**SPECIFICATIONS**

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 2ª 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

**Feature, Test method, Performance requirements UNI EN 1504-3 Class R4, Declared 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

**Controlled parameters**

**Feature, Test method, Performance requirements UNI EN 1504-3 Class R4, Certified performance**

**Compressive strength after 28 days, UNI EN 12190, ≥ 45 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: 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 < calcestruzzo di controllo (MC 0.45): Fulfilled requisite**

**Capillary absorption coefficient, UNI EN 13057, ≤ 0.5 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**

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**SPECIFICATIONS**

FIBRO HFR - HIGH FRACTURE RESISTANCE

**Composite system characteristics according to CVT No. 02/2025**

**Description, Test method, Values**

**Mechanical behavior, -:** Non-strain hardening behaviour

**Density, -: 2.32 m³**

**Consistency class, EN 12350-8:** SF3

**Compressive strength class, NTC 2018 Tab. 4.1.I.:** C70/85

**Modulus of elasticity, NTC 2018 § 11.2.10.3:** 41 GPa

**Poisson's coefficient, NTC 2018 § 11.2.10.4:** 0-0.2 (depending on stress state)

**Coefficient of linear thermal expansion, NTC 2018 § 11.2.10.5: 10∙10-6 °C -1**

**Toughness class, EN 14651:** 8.0 c

**Mean value of the limit of proportionality ffct,Lm, EN 14651:** 6.51 MPa

**Characteristic value of the limit of proportionality ffct, Lk, EN 14651:** 5.25 MPa

**Ratio fR,1k/ ffct, Lk, EN 14651:** 1,79

**Ratio fR,3k/ fR,1k, EN 14651:** 0,93

**Tensile strength fctm (average value), NTC 2018 § 11.2.10.2:** 1.4 MPa

**Tensile strength fctk (charactersitic value), NTC 2018 § 11.2.10.2:** 0.98 MPa

**Exposure class, UNI EN 206:2021:** X0

 XC1, XC2, XC3, XC4

 XD1, XD2, XD3

 XS1, XS2, XS3

 XA1

**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.

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