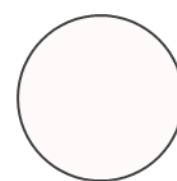


AMPRO™ CLR

HIGH CLARITY EPOXY MULTIPURPOSE SYSTEM

- Ideal for clear coating applications
- SP 320 re-engineered, with improved health & safety
- 3 : 1 mix ratio by volume
- Available with Fast, Slow and Extra-slow hardeners
- No surface residue after cure
- Can also be used for bonding, laminating & filling wood & GRP



Cured Resin Colour

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.

AMPRO™ CLR hardeners have been developed based on the well-established SP 320 and SP 115 systems which has been the primary epoxy clear coating systems 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 this data sheet.

SYSTEM PROPERTIES AT 25°C		MIXED VISCOSITY*	150g POT-LIFE*	TACK-OFF TIME*	EARLIEST SANDING TIME*	PAGE
AMPRO™ Resin	Product Information, Instructions for Use and Health & Safety					2
	AMPRO™ CLR Fast Hardener	970 cP	½ hour	2 ¾ hours	12 hours	3
	AMPRO™ CLR Slow Hardener	740 cP	1 ¼ hours	4 hours	16 hours	4
	AMPRO™ CLR Extra-slow Hardener	690 cP	1 ½ hours	5 hours	16 hours	5

*working time properties are highly subjective to ambient conditions and should be used an approximate guideline for all AMPRO™ systems at 20°C. Please refer to the corresponding page of this document for specific testing methods used.

PRODUCT INFORMATION

AVAILABILITY

The product is available in a number of formats please contact your local customer support representative for more information.

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). Adequate long term storage conditions will result in a shelf life of 2 years 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. Typically the physical properties of the hardener are not affected, however the color may darken over time. Be aware of a possible mixed system color change if very old and new hardeners are used on the same project.

COMPONENT	UNITS	10 – 25°C
AMPRO™ Resin	months	24
AMPRO™ CLR Hardeners	months	24

INSTRUCTIONS FOR USE

The product is optimised for use at temperatures between 15 and 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.

COATING

2 coats of AMPRO™ CLR will achieve a stable substrate. AMPRO™ CLR has a number of benefits, including:

- Subsequent coats of AMPRO™ CLR can be applied after just 5 hours at 20°C without sanding
- AMPRO™ CLR is solvent-free and will be fully hardened overnight ready for over-coating or top-coating

If exposed to sunlight the product should be painted or coated with a varnish which includes UV filter or blockers

FILLING AND FAIRING MIXES

All filler additions are approximate and can be adjusted by the user to achieve the desired consistency.

DESCRIPTION	FILLER TYPE	EASE OF SANDING	WATER RESISTANCE	FILLER QUANTITY*		AMPRO™ SILICA ADDITION*		APPROX. DENSITY	APPROX. VOLUME
				%	FOR 1KG	%	FOR 1KG		
Brown, Low Density	Microballons	Easy	Moderate	25 - 30	250 - 300 g	2 - 3	20 - 30	0.6 g/cm ³	2.2 Litres
White, Low Density	Glass Bubbles	Moderate	High	35 - 40	350 - 400 g	3 - 5	30 - 50	0.5 g/cm ³	3.0 Litres

ADHESIVE MIXES

All filler additions are approximate and can be adjusted by the user to achieve the desired consistency.

DESCRIPTION	FILLER TYPE	FILLER QUANTITY*		AMPRO™ SILICA ADDITION*		APPROX. DENSITY	APPROX. VOLUME
		%	FOR 1KG	%	FOR 1KG		
Brown, Low Density	Microballoons**	15 - 20	150 - 200 g	4 - 5	40 - 50 g	0.7 g/cm ³	1.8 Litres
White, Low Density	Glass Bubbles**	15 - 20	150 - 200 g	5 - 6	50 - 60 g	0.6 g/cm ³	2.0 Litres
Opaque, High Strength	Microfibres	7 - 10	70 - 100 g	3 - 4	30 - 40 g	0.9 g/cm ³	1.0 Litres

COVERAGE

THICKNESS (PER COAT)	50 - 150 MICRONS	COMMENT
Coating Coverage (at 250 microns)	Approximately 3 m ² /kg	Dependant on temperature, surface inclination, surface porosity and evenness
Adhesive Coverage	Approximately 1.5 - 2.0 m ² /kg	Dependant on temperature, surface inclination, surface porosity and evenness

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. 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, drinking or smoking
 - before using the lavatory and 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.

*calculated by weight relative to the mixed system of resin and hardener, using AMPRO™ Silica – other products will give different results

**Microfibres are always preferred for load-carrying adhesive joints

AMPRO™ RESIN & AMPRO™ CLR FAST HARDENER

MIXING AND HANDLING

PROPERTY	UNITS	AMPRO™ RESIN	CLR FAST HARDENER	MIXED SYSTEM
Colour	-	Clear	Clear	Clear
Mix ratio by weight	Parts by weight	100	29	-
Mix ratio by volume	Parts by volume	3	1	-
Density at 21 °C (ISO 1183-1B)	g/cm ³	1.16	1.04	1.13

COMPONENT & MIXED SYSTEM PROPERTIES*

PROPERTY	UNITS	15 °C	25 °C	TEST METHOD
AMPRO™ Resin Viscosity	cP	1708	529	-
AMPRO™ CLR Fast Hardener Viscosity	cP	1680	620	-
Initial Mixed System Viscosity	cP	-	971	-

WORKING TIME PROPERTIES*

PROPERTY	UNITS	20 °C	TEST METHOD
Thin-Film Gel-time	hrs:min	01:33	-
Pot-life (150 g, mixed in water)	hrs:min	00:28	Tecam Gel Time
Tack-off Time	hrs:min	02:50	Internal Gurit Method
Earliest Sanding Time	hrs:min	12:00	Internal Gurit Method

AMBIENT CURE THERMAL PERFORMANCE PROGRESSION at 21°C

PROPERTY PROGRESSION AT 21°C	SYMBOL	UNITS	7 DAYS	14 DAYS	21 DAYS	28 DAYS	TEST STANDARD
Glass Transition Temperature	T _{g1}	°C	43.9	44.8	47.0	46.6	ISO 6721 (DMA)

CURED RESIN PROPERTIES

PROPERTIES	SYMBOL	UNITS	28 DAYS AT 21°C	16 HRS AT 50°C**	TEST STANDARD
Glass Transition Temperature	T _{g1}	°C	46.6	55.5	ISO 6721 (DMA)
Ultimate Glass Transition Temp.	UT _{g1}	°C	53.6	-	ISO 6721 (DMA)
Tensile Strength	σ _T	MPa	50.6	56.2	ISO 527-2
Tensile Modulus	E _T	GPa	3.05	3.08	ISO 527-2
Tensile Elongation	ε _T	%	4.85	10.8	ISO 527-2
Flexural Strength	σ _F	MPa	85.3	90.8	ISO 178
Flexural Modulus	E _F	GPa	2.83	2.86	ISO 178
Flexural Elongation	ε _F	%	12.0	11.9	ISO 178
28 Day Water Uptake (coupon size 60x60x1mm)	-	mg	58.7 (0.83%)	-	ISO 62
ILSS (8 x RE301H8, 50% resin content)	X _{ILSS}	MPa	35.7	-	ISO 14130

ADHESIVE PERFORMANCE (AFTER 28 DAYS AT 21°C CURE)

PROPERTIES	SYMBOL	UNITS	PLYWOOD	TEAK	STEEL	TEST STANDARD
Lapshear Strength	τ	MPa	2.3 (failed in wood)	TBC	16.4	BS 5350 Part C5
Lapshear Strength Wet Retention (saturated for 28 days at 23°C in water)	τ _{wet}	MPa	-	-	17.4	BS 5350 Part C5

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

**initial cure of 24 hours at 21°C

AMPRO™ RESIN & AMPRO™ CLR SLOW HARDENER

MIXING AND HANDLING

PROPERTY	UNITS	AMPRO™ RESIN	CLR SLOW HARDENER	MIXED SYSTEM
Colour	-	Clear	Clear	Clear
Mix ratio by weight	Parts by weight	100	29	-
Mix ratio by volume	Parts by volume	3	1	-
Density at 21 °C (ISO 1183-1B)	g/cm ³	1.16	1.01	1.12

COMPONENT & MIXED SYSTEM PROPERTIES*

PROPERTY	UNITS	15 °C	25 °C	TEST METHOD
AMPRO™ Resin Viscosity	cP	1708	529	-
AMPRO™ CLR Slow Hardener Viscosity	cP	537	232	-
Initial Mixed System Viscosity	cP	-	742	-

WORKING TIME PROPERTIES*

PROPERTY	UNITS	20 °C	TEST METHOD
Thin-Film Gel-time	hrs:min	02:21	-
Pot-life (150 g, mixed in water)	hrs:min	01:15	Tecam Gel Time
Tack-off Time	hrs:min	04:00	Internal Gurit Method
Earliest Sanding Time	hrs:min	16:00	Internal Gurit Method

AMBIENT CURE THERMAL PERFORMANCE PROGRESSION at 21°C

PROPERTY PROGRESSION AT 21°C	SYMBOL	UNITS	7 DAYS	14 DAYS	21 DAYS	28 DAYS	TEST STANDARD
Glass Transition Temperature	T _{g1}	°C	43.8	44.3	46.6	47.3	ISO 6721 (DMA)

CURED RESIN PROPERTIES

PROPERTIES	SYMBOL	UNITS	28 DAYS AT 21°C	16 HRS AT 50°C**	TEST STANDARD
Glass Transition Temperature	T _{g1}	°C	47.3	58.0	ISO 6721 (DMA)
Ultimate Glass Transition Temp.	UT _{g1}	°C	56.0	-	ISO 6721 (DMA)
Tensile Strength	σ _T	MPa	49.8	54.4	ISO 527-2
Tensile Modulus	E _T	GPa	2.98	2.90	ISO 527-2
Tensile Elongation	ε _T	%	3.98	13.6	ISO 527-2
Flexural Strength	σ _F	MPa	81.1	88.0	ISO 178
Flexural Modulus	E _F	GPa	2.89	2.79	ISO 178
Flexural Elongation	ε _F	%	5.55	11.5	ISO 178
28 Day Water Uptake (coupon size 60x60x1mm)	-	mg	66.9 (0.96%)	-	ISO 62
ILSS (8 x RE301H8, 50% resin content)	X _{ILSS}	MPa	36.5	-	ISO 14130

ADHESIVE PERFORMANCE (AFTER 28 DAYS AT 21°C CURE)

PROPERTIES	SYMBOL	UNITS	PLYWOOD	TEAK	STEEL	TEST STANDARD
Lapshear Strength	τ	MPa	2.7 (failed in wood)	TBC	15.6	BS 5350 Part C5
Lapshear Strength Wet Retention (saturated for 28 days at 23°C in water)	τ _{wet}	MPa	-	-	13.4	BS 5350 Part C5

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

**initial cure of 24 hours at 21°C

AMPRO™ RESIN & AMPRO™ CLR EXTRA-SLOW HARDENER

MIXING AND HANDLING

PROPERTY	UNITS	AMPRO™ RESIN	CLR EXTRA-SLOW HARDENER	MIXED SYSTEM
Colour	-	Clear	Clear	Clear
Mix ratio by weight	Parts by weight	100	29	-
Mix ratio by volume	Parts by volume	3	1	-
Density at 21 °C (ISO 1183-1B)	g/cm ³	1.16	1.01	1.12

COMPONENT & MIXED SYSTEM PROPERTIES*

PROPERTY	UNITS	15 °C	25 °C	TEST METHOD
AMPRO™ Resin Viscosity	cP	1708	529	-
AMPRO™ CLR Extra-Slow Hardener Viscosity	cP	340	148	-
Initial Mixed System Viscosity	cP	-	686	-

WORKING TIME PROPERTIES*

PROPERTY	UNITS	20 °C	TEST METHOD
Thin-Film Gel-time	hrs:min	02:49	-
Pot-life (150 g, mixed in water)	hrs:min	01:32	Tecam Gel Time
Tack-off Time	hrs:min	05:00	Internal Gurit Method
Earliest Sanding Time	hrs:min	16:00	Internal Gurit Method

AMBIENT CURE THERMAL PERFORMANCE PROGRESSION at 21°C

PROPERTY PROGRESSION AT 21°C	SYMBOL	UNITS	7 DAYS	14 DAYS	21 DAYS	28 DAYS	TEST STANDARD
Glass Transition Temperature	T _{g1}	°C	43.6	44.6	46.8	45.6	ISO 6721 (DMA)

CURED RESIN PROPERTIES

PROPERTIES	SYMBOL	UNITS	28 DAYS AT 21°C	16 HRS AT 50°C**	TEST STANDARD
Glass Transition Temperature	T _{g1}	°C	45.6	56.5	ISO 6721 (DMA)
Ultimate Glass Transition Temp.	UT _{g1}	°C	57.2	-	ISO 6721 (DMA)
Tensile Strength	σ _T	MPa	49.9	53.7	ISO 527-2
Tensile Modulus	E _T	GPa	2.99	2.92	ISO 527-2
Tensile Elongation	ε _T	%	5.89	13.8	ISO 527-2
Flexural Strength	σ _F	MPa	81.1	88.0	ISO 178
Flexural Modulus	E _F	GPa	2.79	2.79	ISO 178
Flexural Elongation	ε _F	%	5.46	11.5	ISO 178
28 Day Water Uptake (coupon size 60x60x1mm)	-	mg	64.0 (0.95%)	-	ISO 62
ILSS (8 x RE301H8, 50% resin content)	X _{ILSS}	MPa	36.5	-	ISO 14130

ADHESIVE PERFORMANCE (AFTER 28 DAYS AT 21°C CURE)

PROPERTIES	SYMBOL	UNITS	PLYWOOD	TEAK	STEEL	TEST STANDARD
Lapshear Strength	τ	MPa	2.2 (failed in wood)	TBC	19.3	BS 5350 Part C5
Lapshear Strength Wet Retention (saturated for 28 days at 23°C in water)	τ _{wet}	MPa	-	-	15.9	BS 5350 Part C5

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

**initial cure of 24 hours at 21°C

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.

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