

Ampreg Adhesion Promoter RESIN SYSTEM

- Improves adhesion between vinylester (VE) and epoxy resins
- Improves the toughness at the VE/epoxy interface
- Uses existing range of Ampreg 22 hardeners

INTRODUCTION

Ampreg Adhesion Promoter (AP) is a unique resin system formulated to promote the adhesion between epoxy and vinylester resin. This allows production boatbuilders to use existing polyester gelcoats with higher performance epoxy resins supplied by Gurit.

Benefits are:

- Longer lasting hulls & decks
- Better aesthetic finish
- Reduced production processes
- Improved secondary bonding

INSTRUCTIONS FOR USE

WORKSHOP CONDITIONS

Ampreg AP and Ampreg 22 are optimised for use between 18-25°C. At lower temperatures the viscosity of the resin and hardeners increases making the mix material less workable. Maximum relative humidity for use is 70%.

MIXING AND HANDLING

MIXING INSTRUCTIONS

Ampreg AP can be used with Ampreg 22 Std, Slow, Extra Slow or SP4661 hardeners at the following mix ratio:

MIX RATIO

100pbw (Ampreg AP resin): 28 pbw (hardener)

It is important that the resin and hardener components are measured out accurately. Measurement by weight and electronic scales are recommended for this purpose. The two components must be mixed thoroughly. If mixing by hand particular attention should be paid to the side and bottom of the mixing vessel. All solvent free epoxy systems have limited pot-life so use from the pot quickly or transfer to a shallow vessel with large surface area to allow the heat of the resin/hardener reaction to dissipate and prolong the working life of the system. Do not mix more than can be used within the working time of the particular resin/hardener system.

APPLICATION

A TYPICAL BUILD SCHEDULE

1. Apply polyester gelcoat as per manufacturers' recommendations and allow to cure.
2. Using the vinylester resin, wet laminate 2 layers of 225gsm CSM onto the back of the polyester gelcoat. Based on tests at Gurit we recommend the vinylester should be backed up with the epoxy resin between 6 & 24 hours; 24 hrs should not be exceed.
3. Apply a thin layer (300g/m²) of Ampreg AP to the surface of the vinylester skincoat.
4. Complete the laminate schedule using Ampreg 22 with Slow, Extraslow or SP4661 hardener.
5. It is recommended that the laminate is vacuum bagged to aid the removal of any air entrapment between the VE tiecoat and the epoxy laminate. Please refer to the Ampreg 22 TDS on working times and recommended vacuum times.
6. The laminate should then be post-cured for a minimum of 16hrs at 50°C to achieve the optimum adhesion between the VE skincoat and the epoxy backing laminate. This also increases the strength and toughness of the epoxy resin. To achieve the best surface finish it is recommended to perform the postcure whilst the part is still in the mould.

POST CURE

An elevated post cure is required to enhance the bond between the epoxy and vinylester, this post cure will also increase the mechanical performance of the epoxy resin. The minimum advised post cure is 16hrs at 50°C. High post cure temperatures up to 70°C are possible to remove all cure shrinkage, this is advisable to improve long term surface finish on darker coloured gel coats.

Further processing notes are available on request from Gurit's Marine Technical Support Team.

TEST PANEL CONSTRUCTION

It is recommended to produce test panels to verify the performance of the laminate and to define the manufacture route. It is important to use open times and environmental conditions that are representative of workshop conditions. Test panels should be visually inspected for surface quality and tests should be performed to assess the gelcoat adhesion. The gelcoat adhesion can be assessed by using a knife to score and then prise the gelcoat off the surface of the laminate. In addition test panels can be supplied to Gurit to determine the gelcoat adhesion. Table 1 below gives some indicative cleavage results from tests performed at Gurit.

Gelcoat	Tiecoat	Laminate	Cleavage strength (N)	Failure mode
Polyester gelcoat	Dion 9100-700 Vinylester	Dion 9100-700 Vinylester	2080	Within laminate
Polyester gelcoat	Dion 9100-700 Vinylester	Ampreg 22	3300	Interface
Polyester gelcoat	Dion 9100-700 Vinylester	Ampreg Adhesion Promoter	4280	Within laminate

Table 1 - Example of Cleavage Strength

The failure mode gives an important indication about the level of adhesion. Ideally failure should occur within the laminate. Typically a cleavage load of 2500-3000N indicates that a good bond has been achieved between polyester gelcoat and the backing laminate. The style of fabric reinforcement has an effect on the failure mode and test result. Heavier weight woven and biaxial reinforcements (greater than 500g/m²) give higher cleavage results when compared to CSM or lightweight fabrics.

PROPERTIES

COMPONENT PROPERTIES	
	Ampreg Adhesion Promoter
Mix Ratio (by weight)	100:28
Viscosity @ 15°C (P)	42.9
Viscosity @ 20°C (P)	24.7
Viscosity @ 25°C (P)	10.6
Viscosity @ 30°C (P)	7.2
Viscosity @ 40°C (P)	3.5
Shelf Life (months)	24
Colour	Yellow
Component Density (g/cc)	1.125
Mixed Density (g/cc)	1.08-1.09

WORKING PROPERTIES				
	Ampreg Adhesion Promoter / Slow Hardener		Ampreg Adhesion Promoter / Extra Slow Hardener	
	20°C	30°C	20°C	30°C
Initial Mixed Viscosity (P)	3.4	3.26	2.94	1.91
Gel Time – 150g Mix in water (hrs:mins)	TBD	TBD	TBD	TBD
Pot Life – 500g mix in air (hrs:mins)	TBD	TBD	TBD	TBD
Latest time to apply vacuum (mins)	460	316	694	TBD
Earliest time to turn off vacuum (mins)	640	625	2771	TBD
Demould time	Refer to Ampreg 22 datasheet for demould time of structural laminate			

CURED SYSTEM PROPERTIES		
Property	Ampreg Adhesion Promoter / Slow Hardener*	Ampreg Adhesion Promoter / Extra Slow Hardener*
Tg1 – DMA (°C)	57	49
Tg DMA (Peak Tan d) (°C)	68	58
Tg Ult – DMA (°C)	68	63
Tg2 – DSC (°C)	60	55
Tg Ult – DSC (°C)	76	75
Est. HDT (°C)	53	44
Cured density (g/cc)	1.14	1.13
Linear shrinkage(%)	1.7	1.6
Resin cast tensile strength (MPa)	46.49	44.15
Resin cast tensile modulus (GPa)	2.70	2.71
Resin cast strain to failure (%)	3.77	3.41
Laminate compressive strength (MPa)	439.4	454.8
Tensile Strength (MPa)	547.1	540.9
Tensile Modulus (GPa)	30.6	31.3
Laminate ILSS (MPa)	48.2	47.1
ILSS Wet Retention (%)	76.8	TBD

* All results from a post cure of 16 hrs at 50°C

HEALTH AND SAFETY

The following points must be considered:

1. Skin contact must be avoided by wearing 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 laminating or sanding. Contaminated work clothes should be thoroughly cleaned before re-use.
3. Eye-protection should be worn. If contamination of the eyes occurs then flush the eye with water for 15 minutes, holding the eyelid open, and seek medical attention.
4. 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

5. The inhalation of sanding dust should be avoided. If it settles on the skin then it should be washed off. After more sanding operations, a shower/bath and hair wash is advised.

Gurit produces a separate full Safety Data Sheet (SDS) for all hazardous products. 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 and can be found at www.gurit.com

APPLICABLE RISK & SAFETY PHRASES

Refer to Safety Data Sheet.

TRANSPORT & STORAGE

Ampreg Adhesion Promoter 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 for this material will result in a shelf life of two years. Storage should be in a warm dry place out of direct sunlight and protected from frost. The temperature should be between 10°C and 25°C. Containers should be firmly closed. Hardeners, in particular will suffer serious degradation if left exposed to air.

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:

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24-HOUR CHEMICAL EMERGENCY NUMBER

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