Technical data sheet

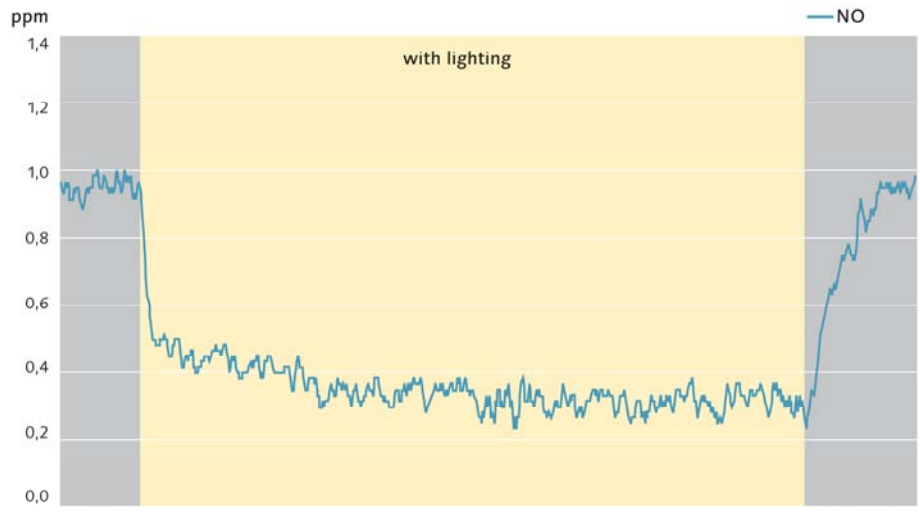
TioCem® premium CEM II/A-S 42.5 R (tx)

Composition

TioCem premium is a Portland slag cement with photocatalytic properties and corresponds to CEM II/A-S 42.5 R according to DIN EN 197-1. TioCem premium consists of Portland cement clinker and granulated blast furnace slag as well as a sulfate carrier, serving as setting controller. Conforming to standards, the granulated blast furnace slag content ranges between 6 and 20 M.-%. In addition, this cement contains nano-crystalline titanium dioxide. High homogeneity of the cement is achieved through an optimized production process. As a low-chromate cement it may contain small quantities of a chromate reducing admixture.

Properties

The photocatalytic properties of TioCem premium result from the use of a special nano-crystalline titanium dioxide as a catalyst. The use of titanium dioxide results in the reduction of nitrogen oxides, which are present in the ambient air of the concrete building component. The photocatalysis is a natural process. During this process, the catalyst increases the chemical reaction by action of light. On the surface of the catalyst and under action of light, highly reactive radicals are formed, which are able to react with organic and inorganic substances. The photocatalytic reaction can be repeated as often as necessary without consuming the photocatalyst. Using TioCem premium in concrete creates photocatalytically active concrete surfaces, which can make a substantial contribution to air pollution control in our cities. Hazardous nitrogen oxides (NO_X) in the air are converted into harmless nitrates (NO_3^-).



Picture 1:
Example for the decomposition of nitrogen monoxide by TioCem premium

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The nitrate resulting from the photocatalysis mineralizes on the concrete surface and washes off with the next rain.
Nitrogen oxides are not only directly hazardous to health. In summer, they are the precursor substances for formation of harmful ozone in near-ground layers. Photocatalytically active concrete surfaces thus make an active contribution to the reduction of summer smog.

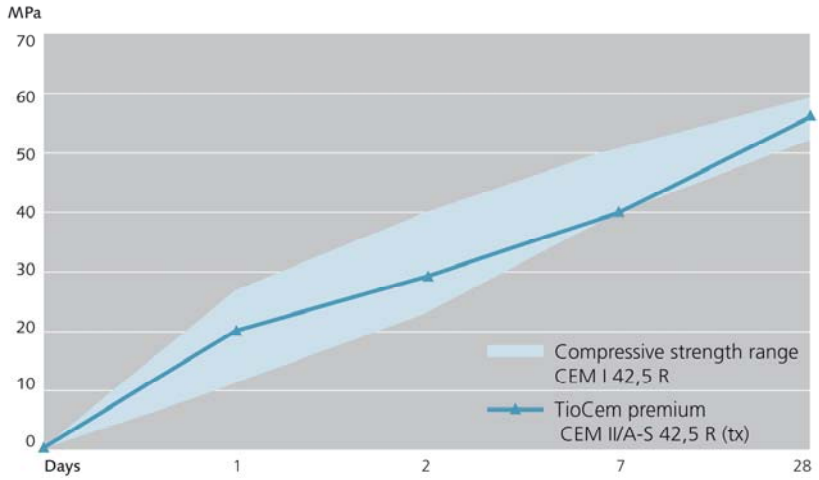
TioCem premium is cement of strength class 42.5 with high initial strength. According to the EU Directive 2003/53/EG it is low in chromate.

Area of application

The photocatalysis is a reaction activated by light, which takes place on the surface of the building component. For this reason, TioCem premium has to be used in near to surface areas. Application of TioCem in two-layer constructions, where TioCem is specifically applied as a thin and near to surface layer, results in high profitability. Examples for such applications:

- Paving stones,
- Façade elements,
- Outside plasters,
- Noise - and view protection elements,
- Road surfaces,
- Concrete roofing tiles,

Additionally, TioCem premium is suitable for production of ready-mix concrete and precast concrete units.



Picture 2:
Typical strength development of TioCem premium

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Processing conditions

In order to exploit the potential of the cement, the generally accepted rules of technique have to be applied, as for example sufficient curing of the cement for protection against dehydration and freezing. As it applies for all other cements, skin or eye contact has to be avoided during processing. Individual precautions such as wearing safety gloves and protective goggles are compulsory.

Ecological relevance

In addition to thermal and electrical energy leading to CO_2 emissions during cement production, considerable CO_2 quantities are released during the burning process of Portland cement clinker. CO_2 is a climate relevant greenhouse gas. Due to the reduced clinker share, the utilization of Portland slag cement leads to a reduction in the emitted quantity of greenhouse gases.

Monitoring

CEM II/A-S 42.5 R is subject to the plant internal production control in accordance with the conformity criteria within DIN EN 197-1 and is externally controlled by Verein Deutscher Zementwerke e.V. (VDZ).

During production of TioCem premium, the photocatalytic functionality is monitored as well. Therefore, a new standard for this cement has been defined. In order to make sure that not only the cement but also the final product meets the high requirements, HeidelbergCement controls the photocatalytic activity of the final products. Cement and final products, which meet the requirements of the standard will have the quality label TX Active®.

TX Active® is the Europe-wide quality label for photocatalytic activity of building materials.

Storage

Cement is moisture-sensitive and should therefore be stored in a dry place and protected against moisture. At appropriate storage conditions, the low-chromate property of the cements can be guaranteed for six months from the loading date.

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Sales and consulting

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