

4.4 CONTAINMENT TESTS

Applicability

Applies to containment leakage and structural integrity.

Objective

To verify that potential leakage from the containment and that pre-stressing tendon loads are maintained within acceptable values.

Specification

4.4.1 Operational Leakage Rate Tests

4.4.1.1 Integrated Leakage Rate Tests (ILRT)

- a. Integrated leak rate tests shall be performed prior to initial plant operations at the containment design pressure (P_p) of 42 psig and at a test pressure (P_t) of 21 psig to establish the respective measured leak rates, L_m (42) and L_m (21). The minimum test temperature will be 50°F.
- b. Subsequent integrated leakage rate tests shall be performed at intervals specified in 4.4.1.1.g at an initial pressure (beginning of test) at or above 21 psig (50% of design pressure). The first integrated leak rate test shall be performed at 21 psig and 42 psig.
- c. The test duration shall meet the requirements of 10CFR50 Appendix J, and ANSI N45.4 (1972) for leakage rate measurements, and shall be extended a sufficient period of time to verify, by superimposing a known leak rate on the containment, the validity and accuracy of the leakage rate results.

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The performance of a periodic integrated leak rate test during plant life provides a current assessment of potential leakage from the containment in case of an accident that would pressurize the interior of the containment.

In order to provide a realistic appraisal of the integrity of the containment under accident conditions, this periodic leakage rate test is to be performed without preliminary leak detection surveys or leak repairs and containment isolation valves are to be closed in the normal manner.

The test pressure of 21 psig for the periodic integrated leakage rate test is sufficiently high to provide an accurate measurement of the leakage rate and it duplicates the pre-operational leak rate test at 21 psig. The factor of 0.8 relates the measured leakage of air to the potential leakage of a steam-air mixture. The specification also allows for possible deterioration of the leakage rate between tests, by requiring that only 75% of the allowable leakage rates actually be measured. The basis for these deterioration allowances is arbitrary, but is believed to be conservative and will be confirmed or denied by periodic testing. If indicated to be necessary, the deterioration allowances will be altered based on experience.

As stated in ANSI 45.4 (1972), "The leakage rate test period, for any method, shall extend to 24 hours of retained internal pressure. If it can be demonstrated to the satisfaction of those responsible for acceptance of the containment structure that the leakage rate can be accurately determined during a shorter test period, the agreed-upon shorter period may be used. If an ILRT of a duration less than 24 hours is attempted, the criteria of Section 2.0 of the Bechtel Topical Report NB-TOP-1, Revision 1, will be met. Also, the mass point technique will be used to calculate the leakage rate.

The specified frequency of periodic integrated leak rate tests is based on the following major considerations. First is the low probability of leaks in the liner, because of (a) the test of the leak tightness of the welds during erection; (b) conformance of the complete containment to a low leakage rate limit at 42 psig during preoperational testing which is consistent with 0.1% leakage at design basis accident (DBA) conditions; and (c) absence of any significant stresses in the liner during reactor operation.