Gurit EPOXY

PRODUCT DATASHEET

Gurit

GR210

160°C TEMPERATURE RESISTANT EPOXY FILAMENT WINDING SYSTEM

GR210 has been innovated for the manufacture of high temperature resistant (160°C) filament wound composite structures.

This highly flexible system allows the manufacture of a wide range of wound composite structures such as transmission shafts, rollers, pressure tanks, flywheels and tubular components.

The resin has been specially formulated with low surface tension chemistry for efficient fiber wetting during the winding process. Combined with low drip chemistry, this ensures the production of high-quality wound laminates at high production rates, with low resin dripping or fiber spraying.

Available in a wide range of formats from small pack sizes to drums and IBCs, this system uses long-pot life chemistry enabling stable and controlled viscosity growth over the impregnation process. A flexible cure window allows room-temperature curing and elevated post-curing to achieve maximum thermal resistance.

- High performance structural epoxy filament winding
- High thermal resistance (160°C)
- Low resin drainage/dripping
- Easy fiber wet-out resin chemistry
- Long room temperature bath life for large structures
- Flexible cure window
- Rapid Tg generation at post-cure (30 minutes at 155°C)
- Mix ratio 100:26 by weight

INSTRUCTIONS FOR USE

APPLICATION

The product is optimized for use between 18 - 25°C (64 – 77°F). At lower temperatures the product thickens and may become unworkable. At higher temperatures working times may be reduced. By-product prior to curing may occur at high humidities or after long periods of exposure to the atmosphere.

MIXING AND HANDLING

Accurate measurement and thorough mixing are essential when using this system, and any deviation from the prescribed mix ratios will degrade the physical properties of the cured system.

The resin and hardener must be stirred well for two minutes or more, with particular attention being paid to the sides and bottom of the container. As soon as the material is mixed the reaction begins. This reaction produces heat (exothermic), which will in turn accelerate the reaction. If this mixed material is left in a confined mixing vessel the heat cannot disperse and the reaction will become uncontrollable.

Gurit produces a separate full Safety Data Sheet for each component of this system. Please ensure that you have the correct SDS to hand for the materials you are using before commencing work. A more detailed guide for the safe use of Gurit resin systems is also available from Gurit and can be found on our website at www.gurit.com. Any accidental spillage should be soaked up with sand, sawdust, cotton waste or any other absorbent material. The area should then be washed clean (see appropriate Safety Data Sheet).

APPLICATION

The correct amount of hardener should be weighed and added to the corresponding resin and well mixed. To maximize bath life, and prevent localized gelation or exotherm, only use the minimum amount of mixed resin, and top-up during the process. For further advice, please contact Gurit Technical Support.

CURE SCHEDULE

The system will cure at room temperature, however to achieve maximum mechanical and thermal properties, it is recommended to post cure for 30 minutes at 155°C.

The post cure need not be carried out immediately after winding. It is possible to assemble several composite components and post-cure the entire assembly together, however care should be taken prior to demold as the system may remain brittle until post cured. It is recommended, however, that elevated temperature curing should be completed before any further painting / finishing operations. Furthermore, care should be taken to adequately support the laminate if it is to be post cured after demolding, and the laminate must be allowed to cool before the support is removed.

When postcuring it is recommended to use a ramp rate of 10°C (18°F) / hour when heating from ambient to the postcure temperature, to ensure that the thermal performance of the laminate stays ahead of the oven temperature. Higher ramp rates may result in the resin softening and distortion of the part.

HIGH HUMIDITY DURING WINDING

Although the recommended ambient relative humidity remains <70%, As mechanical properties are highly dependent on the processing method, Gurit recommends that a test laminate is manufactured and evaluated in representative conditions in order to ensure that the required performance is achieved.

TRANSPORT & STORAGE

The resin and hardener should be kept in securely closed containers during transport and storage. Any accidental spillage should be soaked up with sand, sawdust, cotton waste or any other absorbent material. The area should then be washed clean (see appropriate Safety Data Sheet). Adequate long term storage conditions will result in a shelf life, as per table, from the date of manufacture for both the resin and hardeners, see product container label for expiry date.

COMPONENT	UNITS	10 – 25°C (50 – 77°F)
GR210 Resin	Months	24
GR210 Hardener	Months	24

Storage should be in a warm dry place out of direct sunlight and protected from frost. The storage temperature should be kept constant between 10 - 25°C (50 – 77°F), cyclic fluctuations in temperature can cause crystallization. Containers should be firmly closed. Hardener, in particular, will suffer serious degradation if left exposed to air. Hardeners may darken over time, however the physical properties are not affected. Be aware of a possible mixed system color change if very old and new hardeners are used on the same project.

GR210

This product summary is intended for use in conjunction with further advice provided under the Instructions for Use section. All data has been generated from typical production material and does not constitute a product specification.

PROPERTY	UNITS	GR210 RESIN	GR210 HARDENER	MIXED SYSTEM	TEST METHOD
Color	Gardner	3-5	0-2	3-5	-
Mix ratio by weight	Parts by weight	100	26	-	-
Mix ratio by volume	Parts by volume	100	32	-	-

COMPONENT & MIXED SYSTEM PROPERTIES

PROPERTY	UNITS	15°C	20°C	25°C	30°C	40°C	TEST METHOD
GR210 Resin viscosity	cP	-	-	6000-7000	-	-	-
GR210 Hardener viscosity	cP	-	-	15-25	-	-	-
Initial mixed system viscosity	cP	-	-	900-1200	-	-	-
Pot life (150 g, mixed in water)*	hrs:min	-	-	04:00	-	-	Tecam gel time

CURED RESIN PROPERTIES

PROPERTY	SYMBOL	UNITS	30 MINUTES @ 155°C**	TEST METHOD
Glass transition temp.	Tg_2	°C	159	ISO 11357 (DSC)
Tensile strength	σ_T	MPa	76	ISO 527-2
Tensile modulus	E_T	GPa	2.8	ISO 527-2
Tensile strain	ε_T	%	4.5	ISO 527-2
Flexural strength	σ_F	N/mm^2	83	ISO 178
Flexural modulus	E_F	GPa	1.7	ISO 178
Compressive strength	σ_C	MPa	128	

**working time properties are highly subjective to ambient conditions and should be used as an approximate guideline for all systems*
***initial cure of 24 hours at 21°C ***normalized to 55% fiber volume fraction*

HEALTH AND SAFETY

The following points must be considered:

1. Skin contact must be avoided by wearing protective gloves. Gurit recommends the use of disposable nitrile gloves for most applications. The use of barrier creams is not recommended, but to preserve skin condition a moisturizing cream should be used after washing.
2. Protective clothing should be worn when mixing, laminating or sanding. Contaminated work clothes should be thoroughly cleaned before re-use.
3. Eye protection should be worn if there is a risk of resin, hardener, solvent or dust entering the eyes. If this occurs flush the eye with water for 15 minutes, holding the eyelid open, and seek medical attention.
4. Ensure adequate ventilation in work areas. Respiratory protection should be worn if there is insufficient ventilation. Solvent vapors should not be inhaled as they can cause dizziness, headaches, loss of consciousness and can have long term health effects.
5. If the skin becomes contaminated, then the area must be immediately cleansed. The use of resin-removing cleansers is recommended. To finish, wash with soap and warm water. The use of solvents on the skin to remove resins etc must be avoided.

   Washing should be part of routine practice:
   - before eating or drinking
   - before smoking & vaping
   - before using the lavatory
   - after finishing work

6. The inhalation of sanding dust should be avoided and if it settles on the skin then it should be washed off. After more extensive sanding operations a shower/bath and hair wash is advised.

Gurit produces a separate full Safety Data Sheet for all hazardous products. Please ensure that you have the correct SDS to hand for the materials you are using before commencing work.

NOTICE

All advice, instruction or recommendation is given in good faith but the selling Gurit entity (the Company) only warrants that advice in writing is given with reasonable skill and care. No further duty or responsibility is accepted by the Company. All advice is given subject to the terms and conditions of sale (the Conditions) which are available on request from the Company or may be viewed at Gurit's Website: www.gurit.com/terms-and-conditions.aspx

The Company strongly recommends that Customers make test panels in the final process conditions and conduct appropriate testing of any goods or materials supplied by the Company prior to final use to ensure that they are suitable for the Customer's planned application. Such testing should include testing under conditions as close as possible to those to which the final component may be subjected. The Company specifically excludes any warranty of fitness for purpose of the goods other than as set out in writing by the Company. Due to the varied nature of end-use applications, the Company does, in particular, not warrant that the test panels in the final process conditions and/or the final component pass any fire standards.

The Company reserves the right to change specifications and prices without notice and Customers should satisfy themselves that information relied on by the Customer is that which is currently published by the Company on its website. Any queries may be addressed to the Technical Services Department.

Gurit is continuously reviewing and updating literature. Please ensure that you have the current version by contacting your sales contact and quoting the revision number in the bottom left-hand corner of this page.

CONTACT INFORMATION

Please see local contact information at www.gurit.com

24-HOUR CHEMICAL EMERGENCY NUMBER

For advice on chemical emergencies, spillages, fires or exposures:

Europe	+44 1273 289451
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