

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 61720

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### CONTAINMENT LOCAL LEAK RATE TESTING

PROGRAM APPLICABILITY: 2513, 2515 (BASIC)

#### 61720-01 INSPECTION OBJECTIVES

01.01 Ascertain through inspector observation, records review, and independent calculations whether the containment local leak rate test (LLRT) program is being properly conducted.

01.02 Independently verify the acceptability of the test results through on-the-spot analysis.

#### 61720-02 INSPECTION REQUIREMENTS

02.01 Verify that all containment penetration boundaries (CPBs) and containment isolation valves (CIVs) have been local leak rate tested at the required frequency since the previous containment integrated leak rate test (CILRT).

02.02 Determine if the sum of the local leak rates for all boundaries and valves subject to LLRTs meets the acceptance criteria.

02.03 Ensure that the licensee performed the actions required by the Technical Specifications (TS), if the combination of the local leak rates was in excess of the acceptance criteria.

02.04 Review the LLRT procedures and ensure that the following items are included:

- a. All applicable CPBs and CIVs are subjected to local leak rate testing.
- b. LLRTs are performed at CILRT peak pressure except where reduced pressure tests have received prior NRR approval in the TS (e.g., main steam isolation valves or air locks).
- c. LLRT program utilizes approved methods for testing CPBs and CIVs.

- d. Penetration leakage rates are determined using the maximum pathway leakage.
- e. Criteria and response for LLRT and combined leakage rate failure.

- f. Criteria and response for the leakage rate failure of components specifically cited in the TS.

02.05 Review 10 of the licensee's Maintenance Requests performed on CPBs and CIVs since the last CILRT to verify that these repairs/modifications were preceded and followed by LLRTs on the applicable penetrations.

02.06 Observe LLRTs on at least two CPBs and two CIVs and determine if the licensee is properly complying with regulation and procedural commitments.

02.07 Ensure that the test equipment for the LLRTs observed was within calibration at the initiation of the LLRT.

#### 61720-03 INSPECTION GUIDANCE

General Guidance. The purpose of the LLRT program is to provide a continually updated evaluation for the leak-tight integrity of each containment penetration and of the containment as a whole.

Repeated leak rate failures of penetrations or sets of penetrations would indicate either a generic problem with the penetration or a licensee failure to properly maintain containment components. These failures should be addressed to correct the causes of loss of containment integrity.

#### 03.01 Specific Guidance

- a. Inspection Requirement 02.01. The required frequency for performing LLRTs on CPBs and CIVs is provided in the TS. This TS periodicity must be at a minimum as restrictive as the following test frequencies:

##### 1. CPB LLRTs

- (a) Every 2 years following the successful completion of the initial preoperational LLRT for that penetration.
- (b) If opened following a CILRT or LLRT, prior to returning the reactor to a mode requiring containment integrity.
- (c) If the penetration employs a continuous leakage monitoring system, every 3 years or every other refueling outage, whichever comes first.
- (d) Air locks every 6 months and if opened:
  - (1) when containment integrity is not required, at the end of such opened periods.
  - (2) when containment integrity is required, within 3 days of being opened or once every 3 days during periods of frequent openings.

(3) the air lock seal test will not replace the required 6 month LLRT.

2. CIV LLRTs. Every refueling outage or 2 years, whichever comes first.

b. Inspection Requirement 02.02

1. The continuous running sum of local leak rates for all penetrations required to be subjected to LLRTs shall be less than 0.60 La, where:

La = the maximum allowable leakage rate at the calculated peak containment internal pressure related to the design basis loss of coolant accident (Pa).

2. CIVs that are sealed with fluid (e.g., water) from a seal system which has a sufficient inventory to provide a seal for at least 30 days at a pressure of 1.10 Pa are excluded from the combined local leak rate criteria.

No other containment penetrations are excluded unless it can be shown that these penetrations are not part of a potential containment-to-atmosphere leakage path.

3. The method used to obtain the combined leak rate should add the new LLRT results for the penetrations tested and subtract the previous results for these same penetrations to the combined local leak rate sum. Results of LLRTs should be factored into the sum as soon as a set of LLRTs are complete. Extensive lag time (more than 30 days) between the LLRTs and the combined leak rate update should not be permitted. Entry of the plant into a mode requiring containment integrity shall never be permitted until the combined leakage rate is updated.

c. Inspection Requirement 02.03

1. If the combined local leak rate is greater than or equal to 0.60 La, the CPB's and CIVs shall be repaired to restore the combined leak rate to less than 0.60 La prior to entering a mode requiring containment integrity (e.g., increasing the Reactor Coolant System temperature above 200°F).
2. If containment integrity is lost while operating the reactor (e.g., a normally shut CIV fails open), integrity must be restored within 1 hour or the plant shutdown to hot standby within the next 6 hours and cooled down to cold shutdown within the following 30 hours.

d. Inspection Requirement 02.04a

1. All CPBs and CIVs must undergo LLRTs with the exception of fluid sealed CIVs as described in 03.02b2 of this

procedure or those penetrations which are not located in a potential containment-to-atmosphere leakage path.

2. The inspector shall verify that all penetrations listed in the TS are incorporated in the licensee's local leak rate test program.
- e. Inspection Requirement 02.02c. The approved methods for LLRTs are provided below. The test method used must provide a quantitative leakage rate for the penetration in order to determine the combined leakage rate. Tests which provide only a positive or negative indication of leakage are not acceptable, unless, if leakage is detected, they are followed by a quantitative leak rate test on the same penetrations.
1. CPBs
    - (a) halide leak detection test (or similar methods) on a test chamber pressurized with air, nitrogen, or pneumatic fluid which is constructed as part of the individual penetration. (This test method provides only a positive/negative indication of leakage.)
    - (b) measurement of the rate of pressure loss of a test chamber of the penetration pressurized with air, nitrogen, or pneumatic fluid.
    - (c) leakage surveillance by means of any system which continuously or intermittently pressurizes penetrations and measures the pressure loss or the makeup pressurization necessary to return the penetration to its TS specifications. This method uses air, nitrogen, or pneumatic fluid to pressurize the local penetration being tested.
  2. CIVs
    - (a) Testing shall be performed by local pressurization with the pressure being applied in the same direction as it would be when the valve performs its safety function. Pressurization from a different direction is permissible only if it can be proven that this is at least as conservative as the normal testing direction.
    - (b) Each CIV tested shall be closed by normal operation without any preliminary exercising or adjusting of the valve.
- f. Inspection Requirement 02.04d. Only maximum pathway leakage rates will be utilized for the determination of the combined local leakage rate. The maximum pathway leakage rate is based upon the assumption of a single active failure of the better of two leakage barriers in series when performing Type B or C tests. Thus, the maximum pathway leakage rate would be the larger leakage rate of two barriers tested in series or the actual leakage rate measured for barriers tested in parallel.

- g. Inspection Requirements 02.04e and f. LLRT acceptance criteria are provided in the TS. This criteria should be discussed in the test procedures or in administrative or quality assurance procedures with the detailed actions required for test failure included.
- h. Inspection Requirement 02.07
1. All test equipment shall have been calibrated over the normal range of conditions experienced during the LLRT. Correction factors should be determined for each sensing device prior to initiation of the LLRT.
  2. All calibrations shall be traceable to NBS standards.
  3. Calibration of instruments used in the LLRT shall have been performed no more than 6 months before the LLRT. An in-site check of all test equipment shall be performed after installation and prior to pressurization. These checks shall be performed within one month of the initiation of the LLRT.
  4. Though it is generally a good engineering practice to calibrate all test equipment after completion of the LLRT, it is not a requirement. The inspector should determine whether the licensee has committed to post-testing calibration prior to attempting to enforce it.

61720-04 REFERENCES

10 CFR 50, Appendix J.

ANSI N45.4-1972, "Leakage-Rate Testing of Containment Structures for Nuclear Reactors."

ANSI/ANS-56.8-1981, "Containment System Leakage Testing Requirements."

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