

FORSITE
CONSTRUCTION ACCESSORIES

CHRYSO Flexo®

*An Innovative System
for Precast Insulated Concrete
Sandwich Panel*



CHRYSO

CHEMICAL SOLUTIONS FOR THE
CONSTRUCTION MATERIALS INDUSTRY
www.chryso.com

Products for the Reinforced
Concrete Construction Industry

Description

CHRYSO Flexo® is an advanced technology for insulated panels

Anternationally patented system to reach the thermal performance required

Thermal regulations evolve and impose important adaptations regarding construction.

Thanks to its 65 years of development in construction materials, CHRYSO has developed a unique patented technology for precast, which offers the ability to control the thermal performance of insulated sandwich panels.

The CHRYSO Flexo® innovative connection system solution comprises:

- **easy-to-place inserts**, which ensure even distribution of charges. Their synthetic composition prevents thermal energy loss while allowing unrestricted expansion of the panel sides caused by temperature variances;
- **the Flexo® Tool software program**, designed to achieve the expected thermal properties according to the quality of the insulating material used. Thus enabling it to reach the best cost/thermal performance compromise. This tool also assists engineers in panel and structural reinforcement designs along with insert positioning.

Uses

The system can be used for all types of precast sandwich panels

This connection system can be used for:

- The production of both horizontal and vertical panels of any shape, with door/window openings and entrance doors.
- High performance insulated panels, lightweight and even fire-resistant insulated panels up to 240 minutes.



Benefits

CHRYSO Flexo® solution benefits are as follows:

- **Optimised thermal performance:**
 - elimination of thermal bridges thanks to new generation synthetic insert and Flexo® Tool.
- **A flexible system:**
 - allows to manufacture a panel that reaches the thermal performance required.
- **A very easy-to-use system:**
 - approximately 1,5 CHRYSO Flexo® inserts are used for every m²;
 - Flexo® Tool assistance to position the inserts.
- **A cost-effective solution:**
 - cycle time optimisation and improved productivity for precast manufacturers;
 - selection of appropriate materials (Polystyrene and thickness of concrete) adapted to the level of targeted thermal value.



CHRYSO Flexo®, an asset for sustainable construction:

- thermal efficiency of a building is enhanced thanks to the use of Flexo® panels;
- panel manufacturing costs are reduced;
- maintenance costs are limited thanks to the increased durability of a Flexo® panel;
- working conditions are improved in the concrete precast plant.

CHRYSO Flexo® Global solution =



CHRYSO Flexo® new generation synthetic inserts

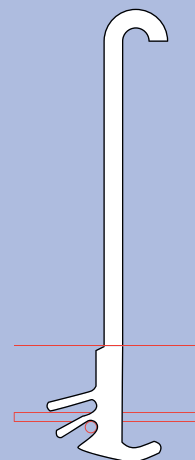
The CHRYSO Flexo® insert is made of a thermosetting vinyl resin and reinforced with different types of fibreglass. It is specifically formulated to efficiently withstand the action of concrete-borne alkali.

The insert is fixed to the welded wire mesh of the first concrete layer in a very simple way. It provides maximum flexibility in optimizing industrial cycles and the subsequent operations needed to make the panel.

Once installed, the insert enables a bending action in the direction of maximum stress. This bending, caused by thermal expansion, allows the two layers of concrete to move independently from one another for an infinite number of cycles without any cracking.

The CHRYSO Flexo® insert avoids any thermal bridge between the two concrete layers thanks to its very low thermal conductivity ($\lambda < 0.231 \text{ W/m.K}$), as specified in the certificate issued by CSI. For this reason, the calculation of thermal transmittance of insulated panels is facilitated in accordance with the EN ISO 6946 Standard.

Inside a CHRYSO Flexo® panel, the stress caused by the weight of the concrete layers is transferred to the entire panel structure, dramatically reducing local stress on the structural parts of the panel and hence its overall size.



An innovative software for thermal performance optimisation

The CHRYSO Flexo® solution includes a software for thermal and structural calculation to meet the precast operational expectations:

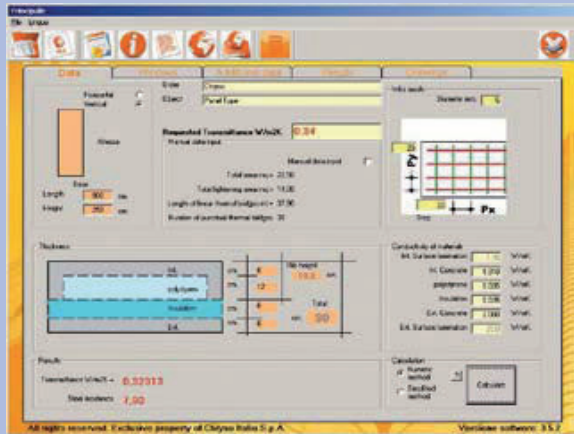
Flexo® Tool is a consistent assistance in the design and in the process of manufacturing the best technical compromise at the lowest cost.

It takes into account different parameters such as:

- size and spacing of the steel mesh;
- thermal efficiency of the polystyrene;
- thickness of the polystyrene;
- thickness of the concrete;
- openings of the panels;
- and many others.

Consequently, the use of the software allows a perfect optimisation of panel properties:

- structural/mechanical performance;
- thermal insulation performance;
- thickness reduction;
- cost reduction.



Here is an example calculation of the thermal transmission of an insulated panel made with CHRYSO Flexo®:

- Dimensions of the panel:
height H = 9.0 m, width W = 2.5 m and thickness T = 28 cm
- Thickness of the exterior concrete: 5 cm (surface: 22.50 m²)
- Low conductivity polystyrene foam thickness: 6 cm (λ = 0.035 W/m.K)
- Lightening polystyrene thickness: 12 cm (λ = 0.044 W/m.K) (surface 15.20 m²)
- Total thermal transmission of the panel: U = 0.3278 W/m².K



● Manufacturing

A quick and flexible way to manufacture a CHRYSO Flexo® panel

A first layer of concrete is cast with usual operating methods. Then, a welded mesh of maximum 5 mm diameter is laid on top of it.

CHRYSO Flexo® inserts are then connected to the grid at the interlaces, at the point of maximum strength, by using a consistent spacing given by the Flexo® Tool software.

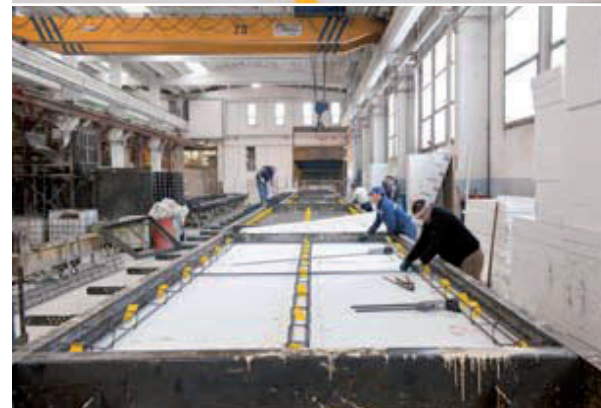
The inserts are installed and anchored down the longitudinal axis of the panel (extra inserts are needed near the panel base for vertical panels).

Both CHRYSO Flexo® inserts, and the grid to which they are anchored, are embedded into the concrete layer of the non bearing section.

The heat-proofing material (usually two layers of high-density polystyrene) for thermal insulation is installed after concrete is cast in place.

The panel is then ready for the installation of reinforcement according to the design specifications.

The casting of the structural layer is the final operation. CHRYSO Flexo® will remain anchored to the structural layer thanks to its special design.



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Alpha 319, Chobham Business Centre,
Chertsey Road, Chobham, Surrey, GU24 8JB

Tel: +44 (0)1276 485450 • Fax: +44 (0)1276 485451 • E-mail: sales@forsite.co.uk • www.forsite.co.uk