

## K-13694-CP

12" rainhead with Katalyst® air-induction technology, 2.5 gpm

**Product Group**

Commercial Products



**Product Specifications**

|                              |            |
|------------------------------|------------|
| Packaged Product Weight (kg) | 5          |
| Product Recycled Content     | 0%         |
| Product Recyclable Content   | 100%       |
| Product Life time (years)    | 10         |
| Product Application          | Commercial |

**Use Phase Specifications**

|                                   |                                 |
|-----------------------------------|---------------------------------|
| Flow rate (gal/min)               | 3                               |
| User Frequency (Events/year)      | 5840                            |
| Annual Cleaning Frequency (times) | 365                             |
| Cleaner                           | 10 ml, 1% sodium lauryl sulfate |

**Greenhouse Gas Emission (kg CO2- eq.)**

|                          |       |
|--------------------------|-------|
| Material & Manufacturing | 7085  |
| Use & Maintenance        | 11160 |

**Water Intensity (m3)**

|                          |        |
|--------------------------|--------|
| Material & Manufacturing | -17.41 |
| Use & Maintenance        | 190.78 |

**Manufacturing Locations**

Nanchang- China

### Believing in Better

We believe in a better world. We are passionate about protecting the environment and enhancing the quality of life for current and future generations. And that means designing products that look beautiful and deliver exceptional performance, while being as sustainable as possible.



|   |  |
|---|--|
| Program Operator Name, Address, Logo, and Website | UL Environment   |
| General Program Instructions and Version Number   | Program Operator Rules V2.3 February 2018  |
| Location of Explanatory Material                  | Nanchang- China  |
| Declaration Holder and Address                    | Kohler Co.<br>444 Highland Drive, Kohler, WI   |
| Declaration Number                                | 4788111728.264.1   |
| Declared Product and Functional Unit              | Single Showerhead- Commercial  |
| Product Definition                                | 12" rainhead with Katalyst® air-induction technology, 2.5 gpm  |
| Reference PCR and Version Number                  | PCR for Building-Related Products and Services. Adapted for UL Environment from the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU). Part A (v.3): Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report. Part B: Kitchen and Bath Fixture Fittings and Accessory Products |
| Markets of Applicability                          | Asia pacific   |
| Date of Issue                                     | 01-Oct-21  |
| Period of Validity                                | 5 Years  |
| EPD Type  | Product Specific   |
| EPD Scope   | Cradle-to-grave  |
| Year of Reported Manufacturer Primary Data        | 2019-2020  |
| LCA Software and Version Number                   | SimaPro v. 8.4.0.0   |
| LCIA Database(s) and Version Numbers              | Ecoinvent 3<br>DATASMART LCI Package (USEI 2.2)<br>TRACI 2.1 v1.04   |
| LCIA Methodology and Version Number               | CML-IA baseline v3.04<br>Cumulative Energy Demand (CED) v1.09  |
| Applicable Green Building Certifications Schema   | LEED v4/BD+C/Materials and Resources/Building Product Disclosure and Optimization- Environmental Product Declarations  |

The PCR review was conducted by:

This declaration was independently verified in accordance with ISO 14025:2006. The UL Environment "Part A: calculation Rules for the Life Cycle Assessment Reuirements on the Project Report" v3.0 (December 2017), based on CEN Norm EN 15804 (2012) and ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/ UL Environment Part A Enhancement (2017).

INTERNAL

EXTERNAL

This life cycle assessment was conducted in accordance with ISO 14044 and reference PCR by:

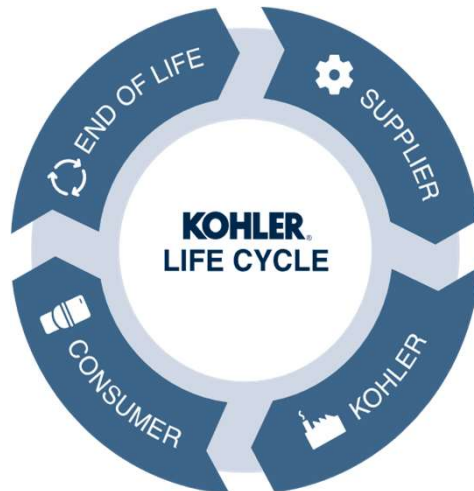
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:

Thomas Gloria, Life-Cycle Services, LLC

LIMITATIONS: 1) Environmental declarations from different programs (ISO 14025) may not be comparable; 2) Comparison of the environmental performance 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 building use phase as instructed under this PCR; 3) Full conformance with the PCR allows EPD comparability when all stages of a life cycle have been considered, when they comply with all referenced standards, use the same sub-category PCR, and use equivalent scenarios with respect to construction work. 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.

This document is an environmental product declaration (EPD) in accordance with ISO 21930. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycles.

At Kohler Co., we believe in protecting the environment and enhancing the quality of life for current and future generations. When developing new products, we consider the environmental impact at each stage of a product's existence - from the activities of our suppliers through the end of the product's useful life. Designing for a better world means every choice counts.



## Product Description



Enjoy a shower that simulates the soaking deluge of a warm summer downpour. This traditional-style rainhead features innovative Catalyst air-induction technology, which efficiently mixes air and water to produce large water droplets and deliver a powerful, thoroughly drenching overhead shower experience. Its clean good looks and durable finish coordinate with many other KOHLER faucets and accessories.

Additional data can be found at:

<https://www.us.kohler.com/us/traditional-round-12-rainhead-with-catalyst-air-induction-spray-2.5-gpm/productDetail/rainheads/428158.htm?skuld=409257>

## Applications and Uses

- Single-function rain showerhead.
- MasterClean™ sprayface features an easy-to-clean surface that withstands mineral buildup.
- Optimized sprayface for maximum performance.
- 2.5 gpm (9.5 lpm) maximum flow rate
- 1/2" - 14 NPT connection.

## Product Standards, Approvals and Certifications

Specified model meets or exceeds the following:



## Technical Data

| Name                       | Applicable Test Standard          | Value | Unit                     |
|----------------------------|-----------------------------------|-------|--------------------------|
| Flow/ Flush Rate           | ASME A112.18.1-2018/CSA B125.1-18 | 2.5   | gallon per minute/ flush |
| Operational Water Pressure | ASME A112.18.1-2018/CSA B125.1-18 | -     | N/m2 or PSI              |



## SUPPLIER OPERATIONS

### Base Material Content of the Product

| Material        | Function                             | Quantity (% By Weight) |
|-----------------|--------------------------------------|------------------------|
| Brass           | Internal Body Component              | 55-65                  |
| Stainless Steel | Internal Body Component              | 30-20                  |
| Aluminium       | Internal Body Component              | 1-5                    |
| Plastic         | Internal Body Component              | 85-90                  |
| Balance         | Miscellaneous hardware and packaging | 10-15                  |

## KOHLER OPERATIONS

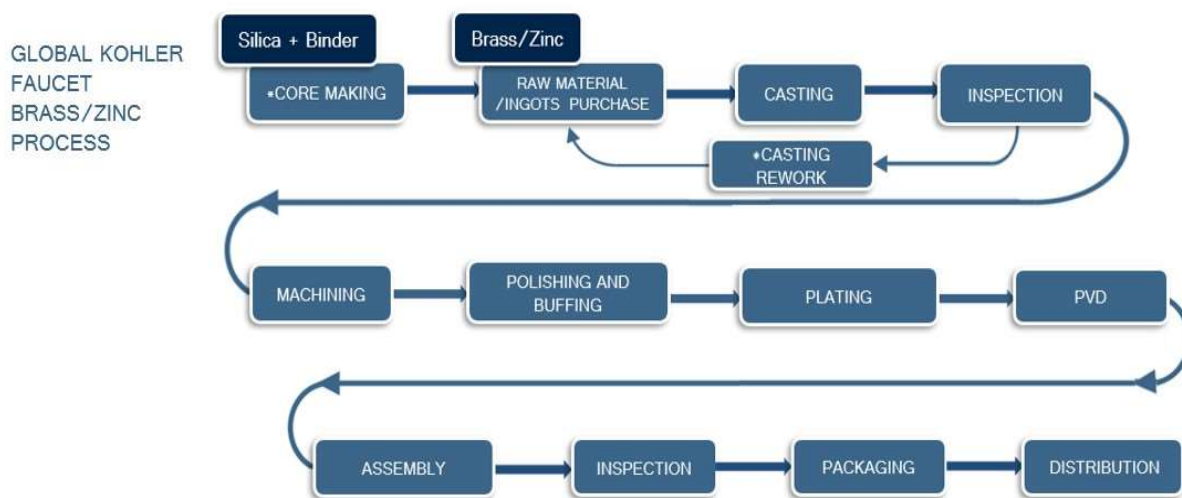
### Manufacturing Process Description

Raw Materials are casted into a mold with cavities. After casting, components go through several setups of machining, polishing and buffing before final coating. Depending on the intended color, parts may go through plating and/ or physical vapor deposition processes. Finished products are assembled, inspected and packaged for distribution.

### Manufacturing Locations



### Manufacturing Process



## Health, Safety and Environmental Aspects during Production

Kohler Co. has established program management guidelines for safety, accident prevention and environmental performance. These systems enable Kohler Co. operations to achieve world-class performance: Kohler Safety Management System (KSMS) and Kohler Environmental Management System (KEMS). The management systems are based on best management practices, and the application of these programs consistently delivers significant results.

## Packaging

Showering components are packaged primarily in single-wall corrugated containerboard. Plastic blisters- made of PET and RPET- are often used to protect the components. Corrugated containerboard are 100% recyclable, and collection is available in most municipalities. Other materials are also recyclable; however, this is dependent on local availability of collection programs.



## CONSUMER USE

### Conditions of Use

The majority of product use phase environmental impacts are related to energy required to heat up the water. Water consumed in each use cycle is defined by product specifications- flow rate- while proportion of hot and cold water is defined by PCR.

### Reference Service Life

Commercial Showerhead- Commercial are assumed to remain in service for 10 years.

### Cleaning and Maintenance

Showerhead- Commercial are assumed to require 365 cleanings per year with 10 ml, 1% sodium lauryl sulfate. These impacts are included within the product use stage of the LCA.



## END OF LIFE

### Recycle or Reuse

Collection and processing for zinc and brass product beneficial reuse and recycle are possible, but availability of the technologies depend on disposal locations.

### Disposal

Upon PCR default assumptions, The KOHLER® LCA model assumes 100% of the brass portion of the product, accessories and packaging materials are landfilled.

## LIFE CYCLE ASSESSMENT

### Description of Declared or Functional Unit

The functional unit represented here refers to a single showerhead- commercial.

| Name                                | Value | Unit                                     |
|-------------------------------------|-------|--|
| Functional Unit                     | 1     | One packaged product with referenced RSL |
| Component Breakdown (if applicable) | -     | components in 1 pckaged product          |
| Mass                                | 4.50  | kg                                       |
| Thickness (if relevent)             | -     | cm                                       |
| Surface Area (if relevant)          | -     | m2                                       |

### Estimates and Assumptions

The LCI/ LCA assumptions are mentioned below:

- Product transport from DC to final customer and from customer to diposal site are modeled based on PCR specifications
- Product and packaging disposal scenarios are adopted from the PCR specifications
- Building estimated service life (ESL) is assumed to be 75 years
- Biogenic carbon content is estimated for three types of packaging materials: plywood, corrugate box and kraft paper

### Cut-off Criteria

This LCA is in compliance with the cutoff criteria specified in the PCR, as no known processes were excluded from this assessment outside of the specific items listed within the “System Boundary” section below.

### Allocation

Impacts are allocated to individual products with a unit process approach. Typically, product mass is used to build the impact allocation factors. Product-specific quality data is also employed to match impacts to products.

### Data Sources

Primary manufacturing data is collected directly from Kohler Faucets Operations globally, including North America, Inida and China. Supply chain data is sourced from primary survey results and individual part modeling. Secondary data primarily references the DATASMART and ecoinvent 3 LCI databases. Both databases are widely distributed and are referenced within the LCA community. All ecoinvent datasets have been critically reviewed.

### Data Quality

Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision and reproducibility to limit uncertainty. The data sources used are complete and representative of North America, India and China in terms of the geographic and technological coverage and are a recent vintage (i.e., less than ten years old). Any deviations from these initial data quality requirements for secondary data are documented in the critically reviewed LCA report. When a product is produced at more than one plant, impacts are weighted by unit volume to produce a single result.

LCA Modeling Scenarios

| Transport from gate to the building site (A4) |                   |                   |
|---|-------------------|-------------------|
| Name  | Value             | Unit              |
| Fuel type                                     | Diesel            |                   |
| Liters of fuel                                | 38                | l/100 km          |
| Vehicle Type                                  | Single Unit Truck |                   |
| Transport distance                            | 821.869           | km                |
| Capacity utilization (including empty runs)   | 89                | %                 |
| Gross density of products transported         | -                 | kg/m <sup>3</sup> |
| Capacity utilization volume factor            | 89                | -                 |

| Installation into the building (A5)                             |         |                |
|---|---------|----------------|
| Name  | Value   | Unit           |
| Ancillary materials   | -       | kg             |
| Net fresh water consumption                                     | -       | m <sup>3</sup> |
| Other resources   | -       | km             |
| Electricity consumption   | -       | kWh            |
| Other energy carriers   | -       | MJ             |
| Product loss per functional unit                                | -       | kg             |
| Waste material at the construction site before waste processing | 1.23    | kg             |
| Output materials resulting from on-site waste processing        | -       | kg             |
| Mass of packaging waste- corrugate and paper                    | 1.228   | kg             |
| Biogenic carbon contained in packaging                          | 5.4E-01 | kg CO2         |
| Direct emissions to ambient air, soil and water                 | -       | kg             |
| VOC Emissions   |         | µg/m3          |

| Reference service life       |       |       |
|------------------------------|-------|-------|
| Name                         | Value | Unit  |
| Reference service life (RSL) | 10    | years |

| Maintenance (B2)                                |         |                |
|---|---------|----------------|
| Name  | Value   | Unit           |
| Maintenance process information                 | -       | -              |
| Maintenance cycle                               | 3650    | Number/RSL     |
| Maintenance cycle                               | 27375   | Number/ESL     |
| Net freshwater consumption                      | -       | m <sup>3</sup> |
| Ancillary materials by type- cleaning agent     | 16.5561 | kg             |
| Other resources                                 | -       | kg             |
| Energy input by activity, type, amount          | -       | kWh            |
| Other energy carriers by type                   | -       | kWh            |
| Power output of equipment                       | -       | kW             |
| Waste materials- cleaning agent                 | 16.5561 | kg             |
| Direct emissions to ambient air, soil and water | -       | kg             |

| Repair (B3)                                  |       |             |
|--|-------|-------------|
| Name   | Value | Unit        |
| Repair process information                   | -     |             |
| Inspection process information               | -     |             |
| Repair cycle                                 | -     | Number/RSL  |
| Repair cycle                                 | -     | Number/ ESL |
| Net fresh water consumption                  | -     | m3          |
| Ancillary materials by type                  | -     | kg          |
| Energy input by activity, type, amount       | -     | kWh         |
| Waste materials from repair                  | -     | kg          |
| Direct emissions to air, soil and water      | -     | kg          |
| Further assumptions for scenario development |       |             |

| Replacement (B4)                             |       |             |
|--|-------|-------------|
| Name   | Value | Unit        |
| Reference service life                       | 10    | years       |
| Replacement cycle                            | 7.5   | (ESL/RSL)-1 |
| Energy input by activity, type, amount       | -     | kWh         |
| Net fresh water consumption                  | -     | m3          |
| Ancillary materials by type                  | -     | kg          |
| Replacement of worn parts                    | -     | kg          |
| Direct emissions to air, soil and water      | -     | kg          |
| Further assumptions for scenario development |       |             |

| Refurbishment (B5)                           |       |                |
|--|-------|----------------|
| Name   | Value | Unit           |
| Refurbishment process description            |       |                |
| Replacement cycle                            | 1     | Cycle/RSL      |
| Replacement cycle                            | 7.5   | Number/ESL     |
| Energy input by activity, type, amount       | -     | kWh            |
| Net fresh water consumption                  | -     | m <sup>3</sup> |
| Material input for refurbishment             | -     | kg             |
| Waste materials                              | -     | kg             |
| Direct emissions to air, soil and water      | -     | kg             |
| Further assumptions for scenario development | -     |                |

| Operational energy (B6) and water (B7) use   |       |          |
|--|-------|----------|
| Name   | Value | Unit     |
| Net fresh water consumption                  | 553   | m3/p/RSL |
| Ancillary materials                          | -     | kg       |
| Energy input by activity, type, amount       | -     | kWh      |
| Equipment power output                       | -     | kW       |
| Characteristic performance                   | -     | kg       |
| Direct emissions to air, water and soil      | -     | kg       |
| Further assumptions for scenario development | -     |          |

| End of life (C1-C4)                       |       |        |
|---|-------|--------|
| Name                                      | Value | Unit   |
| Assumptions for scenario development      |       |        |
| Collected separately                      | 0     | kg     |
| Collected as mixed construction waste     | 0     | kg     |
| Reuse                                     | -     | kg     |
| Recycling                                 | -     | kg     |
| Landfill                                  | 0     | kg     |
| Incineration                              | -     | kg     |
| Incineration with energy recovery         | -     | kg     |
| Energy conversion                         | -     |        |
| Product or material for final disposition | 0     | kg     |
| Removal of biogenic carbon                | -     | kg CO2 |

System Boundaries

|                              | Product Stage       |           |               | Construction Process Stage      |                   | Use Stage |             |        |             |               |                        |                       | End of Life Stage |           |                  |          | Benefits and Loads Beyond the System Boundaries | Reference Service Life |  |
|------------------------------|---------------------|-----------|---------------|---------------------------------|-------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|-------------------|-----------|------------------|----------|---|------------------------|--|
|                              | Raw material supply | Transport | Manufacturing | Transport from gate to the site | Assembly/ Install | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction    | 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   |                        |  |
| Cradle to grave with options | X                   | X         | X             | X                               | X                 | X         | X           | X      | X           | X             | X                      | X                     | X                 | X         | X                | X        | X   | MND                    |  |

Description of the System Boundary Stages Corresponding to the PCR  
(X = Included; MND = Module Not Declared)

Results of the Assessment

| TRACI 2.1 Impact Assessment |              |                 |               |            |             |              |
|-----------------------------|--------------|-----------------|---------------|------------|-------------|--------------|
| Module                      | GWP          | ODP             | AP            | EP         | POCP        | ADP          |
|                             | (kg CO2 Eq.) | (kg CFC-11 Eq.) | (kg SO2- Eq.) | (kg N-Eq.) | (kg O3-Eq.) | (MJ surplus) |
| Total                       | 1.55E+05     | 2.07E-02        | 7.77E+02      | 6.42E+02   | 1.53E+04    | 1.97E+05     |
| A1- A3                      | 7.08E+03     | 1.65E-03        | 4.66E+01      | 1.48E+01   | 1.18E+03    | 1.49E+04     |
| A4                          | 5.71E-01     | 2.72E-08        | 3.35E-03      | 3.91E-04   | 9.55E-02    | 1.10E+00     |
| A5                          | 3.04E-03     | 1.29E-09        | 2.66E-05      | 9.07E-06   | 6.69E-04    | 1.21E-02     |
| B1                          | 0.00E+00     | 0.00E+00        | 0.00E+00      | 0.00E+00   | 0.00E+00    | 0.00E+00     |
| B2                          | 6.21E+01     | 2.42E-06        | 2.80E-01      | 2.46E-01   | 3.61E+00    | 5.57E+01     |
| B3                          | 0.00E+00     | 0.00E+00        | 0.00E+00      | 0.00E+00   | 0.00E+00    | 0.00E+00     |
| B4                          | 1.37E+05     | 1.83E-02        | 7.27E+02      | 5.67E+02   | 1.35E+04    | 1.74E+05     |
| B5                          | 0.00E+00     | 0.00E+00        | 0.00E+00      | 0.00E+00   | 0.00E+00    | 0.00E+00     |
| B6                          | 5.36E+03     | 3.77E-04        | 2.36E+01      | 2.15E+01   | 2.94E+02    | 3.93E+03     |
| B7                          | 5.73E+03     | 4.05E-04        | 2.65E+01      | 3.91E+01   | 3.25E+02    | 4.26E+03     |
| C1                          | 0.00E+00     | 0.00E+00        | 0.00E+00      | 0.00E+00   | 0.00E+00    | 0.00E+00     |
| C2                          | 1.25E-01     | 5.28E-12        | 1.28E-03      | 7.56E-05   | 3.16E-02    | 2.65E-01     |
| C3                          | 0.00E+00     | 0.00E+00        | 0.00E+00      | 0.00E+00   | 0.00E+00    | 0.00E+00     |
| C4                          | 2.03E-02     | 9.05E-09        | 1.75E-04      | 3.59E-05   | 4.32E-03    | 8.42E-02     |

| CML 4.1 Impact Assessment |              |                 |              |                  |               |             |                  |
|---------------------------|--------------|-----------------|--------------|------------------|---------------|-------------|------------------|
| Module                    | GWP          | ODP             | AP Air       | EP               | POCP          | ADP element | ADP fossil fuels |
|                           | (kg CO2-Eq.) | (kg CFC-11 Eq.) | (kg SO2-Eq.) | (kg (PO4)3- Eq.) | (kg C2H4 Eq.) | (kg Sb-Eq.) | (MJ, LHV)        |
| Total                     | 1.56E+05     | 1.59E-02        | 7.49E+02     | 3.26E+02         | 2.83E+01      | 2.27E+00    | 1.93E+06         |
| A1- A3                    | 7.10E+03     | 1.24E-03        | 3.90E+01     | 1.11E+01         | 1.23E+00      | 2.22E-01    | 1.05E+05         |
| A4                        | 5.73E-01     | 2.04E-08        | 2.69E-03     | 5.89E-04         | 1.05E-04      | 3.02E-06    | 7.39E+00         |
| A5                        | 3.04E-03     | 9.72E-10        | 2.25E-05     | 6.26E-06         | 9.32E-07      | 2.92E-08    | 8.27E-02         |
| B1                        | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00         | 0.00E+00      | 0.00E+00    | 0.00E+00         |
| B2                        | 6.20E+01     | 1.80E-06        | 2.55E-01     | 1.37E-01         | 9.87E-02      | 1.96E-04    | 4.51E+02         |
| B3                        | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00         | 0.00E+00      | 0.00E+00    | 0.00E+00         |
| B4                        | 1.38E+05     | 1.41E-02        | 6.61E+02     | 2.97E+02         | 2.50E+01      | 2.00E+00    | 1.70E+06         |
| B5                        | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00         | 0.00E+00      | 0.00E+00    | 0.00E+00         |
| B6                        | 5.40E+03     | 3.04E-04        | 2.30E+01     | 1.04E+01         | 9.40E-01      | 1.79E-02    | 5.89E+04         |
| B7                        | 5.77E+03     | 3.27E-04        | 2.58E+01     | 1.80E+01         | 1.06E+00      | 2.66E-02    | 6.25E+04         |
| C1                        | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00         | 0.00E+00      | 0.00E+00    | 0.00E+00         |
| C2                        | 1.25E-01     | 5.22E-12        | 9.96E-04     | 2.06E-04         | -1.79E-04     | 0.00E+00    | 1.79E+00         |
| C3                        | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00         | 0.00E+00      | 0.00E+00    | 0.00E+00         |
| C4                        | 2.03E-02     | 6.80E-09        | 1.49E-04     | 3.25E-05         | 6.25E-06      | 1.90E-07    | 5.75E-01         |

| Rest of the World Impact Assessment |              |                 |              |            |              |
|-------------------------------------|--------------|-----------------|--------------|------------|--------------|
| Module                              | GWP          | ODP             | AP           | EP         | POCP         |
|                                     | (kg CO2-Eq.) | (kg CFC-11 Eq.) | (kg SO2-Eq.) | (kg N-Eq.) | (kg O3- Eq.) |
| Total                               | 1.56E+05     | 1.59E-02        | 7.10E+02     | 6.42E+02   | 1.53E+04     |
| A1- A3                              | 7.10E+03     | 1.24E-03        | 3.90E+01     | 1.48E+01   | 1.18E+03     |
| A4                                  | 5.73E-01     | 2.04E-08        | 2.69E-03     | 3.91E-04   | 9.55E-02     |
| A5                                  | 3.04E-03     | 9.72E-10        | 2.25E-05     | 9.07E-06   | 6.69E-04     |
| B1                                  | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00   | 0.00E+00     |
| B2                                  | 6.20E+01     | 1.80E-06        | 2.55E-01     | 2.46E-01   | 3.61E+00     |
| B3                                  | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00   | 0.00E+00     |
| B4                                  | 1.38E+05     | 1.41E-02        | 6.61E+02     | 5.67E+02   | 1.35E+04     |
| B5                                  | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00   | 0.00E+00     |
| B6                                  | 5.40E+03     | 3.04E-04        | 2.30E+01     | 2.15E+01   | 2.94E+02     |
| B7                                  | 5.77E+03     | 3.27E-04        | 2.58E+01     | 3.91E+01   | 3.25E+02     |
| C1                                  | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00   | 0.00E+00     |
| C2                                  | 1.25E-01     | 5.22E-12        | 9.96E-04     | 7.56E-05   | 3.16E-02     |
| C3                                  | 0.00E+00     | 0.00E+00        | 0.00E+00     | 0.00E+00   | 0.00E+00     |
| C4                                  | 2.03E-02     | 6.80E-09        | 1.49E-04     | 3.59E-05   | 4.32E-03     |

| Resource Use |          |          |          |          |          |          |          |          |          |          |          |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Module       | RPRe     | RPRm     | RPRt     | NRPRe    | NRPRm    | NRPRt    | SM       | RSF      | NRSF     | RE       | FW       |
|              | (MJ)     | (MJ)     | (MJ)     | (MJ)     | (MJ)     | (MJ)     | (kg)     | (MJ)     | (MJ)     | (MJ)     | (m3)     |
| Total        | 1.05E+03 | 0.00E+00 | 1.05E+03 | 6.44E+03 | 0.00E+00 | 5.68E+03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.5E+03  |
| A1- A3       | 1.24E+02 | 0.00E+00 | 1.24E+02 | 7.58E+02 | 0.00E+00 | 7.58E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | -1.7E+01 |
| A4           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3E-02    |
| A5           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1E-05    |
| B1           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0E+00    |
| B2           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3E+01    |
| B3           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0E+00    |
| B4           | 9.28E+02 | 0.00E+00 | 9.28E+02 | 5.68E+03 | 0.00E+00 | 5.68E+03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1E+03    |
| B5           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0E+00    |
| B6           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4E+01    |
| B7           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1E+02    |
| C1           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0E+00    |
| C2           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0E+00    |
| C3           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0E+00    |
| C4           | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8E-05    |

| Output Flows and Waste Categories |          |          |          |          |          |          |          |          |
|-----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Module                            | HWD      | NHWD     | HLRW     | ILLRW    | CRU      | MFR      | MER      | EE       |
|                                   | (kg)     | (kg)     | (kg)     | (kg)     | (kg)     | (kg)     | (kg)     | (MJ)     |
| Total                             | 0.00E+00 | 5.19E+04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| A1- A3                            | 0.00E+00 | 4.97E+03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| A4                                | 0.00E+00 | 8.51E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| A5                                | 0.00E+00 | 5.70E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| B1                                | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| B2                                | 0.00E+00 | 7.79E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| B3                                | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| B4                                | 0.00E+00 | 4.58E+04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| B5                                | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| B6                                | 0.00E+00 | 3.97E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| B7                                | 0.00E+00 | 7.19E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| C1                                | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| C2                                | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| C3                                | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| C4                                | 0.00E+00 | 3.95E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

| Greenhouse Gas Emissions and Removals |           |           |           |          |           |           |           |           |
|---------------------------------------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|
| Module                                | BCRP      | BCEP      | BCRK      | BCEK     | BCEW      | CCE       | CCR       | CWNR      |
|                                       | (kg CO2e) | (kg CO2e) | (kg CO2e) | (kgCO2e) | (kg CO2e) | (kg CO2e) | (kg CO2e) | (kg CO2e) |
| Total                                 | 0.00E+00  | 0.00E+00  | 5.43E-01  | 5.43E-01 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| A1- A3                                | 0.00E+00  | 0.00E+00  | 5.43E-01  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| A4                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| A5                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 5.43E-01 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| B1                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| B2                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| B3                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| B4                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| B5                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| B6                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| B7                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| C1                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| C2                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| C3                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |
| C4                                    | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00 | 0.00E+00  | 0.00E+00  | 0.00E+00  | 0.00E+00  |

### Interpretation

Due to the high degree of value add within the faucet product manufacturing process, the Kohler Operations life cycle stage drives most of the environmental impact categories for maximum faucet products. Exceptions are products that are battery operated such as Metering Lavatory Faucet, where operational energy contributes to consumer use phase impacts dominate the product life cycle. Manufacturing impacts are primarily driven by energy (natural gas and electricity) use. Therefore, projects that improve energy efficiency have been and will continue to be a primary area of focus. Hardware accessories, especially those that contain metals such as brass and steel, also carry a greater contribution toward overall product environmental impact. Mass reduction and material substitution are areas of focus within the supplier operations portion of the product life cycle. Raw material and the product maintenance stages also tend to have significant impacts across certain impact categories.

Further increase in energy efficiency, decrease in process losses, and implementation of supplier sustainability requirements would be the best method to reduce overall environmental impacts. Kohler has direct control over the modes of transportation for raw materials and final products. Finding, vetting, and selecting more local suppliers and incorporating recycled content will further improve the environmental performance of these products. Where applicable, water use reduction efforts will see the greatest return on investment due primarily to the associated reduction in energy required to pump and treat this water. These efforts must be balanced against the product and product system's capacity to operate effectively when less water is available as a motive force.

## REFERENCES

- PCR Part A      UL Environment and Institut Bauen und Umwelt e.V., Königswinter (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. December 2017, version 3. General Information The UNSPSC code and the appropriate Construction Specifications Institute (CSI) / Construction Specifications Canadian (CSC) classification shall be identified for the product category covered by the Part B PCR
- PCR Part B      UL Environment and Institut Bauen und Umwelt e.V. (IBU). Product Category Rules Part B: Applicable Products  
The Construction Specification Institute (CSI) Masterformat codes that cover the scope of this Part B include:
  - 15400 Plumbing Fixtures and Equipment Corresponding applicable UNSPSC codes include:
    - 301817 - Faucets or taps
    - 301818 - Faucet and shower heads, jets and parts and accessories
    - 311626 - Hooks
    - 471317 - Restroom supplies
    - 401416 - Valves
- ISO 14025      ISO 14025:2011-10, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.
- ISO 14040      ISO 14040:2009-11, Environmental management — Life cycle assessment — Principles and framework
- ISO 14044      ISO 14044:2006-10, Environmental management — Life cycle assessment — Requirements and guidelines
- ISO 21930      Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
- EN 15804      EN 15804:2012-04: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction product
- WaterSense®      US EPA, Office of Wastewater Management <http://www.epa.gov/watersense>
- ULE 2013      UL Environment, General Program Instructions, 2013.
- OHSAS 18001      Occupational Health and Safety Management Systems - Requirements
- ISO 14001      Environmental Management Systems - Requirements with guidance for use
- ASME A112.19.2/CSA B45.1      Ceramic Plumbing Fixtures
- ADA      Americans with Disabilities Act - Standards for Accessible Design
- ICC/ANSI A117.1      International Code Council - Accessible and Usable Buildings and Facilities
- CSA B651      Accessible Design for Built Environment
- OBC      Ontario Building Code Section 3.8 - Barrier-Free Design
- ICES-003      Industry Canada, Interference Causing Equipment Standard 003 - Information Technology Equipment (ITE) - Limits and methods of measurement
- FCC part 15      Federal Communications Commission, Title 47, Part 15 - Radio Frequency Devices
- DOE-Energy Policy Act 1992      Department of Energy - Energy Policy Act 1992
- ASME A112.19.14      Six Liter Closets Equipped with a Dual Flushing Device
- ADA-Children's Environment      ADA Standards for Accessible Design - Clause 604.9
- ASME A112.19.19-06      Vitreous China Nonwater Urinals
- GREENGUARD      UL Environment, <http://greenguard.org/en/index.aspx>