LIQUID PENETRANT TESTING EXAMINATION |

PROGRAM APPLICABILITY: 2515, 2700 |

57060-01 INSPECTION OBJECTIVES

01.01 To determine whether liquid penetrant testing (LT) | examination procedures used by the licensee or contractor meet the | applicable American Welding Society (AWS)/American Society of | Mechanical Engineers (ASME) Code, regulatory specification, and | contract requirements.

01.02 To determine through direct observation whether LT | examination is being conducted by properly qualified personnel, in accordance with qualified procedures and the licensee's/contractor's approved Quality Assurance (QA) program. |

01.03 To review a sample of records to determine whether records | are prepared, evaluated, and maintained in accordance with | applicable commitments and/or requirements. |

57060-02 INSPECTION REQUIREMENTS

02.01 Procedure Review

a. Review the active LT examination procedure(s) and ascertain | whether it has (they have) been issued and qualified in accordance with the licensee's or contractor's QA program. |

b. Review each special test procedure that deviates from the | technique prescribed in the ASME Code to determine that the | procedure has been qualified in accordance with applicable | Code requirements, and has been approved by the licensee's | authorized inspection agency or that NRC relief has been | obtained in compliance with 10 CFR 50.55a. |

c. Determine whether the LT procedure contains information or | references a general inspection procedure or supplementary instruction sufficient to ensure that the following | parameters are specified and controlled within the limits permitted by the applicable Code and other additional

specification requirements. For each LT examination procedure, ascertain whether essential examination variables are defined and whether these variables are controlled within the limits specified by the applicable Code and other specification/contract requirements. Perform the following evaluation:

1. The specified test method is consistent with applicable Code requirements.

2. The brand names and specific types (number or letter designation if available) of penetrant, penetrant remover, emulsifier, and developer are specified.

3. The penetrant materials used for nickel-based alloys are required by procedure to be analyzed for sulfur using the method prescribed by the applicable Code.

4. The penetrant materials used for examining austenitic stainless steel are required by procedure to be analyzed for total halogens using the method prescribed in the applicable Code.

5. The methods for acceptable examination of surface preparation are specified and consistent with the applicable Code. The area to be cleaned is consistent with applicable Code requirements. The cleanliness acceptance requirements are consistent with applicable Code requirements. The surface area to be examined is consistent with applicable Code requirements.

6. The procedure establishes a minimum drying time following surface cleaning.

7. The method of penetrant application and the penetration (dwell) time are specified and that the penetration time is consistent with the penetrant manufacturer's recommendation.

8. The examination surface temperature is specified and is consistent with the applicable Code.

9. The procedures (when applicable) specify acceptable methods for removing water-washable penetrant consistent with the applicable Code.

10. The method of applying emulsifier (when applicable) and the maximum emulsification time are specified and consistent with the applicable Code.

11. The methods for removing solvent-removable penetrant (when applicable) are specified.

12. The method and time of surface drying prior to developing are specified.

13. The type of developer to be used, the method of applying the developer, and the time interval between penetrant removal and developer application are specified.

14. The examination technique is specified, and the permitted time interval is specified during which the "final interpretation" is performed within the range of 7 to 30 minutes after the developer is applied.

15. Minimum light intensity at the inspection site is prescribed.

16. The technique for evaluating indications is specified, acceptance standards are included, and techniques and standards are consistent with applicable Code and specific contract requirements.

17. Reporting requirements are specified.

18. The procedure requires requalification when changes are encountered in any of the following parameters:

    (a) Surface treatments that may alter the condition of surface openings (blast cleaning, acid etching).

    (b) Change in precleaning materials or methods.

    (c) Change in the type of penetrant materials (including developer, etc.) or in processing technique.

    (d) Change in surface examination temperature limits.

02.02 Work Observation. Observe the performance of LT examination(s) for randomly selected weld samples and conduct the following reviews:

a. Determine whether the applicable drawings, instructions, or travelers clearly specify the test procedure to be used and whether a copy of that procedure is available in the areas in which the work is being performed.

b. Determine whether the sequencing and timing of the examination relative to other operations such as grinding, welding, or heat treating are specified and are in accordance with applicable Code and contract requirements.

c. Identify for subsequent record review the personnel performing the examination and ascertain whether they are qualified to perform the assigned task.

d. Determine whether the required equipment and materials are at the work station. Identify the serial number(s) of materials for subsequent record review and ascertain whether the certifications are available that demonstrate conformance with the applicable sulfur and halogen limitations.

e. Determine whether the specific areas, locations, and extent of examination are clearly defined.

f. Determine whether the following test attributes are as specified in the applicable procedure being used and whether they are consistent with the applicable Code and contract requirements:

1. Surface preparation/cleaning method, type, time, etc.

2. Penetrant type (intermixing of materials from various manufacturers is not recommended).

3. Penetrant application method.

4. Penetration time (dwell time).

5. Temperature of surface.

6. Penetrant removal.

7. Drying.

8. Developer, application, type.

9. Developing time.

g. Determine that the indications are being evaluated at the proper time in accordance with the procedure requirements using the correct acceptance criteria, and are reporting the results in a prescribed manner.

h. Verify that the licensee has nondestructive examination (NDE) indication evaluation process that contains a provision for adequate corrective action or analysis of the indication before plant system startup.

i. Determine whether examined surfaces are cleaned at the conclusion of the examination.

02.03 Record Review

a. Review a sample of qualification records for LT inspection personnel and ascertain whether the qualification records properly reflect the following:

1. Employer's name.

2. Person certified.

3. Activity qualified to perform.

4. Level of qualification.

5. Effective period of certification.

6. Signature of employer's designated representative.

7. Basis used for certification.

8. Annual examination of visual acuity and color vision, and periodic recertification.

b. Review the "certification of contaminant content" for materials identified in paragraph 02.02d and ascertain whether the halogen and sulfur analyses are consistent with the procedure requirements of 02.01c3 and 02.01c4.

c. Review a random sampling of LT inspection records for compliance with the procedure requirements, for recording of examination, for evaluation of data, and for results.

57060-03 INSPECTION GUIDANCE

General Guidance

a. Review applicable portions of the Safety Analysis Report (SAR) to determine licensee commitments relative to NDE of components and equipment. The applicable Code editions and special requirements will generally be indicated in specifications, drawings, and/or QA manuals. The inspector is responsible for determining the acceptance criteria for each individual application.

b. Inspection of LT examination as outlined in this procedure can be described as a three-phase, progressive review: First, a general audit is made of the applicable LT procedure to verify that it is properly prepared, approved and qualified in accordance with the applicable Code and contract requirements. Secondly, the use of the procedure is observed to verify that the work is planned, scheduled, and completed in accordance with the licensee's or contractor's QA program and that personnel performing the examination are properly qualified.

   Finally records are reviewed to verify that they are complete, accurate and retrievable. It is preferable to complete all phases of the procedure during a single inspection. However, this may not always be possible since there may be no LT examination in progress during a particular inspection. Under such circumstances, completion of a specific phase of the procedure may be deferred and then resumed during a subsequent inspection.

c. Findings from this inspection activity should address each element as being satisfactory, being unresolved and requiring resolution, or being in violation and requiring correction. When significant inadequacies are identified indicating possible generic deficiencies, the issue should be addressed at the appropriate level of licensee management.

Specific Guidance

03.01 Procedure Review. The LT examination method described in Section III, V, or XI of the ASME Code is applicable to most conditions encountered during fabrication and inservice inspection. However, the Code recognizes that special conditions may be encountered, which require modification of these techniques. If modified procedures are used, they must be equivalent or superior to the Code techniques. Such special procedures must also be proven by demonstration to be capable of detecting discontinuities to at least the same extent as the applicable Code technique under normal conditions. This applies to all NDE procedures used to meet Code acceptance criteria.

03.02 Work Observation. The actual number and location of welds to be inspected should be selected by the inspector. The number of welds selected for observation should be adequate to permit an effective evaluation of the inspected LT examination activities.

In addition, the sample selection should include such considerations as number of NDE technicians or contractors performing the work at the manufacturing facility or plant site (construction or modification), combination of systems, weld configurations and difficulties involved in performing the required NDE.

03.03 Record Review. Qualification of personnel involved in the performance, evaluation, or supervision of NDE should meet the requirements stated in the applicable codes and standards referenced in the licensee's SAR. Qualification certificates, visual acuity, color vision examination, and periodic recertification should be included in the licensee's or contractor's procedures.

57060-04 REFERENCES

10 CFR Part 50, Appendix B, Criterion IX

ASME Boiler and Pressure Vessel Code Sections III, V, and XI

Society for Nondestructive Testing, Recommended Practice No. SNT-TC-1A and Supplements

ANSI/ASNT CP-89, Standard for Qualification and Certification of Nondestructive Testing Personnel

Regulatory Guide 1.88, Collection, Storage and Maintenance of Nuclear Power Plant QA Records

Regulatory Guide 1.19, Nondestructive Examination of Primary Containment Liner Welds

Regulatory Guide 1.58, Qualification of Nuclear Power Plant Inspection, Examination and Testing Personnel

ANSI N45.2.9, Requirements for Collection, Storage and Maintenance of QA Records for Nuclear Power Plants

ANSI N45.2.6, Qualification of Inspection, Examination and Testing Personnel.

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