E-por®
The New Dimension in Packaging

BASF
The Chemical Company

Preliminary Technical Leaflet

March 2010

® = registered trademark of BASF SE

E-por®

Application

For the production of elastic, multi-shock absorbing expanded foams.

Product description

Expandable granules made of styrene and ethylene containing polymers without flame retardant (blowing agent: pentane).

Delivery and raw material storage

E-por® is supplied as lenticular granules in octabins or metal drums. It can be stored in these unopened receptacles for three months before processing.

E-por should always be stored in a cool place to minimize the loss of blowing agent. At ambient temperatures, the loss of blowing agent of E-por is comparable to Styropor®. The receptacles have to be protected against the effects of weather (rain, snow, frost, sun) and against damage.

	Bead Size Range	Sieve Analysis	Moisture Content
E-por	0.9–1.4 mm	> 1.4 mm max. 5% 0.9–1.4 mm min. 93% < 0.9 mm max. 2%	< 0.5%

Pentane Content

Max. 5.9%

Expansion

Single pass expansion: 20 g/L
Double pass expansion: 16 g/L

	Recommended Bulk Density Range	Recommended Intermediate Aging Time
E-por	16–35 kg/m^3	24–48 hours

Processing

E-por® is converted to expanded foam in three stages: Pre-expansion, intermediate aging time, final expansion.

Pre-expansion

The lowest achievable bulk density depends on the type and mode of operation of the pre-expansion equipment. E-por can be reliably preexpanded in technically sound pre-expanders. The optimum pre-expansion steam pressure and steam time to reach densities of approx. 20 g/L in a batch pre-expander are usually in the range of 0.10 to 0.20 bar and 100 to 130 sec., respectively. It is also possible to pre-expand E-por in a continuous pre-expander.

The pre-expanded material has good free-flow properties and can be conveyed pneumatically without problems. A downstream fluidizing bed is improving the stability of the pre-expanded beads.

In case of a double pass expansion, it is recommended to pre-expand E-por to 25–30 kg/m^3 during the first pre-expansion step and to start the second pre-expansion step after an aging time of 3–6 h.

Intermediate aging time

The intermediate aging time should be chosen according to the targeted bulk density, the surrounding temperature and the final application.

In case of a single-pass expansion, it is typically in the range of 24–72 h. Esp. for higher targeted bulk densities, intermediate aging times of > 36 h are recommended to reduce the cycle time during the final expansion.

In case of a double-pass expansion, an intermediate aging time of only 3–6 h after the second pre-expansion step is recommended.

Molding

E-por can be processed in common block molds as well as in shape molding machines. E-por allows to fill molds reliably and easily even in case of complicated mold geometries. The recommended steam pressure for shape molding is in the range of 0.8–1.3 bar. Shape or block molded parts made of E-por are showing an excellent dimensional stability and do not require an additional downstream drying step. Further information about product properties and applications of E-por can be found at www.e-por.basf.com.

Safety notes

It is to be noted that in the storing and processing of E-por and of the expanded foams manufactured from it, flammable mixtures of the blowing agent (pentane) and air can be produced due to blowing agent diffusion out and therefore all conceivable sources of ignition are to be kept away (naked flames, welding sparks, electric sparks, avoidance of electrostatic charging). A ban on smoking must be observed without fail!

Information about the safety precautions necessary in processing may be obtained from the brochure “Fire Safety During Processing”. In addition the “Richtlinien für die Vermeidung von Zündgefahren infolge elektrostatischer Aufladungen” (Guidelines for the Avoidance of Fire Hazards as a Result of Electrostatic Charges), BG Chemie, 7th Edition, 2004, are to be observed.

The contents of open containers should be processed quickly. At other times the containers are to be kept well sealed.

The transportation of E-por, or of expanded foams freshly made from it, in unventilated or closed means of conveyance is not permitted. Further information regarding transportation is given in the respective Technical Information bulletin.

Biological action

During the storage and in the processing of E-por pentane escapes. Particularly when cutting the expanded foams with heated wires, care must be taken to remove rising fumes by suction since apart from pentane they also contain small amounts of styrene.

The maximum allowable concentration values for styrene and for pentane are to be observed.

Properties and applications of E-por

Together with attractive visual and tactile properties, key features are a high energy absorption linked with excellent cushioning behaviour and resilience. Low water absorption, good thermal insulation properties and an environment friendly performance (recyclability, low blowing agent content, reduced process energy consumption) complete the range of the properties of E-por.

If E-por is processed appropriately, the information given in the following table and diagrams can be regarded as a guideline.

Table 1
Physical properties of E-por® (after heat storage of 24 h at 60°C)

Property	Test Specification	Unit	Density (kg/m^3)			
			20	25	30	35
Flexural Work to Break	DIN-EN12089	J	5.7	6.3	6.8	7.4
Flexural Strength	DIN-EN12089	kPA	265	330	410	480
Compressive Strength						
at 10% Compression	DIN-EN 826	kPA	90	115	140	165
at 25% Compression	DIN-EN 826	kPA	115	145	175	205
Cushioning (h/d = 15)	DIN 55471	–	2.75	2.73	2.7	2.65
Energy Absorption (hysteresis						
at 70% compression, v=5 mm/min)	ISO 3386-1	J	9.5	12.5	16.0	19.0

Fig. 1: **Hysteresis of E-por® at 20 kg/m³**

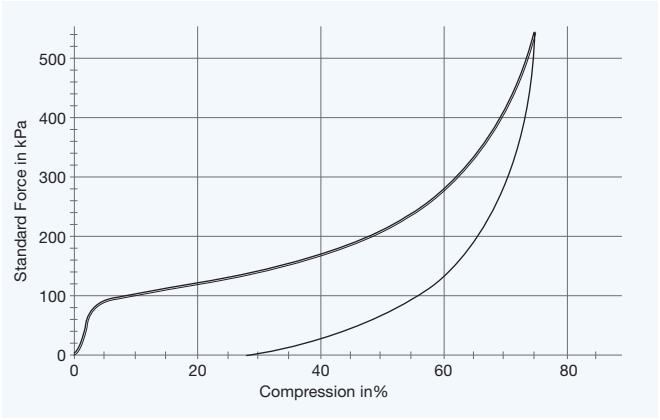


Fig. 2: **Hysteresis of E-por® at 25 kg/m³**

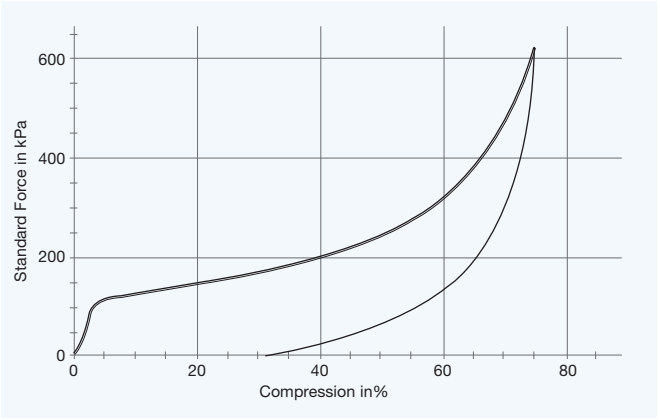


Fig. 3: **Hysteresis of E-por® at 30 kg/m³**

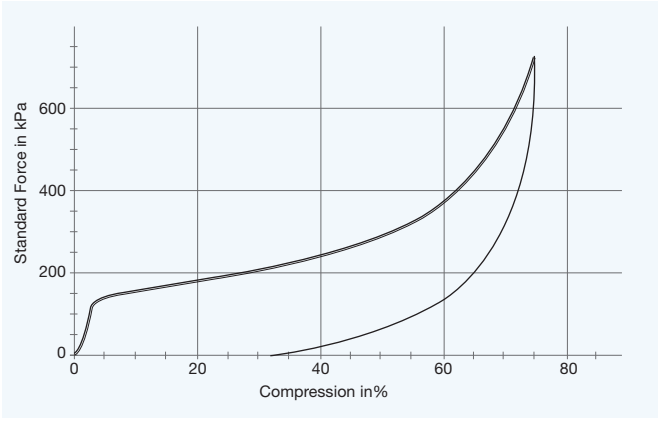


Fig. 4: **Cushioning diagram for E-por® at 20 kg/m³**

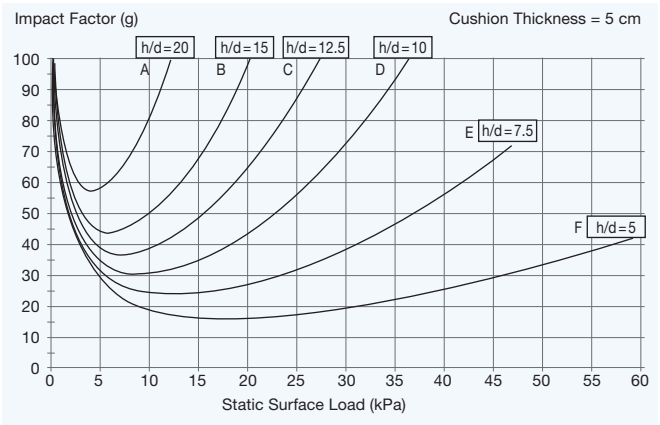


Fig. 5: **Cushioning diagram for E-por® at 25 kg/m³**

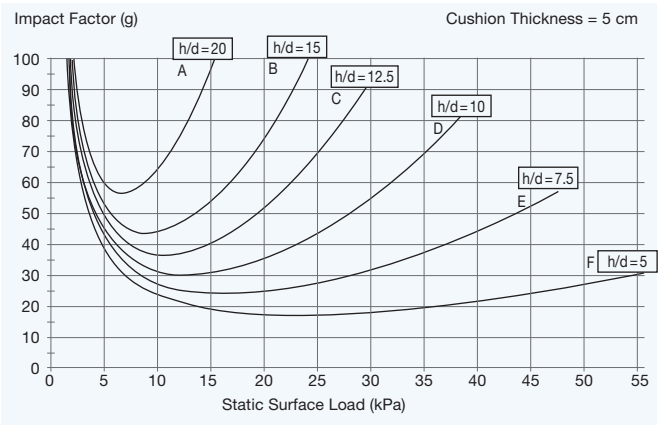
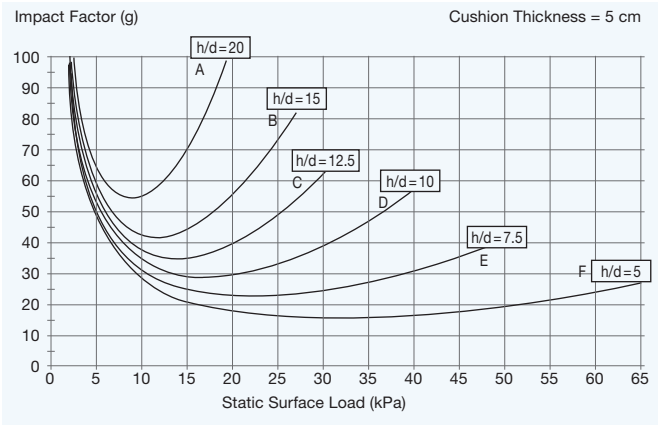


Fig. 6: **Cushioning diagram for E-por® at 30 kg/m³**



NOTE:

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. (March 2010)

Fig. 1: **Flexural Strength (kPa)**

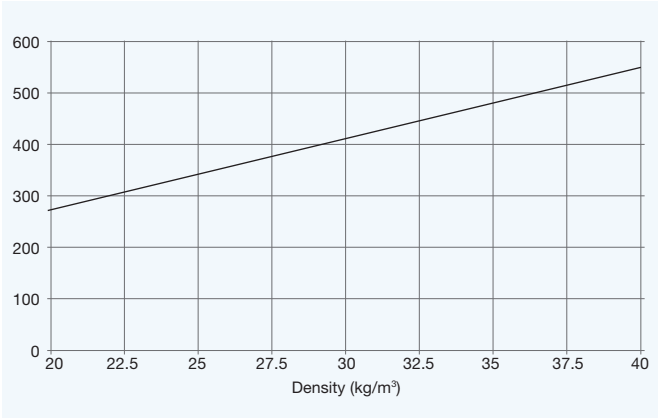


Fig. 2: **Flexural Work to Break (Nm)**

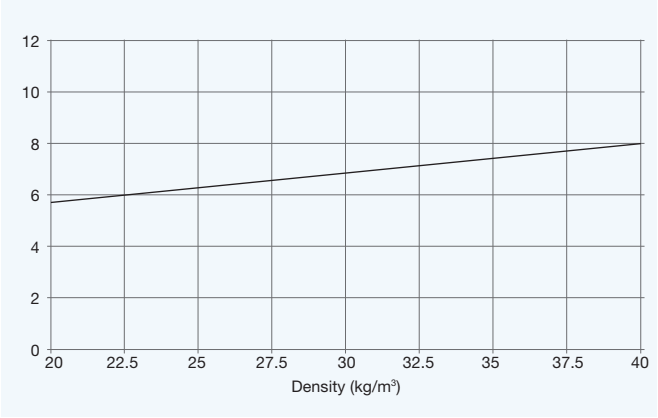


Fig. 3: **Compressive Strength at 10% deformation (kPa)**

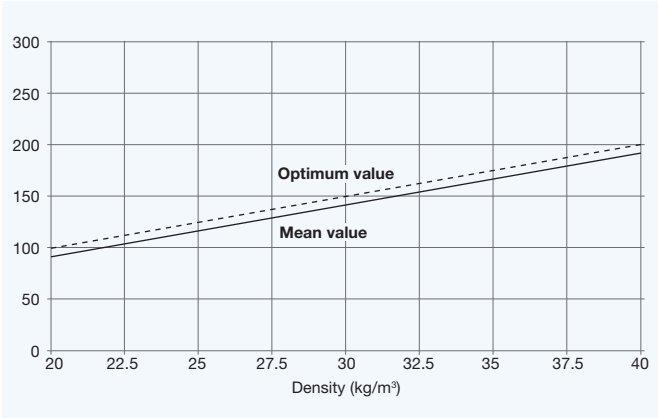
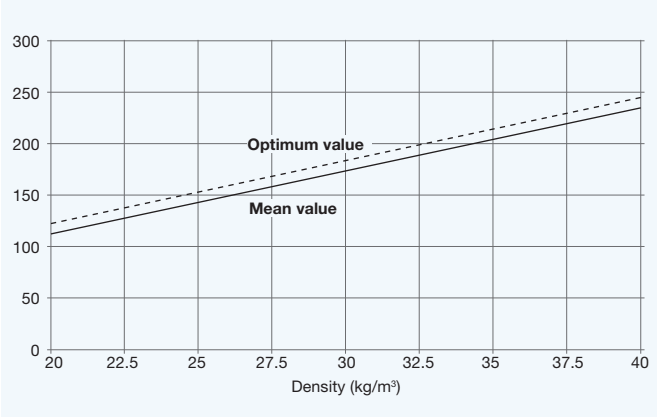


Fig. 4: **Compressive Strength at 25% deformation (kPa)**



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