IXOL® B 251

High Performance Halogenated Polyether Polyol
Reactive Flame-Retardant for Rigid Polyurethane Foams
Thermal insulation is part of the state-of-the-art way of construction, be it for individual houses, commercial complexes, industrial structures or public buildings.

In this area rigid polyurethane foams (PUR) are established as the most efficient thermal insulation material that is manufactured on industrial scale. The outstanding characteristics of this cellular material are becoming nowadays a major item because of the necessity to protect our environment, in particular by reducing the emissions of greenhouse gases through a lower energy consumption (reduction of carbon dioxide emissions).

For obvious safety reasons, rigid polyurethane foams must comply with various standardized tests defined by national or international institutions. IXOL® B 251 gives the possibility to produce rigid polyurethane foams which can achieve the requirements of many European and American tests. Rigid polyurethane foams formulated with IXOL® B 251 can in particular pass the following tests.

**Example of fire tests**

<table>
<thead>
<tr>
<th>Country</th>
<th>Test Standard</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>BS 476, part 7</td>
<td>Class 1</td>
</tr>
<tr>
<td>France</td>
<td>Epiradiateur, NF P 92-501</td>
<td>Class M1</td>
</tr>
<tr>
<td>Germany</td>
<td>DIN 4102</td>
<td>Class B2</td>
</tr>
<tr>
<td>Switzerland</td>
<td>EMPA</td>
<td>Class V</td>
</tr>
<tr>
<td>USA</td>
<td>ASTM E-84</td>
<td>Class 1</td>
</tr>
</tbody>
</table>

IXOL® B 251 is also suitable for the development of formulations having high fire performance according to the new European standard based on the Single Burning Item (SBI) test. As example, formulations containing the polyol IXOL® B 251 can lead to the manufacture of sandwich panels with a class B according to the European classification. This is the highest level that can be achieved by polyurethane foams.

The polyol IXOL® B 251 does not affect the thermal insulation characteristics of the foam or its mechanical properties. It can therefore be used in various concentrations in combination with standard polyether or polyester polyols. IXOL® B 251 is also suitable for manufacturing of modified isocyanurate polyurethane foams (PUR: also known as low index polyisocyanurate foams).
IXOL® B 251
A High Standard in Fire Safety

IXOL® B 251 is a brominated aliphatic polyether triol, particularly well suited for the production of rigid polyurethane foams. It has a moderate viscosity and a good compatibility with the main conventional polyols (polyether or polyesters). Besides, IXOL® B 251 gives a permanent flame retardant effect since the active component (bromine) is chemically bound to the final polymer.

The polyol IXOL® B 251 can be used with the new generation of blowing agents. In particular, the combination of IXOL® B 251 with our third generation blowing agent Solkane® 365/227 can lead to foams offering an outstanding fire behavior and excellent insulation properties.

In addition, the polyol IXOL® B 251 can be used in foams blown with flammable blowing agents such as pentane derivatives. In that case, the high performance of that polyol can improve the fire behavior of the foam in spite of the high flammability of pentane isomers.

IXOL® B 251 has been manufactured in our plant of Tavaux (France) for more than 20 years. It is a mature product; its manufacturing process is proven and is running totally under computer control, which ensures optimum and constant quality. The production process of the polyol IXOL® B 251 is certified ISO 9000.

### General Characteristics*

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroxyl number mg KOH/g</td>
<td>330</td>
</tr>
<tr>
<td>Density at 25 °C g/cm³</td>
<td>1.580</td>
</tr>
<tr>
<td>Viscosity at 25 °C mPa·s</td>
<td>7,000</td>
</tr>
<tr>
<td>Flash point (open cup) °C</td>
<td>196</td>
</tr>
<tr>
<td>Water content wt-% &lt; 0.2</td>
<td></td>
</tr>
<tr>
<td>Bromine wt-% ≈ 31.5</td>
<td></td>
</tr>
<tr>
<td>Chlorine wt-% ≈ 6.9</td>
<td></td>
</tr>
<tr>
<td>Acidity mg KOH/g &lt; 0.3</td>
<td></td>
</tr>
<tr>
<td>Appearance dark-brown liquid</td>
<td></td>
</tr>
</tbody>
</table>

*These values are given as an indication and do not represent sales guarantees. Sales guarantees are available on request.

### Viscosity

Viscosity as a function of temperature

![Viscosity graph](attachment:viscosity_graph.png)
The polyol IXOL® B 251 is compatible with all usual polyols and with non-reactive flame retardants such as phosphoric acid esters. It presents moreover useful synergism with these compounds.

The use of IXOL® B 251 offers therefore considerable flexibility in formulation.

Nevertheless, system houses are advised to check that their formulations do not alter with time whenever a long term stability of the polyol blend is required.

The graph shown in this page indicates for PUR formulations (ISO index 110) the typical concentration range of IXOL® B 251 that are needed in formulated polyol blends in order to achieve different levels of fire retardancy.

Furthermore, formulations containing the polyol IXOL® B 251 can be used in the most varied processing techniques such as e.g.:

- Injection moulding in “sandwich” plates for the manufacture of cladding panels or elements for cooling chambers and cold stores
- Continuous production of panels (laminates) according to the so-called “double conveyor” technique
- Manufacture of blocks which can be shaped or cut into plates
- In-situ projection or cast molding for roof tightening and insulation, vertical or under-face insulation

For one-component foams and high index polyisocyanurate foams, we also offer IXOL® M 125, a diol with a lower hydroxyl number and a lower viscosity. A specific documentation on this other IXOL® type is available on request.

### Ratio IXOL®/Polyol and Performance

<table>
<thead>
<tr>
<th>IXOL®/Polyol %</th>
<th>Limiting oxygen index %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>75</td>
<td>35</td>
</tr>
<tr>
<td>100</td>
<td>autoextinguishing</td>
</tr>
</tbody>
</table>

CI B2 (D)
CI V (CH)
CI M1 (F)
CI 1 (GB)
PUR
IXOL® B 251

Packaging and Storage

IXOL® B 251 and IXOL® M 125 are delivered in:

- Drums of 300 kg net
- Intermediate bulk containers (IBCs) of 1.5 t net
- IXOL® B 251 is also delivered in road tankers, 20 mt.

IXOL® B 251 polyol is non corrosive under normal storage conditions. Since it is hygroscopic it should be kept in a closed container.

No particular precautions are required for the transport and storage of this polyol. Normal steel containers may be used. It is advised, however, not to use tin-plated steel containers.

In a closed container, the IXOL® B 251 polyol is stable for 1 year, provided the storage temperature will not exceed 25 °C.

Heating IXOL® B 251 polyol above 50 °C must be avoided because this may promote its acidification.

IXOL® B 251

Safety and Handling

IXOL® B 251 can be considered as a moderately harmful product. Therefore, its use does not present any risk as long as normal handling precautions are observed.

It is advised to avoid contact of the IXOL® B 251 polyol with the skin and the eyes, and especially to avoid ingestion. It is always recommended to wear protective gloves and goggles. In case of contact with skin, wash the affected part with hot water and soap. For the eyes, rinse abundantly with warm water and call a doctor. For further information refer to our Material Safety Data Sheet.

Information on statutory regulations and safety:

- CAS no 68441-62-3
- According to the EEC directive 92/32/CEE IXOL® polyols are classified as “no-longer polymers”.
  They are listed in the major national inventories (TSCA, MITI, etc.)
- EEC labelling:
  Xnc: Harmful
  R22: Harmful if swallowed
  R36: Irritating to eyes
  S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
- "Wassergefährdungsklasse" (Germany): 1.
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