



# GraphiSeal™

## For Graphite Impregnation

Low viscosity liquid precursor resin used to infiltrate / seal porous graphite, carbon-carbon composite components and similar porous substrates used in harsh environments. Impregnations followed by air curing 220<sup>0</sup> C ( 430<sup>0</sup>F) and then high temperature processing >400<sup>0</sup> C ( 750<sup>0</sup>F) in non-oxygen environment ( Nitrogen, vacuum, etc) for minimum of one hour will extend and enhance the performance of a graphite or composite components through improved oxidation, wear and corrosion resistance. One or more impregnation cycles will fill internal porosity ( increase density) and further result in a thin film barrier on the surface. For additional enhanced properties GraphiSeal can be combined with particulate fillers ( copper, zinc phosphate, silicon, carbon, ceramics-*ie.*, SiC, alumina, boron nitride) to modify both internal and coated surface properties.

### Attributes of GraphiSeal:

- Low viscosity ( < 10 cps), air stable liquid
- Low odor
- Hard cures at 220°C in air followed by high temperature processing in nitrogen or non oxygen environment; to at least 850°C to form a glassy ceramic.
- Compatible with most metals, ceramic powders, inorganic fillers and carbon or ceramic fibers
- Solvent free

### Processing of Porous Graphite and Carbon / Carbon Composites:

1. Remove any loose dust or debris and any other liquid contaminates such as machining oils, water based materials
2. Coat dry clean surfaces with GraphiSeal or GraphiSeal+fillers. Graphite or CC Composite can be brushed or spray coated. Multiply applications may be necessary as GraphiSeal will rapidly be absorbed into any open porosity and thus to insure maximum filling of porosity and that a light coating remains at the surface. GraphiSeal is a very low



viscosity liquid so it is recommended that thick parts be submerged to allow GraphiSeal to fully penetrate open porosity, this can be accelerated via vacuum impregnation.

3. GraphiSeal requires heat to cure but can also be catalyzed ( EEMS offers a range of catalysts upon request ) to facilitate room temperature cure over night or accelerate thermal curing. Once catalyzed GraphiSeal will begin to cure and shorten pot life; length of time dependent on level of catalyst loading.
4. Remove excess resin place components into a drying oven or furnace (for large parts) and slowly ramp temperature to 220<sup>0</sup> C ( 430<sup>0</sup>F) and hold at temperature for minimum one hour, or longer for overly thick or large parts. Curing can take place in an air environment. An inert or non-oxidizing environment can also be used to cure components and particularly if one desires to process further to convert GraphiSeal to ceramic for improved high temperature performance.
5. To convert GraphiSeal to a glassy ceramic thermal processing must be done in a non-oxidative environment ( nitrogen, vacuum, etc) above 400<sup>0</sup> C ( 750<sup>0</sup>F). Once processed at high temperature, additional coatings and thermal processing may be needed for highly porous materials to achieve desired end result.
6. NOTE: during thermal processing some out gassing will occur, adequate ventilation is required. For additional guidance contact EEMS for further assistance.

**Packaging:**

Available in quart, gallon, 5 gallon containers and drums.

**Warranty: The data provided relates only to the product noted above. The information is correct to the best of our knowledge, CeraMaterials does not guarantee any properties. Because conditions and methods of use of our products are beyond our control, this information should not be used as a substitution for users own tests to ensure that CeraMaterials' products are safe, effective, and fully satisfactory for the intended end use. CeraMaterials' sole warranty is that the product will meet sales specifications in effect at the time of shipment.**

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