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The Norwegian EPD Foundation

# ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

|                                |                              |
|--------------------------------|------------------------------|
| Owner of the declaration:      | Sunde AS                     |
| Program operator:              | The Norwegian EPD Foundation |
| Publisher:                     | The Norwegian EPD Foundation |
| Declaration number:            | NEPD-2795-1495-EN            |
| Registration number:           | NEPD-2795-1495-EN            |
| ECO Platform reference number: | -                            |
| Issue date:                    | 22.04.2021                   |
| Valid to:                      | 22.04.2026                   |

## Sundolitt EPS S80 EPS Insulation

Sunde AS

[www.epd-norge.no](http://www.epd-norge.no)



## General information

### Product

Sundolitt EPS S80

### Program operator

The Norwegian EPD Foundation  
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### Declaration number

NEPD-2795-1495-EN

### ECO Platform reference number

### Product Category Rules

EN 15804:2012 + A1:2013 serves as core PCR  
 NPCR 012:2018 Part B for Thermal insulation products

### Statement of liability

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

### Declared unit

-

### Declared unit with option (A1-A3, A4, C1-C4, D)

1 m<sup>2</sup> EPS insulation board with 38 mm thickness at R=1 m<sup>2</sup> K/W, transportation to site, waste handling and recovery.

### Functional unit

-

### Verification

The CEN Norm EN 15804 serves as the core PCR. Independent verification of the declaration and data, according to ISO14025:2010

internal  external

Third party verifier:

*Jane Anderson*

Jane Anderson, ConstructionLCA Ltd  
 Independent verifier approved by EPD Norway

### Owner of the declaration

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### Manufacturer

Sunde AS  
 PB 8115 Spjelkavik, 6022 Ålesund  
 Phone: +47 70 17 70 00  
 e-mail: [norway@sundolitt.com](mailto:norway@sundolitt.com)

### Place of production

Norway, multiple sites

### Management system

NS-EN ISO 9001  
 NS-EN ISO 14001

### Organisation number

916,416,784

### Issue date

22.04.2021

### Valid to

22.04.2026

### Year of study

2020

### Comparability

EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

### The EPD has been worked out by

Michael M. Jenssen, Asplan Viak AS

*Michael M. Jenssen*  **asplan viak**

Approved

*Håkon Hauan*

Håkon Hauan  
 Managing Director of EPD-Norway

## Product

### Product variation and calculation of averages

The insulation board is provided in several dimensions and thicknesses. Please use the conversion table below for other sizes than the declared unit.

Variation per declared unit between manufacturing sites <10%. Weighted average applied for all inputs.

### Product description

Expanded polystyrene (EPS) is a common material used for thermal insulation of buildings, including floors, walls and ceilings. It is a polymer foam, consisting of air-filled polystyrene cells. As 98% of the material is air, EPS provides good insulating properties at a low weight. Other characteristics of the material include low moisture absorption, long service life and high compressive strength.

EPS is manufactured through permeating polystyrene beads with pentane, allowing the beads to expand when exposed to steam. This addition of a so-called blowing agent adds 4% - 6% w/w. The expanded polystyrene (EPS) beads are then fed into a block molding machine, where steam and pressure forms large blocks of EPS. The amount of EPS going into the mold determines the density of the block, where pressure class 80 provides a density at 80 kN/m<sup>2</sup>, which is approximately 15 kg/m<sup>3</sup>. After molding, the remaining blowing agent, pentane, is aired out and the blocks are cut into the desired shape.

*Weight per declared unit is approximately 0,57 kg given a density of 15 kg/cubic meter with a thickness of 38 mm.*

### Technical data

|                      |   |
|----------------------|---|
| CE marking           | EPS insulation boards are CE certified according to NS-EN 13163               |
| Typical size         | 600 mm x 1200 mm  |
| Typical thickness    | 10 mm - 200 mm  |
| Bending strength     | >50 kN/m <sup>2</sup>   |
| Compressive strength | 80 kN/m <sup>2</sup> (declared unit), see conversion factors for other values |
| Moisture absorption  | <5 vol%   |
| Fire class           | F   |

### Conversion factors

EPS insulation is provided in different densities and thicknesses depending on the intended use. The relationships between density and weight, and between weight and environmental impacts are linear. Results for various densities and thicknesses can be converted based on the following factors (factor \* environmental impact):

| Compressive strength [kN/m <sup>2</sup> ] | Thickness [mm] |     |     |
|---|----------------|-----|-----|
|   | 38             | 50  | 100 |
| 60  | 0.89           | 1.2 | 2.3 |
| 80  | 1              | 1.3 | 2.6 |
| 100                                       | 1.2            | 1.6 | 3.1 |
| 150                                       | 1.6            | 2.1 | 4.2 |
| 200                                       | 1.9            | 2.5 | 5   |
| 250                                       | 2.3            | 3   | 6   |
| 300                                       | 2.6            | 3.4 | 6.9 |
| 400                                       | 3.3            | 4.3 | 8.7 |

### Product specification

| Material use per declared unit | kg   | %   |
|--------------------------------|------|-----|
| Polystyrene                    | 0.57 | 96% |
| Pentane                        | 0.02 | 4%  |

### Market

Norway

### Reference service life, product

60 years

### Reference service life, building

60 years

## LCA: Calculation rules

### Declared unit

1 m<sup>2</sup> EPS insulation board with 38 mm thickness at R=1 m<sup>2</sup> K/W, transportation to site, waste handling and recovery.

### System boundary

Modules are declared according to NPCR 012 Part B. Declared units include A1-A3, A4, C1-C4, and D and are shown in *Figure 1*. Gray boxes denote modules not declared.

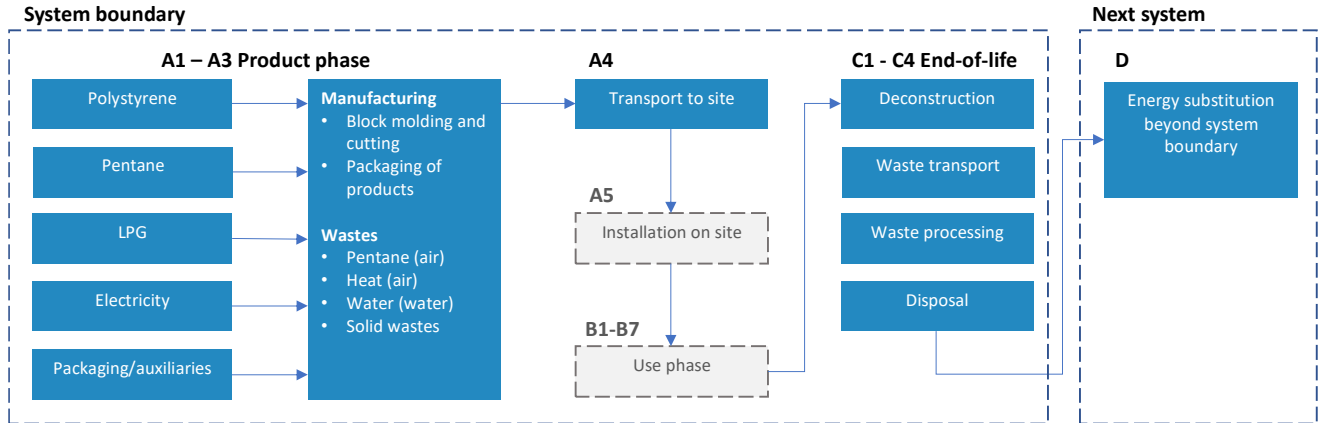


Figure 1: System boundaries

### Data quality

General requirements and guidelines concerning the use of generic and specific data and the quality of those are as described in EN 15804: 2012+A1:2013, clause 6.3.6 and 6.3.7., including ISO14044:2006, 4.2.3.6. The data is representative according to temporal, geographical and technological requirements. Databases used have been ecoinvent v3.6 (2019). Upstream data for polystyrene from Plastics Europe (2015). Calculations have been carried out using Simapro v9.

#### Temporal:

Data for use in module A3 is supplied by the EPD owner and consists of recorded and calculated amounts of specific material and energy consumption. Specific data has been collected for 2019. Generic data has been created or updated within the last 10 years. Any exceptions are documented in the LCA-report.

#### Geographical:

The product included in this EPD is manufactured in Norway and is representative for the Norwegian market. Best available approximations are used where Norwegian-specific data are unavailable.

#### Technological:

Data represents technology in use.

### Allocation

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

### Cut-off criteria

All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included with very small amounts (<1% energy, mass, impact) are not included. This cut-off rule does not apply for hazardous materials and substances.

### Benefits and loads beyond the system boundary (Module D)

The scenario for Module D follows the conservative scenario provided in NPCR 012 Part B. EPS insulation recovered at the end of life is incinerated with energy recovery and substitutes Norwegian electricity and district heat mixes.

## LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

### Transport from production place to user (A4)

| Type  | Capacity utilisation (incl. return) % | Type of vehicle                  | Distance km | Fuel/Energy consumption | Value (l/t) |
|-------|---------------------------------------|----------------------------------|-------------|-------------------------|-------------|
| Truck | 4.6 %                                 | 100 m <sup>3</sup> jumbo trailer | 300         | 0.19 l/tkm              | 57.9        |

The scenario for transportation to building site follows the default scenario provided in NPCR 012 Part B. EPS is a bulky product, resulting in a low capacity utilization (4,6 %).

### End of Life (C1, C3, C4)

|                                       | Unit | Value |
|---------------------------------------|------|-------|
| Hazardous waste disposed              | kg   |       |
| Collected as mixed construction waste | kg   |       |
| Reuse                                 | kg   |       |
| Recycling                             | kg   |       |
| Energy recovery (C3)                  | kg   | 0.57  |
| To landfill (C4)                      | kg   | 0.004 |

### Benefits and loads beyond the system boundaries (D)

|                                  | Unit | Value |
|----------------------------------|------|-------|
| Substitution of electricity      | MJ   | 1.50  |
| Substitution of district heating | MJ   | 12.20 |
|                                  |      |       |
|                                  |      |       |
|                                  |      |       |

Due to a lack of reliable data for the removal of EPS insulation from buildings, C1 is assumed to not require energy or material inputs. The scenario for end-of-life treatment of collected EPS follows the default conservative scenario provided in NPCR 012 Part B, which is municipal incineration with energy recovery (C3). Ashes and solids after incineration is landfilled (C4). Recovered energy from C3 is assumed to substitute electricity and district heating (D).

### Transport to waste processing (C2)

| Type  | Capacity utilisation (incl. return) % | Type of vehicle               | Distance km | Fuel/Energy consumption | Value (l/t) |
|-------|---------------------------------------|-------------------------------|-------------|-------------------------|-------------|
| Truck | 4.3%                                  | 90 m <sup>3</sup> box trailer | 83          | 0.19 l/tkm              | 15.6        |

The scenario for transportation to waste processing is assumed to be 83 km (Raadal et al., 2009). Insulation is assumed compressed at the waste handling facility. A standard box trailer with a 90 m<sup>3</sup> cubic capacity is assumed.

## LCA: Results

System boundaries (X=included, MND= module not declared, MNR=module not relevant)

| Product stage |           |               | Assembly stage |          | Use stage |             |        |             |               |                        |                       | End of life stage          |           |                  |          | Beyond the system boundaries       |
|---------------|-----------|---------------|----------------|----------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|------------------------------------|
| Raw materials | Transport | Manufacturing | Transport      | Assembly | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| A1            | A2        | A3            | A4             | A5       | B1        | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                         | C2        | C3               | C4       | D                                  |
| X             | X         | X             | X              | MND      | MND       | MND         | MND    | MND         | MND           | MND                    | MND                   | X                          | X         | X                | X        | X                                  |

### Environmental impact

| Parameter | Unit                                  | A1-A3    | A4       | C1       | C2       | C3       | C4       | D         |
|-----------|---------------------------------------|----------|----------|----------|----------|----------|----------|-----------|
| GWP       | kg CO <sub>2</sub> -eqv               | 1.68E+00 | 1.12E-01 | 0.00E+00 | 3.19E-02 | 1.81E+00 | 3.53E-05 | -8.94E-03 |
| ODP       | kg CFC11-eqv                          | 3.87E-08 | 2.54E-08 | 0.00E+00 | 7.62E-09 | 1.25E-09 | 1.58E-11 | -5.68E-10 |
| POCP      | kg C <sub>2</sub> H <sub>4</sub> -eqv | 9.63E-03 | 3.84E-04 | 0.00E+00 | 5.26E-05 | 2.68E-04 | 3.08E-07 | -1.96E-05 |
| AP        | kg SO <sub>2</sub> -eqv               | 4.85E-03 | 3.93E-04 | 0.00E+00 | 7.23E-05 | 2.19E-04 | 2.77E-07 | -3.43E-05 |
| EP        | kg PO <sub>4</sub> <sup>3-</sup> -eqv | 5.78E-04 | 2.26E-06 | 0.00E+00 | 6.58E-07 | 1.67E-06 | 1.95E-07 | -3.64E-07 |
| ADPM      | kg Sb-eqv                             | 4.44E-06 | 3.36E-07 | 0.00E+00 | 9.48E-08 | 7.47E-08 | 5.83E-10 | -2.14E-07 |
| ADPE      | MJ                                    | 5.11E+01 | 1.58E+00 | 0.00E+00 | 4.75E-01 | 1.38E-01 | 1.07E-03 | -1.19E-01 |

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

### Resource use

| Parameter | Unit           | A1-A3    | A4       | C1       | C2       | C3       | C4       | D         |
|-----------|----------------|----------|----------|----------|----------|----------|----------|-----------|
| RPEE      | MJ             | 1.43E+00 | 6.58E-03 | 0.00E+00 | 1.92E-03 | 4.62E-03 | 2.49E-05 | -1.63E+00 |
| RPEM      | MJ             | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| TPE       | MJ             | 1.43E+00 | 6.58E-03 | 0.00E+00 | 1.92E-03 | 4.62E-03 | 2.49E-05 | -1.63E+00 |
| NRPE      | MJ             | 2.60E+01 | 1.58E+00 | 0.00E+00 | 4.75E-01 | 1.38E-01 | 1.07E-03 | -1.19E-01 |
| NRPM      | MJ             | 2.51E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| TRPE      | MJ             | 5.11E+01 | 1.58E+00 | 0.00E+00 | 4.75E-01 | 1.38E-01 | 1.07E-03 | -1.19E-01 |
| SM        | kg             | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| RSF       | MJ             | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| NRSF      | MJ             | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  |
| W         | m <sup>3</sup> | 1.38E-02 | 4.48E-05 | 0.00E+00 | 1.29E-05 | 5.40E-04 | 1.18E-06 | -1.22E-02 |

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

### End of life - Waste

| Parameter | Unit | A1-A3    | A4       | C1       | C2       | C3       | C4       | D         |
|-----------|------|----------|----------|----------|----------|----------|----------|-----------|
| HW        | kg   | 4.11E-04 | 3.82E-05 | 0.00E+00 | 1.13E-05 | 1.70E-02 | 2.53E-06 | -2.25E-05 |
| NHW       | kg   | 5.08E-02 | 2.16E-02 | 0.00E+00 | 6.01E-03 | 9.56E-03 | 3.68E-03 | -9.37E-03 |
| RW        | kg   | 1.79E-05 | 1.13E-05 | 0.00E+00 | 3.39E-06 | 3.11E-07 | 7.16E-09 | -1.11E-06 |

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

### End of life - Output flow

| Parameter | Unit | A1-A3    | A4       | C1       | C2       | C3       | C4       | D        |
|-----------|------|----------|----------|----------|----------|----------|----------|----------|
| CR        | kg   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MR        | kg   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MER       | kg   | 7.70E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.70E-01 | 0.00E+00 | 0.00E+00 |
| EEE       | MJ   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.50E+00 | 0.00E+00 | 0.00E+00 |
| ETE       | MJ   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.22E+01 | 0.00E+00 | 0.00E+00 |

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009

## Additional Norwegian requirements

### Greenhouse gas emission from the use of electricity in the manufacturing phase

Norwegian production mix from import, medium voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process(A3).

| Data source     | Amount | Unit                        |
|-----------------|--------|-----------------------------|
| Econinvent v3.6 | 0.022  | kg CO <sub>2</sub> -eqv/kWh |

### Dangerous substances

- The product contains no substances given by the REACH Candidate list or the Norwegian priority list
- The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforsiften, Annex III), see table.

### Indoor environment




No tests have been carried out on the product concerning indoor climate - Not relevant.

### Carbon footprint

Carbon footprint has not been worked out for the product.

## Bibliography

|                       |  |
|-----------------------|--|
| ISO 14025:2010        | <i>Environmental labels and declarations - Type III environmental declarations - Principles and procedures</i>   |
| ISO 14044:2006        | <i>Environmental management - Life cycle assessment - Requirements and guidelines</i>  |
| EN 15804:2012+A1:2013 | <i>Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products</i>   |
| ISO 21930:2007        | <i>Sustainability in building construction - Environmental declaration of building products</i>  |
| Jennssen, M.M. (2020) | <i>LCA report: EPS insulation, for Sunde AS</i>  |
| NPCR 012:2018         | <i>Part B for Thermal insulation products</i>  |
| Raadal et al. (2009)  | <i>Klimaregnskap for avfallshåndtering. Fase I og II: Glassemballasje, metallemballasje, papir, papp, plastemballasje, våtorganisk avfall, treavfall og restavfall fra husholdninger. ISBN: 82-8035-073-X.</i> |

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