MSDS for EPS

About EPS

History of Expandable Polystyrene (EPS)

Expandable & Expanded polystyrene (EPS) is a generic term for polystyrene and styrene copolymers. It is a rigid cellular plastic foam material derived from petroleum and natural gas byproducts. The spherical beads of resin are subjected to steam which causes the thermoplastic polystyrene to soften and expand up to 40 times its original volume. Each small bead of polystyrene is fully sealed.

Expanded polystyrene (EPS) is produced in a wide range of densities from 8 to 48 Kg/m³ providing a varying range of Physical / Mechanical properties. These are matched to the various applications where the material is used to optimize its performance and strength.

Features of Expanded polystyrene (EPS)

- EPS is a good example of the efficient use of natural resources – it is 95% air.

- It has wide application temperature from −110 degrees to +110 degrees Max. Degree Celsius.

- The manufacture and use of EPS does not generate any risk to health or to the environment.

- EPS does not damage the ozone layer since it does not use CFCs or HCFCs in the manufacturing process.
The transformation process consumes little energy and does not generate waste.

The use of EPS for thermal insulation in the construction industry contributes in significant savings on heating and cooling buildings and a drastic reduction in the emission of polluting gases CO² and SO².

EPS packaging protects products, helping to reduce wastage and its lightweight nature helps to reduce fuel consumption.

EPS packaging can come directly into contact with foodstuff as it meets all the prevailing international health regulations.

Fungi and bacteria cannot easily grow on EPS.

EPS makes up only a tiny part of Municipal Solid Waste (0.1%)

As it does not biodegrade EPS does not contaminate the air or water with gases or hydro soluble substances.

HYGIENIC NATURE: since the material is inert, unalterable and innocuous, it can come into direct contact with foodstuff whilst complying with the laid down health and safety standards.

ADAPTABILITY: it is easy to adapt to any product or any design.

EPS is 100% recyclable
Manufacturing

Expanded Polystyrene (EPS) - Manufacturing Process

Figure 1
Above block drawings (Figure 1&2) illustrate the process of Manufacturing of Expanded Polystyrene (EPS) from the Expandable Polystyrene Beads.

Four stages can be seen in the figure-1. First the beads are fed to a vertical tank containing an agitator and a controlled steam input. The final material density is determined at this stage.

Density adjustment is carried out by controlling the length of time. Beads remain in the expander and/or the pressure in the expander. Secondly, the expanded beads are stored in the open to air silos for few hours as a drying stage. During storage, they are allowed to reach an
ambient temperature. This process takes as long as three days or as short as few hours. This process is called the stabilization process, as condensation of the blowing agent and the surrounding water vapor occurs.

Later on, beads are poured in a mold of various sizes depending on the manufacturer. Steam is injected from the walls of the mould through longitudinal tiny slots where fusion takes place. The basic EPS product is white although it can be colored otherwise.

**Fire Retardant**

**Expanded Polystyrene Fire Properties**

**EFFECT OF HEAT ON EPS**

As EPS is heated it softens and at about 150ºC it begins to shrink. This continues until it is reduced to its original density prior to expansion. Continued heating will melt it to liquid and then a combustible gas will form above 200ºC. This gas can be ignited at temperatures between 360ºC and 380ºC and will self ignite around 500ºC. When burning, it produces 40 – 45 MW/Kg of heat. Temperatures of this magnitude usually occur only in well developed fires.

**FLAMMABILITY**

As with many construction and packaging materials, EPS must be considered combustible. Its fire behavior depends on the type of material and its application conditions. It is important to distinguish between the two commonly used grades of EPS.

All EPS used in construction and decoration products contain a Flame Retardant conforming to AS 1366, part 3 – 1992. The flame retardant reduces the flammability and spread of flame on the surface of EPS products to such an extent that it is classified as “flame retardant” according to the ASTM E84. If
Ignited with a flame, EPS extinguishes itself as soon as the ignition flame is removed.

The flammability of EPS construction products is reduced with surface coatings, such as plaster and metal cladding as in sandwich panels. Non flame retardant EPS, typically used in packaging will sustain combustion and the resultant fire spreads at a rate of about 3cm per minute over the surface. This is comparable to other combustible solid materials. EPS does not catch fire spontaneously and small sources of ignition will not ignite it.

**SMOKE AND DANGEROUS GAS EMISSIONS**

The burning of EPS is less harmful than burning timber and many other commonly used building materials. Gases released during combustion are predominantly carbon dioxide and carbon monoxide. Tests carried out in accordance with ASTM E84 show that the levels of dangerous gases are considerably less than those occurring when burning timber.
Recycling:

“STYRO” is fully committed to recycling Expanded Polystyrene (EPS), manufacturing waste and converting EPS into other products. Our recycling facilities serve EPS end-users building and construction sites and other XPS manufacturers. EPS fused products are chemically neutral. They may be disposed off without any problems. EPS does not react with ground water nor produce any gases when dumped. Due to its lightweight cellular structure it assists the aeration of sanitary landfills and burns completely in refuse incinerators.

Most Renowned EPS RECYCLING / DISPOSAL SCHEMES

- By Melting
- By granulating - Recycling and Reprocessing
- By Using Re-grind beads – for Soil improvement;
- Re grind beads – used for ENERGY RECOVERY
- Land fill (DISPOSAL)
- **Melting**

By recycling all EPS Manufacturing waste, virtually all EPS waste generated at “STYRO” is used to produce EPS by-products such as lumps, pellets, which are raw material for XPS Production.

- **Recycling and Reprocessing by Granulating**

Our granulating machines reduce off-cuts of EPS into regrind beads that are dosed with virgin from 1 to 5% according to the quality of final products.

- **Re-grind beads – for Soil Improvement;**

“Styro” EPS loose or recycled beads can also be used for soil improvement for free draining to improve soil aeration. It can be used for potting & plantation applications or simply around planting beds. Prime or Recycled beads are ideal for various agricultural applications as it is made of 95% air, therefore extremely safe and above all non-toxic. It offers environmental advantages and has many useful properties like lightness & thermal insulation. “Styro” Loose beads enhance total porosity and moisture retention of the soil to a greater extent which encourages growth of roots (plant growth).

- **Re-grind beads – used as a fuel for Energy recovery (Applicable for NON FR GRADE EPS regrind only)**

The calorific value of EPS NON FR GRADE per kilogram is 40 MJ/kg, at a typical use density of 15-20 kg/m³. The heat energy generated by the EPS incineration process can be utilized for Power generation.
Land Fill (DISPOSAL)

Landfill-using EPS does bring advantages. EPS waste is inert and non-toxic, so the landfill site becomes more stable. EPS aerates the soil, encouraging plant growth or reclaimed sites. EPS does not degrade and will not leach any substances into ground water.
**General Instructions**

**Do's**

**Application:**

- EPS products have versatile applications due to its unique nature and Physical properties. It can be used as an INSULATION, CONSTRUCTION FILL, DECORATION, BRANDING and for various PACKING and PACKAGING applications.

**Fire Fighting**

- Storing EPS products ensures adequate firefighting equipment and sufficient fire exits that are kept clear at all times. In the event of fire, call the Fire Brigade immediately informing them that EPS [expanded polystyrene] is involved. A small fire can be easily extinguished at early stages if tackled quickly with water, CO2, dry powder or BCF extinguisher provided that the person tackling a fire in its early stages takes no undue risk.

- Fire retardant material contains a uniformly distributed flame retardant. Conversely, such material must not be considered non-flammable and proper precautions must be heeded.

**Storage**

- Store the product well away from fire, high temperature, electrical equipments, and highly inflammable materials such as paint or similar materials.
Don’ts

**Coloring of STYRO**

- All STYRO EPS products can be colored with Water based paints; however oil paints can be applied with special protection coating. (Please refer to special coating CPA page for more info.)

**Storage**

- STYRO EPS products can't be exposed to direct sunlight in order to avoid Ultraviolet (UV) degradation. A yellowish powder skin will be formed on the EPS when it is exposed to direct sunlight for a prolonged period. Ultraviolet (UV) has effects on the EPS surface that can be avoided by covering with opaque sheeting during extended periods of open-air storage or storing at shaded area.

- All STYRO EPS products must be stored well in a ventilated and shaded warehouse; it should be kept away from source of heavy wind, flood and fire.

- STYRO EPS boxes are made with FOOD grade EPS RM materials that are combustible. All areas where the products are used or stored must be designated very strictly to “No smoking” and free from other potential ignition hazards.

**Application;**

- Fire retardant grade EPS products should be used for FOOD packaging applications in order to avoid food contamination. STYRO uses food grade EPS RM for packaging applications.
EPS resistant behavior

- STYRO EPS products have very good resistance to several chemicals. However, it has zero resistance to petroleum based solvents & resins. Please refer below chart for more info.

![EPS Resistant Behavior](image)

The above information is given in good faith by STYRO Ltd and no liability is accepted. The responsibility for safe working and compliance with legislation or any local requirements rests with the purchaser and user.