

REFRIGERANT PERMEATION TEST PROCEDURE**Application**

This procedure is used to measure the rate at which R-134a or other specified refrigerant permeates HNBR or other specified compressor manifold O-rings at high temperature conditions.

Apparatus Required**Oven**

Standard laboratory oven, temperature range above 100 °C.

Low Temperature Chamber**Balance**

Balance capacity of 3000 g with an accuracy of +/- 0.001 g.

Refrigerant Bomb

Steel refrigerant bomb. See attached drawings.

Materials Required**FS-10 Compressor Manifold O-rings**

Must be made of HNBR material, unless otherwise specified.

Example: Ford Standard Part Number N806959.

Refrigerant Supply**Conditioning and Test Conditions**

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 °C +/- 2 °C and 50 +/- 5 % relative humidity for not less than 24 hours prior to testing and tested under the same conditions unless otherwise specified.

Date	Action	Revisions
2001 09 25	Revised	Editorial – no technical change A. Cockman
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Procedure

A. Charging

1. Make sure no residue remains in refrigerant bomb from previous testing. After bomb is cleaned, handle it only with clean gloves.
2. Chill refrigerant container AND bomb for 2 hours at - 40 °C.
3. Pour 4.0 +/- 0.5 cc of test refrigerant into the bottom of the test bomb. For example, this quantity of R134a will provide approximately 1.73 MPa pressure at 100 °C given our bomb volume of 78.3 cc. Different amounts of refrigerant may be used to provide different pressures. Invert the container when dispensing so that the refrigerant can be dispensed in the liquid phase.
4. Place the FS-10 compressor manifold O-ring to be tested in the groove of the body top half section of the bomb, making certain that it stays centered.
5. Immediately place the top half section of the bomb onto the bottom half section and tighten the bolts securely to prevent leakage of the refrigerant.
6. Allow the assembled bomb to come to room temperature and make sure that no condensed moisture is on its outer surface.
7. Record the total weight of the assembled bomb/O-ring/refrigerant assembly.

B. Testing

1. Heat age the bomb at 100 °C.
2. After 22 hours of aging, remove the bomb from the oven.
3. Cool at room temperature for 2 hours. Check for leaks by weighing (Step 4). The initial check (at 22 hours) is to verify that there are no gross leaks in the fixture.
4. Weigh the cooled bomb assembly and record the initial weight.
5. Repeat the steps above, weighing the bomb twice weekly. Record the number of hours elapsed at each weighing. Plot data until weight loss reaches a steady state. Take at least five readings total.
6. Calculate the refrigerant loss over the steady state period (in grams). Then calculate the annual permeation rate (in grams per year).
7. Open the bomb in a fume hood, only after it has cooled.