

PRIME™ 37

LOW TOXICITY EPOXY INFUSION SYSTEM

- Uses same Ampreg 3X low toxicity hardeners as the Ampreg range
- Blend-able hardener speeds.
- Fibre wetting technology reduces infusion time & improves laminate quality
- Cure characteristics optimised for infusion:
 - Mixed viscosity remains lower for longer
 - Faster through-cure, avoiding a “sugary phase”
 - Overall Improved exotherm control
- Lloyds Register & DNV certified formats available
- Includes Bio content as standard

INTRODUCTION

PRIME™ 37 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™ 37 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™ 37 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.

This system is available with Fast, Slow and Extra-Slow Ampreg 3X Hardener speeds, as well as PRIME High Tg hardener and in a wide range of formats from small pack sizes to drums and IBCs. For further advice please contact Gurit Technical Support.

SYSTEM PROPERTIES AT 20°C**		MIXED VISCOSITY**	150g POT-LIFE @ 25°C	LATEST FLOW UNDER VACUUM**	EARLIEST VACUUM-OFF TIME**	EARLIEST DEMOULD TIME**	PAGE
PRIME™ 37 Resin	Product Information, Instructions for Use and Health & Safety						2
	Ampreg 3X Fast Hardener	509 - 515	½ hour	2 ¼ hours	4 hours	5 ½ hours	4
	Ampreg 3X Slow Hardener	159 - 194	4 hours	5 ¾ hours	11 hours	16 hours	5
	Ampreg 3X Extra-slow Hardener	142 - 157	10 ½ hours	8 hours	12 ½ hours	Not recommended without a post-cure	6
	PRIME™ High Tg Hardener	500 - 520	5 hours	-	-	Not recommended without a post-cure	7

*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 an approximate guideline for all PRIME™ 37 systems at 25°C.

PRODUCT INFORMATION

AVAILABILITY

The product is available in a number of formats please contact your local customer support for more information. This product also benefits from the 3rd party certifications summarised in the table (right).

PRODUCT DESCRIPTION	STATUS	CERTIFICATION
PRIME™ 37 Resin with Fast, Slow & Extra-Slow Ampreg 3X Hardeners	Certified	Lloyd's Register LR21145785ALP
PRIME™ 27 Resin with PRIME™ High Tg Hardener (note that PRIME™ 27 & PRIME™ 37 resins are identical)	Certified	DNV-GL TAK000014W
PRIME™ 37 Resin with Fast, Slow & Extra-Slow Ampreg 3X Hardeners for Wind, Marine & Industrial Applications	Pending	DNV-GL tbc

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	UNITS	10 – 25°C
PRIME™ 37 Resin	months	24
All Hardeners	months	24

Adequate long term storage conditions will result in a shelf life of 24 months 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.

INSTRUCTIONS FOR USE

The product is optimised for use between 18 - 25°C. At lower temperatures the product thickens and may become unworkable. At higher temperatures working times will be significantly reduced. Maximum relative humidity for use is 70%.

MIXING AND HANDLING

Accurate measurement and thorough mixing are essential when using this system, and any deviation from the prescribed mix ratios will seriously degrade the physical properties of the cured system. The resin and hardener must be stirred well for two minutes or more, with particular attention being paid to the sides and bottom of the container. As soon as the material is mixed the reaction begins. This reaction produces heat (exothermic), which will in turn accelerate the reaction. If this mixed material is left in a confined mixing vessel the heat cannot disperse and the reaction will become uncontrollable.

PRIME™ 37 resin and Ampreg 3X hardeners have been designed for use in closed-mould processes. This includes the mixing phase, which should ideally be carried out by automated mixing machines*. It is not suitable for open-mould processing and strict adherence to the health and safety procedures stated in the product SDS is essential.

If using Slow or Extra Slow Hardener the part requires a post-cure before de-moulding. When sanding or machining a component made from PRIME™ 37, which has seen no heat, there will be very low degree of cure, and the sanding dust will be more irritating than dust from a laminate, which has seen heat to effect more thorough cross-linking.

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

*Other mixing methods can be used.

APPLICATION

PRIME™ 37 resin used with Ampreg 3X hardeners is intended for use in any established resin infusion process. The information provided in the tables in this data sheet should allow the user to achieve a successful result with this system. However, if further information is required please contact Gurit Technical Support.

CURE SCHEDULE

A post-cure is required to generate optimum mechanical properties for this system. The recommended minimum cure schedule is 7 hours at 65°C or 16 hours at 50°C. Ambient temperature cure of this system will not generate adequate mechanical properties and is therefore not recommended.

Infused parts can be pre-cured on the mould at temperatures just above ambient (eg 30-45°C) to give the part sufficient strength and stiffness to allow earlier demoulding. Such parts should still be post cured for the minimum recommended time/temperature indicated above, to obtain adequate inservice mechanical properties. Contact Gurit Technical Support for "pre-cure" time and temperature recommendations.

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 RISK & SAFETY PHRASES

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

PRIME™ 37 RESIN & AMPREG 3X FAST HARDENER

This 1 page 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	PRIME™ 37 RESIN	A3X FAST HARDENER	MIXED SYSTEM	TEST METHOD
Mix ratio by weight	Parts by weight	100	29	-	-
Mix ratio by volume	Parts by volume	100	34	-	-
Density at 21 °C	g/cm ³	1.13	0.90 – 1.10	1.10	ISO 1183-1B

COMPONENT & MIXED SYSTEM PROPERTIES*

PROPERTY	UNITS	15 °C	20 °C	25 °C	30 °C	TEST METHOD
PRIME™ 37 Resin Viscosity	cP	956 - 1130	675 - 731	390 - 448	270 - 395	-
Ampreg 3X Fast Hardener Viscosity	cP	900 - 1000	500 - 600	300 - 500	150 - 250	-
Initial Mixed System Viscosity	cP	-	771	512	375	-
Pot-life (150 g, mixed in water)*	hrs:min	-	-	00:30	-	Tecam Gel Time
Latest flow under vacuum	hrs:min	02:32	02:12	01:41	01:16	Theoretical, Thin Film
Earliest vacuum off time	hrs:min	04:47	03:53	02:26	02:00	Theoretical, Thin Film
Demould Time	hrs:min	07:13	05:34	04:01	02:56	Theoretical, Thin Film

CURED RESIN MECHANICAL AND THERMAL PROPERTIES

PROPERTIES	SYMBOL	UNITS	16 HOURS AT 50°C**	TEST STANDARD
Glass Transition Temperature	T _{g1}	°C	71.5	ISO 6721 (DMA)
Cured Density	ρ _{CURED}	g/cm ³	1.2	ISO 1183-1A
Barcol Hardness	-	mg	31.9	ISO 62
Tensile Strength	σ _T	MPa	72.4	ISO 527-2
Tensile Modulus	E _T	GPa	3.26	ISO 527-2
Flexural Strength	σ _F	MPa	116	ISO 178
Flexural Modulus	E _F	GPa	3.21	ISO 178

CURED LAMINATE MECHANICAL PROPERTIES

Laminate: 4 plies of XE600 biaxial e-glass. Cure: 24 hours at 21 °C + 16 hours at 50 °C post-cure. Conditioning: as stated in column heading.

PROPERTIES	SYMBOL	UNITS	16 HOURS AT 50°C**	TEST STANDARD
Fibre Volume Fraction	V _{FVF}	%	52%	ASTM D 3171 Method II
Tensile Strength***	σ _T	MPa	579	ISO 527-4
Tensile Modulus***	E _T	GPa	28.0	ISO 527-4
Compressive Strength***	σ _C	MPa	528	SACMA SRM1-94
Compressive Modulus***	E _C	GPa	29.0	SACMA SRM1-94
Flexural Strength	σ _F	MPa	646	ISO 14125
Flexural Modulus	E _F	GPa	15.1	ISO 14125
ILSS	X _{ILSS}	MPa	44.3	ISO 14130

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

**initial cure of 24 hours at 21 °C

***normalised to 55% fibre volume fraction

PRIME™ 37 RESIN & AMPREG 3X SLOW HARDENER

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MIXING AND HANDLING

PROPERTY	UNITS	PRIME™ 27 RESIN	A3X SLOW HARDENER	MIXED SYSTEM	TEST METHOD
Mix ratio by weight	Parts by weight	100	29	-	-
Mix ratio by volume	Parts by volume	100	35	-	-
Density at 21 °C	g/cm ³	1.13	0.90 – 1.10	1.10	ISO 1183-1B

COMPONENT & MIXED SYSTEM PROPERTIES

PROPERTY	UNITS	15°C	20°C	25°C	30°C	TEST METHOD
PRIME™ 37 Resin Viscosity	cP	956 - 1130	675 - 731	390 - 448	270 - 395	-
Ampreg 3X Slow Hardener Viscosity	cP	34 - 42	24 - 34	20 - 30	14 - 20	-
Initial Mixed System Viscosity	cP			181		-
Pot-life (150 g, mixed in water)*	hrs:min	-	-	04:00	-	Tecam Gel Time
Latest flow under vacuum	hrs:min	08:45	06:43	05:07	03:47	Theoretical, Thin Film
Earliest vacuum off time	hrs:min	14:43	10:52	08:10	05:47	Theoretical, Thin Film
Demould Time	hrs:min	21:50	15:51	11:52	08:40	Theoretical, Thin Film

CURED RESIN MECHANICAL AND THERMAL PROPERTIES

PROPERTIES	SYMBOL	UNITS	16 HOURS AT 50°C**	TEST STANDARD
Glass Transition Temperature	T _g	°C	73.9	ISO 6721 (DMA)
Cured Density	ρ _{CURED}	g/cm ³	1.2	ISO 1183-1A
Barcol Hardness	-	mg	25.5	ISO 62
Tensile Strength	σ _T	MPa	72.5	ISO 527-2
Tensile Modulus	E _T	GPa	3.21	ISO 527-2
Flexural Strength	σ _F	MPa	113	ISO 178
Flexural Modulus	E _F	GPa	3.01	ISO 178

CURED LAMINATE MECHANICAL PROPERTIES

Laminate: 4 plies of XE600 biaxial e-glass. Cure: 24 hours at 21°C + 16 hours at 50°C post-cure. Conditioning: as stated in column heading.

PROPERTIES	SYMBOL	UNITS	16 HOURS AT 50°C**	TEST STANDARD
Fibre Volume Fraction	V _{FVF}	%	51	ASTM D 3171 Method II
Tensile Strength***	σ _T	MPa	537	ISO 527-4
Tensile Modulus***	E _T	GPa	28.4	ISO 527-4
Compressive Strength***	σ _C	MPa	547	SACMA SRM1-94
Compressive Modulus***	E _C	GPa	28.4	SACMA SRM1-94
Flexural Strength	σ _F	MPa	664	ISO 14125
Flexural Modulus	E _F	GPa	16.2	ISO 14125
ILSS	X _{ILSS}	MPa	44.9	ISO 14130

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

**initial cure of 24 hours at 21°C

***normalised to 55% fibre volume fraction

PRIME™ 37 RESIN & AMPREG 3X EXTRA-SLOW HARDENER

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MIXING AND HANDLING

PROPERTY	UNITS	PRIME™ 37 RESIN	A3X EXTRA SLOW HARDENER	MIXED SYSTEM	TEST METHOD
Mix ratio by weight	Parts by weight	100	29	-	-
Mix ratio by volume	Parts by volume	100	35	-	ISO 1183-1B
Density at 21 °C	g/cm ³	1.13	0.85 – 1.05	1.09	-

COMPONENT & MIXED SYSTEM PROPERTIES

PROPERTY	UNITS	15°C	20°C	25°C	30°C	TEST METHOD
PRIME™ 37 Resin Viscosity	cP	956 - 1130	675 - 731	390 - 448	270 - 395	-
Ampreg 3X Extra Slow Hardener Viscosity	cP	0.17	0.14	0.12	-	-
Initial Mixed System Viscosity	cP	-	217	147	97	-
Pot-life (150 g, mixed in water)*	hrs:min	-	-	10:30	-	Tecam Gel Time
Latest flow under vacuum	hrs:min	13:02	11:07	07:59	06:34	Theoretical, thin film
Earliest vacuum off time	hrs:min	21:35	17:47	12:26	09:43	Theoretical, thin film
Demould Time	This hardener requires an elevated temperature cure – demould times at temperatures of 15-30°C are not recommended.					Theoretical, thin film

CURED RESIN MECHANICAL AND THERMAL PROPERTIES

PROPERTIES	SYMBOL	UNITS	16 HOURS AT 50°C**	TEST STANDARD
Glass Transition Temperature	T _g	°C	64.2	ISO 6721 (DMA)
Cured Density	ρ _{CURED}	g/cm ³	1.15	ISO 1183-1A
Barcol Hardness	-	mg	22.5	ISO 62
Tensile Strength	σ _T	MPa	64.7	ISO 527-2
Tensile Modulus	E _T	GPa	3.21	ISO 527-2
Flexural Strength	σ _F	MPa	112	ISO 178
Flexural Modulus	E _F	GPa	3.03	ISO 178

CURED LAMINATE MECHANICAL PROPERTIES

Laminate: 4 plies of XE600 biaxial e-glass. Cure: 24 hours at 21°C + 16 hours at 50°C post-cure. Conditioning: as stated in column heading.

PROPERTIES	SYMBOL	UNITS	16 HOURS AT 50°C**	TEST STANDARD
Fibre Volume Fraction	V _{FVF}	%	52.2	ASTM D 3171 Method II
Tensile Strength***	σ _T	MPa	492	ISO 527-4
Tensile Modulus***	E _T	GPa	27.9	ISO 527-4
Compressive Strength***	σ _C	MPa	516	SACMA SRM1-94
Compressive Modulus***	E _C	GPa	28.6	SACMA SRM1-94
Flexural Strength	σ _F	MPa	738	ISO 14125
Flexural Modulus	E _F	GPa	20.7	ISO 14125
ILSS	X _{ILSS}	MPa	49	ISO 14130

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

**initial cure of 24 hours at 21°C

***normalised to 55% fibre volume fraction

PRIME™ 37 RESIN & PRIME™ HIGH TG HARDENER

This 1 page 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	PRIME™ 37 RESIN	HIGH TG HARDENER	MIXED SYSTEM	TEST METHOD
Mix ratio by weight	Parts by weight	100	25	-	-
Mix ratio by volume	Parts by volume	100	31	-	-
Density at 21 °C	g/cm ³	1.13	0.92	1.08	ISO 1183-1B

COMPONENT & MIXED SYSTEM PROPERTIES

PROPERTY	UNITS	15°C	20°C	25°C	30°C	TEST METHOD
PRIME™ 37 Resin Viscosity	cP	1650 - 1670	815 - 865	480 - 510	310 - 330	-
PRIME™ High Tg Hardener Viscosity	cP	-	29 - 31	25 - 27	21 - 23	-
Initial Mixed System Viscosity	cP	580 - 600	500 - 520	310 - 330	210 - 230	-
Geltime (150 g, mixed in water)*	hrs:min	-	05:00	-	-	-
Latest flow under vacuum	hrs:min	-	-	-	-	Theoretical, thin film
Earliest vacuum off time	hrs:min	-	-	-	-	Theoretical, thin film
Demould Time	This hardener requires an elevated temperature cure – demould times at temperatures of 15-30°C are not recommended.					Theoretical, thin film

THERMAL PROPERTIES CURE PROGRESSION

PROPERTIES	UNITS	16 HOURS AT 50°C	16HRS 50 + 5HRS 70	12 HOURS AT 85°C	16 HRS 50 + 5HRS 90°C	12 HOURS AT 100°C	16HRS 50 + 5 HRS 100°C	1 HOUR AT 150°C	TEST METHOD
Tg ₁ by DMA	°C	75	93	109	108	120	114	120	ISO 6721 (DMA)
Tg ₂ by DSC	°C	74	83	105	101	110	108	117	ISO 11357 (DSC)

CURED RESIN MECHANICAL AND THERMAL PROPERTIES

PROPERTIES	SYMBOL	UNITS	16 HOURS AT 50°C**	TEST STANDARD
Heat Deflection Temperature	T _{HDT}	°C	75.0	ISO 75
Glass Transition Temperature	T _{g1}	°C	75.0	ISO 6721 (DMA)
Cured Density	ρ _{CURED}	g/cm ³	1.1	ISO 1183-1A
Linear Shrinkage	-	%	1.8	ISO 1183-1A
Barcol Hardness	-	mg	34	ISO 62
Tensile Strength	σ _T	MPa	70.4	ISO 527-2
Tensile Modulus	E _T	GPa	3.5	ISO 527-2
Flexural Strength	σ _F	MPa	105.3	ISO 178
Flexural Modulus	E _F	GPa	3.6	ISO 178

CURED LAMINATE MECHANICAL PROPERTIES

Laminate: 4 plies of XE600 biaxial e-glass. Cure: 24 hours at 21°C + 16 hours at 50°C post-cure. Conditioning: as stated in column heading.

PROPERTIES	SYMBOL	UNITS	NO CONDITIONING	28 DAYS AT 35°C (DISTILLED WATER)	TEST STANDARD
Fibre Volume Fraction	V _{FVF}	%	51 – 53		ASTM D 3171 Method II
Tensile Strength***	σ _T	MPa	607.7	459.1	ISO 527-4
Tensile Modulus***	E _T	GPa	30.0	28.7	ISO 527-4
Compressive Strength***	σ _C	MPa	592.0	-	SACMA SRM1-94
Compressive Modulus***	E _C	GPa	29.8	-	SACMA SRM1-94
Flexural Strength	σ _F	MPa	692.2	564.8	ISO 14125
Flexural Modulus	E _F	GPa	17.9	15.7	ISO 14125
ILSS	X _{ILSS}	MPa	-	-	ISO 14130

*working time properties are highly subjective to ambient conditions and should be used as an approximate guideline for all PRIME™ 37 systems

**initial cure of 24 hours at 21°C

***normalised to 55% fibre volume fraction

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

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