



### 330-VACSEAL-S

## Vacseal® High Vacuum Leak Cement - UHV Compatible Additional technical information

### Background:

Vacseal is a silicone based thin film cement. It was developed to seal the tip off in the manufacture of vacuum picture tubes and to seal around terminals in environmentally sealed switches and relays. It has many uses such as the assembly of front panels on cathode ray tubes and the mounting of windows on gas lasers.

Vacseal is a highly effective cement for creating vacuum tight, low vapor pressure bonds between materials of widely differing thermal expansion properties. Stress generated by differences in thermal expansion properties are absorbed by Vacseal, meaning that this cement is able to maintain an effective seal over extremes in temperature from liquid helium to 450°C, possibly higher.

For example, a quartz window can be cemented to a stainless steel port and be subjected to a temperature range of 50°C to 250°C provided the diameter does not exceed 2" (50 mm). Where the expansion differences are more moderate, as between quartz and borosilicate glass, the range can be extended from below -200° C to 400° C, and in diameters of 4" (10 mm). The closer the expansion match, the more tolerant the seal.

Naturally, these are estimations as to what one should expect, in this kind of application, but the customer is the one that has the sole responsibility for conducting the appropriate level of testing to ensure the suitability for any particular application.

Vacseal is also useful for the sealing of ground joints, creating a bakeable, demountable, sealed off system. This is possible because of the extremely low vapor pressure of the final cured . Ground joints are bonded together by preheating both parts (the temperature is not critical, but should be high enough to flash off the solvents), and then apply Vacseal® II, then pushing the parts together with a twisting motion. When cool, it becomes a strong vacuum tight seal.

Again, we stress that for this kind of application, but the customer is the one that has the sole responsibility for conducting the appropriate level of testing to ensure the suitability in a particular application.

### Application:

The quality of the seal is affected by the care used in fitting the mating surfaces. Vacseal is not a bulk cement and cannot be used to fill voids. In order to achieve a true thin film bond, surfaces to be joined must have a near perfect flatness. When the contact areas have been properly fitting and cleaned, apply Vacseal to both surfaces to be joined with a small pipette or glass rod, heat for 30 minutes at 150°C to drive off the volatile solvents, assemble and cure.

### Curing:

Raise the temperature to 250° C for one hour. At this point, a "green cure" has taken place. If heating is continued to 300° C or above, a "hard cure" will form. It is a less compliant bond than the "green cure". If the sealed surfaces have been well-fitted, it will withstand bakeout temperatures. The "green cure" is recommended for high expansion materials or where severe bakeouts are not required. The cement may be cured at room temperature but requires a period of several days.

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All data given in this sheet are carefully checked but are open to change at any time.



**Removal:**

Uncured Vacseal can be removed by wiping with any standard hydrocarbon solvent. Removal of cured cement requires methyl ethyl ketone (MEK) or some other solvent of similar strength.

**Shelf life:**

We are often times asked about shelf life. The official shelf life for which the is guaranteed is two years. However, we have had reports of Vacseal produced thirty years ago still being efficacious in terms of sealing a vacuum leak.

We know that in many such instances, while it might not perform exactly as it would if new, it would perform good enough.

**Resistance to helium (He):**

This is another frequently asked question. Just remember that He diffuses so easily, that it will diffuse easily through a 0.25" (6.25 mm) thickness of Pyrex® glass. Of course, He will not diffusion through stainless steel. But Vacseal end up being cured silicone resins, and yes, there will be some very slow diffusion of He through it. However, all that we have been led to believe suggests that the diffusion rate is indeed very low and that one would need an exceptionally sensitive device for such low levels to be detected.

**Handling:**

Caution Flammable: Vacseal contains silicone resins in oxygenated solvents. Keep away from sources of ignition. Use only in a well ventilated area. May irritate eyes. Avoid contact with skin. Avoid breathing of vapors. Store away from heat in a tightly closed container.