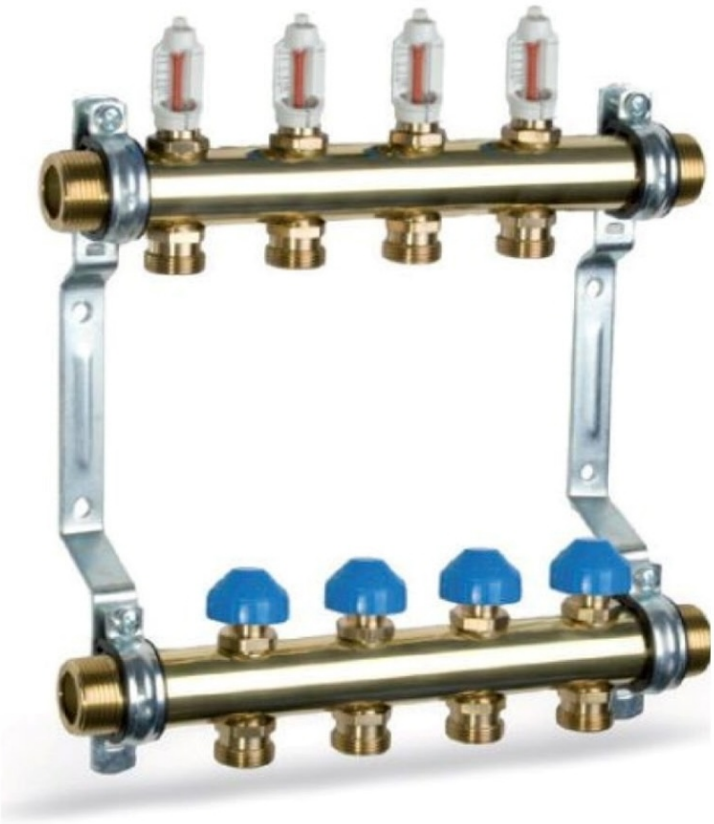
Environmental Product Declaration

according to EN 15804 + A2

Brass Manifold HKV2013A

Brass Manifold with Flow Meters for Underfloor Heating

Product Family: Underfloor Heating



EPD Scope Cradle to Grave

Product Specifications

Recycled Content in Brass: 71%

Manufacturing Specifications

Location: Landau, Germany

Energy Source: Electricity, Medium Voltage, Germany

Greenhouse Gas Emissions (EF 3.1)

Product Size	Packaged Weight (kg)	A1-A3 GWP-total (kg CO_2 eq)
HKV2013A MS02	1.91	12.7
HKV2013A MS03	2.08	13.7
HKV2013A MS04	2.48	16.0
HKV2013A MS05	2.78	17.7
HKV2013A MS06	3.28	20.6
HKV2013A MS07	3.73	23.2
HKV2013A MS08	4.03	24.9
HKV2013A MS09	4.38	27.0
HKV2013A MS10	4.78	29.3
HKV2013A MS11	5.13	31.3
HKV2013A MS12	5.92	34.0

Verified by:

SMART EPD

Sustainability Mission Statement

A Safer World is a More Sustainable World

Watts was founded on a simple premise: the water we use every day should be delivered safely and reliably. We influenced the codes that shaped the way the world uses water. Our goal has always been to be good stewards of this critical resource while creating solutions that keep our customers safe where they live, work, and play. Watts believes a safer world is a more sustainable world.

SmartEPD-2025-095-0636-01.3

Date of Issue	Expiration date	Last updated
Nov 03, 2025	**Nov 03, 2030**	**Dec 04, 2025**

Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

General Information

Watts Water Technologies

Kollergang 14, 6961 LZ Eerbeek, Netherlands

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Product Name:	Brass Manifold HKV2013A with Flow Meters for Underfloor Heating
Functional Unit:	1 packaged product
Declaration Number:	SmartEPD-2025-095-0636-01.3
Date of Issue:	November 03, 2025
Expiration:	November 03, 2030
Last updated:	December 04, 2025
EPD Scope:	Cradle to grave A1 - A3, A4, A5, B1 - B7, C1 - C4, D
Market(s) of Applicability:	Europe, North America

General Organization Information

Watts Water Technologies, Inc. (Watts) is a global leader of quality water solutions for residential, industrial, municipal, and commercial settings. Watts' family of brands offers one of the most varied product lines in the world, with world-class, water-related solutions focused on Drainage, HVAC and Hot Water, Plumbing & Flow Control and Water Quality & Rainwater Harvesting.

Further information can be found at: https://www.watts.com/

Limitations, Liability, and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared. The EPD owner has sole ownership, liability, and responsibility for the EPD.

Reference Standards

Standard(s):	ISO 14025 and EN 15804+A2:2019/AC:2021
Core PCR:	Smart EPD® Part A Product Category Rules for Building and Construction Products and Services, 1000, v1.2 Date of issue: March 14, 2025 Valid until: March 14, 2030
Sub-category PCR review panel:	Contact Smart EPD for more information.

General Program Instructions: Smart EPD General Program Instructions v.2.0, March 2025

Verification Information

LCA Author/Creator: Brooke Alsterlind | TrueNorth Collective | info@truenorthcollective.net

EPD Program Operator: Smart EPD | info@smartepd.com | www.smartepd.com
585 Grove St., Ste. 145, Herndon, VA 20170, USA

Verification:
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071: External
Sarah Curpen | curpen1996@gmail.com

Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External
Sarah Curpen | curpen1996@gmail.com

Product Information

Functional Unit: 1 packaged product

Mass: 5.92 kg

Reference Service Life: 75 Years

Product Specificity:
✗ Product Average
✓ Product Specific

Product Description

Underfloor heating manifolds products are used in hydronic systems to distribute mixed-temperature water to radiant heating system zones. This EPD represents a brass flowmeter manifold with a 1" trunk size. Eleven sizes are available for this manifold. The sizes, two through twelve, represent the number of circuits in the model. Brass manifolds are designed for radiant heating and snow melting application with water or water and glycol solutions. The declared unit of this EPD is 1 unit of the size 12 Brass Manifold HKV2013A. The functional unit is 1 packaged product.

Further information can be found at: https://www.watts.eu/en/products/eu/hydronic-radiant-heating-solutions/stainless-steel-manifolds/manifold-hkf2013af

Product Specifications

Product SKU(s):

HKV2013A MS12

Product Classification Codes: Masterformat - 22 11 19

Material Composition

Material/Component Category	Origin	% Mass
Stainless Steel	Europe	9.7%

POM/POM-C	Europe	2.5%
Polyamide	Europe	1.3%
EPDM	Europe	1.1%
Brass	Europe	85.4%

Packaging Material	Origin	kg Mass
Cardboard Box	Europe	0.542
PVC	None	0.009
Polyethylene	None	0.04
Paper	None	0.001

Biogenic Carbon Content	kg C per packaged product
Biogenic carbon content in product	None
Biogenic carbon content in accompanying packaging	0.272

Hazardous Materials
No regulated hazardous or dangerous substances are included in this product.

EPD Data Specificity

Primary Data Year: 2024

Manufacturing Specificity:

- ✗ Industry Average
- ✗ Manufacturer Average
- ✓ Facility Specific

Averaging:

Averaging was not conducted for this EPD.

System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓
Use	B1	Use	✓
	B2	Maintenance	✓
	B3	Repair	✓
	B4	Replacement	✓
	B5	Refurbishment	✓
	B6	Operational Energy Use	✓
	B7	Operational Water Use	✓
End of Life	C1	Deconstruction	✓
	C2	Transport	✓
	C3	Waste Processing	✓
	C4	Disposal	✓
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	✓

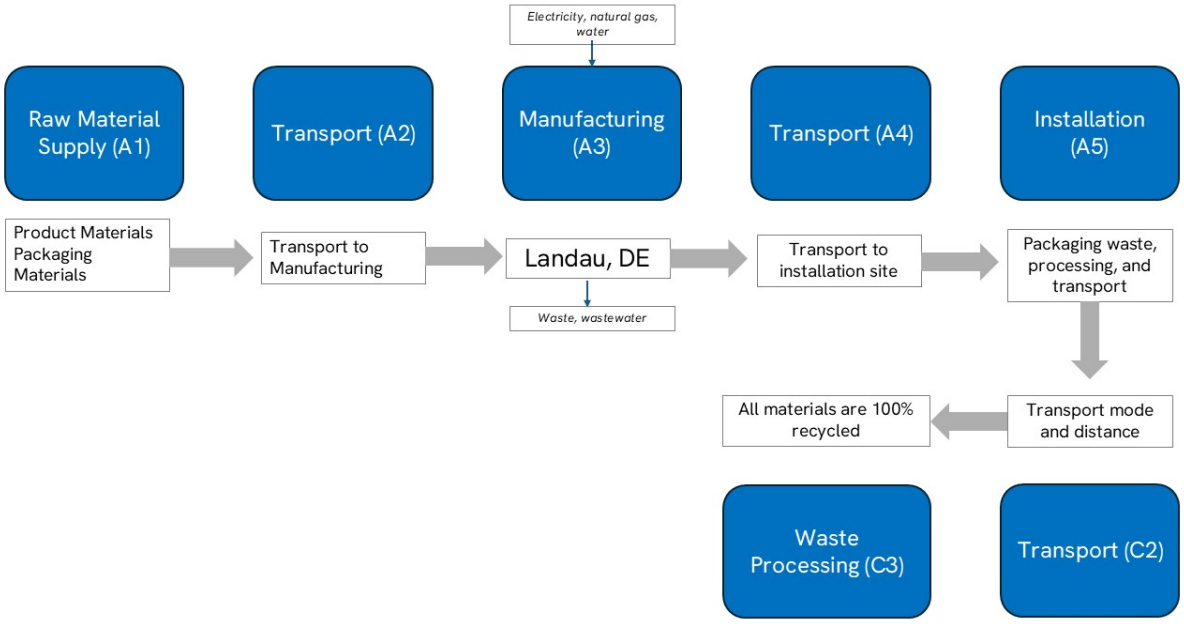
Note:

ND = Module not declared

Plants

Watts Industries GmbH Germany
Godramsteiner Hauptstraße 167, 76829 Landau in der Pfalz-Godramstein, Germany

Product Flow Diagram



The system boundary for this study is cradle-to-grave with all modules A1-C4. Module D is also included in this study.
The following modules are included in the study but have zero impacts, so they are not shown in the Figure 1 below or in the results:

B1 Use
B2 Maintenance
B3 Repair
B4 Replacement
B5 Refurbishment
B6 Operation Energy Use
B7 Operational Water
C1 Deconstruction
C4 Disposal

The product does require maintenance, repair, etc. throughout its lifetime. Additionally, the manifolds are a passthrough for water used in radiant heating systems, therefore there is no use phase for this product.

Each module includes provision of all relevant materials, products, and energy, and all processes in the technosphere which are necessary to cover the declared unit. Potential impacts and aspects related to wastage (i.e. transport and waste processing of lost waste products and materials) are considered in the module in which the wastage occurs.
Capital goods and infrastructure flows are assumed to not significantly affect LCA results or conclusions and thus are excluded from the analysis. However, background data from ecoinvent does include the infrastructure components.

Software and Database

LCA Software: SimaPro v. 9.6

LCI Foreground Database(s): Ecoinvent v. 3.10

LCI Background Database(s): Ecoinvent v. 3.10

A foreground LCI database is the database used to model the primary, site-specific data collected for this EPD. A background LCI database is the database used to model generic or non-specific data.

Data Quality

In order to comply with the ISO 14044 (ISO, 2006) and ISO 14040 (ISO 14040, 2006) requirements, this study reports the results and conclusions of the LCA completely and accurately without bias to the intended audience. The results, data, methods, assumptions, and limitations are presented in a transparent manner and in sufficient details to allow the reader to comprehend the complexities and trade-offs inherent in the LCA. This report allows the results and interpretation to be used in a manner consistent with the goals of the study.

Data Sources

Material/Process Category	Module	Material/Process Name	Inventory Dataset Name	Dataset Geographic Region	Reporting Period/Year Dataset Represents	Reference	Amount (if relevant)	Unit
Raw Materials	A1	Metal Working	metal working, average for metal product manufacturing	Europe	2024	Ecoinvent 3.10	ND	ND
Raw Materials	A1	Stainless Steel	market for steel, chromium steel 18/8	Global	2024	Ecoinvent 3.10	ND	ND
Raw Materials	A1	Brass	market for brass	Rest-of-World	2024	Ecoinvent 3.10	ND	ND
Raw Materials	A1	Nickel Plating	market for nickel, class 1	Global	2024	Ecoinvent 3.10	ND	ND
Packaging	A3	Cardboard	market for corrugated board box	Europe	2024	Ecoinvent 3.10	ND	ND
Manufacturing	A3	Electricity	market for electricity, medium voltage	Germany	2024	Ecoinvent 3.10	ND	ND
Waste Processing	A3	Hazardous Waste Disposal	market for hazardous waste, for incineration	Europe without Switzerland	2024	Ecoinvent 3.10	ND	ND
Waste Processing	A5	Cardboard/Paper Packaging Disposal	treatment of waste paperboard, inert material landfill	Rest-of-World	2024	Ecoinvent 3.10	ND	ND
Waste Processing	A5	Cardboard/Paper Packaging Disposal	treatment of waste paperboard, municipal incineration	Global	2024	Ecoinvent 3.10	ND	ND
Waste Processing	A5	Plastic Packaging Disposal	treatment of waste plastic, mixture, sanitary landfill	Rest-of-World	2024	Ecoinvent 3.10	ND	ND
Waste Processing	A5	Plastic Packaging Disposal	treatment of waste plastic, mixture, municipal incineration	Global	2024	Ecoinvent 3.10	ND	ND
Transport	Various	Truck	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 3	Europe	2024	Ecoinvent 3.10	ND	ND
Transport	Various	Ship	market for transport, freight, sea, container ship, heavy fuel oil |	Global	2024	Ecoinvent 3.10	ND	ND

Life Cycle Module Descriptions

Raw material supply (A1) includes the procurement of raw materials and any relevant supplier processing steps prior to shipment to the manufacturing facility, Components are shipped via truck and/or ship to the manufacturing facility (A2). During manufacturing, components move through various assembly steps driven by electricity (A3). Manufacturing also includes overhead demands and waste (A3). Packaging procurement and transportation is also included in this step (A3). Products are shipped from the reporting company's facility in Landau, DE and they travel a total average distance of 468.702 km by diesel trucks and 1450.047 km by ocean transport to customers (A4). During installation, scrap waste is generated from the discarded packaging materials. All the waste is transported and disposed of, and the disposal method depends on the material type. During installation, scrap waste is generated from the discarded packaging materials (A5). All the waste is transported

and disposed of, and the disposal method depends on the material type. No installation scrap was assumed, as the product arrives ready to install. All use phase impacts are assumed to be zero. Manifolds require no repair or replacement over their RSL. Additionally, there is no direct water or energy use by the manifolds. Any leakage is associated with the manifolds is assumed to have a negligible impact. The weight of the installed product is transported to its final disposal via truck (C2) where it is assumed to be 100% recycled (C4). Module D is declared in this study, and while not a life cycle stage, considers the loads and benefits of recycled materials beyond the system boundary. First, the mass of recycled materials entering the system and material exiting the system to be recycled were summed by general material type and information module. Recycled brass and stainless steel enters the system as a raw material (A1). Brass and stainless steel are also recycled during manufacturing and at end of life. Rubber and nylon components are recycled at end of life. The net amount of material leaving the system boundary to be recycled were modeled as both a load (recycling processes) and benefit (virgin material replaced).

LCA Discussion

Allocation Procedure

For the processes within the system boundary, described in Study Boundaries, input and output flows of mass and energy greater than 1% (based on total mass of final product and total energy usage of the product system) or greater than 1% of environmental impacts were included within the scope of the analysis. Flows of less than 1% were included if sufficient data were available to warrant inclusion and/or the flow was thought to have significant environmental impact. Where data gaps were identified, they are filled by conservative assumptions with average, generic, or proxy data and assumptions are documented. No known flows relevant to the product system are deliberately excluded from this LCA.
All upstream and downstream activities are included using a combination of primary and secondary data. While the majority of inventory data are sourced from primary resources, representative proxies are used to close gaps in the absence of primary data.
The allocations of relevance for calculation (appropriation of impacts across various products) are performed as follows:

- The use of recycled and secondary raw materials is based on the mass of the material present in a specific weight of product.
- Manufacturing production is tracked by the total number of products produced, so energy, ancillary, and operating materials are allocated per packaged product (per product).

No multi-output allocation was necessary in the foreground of the study, and the secondary data that is sourced from ecoinvent v3.10 cut-off by classification has allocation applied to it.

Cut-off Procedure

This study uses the cut-off approach method for recycling. According to this approach, the first life of a material bears the environmental burdens of its production (e.g., raw material extraction and processing) and the second life (e.g., scrap input) bears the burdens of refurbishment (e.g., collection and refining of scrap). The burdens from recycling waste treatment are taken on by the next life of the product and are not included in this study.

Renewable Electricity

Energy Attribute Certificates (EACs) such as Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) are included in the baseline reported results:	✗ No

Results

Environmental Impact Assessment Results

EF 3.1

per 1 packaged product.

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

HKV2013A MS12

Impact Category	Method	Unit	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	EF 3.1	kg CO2 eq	3.40e+1	6.14e-1	6.56e-2	0	0	0	0	0	0	0	0	3.24e-2	1.29e-1	0	-4.64e+0
GWP-fossil	EF 3.1	kg CO2 eq	3.33e+1	6.14e-1	9.05e-3	0	0	0	0	0	0	0	0	3.24e-2	1.30e-1	0	-4.61e+0
GWP-biogenic	EF 3.1	kg CO2 eq	6.17e-1	1.56e-4	5.66e-2	0	0	0	0	0	0	0	0	1.03e-5	-1.55e-3	0	-2.87e-2
GWP-luluc	EF 3.1	kg CO2 eq	7.13e-2	2.82e-4	4.02e-6	0	0	0	0	0	0	0	0	1.45e-5	1.91e-4	0	-4.31e-3
ODP	EF 3.1	kg CFC 11 eq	4.44e-7	7.96e-9	1.34e-10	0	0	0	0	0	0	0	0	4.14e-10	1.83e-9	0	-2.81e-8
AP	EF 3.1	mol H+ eq	1.21e+0	5.45e-3	5.60e-5	0	0	0	0	0	0	0	0	1.84e-4	1.44e-3	0	-6.84e-2
EP-freshwater	EF 3.1	kg PO4 eq	8.07e-2	6.14e-5	8.05e-2	0	0	0	0	0	0	0	0	3.57e-6	7.71e-5	0	-6.92e-3
EP-marine	EF 3.1	kg N eq	7.40e-2	1.81e-3	2.34e-5	0	0	0	0	0	0	0	0	7.34e-5	3.34e-4	0	-7.06e-3
EP-terrestrial	EF 3.1	mol N eq	8.79e-1	1.99e-2	2.44e-4	0	0	0	0	0	0	0	0	8.01e-4	3.75e-3	0	-7.80e-2
POCP	EF 3.1	kg NMVOC eq	2.76e-1	6.00e-3	7.62e-5	0	0	0	0	0	0	0	0	2.54e-4	1.13e-3	0	-2.37e-2
ADP-miner-als&metals	EF 3.1	kg SO2 eq	1.34e-2	1.82e-6	2.59e-8	0	0	0	0	0	0	0	0	1.06e-7	8.00e-6	0	-7.69e-4
ADP-fossil	EF 3.1	MJ	4.64e+2	8.41e+0	1.30e-1	0	0	0	0	0	0	0	0	4.51e-1	1.77e+0	0	-6.14e+1
WDP	EF 3.1	m3 world eq deprived	3.32e+1	3.65e-2	2.85e-3	0	0	0	0	0	0	0	0	2.09e-3	1.95e-2	0	-2.46e+0
PM	EF 3.1	Disease in-cidence	3.28e-6	5.76e-8	9.66e-10	0	0	0	0	0	0	0	0	3.37e-9	2.02e-8	0	-3.96e-7
IRP	EF 3.1	kBq U235 eq	4.98e+0	6.36e-3	1.08e-4	0	0	0	0	0	0	0	0	3.62e-4	1.34e-2	0	-2.24e-1
ETP-fw	EF 3.1	CTUe	1.78e+3	1.43e+0	8.12e-2	0	0	0	0	0	0	0	0	8.31e-2	9.16e-1	0	-1.18e+2
HTP-c	EF 3.1	CTUh	1.20e-7	2.12e-10	5.59e-12	0	0	0	0	0	0	0	0	1.19e-11	1.03e-10	0	-8.54e-9
HTP-nc	EF 3.1	CTUh	9.13e-6	6.01e-9	1.95e-10	0	0	0	0	0	0	0	0	3.52e-10	6.97e-9	0	-5.13e-7
SQP	EF 3.1	dimension-less	4.22e+2	4.39e+0	1.12e-1	0	0	0	0	0	0	0	0	2.63e-1	3.10e+0	0	-2.88e+1

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit

basis before any comparison is attempted.
Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Resource Use Indicators

per 1 packaged product.

HKV2013A MS12

Indicator	Unit	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ, net calorific value	1.29e+2	1.10e-1	1.91e-3	0	0	0	0	0	0	0	0	6.23e-3	2.83e-1	0	-9.70e+0
PERM	MJ, net calorific value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ, net calorific value	1.29e+2	1.10e-1	1.91e-3	0	0	0	0	0	0	0	0	6.23e-3	2.83e-1	0	-9.70e+0
PENRE	MJ, net calorific value	4.87e+2	8.94e+0	1.39e-1	0	0	0	0	0	0	0	0	4.80e-1	1.87e+0	0	-5.96e+1
PENRM	MJ, net calorific value	6.99e+0	0	0	0	0	0	0	0	0	0	0	0	-6.99e+0	0	-6.99e+0
PENRT	MJ, net calorific value	4.94e+2	8.94e+0	1.39e-1	0	0	0	0	0	0	0	0	4.80e-1	-5.12e+0	0	-6.65e+1
SM	kg	2.65e+0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ, net calorific value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ, net calorific value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m3	8.67e-1	1.09e-3	8.34e-5	0	0	0	0	0	0	0	0	6.20e-5	7.43e-4	0	-6.66e-2

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 packaged product.

HKV2013A MS12

Indicator	Unit	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	4.71e-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NHWD	kg	5.06e-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	5.00e+0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Carbon Emissions and Removals

per 1 packaged product.

HKV2013A MS12

Indicator	Unit	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BCRP	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BCEP	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BCRK	kg CO2	-1.81e+0	0	1.40e+0	0	0	0	0	0	0	0	0	0	0	0	0
BCEK	kg CO2	0	0	3.99e-1	0	0	0	0	0	0	0	0	0	0	0	0
BCEW	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CCE	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CCR	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWNR	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Impact Scaling Factors

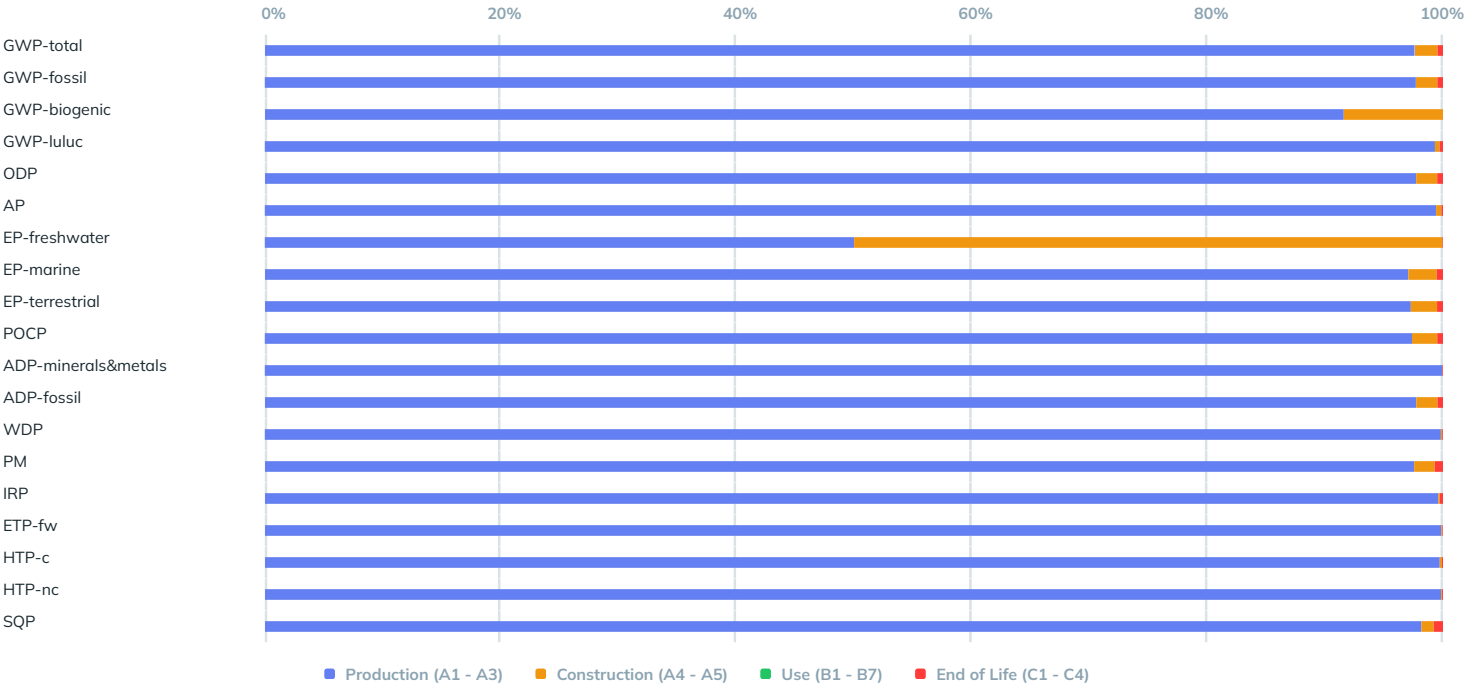
Manifold Size	Packaged Weight (kg)	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HKV2013A MS02	1.91E+00	3.73E-01	3.41E-01	8.56E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.92E-01	2.92E-01	0.00E+00	7.12E-01
HKV2013A MS03	2.08E+00	4.02E-01	3.72E-01	8.63E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-01	3.25E-01	0.00E+00	7.25E-01
HKV2013A MS04	2.48E+00	4.70E-01	4.43E-01	8.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-01	4.01E-01	0.00E+00	7.57E-01
HKV2013A MS05	2.78E+00	5.21E-01	4.97E-01	8.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.59E-01	4.59E-01	0.00E+00	7.80E-01
HKV2013A MS06	3.28E+00	6.06E-01	5.86E-01	9.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.55E-01	5.55E-01	0.00E+00	8.19E-01
HKV2013A MS07	3.73E+00	6.82E-01	6.66E-01	9.27E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.41E-01	6.41E-01	0.00E+00	8.54E-01
HKV2013A MS08	4.03E+00	7.33E-01	7.20E-01	9.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.99E-01	6.99E-01	0.00E+00	8.78E-01
HKV2013A MS09	4.38E+00	7.93E-01	7.82E-01	9.52E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.66E-01	7.66E-01	0.00E+00	9.05E-01
HKV2013A MS10	4.78E+00	8.61E-01	8.54E-01	9.68E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.43E-01	8.43E-01	0.00E+00	9.36E-01
HKV2013A MS11	5.13E+00	9.20E-01	9.16E-01	9.82E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E-01	9.10E-01	0.00E+00	9.63E-01

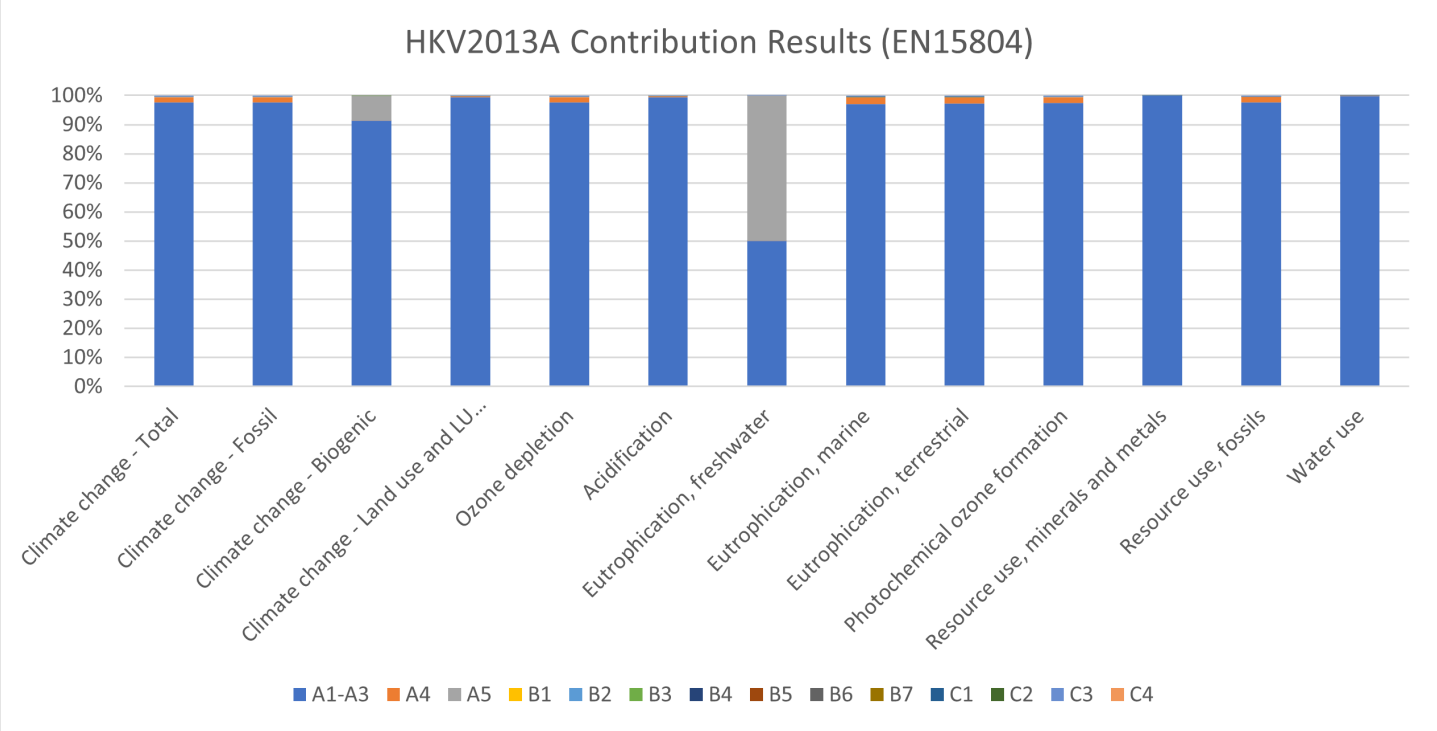
Manifold Size	A1-A3 GWP 100	A4 GWP 100	A5 GWP 100	B1 GWP 100	B2 GWP 100	B3 GWP 100	B4 GWP 100	B5 GWP 100	B6 GWP 100	B7 GWP 100	C1 GWP 100	C2 GWP 100	C3 GWP 100	C4 GWP 100	D GWP 100
HKV2013A MS02	1.27E+01	2.10E-01	5.62E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.47E-03	3.76E-02	0.00E+00	-3.31E+00

Scaling factors for each additional manifold size (2-11) are provided for each information module included in this study (with A1-A3 aggregated). Example scaled results are provide for a size 2 manifold in the second table, which includes GWP - Total. Scaling factors for the corresponding size and information module need only be multiplied by the declared results to determine specific results for the given manifold.

Interpretation

The analysis of Watts' manifold products provides useful insights regarding the cradle-to-grave environmental impacts. The LCA results also identify where substantial impacts are occurring to allow further process and materials improvements to be implemented by the reporting company. The cradle-to-grave impacts for all products are dominated by the A1 Raw Material Stage, which contributes between 60-98% of impacts, depending on the impact category and manifold (with the 60% corresponding to ozone depletion, and 98% corresponding to total GHGs). The high contribution of A1 can be attributed to the use of many stainless steel and brass components, that require multiple processing steps prior to use in the manifolds. A3, Manufacturing, represents the next major contributor to impacts, and this is mainly driven by electricity use. Manufacturing contributes the most (~70%) to marine eutrophication.





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