

# Environmental Product Declaration



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

## Premablock green II-SRx PRx FBU-20-50- Värme

Including products of dimensions DN 20, 25, 32, 40 and 50

EPD of multiple products, based on worst-case results

from

**PREMA AB**



|                          |                                                                                           |
|--------------------------|-------------------------------------------------------------------------------------------|
| Programme:               | The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a> |
| Programme operator:      | EPD International AB                                                                      |
| EPD registration number: | S-P-07233                                                                                 |
| Publication date:        | 2022-11-21                                                                                |
| Revision date:           | 2023-10-18                                                                                |
| Valid until:             | 2028-10-18                                                                                |

*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at [www.environdec.com](http://www.environdec.com)*



## General information

### Programme information

|                   |                                                                     |
|-------------------|---------------------------------------------------------------------|
| <b>Programme:</b> | The International EPD® System                                       |
| <b>Address:</b>   | EPD International AB<br>Box 210 60<br>SE-100 31 Stockholm<br>Sweden |
| <b>Website:</b>   | <a href="http://www.environdec.com">www.environdec.com</a>          |
| <b>E-mail:</b>    | <a href="mailto:info@environdec.com">info@environdec.com</a>        |

|                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Accountabilities for PCR, LCA and independent, third-party verification</b>                                                                                                                                                                                                                                                                                    |
| <b>Product Category Rules (PCR)</b>                                                                                                                                                                                                                                                                                                                               |
| CEN standard EN 15804 serves as the Core Product Category Rules (PCR)                                                                                                                                                                                                                                                                                             |
| Product Category Rules (PCR): <i>Construction Products 2019:14, Version 1.3.1 and EN 15804:2012 + A2:2019 Sustainability of Construction Works</i>                                                                                                                                                                                                                |
| PCR review was conducted by: <i>The Technical Committee on the International EPD® System. Contact via <a href="http://www.environdec.com">www.environdec.com</a> <a href="mailto:info@environdec.com">info@environdec.com</a></i>                                                                                                                                 |
| <b>Life Cycle Assessment (LCA)</b>                                                                                                                                                                                                                                                                                                                                |
| LCA accountability: <i>Kristin Fransson, AFRY, <a href="http://www.afry.com">www.afry.com</a></i>                                                                                                                                                                                                                                                                 |
| <b>Third-party verification</b>                                                                                                                                                                                                                                                                                                                                   |
| Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:<br><br><input checked="" type="checkbox"/> EPD verification by individual verifier<br><br>Third-party verifier: Pär Lindman, Miljögiraff AB, ( <a href="mailto:par@miljogiraff.se">par@miljogiraff.se</a> )<br><br>Approved by: The International EPD® System |
| Procedure for follow-up of data during EPD validity involves third party verifier:<br><br><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No                                                                                                                                                                                                     |

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

## Company information

Owner of the EPD: PREMA AB

Contact: Thomas Winge

Description of the organisation: PREMA provides solutions for regulating heating and cooling, as well as heat recovery in buildings and industrial processes. Our focus is on installations with high demands on energy efficiency and operational reliability. Our solutions are based on our high-quality, flexible and service-friendly Premablock® system for prefabricated facility-adapted shunt units and associated accessory products such as system liquid degassers, mixing units, expansion systems and particle filters.

Name and location of production site(s): PREMA Kalmar, Franska vägen 17, SE- 393 56 Kalmar, Sweden

## Product information

Product name: Premablock green II-SRx PRx FBU-20-50-Värme

Product description: Premablock green II-SRx PRx FBU-20-50-Värme is a functional hydraulic circuit, so-called shunt unit, composed of several components to regulate temperature, as well as mix and distribute flows in systems for water-borne heating or cooling. The expected lifetime of the product is typically 25-30 yrs.

Premablock® shunt units are adapted for low internal pressure drops, which reduces the pumps' energy consumption and gives the control valves good authority. Low internal pressure drops are achieved by giving the pipe assembly sufficient dimension, using soft pipe bends, and placing any tapers in direct connection with control valves and pumps, thereby preventing energy losses due to turbulent flow and self-circulation. Energy loss due to involuntary heat transfer between the primary and secondary system is also minimized thanks to a built-in thermal heat barrier.

The chosen operating scenarios for calculation of annual energy consumption are defined based on the maximum flow PREMA recommends for each pipe dimension. The circulation pump must manage a pressure drop of 3 m for the secondary system as well as the pressure drop in the shunt unit. The shunt unit's part of the total pressure drop is reported for each scenario. Energy consumption is reported both when the pump is run in fixed and variable delta-p mode. Load profiles are based on recommendations for EU Directive 2009/125/EC with the following operational parameters and load profile:

| Operational data                       |                           |
|----------------------------------------|---------------------------|
| Liquid                                 | water (pure)              |
| Water temperature                      | 20°C                      |
| Density                                | 0.9983 kg/dm <sup>3</sup> |
| Kinematic viscosity                    | 1.005 mm <sup>2</sup> /s  |
| Vapor pressure                         | 0.02337 bar               |
| Load profile (common to all scenarios) |                           |
| Operational time                       | 8760 hours/year           |
| 100% flow                              | 6% of operational time    |
| 75% flow                               | 15% of operational time   |
| 50% flow                               | 35% of operational time   |
| 25% flow                               | 44% of operational time   |

The results and information on material content in this EPD is calculated based on a Premablock green II-SRx PRx FBU 40 with a total weight of 78.0 kg since this is considered a "worst case" product

based on LCA calculations for environmental indicators within the EPD system. Main results for operational use are given for Premablock green II-SRx PRx FBU 40,  $\Delta p$  variable.

The following standard configurations of Premablock green II-SRx PRx FBU-20-50-Värme, including scenarios for operational energy use (B6) are included in the EPD:

| Dimension of the shunt unit | Flow (l/s) | Head (m)                                 | Pressure controlled pump class A, $\Delta P$ variable (kWh/year) | Pressure controlled pump class A, $\Delta P$ constant (kWh/year) | Weight standard configuration(kg) |
|-----------------------------|------------|------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------|
| DN20M                       | 0.3        | 3.7 m of which 0.7 m in the shunt unit   | 177                                                              | 237                                                              | 42.5                              |
| DN25M                       | 0.5        | 3.73 m of which 0.73 m in the shunt unit | 201                                                              | 368                                                              | 49.1                              |
| DN25                        | 0.5        | 3.73 m of which 0.73 m in the shunt unit | 201                                                              | 368                                                              | 56.6                              |
| DN32                        | 0.9        | 3.86 m of which 0.86 m in the shunt unit | 261                                                              | 344                                                              | 65.6                              |
| DN40                        | 1.3        | 3.87 m of which 0.87 m in the shunt unit | 321                                                              | 417                                                              | 81.1                              |
| DN50                        | 2.1        | 3.9 m of which 0.9 m in the shunt unit   | 476                                                              | 599                                                              | 103.7                             |

UN CPC code:

4325

Geographical scope:

Raw materials and components (A1) are sourced globally while manufacturing of the final product (A3) is made in Sweden. More than 95% of the use phase (B6) and waste management of the product (C1-C4) takes place in Sweden and Sweden is therefore selected as a model for both operational energy use and end-of-life.

## LCA information

Functional unit / declared unit:

1 kg of shunt unit. Calculations based on the worst-case product Premablock green II-SRx PRx FBU 40

Expected product life:

The expected product life of the shunt units is 25 years. This value is an average based on experience. The actual life of the product can be shorter or longer.

Time representativeness:

The LCA is based on average production data from 2020 and 2021 which are considered to be average years of production.

Database(s) and LCA software used:

Ecoinvent 3.9.1 and SimaPro 9.5.0.0

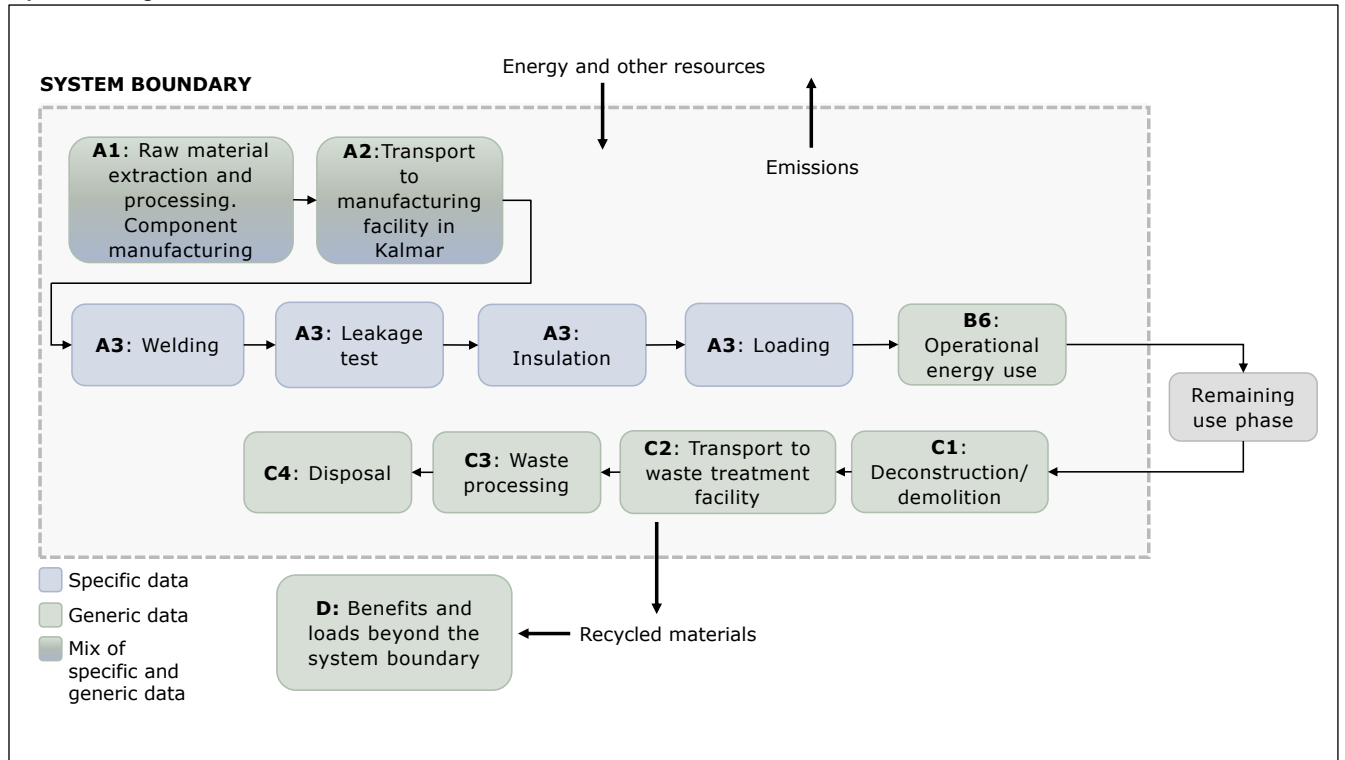
Description of system boundaries:

Cradle to gate with options, modules C1–C4, module D and with optional module B6 (A1–A3 + B6 + C + D).

LCA practitioner:

AFRY Sustainability consulting, Sweden, [www.afry.com](http://www.afry.com)

**System diagram:**



Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

|                      | Product stage                                                       |           |               | Construction process stage |                           | Use stage |             |        |             |               |                        |                       | End of life stage          |           |                  |          | Resource recovery stage            |
|----------------------|---------------------------------------------------------------------|-----------|---------------|----------------------------|---------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|------------------------------------|
|                      | Raw material supply                                                 | Transport | Manufacturing | Transport                  | Construction installation | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| Module               | A1                                                                  | A2        | A3            | A4                         | A5                        | B1        | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                         | C2        | C3               | C4       | D                                  |
| Modules declared     | X                                                                   | X         | X             | ND                         | ND                        | ND        | ND          | ND     | ND          | ND            | X                      | ND                    | X                          | X         | X                | X        | X                                  |
| Geography            | GLO/EU                                                              | GLO/EU    | SE            |                            |                           |           |             |        |             |               | SE                     |                       | SE                         | SE        | SE               | SE       | SE                                 |
| Specific data used   | 8% of the total GWP-GHG impact stems from specific data (A2 and A3) |           |               |                            |                           | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -                | -        | -                                  |
| Variation – products | 3-6%                                                                |           |               |                            |                           | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -                | -        | -                                  |

### A1: Raw Material

This stage includes production of raw materials for components as well as component manufacturing. Transportation of raw materials to component manufacturing is also included in this module.

### A2: Transport

This stage includes transportation of raw components PREMA's manufacturing facility.

### A3: Manufacturing

This stage includes welding, pressure test, insulation and loading at PREMA. It also includes treatment of waste generated from the manufacturing processes up to the end-of-waste state. The electricity used in manufacturing is 100% renewable with a mix of 95% hydro power, 2.5% wind power and 2.5% biomass.

The climate impact of the electricity mix is 21.2 g CO<sub>2</sub> eq./kWh.

### B6: Operational energy use

This stage includes impacts from electricity use. The chosen operating scenarios for calculation of energy consumption are defined based on the maximum flow PREMA recommends for each pipe dimension. Energy consumption is reported both when the pump is run in fixed and variable delta-p mode. Results are calculated per 25 years and kg shunt unit.

### C1: Deconstruction

This stage includes impacts related to removing the shunt units at product end-of-life. The environmental impacts generated during this phase are very low and therefore can be neglected.

**C2: Waste Transport**

Includes the transportation of the discarded product to a waste treatment facility. The transport distance was assumed to be 100 km.

**C3: Waste Processing**

This stage includes sorting and recycling processes. An Ecoinvent process for sorting of waste iron has been used as proxy for these processes.

**C4: Waste disposal**

This stage includes waste disposal processes such as landfilling or incineration. Metals in the shunt unit are assumed to be recycled while plastics, rubbers and other materials are assumed to be incinerated.

**D: Benefits and loads outside the system boundary**

This stage includes benefits and burdens associated with recovery/recycling that affects previous or future life cycles. For this product it includes benefits from the recycling of metals and incineration of waste.

## Content information for Premablock green II-SRx PRx FBU-20-50-Värme,

| Product components          | Average content, % | Content range, % | Post-consumer material, weight-%* | Biogenic material, weight-% and kg C/kg |
|-----------------------------|--------------------|------------------|-----------------------------------|-----------------------------------------|
| Steel, low-alloyed          | 51.77              | 50.3 - 54.2      |                                   | 0                                       |
| Steel, un-alloyed           | 22.09              | 16.3 - 23.9      |                                   | 0                                       |
| Brass                       | 4.83               | 4.4 - 5.8        |                                   | 0                                       |
| Stainless steel             | 1.39               | 1.3 - 1.5        |                                   | 0                                       |
| Cast iron                   | 14.86              | 12.9 - 16.4      |                                   | 0                                       |
| Insulation/glass fibre      | 4.48               | 0.05 - 7.3       |                                   | 0                                       |
| Plastics                    | 1.26               | 1.1 - 1.5        |                                   | 0                                       |
| Bronze                      | 0.56               | 0.5 - 0.7        |                                   | 0                                       |
| Aluminium                   | 0.36               | 0.32 - 0.38      |                                   | 0                                       |
| Copper                      | 0.21               | 0.19 - 0.22      |                                   | 0                                       |
| Paper                       | 0.19               | 0.17 - 0.20      |                                   | 0.23%, 1.1E-3 kgC/kg shunt unit         |
| Glass                       | 0.002              | 0.02 - 0.02      |                                   | 0                                       |
| Other (rubbers, synthetics) | 0.34               | 0.32 - 0.37      | 0                                 | 0                                       |
| Packaging materials         | Weight, kg         |                  | Weight-% (versus the product)     | Weight biogenic carbon, kg C/kg         |
| Wood packaging              | 17.8               |                  | 21.9                              | 0.21                                    |
| EUR pallet**                | 22.6               |                  | 27.9                              | 0.14                                    |
| TOTAL                       | 40.4               |                  |                                   | 0.35                                    |

\*Share of post-consumer material is unknown. Average values from Ecoinvent datasets have been used for modeling

\*\* The weight of the EUR pallet as well biogenic carbon has been divided with amount times of use until discarded (9).

| Dangerous substances from the candidate list of SVHC for Authorisation | EC No.    | CAS No.   | Weight-% per functional or declared unit |
|------------------------------------------------------------------------|-----------|-----------|------------------------------------------|
| Lead                                                                   | 231-100-4 | 7439-92-1 | 0.016%                                   |



## Results of the environmental performance indicators

### Potential environmental impact – mandatory indicators according to EN 15804

B6 is calculated for DN40, variable pressure per kg and use for 25 years.

### Mandatory impact category indicators according to EN 15804

| Results per functional or declared unit |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |          |          |          |          |          |           |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|----------|----------|----------|----------|-----------|
| Indicator                               | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | A1-A3     | B6       | C1       | C2       | C3       | C4       | D         |
| GWP-fossil                              | kg CO <sub>2</sub> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4.37E+00  | 3.30E+00 | 0.00E+00 | 1.81E-02 | 7.94E-04 | 1.63E-01 | -1.03E+00 |
| GWP-biogenic                            | kg CO <sub>2</sub> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -2.06E-01 | 1.42E-01 | 0.00E+00 | 1.67E-05 | 2.38E-05 | 2.14E-03 | -4.85E-04 |
| GWP-luluc                               | kg CO <sub>2</sub> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1.66E-02  | 3.21E-01 | 0.00E+00 | 8.62E-06 | 1.73E-06 | 1.42E-06 | -1.18E-03 |
| GWP-total                               | kg CO <sub>2</sub> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4.19E+00  | 3.77E+00 | 0.00E+00 | 1.81E-02 | 8.20E-04 | 1.65E-01 | -1.03E+00 |
| ODP                                     | kg CFC 11 eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 7.05E-07  | 1.08E-07 | 0.00E+00 | 3.83E-10 | 1.49E-11 | 1.77E-10 | -1.80E-08 |
| AP                                      | mol H <sup>+</sup> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4.75E-02  | 1.91E-02 | 0.00E+00 | 5.75E-05 | 4.69E-06 | 3.94E-05 | -2.19E-02 |
| EP-freshwater                           | kg P eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.17E-03  | 1.48E-03 | 0.00E+00 | 1.23E-06 | 6.64E-07 | 6.11E-07 | -1.78E-03 |
| EP-marine                               | kg N eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 6.55E-03  | 5.85E-03 | 0.00E+00 | 1.98E-05 | 9.51E-07 | 2.21E-05 | -1.67E-03 |
| EP-terrestrial                          | mol N eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 6.20E-02  | 5.49E-02 | 0.00E+00 | 2.09E-04 | 9.17E-06 | 1.90E-04 | -2.09E-02 |
| POCP                                    | kg NMVOC eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2.25E-02  | 1.33E-02 | 0.00E+00 | 8.58E-05 | 2.93E-06 | 4.87E-05 | -7.54E-03 |
| ADP-minerals&metals*                    | kg Sb eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5.49E-04  | 5.73E-05 | 0.00E+00 | 5.66E-08 | 8.72E-09 | 8.26E-09 | -2.63E-04 |
| ADP-fossil*                             | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 5.19E+01  | 5.62E+02 | 0.00E+00 | 2.50E-01 | 1.67E-02 | 3.71E-02 | -1.05E+01 |
| WDP*                                    | m <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 8.79E-01  | 6.82E+00 | 0.00E+00 | 1.03E-03 | 1.83E-04 | 7.78E-03 | -3.92E-01 |
| Acronyms                                | GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption |           |          |          |          |          |          |           |

\* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

## Additional mandatory and voluntary impact category indicators

| Results per kg shunt unit |                        |           |          |          |          |          |          |           |
|---------------------------|------------------------|-----------|----------|----------|----------|----------|----------|-----------|
| Indicator                 | Unit                   | Tot.A1-A3 | B6       | C1       | C2       | C3       | C4       | D         |
| GWP-GHG <sup>1</sup>      | kg CO <sub>2</sub> eq. | 4.39E+00  | 3.63E+00 | 0.00E+00 | 1.81E-02 | 7.96E-04 | 1.63E-01 | -1.03E+00 |

### Resource use indicators

B6 is calculated for DN40, variable pressure per kg and use for 25 years.

| Results per kg shunt unit |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |          |          |          |           |          |           |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|----------|----------|-----------|----------|-----------|
| Indicator                 | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Tot.A1-A3 | B6       | C1       | C2       | C3        | C4       | D         |
| PERE                      | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.96E+01  | 8.11E+02 | 0.00E+00 | 3.88E-03 | 3.41E-03  | 1.30E-03 | -1.97E+00 |
| PERM                      | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3.66E+00  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00  |
| PERT                      | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.32E+01  | 0.00E+00 | 0.00E+00 | 3.88E-03 | 3.41E-03  | 1.30E-03 | -1.97E+00 |
| PENRE                     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 5.52E+01  | 4.57E+04 | 0.00E+00 | 2.66E-01 | 1.75E-02  | 4.01E-02 | -1.11E+01 |
| PENRM                     | MJ.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4.07E+01  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00  |
| PENRT                     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 9.59E+01  | 0.00E+00 | 0.00E+00 | 2.66E-01 | 1.75E-02  | 4.01E-02 | -1.11E+01 |
| SM                        | kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3.27E-01  | 0        | 0        | 0        | 0         | 0        | 0         |
| RSF                       | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 0        | 0        | 0        | 0         | 0        | 0         |
| NRSF                      | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0         | 0        | 0        | 0        | 0         | 0        | 0         |
| FW                        | m <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.00E+00  | 4.05E-05 | 4.94E-06 | 2.79E-04 | -1.22E-02 | 5.78E-02 | 2.56E-04  |
| Acronyms                  | PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water |           |          |          |          |           |          |           |

<sup>1</sup> The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

## Waste indicators

### Waste production

B6 is calculated for DN40, variable pressure per kg and use for 25 years.

| Results per kg shunt unit    |      |           |    |    |    |    |    |   |
|------------------------------|------|-----------|----|----|----|----|----|---|
| Indicator                    | Unit | Tot.A1-A3 | B6 | C1 | C2 | C3 | C4 | D |
| Hazardous waste disposed     | kg   | 0         | 0  | 0  | 0  | 0  | 0  | 0 |
| Non-hazardous waste disposed | kg   | 0         | 0  | 0  | 0  | 0  | 0  | 0 |
| Radioactive waste disposed   | kg   | 0         | 0  | 0  | 0  | 0  | 0  | 0 |

## Output flow indicators

| Results per kg shunt unit     |      |           |    |    |    |    |          |   |
|-------------------------------|------|-----------|----|----|----|----|----------|---|
| Indicator                     | Unit | Tot.A1-A3 | B6 | C1 | C2 | C3 | C4       | D |
| Components for re-use         | kg   | 0         | 0  | 0  | 0  | 0  | 5.00E-02 | 0 |
| Material for recycling        | kg   | 1.23E-1   | 0  | 0  | 0  | 0  | 8.85E-01 | 0 |
| Materials for energy recovery | kg   | 0         | 0  | 0  | 0  | 0  | 0        | 0 |
| Exported energy, electricity  | MJ   | 0         | 0  | 0  | 0  | 0  | 0        | 0 |
| Exported energy, thermal      | MJ   | 0         | 0  | 0  | 0  | 0  | 0        | 0 |

## Additional environmental information

### Energy use operating phase

Below are results for environmental impact in operational use phase (B6) based on the operating scenarios defined in the section Product description.

### Potential environmental impact B6– mandatory indicators according to EN 15804 – results for product life of 25 years

| Results per kg shunt unit and a product life of 25 years |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                         |                         |                        |                        |                        |                        |                        |                        |                        |                        |
|----------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Indicator                                                | Unit                     | DN20M<br>ΔP<br>variable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | DN20M<br>ΔP<br>constant | DN25M<br>ΔP<br>variable | DN25M<br>ΔP<br>constant | DN25<br>ΔP<br>variable | DN25<br>ΔP<br>constant | DN32<br>ΔP<br>variable | DN32<br>ΔP<br>constant | DN40<br>ΔP<br>variable | DN40<br>ΔP<br>constant | DN50<br>ΔP<br>variable | DN50<br>ΔP<br>constant |
| GWP-fossil                                               | kg CO <sub>2</sub> eq.   | 3.47E+00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.64E+00                | 3.41E+00                | 6.24E+00                | 2.96E+00               | 5.41E+00               | 3.31E+00               | 4.37E+00               | 3.30E+00               | 4.28E+00               | 3.82E+00               | 4.81E+00               |
| GWP-biogenic                                             | kg CO <sub>2</sub> eq.   | 1.49E-01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2.00E-01                | 1.46E-01                | 2.68E-01                | 1.27E-01               | 2.33E-01               | 1.42E-01               | 1.88E-01               | 1.42E-01               | 1.84E-01               | 1.64E-01               | 2.07E-01               |
| GWP-luluc                                                | kg CO <sub>2</sub> eq.   | 3.37E-01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.52E-01                | 3.32E-01                | 6.07E-01                | 2.88E-01               | 5.27E-01               | 3.22E-01               | 4.25E-01               | 3.21E-01               | 4.16E-01               | 3.72E-01               | 4.68E-01               |
| GWP-total                                                | kg CO <sub>2</sub> eq.   | 3.97E+00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 5.31E+00                | 3.90E+00                | 7.14E+00                | 3.38E+00               | 6.20E+00               | 3.79E+00               | 5.00E+00               | 3.77E+00               | 4.90E+00               | 4.37E+00               | 5.51E+00               |
| ODP                                                      | kg CFC <sub>11</sub> eq. | 1.13E-07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.52E-07                | 1.11E-07                | 2.04E-07                | 9.66E-08               | 1.77E-07               | 1.08E-07               | 1.43E-07               | 1.08E-07               | 1.40E-07               | 1.25E-07               | 1.57E-07               |
| AP                                                       | mol H <sup>+</sup> eq.   | 2.01E-02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2.69E-02                | 1.97E-02                | 3.61E-02                | 1.71E-02               | 3.13E-02               | 1.92E-02               | 2.53E-02               | 1.91E-02               | 2.48E-02               | 2.21E-02               | 2.78E-02               |
| EP-freshwater                                            | kg P eq.                 | 1.55E-03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2.08E-03                | 1.53E-03                | 2.80E-03                | 1.33E-03               | 2.43E-03               | 1.49E-03               | 1.96E-03               | 1.48E-03               | 1.92E-03               | 1.71E-03               | 2.16E-03               |
| EP-marine                                                | kg N eq.                 | 6.15E-03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8.24E-03                | 6.05E-03                | 1.11E-02                | 5.25E-03               | 9.60E-03               | 5.88E-03               | 7.75E-03               | 5.85E-03               | 7.59E-03               | 6.78E-03               | 8.53E-03               |
| EP-terrestrial                                           | mol N eq.                | 5.78E-02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 7.74E-02                | 5.68E-02                | 1.04E-01                | 4.93E-02               | 9.02E-02               | 5.52E-02               | 7.28E-02               | 5.49E-02               | 7.14E-02               | 6.37E-02               | 8.02E-02               |
| POCP                                                     | kg NMVOC eq.             | 1.40E-02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.88E-02                | 1.38E-02                | 2.53E-02                | 1.20E-02               | 2.19E-02               | 1.34E-02               | 1.77E-02               | 1.33E-02               | 1.73E-02               | 1.55E-02               | 1.95E-02               |
| ADP-minerals&metals*                                     | kg Sb eq.                | 6.03E-05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8.07E-05                | 5.92E-05                | 1.08E-04                | 5.14E-05               | 9.41E-05               | 5.76E-05               | 7.59E-05               | 5.73E-05               | 7.44E-05               | 6.64E-05               | 8.36E-05               |
| ADP-fossil*                                              | MJ                       | 5.91E+02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 7.92E+02                | 5.81E+02                | 1.06E+03                | 5.04E+02               | 9.23E+02               | 5.65E+02               | 7.44E+02               | 5.62E+02               | 7.30E+02               | 6.52E+02               | 8.20E+02               |
| WDP                                                      | m <sup>3</sup>           | 7.18E+00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 9.61E+00                | 7.06E+00                | 1.29E+01                | 6.12E+00               | 1.12E+01               | 6.86E+00               | 9.04E+00               | 6.82E+00               | 8.86E+00               | 7.91E+00               | 9.96E+00               |
| Acronyms                                                 |                          | GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption |                         |                         |                         |                        |                        |                        |                        |                        |                        |                        |                        |

## Potential environmental impact B6– mandatory indicators according to EN 15804 – results per year of use

To facilitate for comparison with other shunt units, results for operational energy use are also given per year.

|                      |                          | Results per year and kg shunt unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                         |                         |                         |                        |                        |                        |                        |                        |                        |                        |                        |
|----------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Indicator            | Unit                     | DN20M<br>ΔP<br>variable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | DN20M<br>ΔP<br>constant | DN25M<br>ΔP<br>variable | DN25M<br>ΔP<br>constant | DN25<br>ΔP<br>variable | DN25<br>ΔP<br>constant | DN32<br>ΔP<br>variable | DN32<br>ΔP<br>constant | DN40<br>ΔP<br>variable | DN40<br>ΔP<br>constant | DN50<br>ΔP<br>variable | DN50<br>ΔP<br>constant |
| GWP-fossil           | kg CO <sub>2</sub> eq.   | 1.39E-01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.86E-01                | 1.36E-01                | 2.50E-01                | 1.18E-01               | 2.17E-01               | 1.33E-01               | 1.75E-01               | 1.32E-01               | 1.71E-01               | 1.53E-01               | 1.92E-01               |
| GWP-biogenic         | kg CO <sub>2</sub> eq.   | 5.96E-03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 7.98E-03                | 5.86E-03                | 1.07E-02                | 5.08E-03               | 9.31E-03               | 5.69E-03               | 7.51E-03               | 5.67E-03               | 7.36E-03               | 6.57E-03               | 8.27E-03               |
| GWP-luluc            | kg CO <sub>2</sub> eq.   | 1.35E-02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.81E-02                | 1.33E-02                | 2.43E-02                | 1.15E-02               | 2.11E-02               | 1.29E-02               | 1.70E-02               | 1.28E-02               | 1.67E-02               | 1.49E-02               | 1.87E-02               |
| GWP-total            | kg CO <sub>2</sub> eq.   | 1.59E-01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2.13E-01                | 1.56E-01                | 2.86E-01                | 1.35E-01               | 2.48E-01               | 1.52E-01               | 2.00E-01               | 1.51E-01               | 1.96E-01               | 1.75E-01               | 2.20E-01               |
| ODP                  | kg CFC <sub>11</sub> eq. | 4.53E-09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 6.07E-09                | 4.46E-09                | 8.16E-09                | 3.87E-09               | 7.08E-09               | 4.33E-09               | 5.71E-09               | 4.31E-09               | 5.60E-09               | 5.00E-09               | 6.29E-09               |
| AP                   | mol H <sup>+</sup> eq.   | 8.03E-04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.08E-03                | 7.89E-04                | 1.45E-03                | 6.85E-04               | 1.25E-03               | 7.67E-04               | 1.01E-03               | 7.63E-04               | 9.91E-04               | 8.85E-04               | 1.11E-03               |
| EP-freshwater        | kg P eq.                 | 6.22E-05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8.33E-05                | 6.11E-05                | 1.12E-04                | 5.30E-05               | 9.71E-05               | 5.94E-05               | 7.83E-05               | 5.91E-05               | 7.68E-05               | 6.86E-05               | 8.63E-05               |
| EP-marine            | kg N eq.                 | 2.46E-04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3.29E-04                | 2.42E-04                | 4.43E-04                | 2.10E-04               | 3.84E-04               | 2.35E-04               | 3.10E-04               | 2.34E-04               | 3.04E-04               | 2.71E-04               | 3.41E-04               |
| EP-terrestrial       | mol N eq.                | 2.31E-03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3.10E-03                | 2.27E-03                | 4.16E-03                | 1.97E-03               | 3.61E-03               | 2.21E-03               | 2.91E-03               | 2.20E-03               | 2.85E-03               | 2.55E-03               | 3.21E-03               |
| POCP                 | kg NMVOC eq.             | 5.61E-04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 7.52E-04                | 5.52E-04                | 1.01E-03                | 4.79E-04               | 8.77E-04               | 5.36E-04               | 7.07E-04               | 5.34E-04               | 6.93E-04               | 6.19E-04               | 7.79E-04               |
| ADP-minerals&metals* | kg Sb eq.                | 2.41E-06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3.23E-06                | 2.37E-06                | 4.34E-06                | 2.06E-06               | 3.76E-06               | 2.30E-06               | 3.03E-06               | 2.29E-06               | 2.98E-06               | 2.66E-06               | 3.34E-06               |
| ADP-fossil*          | MJ                       | 2.36E+01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3.17E+01                | 2.32E+01                | 4.26E+01                | 2.02E+01               | 3.69E+01               | 2.26E+01               | 2.98E+01               | 2.25E+01               | 2.92E+01               | 2.61E+01               | 3.28E+01               |
| WDP                  | m <sup>3</sup>           | 2.87E-01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3.84E-01                | 2.82E-01                | 5.17E-01                | 2.45E-01               | 4.48E-01               | 2.74E-01               | 3.62E-01               | 2.73E-01               | 3.54E-01               | 3.16E-01               | 3.98E-01               |
| Acronyms             |                          | GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption |                         |                         |                         |                        |                        |                        |                        |                        |                        |                        |                        |

## Other information and instructions

With the Premablock® system for pre-fabricated shunt units, PREMA can offer solutions for a variety of regulation needs in heating and cooling, as well as heat recovery. Some common examples are:

- Regulation of room heating or room cooling
- Control of heating when connecting systems to district heating and the return temperature of the heating system should be lowered
- Regulation of cooling with equipment which do not require low-temperature cooling but can primarily use the return water in the property's cooling system
- Pre-shunting
- Pre-heating and post-heating batteries
- Control of heat recovery via liquid-coupled batteries
- Regulation of heating and cooling in systems requiring different media in primary and secondary circuits
- Pick-up of free-cooling
- Tip-heating with excess heat
- Emergency cooling of secondary systems with high demands on cooling reliability
- Regulation of energy management in heating or cooling centers.

The Premablock® system is recognized for being high quality, flexible and service friendly. With the Premablock® system, customers get the maximum possible control over the design of pipe connections and make on components. The fact that all components are easily accessible also makes it easy to service Premablock® shunt units. Premablock® shunt units consist only of quality components from large and reputable manufacturers. All production takes place in our own premises, which gives us good control over both quality and delivery precision. We use TIG technology in welding and all shunt units are pressure tested with liquid before delivery.

Each shunt unit we supply is 100 percent adapted to the unique pressure and temperature conditions that apply to its location in the facility. Only in this way can we guarantee that it will be integrated into the system with the highest possible performance. Thanks to the system's low pipe pressure drop, our customers can also rely on the highest possible energy efficiency and low operating costs as a result.

In dialogue with our customers, we also develop tools to make it easier to work with our shunt units. Examples of this are our dimensioning and calculation software, ShuntLogik®, our MagiCAD plugins for AutoCAD and Revit as well as our database of 3D cad/BIM models. Our goal is to make it easy and fun to work with our products.

Instructions on functional designs and proper use of the product:

- <https://prema.se/support/produktkatalog/shuntgrupper-utan-vaxlare/>

Instructions for proper maintenance and service of the product:

- <https://prema.se/drift-och-skotselanvisningar/>
- <https://prema.se/support/tillverkaredeklarationer/>

Information on recycling:

<https://prema.se/support/demontering-och-atervinning/>

Other information on sustainability at PREMA:

- <https://prema.se/hallbarhet/>
- <https://prema.se/uppforandekod/>
- <https://prema.se/var-miljopolicy/>
- <https://prema.se/var-kvalitetspolicy/>
- <https://prema.se/var-arbetsmiljopolicy/>

## Differences versus previous versions

The main reason for updating this EPD was a change of control valve. Due to this change has GWP-GHG for A1-A3, C1-C4 increased with 2.6%. Also, the following updates have been done in this version of the EPD:

- Update of report and EPD to comply with PCR Construction products 2019:14, version 1.3.1
- Update of database used for calculations to Ecoinvent 3.9.1, this has resulted in significantly lower climate impact for electricity in use phase since environmental impact from Swedish average electricity mix has decreased significantly due to the Ecoinvent update.

## References

EPD International (2021): General Programme Instructions for the International EPD® System. Version 4.0. [www.environdec.com](http://www.environdec.com).

EPD International (2023): Product Category Rules (PCR) Construction products 2019:14, version 1.3.1

EN15804-A2:2019. Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

Ecoinvent v.3. Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B. (2016): The ecoinvent database version 3 (part I): overview and methodology. *The International Journal of Life Cycle Assessment*, [online] 21(9), pp.1218–1230. Available at: <<http://link.springer.com/10.1007/s11367-016-1087-8>> [Accessed 27-08-2021].

European Commission (2009): Directive 2009/125/EC of the European parliament and of the council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energyrelated products. *Official Journal of the European Union*.

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Fransson, K., Westman, J., Žilinskaitė E. (2023). *Life Cycle Assessment of Premablock green II-SRx PRx FBU-20-50 Värme from PREMA AB*. Gothenburg, AFRY Sustainability Consulting. (Updated 2023)

