

ENVIRONMENTAL PRODUCT DECLARATION

CALCULATION BASED ON
ISO 14025, EN 15804 AND EN 16578

1. GENERAL INFORMATION

LAUFEN BATHROOMS AG

Programme holder

Laufen Bathrooms AG
Wahlenstrasse 46
4242 Laufen, Switzerland

Declaration number

EPD-LB-2017001

This Declaration is based on the Product

Category Rules

EN 15804

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2.edition

Changes in Chapter 5, 6, 9



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CERAMIC SANITARYWARE

Owner of the Declaration

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Declared product / Declared unit

The Environmental Product Declaration refers to the declared unit of 1 tonne sanitary ceramic for an average product such as washbasins, bidets, toilets, urinals, cisterns and shower trays.

Scope

The object of this study is to draw up an LCA (Life Cycle Analysis) for Laufen Bathrooms AG sanitary ceramic, including packaging, produced at the production sites mentioned at 2.7. Owing to comparable manufacturing methods, an average product such as washbasins, bidets, toilets, urinals, cisterns and shower trays is formed on the basis of the overall sales volume of the respective products for 2015. The owner of the declaration shall be liable for the underlying information, life cycle assessment data and evidences.

EN 16578 describes the rating of product categories. The results are as shown in chapter 9 of this document.

Verification

The CEN Norm EN 15804:2013 serves as the core PCR for the EPD from chapter 1-8.

The CEN Norm EN 16578:2016 serves as basis for the product rating in chapter 9.

Independent verification of the declaration according to ISO 14025/

internally externally



M. Hartmann
Independent verifier

2. PRODUCT

2.1 PRODUCT DESCRIPTION

Ceramic sanitaryware encompasses mainly washbasins, bidets, toilets, urinals, cisterns and shower trays. These products are primarily made of materials such as clay, kaolin, quartz and feldspar. After preparation of the slurry, the mixture is cast or pressed, dried, glazed and then fired to form ceramic sanitaryware. A representative average sanitary ceramic product based on the overall mass volume manufactured in 2015 was used in calculating the environmental impact.

2.2 APPLICATION

The group of ceramic sanitaryware comprising of washbasins, bidets, toilets, urinals, shower trays and cisterns including accessories like pedestal, syphon covers and shelves are products that characterize bathroom furnishings and are normally used for personal hygiene.

2.3 TECHNICAL DATA

Ceramic sanitaryware are manufactured in a wide variety of dimensions. This has no impact on this subject.

The following (structural) technical data are representative examples (details as L x W x H):

Technical construction data (as an example)

Name	Value	Unit
Washbasins	850 x 460 x 150	mm
Bidets	530 x 360 x 400	mm
Toilets	600 x 360 x 430	mm
Urinals	650 x 300 x 350	mm
Cisterns	380 x 170 x 370	mm
Shower Trays	900 x 900 x 80	mm

2.4 PLACING ON THE MARKET / APPLICATION RULES

Ceramic sanitaryware manufactured by the production sites of Laufen Bathrooms AG are subject to the following international standards.

Europe (EU):

Directive (EU) No. 305/2011 applies for placing the products on the market in the EU/EFTA.

The products require a Declaration of Performance and CE marking taking into consideration:

EN 997:2012 and EN 997/A1:2012 WC pans and WC suites with integral trap and/or

EN 13407:2006 and EN 13407 A1: 2014 Wall-hung urinals – Functional requirements and test methods and/or

EN 14528:2007 Bidets – Functional requirements and test methods and/or

EN 14688:2006 Sanitary appliances – Washbasins – Functional requirements and test methods and/or

EN 14527:2006 + A1:2010 Shower trays for domestic purposes.

Australia (AS):

AS 1976: Vitreous china used in sanitary appliances

AS 1172.1: Pans

AS 1172.2: Cisterns

AS 3982: Urinals

AS / NZS 1730: Washbasins

AS 3494: Bidettes and bidets

AS / NZS 6400: Water efficient products – Rating and labelling

USA (ASME):

ASME A112.19.2 / CSA B45.1: Ceramic plumbing fixtures

ASME A112.19.14: Six-litre water closets equipped with a dual flushing device

ASME A112.19.19: Vitreous china non-water urinals

France (NF):

NF D14-601: Sanitary appliances: material enamelled - General specifications

NF D12-101: Sanitary appliances - Sanitary ceramic WC pans

NF D12-203: Sanitary appliances - Equiped flushing cisterns for toilet bowl

NF D12-101: Sanitary appliances - Sanitary ceramic WC pans

NF D11-101: Sanitary appliances - Sanitary ceramic wash basins

NF D11-201: Household management - Conditions of assembly and installation of wash basins for accomodating handicapped

Malaysia (MS):

MS 147: Specification for quality of vitreous china sanitary appliances

MS 1522: Vitreous china water closet pans specification

MS 795-1: WC flushing cisterns – PART I: Specification

MS 795-2: WC flushing cisterns – PART II: Inlet Valves

MS 795-3: WC flushing cisterns – PART III: Flushing devices

Singapore (SS):

SS 574 Part I: Dual flush low capacity water closet (WC) up to 4.5l/3l, WC flushing cisterns

SS 574 Part II: Dual flush low capacity water closet (WC) up to 4.5l/3l, WC pans

PRC National standard / China (GB):

GB 6952: Sanitary ware

Philippines (PNS):

PNS 156: Ceramic plumbing fixtures

Indonesia (SNI):

SNI-03-797: Water closet

Thailand (TIS):

TIS 792: Ceramic sanitary ware: water closets

2.5 DELIVERY STATUS (AS AN EXAMPLE)**Average product weight on delivery, excl. packaging**

Name	Product weight	Unit
Washbasins	16.7	kg
Bidets	19.5	kg
Toilets	23.0	kg
Urinals	17.2	kg
Cisterns	11.8	kg
Shower Trays	33.3	kg

2.6 BASE MATERIALS / ANCILLARY MATERIALS

Fine fire clay and vitreous china share similar production methods, the raw materials composition is used in various ways during the production process. Both materials, fine fire clay and vitreous china, were taken into account.

The following table provides an overview of the average composition of ceramic sanitaryware taking into account both fine fire clay and vitreous china.

Name	Value	Unit
Clay and Chamotte	49.5 %	by mass
Kaolin	24.3 %	by mass
Feldspar	13.0 %	by mass
Gypsum	5.4 %	by mass
Quartz	3.0 %	by mass
Zirconia	1.2 %	by mass
Others	3.6 %	by mass

Packaging is calculated with an average weight evaluation per production site. For an average product, it needs 53.7 kg cardboard, 72.7 kg wood and 5.1 kg plastics for the packaging per declared unit (1 tonne).

2.7 MANUFACTURE

The raw materials supplied are dried where necessary before storing in silos. Smaller volumes of components are supplied in sacks and/or big bags.

Slurry

Some of the raw materials require mechanical treatment in a grinding process. This is followed by preparing the slurry by mixing the raw materials with water and passing them through a sieve.

Glaze

The raw material is mixed with water before being sieved and then ground. Glue is added shortly before processing.

Mould construction

The casting moulds required for production are made of either plaster or a porous plastic.

Casting

Small batches are manufactured exclusively with plaster moulds in a manual hand mould process. Another production method involves the battery casting method, also with plaster moulds. The porous plastic moulds are used for high-pressure casting.

Remains and rejects are 100% recyclable and reintroduced back into the slurry preparation.

Drying

After casting, the ceramic products are processed through various drying methods depending on the respective complexity. Rejects are 100% recyclable and reintroduced back into the slurry preparation.

Glazing

The glaze is applied to the dry blank either manually or fully-automatically using robots. Surplus is collected, redirected and re-used in both methods.

Firing

In order to achieve a maximum kiln load, the glazed blanks are positioned manually on the firing trolley. The blanks are fired at over 1250°C in a tunnel kiln for approx. 14-24 hours.

Sorting

After firing, each product is subject to extensive individual examination. The Laufen logo is either fired on or applied by laser to perfect pieces before they get assembled, packed, stored and shipped.

Products which do not meet the quality requirements can often be touched up and fired again in a shuttle kiln or recycled.

Comments

- It is typical for production of ceramic sanitary ware, that one product model will be produced at several sites. All data are an average calculation based on the several manufacturing sites.
- In order to ensure consistent high quality, extensive inspections are carried out throughout all processes, starting at the delivery of the raw materials, and during all stages.
- Setter plates are required for many products during the firing process. These are mainly manufactured from recycled materials.
- The aim is to achieve a high recycling rate to avoid waste and to monitor and improve the rate continuously.
- The production facility of Laufen Bathrooms AG are certified to /ISO 9001/ and /ISO 14001/.
- Within the water management framework, improvements to the internal water processing are reviewed with water consumption being the main priority.
- Within the energy management framework, improvements to the internal processes are reviewed with energy consumption being the priority

Production sites

The following production sites delivered the necessary data for the EPD calculation of Laufen Bathrooms AG:

- | | | |
|----------------------|-------------------------|-----------------------|
| • Keramik LAUFEN AG | Wahlenstrasse 46 | CH – 4242 Laufen |
| • LAUFEN Austria AG | Engelhofstraße 7-9 | A – 4810 Gmunden |
| • LAUFEN Austria AG | Mariazeller Strasse 100 | A – 3150 Wilhelmsburg |
| • LAUFEN c.z. s.r.o | Na Libuši 717 | CZ – 39165 Bechyne |
| • LAUFEN c.z. s.r.o | Průmyslová 14 | CZ – 670 40 Znojmo |
| • ZWS Silesia Sp zoo | ul.Wyczolkowskiego, 20 | PL – 44-109 Gliwice |

2.8 ENVIRONMENT AND HEALTH DURING MANUFACTURING

Legal conformity in relation to occupational safety, health and environmental protection is maintained throughout the entire manufacturing process for ceramic sanitaryware.

2.9 PRODUCT PROCESSING/INSTALLATION

There are no particular requirements on machines to be used. The manufacturing process complies with national legal requirements on dust extraction.

The installation tools required or the use of auxiliary materials are listed in the mounting instructions supplied with the product.

2.10 PACKAGING

Ceramic sanitaryware is packaged either in cardboard boxes and/or shrinkwrap or stacked on pallets and fixed by shrinkwrap.

2.11 CONDITION OF USE

No particular features arise in the material composition of the product during use.

2.12 ENVIRONMENT AND HEALTH DURING USE

As ceramic sanitaryware is fired at very high temperatures, it is solid and chemically stable.

The product has no negative impact on the environment and health during the entire service life.

2.13 REFERENCE SERVICE LIFE

The service life is not a component under review or a component of this Environmental Product Declaration but is used and cared for appropriately; a typical service life of 40 year can be achieved for ceramic sanitaryware.

2.14 EXTRAORDINARY EFFECTS

Fire

Ceramic sanitaryware is classified as construction product class A1, non-combustible in accordance with DIN 4102-1.

Water

In the event of unforeseen impact by water (e.g. flooding) on ceramic sanitaryware, no negative impacts are to be anticipated in terms of product function or the environment.

Mechanical destruction

In the event of minor, unforeseen mechanical damage, no impacts are to be anticipated in terms of ceramic sanitaryware product function.

2.15 RE-USE PHASE

Material recycling of ceramic sanitaryware is technically possible.

2.16 DISPOSAL

Ceramic sanitaryware is currently reused together with building rubble in European countries.

The following /waste keys/ can be indicated for the respective components:

wastes from manufacture of ceramic products = /1012/

Paper and cardboard packaging = /150101/

Plastic packaging = /150102/

Construction and demolition waste: tiles, bricks and ceramic = /170103/

2.17 FURTHER INFORMATION

Additional information available at www.laufen.com.

3. LCA: CALCULATION RULES

3.1 DECLARED UNIT

A declared unit of 1 tonne is taken as a basis for calculating the LCA (Life Cycle Assessment) for ceramic sanitaryware. All environmental impacts by the product relate to 1 tonne (t) of ceramic sanitaryware.

Chapter 2.5 provides an overview of the typical average mass per product group.

Packaging is calculated with an average of 53.7 kg cardboard, 72.7 kg wood and 5.1 kg plastics per declared unit (1 tonne) ceramic sanitaryware.

A manufacturer declaration for an average product at Laufen Bathrooms AG ceramic sanitaryware location(s) are drawn up as a basis for the environmental impacts. On account of comparable manufacturing methods, an average product representing washbasins, bidets, toilets, urinals, cisterns and shower trays is formed on the basis of the overall sales volume of the respective products for 2015.

3.2 SYSTEM BOUNDARY

The system boundaries contain all relevant process steps during the manufacture of ceramic sanitaryware within a cradle-to-gate review. This means, that in accordance with the EN 15804 on which they are based, all processes of the production stage A1-A3 are considered. Subsequent transport of the product to the construction site is no longer included in the calculation.

As a general rule, the system can be divided into three main processes:

Module A1: Provision and production of preliminary products and packaging materials

Module A2: Transport of preliminary products and packaging materials to the plant

Module A3: Production of sanitary ceramic as well as processing and disposal of production waste.

The images shown below depicts an overview of the system boundaries in this study:



Raw material production (A1)

Clay, Chamotte, Kaolin, Quartz, Feldspar, Zirconia



Transport of raw material (A2)



Production of Ceramic Sanitary ware (A3)

Slurry, Casting, Drying, Glazing, Firing, Sorting, Packaging

3.3 ESTIMATES AND ASSUMPTIONS

As the production processes are the direct responsibility of Laufen Bathrooms AG, the data accuracy can be classified as good. Very few assumptions were made.

No suitable dataset could be found for the raw materials wollastonite and nepheline. Each of these materials make up less than 1% and therefore come under the cut off criteria but are considered with the following datasets anyway:

- Wollastonite = Quartz sand
- Nepheline = Quartz sand

3.4 CUT-OFF CRITERIA

All data from the period described in chapter 3.7 are taken into account. Thus, material flows with a mass fraction of less than one percent were also recognized. It can be assumed that the sum of the neglected mass fractions does not exceed 5% of the total mass flow.

3.5 BACKGROUND DATA

For modeling the lifecycle, the software system for holistic balancing /GaBi/ was used. All background data records relevant for production and disposal were taken from various GaBi supplementary databases as well as from /ecoinvent/. The data records included in the databases are documented online.

3.6 DATA QUALITY

Data collection for the investigated products was carried out on the basis of evaluations of the internal production and environmental data, the collection of LCA-relevant data within the supply chain as well as through the measurement of relevant energy supply data. The collected data was checked for plausibility and consistency. A good representation is to be assumed.

Where possible, the GaBi database was used in the latest version. If no appropriate dataset was available in GaBi, /ecoinvent/ or /ELCD/ datasets were selected. This applies for clay, chamotte and feldspar. These datasets exceed the age of ten years but were updated in 2010 and therefore meet the requirements of the /DIN EN 15804/.

3.7 PERIOD UNDER REVIEW

The period under review for the data collected on ceramic sanitaryware involves 2015.

3.8 ALLOCATION

No allocations of production data were necessary, as only the products reviewed are manufactured at the production sites. All data refers to the reference products.

3.9 COMPARABILITY

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account. The used background database has to be mentioned.

4. LCA: SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

The following technical information forms the basis for the declared modules or can be used for developing specific scenarios in the context of a building evaluation if modules are not declared (MND).

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED; MND = MODULE NOT INCLUDED)																
PRODUCTION STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Water processing	Disposal	Reuse - Recovery - Recycling - potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

5. RESULTS OF THE LCA (LIFE CYCLE ANALYSIS)

Parameter	Unit	Raw material supply A1	Transport A2	Manufacturing A3	A1, A2 and A3
Environmental impact as per 1 tonne ceramic sanitaryware					
Global warming potential (GWP)	[kg CO ₂ -Äq.]	9,83E+02	1,88E+01	1,20E+03	1,20E+03
Depletion potential of the stratospheric ozone layer (ODP)	[kg CFC11-Äq.]	2,72E-05	8,63E-11	9,22E-10	2,72E-05
Acidification potential of land and water (AP)	[kg SO ₂ -Äq.]	2,78E+00	1,18E-01	8,84E-01	3,78E+00
Eutrophication potential (EP)	[kg PO ₄₃ --Äq.]	5,81E-01	2,95E-02	1,89E-01	7,99E-01
Formation potential of tropospheric ozone photochemical oxidants (POCP)	[kg Ethen-Äq.]	2,55E-01	-4,92E-02	1,98E-01	4,04E-01
Abiotic depletion potential for non-fossil resources (ADPE)	[kg Sb-Äq.]	3,80E-03	1,25E-06	9,71E-05	3,89E-03
Abiotic depletion potential for fossil resources (ADPF)	[MJ]	1,24E+04	2,59E+02	1,85E+04	3,12E+04
Resource use as per 1 tonne ceramic sanitaryware					
Use of renewable primary energy	[MJ]	1,60E+03	1,47E+01	4,24E+01	1,66E+03
Use of renewable primary energy resources used as raw materials	[MJ]	2,37E+03	0,00E+00	0,00E+00	2,37E+03
Total use of renewable primary energy resources	[MJ]	3,97E+03	1,47E+01	4,24E+01	4,02E+03
Use of non-renewable primary energy	[MJ]	1,47E+04	2,60E+02	1,85E+04	3,34E+04
Use of non-renewable primary energy resources used as raw materials	MJ	2,19E+02	0,00E+00	0,00E+00	2,19E+02
Total use of non-renewable primary energy resources	[MJ]	1,49E+04	2,60E+02	1,85E+04	3,37E+04
Use of secondary material	[kg]	1,71E+02	0,00E+00	0,00E+00	1,71E+02
Use of renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	[m ³]	1,62E+01	3,68E-02	5,81E-01	1,68E+01
Output flows and waste categories as per 1 tonne ceramic sanitaryware					
Hazardous waste disposed	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	[kg]	3,48E+01	2,18E-02	1,43E+02	1,78E+02
Radioactive waste disposed	[kg]	7,53E-01	3,71E-04	6,43E-03	7,60E-01
Components for re-use	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	[kg]	0,00E+00	0,00E+00	3,42E+02	3,42E+02
Materials for energy recovery	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00

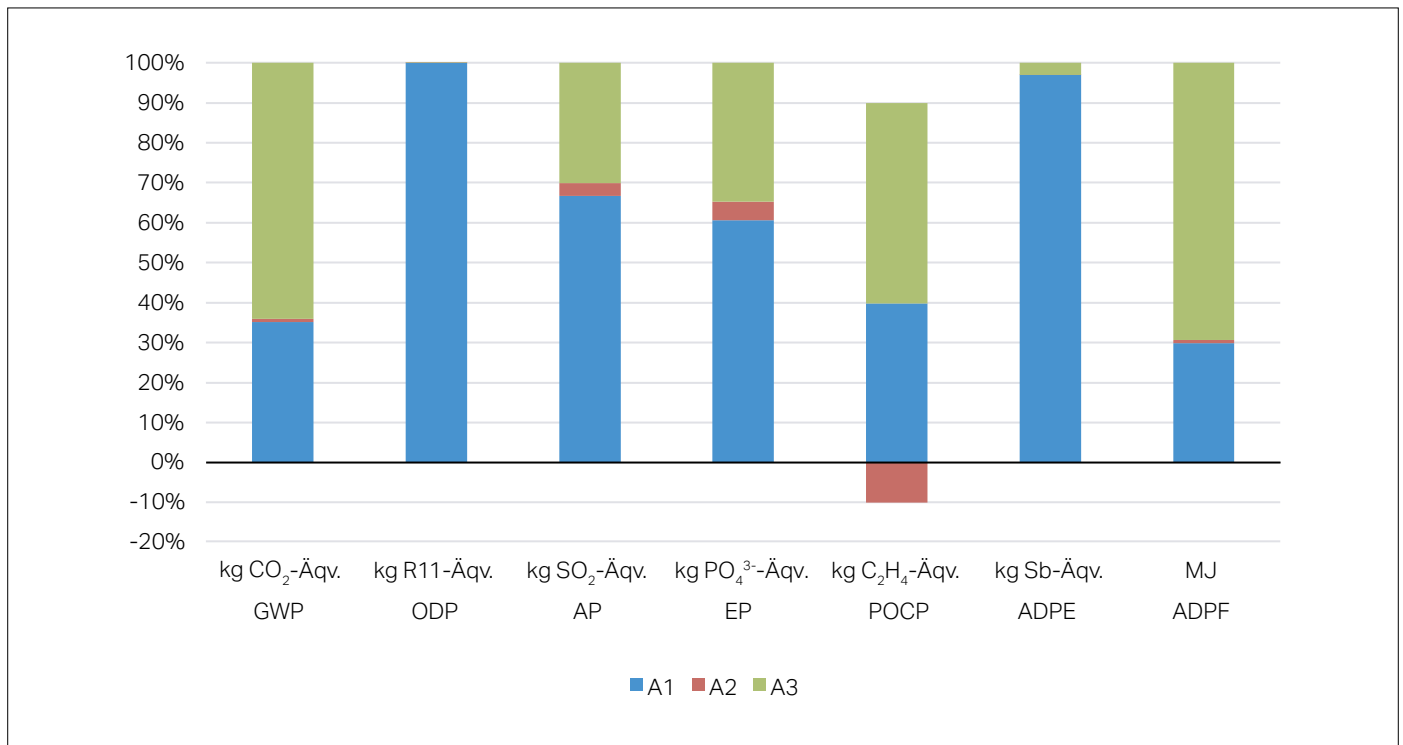
Remarks to the collection of data:

1.) Water for the manufacturing process of ceramic sanitaryware is taken from private wells.

6. LCA: INTERPRETATION

The following influence analysis aims to provide an interpretation of the results from the LCA:

Graph of results



The graph depicts the primary parameters influencing the product's environmental profile.

Module A1 primarily characterises most of the environmental impacts mainly because of the electricity generation and sourcing of raw materials.

Module A2 represents the transport of raw materials to the production site which has a relatively small impact on the result of the LCA.

Module A3 contains the life cycle impacts caused by the production processes of the manufacturer. It has a major impact on energy related environmental impact categories.

In detail, the Global Warming Potential (**GWP**) is a primary factor reaching 65% by stage A3 of the manufacturing of ceramics. The predominant part is the firing process. The remaining 35% are dominated by electricity generation which is part of module A1. This applies also on the environmental influence of the Acidification (**AP**) and Eutrophication Potential (**EP**). The extraction of minerals has only little influence on the overall result.

The Ozone Depletion Potential (**ODP**) is nearly completely affected by the extraction of zirconium oxide. Generally, the influence of A2 (Transport of raw materials) is very small, except at the potential of tropospheric ozone photochemical oxidants POCP where module A2 causes a credit. The Abiotic Depletion Potential of non-Fossil Resources (**ADPE**) is dominated by the production of gypsum by about 80%. However, the Abiotic Depletion Potential Fossil Resources (**ADPF**) is dominated by A3 due to the combustion of natural gas in the firing process.

7. REQUISITE EVIDENCE

Regarding the REACH compliance, for ceramic sanitaryware of Laufen Bathrooms AG, this is an area where there is no obligation to register, or any obligation to produce safety data-sheets.

Regarding the use of dangerous substances, for ceramic sanitaryware of Laufen Bathrooms AG, this is an area where there is no obligation to declare any substances, or any obligation to produce safety data-sheets.

Sustainability of products: The evaluation of sustainability can be given in EN 16578 by means of a ranking system. For details see chapter 9.

8. REFERENCES

The literature referred to in the Environmental Product Declaration must be quoted in full from the following sources. Standards already fully quoted in the EPD do not need to be listed here again.

EN 16578 was used as PCR document.

DIN EN ISO 14025: 2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 14040: 2006, Environmental management – Life Cycle Assessment – Principles and framework

ISO 14044: 2006, Environmental management – Life Cycle Assessment – Requirements and guideline

EN 15804: 2012-04+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

EN 16578: 2015 Ceramics sanitary appliances — Sustainability assessment

ecoinvent – Database for ecobalancing, version 2.2. Swiss Centre for Life Cycle Inventories, St. Gallen.

Europe (EN):

EN 997:2012 and EN 997/AC:2012 WC pans and WC suites with integral trap and/or

EN 13407:2006 Wall-hung urinals – Functional requirements and test methods/ and/or

EN 14528:2007 Bidets – Functional requirements and test methods and/or

EN 14688:2006 Sanitary appliances – Washbasins – Functional requirements and test methods and/or

EN 14527:2006 + A1:2010 Shower trays for domestic purposes

ELCD – European Reference Life Cycle Database, version 2.0. European Commission, Joint Research Centre – Institute for Environment and Sustainability and DG Environment – Directorate G (2008)

GaBi – GaBi 7.3: softwaresystem for holistic balancing, LBP [Institut für Kunststoffprüfung und Kunststoffkunde] University of Stuttgart and Thinkstep AG, Leinfelden-Echterdingen, 1992 – 2015

JRC - European Reference Life Cycle Database, version 2.0. European Commission, Joint Research Centre – Institute for Environment and Sustainability and DG Environment – Directorate G (2008)

Waste keys – COMMISSION DECISION of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council (2014/955/EU)

Abbreviations:

PCR = Product Category Rules

EPD = Environmental Product Declaration

LCA = Life Cycle Analysis

9. PRODUCT RATING ACCORDING EN 16578

9.1. PRINCIPLE OF RATING

EN 16578 chapter 4.1 describes the rating of products as shown below.

The criteria is based on the “three pillar model” of sustainability as stated in the World Summit Conference in 2005 [1]. These “three pillars” (ecological, economic and social requirements) are generally used in terms of sustainability.

Pillar 1	“Ecological requirements” covers the applicable requirements from information moduls A1 to A5 of EN 15804.
Pillar 2	“Economical requirements” covers the applicable requirements from information moduls B1, B6 and B7 of EN 15804.
Pillar 3	“Social requirements” covers further applicable requirements from information moduls B2 to B5 of EN 15804.

The weighting factors for the three pillars are in accordance with EN 16578 (annex B - table B.4):

Factor 3	for pillar 1 (e.g. raw material, transport, production and transport to the market)
Factor 2	for pillar 2 (e.g. energy and water consumption)
Factor 1	for pillar 3 (e.g. cleanability and noise)

For the purposes of assessment, the manufacturer's products may be grouped into categories, where it is considered that the results for the assessed characteristics from any one product within the category are representative for the same characteristics for all products within that same category, e.g. WC of type 5, WC of type 6, WCs suites of type 6 or washbasins.

The concluding results for each requirement shall be reported according the evaluation scheme in EN 16578 annex B. The classification allows rating-classes from S1 to S7 with S7 to be the highest level.

Correlation of achieved sustainability value to sustainability class

Rating value range (%)	Sustainability Class
< 79	S1
≥ 79 und < 87	S2
≥ 87 und < 96	S3
≥ 96 und < 104	S4
≥ 104 und < 113	S5
≥ 113 und < 121	S6
≥ 121	S7

The ceramic sanitaryware mentioned in chapters 9.2 to 9.4 are groups of products according to their performance.

The performance of each single product is shown within the declaration of performance.

The DoP (Declarations of Performance) of Laufen Bathrooms AG are published at www.laufen.com.

9.2. RATING OF WCS AND WC SUITES

For the product rating according to EN 16578 Annex B (Evaluation schema) it was taken into account all manufactured WC's and WC suites are based on the LCA – data according EN 16578 / 'EN 15804 shown in point 5 (Results). Table 9.1 to 9.3 show the product rating of certain WC pans and suites.

Rating according EN 16578	WC 1	WC 2	WC 3	WC 4
Average flush volume for WCs	3,73 l 5,9 / 3 litres	3,50 l 5 / 3 litres	3,38 l 4,5 / 3 litres	2,50 l 4 / 2 litres
Name / Type of Product	Pan	Pan	Pan	Pan
Part 1: Ecologic criteria (4.2 ¹⁾)	99%	99%	99%	99%
Part 2: Economical criteria (4.3 ¹⁾)	122%	124%	125%	132%
Part 3: Social and functional criteria (4.4 ¹⁾)	100%	100%	100%	100%
Rating value	107%	108%	108%	110%
Sustainability Class	S 5	S 5	S 5	S 5

Table 9.1: WC 1 to WC 4 (pans)

Rating according EN 16578	WC 5	WC 6	WC 7
Average flush volume for WCs	3,75 l 6 / 3 litres	3,50 l 5 / 3 litres	3,38 l 4,5 / 3 litres
Name / Type of Product	Shower pan	Shower pan	Shower pan
Part 1: Ecologic criteria (4.2 ¹⁾)	99%	99%	99%
Part 2: Economical criteria (4.3 ¹⁾)	115%	117%	118%
Part 3: Social and functional criteria (4.4 ¹⁾)	100%	100%	100%
Rating value	105%	105%	106%
Sustainability Class	S 5	S 5	S 5

Table 9.2: WC 5 to WC 7 (Shower pans)

Rating according EN 16578	WC 8	WC 9	WC 10	WC 11
Average flush volume for WCs	3,73 l 5,9 / 3 litres	3,50 l 5 / 3 litres	3,38 l 4,5 / 3 litres	2,50 l 4 / 2 litres
Name / Type of Product	cl.c. suites	cl.c. suites	cl.c. suites	cl.c. suites
Part 1: Ecologic criteria (4.2 ¹⁾)	99%	99%	99%	99%
Part 2: Economical criteria (4.3 ¹⁾)	122%	124%	125%	132%
Part 3: Social and functional criteria (4.4 ¹⁾)	103%	103%	103%	103%
Rating value	108%	108%	108%	111%
Sustainability Class	S 5	S 5	S 5	S 5

Table 9.3: WC 8 to WC 11 (WC suites)

¹⁾ relevant chapter of EN 16578

9.3. RATING OF URINALS

For the product rating according to EN 16578 Annex B (Evaluation scheme) it was taken into account all manufactured urinals based on the LCA – data according to EN 16578 / EN 15804 shown in point 5 (Results).

Table 9.4 to 9.5 shows the product rating of certain urinals.

	Urinal 1	Urinal 2	Urinal 3	Urinal 4	Urinal 5
Flush volumes for urinals	1,00 l C1-I – 1 L	1,00 l C1-IV – 1 L	1,00 l C1-IV – 1 L	0,50 l C1-IV – 0,5 L	0,50 l C1-IV – 0,5 L
Name of the product	TAMARO	TAMARO - 220 V	TAMARO - Battery	LEMA - 220V	LEMA - Battery
Type of urinal	C1-I	C1-IV	C1-IV	C1-IV	C1-IV
Part 1: Ecologic criteria (4.2 ¹⁾)	99%	99%	99%	99%	99%
Part 2: Economical criteria (4.3 ¹⁾)	125%	117%	109%	119%	111%
Part 3: Social and functional criteria (4.4 ¹⁾)	100%	100%	100%	100%	100%
Rating value	108%	105%	103%	106%	103%
Sustainability Class	S 5	S 5	S 4	S 5	S 4

Table 9.4: Urinal 1 to Urinal 5

	Urinal 6	Urinal 7	Urinal 8	Urinal 9
Flush volumes for urinals	1,00 l C2-III – 1 L	2,00 l C2-III – 2 L	1,65 l C1-IV – 1,65 L	1,65 l C1-IV – 1,65 L
Name of the product	CASA	CAPRINO	CAPRINO -220 V	CAPRINO - Battery
Type of urinal	C2-III	C2-III	C1-IV	C1-IV
Part 1: Ecologic criteria (4.2 ¹⁾)	99%	99%	99%	99%
Part 2: Economical criteria (4.3 ¹⁾)	125%	120%	114%	106%
Part 3: Social and functional criteria (4.4 ¹⁾)	100%	100%	100%	100%
Rating value	108%	106%	104%	101%
Sustainability Class	S 5	S 5	S 5	S 4

Table 9.5: Urinal 6 to Urinal 9

9.4. RATING OF FURTHER CERAMIC SANITARY APPLIANCES

For the product rating according to EN 16578 Annex B (Evaluation scheme) it was taken into account all further manufactured ceramic sanitaryware products based on the LCA – data according EN 16578 / 'EN 15804 shown in point 5 (Results). Table 9.6 shows the rating of certain ceramic sanitaryware products. Accessories are products such as: pedestals, syphon covers and shelves.

Product group	Washbasin	Bidet	Shower Tray	Accessories
Part 1: Ecologic criteria (4.2 ¹⁾)	99%	99%	99%	99%
Part 2: Economical criteria (4.3 ¹⁾)	128%	128%	128%	128%
Part 3: Social and functional criteria (4.4 ¹⁾)	100%	100%	100%	103%
Rating value	109%	109%	109%	109%
Sustainability Class	S 5	S 5	S 5	S 5

Table 9.6: Further ceramic sanitary appliances

¹⁾ relevant chapter of EN 16578

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