Understanding
The 1071.9
Radioisotope Red Dye
Leak Testing

JEDEC
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IsoVac Engineering, Inc.
MIL-STD-750E T/M 1071.9

4. Test Condition A

“radioisotope wet gross leak test”

Application

1. To detect very large gross leaks
2. For devices smaller than 0.02 cc
3. Detect gross leaks dry gas test misses
4. Catch leaks missed by visual inspection
5. Combines visual and Kr85 detection
6. Commonly applied to < 0.05 cc parts

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Equipment & Materials

Krypton$^{85}$ Pressurization System
Kr$^{85}$ Concentration $> 100$ $\mu$Ci/atm cc
Pressure/vacuum container
Red-Dye Solution (Mineral oil base + red dye)
Acetone
Screen-strainer
Funnel
Erlenmeyer Flask
4.2 Testing Process

- 4 steps in the 1071.9, 4.2 procedure.
- All 4 steps must be followed in order to assure the best success for this test.
- Proper “Red-Dye” material must be used to assure Kr85 “Gettering” and/or visible detection of ‘very-large-leaks’.
- Experience has suggested the application of this procedure to packages to 0.05cc that could have missed ‘Visual Inspection’
Step 1: Parts are placed in a metal container
Parts are covered with red-dye

Sufficient red-dye is added to cover the devices.
Container is placed in a pressure/vacuum chamber.

- - The type of chamber is not critical - -

The chamber needs to have a capability of being evacuated, (using a ‘Roughing-Pump’), and then pressurized with air to 45 psia (min).

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While devices are submerged in Red-dye Chamber is evacuated, (roughing pump) for 10 minutes, (to remove trapped air) from leaking device, and/or cavities Parts are then pressurized with air, (45psia minimum) for 10 minutes.
Parts are removed from chamber and placed in a screen strainer and red dye recovered back into red-dye container.
Screened container is set into a large funnel. The red-dye is then washed off of the parts using acetone in a squirt bottle.
Parts are spread out onto a white towel and parts that are visibly bleeding red-dye are removed as rejects.
Step 2

Good parts are placed in a pan and run through a Kr85 leak test - (12 min @ 45 psia min)

• Parts must be measured for Kr85 within 5 minutes.
• Any device that reads 500 counts per minute (net), is a reject.
Step 3
Parts are then spread out onto a white surface and red dye leakers are removed.
Step 4

If any rejects are detected in steps 1-3, the lot shall be re-run through steps 2-4.

This re-test has been found to detect rejects as many as two times in very bad lots of micro parts.
Step 1 of 1071.9, 4.2, is also commonly used for failure analysis to identify the leak site.

The following pictures are examples of the application of step one.

Leak sites are usually identified microscopically @ 30X
TO – 18 Weld Leak
Can weld leak, (failed dry-gross)
Identified by red-dye
LED Seal leak
Weld Leak
Pin-Glass Seal Problem
Weld Leak
Dye on feed-through after “Step 1”
0.002 cc Impatt Diode