

FIBRO HFR - HIGH FRACTURE RESISTANCE

Supply and installation of three-component casting with reinforcement diffused with high-strength steel fibres and high carbon index, with high residual tensile strength (firmness) and high mechanical performance.

The product must be used for:

- Structural reinforcement and seismic upgrade/improvement of highly stressed reinforced concrete elements and with the need of high ductility performance
- Structural reinforcement and seismic upgrade/improvement of reinforced concrete, brick-cement, corrugated sheets, wood and mixed brick-steel beam floors
- Reinforcement, restoration and casing of reinforced concrete structures such as beams, even prestressed, pillars, curbs, floors, slabs, etc...
- The product is particularly suitable for thin "RE-LINING" in combination with the AMPHIBIA waterproof membrane in structures subjected to hydraulic pressure

The material must have the following characteristics:

EC Certification according to EN 1504-3 - Class R4

Complies with Technical Assessment Certificate (CVT) No. 02/2025 issued by 2^a Div. of the CSLP STC

Specification	Values
Appearance	Component A: grey powder Component B: transparent liquid Component C: metallic fibres
Mixture consistency	Fluid
Application temperature	from +5 °C to +35 °C
Workability time at +20 °C	20'
Maximum aggregate size	2.40 mm
Mixture ratio	100 parts powder 14 parts liquid 5 parts fibres

Controlled parameters

Feature	Test method	Performance requirements UNI EN 1504-3 Class R4	Declared performance	Certified performance (**)
Mixture bulk density	-	-	> 2,3 kg/l	-
Shrinkage	-	-	controlled	-
Flexural strength after 1 day	UNI EN 196-1	-	> 10 MPa	-
after 7 days	UNI EN 196-1	-	>15 MPa	-
after 28 days	UNI EN 12190	-	>18 MPa	-
Compressive strength after 28 days	UNI EN 12190	≥ 45 MPa	> 110 MPa	134.5 MPa
Chloride ions content	UNI EN 1015-17	≤ 0.05%	-	0.01%
Adhesion to the concrete	UNI EN 1542	≥ 2.0 MPa	> 3,0 MPa	4.41 MPa
Compressive modulus of elasticity after 28 days	UNI EN 13412	> 20 GPa	-	35.7 GPa
Resistance to carbonation	UNI EN 13295	dk < control concrete (0.45 MC)	-	Fulfilled requisite
Capillary absorption coefficient	UNI EN 13057	≤ 0.5 kg*m ⁻² *h ^{-0.5}	< 0.4 kg*m ⁻² *h ^{-0.5}	0.14 kg*m ⁻² *h ^{-0.5}
Thermal compatibility Part 1 (adhesion after 50 un/freezing cycles)	UNI EN 13687-1	≥ 2.0 MPa	-	4.36 MPa
Reaction to fire	UNI EN 13501-1	Classification	-	Euroclass A1

Composite system characteristics according to CVT No. 02/2025

Description	Values	Test method
Mechanical behavior	Non-strain hardening behaviour	-
Density	2,32 m ³	
Consistency class	SF3	EN 12350-8
Compressive strength class	C70/85	NTC 2018 Tab. 4.1.I.
Modulus of elasticity	41 GPa	NTC 2018 § 11.2.10.3
Poisson's coefficient	0-0.2 (depending on stress state)	NTC 2018 § 11.2.10.4

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Description	Values	Test method
Coefficient of linear thermal expansion	$10 \cdot 10^{-6} \text{ }^{\circ}\text{C}^{-1}$	NTC 2018 § 11.2.10.5
Toughness class	8,0 c	EN 14651
Mean value of the limit of proportionality $f_{ct,Lm}^f$	6,51 MPa	EN 14651
Characteristic value of the limit of proportionality $f_{ct,Lk}^f$	5,25 MPa	EN 14651
Ratio $f_{R,1k}/f_{ct,Lk}^f$	1,79	EN 14651
Ratio $f_{R,3k}/f_{R,1k}$	0,93	EN 14651
Tensile strength f_{ctm}	1,4 MPa	NTC 2018 § 11.2.10.2
Tensile strength f_{ctk}	0.98 MPa	NTC 2018 § 11.2.10.2
Exposure class	X0 XC1, XC2, XC3, XC4 XD1, XD2, XD3 XS1, XS2, XS3 XA1	NTC 2018 § 11.2.10.2

Feature	Certifying body	Test method	Certified performance (**)
Pressurised impermeability	IMM SA (Switzerland)	UNI EN 12390-8	8 Bar: no passage

Feature	Certification
Environmental Product Declaration 0298 (EPD)	EPDItaly 0298 (30/05/2027) www.epditaly.it

as well as Fibro Hfr Volteco or a product with equal or superior characteristics.

The technical data must be supported by test certification issued by an accredited official laboratory and / or be subjected to quality control according to ISO 9001.

The product must have the CE marking and be used according to the manufacturer's prescriptions.

For further details on the individual products and installation specifications, refer to the relevant technical data sheets which can be downloaded in the updated version on the website www.volteco.com.