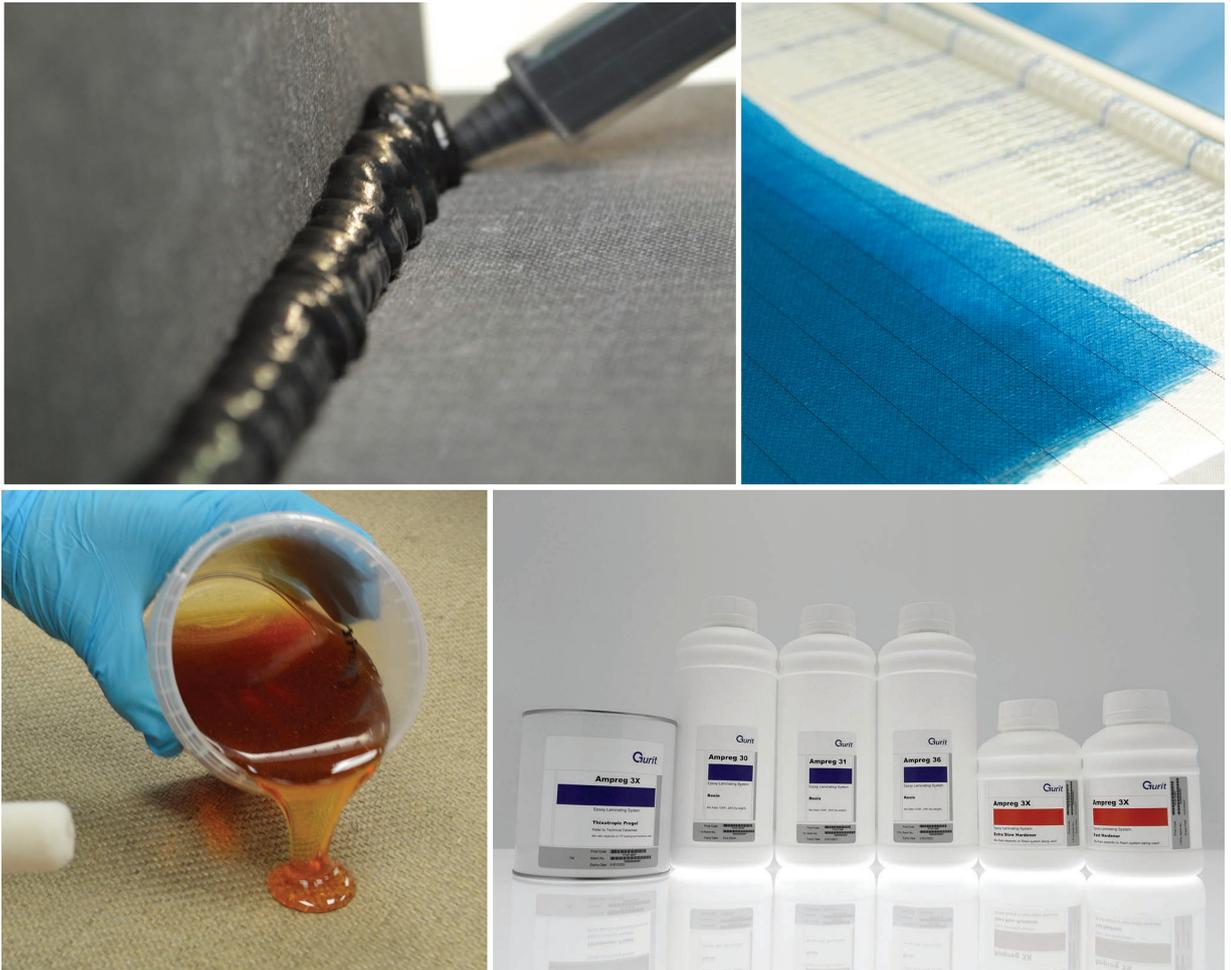




PRODUCT INFORMATION : FORMULATED PRODUCTS



DELIVERING THE FUTURE OF COMPOSITE SOLUTIONS

FORMULATED PRODUCTS

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www.gurit.com





CONTENTS

Introduction	2
Typical Applications	3
Laminating Systems	4
Ampreg™ 3X Series Laminating Systems	6
Laminating Ancillaries	7
Multi-Purpose Systems	8
AMPRO™ Multi-Purpose Systems	8
AMPRO™ - One System, Many Uses...	11
Resin Infusion Systems	12
PRIME™ 27	13
Adhesive Systems	14
Spabond™ 300 Series	16
Spabond™ 500 Series	17
Spabond™ 700 Series	19
Spabond™ 800 Series	19
Filling and Fairing	20
S'Fill 15-Minute	21
S-Fair 600	21
In-mould Process Coats	22
CR 3400	22
Tooling Products	23
T-Gel 130-1	24
T-Lam 130-1	24
T-PRIME™ 130-1	25
T-PRIME™ 160	25
Ancillary Products	26
Introduction to Formulated Products	27
Working Properties	29
Thermal Properties	32
Environmental Conditioning	33
Mechanical Properties	34

INTRODUCTION

Introduction to Gurit

Gurit pioneered the use of epoxy resin in the manufacture of large light weight, high stress composite structures, by formulating low viscosity systems with long working times before gelation. These systems allow the use of vacuum bagging techniques to be used, which improve the mechanical properties of the finished item by obtaining highly favourable fibre to resin ratios. This reduced void numbers and sizes and improved the interface between resin matrix and the fibres by ensuring they are in intimate contact before and during curing.

These epoxy systems also used lower temperature post cures to more fully polymerise the epoxy matrix than had been experienced in the composites industry before this time.

This legacy of creating formulations which generate the highest possible properties from the simplest and most robust production processes have allowed the use of Gurit Laminating and Infusion products for both new build and repair on small items and huge structures the world over.

All of the “formulated products” manufactured by Gurit are classified as thermosetting materials or ‘thermosets’. These materials are supplied in a liquid or semi-liquid form, usually as a “2-part system”. Under the correct conditions, the system undergoes a chemical reaction (known as “curing”) to form a solid material. While the resultant cured material will soften above a certain temperature (its glass transition temperature, or Tg), it will not become liquid and flow again, unlike ‘thermoplastics’ which can be heated up and will reflow in a reversible and repeatable process.

GURIT FORMULATED PRODUCTS

Gurit manufactures a wide range of epoxy chemistry based formulated resin products. These formulations are unique combinations of chemicals that have been blended together to yield products with characteristics optimised for their intended application. The products have been extensively tested both for their handling and usage characteristics, and for the properties that result from their curing, and this information is presented here.

The characteristics of thermosets mean that they can be formulated into a wide variety of forms, with many different liquid-state properties and cured properties. The products manufactured by Gurit have therefore been grouped under the following headings, broadly relating to their intended application:

- Ampreg™ Laminating Systems - epoxy based liquids, low viscosity for good wet-out, high strength and stiffness.
- AMPRO™ Multi-purpose Systems - epoxy based. Capable of performing as adhesives, coatings, filling compounds and laminating systems.
- PRIME™ Resin Infusion Systems – low viscosity, high performance epoxy based liquids ideal for vacuum bag infusion and resin transfer moulding process.
- Spabond™ Adhesives - epoxy based semi-liquids and pastes, high strength and durability.
- Filling and Fairing Compounds - epoxy based pastes, high adhesive ability and durability.
- Coatings - epoxy process coats for in-mould application to achieve a defect free surface ready for sanding and painting.
- Tooling Products - a complete range of epoxy composite tooling products that can be used up to an operating temperature of 160°C.

TYPICAL APPLICATIONS

Marine

Spabond™ 300 Series
Structural Epoxy Adhesives

Spabond™ 5-Minute
Extra-hand Construction Adhesive

Spabond™ 540
Epoxy to Polyester Bonding Adhesive

Spabond™ 568
Epoxy Core Splicing Adhesive

Spabond™ 570
Teak Bonding Adhesive

AMPRO™ CLR
Epoxy Coating Systems

CR 3400
In-Mould Process Coat

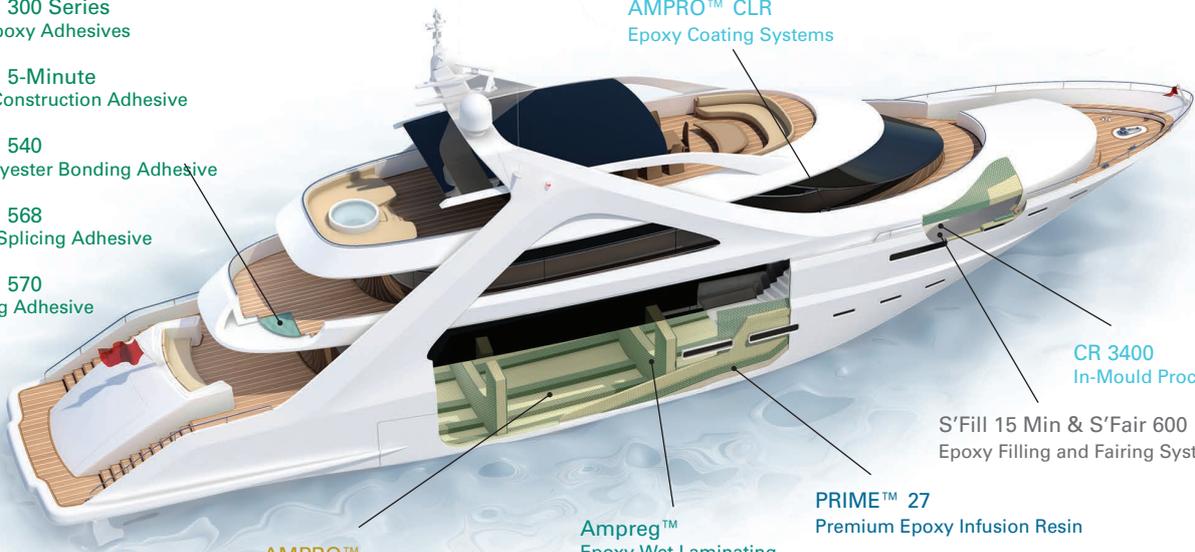
S'Fill 15 Min & S'Fair 600
Epoxy Filling and Fairing Systems

PRIME™ 27
Premium Epoxy Infusion Resin

Ampreg™
Epoxy Wet Laminating

AMPRO™
Epoxy Multi-purpose Systems

T-Gel, T-Lam & T-Prime
Epoxy Tooling Systems



Wind Energy Turbine Blades

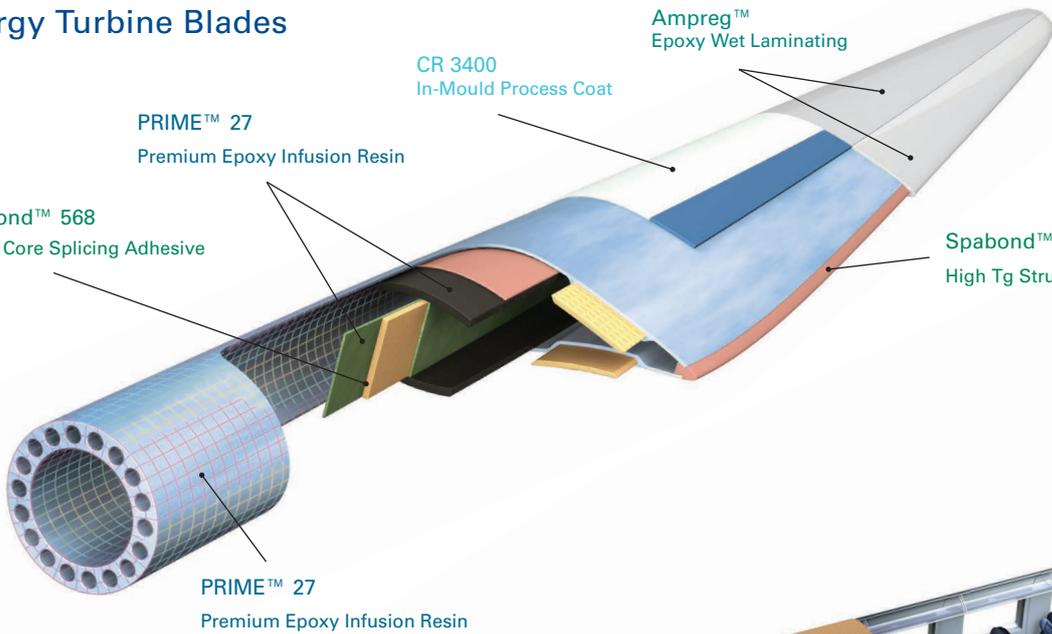
Ampreg™
Epoxy Wet Laminating

CR 3400
In-Mould Process Coat

PRIME™ 27
Premium Epoxy Infusion Resin

Spabond™ 568
Epoxy Core Splicing Adhesive

Spabond™ 840
High Tg Structural Adhesive Systems



Transport & Industrial

Spabond™ 545
Epoxy Industrial Adhesive Systems
for Dissimilar Substrates



LAMINATING SYSTEMS



The Ampreg™ 3X Series replaces Gurit's legacy range of wet laminating systems for the manufacture of large composite structures in the marine, wind and construction industries.

The comprehensive 3X Series portfolio comprises of a single range of low toxicity, blend-able Ampreg™ 3X hardeners that can be used in conjunction with the following resins:

- Ampreg™ 30 Low viscosity Resin: replaces Ampreg™ 21
- Ampreg™ 31 Drainage resistance Resin: replaces Ampreg™ 22
- Ampreg™ 36 Premium performance Resin: replaces Ampreg™ 26

Additional ancillary products including Thixotropic Pregel Resin and High Tg hardeners are also available.

Health and Safety Focus

The award winning Ampreg™ 3X Series laminating system has been reformulated to prioritise user health and safety through careful selection of base chemicals. The new low toxicity resin matrix is CMR, SVHC free* and the hardeners are classified as environmentally non-hazardous.

Light Reflective Technology As Standard

The Ampreg™ 3X series is now available with LRT (Light Reflective Technology) as standard, which serves as a risk monitoring feature for the user and enables inspection of contamination by means of UV light. To learn more about Gurit® LRT technology, please refer to the respective data sheet.



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

System Properties At 25°C		Mixed Viscosity*	150g Pot-Life*	Earliest Time To Apply Vacuum*	Latest Time To Apply Vacuum*	Earliest Demould Time*
Ampreg™ 30	Low initial mixed viscosity & good cure progression from ambient only cures, DNV-GL & Lloyd's Register Certified, Replaces Ampreg™ 21					
	Ampreg™ 3X Fast Hardener	900 cP	½ hour	1 ½ hours	2 hours	3 hours
	Ampreg™ 3X Standard Hardener	750 cP	1 hour	2 ½ hours	3 hours	6 ½ hours
	Ampreg™ 3X Slow Hardener	350 cP	4 hours	4 hours	5 hours	16 hours
	Ampreg™ 3X Extra-slow Hardener	300 cP	7 hours	6 hours	7 ½ hours	40 hours
	Ampreg 3X High Tg Hardener	820 cP	8½ hour	7 ¼ hours	9 ¼ hours	60 hours
	Ampreg™ 3X Thixotropic Pregel	Resin additive with a grease-like consistency, used primarily as a thixotrope - to be added to low viscosity laminating resins for applications where resin drainage is a concern. Refer to product datasheet for more information.				
Ampreg™ 31	Viscosity optimised for good fabric wet-out and drainage resistance, DNV-GL & Lloyd's Register Certified, Replaces Ampreg™ 22					
	Ampreg™ 3X Fast Hardener	1300 cP	½ hour	1 ¼ hours	1 ¾ hours	2 ¾ hours
	Ampreg™ 3X Standard Hardener	1000 cP	1 hour	2 hours	2 ¾ hours	5 hours
	Ampreg™ 3X Slow Hardener	500 cP	3 ½ hours	3 ¼ hours	4 ¼ hours	12 hours
	Ampreg™ 3X Extra-slow Hardener	400 cP	6 hours	4 ¼ hours	5 ½ hours	20 hours
	Ampreg 3X High Tg Hardener	1110 cP	5 ¾ hour	4 ¾ hours	6 ¾ hours	30 hours
	Ampreg™ 3X Thixotropic Pregel	Resin additive with a grease-like consistency, used primarily as a thixotrope - to be added to low viscosity laminating resins for applications where resin drainage is a concern. Refer to product datasheet for more information.				
Ampreg™ 36	Improved fabric impregnation, Faster mechanical property generation, High flexural properties, Replaces Ampreg™ 26					
	Ampreg™ 3X Fast Hardener	700 cP	½ hour	1 ½ hours	2 hours	2 ¾ hours
	Ampreg™ 3X Standard Hardener	450 cP	1 hour	2 ¼ hours	3 hours	5 ¾ hours
	Ampreg™ 3X Slow Hardener	275 cP	3 ½ hours	3 ½ hours	4 ½ hours	13 hours
	Ampreg™ 3X Extra-slow Hardener	200 cP	6 hours	4 ¾ hours	5 ¾ hours	21 hours
	Ampreg™ 3X Thixotropic Pregel	Resin additive with a grease-like consistency, used primarily as a thixotrope - to be added to low viscosity laminating resins for applications where resin drainage is a concern. Refer to product datasheet for more information.				

* Working time properties are highly subjective to ambient conditions and should be used as an approximate guideline for all Ampreg™ systems at 25°C. Please refer to the corresponding page of this document for specific testing methods used.



AMPREG™ 30

Low Toxicity Epoxy
Wet Laminating System

Light Reflective
Technology as
standard



Mix ratio
(by weight)

100
26

- ↪ Low Toxicity Hardener Formulations
- ↪ Low initial mixed viscosity & good cure progression from ambient only cures
- ↪ With Gurit LRT (Light Reflective Technology) as standard
- ↪ Same 100:26 resin to hardener mix ratio by weight across range of hardener speeds
- ↪ DNV-GL certified formats available

INTRODUCTION

Ampreg™ 30 has been optimised for the manufacture of large composite structures using hand layup and vacuum bagging techniques whilst offering improved health and safety.

The relatively low initial mixed viscosity of Ampreg™ 30 allows easy wetout of heavyweight reinforcements. Ampreg™ 30 has been designed to give excellent mechanical and thermal properties from both ambient temperature cures, and moderate temperature postcures (50°C). This system is available with a range of hardener speeds, from Fast to Extra Slow.

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.

TYPICAL APPLICATIONS

Manufacture of large composite structures in the marine, wind and construction industries.

PACK SIZES & AVAILABILITY

Ampreg™ 30 is available in 1.26 and 4.66 kg resin & hardener packs or in 1000 / 219 / 18 kg resin and 174 / 19 / 4.68 kg hardener quantities.

AMPREG™ 31

Epoxy Wet Laminating System

Light Reflective
Technology as
standard



Mix ratio
(by weight)

100
26

- ↪ DNV-GL certified formats available
- ↪ Viscosity optimised for good fabric wet-out and drainage resistance
- ↪ Good cure progression from ambient only cures

INTRODUCTION

The viscosity of Ampreg™ 31 has been optimised for good fabric wet-out whilst maintaining good drainage resistance for application on vertical surfaces. Ampreg™ 31 has been designed to give excellent mechanical and thermal properties from both ambient temperature cures and moderate temperature postcures (50°C). This system is available with a range of Ampreg™ 3X hardener speeds, from Fast to Extra Slow.

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.

TYPICAL APPLICATIONS

Ampreg™ 31 has been optimised for the manufacture of large composite structures using hand layup and vacuum bagging techniques whilst offering improved health and safety.

PACK SIZES & AVAILABILITY

Ampreg™ 31 is available in 1.26 and 4.66 kg resin & hardener packs or in 1000 / 219 / 18 kg resin and 174 / 19 / 4.68 kg hardener quantities.

AMPREG™ 36

Low Toxicity Premium Wet Laminating System

Light Reflective Technology as standard



Optimum mechanical properties



Mix ratio (by weight)

100
29

- Same 100:29 resin to hardener mix ratio by weight across range of hardener speeds
- Improved fabric impregnation with lower initial mixed viscosity
- Faster mechanical property generation at ambient cure

INTRODUCTION

Ampreg™ 36's superior laminate mechanical properties and high Tg's achievable from modest post-cures, make it well suited for heavily loaded applications, particularly those where a little extra thermal performance is required.

Ampreg 36™ is optimised for use in hand-lay up and vacuum bagging processes, but can also be used in other processes such as RTM, vacuum infusion, pultrusion and filament winding. Ampreg 36 is recognised worldwide as the premium laminating system for the manufacture of racing sailboats, and high performance, one-off cruising boats. This system is available with a range of hardener speeds, from Fast to Extra Slow and in a wide range of formats from small pack sizes to drums and IBCs.

TYPICAL APPLICATIONS

Ampreg™ 36 is Gurit's premium epoxy laminating system and is particularly suitable for the manufacture of large, high-performance composite structures, whilst offering improved health and safety through the careful selection of low toxicity raw materials.

PACK SIZES & AVAILABILITY

Ampreg™ 36 is available in 1.26 and 4.66 kg resin & hardener packs or in 197 / 16.2 kg resin and 174 / 19 / 4.68 kg hardener quantities.

AMPREG 3X THIXOTROPIC PREGEL

Ampreg™ Resin Viscosity Increaser

Compatible with all Ampreg™ resins



Improves drainage resistance



Up to 100% substitution for max resistance

100
0

- Compatible with a range of Gurit Ampreg™ laminating hardeners
- Can be used as a core bonding adhesive
- Reduces drainage of vertical laminates

INTRODUCTION

Ampreg™ Thixotropic Pregel (TP) is a resin additive with a grease-like consistency, which can be used with a variety of hardeners from the Gurit laminating resin range. The properties of an Ampreg™ Thixotropic Pregel/laminating hardener combination are broadly similar to those of the hardener with its usual resin. This is because the thixotropic agents are added to a high quality resin base and because the Pregel is usually added to the laminating system at relatively low levels. At high addition levels, the resulting laminate will be more brittle than the 'neat' laminating system.

TYPICAL APPLICATIONS

Ampreg™ Thixotropic Pregel (TP) is used primarily as a thixotrope - to be added to low viscosity laminating resins for applications where resin drainage is a concern. It is therefore typically used in vertical and overhead laminating situations, particularly where heavy, open weave fabrics are being used, since these are the most prone to resin drainage. Ampreg™ Thixotropic Pregel can be used as the base resin component of an adhesive for bonding honeycomb & foam cores, and other rigid materials.

PACK SIZES & AVAILABILITY

Ampreg™ Thixotropic Pregel is available in 193 / 20 kg resin quantities.

AMPRO™ MULTI-PURPOSE SYSTEMS



AMPRO™ is an award winning, latest generation multi-purpose epoxy system from Gurit. It is a simple to use, all-purpose epoxy which can be used for bonding, coating, laminating and filling.

AMPRO™ provides a quick and convenient way of using one epoxy system for a wide range of tasks.

Key features include:

- **Professional:** boat-builder's choice for bonding, laminating and filling
- **Safer:** uses lower toxicity chemicals with low hazards
- **Stronger:** more flexible resin matrix ideal for working with wood
- **Tack-free:** no surface residue when cured and does not clog sandpaper
- **Water-proof:** AMPRO™ SILICA has been optimised to withstand the marine environment
- **Wide over-coating window:** up to 4 days later without additional surface preparation
- **Faster:** improved cure at temperatures as low as +5°C
- **Glossier:** improved coating performance with reduced surface defects
- **Cardboard outer packaging:** less single use plastics
- **Greener:** accredited, bio-based option using a high content of plant based chemicals
- **Simplified:** Four unique systems with inter-changeable hardeners and the same 3:1 mix ratio

System Properties at 25°C			Mixed Viscosity*	150g Pot-Life*	Tack-off Time*	Earliest Sanding Time*
AMPRO™	Suitable for all general purpose applications including laminating, bonding, filling and coating.					
	AMPRO™ Resin	AMPRO™ Fast Hardener	1000 cP	½ hour	1 ½ hours	10 hours
		AMPRO™ Slow Hardener	800 cP	1 ¼ hours	4 hours	20 hours
		AMPRO™ Extra-slow Hardener	700 cP	1 ½ hours	5 hours	20 hours
AMPRO™ CLR	Ideal for clear coating and laminating applications where colour is critical.					
	AMPRO™ Resin	AMPRO™ CLR Fast Hardener	1000 cP	½ hours	1 ½ hours	10 hours
		AMPRO™ CLR Slow Hardener	750 cP	1 ¼ hours	4 hours	20 hours
		AMPRO™ CLR Extra-slow Hardener	700 cP	1 ½ hours	5 hours	20 hours
AMPRO™ BIO	Market leading, accredited >40% bio-content multi-purpose system suitable for laminating, bonding, filling and coating.					
	AMPRO™ BIO Resin	AMPRO™ Fast Hardener	1260 cP	½ hour	1 ¼ hours	20 hours
		AMPRO™ Slow Hardener	1100 cP	¾ hour	4 ½ hours	20 hours
		AMPRO™ Extra-slow Hardener	1050 cP	1 hour	6 hours	20 hours
AMPRO SEAL	Solvent-free, low viscosity epoxy resin sealer for porous surfaces prior to coating and bonding.					
	AMPRO™ SEAL Resin	AMPRO™ Fast Hardener	1253 cP	½ hour	1 ¾ hours	10 hours

* Working time properties are highly subjective to ambient conditions and should be used as an approximate guideline for all AMPRO™ systems at 25°C. Please refer to the corresponding page of this document for specific testing methods used.

AMPRO™

Low Temperature Curing
Multi-purpose System

Rapid curing &
multi-purpose



Low Toxicity
Formulation



Mix ratio
(by volume)

3
1

- Ideal for repairs and other small tasks
- Suitable for gluing, coating, laminating and filling
- Simple 3:1 by volume mix ratio
- Low Toxicity Formulation

INTRODUCTION

AMPRO™ is a simple to use, all-purpose epoxy which can be used for gluing, coating, laminating and filling. With its fast, low temperature curing hardener and easy 3:1 mix ratio by volume, AMPRO™ provides a quick and convenient way of using one epoxy system for a very wide range of tasks.

TYPICAL APPLICATIONS

AMPRO™ has been built on the well-established SP 106 which has been the primary epoxy system for the manufacture and repair of wooden boats for over 20 years.

By using the Gurit range of filler powders, an AMPRO™ Resin & AMPRO™ Fast Hardener mix can be turned into a very effective adhesive or filling compound. Details of this filler range, and how to use them, are contained in a separate information sheet (Filler Guide) and typical filling and fairing mixes (resin / hardener / filler) are shown in the data sheet.

PACK SIZES & AVAILABILITY

AMPRO™ is available 1.33kg or 4.2kg resin and hardener packs, or in 10 / 20 / 206 / 1000 kg resin and 3 / 6 / 20 / 200 kg hardener quantities.

AMPRO™ CLR

High Clarity Epoxy
Multi-purpose System

Rapid curing &
multi-purpose



Ideal for
clear coating
applications



Mix ratio
(by volume)

3
1

- Ideal for clear coating applications
- Tack / blush / bloom-free surface after cure
- Simple 3:1 by volume mix ratio
- Low Toxicity Formulation

INTRODUCTION

AMPRO™ CLR is a simple to use, all-purpose epoxy ideal for coating applications which can also be used for gluing, laminating and filling. With its fast, low temperature curing hardener and easy 3:1 mix ratio by volume, AMPRO™ CLR provides a quick and convenient way of using one epoxy system for a very wide range of tasks.

TYPICAL APPLICATIONS

AMPRO™ CLR hardeners have been developed based on the well-established SP 320 system, which has been the primary epoxy clear coating system for the manufacture and repair of wooden boats for over 20 years.

By using the Gurit range of filler powders, an AMPRO™ CLR Fast Hardener mix can be turned into a very effective adhesive or filling compound. Details of this filler range, and how to use them, are contained in a separate information sheet (Filler Guide) and typical filling and fairing mixes (resin / hardener / filler) are shown in the data sheet.

PACK SIZES & AVAILABILITY

AMPRO™ CLR is available 1.33kg or 4.2kg resin and hardener packs, or in 10 / 20 / 206 / 1000 kg resin and 3 / 6 / 20 / 200 kg hardener quantities.

AMPRO™ BIO

Bio-based Epoxy
Multi-purpose System

Quick &
convenient



Ideal for coating
applications



Mix ratio
(by volume)

3
1

- ↪ Accredited 40-60% bio-based system
- ↪ Suitable for gluing, coating, laminating and filling
- ↪ Simple 3:1 by volume mix ratio
- ↪ Low Toxicity Formulation

INTRODUCTION

AMPRO™ BIO is a simple to use, all-purpose epoxy which can be used for gluing, coating, laminating and filling. With its fast, low temperature curing hardener and easy 3:1 mix ratio by volume, AMPRO™ BIO provides a quick and convenient way of using one epoxy system for a very wide range of tasks.

TYPICAL APPLICATIONS

AMPRO™ BIO has been built on the well-established SP 106 which has been the primary epoxy system for the manufacture and repair of wooden boats for over 20 years.

By using the Gurit range of filler powders, an AMPRO™ BIO resin and hardener mix can be turned into a very effective adhesive or filling compound. Details of this filler range, and how to use them, are contained in a separate information sheet (Filler Guide) and typical filling and fairing mixes (resin / hardener / filler) are shown in the data sheet.

PACK SIZES & AVAILABILITY

AMPRO™ BIO is available 1.3kg or 4.1kg resin and hardener packs, or in 10 / 20 / 200 / 1000 kg resin and 3 / 6 / 20 / 200 kg hardener quantities.

AMPRO™ SEAL

Epoxy Binding Primer

Long pot-life



Solvent-free,
low toxicity



Mix ratio
(by volume)

3
1

- ↪ Ideal sealer coat before solvent-free epoxies
- ↪ Good penetration into porous surfaces
- ↪ Simple 3:1 by volume mix ratio
- ↪ Solvent-free, low toxicity formulations

INTRODUCTION

AMPRO™ SEAL is a solvent-free, low viscosity epoxy resin sealer. It has been developed primarily for use on wood but can also be used on other materials such as glass and carbon composite laminates.

TYPICAL APPLICATIONS

AMPRO™SEAL has a low viscosity which ensures that the product achieves rapid and deep penetration of porous surfaces. Once AMPRO™ SEAL has soaked into a surface, the adhesive nature of the epoxy base will help to consolidate and strengthen that surface. The resultant epoxy sealing layer provides a high adhesion and moisture resistant base for any type of paint, varnish or epoxy coating system. For example, many woodworking applications combine the penetrating power of the AMPRO™ SEAL, with the thick, clear coating capability of AMPRO™ CLR to produce a strong, highly protective, deep gloss surface on wood.

PACK SIZES & AVAILABILITY

AMPRO™ SEAL is available 1.3kg or 4.1kg resin and hardener packs.

One System, Many Uses...

AMPRO™ consists of inter-changeable resins, blend-able hardeners and additives for many uses. The following table provides a step by step guide to choosing the right AMPRO™ system.

The components you need will depend on your application...	Coating, Sheathing, or Laminating		Filling, Fairing or Bonding	
	A + B		A + B + C	

A Select the right system...	AMPRO™	AMPRO™ CLR	AMPRO™ BIO	AMPRO™ SEAL
Low temperature curing	✓	✓		
Clear coating		✓		
Grain enhancing wood coating	✓		✓	
Bio-based content	<10%		40 - 60%	40 - 60%
Sealing & priming porous surfaces				✓
Filling, Fairing or Bonding	✓	✓	✓	

B Select the hardener speed...	Fast	F	Slow	S	Extra-Slow	XS
Working time with a brush at 20°C	1- 2 hours		4 - 5 hours		5 - 6 hours	
50g pot-life in air at 20°C	½ hour		1 hour		1½ hours	

C Select the additive(s)...		Micro Balloons	MB	Glass Bubbles	GB	Micro Fibres	MF	AMPRO™ Silica	AS
Filling & Fairing Mixes	Easy to sand, filling and filleting for cosmetic wood applications	✓						✓	
	Water-proof or lowest-cost filler for general applications			✓				✓	
	Hard surface finish filler for hard wearing edges and surfaces			✓				✓	
Bonding Mixes	General bonding of softwood, brown in colour	✓						✓	
	General bonding of softwood, white in colour			✓				✓	
	Structural bonding of wood or composite, opaque in colour					✓		✓	

Microballoons MB

Wood Filling & Bonding

- Brown, hollow phenolic resin spheres ideal for **wood** applications
- Easy to profile and sand for filling, filleting and bonding

Glass Bubbles GB

Waterproof Filling & Bonding

- White, hollow glass spheres for waterproof filling and bonding
- Ideal as a finishing filler for hard wearing edges & surfaces

Microfibres MF

Structural Bonding

- Opaque, very fine cellulose wood fibres for **structural** bonding
- Suitable for both wood and GRP

AMPRO™ Silica AS

Waterproof Resin Thickener

- Fine waterproof, white powder used to thicken the epoxy system
- Can be used with Glass Bubbles, Microballoons and Microfibres

Refer to the AMPRO™ datasheet for recommended mixes

PRIME™ INFUSION SYSTEMS



The PRIME™ infusion system from Gurit has been used successfully for the single-operation moulding of components ranging from narrow carbon yacht masts, up to 80' yacht hulls and wind turbine blades. PRIME™ infusion resin has a much reduced viscosity and longer working time, which makes it ideal for infusing very large parts with complex reinforcements in one operation.

PRIME™ 27 is suitable for the female moulding of large, complex components incorporating advanced fibres such as carbon* and aramid. Typical projects include spars, hulls and reinforcing structures.

PRIME™ 27 offers outstanding performance in a variety of liquid infusion processes including SCRIMP, RIFT (resin infusion under flexible tooling), VARTM (vacuum assisted resin transfer moulding) and RTM (resin transfer moulding).

PRIME™ 27 resin uses a wide range of hardeners to give a range of working times and cure speeds. This enables the gel time of the resin to be closely matched to the required infusion time for any particular size of moulded part. It achieves excellent mechanical and physical properties, including a high Tg from a moderate (50°) post-cure.

The system has an exceptionally low exotherm characteristic, which allows thick sections to be manufactured without risk of premature gelation due to exothermic heat build-up. This low exotherm will also extend the life of the mould tools.

System Properties At 20°C**		Mixed Viscosity**	150g Gel-Time**	Latest Flow Under Vacuum**	Earliest Vacuum-Off Time**	Earliest De-mould Time**
PRIME™ 27	Fast Hardener	260 - 280	1 hour	2 ¾ hours	4 hours	5 hours
	Slow Hardener	265 - 285	4 ¾ hours	5 hours	11 hours	17 hours
	Extra-slow Hardener	250 - 270	10 ½ hours	9 ½ hours	29 hours	Not recommended without a post-cure
	High Tg Hardener	500 - 520	5 hours	-	-	Not recommended without a post-cure

*Unidirectional carbon fibre is acknowledged difficult to infuse. Please contact a member of technical team before attempting a carbon infusion with PRIME™ 27.

**Working time properties are highly subjective to ambient conditions and should be used as approximate guideline for all PRIME™ 27 systems at 20°C.

PRIME™ 27

Premium Epoxy
Infusion System

Up to 14 hours
working time



Mix ratio
(by weight)

100
28

- ↪ The lowest viscosity PRIME™ infusion resin
- ↪ Variable infusion times
- ↪ Very low exotherm in thick sections
- ↪ Suitable for infusing structures that utilise carbon, aramid and glass fibres
- ↪ DNV-GL & Lloyd's Register certified formats available

INTRODUCTION

PRIME™ 27 offers outstanding performance in a variety of liquid infusion processes. It is Gurit's premium infusion system, offering high mechanical and thermal properties, lower viscosity, improved wetting out and longer working time. It achieves excellent mechanical and physical properties, including a high Tg from a moderate (50°C / 120°F) post-cure.

PRIME™ 27 resin uses PRIME™ hardeners to give a range of working times and cure speeds. This enables the gel time of the resin to be closely matched to the required infusion time for any particular size of moulded part. The system has an exceptionally low exotherm characteristic, which allows thick sections to be manufactured without risk of premature gelation due to exothermic heat build-up. This low exotherm will also extend the life of mould tools.

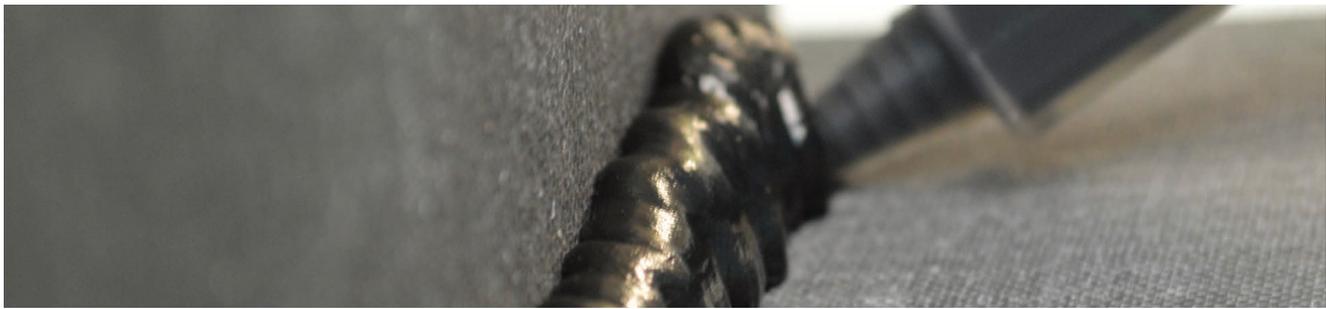
TYPICAL APPLICATIONS

PRIME™ 27 is suitable for the female moulding of large, complex components including spars, hulls and reinforcing structures.

PACK SIZES & AVAILABILITY

PRIME™ 27 is available in 4 kg resin & hardener packs or in 1000 / 214 / 18.6 kg resin and 900 / 180 / 19 / 5.2 kg hardener quantities.

ADHESIVE SYSTEMS



Spabond™ adhesives offer outstanding performance in high-stress, high-load applications for Marine, Wind Energy and Civil Engineering applications.

System Properties at 20°C		Description	Hardener	Mix ratio	Working Time* at 20°C	Clamp Time* at 20°C	Sag*	Max Temp
Structural, high dynamic load applications								
Spabond™ 300 Series	Spabond™ 335	Toughened gap filling epoxy adhesive system.	Fast (Black)	2:1 (by volume)	20 mins	6 hrs	5mm	65°C
			Standard (Grey)		1 hr	9 hrs		
	Spabond™ 340LV HT	High strength, rubber toughened, fast dispense. Uses: Industrial, wind energy and marine.	Fast (Red)	2:1 (by volume)	½ hr	4 hrs	20 – 25mm	68°C
			Slow (Purple)		4 hrs	18hrs		
			Extra Slow (Blue)		6 hrs	24 hrs		
	Spabond™ 345	Highly sag resistant. Uses: highest performance marine projects	Fast (Black)	2:1 (by volume)	½ hr	5 ½ hrs	15 – 30mm	75°C
			Slow (Red)		4 hrs	12 hrs		85°C
			Extra Slow (Blue)		6 hrs	19 hrs		80°C
	Specialist substrate and applications							
Spabond™ 500 Series	Spabond™ 5 Minute	Tacking and secondary bonding.		1:1 (by volume)	5 mins	20 mins	10 - 15mm	55°C
	Spabond™ 540	High elongation, long bonding times.	Fast (Red)	1:1 (by volume)	¾ hr	3 ½ hrs	20 – 30mm	56°C
			Standard (Purple)		2 hrs	15 hrs		58°C
	Spabond™ 540LV	Low viscosity resin option for easier application.	Slow (Green)		4 hrs	25 hrs		52°C
			Extra Slow (Blue)		6 ½ hrs	tbc		tbc
	Spabond™ 545	Bonds multiple substrates found in general applications	Fast	2:1 (by volume)	25 mins	5 hrs	0.2 - 20mm	63°C
			Slow		90 mins	10 hrs		61°C
	Spabond™ 568	Core bonding adhesive		2:1 (by volume)	5 ½ hrs	24 hrs	10mm	65°C
Spabond™ 570	Easy mixing/smooth spreading. Bonds all woods		1:1 (by volume)	1 ½ hrs	-	10 - 20mm	55°C	
Spabond™ 570LV	Low viscosity hardener option for easier application							
Rapid structural adhesives								
Spabond™ 700 Series	Spabond™ 730	High strength, rapid curing. General purpose adhesive.		1:1 (by volume)	10 mins	1 hr	10 - 15mm	60°C
Structural WTG blade bonding adhesives								
Spabond™ 800 Series	Spabond™ 840	High strength, rapid curing long open time adhesive for WTG blade bonding.		1:33 (by vweight)	-	-	25 - 30mm	72°C

Please note: A suitable mixing method is required to mix and dispense Spabond™ adhesives. For our range of dispense guns and mix heads, please refer to the Ancillary Products section.

S/S – straight sided metal pail for mixing machine extrusion and automated dispense



SPABOND™ 335

Structural 5mm Bond-line Adhesive

Up to 10 hours working time



Ideal for thin bond-lines

5mm

Mix ratio (by volume)

$\frac{2}{1}$

- Temperature performance up to 73°C
- Formulated for bond lines up to 5mm
- High Strength & Toughness

INTRODUCTION

Spabond™ 335 is a toughened, high performance, thixotropic adhesive, with a simple 2:1 by volume mix ratio. It is a very versatile system suitable for bonding a wide range of materials. The product has a grease-like consistency, and can be applied in thicknesses of up to 5mm at 20°C on vertical surfaces, without the risk of drainage.

With its inherent thixotropic characteristics, Spabond™ 335 usually needs no further filler addition for most applications.

TYPICAL APPLICATIONS

Thin bond-lines and gap-filling.

PACK SIZES & AVAILABILITY

Spabond™ 335 is available in 20 resin and 8.4 – 9.2 kg hardener quantities.

SPABOND™ 340LV HT

Structural High Tg Adhesive

Good sag resistance

25mm



Mix ratio (by volume)

$\frac{2}{1}$

- Lower density than glass filled adhesives
- Higher thermal performance & faster cure
- High strength and toughness industrial adhesive
- Excellent gap filling properties
- DNV-GL certified formats available
- Low exotherm and shrinkage
- Cartridge and mixing machine dispense
- Range of working times / clamp times
- Temperature performance up to 90°C / 195°F

INTRODUCTION

The latest Spabond™ 340LV HT formulation is a high performance adhesive designed for bonding large structures. It is a cost-effective system with good thermal and mechanical properties.

The new improved formulation gives higher thermal performance and allows faster curing, making this product ideal for bonding large composite structures where minimising cure times and increasing productivity is of value. The components are pigmented 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 2:1 mix ratio by volume.

TYPICAL APPLICATIONS

Large structures such as yacht hulls and wind turbine blades.

PACK SIZES & AVAILABILITY

Spabond™ 340LV HT is available in 400 and 900ml cartridges with mix-heads, 200 / 20 resin and 200 / 20 / 10 kg hardener quantities. Cartridge guns and additional mix heads are also available.

SPABOND™ 345

Epoxy Gap-Filling Adhesive

High sag
resistance for
gap-filling

30mm



Mix ratio
(by volume)

2
1

- ↪ High strength and toughness
- ↪ Excellent gap filling properties
- ↪ Designed for cartridge & mixing machine dispense
- ↪ Low exotherm and shrinkage
- ↪ Black fast hardener for cosmetic applications
- ↪ DNV-GL and Lloyds Register certified formats available

INTRODUCTION

Spabond™ 345 is a toughened, high performance adhesive system ideal for bonding large structures where substrate surfaces have uneven geometry. The product has a thick, paste-like consistency, and can be applied without sag in thicknesses of over 30mm at 15°C, making it ideal where large, uneven vertical glue-lines are required.

The product has a 2:1 mix ratio by volume. To aid mixing, the components are pigmented to give visual indication of mix quality. The Fast hardener is coloured purple, but there is also a black version. This is useful for improving the cosmetic appearance of bond-lines involving exposed carbon composites.

TYPICAL APPLICATIONS

For highest performance marine projects.

PACK SIZES & AVAILABILITY

Spabond™ 345 is available in 400ml cartridges with mix-heads or 20 kg resin and 20 / 9.6 kg hardener quantities. Cartridge guns and additional mix heads are also available.

SPABOND™ 500 SERIES

SPABOND™

5-MINUTE

Tacking and Secondary Bonding

Fast setting
in 5 minutes



Ideal extra-
hand adhesive
in assembly



Mix ratio
(by volume)

1
1

- ↪ 5 minute adhesive
- ↪ Can be used alongside other Spabond™ products
- ↪ Available in cartridges
- ↪ Ideal when used as an “extra hand” in assembly

INTRODUCTION

Spabond™ 5-Minute uses Gurit's fast-setting technology. It combines outstanding bonding speed with a simple 1:1 by weight and by volume mix ratio. This thixotropic system is ideal for general bonding and repair work on a wide range of materials.

Components bonded with Spabond™ 5 Minute demonstrate high bond strengths and can be handled after a very short period of time. Spabond™ 5-Minute can be used in conjunction with other Spabond™ products as a “spot weld” system in situations where the use of conventional clamps is not possible.

TYPICAL APPLICATIONS

Used to tack panels in place whilst the structural adhesive is curing.

PACK SIZES & AVAILABILITY

Spabond™ 5-Minute is available in individual 310ml resin and hardener cartridges or 400ml combined cartridges with mix-heads. Cartridge guns and additional mix heads are also available.

SPABOND™

540 & 540LV

Epoxy to Polyester Bonding

Over 6.5hrs
working time



Mix ratio
(by volume)

1
1

- ↪ Excellent bond to polyester & epoxy substrates
- ↪ Sag resistance of up to 30mm on a vertical face
- ↪ Resin and Hardener pigmented to give a visual indication of mix quality
- ↪ Wide range of hardeners, from Fast to Extra-slow
- ↪ Exceptional impact toughness & peel strength
- ↪ Low exotherm & shrinkage in thick bond-lines
- ↪ Lloyds Register certified formats available

INTRODUCTION

Spabond™ 540 is a modified ambient curing epoxy adhesive designed for bonding polyester or epoxy laminates. The Adhesive system is available with two resins; Spabond™ 540 resin is designed for larger gaps up to 30mm and Spabond™ 540LV for bond-line <20mm.

TYPICAL APPLICATIONS

The high toughness and excellent gap filling properties make this adhesive ideal for stringers/bulkheads, frames and hull-to-deck joints on medium to large production boats.

PACK SIZES & AVAILABILITY

Spabond™ 540 is available in 600ml cartridges with mix-heads and 200 / 20 kg resin and 184 / 18.4 kg hardener quantities. Cartridge guns and mix heads are also available on request.

Spabond™ 545

Dissimilar Substrate
Epoxy Adhesive System

Range of
hardener speeds



Ideal for
dissimilar
substrates



Suitable for a
range of bond-
line thicknesses

0.2
to
20mm

- ↪ Range of hardener speeds to suit most application requirements
- ↪ Cross-market industrial applications
- ↪ Range of gap filling: Low (0.2mm) - High (20mm)
- ↪ Easy to apply – Manual or Pneumatic Dispense Guns, Bulk Dispensing Unit
- ↪ Bonds multiple substrates

INTRODUCTION

Spabond™ 545 is a two component Epoxy Adhesive offering outstanding performance in numerous composite and non-composite applications, ideally suited for bonding dissimilar substrates.

TYPICAL APPLICATIONS

Ideal for cross-market applications - Automotive, Transportation, Industrial, Construction.

PACK SIZES & AVAILABILITY

Spabond™ 545 is available in 400ml cartridges with mix-heads, 20 kg resin and 18.8 kg fast or 18.4 kg slow hardener quantities for machine mixing/dispense. Cartridge guns and additional mix heads are also available on request.

SPABOND™ 568

Core Bonding & Splicing

Ideal for PVC,
PET, SAN &
BALSA bonding



Mix ratio
(by volume)

2
1

- Low cured density ideal for core bonding
- Long working time for large structures
- Suitable for use with lightweight core
- DNV-GL certified formats available

INTRODUCTION

Spabond™ 568 is a low density adhesive, with a simple 2:1 by volume mix ratio which is designed for bonding a wide range of core materials. The product is uniquely filled and can be applied in thicknesses of up to 6mm at 20°C on vertical surfaces without the risk of drainage.

Resin and hardener are both colour coded to ensure consistency of the mix. The resin is light green and the hardener pale brown leading to a neutral grey colour when fully mixed.

TYPICAL APPLICATIONS

With the fillers used in its formulation, Spabond™ 568 is easy to sand and can be used for strip planking with wood or foam strips.

PACK SIZES & AVAILABILITY

Spabond™ 568 is available in 17.5 / 10 kg resin and 7.7 / 4.4 kg hardener quantities.

SPABOND™ 570

Oily Wood to Epoxy Bonding

90 minute
working time



Excellent
adhesion to oily
wood like teak



Mix ratio
(by volume)

1
1

- Excellent application characteristics
- Mixing machine pump-able hardener available
- Highly sag resistant - 15mm on a vertical surface
- Tolerant of very high humidity

INTRODUCTION

Spabond™ 570 has been formulated to give the optimum mechanical and working properties for bonding teak decking to a composite hull. Designed specifically for this purpose, it is the ideal adhesive for bonding down teak decks.

In use, Spabond™ 570 has a tolerant 1:1 mix ratio and a thixotropic, gel type consistency. This makes Spabond™ 570 very easy to measure, mix and apply. Spabond 570 is non-corrosive, solvent free and generates green strength at ambient without the need for a post. Once cured, Spabond 570 is a tough, very strong adhesive that is compatible with all types of wood, though excels with oily wood types.

TYPICAL APPLICATIONS

Teak deck bonding.

PACK SIZES & AVAILABILITY

Spabond™ 570 is available in 20 / 5 kg resin and 20 / 5 kg hardener quantities.

SPABOND™ 730

Rapid Structural Bonding

Rapid 5-minute
working time



Full properties
from overnight
ambient cure



Mix ratio
(by volume)



- Reduced clamp time structural adhesive
- High strength and toughness
- Gels in 10 minutes, touch-dry in 2 hours
- Full properties after an overnight cure at ambient

INTRODUCTION

Spabond™ 730 is a fast curing structural adhesive designed for applications where reduced clamp times are important. It has a simple 1:1 by weight and volume mix ratio.

It can be used to bond together a wide variety of dissimilar materials and has been designed to give a durable high strength bond.

TYPICAL APPLICATIONS

Fit-out, finishing and repair.

PACK SIZES & AVAILABILITY

Spabond™ 730 is available in 400ml cartridges with mix-heads. Cartridge guns and additional mix heads are also available.

SPABOND™ 840

Fast Curing Structural
Epoxy Adhesive

Long working
time



Low toxicity
formulation



Mix ratio
(by weight)



- Long working time – for manufacture of large components
- Rapid cure in 2 hours at 70°C
- Formulated with Gurit LRT (Light Reflective Technology)
- High strength and toughness

INTRODUCTION

Spabond™ 840 is a high performance, toughened adhesive. It is a cost-effective system with good thermal, mechanical properties with long working time for adhesive application yet incorporates innovative chemistry to allow a rapid 2 hour cure time at elevated temperature.

TYPICAL APPLICATIONS

Bonding large structures, such as wind turbine blades

PACK SIZES & AVAILABILITY

Spabond™ 840 is available in 20 / 180 kg resin and 20 / 180 kg hardener quantities.

FILLING AND FAIRING



Gurit's filling and fairing systems for the finishing of component manufacture, offer a range of working times, good sandability and compatibility with a wide range of primers.

System	Description	Hardener	Speed	Mix ratio	Intended Application
S-Fill™ 15 Minute	Rapid cure at ambient temperature, to allow sanding without clogging at just over an hour after application.	Standard	15 mins	100 : 100 (parts by volume)	Ideal for rapid filling and repairing all sizes of composite and metal structures such as hulls and decks.
S'Fair™ 600	Two component filler that can be applied up to a thickness of 35mm on a vertical surface. It is easy to sand and is compatible with a wide range of primers and top coats.	Fast Standard	10 mins 45 mins	100:100 (parts by volume)	Designed for filling and fairing large composite and metal structures such as hulls and decks.

S'FILL™ 15 MINUTE

Rapid Epoxy Filler

15 minute
tack-off time



Sand-able after
1 hour without
clogging



Simple mix
ratio (volume)

1
1

- Simple 1:1 mix ratio by volume
- Spreadable for up to 5 minutes
- 15 minute tack-off time
- Easy to sand without clogging after 1 hour

INTRODUCTION

Gurit's S'Fill™ 15 Minute Filler is an epoxy filler system designed for rapid cure at ambient temperature, to allow sanding without clogging at just over an hour after application. As well as rapid cure and good sandability, the system has been developed to offer ease of dispense and mixing, good sag resistance during application, good cured properties. The system offers a simple 1:1 mix ratio, high levels of adhesion, low shrinkage and good thermal and mechanical properties.

TYPICAL APPLICATIONS

Ideal for rapid filling and repairing all sizes of composite and metal structures such as hulls and decks.

PACK SIZES & AVAILABILITY

S'Fill™ 15 Minute is available in 2 L resin and hardener pack quantities.

S-FAIR™ 600

Epoxy Fairing System

Up to 3 hours
working time



Easy to sand
and high 35mm
sag resistance



Simple mix
ratio (volume)

1
1

- Sag resistance up to 35mm on vertical surfaces
- Easy to sand
- Simple 1:1 mix ratio by volume
- Available with two hardeners; Fast and Standard
- Simple 1:1 mix ratio by volume
- Density of 0.86-0.93 g/cm³

INTRODUCTION

S-Fair™ 600 is a simple 1:1 by volume, two component filler that can be applied up to a thickness of 35mm on a vertical surface. It is easy to sand and is compatible with a wide range of primers and top coats typically used in the marine market for the finishing of yachts. It is available with two hardeners; Fast and Standard, which enables the customer to tailor the working/cure time to the ambient workshop temperature.

TYPICAL APPLICATIONS

Designed for filling and fairing large composite and metal structures such as hulls and decks.

PACK SIZES & AVAILABILITY

S-Fair™ 600 is available in 10 / 2.5 L resin and 10 / 2.5 L hardener quantities.

IN-MOULD PROCESS COAT



Our coating products are hard wearing and versatile partners for the prepreg and infusion systems. Available in solvent-free formulations, Gurit's in-mould process coats are suitable for a range of applications and industries.

System	Description	Hardener	Speed	Mix ratio	Intended Application
CR 3400	Easy to sand, in-mould epoxy surfacing system for epoxy laminates and is designed to be used as the base for the subsequent application of a paint scheme.	Standard	5 hrs	100:30 (parts by weight)	Designed to be backed up with Ampreg™ laminating systems and PRIME™ infusion systems to give a sand-able surface ready for painting.

IN-MOULD PROCESS COAT

CR 3400

Epoxy In-mould Primer Coat

24 hour over-coating window



Easy to sand



Mix ratio
(by weight)

100
30

- ↪ Long over-coating window
- ↪ Easy to sand
- ↪ May also be used with some Gurit prepregs
- ↪ Co-curable with Gurit epoxy laminating and infusion systems

INTRODUCTION

CR 3400 is an in-mould epoxy surfacing system for epoxy laminates, and is designed to be used as the base for the subsequent application of a paint scheme. CR 3400 is formulated to be easily sand-able so that once released, the surface can be readily keyed prior to the application of the paint system. This feature gives additional benefits in that any minor surface defects caused by laminate print-through or mould imperfections can easily be sanded away. CR 3400 is applied into a mould in the same way as other epoxy gelcoats, and has similar handling characteristics. However, the product has a considerably longer over-coating window than other gelcoats - up to one day with Standard Hardener at 20°C so that the system can also be used in a very flexible manufacturing environment.

TYPICAL APPLICATIONS

CR 3400 is designed to be backed up with Ampreg™ laminating systems and Prime infusion systems. Under certain conditions it may also be used in conjunction with SE70 / SE84LV prepregs and SPRINT™ systems. CR 3400 must be painted prior to water immersion.

PACK SIZES & AVAILABILITY

CR 3400 is available in 19 kg resin and 5.7 kg hardener quantities.

TOOLING PRODUCTS



As a technical leader in commercial composite materials, Gurit offers a complete range of composite tooling products.

Gurit's tooling product range consists of a range of ambient curing mould materials that can be used up to an operating temperature of up to 160°C.

Type	Product	Operating Temperature	Description
Gelcoats	T-Gel 130-1	130°C	T-Gel 130-1 is an epoxy gelcoat system for manufacturing glass or carbon reinforced mould tools. T-Gel 130-1 is compatible with Gurit's range of 130°C / 265°F tooling laminating, infusion and repair materials.
Laminating Systems	T-Lam 130-1	130°C	T-Lam 130-1 is an epoxy tooling system designed for wet laminating glass or carbon moulds. T-Lam 130-1 is compatible with T-Prime 130-1.
Infusion Resin	T-PRIME™ 130-1	130°C	T-PRIME™ 130-1 is a low viscosity epoxy tooling system for manufacturing infused glass and carbon moulds. It is compatible with T-Lam™ 130-1 laminating.
Infusion Resin	T-PRIME™ 160	160°C	T-PRIME™ 160 is a low viscosity epoxy tooling system for manufacturing infused glass and carbon moulds.

T-GEL 130-1

130°C Tooling Gelcoat System

Over 5 hours
working time



Stable up to
130°C (266°F)



Mix ratio
(by weight)

100
49

- Thermally stable up to 130°C (266°F) when fully post-cured
- Application by roller or brush
- Resistant to thermal cycling damage
- Low shrinkage for accurate mould manufacture
- Sag resistant up to 1mm on vertical surfaces

INTRODUCTION

T-Gel 130-1 is an epoxy gelcoat system for manufacturing glass or carbon reinforced mould tools. T-Gel 130-1 is compatible with Gurit's range of 130°C tooling laminating, infusion and repair materials.

Prepreg over-lamination as part of tool construction is not recommended with this system. The formulation has been designed to provide excellent application handling and sag resistance to aid tool manufacturing. As with all epoxy tooling systems, care must be taken to avoid exposure to sunlight to avoid breakdown of the surface.

To ensure sufficient strength for de-mould and maximise gelcoat adhesion a mid-cure of 4 hours at 40°C (104°F) is recommended after the ambient cure stage.

TYPICAL APPLICATIONS

Manufacturing of glass or carbon moulds from liquid infusion processes such as yacht hulls and wind turbine blades.

PACK SIZES & AVAILABILITY

T-Gel 130-1 is available in a 7.6 kg resin & hardener pack quantity.

T-LAM 130-1

130°C Tooling
Laminating System

Over 8 hours
working time



Stable up to
130°C (266°F)



Mix ratio
(by weight)

100
40

- Thermally stable up to 130°C (266°F) when fully post-cured
- Low viscosity for wet-out of heavy weight reinforcements
- Low exotherm and extended pot-life makes this product ideal for large or complex moulds
- Ambient curing and low shrinkage for accurate mould manufacture

INTRODUCTION

T-Lam 130-1 is an epoxy tooling system for manufacturing glass or carbon moulds by wet laminating. T-Lam 130-1 is part of the 130°C tooling systems and is compatible with the range of gelcoats, infusion, and repair materials.

T-Lam 130-1 is a low shrinkage ambient curing system, which simplifies accurate mould manufacture. Designed for laminating and cure at 20°C, it should then be mid-cured at 40°C (104°F) for 4 hours to guarantee the strength needed for de-moulding. It can then be post-cured off the plug to give a material that is thermally stable to 130°C (266°F). Exceeding this temperature will cause a rapid loss in stiffness and a safety margin is required for the maximum tool operating temperature to prevent distortion or tool damage.

TYPICAL APPLICATIONS

Manufacturing of glass or carbon moulds from liquid infusion processes such as yacht hulls and wind turbine blades.

PACK SIZES & AVAILABILITY

T-Lam 130-1 is available in 20 kg resin and 8 kg hardener quantities.

T-PRIME™ 130-1

130°C Tooling Infusion System

Over 6 hours
infusion time



Stable up to
130°C (266°F)



Mix ratio
(by weight)

100
27

- Thermally stable up to 130°C (266°F) when fully post-cured
- Resistant to thermal cycling damage
- Low initial mixed viscosity for easier infusion
- Long pot-life and gel time; capable of infusing large or complex moulds
- Ambient curing and low shrinkage for accurate mould manufacture

INTRODUCTION

T-PRIME™ 130-1 is an epoxy tooling system for manufacturing glass or carbon moulds from liquid infusion processes and is compatible with Gurit's range of 130°C tooling gelcoat, laminating and repair systems.

T-PRIME™ 130-1 is a low shrinkage ambient curing system, which provides a simple way to produce high accuracy moulds. Designed for infusion and cure at ambient temperatures, it should then be mid-cured at 40°C (104°F) for 4 hours to guarantee the strength needed for de-moulding. It can then be post-cured off the plug to give a material that is thermally stable to 130°C (266°F). Exceeding this temperature will cause a rapid loss in stiffness and a safety margin is required for the maximum tool operating temperature to prevent distortion or tool damage.

TYPICAL APPLICATIONS

Manufacturing of glass or carbon moulds from liquid infusion processes such as yacht hulls and wind turbine blades.

PACK SIZES & AVAILABILITY

T-PRIME™ 130-1 is available in 185 / 12.5 kg resin and 16.7 / 3.4 kg hardener quantities.

T-PRIME™ 160

160°C Tooling Infusion System

Over 6 hours
infusion time



Stable up to
160°C (320°F)



Mix ratio
(by weight)

100
35

- Thermally stable up to 160°C (320°F) when fully post-cured
- Resistant to thermal cycling damage
- Low viscosity suitable for infusion
- Long pot-life and gel time; capable of infusing large or complex moulds
- Ambient curing and low shrinkage for accurate mould manufacture

INTRODUCTION

T-PRIME™ 160 is an epoxy tooling system for manufacturing glass or carbon moulds from liquid infusion processes and is compatible with Gurit's range of 160°C gelcoat and repair systems.

T-PRIME™ 160 is an ambient curing system, providing a simple way to produce high accuracy moulds. Designed for infusion and cure at ambient temperatures, it should then be mid-cured at 40°C (104°F) for 4 hours to guarantee the strength needed for de-moulding. It can then be post-cured off the plug to give a material that is thermally stable to 160°C (320°F). Exceeding this temperature will cause a rapid loss in stiffness and a safety margin is required for the maximum tool operating temperature to prevent distortion or tool damage.

TYPICAL APPLICATIONS

Manufacturing of glass or carbon moulds from liquid infusion processes such as yacht hulls and wind turbine blades.

PACK SIZES & AVAILABILITY

T-PRIME™ 160 is available in 200 / 20 kg resin and 180 / 17.5 kg hardener quantities.

ANCILLARY PRODUCTS



In order to assist in the use of the wide range of materials manufactured and supplied by Gurit, a range of ancillary products are also available. These have been refined over many years to enable users to handle products safely and to obtain the very best results from Gurit materials. The ancillary products are grouped together into three main categories:

FILLER POWDERS

A range of filler powders which are designed to modify the properties of some of the Gurit liquid solvent-free resin systems, and so create resin mixes for use as fillers and adhesives. The fillers form three distinct categories: hollow spheres, short fibres, and flow modifiers.

Hollow spheres

Hollow spheres increase the volume and reduce the density of any resin system and are used to make adhesive mixes and filling & fairing mixes.

- Micro-balloons: Brown microsphere filler powder used to make glues or paste fillers.
- Glass Bubbles: White microsphere filler powder used to make glues or paste fillers.

Short Fibres

For adding strength to a resin and hardener mix used as a structural adhesive, short reinforcing fibres are often added which act in a similar strengthening way to the long reinforcing fibres used in composite construction.

- Micro-fibres: Cellulose fibres used to make adhesive mixes.

Flow Modifiers

The most common material for modifying the flow properties of a resin mix is colloidal silica. This is a very fine powder which is added in conjunction with other fillers to 'thicken' mixes and reduce their flow on vertical surfaces (increase thixotropy).

- Colloidal Silica: Fine, anti-sag, filler powder. Use in combination with other filler powders.

SOLVENTS

A range of solvents for cleaning tools and surfaces. Due to the very different chemistry of some of the Gurit products from each other, it is important that the correct solvents are selected for the intended application.

PIGMENTS

A range of pigments that can be added to some Gurit products to adjust the colour / visual appearance. Please contact Gurit Technical Support for further guidance on the correct usage / addition of pigments which can vary by product.

APPLICATION, PROCESSING AND SUNDRY ITEMS

Pumps and dispense equipment, application and processing items and pigments.

For our range of dispense guns and mix heads, please contact your local customer services representative for more information.

INTRODUCTION TO FORMULATED PRODUCTS

Data sheets are also supplied with the product when it is ordered. If required in advance of a product, the relevant full SDS (Safety Data Sheet) can be obtained from Gurit.

Each formulated product datasheet contains a brief product description, a list of the availability of the product and its components and then the technical data. The technical data in each datasheet includes the following:

- Physical properties of the resin, hardener and mixed systems e.g. viscosity, density etc.
- Working Properties characteristics of the mixed resin and hardener e.g. gel time, working time etc. This is normally presented over a range of different temperatures.
- Cured System Thermal and Mechanical properties, in many cases with more than one cure cycle e.g. glass transition temperature (Tg), shrinkage, laminate compressive strength, etc.

Physical Properties

Each product datasheet details a number of important physical properties. These properties provide important information on the discrete elements and mixed systems, and are particularly relevant when looking at applications such as automated mixing and dispensing.

Mix Ratio

Most of the formulated resin products that are produced by Gurit are based on epoxy chemistry. In most cases the reaction of resin and hardener is an addition reaction, which, in its simplest form, means that one molecule of resin needs to react with one molecule of hardener for a complete reaction to occur. This is different to the catalytic cure of, for example, a polyester resin where a 'chain-reaction' is involved.

The implication of this for most epoxies is that the ratio of resin to hardener is critical, and deviating from it will result in unreacted resin or hardener, and an inferior end-product.

Most products in the Gurit range are intended to be mixed by accurately weighing out the correct amounts of resin and hardener using appropriate scales. Other products in the Gurit range are designed to be dispensed and mixed by volume, making them easier to use with dispensing pumps and mixing machines.

Viscosity

The viscosity of a liquid is defined as the measure of its resistance to a shearing action, such as that applied by a brush, laminating roller or the products own self-weight on a vertical surface. It affects many handling properties including ease of fibre wet-out and mixing, degree of flow under vacuum, and drainage on a vertical surface.

The viscosity of a mixed resin and hardener system is strongly affected by temperature, with most systems becoming unworkable if the temperature falls below a certain point, a factor that should be borne in mind when controlling workshop temperatures.

Viscosity can be measured in a number of different ways, with different test methods giving slightly different results. A standard industry method is a cone and plate viscometer. This uses a slowly rotating conical disc, which is applied at a constant pressure onto a heated metal base-plate. The liquid being sampled is sandwiched in a thin film between the cone and the plate, and the torque required to revolve the cone is measured and converted to a viscosity.

The method can be used to produce isothermal viscosity curves which show how viscosity increases as a material cures at a constant temperature. Non-isothermal curves can also be generated by heating the base-plate. These show how the viscosity of a material, either mixed or as a single component, changes with temperature.

The SI units of measure of dynamic viscosity is a pascal-second (Pa.s) but the unit of poise (P) or centipoise (cP) is commonly used, where $0.1\text{Pa.s} = 1\text{P} = 100\text{cP}$.



SUBSTANCE	cP
Water	1
Olive Oil	80
Motor Oil (SAE 40)	300
Honey	2000-10000
Ketchup	50000-100000
Ambient Viscosity of Common Products	

Thixotropy

Some liquids have a characteristic known as thixotropy whereby their viscosity depends on shear rate and time. This means that under high shear rates, such as when applied with a brush, they act as if they have a low viscosity, but under low shear rates, such as under the product's own weight, they act as if they have a high viscosity. Non-drip paint is a common example where this phenomenon is used to formulate a product for a specific application.

Comparing data for materials with this characteristic can be complicated as the conditions under which it has been tested with regard to shear rate and time will influence the measured viscosity.

Some resin systems which are low in viscosity can be given this characteristic by the addition of fillers such as colloidal silica powder. However, colloidal silica, being a very low density powder, can be difficult to handle, so pre-thixotroped products, such as Ampreg™ Pregel can be used to alter the thixotropy of low viscosity resin systems - for example where there is a need to stop a resin system draining from a vertical surface.



Shelf Life

Since the properties of many resins and hardeners will change slightly with age, they have been allocated a shelf life. Within this shelf life, the properties of an unopened product will remain within the product's original quality control limits. This also assumes storage in accordance with the instructions given in the product datasheet. On each product label this shelf life is expressed in the form of an expiry date. Once opened and exposed to air, hardeners particularly will begin to degrade and should be used as soon as practicable. To maintain the freshness of the product for as long as possible, it is recommended that when hardener containers are nearly empty, the contents are dispensed into smaller containers so that the headspace of air above the liquid is minimised. It should be noted that, with a few exceptions, products may still be usable after their expiry date, but their properties may have changed beyond those set in the QC specification, and cannot therefore be guaranteed by Gurit. Typical changes that may be noticed are a darkening of colour, an increase in viscosity, an increase in gel times and settlement or separation of fillers and pigments.

Product Colour

Pigment is added to some products to either produce a finish of a specific colour or as an aid to mixing.

Liquids which are coloured in varying shades of yellow/brown or 'darkness', are often classified using the Gardner colour index. Most of the un-pigmented resins and hardeners produced by Gurit can be classified in this way, with the scale being approximately illustrated on the coloured film overleaf. Note that epoxy resins and hardeners may darken on storage, and may also vary slightly in colour from batch to batch. Once cured and exposed to sunlight most epoxies will also yellow slightly. These colour changes do not generally affect their other properties, but should be considered if the clarity and colour of a finished product is important.

Density

The density of liquid resin and hardener components are determined using pycnometers. These are simply containers with precisely known volume, typically 100ml. The container is weighed before and after filling, air free, with the sample. The density is then simply calculated by mass over volume.

Cured material density is determined by the Archimedes principle using a hydrostatic balance. A solid immersed in a liquid is exposed to the force of buoyancy. The value of the force is the same as that of the weight of the liquid displaced by the volume of the solid. A hydrostatic balance enables you to weigh a solid in air as well as in water, it is possible determine the density of a solid if the density of the liquid causing buoyancy is known.

Barcol Hardness

A measure of the resistance to penetration of a sharp point under a fixed load, applied by a standard Barcol Hardness tester. The higher the number, the harder the material. Barcol hardness can be used as a basic determination of how cured a material is, or as an indication of the wear resistance of a surface.

Solids Content

With solvent-based systems, the solids content is the percentage of a component or mix which comprises non-volatile material. Once the volatile solvent has evaporated, it is the solids element that remains behind to cure into the final film.

Hazard Definition

Most Gurit formulated products have some hazardous properties according to EU regulation on Classification, Labelling and Packaging (EC) No. 1272/2008, also known as Globally Harmonised System (GHS) of classification and labelling. The products may also be classified as dangerous goods for transport according to UN recommendations on the transport of dangerous goods.

This hazard classification system both defines a broad hazard category into which products with similar hazards are grouped, as well as defining in more detail the risks and safety issues associated with the handling and use of each product. The hazardous nature of the product is indicated by red border diamonds on the label of a resin or hardener container. The categories of hazard that can be found on Gurit products are as follows:

				
Irritant and/ or sensitiser	Corrosive	Toxic	Long term adverse effects	Harmful / toxic to the environment

The product label also contains details of the hazards associated with the product and precautions that should be taken whilst using the product. These are listed as Hazard Statements and Precautionary Statements.

Further classification is also allocated to a product to define the nature of the hazard during its transport. This classification uses similar hazard symbols to those for handling, and is indicated by a diamond label on the outer surface of a package in transit.

			
Toxic	Corrosive	Other hazards, such as environmentally hazardous	Dangerous to the environment

Full details concerning the safe handling, use and transport of any hazardous goods are contained in the Safety Data Sheet (SDS) for that product. This is a globally defined document split into 16 sections covering all aspects of product handling, storage and transportation. Every resin and hardener produced by Gurit has an SDS, and you should ensure that you have this document to hand before using the product. If you do not have this document, please contact Gurit.

Working Properties

On each product datasheet, the Working Properties table shows how the mixed resin and hardener will handle in use over a range of ambient temperatures. Many working properties are heavily temperature dependent and working outside of the recommended range is likely to have a detrimental effect on the use of or final properties of the product.

As a resin and hardener react together and begin to cure, the viscosity of the mix will begin to increase, slowly at first and then more rapidly as gelation approaches. The heat generated by the exothermic epoxy reaction will initially tend to reduce the viscosity, but it will also accelerate the cure. If this heat is contained within the mix by keeping the product in bulk, such as in a mixing pot, the time during which the product remains at a workable viscosity is markedly reduced, particularly in the

faster reacting systems. For this reason, once an epoxy is mixed, it should be poured into a shallow tray. This helps the heat of reaction to escape, and prolongs the time during which the product remains useable.

For almost all systems, Gel Time and Pot Life times are provided as a guide to working times, other experimental values are also provided but on a case by case basis depending on the product type.

Gel Time - 150g Mix in Water

A 150g resin and hardener mix is placed in a plastic beaker suspended in a water bath at the specified temperature. A Tecam gel timer is used to determine the point at which the viscosity of the liquid has increased to the point where the material is sufficiently solid to provide a back-force of $>0.05\text{N}$, on the plunging 22mm disk.

Pot life - 500g Mix in Air

A 500g resin and hardener mix is placed in a plastic beaker left in air at the specified temperature. The same Tecam gel timer is used as above. This test gives an indication of the exothermic (heat-emitting) properties of a resin system when confined in bulk, and is useful for both determining how quickly a material needs to be used, as well as providing an indication of how the material will behave in thick sections.

Note that because of the greater insulating nature of air compared with water, and the exothermic effects of higher volume mixes, these pot lives are always shorter than the gel- times given above. The only exceptions to this are the solvent- based products which are very low in exotherm, and where the larger mixes provide a greater reservoir of solvent to maintain the fluidity of the product for longer periods.

Earliest and Latest Time to Apply Vacuum

When a laminating resin and hardener are mixed, they begin to react together. Assuming temperatures remain constant, the viscosity of the mixed system will then begin to increase, with the mixture gradually thickening and becoming less workable as time progresses. If the resin is being used for a laminate that is to be vacuum bagged, the viscosity will eventually become so high that the vacuum bag becomes ineffective at bleeding out excess resin and so cannot consolidate the laminate properly. In the experience of Gurit this equates to a viscosity of approximately 5000P, and the time taken to reach this viscosity after mixing is given in the datasheets as the 'Latest Time to Apply Vacuum'.



However, it is equally important that the vacuum is not applied too early, since, if the resin is too low in viscosity, excessive bleed out can occur leading to resin-starved laminates. The minimum recommended viscosity for beginning to apply a vacuum to most laminates is 1000P and is quoted in some of the datasheets as the 'Earliest Time to Apply Vacuum'.

The times given in the datasheets are based on measuring the viscosity of a thin layer of the mixed resin system as it cures in a cone and plate viscometer. It should be noted that the measurements therefore relate primarily to thin laminates ($<1\text{mm}$) where there is a very low exotherm effect. Thicker laminates may well produce an exotherm effect, raising the laminate's temperature and significantly reducing these times as the data shows. Such temperature changes are best monitored by using thermocouples in the laminate and using the working times quoted for the laminate's actual temperature rather than that of the workshop. All times are measured from when the resin and hardener are first mixed together.

De-mould Time

This is derived from the cure profile of the material and is the earliest time at which a laminate or gelcoat will have sufficient strength to be carefully handled, and removed from a properly release-coated mould. This time is somewhat subjective since the degree of care exercised and the thickness and configuration of the laminate being de-moulded will also have a very significant effect on the time at which de-moulding can begin. De-mould time is measured from when the resin and hardener are first mixed together.

Clamp Time

This is the time from first mixing after which a resin system used as an adhesive should have reached a degree of cure where the substrates being bonded cannot be easily separated without damage to the adhesive layer or the substrates themselves. The cure will not have advanced to the point where the joint has sufficient mechanical properties to meet the intended in-service loads, but will have sufficient strength to be carefully handled, and removed from a jig or clamp.

Sag Resistance

This is the maximum thickness of fresh gelcoat, filler or coating material that can be applied to a vertical surface without it slumping or running. Sag resistance may be increased by the addition of Colloidal Silica, although this will also have the effect of making the material more brittle.

Coating Working Time

This is defined as the time in thin film for a product used as a coating or a gelcoat to reach a viscosity of 5000P. Beyond this viscosity the product will no longer be brush-able.



Tack-Off Time & Latest Over-coating Time

With most Gurit materials used as coatings, a second coat can be applied when the first has 'tacked-off'. This is the point where the material is still tacky but has reached a sufficient degree of cure for it not to be disturbed when a second layer is applied on top. As the first layer of material continues to cure beyond this "tack-off" point, it will reach a point where the tack has disappeared. At this point the exposed surface material loses its ability to bond due to the formation of an inert surface layer. Over-coating cannot continue after this point unless the first coat is allowed to cure fully and is then sanded to remove this inert layer. This point is known as the Latest Over-coating Time. The time between this and the Tack-Off Time is known as the over-coating window. Attempting to apply second coats outside of the over-coating window, and without sanding, can lead to severe bond problems between the layers. The exact over-coating window is affected by many factors including humidity and temperature.

Although the data presented will apply in most circumstances, a coating should always be tested by touching lightly with a finger. If the resin comes away on the finger then it is too early to overcoat, if the material is not tacky and a fingerprint cannot be left, then it is too late to overcoat without sanding. These times are measured from when the resin and hardener are first mixed together.

Earliest Sanding Time

This is the earliest time at which the material can be sanded, once any inert surface layer (commonly known as by-product) has been removed. By-product may form on coatings particularly if they are allowed to cure in low temperatures and high humidity. With SP 106 and Handipack, it can be removed by wiping with Solvent C.

Minimum Application Thickness for Coverage

The minimum thickness for application of a gelcoat or coating in order to achieve sufficient opacity to completely cover a contrasting base colour.

Suitability for Double Gelling

Many gelcoats have a surface chemistry that means they should not be applied in more than one coat, if inter-coat problems are to be avoided.

Wet Film Thickness & Dry Film Thickness

With solvent-based systems, the wet-film thickness is the typical coating thickness that can be applied as one layer. When the solvent has evaporated, the dry-film thickness is what remains.

THERMAL PROPERTIES

One of the most important physical characteristics of all cured formulated products is the way the material behaves when heated. This thermal data is critical to almost every application since it gives an indication of the limiting temperature for use of the material. Although it is ultimately only by testing the products in the loading configuration they will see in service, that an accurate determination can be made as to whether they are suitable for use at a particular temperature, the glass transition temperature can be used as a guide for initial product selection.

The Glass Transition Temperature (T_g) of a polymeric material, such as cured epoxy, is the temperature at which it changes from a hard and rigid molecular structure into a soft, semi-flexible one.

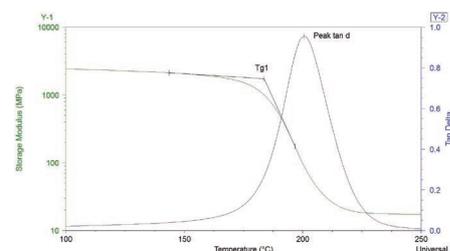
At this point, the polymer structure is still intact, but portions of the matrix are no longer 'locked' in position. In practical terms it signifies the upper use temperature of the material, above which the material will exhibit significantly reduced mechanical properties.

The transition from a rigid state to a flexible state is not an instantaneous one, and so there is a range of temperature over which the material undergoes the transition.

Great care should be taken when comparing datasheet values because different techniques, methods within techniques and evaluation procedures can all provide different T_g results. Pay particular attention to the technique used, the ramp rate of the test, the designation of the T_g value quoted and the cure conditions of the sample.

Dynamic Mechanical Analysis (DMA)

DMA is the technique most suited for the measurement of laminates. The sample, typically around 60x10x2mm, is mounted in a 3-point bend fixture and a precise cyclic load (stress) or displacement (strain) is applied. The sample is heated (3°C/min at Gurit) and the stress/strain response of the sample measured. The response can be converted into three plots, Storage Modulus (Stiffness), Loss Modulus (Viscous behaviour) and $\tan \delta$ (Dampening).

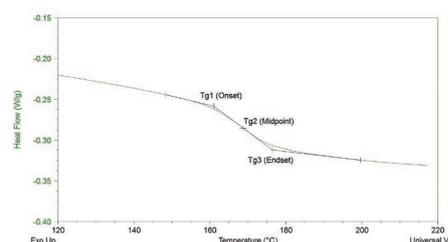


T_g values can be measured from each of these curves but at Gurit we prefer to quote the onset of the drop in the Storage Modulus (stiffness) denoted as T_{g1} .

This is the most conservative measure, other measures, particularly T_{g2} and peak $\tan \delta$, can be 10's of °C higher but are at the temperature that the material has lost virtually all of its stiffness and mechanical performance.

Differential Scanning Calorimetry

DSC is the technique most suited for the measurement of resin casts. DSC is a measure of heat flow into and out of a sample and is able to measure a T_g because the heat capacity of the material before and after the transition is different. A sample, typically around 10mg, is encapsulated in an aluminium pan. The sample is then heated (10°C/min at Gurit) and the heat flow measured. As the sample transitions through its T_g there is a step in the baseline. At Gurit we prefer to quote the midpoint of the step in the heat flow denoted as T_{g2} , as this is generally closer to the DMA measure.



The DSC has a further use, since it is measuring heat-flow, it can quantify the heat generated the reaction of any unreacted epoxy left in a sample after a given cure cycle. This is given here as ΔH , and is measured in J/g i.e. the residual energy (Joules) left in a gram of material. Use of both these measures can give a good indication of degree of cure of a laminate.

Ultimate Glass Transition Temperature (UTg)

Each formulation will have an Ultimate Glass Transition Temperature. This is the maximum that the particular formulation can attain if mixed at the correct ratio and fully cured. Knowing the difference between the "current" T_g and the "ultimate" will inform as to how well the material is cured and whether the material could benefit from a post cure.

HDT - EST

A further indication of the temperature at which a material begins to soften is the HDT (Heat Deflection Temperature). This is usually determined by heating a cast bar of the resin system in an oil bath, and measuring its deflection under an applied flexural load.

Although it has been used for a long time, and is still widely quoted today, it is a crude method in comparison to the DMA which measures the same property (stiffness change), but in a much more controlled way and to a higher degree of accuracy. Empirical testing of a wide range of products at Gurit has determined an approximate correlation between Tg (Peak Tan δ) and HDT, which has been used here to generate an 'Estimated HDT', by the formula:

HDT (Est.) °C = (Tg (Peak Tan δ)°C - 15°C) to an accuracy of $\pm 5^\circ\text{C}$

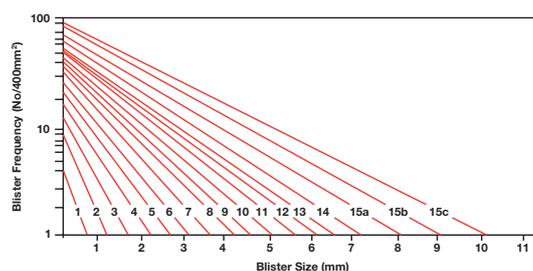
ENVIRONMENTAL CONDITIONING

Moisture Absorption

Cast samples are fully immersed in distilled water at 35°C, and the weight change is measured after 28 days. This is the required test temperature and time for Lloyds approval of resin systems for marine applications. Moisture absorption of a cast resin on its own can be misleading as it is equally important to know what effect the absorbed moisture has on a laminate's properties. Many hydrolysable resins, such as polyesters, may pick up low quantities of moisture in a casting, but in a laminate that moisture will cause deterioration and damage, and, in extreme cases, osmotic blistering. For this reason this data should always be looked at in conjunction with other wet property retention data.

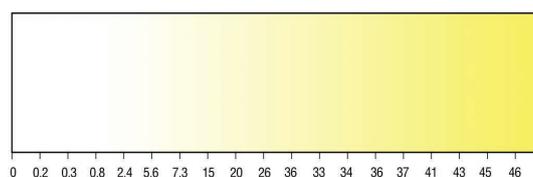
Blister Rating

For coatings and gelcoats that may be immersed in water, the blister rating gives an indication of how water-resistant the coating is. The test exposes one side of a coated laminate to a distilled water bath at 50°C for three weeks, in order to accelerate the ageing effects of the water. The number and size of the resultant blisters is graded and a rating assigned from the chart below. A low rating indicates good resistance.



Yellowing Index

Most epoxies will gradually turn yellow on exposure to UV light such as that from the sun. The Yellowing Index provides an indication of how rapid and severe this colour change is, so that for applications which require colour stability and clarity, the correct product can be chosen. In the gelcoats section, the comparative graph shows the indices of the epoxy products, and also compares them with a standard isophthalic polyester gelcoat, as this is often used in many UV-exposed applications. The test is carried out by exposing coated panels to a UV/heat/moisture cycle in a QUV accelerated weathering machine. This simulates typical outdoor weather, and provides useful comparisons between products, although these cannot accurately be correlated to a time in real outdoor conditions. A Minolta colour analysis spectrometer is used to measure the change from the unexposed condition, and the following chart provides an indication of what this colour change looks like if taken from the background white of the page.



MECHANICAL PROPERTIES

Casting Tensile Strength, Modulus & Strain to Failure

Carried out on laminating resins on a casting of the unfilled resin/hardener mix, post-cured as specified.

Glass Laminate Compressive Strength

The compression strength of a laminate is one of the mechanical properties that is dependent on the properties of the resin system, rather than just on the properties of the reinforcing fibres. In compression testing the resin system has to hold the fibres straight as columns, so that they can carry their full loads before they fail themselves. In many designs, the compression strength of a laminate is the limiting factor, since most laminates are weaker in compression than they are in tension.

Glass Laminate ILSS

Inter-Laminar Shear Strength (ILSS) is a measure of the shear strength of a laminate along the plane of a reinforcement layer. It is strongly dependent on the strength and adhesive properties of the resin which stops the laminate layers sliding over each other.

ILSS Wet Retention

When a laminate is immersed in water, the resin system in the laminate will eventually absorb moisture to an equilibrium level.

Since ILSS is a resin-dependent property, it can be used to see what effect the absorbed moisture has had on the laminate mechanical properties. The ILSS data here is measured after 28 days full immersion in distilled water at 35°C, and is expressed as a percentage of the ILSS before immersion.

Tensile Strain to Failure on Laminate

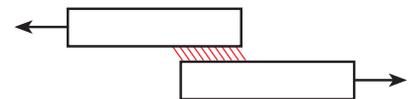
For a coating or a gelcoat applied to a laminate, this is the strain at which the gelcoat will crack. In many cases this may limit the strain to a level well below that which the uncoated laminate could be allowed to see before micro-cracking or ultimate failure occurred.



Lap Shear Strength – Shot-blasted Steel

This tests the shear strength of a resin system used as an adhesive by bonding two thick, overlapping steel blocks together and pulling them apart.

This is one of the most severe shear tests that can be applied to an adhesive, since the steel blocks do not flex at all, and so cannot provide any stress relief to the joint. This is in contrast to the thin aluminium plates often used for adhesive testing, where the flexibility of the aluminium enables artificially high shear strengths to be obtained.

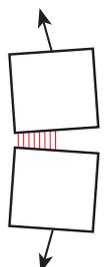


Lap shear strength wet retention

The lap-shear strength test above is applied to test samples that have been immersed in distilled water at 35°C for 28 days. Expressed as a percentage of the pre-soak value, the retention figure gives an indication of the degradation of the adhesive strength in wet conditions.

Cleavage Strength

This test pulls apart two steel blocks bonded together, by loading in a mode which will cause cleavage of the adhesive joint. This is a mode in which most adhesives are poor, and is generally avoided in design. However it gives a useful indication of the toughness of an adhesive and its resistance to cracking.

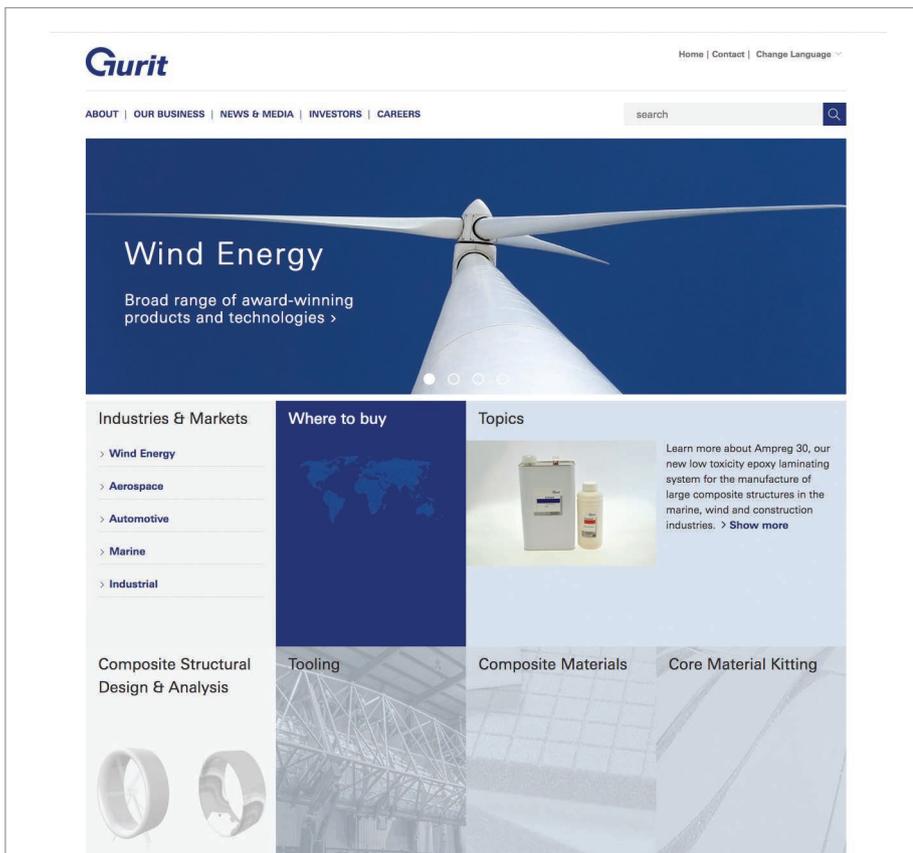


TECHNICAL INFORMATION AND PRICING

For more detailed information on Gurit Formulated Products, as well as the complete Gurit product portfolio, please visit: www.gurit.com to view the following:

- Product Data Sheets
- News / Case Studies
- Events Schedules
- Product Brochures
- Corporate Videos
- Composite Guides
- Representatives Contact Details

For pricing or other enquiries, please contact uk-customer.support@gurit.com



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Product Datasheets



Case Studies

