UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NRC INSPECTION MANUAL

EMCB

INSPECTION PROCEDURE 57070

MAGNETIC PARTICLE TESTING EXAMINATION

PROGRAM APPLICABILITY: 2515, 2700

57070-01 INSPECTION OBJECTIVES

01.01 To determine whether the magnetic particle testing (MT) examination procedures used by the licensee or contractor meet 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 the MT examination is being conducted by properly qualified personnel, in accordance with procedures and the licensee's or contractor's approved Quality Assurance (QA) program.

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

57070-02 INSPECTION REQUIREMENTS

02.01 Procedure Review

a. Review the active MT 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 or exceeds the range of examination parameters specified by the ASME Code to determine that it has been qualified in accordance with the Code requirements and has been approved by the licensee's authorized inspection agency or that NRC has granted relief in accordance with 10 CFR 50.55a.

c. Determine whether the examination procedure for MT contains information or references a general inspection procedure or supplementary instruction sufficient to assure that the following parameters specified are controlled within the limits permitted by the applicable Code and other additional specification requirements. For each MT 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. Method continuous.
2. Surface preparation.
3. Particle contrast.
4. Surface temperature.
5. Light intensity.
6. Coverage.
7. Prod spacing.
8. Magnetizing current.
9. Yoke pole spacing.
10. Acceptance criteria are specified consistent with the applicable ASME Code section and specific contract requirements.

02.02 Work Observation

Observe the performance of a MT examination for a randomly selected weld sample and conduct the following reviews:

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

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

c. Determine whether the required equipment and materials (as specified in the examination procedures) are available at the work station. Identify materials/equipment serial number(s) for subsequent review of calibration records and certifications as required.

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

e. Determine whether the following test attributes are as specified in the applicable test procedure and are consistent with the limits or ranges given in paragraph 02.01c above.

1. Type and color of ferromagnetic particles.
2. Material surface preparation and cleanliness.
3. Material surface temperature.
4. Examination technique and coverage.

5. Prod condition and usage.

6. Magnetizing current.

7. Prod or pole spacing.

8. Yoke lifting power.

9. Demagnetization.

f. Ascertain whether the indications are evaluated in accordance with the procedure requirements using the correct acceptance criteria, and whether the inspection findings are reported as prescribed.

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

02.03 Record Review

a. Review a random sampling of qualification records for MT 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 calibration records and material certification records for the equipment and materials recorded during the inspection in paragraph 02.02c. Review a random sample of calibration and certification records for equipment and materials listed in the records reviewed in paragraph 02.03c below.

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

General Guidance

a. Applicable portions of the Safety Analysis Report (SAR) should be reviewed 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 MT examination as outlined in this procedure can be described as a three-phase, progressive review: First, a general audit is made of the applicable MT 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 accomplished in accordance with the licensee's/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 this procedure during a single inspection. However, this may not always be possible since there may be no MT examination in progress during a particular inspection. Under such circumstances, completion of a specific phase of the procedure may be deferred and 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 deficiency, the issue should be addressed at the appropriate level of licensee management.

Specific Guidance

03.01 Procedure Review. The MT 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 which 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 scheduled for observation should be adequate to permit an effective evaluation of the inspected MT 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 how difficult it is to perform the required NDE.

03.03 Record Review. Qualification of NDE personnel involved in the performance, evaluation, or supervision of NDE should meet the qualification

requirements stated in the applicable codes and standards referenced in the licensee's SAR. Qualification certificates, visual acuity examination, color vision examination, and periodic recertification should be included in the licensee or contractor's procedures.

57070-04 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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