

XEPOX

TIMBER, STEEL AND CONCRETE
STRUCTURES



**rothoblaas**

Solutions for Building Technology

TWO COMPONENTS EPOXY ADHESIVE

RELIABLE

Volume inalterability and reliability over time.

PERFORMING

100% epoxy adhesive with high performance.

VERSATILE

Supplied in various viscosities and formats for multiple applications.

CODES AND DIMENSIONS

CARTRIDGES

CODE	EX CODE	description	content	pcs.
XEPOXF400	XP400050	fluid	400 ml	1
XEPOXD400	XP400080	dense	400 ml	1

DRUMS

CODE	EX CODE	description	content	pcs.
XEPOXP3000	XP400165	primer	A + B = 3000 ml	1
XEPOXL3000	XP400150	liquid	A + B = 3000 ml	1
XEPOXL5000	-		A + B = 5000 ml	1
XEPOXF3000	XP400100	fluid	A + B = 3000 ml	1
XEPOXF5000	XP400120		A + B = 5000 ml	1
XEPOXG3000	XP400080	gel	A + B = 3000 ml	1

ADDITIONAL PRODUCTS - ACCESSORIES

CODES	description	pcs.
MAMDB	double cartridge gun	1
STING	mixing nozzle	12



STRUCTURAL

^
Ideal for creating rigid multi-directional joints.

MATERIAL

Polymeric epoxy synthetic binder.



XEPOX F - FLUID



XEPOX D - DENSE



XEPOX P - PRIMER



XEPOX L - LIQUID



XEPOX F - FLUID



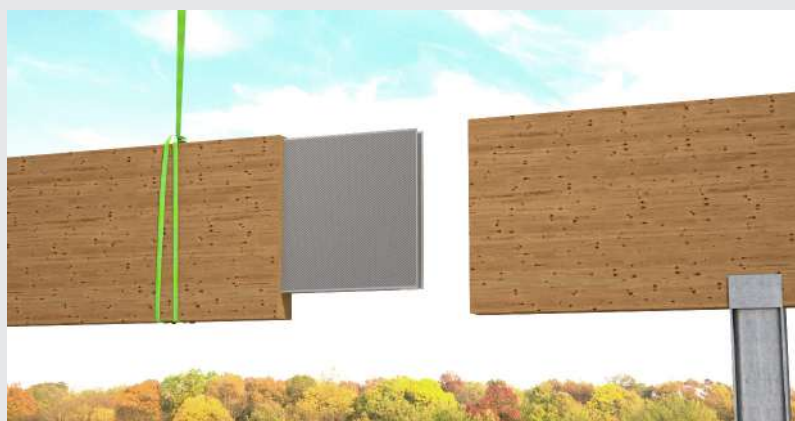
XEPOX G - GEL

STATIC CONSOLIDATION

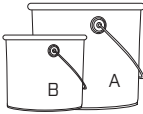
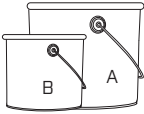
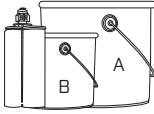
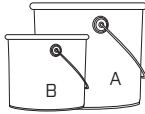
Can be used to rebuild "timber material" in combination with metal rods and other materials.

FRP COMPOSITE SYSTEMS

Polymer matrix for reinforcing carbon and/or glass elements (FRP - fiber reinforced polymers).



TECHNICAL FEATURES

		XEPOX P	XEPOX L	XEPOX F	XEPOX D	XEPOX G
						
Properties	Standard	Value	Value	Value	Value	Value
Density	ASTM D 792-66	≈ 1,10	≈ 1,40	≈ 1,45	≈ 2,00	≈ 1,90
Stoichiometric volume ratio (A/B) ⁽¹⁾	-	100 : 50 ⁽²⁾	100 : 50	100 : 50	100 : 50	100 : 50
Pot life 23 ± 2° 150 cc	ERL 13-70	-	50 ÷ 60 min	50 ÷ 60 min	50 ÷ 60 min	60 ÷ 70 min
Working life of the mixture	ERL 13-70	25 ÷ 30 min	25 ÷ 30 min	25 ÷ 30 min	25 ÷ 30 min	-
Application temperature (maximum relative moisture 90%)	-	10 ÷ 35 °C	10 ÷ 35 °C	10 ÷ 35 °C	5 ÷ 40 °C	5 ÷ 40 °C
Suggested thickness		0,1 ÷ 2 mm	1 ÷ 2 mm	2 ÷ 4 mm	2 ÷ 6 mm	1 ÷ 10 mm
Strength of adhesive bond σ	EN 12188	21 N/mm ²	27 N/mm ²	25 N/mm ²	19 N/mm ²	23 N/mm ²
Slant shear strength σ_0 50°	EN 12188	94 N/mm ²	70 N/mm ²	93 N/mm ²	55 N/mm ²	102 N/mm ²
Slant shear strength σ_0 60°	EN 12188	106 N/mm ²	88 N/mm ²	101 N/mm ²	80 N/mm ²	109 N/mm ²
Slant shear strength σ_0 70°	EN 12188	121 N/mm ²	103 N/mm ²	115 N/mm ²	95 N/mm ²	116 N/mm ²
Shear strength τ	EN 12188	39 N/mm ²	27 N/mm ²	36 N/mm ²	27 N/mm ²	37 N/mm ²
Unitary breaking load in compression ⁽³⁾	EN 13412	83 N/mm ²	88 N/mm ²	85 N/mm ²	84 N/mm ²	94 N/mm ²
Elastic modulus in compression	EN 13412	3438 N/mm ²	3098 N/mm ²	3937 N/mm ²	3824 N/mm ²	5764 N/mm ²
Thermal expansion coefficient (ranging between -20°C/+40°C)	EN 177	7,0 x 10 ⁻⁵ m/m·°C	7,0 x 10 ⁻⁵ m/m·°C	6,0 x 10 ⁻⁵ m/m·°C	6,0 x 10 ⁻⁵ m/m·°C	7,0 x 10 ⁻⁵ m/m·°C
Total shrinkage	EN 12617-1	0,23 %	0,19 %	0,18 %	0,19 %	0,16 %
Tensile strength ⁽⁴⁾	ASTM D638	40 N/mm ²	36 N/mm ²	30 N/mm ²	28 N/mm ²	30 N/mm ²
Elastic modulus in tension ⁽⁴⁾	ASTM D638	3300 N/mm ²	4600 N/mm ²	4600 N/mm ²	6600 N/mm ²	7900 N/mm ²
Flexural strength ⁽⁴⁾	ASTM D790	86 N/mm ²	64 N/mm ²	38 N/mm ²	46 N/mm ²	46 N/mm ²
Elastic modulus in flexure ⁽⁴⁾	ASTM D790	2400 N/mm ²	3700 N/mm ²	2600 N/mm ²	5400 N/mm ²	5400 N/mm ²
Unitary shear strength by punch tool ⁽⁴⁾	ASTM D732	28 N/mm ²	28 N/mm ²	28 N/mm ²	19 N/mm ²	25 N/mm ²
Viscosity		A = 1100 mPa·s B = 250 mPa·s	A = 2300 mPa·s B = 800 mPa·s	A = 14000 mPa·s B = 11500 mPa·s	A = 300000 mPa·s B = 300000 mPa·s	A = 450000 mPa·s B = 13000 mPa·s
Storage		36 months in the original, separate, unopened packaging at a temperature between +5°C and +30°C				
Application		with a roller, brush or by spraying	as a casting or via injection	as a casting or via injection/double cartridge	double cartridge	spreadable

NOTES:

⁽¹⁾ The components are packaged in pre-measured quantities, ready to use. The ratio is by volume (not weight).

⁽²⁾ It is best not to use more than one litre of mixed product at a time. The weight ratio between components A:B is around 100:44,4.

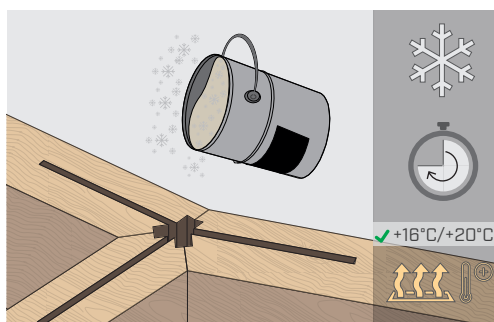
⁽³⁾ Average value at the end of the loading / unloading cycles.

⁽⁴⁾ Test values from the research campaign "Innovative links for timber structural elements" - Politecnico di Milano.

APPLICATIONS

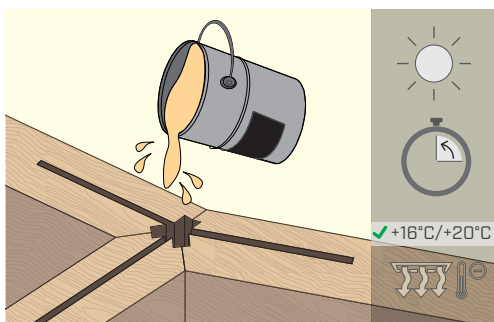
XEPOX P	Two-component epoxy adhesive with extremely low creep and high wetting properties for structural reinforcements through carbon or glass fiber textures. Useful to protect sanded metal sheets SA2,5/SA3 (ISO 8501) and to realize FRP (Fiber Reinforced Polymers) inserts.
XEPOX L	Two-component epoxy adhesive for structural usage, very fluid, applicable via pouring into very deep vertical holes and suitable for large joints with hidden inserts placed in quite extended grooves, also good in case of reduced spacing (1mm or more), provided that the slots are accurately sealed.
XEPOX F	Two-component epoxy adhesive for structural usage, applicable via injection into holes and grooves, provided that the slots are accurately sealed. Preferable for binding timber fasteners bent (Turrini-Piazza method) into timber-concrete composite floors, both with new and existing joists; gaps between timber and metal of approximately 2 mm or more. Percolation into the vertical holes in the groves after inserting the metal plate or rod inserts.
XEPOX D	Two-component epoxy thixotropic (dense) adhesive for structural usage, applicable via injection especially into horizontal or vertical holes in Glulam and solid wood beams, masonry or reinforced concrete walls.
XEPOX G	Two-component epoxy gel adhesive for structural usage, applicable via trowel also on vertical surfaces, permits the realization of thick or uneven layers. Suitable for large timber overlaps, for gluing structural reinforcing elements by using glass or carbon fiber textures and for metal or timber coatings.

APPLICATION AND CONSERVATION TEMPERATURE



ADHESIVE CONSERVATION

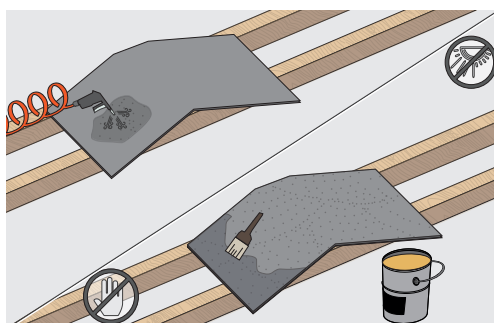
Epoxy adhesives must be maintained at moderate temperature levels (approximately +16°C/+20°C) both in winter and summer until the moment they are used. Do not store the package in cold temperature environments, as it may increase the viscosity and hinder the pouring and the cartridge extrusion. Do not leave the package exposed to direct sunlight, as heat reduces the polymerisation times.



ADHESIVE APPLICATION

The advised ambient application temperature is $> +10^{\circ}\text{C}$. If the temperature is too cold, it will be necessary to warm up the packages at least one hour prior to using them or warm up the application sites and the metallic inserts before percolating the product. If the temperatures should be too high, it will be necessary cool the product down, avoiding the hottest time of day.

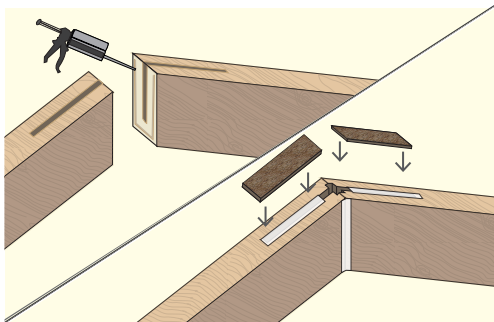
PREPARATION OF METALLIC SUPPORTS



METALLIC INSERTS

The metallic inserts reinforcing the joints must be cleaned and ungreased. Smooth sheets must be treated with grade SA2,5/SA3 sanding and then protected through a layer of XEPOX P to avoid their oxidation. Especially during hot seasons, it is necessary to protect the metallic surfaces from direct sunlight.

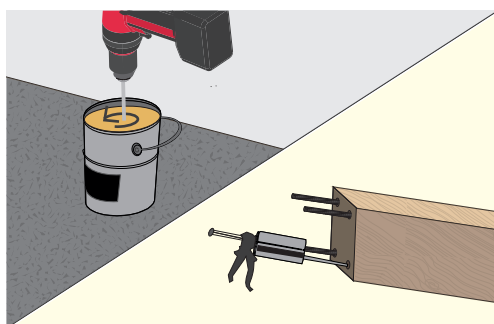
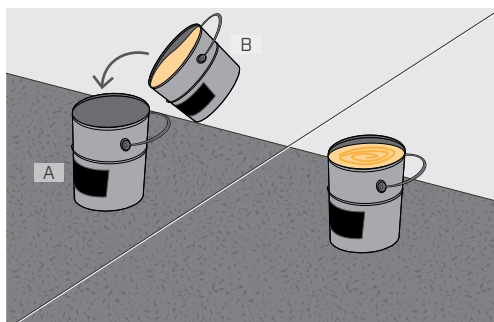
■ PREPARATION OF TIMBER SUPPORTS



SEALINGS

Apply continuous strips of adhesive tape about 2÷3 mm from the vertical edges. Next, apply a continuous bead of acetic silicone and apply pressure so that it also adheres to the surface protected by the tape. The outer grooves of the sloping elements must be sealed with strips or wooden planks, leaving only the end of the grooves uncovered at the highest point from where the adhesive is exposed.

■ PRODUCT PREPARATION



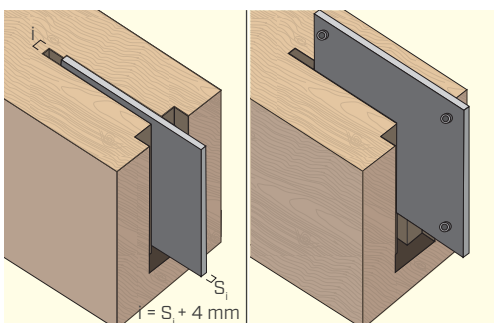
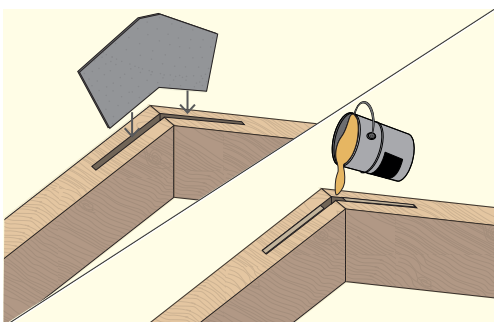
MIXING

To use the product in drums, pour the hardener (comp. B) into the drum containing the epoxy resin (comp. A). Vigorously mix the two different coloured components. We recommend a suitable mixer with a double helix mounted on an electric tool; alternatively a metal whisk can be used. Mix until the colour is consistent. Pour the resulting mixture.

To distribute the mixture into crevices of significant length and for castings, pour directly from the drum or spread the product with a spatula.

Small amounts of adhesive can be extracted from the cartridges equipped with a mixing nozzle by using the special double cartridge gun. To change the amount of adhesive to be injected, cut the end of the nozzle.

■ RESIN



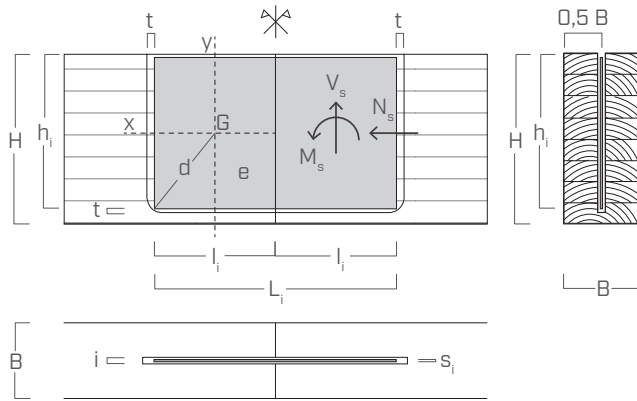
GROOVING AND HOLE TREATMENTS

Before pouring and injecting the adhesive, holes and grooves must be protected from meteoric water and humidity, and cleaned with compressed air. If the parts expecting the potting are wet, it is mandatory to dry them. XEPOX adhesive is recommended for use with timber that has been adequately dried, with a moisture content lower than 18%.

It is best to provide "useful" bearing of adhesive to be made with a special machine at the top of the structural timber elements as an additional guarantee of the functionality of the contact system. Spaces between the metallic and timber inserts should be 2÷3 mm wide on each side. To guarantee the correct positioning of the inserts in the grooves, place spacing washers in the inserts during the protection polymerisation phase with XEPOX P.

CALCULATION EXAMPLE

GLUED JOINT WITH XEPOX ADHESIVE



PROJECT DATA

- external actions on node $[M_d, V_d, N_d]$
- smooth and sanded metallic inserts with one degree of SA2,5/SA3 (ISO8501)
- inserts protection through adhesive XEPOX P
- use of XEPOX F or XEPOX L adhesive

VERIFICATION OF METALLIC INSERTS ^[1]

ELASTIC SECTION MODULUS
OF METALLIC INSERTS

$$W_x = \frac{n_i \cdot s_i \cdot h_i^2}{6}$$

MAXIMUM STRESS IN THE
INSERT

$$\sigma_s = \frac{M_d}{W_x}$$

VERIFICATION

$$\sigma_s \leq f_{y,d}$$

VERIFICATION OF TIMBER SECTION WITHOUT SLOTS ^[1]

TIMBER ELASTIC SECTION
MODULUS

$$W_n = \frac{B_n \cdot H^2}{6}$$

MAXIMUM STRESS IN THE
TIMBER ELEMENT

$$\sigma_s = \frac{M_d}{W_n}$$

VERIFICATION

$$\sigma_s \leq f_{m,d}$$

VERIFICATION OF TORSIONAL CAPACITY AT THE INTERFACE ^[2]

INERTIA OF HALF INSERT

$$J_P = J_X + J_Y \quad J_X = \frac{l_i \cdot h_i^3}{12} \quad J_Y = \frac{h_i \cdot l_i^3}{12}$$

MAXIMUM SHEAR STRESS

$$\tau_{max} = \frac{(M_d + M_{T,Ed}) \cdot d}{2 \cdot n_i \cdot J_P} + \sqrt{\frac{N_d^2 + V_d^2}{2 \cdot n_i \cdot A_i}}$$

VERIFICATION

$$\tau_{max} \leq f_{v,d}$$

LEGENDA:

B_n = width without slots
 $B_n = B - (n_i \cdot i)$
 n_i = number of inserts
 i = grooving thickness ($\geq s_i + 4$ mm)
 s_i = metallic insert thickness
 h_i = metallic insert height
 H = element depth
 G = center of gravity of the insert

d = farthest position of the interfaced surfaces from the center of gravity G
 A_i = surface of half the insert
 e = eccentricity among center of gravity G and joint vertical axis
 W_x = elastic section modulus of metallic inserts
 σ_s = maximum stress in the insert
 $f_{y,d}$ = steel design yield strength
 W_n = elastic section modulus for net section

$f_{m,d}$ = timber design flexural strength
 J_x = inertia modulus of half insert with respect to the centre of gravity G – X axis
 J_y = inertia modulus of half insert with respect to the centre of gravity G – Y axis
 $\tau_{max}^{(3)}$ = maximum shear stress
 $f_{v,d}$ = timber design shear strength
 $M_{T,Ed} = V_d \cdot e$

NOTES:

- ^[1] In this calculation note only the bending check of the element is described as it is generally the most severe condition. It is necessary, however, to check the combined resistance to the other loading conditions as well.
- ^[2] XEPOX adhesives are characterized by tensile and shear strength values much larger than those of timber and with constant value over time. Due to this reason the interface torsional capacity check can be performed only on the timber element, considering the same check satisfied by the adhesive.
- ^[3] The shear stress “ τ ” of the interface timber-adhesive-steel, transferred to the timber, includes also the additional moment $M_{T,Ed}$ due to shear load.



Solutions for Building Technology

- FASTENING
- AIRTIGHTNESS AND WATERPROOFING
- SOUNDPROOFING
- FALL PROTECTION
- TOOLS AND MACHINE

Rothoblaas is the multinational Italian company that has made innovative technology its mission, making its way to the forefront for timber buildings and construction safety in just a few years. Thanks to its comprehensive product range and the technically-prepared and widespread sales network, the company promotes the transfer of its know-how to the customers and aims to be a prominent and reliable partner for developing and innovating products and building methods. All of this contributes to a new culture of sustainable construction, focused on increasing comfortable living and reducing CO₂ emissions.

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