Microflex Technologies

MICROSEAL™ MODULAR SURFACE MOUNT SEAL TEST SUMMARY

Tests were conducted according to section 5.9 of SEMI Guide to Performance Specifications and Test Methods for Sealing Systems, which address the mechanical aspects of the sealing system for 1.125 and 1.5 inch gas distribution system components.

Performance Test	Acceptance Criteria	Performance
Material Cr/Fe Ratio Oxide Thickness (less carbon) **Surface Roughness / Defects**	316L VIM VAR Cr/Fe ratio > 2.0 CrO Thickness > 20 angstroms 10 micro inch / less than 25 defects per location	>0.004% Sulfur content Cr/Fe ratio 2.5 CrO thickness (less Carbon) 35 angst. Less than 1micro inch / less than 1 defect per location
Leak Tests, Design Pressure (5000 psig)	Outboard leakage: <1 x 10^{-9} atm·cc/sec He	Outboard leakage: <7 x 10^{-11} atm·cc/sec He at 100 psig after exposure to 5000 psig
Pressure Tests-Proof at 7500psig **Burst** Test (hydrostatic)	No hydrostatic test fluid shall be visible. Inboard leakage: <7 x 10^{-11} atm·cc/sec He	No hydrostatic test fluid visible. Proof parts leak tight <7 x 10^{-11} Burst at > 20,000 psig
Vibration-MILSPEC 810E Sec 1 Category 1 **Shock** – Drop test in 25G increments	Inboard leakage: <1 x 10^{-9} atm·cc/sec He after testing No Spec on Shock	Inboard leakage: <7 x 10^{-11} atm·cc/sec He after MIL-SPEC 810E Sec 1-3 category 1test. Shock exceeding >294G's – No leaks
Pre-load Safety Factor	Inboard leakage: <1 x 10^{-9} atm·cc/sec He at 80% and 120% of manufacturers' specified torque setting.	Inboard leakage: <7 x 10^{-11} atm·cc/sec He at 10, 15, 24, 30, 36, and 48 in/lbs torque.
Repeatability-Make and remake substrate with 20 sets of new seals.	Inboard leakage: <1 x 10^{-9} atm·cc/sec He after 20 re-make cycles.	Passed Inboard leak: <7 x 10^{-11} atm·cc/sec He at each make and remake and after 20 re-make cycles. Tested at 10, 24, and 48 in/lbs torque
Torsion	Inboard leakage: <1 x 10^{-9} atm·cc/sec He after testing at 50,75,and 100 ft/lbs.	Inboard leakage: <5 x 10^{-11} atm·cc/sec He after torque test.
Temperature Cycling	Inboard leakage: <1 x 10^{-9} atm·cc/sec He after temperature testing. Three sets of two port seals room temperature, 100°C, room temperature, -10°C; five cycles	Inboard leakage: Passed leak test <7 x 10^{-11} atm·cc/sec He at each temperature.
Temperature Shock Test	Shock 200°C to -196°C	Shock test +200°C to -196°C (direct insertion into Liquid N2) No Leaks at <7 x10^{-11} atm·cc/sec He
Compression Load Test	Compress from .062 to .050 inch Measure Load	Standard Seal - 685 lbs Low Load Seal - 618 lbs

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