

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 46071

### CONCRETE EXPANSION ANCHORS

PROGRAM APPLICABILITY: 2512

#### 46071-01 INSPECTION OBJECTIVES

01.01 Determine by review whether adequate quality assurance plans, qualification reports, instructions, and procedures have been established. These documents should be consistent with the licensee's response to IE Bulletin 79-02.

01.02 Determine by observation of ongoing or completed work if licensee commitments are being met.

01.03 Review portions of the as-built facility to determine if construction was consistent with NRC requirements and licensee commitments.

#### Inspection Schedule

##### May Be Started

249

##### Must Be Started

250

##### Must Be Completed

300

It is intended that the requirements of this procedure be applied to construction initiated after issuance of this procedure or, as deemed appropriate, to completion of remaining inspection followup of licensee actions on IE Bulletin 79-02, Pipe Support Base Plate Using Concrete Expansion Anchors.

#### 46071-02 INSPECTION REQUIREMENTS

##### 02.01 Review of QA Program

- a. Ascertain whether quality assurance plans, instructions, and procedures have been established and whether they conform to the QA program described in the SAR.
- b. Review the expansion anchor bolt qualification report and the licensee's response to IE Bulletin 79-02 for consistency to the quality assurance plans and instructions and procedures.
- c. Determine if the procedures, plans, and specifications incorporate licensee commitments and NRC recommendations.

02.02 Observation of Work. Observe ongoing work or completed work in the above activities to determine if the licensee's commitments are being met.

The inspector should independently sample in various areas of construction approximately 200-400 installed and QC-accepted expansion anchors of various bolt diameters by use of calibrated torque wrench to ensure proper tension is being developed in the bolt. Proper torque values may be obtained through the use of site-generated data.

Check to be sure that the QC inspection attributes cover control of specific materials and specific processes or activities listed below.

a. Control of Specific Materials

1. stud bolt and expander ring, nuts, and washers
2. concrete drill bits

b. Control of Specific Processes or Activities

1. anchor bolt hole drilling including depth, perpendicularity to concrete surface, hole size, and rebar damage prevention
2. embedded depth of anchor bolt
3. thread engagement of nut and projected length of bolt above the concrete surface meets acceptance criteria (related to control of anchor bolt embedded depth)
4. initial installation torque to properly set bolt
5. torque-tension relationship of bolt installation
6. proper consideration of oversized holes in base plates (welded washers or bolts preloaded and monitored)
7. minimum edge distance from concrete and steel lined openings
8. minimum spacing between bolts
9. minimum distance from embedded steel
10. bolt marking/stamp and diameter
11. slippage of nut during installation
12. number of washers used on a bolt
13. existence of installed torque seal, if required by project requirements

02.03 Review of As-Built Portions. Review portions of the as-built facility for the applicable activities listed in Section 02.02 to determine if construction was consistent with NRC requirements and licensee commitments. The inspector should independently sample approximately 200-400 installed and QC-accepted expansion anchors of various bolt diameters.

General Guidance. The qualification report such as in response to IE Bulletin 79-02 and applicable portions of the SAR, the SER, and NRR/licensee questions and answers should be reviewed to determine those licensee commitments relative to construction and inspection requirements. The inspector should then utilize these documents during the review of the construction specifications. The implementing QA/QC and construction procedures should subsequently be reviewed with the applicable specification and QA manual in mind. Most of this review can be completed during inspection preparation after these procedures have been obtained from the site.

Before observing the activities included in Section 02.02 above, review the bolt materials and components in storage. Determine the requirements for such things as storage conditions, protection from damage, special preservation requirements, material and component identification, segregation of nonconforming items, and required records.

The inspector may not be able to observe all facets of all work activities in progress; however, direct observation of portions of important activities should be made.

Applicable quality assurance manuals and procedures should be reviewed to determine licensee commitments relative to documenting construction and inspection activities prior to performing this inspection. The adequacy of the licensee's documentation requirements already should have been reviewed. Findings from this inspection should indicate proper implementation of documentation requirements for material certifications, installation inspections, and personnel qualification records. Review of QA audits and nonconformance and deviation records should incorporate an assessment of the licensee's conformance to the reporting requirements of 10 CFR 50.55(e).

The inspector should cover most safety-related construction areas which have supports using concrete expansion anchors at the site such as:

- a. reactor coolant pressure boundary piping
- b. piping
- c. pipe support and restraint systems
- d. mechanical components
- e. heating, ventilating, and air conditioning systems
- f. electrical components and systems
- g. instrument components and systems

### 03.01 Specific Guidance

- a. Inspection Requirement 02.01. The construction specification must translate the design requirements into details sufficient to define the acceptance testing requirements, and it should specify the personnel and interface responsibilities required to define, control, and resolve field problems or design problems that are evidenced during construction.

QA/QC procedures must provide for effective inspections to ensure that work is performed in accordance with specification requirements. Inspections should require verification of specified controls and should not be accomplished merely by surveillance. Laboratory and field testing procedures must provide for verification of correct material usage, correct selection of reference standards, and should prohibit discretionary selection of inspection and testing parameters on the part of

inspectors. Construction procedures must reference the required inspection hold points and must also address the quality assurance department authority to stop work.

- b. Inspection Requirement 02.02. Items selected for observation of work and inspection activities should include the appropriate items listed in Section 02.02 for the specific site design. The review of procedures, specifications, and drawings should ensure that those activities are controlled and performed in accordance with applicable requirements.

#### 46071-04 REFERENCES

IE Bulletin No. 79-02, Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts.

ICBO Report No. 2156, Research Committee Report.

SAR, Chapters 1, 3 and 17, including pertinent codes and standards referenced in the chapter.

Regulatory Guide 1.38, Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage and Handling of Items for Water-Cooled Nuclear Power Plants.

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

Regulatory Guide 1.88, Collection, Storage and Maintenance of Nuclear Power Plant Quality Assurance Records.

Regulatory Guide 1.123, Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants.

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