Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Atlantic kitchen mixers

from

Villeroy & Boch Gustavsberg AB

Programme:	The International EPD® System, www.environdec.com
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General information

Programme information

Programme:	The International EPD® System
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR) Construction Products 2019:14, Version 1.1 and EN 15804:2012 + A2:2019 Sustainability of Construction Works
PCR review was conducted by: *The Technical Committee on the International EPD ® System. Contact via www.environdec.com info@environdec.com*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: *Marcus Wendin, Miljögiraff AB* Approved by: The International EPD® System
LCA report and EPD prepared by: AFRY, www.afry.com
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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Company information

Owner & Contact of the EPD:
Villeroy & Boch Gustavsberg AB
Odelbergs väg 11
134 40 Gustavsberg
Tel: +46 8-570 391 00

Description of the organisation:
Villeroy & Boch Gustavsberg's head office is situated on Värmdö, just outside Stockholm, Sweden, and we have production facilities in Gustavsberg and Vårgårda as well. In addition to our production facilities in Sweden, we also have sales offices around the Nordic countries and in the Baltics. The company is a wholly owned subsidiary of the German Villeroy & Boch AG Group and thus belongs to one of the largest manufacturers of bathroom furnishing solutions in Europe.

Product-related or management system-related certifications:
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
EMAS, Eco Management and Audit Scheme – register, Site Vårgårda

Name and location of production site:
Villeroy & Boch Gustavsberg AB, Vårgårda, Sweden

Product information

Product name:
Atlantic kitchen mixer

The results and information on material content in this EPD is calculated based on the Atlantic kitchen mixer with dishwasher shut-off (GB41205098) which is considered a representative product since it is the product with largest production volumes within the product group. The article numbers below are very similar and are also included in the EPD. The difference in GWP-GHG results for module A1-A3 is less than 10% for all included article numbers.

Product name	Article number	RSK	EAN-number	Article weight (kg/piece)	Energy class
Atlantic kitchen mixer, with dishwasher shut-off	GB41205098	8310776	7393792232326	1.35	C
Atlantic kitchen mixer, without dishwasher shut-off	GB41205058	8310774	7393792232302	1.27	C
Atlantic kitchen mixer, with dishwasher shut-off and G3/8 connection	GB41205098R		7393792234863	1.35	C
Atlantic Wash Through kitchen mixer	GB41215045	8246914	7393792233729	1.17	C

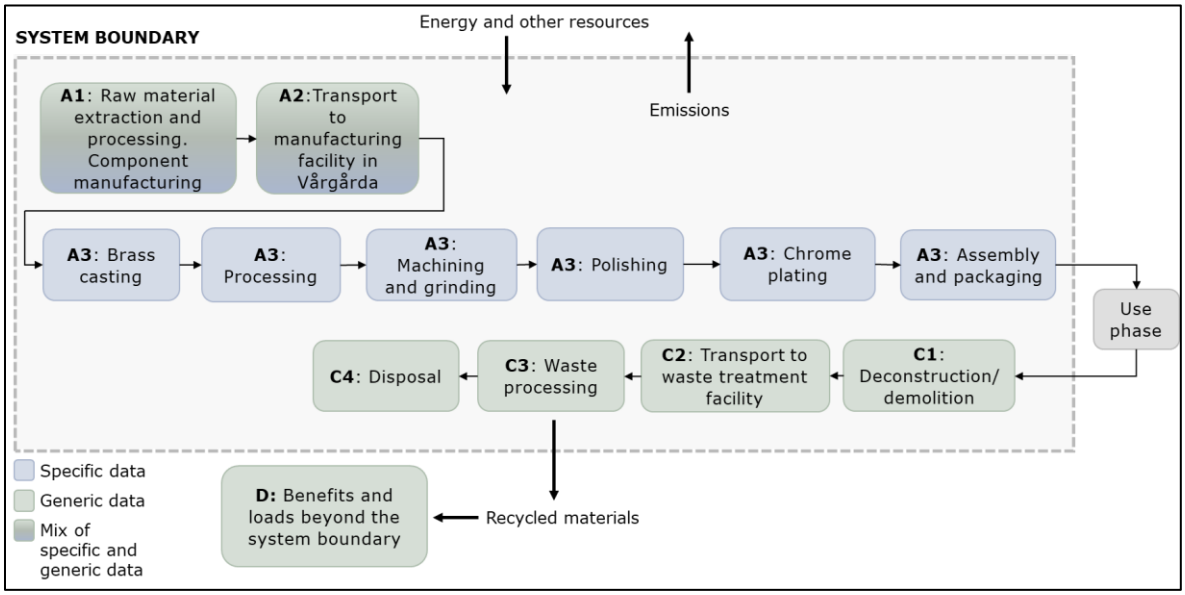
Product description:
Atlantic kitchen mixers in this EPD are Energy class C product that supports saving of energy and water during the user phase. The range of Atlantic kitchen mixers also consist of mixers with a more efficient products, rated Energy Class B. These products are presented in EPD S-P 05058

UN CPC code:
42911 - Sinks, wash-basins, baths and other sanitary ware and parts thereof, of iron, steel, copper or aluminum

LCA information

Declared unit:
1 kg of brass mixer
Reference service life:
No RSL is declared. This EPD is based on a cradle-to-gate assessment
Time representativeness:
The LCA is based on production data from 2020 and is considered to be an average year of production.
Cut-off criteria:
More than 95% of total inflows of mass and energy are included in the study.
Database(s) and LCA software used:
Ecoinvent 3.8 and SimaPro 9.3
Description of system boundaries:
Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D).
Data quality:
Raw material input, energy, water and chemical consumption from manufacturing and waste in manufacturing is primary data collected from Villeroy & Boch. A mix of specific and general data is used for extraction and refining of raw materials and components, and for transportation.
LCA practitioner:
AFRY Sweden, www.afry.com

System diagram:



	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	ND	ND	X	X	X	X	X
Geography	GLO/ EU	GLO/ EU	EU										EU	EU	EU	EU	EU
Specific data used	11% of the GWP-GHG impact (modules A-C) stems from specific data (A2 and A3)					-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	Less than 10% for GWP-GHG (A1-A3)																

A1: Raw Material
This stage includes raw material extraction, including melting and forming of brass. 70% of brass is produced from recycled metals. Also, production of raw materials for components as well as component manufacturing is included. Transportation of inputs to brass production and component manufacturing is included in this module.

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 production of the brass housings for the faucets, surface treatment of the housings and assembly of the finished product. It also includes treatment of waste generated from the manufacturing processes up to the end-of-waste state. The manufacturing processes at Villeroy & Boch includes casting, machining, grinding, polishing and chrome plating. The electricity used in manufacturing is the residual electricity mix of the Swedish energy supplier Vattenfall and consists of 56% hydropower and 46% nuclear power. The climate impact of the electricity mix is 17g CO2 eq./kWh.

C1: Deconstruction
This stage includes impacts related to removing the mixers 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. 95% of the brass in the product is assumed to be recycled.

C4: Waste disposal
This stage includes waste disposal processes such as landfilling or incineration. Brass mixers are generally recycled at the end of their life. Non-brass metals, plastics and rubbers in the product are assumed to be landfilled or 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 brass and incineration of waste.

Content information

The main material in the kitchen mixer is brass. Zinc is used in the lever and other materials are used in different components.

Product components	Weight-%	Post-consumer material, weight-%	Renewable material, weight-%
Brass	68%	70%	0
Zinc	11%	0	0
Stainless steel	7%	49%	0
Polyamide	6%	0	0
Polyoxymethylene (POM)	2%	0	0
Aluminium oxide	2%	0	0
Soft PEX	2%	0	0
Polypropylene	1%	0	0
ABS	1%	0	0
EPDM	1%	0	0
TPE	0.2%	0	0
Vulcan fibre	0.1%	0	0
NBR	0.02%	0	0
PTFE	0.01%	0	0
Lead	<0.7%	0	0
TOTAL	1 kg mixer		
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Cardboard	0.2 kg	14%	
TOTAL	0.2 kg	14%	

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	<0.7%

Environmental Information for Atlantic kitchen mixer

Potential environmental impact – mandatory indicators according to EN 15804

Results per 1 kg of brass mixer										
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	4.42E+00	8.95E-02	4.53E-01	4.96E+00	0.00E+00	1.63E-02	9.75E-04	2.27E-01	-2.23E+00
GWP-biogenic	kg CO_2 eq.	8.37E-02	1.05E-04	3.27E-02	1.16E-01	0.00E+00	4.37E-05	5.50E-05	3.38E-05	-2.56E-02
GWP-luluc	kg CO_2 eq.	6.73E-03	5.18E-05	2.12E-02	2.80E-02	0.00E+00	6.51E-06	2.09E-06	3.00E-06	-4.68E-03
GWP-total	kg CO_2 eq.	4.51E+00	8.96E-02	5.07E-01	5.11E+00	0.00E+00	1.63E-02	1.03E-03	2.27E-01	-2.26E+00
ODP	kg CFC 11 eq.	2.05E-07	1.97E-08	8.57E-08	3.11E-07	0.00E+00	3.77E-09	6.15E-11	9.60E-10	-1.38E-07
AP	mol H^+ eq.	1.79E-01	1.78E-03	5.49E-03	1.86E-01	0.00E+00	4.63E-05	5.88E-06	6.30E-05	-1.55E-01
EP-freshwater	kg P eq.	1.30E-02	4.17E-06	1.79E-04	1.32E-02	0.00E+00	1.07E-06	8.96E-07	7.77E-07	-1.15E-02
EP-freshwater	kg PO4 eq	4.00E-02	1.28E-05	5.48E-04	4.06E-02	0.00E+00	3.28E-06	2.75E-06	2.39E-06	-3.53E-02
EP-marine	kg N eq.	1.08E-02	4.35E-04	7.94E-04	1.21E-02	0.00E+00	9.40E-06	1.19E-06	3.31E-05	-7.57E-03
EP-terrestrial	mol N eq.	1.38E-01	4.83E-03	5.94E-03	1.49E-01	0.00E+00	1.02E-04	1.13E-05	2.91E-04	-1.04E-01
POCP	kg NMVOC eq.	3.87E-02	1.29E-03	1.96E-03	4.19E-02	0.00E+00	3.94E-05	3.16E-06	7.27E-05	-2.90E-02
ADP-minerals&metals*	kg Sb eq.	4.41E-03	1.62E-07	1.13E-05	4.43E-03	0.00E+00	5.77E-08	9.15E-09	1.86E-08	-3.92E-03
ADP-fossil*	MJ	5.63E+01	1.28E+00	3.54E+01	9.30E+01	0.00E+00	2.47E-01	1.98E-02	7.43E-02	-2.94E+01
WDP*	m^3	4.22E+00	3.11E-03	1.04E+00	5.27E+00	0.00E+00	7.28E-04	2.23E-04	1.21E-02	-2.67E+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									

** 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.*

Potential environmental impact – additional mandatory and voluntary indicators

Results per 1 kg of brass mixer										
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	4.43E+00	8.95E-02	4.74E-01	4.99E+00	0.00E+00	1.63E-02	9.77E-04	2.27E-01	-2.23E+00

Use of resources per 1 kg of brass mixer

Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	9.86E+00	1.24E-02	1.14E+01	2.13E+01	0.00E+00	3.53E-03	3.73E-03	1.92E-03	-7.03E+00
PERM	MJ	0.00E+00	0.00E+00	2.48E+00	2.48E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	9.86E+00	1.24E-02	1.39E+01	2.38E+01	0.00E+00	3.53E-03	3.73E-03	1.92E-03	-7.03E+00
PENRE	MJ	6.01E+01	1.36E+00	3.58E+01	9.73E+01	0.00E+00	2.62E-01	2.08E-02	7.99E-02	-3.14E+01
PENRM	MJ.	5.75E+00	0.00E+00	2.26E+00	8.01E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	6.59E+01	1.36E+00	3.81E+01	1.05E+02	0.00E+00	2.62E-01	2.08E-02	7.99E-02	-3.14E+01
SM	kg	5.06E-01	0	0	5.06E-01	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m^3	1.31E-01	1.88E-04	2.47E-02	1.56E-01	0.00E+00	4.13E-05	5.78E-06	4.11E-04	-7.52E-02
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 = Net use of fresh water									

[1] 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 production and output flows

Waste production* per 1 kg of brass mixer

Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0	0	1.15E-01	1.15E-01	0	0	0	0	0
Non-hazardous waste disposed	kg	0	0	2.03E-01	2.03E-01	0	0	0	3.13E-01	
Radioactive waste disposed	kg	0	0	0	0	0	0	0	0	0

**These indicators are presented according to Environdec's guidelines on resource use and waste indicators (https://www.environdec.com/resources/indicators).*

Output flows per kg 1 kg of brass mixer

Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0	0	0	0
Material for recycling	kg	0	0	4.36E-01	4.36E-01	0	0	0	6.86E-01	1.12E+00
Materials for energy recovery	kg	0	0	0	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0	0	0

Information on biogenic carbon content

Results per kg 1 kg of brass mixer		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0.030

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

Additional information

Drinking water is by far our most important natural resource and fundamental for our health. Worldwide the limitations regarding materials and their influences on drinking water quality are increasingly getting stricter. Therefore, the proper choice of suitable alloys for drinking water installations is one of the most crucial aspects. Technical, economic, and – with growing interest – hygienical characteristics have to be considered.

More than 20 percent of Sweden's energy use comes from heating and production of hot water. In a two-year project, RISE has shown that large savings are possible by using energy-efficient mixers (Folkeson et al., 2017). Researchers at RISE have carried out measurements in apartment buildings with mixers in different energy classes from Villeroy & Boch Gustavsberg & others.
Good energy-rated mixers have functions that reduce hot water use, such as cold start or resilient controls. The results show that it is possible to save about 28% of the hot water used.

These products are designed and constructed to enable reuse, by in future change components and thereby reach new and updated functionality and flowrates, this to enhance their lifetime and reduce use of material and resources.

References

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