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HPS 59801

Hernon® Porosity Sealant (HPS) 59801 is a low viscosity liquid sealant designed for sealing interfacial leak paths in flexible electronic assemblies. It may also be used to enhance dielectric strength or seal porosity in passive materials. The dual-cure system incorporated in **HPS 59801** offers the advantage of elevated temperature curing or curing at room temperature.

HPS 59801 is typically applied with a vacuum impregnation process that removes air from the internal void and then saturates the part with liquid sealant. In the absence of circulating air, the liquid rapidly polymerizes to form a tough, flexible, thermoset polymer that permanently seals gaps in the assembly. Excess liquid sealant is rinsed from the outside of the part with an aqueous solution effectively leaving no surface build up. Parts processed with **HPS 59801** are sealed internally but remain cosmetically and dimensionally unchanged. Typical applications include sealing or unitizing over-molded electrical components against leakage of air, water, coolants, oils and other fluids. As a good insulator, **HPS 59801** may also be used to improve the dielectric strength across gaps between high voltage conductors.

Product Benefits

- UV fluorescence for in-process inspection.
- Flexibility – Polymerizes to form a tough, flexible, thermoset polymer.
- Dual cure system
- High speed processing – impregnation cycles of 25 minutes with 1-to-3-hour room temperature full cures.
- Economical – quick room temperature cures coupled with efficient utilization of resin allows for excellent process economics.
- Reliability – hardened resin exhibits superior chemical and physical elevated temperature resistance and pressure sealability.
- Simplified processing of treated parts – immediate painting or machining of impregnated parts is possible because **HPS 59801** resin treatment leaves no residue on part surfaces.
- Good adhesion to plastics and metals

Typical Sealing Applications

- Connectors
- Thermally cycled coils
- Wire terminations in PC board
- Plastic inserts in PC board
- Housings
- Sealed enclosures
- Signal harnesses

Typical Properties (Uncured)

Property	Value
Resin	Dimethacrylate ester
Appearance	Amber liquid
Viscosity @ 25ºC, cP	30 to 45
Specific gravity	1.02
Flash point	See SDS

Typical Properties (Cured)

Physical Properties

Property	Value
Shore Hardness, D Durometer ISO 868	25 to 30
Temperature Limit, Continuous, ºC	110
Temperature Limit, < 24 hours, ºC	150
Tensile Elongation (%)	19
Tensile Modulus (psi)	245
Compressive Modulus (psi)	418
Coefficient of Thermal Expansion	7.3×10^{-4}

Electrical Properties

Property	Value
Dielectric Strength, kV/mm, IEC 60243-1	46
Dielectric Constant @ IEC 60250 1 kHz	3.84 3.61 3.23

Typical Environmental Resistance

Data shown herein should not be used in place of actual part testing. Sealing performance depends as much upon the surrounding substrate as it does upon the sealant. The parent material provides substantial protection against oxygen and pressure loads. Smaller pores, longer leak paths and lower differential pressures yield better durability. The testing described herein provides standard comparisons of **Hernon®** sealants on a consistent interface. Predicting the performance of real-world applications using extrapolations from this data is not recommended. The performance of any sealant should be experimentally validated against the specific demands of a particular application, preferably using actual production methods.

Durability Performance
Standard test pieces were sealed with **HPS 59801** and subjected to accelerated life testing under adverse conditions. The test specimen was 3.2 mm thick FC0208 sintered powder metal of 6.8 g/mL density (12% porous substrate). Samples were tested at 4 atmospheres internal pressure. Leak rates were measured using volume/time at pressure under water. Initial leak rates were over 10,000 mL/minute.

Environment	ºC	% of Initial Leak	
		500 hours	1000 hours
Unleaded Gasoline	23	0	0
21% Oxygenated Air	23	0	0
21% Oxygenated Air	121	<0.01*	<0.01*
Motor Oil (10W-30)	121	0	0
ATF (Dexron III)	121	0	0
Water/glycol 50/50	121	0	0
Brake Fluid (Dot 3)	121	0	0

* Leak too small to quantify.

High Temperature Resistance
At temperatures above 160ºC, organic polymers may react with available oxygen. In porosity, the surrounding substrate typically protects the sealant from air. Oxidation may cause the sealant to discolor without compromising the seal. Exterior surfaces are affected first; therefore, cross-sections that are thicker than 3.2 mm enjoy proportionately higher resistance. Applications that include working fluids other than oxygenated air resist elevated temperatures better.

Environment	Exposure	% Leak
Condensing Salt Fog, 40ºC	1000 Hours	0
Thermal Cycling, -40ºC to + 121ºC, 2 Hour Period	500 Cycles	<0.01
Sulfuric Acid, pH 1	24 Hours	0
Sodium Hydroxide, pH 13	24 Hours	0
Hot Strength, 100 psi Air	Part at 176ºC	0

* Leak too small to quantify

General Information

This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or other strong oxidizing materials.

For safe handling information on this product, consult the Safety Data Sheet (SDS).

Directions for use

Porosity sealants typically require catalyzation and must be handled with chemically compatible materials and equipment. Use of process equipment designed, built and maintained to **Hernon**® standards is recommended to ensure consistent performance.

1. Typically, a basket of parts is submerged in sealant. Air is expelled out of the porosity under vacuum.
2. A pressure increase causes the sealant to flow into the pore. Ambient pressure is typical but may be augmented.
3. The basket is lifted and spins to reclaim excess sealant.
4. The parts basket is washed in water with agitation as necessary to achieve good cleaning.
5. Parts cure and dry at room temperature.

Consult a **Hernon**® Porosity Sealing Specialist for specific application assistance, process development and equipment selection.

Anaerobic Cure Mechanism
HPS 59801 is anaerobic, curing in the absence of air where confined, to form a thermoset polymer. Several factors influence the cure rate of the **HPS 59801** system – chemical, thermal, and ionic activity.

Chemically, **HPS 59801** is accelerated by introduction of **Hernon**® **Accelerator 28** to the main resin tank. Conversely, addition of more un-accelerated **HPS 59801** bulk to the main tank lowers the overall system activity. An alternate chemical influence is exerted by the addition of **Hernon**® **Stabilizer 27** to inhibit reactivity. Also, the presence of oxygen, introduced by aerators, inhibits the cure rate.

Alternatively, **HPS Stabilizer 50991** can be added to the activated resin to slower the reaction when metal concentration at the environment is high.

The higher the system temperature (greater thermal energy) – the quicker the reaction of the impregnation system. Less energy or cooling slows reaction rates.

The activity of metals and other ionic properties of parts in contact with the **HPS 59801** influence cure rate. Highly reactive materials like brass a copper promote faster cure rates. Whereas less active materials like stainless steel are slower.

Elevated Temperature Cure
HPS 59801 cures to form a thermoset polymer when exposed to elevated temperatures. Thermal content and coefficient of thermal transfer in the workpieces influence the cure rate of the **HPS 59801** system.

Higher temperatures produce quicker cure rates. **HPS 59801** cures within the range of 177ºF (80ºC) to 205ºF (96ºC).

Proper cure requires the workpiece to uniformly attain full cure temperature. Parts that do not transfer heat well will be required longer processing times. Efficient thermal conductivity yields shorter processing cycles. Parts with heavier cross sections require longer exposure at heat to attain sufficient temperature internally. Carefully consider part geometry.

Disposal of Waste

Wastes generated during the impregnation process can, in general, be adequately handled by conventional biological treatment methods. Since both the circumstances of use and local environmental_requirements vary, waste disposal recommendations are somewhat application specific.

Storage

Prior to activation, **HPS 59801** should be stored in a cool, dry location in unopened containers at a temperature between 46ºF to 82ºF (8ºC to 28ºC) unless otherwise labeled. **Activated resin must be stored under refrigeration at a temperature of 40ºF ± 5ºF.** Optimal storage is at the lower half of these temperature ranges. To prevent contamination of unused material, do not return any material to its original container.