

Torr Seal Specifications

Absorption

0.30% (water, 24-hour immersion)

Acid Resistance

Withstands SF₆ at 25 °C

Adhesion

Will not adhere to Teflon, Kel-F, nylon nor polypropylene

Carcinogenic

Does not contain any of the carcinogens listed in the OSHA Standards of November 29, 1975

Color

Off-white

Combustion

(Gasses emitted at normal temperatures) NO_x, CO₂, H₂O, CO

Compressive Strength

10,000-psi ± 20% (at 25 °C)

Corrosive Properties

Corrosive to copper when uncured; non-corrosive when cured

Cure Time

24 hours at 25 °C, 2 hours at 60 °C

Dielectric Strength

350 volts/mil

Dissipation Factor

0.09 (at 25 °C, 1 kHz)

Expansion, Linear

30.3×10^{-6} in/in/°C (at 30 °C to 90 °C)

Flash Point

175 °C

Flexural Strength

11,000 psi ± 20% (at 25 °C)

Fungus Resistance

Very high

Hardening Time

1 to 2 hours at 25 °C, 30 minutes at 60 °C

Hardness

75 – 80 Shore D

Outgassing

See table below for typical sample at various temperatures

Temperature, °C Cumulative Pumping

Time in hrs

Outgassing Rate

T-l/cm²/sec

25 1 1.0 x 10⁻⁵

25 40 7.5 x 10⁻⁷

116 (for 3 hrs) 43 7.0 x 10⁻⁵

135 (for 9 hrs) 52 8.0 x 10⁻⁶

130 (for 14 hrs) 66 2.0 x 10⁻⁶

Heat of Reaction

Very slightly exothermic

Pressure Range

Suitable for use in pressures of 10⁻⁹ Torr and below

Pot Life

55 minutes (100 grams at 25 °C)

Radiation

Similar epoxy resins have been tested to 10¹¹ ergs of gamma radiation without noticeable effect. Torr Seal is a rigid epoxy resin (as opposed to other epoxies which have plasticizers added); all rigid epoxies are relatively impervious to damage from radiation (as compared to other organic materials such as silicone rubber, phenolics and polyesters)

Resistivity, Volume

3.52×10^{14} ohms/cm (at 25 °C)

Shear Strength, Tensile (on an aluminum lap joint)

at 25 °C, following 7 days at -45 °C, 2150 psi

at 25 °C, following 7 days at 25 °C, 2000 psi

at 25 °C, following 7 days at 80 °C, 1900 psi

at 80 °C, 800 psi

100% relative humidity, long-term, 1900 psi

immersed in alcohol, 0.5 hour, 1600 psi

after 24-hour room temperature cure, 800 psi

Shelf Life

12 months minimum from date of shipment from Varian

Shrinkage, Linear

0.00125 in/in (at 25 °C)

Specific Gravity

1.6

Temperature

-45 °C to 120 °C; cracks at LN₂ temperatures

Tensile Strength

5000-psi ± 30%

Thermal Conductivity

10.4×10^{-4} (cal/sec)/(cm² °C/cm)

Toxicity

Known in cured product - none

Viscosity

Thick non-flow paste