

**Safety data sheet****1. Identification of the substance/preparation and the company/undertaking**

<b>Material name</b>	SUNDE EPS SE
<b>Chemical name</b>	Expandable polystyrene
<b>Applications</b>	Raw material for expanded polystyrene. Expansion is typically carried out with steam. The expanded products are typically used for thermal insulation and packaging material where flame retardant properties are needed.
<b>Manufacturer</b>	Brødr. Sunde as v/ Rolf Fagervoll Borgundfjordveien 118 6022 Ålesund
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**2. Hazards identification**

<b>Risk-phrases</b>	<b>Text</b>
<b>R18</b>	In use, may form flammable/explosive vapour-air mixture.
<b>R52/53</b>	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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<b>Health risk</b>	Spillage of product can cause slippery surfaces (floor, road etc.) The product releases pentane that can cause drowsiness and dizziness.
<b>Safety risk</b>	The product releases pentane, a flammable hydrocarbon. By use and storage flammable/explosive mixtures of pentane/air can be formed.
<b>Environmental risk</b>	The product contains HBCDD a PBT substance that potentially can be released from the product over time. Pentane is harmful to aquatic organisms, may cause long-term adverse effects in aquatic environments. The product releases pentane in use. Pentane is a hydrocarbon that can create ground level ozone via a photochemical process. This process is however so slow (pentane half life of 4 days), that dilution by winds mean that this does not represent any significant threat to plant, animals or humans.

**3. Composition/information on ingredients**

<b>Formal name</b>	Polystyrene (CAS no. 9003-53-6), containing pentane isomers as blowing agents and HBCDD as a flame retardant.
<b>Synonym</b>	Expandable polystyrene, EPS

Chemical name	CAS no.	EINECS	Hazard Symbol(s)	R-phrases(s)	Conc. W/W%
Polystyrene	9000-53-6	500-008-9	-	-	>92%
n-pentane	109-66-0	203-692-4	F+, Xn, N	12, 51/53, 65, 66, 67	< 8%*
iso-pentane	78-78-4	201-142-8	F+, Xn, N	12, 51/53, 65, 66, 67	< 8%*
Styrene	100-42-5	202-851-5	Xn	10, 20, 36/38	<0,1%
Hexabromocyclododecane	25637-99-4	1471484	N	50/53	<1%
Dicumylperoxide	80-43-3	201-279-3	Xi, O, N	7, 36/38, 51/53	<1%

\* Sum of n-pentane and iso-pentane < 8%

**Safety data sheet****4. First aid measures**

<b>General information</b>		Inhalation of high concentration of pentane can cause drowsiness and dizziness. Inhalation of pentane can cause irritation of air ways.
<b>Inhalation</b>	Symptom	Headache, dizziness, coughing, narcosis.
	Action	Move the exposed person to fresh air. Contact a doctor if rapid improvement does not occur.
<b>Skin contact</b>	Symptom	Blushed and irritated skin.
	Action	Wash skin with soap and water, otherwise no special measures required.
<b>Eye contact</b>	Symptom	Irritated eye.
	Action	Rinse eyes with clean water. Contact a doctor if rapid improvement does not occur.
<b>Swallowing</b>	Symptom	Not known.
	Action	Insure air ways are free of obstruction and contact doctor.

**5. Fire-fighting measures**

<b>General</b>	The product is not classified as flammable according to 1999/45/EC, but will burn in contact with flames or high temperatures.
<b>Extinguishing media</b>	Foam, water spray, dry chemical powder, carbon dioxide. Sand or soil can be used for small fires only.
<b>Unsuitable extinguishing media</b>	Water in a jet.
<b>Exposure hazards</b>	The combustion gases will contain carbon dioxide (CO <sub>2</sub> ), particles and small amounts of carbon monoxide (CO). With a reduced supply of oxygen an increased amount of carbon monoxide will be produced.
<b>Fire fighting protective equipment</b>	Full protective clothing and self-contained breathing apparatus.
<b>Other information</b>	The product release pentane on heating. At temperatures above 70 °C the product will expand with a subsequent increased release of pentane, pentane may form an explosive mixture in air.

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	Material near the fire should, if possible, be moved or cooled with water.
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**6. Accidental release measures**

<b>Preventive measures</b>	Remove spills that can cause slippery surfaces - slip hazard. Eliminate all ignition sources. Smoking prohibited. Ensure adequate ventilation. Avoid sparks, and take all feasible measures against static discharge. Close the sewage lids near the spill.
<b>Cleaning Methods</b>	Ensure good ventilation to prevent explosive pentane / air mixture. Collect in an appropriate container e.g. with a shovel, for recycling or other use. Do not allow spillage into the sewage drains.

**7. Handling and storage**

<b>Handling</b>	Ensure that no open flames or other ignition sources are in the area where the product is handled. Ensure adequate ventilation and avoid sparks. Smoking prohibited. Take precautionary measures against static electricity.
<b>Storage</b>	Keep in dry and cool place, in closed containers. Keep away from direct sunlight and other heat or ignition sources. Storage temperature, preferably below 20 °C.

**8. Exposure controls/personal protection**

Accidental heating of the product can cause emission of pentane and small amounts of styrene. The same applies to the processing of the product by pre-expansion and moulding. Should only be used in well-ventilated locations.

**8.1 Exposure limits values**

Component	Workplace Exposure Limits (United Kingdom)
Sum of: n-pentane and iso-pentane	600 ppm = 1800 mg/m <sup>3</sup> (8 hour average)
Styrene	100 ppm = 430 mg/m <sup>3</sup> (8 hour average)

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Component	OEL (Commission Directive 1998/24/EC)
Sum of: n-pentane and iso-pentane	1000 ppm = 3000 mg/m <sup>3</sup> (8 hour average)
Styrene	Not listed

**8.2 Exposure controls**

Good ventilation must be ensured where the product is stored and handled.

Equipment for pre-expansion should have ventilation/exhaust systems that can ensure workers are not exposed to pentane / styrene, in higher concentrations than specified in the local regulations.

During pre-expansion, pentane corresponding to 1 - 3% by weight of the product is expected to be released.

Intermediate storage of expanded beads in silo must also take place in a well ventilated area.

Depending on the storage time, it can be expected that the pentane released during silo storage, is around 0-2% by weight.

Moulding of products from pre-expanded beads must also take place under well ventilated conditions.

It can be expected, during moulding, that released pentane is around 1 - 2% by weight.

The finished moulded product should be stored/handled in well ventilated areas, as the product may still contain 0 - 2% of pentane.

1-2 weeks after the conversion of the product for insulation, packaging or other. The residual pentane will, under normal conditions, be so low that there will no longer be risk of formation of explosive pentane/air atmosphere from the product.

<b>Respiratory Protection</b>	Normally not required under proper ventilation. In cases of inadequate ventilation use filter mask with filter type AX. Under inadequate ventilation makes sure that the pentane concentration is below the lower explosion limit and ignition sources are eliminated, before working in the area.
<b>Hand Protection</b>	Use normal work gloves
<b>Eye Protection</b>	Goggles for physical protection
<b>Skin protection</b>	Normal working clothes

**Safety data sheet****9. Physical and chemical properties**

<b>Appearance</b>	Solid white or dyed beads with diameter < 3.5 mm
<b>Physical state</b>	Solid
<b>Odour</b>	Weak odour, paraffinic

<b>Flashpoint</b>	-50°C (pentane)
<b>Flammability</b>	The product is not classified as flammable according to test 92/69/EC (annex V of 67/548/EC)
<b>Explosion limits</b>	1,3 - 7,8 VOL% (pentane)
<b>Density</b>	1040 kg/m <sup>3</sup> (bulk density 550-650 kg/m <sup>3</sup> )
<b>Solubility</b>	Soluble in some organic solvents, e.g. aromatic hydrocarbons, halogenated hydrocarbons and ketones.
<b>Water solubility</b>	Insoluble
<b>Vapour density (air= 1)</b>	2,5 (pentane)

**10. Stability and reactivity**

Stable under normal handling in the original packaging. The product releases pentane under heating and gradually softens at temperatures above 70°C.

<b>Conditions to avoid</b>	Heat, flames and sparks. Avoid exposing the product to strong sunlight for long periods.
<b>Materials to avoid</b>	Avoid contact with organic solvents.
<b>Hazardous decomposition products</b>	By combustion and hot wire cutting, styrene, pentane, hydrogen bromide, carbon dioxide, carbon monoxide and soot may be formed/released.

**Safety data sheet****11. Toxicological information**

The information is based primarily on the available experiment data for the pure substances n-pentane, styrene and HBCDD. It is not based on trials conducted on the product itself.

<b>Acute oral toxicity</b>	LD <sub>50</sub> > 2000 mg/kg (styrene and n-pentane) LD > 20 g/kg (HBCDD)
<b>Acute skin toxicity</b>	LD <sub>50</sub> > 2000 mg/kg (styrene and n-pentane) LD <sub>50</sub> > 20 g/kg (HBCDD)
<b>Acute toxicity by inhalation</b>	LC <sub>50</sub> > 2-20 mg/litre (styrene) LC <sub>50</sub> = 295 mg/litre (n-pentane, 2 hours for mice)
<b>Skin irritation</b>	Can cause irritation of the skin
<b>Eye irritation</b>	Dust can cause physical irritation. Pentane vapour can cause irritation.
<b>Irritation of the respiratory system</b>	Inhalation of pentane can cause irritation of the respiratory system
<b>Skin sensitisation</b>	Not expected to cause skin sensitisation
<b>Mutagenic</b>	Not expected to be mutagenic
<b>Carcinogenic</b>	Not expected to be carcinogenic
<b>Reproduction</b>	Not expected to be toxic to reproduction

**12. Ecological information**

The information is based primarily on the available experiment data for the pure substances n-pentane, styrene and HBCDD. It is not based on trials conducted on the product itself.

**12.1 Ecotoxicity**

Acute toxicity for:

<b>Fish</b>	LC <sub>50</sub> = 4 mg/litre (styrene) LC <sub>50</sub> = 4,3 mg/litre (n-pentane) NOEC > 6.8 µg/liter (HBCDD)
<b>Invertebrates that live in water</b>	LC <sub>50</sub> = 4,7 mg/litre (styrene) LC <sub>50</sub> = 2,7 mg/litre (n-pentane) EC <sub>50</sub> > 3.2 µg/litre (HBCDD)
<b>Algae</b>	LC <sub>50</sub> = 4,9 mg/litre (styrene) LC <sub>50</sub> = 10,7 mg/litre (n-pentane) EC <sub>50</sub> = 52 µg/litre (HBCDD)

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<b>Microorganisms</b>	EC <sub>50</sub> = 500 mg/litre (styrene, sludge of domestic sewage) * NOEC > 38,5 mg/litre (n-pentane) EC <sub>30</sub> = 15 mg/litre (HBCDD)
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\* information about effect on more types of microorganisms can be found in "EU Risk Assessment Report volume 27".

**12.2 Mobility**

The product is insoluble in water. Will sink in fresh water, and may sink or float in salty water, depending on the salt concentration.

Pentane is released when the product is removed from the original container. At 25°C a loss of 1% by weight of pentane, can be expected after 1 day. An additional 1% loss after 5 days and additional 1% loss after 5 weeks is expected. Loss of pentane is slower, at lower temperature, and faster at higher temperatures.

The content of residual styrene is so low that no measureable amounts will be released at room temperature.

In the case of a ground spillage pentane will be released to air and decomposed in the atmosphere.

In the case of a spillage to water, pentane will be released into the water (solubility 38 mg/litre) and due to the high vapour pressure, be rapidly be released to air and decomposed in the atmosphere.

**12.3 Persistence and degradability**

Polystyrene is not inherently biodegradable

Pentane is readily biodegradable fulfilling the 10-day window criterion.

Atmospheric half-life for pentane is approximately 4 days.

**12.4 Bio accumulative potential**

Pentane has potential for bioaccumulation, log Kow = 3,45, BCF = 171. But because it is readily biodegradability, no significant accumulation in the food chain is expected.

HBDC in pure form has been concluded to be bio accumulative, BCF 13-18,000 in different studies. A study using sediment with high concentration of HBCDD (mainly in form of HBCDD embedded in polystyrene) showed however no sign of bioavailability to polychaete.

**12.5 Results of PBT assessment**

Not assessed.

**12.6 Other adverse effects**

Pentane has potential for creation of ground level ozone, POCP ca. 40 (ethylene = 100). In annex IV protocol 1979 pentane is placed in category "less important" for ground level ozone creation. Ozone creation speed in the atmosphere is relative slow, approx. 4 days half life. This means that even in the weakest wind conditions, pentane will be spread and diluted that much that no significant ground level ozone is formed, even from point sources.



**Safety data sheet****13 Disposal considerations**

The product can release pentane and must be handled according to section 7.

Non-contaminated product can be recycled for material recovery.

Contaminated product can be incinerated for energy recovery or disposed in land fill.  
Please observe that national regulations for disposal might exist, such as material collection programme or classification as hazardous waste.

Empty container completely, residues of the product can release pentane, that can form explosive mixtures with air.

**14. Transport information**

ADR/RID

<b>UN no.</b>	2211
<b>Class</b>	9
<b>Name and description</b>	POLYMERIC BEADS, EXPANDABLE, evolving flammable vapour
<b>Packing group</b>	III
<b>Classification code</b>	M3
<b>Hazard identification No.</b>	90
<b>Labels</b>	none

IMDG

<b>UN no.</b>	2211
<b>Class</b>	9
<b>Name and description</b>	POLYMERIC BEADS, EXPANDABLE, evolving flammable vapour
<b>Packing group</b>	III
<b>Labels</b>	9
<b>Marine pollutant</b>	no

**Safety data sheet****15. Regulatory information**

No chemical safety assessment has been made for the product.

The present safety data sheet has been prepared according to the guidelines of EC no 1907/2006.

<b>Label name</b>	SUNDE EPS SE
<b>Responsible company</b>	Brødr. Sunde AS v/ Rolf Fagervoll Borgundfjordveien 118 6022 Ålesund Norway
<b>Hazard classification</b>	None
<b>R-phrases</b>	R18 In use, may form flammable/explosive vapour-air mixture. R52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
<b>Safety-phrases</b>	S7/9 Keep container tightly closed and in a well-ventilated place. S16 Keep away from sources of ignition - No smoking. S33 Take precautionary measures against static discharges. S51 Use only in well-ventilated areas. S61 Avoid release to the environment. Refer to special instructions/safety data sheets.
<b>REACH (EC) No 1907/2006:</b>	This product is a polymer. This product contains Hexabromocyclododecane above 0.1% (w/w) listed in the Candidate list for Authorisation established in accordance with article 59.1. Following the instructions in this safety data sheet will to the best of our knowledge ensure safe handling as required by Article 33.

**16. Other information**

Full text of R-phrase mentioned in section 2 and 3.

<b>R7</b>	May cause fire.
<b>R12</b>	Extremely flammable.
<b>R18</b>	In use, may form flammable/explosive vapour-air mixture.
<b>R20</b>	Harmful by inhalation.

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<b>R36/38</b>	Irritating to eyes and skin.
<b>R50/53</b>	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
<b>R51/53</b>	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
<b>R52/53</b>	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
<b>R65</b>	Harmful: may cause lung damage if swallowed.
<b>R66</b>	Repeated exposure may cause skin dryness or cracking.
<b>R67</b>	Vapours may cause drowsiness and dizziness.
<b>Use and restriction</b>	Raw material for production of expanded polystyrene products. The expanded products are typically used for thermal insulation and packaging material where flame retardant properties are needed.
<b>Main source of information</b>	European Union Risk Assessment Report: n-pentane European Union Risk Assessment Report: styrene European Union Risk Assessment Report: Hexabromocyclododecan
<b>Distribution of safety data sheet</b>	The information in this document should be made available to all whom may handle the product.
<b>Disclaimer</b>	This information is based on our current knowledge and experience. The Safety Data Sheet describes the product only with regard to health safety and environmental requirements. It should not be construed as a guarantee for specific product features.
<b>Advice on training</b>	It should be given training in safe handling and use of the product, based on the information in this document and the specific local conditions production where the product is handled and used.
<b>Changes from previous version</b>	