



EQIOM
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SUPERSTRESSCEM[®]

A certified kit of cement-admixtures to achieve grouts for the injection of ducts in post-tensioning works.

European Technical Assessment n° ETA-07/0269

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Superstresscem®

EQIOM is a subsidiary of the Irish group CRH, worldwide leading supplier of construction products. The Group is present in 37 countries worldwide with more than 90 000 employees.

EQIOM positions itself as a generator of innovations and solutions to meet the new challenges of sustainable development, which is at the heart of the strategy of EQIOM. This dynamic brings the innovation in our technics, our process and our solutions that meet the requirements of the sustainable construction. It is a matter of controlling a balance within the three poles, i.e. economic, social and environmental.

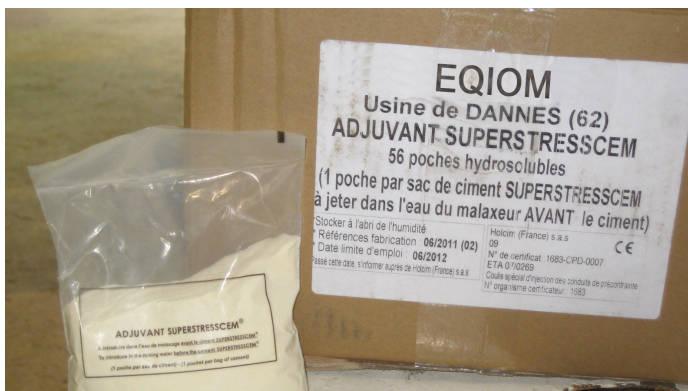
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Superstresscem®

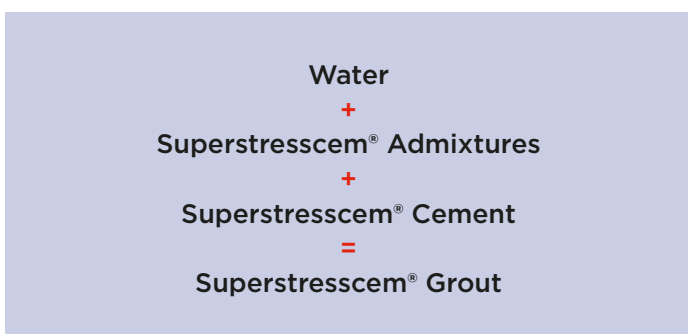
What is Superstresscem®?

It is the offer of an optimized couple of cement and specific admixtures in order to guarantee an efficient grout.

The ETA Superstresscem® grout matches the most severe European regulations.



Through this ETA, Holcim commits itself to control the quality and the consistency of the cement, the admixtures and the grout in its laboratories.



Superstresscem® applications

During the construction of pre-stressed concrete engineering structures, the grouting of ducts with a cement grout ensures several functions:

- The coating of the pre-stressed steel bars - in order to protect corrosion effects under a high pH between steel and hydrated cement, i.e. "steel passivation" - ensures the highest protection
- The filling of empty spaces along the length of the tube allows to create a shield against corrosive agents

In a long term, an uncomplete coating could involve corrosion and break off steel bars. The tubes grouting is an operation of primary importance, in terms of implementation quality and in terms of choosing the product; the engineering structure's life depends on this operation.



The Superstresscem® grout has been developed especially to meet these requirements.

Superstresscem® grout: First EN 447 special grout under European Technical Assessment n° ETA-07/0269

What are the Superstresscem® grout properties?

Superstresscem® grout characteristics		
Characteristics	Superstresscem® results	ETAG 013 criteria
Cone fluidity, 5°C ≤ t ≤ 35°C (EN 445)	≤ 25 sec. at t ₀ + 2 h.	≤ 25 sec. à t ₀ + 30 min.
Wick induced bleed test (ETAG 013 §C.4.3.3.2.3)	None at 3 hours None at 24 hours	≤ 0,3 %
Sedimentation test (ETAG 013 §C.4.3.3.2.2)	≤ 1 %	≤ 10 %
Inclined tube test (ETAG 013 §C.4.3.3.2.1)	Bleeding = 0 % Air void ≤ 0,01 % No crack	Bleeding ≤ 0,3 % Air void ≤ 0,3 % No crack
Grouting time	3 hours (temperature > 5°C)	-

Nota: The grout is gently shaken in the low agitation vat as long as the Marsh fluidity test is performed.

Its formula, which is exempt from corrosive agents (S²⁻, chloride...), is controlled on a rheological scale by using a high performing admixture.

The properties of formulation guarantee :

- A Marsh fluidity maintained during 2 hours
- A grout stability, ensuring absence of bleeding and white mixture
- Wick induced bleeding: none at 3 hours and 24 hours

Marsh Cone Fluidity (EN445) Lab Test Results			
Temperature	W/C	Fluidity t ₀	Fluidity t ₂ hours
5°C	0,38	20 s	21 s
20°C	0,38	14 s	16,5 s
35°C	0,37	14 s	16,5 s



Injectability, sedimentation, bleeding water and stability of the grout are measured on-site with inclined tube tests: (diameter \varnothing 81 mm, length 5 m). This test reproduces the grout behaviour after injection or re-injection in a 2,50 m inclined tube and takes into account filter effects due to steel bars.

The Superstresscem® grout stays homogeneous with no bleeding during injections performed under extreme temperatures (i.e. 5°C or 35°C).

According to the best practice, no grout shall be placed if the temperature of the structure adjacent to the tendon is below 5°C, unless it is heated so as to maintain the temperature of the placed grout above 5°C for at least 48 h after the injection.

No grout shall be placed in case its own temperature or the temperature of the tendon adjacent structure is exceeding 35°C.



Miscellaneous:

- Initial setting time > 3 hours
- Final setting time < 24 hours



How to make the Superstresscem® grout?

A high turbulent mixer (1500 rounds/min, 3000 rounds/min) or a turbo-mixer is required to prepare the grout according to EN 446 standard §6.1. The Marsh cone fluidity (Ø 10 mm aperture) must be controlled in compliance with the EN 445 standard.

Grout mixing proceeding:

- Pour in the mixer the exact quantity of water required (W/C between 0,35 and 0,39),
- Put (without opening them) the right number of water-soluble pre-dosed pockets of Adjuvant Superstresscem®,
- Switch on the mixer (at a normal speed) during 1 minute in order to allow the complete dissolution of pockets,
- Mix the right number of Cement Superstresscem® sacks and keep on mixing during 4 minutes at least, then transfer the grout into the low agitation vat (60 rounds/min),
- Proceed to the Marsh fluidity test (EN 445). Adjust the water dosage to obtain the targeted t0 Marsh cone fluidity while keeping the bracket of W/C ratio from 0,35 to 0,39. The t0 Marsh fluidity should never be inferior to 12 sec. In the case of a Marsh fluidity inferior to 12 sec. the W/C must be reduced and a new batch must be mixed,
- Inject the Superstresscem® grout. During grout time, keep the grout by low agitation.



	Example 1	Example 2
Water	17,5 to 19,5 litres	35 to 39 litres
Superstresscem® Admixture	2 pockets (put into mixing water)	4 pockets (put into mixing water)
Superstresscem® Cement	2 sacks of 25 kg	4 sacks of 25 kg

Nota : The quantities of water are only indicative and depend upon the mix-unit used on site and/or temperature.



**Important instructions for use of Superstresscem®:
Specific and general recommendations**

In order to obtain optimal grout properties and to carry out properly the injection steps, it is important to follow the instructions here below :

- Use water according to the EN 1008 standard,
- Do not inject grouts on site with temperature lower than 5°C or higher than 35°C,
- Preserve the mixer vat from any risks of pollution, water evaporation during hot weather...,
- If the weather is hot, avoid to expose cement, admixture pockets and water at a temperature exceeding 30°C,
- Superstresscem® cement must be stored in a dry area, on unopened covered pallets and used in a six months period from the packaging date indicated on each sack,
- The Superstresscem® admixture must be used before “use-by date” printed on the box,
- Keep the Superstresscem® admixture boxes in a dry and heated place. (T > 0°C).



Packing and logistics:

The components are delivered from our warehouse in Homblières (02) in France as follows, on each pallet:

Superstresscem® Ciment	Superstresscem® Adjuvant
25 kg sacks on wrapped pallets of 1,40 MT	Water-soluble pockets wrapped in a plastic bag and placed in a box
Quantity per pallet: 56 sacks	Quantity per pallet: 56 pockets
Dosage: 1 pocket + 1 sack	



Furthermore, the grout mixing proceeding is printed on each Superstresscem® Cement sack.

For each project (quantity, delivery time, destination) EQIOM studies the most appropriate solution (truck, container) in order to ensure a complete customer satisfaction.

Safety instructions

In case of grout projection in the eyes or on the skin, wash with drinking water.
Glasses and gloves are advised.



The Safety Data Sheet is available on our website www.eqiom.com

Our specialists are at your disposal to answer any technical question.

Launched on the market in 1998, this formulation has allowed all types of weather implementations with all site-equipments. It has been updated in 2007 with the aim of ever meeting your expectations.
Up to now, Superstresscem® grout has been protecting more than 40 000 Mtons of steel bars for pre-stressed concrete without any default to be reported.



Superstresscem® references

- LNG tanks of Zeebrugge (B), Fos sur Mer (F) and isle of Grain (UK)
- Airplane bridge in Charles de Gaulle Airport (F)
- Viaduc de Millau (F) ①
- Viaduc de Verrières (F) ④
- Viaduc des Barrails (F)
- Viaduc de Digoïn (F)
- Viaduc de Dordogne (F)
- Medway Viaduct (UK)
- Viaduc de la Rauze (F)
- Viaduc de Saint André (F)
- Viaduc TGV ligne Liège Köln (Herve, Battice) (B)
- Viaduc of Rion Antirion (GR) ③
- Pont sur le Rhin (F)
- Pont-Canal de Houdeng (B)
- Viaduc de la Goulette in Tunis (TN) ②
- Viaduc de Meaux (F) in cover page
- Wind mill from in Ostende (B)





The information data described in this documentation are purely the expression of our knowledge and laboratory test results, carried out in a constant care of objectivity. They cannot be considered as a guarantee or a commitment in case of faulty use or a different application from those described in this document.

Prior to any use, the Marsh fluidity test will help to check the direction for use and the grout making conditions.

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