried out on unsuitable questions to determine if they can be re-worded or corrected to make them suitable for use. Where this is done, a copy of the amended question shall be added to the file to indicate its original source.

6.6.6. Preparation of examination papers

The Scheme Manager with the Level 3 shall be responsible for generating examination papers from the CB Question Database. For security purposes access to the database will be restricted to persons holding a valid password. Passwords are allocated or withdrawn by the CB Scheme Manager. During preparation of examination papers the Scheme Manager shall be responsible for monitoring questions for accuracy, technical content and repeat usage, to avoid mistakes, duplication and bias of questions papers to a particular topic or question type.

6.6.7. Validation of draft examination papers

For identification purposes the heading on draft examination papers and answer sheets shall include the word 'DRAFT' indicating that the papers may not be used for examination purposes. The foot of each paper shall contain a clear and unique computer generated reference code, indicating the Sector, Method, Level and examination part number for which it is intended. The date of preparation and an issue status number shall also be printed at the foot of each page.

All alterations shall be marked on the draft paper in red ink. For security purposes hard copies of draft papers that are not in use shall be kept in their appropriate file in a lockable filing cabinet. File numbers for examination papers shall be allocated by the Scheme Manager, based on the NDT Sector, Method and Level for which the paper is intended.

6.6.8. Distribution of draft examination papers

Draft examination papers shall be distributed to all CB Authorised Qualifying Bodies for technical comment. Each draft paper distributed for comment shall be accompanied by a standard memorandum comment sheet and a transmittal slip. For security purposes distribution of examination papers shall be by recorded delivery. A maximum period of 30 days shall be allowed for technical comment by Authorised Qualifying Bodies from the issue date printed on the document transmittal slip. The Scheme Manager shall be responsible for the distribution of papers, receipt of returned transmittal slips and collating any technical comments received. Technical comments received in this way shall be filed with the question papers to which they refer.

6.6.9. Evaluation of technical comments

On the expiry date for technical comments, the Level 3 Consultant or CB Scheme Manager shall consider comments received and indicate on the sheet, adjacent to the comment, whether or not it is accepted. On completion of this the person carrying out the review shall sign and date the foot of the paper and place it in the question paper file for further action.

6.6.10. Final amendment of examination papers

The Scheme Manager shall be responsible for incorporating amendments resulting from comments, into examination papers, This shall be done by altering questions in the CB Question Database and re-generating amended papers. Following this and any necessary corrections they shall be 'frozen' and master hard copies printed for distribution. Master examination papers shall not have the word 'DRAFT' in the heading and will have, in addition to the identification number contained on the draft paper, an issue date at the foot of each page.

At this stage the Scheme Manager shall also assess the effect of these alterations upon existing (master) examination papers which incorporate the amended questions. Where necessary, any affected papers will be raised and re-issued to Authorised Qualifying Bodies for immediate use, with the previous issue being stamped 'SUPERSEDED'. The Scheme Manager shall be responsible for distribution of master examination papers in accordance with Section 6.6.6 of this procedure.

6.6.11. Usage of examination papers

To prevent the possibility of candidates who have failed examinations being given the same examination paper for subsequent re-sit examinations, and the general leakage of information on the content of examination papers by candidates, the following precautionary measures shall be taken.

Existing AQB quality procedures for recording the details of examination papers attempted by candidates shall also be implemented for centrally issued papers. In the event of failed candidates attempting re-sit or repeat examinations at different Authorised Qualifying Bodies, the second (or subsequent) AQB shall be responsible for determining which examination papers have been used previously, and ensuring that the same papers are not used again. This requirement and the method to be used for determining this information shall be recorded in relevant AQB's quality procedures.

At regular periods the Scheme Manager shall be responsible for issuing new examination papers, until such time that sufficient papers exist to guarantee effective rotation to avoid candidate familiarity (at this time CB will advise Authorised Qualifying Bodies accordingly). New examination papers may contain entirely new questions, a combination of new and old questions from existing examination papers provided that, in both cases, the content of papers broadly covers the overall examination syllabus defined in relevant CB documentation.

NB New papers that are compiled entirely from questions that have been used previously and have been validated in accordance with this procedure need not be re-validated.

The issue of new examination papers in the same Sectors, Methods and Levels for which central papers already exist shall *not* be regarded as a notification that the previous papers should be withdrawn, unless withdrawal is specifically requested on the transmittal documentation. All valid CB centrally issued examination papers may continue to be used at the discretion of Authorised Qualifying Bodies.

6.6.12. Review

(a) Performance Review

It shall be the responsibility of Authorised Qualifying Bodies to monitor the performance of centrally issued master examination papers, initially over a 60 day period, and to provide feed back information to CB on the comment sheet provided (Section 6.6.16). Comments on the performance of master examination papers will be processed according to Sections 6.6.7 to 6.6.9 of this procedure. Following the 60 day review period, the continuing performance of new question papers shall be reviewed for a period of one year. An annual review of question papers will be carried out on 1st January each year. The continuing performance review shall be based on submission by Authorised Qualifying Bodies, of completed forms (Annual Review of Question Papers) showing the answers given by candidates during examinations incorporating the question papers over the relevant review period. On receipt and processing of these, the Scheme Manager will identify questions that consistently elicit incorrect answers and review them accordingly. Question papers that are amended following review shall be re-issued under a revised issue status code and the records revised accordingly.

(b) Technical Review

All issued examination papers shall be subject to an annual review to confirm that they continue to reflect current application standards, technology and practice.

6.6.13. Records

A record of examination papers issued is maintained in spreadsheet file which is accessible from any workstation on the office network. A hard copy of the record shall be taken each time it is amended and retained in file ####. The Scheme Manager is responsible for issuing quarterly copies of the record to CB Authorised Qualifying Bodies.

6.6.14. References (examples not included)

File #### Index of issued CB examination papers.

Procedure for Office Security and Computer Backup Operations.

Procedure for Document Change and Control.

6.6.15. Form for receipt of examination questions

UNVALIDATED QUESTIONS RECEIVED FROM: _____									
paper ref	**Date Received**	**s**	**m**	**l**	**part no.**	**no. of questions**	**review date**	**reviewed by**	**number added to database**

6.6.16. Form for comments received on examination questions

AQB		**DATE**	
PAPER REFERENCE		**ISS. DATE**	

QUEST No.	COMMENT

COMMENTS MADE BY	AUTHORISED BY AQB CO-ORDINATOR
NAME.	SIGNATURE

6.6.17. Form for annual review of question papers

ANNUAL REVIEW OF QUESTION PAPERS			
AQB:		AQB COORDINATOR:	
PAPER REFERENCE:		SIGNATURE:	
ISSUE DATE:			

Q		C1	C2	C3	C4	C5	C6	C7	C8	Q		C1	C2	C3	C4	C5	C6	C7	C8	Q		C1	C2	C3	C4	C5	C6	C7	C8
1	A									**15**	A									**29**	A								
	B										B										B								
	C										C										C								
	D										D										D								
2	A									**16**	A									**30**	A								
	B										B										B								
	C										C										C								
	D										D										D								
3	A									**17**	A									**31**	A								
	B										B										B								
	C										C										C								
	D										D										D								
4	A									**18**	A									**32**	A								
	B										B										B								
	C										C										C								
	D										D										D								
5	A									**19**	A									**33**	A								
	B										B										B								
	C										C										C								
	D										D										D								
6	A									**20**	A									**34**	A								
	B										B										B								
	C										C										C								
	D										D										D								
7	A									**21**	A									**35**	A								
	B										B										B								

	C										C										C							
	D										D										D							
8	A									**22**	A									**36**	A							
	B										B										B							
	C										C										C							
	D										D										D							
9	A									**23**	A									**37**	A							
	B										B										B							
	C										C										C							
	D										D										D							
10	A									**24**	A									**38**	A							
	B										B										B							
	C										C										C							
	D										D										D							
11	A									**25**	A									**39**	A							
	B										B										B							
	C										C										C							
	D										D										D							
12	A									**26**	A									**40**	A							
	B										B										B							
	C										C										C							
	D										D										D							
13	**A**									**27**	**A**																	
	B										**B**									Key:								
	C										**C**									Q = Question (1-40)								
	D										**D**									C = Candidate (1-8)								
14	**A**									**28**	**A**									A, B, C, D = multiple choice								
	B										**B**																	
	C										**C**																	

6.7. SAMPLE CONFIDENTIALITY AGREEMENT

6.7.1. Commitment to confidentiality and impartiality

All directly employed and contracted persons shall sign a commitment to comply with the rules defined in the specific CB document that applies to their particular role(s) within the CB Scheme, including those relating to confidentiality and those relating to independence from commercial and other interests, and from any prior and/or present link with the persons to be examined or organisations assessed that would compromise impartiality.

All individuals involved in certification matters are required to respect the confidentiality of information to which they are privy by virtue of their position or appointment. Such confidentiality must be respected even in the event that an individual should cease to be so involved.

Employees, AQB examination staff AQB, QMS assessors and members of Boards and Committees will sign the undertaking below, which will be retained by the relevant department of CB indefinitely.

DECLARATION

I, _____ (full name)

Give an undertaking in respect of the above commitments, as appropriate to my position as:

_____

Signed _____ Date _____

6.8. PROCEDURE FOR COMPLAINTS AND APPEALS

6.8.1. Definitions and abbreviations

Complaint:	(i)	criticism of Certification Scheme procedure and/or
	(ii)	criticism of a Certification Scheme AQB or
	(iii)	criticism of a Certification Scheme certificate holder
Appeal:	(i)	against failure to certify Authorised Qualifying Body

6.8.2. Information for complainants or appellants

(a) All complaints or appeals must be made in writing and should be similarly acknowledged. Verbal complaints should not be accepted.

(b) Complaints may be made by any individual (certificate holder, certificate holder's employer, or client of employer) against the Certification Scheme, a Certification Scheme AQB, or a Certification Scheme certificate holder.

(c) Appeals may be made against a decision taken by Certification Scheme Management not to award a certificate, to withdraw or cancel a certificate, or not to renew a certificate.

(d) The Certification Scheme Manager should endeavor to deal with complaints and appeals without recourse to committee. Where this is not possible, or where the complainant or appellant insists, the matter should be put before a properly constituted panel.
N.B. Ordinarily, complaints are handled by correspondence with the complainant/appellant who may submit written representations, and attendance in person before the complaints and appeals panel may be arranged only if special circumstances prevail (as judged by the Panel).

(e) The appointed Panel should meet and review all relevant material within 42 days of receipt of a written complaint or appeal and decide upon action to be taken by the Scheme Manager.

(f) Where the Panel cannot, for whatever reason, reach a decision, the matter should be referred to the Certification Scheme Committee.

(g) The Constitution, Terms of Reference and Method of Working of a Certification Scheme Panel for Complaints and Appeals is described in Section 6.8.3.

6.8.3. Certification scheme complaints and appeals panel

(a) Constitution

i. The Certification Scheme Complaints and Appeals Panel shall be constituted of not less than three ordinary members including the Scheme Manager, a member of the Certification Scheme Committee and one other to be concerned solely with the interests of the complainant or appellant. At least one member of the Panel should have technical expertise relevant to the complaint or appeal under consideration, e.g. for a complaint or appeal concerning a Radiography certification, the Panel should include a certificated Level 3 radiographer.

ii. No person having a direct interest in the case of complaint or appeal in hand shall serve on the Panel. The Scheme Committee Member should chair the meeting of the Panel.

(b) Terms of reference

The Panel should be responsible to the Certification Scheme Committee for assessing individual cases of complaint or appeal.

(c) Method of Working

i. The Scheme Manager should gather all necessary information from the parties concerned in order that the case can be fully assessed by the Panel.

ii. A meeting of the Panel shall be convened by the Certification Scheme Manager in writing, giving 21 clear days notice of the meeting (unless the case is to be dealt with at a scheduled Certification Scheme Committee meeting), which shall take place within 42 days of receipt of a complaint.

iii. The Panel shall take into consideration all of the material submitted when reaching a decision. Where the Panel is able to reach a unanimous decision, the Scheme Manager should implement the decision and submit a brief report of the circumstances and decision to the next meeting of the Certification Scheme Committee.

iv. If the decision of the Panel is not unanimous, it shall be referred to the next ordinary meeting of the Certification Scheme Committee which shall decide the case by majority decision.

6.9. SAMPLE CODE OF CONDUCT

Certified Individuals and individuals in the process of certification must recognise that personal integrity and professional competence are the fundamental principles on which their testing activities are founded. Accordingly, it is a condition of certification that certificate holders shall undertake to:

- comply with this code of conduct;
- undertake only those non-destructive testing assignments for which they are competent by virtue of their training, qualification and experience;
- report any inaccuracy in the scope of certification awarded;
- only sign documents for work of which they have personal professional knowledge and/or direct supervisory control;
- engage, or advise the engagement of, such specialists as are required to enable assignments to be properly completed;
- conduct themselves in a responsible manner and utilize fair and equitable business practices in dealing with colleagues, clients and associates;
- be aware, at all times, of and uphold the provisions/ requirements of codes, regulations and standards under which they are working;
- report immediately to their supervisor/employer any perceived violation(s) of codes, regulations or standards. In the event that their supervisor/employer provides no satisfactory explanation or takes no corrective action, the certified individual shall report the situation direct to the Certification Body;
- perform their professional duties with proper regard for the physical environment and the safety, health and well-being of the public;
- protect to the fullest extent possible, consistent with the well being of the public and the provisions of this code of conduct, any information given to them in confidence by an employer, colleague or member of the public;
- avoid conflicts of interest with the employer or client, but when unavoidable, forthwith disclose the circumstances to the employer or client;
- strive to maintain their proficiency by updating their technical knowledge as required to properly practice NDT in the certified methods and levels;
- indicate to the employer or client any adverse consequences which may result from an overruling of their technical judgment by a non-technical authority;
- not falsify nor permit misrepresentation of their own or their associate's academic or professional qualifications, training, experience or work responsibilities;
- refrain from making unjustified statements or from performing unethical acts which would discredit the Certification scheme;
- report immediately to the Certification Body a significant interruption;
- report immediately to the Certification Body any perceived violation(s) of this code of conduct;
- report immediately to the Certification Body any attempt to pressurize or force an individual certified under the Scheme to violate this code of conduct;
- inform their employer in the event that their certificate is suspended, cancelled or withdrawn by the Certification Body.

Failure to comply with the above code of conduct will be dealt with under arrangements for handling complaints and appeals.

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