



Technical dossier: 189 tons of “transparent cement” for the Pavilion

The transparent properties of the cement have been made possible by the particular processing technologies applied to the materials used, i.e. cement, admixtures and resins. The resulting mix features all those properties, including flow, that are needed to fix resins into the panels thus allowing optical conveyance of light and images without altering the insulation and robustness properties of the cement-based material. The resins are special polymers, which Italcementi Group researchers have found to be particularly suitable for this type of application. These resins, which may have different colors, interact both with artificial and natural light creating a soft, warm light inside the building and a clear bright image on the outside. Italcementi Group researchers have identified **the right formulation of a dry ready-mixed product that allows inserting these plastic resins in the cementitious material, which is naturally opaque, without creating cracks and jeopardizing the structure.**

Without resorting to the more expensive optical fibers, this solution is particularly suitable for an **industrial use of the “transparent cement”** and offers a greater luminosity, since the resins are able to exploit much wider angles of light incidence than optical fibers.

Another peculiarity of the transparent cement designed for Shanghai concerns casting operations. Despite the material's complexity, **this cement can be poured straight into molds at the building site, with a significant reduction in cost.** Even the **strength properties of the transparent cement are very interesting.** Currently, pre-fabricated panels, some of which are very large, are being developed.

3,774 transparent panels (and “semi-transparent” ones, i.e. with a 50% lower transparency level due to architectural requirements) have been produced **and will be used to cover a total surface area of 1,887 m², approximately 40% of the total**

covering of the Pavilion, creating in the building in Shanghai a sequence of lights and shadows in constant evolution during the day.

Thanks to the 189 tons of transparent cement, when it is dark, seen from the outside, the building will allow the interior lights to filter through while, from inside, it will show the changes in the levels of daylight during the day.

The panels used in Shanghai measure 500x1000x50 mm and degree of transparency equals 20% of their surface area. Compared with static performance, based on tests carried out in the laboratory, a three-point flexural test showed that the panels can bear an elastic load of around 2 kN; maximum failure load as measured from tests was around 8 kN. Each panel weighs about 25 kg.

The properties of this material are undergoing further investigation by Italcementi Group researchers to develop additional and more advanced applications for the product.