PREPREG TOUGHNED WITH GRAPHENE
GENERAL DATASHEET

HY E9-150M

HY E9-150M MATRIX SERIES belongs to a thermosetting epoxy matrices family with process temperatures ranging from 80°C to 140°C toughened with **GRAPHENE**; the basic system E9-150 is designed, initially for general applications. The system HY E9-150M is available in several product variants, including one for Flame Retardant and one for electrical applications. The viscosity of the system epoxy matrices offers flexible processing and a range of handling characteristics. HY E9-150M matrix exhibit high mechanical properties and, properly post-cured, can be used at continuous operating temperatures up to 100°C. Higher not continuous operating Temperatures can be supported. The flame retardant matrix is characterized by high Tg and better thermal performance. The system toughened with graphene is commonly used in vacuum bagging, press-molding, autoclave and other pressure molding processes.

Standard Features:	**Features with Graphene:**	
General applications	Excellent mechanical properties	Toughened for impact resistance and peel strength
Excellent handling during lamination	Excellent quality laminate	Abrasion resistant
Good mechanical properties	Excellent longevity	Hard barrier to water and gases and chemical agents
	Suitable for special coating and painting	Hard protecting coating

Typical Applications:	**More applications with Graphene:**
Sport and Leisure	Structural
Automotive	Industrial
Motorsport	Yacht Hulls

Prepreg shelf life :	DAYS @ (21°C)	MTHS @ (-18°C)
	24 tack life 30 out of life	12

Product Variants:

HY E9-150MH: standard, unpigmented Hotmelt

HY E9-150ML rf: light black pigmented

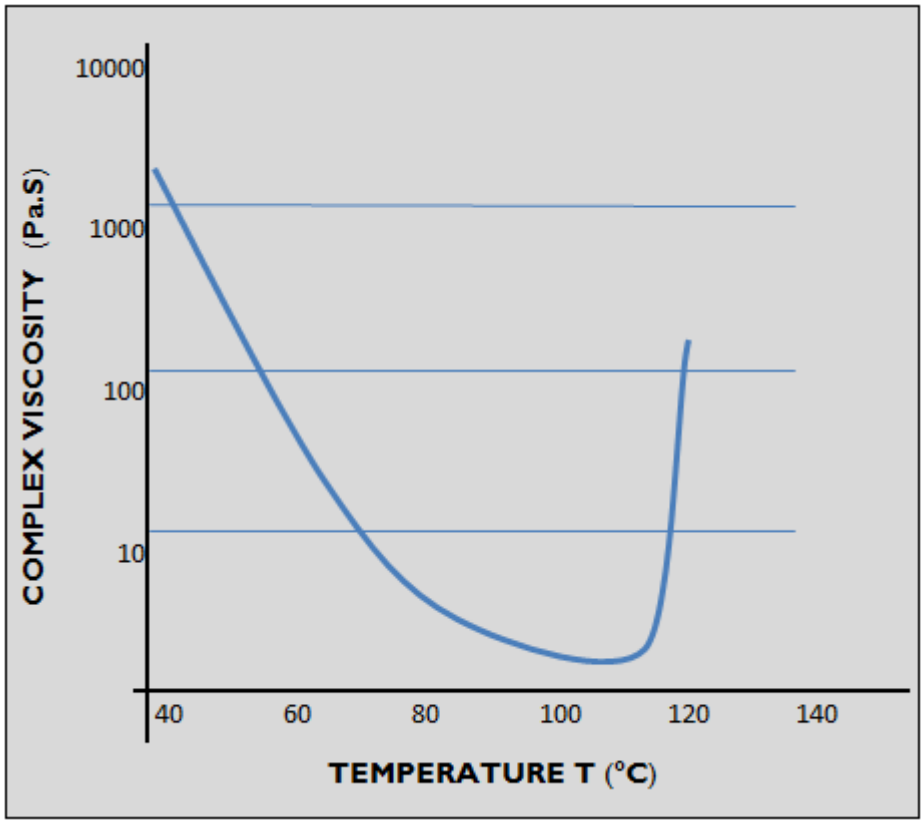
HY E9-150MD rf: heavy black pigmented

HY E9-150ME -L: electrical conductor light black pigmented

HY E9-150ME -D: electrical conductor heavy black pigmented

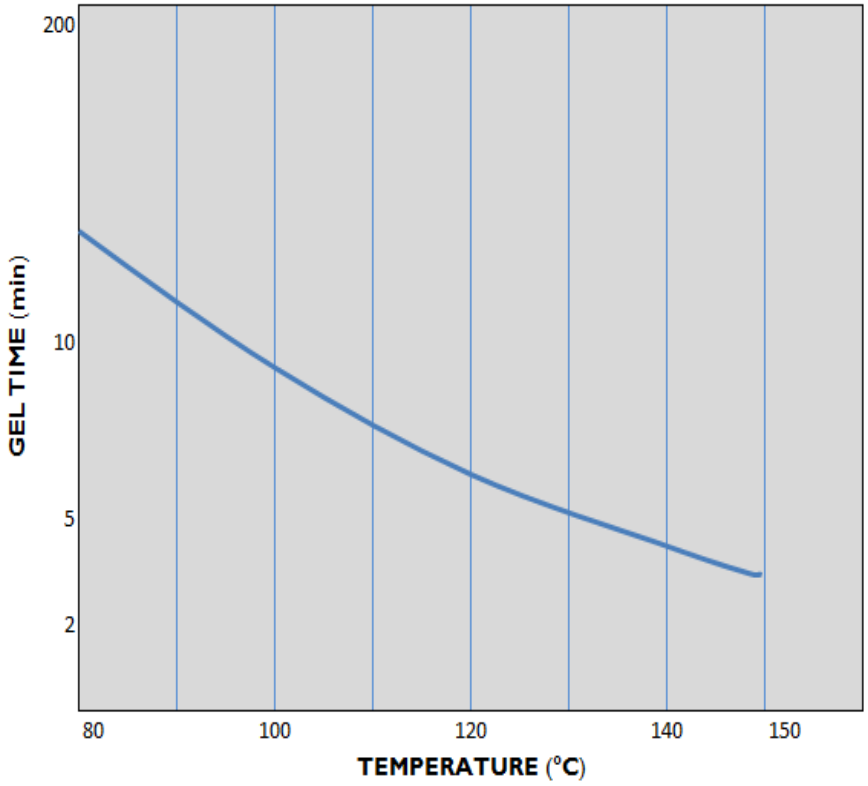
Rheology data:

Viscosity profile HY 109-M conducted at ramp 2°C/min, strain % 0.1, frequency 1.0 Hz



Solvent System HY E9-150M	**Value**
Minimum Viscosity (Pa.S)	2,75
Temperature at minimum viscosity (°C)	111,41

Gel Time (Hot Plate):



Curing Conditions:

Autoclave Cure

Vacuum bag pressure	0.9 bar
Autoclave pressure	4-7 bar(*)
Ramp rate	1÷5 °C/minute
Cure cycle	**60 minutes**@130°C (+5/-0°C)
Cool rate	2÷3 °C/min until 60°C

(*) on a sandwich production, adjust the pressure on core specification to avoid buckling and / or distortion

Press Cure (**)

Press pressure	Minimum 3 bar
Ramp rate	Depending on mold tooling
Cure cycle	**60 minutes**@120°C (+5/-0°C)
Cool rate	Depending on process conditions to 60°C

(**) mould tool attitudes to avoid excessive resin flow is crucial for reducing fabric distortion

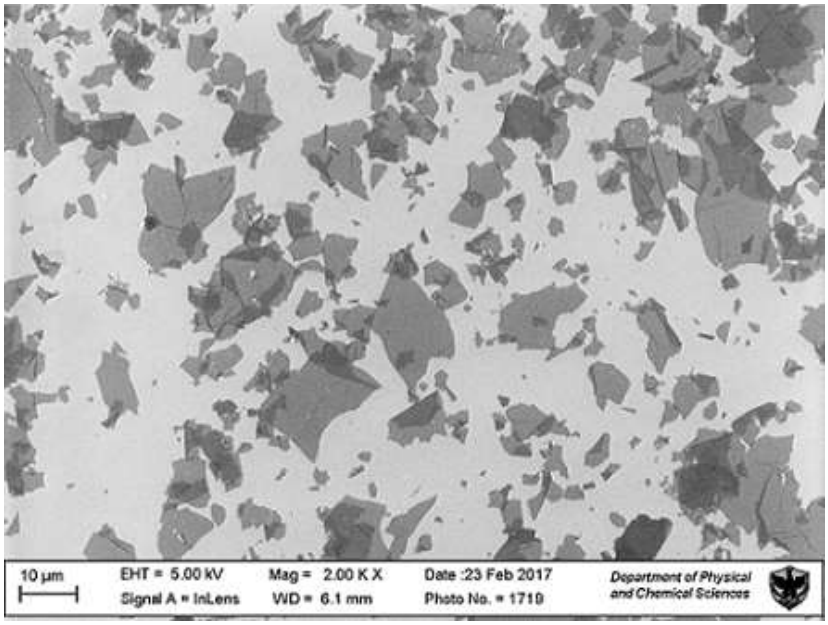
Alternative Cure Cycles and Tg dry: 90'@130°C Tg130-135°C (IEC1006)

Density @RT(average value) 1,25-1,30,g/cm^2 - **60'**@130°C

Laminate Mechanical Properties: GG630TGX Pyrofil TR50, Weave twill 2/2, Fiber12K, Resin Content Rc 37%, Warp and Weft 3,9 Threads/cm , Graphene Content 0,3% - standard vacuum bag processing in autoclave

Cure cycle: Test conditions: 90 minutes at 130°C , 6.0 bar Room temperature, dry Ramp rate: 2°C/min, Cool rate: 3°C/min

	Temp. Amb.	Orientation	Actual Vf (normalized Vf 55%)
Tensile Strength (MPa) ASTM D3039	22	Warp (0)°	970,10
Tensile Modulus (GPa) ASTM D3039	22	Warp (0)°	65,16
Poisson Ratio ASTM D3039	22		0,06
Tensile Strength (MPa) ASTM D3039	22	Warp (90)°	780,20
Compression Strength (MPa) ASTM D6641	22	Warp (0)°	490,11
Compression Modulus (GPa) ASTM D6641	22	Warp (0)°	59,18
In Plane Shear Strength (MPa) ASTM D3518	22	Warp +/-45°	99,50
In Plane Shear Modulus (GPa) ASTM D3518	22	Warp +/-45°	3,33
ILSS (MPa) EN2563	22	Warp (0)°	62,26
Mode I Strain Energy Release G1c (J/m2)	22		989
Flexural Strength (MPa) ASTM D790	22	Warp (0)°	803,21
Flexural Modulus (GPa) ASTM D790	22	Warp (0)°	62,30



Graphene at SEM (Surface dimensions)

Availability:

The HY E9-150M series is available in a wide range of reinforcing fabrics and UD tapes, including carbon, aramid, glass and special fabrics.

Exotherm risk:

This matrix system can undergo severe exothermic heat up during the curing process if incorrect procedures are followed. Great care must be taken to ensure that safe heating rates, dwell temperatures and lay, up/bagging procedures are properly executed, especially when molding solid laminates with more than 8mm thickness. The risk of exotherm increases with lay, up thickness and increasing cure temperature. It is strongly recommended that trials, representative of all the relevant processing parameters, are carried out by the user to allow a safe cure cycle to be specified. It is also important to recognize that the model or tool material and its thermal mass, combined with the insulating effect of breather/bagging materials can affect the risk of exotherm in particular cases. Please contact our technical department for further information on exotherm behavior of these systems.

Storage Conditions:

This prepreg should be stored as received in a cool dry place or in a refrigerator. After removal from refrigerator storage, prepreg should be allowed to reach room temperature before opening the polyethylene bag, thus preventing condensation. A full reel in its packaging can take more than one day.

Precautions for Use:

Please refer to product SDS for up to date information specific to this product.

Note: Hygraner is continuously reviewing and updating literature. Please ensure that you have the current version, by contacting the sales department and quoting the revision number in the bottom left-hand corner of any pages of this document (Issued: 15/02/2018).