# Environmental Product Declaration

Of multiple products based on average results
In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

# Villeroy & Boch / Gustavsberg Thermoplast Toilet Seats

from

## Villeroy & Boch AG

| | |
|---|---|
| Programme: | The International EPD® System, www.environdec.com |
| Programme operator: | EPD International AB |
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*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*

# General information

## Programme information

| | |
|---|---|
| **Programme:** | The International EPD® System |
| **Address:** | EPD International AB<br>Box 210 60<br>SE-100 31 Stockholm<br>Sweden |
| **Website:** | www.environdec.com |
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| **Accountabilities for PCR, LCA and independent, third-party verification** |
|---|
| **Product Category Rules (PCR)** |
| CEN standard EN 15804 serves as the Core Product Category Rules (PCR)<br>Product Category Rules (PCR): PCR 2019:14 Construction products (EN 15804:A2) (version 1.3.4) |
| Product Category Rules (PCR): Construction Products 2019:14, Version 1.3.4 and EN 15804:2012+A2:2019 Sustainability of Construction Works |
| PCR review was conducted by: The Technical Committee on the International EPD ® System.<br>Contact via www.environdec.com info@environdec.com |
| **Life Cycle Assessment (LCA)** |
| LCA accountability: Alexander Kyriakidis, AFRY, www.afry.com |
| **Third-party verification** |
| Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:<br><br>☒ EPD verification by individual verifier<br><br>Third-party verifier: Katrin Molina-Besch, Miljögiraff<br><br>Approved by: The International EPD® System |
| Procedure for follow-up of data during EPD validity involves third party verifier:<br><br>☐ Yes ☒ 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:
Villeroy & Boch AG
Saaruferstraße
66693 Mettlach (Germany)
https://www.villeroyboch-group.com/ [villeroyboch-group.com]

Contact:
Mattias Virsgård

Description of the organisation:
Since its foundation in 1748, the ceramic producer has developed into an international lifestyle brand. Like very few other premium brands, Villeroy & Boch is deeply rooted in European culture. And, in the way that only a great brand can do, it has understood how to preserve its identity while still moving with the times.
Villeroy & Boch produces innovative and stylish products to enhance people's lives, provide continuous inspiration and open up new horizons for truly personalised interior design.

Product-related or management system-related certifications:
Production facilities:
DIN EN ISO 9001

Villeroy & Boch AG organization:
SS-EN ISO 9001:2015 – Quality Management System
SS-EN ISO 14001:2015 – Environmental Management System
SS-EN ISO 45001:2018 – Occupational Health and Safety Management Systems
SS-EN ISO 50001:2018 – Energy Management System

Name and location of production site(s):
Rohrdorf, Germany
Sevlievo, Bulgaria
Kunshan, China

## Product information

Product name:
Thermoplast Toilet Seats

Product list
*Brand Villeroy & Boch*
8M28S101 O.novo

*Brand Gustavsberg*
9M646101 Gustavsberg/Saval
9M649901 Nordic
9M648101 Saval
9M246101 Nautic

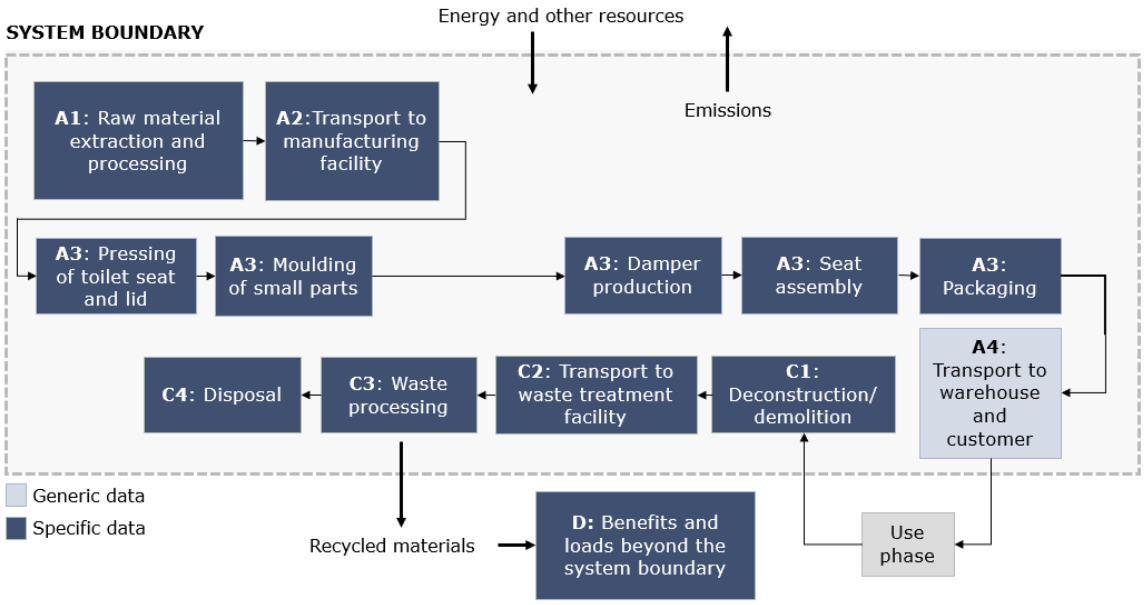
And others for Villeroy & Boch group, produced in the same material in the same production site.

Product identification:
Toilet seat set made of thermoplast material (PP)

Product description:
Villeroy & Boch & Gustavsberg toilet seats are the perfect, custom-fit solution for each toilets. Their quick assembly and easy-clean benefits speak for themselves, and their designs create a harmonic unit with the ceramic bowl.

UN CPC code:
3693 - Baths, wash-basins, lavatory pans and covers, flushing cisterns and similar sanitary ware, of plastics.

Production diagram:




## LCA information

Declared unit:
1 piece average Toilet seat set made of thermoplast material (PP) (1.10 kg).

Reference service life:
RSL is not considered in the LCA. PP WC seats have an average lifespan of 3 years.

Time representativeness:
Production data was collected for the year 2022.

Database(s) and LCA software used:
LCA for Experts (Version 10.7) and Sphera LCA content (Content Version 2023.1).

For module A4 only: SimaPro 9.6.1 and Ecoinvent 3.10.
Environmental impact was assessed according to EN 15804:2012+A2:2019 using EF 3.1 characterization factors

LCA scenarios:
In module A5, the waste treatment of the packaging materials is modelled. Cardboard is recycled and polyethylene foil is incinerated. For waste treatment in module C3, incineration is modelled for plastic components and recycling for metal components. Loads and benefits resulting from recycling and incineration in modules A5 and C3 are assigned to module D. For transports to waste treatment, a distance of 100 km is assumed.

Description of system boundaries:
Cradle to gate with options, modules A1–A5, C1–C4 and module D.

Cut-off criteria:
Infrastructure, capital goods and personnel-related processes were excluded. Nucleating agent was cut-off (0.75% of mass of product). It is assumed that the cut-off criterion on mass inputs and primary energy at the unit process level (1%) and at the information module level (5%) are met.

Allocation:
Energy was allocated between Thermoplast and other toilet seats (Duroplast) based on the number of seats produced at each site.

Assumptions:
As Thermoplast toilet seats are predominantly sold with plastic hinges, a plastic hinge was modelled.

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 | X | X | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | X |
| Geography | DE, BG, CN | DE, BG, CN | DE, BG, CN | EUR | EUR | - | - | - | - | - | - | - | EUR | EUR | EUR | EUR | - |
| Specific data used | -19% to +44% for GWP-GHG indicator | | | | | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – products | -1% to +109% for GWP-GHG indicator compared to declared average | | | | | - | - | - | - | - | - | - | - | - | - | - | - |

Variability in the LCIA results is mainly due to the different weights of the products. In general, the lighter the product, the lower the LCIA results. The weight of the unpackaged product varies between 1.4 and 3.5 kg.

**A1: Raw Material**
This stage includes raw material extraction and production of bought components.

**A2: Transport**
This stage includes transportation of raw materials to production sites and of components to final site of assembly.

**A3: Manufacturing**
This stage includes resource use in the manufacturing facility in Vårgårda such as use of energy. It also includes treatment of waste generated from the manufacturing processes. The manufacturing includes casting, chrome plating, assembling, and packing. Data from the full year of 2022 have been used in the calculations.

Site electricity mixes were the following (GWP-GHG/kWh):

- Germany: Green electricity (3 g)
- Bulgaria: Residual electricity mix (441 g)
- China: Electricity mix (811 g)

**A4**
This stage includes the transportation of the finished product to its installation location. 1000 km transportation is assumed.

**A5**

This stage includes the installation of the product, materials needed and waste generated as an result of installation.

**C1: Deconstruction**
No impacts are assumed to be associated with the deconstruction phase.

**C2: Waste Transport**
Includes the transportation of the discarded product to a waste treatment facility. 100 km transportation is assumed.

**C3: Waste Processing**
This stage includes sorting of waste.

**C4: Waste disposal**
This stage includes waste disposal processes, such as landfill or incineration. Incineration is assumed for plastics, with metals assumed to have a recycling rate of 90%

**D: Benefits and loads outside the system boundary**
This stage includes benefits and burdens associated with recovery/recycling that affects future life cycles. For this product it includes benefits from the recycling of brass and metals, as well as energy recovery from waste incineration

# Content information

| Product components | Weight, kg | Post-consumer material, weight-% | Biogenic material, weight-% and kg C/kg |
|---|---|---|---|
| Thermoplast (polypropylene) | 1.027 | 0% | 0 |
| Injection Molding (polyethylene - ethylene vinyl acetate, pigment) | 0.043 | 0% | 0 |
| Other (polyamide) | 0.030 | 0% | 0 |
| TOTAL | 1.1 | 0% | 0 |
| **Packaging materials** | **Weight, kg** | **Weight-% (versus the product)** | **Weight biogenic carbon, kg C/kg** |
| Polyethylene foil | 0.017 | 1.5% | - |
| Cardboard box | 0.272 | 24.7% | 0.112 |
| TOTAL | 0.29 | 26.2% | 0.112 |

No substances that appear in the REACH Candidate List of Substances of Very High Concern (SVHC) are present or used in the product.

# Results of the environmental performance indicators

## Mandatory impact category indicators according to EN 15804

| Results per functional or declared unit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **A5** | **C1** | **C2** | **C3** | **C4** | **D** |
| GWP-total | kg $CO_2$ eq. | 3.18E+00 | 1.33E+00 | 4.67E-01 | 0.00E+00 | 1.08E-02 | 3.34E+00 | 0.00E+00 | -1.54E+00 |
| GWP-fossil | kg $CO_2$ eq. | 3.59E+00 | 1.33E+00 | 5.61E-02 | 0.00E+00 | 1.07E-02 | 3.34E+00 | 0.00E+00 | -1.54E+00 |
| GWP-biogenic | kg $CO_2$ eq. | -4.11E-01 | 9.86E-04 | 4.11E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-luluc | kg $CO_2$ eq. | 1.91E-03 | 4.34E+00 | 2.63E-05 | 0.00E+00 | 9.77E-05 | 3.13E-06 | 0.00E+00 | -9.91E-05 |
| ODP | kg CFC 11 eq. | 1.99E-11 | 2.58E-08 | 2.89E-15 | 0.00E+00 | 1.37E-15 | 1.69E-13 | 0.00E+00 | -1.19E-11 |
| AP | mol $H^+$ eq. | 7.76E-03 | 2.70E-03 | 1.74E-05 | 0.00E+00 | 4.18E-05 | 4.56E-04 | 0.00E+00 | -1.91E-03 |
| EP-freshwater | kg P eq. | 1.19E-05 | 8.78E-05 | 1.10E-08 | 0.00E+00 | 3.86E-08 | 4.18E-08 | 0.00E+00 | -2.47E-06 |
| EP-marine | kg N eq. | 2.28E-03 | 6.48E-04 | 6.81E-06 | 0.00E+00 | 1.94E-05 | 1.35E-04 | 0.00E+00 | -5.58E-04 |
| EP-terrestrial | mol N eq. | 2.37E-02 | 7.00E-03 | 8.86E-05 | 0.00E+00 | 2.18E-04 | 2.27E-03 | 0.00E+00 | -5.97E-03 |
| POCP | kg NMVOC eq. | 7.06E-03 | 4.49E-03 | 1.43E-05 | 0.00E+00 | 3.79E-05 | 3.74E-04 | 0.00E+00 | -1.55E-03 |
| ADP-minerals&metals* | kg Sb eq. | 5.35E-07 | 4.22E-06 | 2.10E-10 | 0.00E+00 | 6.95E-10 | 1.51E-09 | 0.00E+00 | -1.09E-07 |
| ADP-fossil* | MJ | 1.04E+02 | 1.52E+00 | 4.49E-02 | 0.00E+00 | 1.44E-01 | 4.34E-01 | 0.00E+00 | -2.81E+01 |
| WDP* | $m^3$ | 3.51E-01 | 7.68E-02 | 4.94E-03 | 0.00E+00 | 1.27E-04 | 3.12E-01 | 0.00E+00 | -1.45E-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 functional or declared unit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **A5** | **C1** | **C2** | **C3** | **C4** | **D** |
| GWP-GHG[1] | kg $CO_2$ eq. | 3.59E+00 | 1.33E+00 | 5.61E-02 | 0.00E+00 | 1.07E-02 | 3.34E+00 | 0.00E+00 | -1.54E+00 |

In order to calculate the results for module A1-A3 for a toilet seat with another weight, the following formula can be applied:
Average Thermoplast toilet seat GWP-GHG emissions in kg CO2e = 1.67 + Product weight (without packaging) in kg * 1.75

## Resource use indicators

| Results per functional or declared unit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **A5** | **C1** | **C2** | **C3** | **C4** | **D** |
| PERE | MJ | 1.14E+01 | 7.16E-01 | 4.57E+00 | 0.00E+00 | 1.05E-02 | 1.08E-01 | 0.00E+00 | -8.16E+00 |
| PERM | MJ | 4.57E+00 | 0.00E+00 | -4.57E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | MJ | 1.60E+01 | 7.16E-01 | 4.42E-03 | 0.00E+00 | 1.05E-02 | 1.08E-01 | 0.00E+00 | -8.16E+00 |
| PENRE | MJ | 5.89E+01 | 9.82E+00 | 7.95E-01 | 0.00E+00 | 1.44E-01 | 4.48E+01 | 0.00E+00 | -2.81E+01 |
| PENRM | MJ | 4.52E+01 | 0.00E+00 | -7.50E-01 | 0.00E+00 | 0.00E+00 | -4.44E+01 | 0.00E+00 | 0.00E+00 |
| PENRT | MJ | 1.04E+02 | 9.82E+00 | 4.51E-02 | 0.00E+00 | 1.44E-01 | 4.35E-01 | 0.00E+00 | -2.81E+01 |
| SM | kg | 2.42E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW | $m^3$ | 2.26E-02 | 7.84E-04 | 1.18E-04 | 0.00E+00 | 1.15E-05 | 7.31E-03 | 0.00E+00 | -6.62E-03 |
| 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 | | | | | | | | |

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic $CO_2$ is set to zero.

## Waste indicators

| Results per functional or declared unit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **A5** | **C1** | **C2** | **C3** | **C4** | **D** |
| Hazardous waste disposed | kg | 9.06E-08 | 0.00E+00 | 2.62E-13 | 0.00E+00 | 4.47E-13 | 1.45E-11 | 0.00E+00 | -1.49E-09 |
| Non-hazardous waste disposed | kg | 3.89E-02 | 0.00E+00 | 2.17E-04 | 0.00E+00 | 2.20E-05 | 1.52E-02 | 0.00E+00 | -1.39E-02 |
| Radioactive waste disposed | kg | 4.60E-03 | 0.00E+00 | 4.53E-07 | 0.00E+00 | 2.70E-07 | 2.45E-05 | 0.00E+00 | -2.16E-03 |

## Output flow indicators

| Results per functional or declared unit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **A5** | **C1** | **C2** | **C3** | **C4** | **D** |
| Components for re-use | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Material for recycling | kg | 0.00E+00 | 0.00E+00 | 2.72E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Materials for energy recovery | kg | 0.00E+00 | 0.00E+00 | 1.70E-02 | 0.00E+00 | 0.00E+00 | 1.10E+00 | 0.00E+00 | 0.00E+00 |
| Exported energy, electricity | MJ | 0.00E+00 | 0.00E+00 | 1.14E-01 | 0.00E+00 | 0.00E+00 | 7.09E+00 | 0.00E+00 | 7.20E+00 |
| Exported energy, thermal | MJ | 0.00E+00 | 0.00E+00 | 2.02E-01 | 0.00E+00 | 0.00E+00 | 1.28E+01 | 0.00E+00 | 1.30E+01 |

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. The results of the end-of-life stage (module C) should be considered when using the results of the production stage (modules A1-A4).

## Other environmental performance indicators

# Additional environmental information

- the existence of a quality or environmental management system or any type of organised environmental activity, and
- information on where interested parties may find more details about the organisation's environmental work.

Additional environmental information can also include information on carbon offset, carbon storage and delayed emissions, or on release of dangerous substances to indoor air, soil and water during the use stage.

# References

EPD International (2021): General Programme Instructions of the International EPD® System. Version 4.0.

EPD International (2023): PCR 2019:14. Construction products 2019:14. Version 1.3.4.

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Hamberger Sanitary GmbH (2023). *Environmental Product Declaration for Thermoplast Toilet Seats (Urea).* EPD No. S-P-09401. EPD International. Available at: EPD-IES-0009401:001 (S-P-09401) - Thermoplast Toilet Seats

Kyriakidis, A. (2025): Life Cycle Assessment of Villeroy-Boch toilet seats

SimaPro. SimaPro LCA Package, Pré Consultants, the Netherlands, www.pre-sustainability.com

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