

## What is EPS (expanded polystyrene particle foam):

### Production:

The patent for production of EPS was published in the 1950's.

Polystyrene is produced from the crude oil refinery product styrene. In the case of expanded polystyrene particle foam (EPS) the polystyrene granulate (polystyrene powder), into which the foaming agent pentane has been polymerized, is prefoamed at temperatures above 90°C. The temperature causes the foaming agent to evaporate inflating the thermoplastic base material to 20 to 50 times its original size, forming PS foam particles. Discontinuously or continuously operating systems then convert this material to blocks, panels or shaped elements in a superheated steam process at temperatures between 110°C and 120°C. The profiled panels for such applications as roof insulation can be shaped immediately during the foaming process (automated or belt goods).

The EPS is also treated with flame retarding agents in compliance with construction regulations.

### Properties:

EPS hard foam is a primarily closed-cell insulating material with up to 98% pores containing air. Polystyrene particle foam has a honeycomb structure, is resistant to moisture and is only slightly resilient. Its water absorption rate is < 5% (DIN 53 428). EPS is not resistant to UV light; the surface yellows and becomes brittle when subjected to sunlight.

### Characteristic values:

Thermal conductivity $\lambda(R)$ :	0.035-0.040 W/(m·K)
Spec. thermal storage capacity c:	1,500 J/(kg·K)
Water vapor diffusion resistance $\mu$ :	20-100
Construction material class:	B 1 flame resistant
Resistance to temperature:	70-85°C (long-term at 5 kN/m <sup>2</sup> ) 100°C (short-term)
Bulk density $\rho$ :	10-35 kg/m <sup>3</sup>
Resistance to pressure:	0.070-0.260 N/mm <sup>2</sup> (compressive strength at 10% compression) 0.012-0.062 N/mm <sup>2</sup> (compressive strength at <2% compression)
Expansion coefficient:	$5-7 \cdot 10^{-5} \text{ 1/K}$
Primary energy content:	200-760 kWh/m <sup>3</sup>

Applications:

Roofs: Flat roofs

Walls: WDVS

Ceilings: Thermal insulation and sound deadening

Basements/cellars: Partial perimeter insulation.

### Remarks:

Expanded polystyrene hard foam (EPS) is the most widely used type of foam.

### Environmental aspects:

+ Pentane does not pollute the stratosphere, biologically neutral – approved for packaging foodstuffs, partially recyclable.

- down-recycling possible only to limited extent, usually energy recovery, combustion can release hazardous substances, toxic source materials, limited availability of raw materials for production, emits pentane, pentane contributes slightly to summer smog.

## **Standards:**

DIN EN 13163:2001-10 (became effective on March 1, 2002)

Thermal insulation products for buildings – Factory made products of expanded polystyrene (EPS) – Specification; German version EN 13163:2001

(New designations e.g. EPS 20 B1 WLG 035 Application type WD (old) --> EPS 035 DAA dm (new) )

DIN 18164-1:1992-08 (expired on March 1, 2003)

Thermal insulating products for building applications;

Insulating materials for thermal insulation

DIN 18164-2:2001-09

Thermal insulating products for building applications;

Insulating materials for impact sound insulation; Polystyrene particle foam materials

ÖNORM EN 13163

Thermal insulation products for buildings – Factory made products of expanded polystyrene – Specification

RAL-RG 710/1, Edition:1993-09

Synthetic hard foam; Polystyrene hard foam panels and rolls as insulation for construction projects; Quality control