# Statement of Verification

BREG EN EPD No.: 000425 Issue 01

This is to verify that the

**Environmental Product Declaration**

provided by:

PPG Architectural Coatings UK Ltd

is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

Johnstone's Trade Microbarr Anti Bacterial Acrylic Eggshell

## Company Address

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| | | |
|---|---|---|
| Signed for BRE Global Ltd | Emma Baker<br>Operator | 05 July 2022<br>Date of this Issue |
| 05 July 2022<br>Date of First Issue | | 04 July 2027<br>Expiry Date |



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# Environmental Product Declaration

## EPD Number: 000425

## General Information

| EPD Programme Operator | Applicable Product Category Rules |
|---|---|
| BRE Global<br>Watford, Herts<br>WD25 9XX<br>United Kingdom | BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 PN 514 Rev 3.0 |
| **Commissioner of LCA study** | **LCA consultant/Tool** |
| Ben Wilde<br>Marketing Manager – Johnstone's Trade<br>PPG Architectural Coatings - Region North East Europe | Joanna Zhuravlova, Ecomatters<br>Brienne Wiersema, Ecomatters |
| **Declared/Functional Unit** | **Applicability/Coverage** |
| Protecting and decorating 1m² of substrate, suitably prepared, on the basis of two layers of the product | Product Average. |
| **EPD Type** | **Background database** |
| Cradle to Gate with options | ecoinvent |

| Demonstration of Verification |
|---|
| CEN standard EN 15804 serves as the core PCR [a] |
| Independent verification of the declaration and data according to EN ISO 14025:2010<br>☐Internal ☒ External |
| (Where appropriate [b])Third party verifier:<br>Pat Hermon |
| a: Product category rules<br>b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4) |

| Comparability |
|---|
| Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019 for further guidance |

## Information modules covered

| Product | | | Construction | | Use stage | | | | | | | End-of-life | | | | | Benefits and loads beyond the system boundary |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Related to the building fabric | | | | | Related to the building | | | | | | | |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | | D |
| Raw materials supply | Transport | Manufacturing | Transport to site | Construction – Installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction demolition | Transport | Waste processing | Disposal | | Reuse, Recovery and/or Recycling potential |
| ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☑ | ☑ | ☑ | | ☑ |

Note: Ticks indicate the Information Modules declared.

## Manufacturing site(s)

Birstall, United Kingdom

# Construction Product:

## Product Description

A water based acrylic coating that inhibits the growth of bacteria such as MRSA and E.coli. It is typically applied with standard roller application on interior walls, using two layers of the product. One EPD is produced per product group. In order to group different paints belonging to the same product type within the EPDs, a representative paint product is constructed. Annual sales volumes are used to construct the weighted average representative paint. Sales volumes are based on the year averaged values for the year 2021.

The average calculation rule is applied to paint composition and performance characteristics (e.g. formulation, density, coverage), as well as the coatings production sites characteristics including the production inputs (electricity, natural gas, coal and water) and outputs (hazardous and non-hazardous waste, and wastewater outputs).

| EPD | Paint Product Name | Annual Volumes (% per product) | Paint Application |
|---|---|---|---|
| Johnstone's Trade Microbarr Anti Bacterial Acrylic Eggshell | Johnstone's Trade Microbarr Anti Bacterial Acrylic Eggshell Brilliant White | 43% | Interior wall, applied with standard roller application. |
| | Johnstone's Trade Microbarr Anti Bacterial Acrylic Eggshell L Base | 54% | |
| | Johnstone's Trade Microbarr Anti Bacterial Acrylic Eggshell Z Base | 3% | |

## Technical Information

| Paint Product | Property | Value, Unit |
|---|---|---|
| Johnstone's Trade Microbarr Anti Bacterial Acrylic Eggshall Brilliant White | Spreading rate | 12 m2/l |
| | Time to touch dry | 2 h |
| | Time to recoat | 4 h |
| | Initial coats | 2 |
| | Density | 1.28 kg/L |
| | Declared unit | 0.213 kg/m2 |
| Johnstone's Trade Microbarr Anti Bacterial Acrylic Eggshell L Base | Spreading rate | 12 m2/l |
| | Time to touch dry | 2 h |
| | Time to recoat | 4 h |
| | Initial coats | 2 |
| | Density | 1.23 kg/L |
| | Declared unit | 0.205 kg/m2 |
| Johnstone's Trade Microbarr Anti Bacterial Acrylic Eggshell Z Base | Spreading rate | 12 m2/l |
| | Time to touch dry | 2 h |
| | Time to recoat | 4 h |
| | Initial coats | 2 |
| | Density | 1.12 kg/L |
| | Declared unit | 0.187 kg/m2 |

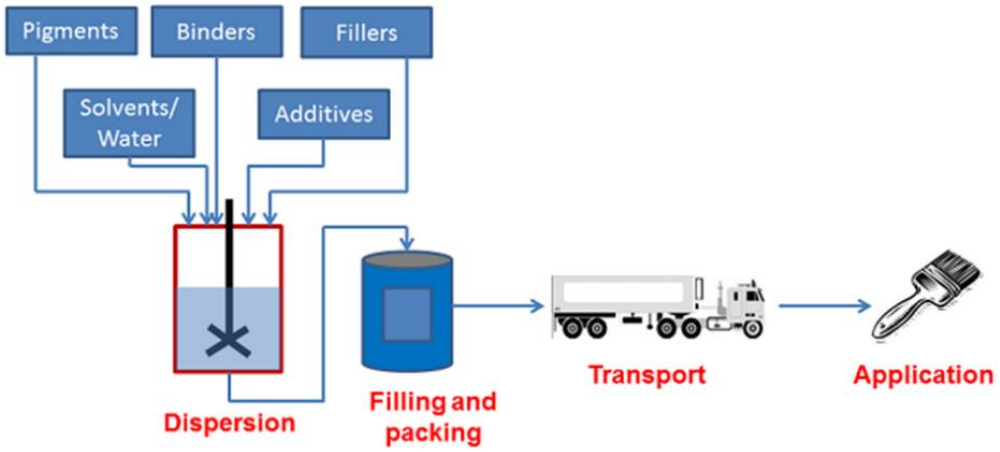
## Main Product Contents

| Material/Chemical Input | % |
|---|---|
| Binder | 20 - 25 |
| Water | 45 - 65 |
| Additives | 0 - 5 |
| Biocide | 0 - 1 |
| Filler | 7.5 - 15 |
| Glycols and Esters | 0 – 2.5 |
| Pigment | 0 - 20 |

## Manufacturing Process

The manufacturing process involves the mixing and dispersing of raw materials into a homogeneous mixture. The product is then packaged for distribution to the customer.

## Process flow diagram




## Construction Installation

All surfaces should be sound, clean, dry and free from grease. Remove any crazed or flaking paint. Stir well before use and apply by brush, roller or paint pad. When using a roller, use a medium pile synthetic type. Apply liberally and evenly; avoid overspreading. Do not apply when air or surface temperature is less than 10°C or in damp conditions. If more than one can of colour is to be used in the same area, intermix before use.

## Use Information

For more information on the application of the paint; please consult the technical datasheets or visit: https://www.johnstonestrade.com/.

## End of Life

The end-of-life stage (module C) of paints is reached when the paint products are discarded with the surface they are applied on; thus, the paint is normally not separated from that surface during the disposal process. The end of life the product is that of the end of life of the underlying substrate. After its disposal, it is assumed that the dried paint film ends up entirely in a landfill, in line with the PEFCR for decorative paints (v1.). Therefore, landfilling is the 100% scenario included in this EPD.

Benefits and loads beyond the product system boundary are reported as additional information in module D. The module declares net benefits and loads from net flows leaving the product system that have passed the end-of-waste state, except those which have been allocated as co-products. Net impacts in module D are calculated according to Annex D of EN15804+A2.

# Life Cycle Assessment Calculation Rules

## Declared / Functional unit description

Protecting and decorating 1m² of substrate, suitably prepared, on the basis of two layers of the product, a spreading rate of 12 m2/L and a weight of 0.229 kg/m2. These characteristics apply for the paint application on an interior wall.

## System boundary

The system boundaries of the product LCA follow the modular design defined by EN15804+A2. This cradle-to-gate with options study includes the Product stage (A1-A3), Transport stage (A4), Installation stage (A5), Deconstruction (C1), End-of-life transport (C2), Waste processing (C3), Disposal (C4) and Reuse, recovery and/or recycling potential (D).

## Data sources, quality and allocation

Data related to in-house PPG processes has been collected from PPG reporting systems and is of high quality. The data collection period is the full year of 2019.
For life cycle modelling of the process, Sphera Gabi 10.5.1.124 software (2021 version) is used. All relevant background datasets are taken from Ecoinvent 3.7.1 (September 2020 version) and Raw materials LCI database for the European coatings and printing ink industries (CEPE, 2016) and are consistent with the foreground modelling in system limits and allocation procedures.

The technological and geographical coverage reflects the physical reality as far as possible taking into account the technology mix, location, and representativeness of technologies, input materials, and input energies for the region.

## Cut-off criteria

No cut-offs were intentionally applied to inputs and outputs within the system boundaries in the models. Cut-offs in the background processes are according to the respective methodologies.

## LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

| Parameters describing environmental impacts | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | GWP-total | GWP-fossil | GWP-biogenic | GWP-luluc | ODP | AP | EP-freshwater |
| | | | kg $CO_2$ eq | kg $CO_2$ eq | kg $CO_2$ eq | kg $CO_2$ eq | kg CFC11 eq | mol $H^+$ eq | kg $(PO_4)^{3-}$ eq |
| Product stage | Raw material supply | A1 | 3.52E-01 | 3.50E-01 | 1.34E-03 | 2.49E-04 | 2.76E-08 | 2.42E-03 | 6.30E-05 |
| | Transport | A2 | 4.38E-03 | 4.37E-03 | 9.24E-06 | 1.28E-06 | 1.03E-09 | 2.21E-05 | 2.87E-07 |
| | Manufacturing | A3 | 6.09E-02 | 6.74E-02 | -6.53E-03 | 1.00E-05 | 7.19E-10 | 2.92E-04 | 2.96E-06 |
| | Total (of product stage) | A1-3 | 4.17E-01 | 4.22E-01 | -5.18E-03 | 2.60E-04 | 2.93E-08 | 2.74E-03 | 6.62E-05 |
| Construction process stage | Transport | A4 | 1.95E-02 | 1.94E-02 | 4.50E-05 | 6.40E-06 | 4.50E-09 | 9.77E-05 | 1.30E-06 |
| | Construction | A5 | 1.85E-02 | 7.20E-03 | 1.13E-02 | 8.80E-08 | 5.63E-11 | 3.20E-06 | 3.36E-07 |
| Use stage | Use | B1 | MND | MND | MND | MND | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND | MND | MND | MND | MND |
| | Repair | B3 | MND | MND | MND | MND | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND | MND | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND | MND | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND | MND | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND | MND | MND | MND | MND |
| **100% Landfilling Scenario** | | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 7.34E-04 | 7.32E-04 | 1.55E-06 | 2.14E-07 | 1.73E-10 | 3.70E-06 | 4.81E-08 |
| | Waste processing | C3 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Disposal | C4 | 1.18E-02 | 5.35E-04 | 1.13E-02 | 1.55E-07 | 2.21E-10 | 5.05E-06 | 5.00E-08 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -3.98E-04 | -3.79E-04 | -1.82E-05 | -6.43E-07 | -2.62E-11 | -1.71E-06 | -3.05E-07 |

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

## LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

| Parameters describing environmental impacts | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | EP-marine | EP-terrestrial | POCP | ADP-mineral &metal | ADP-fossil | WDP | PM |
| | | | kg N eq | mol N eq | kg NMVOC eq | kg Sb eq | MJ, net calorific value | $m^3$ world eq deprived | disease incidence |
| Product stage | Raw material supply | A1 | 4.63E-04 | 4.65E-03 | 1.57E-03 | 1.39E-06 | 7.27E+00 | 1.08E+01 | 3.51E-08 |
| | Transport | A2 | 3.53E-04 | 3.60E-03 | 1.23E-03 | 1.29E-06 | 5.44E+00 | 1.08E+01 | 3.02E-08 |
| | Manufacturing | A3 | 7.65E-06 | 8.35E-05 | 2.49E-05 | 1.03E-08 | 6.89E-02 | 3.42E-04 | 4.05E-10 |
| | Total (of product stage) | A1-3 | 5.11E-05 | 5.46E-04 | 1.55E-04 | 2.28E-08 | 1.44E+00 | 2.90E-02 | 2.79E-09 |
| Construction process stage | Transport | A4 | 4.12E-04 | 4.23E-03 | 1.41E-03 | 1.32E-06 | 6.95E+00 | 1.08E+01 | 3.34E-08 |
| | Construction | A5 | 3.41E-05 | 3.72E-04 | 1.08E-04 | 6.23E-08 | 3.01E-01 | 1.43E-03 | 1.54E-09 |
| Use stage | Use | B1 | MND | MND | MND | MND | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND | MND | MND | MND | MND |
| | Repair | B3 | MND | MND | MND | MND | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND | MND | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND | MND | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND | MND | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND | MND | MND | MND | MND |
| **100% Landfilling Scenario** | | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 1.28E-06 | 1.40E-05 | 4.18E-06 | 1.73E-09 | 1.16E-02 | 5.74E-05 | 6.79E-11 |
| | Waste processing | C3 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Disposal | C4 | 1.77E-06 | 1.93E-05 | 5.60E-06 | 1.20E-09 | 1.50E-02 | 6.90E-04 | 9.89E-11 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -3.08E-07 | -2.72E-06 | -7.56E-07 | -3.15E-10 | -8.49E-03 | -2.27E-04 | -4.61E-12 |

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
PM = Particulate matter.

## LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

| Parameters describing environmental impacts | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | IRP | ETP-fw | HTP-c | HTP-nc | SQP |
| | | | kBq $U^{235}$ eq | CTUe | CTUh | CTUh | dimensionless |
| Product stage | Raw material supply | A1 | 3.56E-02 | 1.92E+02 | 6.99E-10 | 4.76E-08 | 1.85E+00 |
| | Transport | A2 | 3.33E-02 | 2.60E+01 | 6.73E-10 | 4.45E-08 | 8.58E-01 |
| | Manufacturing | A3 | 3.52E-04 | 5.47E-02 | 1.63E-12 | 4.87E-11 | 7.86E-02 |
| | Total (of product stage) | A1-3 | 3.61E-04 | 1.19E-01 | 1.17E-11 | 2.35E-10 | 6.14E-01 |
| Construction process stage | Transport | A4 | 3.40E-02 | 2.62E+01 | 6.86E-10 | 4.48E-08 | 1.55E+00 |
| | Construction | A5 | 1.56E-03 | 2.38E-01 | 7.80E-12 | 2.09E-10 | 2.54E-01 |
| Use stage | Use | B1 | MND | MND | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND | MND | MND |
| | Repair | B3 | MND | MND | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND | MND | MND |
| **100% Landfilling Scenario** | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 5.90E-05 | 9.17E-03 | 2.73E-13 | 8.17E-12 | 1.32E-02 |
| | Waste processing | C3 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Disposal | C4 | 6.69E-05 | 1.56E+02 | 2.81E-13 | 2.40E-09 | 3.15E-02 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.73E-04 | -3.55E-03 | -9.76E-14 | -3.05E-12 | -9.38E-04 |

IRP = Potential human exposure efficiency relative to U235;
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
HTP-nc = Potential comparative toxic unit for humans; and
SQP = Potential soil quality index.

## LCA Results (continued)

| Parameters describing resource use, primary energy | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | PERE | PERM | PERT | PENRE | PENRM | PENRT |
| | | | MJ | MJ | MJ | MJ | MJ | MJ |
| Product stage | Raw material supply | A1 | 1.75E-01 | 1.90E-04 | 1.75E-01 | 5.44E+00 | 1.84E-06 | 5.44E+00 |
| | Transport | A2 | 8.39E-04 | 4.12E-10 | 8.39E-04 | 6.89E-02 | 0.00E+00 | 6.89E-02 |
| | Manufacturing | A3 | 1.13E-01 | 9.50E-03 | 1.23E-01 | 1.44E+00 | 1.11E-07 | 1.44E+00 |
| | Total (of product stage) | A1-3 | 2.88E-01 | 9.69E-03 | 2.98E-01 | 6.95E+00 | 1.95E-06 | 6.95E+00 |
| Construction process stage | Transport | A4 | 3.91E-03 | 2.21E-09 | 3.91E-03 | 3.01E-01 | 0.00E+00 | 3.01E-01 |
| | Construction | A5 | 3.55E-04 | 1.33E-10 | 3.55E-04 | 4.59E-03 | 0.00E+00 | 4.59E-03 |
| Use stage | Use | B1 | MND | MND | MND | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND | MND | MND | MND |
| | Repair | B3 | MND | MND | MND | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND | MND | MND | MND |
| **100% Landfilling Scenario** | | | | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| End of life | Deconstruction, demolition | C1 | 1.41E-04 | 6.90E-11 | 1.41E-04 | 1.16E-02 | 0.00E+00 | 1.16E-02 |
| | Transport | C2 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Waste processing | C3 | 1.21E-04 | 3.12E-10 | 1.21E-04 | 1.50E-02 | 0.00E+00 | 1.50E-02 |
| | Disposal | C4 | -1.02E-03 | -3.84E-11 | -1.02E-03 | -8.49E-03 | 0.00E+00 | -8.49E-03 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | 1.65E-01 | 1.90E-04 | 1.66E-01 | 5.43E+00 | 1.84E-06 | 5.44E+00 |

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

## LCA Results (continued)

| Parameters describing resource use, secondary materials and fuels, use of water | | | | | | |
|---|---|---|---|---|---|---|
| | | | SM | RSF | NRSF | FW |
| | | | kg | MJ net calorific value | MJ net calorific value | $m^3$ |
| Product stage | Raw material supply | A1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.51E-01 |
| | Transport | A2 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.97E-06 |
| | Manufacturing | A3 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.76E-04 |
| | Total (of product stage) | A1-3 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.52E-01 |
| Construction process stage | Transport | A4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.32E-05 |
| | Construction | A5 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.04E-05 |
| Use stage | Use | B1 | MND | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND | MND |
| | Repair | B3 | MND | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND | MND |
| **100% Landfilling Scenario** | | | | | 0.00E+00 | 0.00E+00 |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.34E-06 |
| | Transport | C2 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Waste processing | C3 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.61E-05 |
| | Disposal | C4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | -5.28E-06 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.51E-01 |

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

## LCA Results (continued)

| Other environmental information describing waste categories | | | | | |
|---|---|---|---|---|---|
| | | | HWD | NHWD | RWD |
| | | | kg | kg | kg |
| Product stage | Raw material supply | A1 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | A2 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Manufacturing | A3 | 1.28E-03 | 2.57E-03 | 0.00E+00 |
| | Total (of product stage) | A1-3 | 1.28E-03 | 2.57E-03 | 0.00E+00 |
| Construction process stage | Transport | A4 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Construction | A5 | 0.00E+00 | 1.63E-02 | 0.00E+00 |
| Use stage | Use | B1 | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND |
| | Repair | B3 | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND |
| **100% Landfilling Scenario** | | | | | 0.00E+00 |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Waste processing | C3 | 0.00E+00 | 1.02E-01 | 0.00E+00 |
| | Disposal | C4 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | 0.00E+00 | 0.00E+00 | 0.00E+00 |

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

## LCA Results (continued)

| Other environmental information describing output flows – at end of life | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | CRU | MFR | MER | EE | Biogenic carbon (product) | Biogenic carbon (packaging) |
| | | | kg | kg | kg | MJ per energy carrier | kg C | kg C |
| Product stage | Raw material supply | A1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 0.00E+00 |
| | Transport | A2 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 0.00E+00 |
| | Manufacturing | A3 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 1.87E-03 |
| | Total (of product stage) | A1-3 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 1.87E-03 |
| Construction process stage | Transport | A4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 0.00E+00 |
| | Construction | A5 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 0.00E+00 |
| Use stage | Use | B1 | MND | MND | MND | MND | MND | 0.00E+00 |
| | Maintenance | B2 | MND | MND | MND | MND | MND | 0.00E+00 |
| | Repair | B3 | MND | MND | MND | MND | MND | 0.00E+00 |
| | Replacement | B4 | MND | MND | MND | MND | MND | 0.00E+00 |
| | Refurbishment | B5 | MND | MND | MND | MND | MND | 0.00E+00 |
| | Operational energy use | B6 | MND | MND | MND | MND | MND | 0.00E+00 |
| | Operational water use | B7 | MND | MND | MND | MND | MND | 0.00E+00 |
| **100% Landfilling Scenario** | | | | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 0.00E+00 |
| | Transport | C2 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 0.00E+00 |
| | Waste processing | C3 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 0.00E+00 |
| | Disposal | C4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 0.00E+00 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | 0.00E+00 |

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

## Scenarios and additional technical information

| Scenarios and additional technical information | | | |
|---|---|---|---|
| Scenario | Parameter | Units | Results |
| A4 – Transport to the building site | Description of scenario | | |
| | Fuel type / Vehicle type | Litre of fuel type per distance or vehicle type | Lorry >32 t<br>Lorry 16-32 t |
| | Distance: | km | 350<br>370 |
| | Capacity utilisation (incl. empty returns) | % | 64 |
| | Bulk density of transported products | kg/m$^3$ | 1247,7 |
| A5 – Installation in the building | Description of scenario | | |
| | Treatment of waste paint, municipal incineration | % | 45 |
| | Treatment of waste paint, inert material landfill | % | 55 |
| | Waste transport, articulated lorry >32 t | km | 80 |
| | Energy recovery from incineration, electricity | MJ/kg of incinerated waste | 1,01 |
| | Energy recovery from incineration, heat | MJ/kg of incinerated waste | 2,16 |
| | VOC emissions | kg/l | 0,00156 |
| C1 to C4<br>End of life, | Description of scenario | | |
| | Waste transport, articulated lorry >32 t | km | 80 |
| | Treatment of waste paint, municipal incineration (wood paint) | % | 100 |
| | Treatment of waste paint, inert material landfill (wall paint) | % | 100 |
| | Biocides leaching to freshwater | % | 100 |

## Summary, comments and additional information

### Interpretation

The results of the LCIA indicate which life cycle stage contributes the most to a specific environmental impact.

Analysis of the results shows that most of the impact comes from the raw materials stage (A1) for most of the impact categories. This high contribution of raw materials to the impact indicators is not unexpected. As paints are at the end of the chemical value chain much of the expenditure of energy, raw materials, processing, waste processing, etc. in bringing the product to existence has occurred prior to the entry of the raw materials onto the PPG production site.

In impact category Ecotoxicity, freshwater the highest impact occurs in stage A5 application. This can be caused by the direct emissions of biocides leaching to freshwater.

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