

RENUVO™ PP

UV CURING PREPREG

Gurit has a range of blade repair products which are approved by blade OEM's and DNV-GL and globally available to deliver fast, efficient wind turbine repair.

These focus on achieving:

- Minimum turbine down time
- Consistent repair quality
- Ease of application
- Maximum weather window for application
- Minimum environmental impact from waste
- Maximizing operator health and safety

Through:

- Market leading product health and safety
- Practical repair packaging, dispensing
- Mixing solutions for easy processing
- Robust repairs in challenging conditions
- Technical support help line
- Two product streams, heat and UV cured



Our composite repair solutions maximise the wind repair window:

	Prepreg + Primer	Application Temperature Range						
	OEM Qualified	5°C	10°C	15°C	20°C	25°C	30°C	55°C
	RENUVO™ PP	+	+	+	+	+	+	+

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RENUVO™ PP	180 seconds at 30mm height using 300mW/cm ² lamp	PA51-5529	RENUVO +5-+30C/EGL/600/400/35±3%/2DPE	3
		PA21-5331	RENUVO +5-+30C/XE600/35±3%/400/2DPE	
	20 seconds at 1mm height using 2500mW/cm ² lamp	PA51-5529	RENUVO +5-+30C/EGL/600/400/35±3%/2DPE	4
		PA21-5331	RENUVO +5-+30C/XE600/35±3%/400/2DPE	

PRODUCT INFORMATION

AVAILABILITY

The product is available in several formats please contact your local customer support for more information.

TRANSPORT & STORAGE

The products 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).

COMPONENT	UNITS	-18°C to +21°C
RENUVO™ PP	months	18

Storage should be in a dry place out of direct sunlight and ambient light, since the prepreg is sensitive to UV light. The recommended storage temperature should be between -18°C and 21°C (0°F and +70°F). Whilst storage at higher temperatures between +5°C and 30°C (+41°F and +86°F) prior to application will not adversely affect the product shelf-life, it may cause problems such as distortions of the prepreg and excess resin bleed. It is recommended that the prepreg is stored in its original sealed plastic wrapper and box to protect it from ambient UV light.

HEALTH AND SAFETY

The following points must be considered:

- Using UV curing equipment:
 - Eye-protection: UV filter function of class 2 or 2C as described in EN166 Personal eye Protection – specifications and EN170 Personal eye-protection, also with shade number of 1.7 up to 2.5.
 - Skin protection: Gloves (of a UV blocking material); Wear long sleeves. UV blocking clothing to cover all exposed skin directly in contact with the UV source.
 - Do NOT point the lamp directly at any skin, any eyes or any other personnel.
- 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 moisturising cream should be used after washing.
- Overalls or other protective clothing should be worn when mixing, laminating or sanding. Contaminated work clothes should be thoroughly cleaned before re-use.
- 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.
- Ensure adequate ventilation in work areas. Respiratory protection should be worn if there is insufficient ventilation. Solvent vapours should not be inhaled as they can cause dizziness, headaches, loss of consciousness and can have long term health effects.
- 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
 - before using the lavatory
 - after finishing work
- 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.

APPLICABLE RISK & SAFETY PHRASES

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.

RENUVO™ PP (PREPREG)

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UNCURED PREPREG PROPERTIES

PROPERTY	UNITS	PA51-5529	PA21-5331	TEST METHOD
Format	-	0° Unidirectional Prepreg	±45° Biaxial Prepreg	-
Nominal Resin Content (by weight)	%	35	35	EN 2329
Nominal Fibre Weight	g/m ²	600	600	
Nominal Prepreg Areal Weight	g/m ²	924	924	
Stitching Type	-	N/A	Textured Polyester	-
Sizing Type	-	Epoxy Compatible	Epoxy Compatible	EN 2331
Backer	-	2 x 50µm MDPE	2 x 50µm MDPE	-
Recommended ply drop length	mm	30	7.5	-

PROCESSING, HANDLING & CURING PROPERTIES*

The product should be applied out of direct sunlight to extend the working time. The cure time and method will be dependant on the UV light source used. Please contact Gurit Technical Support for further information.

PROPERTY	UNITS	300mW/cm ²	2500mW/cm ²	TEST METHOD
Recommended Handling Temperature	°C	+5 to +55		-
Maximum Relative Humidity	%	90		-
Working time	-	The product should be applied out of direct sunlight to extend working time.		-
Cure Time	min:sec	03:00*	00:20*	395nm UV-A Light Source*
Cure Height	mm	30*	1*	395nm UV-A Light Source*
Maximum laminate thickness per cure	-	4 x 924g/m ² prepreg plies		-

CURED LAMINATE MECHANICAL PROPERTIES*

PROPERTIES	SYMBOL	UNITS	PA51-5529	PA21-5331	TEST STANDARD
Cure Schedule	-	-	180 seconds at 30mm height using 300mW/cm ² lamp		395nm UV-A Light Source*
Cured Laminate Colour	-	-	3 - 5		Gardner
Glass Transition Temperature	Tg ₁	°C	95		ASTM D7028
Cured Ply Thickness	t _{CPT}	Mm	0.48	0.49	-
Cured Ply Thickness Tolerance	-	Mm	+/- 0.03	+/- 0.03	-
Fibre Volume Fraction	FVF	%	53	53	ASTM D 3171 Method II
0° Tensile Strength**	X _{T11}	MPa	900	427	ISO 527-4
0° Tensile Modulus**	E _{T11}	GPa	41	27	ISO 527-4
0° Tensile Strain**	ε _{T11}	%	1.1	2.0	ISO 527-4
90° Tensile Strength**	X _{T22}	MPa	26	-	ISO 527-4
90° Tensile Modulus**	E _{T22}	GPa	13	-	ISO 527-4
0° Flexural Strength**	X _F	MPa	1140	455	ISO 14125
0° Flexural Modulus**	E _{F11}	GPa	36	17	ISO 14125
0° Inter-laminar Shear Strength**	X _{ILSS}	MPa	69	25	ISO 14130
0° Compressive Strength**	X _{C11}	MPa	966	607	SACMA SRM1-94

*The cure will depend on the type of UV lamp used to conduct the repair. Please contact Gurit Technical Support for advice.

**Mechanical test direction evaluated relative to the 0° to fibre direction

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Nominal Prepreg Areal Weight	g/m ²	924	924	
Stitching Type	-	N/A	Textured Polyester	-
Sizing Type	-	Epoxy Compatible	Epoxy Compatible	EN 2331
Backer	-	2 x 50µm MDPE	2 x 50µm MDPE	-
Recommended ply drop length	mm	30	7.5	-

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PROPERTY	UNITS	300mW/cm ²	2500mW/cm ²	TEST METHOD
Recommended Handling Temperature	°C	+5 to +55		-
Maximum Relative Humidity	%	90		-
Working time	-	The product should be applied out of direct sunlight to extend working time.		-
Cure Time	min:sec	03:00*	00:20*	395nm UV-A Light Source*
Cure Height	mm	30*	1*	395nm UV-A Light Source*
Maximum laminate thickness per cure	-	4 x 924g/m ² prepreg plies		-

CURED LAMINATE MECHANICAL PROPERTIES*

PROPERTIES	SYMBOL	UNITS	PA51-5529	PA21-5331	TEST STANDARD
Cure Schedule	-	-	20 seconds at 1mm height using 2500mW/cm ² lamp		395nm UV-A Light Source*
Cured Laminate Colour	-	-	3 - 5		Gardner
Glass Transition Temperature	T _{g1}	°C	TBC		ASTM D7028
Cured Ply Thickness	t _{CPT}	mm	0.48	0.49	-
Cured Ply Thickness Tolerance	-	mm	+/- 0.03	+/- 0.03	-
Fibre Volume Fraction	FVF	%	53	53	ASTM D 3171 Method II
0° Tensile Strength**	X _{T11}	MPa	906	440	ISO 527-4
0° Tensile Modulus**	E _{T11}	GPa	44	23	ISO 527-4
0° Tensile Strain**	ε _{T11}	%	2	2	ISO 527-4
90° Tensile Strength**	X _{T22}	MPa	TBC	-	ISO 527-4
90° Tensile Modulus**	E _{T22}	GPa	TBC	-	ISO 527-4
0° Flexural Strength**	X _F	MPa	1039	662	ISO 14125
0° Flexural Modulus**	E _{F11}	GPa	31	20	ISO 14125
0° Inter-laminar Shear Strength**	X _{ILSS}	MPa	55	28	ISO 14130
0° Compressive Strength**	X _{C11}	MPa	TBC	TBC	SACMA SRM1-94

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 **Mechanical test direction evaluated relative to the 0° to fibre direction

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.

TECHNICAL CONTACT INFORMATION

For all other enquiries such as technical queries:

Telephone + 44 1983 828000 (08:30 – 17:00 GMT)
Email technical.support@gurit.com

24-HOUR CHEMICAL EMERGENCY NUMBER

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

Europe +44 1273 289451
Americas +1 646 844 7309
APAC +65 3158 1412

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E customer.support@gurit.com

W www.gurit.com