

*Guidelines for Training  
and Qualifying Personnel  
in Nondestructive Testing  
Methods*

105

*Revision 2017.1*



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## Highlights

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### Revision 2017.1 (December 2017)

| <b>Location</b>   | <b>Description of Change</b>   |
|---|--|
| Section 1-1: Scope                                      | Added information regarding acronym use  |
| Section 1-2: Definitions<br>Section 1-4: Qualifications | Added definitions to align with NAS-410 document.<br><br>Clarified NDT individual qualification. |

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## Introduction

In June of 1988, the Federal Aviation Administration sponsored an **Aging Aircraft Conference**, which included separate discussion sessions on nondestructive testing (NDT) of aircraft structure. Such sessions included discussions on what training is received by NDT specialists at a typical airline and whether this training is adequate. Certain attending NDT specialists from the Air Transport Association (ATA)-member airlines expressed the view that a uniform approach to training NDT inspectors among the airlines was highly desirable but that certification of individuals should be accomplished within the existing framework of each airline's maintenance training program.

Existing standards, such the **American Society for Nondestructive Testing (ASNT)** Recommended Practice No. [\[SNT-TC-1A\]](#), National Aerospace Standard [\[NAS-410\]](#), and EN 4179, directly respond to the training and qualification of NDT personnel. In fact, the curriculum of individual member programs upon which this guideline was developed was primarily derived from such standards. However, ATA NDT-specialists required a training guideline that was specifically tailored for airplane inspection. A guideline that could be adopted among ATA-member training programs was needed.

The first draft of this guideline was developed by NDT representatives from American Airlines, Eastern Airlines, Trans World Airlines, United Airlines and US Air. This draft was distributed among the other ATA members for comment and, following minor changes, was adopted in January 1990 by the ATA Engineering, Maintenance and Materiel Council (EMMC). Also approved by the EMMC was the formation of the ATA NDT Panel, which is responsible for review and approval of subsequent changes to this specification.

ATA Specification 105 does not, in itself, impose any performance obligations on any airline or any other entity. Its provisions become effective only to the extent they are adopted by an airline and incorporated into its manual provided in the Federal Aviation Regulations (FARs). For this reason, any entity that contractually performs maintenance for an airline must determine from that airline which provisions of that airline's manual are applicable to the specific situation. Any recommendations for changes or amendments to the manual of a given airline must be communicated directly to it.

It is important to note that the Federal Aviation Regulations 14 CFR do not require NDT, but do specify that procedures and inspector qualifications be documented when NDT is used. The following 14 CFRs have requirements related to NDT: 14 CFR 23.1529 & Appendix G, 14 CFR 25.611, 14 CFR 25.621, 14 CFR 25.1529 & Appendix H, 14 CFR 27.1529 & Appendix A, 14 CFR 29.1529 & Appendix A, 14 CFR 33.4 & Appendix A, 14 CFR 35.4 & Appendix A, 14 CFR 43.11, 14 CFR 91.403, 14 CFR 121.135, 14 CFR 121.369, 14 CFR 121.371, 14 CFR 121.1109, 14 CFR 135.419, 14 CFR 135.427, 14 CFR 135.429, 14 CFR 145.61, 14 CFR 145.155, and 14 CFR 145.161.



## Chapter 1. General

### 1-1. Scope

This guideline establishes the minimum requirements for training, qualifying, examining, and certifying of nondestructive testing personnel for inspection of aircraft, powerplants, and components. It establishes criteria for the qualification for personnel requiring appropriate knowledge of the technical principles underlying the nondestructive tests they perform.

It is recognized that the effectiveness of nondestructive testing applications depends upon the capabilities of the individuals who are responsible for performing nondestructive testing.

This guideline applies to one or more of the methods listed in [\[Section 1-3\]](#), Nondestructive Testing Methods.

Compliance with this document, along with the knowledge and experience gained while attending Airframe and Powerplant Technical Schools, and/or knowledge and experience gained while working as an Airframe and/or Powerplant technician or repairman's certificate, may serve to provide equivalent competency as set forth in [\[NAS-410\]](#), EN 4179, and [\[SNT-TC-1A\]](#).

The acronyms NDT (Nondestructive Testing), NDI (Nondestructive Investigation) and NDE (Nondestructive Evaluation) used within this document are synonymous.

### 1-2. Definitions

Terms included in this document are defined as follows:

|                                  |  |
|----------------------------------|--|
| <b>Certification</b>             | Written testimony by the certificate holder that an individual has met the applicable requirements of this standard; may be recorded in electronic or hardcopy format.   |
| <b>Certifying Agency</b>         | The employer of the personnel being certified.   |
| <b>Grandfathered</b>             | Certification of individuals who are considered qualified under a prior qualification program. <u>This option can only be used to start a new program or accommodate specification change.</u>   |
| <b>Comparable</b>                | Being at an equivalent or similar level of NDT responsibility and difficulty as determined by the employer's Level III or other designated individual.   |
| <b>Direct Readout Instrument</b> | Instruments that physically display measurements in dimensional or electrical units (e.g. inches, millimeters or %IACS, etc.) either as digital readout or an analog display, such as a scale/pointer configuration and do not require special skills or knowledge to set up the instrument and do not involve adjusting signal displays such as gates, delays, gain, or phase to obtain measurements. For example, common direct readout instruments include basic ultrasonic thickness gauges without an oscilloscope display, portable hardness testers, and eddy current coating thickness gauges. |
| <b>Documented</b>                | The condition of being recorded in written or electronic form.   |
| <b>Formal Training</b>           | An organized and documented program of learning activities designed to impart the knowledge and skills necessary to be qualified to the applicable method. Formal training may consist of any combination of classroom, practical and programmed self-instruction.   |
| <b>Employer</b>                  | A government, prime contractor, sub-contractor, supplier, or outside agency employing or contracting the services of one or more individuals who perform NDT. Self-employed individuals are included in this definition.   |

|   |  |
|---|--|
| <b>Experience</b>                           | Actual performance of an NDT method conducted in the work environment resulting in the acquisition of knowledge and skill. This does not include formal training, but includes laboratory or on-the-job training as defined by the employer's written practice.  |
| <b>Evaluation</b>                           | 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.  |
| <b>Instructor</b>                           | The instructor should meet the requirements of a Level II and shall have the necessary skills and knowledge to plan, organize, and present classroom, laboratory, or on-the-job training programs of instruction in accordance with approved course outlines, in the method for which certified. The individual shall be thoroughly familiar with the theory and practical applications of the method as utilized by the employer. The individual shall not conduct nondestructive testing for the acceptance of parts unless he or she is properly qualified. |
| <b>Indications</b>                          | The response or evidence of a condition resulting from an NDT inspection that requires interpretation to determine its significance.   |
| <b>Interpretation</b>                       | To determine whether indications are relevant or non-relevant.   |
| <b>Method</b>                               | One of the disciplines of nondestructive testing (e.g. ultrasonic, radiography, etc) within which different techniques may exist.  |
| <b>NDT Automation Training</b>              | Classroom training, on-the-job training or the combination of both, with the purpose of providing a trainee with knowledge of the computer, data management, and automated equipment applications necessary to perform NDT inspections using computer-driven NDT equipment. This training is to be delivered under the technical guidance of a qualified instructor, Level II, Level III or other designated individual.   |
| <b>Non-Film Radiography</b>                 | Where digital X-ray sensors are used instead of traditional photographic film.   |
| <b>On-the-Job Training (OJT)</b>            | Training, during work time, in learning instrumentation set up, equipment operation, recognition of indications, and interpretation under the technical guidance of an experienced, Level II, Level III or other designated individual.  |
| <b>Open Book Examination</b>                | An examination administered with access to specific reference material that is provided with or referenced in the examination.   |
| <b>Outside Agency</b>                       | The organization under contract for NDT services, which may include an examination of personnel to the requirements of this standard. Consultants and self-employed individuals are included in this definition.   |
| <b>Practical Examination</b>                | An examination to demonstrate an individual's ability to conduct an NDT method as used by the employer. Questions and answers need not be written, but a checklist must be used and observations and results must be documented.   |
| <b>Procedure</b>                            | A general or detailed written instruction for conducting a given process.  |
| <b>Qualification</b>                        | Demonstrated skill, training, knowledge and experience required for personnel to properly perform the duties of a specific job.  |
| <b>Recertification / Recurrent Training</b> | Scheduled, periodic formal training, on-the-job training or the combination of both, with the purpose of refreshing knowledge and/or expanding the skills of individuals in a specific NDT method. This training is beyond initial training. This training is to be delivered under the technical guidance of a qualified instructor, Level II, Level III or other designated individual.  |

|                                |  |
|--------------------------------|--|
| <b>'Special' Certification</b> | Nondestructive test methods may be further subdivided into limited disciplines or techniques to meet specific employer's needs; these are Level I 'Special' certifications, but to a task-limited scope. Also known as "task qualified".   |
| <b>Task</b>                    | The use of a procedure or work instruction to accomplish a specific NDT method. A task for the purpose of task specific qualification (Level I Special) may consist of multiple similar procedures for mixed aircraft fleet types.   |
| <b>Technique</b>               | A category within a method; for example, ultrasonic immersion testing or ultrasonic contact testing.   |
| <b>Test Sample</b>             | A part or image containing none, one or more known and documented natural or artificial discontinuities, flaws or conditions used in the practical examination to demonstrate the candidate's proficiency in an NDT method. Test samples can refer to actual hardware, fabricated test parts, or when applicable, images of actual hardware such as radiographs.         |
| <b>Training</b>                | The program developed to impart the knowledge and skills necessary to qualify.   |
| <b>Trainee</b>                 | An individual participating in a training program for an NDT method who is not certified. Trainees shall obtain work experience only under the direct supervision of a qualified instructor, Level II or Level III or other designated individual. Trainees shall not independently conduct tests, make, accept or reject decisions, or perform any other NDT functions. |
| <b>Work Instruction</b>        | A document detailing the NDT technique and testing parameters to be used for the inspection of a specific part number, group of parts (e.g. "aluminum extrusions" or "steel brackets"), or assembly. These are sometimes referred to in the industry as "technique sheets" or "data cards".  |
| <b>Written</b>                 | A retrievable electronic or hard copy.   |

### 1-3. Nondestructive Testing Methods

Qualification of personnel in accordance with this recommended guideline shall be applicable to the following methods:

- (1) Radiographic (RT)
- (2) Magnetic Particle (MT)
- (3) Ultrasonic (UT)
- (4) Liquid Penetrant (PT)
- (5) Eddy Current (ET)
- (6) Thermography / Infrared (IRT)
- (7) Shearography/ Holography (ST)
- (8) Vibration Analysis (VA)
- (9) Acoustic Emission Testing (AE)
- (10) Laser Testing Methods (LT)

**NOTE: Methods other than those listed above may be added as the need arises.**

## 1-4. Qualifications

An NDT individual must have sufficient training and experience and possess an Airframe and / or Powerplant License or Repairman Certificate as required by the certificate holder to properly perform the necessary tasks. Instructors are exempt from the above-mentioned licenses or certificates unless specifically required by the certificate holder.

An NDT individual shall be qualified to direct and perform tests in the method concerned. The individual certified to any level must be able to set up and calibrate equipment (where applicable), read and interpret indications and evaluate them with reference to applicable standards and specifications. The individual should be thoroughly familiar with the scope and limitations of the method and should have the ability to apply detailed techniques to products or parts within the limit of the qualifications. They shall be able to organize and report nondestructive testing results.

Personnel presently qualified to perform specific methods of NDT may request Level I or Level II certification. By presenting documentation of previous training and experience as previously required by the employer for each NDT method to the Level III or other designated individual, an individual may be grandfathered to the requested level. Permanent personnel records should indicate when an individual has been grandfathered.

There should be three basic levels (Level I, Level II, Level III) of personnel qualification. These skill levels may be further subdivided by the certificate holder for specific situations, when deemed necessary, including but not limited to Level I Special or other designated individual.

Personnel performing specialized inspections using certain direct readout instruments as determined by a Level III or other designated individual certified in the method, do not require qualification or certification to this standard.

### (1) Levels of qualification

- (a) **Level I Special** (Optional) - Level I Special is the first certifiable qualification level. Personnel qualified and certified to this level are only authorized to accomplish specific tasks as documented in their company qualification record. As part of the OJT qualification phase, the individual being considered for qualification shall satisfactorily demonstrate that he / she is familiar with and can operate the necessary test equipment and interpret the resultant information to the degree required by the Level II / III, training instructor, or other designated individual for each task. OJT qualification entries must be entered in qualification records for each applicable task for an individual to be considered task qualified. A task listed in the qualification record may consist of multiple similar OEM or other approved procedures for the purpose of task specific qualification provided that the OJT task is clearly defined for applicability (examples: HFEC aluminum surfaces, all fleet types, ultrasonic thickness testing, all fleet types). The individual shall meet the requirements of Section 1-5 for Level I Special.
- (b) **Level I** - The Level I individual shall have the skills and knowledge to perform specific tests, specific calibrations, specific interpretations and evaluations for acceptance or rejection, and document the results in accordance with procedures in method(s) certified. The individual shall be knowledgeable of any necessary preparation of parts before or after inspection. The individual shall be able to follow procedures in the techniques for which certified and shall receive the necessary guidance or supervision from a Qualified Level II, Level III or other designated individual. The individual shall meet the requirements of [Table 1-5.1](#).

- (c) **Level II** - The Level II individual shall have the skills and knowledge to set up and calibrate equipment, conduct tests, and to interpret, evaluate, and document results in accordance with procedures in all techniques utilized by the certificate holder in the method certified. The individual shall be thoroughly familiar with the scope and limitations of the method to which they are certified and shall be capable of providing on-the-job training for trainees and other inspectors. The individual shall be able to organize and document NDT results. The individual shall be familiar with the codes, standards, and other documents that control the method as utilized by the certificate holder. The individual shall meet the requirements of [\[Table 1-5.1\]](#). When specified in the written practice, be capable of developing work instructions from approved general procedures. Such work instructions shall require final approval by a Level III or other designated individual certified in the method.
- (d) **Level III** - The Level III shall have the skills and knowledge to interpret codes, standards, and other regulatory documents that control the method as utilized by the certificate holder; select the method and technique for specific inspection; select and / or design equipment and reference standards; and verify the adequacy of procedures. Only individuals certified to this qualification shall have the authority to approve procedures for technical adequacy in the method to which they are certified. The individual shall also have general knowledge of all other NDT methods utilized by the certificate holder. The individual shall be capable of conducting or directing the training and examination of personnel in the method certified. When required by the written practice, be capable of auditing outside agencies/vendors to ensure the requirements of the written practice are met.

## 1-5. Requirements

The certificate holder shall establish a written practice (program) for the control and administration of personnel training, examination, qualification and documentation. This program shall include a method for maintaining proficiency and steps to suspend, revoke, and reinstate certification, and for expiration, plus retraining or recertifying as required.

The certificate holder shall provide qualified instructors who have satisfactorily completed an approved NDT program for the applicable testing method. Such individuals must have demonstrated practical experience and knowledge of the subject.

The certificate holder shall identify the person(s) responsible for ensuring the certificate holders written practice is adhered to. The designated responsible person(s) shall have a thorough knowledge of the written instructions, codes, specifications and standards used by the certificate holder.

Prior to certification, personnel shall complete sufficient organized training to become familiar with principles and practices of the applicable test method. The training program shall include on-the-job instructions in basic principles, products, equipment, operating procedures and test techniques that the individual will encounter in his work assignment. During this period, personnel shall be considered a "Trainee" as defined in Section 1-2.

Qualification of personnel shall be based on demonstration of satisfactory performance as determined by procedures outlined in [\[Section 1-6\]](#), Examination. Candidates for certification to Level I Special, Level I, Level II or Level III shall complete sufficient formal training to become proficient with the principles and practices of the applicable test method and technique(s) and shall have sufficient practical experience to assure that they are capable of performing the duties of the level for which certification is sought.

To be considered for certification, a candidate shall satisfy one of the following criteria for the applicable NDT Levels:

- **Level I Special**

Initial formal training hours and on-the-job training experience shall be sufficient to qualify an individual for certification for a specific task. The minimum training hours for Level I Special shall be determined and documented by the Level III or other designated individual, but Level I Special training hours shall not be less than 25% of those required for Level I in the applicable method (see Table 1-5.1). Experience requirements for Level I Special shall be determined and documented by the Level III or other designated individual, but shall not be less than 10% of those required for Level I in the applicable method (see Table 1-5.2). As documented in the written practice, on-the-job training for the purpose of gaining experience shall be conducted by personnel certified in accordance with this standard. Additionally, to be qualified, the individual must meet the requirements of [Section 1-6], Examination. The individual is recommended to have an Airframe, Powerplant or Repairman Certificate, as required by the certificate holder. Limited certifications issued in any method should be approved by the Level III or other designated individual, and documented in the certification records.

- **Level I /Level II**

[Table 1-5.1] lists the recommended formal training hours and Table 1-5.2 lists on-the-job training / experience to be used in establishing written practices for initial qualification to Level I or Level II. The individual is recommended to have an Airframe, Powerplant or Repairman Certificate, as required by the certificate holder.

- **Level III**

- Have graduated from a minimum four-year college or university curriculum with a degree in engineering or science, plus one year minimum experience in NDT testing in an assignment comparable to that of an NDT Level II in the applicable NDT method(s); or
- Have completed two years of engineering or science study at a university, college, or technical school, plus two years' experience in assignments at least comparable to that for NDT Level II in the applicable NDT method(s); or
- Have four years' experience in an assignment at least comparable to that of an NDT Level II in the applicable NDT method(s).

Records of qualification and certification shall be maintained by the employer.

At the option of the certificate holder, a qualified outside agency may be engaged to provide NDT training and qualification.

Refer to [Chapter 2] for the recommended training outline for each of the methods, the required minimum content of the organized training material and recommended classroom hours.

**Table 1-5.1 Minimum Formal Training Hour Requirements <sup>1,4</sup>**

| Method                            | Level I | Level II<br>with Level I<br>certification <sup>2</sup> | Level II<br>without Level I<br>certification <sup>3</sup> |
|-----------------------------------|---------|--|---|
| Eddy Current <sup>5</sup>         | 40      | 40   | 80  |
| Ultrasonic – General <sup>5</sup> | 40      | 40   | 80  |
| Magnetic Particle<br>Penetrant    | 16      | 8  | 24  |
| Radiography <sup>5</sup>          | 40      | 40   | 80  |
| Thermography/Infrared             | 20      | 40   | 60  |
| Shearography/Holography           | 20      | 40   | 60  |
| Laser Profilometry                | 8       | 24   | 32  |
| Acoustic Emission                 | 40      | 40   | 80  |
| Vibration Analysis                | 24      | 32   | 56  |

Notes:

1. To be qualified for any level (other than Level I Special), a trainee must complete the required formal training hours shown in Table 1-5.1, have sufficient experience per Table 1-5.2 and successfully complete Examination as per section 1-6 of this document.
2. A Level I may be certified to Level II after satisfactory completion of required formal training hours and experience in method certified and demonstrated proficiency.
3. For Level II certification, the hours should consist of time at Level I or equivalent. If a person is being qualified directly to Level II with no time at Level I, the required training should consist of the sum of the hours required for Level I and Level II.
4. During initial training, prior to Level I, the individual shall independently accomplish only procedures that he has previously been on-the-job-training qualified (i.e., Level I Special). Documentation is required.
5. Training should be appropriate for the technology which is utilized (eg. Time of Flight Diffraction, Phased Array Ultrasonics and Eddy Current Array require additional training and completion of Level I Eddy Current, or Level I Ultrasonic training, as appropriate, as a prerequisite).
6. Additional formal training hours and experience hours are required for transition from film based Radiography to non-film methods and vice versa. Refer to Table 1-5.1A and Table 1-5.2A.

**Table 1-5.1A Formal Training Hour Requirements for transition to film and non-film radiography**

| Additional Formal Training Hours |                  |
|----------------------------------|------------------|
| Current Level I                  | Current Level II |
| 20                               | 40               |

**Table 1-5.2 Minimum Experience Requirements<sup>1, 4, 5, 7</sup>**

| Method                            | Level I | Level II <sup>2,3</sup> |
|-----------------------------------|---------|-------------------------|
| Eddy Current <sup>6</sup>         | 200     | 600                     |
| Ultrasonic – General <sup>6</sup> | 200     | 600                     |
| Magnetic Particle                 | 70      | 210                     |
| Penetrant                         | 70      | 140                     |
| Radiography <sup>6</sup>          | 200     | 600                     |
| Thermography/Infrared             | 200     | 600                     |
| Shearography/Holography           | 210     | 630                     |
| Laser Profilometry                | 70      | 140                     |
| Acoustic Emission                 | 210     | 630                     |
| Vibration Analysis                | 210     | 1260                    |

Notes:

1. To be qualified for any level (other than Level I Special), a trainee must complete the required formal training hours shown in Table 1-5.1, have sufficient experience per Table 1-5.2 and successfully complete Examination as per section 1-6 of this document.
2. A Level I may be certified to Level II after satisfactory completion of required formal training hours and experience in method certified and demonstrated proficiency.
3. Level II certification, the hours should consist of time at Level I or equivalent. If a person is being qualified directly to Level II with no time at Level I, the required experience should consist of the sum of the times required for Level I and Level II.
4. Minimum experience requirement must be recorded in 'hours' for each method qualification request.
5. During initial training, prior to Level I, the individual shall independently accomplish only procedures that he has previously been on-the-job-training qualified (i.e., Level I Special). Documentation is required.
6. On-the-job training should be appropriate for the technology which is utilized (eg. Time of Flight Diffraction, Phased Array and Eddy Current Array require additional training and completion of Level I Eddy Current, or Level I Ultrasonic experience, as appropriate, as a prerequisite).
7. Additional formal training hours and experience hours are required for transition from film based Radiography to non-film methods and vice versa. Refer to Table 1-5.1A and Table 1-5.2A

**Table 1-5.2A Minimum Experience Hour Requirements for transition to film and non-film radiography**

| Additional Minimum Experience Time in Hours |                 |
|---|-----------------|
| Current Level 1                             | Current Level 2 |
| 20  | 200             |

**Emerging NDT Methods** - The minimum required training and experience hours for methods used by the employer that are not listed in Table 1-5.1 through Table 1-5.2 shall be established by the Level III or other designated individual.

For Levels I and II (and (Level I Special), when determining training or experience hours for new methods not listed in Table 1-5.1 through Table 1-5.2, the minimum hours shall be based on the requirements for a method of similar complexity listed in Table 1-5.1 through Table 1-5.2.



When authorized by the employer's written practice, an employer may qualify and certify its first Level III in a new NDT method not listed in Table 1-5.1 through Table 1-5.2. provided:

- a) The candidate has the skill and ability to carry out the Level III responsibilities in Section 1-4.
- b) All of the requirements in Table 1-5.3 are met.

**TABLE 1-5.3: MINIMUM REQUIREMENTS FOR FIRST LEVEL III IN AN EMERGING NDT METHOD.**

| College or University  | Instruction/<br>Study | Experience | Other NDT<br>Certifications                                      |
|--|-----------------------|------------|--|
| No engineering or science study at a technical school, college or university           | 80 hours              | 300 hours  | At least one previous Level 3 or two Level 2 certifications held |
| Two years of engineering or science study at a technical school, college or university | 60 hours              | 200 hours  | At least one previous Level 3 or two Level 2 certifications held |
| 3-4 year science or engineering undergraduate degree                                   | 40 hours              | 200 hours  | At least one previous Level 2 certification held.                |

Records of qualification and certification shall be maintained by the employer.

At the option of the certificate holder, a qualified outside agency may be engaged to provide NDT training and qualification.

Refer to [Chapter 2] for the recommended training outline for each of the methods, the required minimum content of the organized training material and recommended classroom hours.

## 1-6. Examination

To be considered for Non Destructive Testing (NDT) certification / recertification, personnel must meet the requirements of this recommended guideline as adapted by the certificate holder's written program referenced in [Section 1-5], Requirements.

The examination shall consist of the following five segments to insure physical and technical qualification:

### (1) Physical

(a) **Vision** - An examination to assure near vision, of at least one eye, either corrected or uncorrected, must be such that the employee can read SNELLEN equivalent of 20 / 25. The examination must be on a periodic basis, not to exceed 1 year. This examination shall be administered by qualified medical personnel, or trained personnel designated by the company. When vision correction is necessary to pass the examination, vision correction shall be worn during all testing/inspections.

(b) **Color perception** - Distinguish and differentiate between colors used in the method for which certification is sought. This can be shown through the Pseudoisochromatic Plate (PIP) Test, or

Farnsworth Panel D-15 Test, or equivalent test as determined by qualified medical personnel. Color vision testing need only be done one-time, at the initial vision examination. Any limitations in color perception shall be evaluated by the Responsible Level 3 prior to certification and must be approved in writing.

(c) **Physical** - Requirements established by the certificate holder for 'inspection' classification will normally suffice.

**(2) Written (General and Specific)**

(a) The **general examination** for all skill levels shall be a closed-book examination consisting of questions that cover the basic test principles relative to the applicable method and the equipment, operating procedures and test techniques that the individual may encounter in his assignment.

(b) In preparing the examination, the certificate holder should select pertinent questions covering the applicable method. A minimum of 10 questions shall be administered for the general examination for Level I-Special. A minimum of 40 questions shall be administered for the general examination at Levels I, II or III. For Level III, the general examination questions shall address the general knowledge of other methods used by the employer as well as the method for which certification is sought.

(c) The **specific examination** for all levels shall be an open book examination covering the requirements and use of the specifications, codes, equipment, operating procedures and test techniques the candidate may use in the performance of his/her duties with the employer. A minimum of 8 questions shall be administered for the specific examination for Level I-Special. A minimum of 30 questions shall be administered for the specific examination at Levels I, II, III. Reference material such as specifications, tables, formulas, etc. may be provided as determined by the Level III or other designated individual or examiner. Questions utilizing such material shall require understanding of the information contained therein rather than merely finding its location.

**(3) Practical (Formal & OJT)**

(a) As part of the formal training, the individual being considered for qualification shall satisfactorily demonstrate that he / she is familiar with and can operate the necessary test equipment and interpret the resultant information to the degree required by the Level III or other designated individual. If the candidate is required to demonstrate proficiency in the application of the process as well as interpretation of results, hardware test samples shall be used. The location and severity of flaws in the test sample shall not be apparent to the candidate. If the candidate is only required to interpret the results and not perform the process of generating the image, the test samples may be images, such as radiographs or other resultant test data. A written checklist covering the topics detailed in the following sub-paragraphs shall be developed and completed by the Level III or other designated individual or Examiner to assure adequate coverage and to assist in the administration and grading of the examination. In addition to using the checklist, the Level III or other designated individual or Examiner shall determine and document how the examination results obtained by the candidate are to be documented (e.g. part maps, drawings, sketches, written descriptions, etc). All such documentation shall become part of the examination and filed accordingly.

(b) OJT shall be accomplished in the shop area on actual components under normal working conditions. The hours of on-the-job training are defined in [Table 1-5.2]. Only personnel who have demonstrated that they possess the required knowledge and ability to a qualified Level III or other designated individual, shall be considered for certification.

**LEVEL I-SPECIAL:** The candidate shall demonstrate proficiency by using a work instruction to process and, if approved to accept hardware, examine at least one test sample for each technique and part configuration for which certification is sought. The test samples shall be representative of the specific product to be encountered by the candidate in the performance of his/her duties with the employer. The candidate shall document the NDT results. If approval to accept/reject hardware is to be granted by the Level III or other designated individual, the candidate shall interpret and document

the results of the inspection of the test samples. The checklist shall include proficiency in the use and standardization of equipment and materials, adherence to procedural details and, if applicable, proficiency in the interpretation and evaluation of indications.

**LEVEL I:** The candidate shall demonstrate proficiency by using a work instruction to process at least 2 test samples of differing configurations for each method, with at least one test sample for each technique for which certification is sought. When only one configuration of hardware is to be inspected upon certification, both test samples may be of the same configuration. The test samples shall be representative of the products to be encountered by the candidate in the performance of his/her duties with the employer. The candidate shall document the NDT results. The checklist shall address proficiency in the use and standardization of the equipment and materials, adherence to procedural details and the documentation of the results. If the Level I candidate is to accept products, the checklist shall also include proficiency in the interpretation and evaluation of indications.

**LEVEL II:** The candidate shall demonstrate proficiency by inspecting at least 2 test samples of differing configurations for each method, with at least one test sample for each technique for which certification is sought. When only one configuration is to be inspected upon certification, both test samples may be of the same configuration. The test samples shall be representative of the products to be encountered by the candidate in the performance of his/her duties with the employer. The candidate shall document the NDT results in accordance with the applicable acceptance criteria. The checklist shall include proficiency in the use and standardization of equipment and materials, adherence to procedural details, the accuracy and completeness of interpretation and evaluation of indications and, when required by the employer's written practice, the ability to develop work instructions.

**LEVEL III:** The candidate shall demonstrate proficiency by preparing an NDT procedure or work instruction appropriate to the employer's current requirements for the method. The procedure or work instruction shall be developed in conjunction with the general and/or specific examination(s) required for certification or recertification, as applicable. A procedure or work instruction developed within the previous 3 months by the candidate may be used with the approval of the Level III or other designated individual. When the candidate's duties will include processing and/or acceptance/rejection of products, proficiency in performing such tasks shall be demonstrated by a hands-on practical examination equivalent to Level II. The results of the practical examination shall be documented and a checklist shall be used to address the practical and technical adequacy of the procedures or work instructions prepared by the candidate. When the candidate is to accept/reject hardware, the adequacy of the candidate's interpretation and evaluation of indications shall also be documented. The additional practical examination to accept/reject hardware is not required for Level IIIs or other designated individuals who write or approve procedures or work instructions even if those instructions are used by personnel to accept/reject hardware.

#### **(4) Certification**

(a) Upon satisfactory completion of the required Physical, Written Examinations, Practical Examinations, and OJT, an individual shall be certified to Level I.

The **Grading and Examinations** shall consist of:

- (1) A Level III or other designated individual shall conduct and grade the qualification examinations for each classification.
- (2) The examination shall include sufficient questions to assure the training material has been comprehended.
- (3) Examinations administered for qualification shall result in each individual examination having a grade of at least 70 percent.
- (4) In no case can an examination be administered by one's self or by a subordinate.

The **Re-examination** shall conform with:

(a) Candidates failing the examinations, at the discretion of the employer, may be given time for additional studies and be re-examined. The re-examination shall not utilize the same specimens that were used in the initial examination. The re-examination test must contain a minimum of 25% new questions.

## 1-7. Recertification / Recurrent Training

NDT personnel shall be reexamined any time at the discretion of the employer and have their certificates extended or revoked. This examination may occur at any time (i.e., random audit) and is not necessarily timed to synchronize with expiration/renewal of certifications.

Periodically, as defined in the employers written practice, Level I, Level I Special and Level II personnel should be re-evaluated by the Level III or other designated individual, by administering a practical examination. The practical examination should follow the format and guidelines described in section 1-6.

Level I, Level I Special and Level II personnel shall receive recurrent training and be evaluated for compliance with performance standards, by the Level III or other designated individual, at an interval not to exceed three (3) years.

Level III personnel shall be re-certified at intervals not to exceed five (5) years. Re-certification shall be accomplished in accordance with [\[Appendix A\]](#), or by specific and/or practical re-examination equivalent to initial certification.

Personnel shall have their certification continued, suspended or revoked at the discretion of the certificate holder due to:

- (1) PERFORMANCE: Demonstrate unsatisfactory performance.
- (2) EXPIRATION: Certifications for all levels shall expire when the certification interval has lapsed with no recertification issued. Certification for all levels is considered to expire at the end of the corresponding month in which the certification began.
- (3) SUSPENSION: Certification shall be suspended when employment is terminated, the visual acuity examination (section 1-6, Item 1) is overdue or deficient, the individual does not perform in the method certified for at least twelve consecutive months, or when the individual's performance is found to be deficient in any manner.
- (4) REVOCATION: Certification shall be revoked when the individual does not perform in the certified method for the employer for at least 24 consecutive months or when the individual's conduct is found to be unethical or incompetent.

The employer's written practice should include rules covering the types and duration of interrupted service that requires reexamination and recertification. The employer's certification shall be deemed revoked when employment is terminated.

### REINSTATEMENT OF CERTIFICATION:

- a) SUSPENSION - Certifications that have been suspended may be reinstated up to the original certification date when the cause for the suspension has been corrected and the correction verified by the employer or the individual's proficiency is verified by the Level III or other designated individual. The employer must have maintained the personnel certification records during the suspended period, otherwise certification may only be reinstated by written and practical examination equivalent to initial certification.
- b) EXPIRATION OR REVOCATION - Certifications that have expired or been revoked may only be reinstated by written and practical examination equivalent to latest certification, prior to expiration/revocation.

## 1-8. Records

The certificate holder shall maintain sufficient personnel training records for as long as their certification is in effect. Such records shall be available for audit by authorized personnel.

The records maintained by the employer shall include, as a minimum:

- a. Name of the certified individual.
- b. Level, method, and technique(s) for which individual is certified.
- c. Results of the latest written and practical examinations.
- d. Date and expiration of current certification(s).
- e. NDT training history that identifies the source, type of training, dates of training and course hours.
- f. NDT experience history, including any previous certifications, both with current and previous employers sufficient to justify satisfaction of experience requirements for qualification.
- g. Results of the most-recent (i.e. current) visual acuity and color perception examinations.
- h. Name and Signature of the Level III or other designated individual that verified qualifications of candidate for certification.
- i. Extent and documentation of formal education used to meet qualification requirements (i.e., Airframe and/or Powerplant License or Repairman Certificate; for Level III this includes college, university, or technical school) in Section 1-5.
- j. For Level I Special certifications, the case-by-case justification, the training and experience hours, the length of the certification, the specific NDT test to be performed, the specific hardware or part or material to be tested, and, if applicable, the approval to accept/reject parts.

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## Chapter 2. Training Outlines

Please refer to the Training Outlines found in The American Society for Nondestructive Testing, Inc. (ASNT) document CP-105 for the following methods:

- (1) Radiographic (RT)
- (2) Magnetic Particle (MT)
- (3) Ultrasonic (UT)
- (4) Liquid Penetrant (PT)
- (5) Eddy Current (ET)
- (6) Thermography / Infrared (IRT)
- (7) Shearography/ Holography (ST)
- (8) Vibration Analysis (VA)
- (9) Acoustic Emission Testing (AE)
- (10) Laser Testing Methods (LT)

The entire body of knowledge contained in these training outlines for the applicable method shall be covered in the training course. Each method taught shall consist of basic classroom or other formal instruction and appropriate practical demonstrations and / or on-the-job training to ensure complete understanding.

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## Appendix A. Credit System for Re-certification of Level III NDT Personnel

### A-1. Scope

This appendix specifies the requirements for re-certification of the Level III NDT personnel without examination. It applies only to those persons holding a valid Level III NDT certification at the time of re-certification.

### A-2. Requirements

Application for re-certification shall be made to the Level III prior to the expiration date of the certification, and shall be made to his/her employer. Request for data to support his/her certification shall also be made to outside sources, if applicable.

The candidate shall have been employed in a Level III function for a minimum of 36 months (at least 12 of which are in the last 24 months) within the previous five (5) years in the method(s) for which re-certification is sought. The number of months is cumulative and does not need to be consecutive months for validation purposes. Candidates shall provide objective evidence that they have kept up to date with current NDT technology in the method(s) for which they are seeking re-certification by obtaining a minimum of 24 points during the five (5) year period of certification, irrespective of the number of certifications (methods) obtained, by engaging in one or more of the activities listed in [\[Table A.1\]](#).

### A-3. Definitions

Committee or Panel Meetings: Meetings, conferences, symposia, seminars, trade association meetings, panels, etc. organized or sponsored by a regional, national, or international NDT organization or technical society. Foreign or international meetings qualify if the sponsor(s) are national or international.

Committee Projects: Specific identifiable official activities of regional or national technical societies, committees, or work groups, such as round-robins or individual studies, preparation of guidelines, appendices, specifications, recommended practices, procedures, codes or standards, etc. Documentation may include memos or reports, drafts of committee output documents, or official written comments submitted by the candidate on such documents.

Table A.1. **Level III Awarded Credit Activity**

| <b>ACTIVITY</b>   | <b>CRITERIA</b>   | <b>Point Allocation</b>       | <b>Max. Points per 5 years</b> |
|---|---|-------------------------------|--------------------------------|
| Authoring or co-authoring technical NDT papers, presentations, or white papers.   | Sole Author   | 8                             | 16                             |
|   | Co-author (contribution > 30%)  | 4                             |                                |
|   | Co-author (contribution < 30%)  | 2                             |                                |
| Authoring, co-authoring, or Custodian for company or industry NDT specifications or standards.  | Each standard/specification   | 8                             | 16                             |
| Attending technical sessions, seminars, committee or panel meetings organized by:<br>a) - National or international technical NDT societies, associations, and institutes.<br>b) - Inter-company NDT teams comprised of members from several locations. | 1 day or 1 meeting  | 1                             | 24                             |
|   | 2 days  | 2                             |                                |
|   | 3 or more days  | 4                             |                                |
| NDT technical training instructor teaching courses or seminars for which academic credit is given.  | For each 8 hours of instruction                                       | 4                             | 8                              |
| Participating in technical courses or seminars.   | For every 8 hours of documented instructions                          | 2                             | 8                              |
| Participating in technical courses or seminars for which academic credit is given.  | For actual Continuing Education Units (CEU) or academic credit earned | Actual CEUs or credit awarded | 16                             |
| Nondestructive testing examiner.  | For each examination session  | 1                             | 8                              |
| NDT related technical and/or scientific publication published either internally or externally.  | For each published paper  | 4                             | 8                              |
| Documented NDT contributions to company, technical society, or industry committee project.  | For each documented contribution                                      | 4                             | 8                              |
| Documented participation in NDT-related studies, developments, or investigations.   | For each documented participation                                     | 4                             | 8                              |
| Documented continuous satisfactory performance as a Level III.  | Written testament by employer   | 4                             | 16                             |
| Conduct external NDT audits.  | For each external audit conducted                                     | 1                             | 16                             |
| Attend equipment or trade show.   | For each show attended  | 1                             | 4                              |



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## Annex 1

### References

- [ASTM E94] *ASTM E94-04 Standard Guide for Radiographic Examination*, American Society for Testing and Materials (<http://www.astm.org>), West Conshohocken, Pennsylvania..
- [NAS-410] *NAS-410, Non Destructive Testing Personnel Qualification and Certification*, see National Aerospace Standards, NAS 410 (<http://aero-defense.ihs.com/collections/abstracts/nas410.htm>) for information
- [SNT-TC-1A] *Recommended Practice No. SNT-TC-1A*, available from the American Society for Non Destructive Testing as order number 2065 ( ISBN 0-57117-078-2), American Society for Nondestructive Testing (ASNT) (<http://www.asnt.org>), Columbus, OH.
- [CP-105] *ASNT Standard Topical Outlines for Qualification of Nondestructive Testing Personnel*, available from the American Society for Non Destructive Testing ( ISBN-13: 978-1-57117-140-5), American Society for Nondestructive Testing (ASNT) (<http://www.asnt.org>), Columbus, OH.