



agy
strength in materials

PRODUCT INFORMATION

933 S-2 Glass® Roving

High-Strength Solutions for Your Toughest Reinforcement Challenges

AGY's S-2 Glass® high-strength fibers are specifically designed to meet your most demanding performance processing and cost requirements. AGY's global network of people and facilities are ready to help you develop innovative solutions to your most difficult reinforcement challenges.

Product Application

933 S-2 Glass roving is designed to be used in aerospace, defense, and recreation applications such as:

- Aircraft Flooring
- Helicopter Blades
- Radomes
- Composite Structures

Product Solutions

S-2 Glass fibers offer a unique combination of properties: strength, impact resistance, stiffness, radar transparency and temperature, and fatigue resistance. Compared with other reinforcing materials, S-2 Glass fibers weigh less than conventional glass fiber and deliver better cost performance than aramid and carbon fibers. In addition, they meet the requirements of MIL-R-60346 Type IV Class 1 specifications.

Product Description

933 S-2 Glass roving consists of numerous G filament (9 microns) continuous glass strands, gathered without mechanical twist and treated with a thermally stable inorganic sizing for high temperature matrices.

Resin Compatibility

- Polyamide
- Polyamide-imide
- Phenolic
- Cyanate Ester
- Polyimide
- Bismaleimide (BMI)
- Modified Epoxy
- Polyetherimide
- Polyetheretherketone
- Liquid Crystal Polymers

Processes

- Weaving
- Filament Winding
- Hand Lay-up
- Compression Molding
- Unidirectional Pre-impregnation



Specified in critical damage-resistant or damage-tolerant structural applications



S-2 Glass Conventional Roving Package

Features	Benefits
S-2 Glass fiber offers significantly more strength than conventional glass fiber: 85% more tensile strength in resin impregnated strands	Consistent high performance for reliable and durable finished parts
Better fiber toughness, modulus of resilience and impact deformation than conventional glass fiber	Improved impact capabilities to finished parts and higher composites durability and damaged tolerance
Softening point: 1056°C (1932°F) Annealing point: 816°C (1500°F) Strain point: 766°C (1410°F)	Greater fiber tensile strength and stability at elevated temperatures in thermoset and thermoplastic applications
Enhanced stiffness	Delivers 25% more linear-elastic stiffness than conventional glass fiber
Excellent tolerance to damage accumulation	The ability of composite parts to withstand high levels of tension and flexural fatigue without catastrophic failure
S-2 Glass fibers deliver 20% reduction in dielectric constant over E-Glass fibers	Radar transparency
Long shelf life, good machinability and excellent durability	Consistent performance and reliability
Quick wet-out (penetration of resin into the strand)	Faster, more efficient processing
Performs as well in certain modified epoxy resin systems where high strength and improved hot/wet tensile strength retention is important	Improved epoxy performance
S-2 Glass fibers facilitate co-mingling and hybridization with other reinforcement, or thermoplastic fibers, including carbon fibers	Improvement in impact resistance and damage tolerance, as well as material cost reduction
The 933 sizing is stable at processing temperatures of 354°C (670°F)	Facilitates molding with high temperature thermoplastic matrices, yielding exceptional laminate mechanical properties

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Properties		
Characteristic (in epoxy)	ASTM Test Method	Values
Impregnated strand tensile strength	D-2343	3.7-4.3 GPa (450-620 ksi)
Horizontal shear (short beam)	D-2344	69-110 MPa (10-16 ksi)
Wet strength retention after - 6 hour water boil - 24 hour water boil	- -	100% 95%

S-2 Glass®/PEEK Laminate Properties ¹			
Property	ASTM Test Method	Unidirectional Composite	Quasi-Isotropic Composite
Tensile strength	D-638	1794 MPa (260 ksi)	614 MPa (89 ksi)
Modulus		59.3 GPa (8.6 msi)	34.5 GPa (5.0 msi)
Strain		3.0%	2.1%
Compressive strength	D-695	1139 MPa (165 ksi)	628 MPa (91 ksi)
		58.0 GPa (8.4 msi)	33.8 GPa (4.9 msi)
Flexural strength	D-790	1415 MPa (205 ksi)	690 MPa (100 ksi)
Modulus		55.9 GPa (8.1 msi)	22.1 GPa (3.2 msi)
Fatigue strength tension	D-3479		
Tension @ 3 Hz, R=0.05	@ 10 ⁴ cycles @ 10 ⁷ cycles		380 MPa (55 ksi) 214 MPa (31 ksi)
Dielectric constant, 10GHz		4.15	
Dissipation factor, 10 GHz		0.0085	
Composite thickness		0.272 cm (0.107 in)	0.419 cm (0.165 in)
Composite fiber volume		60%	62%
Composite resin weight		24%	22%

¹ Unidirectional PEEK laminate at 60%, +/- 3% fiber volume. Data based upon laboratory testing. Quasi-Isotropic (0.90 +/- 45)s.

S-2 Glass is a registered trademark of AGY.

Packaging		
Package #	4057 Rhino Tube	
Descriptions	Metric	English
Outside diameter	17.8 cm	7.0 in
Inside diameter	7.6 cm	3.0 in
Tube length	27.7 cm	10.9 in
Traverse	25.4 cm	10.0 in
Approximate package weight	6.8 kg	15.0 lbs
Pallet Type		
	Carton	
Packages/pallet	60	
Approximate net weight/pallet	408 kg	900 lbs
Pallets/typical truckload	44	

Available Products

Product Identification	TEX	Yards/Pound
933-AA-750	675	735
933-AA-310	1600	310

Glass Composition

"S Glass" - reference ASTM C 162-90, MIL-R-60346, AMS 3832B

Nominal Filament Diameter

G or 9 microns

Solids (% LOI*)

0.15 minimum

0.23 nominal

0.31 maximum

* Loss on ignition after drying

Additional References

Customer acceptance standard: RF-60

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