ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Hansgrohe Group
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-HAN-20210262-ICC1-EN
Issue date	12.09.2022
Valid to	11.09.2027

Shower hoses

Hansgrohe Group

Institut Bauen und Umwelt e.V.

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1. General Information

Hansgrohe Group

Programme holder
IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number
EPD-HAN-20210262-ICC1-EN

This declaration is based on the product category rules:
Fittings and showers, 03.2022
(PCR checked and approved by the SVR)

Issue date
12.09.2022

Valid to
11.09.2027

Dipl. Ing. Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.))

Shower hoses

Owner of the declaration
Hansgrohe Group
Auestraße 5 - 9
77761 Schiltach
Germany

Declared product / declared unit
1 piece of an average shower hose incl. packaging

Scope:
This average EPD was determined on the basis of sales volumes from the year 2020. The shower hoses are manufactured at the production sites in Willstätt and Schiltach, Germany and in Atlanta, USA. This average EPD was formed from >90% of the products involved in sales.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
The EPD was created according to the specifications of *EN 15804+A2*. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard *EN 15804* serves as the core PCR
Independent verification of the declaration and data according to *ISO 14025:2011*
☐ internally ☒ externally

Dr Naeem Adibi
(Independent verifier)

2. Product

2.1 Product description/Product definition

Shower hoses essentially comprise of a plastic hose and metal connectors, made of brass or stainless steel. In case the connectors are made of brass, the surfaces are usually chrome-plated by means of various galvanic process stages.
For the use and application of the product the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.
Following standards apply to shower hoses to prove product safety:
EN 1113:2015: Sanitary tapware – Shower hoses for sanitary tapware for water supply systems of type 1 and type 2

2.2 Application

Shower hoses are the hoses which connect hand showers to plumbing fixtures for water supply. They are used for showers and bathtubs.

2.3 Technical Data

Constructional data
The products must comply with the standard *DIN EN 1113* and specific Hansgrohe standards.

Name	Value	Unit
Maximum load temperature permanent operation	42	°C
Maximum load temperature temporary operation	70	°C
Flow rate (indications for pressure range of 1-3 bar)	> 0,72	m^3/h
Sound emissions	-	dB

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).

2.4 Delivery status

The shower hoses are delivered singularly packaged. The packaging is customized to the size of the product and supplies. Customers can order single products or multiple products with outer packaging. The dimensions of the products are between 25x25x1250 mm and 25x25x2050 mm.

2.5 Base materials/Ancillary materials

The hoses are made of an inner hose and an outer hose. Inner hose made of thermoplastic elastomer (TPE) - total weight share of approx. 10 %. Outer hose made of Polyvinylchloride (PVC) - total weight share of approx. 70%. The fittings are made of brass and contain between 0.1 % and 1.4 % lead. The material composition (incl. packaging) of an average shower hose is as follows:

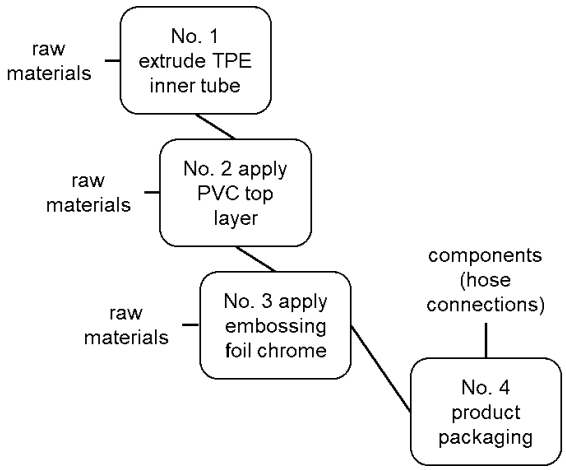
Name	Value	Unit
Brass	14.4	%
Stainless steel	1.9	%
Plastic	66.0	%
Cardboard, Paper (packaging)	17.6	%

This product contains substances listed in the *candidate list* (date: 17.12.2021) exceeding 0.1 percentage by mass: Lead (CAS number 7439-92-1) as a component of the brass alloy has been on the *candidate list* of the *Reach Regulation* (Regulation (EC) No. 1907/2006) since 27.06.2018.

This product/article/at least one partial article contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: **no**.

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) *Ordinance on Biocide Products No. 528/2012)*: **no**.

2.6 Manufacture



No. 1: The TPE inner tube is extruded.
No. 2: The PVC top layer is applied on the inner tube.
No. 3: The embossing foil chrome is applied on the top layer.
No. 4: The hose is cut in length and assembled with the connections.
Any production waste generated is disposed accordingly.

2.7 Environment and health during manufacturing

Hansgrohe SE tries to keep the impact on people and the environment as low as possible when manufacturing its products.
Hazards at workplaces are regularly assessed and reduced to a minimum.
For example, in basic production, sawing or grinding work is mainly carried out by robots, and in electroplating, chemicals are dosed automatically via appropriate pump stations.
Emissions that are hazardous to health are extracted directly at the source and cleaned by filter systems.
Workplace and emission limits are regularly monitored and are far below the prescribed limits.
To reduce environmental impact, water and production waste are recycled wherever possible.
In addition, all production sites are certified according to the *DIN EN ISO* standards *14001* (environment), *50001* (energy), *45001* (occupational health and safety) and *9001* (quality). Continuous improvement of environmental and occupational safety performance is thus guaranteed.

2.8 Product processing/Installation

The shower hose is screwed with the union nut and the seal onto the shower fitting or the water connection by hand. And it is also screwed by hand onto the hand shower with the union nut and the seal (tools: none).

2.9 Packaging

For product protection the shower hoses are individually packed in a cardboard box, which consists of approximately 80% recycled material. The cardboard is always printed with lead-free ink and in some cases additionally coated with a clear topcoat.
The inlay of the packaging consists of folded cardboard, fibre form or plastic bags, depending on the product.
The packaging can be fully recycled.
All packaged products fit on a reusable euro pallet.

2.10 Condition of use

To protect the shower hoses and make them durable, parts of the product are usually chrome-plated. Nevertheless, there are no unhealthy contaminants in the water. To ensure the longevity of the product, it should be used and cleaned regularly.

2.11 Environment and health during use

Our products do not emit any contaminants or substances that are harmful to the environment or health during the use phase.

2.12 Reference service life

The quality and durability of our shower hoses are designed for a product life of about 10 years. Which on average is approximately the duration of use by the consumers.
With few exceptions, all products have a five-year warranty. Furthermore, an after-sale service warranty of 15 years is provided.

Signs of age of the products can be shown by changed surfaces, calcification, or mechanical wearing.

2.13 Extraordinary effects

Fire

The products are not classified as building materials (building products) and are not subject to *DIN 4102* and *EN 13501-1*.

Fire protection

Name	Value
Building material class	-
Burning droplets	-
Smoke gas development	-

Water
If a room in which the products offered by Hansgrohe are installed is flooded with water, the products are not affected in their function.

Mechanical destruction
If the surface of the coating is destroyed by a mechanical stress, there is a possibility of corrosion. In the event of mechanical damage, the products may need to be replaced due to possible sharp cut edges.

2.14 Re-use phase
The shower hoses are not taken back by the manufacturer for the purpose of reuse. Users can disassemble the products repeatedly within the reference utilization period and reuse it elsewhere.

2.15 Disposal
The waste code of the product is *AVV 20 03 01*. Disassembly of the products consists of the same steps as assembly, in reverse order.
All metal components can be recycled (as scrap), all plastic components have a high calorific value and can be incinerated with energy recovery, provided the components have been separated beforehand. A more conservative approach is modelled in this EPD considering plastic incineration as the main disposal route without credits for metal recycling.

2.16 Further information
Additional information about our products can be found at https://www.hansgrohe.com.

3. LCA: Calculation rules

3.1 Declared Unit
The results of this EPD are valid for the following functional unit:
Provide sanitary function for one (1) average shower hose unit including packaging, used in accordance with the manufacturer's recommendations for a 10-year life, following the manufacturer's operating instructions. An average conditioned shower hose is considered the baseline flow.

Weighted averaging based on production tonnages in 2020 is chosen as the basis for creating the environmental profile. 42 different shower hoses were considered.

Functional unit

Name	Value	Unit
Declared unit	1	pce.
Functional unit	1	pce.
Functional unit with packaging	0.374	kg
Packaging	0.071	kg
Weight range of the products examined	0.206 - 0.546	kg

3.2 System boundary

This average EPD follows the EPD type "cradle to grave". The following life cycle modules are declared:
Modules A1-A3:
The product stage begins with considering the production of the necessary raw materials and energies, including all corresponding upstream chains and the actual procurement transports. Furthermore, the entire manufacturing phase was mapped, including the treatment of production waste until the end-of-waste status (EoW) was reached. Green electricity from hydropower is used for the manufacturing processes in Germany. US electricity mix is used for the US production site.
Module A4:
All distribution transports (A4) to the customers were considered.
Module A5:
This module covers the installation process with the corresponding packaging waste generated that needs to be disposed of.
Module B2:
Maintenance expenses are declared in this module and consist of weekly cleaning expenses for this product.
Module B1, B3-B7:
These modules were considered, but evaluated as not relevant for the shower hoses and considered as zero.
Modules C1-C4
The modules include the environmental impacts for dismantling on the shower hoses and the treatment of the waste fractions until the end-of-waste status (EoW) is reached, including the associated transports at the end of the product life cycle.
Module D
Identification of the benefits and costs of the product outside the system boundary. For plastics, these consist of energy credits from thermal utilization (C3) in the form of the average European electricity mix or thermal energy from natural gas. Recycling of metal scrap results in credits of the respective raw materials.

3.3 Estimates and assumptions
Energy and water consumption, material amount for coating as well as waste during production could only be determined on concrete and existing products and not on the average product. Since the top seller represents a high proportion of the production volume and has a similar GWP to the calculated average product, the top seller was chosen for the assessment of energy, water, waste and coating. For the incineration with energy recovery (thermal and electric) of waste, an r1 value of >0.6 is assumed. The net efficiency for the average waste incinerated is between 38 and 44%, depending on the type of waste respectively the disposal data set

3.4 Cut-off criteria
The effect associated with the neglected mass shares is less than 5 % of the effect categories per module. The minimum limit of 1 % total mass and the use of renewable and non-renewable primary energy is not exceeded.

3.5 Background data

The LCA software *GaBi 10.6* was used to model the life cycle. The entire manufacturing process, as well as energy consumption, were modelled on the basis of manufacturerspecific data.
However, generic background datasets were used for the upstream and downstream processes. The majority of the background datasets used were taken from the current version (2021.2) of the *GaBi* database.
Ecoinvent Version 3.6 (2019) datasets were only used when suitable *GaBi* datasets were not available.

3.6 Data quality

The background datasets used for accounting purposes mainly originate from the respective updated *GaBi* databases at the time of calculation.
The data for the examined products was captured on the basis of evaluations of internal production and environmental data, the collection of LCA relevant data within the supply chain, as well as the evaluation of relevant data for the energy supply. The collected data were checked for plausibility and consistency. Good representativity can be assumed.
For the assessment of the variability of the results, all products were balanced in addition to the average product. Considering modules A1-C4, the variation of the GWP indicator value ranges in relation to the declared product between -6 % and +10 %.

3.7 Period under review

Life cycle assessment data were collected in 2020.

3.8 Allocation

For the production process of the different product groups nearly all raw materials, precursors and supplies could be assigned to the declared product. Energy, water and galvanization process were assigned to a top-seller representing a large portion of the product volume. No byproducts are produced and no allocation is required.
Credits for plastics, paper and cardboard recycled in A5 and metallurgical waste in C3 are credited in module D.
Credits for the energy recovery of incinerated production waste in A1-3, paper, cardboard and plastics in A5 and plastics and other materials in C3 are credited in module D.
Packaging:
For paper and cardboard, recycling (91 %) and energy recovery (9 %) are considered on a pro rata basis. For plastic, a proportionate recycling (52 %) and energy recovery (48 %) are considered.
Deconstructed product at the end of life:
95 % of the non-metallic components are recycled for energy recovery and 5 % are disposed of in landfill.
For the metal components, it is assumed that 95 % are sent for incineration with the plastic but without energy recovery and 5 % are disposed of in landfill (C4).

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 background database used is *GaBi* 10.6 in the database version 2021.2

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic carbon

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product -	-	kg C
Biogenic carbon content in accompanying packaging	0.0245	kg C

Transport to the building site (A4)

Name	Value	Unit
Transport distance (Truck)	613	km
Capacity utilisation, including empty runs (Truck)	55	%
Transport distance (Container Ship)	1847	km
Capacity utilisation (Container Ship)	80	%

Installation into the building (A5)

The shower hose with union nut and seal is first screwed onto the shower fitting or water connection by hand. Then the hose is screwed onto the hand shower by hand using the union nut and seal. No additional resources or energy are required for this. The packaging is disposed either by recycling or incineration.

Name	Value	Unit
Packaging waste Paper, cardboard and plastic	0.071	kg

Use or application of the installed product (B1) see section 2.12 "Use"

No emissions are expected.

Maintenance (B2)

For module B2, it is assumed that a weekly cleaning of the product takes place, with 0.5 litre of water containing 1.5 % soap.

Name	Value	Unit
Water consumption/Cycle weekly	0.5	Liter/cycle
Soap concentration	1.5	%
Maintenance cycle	520	Number/RSL
Water consumption	0.26	m^3
Auxiliary Soap (Tensides)	3.9	kg

Hansgrohe SE declares a Service Life of 10 years as an empirical value for the shower hoses when used in accordance with the care instructions. This value is based on their technical service centre's statistics on service life in the market and complaints.

Service life

Name	Value	Unit
Life Span according to the manufacturer	10	a

End of life (C1-C4)

Name	Value	Unit
Collected as mixed construction waste	0.303	kg
Energy recovery (Plastics, Metal)	0.288	kg
Landfilling (Plastics, Metal)	0.015	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

In module D, the credits from the energetic energy recovery of the packaging materials (resulting from module A5) and of the plastic incineration at end of life are shown.

5. LCA: Results

The following table shows the result of the LCA for 1 piece of an average shower hose. The results in the B-module are based on a lifetime of 10 years.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT 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	Waste 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	X	X	X	X	MNR	MNR	MNR	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 piece average shower hose incl. packaging

Core Indicator	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO_2-Eq.]	5.94E-1	2.55E-2	1.01E-1	0.00E+0	1.28E+1	0.00E+0	0.00E+0	0.00E+0	5.15E-3	6.15E-1	1.02E-3	-3.11E-1
GWP-fossil	[kg CO_2-Eq.]	6.83E-1	2.53E-2	1.11E-2	0.00E+0	9.80E+0	0.00E+0	0.00E+0	0.00E+0	5.11E-3	6.15E-1	1.02E-3	-2.21E-1
GWP-biogenic	[kg CO_2-Eq.]	-8.99E-2	0.00E+0	8.99E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-8.99E-2
GWP-luluc	[kg CO_2-Eq.]	9.40E-4	1.60E-4	1.38E-5	0.00E+0	3.01E+0	0.00E+0	0.00E+0	0.00E+0	4.19E-5	1.26E-4	8.74E-7	-3.26E-4
ODP	[kg CFC11-Eq.]	5.73E-10	4.45E-18	5.46E-17	0.00E+0	5.43E-7	0.00E+0	0.00E+0	0.00E+0	1.01E-18	1.59E-12	2.44E-18	-1.39E-9
AP	[mol H^+-Eq.]	1.84E-3	2.46E-4	8.16E-6	0.00E+0	3.32E-2	0.00E+0	0.00E+0	0.00E+0	8.57E-6	1.55E-4	3.07E-6	-3.13E-4
EP-freshwater	[kg P-Eq.]	1.14E-5	5.93E-8	1.83E-8	0.00E+0	2.90E-4	0.00E+0	0.00E+0	0.00E+0	1.52E-8	1.45E-7	1.60E-7	-3.59E-6
EP-marine	[kg N-Eq.]	4.60E-4	6.92E-5	2.72E-6	0.00E+0	7.57E-3	0.00E+0	0.00E+0	0.00E+0	3.37E-6	5.07E-5	7.07E-7	-1.07E-4
EP-terrestrial	[mol N-Eq.]	4.88E-3	7.64E-4	3.27E-5	0.00E+0	9.04E-2	0.00E+0	0.00E+0	0.00E+0	3.86E-5	6.42E-4	7.75E-6	-1.13E-3
POCP	[kg NMVOC-Eq.]	1.79E-3	1.87E-4	6.86E-6	0.00E+0	3.02E-2	0.00E+0	0.00E+0	0.00E+0	7.65E-6	1.46E-4	2.25E-6	-2.87E-4
ADPE	[kg Sb-Eq.]	2.74E-5	1.90E-9	7.83E-10	0.00E+0	1.05E-5	0.00E+0	0.00E+0	0.00E+0	4.54E-10	1.36E-8	6.99E-11	-5.28E-7
ADPF	[MJ]	1.63E+1	3.30E-1	4.83E-2	0.00E+0	2.26E+2	0.00E+0	0.00E+0	0.00E+0	6.83E-2	1.01E+0	1.48E-2	-3.39E+0
WDP	[m^3 world-Eq deprived]	9.81E-2	1.90E-4	1.89E-3	0.00E+0	3.47E+0	0.00E+0	0.00E+0	0.00E+0	4.76E-5	4.89E-2	-1.24E-5	-4.07E-2

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 piece average shower hose incl. packaging

Indicator	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.21E+0	1.52E-2	1.14E+0	0.00E+0	4.68E+1	0.00E+0	0.00E+0	0.00E+0	3.93E-3	2.51E-1	1.07E-3	-1.73E+0
PERM	[MJ]	1.13E+0	0.00E+0	-1.13E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	2.34E+0	1.52E-2	1.56E-2	0.00E+0	4.68E+1	0.00E+0	0.00E+0	0.00E+0	3.93E-3	2.51E-1	1.07E-3	-1.73E+0
PENRE	[MJ]	9.61E+0	3.31E-1	2.65E-1	0.00E+0	2.26E+2	0.00E+0	0.00E+0	0.00E+0	6.85E-2	7.16E+0	3.38E-1	-3.39E+0
PENRM	[MJ]	6.69E+0	0.00E+0	-2.16E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-6.15E+0	-3.23E-1	0.00E+0
PENRT	[MJ]	1.63E+1	3.31E-1	4.83E-2	0.00E+0	2.26E+2	0.00E+0	0.00E+0	0.00E+0	6.85E-2	1.01E+0	1.48E-2	-3.39E+0
SM	[kg]	9.90E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.76E-2
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m^3]	5.59E-3	1.75E-5	5.13E-5	0.00E+0	8.10E-2	0.00E+0	0.00E+0	0.00E+0	4.50E-6	1.27E-3	1.40E-7	-1.35E-3

Caption	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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 piece average shower hose incl. packaging

Indicator	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	3.68E-7	1.43E-11	1.01E-11	0.00E+0	4.25E-3	0.00E+0	0.00E+0	0.00E+0	3.61E-12	1.91E-10	2.66E-12	-1.00E-9
NHWD	[kg]	2.06E-2	4.80E-5	5.87E-4	0.00E+0	3.29E-1	0.00E+0	0.00E+0	0.00E+0	1.08E-5	1.28E-2	1.51E-2	-1.68E-3
RWD	[kg]	2.69E-4	5.51E-7	2.82E-6	0.00E+0	2.06E-3	0.00E+0	0.00E+0	0.00E+0	1.24E-7	3.31E-5	1.71E-7	-1.21E-4
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	6.23E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	2.73E-4	0.00E+0	2.88E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.32E-1	7.06E-8	0.00E+0
EET	[MJ]	5.57E-4	0.00E+0	5.17E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.33E+0	0.00E+0	0.00E+0

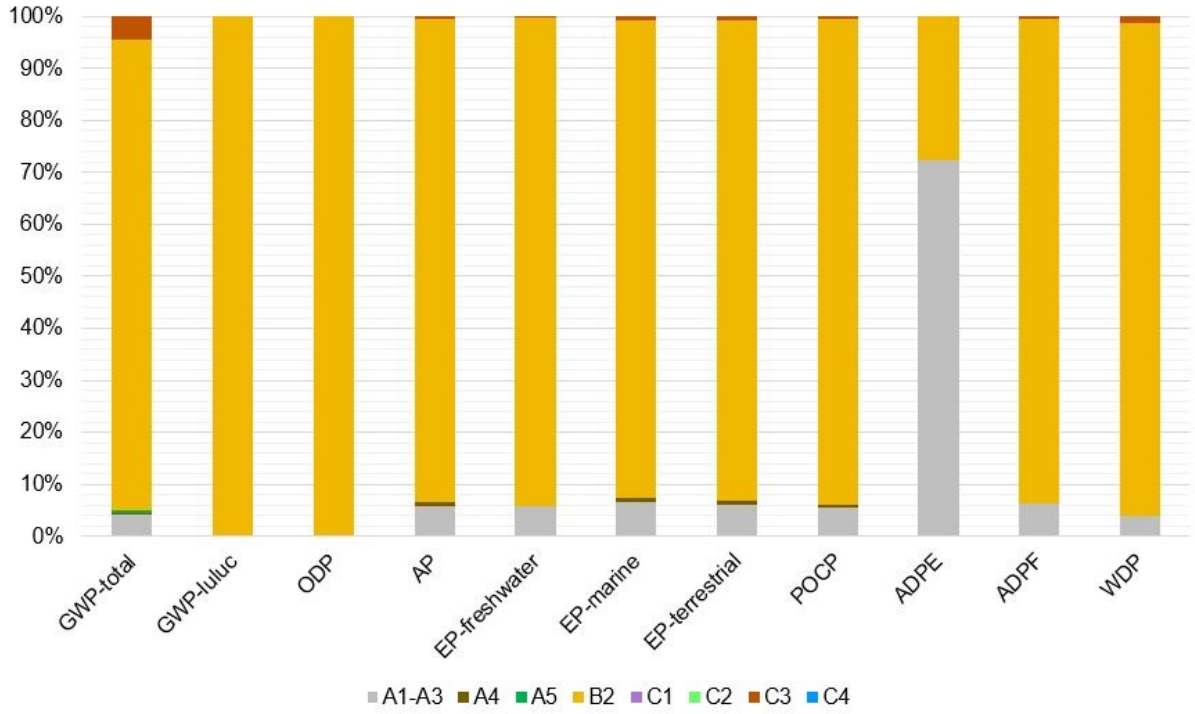
Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 piece average shower hose incl. packaging

Indicator	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
PM	[Disease Incidence]	1.76E-8	3.85E-9	5.52E-11	0.00E+0	1.65E-6	0.00E+0	0.00E+0	0.00E+0	5.35E-11	3.58E-9	3.06E-11	-4.18E-9
IRP	[kBq U235-Eq.]	5.00E-2	8.04E-5	3.77E-4	0.00E+0	1.07E+0	0.00E+0	0.00E+0	0.00E+0	1.82E-5	3.42E-3	2.46E-5	-1.25E-2
ETP-fw	[CTUe]	1.04E+1	2.44E-1	2.42E-2	0.00E+0	1.00E+2	0.00E+0	0.00E+0	0.00E+0	5.07E-2	7.93E-1	1.26E-2	-1.03E+0
HTP-c	[CTUh]	1.13E-8	4.85E-12	7.57E-13	0.00E+0	1.10E-8	0.00E+0	0.00E+0	0.00E+0	1.03E-12	3.22E-11	6.12E-13	-5.45E-11
HTP-nc	[CTUh]	3.02E-8	2.52E-10	3.53E-11	0.00E+0	3.74E-7	0.00E+0	0.00E+0	0.00E+0	5.45E-11	3.30E-9	5.25E-11	-2.01E-9
SQP	[-]	3.39E+0	8.95E-2	1.70E-2	0.00E+0	1.59E+2	0.00E+0	0.00E+0	0.00E+0	2.35E-2	2.40E-1	1.02E-3	-5.64E+0

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

6. LCA: Interpretation



The dominance analysis shows that module B2 in particular is the dominant life cycle stage, due to the demand of soap and water for cleaning. The module A1-A3 has the second most input regarding GWP_{total} (0.59 kg CO_2-eq.). This is mainly caused by the provision of plastic (PVC) for the production of the shower hose at the production site (0.43 kg CO_2-eq.) ADPE differs from the other indicators. The provision of brass in A1-A3 has the largest contribution.
The end-of-life stage (module C1-C4) only has a noteworthy influence on the indicators GWP_{total} and WDP. Here, these indicators are each influenced primarily by the thermal treatment of plastics. The end-of-life stage has no significant influence on the other environmental indicators.

The environmental burdens from the transports (modules A4 and C2) account for less than 1 % of the total burdens of the respective indicators in all cases. The possible potentials of avoided loads of subsequent systems (module D) lie outside the considered system boundaries and relate exclusively to credits from recycling and thermal recycling by means of incineration with energy recovery of the different materials.
For the assessment of the variability of the results, all other products were balanced in addition to the average product. Considering modules A1-C4, the variation of the GWP_{fossil} indicator value ranges in relation to the declared product between -6 % and +10 %.

7. Requisite evidence

The drinking water regulation determines the quality of drinking water at the point of withdrawal. This result in requirements for used materials in drinking water installations in general and therefore in sanitary fittings in particular.

All materials used by Hansgrohe SE, which are in contact with drinking water, fulfill the drinking water regulation.
Regulations for metals (Europe-wide):

- Acceptance of metallic materials used for products in contact with drinking water: 4MS Common Approach

  - Part A – Procedure for the acceptance
  - Part B – 4MS Common Composition List

- Metal recommendation of the federal environment agency: metal materials suitable for drinking water hygiene

Regulations for other materials (Germany):

- KTW: Assessment basis for plastics and other organic materials in contact with drinking water
- Elastomer guideline: Guideline for the hygienic assessment of elastomers in contact with drinking water
- Thermoplastic elastomers: Recommendation for the hygienic assessment of products made of thermoplastic elastomers in contact with drinking water (TPE transition recommendation)
- Ceramics: draft assessment basis for enamels and ceramic materials: assessment basis for enamels and ceramic materials in contact with drinking water (enamel/ceramic assessment basis)
- Lubricants: Guideline for the hygienic assessment of lubricants in contact with drinking water (sanitary lubricants), (Lubricant Guideline)

Regulation for other materials (France):

- ACS: Attestation de Conformité Sanitaire (plastics, elastomers, metals)

Regulation for other materials (UK):

- BS 69 20: Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of water (plastics, elastomers)

Products of the Hansgrohe SE are therefore uncritical to use with any drinking water.

8. References

Standards

DIN EN 1113
DIN EN 1113:2015-06, Sanitary tapware - Shower hoses for sanitary tapware for water supply systems of type 1 and type 2 - General technical specification; German version EN 1113:2015

DIN 4102-1
DIN 4102-1: Fire behaviour of building materials and building components - Part 1: Building materials; concepts, requirements and tests. 1998-05

DIN EN ISO 9004
DIN EN ISO 9004:2018: Quality management — Quality of an organization — Guidance to achieve sustained success. 2018-04

DIN EN 13501-1
DIN EN 13501-1:2019-05: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests; German version EN 13501-1:2018

DIN EN ISO 14001
DIN EN ISO 14001:2015, Environmental management systems — Requirements with guidance for use, 2015-09

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

DIN EN 15804
DIN EN 15804:2012+A2:2019+AC:2021: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products; German version EN 15804:2012+A2:2019+AC:2021

DIN EN ISO 45001
DIN EN ISO 45001:2018: Occupational health and safety management systems — Requirements with guidance for use. 2018-03

DIN EN ISO 50001
DIN EN ISO 50001:2018: Energy management systems — Requirements with guidance for use. 2018-08

Further References

AVV
Draft General administrative provision relating to the Order on the European list of wastes (Waste List Order – German designation: AVV) of 10 December 2001.

ECHA
European Chemicals Agency (ECHA) Candidate List of Substances of Very High Concern (SVHC) for Authorisation https://echa.europa.eu/de/candidate-list-table

Ecoinvent
Ecoinvent 3.6. Database for Life Cycle Assessment. 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.

EU Ordinance on biocide Products No. 528/2012
European Parliament, 2012. Regulation (EU) no 528/2012 of the European parliament and of the council of 22 May 2012 concerning the making available on the market and use of biocidal products

GaBi

GaBi 10.6, GaBi Software System and Database for Life Cycle Engineering, Sphera Solutions GmbH, 1992-2021

IBU 2021
General Instructions for the EPD programme of Institut Bauen und Umwelt e.V. Version 2.0,
Berlin: Institut Bauen und Umwelt e.V.,
2021
www.ibu-epd.com

PCR Part A
Institut Bauen und Umwelt e.V. (IBU), 2021. Product Category Rules for Building-Related Products and Services. Part A: Calculation rules for the life cycle assessment and requirements on the project report. Version 2.1 (11.2021)

PCR Part B
Institut Bauen und Umwelt e.V. (IBU). Requirements on the EPD for Bathroom fittings and showers, 03/2022

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Annex TRACI

For Shower hoses

to the

ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	Hansgrohe Group
Declaration number	EPD-HAN-20210262-ICC1-EN
Issue date	12.09.2022
Valid to	11.09.2027

www.ibu-epd.com / https://epd-online.com

Institut Bauen und Umwelt e.V.

1. LCA with TRACI

In this Annex, the environmental effects are determined using the characterization factors according to TRACI 2.1.

The following tables show the results of the indicators of the impact assessment, the use of resources in relation to one (1) piece of an average shower hose incl. packaging with the grammage of 0.374 kg/piece.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT 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	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste 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	X	X	X	X	MNR	MNR	MNR	X	X	X	X	X	X	X

RESULTS OF THE LCA - RESOURCE USE: Shower hoses

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Eutrophication	[kg N eq.]	2,35E-04	9,44E-06	8,55E-07	0,00E+00	7,93E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,81E-07	1,31E-05	1,07E-06	-8,81E-05
Global Warming Potential, air, excl. biogenic CO2	[kg CO_2 eq.]	6,67E-01	2,49E-02	1,11E-02	0,00E+00	8,89E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,04E-03	6,07E-01	9,62E-04	-2,18E-01
Global Warming Potential, air, incl. biogenic CO2	[kg CO_2 eq.]	5,77E-01	2,49E-02	1,01E-01	0,00E+00	8,89E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,04E-03	6,07E-01	9,62E-04	-3,08E-01
Ozone Depletion, air	[kg CFC 11 eq.]	9,56E-10	5,93E-18	7,28E-17	0,00E+00	7,25E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,35E-18	2,25E-12	3,26E-18	-1,48E-09
Resources, Fossil Fuels	[MJ surplus energy]	2,03E+00	4,73E-02	4,29E-03	0,00E+00	3,03E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,77E-03	6,67E-02	1,90E-03	-3,33E-01
Smog Air	[kg O_3 eq.]	2,70E-02	4,20E-03	1,50E-04	0,00E+00	4,01E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,54E-04	3,06E-03	4,49E-05	-6,22E-03
Acidification	[kg SO2 eq.]	1,64E-03	2,11E-04	7,56E-06	0,00E+00	2,82E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,62E-06	7,67E-04	2,62E-06	-3,02E-04
Ecotoxicity	[CTUe]	2,33E-01	2,14E-03	2,11E-04	0,00E+00	1,99E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,69E-04	2,44E-03	1,07E-04	-1,62E-01
Human Health Particulate Air	[kg PM2.5 eq.]	1,06E-04	1,85E-05	3,01E-07	0,00E+00	7,37E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,34E-07	2,20E-05	1,91E-07	-3,44E-05
Human toxicity, cancer	[CTUh]	1,09E-08	1,41E-11	2,45E-12	0,00E+00	3,67E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,02E-12	1,63E-10	2,92E-12	-1,06E-09
Human toxicity, non-canc.	[CTUh]	2,16E-07	1,95E-09	2,40E-10	0,00E+00	1,63E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,49E-10	1,92E-08	4,40E-10	-1,65E-08