



Rev 6  
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# AETERNUM HTE

High Tech Evolution fiber-reinforced microcalcestruction with high strength and durability



## DESCRIPTION

**AETERNUM® HTE** is a special fiber-reinforced micro-concrete consisting of quartz aggregates ( $D_{max}$  6mm) of high purity and a compound of additives that allow excellent rheology in the absence of shrinkage and permeability. With the addition of water it takes on the characteristics of a self-leveling micro-concrete – pourable, with compensated shrinkage, non-segregable, bleeding-free, with high initial and final mechanical resistance, waterproof, durable, with high adhesion to reinforcing irons, metal parts and concrete.

The **AETERNUM® HTE UHPFRCC** (Ultra High Performance Fiber Reinforced Cementitious Composites) technology represents a formulation evolution of **HPFRC** (High Performance Fiber Reinforced Concretes); the products belonging to this technology combine high values of **MECHANICAL RESISTANCE** (>115 MPa compression) with optimal values of **DUCTILITY** (**Toughness Class 14 d** and Fracture Energy 32,500 N / m) and **TENSILE STRENGTH** ( $\geq 9$  MPa).

## FIELDS OF APPLICATION

Since it has very high values of ultimate deformation at traction, the Aeternum® HTE find the one natural/ideal use:

- in the manufacture of light structural elements with a thin cross-section;
- in structural restorations with casting in formwork or in confined environments;
- in low-thickness structural recovery on floors, beams, pillars;
- in seismic adaptation with absorption and transfer of shear or tensile stresses in the face of events with high dynamic stress;
- in the repair of floors with the need for resistance to high static and dynamic stresses together with exceptional values of resilience;
- in the fire-resistant structural reinforcement of pillars and beams;
- for inflected beams: possible doubling of the last load with 40 mm thick reinforcement – increase in stiffness with reduction of the arrow in operation of about 12 times (behavior comparable to a pre-compression).

## ADVANTAGES

Thanks to the reinforcement technology and exceptional values of:

- ductility and therefore of the ultimate deformations of the material
- adherence to the cut of the reinforcing jacket to the reinforced concrete support
- of tensile strength of the material

important benefits are obtained **in structural calculations**.

On site, the use of **AETERNUM HTE** allows you to:

Toughness class  
14d



1) Aeternum HTE in the mixer, preferably vertical axis



2) Addition of fibers



3) Addition of water

SHEET



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- **minimizes application thicknesses**, guaranteeing improved reinforcement conditions compared to interventions with traditional reinforced concrete;
- **minimizes the additional loads** on the structure;
- **improve DURABILITY over time**, thanks to the exceptional effectiveness of AETERNUM® HTE as an **anti-carbonation and anti-oxidation barrier**;
- **design high-performance structural reinforcements** also taking into account the very high fire resistance of AETERNUM® HTE **FORMULATIONS** even for direct contact 1000 ° C on underload structures (Fire Structural Shield systems n ° 1 - Fire Structural Shield n ° 2).



4) Mixing

## SPECIFICATIONS

State	Dust
	ColorGrege Cement
Granulometry D <sub>max</sub>	6 mm
Mass volume	2,50 kg/dm <sup>3</sup> ± 3%
Yield	25,03 kg/m <sup>2</sup> per cm thickness
Temp. of application	from +5° to +35° C
	<b>ZERO</b> Permeability
Water extruded (bleeding)	Absent



Aeternum HTE ready for casting

### Mechanical resistance

Compressive strength 1 day > 70 MPa at 1 day  
 Compressive strength 7 days > 100 MPa at 7 days  
 Compressive strength 28 days > 15 MPa to 28 days

### Characteristics of fibers

Property	Units of measurement	Value	Test method - Reference standard
Commercial name and fiber	-	Aeternum HTE - fibers	
Form	-	hooked fiber	
Aspect ratio	-	86	
Material	-	steel	
Material density	g/cm <sup>3</sup>	7.0	EN 14889
Length	Mm	30 ± 5%	EN 14889
Equivalent diameter	Mm	0.35 ± 5%	EN 14889
Tensile strength	Mpa	≥ 3000	EN 14889
Elastic modulus	GPa	38	EN 14889
Elongation at break	%	> 1% ± 10%	EN 14889
Viscosity coefficient (polymer fibers)	-	N.A.	
Melting temperature of crystals (polymer fibers)	°C	N.A.	ISO 11357-3-2013
Glass transition temperature (polymer fibers)	°C	N.A.	ISO 11357-2-2014

### Characteristics of the matrix

Property	Units of measurement	Value/Name	Test method - Reference standard
Matrix trade name		Aeternum HTE concrete mixer	



Matrix type		Micro-concrete	
Aggregate max size	Mm	6	

## Features of the composite system

Property	Units of measurement	Value	Test Method - Reference Standard
<b>Mechanical behavior</b>	-	<b>Bloodcrudish</b>	
Density	g/cm <sup>3</sup>	2.50 ± 3%	EN 12390-7
Fiber content by volume	%	2.3	
Fiber content by weight	%	7.4	
Consistency class		S5	EN 12350 -1,2,3,5
Compressive strength class	Mpa	C100/115	EN 12350 -1,2,3
Elastic modulus	GPa	46,64	NTC 2018 § 11.2.10.3
Poisson coefficient		0,1	NTC 2018 § 11.2.10.4
Linear thermal expansion coefficient	°C-1	10 x 10 <sup>-6</sup>	NTC 2018 § 11.2.10.5
Residual strength class - <b>Toughness</b>		<b>class 14d</b>	EN 14651
Resistance to proportionality limit (average value) f <sub>ct, Lm</sub>	Mpa	9,703	EN 14651
Resistance to proportionality limit (characteristic value) f <sub>ct, Lk</sub>	Mpa	8,449	EN 14651
Ratio f <sub>R,1k</sub> / f <sub>ct, Lk</sub>		1,81	EN14651
Ratio f <sub>R,3k</sub> / f <sub>R,1k</sub>		1,10	EN14651
Tensile strength f <sub>ctm</sub> (average value)	Mpa	9,14	NTC 2018 § 11.2.10.2
Tensile strength f <sub>ctk</sub> (characteristic value)	Mpa	6.40 (fractyl 5%)	NTC 2018 § 11.2.10.2
Exposure class	-	XC, XF, XA, XD, XS	EN 206
Reaction to fire class	-	A1	EN 13501-1
Extreme temperature of use	°C	1000	
Frost and thaw resistance	n.cycles	20	EN 12390-9
Resistance to high temperatures	%,°C	ND	
<b>Permeability</b>	Mm	<b>ZERO</b>	EN 12390-8

## INSTRUCTIONS FOR A CORRECT USE

To carry out a correct realization of the AETERNUM® HTE, with guarantee of durability and performance, it is necessary to carry out a series of preparatory works such as:

1. Preparing the support
2. Insertion of any recovery irons (if provided for by project)
3. Application EPOTEK RIPRESA
4. Formwork.

### 1. Support Preparation

With high pressure washer rimuovere, from the surface to be treated, all parts crumbly, inconsistent and non-cohesive of deteriorated concrete. The surface of the concrete must be clean, dust-free, of residues of Olii or fat and slightly rough.

### 2. Insertion of any shooting irons

If required by project, insert all the shooting irons.

### 3. Application of EPOTEK RIPRESA

Make sure that the support is free of water, oil, grease, dust and any other material before applying the Epotek Ripresa (E-LPL version). This operation is essential to allow continuity between the old structure and the AETERNUM® HTE.





## 4. Formwork

The formwork must be sized according to project, anchored and contrasted: the joints between the formwork and the formwork must be sealed, in order to resist the hydrostatic thrust of a very fluid micro-concrete mixer or to prevent leaks of grout and mortar with relative fall of the leaf. It is a good rule to perform the jet of the AETERNUM® HTE by pouring the same from one side only.

Other tricks and suggestions will be provided by the technical service of TEKNA CHEM.

## PREPARATION OF MICROCALCESTRUZZO

To make 1 m<sup>3</sup> of fiber-reinforced micro-concrete you need approx. 2500 kg of AETERNUM® HTE (A+B). Mixing of AETERNUM® HTE must be carried out mechanically. Enter into the AETERNUM® HTE mixer continuously and without interruption, both the powder compound and the pre-dosed fibers contained in the bag in the kit, paying attention to derail them in such a way that they are distributed evenly and a correct dry mixing is obtained. Always during mixing insert and 3.0 L (±0.05) of bag water. Stir for at least 5-6 minutes after pouring the last liter of water to ensure that the dough is homogeneous, free of lumps and in the absence of bleeding.

Do not exceed the recommended dosages: if you need additional amounts of water to reach the desired consistency, please call our technical assistance.

AETERNUM® HTE is a cement-based product and therefore it is necessary to adhere to the rules of laying a normal cement conglomerate as described below:

### Climates

- Store AETERNUM HTE away from sun and weather;
- use cold dough water;
- carry out work in the evening;
- provide adequate protection for the first 48 hours and season the jet with sheets kept constantly wet or with the application of the curing membrane.

### Climates

- Store AETERNUM HTE away from the elements;
- use dough water possibly having a temperature between 15 and 20 ° C;
- carry out work in the morning;
- do not carry out the castings with temperatures inferior to +5°C;
- protect the environment and the jet from frost;

ATTENTION: The thermal accumulation of a steel structure is very high. Even days after the thaw, the metal structure can maintain temperatures below 0 ° C.

## MICROCALCESTRUZZO JET

Properly prepare support and dough, before proceeding with the pouring of the micro-concrete it is necessary to verify that the affected area is not subject to vibrations. If they were present, it is essential to stop the surrounding machines (for at least 12÷16 h) allowing the product to have finished the grip and at least started hardening.

Perform the casting continuously, without interruption, starting from one side to avoid the incorporation of air.

Make sure that the micro-concrete has completely filled the formwork.

When the casting is last it is recommended to protect it with wet TNT for at least 48 h or with our TEKNAPUR range of sagging membranes.

## PACKS

Kit: Microbetoncino (comp. A) of 25 kg + pack of 1.85 kg of fibers (comp. B)





## STORAGE

If the product is stored in places protected from the weather, under standard conditions of controlled temperature and humidity, it remains intact for 12 months from the date of sale.

## WARNINGS

Being a cement product it presents the same recommendations as the use of cement. See the safety data sheet.

## LEGAL

The information contained in this technical sheet, although representing the most advanced stage of knowledge, does not exempt the user from performing accurate preliminary tests in their conditions of use and operation. We therefore decline any responsibility for the improper use of the product.

