



## QUESTIONS AND ANSWERS ON PHOTOCATALYTIC PRODUCTS

### 1) What is TX Active®?

It is the active principle, with photocatalytic properties, developed by Italcementi. It is a brand which indicates the presence of the photocatalytic principle, in accordance with a precise process, in cement products prepared with Italcementi TX Active® cements. Paint, plaster, mortar or prefab materials containing this principle enable a significant reduction in polluting substances.

### 2) What is photocatalysis?

It is a natural phenomenon in which a substance, termed the photocatalyzer, alters the speed of a chemical reaction through the action of light. By exploiting the energy of light, photocatalyzers induce the formation of strongly oxidizing reagents which can cause the decomposition of some organic and inorganic substances present in the atmosphere. Photocatalysis is, therefore, an accelerant for oxidization processes which already exist in nature. Thus it favors the hastened decomposition of pollutants and prevents their accumulation. The worsening of the level of pollution in urban areas has recently driven research towards the application of the capability of removing harmful substances which are in the atmosphere. Photocatalysis, therefore, makes an effective contribution to improving air quality.

### 3) What has Italcementi discovered?

The application of the TX Active® principle to cement products enables the use of light energy to decompose, through oxidization, organic and inorganic substances present in the atmosphere. Therefore, the use of Italcementi cements in the TX range which contain the TX Active® principle actively contributes to the reduction of atmospheric pollution in cities and to keeping the surface of constructions clean.

### 4) Why does TX Active® need a cement support?

The cement makes a significant contribution to the TX Active® principle. It enhances its qualities for the very reason that cement has excellent pollutant absorption capacities. Cement is also the most commonly used material in the construction industry.



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**5) What is the contribution of photocatalytic cements to fighting pollution?**

Structures made or covered with material containing the TX Active<sup>®</sup> principle enable the reduction of various pollutants in the atmosphere. Among these are fine particles, polycondensed aromatics, nitric oxides, carbon monoxide and sulfur monoxide which in urban settings are mainly caused by car exhaust emissions and by the fumes from heating systems.

**6) What patents are there for TX Active<sup>®</sup>?**

Italcementi holds a series of patents deposited in Italy, Europe and the United States starting in 1996. The patents concern photocatalytic cements and a series of specific applications in construction (mortar, paint, paving, etc.).

**7) What were the main stages in the research?**

During the research stage various applications for TX Active<sup>®</sup> were completed, such as for example high-resistance photocatalytic white and grey ready mixed concretes. In this test stage, the ability to reduce pollutants present in the atmosphere was confirmed by the laboratories of Italcementi and of universities and by various research bodies. It was subsequently proven that the degradation of the organic and inorganic material on the surface of the cement enables preservation of the appearance of the constructions even after prolonged exposure to the external environment, thus preserving the initial conditions in terms of brightness.

**8) Does photocatalysis always work: what about closed environments? Or when it rains?**

Photocatalysis is also possible in internal structures treated with photocatalytic TX Active<sup>®</sup> cement materials, in which there is diffuse solar radiation or artificial light. Also when it rains a TX Active<sup>®</sup> product maintains its photocatalytic effect.

**9) Can the principle be used up?**

The mechanical duration of TX Active<sup>®</sup> cement applications is the same as that for similar applications with standard cements. The photocatalytic principle is not subject to consumption and therefore cannot be used up.

**10) What were the most important tests undertaken?**

- A first test on a photocatalytic TX Active<sup>®</sup> mortar was used to cover the asphalt surface of a section of Via Morandi in Segrate (province of Milan); a road which is 230 m. long and 10 m. wide, and which everyday sees traffic flow of around 1,000 vehicles/hour. Monitoring proved a reduction in nitric oxides on the road of around 60%.

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- TX Active<sup>®</sup> self-locking blocks were laid over 8,000 m<sup>2</sup> on an industrial site in the province of Bergamo. The test showed that in the area covered by the TX Active<sup>®</sup> blocks the concentration of nitric oxides measured was clearly lower than in a comparable area. The reduction calculated on the basis of the average values recorded is around 45%.

#### **11) What are the main works undertaken with TX Active<sup>®</sup> products?**

Today there are many outstanding architectural works the beauty of which is maintained thanks to the self-cleaning effect of TX Active<sup>®</sup>: the Dives in Misericordia church in Rome, the new headquarters of Air France at Charles de Gaulle airport in Paris, the Cité de la Musique et des Beaux-Arts in Chambéry, the Hôtel de Police in Bordeaux, the Saint John's Court Montecarlo Bay residence in the Principality of Monaco which will soon be built.

#### **12) Where are Italcementi TX Active<sup>®</sup> cements produced?**

The first cement produced in the TX range was made in Italy at the Rezzato cement plant (province of Brescia). Currently the plant of the subsidiary Socli in Izaourt, in France, in the High Pyrenees, is meeting the needs of Italy and France but, given the likelihood of a rapid expansion of TX Active<sup>®</sup>, two new plants in Italy are at an advanced stage of planning.

#### **13) What is the current production of Italcementi TX Active<sup>®</sup> cement?**

During 2005 the experimentation and testing stage was completed with on-site applications. During the year the main effort was on consolidating partnership arrangements with the leading operators in the various sectors (paint, plaster, prefab materials); this choice enabled the sale of approximately 1,000 tons of the product which was then transformed into photocatalytic material used in various locations in Italy and abroad. In 2006 a significant increase in production is planned.

#### **14) How much does it cost to use TX Active<sup>®</sup>?**

Talking about the cost of producing structural features in photocatalytic cement means little since what reaches the market is the finished product, the paint, the plaster, or the manufactured block.

Given that the part which interacts with the atmosphere is only the surface, the photocatalytic principle is not used in structural applications, but only where it is possible to maintain limited thicknesses, say from centimeters to a few millimeters.

If, therefore, the cost of Italcementi cement containing TX Active<sup>®</sup> is around 1 € per kilo, the important figure is the cost per square meter of the photocatalytic surface.

And so the cost is remarkably low as can be seen from a few examples.

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To transform the facade of a 5-storey block into a photocatalytic surface, it is enough to add around 100 euro to the cost of a traditional paint or plaster.  
Paving in photocatalytic blocks costs on average between 10 - 20% more than traditional paving.

**15) Where will it be marketed?**

TX Active<sup>®</sup> and the whole family of products derived from it will initially be marketed in Italy, then in France and in the United States, and subsequently in some other of the 19 countries where the Group operates worldwide.

**16) What is the Italcementi Group?**

The Italcementi Group is one of the largest cement producers in the world and the biggest in the Mediterranean area. With 2004 annual sales amounting to 4,528 million Euro (approximately 5 billion Euro on the basis of the preliminary figures for 2005) Italcementi Group's companies combine the expertise, know-how and cultures of 19 countries. With a staff of over 20,000 the Group boasts a production capacity of around 70 million tons of cement through an industrial network of 62 cement plants, 152 aggregates quarries and 570 concrete batching units.

**17) What is the CTG?**

The CTG is the *Centro Tecnico di Gruppo* (Group Technical Center) of Italcementi, one of the most important cement research centers in Europe. The CTG is located in Bergamo and has a secondary base in Guerville (France) and numbers 400 employees, of whom 60 are researchers.

The main activities of the CTG are:

- Research and development into materials, products and processes
- Designing and building industrial plants and machinery
- Modernization and optimization of production processes
- Checking technical and economic performance for plants
- Specialist technical assistance

The TX Active<sup>®</sup> principle was created from the R&D activities.

**18) Where can I find more information?**

On the Italcementi website – [www.italcementi.it](http://www.italcementi.it) – there is a section entirely dedicated to TX Active<sup>®</sup>, the range of TX products, the main tests, the most recent applications and our commercial partners who are authorized to make products with the TX Active<sup>®</sup> brand.