



**Authorization of NDT Training Centres
for ICN Examinations
(NCB/ICN Scheme (ISO 9712)/R-1 Dated 25 May 2019)**

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TRAINING MANAGEMENT BOARD- INDIAN SOCIETY FOR NON-DESTRUCTIVE TESTING

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**TRAINING MANAGEMENT BOARD
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Foreword:

The effectiveness of any application of Non-Destructive Testing (NDT) depends upon the competency of the persons who perform NDT and are responsible for the test. Most of the construction codes mandate that only qualified and certified personnel be employed to carry out NDT inspection jobs at various levels. National Certification Board (NCB) constituted by Indian Society for Non Destructive Testing (ISNT) is an accredited Certification Body for NDE personnel certification according to a scheme named International Certification in NDT (ICN) aligned with ISO 9712:2012.

One of the key elements of competency development is a structured training imparted to NDE personnel before they are considered eligible for certification. Training Institutes play a vital role in preparing candidates to qualify for certification by delivering quality training to meet above certification scheme requirements.

The Training Management Board has been set up by ISNT to promote NDT training and administer the process of authorising training institutes to deliver training fulfilling the requirements of ICN scheme. This standard is prepared by TMB, based on the guidelines in ISO/TS 25108 (Non-destructive testing — NDT personnel training organizations) . This standard has been developed to set the minimum requirement of quality system for training service delivery organisations and a basis for evaluating them.



1. Scope

This document details minimum requirements which shall be fulfilled by training centers who intend to carry out training activity to meet the training requirements of ICN scheme No.: NCB/ICN Scheme (ISO 9712)/R-1 Dated 25 May 2019. The objective of this document is to ensure adequate theoretical and practical training delivered to the candidates who wish to appear for NCB-ICN examinations.

2. Normative References

- 2.1. ICN Scheme No.: NCB/ICN Scheme (ISO 9712)/R-1 Dated 25 May 2019
- 2.2. ISO 25108:2018- Non-destructive testing - Guidelines for NDT personnel training organizations
- 2.3. ISO 25107:2019- Non-destructive testing-NDT Training syllabus
- 2.4. ISO 9001:2015-Quality Management System
- 2.5. ISO/TS/18173:2005- Non-destructive testing - General terms and definitions
- 2.6. ISO 9712:2012- Non-destructive testing – Qualification
- 2.7. ISO TS 22809:2007 Non-destructive testing — Discontinuities in specimens for use in qualification examinations

3. Terms and Definitions

3.1. Course Notes:

Educational material that is used in the classroom to support the learning objectives.

Note 1: Supplied and produced by the training center in either paper or electronic format (e.g. Course manual or presentation, assignments, lab exercise, quizzes, case studies etc.)

3.2. Course outline:

Document agreed between the training center and candidates that include high-level overview of what will be taught.

3.3. Curriculum:

Detailed plan of study prepared by the training center which describes the aims, academic and practical content, learning outcomes and practical competencies to be gained, teaching, training and learning methods, assessment processes for the lessons and academic content taught and practical competencies trained in a specific course in line with syllabus defined by ICN Scheme.

3.4. False indication

Representation or signal, in the format allowed by the non-destructive testing method used, which is interpreted to be caused by a condition other than a discontinuity or imperfection.

3.5. Flaw characterization

Process of quantifying the size, shape, orientation, location, growth, or other properties of a flaw, based on NDT response.



3.6. Indication

Representation or signal from a discontinuity in the format allowed by the NDT method used.

3.7. Interpretation

Determination of whether indications are relevant, non-relevant or false.

3.8. Tutor/ Instructor:

Person performing training.

3.9. Sizing

Determination of the dimensions of discontinuities or indications for evaluation.

3.10. Training staff

Personnel performing work affecting the NDT training quality.

Note 1: Pertains to personnel other than the tutor / instructor such as secretariat staff, assistant instructors, lab assistants, practical demonstrators, proctors for practice examination.

3.11. Candidate

Who is interested in getting trained at ATC.

3.12 E- Learning

Learning method facilitated by information and communication technology

Abbreviations

ATC	:	Authorised Training Centre
ISNT	:	Indian Society for Non-Destructive Testing
ICN	:	International Certification in NDT
NCB	:	National Certification Board
NDT	:	Non-Destructive Testing
QMS	:	Quality Management System
TMB	:	Training Management Board



4.0 General

The basic objective of training center is to address and fill the gaps between required and existing competence requirements of the candidate. This shall be monitored by controlling the following stages

- Defining training needs (in line with ICN scheme)
- Designing and planning training (Controlling announcement, training material, equipment, defective specimens, Controlling Library)
- Providing training (controlling administration, instructors and environment)
- Evaluating the outcome of training (practice exams, counselling etc.)

The training objectives shall be broken down into day-wise and session wise objectives. For Effective delivery of training the following things shall be monitored:

- a. Training needs
- b. Candidate
- c. Training Methods
- d. Outline of content
- e. Lesson plans
- f. Duration
- g. Resource Required
- h. Delivery mode

The training completion examination with defined minimum acceptance level shall be monitored to evaluate effectiveness of training.

5.0 Training Center Management

5.1. Management Responsibility

- 5.1.1. The ATC shall set up and maintain a documented Quality Management System (QMS) generally in line with ISO 9001 or similar standard and meeting the requirements of this document.
- 5.1.2. The ATC shall appoint a Training Coordinator who is responsible for the overall management of the training operations. This training coordinator shall be single point contact for all communication with TMB.
- 5.1.3. In respect of training process, the ultimate responsibility for ensuring the compliance with the documented QMS shall remain with the training center management.



6.0 Quality Management System

- 6.1. The training center shall implement and maintain a fully documented quality management system which is conforming to ISO 9001 or similar quality management system.
- 6.2. This QMS shall include quality manual, quality procedures, work instructions and formats covering quality management and product realization process (training service). The quality management system shall be updated with the revisions of ICN schemes, ISO 9712, ISO 9001, ISO 25107 and ISO 25108.
- 6.3. The tutors, instructors/demonstrators (practical trainers), training coordinator and training support staff performing work affecting training quality shall be suitably qualified. Training center shall identify the competence requirements for them based on their role and provide additional training or take other actions to satisfy these requirements. Tutors and Instructors play very important role in the whole training process and therefore the minimum qualification criteria in respect of education, experience, professional qualifications shall be determined and documented for each subject or NDE method. The tutors/instructors are expected to attend a 'train the trainers' program to acquire the skill of imparting their knowledge more efficiently and effectively. The performance assessment of the tutors/ instructor shall be carried out periodically at least once in a year as per a documented procedure.
- 6.4. The training center shall also evaluate the effectiveness of training, time to time and take appropriate corrective actions to improve the training service delivery.
- 6.5. The training center shall ensure the required equipment and facilities including test specimens are available. There shall be a documented procedure for maintenance and verification of NDT equipment, training specimens including records. The training center shall ensure the training environment appropriate for the purpose and is meeting statutory, regulatory and TMB requirements if any .
- 6.6. Any compromise in safe working environment will lead to suspension of authorization with immediate effect.

6.7. Service realization

For a training center, the service realization is delivering successful training leading to training completion certificate. The training center shall identify, control and monitor processes which will lead to training completion examination and a certificate for the candidates.

- 6.8. The success of any quality management system depends on improvements emerging from measurement and analysis. For training centers, the following key areas are to be controlled through a documented system :



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- i. Control on delivery of training including performance monitoring of tutors/instructors
- ii. Candidates' feedback (Separate format is required).
- iii. Monitoring Customer/Student satisfaction by ATC management
- iv. Non conformity (NC) handling system
- v. Monitor and sustain improvements plan.
- vi. Management review

6.9. The following are some of the vital points which need to be addressed in QMS:

- i. Organization chart with roles and responsibility, Job descriptions, job titles and acceptance by the individuals.
- ii. The documented procedure needs to be explained and properly understood by the operating personnel.
- iii. A document revision control procedure to ensure latest version is in use.

6.10. Staff members within the ATC shall be made aware of their specific responsibilities and duties, which shall be defined by a documented job description for each position within the organization. Job Descriptions shall also determine the competence requirements for the role.

6.11. The ATC shall have a documented procedure to handle nonconformities (NC) in a systematic manner. A Non Conformity Report Format (NCR) shall be used to record observed NC, identify root cause and correction/corrective actions taken.

6.12. The ATC quality management system shall include a documented procedure for internal audit which shall be conducted to cover the whole of the quality management system and training processes (including remote training locations where applicable) at least once in each calendar year.

6.13. Management review (MR) shall be conducted, at least once every twelve months to determine the effectiveness of quality system. MR shall use input from (a) Internal/external audit, (b) Customer feedback, (c) NCR, to identify trends and improvement opportunities. ATC management shall implement and monitor improvements, reporting the status of improvement strategies at Management Review.

6.14. A controlled copy of QMS established by the training center shall be issued to TMB as Controlled Copy for the purpose of this authorization. The English version of this document shall be submitted to TMB. Electronic copy with due authentication is acceptable.

6.15. Complaint handling procedure shall be in place and data shall be made available to TMB during TMB audit.

6.16. ATC shall inform TMB immediately of any changes to policy, personnel, documentation, facilities or operating procedure, which may affect the validity of authorization. Failure to do so may result in suspension or withdrawal of authorization, or a refusal to renew authorization.



7.0 Induction of Candidates

There are specific requirements of education, experience and vision test for the candidates wishing to undergo ICN Level 1, 2, 3 training and certification.

- 7.1. These prior knowledge requirements shall be clearly communicated to the candidates while declaring the program schedule.
- 7.2. The training fees including all that is covered by the fees and method of payment
- 7.3. Dates and times of attendance for the course, which shall include clear instructions concerning the location of the training venue (ATC);
- 7.4. Transport, accommodation and catering arrangements, where applicable;
- 7.5. The relevant safety information pertaining to the ATC as a whole or the particular course for which the candidate is enrolled (For e.g. Regarding radiation safety);
- 7.6. Personal protective equipment (PPE) required for candidates attending the training course, and whether this is provided by the ATC, or whether the candidate must provide his/her own PPE;
- 7.7. NDT equipment provided by the ATC for use by candidates during the training course, and whether the candidate may optionally provide/use their own NDT equipment.
- 7.8. Course notes and textbooks essential to the training course, and whether these are provided by the ATC or the candidate.
- 7.9. The name, email and contact number of persons at the ATC from whom additional information may be obtained if required.
- 7.10. The pre requisite education, qualification and experience of candidates shall be verified by a qualified and competent training staff before enrollment for a course.

8.0 Candidate Assessment

- 8.1. A system of ongoing assessment of the candidates shall be in place to ensure the effective learning and the required comprehension of the subject by candidates. These ongoing assessments can be in the form of class work, case studies and question answers (as defined in the course outline). The candidates achieving below average performance (minimum average performance shall be defined by ATC) in class test shall be given additional training and counselling. At the end of training course, a course completion examination shall be conducted. Failing to achieve minimum qualification score (determined by the training center) in this examination shall be the reason for additional training, counselling followed by satisfactory re-examination.



- 8.2.** Training completion examination may have general, specific, practical (for Level 1 and Level 2) or basic, method and specific (for Level 3) examination. The test specimen for practical examination shall be different from those used during training. The examination pattern shall follow the ICN final examination.

9.0 Training curriculum and course notes

- 9.1.** The ATC shall publish course outlines in line with training curriculum (syllabus specified by ICN scheme). These course outlines shall be freely available to the candidates upon request.
- 9.2.** The training curriculum shall be designed to balance both theoretical and practical elements. For Levels 1 and 2 training organizations should dedicate (50 ± 10) % of the minimum training requirement to practical exercises
- 9.3.** ATC shall publish and control training course notes in line with the ICN curriculum. The ATC may however recommend use of external training handbooks, reference books or any such materials over and above the course materials published by the training center.
- 9.4.** These course notes shall be made available to the candidates (either hard or soft copy).
- 9.5.** These course notes shall be reviewed time to time (minimum once in a year). Course notes shall be revision controlled to indicate status and changes incorporated.
- 9.6.** The documentation for the above shall be maintained along with the master sets and the reviewers and approvers signatures.
- 9.7.** Changes in the editions of Normative references as defined in clause no 2.0 can be a cause for revision of course outlines and course notes.

10.0. Facilities

10.1. Training Infrastructure

- 10.1.1.** Classrooms and practical facilities shall have adequate lighting, ventilation and safe working environment.
- 10.1.2.** The ATC shall comply with relevant statutory legislation in respect of fire and other health and safety norms.
- 10.1.3.** For radiographic testing practical the regulatory board radiation safety requirements shall be met.
- 10.1.4.** Classroom and practical facilities shall be equipped with teaching aids including but not limited to black/white board, flip charts, LCD projectors.
- 10.1.5.** Suitable safety notices shall be displayed in appropriate locations accessible to candidates. Relevant safety data sheets shall be made available for the use of potentially hazardous equipment or processes.



11.0. Training Specimens

The training specimens used during practical sessions play very important role in effective delivery of training courses. The ATC shall

- i. Maintain a list of uniquely identified training specimen (With or without defect as required) along with master report of location and extent of defect.
- ii. Make available these specimens including radiographs sufficient in quantity and complexity (ref. ISO TS 22809) to cover full range of NDT methods and techniques mentioned in ICN scheme.
- iii. The specimens with discontinuities shall contain real or artificial discontinuities representative of those found in the field
- iv. Ensure a master report of position and characterization is on file, validated by an experienced and qualified Tutor/Instructor
- v. Maintenance (cleaning, safe custody etc.) of the training specimen.

12.0 NDT Equipment- General

Appropriate NDT equipment, including NDT instruments, accessories, calibration blocks, shall be available in sufficient quantities for the number of candidates under training. (see Annexure A). It shall provide each student with the opportunity to complete all exercises individually with a maximum of two students working on the same exercise at the same time. A master list of all NDT equipment with calibration (as per documented procedure) status shall be maintained and available during audit.

Internal verification and process checks shall be recorded and retained for audit purpose.

13.0. Technical Library

The NDT and product standards relevant to the courses shall be available to the candidates. Relevant technical publications covering the training syllabus shall also be available. Relevant certification scheme documents shall be included in this library and made known to the candidates.

The training course notes are focused on curriculum and hence there is limited literature on the subject. To enhance the interest in the subject, the candidates shall be encouraged to use the technical library (either hard or electronic form). The technical library shall contain relevant codes standards, Specifications, handbooks (e.g. NDT handbooks), reference books, magazines and periodicals dedicated for the subject.

NDT is a dynamic subject and in today's context the magazines and periodicals will have more latest information.



14.0 Instructors

14.1. General

- 14.1.1. The ATC management structure shall include a Training Coordinator with overall responsibility for the technical operation of the training facilities and for ensuring that the ICN scheme requirements are met.
- 14.1.2. The training facility shall have sufficient qualified tutors/instructors to ensure that, as a minimum, one qualified tutor/instructor is present throughout each course. The qualification of tutors/instructors shall be evaluated based upon a documented procedure. The procedure shall include the minimum requirements for education, relevant experience in product sector, professional qualifications, communication and presentation skills. It is desirable that the tutors/instructors undergo "Train the Trainer" program but experience of delivering training would be considered acceptable if demonstrable evidences available. The qualification criteria for tutors/trainers shall include certification to ASNT/ISO9712 Level II (for training Level 1 and 2) or Level III (for training Level3). However, training staff having proven track record of conducting training in the past, good practical experience in performing NDT and demonstrable sector specific knowledge in materials, NDT methods, manufacturing process may be acceptable without above certification, subject to scrutiny by TMB.
- 14.1.3. The ATC shall evaluate the competence of all instructors as detailed in clause 6.3. Competency evaluations shall be by peer review. Records of instructor's competency evaluations shall be retained by the ATC and made available during TMB audit.
- 14.1.4. The ATC shall engage only qualified tutors/instructors whose records of competency have been verified by TMB and included in the scope of ATC.
- 14.1.5. The ATC shall offer qualification records to TMB for verification before adding any new instructor. The practical demonstrators shall be qualified by ATC with documented procedure and the record shall be available for audit purpose.
- 14.1.6. The ATC shall have a documented system for Continual Professional Development (CPD) of tutors/instructor keeping up to date with latest technology and equipment.
- 14.1.7. The maximum candidates in a class for theory training shall not exceed 20 and for practical training 10 per demonstrator.

15.0. Training Records

There shall be a system for preparing and retaining training records, which shall be kept secured and confidential. Records may be retained either in hard copies or in digital form at the option of the training organization.

**15.1. Candidates records**

- 15.1.1. Names and contact details of all candidates.
- 15.1.2. Duration (time) with start and completion dates of training
- 15.1.3. Training history, including results of on-going assessments and the results of final evaluation
- 15.1.4. Training staff involved for each candidate
- 15.1.5. Training completion examination result(s) attained (where appropriate), including a copy of the completed examination paper(s) and details of specimens (including identification numbers) and equipment used by the candidate in any training completion examination.
- 15.1.6. Supplementary training if applicable.

15.2. Staff Records

- 15.2.1. Records shall be prepared, updated and retained for all training staff. shall include (as a minimum):
 - 15.2.1.1. Background and Experience
 - 15.2.1.2. Qualifications
 - 15.2.1.3. Certifications
 - 15.2.1.4. Formal training and CPD
 - 15.2.1.5. Competency assessments.

All the records shall be retained for a period of minimum 5 years.



Annexure A

Minimum equipment holdings for ISNT Accredited Training Centers (ATCs)

A.1 Scope

This document prescribes the minimum equipment holdings essential for the operation of a training center preparing candidates for ICN Certification. It is based upon the minimum guidelines detailed in ISO 25108 edition 2018. It details the minimum equipment for the following NDT methods.

Magnetic Particle testing	(MT)
Penetrant testing	(PT)
Radiographic testing	(RT)
Ultrasonic testing	(UT)
Visual testing	(VT)

A.2 Magnetic Particle Testing

Equipment (Instruments):

- A bench or freestanding transformer with AC or half wave output with a current flow adapter and coil, magnetic flux flow adapter;
- AC/DC ammeter (the effective value display or the peak value display);
- AC/DC electromagnetic yokes with articulated legs and pole pieces;
- Permanent magnets with pole piece adapters suitable for all applications;
- Inspection area or booth equipped with blackout facilities for visible and UV(A) viewing of samples;
- Demagnetizing equipment;
- Powder dispensers;
- Portable and/ or stationary UV(A) black light lamp having sufficient intensity and strength;
- Various rigid and flexible, coils threaded bars etc.

Consumable materials

- Supplies of detection media (aerosol and bulk as applicable) including non-fluorescent, fluorescent, dry powder and contrast paint;

Calibration blocks (Standard blocks)

- Artificially or naturally cracked blocks/specimens for performance checking;



Accessory

- Independent or combined photometer and radiometer for measuring the intensity of visible and black light;
- Flux measuring and comparison gauges to standard recommendations.
- Centrifuge tube for measuring solid content of magnetic ink;

A.3 Penetrant testing (PT):

Equipment (Instruments)

- 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
- Inspection area or booth equipped with black out facilities for visible and UV(A) viewing of samples;
- Portable and/or stationary UV(A) black light lamp having sufficient intensity and strength;

Consumable materials

- Aerosol liquid penetrant inspection kits comprising :
 - Penetrant remover/degreaser;
 - Fluorescent penetrant;
- Color contrast dye penetrant;
- Developer;

Calibration blocks (Standard blocks) :

Reference test blocks (TAM panel) or other means of process control of penetrant line;

Accessory :

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

A.4 Radiographic Testing

Equipment (Instruments):

- At least one X-ray tube with kilovolt range appropriate to the materials to be tested;
- For gamma radiography (Where appropriate) an Iridium-192 source with suitable container and projection mechanism;
- Bunker or X-ray cabin;



- An X-ray centering device ;
- Separate darkrooms for film processing and film preparation;
- A manual or automatic processing unit incorporating thermostatically controlled developing tank, stop bath, rinsing, fixing and washing tanks;
- Thermostatically controlled drying cabinet;
- Darkened room with dimmed lights for film or monitor viewing;

Consumable materials:

- Radiographic film;
- Developing Chemicals;

Calibration Blocks (Standard blocks):

- Several sets of image quality indicators(IQI) for full thickness range; wire IQIs, hole type IQIs, step/hole type IQIs and duplex wire IQI; wires and hole type IQIs at least for steel and optional for aluminum;

Accessory:

- Lead letters and numbers
- Blocking-off compounds and/or liquids;
- Copper and lead filters;
- Densitometers;
- Film viewers, including at least one for densities $D > 4$;
- Radiation monitoring equipment as applicable;
- Caliper or other devices for measuring material thickness;
- Viewing aids, such as magnifiers;
- Channel and clip type film hangers in the common sizes(Manual processing);
- Lead screens in the common sizes;
- Flexible and rigid types cassettes;
- Darkroom timer (manual processing);
- Safelights (RT-F);
- Trimmer to accommodate largest size of films(if required);
- Materials(of lead or tungsten) for masking and collimation;

A.5 Ultrasonic Testing (UT)

Equipment (Instruments):

- Ultrasonic test instruments with adjustable reputation rate and pulse length- Freq. 1 to 10 MHz minimum;
- Cable as applicable to connect probe and instrument;



Probe (Sensors)

- Angle beam probe :
 - 2.25 MHz to 5MHz, 45/60 or 65/70 degrees, 12 mm to 24 mm square and round;
 - 2.25 MHz to 5MHz, 45/60 or 65/70 degrees, 6 mm to 12 mm square and round;
- Straight beam probe :
 - 2MHz to 2.5 MHz, 10 mm to 24 mm square or round;
 - 4MHz to 5MHz, 10 mm to 24 mm square or round;
- Dual element straight beam probe :
 - 4MHz to 5MHz, 6mm to 12 mm square or round;

Consumable materials :

- Couplant (Machine oil, glycerin, water etc.);
- Calibration blocks(Standard blocks):
- Step wedge calibration block:
- 0.100 in to 0.500 in 0.1 increments;
- 1 mm to 8mm in 1 mm increments as specified in ISO 16946;
- Equivalent calibration block according to regional standard 3mm to 10 mm in 1 mm increments as specified in relevant standards;

Calibration block :

- IIW block(Steel- type 1 or 2)
- Calibration block No. 1 according to ISO 2400;
- Equivalent calibration block according to regional standard;

Calibration block :

- DSC or Mini-angle beam block;
- Calibration block No. 2 according to ISO 7963;
- Equivalent calibration block according to regional standard;

A.6 Visual Testing :

Equipment (Instruments):

- Surface table (of suitable size for largest measurement);
- V blocks;
- Block mounted pointers/sensors;
- Squares, rules, protractors;
- Micrometers;
- Vernier calipers;
- External calipers;
- Dial reading bore gauge;
- Hand magnifiers ($\times 2$, $\times 5$ and $\times 10$);



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- Loupes with metric scales no greater than $\times 7$;
- Mirrors – various sizes up to 50 mm diameter with fixed and articulating heads;
- Light sources – penlights, flashlights, customized sources for power endoscopes and fiberscope;
- Indirect viewer , borescope, fiberscope or endoscope including various direction of viewing(as minimum);
- For word viewing, 90° viewing, assortment of field of view/depth of field(articulating end etc.),system with;
- Surface and depth measurement capabilities;
- Photometer;
- Weld gauges, weld profiles, surface comparator;
- Optical comparators with variety of reticles;



Annexure B

Training Specimens Required

B.1 Weldments (MIG, MAG, MMA, SAW, TIG)

	MT	PT	RT	UT	VT
Type of Welds 1. Plate (Butt, T, Cruciform, Thick to thin, Welding with baking plates)					
Tube and Pipe (Circumferential, Axial Butt, Thick to thin weld transition, welding with backing plate, nozzle, node)					
Planer discontinuities					
Surface	Crack, LOF, LOP	Crack, LOF, LOP	Crack, LOF,	Crack, LOF,	Crack, LOF, LOP
Subsurface	Crack, LOF, LOP	Crack, LOF, LOP	Crack, LOF,	Crack, LOF,	Crack, LOF, LOP
Volumetric discontinuities					
Surface	Porosity, Imperfect shape Including undercut	Porosity, Imperfect shape, Including undercut	Porosity, Imperfect shape, Including undercut	Porosity, Imperfect shape, Including undercut	Porosity, Imperfect shape, Including undercut
Subsurface	-	Porosity, Inclusions	Porosity, Inclusions	-	-

Note : the following discontinuities shall be covered in the defective specimens

- 1.0 Excessive Penetration (VT, RT)
- 2.0 Incomplete root penetration (VT,RT,PT,MT,UT)
- 3.0 Heat-affected zone cracking (VT, RT, UT, PT,MT)
- 4.0 Sidewall slag inclusion (RT and UT)
- 5.0 Lack of sidewall fusion (RT,UT)
- 6.0 Longitudinal crack in weld (UT,RT,PT,MT,VT)
- 7.0 Transverse crack in weld (UT,RT,PT,MT,VT)
- 8.0 Porosity (localized and uniform) (RT,PT,VT)
- 9.0 Lack of root fusion (RT,UT,VT,MT,PT)
- 10.0 Solidification cracking (RT,UT)
- 11.0 Lamellar tearing (UT,VT)
- 12.0 Worm holes (RT)
- 13.0 Tungsten/copper inclusions (RT)



Annexure C Curriculum

The syllabus of the training shall be as per NCB-ISNT/ICN/Syllabus (Please refer to the current document)



Annexure D
ICN Scheme-Requirements for NDT training centers (please refer to current document)



Annexure E E learning / Online learning

- E.1** Remote training conducted by electronic means may be referred to as: E-Learning Online Training. These training are permitted only for theory . The practical shall be conducted off-line at a classroom.
- E.2.** E-Learning/online training may be used when the offline training is not possible or to supplement some part of theory prescribed in curriculum.
- E.3.** The option for delivery of E-Learning is available to all current ATCs.
- E.4.** Applications and curriculum for E-Learning shall be approved by TMB for Level 1, Level 2 and Level 3 training.
- E.5.** ATC shall prepare a plan of e-learning and deliver that training to meet the qualification needs.
- E.6.** As with current classroom based training the ATC needs to retain evidence of the pre-training review, the resultant training plan and records of the training delivered. These records would need to be available during TMB assessments
- E.7.** E-Learning content shall fulfill the requirements of the existing syllabus for the course being undertaken, and shall be of an equal and appropriate technical level as that of the approved classroom based course material.
- E..8.** Access to online training materials shall be controlled and restricted by the ATC. Students shall have unique access details and shall only have access to the online material for the duration of the training. The administration software for delivering e learning /on line training shall have features to capture the identity and actual training hours spent by a candidate. The ATC shall have a process in place to control and restrict access including the removal of access permissions.



**Annexure F
Remote training conducted at Client premises/away centres**

- F.1 When there is a requirement of conducting public training or training at the client's premises , the ATC may arrange such training provided a documented system is established with control mechanism described adequately . Such training conducted by training centre at location other than its own facility can be identified as remote training.
- F.2 The ATC shall use its own resources such as equipment, specimens, tutors/instructors and course materials as normally used at its own training centre.
- F.3 The ATC shall conduct a facilities audit before each time training is conducted at location away from its own facility. This audit must verify that the facilities provide an environment which is conducive to the delivery of the training and in compliance with the ATC documented system, acceptable to TMB. The audit of facility shall also include verification that teaching aids such as blackboards/whiteboards or flip charts, overhead and/or slide projectors, and computer generated presentations and video equipment appropriate to the courses are available. The availability of suitable accommodation of its training staff and storage of materials, equipment shall also be included in the plan.
- F.4 When the ATC uses any facilities such as equipment, specimens for practical training etc. provided by the client, it shall be considered as outsourcing and shall meet the ATC quality system for outsourced resources. The test specimens for conduct of examination however shall be those owned by ATC and approved as per its quality system.
- F.5 The ATC shall retain detailed documented records of any transits and movements to and from the main facility and the client's place. This record shall include lists of equipment and specimens shipped or transported and their condition upon receipt.
- F.6 Records of all such training conducted at away locations shall be maintained according to ATC quality system and shall be made available for assessment by TMB.
- F.7 The maximum number of such training shall be limited to six (6) per year. The ATC shall inform TMB in advance of each subsequent training session or course which would be subject to audit by TMB as additional site.