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Mineral Fibre Market Thermal Insulation 2023

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Abstracts

Report Overview

This report examines the European market for thermal insulation products and their different uses in building and in industry, as well as identifying key trends impacting the industry.

It builds up from previous data held in-house by IAL Consultants. All data has been reviewed and updated for this new edition.

Scope of Study

IAL Consultants' report on the European Market for Thermal Insulation Products is comprised of 'Country' and 'Market' volumes.

This report is a Market Volume report.

Country volumes focus on identifying the demand for common thermal insulation materials used in a given country/region.

Market volumes focus on identifying the demand for a given insulation material in Europe in a country-by-country analysis.

Country and Market Volumes are available as follows:

Country Volumes

The following countries are included in the country volumes:

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Austria, Baltics (Estonia, Latvia and Lithuania), Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, UK.

Country Volumes cover the following products:

Glass wool, stone wool, expanded polystyrene (EPS – grey and white), extruded polystyrene (XPS), polyurethane/polyisocyanurate (PUR and PIR) foam, phenolic foam, flexible insulation materials (expanded nitrile rubber (ENR) and polyethylene (PE)), renewable insulation materials (e.g., wool, flax/hemp, cellulose, wood fibre), and vacuum insulation panels (VIPs)/aerogel.

Market Volumes

Market Volumes cover the following products: mineral fibre (glass and stone wool), expanded polystyrene (grey and white), extruded polystyrene, and polyurethane/polyisocyanurate foam.

Market Volumes provide data for the countries/regions listed above.

Methodology

The information included in this study is based on both secondary and primary sources. The desk research examined relevant technical and trade journals, published official statistics, and figures derived from trade associations. The primary interview programme included high-level respondents in companies manufacturing, distributing and/or installing thermal insulation materials. Actual consumption figures are provided for 2022, which has been taken as the base year. Figures are in volume (m3 and tonnes) and value (?). Typical densities have been used to convert between the different volume units, and average prices have been used to convert from volume to value. However, it must be noted that material densities and prices can vary significantly for a given material according to the product’s intended end use.

The study also presents five-year forecasts to 2027, derived from industry and economic indicators, as well as other relevant legislative, commercial and/or technical issues likely to affect individual countries, thermal insulation materials and products, and the end uses to where these are applied.

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Small discrepancies may appear in the total figures due to rounding. Given the current uncertainties in the global economic and political situation, forecasts for 2023 and beyond are based on the latest information available at the time of publication, and IAL has endeavoured to factor in the latest developments. However, given the fluidity of circumstances at this time, we recognise that these forecasts are likely to be superseded by events, and therefore IAL may be updating them, as appropriate, in any subsequent update of our estimates.

Thermal Insulation Materials Overview

Various factors affect the type and amount of thermal insulation required. These can include:

- Climate
- Durability
- Ease of installation and replacement at end of life
- Cost effectiveness
- Toxicity
- Flammability
- Environmental impact and sustainability
- Energy efficiency

A brief description of each of the insulation materials covered within this study is given below although, in reality, a combination of these can be used.

Mineral Fibres

Mineral fibre, or wool, is a non-metallic, inorganic material normally derived from glass or rock. Both glass wool and stone wool can be used in similar applications, except where high temperature resistance and fire protection are required. Stone wool can withstand temperatures up to 1,177oC, whereas glass wool can only be used up to

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400oC.

Mineral fibres can be manufactured into a wide variety of physical forms and shapes and to a range of densities, depending upon the intended application. The most common forms are:

Rolls or blankets, typically for use in loft insulation

Laminated matting, for use in heating, water pipes, ventilation and air conditioning ducts, containers, cooling and tank systems

Rigid slabs for:

(i) Flat and pitched mansard roofs, loft conversions, cavity walls and ceilings

(ii) Concrete floors

(iii) External wall dry ventilated cladding systems

(iv) Process plant - apparatus engineering, furnace construction and plant engineering

Fibre bonded to plasterboard for dry lining and semi-structural applications

Shells and moulded pipe sections for process plant and domestic cooking appliances

Sprayed, for asbestos encapsulation, or blown, for loft and wall insulation, in old or irregularly shaped buildings.

Expanded Polystyrene (EPS)

EPS is a relatively low-cost material with excellent insulating properties. Its lightweight nature means that it adds little to structural weight, yet still offers high dimensional stability. The foam is closed cell and therefore resistant to water penetration, although it is not a water vapour barrier. EPS does not deteriorate, it is non-toxic, non-irritant, and does not contain blowing agents. EPS has a low thermal conductivity and therefore

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good thermal insulation properties. Its chief disadvantages are its susceptibility to physical damage, its flammability characteristics, and its low resistance to chemical attack, including substances like dilute acids, alkalis, methanol and i-propanol. EPS foam can also be used at extremely low temperatures without any time restriction.

EPS is typically encountered in three forms:

(i) As rigid lightweight slab or board for use in wall, floor and roof insulation and cavity fill

(ii) EPS sheet bonded to plaster for use in dry lining and roofing extensions

(iii) Loose fill bead for use in cavity fill and loft insulation

For the first time, the EPS market is segmented into grey EPS and white EPS.

Extruded Polystyrene (XPS)

For extrusion, polystyrene with a high viscosity is most suitable, i.e., products with a melt volume index (MVI) of 200/5 in the lower end of the range between 1 and 7 ml/10min.

The physical properties of XPS mean that it can be used in board form in roofing, flooring and walling applications. The low moisture absorption of the material makes it ideal for use in cold storage facilities and refrigerated transport, where it is subjected to freeze/thaw cycles. The high compressive strength of the material also makes it ideal for load-bearing applications. XPS does not rot and has relatively high thermal insulation properties.

Due to its cost, XPS tends to be used in specialist areas where its properties are specifically required.

Polyurethane/Polyisocyanurate Foam (PUR/PIR)

Produced from a mixture of polyols, isocyanates, process additives and blowing agents, polyurethane foams can provide very high-performance insulating products, despite the change from CFC to CFC-free blowing agents. The foam can be produced in a number of ways depending upon its ultimate use:

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(i) Continuous production of slabstock, which can be cut into flat sheets or shapes

(ii) Continuous lamination between two rigid substrates, suitable for structural building applications

(iii) Lamination between two flexible substrates

(iv) In-situ moulding for refrigerators, pipe sections and cavity walls

(v) Surface spraying for flat roofing and storage tanks.

Polyisocyanurate foams, which offer improved fire resistance, have become popular due to new building regulations. Polyisocyanurate foams are used in both rigid- and flexible-faced panels.

Polyurethane foams are not as widely used as some other materials due to their relatively high cost. However, the excellent low thermal conductivity and wide operating temperature mean that polyurethane can, if specified, be used in virtually all areas of the construction sector.

Polyurethane is most widely used for the following applications:

Dry lining plasterboard for internal solid wall insulation where space is limited

External/cavity wall insulation

Suspended/floating floors

Pitched roofing for residential, agricultural and commercial buildings

Cold stores and food process plant

Refrigerated transport

Blown in-situ for flat roofs, storage tanks, windows and pipe work

Domestic and commercial refrigerators

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Rigid pipe insulation.

Phenolic Foams

These rigid foams are less bulky than filled materials. The foams can exhibit excellent low thermal conductivity such as 0.020W/mK. These foams have a wide operating temperature from -180oC to +150oC. They also have an excellent fire rating meeting all building regulations. In addition, they are thermoset materials and do not drip or melt when exposed to flames.

Phenolic foams can have an open- or closed-cell structure, the latter of which show improved thermal resistance properties, are less flammable, and have lower moisture vapour transfer rates.

They are produced in blocks for cutting to size, and this is typically done in the pipe work sector, where phenolic foams are used for:

Heating, ventilation and air conditioning ducting

Cryogenic process plants

Refrigeration systems

Breweries/hospitals

They are also supplied as laminate panels and composite boards. These panels are used for dry lining, roofing and external insulation, as well as cold tanks and vessels, but have limited use in structural applications. Phenolic foams tend to be faced to improve their durability.

Flexible Insulation

There are two insulation materials that can be grouped together under the heading ‘flexible insulation’ - expanded nitrile rubber (ENR) and polyethylene (PE). Both are primarily used for pipe insulation but are also used to insulate large tanks and vessels. These materials are available as continuous tubes, self-adhesive ‘cuffs’, rolls, mats

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and tapes.

ENR is a flexible closed-cell rubber with an operating temperature of -40oC to +150oC. It has an excellent fire rating and enables specifiers to utilise it in industrial pipe work as well as domestic pipe work. The closed-cell structure provides high resistance to moisture, making it useful in controlling condensation. It is also resistant to chemical attack from oil and grease as well as ozone.

In terms of thermal conductivity PE is comparable to ENR. It is also resistant to moisture but does not perform well in terms of fire rating tests and therefore is unsuitable for use in process plant. The lower cost of the material makes it popular within the domestic lagging market where the flammability of material is not specified.

Renewable Insulation Materials (RIM)

The green alternative to synthetic insulation is natural insulation products. They are made from renewable, organic resources, can be reused and recycled, and are fully biodegradable. They are non-toxic, allergen-free and can be safely handled and installed. There are many different types available, including:

Sheep’s wool: Usually needs to be treated with chemicals to prevent infestation and reduce fire risk

Flax and hemp: Natural plant fibres that are available in batts and rolls; typically contains borates that act as a fungicide, insecticide and fire retardant

Cellulose: A recycled product made from newsprint and other cellulose fibre. It can be blown into cavity walls, floors and roofs; used as a loose fill; and is also available in quilts, boards and batts

Wood fibre: Made from wood chips that have been compressed into boards or batts using water or natural resins as a binder.

Vacuum Insulation Panels (VIPs)/Aerogel

Vacuum insulation panels are specially designed panels that use the insulation of a vacuum within a gas-tight film, in a board shape. A vacuum, or the absence of air, has no thermal conductivity; therefore, these boards give outstanding thermal conductivity.

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Aerogel is a synthetic, porous, ultra-light material derived from a gel (silica), in which the liquid component has been replaced with a gas.

End-Use Sector Definitions

For the purpose of this study, the end-use sectors have been split into building and industrial.

Building

This sector includes commercial and domestic building, cold storage and agricultural storage. The building sector generally takes up to 90% of volume (m3) of the insulation market.

Domestic building is split into flooring, roofing and wall insulation. Thermal insulation for domestic pipe work and air conditioning applications are not included in the building market figures. It was found that some respondents could not separate heating and ventilation figures for domestic and commercial buildings from the usage in industrial buildings and process plant. There is therefore some overlap in the definitions used by the trade. IAL Consultants' approach of combining both sectors into a unique pipe lagging market eliminates double counting.

Industrial

This sector consists of the following:

Pipe lagging

This includes the thermal lagging of industrial pipe work, ducts and plant. Where domestic pipe work has been identified this is also included, as well as insulation of district heating pipes.

Process Plant and Machinery

This section includes all applications in process plant (except the lagging of pipe work and ducts) and in ancillary equipment. A special feature of this end-use sector is the requirement for very high temperature insulation in furnaces, ovens, etc.

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Domestic and Commercial Appliances

This sector covers refrigerators, freezers, cookers and storage and other heaters. Market figures exempt other minor uses, such as irons and commercial presses.

Transport

Road, rail, and sea transport is considered. Applications include the production of refrigerated vehicles and boatbuilding.

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