

SPABOND 840

FAST CURING STRUCTURAL EPOXY ADHESIVE

- Long working time – for manufacture of large components
- Available with a High Temperature Application (HTA) hardener
- Rapid cure in 2 hours at 70°C – allows reduced cycle time
- Reduced component weight; lower density when compared to glass filled adhesives
- High strength and next-generation high toughness & impact strength
- Formulated with Gurit LRT (Light Reflective Technology) as standard
- Low Toxicity Formulation: Improved Hazard Labelling, CMR & SVHC** Free
- Excellent gap filling properties of up to 30mm
- Designed for mixing machine dispense
- Range of blendable hardener speeds coming soon
- DNV-GL certificated formats available

INTRODUCTION

Spabond 840 is a high performance, toughened adhesive designed for bonding large structures such as wind turbine blades. It is a cost-effective system with good thermal, mechanical properties with a long working time for adhesive application yet incorporates innovative chemistry to allow a rapid 2 hour cure time at elevated temperature.

The unique formulation offers improved health & safety through the careful selection of low toxicity raw materials as well as Light Reflective Technology which in conjunction with a UV light-source can detect droplets as small as 1mm for easy identification of contamination to improve industrial hygiene or for the inspection of bond-lines to ensure constant quality and reliability of components.

The components are contrasting colours to give a visual indication of mix quality, which is a useful feature when mixing by hand or with a machine. The system has a simple 3:1 mix ratio by weight. Spabond 840 is available in straight-sided pails and 205 litre drums for machine mixing and dispense.

SYSTEM		20°C POT-LIFE (500 G, MIXED IN AIR)*	20°C CLAMP TIME*	PAGE
Spabond™ 840	Product Information, Instructions for Use and Health & Safety			2
	Spabond™ 840 Hardener	16 minutes	3 hours 50 minutes	3
	Spabond™ 840HTA Hardener	45 minutes	17 hours 40 minutes	4

**working time properties are highly subjective to ambient conditions and should be used an approximate guideline for all Spabond™ 340 systems*

*** CMR = Substances classified as Carcinogenic, Mutagenic or toxic for Reproduction
SVHC = Substances of Very High Concern*

PRODUCT INFORMATION

The product is available in a number of formats please contact your local customer support or download the latest product catalogue available on www.gurit.com.

PRODUCT DESCRIPTION	STATUS	CERTIFICATION
Spabond 840 Resin and Hardener	TAK00001J4	DNV-GL
Spabond 840 Resin and HTA Hardener	IPending	DNV-GL

TRANSPORT & STORAGE

The resin and hardeners 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 STORAGE TIME	UNITS	10 – 25°C
Spabond 840 Resin	months	12
Spabond 840 / 840HTA Hardeners	months	12

Adequate long term storage conditions will result in a shelf life of 1 year for both the resin and hardeners. 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°C and 25°C, cyclic fluctuations in temperature can cause crystallization. Containers should be firmly closed. Hardeners, in particular, will suffer serious degradation if left exposed to air. For more information on crystallization please refer to the Adhesives section on the Gurit website.

INSTRUCTIONS FOR USE

The product is optimised for use at 15 - 25°C. At lower temperatures the components thicken and may eventually become unworkable. To ensure accurate mixing and good workability pre-warm the resin & hardener as well as the surfaces to be bonded before use.

SURFACE PREPARATION

Before using the product ensure that surfaces to be bonded are clean, dry and dust-free. Prepare all surfaces by abrading with medium grit paper or other suitable abrasive, remove dust then wipe with acetone.

Metals - requires a chemical pre-treatment to create the best bond. Please contact Gurit for a Guide to Surface Preparation and Pre-treatments.

Polyester or vinylester - ensure laminates are fully cured before bonding, then prepare as above.

Epoxy laminates - it is recommended to use a suitable Peel Ply as the last stage in their manufacture, otherwise prepare as above. Trials may be required to test Peel Ply suitability.

Ferrocement - etch with 5% solution of hydrochloric acid, wash with fresh water, then dry.

Timber - sand with abrasive paper across grain. Degrease oily timber with a fast evaporating solvent (e.g. acetone). For resinous or gummy timber, etch with 2% caustic soda solution, wash off with fresh water and dry.

MIXING & HANDLING

Gurit recommends mixing machine dispense. If mixing by hand, mix thoroughly for at least one minute, paying particular attention to the sides and bottom of the mixing vessel, to ensure no streaks remain. Once fully mixed the adhesive should have a uniform colour. Use from pot quickly to maximise resin working life.

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 moisturising cream should be used after washing.
2. Overalls or other 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 vapours 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
 - ↪ 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.

APPLICABLE HAZARD & 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.

LIGHT REFLECTIVE TECHNOLOGY (LRT)

Spabond 840 is formulated with Gurit's Light Reflective Technology included as standard which causes the resin or mixed system to fluoresce under UV light and can assist in developing best practise post work, to ensure minimum exposure and no transfer of epoxy outside the workshop, significantly reducing the risks of sensitisation and other conditions associated with contact with uncured resins. Contact Gurit Technical Support for further information.

SPABOND 840 RESIN & SPABOND 840 HARDENER

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.

MIXING AND HANDLING

PROPERTY	UNITS	SP 840 RESIN	SP 840 HARDENER	MIXED SYSTEM	TEST METHOD
Appearance - colour	Description	Off-White	Blue	Light Blue	-
Appearance - form	Description	Thixotropic Paste			-
Mix ratio by weight	Parts by weight	100	33	-	-
Mix ratio by volume	Parts by volume	100	38	-	-
Density at 21 °C	g/cm ³	1.19	1.05	1.16	Archimedes

COMPONENT & MIXED SYSTEM PROPERTIES

PROPERTY	UNITS	20 °C	25 °C	30 °C	40 °C	TEST METHOD
Spabond 840 Resin Viscosity	P	-	240	-	-	-
Spabond 840 Hardener Viscosity	P	-	85	-	-	-
Initial Mixed System Viscosity	P	110 - 150	90 - 120	-	-	-
Open Time (30 x 40mm bondline)*	hrs:min	-	-	02:30	01:30	-
Clamp Time* (time to 2kN cleavage strength)	hrs:min	-	-	-	04:30	BS 5350 Part C1
Sag resistance*	mm	-	25 - 30	25 - 30	-	-

ADHESIVE PERFORMANCE (RECOMMENDED CURE OF 2 HRS AT 70°C)

MECHANICAL PROPERTIES	SYMBOL	UNITS	2 HOURS AT 70°C**			TEST STANDARD
Cleavage on steel	F _{cleavage}	kN	-			BS 5350 Part C1
Lap shear on steel	τ _{steel}	MPa	35.2			BS 5350 Part C5
Lap shear on epoxy GRP (10 plies epoxy infused UTE500)	τ _{EP-GRP}	MPa	22.2			BS 5350 Part C5

THERMAL CURE PROGRESSION AT 70°C

CURE PROGRESSION (70°C)	SYMBOL	UNITS	1 HOUR	2 HOURS	3 HOURS	4 HOURS	5 HOURS	TEST STANDARD
Glass Transition Temperature	T _{g2}	°C	56	70	70	72	73	ISO 11357 (DSC)
Ultimate Glass Transition Temp	UT _{g2}	°C	>80					ISO 11357 (DSC)

CURED MECHANICAL & THERMAL PROPERTIES (RECOMMENDED CURE OF 2 HRS AT 70°C)

MECHANICAL PROPERTIES	SYMBOL	UNITS	2 HOURS AT 70°C**			TEST STANDARD
Glass Transition Temperature	T _{g1}	°C	72			ISO 6721 (DMA)
Cured Density	ρ _{ply}	g/cm ³	1.23			Archimedes
Volumetric Shrinkage	-	%	4.50			Archimedes
Tensile Strength	σ _T	MPa	44.9			ISO 527-2
Tensile Modulus	E _T	GPa	2.96			ISO 527-2
Tensile Strain	ε _T	%	7.34			ISO 527-2
3-point flexural strength	σ _F	N/mm ²	83.8			ISO 178
3-point flexural modulus	E _F	GPa	2.85			ISO 178
3-point flexural strain	ε _F	%	7.22			ISO 178
Charpy (notched)	a _{cN}	kJ/m ²	3.31			ISO 179-1
Fracture Toughness	K1C	MPa.m ^{0.5}	1.89			ASTM D5045

*working time properties are highly subjective to ambient conditions and should be used as an approximate guideline for all Spabond systems

**cure schedule: 1°C/min ramp from 20 to 70°C followed by 2 hour cure at 70°C

SPABOND 840 RESIN & SPABOND 840HTA HARDENER

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MIXING AND HANDLING

PROPERTY	UNITS	SP 840 RESIN	SP 840HTA HARDENER	MIXED SYSTEM	TEST METHOD
Appearance - colour	Description	Off-White	Green	Light Green	-
Appearance - form	Description	Thixotropic Paste			-
Mix ratio by weight	Parts by weight	100	35	-	-
Mix ratio by volume	Parts by volume	100	38	-	-
Density at 21 °C	g/cm ³	1.19	1.09	1.16	Archimedes

COMPONENT & MIXED SYSTEM PROPERTIES

PROPERTY	UNITS	20 °C	25 °C	30 °C	40 °C	TEST METHOD
Spabond 840 Resin Viscosity	P	-	240	-	-	-
Spabond 840HTA Hardener Viscosity	P	-	100	-	-	-
Initial Mixed System Viscosity	P	110 - 150	90 - 120	-	-	-
Open Time (30 x 40mm bondline)*	hrs:min	-	-	02:30	01:30	-
Clamp Time* (time to 2kN cleavage strength)	hrs:min	-	-	-	04:30	BS 5350 Part C1
Sag resistance*	mm	-	25 - 30	25 - 30	-	-

ADHESIVE PERFORMANCE (RECOMMENDED CURE OF 2 HRS AT 70°C)

MECHANICAL PROPERTIES	SYMBOL	UNITS	2 HOURS AT 70°C**				TEST STANDARD
Cleavage on steel	F _{cleavage}	kN	-				BS 5350 Part C1
Lap shear on steel	τ _{steel}	MPa	35.2				BS 5350 Part C5
Lap shear on epoxy GRP (10 plies epoxy infused UTE500)	τ _{EP-GRP}	MPa	22.2				BS 5350 Part C5

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CURE PROGRESSION (70°C)	SYMBOL	UNITS	1 HOUR	2 HOURS	3 HOURS	4 HOURS	5 HOURS	TEST STANDARD
Glass Transition Temperature	T _{g2}	°C	56	70	70	72	73	ISO 11357 (DSC)
Ultimate Glass Transition Temp	UT _{g2}	°C	>80					ISO 11357 (DSC)

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MECHANICAL PROPERTIES	SYMBOL	UNITS	2 HOURS AT 70°C**				TEST STANDARD
Glass Transition Temperature	T _{g1}	°C	72				ISO 6721 (DMA)
Cured Density	ρ _{ply}	g/cm ³	1.23				Archimedes
Volumetric Shrinkage	-	%	4.50				Archimedes
Tensile Strength	σ _T	MPa	44.9				ISO 527-2
Tensile Modulus	E _T	GPa	2.96				ISO 527-2
Tensile Strain	ε _T	%	7.34				ISO 527-2
3-point flexural strength	σ _F	N/mm ²	83.8				ISO 178
3-point flexural modulus	E _F	GPa	2.85				ISO 178
3-point flexural strain	ε _F	%	7.22				ISO 178
Charpy (notched)	a _{cN}	kJ/m ²	3.31				ISO 179-1
Fracture Toughness	K1C	MPa.m ^{0.5}	1.89				ASTM D5045

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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