

NDE CERTIFICATION ON AEROSPACE

Prakash, G¹.,Kamaraj, T¹., Loganathan. T¹.

¹ – INICO INSPECTION SERVICES, Delhi & Chennai, INDIA
Ph: +91-9786097766, Email: prakash@inicondt.com

Abstract:

NDE certification is a wide spectrum covering the fields of Nuclear, Oil & Gas, Automobile, Manufacturing, & Construction. There are many different NDT central certification agencies and employer based certification programs, some of the central certification are by ASNT, BINDT, ISNT, etc. The employer based SNT-TC-1A is an ASNT's recommended practice for the qualification and certification of NDE personnel by their employer's, likewise the NDT certification procedure in aerospace industries is based on NAS410 (National Aerospace Standard - 410). It is now 19 years since the issue of the NEW edition and it is more stringent compare to other standards, as the tested components application are serving under adverse conditions. The application of NDT is more critical and important in the aerospace and defence industries. This paper highlights the important aspects of the employer based qualification and certification programme in accordance with NAS 410.

1.0 Introduction/History: As companies in aerospace and defence industry face increasing pressures on their bottom line. A breakthrough innovation has emerged by AIA offering manufacturers unprecedented opportunities, to reduce costs, lower risk, and to engineer smarter. AIA's National Aerospace standards have led the industries in providing manufacturers with the security of knowing that key components in their systems are designed with industries standard parts.

NAS410 is basically originated from MIL-STD-410. In the industrial world NDT operators are trained, examined, and certified by their employers. All the employers who are doing NDT in-house shall have a written practice in accordance with NAS410. The written practice of each individual employer might be different compare to the other employer, but the minimum requirements shall be met.

2.0 Purpose of NAS410: NAS410 standard establishes the minimum requirements for the qualification of personnel performing non-destructive testing, non-destructive inspection, or non-destructive evaluation in the aerospace manufacturing, service, maintenance and overhaul industries.

3.0 Common Methods

The common methods contained in NAS 410 are,

- Liquid Penetrant (PT)

- Magnetic Particle (MT)
- Eddy Current (ET)
- Ultrasonic (UT)
- Radiography (RT)
- Thermography (IRT)
- Shearography (ST)

4.0 Written Practice

“A document that describes an employer’s requirements and methodology for controlling and administering the NDT personnel qualification and certification process”. The employer shall develop and maintain a written practice for the qualification and certification of NDT personnel in accordance with NAS410. The written practice shall address the procedural details necessary for the NDT qualification and certification process, including:

- The levels of qualification and certification used by employer
- Personnel duties and responsibilities
- Training and experience requirements
- Certification and recertification requirements
- Requirements for expiration, suspension, revocation and reinstatement of certification.

NAS 410 demands a company written practice to meet the needs of the purchasers of the employer’s service. The written practice shall be approved by the Responsible Level 3.

4.1 NDT Techniques

The written practice of the employer shall also include the specific technique within each method of qualification/certification.

4.2 Training & Experience Outline

The written practice shall also include the NDT training and experience outline used by the employer. If the employer uses the outside agency to administer the training program, the responsible Level 3 of the employer shall verify that the training meets the employer’s requirements.

5.0 Qualification and Certification Levels

5.1 Levels of Qualification and Certification: The four basic levels of certifications are Level 1 – Limited, Level 1, Level 2 and Level 3. The employer may subdivide, add or limit levels as appropriate, but cannot eliminate or reduce the minimum requirements for each

level. Those levels to be used by the employer shall be documented in the employer's written practice.

5.1.1 Trainee: An individual who is documented as participating in a training program for an NDT method and is in the process of becoming qualified for certification to Level – 1, Level 1 – Limited or directly to Level 2 shall be considered a trainee. Some of the role of trainee shall:

- Obtain experience under the direct observation of a Level 2 or Level 3 in the same method.
- Not make accept or reject decisions.
- Not independently conduct tests.
- Not independently perform any other NDT function.

5.1.2 Level 1 – Limited: Level 1-Limited is a limited certification allowing only the performance of a specific NDT test on a specific part, part features, or assembly. In the technique and method certified some of the role of the Level 1 – Limited personnel shall:

- Be able to follow work instructions.
- Have the skills and knowledge to process parts and document results.
- Have the skills and knowledge to carry out any necessary preparation of parts before or after inspection in accordance with approved work instruction.

5.1.3 Level 1: In the method in which certified, Level 1 individual shall:

- Be able to follow work instructions.
- Have the skills and knowledge to process parts and document results.
- Have the skills and knowledge to carry out any necessary preparation of parts before or after inspection in accordance with approved work instruction.
- Have skills and knowledge to conduct system performance checks in accordance with the applicable process standard.
- When specified in the written practice and approved by the Responsible Level 3, may perform interpretations and evaluations of specific product(s) or product form(s) for acceptance or rejection in accordance with approved work instructions.

5.1.4 Level 2: In the method in which certified, Level 2 individual shall:

- Have skills and knowledge to set up and standardize equipment, process parts, interpret and evaluate for acceptance or rejection, and document results.
- Be capable of providing the necessary guidance and/or supervision to trainees and Level 1 personnel.
- Be familiar with the codes, standards, and other contractual documents that control the method as used by the employer.

- Have a basic knowledge of relevant product manufacturing and inspection technology.

5.1.5 **Level 3:** In the method in which certified, Level 3 individual shall:

- Be capable of assuming technical responsibility for the NDT facility and staff.
- Be capable of selecting the method and technique for a specific inspection.
- Be capable of preparing and verifying the adequacy of procedures and work instructions.
- Approve NDT procedures and work instructions for technical adequacy.
- Be capable of providing or directing training, examination, and certification of personnel.

6.0 Training and Experience

6.1 **Training:** Candidates for all levels shall complete sufficient formal training to become proficient with the principles and practices of the applicable test method and techniques. For example the following table gives the training for PT & MT.

Table – 1: Minimum Formal Training Hours for Level 1 & 2

Method	Level 1	Level 2 with previous Level 1 certification	Level 2 without previous Level 1 certification
PT	16	16	32
MT	16	16	32

6.2 **Previous Training:** For the personnel credited with previous training, or personnel not certified within 12 months of their training, refresher training must be provided. Previous training must be documented to be accepted by the employer.

6.3 **Experience:** Candidates for all levels shall have sufficient practical experience to assure that they will have the capability to perform the duties of the level for which the certification is sought.

Table – 2: Minimum Experience Requirements for Level 1 & Level 2

Method	Experience Time in Hours		
	Level 1 (Trainee experience)	Level 2 with previous Level 1 certification	Level 2 without previous Level 1 certification
PT	130	270	400
MT	130	400	530

7.0 Examination: Examination to verify the technical qualification of candidates shall consist of a general, specific, and practical examination for each method in which the candidate is to be certified and an examination for visual acuity shall also be conducted prior to the candidate's first certification and periodically thereafter.

7.1 Vision:The vision examination for trainee, Level 1 – Limited, Level 1, Level 2, and Level 3 personnel shall be checked to near vision and color perception in accordance with the requirement.

7.2 General:The general examination for all levels shall be a closed book and it shall cover the cross-section of the applicable method at the appropriate level. A minimum of 40 questions shall be administered for the general examination at Levels 1, 2 or 3.

7.3 Specific:The specific examination for all levels shall be an open book covering the requirements and use of the specification, codes, equipment, operating procedures and test techniques. A minimum of 30 questions shall be administered for the specific examination at levels 1, 2, and 3.

7.4 Practical: The practical examination shall consist of a demonstration of proficiency in performing tasks that are typical of those to be accomplished in the performance of the candidate's duties.

7.5 Re-Examination:Candidates failing any general, specific, or practical examination shall receive additional training as determined and documented by the Responsible Level 3 or Examiner before attempting re-examination of the failed exam.

8.0 Conclusion

Almost all the current NDT certification programmes are in line with NAS 410. According to our experience the second party process of NDT qualification and employers responsibility is not fully understood by the employers. NAS 410 certification will play an important role, as there is a growing trend for the aerospace industries in India. The system shall be used in the way it is intended.

9.0 Reference

- NAS Certification & Qualification of Non-destructive Test Personnel.