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1. Purpose:

- 1.1 This specification establishes the minimum requirements for the qualification and certification of test personnel conducting nondestructive (NDT) testing.
- 1.2 It is the intent of this document to meet or exceed the requirements detailed in ASNT-TC-1A and NAS 410 as no direct flow down of specific customer requirements exist.
- 1.3 Contained herein are the necessary requirements, including education, experience and examination needed to qualify and certify personnel to utilize the NDT methods applied at Trinity Forge & Machine. Additionally, the requirements of those individuals responsible for the administration of this written practice are also detailed.
- 1.4 Trinity Forge & Machine is responsible for the training, qualifying and certifying NDT personnel in accordance with this document.

2. Scope:

Contained herein are the necessary requirements, including education, experience and examination needed to qualify and certify personnel to utilize the NDT methods applied at Trinity Forge & Machine. Additionally, the requirements of those individuals responsible for the administration of this written practice are also detailed.

3. Responsibilities:

Quality Assurance is responsible for the training, qualifying, and certifying NDT personnel in accordance with this document.

4. Definitions:

- 4.1 NDT Auditor An individual qualified to review NDT facilities and procedures for compliance to requirements.
- 4.2 Certification A written testimony that as individual has met the applicable requirements of this specification.
- 4.3 Certifying Agent Trinity Forge & Machine.

Level 3 personnel may require certification from the customers of Trinity Forge & Machine in addition to the certification issued by Trinity Forge & Machine.

- 4.4 Closed Book Examinations an examination administrated without access to reference material except that provided with or in the examination.
- 4.5 Direct Observation is when the observer is able to come to the immediate aid of the trainee and remains within a distance that allows for uninterrupted visual and verbal contact with the individual.
- 4.6 Documented The condition of being in written form.
- 4.7 Evaluation The determination of the significance of indications.
- 4.8 Examination A formal, controlled, documented interrogation conducted in accordance with a procedure.
- 4.9 Experience Actual performance or observation conducted in the work environment resulting in the acquisition of knowledge and skill. This does not include classroom or laboratory training.
- 4.10 General Examination A written examination addressing the basic principles of the applicable NDT method.
- 4.11Indication—The observation, or evidence of observation, which occur during a nondestructive inspection or test.

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- 4.12 NDT Instructor An individual qualified and designated, in accordance with this specification, to provide classroom or laboratory training of NDT personnel.
- 4.13 Interpretation The determination of whether indications are relevant or non-relevant.
- 4.14 On-The-Job Training Training in the work environment in learning instrumentation setup, equipment operation, and recognition of indications, and interpretation under the technical guidance of a certified Level 2 or Level 3 individual.
- 4.15 Outside Agency An independent body under contract for NDT services, which may include the training and examination of personnel to the requirements of this specification. Consultants and self-employed individuals are included in this definition.
- 4.16 Practical Examination An examination used to demonstrate an individual's proficiency in conducting the NDT methods that will be performed. Questions and answers need not be written, but observations and results must be documented.
- 4.17 Procedure A detailed, written instruction for conducting NDT or certifying personnel.
- 4.18 Qualification The skill, training, knowledge and experience required for personnel to properly perform to a specified NDT level.
- 4.19 Responsible Level 3 A Level 3 designated by the employer with the responsibility and authority to ensure that the requirements of this standard are met and to act on behalf of the employer.
- 4.20 Specific Examination The written examination to determine an individual's understanding of procedures, codes, standards and specifications for a given method.
- 4.21 Test Samples Parts or images containing known defects and used in the practical examination to demonstrate the candidates' proficiency in a given method.
- 4.22 Training An organized and documented program of activities designed to improve the knowledges and skills necessary to be qualified to this specification. This program may be a mix of classroom, laboratory, programed self-teaching, and on-the-job training approved by the Level 3 personnel.

5. Instruction Steps:

Methods – This specification contains detailed requirements for the applicable training, experience and examination for Fluorescent wet Magnetic Particle Inspection (MT) and Fluorescent (Dye) Penetrant inspection (PT).

General Requirements

- 5.1 Trainee A trainee is an individual who is participating in a training program for an NDT method and is not certified. Trainees should obtain work experience only under the direct observation of a Level2, Level 3 or instructor in the same method. Trainees should not independently conduct test, make accept or reject decisions, or perform any other NDT functions.
- 5.1.1 Level 1 A certified individual having skills and knowledge to perform specific tests and calibrations. The individual should be knowledgeable of any necessary pre- and/or post preparation in the test method for which the Level 1 is certified and shall receive the necessary guidance from a Level 2 or Level 3. Level 1 personnel shall not make any accept/reject decisions on product or hardware.
- 5.1.2 Level 2 Level 2 individual is responsible for performing system capability verification as required in the methods for which certification is held. The Level 2 shall also be capable of setting up, conducting tests, interpreting and evaluating results, and shall also be capable of organizing and documenting test data as may be required by the applicable testing procedure. The Level 2 shall be thoroughly familiar with the scope and limitations of the test method in which certified and shall be capable of overseeing the work and on-the-job training of trainees and/or Level 1 personnel. The individual shall be thoroughly familiar with the procedures and specifications that control the testing methods utilized. Level 2 personnel may initiate changes to procedures and/or techniques. However these changes must be approved by a Level 3 in the method.
- 5.1.3 Level 3 Level 3 individuals shall have the skills and knowledge to interpret codes, standards and contractual documents that control the method as utilized, select the method and technique for a specific

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inspection, and prepare and verify the adequacy of procedures. Only individuals certified to Level 3 shall have the authority to approve procedures for technical adequacy in the method to which that are certified. The individual shall also have general knowledge of all other NDT methods utilized by the employer. The individual shall be capable of conducting or directing the training and administration of certification examinations in the method certified. The individual shall not conduct NDT for the acceptance of parts, unless the demonstration of proficiency in this capability was included in the practical examination upon which, in part, the certification is based.

- 5.1.4 Responsible Level 3 –Trinity Forge & Machine shall identify in writing an individual responsible for the administration of this written practice. The individual shall be certified Level 3 in the NDT methods employed.
- 5.1.5 NDT Instructor Instructors shall have the skills and knowledge to plan, organize, and present classroom, laboratory or on-the-job training programs of instruction, in accordance with course outlines. NDT instructors and course outlines shall be approved by the Level 3.
- 5.1.6 NDT Auditor Auditor shall have the education, training, skills and knowledge to understand the processes and procedures utilized in the application of NDT processes. The individual shall be familiar with the applicable codes, standards and other contractual documents that control the method.

5.2 Training:

- 5.2.1 Candidates for certifications as Level 1 or Level 2 shall complete sufficient organized training to become proficient with the principles and practices of the applicable test method and techniques. The training shall be conducted in accordance with the requirements of the detailed course outline approved by the Level 3 and listed herein. The training outline shall include a list of references from which the training material is derived.
- 5.2.2 Specialist Personnel Training shall be presented by an instructor or a Level 3 with exception that specialist personnel not qualified to this standard may be used to provide instruction on highly special topics. Selection for such personnel shall be approved by the Level 3.

6. Training/Experience/Examination Requirements:

6.1 Minimum Required Training Hours – The minimum training hours for Levels 1 and 2 are given in Table 1 for the specific NDT methods. There are no additional training requirements to transition from Level 2 to Level 3 nor can an individual have sufficient training to allow certification to Level 3 without prior certification as a Level 2 or performance equivalent to Level 2.

6.1.1 Table 1Minimum Training Hours, Levels 1 and 2

Method	(1)	(2)	(3)
Magnetic Particle	16	16	32
Dye Penetrant	16	16	32

- (1) Level 1
- (2) Level 2, with prior Level 1 certification
- (3) Level 2, no prior Level 1 certification
- 6.2 Previous Training Training obtained from prior employment must be documented and verified by the employer in order to be accepted. For personnel credit with training from a prior employer or those not certified within two months of their training, refresher training must be provided. The refresher training shall cover the following subjects with the depth of coverage of each subject determined by the Level 3.
 - Operations of applicable test or inspection equipment

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- Specific tests and/or inspection procedures
- Interpretation and evaluation of test or inspection results
- Safety
- Applicable codes, standards and specifications
- 6.3 Equivalent Training For personnel certified under previous revisions of ASNT-TC-1A and NAS 410 (MIL-STD-410) or other qualification/certification programs, the equivalency of their previous training to the requirements to this document will be determined and documented by the Level 3.
- 6.4 Experience Candidates for certification at Level 1, 2 or 3 shall have sufficient practical experience to assure that they are capable of performing the duties of the level for which certification is sought. The minimum for Levels 1, 2, and 3 are given in Table 2.

Table 2: Minimum Experience Requirements

Method	(1)	(2)	(3)	(4)	(5)	(6)
Magnetic Inspection	130 hrs	400 hrs	530 hrs	4 Yrs	2 Yrs	1 Yr
Dye Penetrant	130 hrs	270 hrs	400 hrs	4 Yrs	2 Yrs	1 Yr

- (1) Trainee experience for Level 1. Experience in method must be at least half this time.
- (2) Level 1 experience for Level 2. Experience in method must be at least half this time.
- (3) Trainee experience for direct certification to Level 2. Experience in method must at least half this time (Applies when remaining time is in a NDT related function and is approved by the Level 3).
- (4) Level 2 experience required for Level 3 with no college degree.
- (5) Level 2 experience required for Level 3 with technical associate degree.
- (6) Level 2 or equivalent work experience required for Level 3 with technical bachelor's degree. Equivalency of work experience shall be determined and documented by Level 3 responsible for the employer's certification program. Experience in multiple methods may be accumulated simultaneously.
- 6.4.1 Previous Experience A candidate's experience with a previous employer may be accepted only if that experience is documented.
- 6.4.2 Equivalent Experience For personnel certified under previous revisions of this document or other qualification/certification programs, the equivalency of their previous experience to the requirements of Table 1 will be determined and documented by the Level 3.
- 6.4.3 Transition Time for Trainees It is anticipated trainees shall transition to certified individuals in a period not to exceed 1 year for MT and 10 months for PT. Periods beyond these shall require special circumstances and shall be so noted in the trainees' NDT file.

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7. Eye Examination:

The eye examinations shall assure that the applicants near vision and color perception meet the following requirements. Near vision and color perception shall be administrated annually by a Level 3, or a qualified personnel approved by Level 3.

- Near Vision Jaeger #1 test chart at not less than 12 inches, or Snellen 20/25 as determined by a Titmus Orthorater – Ability to discern line 9 or standard 0.8 is equivalent to 20/25. Candidate must meet requirements with at least one eye, either natural or corrected.
- Color Perception The candidate shall be able to distinguish and differentiate between the colors used in the method for which certification is sought.
- 7.1 If it is necessary for an individual to wear corrective lenses to satisfactorily meet the near vision requirements for NDT, "Eye Correction Required" must appear on the record form.
- 7.2 If an employee does not meet visual acuity examination requirements, the candidate shall be temporarily assigned to other duties until the vision has been corrected to at least the minimum level of acceptance and is approved by the Level 3. During this period the employee will not be permitted to inspect parts.

8. Examinations:

- 8.1 Examinations The examinations to verify the technical qualifications of a NDT candidate shall consist of general, specific and practical examinations. The questions utilized for the general and specific examinations, and the checklist for the practical examination shall be available for review by the customers. If the actual test questions given during certification examinations are not kept in each certified individual's records then the listing of questions from which examinations are derived shall be available for review by customers. The questions shall be made available to certification candidates only during administration of the examinations.
- 8.2 General- The general examination for all levels shall be either a close book or open book examination consisting of questions that cover the cross-section of the applicable method at the appropriate level. The questions, answers and references in the applicable SNT-TC-1A supplement and other publications may be used to develop the general examinations. Questions taken from the ASNT SNT-TC-1A supplements (Q&A Booklets) should be modified and not used verbatim. A minimum of 40 questions shall be used for the general examination at each level. For the Level 3, the general examination questions will address the general knowledge of other methods as well as the method for which certification is sought. Possession of a current ASNT NDT Level 3 or equivalent certificate by the candidates may be satisfactory evidence that the general examination requirement is satisfied.
- 8.3 Specific The specific examination for all levels shall be either an open or close book examination and shall cover the specifications, equipment, operating procedures, and test techniques the candidate may use in the performance of their duties. A minimum of 30 questions shall be used for the specific examination at each level.
- 8.4 Practical The practical examination for each discipline shall consist of 10 checkpoints, and demonstration of proficiency by the candidate in performing tasks that are typical of those to be accomplished in his/her duties. Test samples used in the examination shall be actual hardware. The candidate is required to demonstrate proficiency in the application of the process as well as interpretation of results. Written checklists covering the topic detailed below shall be developed by the Level 3 to assure adequate coverage and to assist in the administration and grading of the examination. Candidates for Level 1 and Level 2 shall demonstrate proficiency through the complete processing of a minimum of one test sample per technique employed. A minimum of two test samples shall be employed per test method.
- 8.4.1 Level 1 The candidate shall demonstrate proficiency in the appropriate method by processing test samples for each technique to be used and documenting the results. The test samples shall be representative of the product encountered by the candidate in the performance of assigned duties. The checklist shall address proficiency in the use of the procedures, equipment, materials, attention to

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procedural details and the documentation of the results. Test samples used for the practical examination must contain known defects that are documented by the Level 3.

- 8.4.2 Level 2 The candidate shall demonstrate proficiency in the appropriate method by examining representative test samples for each technique. The candidate shall interpret, evaluate and document the results of the examination of the test samples. The test samples shall be representative of the product to be encountered by the candidate in the performance of assigned duties. The checklist shall include proficiency in the use of the procedures, equipment, materials, adherence to procedural details, and the accuracy and completeness in interpretations and evaluations of indications. Test samples used for the practical examination must contain known defects that are documented by the Level 3.
- 8.4.3 Level 3 The candidate shall demonstrate proficiency by preparing a NDT procedure appropriate to his/her employer's requirements. When the candidate's duties include inspection or evaluation of products, then proficiency in performing such tasks shall also be demonstrated. This portion shall be at least equivalent to a practical examination carried out by a Leve 2 individual. The checklist shall address the practical and technical adequacy of the procedures prepared by the candidate, and when applicable, the adequacy of the interpretation and evaluation of indications. The results of the practical examination shall be documented.
- 8.5 Administration A Level 3 knowledgeable and familiar with the specifications, standards, codes, techniques and products associated with the employer, and certified Level 3 in the method for which the examination are given, shall be responsible for the administration of all qualification examinations. The administration and grading of examinations using multiple choice or true/false type questions can be delegated by the Level 3. If an outside agency is use to provide this function, then the employer shall assure that the individual who performs the administration of the examinations is fully qualified. In no case can an examination be administrated by one's self or by a subordinate.
- 8.5.1 For certification a candidate must achieve a minimum of 80% on the general and specific qualification examinations. The candidate must detect all discontinuities or conditions (100%) during the practical examination specified by the Level 3.
- 8.5.2 An average score of 80% or greater is necessary for certification, where averaging of grades is accepted. All scores shall be considered in weight. When averaging is not accepted, the criteria of paragraph 8.5.1 shall apply.
- 8.5.3 Examinations and test samples shall be revised/replaced in such a manner that no candidate will be tested by the same set of questions or test samples consecutively. Replacement shall be at a minimum 3 years interval. A revised written test shall contain a minimum of 25% new questions.
- 8.5.4 Candidates failing any examination (general, specific, or practical) shall receive additional training before attempting re-examination of the failed exam. The additional training shall be documented and shall address the area(s) found deficient in the candidate's skills/knowledge base. Failure of three consecutive examinations for the applicable NDT method disqualifies the candidate from qualification in that method. The revision of examinations specified in section 8.5.3 shall apply.

9. Recertification:

- 9.1 Level 1 and Level 2 personnel shall be re-certified at intervals not to exceed five years. If the Level 1 and Level 2 personnel do no work in NDT on full-time bases, they shall be re-certified at intervals not to exceed three years. The practical, general and specific examinations to those required for initial certification shall be administrated.
- 9.2 Level 3 personnel shall be re-certified at intervals not to exceed five years.

If equipment operation or accepting production hardware ae required as part of their duties, a practical exam equivalent to initial certification shall be administrated. The extent to which the individuals' knowledge of the general and specific examination subject areas examined shall be determined by the Level 3 responsible for the employer's certification program, and shall be documented in the individual's certification records.

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Trinity Forge & Machine reserves the right to use an outside agency to administrate any portion of the Level 3 re-certification examination (the outside agency shall be approved jointly by Trinity Forge & Machine and the customer base).

- 9.3 The examination requirements established in section 8.5 of this document shall apply to recertification at all NDT levels.
- 9.4 An inspector Level 1 or Level 2 failing a re-qualification exam shall be considered disqualified and shall not inspect or process materials or parts until re-qualified. Before the re-qualification, the inspector shall receive additional training as necessary, and must wait at least 30 days before attempting requalification.

10. Loss of Certification:

- 10.1 Certification shall expire when the certification interval has lapsed with no re-certification issued. Certification for all levels is considered to expire at the end of the corresponding month in which certification began.
- 10.2 Certification shall be suspended when the physical examination is overdue or the inspector has not performed for at least 12 consecutive months, or when an individual's performance has been found to be deficient with respect to assigned NDT duties.
- 10.3 Certification shall be revoked if inactive for a period of 24 months or whenever there is valid reason to question the quality of NDT inspection or process control.
- 10.4 Certification will be revoked upon separation of employment at Trinity Forge & Machine.
- 10.5 Certification will be revoked upon proven evidence of acts of an unethical nature regarding the duties of a NDT inspector.
- 10.6 Reinstatement of Lost Certification Certification which has been suspended may be reinstated up to the original certification date when the cause of suspension has been corrected and the correction verified by quality, or the individual's proficiency has been verified by the responsible Level 3. Reinstatement of certification revoked or expired shall require re-qualification consistent with the requirements of the original qualification/certification examination process.

11. NDT Instructors and Auditors:

- 11.1 Approval of Instructors Instructors shall be approved by the Level 3 responsible for the employer's certification program and shall meet at least one of the following criteria:
 - Be certified to a Level 3 in the method for which they shall be designated instructors.
 - Possesses the equivalent of a B.S. in engineering, physical science or technology and have adequate knowledge in the method for which they will be designated instructors.
 - Possesses an associate's degree in physical science or technology and have a minimum of 2 years' experience, or equivalent, as a Level 2 in the method for which they will be designated instructors.
 - Possesses a minimum of 4 years' experience as a Level 2, or equivalent, in the method for which they will be designated instructors.

11.2 Qualification of NDT Auditors

- 11.2.1 Personnel performing external audits, surveys, or assessments shall be approved by the Level 3, and shall meet the following requirements:
 - Possesses a training program that includes NDT and audit training with final examinations specific to the applicable NDT method(s). The responsible Level 3 and the supplier quality auditing group shall determine the program content, duration and examination requirements.
 - · Complete two audits, accompanied by an auditor.
 - Be qualified Level 2 (minimum) in the method to be audited.

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Note: Third party auditors may be used by Trinity Forge & Machine when approved by the NDT Level 3 and documented evidence of qualification is on file and available for review.

12. Certifications and Records:

- 12.1 Certification Candidates meeting or exceeding the qualification requirements of this document shall be certified at the appropriate NDT level by Trinity Forge & Machine. Level 3 personnel shall be certified via a letter issued by the management of Trinity Forge & Machine. NDT instructors and trainees do not require certification.
- 12.2 Records The employer shall maintain certification records for personnel for as long as their certification is in effect. Such records shall be available for customer review. The records shall include, as minimum (NDT files shall be maintained along with the certified individuals employment file):
 - · The candidates name.
 - Level, method and techniques for which certified.
 - Results of all qualification examinations, including the latest written test date and test scores.
 - Date and expiration of current certification(s).
 - History of all previous NDT certification with Trinity Forge & Machine.
 - Training history, which identifies source, type of training and dates of training, course hours and grades (if applicable), instructor's name.
 - Experience history, both current and previous, sufficient to justify satisfaction of experience requirements for certification.
 - Results of physical examinations.
 - · Documentation of formal education (if applicable).
- 12.3 All certification and qualification records shall be reviewed and approved by the NDT Level 3.

13. NDT Operator Surveillance/Over-Inspect:

- 13.1 All NDT personnel performing inspections for the acceptance of product will be audited by the Level 3 annualty, per NDT method and recorded. This will consist of observing the NDT inspector processing hardware and re-inspecting a sample of the test lot. A permanent record of this surveillance shall be maintained in the employer's NDT file.
- 13.2 Any weakness revealed during the over-inspect and surveillance shall be addressed by training, as directed by the responsible Level 3.

14. Records Keeping and Notification:

- 14.1 Formal education, training, qualification and eye examination records shall be maintained on all Levels 1, 2 and 3 personnel. The examination results will be kept on file and available for review for a minimum of seven (7) years after the expiration of the certification.
- 14.2 A list of certified personnel shall be maintained showing examination dates, certification level, method of certification and examination due dates.
- 14.3 Formal education, training, qualification and eye examination records shall be maintained on all Levels 1, 2 and 3 personnel. The examination results will be kept on file and available for review for a minimum of seven (7) years after the expiration of the certification.
- 14.4 Every approved NDT method requiring qualification shall have at least one certified Level 3 per ASNT-TC-1A and NAS 410, and any additional customer certifications. If, for any reason, a certified Level 3 position is vacated, a qualified replacement must be established within 90 days. The Trinity Forge & Machine Quality Manager shall notify customers of any change in Level 3 status within two weeks of the position being vacated.

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