



Product Overview

P²SI 900HT is an easily processable, thermally stable, addition cure polymer the *highest glass transition temperature of commercially available structural matrices*. This system exhibits exceptional toughness, superb dielectric properties, low toxicity, and maintains mechanical integrity even after exposures in excess of 1300°F (704°C).

P²SI 900HT was engineered for applications requiring mechanical integrity at temperatures above 1000°F for limited times with good dielectric behavior. This system is available in a variety of product forms, including resin solution coated textiles and molding powder. P²SI 900HT has been manufactured on carbon, quartz, and glass textiles. It has a robust cure cycle, low melt viscosity, and good toughness.

Key Features

- **Glass transition temperature of ~900°F (tan δ)**
- **No carcinogenic components**
- **Good toughness and microcrack resistance**
- **Hydrolytically stable**
- **Excellent dielectrics**
- **Processable via autoclave, compression molding, or some liquid molding processes**
- **Suitable for fiber tape placement processes**
- **Shelf life (prepreg): 8 months at 0°F or 12 days at 70°F**
- **Shelf life (powder): 2 years**

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Typical Dielectric Properties

AstroQuartz[®] III/P²SI 900HT Laminate

Property	Value
Loss Tangent	0.020
Dielectric Constant	3.1

Typical Physical/Thermal Properties

P²SI 900HT Resin Properties

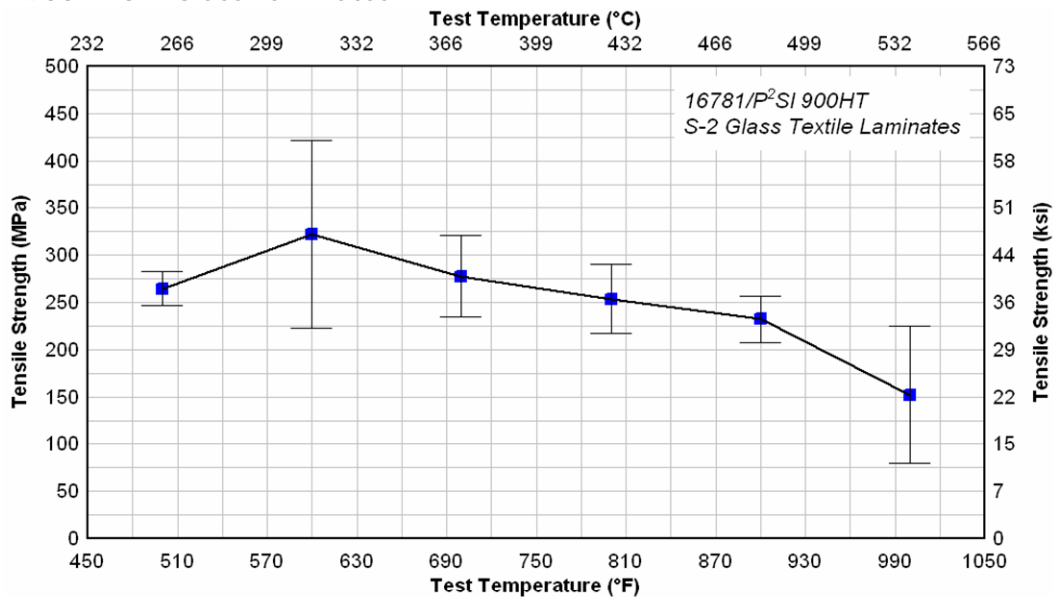
Property	Value
Glass Transition Temperature (tan δ)	489°C (912°F)
Glass Transition Temperature (E')	451°C (844°F)
Mass Density	1.35 g/cm ³

Typical Mechanical Properties

AstroQuartz[®] III/P²SI 900HT Laminate

Property	Exposure Condition	Value, ksi (MPa)
Flexural Strength	none	98.0 (676)
	1300°F/1 minute	71.4 (492)
Interlaminar Shear Strength	none	8.7 (60.0)
	1300°F/1 minute	9.0 (62.0)

16781/P²SI 900HT S-2 Glass Laminates



T650-35/ P²SI 900HT Tape Laminates

Property	Test Temperature	Value, ksi (MPa)
Flexural Strength [0/90] _{6S}	600°F	199 (1371)
	650°F	169 (1164)
	700°F	159 (1095)
Double Notch Shear Strength [0] ₄₈	75°F	8.3 (57)
	600°F	6.8 (47)



Process Cycle

Description: The following process cycles are recommended for textile-reinforced P²SI 900HT prepregs within the following physical specifications:

Fiber: Astroquartz [®] III Textile Style: 4581 Textile Finish: 3059 Prepreg Resin Solids: 33-39% Prepreg Volatiles: 9-16%	Fiber: S-2 Glass Textile Style: 16781 Textile Finish: 1059 Prepreg Resin Solids: 33-39% Prepreg Volatiles: 9-16%	Fiber: T650-35 Carbon Textile Style: 8HS/3K Textile Finish: UC309 Prepreg Resin Solids: 36-42% Prepreg Volatiles: 12-16%
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Autoclave Fabrication

Equipment Requirements

An autoclave capable of achieving 650°F (343°C), 200 psi (1.38 MPa) pressure, and vacuum of 28 in. Hg (709 mm Hg) at the part with multiple vacuum ports. Solvent and water are removed during processing, so chilled vacuum traps are needed for condensate collection. For postcure, a high temperature inert gas furnace capable of achieving 752°F (400°C) maximum temperature and heating/cooling rates as low as 0.5°F/min is required.

General Prepreg Handling and Use

Prior to use, remove prepreg from freezer and allow equilibration at room temperature to avoid moisture condensation. For best results, vacuum debulking is recommended for every 2-4 plies with textile prepregs. Tack can be improved, if desired, by application of a light methanol spray.

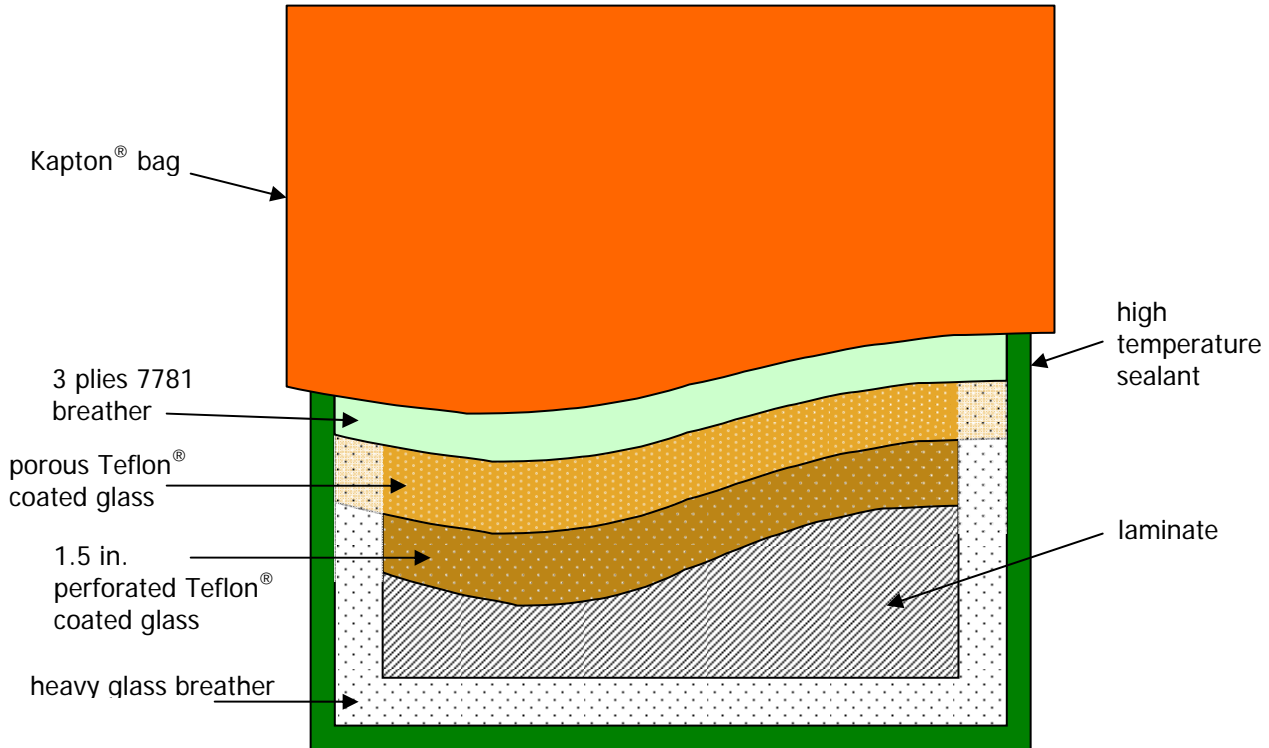
Bagging Materials

- 2 mil (0.051 mm) Kapton[®]HN or Uplix[®] film bag or equivalent
- 7781 breather or equivalent
- perforated (1.5"/38.1 mm) Teflon[®] coated glass fabric
- porous Teflon[®] coated glass fabric
- non-porous Teflon[®] coated glass fabric
- heavyweight glass cloth (boat cloth)
- high temperature bag sealant (Airtech A-800-3G or equivalent)
- Kapton[®] adhesive tape

Bagging Sequence

For flat laminates, we recommend the bagging sequence shown below. Modifications can be made to control bleed for various part geometries.





Cure Cycle

1. Set vacuum at 2-5" Hg
2. Heat at 1.25°F/min (0.69°C/min) to 350°F (177°C)
3. Increase vacuum to at least 28" Hg and maintain through end of cycle
4. Heat at 1.25°F/min (0.69°C/min) to 482°F (250°C)
5. Hold at 482°F (250°C) for 3 hours
6. Heat at 1.25°F/min (0.69°C/min) to 536°F (280°C)
7. Hold at 536°F (280°C) for 1 hour
8. Heat at 2.0°F/min (1.11°C/min) to 620°F (327°C)
 - when lead thermocouple reaches 572°F (300°C) pressurize to 200 psi (1.38 MPa) at the rate of 10-20 psi/min (0.06-0.14 MPa/min)
9. Hold at 620°F (327°C) for 30 minutes
10. Heat at 2°F/min (1.11°C/min) to 650°F (343°C)
11. Hold at 650°F (343°C) for 4 hours
12. Cool at 1°F/min (0.56°C/min) to 500°F (260°C) then maximum rate thereafter
13. Release vacuum and pressure when cool enough to remove from autoclave

Postcure Cycle

1. Place laminate on glass fabric or non-porous Teflon® coated glass to avoid metal contact in the inert gas furnace and purge with nitrogen
2. Heat 10°F/min to 500°F (260°C)
3. Heat 5°F/min to 600°F (316°C)
4. Heat 1°F/min to 650°F (343°C)
5. Heat 0.5°F/min to 700°F (371°C)
6. Hold for 2 hours at 700°F (371°C)
7. Heat 0.5°F/min to 752°F (400°C)
8. Hold for 2 hours at 752°F (400°C)
9. Cool 0.5°F/min to 650°F (343°C)
10. Cool 2°F/min to 600°F (316°C)
11. Cool at maximum rate to room temperature



Compression Molding Fabrication

Equipment Requirements

A hydraulic press capable of achieving 650°F (343°C) and 400 psi (2.76 MPa) is required. An oven capable of achieving 270°C (518°F) is required for solvent-based textiles prior to press fabrication. For out of press postcure, a high temperature inert gas furnace capable of achieving 752°F (400°C) maximum temperature and heating/cooling rates as low as 0.5°F/min is required.

General Prepreg Handling and Use

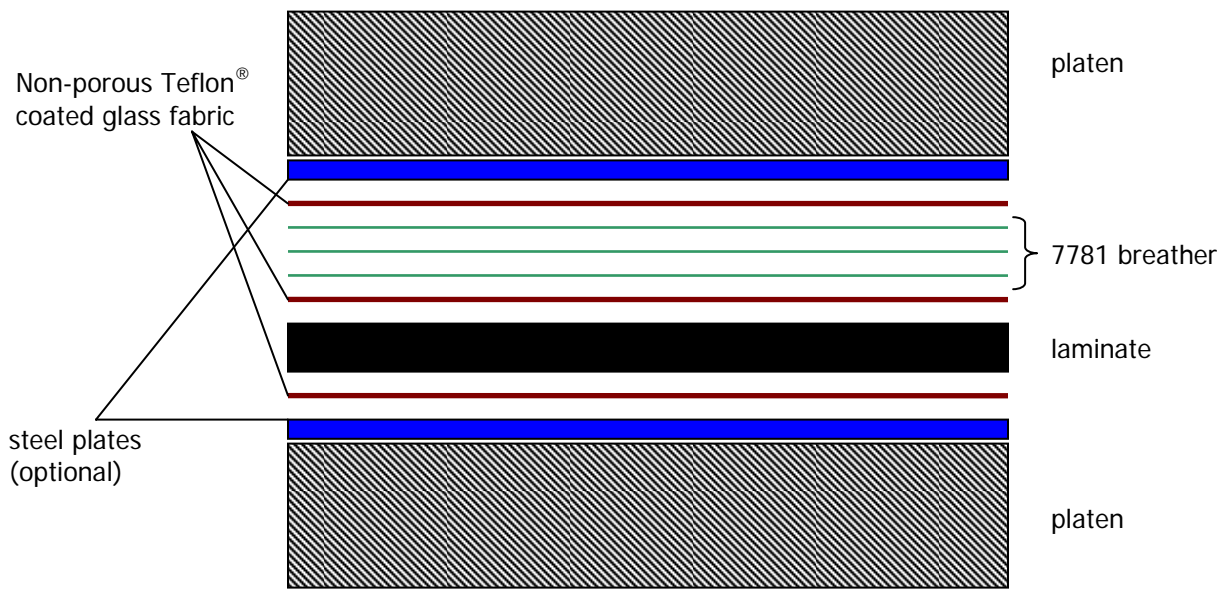
For imidized "tow-preg" based materials proceed directly to the next section. For solvent based broad goods, vacuum debulking is recommended for every 2-4 plies to achieve best results. Place laminate (after hand lay-up) in an air-circulating oven on a sheet of non-porous Teflon® coated glass fabric. Heat at 0.5°F/min to 518°F (270°C) and hold at temperature for 4 hours. Cool at maximum rate and remove from oven.

Bagging Materials

- non-porous Teflon® coated glass fabric
- 7781 breather or equivalent

Bagging Sequence

For open press molding we recommend the bagging sequence shown below.



Cure Cycle

1. Apply contact pressure
2. Heat 10°F/min to 518°F (270°C)
3. Heat 2°F/min to 572°F (300°C)
4. Apply 400 psi (2.76 MPa) and maintain through remainder of cure cycle
5. Heat 2°F/min to 620°F (327°C)
6. Hold for 1 hour at 620°F (327°C)
7. Heat 2°F/min to 650°F (343°C)
8. Hold for 4 hours at 650°F (343°C)
9. Cool 1°F/min to 600°F (316°C)
10. Cool at maximum rate (open below 500°F (260°C) and remove pressure)



Postcure Cycle

The same postcure cycle described for autoclave molded laminates may be used for press molded laminates. If desirable, the postcure may also be completed in the open press rather than an additional postcure step by maintaining pressure (400 psi) and following the heating sequence described previously, beginning with Step 5 in the previous postcure description.

Important Notice

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