

FLUECO 175 C CR FR

HIGHLY DUCTILE POURABLE MORTAR, RESISTANT TO AGGRESSIVE ENVIRONMENTS AND FIBRE-REINFORCED WITH FLEXIBLE CHROME FIBRES

Layer thickness up to 5cm without electro-welded mesh



FLUECO 175 C CR FR is a pre-mixed, pourable, shrinkage-compensated cementitious mortar that is fibre-reinforced with synthetic fibres and flexible, stainless chromium steel fibres.

FLUECO 175 C CR FR develops high initial and final mechanical strength, is waterproof and durable even in aggressive environments. It provides strong bonding to steel and concrete.

FLUECO 175 C CR FR is resistant to chemical and environmental attacks and is suitable for all the classes of exposure required by UNI 11104.

BENEFITS

The characteristics of **FLUECO 175 C CR FR** make it suitable for structural repairs of concrete buildings subject to high physical, chemical and environmental attacks.

FLUECO 175 C CR FR is pourable in layers up to 5 cm thick without electro-welded mesh.

The specific characteristics of the product are:

- ✓ **Resistance to sulphates and chemical and environmental attack:** **FLUECO 175 C CR FR** has high compactness, low capillary porosity and high resistance to aggressive agents present in the environment such as chlorides and sulphates.
- ✓ **Impermeable to water and carbon dioxide:** thanks to the chemical and physical characteristics of its components **FLUECO 175 C CR FR** is totally waterproof, resistant to freeze thaw cycles and is not subject to carbonatation.
- ✓ **Applicable without the need for electro-welded mesh:** the specific formulation of **FLUECO 175 C CR FR** combined with the FIBERCROM flexible, stainless chromium steel fibres it contains mean that no electro-welded meshing is required, thus simplifying its instalment.
- ✓ **Absence of crazing and cracks caused by plastic shrinkage:** **FLUECO 175 C CR FR** has no crazing or plastic shrinkage cracks thanks to the use of special synthetic fibres that impede cracking.
- ✓ **Restrained expansion when exposed to air:** used together with the curing additive PRESIDIO SRA it permits the development of expansive properties even when cured in the open air.
- ✓ **Durability of the work:** **FLUECO 175 C CR FR** has been specifically formulated to reduce the risk of cracking even with lengthy curing times, thus prolonging the useful life of the building and reducing maintenance.



WHERE TO USE

FLUECO 175 C CR FR should be used for the structural repair, maintenance and restoration of damaged concrete and reinforced concrete structures exposed to aggressive environments. **FLUECO 175 C CR FR** is particularly suitable for:

- ✓ structural repair of pillars, beams, floor slabs and walls in reinforced concrete including prefabricated structures subject to sulphate attack;
- ✓ large volume repairs and build ups of concrete with layer thickness up to 5 cm per coat;
- ✓ hydraulic works, infrastructures, viaducts and tunnels, even on structures in contact with sea water

REFERENCE STANDARDS

FIBER FLUECO 175 C CR FR meets the requirements defined by EN 1504-9 "Products and systems for the protection and repair of structures: definitions, requirements, quality control and evaluation of conformity" general principles for the use of products and systems.

FLUECO 175 C CR FR meets the minimum requirements defined by EN 1504-3 "Structural and non-structural repair" for structural mortars of class R4.

TECHNOLOGY

CONTRASTED EXPANSION IN AIR

The addition of PRESIDIO SRA to the mortar promotes the **expansive properties** even when curing does not occur in sufficiently damp conditions, thus ensuring maximum performance even under real jobsite conditions. Shrinkage control enhances the dimensional stability of the mortar and impedes cracking, resulting in superior bonding between the mortar and the substrate and a monolithic action in the composite repair.

Arching test: it is possible to assess the product's ability to guarantee the correct contrasted expansion in the open-air by preparing a sample of approx. 100x5x2. The arching of the sample after just 24 hours demonstrates the actual expansion behaviour of the mortar.



CHARACTERISTICS OF THE FIBRES

FIBERCROM: flexible, stainless chromium steel reinforcement fibres.

TECHNICAL FEATURES

LENGTH	30 mm
WIDTH	1.6 mm
THICKNESS	29 micron
MODULUS OF ELASTICITY	72 GPa
TENSILE STRENGTH	1400-2200 MPa
CORROSION RESISTANCE	Excellent resistance to chlorides, sulphates and acids

APPLICATION PROCEDURE

SUBSTRATE CLEANING

- ▶ **remove all flaking parts** 1 from the concrete in the area to be repaired, including grout slurry, either by mechanical chipping or pressure washing and taking care not to damage the structures.
- ▶ **remove spots, efflorescence or soaked-in stains** of grease oils, paints, lime, dust, dirt etc.;
- ▶ **remove any earlier repairs** if irreparably damaged or deteriorated;

SUBSTRATE PREPARATION

- ▶ **roughen the surface** mechanically by bush hammering, chiselling or pressure washing (this last avoids damage to the substrate and is recommended for large areas) to reach the sound, compact concrete and enhance bonding between the mortar and substrate. The surface should be roughened with unevenness to a depth of at least 5 mm while the edges around the area to be repaired must be scarified to a depth of at least 10 mm with a sharp edge finish. Roughening of the surface layer is needed both to promote bonding of the mortar, and to ensure the expansive properties develop correctly.
- ▶ **wet the surface with water under pressure to saturation.** This procedure avoids the substrate absorbing water from the mix as this could lead to cracking and reduce the bonding strength of the mortar. This operation also allows the removal of any fragments remaining from the roughening of the concrete substrate. Excess water must be removed with compressed air jets or with sponges.

REBAR PROTECTION

- ▶ **sandblast the rebars** and remove all loose particles such as rust flakes or fragments of material that could lead to corrosion or impair bonding. Scarification of the substrate with hydro-blasting also effectively cleans the bars, making sandblasting unnecessary.
- ▶ **protect the reinforcement bars** by re-alkalising them with the corrosion-inhibiting agent **DRACOSTEEL**.

ADDITIONAL REINFORCEMENT FOR STRUCTURAL REQUIREMENTS

- ▶ If the designer requires extra reinforcement for technical or structural reasons, or for lifts thicker than 3cm, it is possible to apply an **electro-welded mesh** with the use of spacers (at least 1 cm from the substrate) and rebar covers of at least 1.5 - 2 cm.

FORMWORK

FLUECO 175 C CR FR can be installed by casting, including pouring into formwork. However, the maximum thickness must not be exceeded. The formwork must be waterproof and adequately anchored and sealed to prevent absorption of the mixing water, leakage of material or blowout of the sides due to the pressure created by the jet of mortar.

MORTAR PREPARATION

The mixing of the mortar **FLUECO 175 C CR FR** is carried out using an on-site concrete mixer. Pour the mixing water into the cement mixer according to the recommended mixing ratio: 3.75 to 4.25 litres of water for every 25 kg of **FLUECO 175 C CR FR**. Add slowly, mixing for at least 4 to 5 minutes until the mix is smooth and free of lumps. Make sure that all the product has been properly mixed in and that there are no residues of powder on the sides or bottom of the concrete mixer. To prepare small quantities of product use a suitable vessel or container and respect the recommended mixing proportions. We recommend the use of a mechanical agitator at low speed to reduce air entrapment. **PRESIDIO SRA**, added to the mix at a dosage of 1 % on the weight of the mortar (0.25 kg per bag) acts as internal curing, and enhances the expansive properties in the open air. **PRESIDIO SRA** affects the curing of the mortar, so the dosage should be adjusted on the basis of the ambient temperature. In warm climates **PRESIDIO SRA** permits good workability; when ambient temperatures range between 5 and 10 ° C we recommend reducing the dosage to avoid excessive slowing down of the setting time.

FLUECO 175 C CR FR



PRECAUTIONS IN HOT CLIMATES

- ▶ store **FLUECO 175 C CR FR** away from direct sunlight;
- ▶ use low temperature mixing water
- ▶ carry out the work in the early hours of the morning, and stop work when the sun is strongest. It is better to resume working in the late afternoon, as long as the structure has been wet continuously for at least 6 hours before work starts;
- ▶ to achieve optimum performance from **FLUECO 175 C CR FR** you should ensure proper curing by applying **PROBETON CURING N** by spray or by brush.



PRECAUTIONS IN COLD CLIMATES

- ▶ Store **FLUECO 175 C CR FR** in a heated environment where possible;
- ▶ use heated mixing water;
- ▶ do not use the product at temperatures below 0 ° C;
- ▶ start work in the later hours of the morning;
- ▶ make sure that the substrate is not frozen.

SUBSTRATE SATURATION WITH WATER

Carry out all the procedures to prepare the substrate then saturate the concrete or masonry with hot water continuously for at least 6 hours before laying **FLUECO 175 C CR FR**. Any excess water on the surface must be removed with compressed air or cloths.

APPLICATION

FLUECO 175 C CR FR can be applied by pouring with either a fluid or super fluid consistency. The product must be applied on clean, roughened surfaces that have been saturated with water as described in the previous paragraph. Pumping mortar into formwork requires specific precautions to ensure it is installed correctly: the casting must be done slowly and only on one side to facilitate the expelling of air. Vibrate slightly while casting to ensure the mortar is compact.

CURING

When **PRESIDIO SRA** is added to the mix at a dosage of 1 % on the weight of the mortar it acts as internal curing and regulates water evaporation by reducing shrinkage and cracking and enhancing curing. The addition of **PRESIDIO SRA** to **FLUECO 175 C CR FR** enables correct expansion in air thus reducing shrinkage by 20 - 50 % compared to the use of the product without the additive. To ensure proper curing of the product even in dry climates, or where surfaces are exposed to excessively windy or sunny conditions, we in any case recommend the use of the curing membrane **PROBETON CURING N**.

PACKAGING AND STORAGE

FLUECO 175 C CR FR is packaged in 25 kg bags.

The **FIBERCROM** flexible, stainless steel fibres are supplied in 250 g bags.

If kept in its original packaging and properly stored under cover in a dry place, the product maintains its characteristics for a year.



PRODUCT CHARACTERISTICS

APPEARANCE	Powder (A) + chrome fibres (B)
COLOUR (COMP. A)	grey
MAXIMUM AGGREGATE SIZE (COMP. A)	2.5 mm
CHLORIDE ION CONTENT ($\leq 0.05\%$)	0.01 %
PACKAGING	25 kg bag + 250g bag for fibres

APPLICATION DATA

MIX COLOR	Grey
MIXING WATER	3.75 ÷ 4.25 litres per bag
DENSITY OF MIX - UNI EN 12190	2170 kg/m ³
PH OF MIX	> 12
MIX CONSISTENCY - UNI EN 13935	Fluid
TEMPERATURE OF USE	+5° C to +35° C
POT LIFE OF MIX	approx. 60 minutes (20° C - 50% RH)
COMPLETE HARDENING	approx. 28 days at 20° C
WAITING TIME BETWEEN COATS	at least approx. 30 minutes (23° C - 50% RH)
THICKNESS OF APPLICATION	5 cm
CONSUMPTION	20 kg/m ² per cm of thickness

FINAL PERFORMANCE 16 % MIXING WATER (20° C - 65% RH)

CHARACTERISTICS	TEST METHOD	REQUIREMENTS IN ACCORDANCE WITH PERFORMANCE EN-1504-3 FOR CLASS R4 MORTARS	PRODUCT PERFORMANCE
COMPRESSIVE STRENGTH (MPa)	EN 12190	≥ 45 (after 28 days)	26 MPa at 1 day 49 MPa at 3 days 59 MPa at 7 days 70 MPa at 28 days
FLEXURAL STRENGTH (MPa)	EN 196/1	None	5 MPa at 1 day 8 MPa at 3 days 9 MPa at 7 days 11 MPa at 28 days
COMPRESSIVE MODULUS OF ELASTICITY (GPa)	EN 13412	≥ 20 (after 28 days)	27 GPa
BOND STRENGTH ON CONCRETE (substrate of type MC 0.40 w / c ratio = 0.40) according to EN 1766	EN 1542	≥ 2 (after 28 days)	2.8 MPa
RESTRAINED EXPANSION IN AIR AT 1 DAY (%)	UNI 8147	None	0.05%
CRACK RESISTANCE	"0 Ring Test"	No cracking at 180 days	Meets specifications (*)
PULL OUT RESISTANCE OF STEEL RODS	RILEM- CEB-FIP RC6-78	None	> 25 MPa
RESISTANCE TO ACCELERATED CARBONATATION	EN 13295	Depth of carbonatation ≤ reference concrete (MC 0.45 w / c ratio = 0.45) according to UNI 1766	Meets specifications
IMPERMEABILITY TO WATER -penetration depth-	EN 12390/8	None	< 5mm
THERMAL COMPATIBILITY measured as bond strength according to EN 1542 (MPa) on concrete type MC 0.4 UNI EN 1766: freeze-thaw cycles with de-icing salts	EN 13687/1	≥ 2 (after 50 cycles)	2.2 MPa
REACTION TO FIRE	EN 13501-1	Euroclass A1	A1

* Specification satisfied with the addition of **FLUECO 175 C CR FR** to PRESIDIO SRA

TECHNICAL SPECIFICATIONS



FLUECO 175 C CR FR, produced by **Draco Italiana SpA**, is a pourable, fibre-reinforced mortar that is shrinkage-compensated in the open air and sulphate resistant to be used for structural repair, large volume repairs and thick coatings of concrete structures and RC exposed to highly aggressive environments. The product will be applied in thicknesses up to 5 cm per layer without requiring electro-welded mesh. The mortar must be reinforced with FIBERCROM flexible, stainless chrome steel fibres. The product must be characterised by high adhesion to the substrate, water-tightness and development of high initial and final mechanical strength. All instructions and precautions followed must comply with the recommendations given by the manufacturer: **Draco Italiana SpA**.