

## Broad-use, new generation concrete superplasticizer

### Description

ADIUM 110 is a new generation, polycarboxylate-based superplasticizer, specially developed for the production of ready-mix concrete where high workability, excellent slump retention, high strength and durability are required. It offers the following advantages:

- When added during the preparation of concrete, reduces the water demand up to 20% and the resulting water/cement ratio, thus significantly increasing both initial and final strength.
- When added to the ready-mixed concrete, significantly improves its workability with a spread up to 63 cm (fluid concrete), without need of additional water.
- Contributes to better hydration of cement.
- Facilitates compaction of concrete, reduces segregation and bleeding and significantly improves pumpability.
- Significantly reduces setting shrinkage (thus preventing cracks) and creep.
- Improves water impermeability.
- Improves resistance to carbonation and chloride ion penetration.
- Does not have air entraining action.
- Is free of chlorides and other corrosive constituents.
- Is compatible with all kinds of Portland cement.

Certified with the CE marking as high-range water reducing - concrete superplasticizing admixture, according to EN 934-2:T3.1 and T3.2, certificate number: 0906-CPR-02412007/01.

### Working mechanism

ADIUM 110 is an innovative superplasticizer of the latest technology, based on modified polycarboxylate ether polymer. Compared to the conventional superplasticizers, it predominates in

performance, because it offers high water reduction or great flowability of high duration in low doses.

These properties are attributed to the specifically designed chemical structure, as well as the unique working mechanism of ADIUM 110, which significantly differs from the working mechanism of conventional superplasticizers based on polymer chains of modified lignosulfonates, sulphonated naphthalene-based and melamine-based polycondensates.

The polymer chains of the conventional superplasticizers carrying a very high anionic charge are immediately adsorbed on the surface of the cement particles and render it a negative charge. Because of the repulsive electrostatic forces, the cement particles are dispersed; as a result, less mixing water is required to achieve the desired concrete workability. However, the adsorbed polymer chains are rapidly overlapped by crystals developed during the hydration of cement and this leads to an early loss of the superplasticizing action. Therefore, conventional superplasticizers must be added directly into the concrete on the construction site or at the concrete plant, in case it is close to the construction site.

Contrary to that, the new generation superplasticizers act by a very different working mechanism. They are copolymers consisting of an anionic backbone with carboxylic groups and long polyethylene oxide-side chains. After the addition of the superplasticizer to concrete the anionic main chain is adsorbed on the positively charged surface of the cement particles whereas the side chains induce a steric repulsion effect between the cement particles. Due to this repulsive force, maximum dispersion of cement particles is reached and agglomeration can be avoided. Furthermore, new polymer chains are continuously released and adsorbed on the crystals, which are developed on the surface of the cement particles during the hydration and prevent the early setting of concrete.

Therefore, high workability of concrete and maximum hydration of cement at a low water/cement ratio are achieved, resulting in a very compact structure of high-strength concrete.

### Fields of application

ADIUM 110 is necessary for preparing high-strength concrete, exposed concrete, pumpable concrete etc. It is suitable for any type of concrete element, such as foundations, basements, water tanks, tunnels, canals, sewage and waste water treatment tanks, swimming pools, screeds for underfloor heating systems etc.

### Technical data

- Color: pale yellow
- Density: 1.01 – 1.05 kg/l
- pH: 6.30 ± 0.50
- Maximum chloride content: chloride free
- Maximum alkali content: ≤ 2.0% by weight

Increase of concrete spread, according to dosage of ADIUM 110:

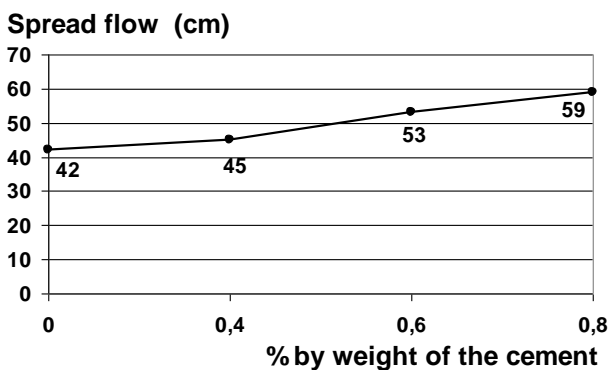


Table 1. Spread flow of reference concrete C20/25, CEM II/B 32.5 (320 kg/m<sup>3</sup>), w/c ratio = 0.59.

Increase of concrete slump, according to dosage of ADIUM 110:

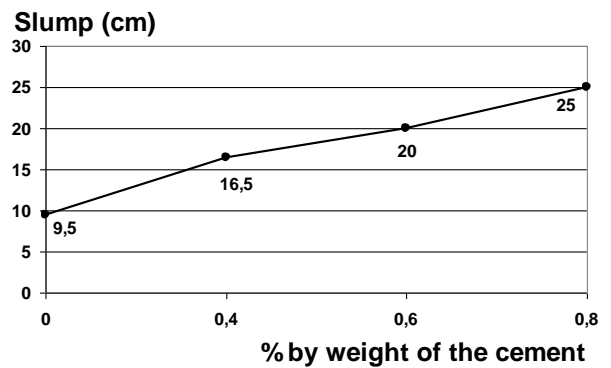


Table 2. Slump of reference concrete C20/25, CEM II/B 32.5 (320 kg/m<sup>3</sup>), w/c ratio = 0.59.

Increase of compressive strength of concrete, according to dosage of ADIUM 110, while reducing the mixing water and keeping the same spread property as the reference concrete (42 cm):

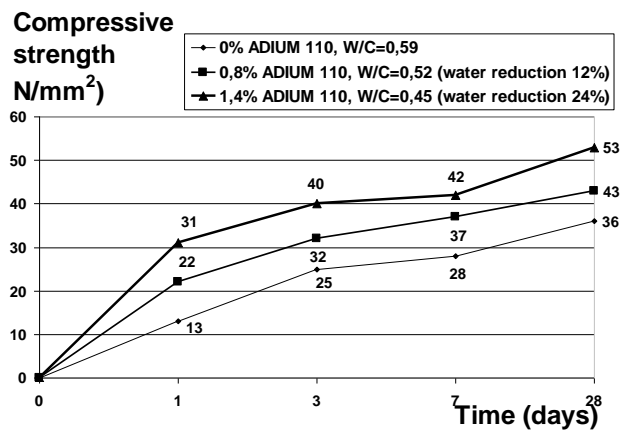


Table 3. Increase of compressive strength of reference concrete C20/25, Cement CEM II/B 32.5 (320kg/m<sup>3</sup>), w/c=0.59 and reduction of w/c ratio by 12% and 24%.

# ADIUM 110



The results shown on the tables are indicative and can be differentiated for different compositions of concrete and types of cement. In any case, it is recommended that trial mixes should be carried out to determine the most effective dose. The optimal dosage is influenced by the composition of concrete (quantity and type of cement, quantity and aggregate gradation, and the w/c ratio).

## Directions for use

ADIUM 110 should be added to the ready concrete mixture, just after its preparation, in order to achieve maximum effectiveness. It can also be added into the ready-mixed concrete, just before use.

To achieve uniform dispersion into the concrete mass, the concrete mixer truck drum should rotate for an additional 4-5 minutes.

## Dosage

0.60-1.40 kg per 100 kg of cement.

The consumption of ADIUM 110 depends on the initial and the desired slump at site.

Before application, it is recommended to check the action of ADIUM 110 in a laboratory, by mixing it with the concrete, in order to define the desired workability and avoid an overdose.

## Packaging

ADIUM 110 is supplied in plastic containers of 20 kg, in drums of 220 kg and in tanks of 1000 kg.

## Shelf-life - Storage

12 months from production date, if stored in original, unopened packaging, at temperatures between +5°C and +35°C. Protect from direct sun exposure and frost.

## Remarks

An overdose could cause segregation or bleeding in concrete; as a result, the final strength is reduced.



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0906-CPR-02412007/01

EN 934-2:2009+A1:2012

DoP No.: ADIUM 110/1604-3

### ADIUM 110

High-Range Water Reducing - Concrete  
Superplasticizing Admixture  
EN 934-2: T3.1/T3.2

Max chloride content: chloride free

Max alkali content: ≤ 2.0 % by weight

Corrosive behavior <sup>1)</sup>: -

Dangerous substances: none

<sup>1)</sup>: Only required when placed in the market of a member state which regulates these items

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