

# ApexShield 1000 Resin System

## DESCRIPTION

Cambium’s phthalonitrile based resin system with a high char yield for ablative and carbon-carbon applications. The system is designed to significantly reduce the number of polymer infiltration and pyrolysis (PIP) cycles for carbon-carbon part fabrication. Cambium’s Thermal Protection Resin System has a low melt viscosity that is ideal for Vacuum Assisted Resin Transfer Molding (VaRTM) or Resin Transfer Molding (RTM) applications. The system is room temperature stable and does not require freezer storage.

## APPLICATIONS

- Ablatives
- Precursor to carbon-carbon thermal protection

## ADVANTAGES

- Room temperature stable, no refrigerated storage required
- Low melt viscosity (35 - 1000 cP)
- Char yield 78%

## PRODUCT FORMATS

- Neat Resin

## NEAT RESIN PROPERTIES

Property	Method	Value
Density	ASTM D792	1.23 g/cc
Char Yield	TGA	78%
Tg (Dry)	ASTM D7028	418°C / 784°F

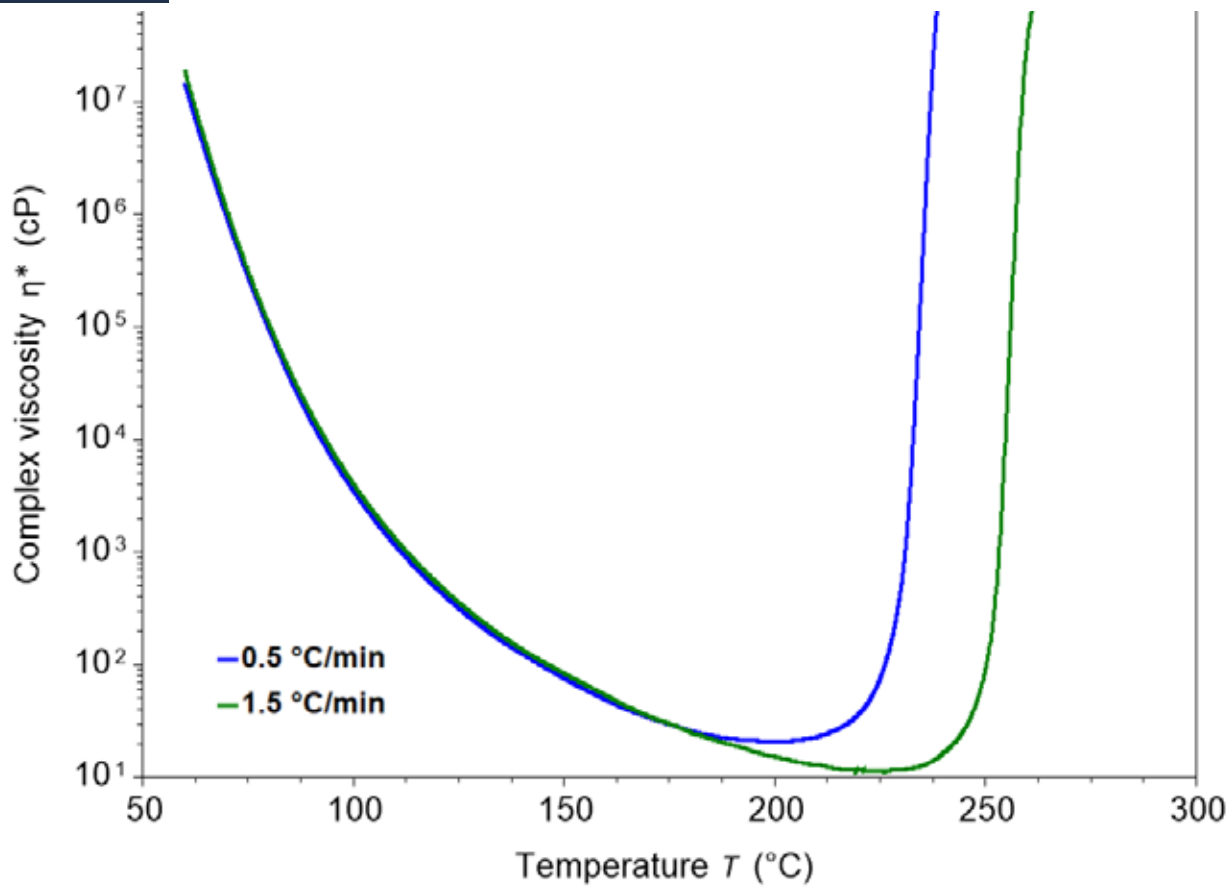
## WORKING LIFE

Temperature	Min. Viscosity	Time
130°C	225 cP	700 hours
150°C	75 cP	125 hours
170°C	35 cP	25 hours

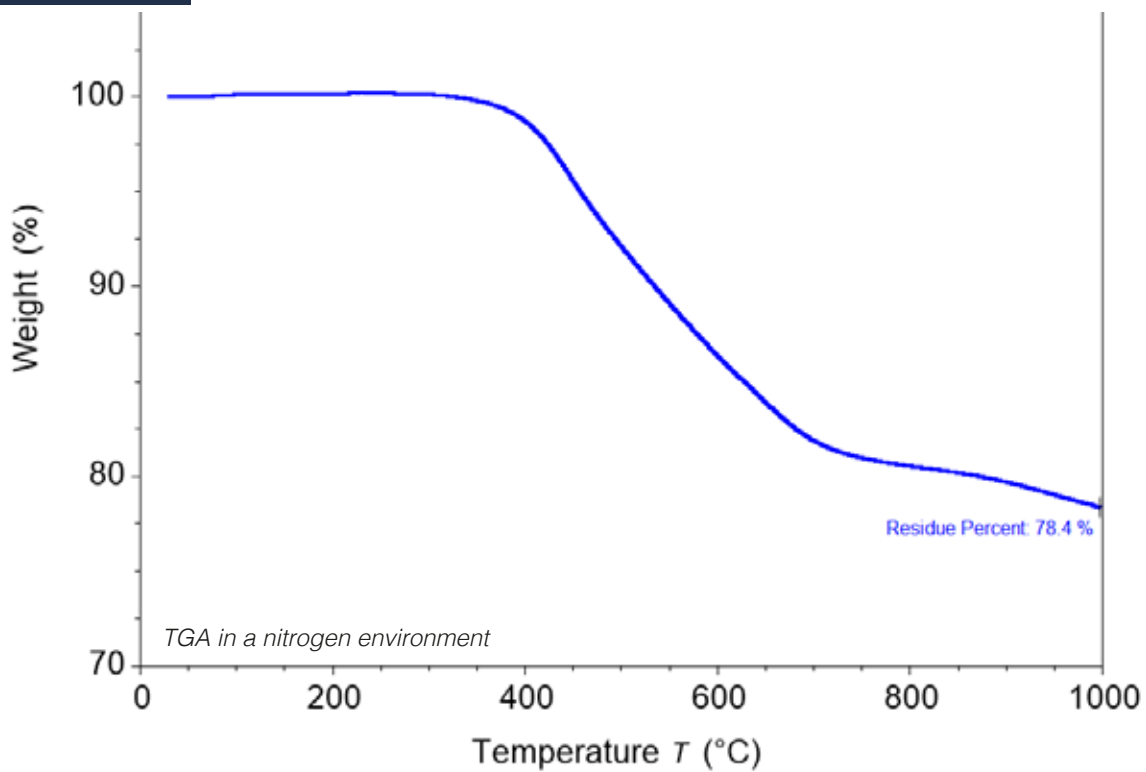
Working life is time where viscosity <1000 cP



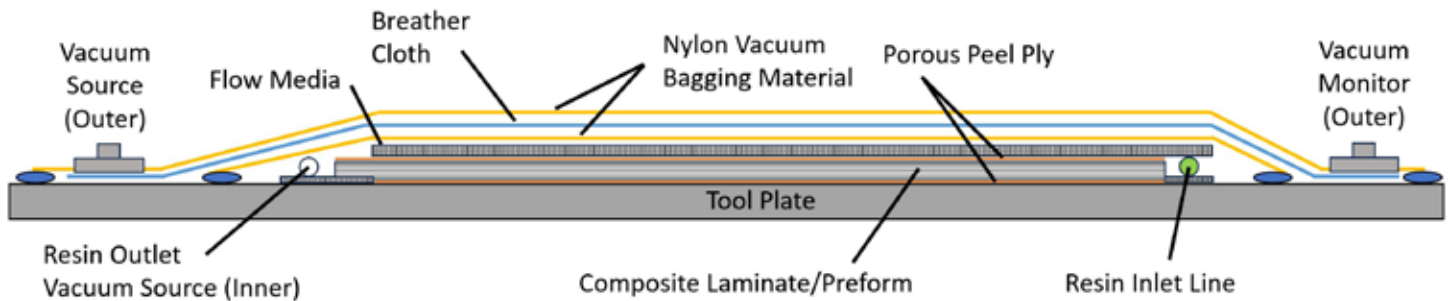
### RHEOLOGY



### TGA, 1000 °C



## VARTM BAGGING



## SUGGESTED PROCESSING PARAMETERS

1. Connect temperature rated vacuum and infusion lines and apply full vacuum to the resin pot and inner bag. Maintain active vacuum and ramp to 150°C at a rate of 1-3°C per minute.
2. Hold at 150°C +/- 3°C under vacuum for a minimum of 2 hours to allow resin to melt and degas.
3. Maintaining resin pot and tool temperature of 150°C begin resin infusion. Depending on infusion process adopted, tooling design and part geometry/ complexity, sufficient time, and/or vacuum should be established to ensure complete fiber wetting.
4. Once the tool is filled with resin, close or clamp the inlet and outlet lines of the inner bag. Apply full vacuum to the outer bag to apply compaction pressure.
5. Ramp to 215°C +/- 3°C at a rate of 1°C per minute.
6. Hold at 215°C +/- 3°C for 6 hours.
7. Ramp to room temperature at a maximum of 3°C per minute.
8. Remove the assembly from the oven and unbag the material.

## FREE STANDING POST CURE

1. Ramp to 350°C +/- 3°C in an inert environment at a maximum of 3°C per minute.
2. Hold at 350°C +/- 3°C in an inert environment for a minimum of 4 hours.
3. Ramp to room temperature in an inert environment at a maximum of 3°C per minute.

*The above cure parameters have been defined using the viscosity profile information and Cambium's experience of molding development and demonstration panels. Some parameters may require adjustment depending upon the nature of the part being molded and the equipment being used. For larger or thicker parts, some parameters may require adjustment to avoid the risk of exotherm. Different injection equipment may require alternative conditions for degassing.*

### Sales & Technical Support Contact:

sales@cambium-usa.com  
www.Cambium-USA.com



## USA MADE

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