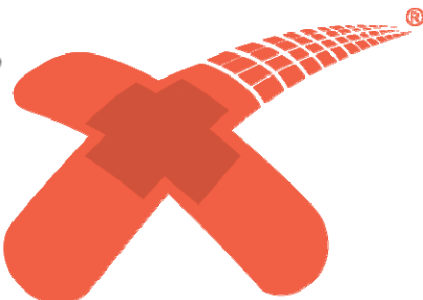




Pipes Repairs

Composite by apITec®
Patch 

Who are we?

AplTec™ Composite Patch is the result of more than 75 years of combined experience in the composite sector of its founders.

AplTec™ Composite Patch was developed as a composite field repair system.

We are bringing repair solutions in all continents, enabling field repairs that otherwise were simply not possible. We enable consistent repairs quality and repeatability, reducing the down time of assets & equipments.



Our composite patches were initially tested & approved for repairs during the 2010/2011 Volvo Ocean Race, the “Everest” of ocean races.

The track record of composite patch repairs in all weather field conditions where extreme high humidity conditions with both freezing cold or tropical hot conditions has enabled Composite Patch to be selected as the SOLE on board repair system for all the teams of the following 2014/2015 Volvo Ocean Race by the technical committee of the organization.

Since then, Composite Patch has become the standard in most trans oceanic races and polar expeditions.

Composite Patch is becoming a choice field repair systems in other industrial markets such as military, aeronautic, wind power and petrochemical.



Composite Patch moved into new larger facilities and obtained the ISO 9001 certification in 2016. AplTec™ Composite Patch is an approved supplier by leading Wind Energy manufacturers.

The pipes repair market is a natural fit for Composite Patch as current repair systems offer a shorter windows or repairs.

The all weather capability of composite patch enables to work in a wider range of temperatures and relative humidity, and cures faster than most systems, enabling to repair more pipes per work day.

In partnership with the Spanish Technologic Institute of Aeronautics, AplTec™ Composite Patch offers optic fibre equipped patches for structures monitoring and repairs monitoring with Fibre Bragg gratings connectivity and other monitoring systems.



HISTORY

CompositePatch
by aplTec

The Product

- Composite patch is a permanent structural and fast repair system that works in any climate condition. Composite patch is composed of a sealed plastic pouch containing the exact amount of resin and hardener for the pre cut fibre patch and is ready to use. It enables specialist & non specialists to make quality repairs – each time.
- Composite patch hardens fast in the coldest weather, under the rain. Composite patch eliminates the need for resin & hardener pails, electronic scale, mixing cups, stirrers, rollers & brushes and cleaning solvents.
- Composite patch structural epoxy adhesive 310 ml standard cartridges enable thin or thick bond lines and to work in cold environments too.



¿How to use Composite Patch?

Simple instructions are included in all patches orange tubes, behind the datasheet.

Repairs are done faster than with any other systems. Skilled workers are doing leading edge lamination repairs in under 5 minutes.

It may be used by specialists or non specialist alike, in extreme or everyday conditions.

The error proof system, guarantees the consistence of repair quality.

	REMOVE CLIP nº 1
	MIX UNTIL COLOR IS HOMOGENEOUS
	REMOVE CLIP nº 2
	USE THE CLIP TO SPREAD THE RESIN ALL OVER THE FIBRE
	CUT & OPEN THE PLASTIC
	APPLY

Why chose AplTec[™] Composite Patch?

- Composite Patch enables to perform structural repairs with guarantee of constant quality by non composite specialist workers thanks to its error proof system.
- Composite patch may be used in all climate conditions: tropical countries, sub zero conditions, under the rain or even underwater.
- Composite patch is nearly as easy to use as a sticker: once mixed, it may be cut and repositioned as necessary before it hardens – like a pre-preg.
- 4 hours after its application it will obtain 90% of its mechanical properties at room temperature (23°C) or in 90 minutes at 60°C when using heating blankets.
- Composite patch does not create contaminated waste: no scales, mixing pots, rollers, brushes etc..
- It travels easily and may form part of any service toolbox.



Why is AplTec[™] Composite Patch the most reliable repair system?

Because AplTec[™] composite patch contains the exact quantity of resin & hardener in the pouch, eliminating the risk of mixing error.

Why is AplTec[™] Composite Patch the easiest to use?

Because carrying AplTec[™] composite patch eliminates the need for carrying resin & hardener pails, scales, mixing pots, acetone, brushes and rollers to carry on a repair – and it reduces the waste material. Being totally enclosed, it reduces to minimum the risk of resin contact with the worker's skin, improving health and safety work condition.



AplTec[™] Composite Patch field repair system for pipes

1. No need of postcuring to obtain 100% of its mechanical properties or fast cure in 90 minutes at 60° C with standard heating blankets.
2. Repairs all over conditions with identical final properties, reducing the human factor – no more mixing ratio errors, always the same fiber/resin ratio.
3. Possibility to use manufacturer's specified fiber.
4. The harshest climate condition do not impede repairs, reducing dramatically commissioning, down times and repair costs.
5. It cures in freezing conditions and under the rain – reducing of the weather factor.
6. It may be painted.
7. It is ideal for field repairs.
8. No need for composite trained specialists.
9. It reduces contaminated wastes, and improves health & safety.
10. Reduces repairs overcall costs by reducing expensive cranes/nacelles or supply ships hours.

Sizes & Fibres

All patches are 21 cm wide and either 50 or 95 cm long as standard, in glass fibre or carbon fibre. Non standard sizes up to 4 m long have been supplied, adapting to specific customer requirements, with specifically oriented fibres & fibre choices.

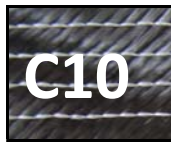
The structural epoxy adhesive may be supplied in standard 310 ml or in dual body 400 ml cartridge.

 UD	E- Glass fibre	Complex shapes
	Type: Unidirectional	Weight: 1200 gsm
	Width: 21 cm	Lengths: 50-95cm

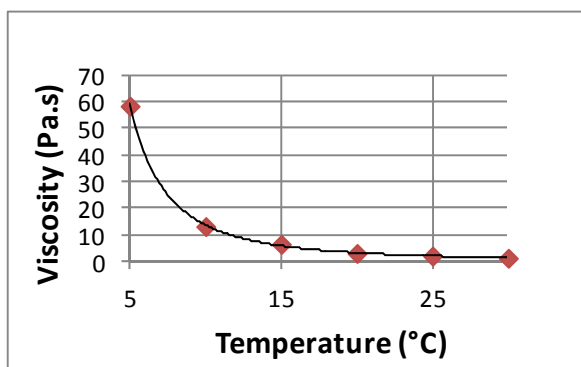
 BIAx	E- Glass fibre	Complex shapes
	Type: Biaxial +/- 45°	Weight: 600 gsm
	Width: 21 cm	Lengths: 50-95 cm

 TRIAx	E- Glass fibre	Complex shapes
	Type: Triax +/-45° / 0°	Weight: 900 gsm
	Width: 21 cm	Lengths: 50-95 cm

 B.ADH	STRUCTURAL EPOXY ADHESIVE	
	Adhesion promoter for secondary laminations and structural bondings	
	310ml or 400ml cartouches. Tixotropic	

 C5	Carbon fibre 3k	For complex shapes
	Type: Twill 2x2	Weight: 200g/m ²
	Width: 21 cm	Length: 50cm
 C10	Carbon fibre 12k	For complex shapes
	Type: Biaxial +/-45°	Weight: 400g/m ²
	Width: 21 cm	Length: 50cm
 C20	Carbon fibre 12K	For flat shapes
	Type: Unidirectional	Weight: 450g/m ²
	Width: 21 cm	Length: 50cm
 C30	Carbon fibre 12k	For flat shapes
	Type: Quadriaxial	Weight: 800g/m ²
	Width: 21 cm	Length: 50cm

Temperature, Viscosity and Working Time



Temperature (° C)	Working time (hh:mm)
5° C	1h 20min
10° C	50min
22° C	35min
30° C	15min

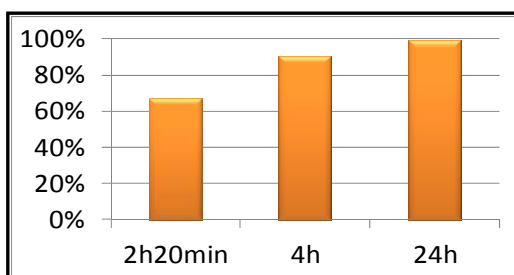
It is advisable to keep the patch above 14° C for easier mixing.

Mechanical Properties for a Glass Biax 600 gr/m²

All reinforcements and resins are DNV-GL compliant

90% of the properties are obtained after 4h at 25° C.

Mechanical properties evolution VS time (at 25° C)



Time measures for 1 mm thickness test sample.

Reparation time depends on the temperature

Temperature (° C)	Curing time (hh:mm)
5° C	15h
25° C	4h
60° C	90min
100° C	10min

Reinforcement data	
Nominal area weight	600 g/m ²
Composition	Biaxial +-45°
Fibre type	E-glass
Nominal fibre density	2,55 g/cm ³

Resin properties	
Glass transition temperature	65° C
Nominal resin density	1,12 g/cm ³

AplTec composite patch Data	
Nominal area weight	1200 g/m ²
Nominal resin content	50% (weight)
Final thickness	0.7mm

Properties	Value	Standard
Lam. Compression Modulus	13,38 GPa	UNE-EN ISO 14126
Lam. Compression Strength	175,03 MPa	UNE-EN ISO 14126
Laminate ILSS	23,80 MPa	UNE-EN ISO 14130
Tensile strength	147,00 MPa	UNE-EN ISO 527
Tensile Modulus	12,34 GPa	UNE-EN ISO 527

Composite Patch field repair system for pipes /petrochemical installations

Results of the initial test for ISO TS 24817 y ASME PPC-2 Article 4.1 f certification

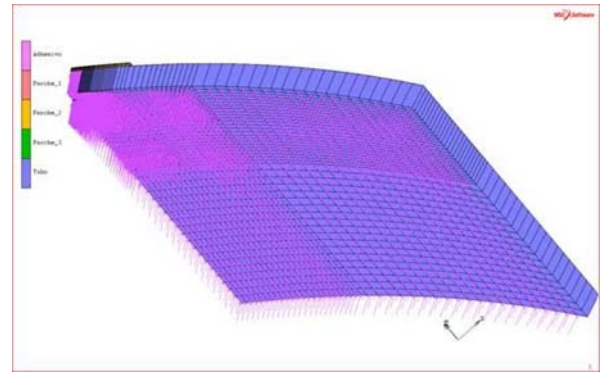
FEM Analisis:

Steel tube sand blasted to SA 2.5 Lenght: 1000 mm with 10 mm hole

Coat of Composite Patch structural adhesive as adhesion promoter

Composite Patch G10: biaxial 600 glass fiber 21cm x 50 cm

Nº layers G10 C-Patch	Max pressure Bars	Failure type
1	8,8	Laminate
2	29,4	Laminate
3	44,5	Laminate



Physical test results

Steel tube 250 mm diameter with corindon sandblast to SA 2.5

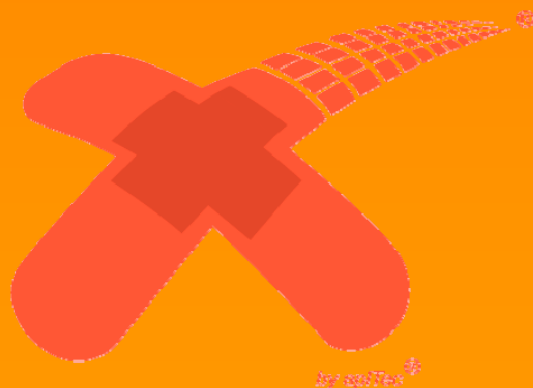
Coat of Composite Patch structural adhesive as adhesion promoter

Patch used G10 XS: biaxial 600 gr glass fibre 20 cm x 20 cm: 0,7 mm thcikness

Curing/hardening time 24h @ 20°C

Diameter hole	Hole covered with adhesive	Nº layers patch	Test 1	Test 2	Test 3	Final load failure
10 mm	No	1	10 bar @15 min	10 bar @15 min	10 bar @15 min	26 bar
10 mm	No	2	20 bar @15 min	20 bar @15 min	20 bar @15 min	20 bar
10 mm	Yes	1	10 bar @3h + 40 bar @ 24h	40 bar @ 15 min	50 Bar @ 5h	50 bar
25 mm	No	1	10 bar @15 min	10 bar @15 min	10 bar @15 min	18 bar

	Hole dia:m 10 mm Hole full of adhesive 1xG10	Hole diam: 10 mm Hole free of adhesive 1xG10	Hole diam: 10 mm Hole free of adhesive + 2xG10	Hole diam 10 mm Hole free of adhesive 2xG10 + adhesive interlayer	Hole diam: 10 mm Hole free of adhesive 3xG10	Hole diam: 10 mm Hole free of adhesive 1xG20	Hole diam: 25 mm Hole free of adhesive 1xG10
1 st load	10 bar@ 3 h	10 bar@ 15 min	20 bar@ 15 min	20 bar@ 15 min	30 bar@ 15 min	15 bar@ 10 min (failure)	10 bar@ 15 min
2 nd load	40 bar@24h	10 bar@ 15 min	20 bar@ 15 min	20 bar@ 15 min	30 bar@ 10 min (failure)	-	10 bar@ 15 min
3th load	40 bar@ 40 min	10 bar@ 15 min	20 bar@ 15 min	20 bar@ 15 min	-	-	10 bar@ 15 min
Failure pressure	55 bar	26 bar	31 bar	42 bar	30 bar	15 bar	18 bar



CompositePatch

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