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TURKISH NATIONAL AEROSPACE NONDESTRUCTIVE TESTING BOARD

MANUAL

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APPROVAL PAGE OF TURKISH CAA

 SİVİL HAVACILIK GENEL MÜDÜRLÜĞÜ DIRECTORATE GENERAL OF CIVIL AVIATION	
<h3>ONAY SERTİFİKASI</h3> <h3>APPROVAL CERTIFICATE</h3>	
<h2>TÜRKİYE ULUSAL HAVACILIK</h2> <h2>TAHRİBATSIZ MUAYENE EL KİTABI</h2> <p>(TURKISH NATIONAL AEROSPACE NDT BOARD MANUAL)</p>	
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<p>This Maintenance Organization Exposition has been evaluated and inspected in accordance with SHT-NDT, SHY-145 and approved by the Airworthiness Department of the Turkish DGCA.</p>	
<p>Inspected & Evaluated By:</p> <p>Mustafa ALTUĞ Uçak Teknisyeni Aircraft Technician</p>	<p>Approved By:</p> <p>Hüseyin KAYA Koordinatör Coordinator</p>
	
 DGCA / SHGM MOE Sayfa 1 / 1 Page	
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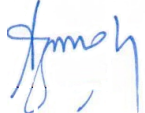
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DEFINITIONS

Certification:

A written statement by an employer that an individual has met the applicable requirements of this standard.

Documented:

The condition of being recorded in written or electronic form.

Employer:

An organization employing or contracting the services of one or more individuals who perform NDT. Self-employed individuals are included in this definition.

Evaluation:

A review following interpretation of the indications noted during an NDT inspection to determine whether the indications meet specified acceptance criteria or to determine the significance of the indication.

Examination:

Formal, controlled, documented testing conducted in accordance with a documented written practice to verify a candidate's visual capability, skill or knowledge of an NDT method.

Examiner:

A Level 3 certified to this standard and designated by the Responsible Level 3 to administer all or part of the qualification process in the NDT method(s) in which the Examiner is certified.

Experience:

Actual performance of an NDT method conducted in the work environment resulting in the acquisition of knowledge and skill. This does not include formal classroom training, but may include laboratory and on-the-job training as defined by the employer's written practice.

Formal Education:

Engineering or science studies at a technical school, college, or university.

National Aerospace NDT Board of Turkey (NANDTB-TR):

An independent national aerospace organisation representing a nation's aerospace industry that is chartered by the participating prime contractors/organisations and recognised by the national regulatory agencies/authorities to provide or support NDT qualification, and/or examination services in accordance with EN 4179 and this written practice.

NDT Instruction:

A written description of the precise steps to be followed in testing to an established standard, code, specification or NDT procedure.

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NDT Method:

One of the disciplines of non-destructive testing (e.g. ultrasonic, radiography, etc.) within which different techniques may exist.

NDT Procedure:

A written general "how to" instruction for conducting a given process. Procedures are then used to develop work instructions, as defined this section.

NDT Technique:

A category within an NDT method (e.g. ultrasonic immersion or ultrasonic contact testing, etc.).

On The Job Training:

Training in the work environment to gain experience in learning instrument set-up, equipment operation, applying the process, and recognition, interpretation and evaluation of indications under appropriate technical guidance.

Outside Agency:

An independent company or organization outside the employer who provides NDT services to implement the requirements of this standard, such as training and examination of NDT personnel. Consultants and self-employed individuals are included in this definition.

Prime Contractor:

An organisation having overall responsibility for design, control and delivery of a system, component or product.

Qualification:

The skills, training, knowledge, examinations, experience and visual capability required for personnel to properly perform to a particular level.

Responsible Level 3:


A Level 3 designated by the employer with the responsibility and authority to ensure that the requirements of this written practice are met and to act on behalf of the employer.

Sub-Contractor:

An organisation responsible to the prime contractor for the manufacture or maintenance of aerospace products. For the purposes of this written practice, this includes suppliers and processors.

Work Instruction:

A document detailing the NDT technique and testing parameters to be used for the inspection of a specific component, group of parts (e.g. "aluminium extrusions" or "steel brackets"), or assembly. These are sometimes referred to in the industry as "technique sheets" or "data cards". Such work instructions are based on procedures defined.


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Written:

Retrievable electronic or hard copy.

Written Practice:

A document that describes an employer's requirements and methodology for controlling and administering the NDT personnel qualification and certification process.

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ABBREVIATIONS

AIA-NAS	: Aerospace Industries Association-National Aerospace Standard
CAA	: Civil Aviation Authority
DGCA	: Directorate General of Civil Aviation
EASA	: European Aviation Safety Agency
EN	: European Norm
NANDTB-TR	: Turkish National Aerospace Non Destructive Testing Board
NDI	: Non-destructive Inspection
NDT	: Non Destructive Testing
OJT	: On the Job Training
SHT-NDT	: Directorate General of Civil Aviation NDT Instruction
The BOARD	: NANDTB-TR

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CHAPTER 1

GENERAL

1. General

1.1. Scope

- This Manual states the operational procedure of the Board.
- This Manual is established according to the requirements of EN 4179 and SHT-NDT.
- This Manual shall be approved by Turkish CAA and the Board is recognized by Turkish CAA regarding to this approval.

1.2. The Aims and Objectives

- Satisfy the Turkish Aviation Authority requirement for a National Aerospace NDT Board as defined in EN 4179, SHY-145 and SHY-21.
- Establish a system for recognition of organisations providing NDT trainings and qualification examinations according to EN 4179.
- Audit the NDT Training and Examination Centres.
- A recommendation letter will be delivered to Turkish CAA by the Board after evaluating the technical requirements of the candidate NDT Training Centres.
- Be a member of the Aerospace NDT Board Forum and comply with ANDTB/08.
- Provide guidance to the National Aerospace Industry in the scope of NDT personnel certification.

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CHAPTER 2

RULES of the BOARD

2. Rules of the Board

- a. The Board is composed of leading companies from national aerospace industry and military organisations.
- b. The Board is recognized by the Turkish CAA.
- c. The Board is consisting of minimum 5 member companies.
- d. The Turkish CAA can nominate a person or persons to attend meetings of the Board with observer status.
- e. The Board shall elect a suitably qualified person as Chairman.
- f. The Board shall elect a suitably qualified person as Secretary.
- g. The Board shall be operated in accordance with this Manual.

2.1. Rules of Membership

- a. The Board members will be suitably qualified nominees from Design, Manufacturing or Maintenance companies from aerospace industries.
- b. These member representatives shall be technically qualified individuals (Level 2 & Level 3 certification) with a minimum 5 years aerospace experience within last 10 years.
- c. The membership has to be confirmed by the Board.
- d. A member representative whose behaviour is detrimental to the Board may be dismissed with a majority of not less than two-thirds of all the voting members.
- e. The membership in the Board is free. The member companies shall carry the expenses for their collaboration on the Board.
- f. Member List is given in Appendix 1.

2.2. Organization and Responsibilities

Chairman

- a. The members of the Board elect a Chairman by voting, for the duration of maximum 5 years. Re-election is possible.
- b. Only a regular member may be elected as Chairman.
- c. The Chairman of the Boards responsible for the contacts with all authorities and other organisations. Also Chairman is responsible for carrying out the agenda of the Board.

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Secretary

- Secretary shall be elected and approved by the Board.
- Secretary may not be a voting member.

2.3. Rules for Meetings and Voting

- The Board will meet at least twice per year.
- Statements to be decided at a meeting shall be recorded by written documentation and distributed to the members by the secretary.
- Only representatives of member organisation qualified as Level 3 have a voting right as one vote. Observers do not have a voting right.
- Approval of changes to the constitution (including the chairman election), working procedures, qualification and examination procedure shall be decided by a majority of not less than 2/3 those present at a meeting. Other matters shall be decided by a simple majority.
- In the case of a tie, the Chairman will have the casting vote.
- The execution of discussions and voting by email, telephone-conference or comparable media is allowed if it is guaranteed that all members get the same information.

2.4. Rules for Documentation

- Secretariat publishes and controls the documentation approved by the Board for publication. All the documents shall be kept minimum 5 years by the Secretariat.
- Minutes of Meetings shall be documented and issued by the secretary. All members attending the meeting shall sign the Minutes of Meeting.
- Documents approved by the Board may be posted on the Board webpage.

2.5. Audit and Monitoring of the Board

- The Board has obligations under the recognition by Turkish CAA to monitor and report on its the Schedule Functions described in the Board Manual.
- The Board is required it shall request audit access, and appoint an auditor(s) to perform the audit in accordance with Audit and Monitoring of the NANDTB-TR (Appendix 7). Appendix 7 describes the Board's internal audit process.
- The Chairman will appoint a competent Board member as auditor, or use an external auditor if appropriate. The audit is administrative and not technical. Accordingly, it need not be undertaken by a NDT Level 3.
- The Auditor will provide a written audit report of findings and observations to the Chairman as soon as practicable after its completion, not later than 30 days.

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CHAPTER 3

QUALIFICATION

3. QUALIFICATION

- a. Qualification of NDT personnel shall be fulfilled according to EN 4179.
- b. Formal Trainings of NDT personnel shall be given by an Approved Training Centre.
- c. NDT qualifications shall be based on a NDT syllabus acceptable to the Board, and this applies to all levels of qualification subject to recognition by the Board.
- d. NDT personnel who can't satisfy the requirements of the training and examination performed by the Approved Training Centre can't be involved in any NDT activities defined in EN 4179.
- e. Equivalency of the Certificates which are not given by a NANDTB approved Training Centre, shall be evaluated by the Board. These are;
 - (1) For Level 1 and/or Level 2 applications, all examinations related to applied method shall be from other countries NANDTB's approved training centre.
 - (2) For Level 3 applications, Level 3 candidate shall previously have EN 4179 Level 2 qualification from an approved training centre and having Level 3 certificates for related method(s) from ASNT, ISO 9712, and PCN Aero.

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CHAPTER 4

EXAMINATIONS

4. Examinations

4.1. Introduction

a. All qualification examination shall satisfy the EN 4179. The Board uses EN 4179 as the standard for the examination of NDT personnel. The Turkish Civil Aviation Authority recognizes EN 4179, and will consider other standards on application.

b. The Turkish Civil Aviation Regulations permit the Approved Training organisation to train and examine the NDT personnel who work in Turkish Aviation Industry, provided it is under the control of Approved Training organisation's Responsible NDT Level 3. This procedure includes guidance for Training organisations that provide examinations, and have them endorsed by the Board.

c. If the examination result is to be recognized by the Board, examination process must be in according with this procedure. Also, NDT examinations shall be based on a NDT syllabus acceptable to the Board, and this applies to all levels of examinations subject to recognition by the Board.

d. Even if the Qualification examination of the NDT personnel is performed by the Approved Training Centre, certification is under the responsibility of the Employer.

4.2. Recognized Examination Centres

a. Organisations which are approved by the Board and Turkish CAA as Approved Training Centre will have been audited and have administrative controls in place which will satisfy this procedure.

b. Recognition as an Approved Training Centre includes recognition to administer examinations.

c. The Board requires examinations to contain at least 50% relevant aerospace specific NDT questions as well as general method questions.

d. Examination centres approved by other national NDT bodies may be acceptable to the Board upon review.

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4.3. Employer' Provided Examinations

Recognition of examinations by the Board is mandatory. Turkish CAA doesn't permit the Employer's Responsible Level 3 to carry out NDT training and examinations without Recognition of Training and Examination Centre, except Chapter 3 paragraph e.(2) condition. In case of using this privilege employer's Responsible Level 3 shall provide all specific and practical examination requirements which are described in Appendix 6 (Application Form for Certification Equivalency) to the Board.

4.4. Candidates

Candidates should have completed the NDT training requirements of EN 4179, and the employer's Written Practice before undertaking examinations.

4.5. Examiners

Examiners grading the examination shall be Level 3 qualified in the method(s) examined. The examiner must be familiar with the governing regulations, the employer's written practice, procedures, inspection methods and products relevant to the candidate's work. Level 3 examiner services may be contracted provided they meet the above requirements.

4.6. Examination Procedure

Examination procedure shall minimum fulfil the EN 4179 requirements.

4.6.1. Questions

Examination format and questions shall conform to EN 4179.

4.6.2. Duration

The duration of the examination shall be determined by the examination source and stated on the examination paper.

4.6.3. Permitted Aids

The permitted aids shall be determined by the examination source and stated on the examination paper.

4.6.4. Invigilation

All examinations shall be taken under supervision to ensure candidates have fair access to approved aids, and are not subject to interference of any kind.

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4.6.5. Cheating

Candidates who use prohibited aids, cheat or attempt to cheat shall be recorded a fail result.

4.7. Security of Examination Material

Prepared examinations shall be securely stored before use and candidates may not review examination questions outside the time allocated for the examination. Practical samples used during training shall not be used for examination.

4.8. Assessment of Examinations

Assessment, scoring and reporting of results shall be carried out in accordance with EN 4179.

4.9. Re-Examinations

4.9.1. Additional Training

Candidates who have failed an examination may only repeat the examination after documented additional training which addresses the deficiency.

4.9.2. Second Failure

If an examination has been repeated and failed a second time, the Responsible Level 3 shall stipulate conditions or training which must be satisfied before the examination may be undertaken again.

4.10. Examination Results

a. Examination results and/or certificates shall be issued by the Examining Organisation to every candidate who has passed the examination. The certificate shall contain the following:

- (1) Name of the Examining Organisation,
- (2) Name of the candidate,
- (3) Statement that the examination meets EN 4179 requirements,
- (4) NDT method and level (or specific inspection technique),
- (5) Date of issue of the certificate,
- (6) Signature of the examiner or the organisation's authorizing person.

b. No certificate will be issued for parts of an examination.

4.11. Withdrawal during the Examination

If a candidate withdraws during the examination, a fail result shall be recorded.

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4.12. Withdrawal before the Examination

If a candidate is unable to start the examination because of illness or for some other unavoidable circumstance, the candidate shall be recorded no result. The examiner will assess the circumstance using fairness and good judgment.

4.13. Examination Records

- a. For each candidate, a record shall be kept of the examination result by the Responsible Level 3/Examiner of the Approved Training Centre.
- b. The examination record shall include all written papers, marking, examiner comments and results. These shall be retained by the Approved Training Centre for a minimum of 10 years and protected against unauthorized access. Results of examinations may only be released by permission of the candidate.
- c. Results of all examinations and the examination documents,
- d. Details of the test samples, plant and equipment used by the participant in the practical examination shall be recorded.

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CHAPTER 5

REQUIREMENTS for APPROVED TRAINING CENTRES

5. Requirements for Approved Training Centres

5.1. Management and Personnel

5.1.1. Organisation

There shall be a clear organisational structure showing lines of responsibility and communication, including identification of personnel in management and other relevant positions. The level of decision making and management is understood and implemented at all levels of the organisation. The training provider shall have documents showing that it is a legal entity.

5.1.2. Responsible Level 3

- The training provider shall state the Responsible Level 3 for the qualification and re-qualification of NDT personnel.
- Stated The Responsible Level 3 shall fulfils the requirements of EN 4179 and this Manual.

5.1.3. Training Coordinator

Providers of training and/or examinations shall appoint a coordinator to be responsible for the conduct, supervision and administration of the NDT training courses and continued education in NDT. The Training Coordinator shall be Level 3 per EN 4179 and have an appropriate level of knowledge of the inspection techniques, materials, types of construction, manufacturing processes, products etc specific to the aerospace sector. The Training Coordinator shall be the point of contact for the Board, and have overall responsibility for ensuring compliance with Board requirements. The Training Coordinator may also be substituted for the Responsible Level 3.

5.1.4. Quality System Manager

Quality System Manager is responsible for preparing the Quality System Documents and Procedures. Each Approved Training Centre shall maintain a Quality System Manager who has a minimum 2 years' experience in quality systems. Also Quality System Manager shall be familiar with NDT methods and Human Factors.

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5.1.5. Number of Instructors

The Training Organisation shall have enough instructors to ensure that at least one instructor is presented during the training.

5.1.6. Qualification and Experience of Instructors

Instructors shall have at least 5 years' experience and an appropriate level of knowledge of inspection techniques in the aerospace sector. The personnel giving practical instruction shall have experience of testing in the aerospace industry and be well informed of technical progress in the field. All training personnel shall be recognized/reported/informed to the Board. Instructors shall be well informed in Human Factors and new training technologies, etc.

5.2. Requirements for the Conduct of Courses

Training shall include general, specific and practical instruction in the methods and procedures for which application has been made. The specific training may be the responsibility of the employer. The subject matter shall include the relevant inspection procedures, instruction sheets, specifications, standards etc. The depth of knowledge shall be appropriate for the level of personnel and conform to the NDT syllabus recognised by the Board, including sufficient time in practical application.

5.3. Training Centre NDT Manual

- a. Each training centre shall prepare a NDT Manual according to the minimum requirements stated in Appendix 2.
- b. Training Centre NDT Manual shall be evaluated by the Board and approved by Turkish CAA.
- c. Except the Management Personnel changes, all the changes in the Training Centre Manual shall be evaluated and approved by the Board.

5.4. Requirements for Training

5.4.1. NDT Syllabus

Approved Training Centres shall provide the NDT syllabus on which each course is based. Training Outlines shall minimum fulfil the EN 4179 requirements. The training program shall cover at least the NDT syllabus recognized by the Board. The NDT syllabus recognised by the Board is the baselines for a general training course in the methods (Appendix 3). The content of training courses shall take the specific requirements of the aerospace industry into account and be made

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available to the participants in the form of a detailed course document. International and manufacturer's own aeronautical standards and specifications shall be taken into account.

5.4.2. Control of Training Specimens

There shall be a system to ensure that specimens used during examination have not been used during the training. The test specimens used during training shall not be used during examination. Specimens shall be stored safely.

5.4.3. Control of Course Documents

The Training Organisation shall keep a "control" on the set of course documents. These are to be revised as necessary, with revision dates clearly identified on the material.

5.4.4. Revision of Documents

Employees who prepare NDT course documents shall be competent for such work. The Training Coordinator shall ensure that they are appropriately qualified.

5.5. Facilities

5.5.1. Training Facility

Training Centre facility shall minimum fulfil the EN 4179's requirements. The facilities used for training shall conform to all the relevant legal provisions (OH&S, Radiation Safety, Hazardous Substances etc). Additionally, the classrooms used for the course and those in which practical work takes place, shall have adequate lighting and ventilation. They shall be suitably equipped with teaching materials such as board, flip charts, projectors etc.

5.5.2. NDT Plant and Equipment

NDT Plant and Equipment shall minimum fulfil the EN 4179's requirements. Sufficient NDT plant and equipment shall be available, including instruments and accessories and reference pieces to cover the range of inspection techniques within the procedures taught, and to occupy all the participants in the course. The type of NDT plant and equipment provided shall reflect the nature of the equipment used by the participants in their normal working environment and shall also be in keeping with the type of product concerned. Suitable PPE shall be available as required The Training Organisation shall have a system of inspecting and calibrating NDT plant and equipment.

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5.5.3. Test Samples

Samples used for training shall be available in sufficient number and complexity to cover the whole range of applications within the curriculum. There shall be a sufficient number of representative test samples specific to the aerospace industry and containing natural or artificial faults to cover the whole range of testing. Examples of the airframe are the skin joints, parts of the landing gear and typical composite structures. Examples of the power plant include turbine blades, rotor discs, castings, gear box parts etc.

5.5.4. Certificates

Participants who have satisfactorily completed a training course by passing the theoretical and practical examinations shall be issued with a certificate confirming that they have completed their NDT training successfully.

5.6. Training Records

5.6.1. Participant Training Records

The records of every participant in the courses shall be kept in a safe place and considered confidential for at least 10 years and be updated if required. They shall contain as a minimum;

- Dates of training and completion of training,
- Name of the course in which the candidate took part,
- Instructors delivering the training,

5.6.2. Training Personnel Records

Records of instructors shall be kept whilst employed and for at least 10 years following. There shall be a system for updating and checking the status of all records with respect to the individual's;

- Experience,
- Qualifications,
- Approvals,
- Special training and continued education.

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CHAPTER 6

AUDIT and APPROVAL PROCEDURE of TRAINING and EXAMINATION CENTRES

6. Audit and Approval Procedure of Training and Examination Centres

6.1. Introduction

A Training and Examination Centre is a NDT Training Provider. This procedure describes the process for the Board recognition of Training and Examination Centres and the training courses and examinations they provide. This procedure shall be followed by the applicant Training and Examination Centre, and the Board.

6.2. Application Procedure

6.2.1. Recognition of Training and Examination Centres

NDT Training Organisations requesting recognition as Training and Examination Centres shall complete the written application in Application Form for Recognition of Training and Examination Centres (Appendix 4) and send it to the Board Secretary. Before making application, the applicant should be familiar with Section 3 & 4 of this procedure. All information requested on the form is to be supplied, or indicated N/A if not applicable.

6.2.2. Evaluation of Application

The Board will assess the application once all the information requested in the application form has been received. A response to each assessable item will be provided. The Board may request access to conduct an audit of the training provider's facilities as part of the assessment. The assessable elements are:

- Application documentation completed in full.
- Training materials/syllabus for suitability to the training outcomes.
- Quality Control of training materials and candidate information.
- Source and control of examinations.
- Training personnel qualifications and experience.
- Training and examination facilities.

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6.2.3. Notification to Applicants

a. The Board shall notify the applicant of acceptance or otherwise as soon as practicable. Recognition of a Training and Examination Centre may be conditional on certain action(s) being undertaken before recognition is granted. Reports to the applicant shall follow the form shown in this Manual, regardless of outcome.

b. Recognized Training and Examination Centres shall receive a Certificate from the Board.

6.2.4. Audit of Training and Examination Centre

If the Board determines that a site audit of the training provider is required it shall request audit access, and appoint an auditor(s) to perform the audit in accordance with Audit and Monitoring of Training and Examination Centres (Appendix 5). The audit team shall submit a report and recommendations to the Board.

6.2.5. Audit Findings and Reports

The audit team shall submit a report in 10 days after the audit. If recognition is not granted, based on adverse audit findings, the applicant has 3 months, or as otherwise agreed to by the Board, to provide evidence of root cause, corrective and preventative action. If the corrective action is not taken within the agreed time, a new application is to be made.

6.3. Conditions of Recognition

6.3.1. Approval of Training and Examination Centres

Approval of the Training and Examination Centres is performed by Turkish CAA after the evaluation of the NDT Training and Examination Centres by the Board and regarding to the recommendation letter of the Board.

6.3.2. Period of Validity

a. The period of validity is maximum 5 years. The recognition remains valid so long as the training organisation maintains compliance with all the requirements of the original assessment. However if these requirements change during the period of validity, the Board will notify Training and Examination Centre to ensure they are aware of the changes, and request that they provide to the Board evidence of compliance with the new requirements as soon as practicable.

b. It is the responsibility of the Training and Examination Centre's Training Coordinator to apply for a renewal assessment before the expiration of the recognition. For planning purposes, allow about 6 months for the reassessment to be completed. It is also the responsibility of the

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Training Coordinator to advise the Board of any changes in personnel or other aspects of the organisation which would impact on the scope of the recognition.

6.3.3. Withdrawal of Recognition

- a. Training organisation recognition may be withdrawn if the Board becomes aware that:
 - (1) The conditions on which recognition was granted are no longer fulfilled.
 - (2) Changes to the organisation as noted in Section 5.3.1. of this procedure have not been conveyed to the Board.
 - (3) The Training organisation has acted unethically.
- b. Recognition will not be withdrawn until the Board has contacted the Training and Examination Centre seeking an explanation, and is satisfied that withdrawal of recognition is warranted. A Training and Examination Centre may re-apply once it demonstrates that the conditions leading to the withdrawal of recognition have been corrected, and measures are in place to reduce the likelihood of its recurrence.

6.4. Variation to Training Courses

Variations to the Training and Examination Centre's scope, or training courses including additional courses and new training locations, will follow the same format as for first applications but reduced to the extent of the variation. Recognition of the new scope must be granted before the training is conducted. The request for the variation should include a copy of the NDT syllabus and description of the course documents, a list of the equipment, test specimens and qualifications of the instructors, and any changes to the facilities.

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CHAPTER 7

RECOGNITION of AEROSPACE NDT EXAMINATION CERTIFICATES

7. Recognition of Aerospace NDT Examination Certificates

- a. Recognition of Aerospace NDT Examination Certificates covers the evaluation of NDT personnel qualification. The certification is under the employer responsibility.
- b. Recognition of NDT personnel qualification is under the control of the Board. This recognition process can only be applied when;
 - (1) Level 1 and/or Level 2 trainings and examinations are from other countries NANDTB's approved training centre.
 - (2) Level 3 candidate shall previously have EN 4179 Level 2 qualification from an approved training centre and having Level 3 certificates for related method(s) from ASNT, ISO 9712, and PCN Aero.
- c. Minimum requirement for the recognition of the qualification is that the training, examination and on the job training shall be fulfilled according to the EN 4179 and ANDTBF/08.
- d. Candidate shall apply to the Board Secretariat by filling the Application Form for Certification Equivalency (Appendix 6).
- e. Candidate shall supply the related qualification, examination and OJT documentation to the Board Secretariat during the application.
- f. Results will be reported to the applicant in 30 days period regarding to the evaluation of the Board.

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CHAPTER 8

RELATIONS between TURKISH CAA and the BOARD

8. Relations between Turkish CAA and the Board

8.1. Recognized by Turkish CAA

a. This Manual shall be approved by Turkish CAA and the Board is recognized by Turkish CAA regarding to this approval.

b. The Board carries out its activities according to Board's Manual based on EN 4179 and approved by Turkish CAA.

8.2. Approval of the Board Manual

This Manual shall be approved by Turkish CAA. Any changes including board members and their representatives shall be approved by Turkish CAA.

8.3. Attend Meetings of the Board

a. The Turkish CAA can nominate a person or people to attend meetings of the Board with observer status.

b. If a country has a bilateral agreement with Turkish CAA, the related countries CAA representative or the prime contractor companies representatives can involve in the Board meetings as an observer.

8.4. Audit of Training and Examination Centre

a. The Audit of Training and examination centre is carried out by at least two board members designated by the Board. Turkish CAA may also assign one or more observer for audit activities.

b. Additionally the foreign countries auditors who audits Turkish CAA at the same time can also take part in the audit activities of the NDT training and examination centre's as an observer.

8.5. Approval of Training and Examination Centre

a. The Board sends a recommendation letter to the Turkish CAA under the scope of its auditing and monitoring activities which are issuing, renewal, suspension, limitation and reinstatement of authorization certificates.

b. Training and Examination Centre shall be approved by Turkish CAA under the vision of the Board's recommendation letter.

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c. Training Centre NDT Manual shall also be approved by Turkish CAA with the Board's recommendation letter initially.

d. All the changes except the Management Personnel changes, in the Training Centre NDT Manual shall be evaluated and approved by the Board.

e. In case of Turkish CAA request, the Board can assign board member(s) to give technical consultancy for the Turkish CAA audit activities which are maintenance organization approval for NDT related ratings or approving processes of technical NDT procedures. If the Board carries out this task, Turkish CAA is informed by a notification letter.

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CHAPTER 9

APPENDIX


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- Appendix 2** Minimum Requirements of Training Centre NDT Manual
- Appendix 3** NDT Syllabus Recognized by the NANDTB-TR (Document No: NANDTB-TR-002)
- Appendix 4** Application Form for Audit and Approval Procedure of Training and Examination Centres
- Appendix 5** Audit and Monitoring of Training and Examination Centres
- Appendix 6** Application Form for Certification Equivalency
- Appendix 7** Audit and Monitoring of the NANDTB-TR
- Appendix 8** Cross Reference Table

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TURKISH NATIONAL AEROSPACE NONDESTRUCTIVE TESTING BOARD (NANDTB-TR)
(www.ndtboard-tr.org)

MEMBER LIST

Member Organisation	Representative's Information					
	Name, Surname	Status	Vote	Title	e-mail	Telephone
Turkish Airlines Technic Inc.	M. İlker SUNAOĞLU	Chairman	Voting	NDT Manager	isunaoglu@thy.com	+90 212 585 98 00 (75301)
Turkish Engine Industry Inc.	Buket TOPEL	Board Member and Deputy Chairman	Voting	NDT & SP Quality Manager	buket.topel@tei.com.tr	+90 222 211 23 50
Turkish Aerospace Industry Inc.	Ferhat SONAT	Board Member	Voting	Material and Process Tech. Leader	fsonat@tai.com.tr	+90 312 811 18 00 (4637)
Turkish Air Forces	Ahmet AKTOSUN	Board Member	Voting	Training Coordinator	aaktosun@hvkk.tsk.tr	+90 232 251 16 00 (5229)
Turkish Land Forces	Mustafa AKKAŞ	Board Member	Non-Voting	NDT Workshop Manager	m1akkas@kkk.tsk.tr	+90 312 252 62 00 (5321)
THK Technic Inc.	Mehmet SAYGIOĞLU	Secretary of Board	Non-Voting	Workshops Manager	mehmet.saygioglu@thkteknik.com	+90 312 245 24 56
Turkish DGCA	Oktay DÖRTEPE	Observer	Non-Voting	Technical Inspector	oktay.dorttepe@shgm.gov.tr	+90 312 203 61 83
Turkish DGCA	Mustafa ALTUĞ	Observer	Non-Voting	Aircraft Maintenance Technician	mustafa.altug@shgm.gov.tr	+90 312 203 74 25

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MINIMUM REQUIREMENTS OF TRAINING CENTRE NDT MANUAL

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 - 1.8.2. Training Organization Audit Checklist
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 - 1.8.4. Audit Findings and Reports
- 1.9. Supporting Organizations

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- 2.1. Training and Examination Program
- 2.2. Reference Documents
 - 2.2.1. Validation of Reference Documents and Standards
- 2.3. Training Procedure
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 - 2.3.2. Training Requirements
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2.4.4.2. Specific

2.4.4.3. Practical

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4. Health and Safety

PART 5

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NDT SYLLABUS

(Document No: NANDTB-TR-002)


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1.1. Penetrant Testing (PT)

1.1.1. PT General


PT - General (1/4)		
Principles	Physical principles	Surface tension
		Wetting
		Capillarity
	Penetrant systems	Penetrants
		Remover
		Developer
		Classification of penetrants
	Precleaning Procedure	Types of precleaning
Cleaning	Mechanical precleaning	Abrasive Blast
		Grinding, Sanding, Brushing
		Impact of the mechanical precleaning
		Removal of Material Smearing
		Impact on the figures after grinding
		Impact on the figures after shotpeening
	Chemical precleaning	Acid cleaning
		Watery degreasing
		Solvent Cleaning
		Vapour Degreasing
		Electrolytic cleaning
		Ultrasonic Cleaning
		Paint stripping agent

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PT - General (2/4)		
Process of testing	Penetration procedure	Temperature requirements as per standards
		Penetrant application
		Wetting
		Dwell time
		Factors influencing penetrant dwell time
		Dipping time, drain time
	Penetrant removal	Factors influencing penetrant removal
		Water
		Lipophilic emulsifier
		Solvent
		Hydrophilic remover
	Drying	Drying process after precleaning
		Drying process after penetrant removal
	Developing	Dry developer
		Water soluble developer
		Water suspended developer
		Solvent based developer
		Special developer
		Developer Dwell
		Comparison of Developers
	Radiation facilities	UV-A lamp
		Examination conditions
		Measuring tools for illumination and radiation
Viewing	Characteristic of human eye	Acuity performance
		Ability to discriminate colour
		Contrast sensitivity
		Brightness adaptation
		Astigmatism

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PT - General (3/4)		
Selection of penetrant	Classification of penetrant	Very low
		Low
		Medium
		High
		Ultra high
Control of penetrant characteristics	Penetrant testing as per EN ISO 3452-2	Sample test
		Batch testing
		Monitoring by the user
	Characteristics to be tested	Density
		Wetting/ marginal angles
		Viscosity
		Flashpoint
		Vapour pressure
		Colour
		Brightness
		Water tolerance
		Removability
		UV-Resistance
		Corrosive components
		Characteristics of developer
Control of penetrant process	System performance check	Reference test block EN ISO 3452-3
		PSM star burst panel
		Storage of reference test block
	Additional testing of penetrant materials	Inspection booth checks
		Surface wetting test
		Penetrant rapid brightness test
		Lipophilic emulsifier removability test
		Hydrophilic remover refractometer test
		Hydrophilic remover hydrometer test


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PT - General (4/4)		
Control of penetrant process (continue)	Additional testing of penetrant materials (continue)	Remover quick test for penetrant contamination
		Hydrophilic remover performance check
		Dry developer contamination test
		Water-suspended developer concentration test
		Water pressure and temperature check
		Measurement of black light intensity
Evaluation and reporting of testing instructions	Detectable defects on different materials	Related and non-related indication
		Inspection of non-metallic material
		Inspection of ceramic materials
		Inspection of composite
Safety	Product related risks	
	UV-related risks	
	Environmental waste water management	
Quality assessment	Procedures and standards	National and international standards
	Construction concept	Safe live
		Fail safe
		Damage tolerance
	Comparison to other NDT methods	Limits of PT inspections
		Detectable flaw size
		Other NDT procedures
	Documentation	Issue of inspection procedures
		Inspection reports
	Personnel requirements	

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1.1.2. PT Specific


PT - Specific		
Airframe	Crack and corrosion detection in	Fittings and lugs
		Bolts
		Landing gear
		Rods
		Links
		Structure
		Skin
Engine	Crack detection in	Pins
		Gears
		Mounts
		Bolts
		Shafts
		Cases
		Blades
		Discs
		Slots
		Bores
Components & Reworked parts	Crack detection in	Wheels
		Pins
		Gears
		Mounts
		Bolts
		Shafts
		Cases
		Blades
		Discs
		Slots
		Bores

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1.2. Magnetic Particle Testing (MT)

1.2.1. MT General


MT - General (1/5)		
	Basic Principles	
Physical principles of magnetic particle inspection	Electrical parameters	Volt
		Current
		Frequency
		Electrical resistance
		Phase
		Electrical resistance
		Effect of electrical current
		Ohm's Law
		Circuit diagrams
		Direct current
		Alternating current
	Magnetical parameters	Ferromagnetism
		Magnetic fields
		Magnetic lines of force
		Magnetic field strength
		Permeability
		Magnetic flux
		Magnetic flux density
		Hysteresis
		Required field strength
	Electromagnetic induction	Transformation
		Skin effect
	Magnetic fields on electrical conductors	Field strength
		Flux density in and around electrical conductors
	Ferromagnetic materials in magnetic fields	

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MT - General (2/5)		
Physical principles of magnetic particle inspection (continue)	Evidence of adequate field strength	Hall-effect gauss meter
	Combined procedures	Combination of two constant magnetic fields
		Combination of constant and alternating magnetic fields
		Combination of two alternating magnetic fields
		Phase shifted alternating magnetic fields
	Demagnetisation	
Magnetisation	Principles of magnetisation technique	Field Direction
		Field strength
		Magnetic field orientation and flaw
		Detectability
		Yoke magnetisation
		Coil magnetisation
		Circular magnetisation with prods
		Circular magnetisation with direct contact
		Circular magnetisation with induced current
		Circular magnetic fields distribution and intensity
		Current amperage for the direct contact
		Longitudinal magnetisation
		Cable wrap technique
		Current amperage for the longitudinal magnetisation
		Method of current application
		Continuous application technique
		Residual application technique
		Combined techniques

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MT - General (3/5)		
Testing equipment and utilities	Equipment	Portable equipment
		Stationary equipment
		Demagnetisation coils
	Test products	Wet-Bath method
		Dry particles
		Dry method vs. wet method
		Fluorescent and coloured test products
		Visible particles vs. fluorescent particles
		Preparation of testing suspension
	Test blocks and tools	Test block for systems performance
		Test block for equipment performance
	Tangential field strength measurement	Field strength measuring instrument
		Field indicators
		Hall-effect (gauss/tesla) meter
		Quantitative quality indicator
		Pie gage
		Berthold test block
		Test block for magnetisation control
	Radiation facilities	UV-A lamp
		Examination conditions
		Measuring tools for illumination and radiation
Procedure monitoring	Illumination and radiation measurement	UV-A radiation measurement
		White light measurement

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MT - General (4/5)		
Viewing	Characteristic of human eye	Acuity performance
		Ability to discriminate colour
		Contrast sensitivity
		Brightness adaptation
		Astigmatism
Evaluation and reporting of testing instructions	Evaluation	
	Assessment	
	Producing an indication	
	Interpreting the indication	
	Evaluating the indication	
	Non-relevant indications	
	Magnetic writing	
	Cold working	
	Abrupt changes of section	
	Elimination of non-relevant indications	
	Inspection protocol	
	Structure of inspection procedure	
	Case studies	
	Standards	
	Inspection instructions	
	Company internal regulations	
Material science	Defects during manufacturing process	Inclusion
		Porosity
		Cracks
		Pipe
		Blowholes
		Segregation


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MT - General (5/5)		
Material science (continue)	Defects during machining process	Roll and forging flaws
		Turning and grinding flaws
		Flaws through hardening process
	Flaws through operation	Cracks
		Corrosion
Safety	Electrical hazards	
	Product related risks	
	UV-related risks	
Process Control	General description	
	System effectiveness check	
	Ammeter check	
	Quick break test	
	Dead weight check	
	Particle concentration test	
	Particle contamination tests	
	Lighting requirements	
Quality assessment	Construction concept	Safe live
		Fail safe
		Damage tolerance
	Comparison to other NDT methods	Limits of MT inspections
		Detectable flaw size
		Other NDT procedures
	Documentation	National and international standards
		Issue of inspection procedures
	Personnel requirements	

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1.2.2. MT Specific


MT - Specific		
Airframe	Crack and corrosion detection in	Fittings and lugs
		Bolts
		Landing gear
		Rods
		Links
Engine	Crack detection in	Pins
		Gears
		Mounts
		Bolts
		Shafts
		Cases
Components & Reworked parts	Crack detection in	Tubes
		Welded parts
		Bolts
		Gears
		Shafts
		Cases

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1.3. Eddy Current Testing (ET)

1.3.1. ET General


ET - General (1/4)		
Physic and fundamentals of eddy current	Electricity	Direct current; current and voltage
		Resistance
		Conductance
		Ohm's law
		Resistivity
		Conductivity
		Conductivity values for some metals
		Alternating current; sinusoidal current and voltage
		Amplitude
		Frequency
		Period
		Phase
		Vector representation
		Other periodic currents
	Magnetism	Magnetic field
		Lines of force
		Magnetic field strength
		Permeability
		Flux density (Induction)
		Flux, hysteresis loop
		Reluctance
		Magneto-motive force
		Diamagnetism
		Paramagnetism
		Ferromagnetism

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ET - General (2/4)		
Physic and fundamentals of eddy current (continue)	Electromagnetism	Magnetic field created by a current (wire, coil)
		Electromagnetic induction phenomenon
		Inductance
		Self inductance
		Inductive reactance
		Mutual induction
		Electromagnetic coupling
		Induced currents and secondary field
		Lenz's law
		Eddy current distribution in conducting materials
		Planar wave; standard depth of penetration
		Amplitude, phase
		Cylindrical conductors; characteristic frequency
		Skin effect
		Penetration depth
	Impedance plane diagrams	Impedance
		Complex plane representation
		Influence of conductivity
		Influence of frequency
		Influence of permeability
		Influence of probe clearance
		Influence of thickness
		Influence of an on-conductive coating on conductive material
		Influence of a through defect
		Influence of internal defects

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ET - General (3/4)		
Eddy current equipment	ET Probes	Design of probes (Mechanical and electrical)
		Operation of probes (Absolute, differential)
		Use of probes (Pencil, borehole, sliding, etc.)
		Connections of probes with ET unit
	ET instruments	Display modes; needle, digital display
		Instrument modules
		Operating principle
		Signal excitation, reception, processing
		Compensation
		Wheatstone bridge
		Filtering; LPF, HPF, BPF
		Single frequency
		Multi frequency
	Reference standards	Design
		Production
		Storage
		Difference to real defects
Eddy current applications	ET Testing	Conductivity
		Material sorting
		Overheat damage
		Material identification
		Thickness of an on-conductive coating on conductive material
		Influence of temperature
		Influence of inspection speed
		Manual inspections
		Automated inspections
		External influence during ET testing
		Crack inspection

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ET - General (4/4)		
Eddy current applications (continue)	ET Testing (continue)	Corrosion inspection
		Sliding probes
		Array applications
Quality assessment	Construction concept	Safe live
		Fail safe
		Damage tolerance
	Comparison to other NDT methods	Limits of ET inspections
		Detectable flaw size
		Other NDT procedures
	Procedures and standards	National and international standards
	Documentation	Issue of inspection procedures
		Inspection reports
	Personnel requirements	

1.3.2. ET Specific

ET - Specific (1/2)		
Airframe	Paint thickness measurement	On metallic structure
	Cracks	Surface (HFEC)
		Subsurface (LFEC)
		Array applications
		Cracks in multilayered structure
		Cracks in riveted structure
		Bolthole
	Material Characteristics	Conductivity
		Material sorting
		Overheat damage
		Material identification

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ET - Specific (2/2)		
Airframe (continue)	Corrosion detection	Single layer
		Multilayered structure
		Boltholes
		Array applications
	Crack and discontinuous detection in	Fittings and lugs
		Fastener holes
		Riveted structures
		Bolts
		Tubes
		Multilayered structure
		Welded structure
		Wrought materials
		Forged materials
Engine	Crack detection in	Blades
		High energy rotating hardware (disc, shafts, blade slots)
		Stators
		Welded parts
		Wrought materials
		Forged materials
		Cast materials
		Automated systems
Components	Crack detection in	Wheels
		Tubes
		Welded parts
		Bolts
		Gears
		Automated systems
	Conductivity	Heat treatment
		Overheat damage

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1.4. Ultrasonic Testing (UT)

1.4.1. UT General


UT - General (1/5)		
Basic principles of acoustics	Mathematic basics	
	Frequency, velocity and wavelength	
	Different acoustic waves	Long-waves
		Shear-waves
		Surface-waves
		Plate-waves
Generation of UT-waves	Generation	Piezoelectricity and types of crystals
		Frequency-crystal thickness relationships
		Conversion efficiencies of various crystals
	Characteristics of search units	Construction of ultrasonic search units
		Damping and resolution
	Sound beam	Sound beam characteristics
		Beam intensity characteristics
	Ultrasonic equipment	Broadband/Small band signal
		Beam divergence
		Near and far zones
		Attenuation
Propagation of UT-waves		Impulse form and repetitions Frequency
		Acoustic impedance
		Reflection/Transmission
		Phase inversion
		Angle beam
		Refraction
		Wave transformation
		Critical angle

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UT - General (2/5)		
Propagation of UT-waves (continue)	Wave propagation in material and gas	
	Wave propagation in liquids	
UT methods	Contact testing	
	Immersion testing	
	Through transmission	
	Pulse-echo	
	Dual transducer	
	Angle beam	
	Phased arrays	
UT Systems	Equipment	Analogue
		Digital
		Phased array (PAUT)
		Thickness gages
	Transducer	Straight beam transducers
		Dual transducers
		Angle beam transducer
		Phased array transducers
		Focused transducers
	Wedges	
	Couplants	
	Reference standards	Standardized reference standards
		Specific reference standards
	Cables	
Displays	A-scan	
	B-scan	
	C-scan	
	D-scan	
	Sector-scan	

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UT - General (3/5)		
Influence of part	Influence of surface/geometry	Surface roughness
		Concave/Convex surfaces
		Object geometry
		Wave transformation
		Triangle reflection
		Angle reflection
	Influence of material properties	Sound absorption
		Acoustic noise
		Diffusion
		Signal to noise ratio (SNR)
		Improvement of SNR
Calibration	Artificial defects	Flat bottom holes
		Cross holes
		Groove
		Ball reflector
		Variation of sound distance
		Variation of artificial defect
		Different defects
	Calibration and functional tests	Calibration standards
		Sensitivity
		Depth compensation
		Functional tests
		Analysis of probe data
		Redundancy checks
Evaluation	Evaluation of indication	Display indications (True/false)
		Defects dependency
		Location of defects
		Depth of defects
		Half-value methods

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UT - General (4/5)		
Evaluation (continue)	Evaluation of indication (continue)	Loss of back wall signal
		Composition with artificial defects
		Evaluation with tables
		Detectable flaw size
		Discontinuity orientation
		Discontinuity spacing
		Types of discontinuity indications
		Delaminations
Quality assessment	Construction concept	Safe live
		Fail safe
		Damage tolerance
	Comparison to other NDT methods	Limits of UT inspections
		Detectable flaw size
		Other NDT procedures
	Procedures and standards	National and international standards
	Documentation	Issue of inspection procedures
UT applications		Inspection reports
	Personnel requirements	
	Castings	
	Forgings	
	Bars	
	Rolled sheet and plate	
	Testing pipe and tubing	
	Welds	
	Determining discontinuity location	
	Thickness measurement	
	Use of shear wave	
	Use of surface waves (Rayleigh waves)	


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UT - General (5/5)		
UT applications (continue)	Use of plate waves (Lamb waves)	
Ultrasonic inspection process controls	Needs for process controls	
	System (Equipment) checks	Vertical linearity
		Inspection system sensitivity check
		Horizontal linearity
		Entry surface resolution
		Back surface resolution
	Angle Beam Checks	Angle beam point-of-incidence
		Angle beam point-of-incidence
		Angle beam angle determination
		Angle beam misalignment


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1.4.2. UT Specific

UT - Specific (1/2)		
Airframe	Thickness measurement	Corrosion measurement
		Wall thickness measurement
		On metallic structure
		On composite structure
	Delamination	CFRP
		GFRP
		Glare
	Water ingress in honeycomb structures	
	Debonding	Honeycomb structure
		Glare
		Metallic structure
	Imperfections in composites	Blowholes
		Porosity
		Inclusions
	Crack and discontinuous detection in	Fittings and lugs
		Fastener holes
		Riveted structures
		Bolts
		Tubes
		Multilayered structure
		Welded structure
		Wrought materials
		Forged materials
		Other applications (glass, plastics)
Engine	Crack detection in	Blades
		High energy rotating hard ware (disc, shafts, blade slots)
		Stators

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UT - Specific (2/2)		
Engine (continue)	Crack detection in (continue)	Welded parts
		Wrought materials
		Forged materials
		Cast materials
	Thickness measurements	
	Delamination	Composite blades
Composite	Delamination	CFRP
		GFRP
		Glare
	Water ingress in honeycomb structures	
	Debonding	Honeycomb structure
		Clare
	Imperfections in composites	Blowholes
		Porosity
		Inclusions
Components	Crack detection in	Wheels
		Tubes
		Welded parts
		Bolts
		Gears
	Delamination	CFRP
		GFRP
		Glare
	Water ingress in honeycomb structures	
	Debonding	Honeycomb structure
		Clare
	Imperfections in composites	Blowholes
		Porosity
		Inclusions

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1.5. Radiographic Testing (RT)

1.5.1. RT General


RT - General (1/9)		
Theory, Physics	Introduction	History
		Philosophy
		Capabilities
		Process of radiography
		Types of electromagnetic radiation sources
		Electromagnetic spectrum
		Penetration ability or quality of x-rays and gamma rays
		X-ray tube
	Principles of radiography	Electromagnetic spectrum
		Significance of wavelength
		Theory, physics
		Characteristics and key properties
		Interaction; absorption and scatter
		Nature and properties of x-rays
		Interaction x-rays/materials
		X-rays absorption, attenuation coefficient
		Radiography principle
	X-rays generation	Generation principles, spectrum of radiation
		X-ray tubes up-to 420kV
		X-rays accelerator
	Gammagraph	Energy spectra
		Isotope source strength
		Isotope source focal spot size
		Isotope source decay characteristics
		Isotope source sensitivity

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RT - General (2/9)		
Theory, Physics (continue)	Gammagraph (continue)	Energy and equivalent energy
		Isotope requirements
		Characteristics and merits of isotopes
		Half-value layer
	Image formation	Rectilinear propagation
		Affecting factors
		Inverse square law consideration
		Types and choice of film
		Types and uses of screens
	Radiographic film	Radiation quality
		Effect of changing kV
		Significance and effect of type of x-ray source
		Effect of time
		Milliamperage and FFD on exposure
		Exposure charts
		Identification, marking out and sitting up
		Intensifying screens role and use
		Filters
Equipment	X-ray machine	
	Types of equipment	Selection of equipment
		X-ray control panel
		Isotope equipment
	Auxiliary equipment	
Exposure techniques	General principles	Contrast; object, image, average gradient
		Radiation energy

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RT - General (3/9)		
Exposure techniques (continue)	Exposure	Focal-spot size
		Determination of focal spot size
		Exposure parameters determination
		RT-techniques, with constant exposure
		Defects position, triangulation
		Enlargement and projection
		Contrast
		Object, image, average gradient
		Radiation energy
		Scattered radiation, limitations
		Source-to-film distance
		Heel effect
	Single-wall radiography	Specimen configuration
	Double-wall radiography	Double-wall exposure, single-wall viewing
		Offset double-wall exposure, single-wall viewing
		Elliptical projections
		Panoramic radiography
		Specimen configuration
		Discontinuity location radiographic configurations
	Multiple-film techniques	Use of multiple-film loading
		Thickness-variation parameters
		Film speed
		Film latitude
	Penetrameters or image quality indicators (IQI's)	Types of penetrameters or IQI's
		Use rules
		Standards
		Calculation of IQI sensitivity

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RT - General (4/9)		
Basic principles	Geometric exposure principles	Shadow formation and distortion
		Shadow enlargement calculation
		Shadow sharpness
		Geometric unsharpness
		Scattered radiation, limitations
	Radiographic screens	Lead intensifying screens
		Fluorescent intensifying screens
		Intensifying factors
		Importance of screen-to film contact
Radiographs	General	Film packing
		Film material and classification systems
		Formation of the latent image on film
		Inherent unsharpness
	Arithmetic of radiographic exposure	Milliamperage-distance-time relationship
		Reciprocity law
		Photographic density
		Inverse-square-law considerations
Radiographic image quality	Radiographic sensitivity	
	Radiographic contrast	
	Film contrast	
	Subject contrast	
	Film graininess and screen mottle effects	
	Penetrameters or image-quality indicators	
	Improving radiographic sensitivity	
Darkroom facilities, film processing	Photographic emulsion chemistry	
	Facilities and equipment	Automatic film processor versus manual processing

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RT - General (5/9)		
Darkroom facilities, film processing (continue)	Processing of film-manual	Developer and replenishment
		Stopbath
		Fixer and replenishment
		Washing
		Prevention of water spots
		Drying
		Temperature control
	Film filing and storage	Retention-life measurements
		Long-term storage
		Filing and separation techniques
	Unsatisfactory radiographs-causes and cures	High film density
		Insufficient film density
		High contrast
		Low contrast
		Poor definition
		Fog
		Light leaks
		Handling faults, artifacts
	Film density	Step-wedge comparison film
		Densitometers
Digital radiography	Basic image types	
	Analogue versus digital images	
	Digital image quality	
	Pixel depth	
	Capture	Film based capture
		Filmless capture
	Digital image quality factors	Noise
		Dynamic range
		Artifacts

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RT - General (6/9)		
Process controls	Scope	
	Ventilation in darkroom	
	Safelights	
	Why test safelights	
	Individual safelight testing	
	Collective safelight testing	
	Safelight fog evaluation	
	Controlling the manual development process	
	Controlling the automatic development process	
Forgings, castings	Metallurgy knowledge and manufacturing techniques	
	Defectsmet	Cavities, gasholes, shrinkage, foreign material
	Application of standards	Castings NDT inspection
		NDT technique instructions
		Shooting use of the IQI and interpretation/evaluation
		Disposition and NDT report
Assemblies, welding, brazing, riveting	Welding processes	
	Defectsmet	Cracks, lack of penetration or brazing, inclusions
	Application of standards	
	Welding NDT inspection	Examination of circumferential in pipes welding/butt-welds
		NDT technique instructions
		Disposition and NDT report
Composite materials	Concepts of development	
	Defectsmet	Cavities
	Application of standards	

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RT - General (7/9)		
Composite materials (continue)	Composite NDT inspection	Tangential shooting
		NDT technique instructions
		Shooting use of the IQI and interpretation/evaluation
		Disposition and NDT report
Indications, discontinuities and defects	Indications	Adventitious images
	Discontinuities	Causes and effects
		Inherent
		Processing
		Service
	Defects	
Manufacturing processes and associated discontinuities	Casting processes and associated discontinuities	Ingots, blooms and billets
		Sand casting
		Centrifugal casting
		Investment casting
	Wrought processes and associated discontinuities	Forgings
		Rolled products
		Extruded products
	Welding processes and associated discontinuities	Submerged arc welding
		Shielded metal arc welding
		Gas metal arc welding
		Flux cored arc welding
		Gas tungsten arc welding
Evaluation	Radiographic standards	
	Radiographic viewing	Film-illuminator requirements
		Background lighting
		Multiple-composite viewing
		Penetrameter placement
		Personnel dark adaptation and visual acuity

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RT - General (8/9)		
Evaluation (continue)	Radiographic viewing (continue)	Film identification
		Location markers
		Film-density measurement
		Film artifacts
		Viewing conditions
		Illuminator requirements
	Evaluation of casting images	Casting-method review
		Casting discontinuities
		Origin and typical orientation of discontinuities
		Radiographic appearance
		Castings codes/standards-applicable acceptance criteria
		Reference radiographs
	Evaluation of welding images	Welding-method review
		Welding discontinuities
		Origin and typical orientation of discontinuities
		Radiographic appearance
		Welding codes/standards-applicable Acceptance criteria
		Reference radiographs or pictograms
Safety	Radiation safety principles	Controlling personnel exposure
		Time, distance, shielding concepts
		ALARA concepts
		Radiation-device operation characteristics
Quality assessment	Standards, codes and procedures for radiography	Acceptable radiographic techniques and setups
		Applicable employer procedures
		Procedure for radiograph parameter verification
		Radiographic reports

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RT - General (9/9)		
Quality assessment (continue)	Construction concept	Safe live
		Fail safe
		Damage tolerance
	Comparison to other NDT methods	Limits of RT inspections
		Detectable flaw size
		Other NDT procedures
	Documentation	Issue of inspection procedures
		Inspection reports
	Personnel requirements	

1.5.2. RT Specific

RT - Specific (1/2)		
Airframe	Water ingress in honeycomb structures	
	Imperfections in composites	Blowholes
		Porosity
		Inclusions
	Crack and corrosion, porosity detection in	Fittings and lugs
		Fastener holes
		Riveted structures
		Bolts
		Tubes
		Multilayered structure
		Welded structure
		Wrought materials
		Forged materials
Engine	Crack detection in	Blades
		Stators
		Welded parts

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RT - Specific (2/2)		
Engine (continue)	Crack detection in (continue)	Wrought materials
		Forged materials
		Cast materials
	General overview	Foreign objects
		Blocked gas passes
		Misalignments of parts
Composites	Water ingress in honeycomb structures	
	Imperfections in composites	Blowholes
		Porosity
		Inclusions
		Layer orientation
		Distribution of glass fibers
Components	Crack detection in	Tubes
		Welded parts
		Bolts
	Water ingress in honeycomb structures	
	Imperfections in composites	Blowholes
		Porosity
		Inclusions
		Foreign objects
		Blocked gas passes
		Misalignments of parts

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1.6. Thermographic Testing (TT)


1.6.1. TT General

TT - General		
Fundamentals of Thermography	Qualitative imagery	
	Quantitative thermography	
	Heat transfer theory	
Principles	Thermal radiation principles	
	Transmittance	
Applications	Infrared Thermography	Equipment overview
		Basic camera setup and operation
		Thermal measurement
		Moisture detection in honeycomb
		Heater blanket and hot air gun methods as outlined by producer
		Defining difference between excessive resin and fluid ingress
Safety	Thermography safety principles	
Quality assessment	Standards, codes and procedures for thermography	Acceptable thermographic techniques and setups
		Applicable employer procedures
		Procedure for thermograph parameter verification
		Thermographic reports
	Construction concept	Safe live
		Fail safe
		Damage tolerance
	Comparison to other NDT methods	Limits of TT inspections
		Detectable flaw size
		Other NDT procedures
	Documentation	Issue of inspection procedures
		Inspection reports
	Personnel requirements	

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1.6.2. TT Specific

TT - Specific		
Composites	Water ingress in honeycomb structures	
	Imperfections in composites	Blowholes
		Porosity
		Inclusions
		Layer orientation
		Distribution of glass fibers

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APPLICATION FORM

FOR AUDIT AND APPROVAL PROCEDURE OF TRAINING AND EXAMINATION CENTRES

TYPE OF APPLICATION	<input type="checkbox"/> Initial Application	<input type="checkbox"/> Renewal Application
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APPLICANT TRAINING AND EXAMINATION CENTRE	
Company Name	
Business Activity	
Address	
City	
Postcode	
Telephone	
Fax	
e-mail	
Web address	
Contact Person(s)	

RESPONSIBLE LEVEL 3 INFORMATION	
Name, Surname	
Organisation (If not the applicant)	
Address	
City	
Postcode	
Telephone	
Fax	
e-mail	

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NDT METHOD(S)

Indicate the NDT method(s) below for which recognition is sought;

☐

Liquid Penetrant Testing (PT) <input type="checkbox"/>	Magnetic Particle Testing (MT) <input type="checkbox"/>	Eddy Current Testing (ET) <input type="checkbox"/>	Ultrasonic Testing (UT) <input type="checkbox"/>
Radiographic Testing (RT) <input type="checkbox"/>	Thermographic Testing (TT) <input type="checkbox"/>	Other Methods/Specify -----	Other Methods/Specify -----

TRAINING LEVEL(S)

Indicate the training level(s) for which recognition is sought;


☐

NDT METHODS	TRAINING LEVELS			
	L 1 Limited	L 1	L 2	L 3
Liquid Penetrant Testing (PT)				
Magnetic Particle Testing (MT)				
Eddy Current Testing (ET)				
Ultrasonic Testing (UT)				
Radiographic Testing (RT)				
Thermographic Testing (TT)				
Other(s)				

In regard to the scope of recognition identified above, provide evidence or substantive statements which show that the training offered meets the minimum standard outlined in the Appendix 2.

Indicate with a check mark what information is included with this application.

- ✓ Description of training organisational structure showing responsibilities
- ✓ Complaints procedure
- ✓ Internal or external audit results
- ✓ Training coordinator
- ✓ Qualified instructor(s)
- ✓ Training and examination materials and their control
- ✓ Training facilities
- ✓ Test equipment, consumables, instruments and samples
- ✓ Examinations
- ✓ Records

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AUDIT AND MONITORING OF TRAINING AND EXAMINATION CENTRES

The Board (NANDTB-TR) aims that all Training and Examination Centres activities shall be subject to periodic audit as part of an initial and continuous improvement strategy.

1. INTRODUCTION

Training and Examination Centre has obligations under the recognition by Turkish CAA and Turkish National Aerospace NDT Board (NANDTB-TR). This scope of audit is to monitor and report the requirements of The Training and Examination Centres described in SHT-NDT and the Board Manual. This procedure describes the Board's audit of the Training and Examination Centres processes.

2. AUDITORS

The Chairman will appoint a competent Board member(s) as auditor, or use an external auditor if appropriate. The audit is both administrative and technical. Accordingly, it needs be undertaken by a NDT Level 3.

3. AUDIT REPORT


The Auditor(s) will provide a written audit report of findings and observations to the Board as soon as practicable after its completion, not later than 30 days. The audit report shall identify each element of the audit guide below.

- a. Findings of non-compliance and root cause,
- b. Observations of potential non-compliance,
- c. Opportunities for improvement.

The final audit report is sent to the Training and Examination Centre.

4. REMEDIAL, CORRECTIVE and PREVENTATIVE ACTIONS

The Training and Examination Centre's Coordinator will prepare a preliminary response for remedial, corrective and preventative actions for non-compliance(s), and any actions to be taken on observations. The Secretary's final audit report is presented to the Board at the next scheduled meeting, and retained along with the audit report as part of the agenda documents.

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5. RESPONSIBILITIES

a. Chairman appoints the auditor(s), reviews the Training and Examination Centre's response for corrective and preventative actions.

b. Auditor(s) conducts the audit in accordance with these guidelines (Part 6 Audit Guide) and reports to the Chairman within 30 days of completion. Auditor(s) also reviews the Training and Examination Centre's response for corrective and preventative actions.

c. Secretary receives copies of the audit, remedial, corrective and preventative action confirmation and audit response for tabling at the next Board meeting, and retains on file as part of the meeting agenda documents.

6. AUDIT GUIDE

6.1. Part A

The auditor(s) will assess and provide a written report on each of the following organizational elements required by EN 4179, SHT-NDT and the Board Manual.

6.1.1. Type of Audit

6.1.1.1. Scheduled initial or review audit.

6.1.1.2. Follow up audit.

6.1.2. Organizational Structure, Quality and Documentation System

6.1.2.1. Does the organization have any Turkish DGCA or EASA certificate(s) for Design, Production, and Maintenance or Training and Examination Centre approval?

6.1.2.2. Does the organization have Training and Examination Centre NDT Manual?


6.1.2.3. Does the organization have organizational chart that shows the position of Training and Examination Centre and is it appropriate?

6.1.2.4. Are the responsibilities of nominated people who are Accountable Manager, Quality Manager and Responsible Level 3 described clearly in the Training and Examination Centre NDT Manual?

6.1.2.5. Does the Training and Examination Centre NDT Manual contain a signed declaration from Accountable Manager for fulfilling all requirements of EN 4179, SHT-NDT and the Board Manual?

6.1.2.6. Does the Training and Examination Centre NDT Manual contain a responsible person list for theory and practical exams?

6.1.2.7. Does the Training and Examination Centre have adequate training personnel for planning and conducting training and exams according to its scope of work?

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6.1.2.8. Does the Training and Examination Centre NDT Manual have general information for places where the training and examination activities take place?

6.1.2.9. Does the Training and Examination Centre NDT Manual have any control procedure for conducting trainings at the places not approved by the Turkish CAA and the Board?

6.1.2.10. Does the Training and Examination Centre NDT Manual have revision record page and is it properly recorded?

6.1.2.11. Has the Training and Examination Centre been audited for security of theory and practical exams and competency of training processes that is described in the scope of work by a Quality System with Independent auditing procedure?

6.1.2.12. Is there any revision on the Training and Examination Centre NDT Manual since last audit?

6.2. Part B

The auditor(s) will assess and provide a written report on each of the following qualification elements required by EN 4179, SHT-NDT and the Board Manual.

6.2.1. Training Personnel

6.2.1.1. Does the Responsible Level 3 have EN 4179 Level 3 certificates for the methods that is mentioned in Training and Examination Centre scope of work and other required qualification that is described in EN 4179, SHT-NDT and the Board Manual?

6.2.1.2. Does the Responsible Level 3 who will approve the training activities have ten years practical experience in aerospace industry?

6.2.1.3. Do the training personnel have required qualification that is described in EN 4179, SHT-NDT and the Board Manual?


6.2.1.4. Do the Level 2 and 3 training personnel who are designated by Responsible Level 3 have five years aerospace practical experience within the past ten years?

6.2.1.5. Is the scope of work for Trainers described clearly?

6.2.1.6. Are the trainers, theory and practical exam personnel able to reach the documents that describe Training and Examination Centre scope of works?

6.2.1.7. Does the Quality System Manager have at least two years' experience in aerospace industry?

6.2.1.8. Does the Quality System Manager have trainings about Quality Systems, Non Destructive Testing Familiarization and Human Factors?

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6.2.1.9. Do the Trainers and Examiners;


- a. Have the skills and knowledge to interpret codes, standards, and specifications aerospace industry?
- b. Have the skills and knowledge to selecting the method and technique for a specific inspection;
- c. Have the skills and knowledge to verify the adequacy of procedures and work instructions;
- d. Have a general knowledge of other NDT methods and product manufacturing and inspection technologies used by aerospace industry?
- e. Have a basic knowledge of aircraft maintenance?
- f. Have the skills and knowledge to provide or direct training, and examination?

6.3. Part C

The auditor(s) will assess and provide a written report on each of the following theory training materials elements required by EN 4179, SHT-NDT and the Board Manual.

6.3.1. Training Books and Auxiliary Training Materials

- 6.3.1.1. Have the training books been prepared to contain minimum requirements that are given by the Board approved syllabus?
- 6.3.1.2. Have the training books been prepared to meet the aviation industry requirements?
- 6.3.1.3. Have the training books been prepared well organized to facilitate learning of candidates?
- 6.3.1.4. Do the training books have simple language and colored figures to facilitate the learning?
- 6.3.1.5. Does the Training and Examination Centre have enough number of books to conduct the trainings described in organization scope of work?
- 6.3.1.6. Are the auxiliary training documents that are aircraft, engine, component manufacturer's manuals and national/international standards, codes and specifications adequate to cover related training?
- 6.3.1.7. Are the visual and aural training materials that are presentations, films, video, figures, graphics, tables etc. adequate to cover related training and to facilitate the learning?
- 6.3.1.8. Are the auxiliary training materials that are computers, projectors, blackboards adequate to cover related training and positioned properly in the classroom?

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6.4. Part D

The auditor(s) will assess and provide a written report on each of the following practical training materials elements required by EN 4179, SHT-NDT and the Board Manual.

6.4.1. Tool, Equipment and test pieces

Does the Training and Examination Centre have adequate number of test pieces with natural or artificial discontinuities that is used for practical trainings to cover related training?

6.4.1.1. Liquid Penetrant Testing (PT)

6.4.1.1.1. Does the Training and Examination Centre have adequate number of Liquid Penetrant Testing tool, equipment, consumable and test pieces with natural or artificial discontinuities that is used for Liquid Penetrant Testing practical trainings?

6.4.1.1.2. Does the Training and Examination Centre have auxiliary materials (Magnifiers, lens etc.)?

6.4.1.1.3. Does the Training and Examination Centre have tool and equipment that is capable of performing process controls that is described in ASTM E 1417?

6.4.1.2. Magnetic Particle Testing (MT)

6.4.1.2.1. Does the Training and Examination Centre have adequate number of Magnetic Particle Testing tool, equipment, consumable and test pieces with natural or artificial discontinuities that is used for Magnetic Particle Testing practical trainings?

6.4.1.2.2. Does the Training and Examination Centre have auxiliary materials (Magnifiers, lens etc.)?


6.4.1.2.3. Does the Training and Examination Centre have tool and equipment that is capable of performing process controls that is described in ASTM E 1444?

6.4.1.3. Eddy Current Testing (ET)

6.4.1.3.1. Does the Training and Examination Centre have adequate number of Eddy Current Testing tool, equipment, consumable and test pieces with natural or artificial discontinuities that is used for Eddy Current Testing practical trainings?

6.4.1.3.2. Does the Training and Examination Centre have auxiliary materials (Magnifiers, lens etc.)?

6.4.1.3.3. Does the Training and Examination Centre have tool and equipment that is capable of performing process controls that is described in related standards and manufacturer's instructions

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6.4.1.4. Ultrasonic Testing (UT)

6.4.1.4.1. Does the Training and Examination Centre have adequate number of Ultrasonic Testing tool, equipment, consumable and test pieces with natural or artificial discontinuities that is used for Ultrasonic Testing practical trainings?

6.4.1.4.2. Does the Training and Examination Centre have auxiliary materials (Lead screens, marking letters, step wedges, Densitometers, IQIs, Film Viewers Magnifiers, lens etc.)?

6.4.1.4.3. Does the Training and Examination Centre have tool and equipment that is capable of performing process controls that is described in related standards and manufacturer's instructions?

6.4.1.5. Radiographic Testing (RT)

6.4.1.5.1. Does the Training and Examination Centre have adequate number of Radiographic Testing tool, equipment, consumable and test pieces with natural or artificial discontinuities that is used for Radiographic Testing practical trainings?

6.4.1.5.2. Does the Training and Examination Centre have auxiliary materials (Magnifiers, lens etc.)?

6.4.1.5.3. Does the Training and Examination Centre have tool and equipment that is capable of performing process controls that is described in related standards and manufacturer's instructions (Ref.: ASTM E 1742)?

6.4.1.5.4. Has the Radiographic Testing facility been established according to national regulations?

6.4.1.5.5. Has the Radiographic Testing Equipment (X-Ray Machine, Gamma Ray Sources) been licensed by Turkish Atomic Energy Authority (TAEA)?

6.4.1.5.6. Does the Training and Examination Centre have radiometer, survey meter that is used for measuring ionizing radiation level?


6.4.1.5.7. Does the radiometer or survey meter that is used for measuring ionizing radiation level have calibration tag that is current?

6.4.1.5.8. Does the Training and Examination Centre have dangerous and emergency situation action plan?

6.4.1.5.9. Does the Training and Examination Centre appointed a Radiation Protection Officer?

6.4.1.5.10. Does the Radiation Protection Officer get Radiation Protection Training for Industrial Radiography and its certificate from TAEA?

6.4.1.5.11. Does the Radiographic Testing Trainers and Examiners get Radiation Protection Training for Industrial Radiography and its certificate from TAEA?

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6.4.1.5.12. Does the Training and Examination Centre have a dark room that is furnished properly?

6.4.1.6. Thermographic Testing (TT)

6.4.1.6.1. Does the Training and Examination Centre have adequate number of Thermographic Testing tool, equipment, consumable and test pieces with natural or artificial discontinuities that is used for Thermographic Testing practical trainings?

6.4.1.6.2. Does the Training and Examination Centre have auxiliary materials (Heaters, Refrigerators, Viewers Magnifiers, lens etc.)?

6.4.1.6.3. Does the Training and Examination Centre have tool and equipment that is capable of performing process controls that is described in related standards and manufacturer's instructions?

6.5. Part E

The auditor(s) will assess and provide a written report on each of the following classroom and laboratories elements required by EN 4179, SHT-NDT and the Board Manual.

6.5.1. Training Environment (classroom, laboratory etc.)

6.5.1.1. Is the theoretical training area located within the facility appropriate?

6.5.1.2. Can theoretical training area provide enough space for the participants?

6.5.1.3. Is the condition; "Classroom size cannot exceed 15 trainees for each teacher/instructor/assessor", met for each individual class?

6.5.1.4. Does the theoretical training area have sufficient lighting?

6.5.1.5. Does the theoretical training area have sufficient air conditioning?

6.5.1.6. Does the theoretical training area have sufficient sound isolation?


6.5.1.7. Does theoretical training area has suitable/adequate training equipment (such as desks, chairs etc.)?

6.5.1.8. Does the Practical Training tool and environment (such as shops, laboratories, furnishings, etc.) have suitable/adequate for the training?

6.5.1.9. Does the Training and Examination Centre provide a workable and comfortable office/working area for the training instructors and practical examiners?

6.6. Part F

The auditor(s) will assess and provide a written report on each of the following Privacy, Objectivity and Security elements required by EN 4179, SHT-NDT and the Board Manual.

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6.6.1. Privacy, Objectivity and Security

- 6.6.1.1. Are the test pieces and exam questions kept in a secured area via controlled access?
- 6.6.1.2. Are the sample parts that used for practical training and test pieces that used for the exam kept in separated areas?
- 6.6.1.3. Are the training and examination processes objectively and confidentially carried out by the Training and Examination Centre?

6.7. Part G

The auditor(s) will assess and provide a written report on each of the following Examination elements required by EN 4179, SHT-NDT and the Board Manual.

6.7.1. Examinations

- 6.7.1.1. Does the Training and Examination Centre request Eye Examination Reports according to EN 4179 from each examinee?
- 6.7.1.2. Does the Training and Examination Centre prepare Level 1 and Level 2 General, Specific, and Practical exams and also Level 3 Basic, Method, and Specific examinations according to EN 4179?
- 6.7.1.3. Are the exam questions approved by the Responsible Level 3?
- 6.7.1.4. Are the number of questions to be asked in the exams enough to meet the requirements of the EN 4179 and company written practice?
- 6.7.1.5. Are the examination and grading processes performed by NDT Level 3 or assigned examiner?

General Examination


- 6.7.1.6. Does the general examination involve basic principles of the related method?
- 6.7.1.7. Are the examination questions prepared complying with the company written practice?

Specific Examination

- 6.7.1.8. Are the questions for Specific Exam prepared according to the company written practice and the related maintenance documents

Practical Examination

- 6.7.1.9. Are the practical exam parts approved by responsible Level 3?
- 6.7.1.10. Do the practical exams contain the description of at least two exam parts, related NDT procedures, the documents that contain inspection steps, and results of the exams?
- 6.7.1.11. Do the parts used in practical exams meet the requirements of the candidates work environment?

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6.8. Part H

The auditor(s) will assess and provide a written report on each of the following Record System elements required by EN 4179, SHT-NDT and the Board Manual.

6.8.1. Record System (Training and Examination Records)

6.8.1.1. Does the Training and Examination Centre have a specific and reliable system for recording and keeping the training and examination records?

6.8.1.2. Does the Training and Examination Centre keep the entire records of each individual student's training, examination and evaluation/assessment data, for following 10 years after the training?

6.8.1.3. Does the Training and Examination Centre keep the entire records of each instructor's personal experiences/qualifications, training-education backgrounds and on-going trainings?

6.8.1.4. Are the training and examination records kept in accordance with SHT-NDT and the Board Manual?


6.8.1.5. Does the organization have enough space/conditions for keeping the training and examination records?

6.8.1.6. Does Quality system manager meet the requirements stated in SHT-NDT?

6.8.1.7. Does the Training and Examination Centre NDT Manual have internal audit and evaluation procedures?


6.8.1.8. Are the audit and evaluation records existed?

Additional questions may be asked by the audit team:

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APPLICATION FORM FOR CERTIFICATION EQUIVALENCY

CERTIFICATE HOLDER			
CERTIFICATE HOLDER NAME			
Given Names (first names) :		Family Name (surname) :	
Position in Company :			
COMPANY NAME :			
Company Address :			
Phone :		e-mail :	
CERTIFICATE EQUIVALENCY REQUEST			
NDT Method for Certificate Equivalency <i>i.e. PT, MT, ET, UT, RT, TT, ST, others</i>		Level: <input type="checkbox"/> Level 1 <input type="checkbox"/> Level 2 <input type="checkbox"/> Level 3	
EMPLOYER / EMPLOYER REPRESENTATIVE:			
Name :		Signature :	
Position :		Date :	
FORMAL EDUCATION ⁽¹⁾			
<input type="checkbox"/> Two years of engineering or science study at a technical school, college or university <input type="checkbox"/> 3-4 year science or engineering under graduate degree <input type="checkbox"/> None / others			
<small>(1) If you do not have formal education in engineering or science, please check "None/others".</small>			
Latest graduated school and date :			
CURRENT CERTIFICATES SUBJECT TO THE EQUIVALENCY REQUEST			
Method /Level	NDT Certification Standard	Issued By	Date of Issue
LAST FORMAL TRAINING ⁽²⁾			
Method /Level	Training Body	Trainer	Date
<small>(2) All trainings related to applied method shall be from a NANDTB approved training centre. Please attach the training records and training outlines including documentation of previous trainings.</small>			

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1.) PRACTICAL EXPERIENCE⁽³⁾

Method /Level	Company	Date (from-to)	Hours

(3) Practical experience (on the job training) hours before the certification. Please attach all documentation includes individual, date, task, hours and certified personnel providing direct observation.

2.) EXPERIENCE FOR LEVEL 3⁽⁴⁾

Method	Company	Date (from-to)

(4) This section shall be filled by Level 3 individuals only.

3.) EXAMINATIONS⁽⁵⁾⁽⁶⁾

3.1. General Examination ☐ Open book
 ☐ Closed book

Method /Level	Examination Body	Examiner	Date	Number of Questions	Score

3.2. Specific Examination ☐ Open book
 ☐ Closed book

Method /Level	Examination Body	Examiner	Date	Number of Questions	Score

Reference materials used at the specific examination:

3.3. Basic Examination ☐ Open book
 For only Level 3 ☐ Closed book

Method /Level	Examination Body	Examiner	Date	Number of Questions	Score


3.4. Practical Examination

Method /Level	Examination Body	Examiner	Date	Number of Test Samples	Score

Inspection technic used at the practical examination :

Details about material/hardware/test samples :

Instruments /Inspection systems used at the examination :

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3.5. Vision Examination⁽⁷⁾


Near Vision: <input type="checkbox"/> Tumbling E in accordance with ISO 18490 <input type="checkbox"/> 20/25 (Snellen) at 16" (40.64cm) ± 1" (2.54cm) <input type="checkbox"/> Jaeger No. 1 at not less than 12" (30.48 cm)	Color Perception:
<p>(5) Please attach all documents about examination body and examiner including examiner's Level 3 certifications.</p> <p>(6) For Level 1 and/or Level 2 applications, all examinations related to applied method shall be from other countries NANDTB's approved training centre. For Level 3 applications, Level 3 candidate shall previously have EN 4179 Level 2 qualification from an approved training centre and having Level 3 certificates for related method(s) from ASNT, ISO 9712, PCN Aero.</p> <p>(7) Please attach the examination report.</p>	

4.) ADDITIONAL INFORMATION

4.1. Please write in the space below which standards/specifications your company uses when carrying out NDT Inspection in the NDT Method of certificate equivalency sought:

4.2. Please write in the space below which techniques your company uses when carrying out NDT Inspection in the NDT Method of certificate equivalency sought:


4.3. Please use this box to inform NANDTB-TR of any other information about the current certificate:

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Please be informed that NANDTB-TR can evaluate if the administration of the qualification conforms to the EN 4179 standard. Only the employer can certify the personnel in accordance with the employer's written practice.

THE FOLLOWING SECTION WILL BE FILLED BY NANDTB-TR

5.) EVALUATION	
5.1. Is practical experience conforming to EN 4179 requirements? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> need more data	
5.2. Is experience for Level 3 conforming to EN 4179 requirements? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A <input type="checkbox"/> need more data	
5.3. Is formal training conforming to EN 4179 requirements? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> need more data	
5.4. Are examinations conforming to EN 4179 requirements? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> need more data	
5.5. Is vision test conforming to EN 4179 requirements? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> need more data	
5.6. Commends (if needed) 	
EN 4179 QUALIFICATION EQUIVALENCY APPROVAL	
NANDTB-TR Approval: <div style="display: flex; justify-content: space-around;"> <div> Approved <input type="checkbox"/> </div> <div> Disapproved <input type="checkbox"/> </div> </div>	Reason of disapproval:
On behalf of NANDTB-TR : Name: Phone: e-mail:	Signature: Date:

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AUDIT AND MONITORING OF THE NANDTB-TR

The Board (NANDTB-TR) aims that all its activities shall be subject to periodic audit as part of a continuous improvement strategy.

1. INTRODUCTION

The Board has obligations under the recognition by Turkish CAA to monitor and report on its the Schedule Functions described in the Turkish National Aerospace NDT Board (NANDTB-TR) Manual. This procedure describes the Board's internal audit process.

2. AUDITORS

The Chairman will appoint a competent Board member as auditor, or use an external auditor if appropriate. The audit is administrative and not technical. Accordingly, it need not be undertaken by a NDT Level 3.

3. AUDIT REPORT

The Auditor will provide a written audit report of findings and observations to the Chairman as soon as practicable after its completion, not later than 30 days. The audit report shall record a response against each element of the audit guide below, and identify specifically;


- a. Findings of non-compliance and root cause,
- b. Observations of potential non-compliance,
- c. Opportunities for improvement.

4. REMEDIAL, CORRECTIVE and PREVENTATIVE ACTIONS

The Chairman will prepare a preliminary response for circulation to Members. The Board will assist the Chairman identify remedial, corrective and preventative actions for non-compliance(s), and any actions to be taken on observations. The Chairman's final audit response is presented to the Board at the next scheduled meeting, and retained along with the audit report as part of the agenda documents.

5. RESPONSIBILITIES

- a. Chairman appoints the auditor(s), reviews the findings, initiates and records corrective and preventative actions and after input from the Board prepares a final report.

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b. Auditor(s) conducts the audit in accordance with these guidelines (Section 6: Audit Guide) and reports to the Chairman within 30 days of completion.

c. Secretary receives copies of the audit, remedial, corrective and preventative action confirmation and audit response for tabling at the next the Board meeting, and retains on file as part of the meeting agenda documents.

6. AUDIT GUIDE

6.1. Part A

The auditor(s) will assess and provide a written report on each of the following elements required by the Board Manual.

6.1.1. NANDTB Procedures

Has the NANDTB maintained operational procedures for the operation of the Board, and have they been reviewed within the past year?

6.1.2. Regular Board Meetings

a. Has the Board held at least two meetings during the deed period? Was adequate notice of meetings provided to members and observers (14 days)?

b. Were the meetings' business recorded satisfactorily and did Turkish CAA receive a copy of the minutes?

c. Were the meetings conducted in accordance with NANDTB procedures?

6.1.3. European Forum of NANDTBs

a. Has the NANDTB maintained membership of the European Forum for NANDTBs?

b. Did the Board attend at least one European Forum meeting in the past 12 months?


6.1.4. Provision of Technical Advice

a. Do the NANDTB procedures have an effective documented process to receive and respond to questions about NDT and NDT training and qualification?

b. Was there any technical advice provided to Turkish CAA through the Turkish CAA observer, and is there a record?

6.1.5. Training Advice and Facilitation

a. Was there any NDT awareness training provided to Turkish CAA or the aerospace industry, and is there a record?

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b. Has the NANDTB provided the services detailed in EN 4179 when reasonably requested by a member of industry or Turkish CAA? These services include:

- (1) Recognition of NDT Level 3 qualifications,
- (2) Recognition of NDT Technician training,
- (3) Recognition of NDT Technician qualifications,
- (4) Recognition of NDT examinations and assessments.

6.1.6. Governance Structure

a. Has the NANDTB remained an incorporated body and met the requirements of SHT-NDT.

b. Is the NANDTB website effective in managing enquires? Does the website contain links to appropriate information sites (e.g. NAAs, other NANDTBs, relevant standards)?

6.2. Part B

The auditor(s) will assess and provide a written report on the Board's compliance with its own Management System and Procedures:

- a. Turkish National Aerospace NDT Manual
- b. Appendix 1 NANDTB-TR Member List
- c. Appendix 2 Minimum Requirements of Training Centre NDT Manual
- d. Appendix 3 NDT Syllabus Recognized by the NANDTB-TR
- e. Appendix 4 Application Form for Audit and Approval Procedure of Training and Examination Centres
- f. Appendix 5 Audit and Monitoring of Training and Examination Centres
- g. Appendix 6 Application Form for Certification Equivalency
- h. Appendix 8 Cross Reference Table

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MANUAL ITEM NO	MANUAL ITEM NAME	SHT-NDT ITEM NO	EN 4179 ITEM NO	ANDTBF/08 ITEM NO
1.	General	-	-	-
1.1.	Scope	1-(1)/(2)/(3), 7	1.	-
1.2.	The Aims and Objectives	2-(2)	1.1.	Purpose
2.	Rules of the Board	6, 2-(2), 7	4.4.2.	Rules, duties and responsibilities of NANDTBs
2.1.	Rules of Membership	6-(2)	4.4.2.	
2.2.	Organisation and Responsibilities	6-(7)	4.4.2.	
2.3.	Rules for Meetings and Voting	6-(3)	4.4.2.	
2.4.	Rules for Documentation	9-(1)	4.4.2.	
2.5.	Audit and Monitoring of the Board	-	4.4.2.	
3.	Qualification	5-(1)	5.	-
4.	Examinations	-	4.1.4.	-
4.1.	Introduction	-	4.1.4.	-
4.2.	Recognized Examination Centres	-	4.1.4.	Recognition of Approvals
4.3.	Employer' Provided Examinations	-	4.1.4.	Criteria to control administration of NDT exams at examination bodies
4.4.	Candidates	-	4.1.4.	
4.5.	Examiners	17-(4), 19	6.2.1.	
4.6.	Examination Procedure	22-(1)	7., 7.1.	

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MANUAL ITEM NO	MANUAL ITEM NAME	SHT-NDT ITEM NO	EN 4179 ITEM NO	ANDTBF/08 ITEM NO
4.6.1.	Questions	25-(1)	7.1.2., 7.1.3., 7.1.4.	Criteria to control administration of NDT exams at examination bodies
4.6.2.	Duration	25-(1)	-	
4.6.3.	Permitted Aids	-	-	
4.6.4.	Invigilation	-	-	
4.6.5.	Cheating	25-(1)	-	
4.7.	Security of Examination Material	22-(2)	6.1.1.	
4.8.	Assessment of Examinations	22	-	
4.9.	Re-Examinations	-	7.2.3.	
4.9.1.	Additional Training	25-(1)	7.2.3.	
4.9.2.	Second Failure	25-(1)	7.2.3.	
4.10.	Examination Results	25-(6)	7.1.4.	
4.11.	Withdrawal during the Examination	-	-	
4.12.	Withdrawal before the Examination	-	-	
4.13.	Examination Records	21-(1)	4.1.6., 8.2.1.	
5.	Requirements for Approved Training Centres	-	-	-
5.1.	Management and Personnel	-	-	-
5.1.1.	Organisation	2-(3), 17	-	-
5.1.2.	Responsible Level 3	4-(1)	4.4.1.	-

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MANUAL ITEM NO	MANUAL ITEM NAME	SHT-NDT ITEM NO	EN 4179 ITEM NO	ANDTBF/08 ITEM NO
5.1.3.	Training Coordinator	18-(1)	-	Criteria to control administration of NDT exams at examination bodies
5.1.4.	Quality System Manager	18-(1)	-	
5.1.5.	Number of Instructors	17-(4)/(5)	6.2.2.	
5.1.6.	Qualification and Experience of Instructors	17-(4)	6.2.2.	
5.2.	Requirements for the Conduct of Courses	-	-	
5.3.	Training Centre Manual	23	-	
5.4.	Requirements for Training	-	-	
5.4.1.	NDT Syllabus	23-(1)	-	
5.4.2.	Control of Training Specimens	23-(1)	-	
5.4.3.	Control of Course Documents	23-(1)	-	
5.4.4.	Revision of Documents	23-(2)	-	
5.5.	Facilities	-	-	
5.5.1.	Training Facility	20-(1)	6.1.5.	
5.5.2.	NDT Plant and Equipment	25-(3)/(5)	6.1.5.	
5.5.3.	Test Samples	25-(3)/(5)	6.1.1., 6.1.5.	
5.5.4.	Certificates	25-(6)	8.	
5.6.	Training Records	-	8.2.1.	
5.6.1.	Participant Training Records	19	4.1.6., 8.2.1.	

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MANUAL ITEM NO	MANUAL ITEM NAME	SHT-NDT ITEM NO	EN 4179 ITEM NO	ANDTBF/08 ITEM NO
5.6.2.	Training Personnel Records	19-(1)	6.2., 8.2.1.	-
6.	Audit and Approval Procedure of Training and Examination Centres	-	-	Recognition of Approvals
6.1.	Introduction	11		
6.2.	Application Procedure	-	-	
6.2.1.	Audit and Approval Procedure of Training and Examination Centres	10-(1)	-	
6.2.2.	Evaluation of Application	11-(1)	-	
6.2.3.	Notification to Applicants	11-(1)	-	
6.2.4.	Audit of Training and Examination Centre	11-(1)	-	
6.2.5.	Audit Findings and Reports	13-(1)	-	
6.3.	Conditions of Recognition	-	-	
6.3.1.	Approval of Training and Examination Centres	14-(2)	-	
6.3.2.	Period of Validity	14-(3), 15	-	
6.3.3.	Withdrawal of Recognition	15-(1), 26-(1)	-	
6.4.	Variation to Training Courses	-	-	
7.	Recognition of Aerospace NDT Certificates	5-(2)	-	-
8.	Relations Between Turkish CAA and the Board	-	-	-