

APPENDIX 7.5: Leakproof Insert Pre-shipment Leak Test

EVALUATION OF LPI MODIFICATIONS

Requirement:

To enable pre-shipment leak testing of loaded and sealed leakproof inserts, minor modifications are required. The modification includes adding a second o-ring under the rim of the cap, and drilling a small test port through the rim of the body outside the containment boundary and below the threads. These modifications do not change the containment design, nor change the structural integrity of the leakproof inserts.

Proposed modification and justification:

A modified F-320 leakproof insert is presented here to demonstrate the proposed change.

In Figure 1, the F-320 leakproof insert is shown assembled. The appearance is identical to an unmodified leakproof insert, with exception of the small test port visible. The cap is fully installed and there is no visible gap between the cap and the body. The assembly procedure and post-assembly visual inspection steps do not change.

In Figure 2, the F-320 body is shown with the test port drilled between the threads and the sealing surface. In the design of all leakproof inserts, there is an undercut in the body in this location which permits a hole to be added that affects neither the threads or the sealing surface. In this way, the added test port does not affect the structural integrity of the threaded portion of the body, nor the containment boundary of the sealing surface. The dimensional tolerances of the upper rim of the body are adjusted to ensure a satisfactory compression of the added o-ring and a smooth mating surface for the added o-ring.

Figure 3 shows the F-320 cap with the additional o-ring. The o-ring is of sufficiently small thickness that the cap assembly process is unchanged and the cap seats fully onto the body when assembled, with no gap. Therefore there is no change to the structural integrity of the cap or leakproof insert assembly. The purpose of the added o-ring is to validate the seal of the primary o-ring. The material of the added o-ring is the same as the primary o-ring, and it is replaced prior to every shipment the same as the primary o-ring. Note that the primary o-ring is unchanged, and still acts as the containment boundary for the leakproof insert.

Conclusions:

These changes do not affect the structural integrity of the leakproof inserts, nor the containment boundary of the leakproof inserts. These changes have no effect on strength, impact resistance, leak-tightness, or fatigue resistance. The assembly and visual inspection procedures remain unchanged, with no gap observed between lid and body. There is little visual difference between a modified and an unmodified leakproof insert.

These changes allow a pre-shipment leak test of leakproof inserts after final closure of the cap.



Figure 1: Modified F-320 Leakproof insert, Assembled

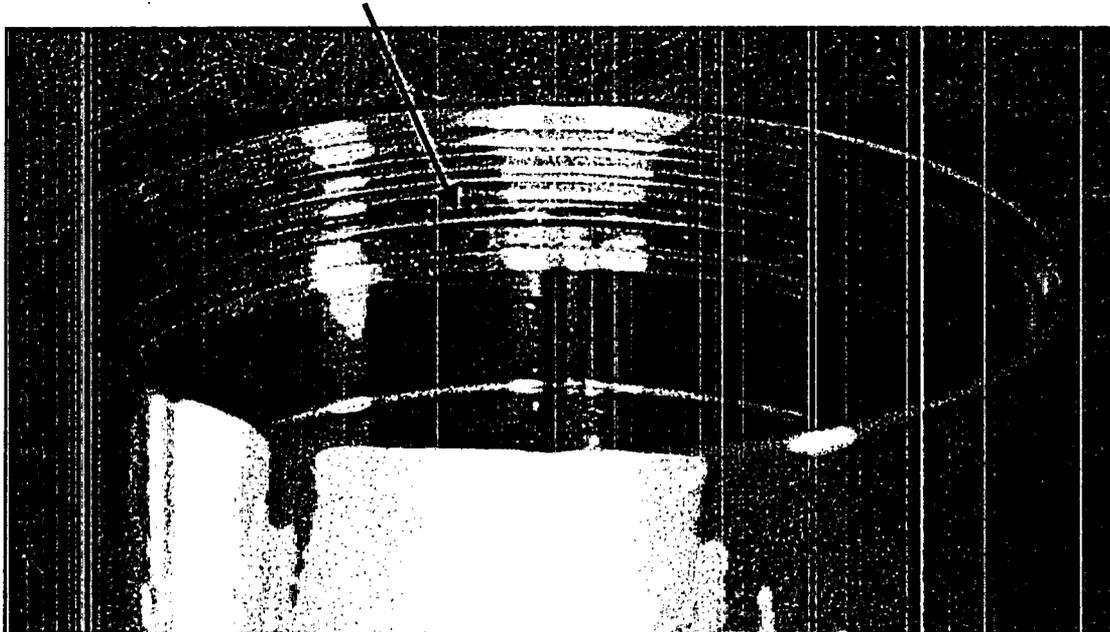


Figure 2: Modified F-320 Leakproof insert Body, with Test Port hole

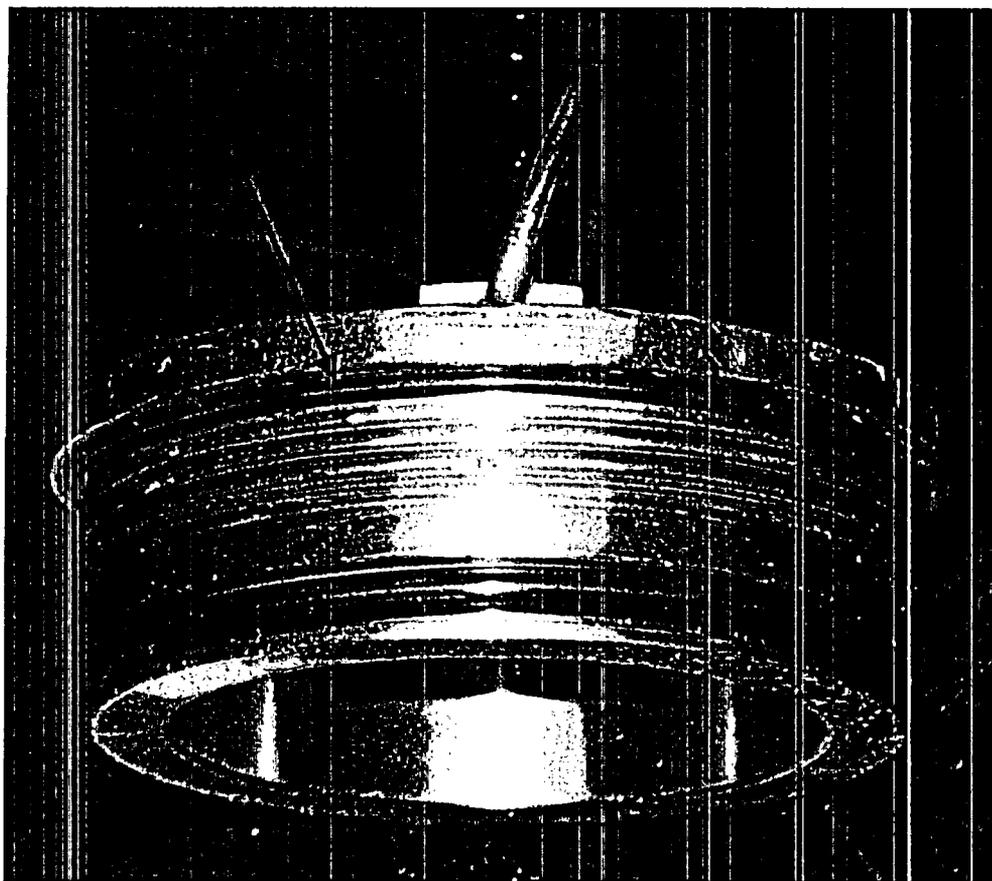


Figure 3: Modified F-320 Leakproof insert Cap, with Added O-ring