Technical information EPP

General

Status: 03.2024

Expanded polypropylene (EPP for short) is a closed-cell particle foam based on the polymer polypropylene. The particles, which are usually supplied in bulk, are conventionally processed into foam parts using water vapour in so-called foaming tools in an automatic moulding machine.

A moulded part density range between 20 and 120 g/l can be achieved with the standard product range. All raw materials used fulfil the RoHS Directive 2011/65/EU, REACH conformity and EC End-of-life vehicles directive Directive (2000/53/EC). Furthermore, many material types can be used for special hygiene requirements (VDI 6022), for toy safety (2009/48/EC) and food contact applications ((EU) No 10/2011).

Properties

Foam parts made of EPP are characterised by a multifaceted property profile:

- high energy absorption with low weight
- good resilience after static and dynamic stress
- almost unaffected energy absorption after multi-impacts
- isotropic deformation behavior, independent of the direction of impact
- low water absorption
- functional reliability over a wide temperature range
- good resistance to chemicals and oils
- moulded part density adjustable to specific requirements
- good thermal insulation properties
- easy to clean and to sterilize
- versatile recyclability
- free of blowing agents

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Material characteristics

The following material characteristics apply to standard EPP in the colour black:

Properties	Test method	Unit	Test result		
Moulded density	-	**g/l**	**40**	**60**	**80**
Tensile strength	DIN EN ISO 1798	kPa	600	880	1150
Elongation at break	DIN EN ISO 1798	%	33	27	23
Compressive strength at • 25 % deformation • 50 % deformation • 75 % deformation	DIN EN ISO 844	 kPa kPa kPa	 210 300 600	 340 475 1000	 500 700 1600
Compression set after 24 h (22 h/ 23 °C/ 25 % deformation)	DIN EN ISO 1856 (C)	%	11,5	11,5	11
Specific energy absorption	ISO 4651	kJ/m³	320	700	-
C-factor	ISO 4651	-	2,7	2,6	-
Surface resistance: • standard types (insulating) • standard types coated with antistatic agent	EN 61340-2-3	 Ω Ω	 ≤ 10^{12} ≤ 10^{9}	 ≤ 10^{12} ≤ 10^{9}	 ≤ 10^{12} ≤ 10^{9}
Thermal stability (10 days at 110 °C)	DIN ISO 2796	%	- 1	- 0,6	- 0,6
Thermal conductivity	DIN 52612	W/(m*K)	0,038	0,040	0,043
Water absorption (after 4 days)	ISO 2896	Vol.-%	< 2	< 2	< 2
Temperature resistence (testing: ~3 weeks, heat storage) • continuous temperature • short-term temperature	-	 °C °C	 - 40 bis 80 - 40 bis 110		

Note:
The information listed here is based on our current knowledge and experience. They do not exempt the user from conducting their own tests and trials due to possible influencing factors of particle foam molded parts or other components located in the vicinity. A legally binding assurance of specific properties or suitability for a particular application cannot be derived from these technical data. Any infringement of protective rights, laws, and regulations must be checked by the recipient of our products at their own responsibility.

Special types

Special materials are marketed alongside the standard product range:

- High density: moulded part density between 120 and 300 g/l
- ESD types: (surface resistance according to EN 61340-2-3):
  special types (dissipative): ≤ 10^7 Ω
- Colours: Various colour variants are available.
  Standard products are black.
- EPP FR: Flame retardant type with UL94 HF-1 classification
  (none-halogen according UL 746 H)
- EPP RE: Raw material with a defined proportion of recycled material from EPP post-consumer moulded parts, reduction of CO2 emissions

Chemical resistance

The following table shows the chemical resistance of EPP:

List of chemicals	bad	moderate	good	very good
Petrol				
Aromatic: Toluene				
Aliphatic: n-Heptane				
Ethanol				
Ketone				
10% sodium hydroxide				
5% ammonium chloride				
10% nitric acid				
10% sulfuric acid				
10% hydrochlorid acid				
Hot water (80°C)				

EPP RG 25 g/l EPP RG 50 g/l

Chemicals that are not listed can be requested and checked for their stability.

CO_2 emission factor

The CO2 emission factors for EPP listed below represent average values from the published values of the raw material manufacturers' specifications:

- Virgin EPP: 2,2 – 2,5 kg CO_2 eq/kg
- EPP, 30% RE content: 1,8 – 2,0 kg CO_2 eq/kg
- EPP, 95% RE content: 0,9 – 1,2 kg CO_2 eq/kg

Environment and recycling

EPP is processed without any use of halogenated hydrocarbons, lead-, cadmium-, mercury- and chrome- compounds.

EPP fulfils the ideas of the Closed Substance Cycle Waste Management Act and the waste hierarchy contained therein:

- Reducing: As a foam material, EPP helps to minimise the use of resources.
- Reusing: Products made of EPP have a long period of application and can be reused many times.
- Recycling: EPP can be recycled in the PP cycle.
- Energy recovery: Due to its high calorific value (> 80% of crude oil) and low flue gas toxicity, EPP can be thermally utilised.
- Landfilling: Landfilling is not required for EPP.