

GPS 996T

Product Description

Hernon® GPS (Graphite Plate Sealant) 996T is a single component electron beam or heat cure impregnation sealant formulated especially for Bipolar plates in fuel cells. **GPS 996T** outperforms all impregnation sealants currently used in the industry for this purpose.

Low surface tension of the sealant allows it to penetrate the smallest pores in graphite plates and offers excellent washability. High Tg and hardness help graphite plates to keep their performance and shape at high temperatures as well as increase the life of the plates.

UV traceability of the sealant helps for quick inspection of the plates.

Product Benefits

- Single component
- Excellent Washability, no need for washing surfactant.
- High Hardness.
- Excellent water and glycol resistance
- High heat resistance
- Bonds to graphite
- Overcomes sulfide contamination in graphite.
- Can be cured with electron beams or heat.

Physical Properties (Uncured)

Property	Value
Resin	Acrylate blend
Appearance	Clear– Light Yellow
Viscosity @ 25°C, cP	5 to 20
Specific gravity	1.05
Surface Tension, Dynes/cm	30
Flash point	See SDS
Cure mechanism	Heat or electron beam
Typical cure temperature	80 °C -95 °C

Typical Properties (Cured)

Property	Value
Hardness, Shore D, ASTM D2240	90-95
Glass Transition Temperature (°C)	160 to 170

Fuel Cell Graphite Plate Impregnation Process:

Bipolar plates used in the fuel cell are made of expanded Graphite compressed together with about 40 to 50 percent porosity. These pores are sealed by impregnating the plates with low viscosity resin.

Impregnation Process

The process consists of putting the plates in stainless steel tank, then the tank is closed and vacuum of 29 inch of mercury applied, the duration of vacuum id varies.

Then the vacuum valve is closed and valve on the resin tank is open and the resin in pulled to the vacuum chamber, further pressure can be applied to push the resin further to the pores.

Then parts are lifted and rotated to remove the excess resin from the surface of the plates.

After spinning plates are immersed in the mixture of surfactant and water to be cleaned.

The surface of plates almost contains 70 percent of the resin, this resin with surfactant creates an emulsion that cannot be dumped in the sewer, is very costly to get rid of this emulsion.

HERNON SOLUTION

The periphery HERNON formula will solve this problem. **GPS 996T** does not need any surfactant to be washed from the surface of the plates. After the plates are washed the resin will separate from the water by itself (for a faster process, by centrifuge). The wash water can be reused, and the resin can go to the resin tank.

Directions for use

GPS 996T requires catalyzation and must be handled with chemically compatible materials and equipment. For electron beam curing, no activator is required.

Liquid **GPS 996T** cures to form a thermoset plastic by free-radical polymerization reaction when initiated by exposure to elevated temperature. **GPS 996T** can be polymerized at temperatures between 80°C-95°C. When determining adequate processing times, the transfer characteristics of the parts being processed must be carefully considered.

Hernon® Technical Data Sheet

GPS 996T

Effective cure time should be measured from the time the entire parts reach the desired curing temperature.

Typical Environmental Resistance

Sealing performance depends as much upon the souring substrate as it does upon the sealant. The resin provides substantial protection against oxygen and hydrogen pressure loads. Smaller pores, longer leak paths and differential pressures yield better durability. The performance of any sealant should be experimentally validated against the specific demands – preferably using actual production methods.

Resin can be activated as follows:

To achieve a gel time of 3 to 10 minutes at 90°C, **Vazo Initiator 52 or 64** can be added to **GPS 996T** at approximately %0.25 by weight.

Alternatively, this table below can be used to activate the resin.

GPS 996T	VAZO Initiator
1 Gallon	8.5 grams
5 Gallon	47.5 grams

Mix the Resin and Initiator thoroughly until completely dissolved before use.

Vazo™ Initiators come in a solid form and are safer to use than conventional peroxide curing systems. Vazo™ products come in a variety of “curing” temperatures to fit production needs. Consult with Hernon for help in selection of a product to complement a given production process.

Impregnation system reactivity is monitored by measurement of the Gel Time of a small -controlled sample of resin taken from the system. The following operational parameters are presented as a “typical” scenario to assess cure rate of the impregnation process and system:

1. Keep Resin at temperatures between 60°F-80°F (15.6-26.7 °C) in Tank.
2. Gel Time at 194°F (90°C) should be in the range of 3-10 minutes when activated.

GPS 996T has been formulated to produce Gel Times in the 3-10 minutes range @ 194°F (90°C). Should the Gel Time be above 10 minutes contact **Hernon®** Customer Service.

Higher temperatures produce quicker cure rates. **GPS 996T** cures within the range of 177°F (80°C) to 205°F (96°C).

Proper cure requires the workpiece to uniformly attain full cure temperature. Parts that do not transfer heat well will require 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.

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).

Disposal of Waste

Waste 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

GPS 996T should be stored in a cool, dry location in unopened containers at a temperature between 45°F to 85°F (7°C to 29°C) unless otherwise labeled. **Activated resin must be stored under refrigeration at a temperature of 40°F ± 5°F.** 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.

GPS 996T in an active impregnation system with normal use has unlimited pot life if recommended controls are maintained, including temperature controls. Do not allow continuous exposure to ultraviolet light. **GPS 996T** does not require aeration.

These suggestions and data are based on information we believe to be reliable and accurate, but no guarantee of their accuracy is made. HERNON MANUFACTURING®, INC. shall not be liable for any damage, loss or injury, direct or consequential arising out of the use or the inability to use the product. In every case, we urge and recommend that purchasers, before using any product in full scale production, make their own tests to determine whether the product is of satisfactory quality and suitability for their operations, and the user assumes all risk and liability whatsoever, in connection therewith. Hernon's Quality Management System for the design and manufacture of high-performance adhesives and sealants is registered to the ISO 9001 Quality Standard.