Geberit AquaClean Mera Comfort

GEBERIT

Environmental Product Declaration

according to EN 15804

KNOW HOW INSTALLED

Certified Management System
SQS
Reg No 31142
ISO 9001 / 14001 / OHSAS 18001

1 General information

1.1 Declaration holder

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Geberit is one of the pioneers when it comes to sustainability in the sanitary industry. Sustainable development has formed part of the corporate strategy for more than 20 years. Most production sites are certified in accordance with ISO 9001 and 14001. In addition, all factories will be certified in accordance with OSHAS 18001 by 2018.
Life cycle assessments were produced for key products from an early stage and Ecodesign has been an integral part of the product development process since 2008.
As a member of the United Nations Global Compact, Geberit has shown its commitment to the ten principles of sustainable development. Current and comprehensive information regarding sustainability strategy and performance with respect to Geberit and Geberit products can be found in the current Annual Report. Furthermore, additional information can be found under www.geberit.com/company/sustainability.

1.2 Declared product

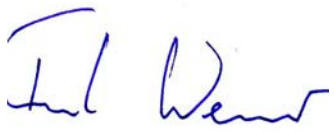
This Declaration applies for the Geberit AquaClean Mera Comfort product in all of the versions listed in this report.

1.3 Verification and validity

Programme holder:	Geberit International AG
Declaration number:	GEB_EPD_D71192
Validity:	01/01/2015 to 01/01/2020
Data calculated by:	Quantis www.quantis-intl.com

EPDs for building products are not always comparable if they do not conform to EN 15804.

The European standard EN 15804:2012 is used as the core PCR.	
Independent verification of the Declaration in accordance with EN ISO 14025:2010	
o Internal	x External



Dr. Frank Werner

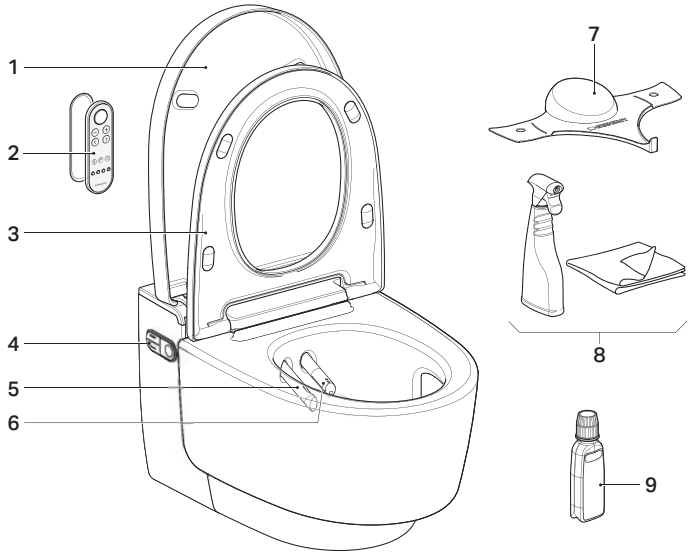
2 Product

2.1 Description and application

Geberit AquaClean shower toilets ensure thorough cleaning with water by combining the function of a toilet with the cleaning possibilities of a bidet. Additional functions are available, depending on the model. All AquaClean models fulfil the European Ecodesign requirements (ErP Directives) with a standby consumption for Geberit AquaClean Mera Comfort of < 0.5 W.

The Geberit AquaClean Mera Comfort is a WC with integrated shower function and additional comfort functions. It is used on the one hand for comfortable and odour-free toilet use and on the other hand for gentle cleaning of the anal and vaginal areas with water. The device with the article number 146.215.21.1 has been applied as a reference article. The sales articles listed below differ only insignificantly from the reference article and are therefore part of the range of validity of this EPD.

Type	Article number
Geberit AquaClean Mera / Maïra Comfort white alpine	146.21x.11.1
Geberit AquaClean Mera / Maïra Comfort bright chrome-plated	146.21x.21.1



1 WC lid with lid lifter function
2 Remote control with magnetic wall-mounted holder
3 WC seat with seat heating
4 Lateral control panel with status LED
5 Dryer arm with dryer nozzle
6 Spray arm with spray nozzle and Lady shower nozzle
7 Spray shield

Consumables

8 Geberit AquaClean cleaning set (art. no. 242.547.00.1)
9 Geberit AquaClean descaling agent (art. no. 147.040.00.1)

2.2 Characteristics

- Anal shower with double-nozzle WhirlSpray shower technology and dynamic aeration for thorough, gentle and water-saving cleaning
- Automatic cleaning of the spray arm and the spray nozzle with fresh water before and after each use
- Hybrid hot water system with continuous flow heater and storage water heater
- Automatically starting, low-noise odour extraction with long-lasting ceramic honeycomb filter
- Dryer functionality with separately extendible dryer arm
- WC seat heating that is activated when approached
- WC lid automatic function that is activated when approached
- Orientation light that is activated when approached
- Descaling programme
- Easy-to-use remote control and haptic control panel for setting the functions
- Rimless WC ceramic appliance with TurboFlush technology for a thorough, quiet and water-saving flushing out with 4.5 litres to 6 litres for the large flush volume
- Rimless WC ceramic appliance with special dirt-repellent surface coating for simple cleaning

2.3 Technical data

Standby	< 0.5 W
Maximum power consumption	2000 W

2.4 Consumption data

The annual consumption of water for the anal region in accordance with reference scenario [1] totals 780 litres.

The annual energy consumption of 103 kWh in accordance with the reference scenario is shown in detail in the following table:

	Annual energy consumption [kWh]
Standby	4.4
Cleaning with hot water	59.5
Drying with dryer	11.7
Odour extraction unit	5.3
WC seat heating	21.5
WC lid automatic function	0.15
Orientation light	0.06
Total	**103**

2.5 Conformity and label

The product complies with the following standards, among others:

Applicable standards		
DIN EN 997	2012	WC pans and WC suites with integral trap
DIN EN 33	2011	WC pans and WC suites – Connecting dimensions
DIN 19516	2004	WC seats – Requirements and test methods
DIN 4109	1989	Sound insulation in buildings – Requirements and verifications
VDI 4100	2012	Sound insulation in building construction. Flats. Assessment and suggestions for enhanced sound insulation.
SIA 181	2006	Sound insulation in building construction
DIN EN 1717	2001	Protection of potable water
KIWA BRL-K 619	2004	WC pans

[1] Four-person household, one major and four minor bathroom visits, factory setting, spray time 20 seconds at 37 °C

Applicable standards		
DIN EN 13077	2008	Devices to prevent pollution by backflow of potable water – Air gap with non-circular overflow
DVGW W 543	2012	Pressure-resistant flexible hosing for drinking water installations – Requirements and tests
DIN EN 60335-1	2010	Household and similar electrical appliances – Safety – Part 1: General requirements
DIN EN 60335-2-84	2009	Household and similar electrical appliances – Safety – Part 2-84: Particular requirements for toilets
DIN EN 60730-1	2010	Automatic electrical controls for household and similar use – Part 1: General requirements
DIN EN 60730-2-8	2004	Automatic electrical controls for household and similar use – Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements
DIN EN 55014-1	2010	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission
DIN EN 55014-2	2009	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 2: Immunity
DIN EN 62233	2008	Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure
DIN EN 61000-3-2	2011	Electromagnetic compatibility (EMC) – Part 3-2: Limit values – Limits for harmonic current emissions
DIN EN 61000-3-3	2009	Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
DIN EN 61000-6-2	2011	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
DIN ISO 2206	1988	Packaging; complete, filled transport packages; identification of parts when testing
DIN EN ISO 1043-1	2012	Plastics – Symbols and abbreviated terms – Part 1: Basic polymers and their special characteristics

EU statutory requirements		
2006/95/EC	2006	Low Voltage Directive
2004/108/EC	2004	EMC Directive
1999/5/EC	1999	RTTY Directive
EU no. 305/2011	2011	Construction Products Regulation
80/778/EEC	1980	Drinking Water Directive
2011/65/EU2	2011	RoHS Directive
2002/96/EC	2002	WEEE Directive
2009/125 EC	2009	Ecodesign Directive
EC no. 1275/2008	2008	Standby Losses Regulation
EC no. 1907/2006	2006	REACH Regulation
2006/66/EC	2006	Batteries Directive
2008/103/EC	2008	Directive 2008/103/EC of the European Parliament and the Council of 19 November 2008 regarding the revision of Directive 2006/66/EC regarding batteries and accumulators as well as used batteries and used accumulators with respect to the launching of batteries and accumulators

Swiss statutory requirements		
730:01 EnV	1998	Energy Ordinance 730.01
StoV, Appendix 4.10	1986	Materials Ordinance

Relevant declarations of conformity can be downloaded from the websites of our local sales companies. A warranty period of at least 24 months applies provided there are no country-specific contracts.

With a Geberit Sigma concealed cistern 12 cm for dual flush and a set full flush volume of 4.5 l, the Geberit AquaClean Mera Comfort fulfils the highest efficiency rating A for WELL.

2.6 Raw material

The product consists of the following raw materials:

Raw material	[g]
Aluminium	352
Battery	23
Brass	182
Cardboard	8,464
Ceramic	16,609
Copper	412
Duroplast	2,528
Elastomer (EPDM)	664
Electronics	1,286
Paper	659
Steel	6,429
Thermoplast	5,163
Other raw materials	218
Total	**42,989**
Recycling portion of raw materials	29%

The orientation light is equipped with LED lamps. They are mercury-free.

2.7 Manufacturing

The mounting of the Geberit AquaClean Mera Comfort shower toilets takes place at the Geberit site in Rapperswil-Jona (CH). Some plastic and metal parts are manufactured at Geberit production sites, the other components are purchased parts. All suppliers sign the Geberit suppliers' code of conduct and undergo a detailed selection and inspection procedure.

2.8 Distribution

Transportation from Geberit to the customer within Europe is made via the state-of-the-art and efficient central warehouse in Pfullendorf (DE) using lorries and outside of Europe mainly by means of freighters together with lorries to distribute the products locally. This is handled by logistics partners who have fleets of modern lorries.

2.9 Installation

Installation is simple and does not require any additional energy consumption or use of materials. All paper and cardboard waste can be recycled.

2.10 Use

Anal shower

The anal shower is the main function of the Geberit AquaClean Mera Comfort shower toilet. The heating of the water used to 37 °C is the source of the greatest energy consumption during this process. The additional consumption of water is negligible from the point of view of ecology. Prolonging the shower sequence results in a corresponding increase in energy consumption.

Comfort functions

When the additional comfort functions are used, the WC seat heating and the drying with the dryer play a central role. Energy consumption can be reduced by switching these functions off. The other functions, e.g. odour extraction, WC lid automatic function and orientation light are of subordinate importance.

Toilet flush

In connection with a suitable Geberit cistern (e.g. Geberit Sigma concealed cistern 12 cm), the full flush volume can be reduced down to as little as 4.5 l thanks to the TurboFlush technology. The WC ceramic appliance is also flushed out cleanly with this flush volume. Furthermore, the use of grey water or rainwater is also possible for the toilet flush.

Cleaning

The cleaning of a shower toilet does not differ from that of a conventional toilet. The rimless WC ceramic appliance and the dirt-repellent ceramic surface enable easy cleaning of the WC.

Maintenance

For a period of utilisation of 15 years, the only device maintenance that needs to be performed is the annual descaling, the replacement every 5 years of the honeycomb filter for the odour extraction and the replacement every two years of the battery for the remote control.

Relevant technical operating data can be found in the chapters "Technical data" and "Consumption data" on page 4 in this document.

2.11 End-of-life

The shower toilets contain electronics and must therefore be disposed of separately. Electronic and metal parts are fully recyclable when disposed of appropriately. Plastic parts are converted into energy and the ceramics are disposed of in the landfill for inert matter.

The device can be uninstalled without requiring modifications to the domestic installation. Water and power connection can be removed without tools.

3 Life cycle assessment – Calculation criteria

3.1 System boundaries

This environmental product declaration is a "cradle to factory gate with options" declaration and includes the construction process and end-of-life. The use stage and the demolition stage are not included, as the former depends on the user and the latter is not relevant. The study covers the European market situation.

Product			Construction process		Use	End-of-life			
Raw material	Transport to the manufacturer	Manufacturing	Distribution	Installation within the building		Demolition	Transport to waste processing	Reuse, recovery, recycling	Disposal
A1	A2	A3	A4	A5	B1–B7	C1	C2	C3	C4
x	x	x	x	x	–	–	x	x	x

– not considered / not relevant

3.2 Technical scenario information and assumptions

(A1) For the raw material supply, the entire raw and recycled material input was modelled using corresponding European data, including the losses of 1 to 6% relating to material and production. Secondary raw materials comprise those environmental influences that arise from the collection of waste and from recycling. The following recycled content was recorded: 80% for aluminium, 55% for copper and steel, 33% for brass and 100% for cardboard.

(A2) For transportation from the suppliers in Europe and Asia to Geberit, standard transport distances were assumed for each country and a capacity contained in the background data was used. Class Euro 4 diesel lorries are used as the means of transport within Europe. Intercontinental transportation consists of freighters and subsequent local distribution by lorry.

(A3) With respect to manufacturing at Geberit, electricity consumption from injection moulding and installation plays the most important role; this consumption is modelled by the European or Swiss energy mix, respectively. The consumption of additional substances or water is negligible. Reliable background data was used for purchased parts.

(A4) The distribution to the customers is based on the planned sales figures, of which approximately half are assigned to Switzerland and a third to Germany. The remainder is supplied to the other countries within and outside Europe. In addition to the current fleet mix consisting predominantly of Euro 5 vehicles, this also takes into account a vehicle load from Ecoinvent. It is implemented exclusively using diesel lorries (on average more than 360 km).

(A5) Apart from packaging waste from paper, cardboard and PE foil, no additional material flows are generated during installation. Cardboard and paper are recycled and PE foil is incinerated.

(C1–C4) Waste that is reused is removed from the product system without causing any environmental impact from the first life cycle. No credits are accounted for cases where production of such waste was avoided. With respect to disposal, it has been assumed that all waste is collected once it has been taken from the building site and is sorted appropriately. 100% of all metal and electronics parts are recycled accordingly. It is also assumed that all plastic parts are incinerated.

3.3 Data basis

This environmental product declaration is based on a comprehensive life cycle assessment according to ISO 14044:2006. A detailed background report, which meets the requirements of EN 15804, is used for verification.

The stock data are based predominantly on average annual production data, which were provided by Geberit AG for 2014. Ecoinvent data (version 3.1, year 2014; www.ecoinvent.org) and the system model "cut-off by classification" were used for all further data. The quality of the data can therefore be considered to be good. Modelling and all calculations were carried out with the aid of an Excel table.

4 Life cycle assessment – results

4.1 Environmental impacts

	Unit	A1	A2	A3	A4	A5	C2	C3	C4
Global warming (GWP)	kg CO_2-eq	168.7	3.13	46.61	1.05	3.724 E-01	2.075 E-02	19.38	9.030 E-02
Ozone depletion (ODP)	kg CFC-11-eq	1.291 E-05	5.853 E-07	3.889 E-06	1.980 E-07	2.965 E-10	3.946 E-09	1.315 E-07	2.986 E-08
Photochemical ozone creation (POCP)	kg C_2H_4	8.141 E-02	7.288 E-04	1.213 E-02	1.828 E-04	8.474 E-07	3.631 E-08	1.617 E-05	3.333 E-05
Acidification (AP)	kg SO_2-eq	1.40	1.868 E-02	1.780 E-01	3.826 E-03	4.034 E-05	8.555 E-05	4.511 E-03	6.881 E-04
Eutrophication potential (EP)	kg PO_4^{3-}-eq	5.855 E-01	3.125 E-03	4.169 E-02	7.990 E-04	2.992 E-05	1.823 E-05	4.262 E-03	1.412 E-04
Consumption of abiotic resources, fossil energy sources (ADP)	MJ	2,150	48.31	649.6	16.29	4.061 E-02	3.246 E-01	4.25	2.52

A1 Raw material
A2 Transport to the manufacturer
A3 Manufacturing
A4 Distribution
A5 Installation within the building
C2 Transport to waste processing
C3 Reuse, recovery, recycling
C4 Disposal

4.2 Resource use

	Unit	A1	A2	A3	A4	A5	C2	C3	C4
Use of primary energy, renewable, total	MJ	237.5	7.110 E-01	35.38	2.286 E-01	7.590 E-04	4.558 E-03	3.422 E-01	5.333 E-02
Use of primary energy, renewable, w/o raw material use	MJ	91.55	7.110 E-01	35.38	2.286 E-01	7.590 E-04	4.558 E-03	3.422 E-01	5.333 E-02
Use of primary energy, renewable, raw material use	MJ	146.0	0	0	0	0	0	0	0
Use of primary energy, non-renewable, total	MJ	2,425	49.41	745.9	16.61	4.146 E-02	3.310 E-01	4.87	2.56
Use of primary energy, non-renewable, w/o raw material use	MJ	2,143	49.41	745.90	16.61	4.146 E-02	3.310 E-01	4.87	2.56
Use of primary energy, non-renewable, raw material use	MJ	281.9	0	0	0	0	0	0	0
Use of secondary materials	kg	10.92	0	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	0	0	0	0	0	0	0	0
Use of net fresh water	m^3	1.28	3.030 E-03	1.077 E-01	9.981 E-04	8.058 E-05	1.993 E-05	9.514 E-03	1.715 E-04

4.3 Output flows and waste

	Unit	A1	A2	A3	A4	A5	C2	C3	C4
Hazardous waste	kg	2.793 E-02	2.775 E-05	1.442 E-03	9.456 E-06	3.619 E-07	1.888 E-07	1.926 E-05	1.710 E-06
Non-hazardous waste	kg	34.83	4.05	3.06	1.52	6.343 E-03	3.038 E-02	3.411 E-01	16.60
Radioactive waste	kg	6.829 E-03	3.327 E-04	1.917 E-03	1.126 E-04	8.804 E-08	2.247 E-06	1.830 E-05	1.694 E-05
Components for re-use	kg	0	0	0	0	0	0	0	0
Materials for recycling	kg	0	0	1.03	0	8.46	0	8.78	0
Materials for energy recovery	kg	0	0	0	0	0	0	0	0
Exported energy – electricity	MJ	0	0	7.633 E-01	0	5.640 E-01	0	38.03	0
Exported energy – heat	MJ	0	0	2.26	0	1.67	0	114.1	0

5 Green building information

Geberit provides system solutions for sustainable building and is an active member of the following associations:
- German Sustainable Building Council, DGNB (DE)
- Minergie for sustainable building (CH)
- Green Building Council – USGBC (USA)
- Greenbuild, sustainable building (AU)

Certain information in this environmental product declaration can be used for the assessment and verification of the various certification systems for sustainable building.

5.1 DGNB

Relevant criteria for the German Sustainable Building Council (DGNB), scheme for new residential buildings, version 2012 on designing and assessing sustainable buildings:

Topic	Criterion		EPD chapter
Ecological quality	Environmental impacts	ENV 1.1	4.1, 4.2
	Risks for local environment	ENV 1.2	2.6
	Primary energy	ENV 2.1	4.2
	Potable water, waste water	ENV 2.2	2.3, 2.10
Economic quality	Life cycle costs	ECO 1.1	2.10
Socio-cultural and functional quality	Indoor air quality	SOC 1.2	2.10
	Safety and malfunctions	SOC 1.7	2.7
Technical quality	Fire protection	TEC 1.1	2.10
	Ease of cleaning	TEC 1.5	2.10
	Ease of demolition / dismantling	TEC 1.6	2.11

The dirt-repellent ceramic surface and the rimless WC ceramic appliance reduce the effort required for cleaning. Furthermore, a wall-mounted fastening permits barrier-free and easy cleaning of the floor.

The topics and criteria that have not been listed for this product are not directly relevant. For assessment in accordance with ENV 2.1, repairs and maintenance work and the operational water requirements during the period under review were not included and are excluded by the system boundaries (ENV 2.1, page 5).

5.2 Minergie-ECO

The Minergie-ECO quality label specifies criteria for new and refurbished buildings in its "New buildings requirements specification 2011".

With regard to the constituents criterion, the product does not contain any materials that would exclude it from a Minergie-ECO certification (NA01/MA01 – NA14/MA16). The additional requirements concerning the materials and construction processes, building concept, sound insulation and indoor climate areas are either not relevant or the product completely complies with them. The requirements for WC flushing systems in the "Drinking water efficiency" check list are fulfilled (NG09/MG09, NG10/MG10) with the observance of all additional measures for the fulfilment of the limit values for enhanced requirements. The requirements for general (BKP 251) and special (BKP 252) sanitary appliances of the "Technical building systems sound insulation" are fulfilled (NS05/MS05). The maximum air speed of the built-in fan is 2.0 m/s.

5.3 LEED v3

Relevant topics and criteria of the US Green Building Council for the design, construction, operation and maintenance of sustainable buildings in accordance with the Rating System for New Construction and Major Renovations, 2009:

Topic	Criterion	Credit	EPD chapter
Water Efficiency (WE)	Water use reduction	WEp1	2.2, 2.4
		WEc3	2.5
Energy and Atmosphere (EA)	Optimized energy performance	EAc1	2.3, 2.4
Materials and Resources (MR)	Construction waste management	MRc2	2.9
Innovation / Design (ID)	Innovation / design	IDc 1.4 / 1.5	1.1

The WC complete solutions with the TurboFlush technology fulfil the requirements regarding water efficiency (6 / 3 l) for public and private WC systems (WEp1). The use of potable water can be reduced further by reducing the full flush to 4.5 l and by the use of rainwater (WEc3). The achievement of the credit being strived for is always dependent on all other installed sanitary appliances.

The topics and criteria that have not been listed for this product are not directly relevant.

5.4 LEED v4

Relevant topics and criteria of the US Green Building Council for the design, construction, operation and maintenance of sustainable buildings in accordance with the Rating System for New Construction and Major Renovations, 2013:

Topic	Criterion	Credit	EPD chapter
Water Efficiency (WE)	Water use reduction	–	2.2, 2.4
		–	2.5
Energy and Atmosphere (EA)	Optimized energy performance	–	2.3, 2.4
Materials and Resources (MR)	Reduced use of PBT	–	2.4, 2.6
	Environmental product declaration	–	1.3
	CSR in accordance with GRI requirements	–	1.1
	Construction waste management	–	2.9
Innovation / Design (ID)	Innovation / design	–	1.1

The WC complete solutions with the water-saving TurboFlush technology fulfil the requirements regarding water efficiency, see LEED v3.

The LED lamps used are mercury-free (MR – PBT Source Reduction – Mercury) and support the documentation of the required verifications. The present document contributes to the fulfilment of the requirements of the environmental product declaration. Analogous to LEED v3, the requirements described there are also fulfilled in LEED v4.

The topics and criteria that have not been listed for this product are not directly relevant.

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