

Product Information Bulletin 219

Environmental Issues Related to Manufacture of EPS



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Plasti-Fab recognizes that PlastiSpan expanded polystyrene (EPS) insulation is a key component in energy efficient building envelopes. However, green building principles extend beyond consideration of the contribution a material makes to the energy efficiency of a building envelope to consider the environmental impact of the material from start of its' manufacture to its' final end-use. EUMEPS (European Manufacturers of EPS) has published a number of publications that address environmental considerations relate to EPS insulation. Below are a few highlights of environmental information that should be noted.

Energy Reduction

EPS insulation is an excellent thermal insulator that dramatically reduces building energy requirements. EUMEPS indicates that a well insulated 'detached one family house' demands only 30% of the heating energy per year that a poorly insulated habitation requires. EPS insulation conserves fossil fuels and cuts carbon dioxide emissions associated with power generation (which add to the greenhouse effect) by about 300,000 kg over 50 years compared to a poorly insulated house.

Ozone depletion

EPS insulation production poses no threat to the ozone layer. Pentane, the blowing agent used in EPS manufacture contains no ozone-depleting substances and the amount released during manufacture is only about 0.2 percent of the total man-made emissions of volatile organic compounds (VOC's). It is actually a naturally occurring chemical like methane. It is also continually being formed by natural processes; for example in the digestive tracts of animals and by the anaerobic decomposition of plant matter. It has a low stability and under the influence of humidity and atmospheric radiation (especially UV light) it is quickly converted into carbon dioxide and water. Because of its low stability, pentane cannot reach the higher (stratospheric) atmospheric levels and therefore does not contribute to ozone depletion (unlike chlorinated blowing agents such as CFC's and HCFC's). Additionally pentane does not contribute directly to the "greenhouse" effect.

The table below illustrates the higher atmospheric effects of some chemical compounds and the low significance of pentane:

Compound	ODP ¹	Life time
CFC11	1.0	65 years
HCFC 141b	0.1	7.8 years
n-pentane	0	8 days
n-butane	0	9 days
methane	0	7.1 years
CO ₂	0	50-200 years
O ₃ (troposphere)	-	2 months

¹ ODP denotes Ozone Depletion Potential (by definition, ODP of CFC11 is 1.0)



Resource Productivity

A product's environmental impact cannot accurately be determined simply by focusing on its disposal at the end of its life. A cradle-to-grave approach should be adopted, assessing its impact from manufacture through to final recovery or disposal. This approach, a developing science known as eco-profile or life-cycle analysis, allows objective decisions to be reached - ensuring maximum environmental protection when products are selected.

Eco-balance and life cycle analysis studies have illustrated that EPS insulation offers environmental benefits over alternative materials in insulating products as well as in packaging.

Additionally, because of its excellent insulating properties and light weight, EPS insulation actually saves natural resources during its lifetime:

- Using EPS insulation board means that less heating fuel - or energy for air conditioning - is required: insulating to the most stringent current regulations can cut heat loss by more than 70%, compared with a similar, non-insulated building.
- For every kg of oil used to manufacture an EPS insulation board, about 150 kg is saved over its functional (ca. 50 years) lifetime through reduced heating demands.
- The excellent insulating properties of EPS insulation mean that hot food stays hot and cold food cold for a longer period of time, reducing the need to pump precious energy resources into refrigeration or heating. Moreover you can still hold the package in comfort.
- EPS insulation boards insulate houses, protective packaging, protects valuable shipments etc. but above all because of its light weight, EPS insulation reduces fuel consumption during transportation - since less weight to move means less fuel to use.

Waste Management

Thermoplastic polymers including polystyrene, both polystyrene and expandable polystyrene can either be mechanically recycled into several applications or chemically converted into other feedstock. Incineration of plastics as part of the municipal solid waste stream generates substantial amounts of energy, saving the use of alternative fuels. The heat of combustion of polystyrene polymers is approximately 41 MJ/kg, comparable to the value for oil. In an appropriately designed combustion device, complete combustion is achieved resulting in water, carbon dioxide and trace levels of ash.