

## **PIR: Fire, Smoke and Toxic Gas Emissions.**

### **Fire**

Polyisocyanurate (PIR) foams are part of the Polyurethane (PUR) rigid foam family. The chemical composition of both are similar bar the fact that the PIR foam contains a high percentage of the cyclic 'isocyanurate' chemical linkages and use a polyester polyol instead of a polyether polyol as would be standard in PUR's.

The advantage that PIR foams have over traditional PUR and plastic foams is that they have a high level of inherent fire resistance. This is due to two reasons:

1. the selection of the raw materials used,
2. the isocyanurate linkage.

In a fire scenario PIR type foams exhibit the following characteristics:

1. low smoke emissions,
2. resistant to ignition,
3. reduced spread of flame,
4. high levels of cellular carbonaceous char formation,
5. increased structural integrity.

As a consequence of the above characteristics PIR foams will:

1. aid in fire containment,
2. reduce loss due to smoke damage,
3. increase the available time for occupants to escape the fire,
4. aid the emergency services ability to control the fire.

All foams are made from organic materials and as a consequence will burn on exposure to a sufficient heat source. However the rate of thermal decomposition and heat/energy emitted will differ from product to product.

### **Smoke:**

This is dependent on factors such as severity of the fire and the amount of air available. PIR foams produce less smoke than PUR, XPS and EPS foams.

### **Toxic gases:**

All organic materials (paper, wood, plastics, etc) release toxic decomposition products. The type of products released depends on the material burnt and the conditions, i.e. temperature and oxygen availability. The main killer in a fire scenario is Carbon Monoxide (CO) poisoning.

With PIR foams the major combustion products are CO and CO<sub>2</sub> (carbon Dioxide) with much smaller quantities of oxides of Nitrogen and Hydrogen Cyanide.