SRI LANKA STANDARD 996 : 1993

UDC 620 . 179 . 14

CODE OF PRACTICE FOR

QUALIFICATION AND CERTIFICATION OF PERSONNEL FOR NON-DESTRUCTIVE TESTING

SRI LANKA STANDARDS INSTITUTION

CODE OF PRACTICE FOR QUALIFICATION AND CERTIFICATION OF PERSONNEL FOR NON-DESTRUCTIVE TESTING

SLS 996 : 1993

Gr.12

SRI LANKA STANDARDS INSTITUTION
53, Dharmapala Mawatha,
Colombo 3,
Sri Lanka.

SRI LANKA STANDARD

CODE OF PRACTICE FOR QUALIFICATION AND CERTIFICATION OF PERSONNEL FOR NON-DESTRUCTIVE TESTING

FOREWORD

This standard was approved by the Sectoral Committee on Welding and Allied Areas and was authorized for adoption and publication as a Sri Lanka Standard by the council of the Sri Lanka Standards Institution on 1993-02-18.

The need of a standard for the qualification and certification of personnel for Non-destructive testing is felt, especially:

a) To facilitate recruitment of competent persons to conduct Non-destructive testing;
b) To get an assurance of the ability of the personnel who carry out the NDT tests;

c) To train, NDT personnel to a definite level of competence; and
d) To certify NDT personnel so that only qualified persons are allowed to carry out Non-destructive tests.

This standard does not include the course material for NDT procedures and methods. It is expected that the "Qualifying Body" should develop a syllabus for training of NDT personnel.

The Sri Lanka Standards Institution gratefully acknowledges the use of the following publication of the International Organization for Standardization (ISO), in the preparation of this standard:

ISO 9712 : 1992 Non-destructive testing - Qualification and certification of personnel.

1 SCOPE

This code provides a system for the qualification and certification of personnel to perform industrial non-destructive testing, using any of the following methods:

a) Eddy current testing ;
b) Liquid penetrant testing ;
c) Magnetic particle testing ;
d) Radiographic testing ; and
e) Ultrasonic testing ;

2 ABBREVIATIONS

The following abbreviations are used to identify the NDT methods covered by this code:

a) Eddy Current Testing - ECT;
b) Liquid Penetrant Testing - LPT;
c) Magnetic Particle Testing - MPT;
d) Radiographic Testing - RT;
e) Ultrasonic Testing - UT; and
f) Non-destructive Testing - NDT.

3 DEFINITIONS

For the purpose of this code, the following definitions shall apply:

3.1 authorization : A permission to work issued by the employer or responsible agency based on the individual's suitability for a specific job. In addition to the certification, amongst others the job-specific knowledge, skill and physical ability could be assessed.

3.2 qualification : A demonstration of the knowledge, skill, training and experience required to properly perform NDT tasks.

3.3 certification : The procedures leading to a written testimony of the qualification of an individual's competence in an NDT method.

3.4 certificate : Written testimony of qualification.

3.5 national certifying body : The agency that administers procedures for certification of NDT personnel according to the requirements of this code.

3.6 qualifying body : A competent organization, independent of the employer or responsible agency, authorized by the national certifying body to prepare and administer examinations to qualify NDT personnel.

3.7 candidate : The individual seeking certification under the qualification and certification scheme.

3.8 employer or responsible agency : The organization for which the candidate works on a regular basis; candidates may be self-employed.

3.9 basic education : The minimum formal education required for qualification as stipulated by the national certifying body.
It may be used to determine duration and level of training and experience required prior to qualification.

.10 **NDT training** : A process of instructions in theory and practice n the NDT method in which certification is being sought, which may ake the form of training courses to an approved syllabus and periods f practical work under qualified supervision.

.11 **experience** : The period during which the candidate performed he specific NDT method as his main activity under qualified upervision including personal application of the NDT method to aterials, parts or structures but not including tests performed uring training courses.

.12 **NDT method** : The discipline associated with applying a physical rinciple in non-destructive testing (for example, ultrasonic esting).

.13 **NDT technique** : A specific way of utilizing an NDT method, for xample: immersion ultrasonic testing.

.14 **NDT procedure** : An orderly sequence of rules which describe in etailed terms where, how and in which sequence an NDT method should e applied to a product.

.15 **NDT instruction** : A written document detailing the precise steps o be followed in testing to an NDT procedure.

16 **industrial sector** : A particular portion of industry or chnology where specialized NDT practices are utilized requiring ecific skill, knowledge, equipment or training to achieve tisfactory performance. An industrial sector may be interpreted to an a product (welds, castings, etc.) or an industry (aerospace, eel, etc.).

17 **qualification examination** : An examination administered by the tional certifying body or an authorized qualifying body, which shall clude a general examination and a specific examination for each vel of competence.

18 **general examination** : The general examination includes both a itten and a practical part for levels 1 and 2, and only a written rt for level 3.

The written test is concerned with the principles of the plicable NDT method and, at least for level 3, covers basic owledge of other NDT methods, of materials and processes, and of scontinuities arising through the use of various materials, nufacturing processes or service conditions. For level 3, the quirements for certification of NDT personnel are also included.

The practical test for levels 1 and 2 is to verify ability to set- and operate test equipment, and perform the necessary settings to eld satisfactory test results.

3.19 **specific examination** : The specific examination includes both a written and a practical part for levels 1 and 2, and only two written parts for level 3.

a) The written test is concerned with components, systems, equipment, operating procedures and test techniques commonly used in a particular industry or industrial sector. It involves the demonstration of knowledge related to the product being tested and covers the applicable specifications, codes and acceptance criteria. For level 3 only, this examination includes the writing of one or more satisfactory procedures.

b) The practical test involves, for levels 1 and 2, the demonstration of familiarity with and the ability to operate the necessary test equipment on prescribed components, record and analyse the resultant information to the degree required.

3.20 **job-specific examination** : Any additional examination concerned with the application of an NDT method to a particular specialized product not commonly involved in a specific industrial sector; an examination which supplements this code and is carried out following written guidelines with results recorded to meet quality assurance or customer audit requirements.

NOTE

This examination is outside the scope of this code of practice.

3.21 **trainee** : A trainee is an individual who works under supervision of certified personnel but who does not conduct any tests independently, does not interpret test results and does not write reports of test results. He may be registered as being in the process of gaining appropriate experience to establish eligibility for qualification to level 1 or for direct access to level 2.

4 LEVELS OF COMPETENCE

4.1 Classification

An individual certified in accordance with this code of practice shall be classified in one of three levels depending upon his respective level of competence, whereas one who has not yet attained certification may be registered as a trainee.

4.2 NDT level 1

An individual certified to NDT level 1 is qualified to carry out NDT operations according to written instructions and under the supervision of level 2 or level 3 personnel. He shall be able to set up the equipment, to carry out the tests, to record the results obtained, to classify the results in terms of written criteria, and to report on the results. He shall not be responsible for the choice of the test method or technique to be used nor for the assessment of test results.

4.3 NDT level 2

An individual certified to NDT level 2, is qualified to perform and direct non-destructive testing according to established or recognized techniques. He shall be competent to choose the test techniques to be used; to set up and calibrate equipment; to interpret and evaluate results according to applicable codes, standards and specifications; to carry out all duties for which a level 1 individual is qualified and to check that they are properly executed; to develop NDT procedures adapted to problems which are the subject of an NDT specification; and to prepare written instructions, organize and report the results of non-destructive tests. He shall also be familiar with the scope and limitations of the method for which he is qualified, and able to exercise assigned responsibility for on-the-job training and guidance of trainees and NDT level 1 personnel.

4.4 NDT level 3

An individual certified to NDT level 3 shall be capable of assuming full responsibility for a test facility and staff; establishing techniques and procedures; interpreting codes, standards, specifications and procedures; and designating the particular test methods, techniques and procedures to be used. He shall have the competence to interpret and evaluate results in terms of existing codes, standards and specifications; a sufficient practical background in applicable materials, fabrication and product technology to select methods and establish techniques and to assist in establishing acceptance criteria where none are otherwise available; general familiarity with other NDT methods, and the ability to train level 1 and level 2 personnel.

5 GENERAL PRINCIPLES OF CERTIFICATION

5.1 Administration

The certification activity that includes all procedures adopted to demonstrate the qualification of an individual to carry out tasks in a specific NDT method and leads to a written testimony of his competence, shall be administered, by the national certifying body, with the assistance, where necessary, of duly authorized qualifying bodies.

5.2 National certifying body

The national certifying body should be a non-profit organization which has no direct involvement in training of NDT personnel and which is a recognized part of the country's national standards system.

5.2.1 *Composition*

The national certifying body should be supported by an advisory committee which should include representatives of NDT societies, NDT institutes, NDT specialists, industrial users, suppliers of NDT services, government departments and other interested parties as appropriate.

5.2.2 *Responsibilities*

The national certifying body:

a) shall initiate, maintain and promote the national certification scheme according to this code;

b) shall administer the procedures and operations for certification in accordance with national documents meeting the minimum requirements of this code;

c) may delegate, under its direct responsibility, the detailed administration of the certification procedure to other organizations which will act as qualifying bodies and which could represent industrial sectors;

d) shall take the ultimate responsibility for the certification scheme including technical and administrative requirements;

e) shall approve, either directly or through a qualifying body, properly staffed and equipped examination centres which it shall monitor on a periodic basis; and

f) shall keep all appropriate records and issue or delegate the issuing of the written testimonies.

5.3 Employer or responsible agency

The employer or responsible agency shall introduce the candidate to the national certifying body and document the validity of the personal information provided including the declaration of education, training and experience used to establish eligibility of the candidate, but shall not be directly involved in the certification procedure itself.

The employer or responsible agency shall be fully responsible for all that concerns the authorization to operate and the validity of the results of NDT operations.

If the individual is self-employed, or introduces himself, he shall assume all responsibilities described for the employer or responsible agency.

5.4 Examination centres

Examination centres established by the national certifying body or through authorized qualifying bodies shall, as a minimum requirement:

a) have adequate qualified staff, premises and equipment to ensure satisfactory qualification examinations for the levels, methods, and industrial sectors concerned;

b) use only those documents and examination questionnaires established or approved by the national certifying body; and

c) use only specimens prepared or approved by the national certifying body for the practical examinations conducted at that centre.

NOTE

When more than one authorized examination centres exist, each should have specimens containing comparable defects. Under no circumstances shall examination specimens be used for training purposes.

ELIGIBILITY FOR EXAMINATION

1 General

ndidates shall have a combination of education, training and perience adequate to ensure that they have the potential to derstand the principles and procedures of the applicable NDT method.

2 Education

dence of education may be required to establish the eligibility of andidate.

Training

.1 *Level 1 and Level 2*

be eligible to apply for certification in any NDT method, the didate shall provide evidence of successful completion of a ning programme approved by the national certifying body in that od. Table 1 and Appendix B are provided for guidance; however onal certifying body shall take into consideration education, ification in other methods, training facilities, and other ors.

TABLE 1 - Minimum duration of training

NDT method	Training hours	
	Level 1	Level 2
Eddy current testing	40	80
Liquid penetrant testing	16	40
Magnetic particle testing	24	40
Radiographic testing	40	80
Ultrasonic testing	40	80

NOTES

1) Training hours include both practical and theoretical training courses.

2) Direct access to level 2 implies the total of the hours shown for level 1 and 2.

6.3.2 *Level 3*

Taking into account the scientific and technical potential of candidate for level 3 certification, it is considered that preparation for qualification could be done in different ways : by taking training courses, attending conferences or seminars such as organized by industrial or independent associations, studying books, periodicals, and other specialized printed materials. No training hours have therefore been specified in Table 1, although references cited in Annex B do suggest course content and duration.

6.4 Experience

6.4.1 *Level 1 and Level 2*

To be eligible for certification, the candidate shall have the minimum experience indicated in Table 2 for the method in which he is seeking certification.

TABLE 2 - Minimum experience requirements

NDT method	Months of experience	
	Level 1	Level 2
Eddy current testing	3	9
Liquid penetrant testing	1	2
Magnetic particle testing	1	3
Radiographic testing	3	9
Ultrasonic testing	3	9

NOTES

1) Work experience in months is based on a nominal 40 hours/week. When an individual is working in excess of 40 hours per week, he may be credited with experience based on the total hours, but he shall be required to produce evidence of this experience.

2) For level 2 certification, the intent of this code is that work experience consists of time as a level 1. If the individual is being qualified directly to level 2, with no time at level 1, the experience shall consist of the sum of the periods required for level 1 and level 2.

3) Credit for work experience may be gained simultaneously in two or more of the NDT methods covered by this code, with the reduction of total required experience as follows:

a) two testing methods - reduction of total required time by 25 per cent;
b) three testing methods - reduction of total required time by 33 per cent; and
c) four or more testing methods - reduction of total time by 50 per cent.
The candidate shall be required to show that, for each of the testing methods for which he seeks certification, he has at least half of the time required in Table 2.

6.4.2 *Level 3*

Level 3 responsibilities require knowledge beyond the technical scope of any specific NDT method. This broad knowledge may be acquired through a variety of combinations of education, training and experience. Table 3 details minimum experience related to formal education. All candidates for level 3 certification in any NDT method shall have successfully completed the practical examination for level 2 in that method.

TABLE 3 - Minimum experience requirements for level 3

	Degree	Experience (months)
Access to level 3 by a certified level 2 operator	Graduate of a four year accredited science or engineering college or university programme	12
	Successful completion of at least two years of engineering or science study at an accredited college, university or technical school.	24
	No degree	48
Direct access to level 3 by a non-certified operator with experience Equivalent to level 2	Graduate of a four year accredited science or engineering college or university programme.	24
	Successful completion of at least two years of engineering or science study at an accredited college, university or technical school.	48
	No Degree	72

NOTE

If the college or university degree is issued in Non-destructive testing, the experience required for access to level 3 may be reduced by 50 per cent.

6.5 Vision requirements

The candidate shall provide evidence of satisfactory vision, as determined by an oculist, optometrist or other medically recognized person in accordance with the following requirements:

a) distant vision shall equal Snellen fraction 20/30 or better in at least one eye, either uncorrected or corrected;

b) near vision shall permit reading a minimum of Jaeger number 2 or equivalent type and size letters at not less than 30 cm on a standard Jaeger test chart for near vision, in at least one eye, corrected or uncorrected; and

c) colour vision shall be sufficient that the candidate can distinguish and differentiate contrast between the colours used in the NDT method concerned.

7 EXAMINATIONS

7.1 Examination Content

The qualification examination shall consist of a General and Specific examination and normally cover a given NDT method as it is applied in one or more specific industrial sectors.

For level 1 and level 2, each of these two examinations shall include both a written and a practical test.

For level 3 however, besides the written General examination, the Specific examination shall consist of two written tests to be respectively designated "Specific-Sector" and "Specific-Procedure". No level 3 practical test as such is required.

In the General examination, the candidate shall demonstrate sufficient proficiency in performing the NDT method. In the Specific examination, he shall demonstrate his ability to use the same NDT method in the industrial sector concerned.

7.2 Administration of Examinations

All examinations shall be conducted in examination centres established or approved by the national certifying body. Detailed procedures for the structure, monitoring and grading of examinations by the national certifying body are contained in
Appendix A.

7.3 Re-examination

Criteria applicable to re-examination with respect to:
a) partial or complete failure of examination; and
b) extension of certification to other methods or sectors;
are described in Appendix A . A.1.5 refers to levels 1 and 2, and A.2.4 to level 3.

8 CERTIFICATION

8.1 Administration

Based on the results of the qualification examinations, the national certifying body, directly or through its authorized qualifying bodies, shall announce the certification and issue certificates and corresponding wallet cards.

8.2 Certificates and/or wallet cards

Certificates and/or corresponding wallet cards shall bear:

a) the name of the certified person;
b) the date of certification;
c) the date upon which certification expires;
d) the level of certification;
e) the NDT method;
f) training;
g) the industrial sector(s) concerned/experience;
h) examination results;
i) a unique identification number;
j) the signature of the certified individual;
k) a photograph of the certified individual; and
l) the cold seal of the national certifying body or the approved qualifying body cancelling the photograph to avoid falsification.

NOTE

By issuing the certificate and/or the corresponding wallet card, the national certifying body or the qualifying body attests to the qualification of the individual but does not give any authority to operate. There may be a special space on both the certificate and the wallet card for the signature of the employer or responsible agency authorizing the holder of the certificate to operate and taking responsibility for test results. This authorization also serves as testimony of activity of the certified individual.

9 VALIDITY AND RENEWAL

9.1 Validity

The period of validity of the certificate shall not exceed a maximum of five years from the date of certification indicated on the certificate and /or wallet card.

Certification shall be invalid:

a) if the individual changes from one industrial sector to another, in which case, he must successfully complete supplementary examinations for the new industrial sector;

b) at the option of the national certifying body after reviewing evidence of unethical behaviour; and

c) if the individual becomes physically incapable of performing his duties based upon the visual examination taken at least every second year under the responsibility of his employer or responsible agency.

9.2 Renewal

After the first period of validity, certification may be renewed by the national certifying body, directly or through an authorized qualifying body, for a new period of similar duration provided the individual meets the following criteria:

a) he provides evidence at least every second year of satisfactory visual examination; and

b) he provides evidence of continued satisfactory work activity without significant interruption.

NOTE

A significant interruption means an absence or a change of activity which prevents the certified individual from practising the duties corresponding to his level in the method and the industrial sector(s) for which he is certified, for one or several periods for a total time exceeding one year.

If the criteria for renewal are not met, the individual shall apply for recertification.

9.3 Recertification

Upon completion of each second period of validity, or at least every ten years, certification shall be renewed by the national certifying body directly, or through an authorized qualifying body, for a similar period, if the individual meets the two criteria for renewal and successfully completes a simplified examination to assess his current knowledge.

This simplified examination shall consist of :

a) Level 1 and Level 2: a practical examination organized according to a simplified procedure ; and

b) Level 3 : a written examination which includes 20 questions on the application of the test method in the industrial sector concerned, and 5 questions on this code of practice. The national certifying body will have the option of replacing this simplified examination by an alternate structured credit system under its control.

If the individual fails to achieve a grade of 80 per cent or better in the simplified examination, he shall apply for new certification.

10 FILES

The national certifying body or its authorized qualifying body shall keep :

a) an updated list of all certified individuals classified according to level, test method and industrial sector; and

b) an individual file for each certified individual and for each individual whose certification has been withdrawn containing:

i) application forms;

ii) examination documents, including questionnaires, answers, description of specimens, records, results of test, written procedures and/or techniques, and grade sheets; and

iii) renewal documents, including evidence of physical condition and continuous activity.

NOTE

Individual files shall be kept under suitable conditions of safety and discretion for a period at least equal to the total of the initial period of validity plus the renewal period.

APPENDIX A

ADMINISTRATION OF EXAMINATIONS

(This Appendix is an integral part of this code.)

A.1 EXAMINATION FOR LEVEL 1 AND LEVEL 2

A.1.1 *Qualification Examination*

The qualification examination administered under this code shall include a General examination and a Specific examination for each level of competence. Each examination shall consist of a written part and a practical part. The practical part shall be of sufficient duration, complexity and scope to adequately verify the candidate's ability to apply the NDT method to real test situations.

A.1.2 *Examination Content*

A.1.2.1 General Examination

In the General examination, the candidate shall demonstrate proficiency in performing the relevant NDT method.

The written test of the General examination shall only include questions selected from the national certifying body's collection of basic knowledge questions valid at the date of examination. The candidate shall be required, as a minimum, to give answers to the fixed number of multiple choice questions shown in Table 4.

The practical test of the General examination is to verify the candidate's ability to make the required settings and operate the test equipment properly in order to obtain satisfactory results and correctly interpret these results. The candidate, therefore, shall be required to demonstrate this ability, with comments, using the means of verification available for each test method, such as calibration blocks, image quality indicators, magnetic field indicators , etc.

NOTES

1) *For the radiographic test method, there shall be an additional examination on radiation safety.*

2) *Examination on the radiographic test method may include either X - or gamma radiation, or both, depending upon the procedures of the national certifying body.*

TABLE 4 - Number of questions for general examination

NDT Method	Number of questions	
	Level 1	Level 2
Eddy current testing	30	30
Liquid penetrant testing	30	30
Magnetic particle testing	30	30
Radiographic testing	40	40
Ultrasonic testing	40	40

A.1.2.2 Specific examination

In the Specific examination, the candidate shall demonstrate his ability to use the relevant test method in the industrial sector concerned.

The written test of the Specific examinations shall only include questions selected from the national certifying body's current collection related to all industrial sectors or from the collection of specific questions maintained by an authorized qualifying body related to the industrial sector concerned.

During the Specific examination, the candidate shall be required to give answers to a fixed number of questions, as defined in Table 5, including multiple choice questions, calculations, written procedures and questions on codes, standards and specifications.

The practical test of the Specific examination is to verify the candidate's ability to perform testing of prescribed components relating to the industrial sector concerned,to record and to analyze the resultant information to the degree required according to specific testing instructions or specifications, and to the NDT level being sought.

The specimens used for the practical test shall be selected from a collection of representative specimens chosen by the national certifying body or by its authorized qualifying body.

For level 2, the candidate shall be required to demonstrate ability to prepare written instructions for level 1 personnel.

If the practical test of the Specific examination covers two or more industrial sectors, the number of specimens to be tested should be increased proportionally to examine the candidate's competence in each of the industrial sectors concerned.

TABLE 5 - Number of questions for specific examination

NDT Method	Number of questions	
	Level 1	Level 2
Eddy current testing	15	15
Liquid penetrant testing	20	15
Magnetic particle testing	20	15
Radiographic testing	20	20
Ultrasonic testing	20	20

NOTE

If the written part of the Specific examination covers two or more industrial sectors, the number of questions should be increased proportionately to reasonably cover each of the industrial sectors and evaluated accordingly.

A.1.3 *Conduct of Examinations*

All examinations shall be conducted in examination centres approved and monitored by the national certifying body either directly or through an authorized qualifying body.

At the examination, the candidate shall have in his possession a valid proof of identification and an official notification of the examination, which must be shown to the examiner or invigilator on request.

Any candidate who does not abide by the examination rules during the course of the examination or who perpetrates or is an accessory to fraudulent conduct will be excluded from further participation.

The written and practical tests should be conducted and supervised by an examiner chosen among NDT level 3 personnel and designated by the national certifying body, either directly or through an authorized qualifying body. The examiner may be assisted by one or more invigilators placed under his responsibility.

The examiner shall mark the written tests completed by the candidate; he shall judge and mark the results of the practical tests according to a procedure which includes at least ten check points. This procedure shall be developed by the national certifying body or an authorized qualifying body.

A candidate for a practical examination may use his own apparatus. The examiner should investigate the reliability of the test apparatus made available to the candidate, and unreliable apparatus should be replaced as well as any apparatus that may be rendered unserviceable during the course of the examination. Any item of apparatus brought by a candidate that is unreliable or rendered unserviceable during the examination should be replaced by the candidate himself.

A.1.4 *Grading*

The General examination shall be graded separately from the Specific examination so that the candidate may be examined later for certification in another branch of industry without having to take the General examination again; thus the certified operator changing from one industrial sector to another keeps the benefit of the General examination valid for all industrial sectors.

To be certified, the candidate shall obtain a grade of at least 70 per cent in each of the four tests of the examination and a composite grade of at least 80 per cent.

The composite grade for the respective level shall be determined by adding the weighted marks obtained from multiplying each of the four test marks by a weighting factor to be selected from Table 6. The total of selected weighting factors must equal to 1.00.

TABLE 6 - Weighting factors for grading

Level	Weighting factor			
	General		Specific	
	Written	Practical	Written	Practical
1	0.2 to 0.4	0.2 to 0.4	0.2 to 0.4	0.2 to 0.4
2	0.2 to 0.4	0.2 to 0.4	0.2 to 0.4	0.2 to 0.4

A.1.5 *Re-examination*

A candidate failing for reason of unethical behaviour must wait at least 12 months before reapplying.

A candidate who failed to obtain the passing grade for the whole examination may take one, and only one, retest in a maximum of two parts provided the minimum percentage (70 per cent) was obtained in each part and that retesting takes place within 12 months from the failed examination.

A candidate for re-examination shall apply for and take the examination according to the procedure established for new candidates.

A certified operator wanting to extend certification in a given NDT method to new industrial sectors keeps the benefit of the General examination and must take only the related Specific examination.

A.2 Examination for Level 3

A.2.1 *Examination content*

The qualification examination for level 3 candidates shall consist only of a written examination which normally covers a specified test method applied in one or more industrial sectors.

This examination shall cover :

a) basic knowledge relating to the test method applied for and to materials and processes, discontinuities; level 2 General examination questions relating to at least two other test methods covered by this code and selected by the candidates; requirements for the certification of NDT personnel; and
b) specific knowledge relating to the application of the NDT method in which the candidate is being examined in the industrial sector concerned, including the applicable codes, standards and specifications, and the knowledge of the product being tested.

If the candidate is not certified to NDT level 2 at the time of application, then he must also successfully complete the level 2 practical examination in the relevant NDT method.

A.2.1.1 General examination

The General examination shall include only multiple choice questions, selected from the national certifying body's collection of basic knowledge questions valid at the date of the examination. The number of questions shall be as follows:

a) 30 questions on the main test method and materials, processes and discontinuities;
b) 10 level 2 questions on each of at least two additional test methods; and
c) not less than 5 questions on the personnel certification scheme.

A.2.1.2 Specific examination

The Specific examination shall include two parts to be marked separately. The first part is designated as "Specific-Sector" and the second, "Specific-Procedure".

The Specific-Sector test shall include 20 questions on the application of NDT method in each industrial sector concerned. The necessary questions shall be chosen from a list maintained by the national certifying body or by an authorized qualifying body.

The Specific-Procedure test shall require the drafting of one or more satisfactory NDT procedures.

A.2.2 *Conduct of examinations*

All examinations shall be conducted in examination centres established or approved by the national certifying body, and shall be monitored by the national certifying body, directly or through an authorized qualifying body.

At the examination the candidate shall have in his possession valid proof of identification and a official notification of the examination. These must be shown to the examiners on request. Any candidate who during the course of the examination does not abide by the examination rules, or who perpetrates or is an accessory to fraudulent conduct, shall be excluded from further participation.

Examination should be conducted and supervised by at least two examiners chosen among level 3 operators and designated by the national certifying body, directly or through an authorized qualifying body.

Each examiner shall correct and grade separately the different parts of the examination according to procedures established by the national certifying body. During a meeting each one of the assigned examiners shall present and explain his grades and an average grade shall be calculated for each part of the examination.

A.2.3 *Grading*

The written General examination shall be graded separately so that the candidate may be examined later for certification in another branch of industry without having to repeat the General examination.

To be certified, a candidate shall obtain a grade of at least 70 per cent in each part of the examination and a composite grade of at least 80 per cent.

The composite grade for the respective level shall be determined by adding the weighted marks obtained from multiplying the test marks in each part of examination by a weighting factor to be selected from Table 7. The total of selected weighting factors must equal to 1.00.

TABLE 7 - Weighting factors - Level 3

General	0.3 to 0.4
Specific-sector	0.3 to 0.4
Specific-procedure	0.3 to 0.4

.2.4 *Re-examination*

candidate failing for reason of unethical behaviour must wait at past 12 months before reapplying.

candidate who failed to obtain the passing grade for the whole amination may take one, and only one, retest to a maximum of two rts of the examination, provided he obtained the minimum passing rcentage of 70 per cent in each part and the retest is done within months after the first failure. In the case of a second failure in taining the passing grade, the candidate shall be re-examined in all ree parts. A candidate who failed and wants to resit the amination must apply for and take examination according to the ocedure applicable to new candidates.

certified operator changing from an industrial sector to another but keeps using the same NDT method, retains the benefit of the neral examination and must take only the two Specific (Sector and ocedure) examinations concerning the new industrial sector.

special procedure may be applied for the candidate taking minations for certification in several testing methods within a iod of one year to avoid the duplication of level 2 questions ating to the additional test methods as well as those questions ating to codes or standards and the certification scheme.

APPENDIX B

REQUIREMENTS OF TECHNICAL KNOWLEDGE OF NDT PERSONNEL

(This informative Appendix provides a bibliography of international publications detailing course content.)

B.1 Course content

The minimum hours of training recommended to confirm eligibility for examination are detailed in this code.

B.2 References

B.2.1 Technical document IAEA-TECDOC-407 (1987), Training guidelines in Non-Destructive testing techniques, International Atomic Energy Agency, wagrammerstrabe 5, P.O. Box 100, A-1400 Vienna, Austria.

B.2.2 The complete recommendations on international harmonization of training qualification and certification of Non-Destructive testing personnel, prepared by the International Committee on Non-Destructive Testing, adopted November 1985. Available from the Foundation for the Qualification of NDT Personnel, P.O. Box 100, 2700 AD Zoetermeer, The Netherlands, Tel : (31) 79-53-1100.

B.2.3 ASNT Recommended Practice SNT-TC-IA, 1988 Edition, Tables 1-A to 1-H, (Recommended Training Courses). Published by the American Society for Non-Destructive Testing, 4153 Arlingate Lane, P.O. Box 28518, Columbus, Ohio 43228-0518, USA.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

Printed at SLSI (Printing Unit)

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

Printed at the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.