

INSPIRE[®]

PIR insulation foam for sandwich panels



INSPIRE[®] Inspiration and innovation

INSPIRE[®] PIR (polyisocyanurate) foam for sandwich panels was developed by Huntsman to deliver superior fire properties, via a standard production set-up using an easy foam processing.



Commercial building with sandwich panels containing INSPIRE[®] PIR insulation foam.

Superior fire properties

INSPIRE[®] PIR foam offers the possibility to meet existing and future panel regulations. It has all the positive attributes expected of a PUR foam: it is lightweight and offers good thermal conductivity and moisture resistance, making it superior to mineral wool (MW) or expanded polystyrene (EPS)-based panels. Importantly however,

it can also be used to address panel applications where fire resistance is essential. Employing environmentally friendly, halogen-free ingredients to achieve good fire properties, INSPIRE[®] PIR formulations are a reliable solution for panel projects where PUR foam is deemed unsuitable.

Standard production set-up

INSPIRE[®] PIR technology was developed to work without an adhesive coating between foam and steel facings, thereby reducing processing complexities and production costs. When recommended process conditions are met, the adhesion between foam and steel facers as well as the surface quality of the panels, are both excellent.

However, there are scenarios where the use of an adhesive coating may be beneficial, for example where there are variations in steel quality, difficulties in reaching minimum process conditions, or a requirement for high mechanical properties for particular end applications. If this is necessary, Huntsman can draw on its extensive understanding of adhesive chemistry to recommend a suitable bonding solution.

Easy foam processing

INSPIRE[®] PIR foam is the outcome of a long-term research program that investigated the fire, flow and adhesion characteristics of PIR. The result is a product with a reaction profile optimized to allow easy foam processing and

high production speeds. INSPIRE[®] PIR technology also offers panel producers the flexibility to manufacture different panel types of varying thicknesses ranging from 30 to 240 mm.

A range to suit customer needs

Huntsman offers a range of INSPIRE® PIR systems with different NCO indices to meet individual customer laminating conditions and desired fire rating standards.

As a rule of thumb, the higher the index, the better the fire properties of a foam and the higher the recommended minimum conveyor temperature. NB: the NCO index is always higher than 180, one of the parameters used to define PIR.

Reaction to fire

When it comes to reaction to fire, national tests are harmonized under EN 14509. The mechanical properties of INSPIRE® PIR sandwich panels have been determined according to this standard. The result is a panel system that meets customer expectations and is of a comparable quality to a standard PUR sandwich panel.

The entire INSPIRE® PIR product range also achieves a B s2 d0 rating in the Single Burning Item (SBI) EN 13823 test. This result was achieved with a number of different joint designs and panel thicknesses.

Classification obtained by the entire INSPIRE® PIR product range according to EN 13501-1 is:

- B s2 d0 for panels with standard assembly (EN 13823)
- B s1 d0 possible for panels with alternative assembly (EN 13823)
- E on naked foam (EN ISO 11925-2).

Classification obtained according to national tests is:

- V.3 on naked foam (SAV nr 241-242, Switzerland)
- B1 on panel (DIN 4102, Germany)
- B2 on naked foam (DIN 4102, Germany)
- M1 on panel (NFP 92507, France).

Fire resistance

Assembly techniques and the type of joining method used can have a huge impact on how a panel performs in a fire resistance test. Huntsman has researched this area extensively, using its experience to achieve the following classifications according to EN 13501-2:

- EI 20 for 80 mm wall panels (EN 1364-1)
- EI 30 and E 45 for 100 mm wall panels (EN 1364-1)
- REI 30 and RE 60 for 100 mm roof panels (EN 1365-1).

Forty minutes integrity and 33 minutes insulation are achieved for 100 mm wall panels according to requirements specified in Clause 5 of BS 476: Part 22: 1987.



Sandwich panel containing INSPIRE® PIR insulation foam.



EI 30 obtained with 100 mm wall panel.

Factory Mutual

High index INSPIRE® PIR grades are ideal for obtaining excellent results with the 50 Kw FM Approvals Flammability Apparatus. An FSPc < 0.39 s^{-1/2} (FM 4880 and FM 4881) makes the foam an excellent candidate to obtain FM Approval for the corresponding sandwich panel. Some INSPIRE® PIR grades are capable of obtaining such FSPc results, in some cases below 0.25 s^{-1/2}. As such, it is already possible to find FM approved panels on the market that are produced using INSPIRE® PIR grades.

Experience counts

Huntsman is a world leader in the production of MDI, polyols and polyurethane systems. INSPIRE® PIR foam was developed using the company's experience in these areas and the team's inherent technical skills and

capabilities. Polyurethane for insulation is used extensively in residential housing, commercial buildings, cold storage appliances and pipelines, among many other applications.

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