Product Overview

F-502 Phenolic Prepregs

Park's F-502 is a MIL-R-9299 phenolic resin system suitable for impregnation on any MIL-C-9084 fabric with a compatible finish. F-502 is used in the manufacture of ablative reinforcements in rocket nozzles, as well as ducting and secondary structures.

Key Features & Benefits

- Provides a combination of high-strength and ablative properties for demanding applications
- Low thermal expansion
- Good Tack and Drape properties
- Conforms to MIL-R-9299 Type B

Product Forms

- Available on a wide variety of reinforcements, including fiberglass, graphite, and quartz.
- Also available as a Molding Compound and Bias Tape
- Solution coated fabrics up to 152 cm wide
- Compatible with Autoclave or Press Molding processes

Applications / Qualifications

- Rocket Nozzles
- Ducting
- Secondary Structures

Qualified Specifications

- GMS4001

For Information about Park's materials:

Newton, KS +1.316.283.6500

info@parkaerospace.com

www.parkaerospace.com

PARK AEROSPACE CORP.

Technical Datasheet

F-502 Phenolic Prepregs

Prepreg Physical Properties

Reinforcement	3K 8HS PAN	12K GA090 UniTape	7628 E-Glass	7781 E-Glass	581 Quartz	Silica
Fabric Area Weight (gsm)	617	300	203	303	475	610
Prepreg Resin Content (%)	32 – 38	32 – 38	36 – 44	31 – 37	33 – 39	31 – 37
Resin Flow (163°C, 103kPa) (%)	10 – 25	5 – 20	20 - 32	5 – 20	5 – 20	10 - 30
Volatiles (135°C, 8 min) (%)	2 – 8	3 – 5	5 – 8	2 – 5	2 – 5	6 – 10
Gel Time (sec)	50-200	50-200	50-100	50-100	50-200	50 - 100

Cured Laminate Physical Properties

Reinforcement	3K 8HS PAN	12K GA090 UniTape	7781 E-Glass	581 Quartz	Silica
Per Ply Thickness	0.016	0.010	0.009	0.012	0.028
Specific Gravity *ASTM-D-792*	1.35	1.45	1.75	1.70	1.7
Hardness (Barcol) *ASTM-D-2583*	75	75	70	75	70
Specific Heat (J/g °C) *ASTM-C-351*	--	--	1.17 *(@ 66°C)*	0.84 *(@ 24°C)*	--
CTE - with ply 27 - 205°C (ppm/°C) *ASTM-D-696*	--	--	--	8.1	--
CTE – x-ply 27 - 205°C (ppm/°C) *ASTM-D-696*	--	--	--	34.2	--

All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a Park representative directly. Park reserves the right to change these values based on a nature process of refining our testing equipment and techniques.

PARK AEROSPACE CORP.

Technical Datasheet

F-502 Phenolic Prepregs

Laminate Mechanical Properties

Reinforcement	3K 8HS PAN	12K GA090 UniTape	7781 E-Glass	581 Quartz	Silica
Cure Cycle	163°C Autoclave	163°C 6900 KPa	163°C Autoclave	163°C Autoclave	163°C 6900 KPa
Tensile Strength, 0° (MPa)					
24°C Dry	614	1551	352	414	89.6
260°C Dry	--	--	331	--	--
ASTM-D-638					
Tensile Modulus, 0° (GPa)					
24°C Dry	59.3	96.5	25.5	24.1	16.5
260°C Dry	--	--	20.0	--	--
ASTM-D-638					
Compressive Strength (MPa)					
24°C Dry	531	690	462	448	165
260°C Dry	--	--	262	--	--
ASTM-D-695					
Compressive Modulus (GPa)					
24°C Dry	64.1	96.5	24.1	24.8	16.5
260°C Dry	--	--	20.7	--	--
ASTM-D-695					
Flexural Strength (MPa)					
24°C Dry	772	--	490	586	159
260°C Dry	--	--	276	--	--
ASTM-D-790					
Flexural Modulus (GPa)					
24°C Dry	55.8	--	24.8	24.1	17.2
260°C Dry	--	--	18.6	--	--
ASTM-D-790					
Short Beam Shear (MPa)					
24°C Dry	33.1	--	--	--	--
ASTM-D-5379					

All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a Park representative directly. Park reserves the right to change these values based on a nature process of refining our testing equipment and techniques.

PARK AEROSPACE CORP.

Processing Guidelines

F-502 Phenolic Prepregs

Prepreg Storage Life

Out Life: 30 days @ 24°C
Shelf Life: 6 months @ -18°C and 3 months @ 4°C (dry)
**Store F-502 Silica at –18°C (dry)

Autoclave Cure Cycle

- Apply 610 mmHg vacuum (minimum) for 1 hour before beginning heat cycle
- Apply 689 KPa autoclave pressure
- Raise product temperature from RT to 121°C at 1 - 3°C/min
- Increase autoclave pressure to 276 KPa, vent vacuum at 103 – 138 KPa
- Hold product at 121 ± 3°C for 30 minutes
- Raise product temperature to 163 ± 3°C at 1 - 3°C/min
- Hold product at cure temperature for 60 – 90 minutes
- Cool to 66°C at no more than 5°C/min prior to releasing autoclave pressure

Optional Post Cure Cycle for High-Temp Applications

- Heat Rise Rate between soak temperature: 1 – 5 °C/min
    - 121°C for 2 hours
    - 149°C for 1 hour
    - 177°C for 1 hour
    - 204°C for 1 hour
    - 218°C for 1 hour
    - 232°C for 2 hours

Note: The following guidelines are provided to assist Park material users with general recommendations for successful processing. The recommendations are for general review purposes only and process adjustments may be required to achieve optimum results in your specific manufacturing environment.

High Silica Phenolic Autoclave Cure Cycle

- Apply 610 mmHg vacuum (minimum) for 1 hour before beginning heat cycle
- Raise product temperature from RT to 93°C at 1 - 3°C/min
- Apply autoclave pressure of 689 KPa, vent vacuum at 103 - 138 KPa
- Raise product temperature to 177°C at 1 – 3°C /min
- Hold product at 177 ± 3°C for 60 - 90 minutes
- Cool to 66°C at 5°C/min prior to releasing autoclave pressure
- Post Cure
    - Heat Oven to 177°C at 1 – 5°C /min and hold for 2 hours
    - Hold product at 204°C for 4 hours

PARK AEROSPACE CORP.