



## General information

**Product:**

Penguard WF, Jotun U.A.E. Ltd. (L.L.C.)

**Program operator:**

The Norwegian EPD Foundation  
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Phone: +47 22 11 40 40  
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**Declaration number:****ECO Platform reference number:****This declaration is based on Product Category Rules:**

CEN Standard EN 15804:2012+A1:2013 serves as core PCR.  
Product descriptions and scenarios are based on IBU PCR Part B for coatings with organic binders. This also applies for inorganic coatings.

**Statement of liability:**

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

**Declared unit:**

1 kg Penguard WF, Jotun U.A.E. Ltd. (L.L.C.)

**Declared unit with option:**

A1,A2,A3

**Functional unit:****Verification:**

Independent verification of data, other environmental information and the declaration according to ISO14025:2010, § 8.1.3 and § 8.1.4

External

Third party verifier:

Sign



Senior Research Scientist, Anne Rønning

(Independent verifier approved by EPD Norway)

**Owner of the declaration:**

Jotun A/S  
Contact person: Anne Lill Gade  
Phone: +47 33 45 70 00  
e-mail: [anne.lill.gade@jotun.no](mailto:anne.lill.gade@jotun.no)

**Manufacturer:**

Jotun A/S

**Place of production:**

Jotun U.A.E. Ltd. (L.L.C.), P.O.Box 3671 Al Quoz Industrial Area, Dubai, U.A.E

**Management system:**

ISO 9001:2008 Certificate nr: 0044915-00, ISO 14001:2004 Certificate nr 0044914-00, OHSAS 18001:2007 Certificate nr: 0044916-00.

**Organisation no:**

923 248 579

**Issue date:****Valid to:****Year of study:**

2017

**Comparability:**

EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

**Author of the Life Cycle Assessment:**

The declaration is developed using eEPD v2.0

Approval:

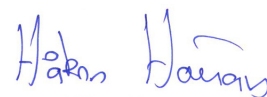
Company specific data are:

Collected/registered by: Anne Elisabeth Thorstensen

Internal verification by: Anne Lill Gade

**Approved:**

Sign



Håkon Hauan  
Managing Director of EPD-Norway

## Product

### Product description:

Penguard WF is a two component water borne epoxy coating for corrosion protection. It is a versatile, fast drying product containing flash rust inhibitors. It cures down to 41 °F (5 °C).

The declared product is specially designed for new construction where short dry to handle and over coating times are required. It can be used as primer, mid coat, finish coat or as single coat system in atmospheric environments. This product is suitable for properly prepared carbon steel, aluminum, concrete and galvanized steel substrates.

Penguard WF is suitable for structural steel and piping to be exposed to corrosive environments up to high, and is recommended for offshore environments, refineries, power plants, bridges, buildings and mining equipment. It is suitable for over coating with water borne acrylics, water borne epoxy and suitable solvent borne coatings.

### Product specification

For information on Green Building Standard credits, see "Additional Information" on page 4.

The material composition of the declared mixed product is given below:

| Materials        |           |
|------------------|-----------|
| Binder           | 25 - 50 % |
| Water            | 25 - 50 % |
| Filler           | 10 - 25 % |
| Titanium dioxide | 5 - 10 %  |
| Pigment          | 3 - 5 %   |
| Solvent          | 3 - 5 %   |
| Biocide          | <0.1 %    |

### Technical data:

Product mixing ratio (by volume):  
Penguard WF Comp A: 2 parts  
Penguard WF Comp B: 1 part

Density: 1.3 kg/l  
Solids by volume: 51 ± 2 %  
Dry film thickness: 75 - 150 µm  
Wet film thickness: 145 - 295 µm  
Theoretical spreading rate: 6.8 - 3.4 m<sup>2</sup>/l

The most representative and worst case formulation produced at the manufacturing site is chosen for this EPD. For products with a selection of colours, this will be the formulation with the highest content of titanium dioxide.

The product packaging is based on an average sized metal packaging, including secondary packaging such as pallets and plastic wrapping.

For safety, health and environmental conditions, see the Safety Data Sheet for the declared product on [www.jotun.com](http://www.jotun.com).

For information on technical data, application and use of the product, see the Technical Data Sheet and Application Guide for the declared product on [www.jotun.com](http://www.jotun.com).

### Market:

Global. Transport to market is not included in this EPD.

### Reference service life, product

The reference service life of the product is highly dependent on the conditions of use.

### Estimated service life, object

The coated object is not declared.

## LCA: Calculation rules

### Declared unit:

1 kg Penguard WF, Jotun U.A.E. Ltd. (L.L.C.)

### Cut-off criteria:

All major raw materials and essential energy is included. The production process for raw materials and energy flows with very small amounts (less than 0.1 % dry matter) are not included. In total, more than 99% of the material input is included. This cut-off rule does not apply for non-energy related emissions (such as wastes, hazardous materials and substances).

### Data quality:

The CEPE database is used as basis for the raw material composition. Specific data for the product composition and raw material amounts has been provided by the manufacturer and represents the production of the declared product. Production site data was collected in 2015. Representative data from ecoinvent v3.2 was used for other processes. The data quality for the material input in A1 is presented in tabular form.

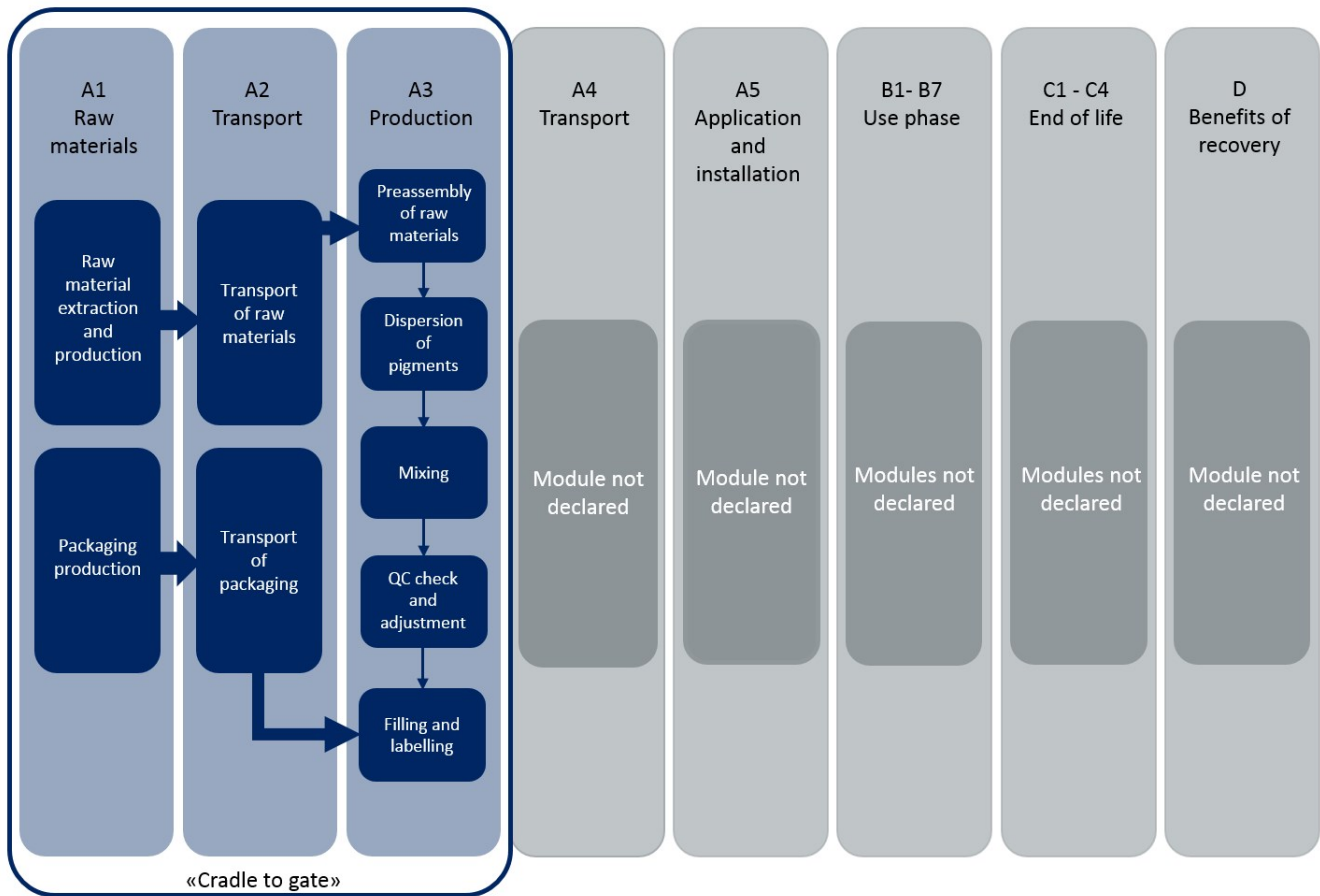
| Materials                                      | Source           | Data quality | Year |
|--|------------------|--------------|------|
| Packaging                                      | Østfoldforskning | Database     | 2017 |
| Penguard WF Comp A, Jotun U.A.E. Ltd. (L.L.C.) | Owner of EPD     | Database     | 2017 |
| Penguard WF Comp B, Jotun U.A.E. Ltd. (L.L.C.) | Owner of EPD     | Database     | 2017 |

### Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy, water and waste production in-house is primarily allocated equally among all products through mass allocation. Specific allocation was performed for certain waste flows according to information provided by the site manager. VOC emissions have been allocated entirely to the production of solvent based paints. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

**System boundary:**

The flowchart in the figure below illustrates the system boundaries for the analysis, in accordance with the modular principle of EN 15804. The analysis is a cradle-to-gate (A1 - A3) study.



**Additional information:**

The declared product contributes to Green Building Standard credits by meeting the following specific requirements:

LEED®v4 (2013):

EQ credit: Low emitting materials

VOC content for Industrial Maintenance Coatings (250 g/l) (CARB (CSM) 2007) and emissions between 0.5 and 5.0 mg/m<sup>3</sup> (CDPH method 1.1).

MR credit: Building product disclosure and optimization

- Material Ingredients, Option 2: Material Ingredient Optimization, International Alternative Compliance Path - REACH optimization: Fully inventoried chemical ingredients to 100 ppm and not containing substances on the REACH Authorization list – Annex XIV, the Restriction list – Annex XVII and the SVHC candidate list.

- Environmental Product Declarations. Product-specific Type III EPD (ISO 14025;21930, EN 15804) for Jotun U.A.E. Ltd. (L.L.C.).

LEED® (2009):

IEQ Credit 4.2: The VOC requirements of Green Seal Standard GC-03, 1997.

BREEAM International (2016):

Mat 01: Product-specific Type III EPD (ISO 14025;21930, EN 15804) for Jotun U.A.E. Ltd. (L.L.C.).

BREEAM International (2013):

Hea 02: VOC content for Two-pack Performance Coating WB (140 g/l) (EU Directive 2004/42/CE).

Additional certificates and approvals may be available on request.

## LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

This is a cradle to gate (A1-A3) EPD with no declared modules after the factory gate. Transport from place of production to user (A4) has to be calculated by the user.

### Transport from production place to user (A4)

| Type                 | Capacity utilisation (incl. return) % | Type of vehicle | Distance km | Fuel/Energy consumption | Unit  | Value (l/t) |
|----------------------|---------------------------------------|-----------------|-------------|-------------------------|-------|-------------|
| Truck                |                                       |                 |             |                         | l/tkm |             |
| Railway              |                                       |                 |             |                         | l/tkm |             |
| Boat                 |                                       |                 |             |                         | l/tkm |             |
| Other Transportation |                                       |                 |             |                         | l/tkm |             |

### Assembly (A5)

| .                                     | Unit           | Value |
|---------------------------------------|----------------|-------|
| Auxiliary                             | kg             |       |
| Water consumption                     | m <sup>3</sup> |       |
| Electricity consumption               | kWh            |       |
| Other energy carriers                 | MJ             |       |
| Material loss                         | kg             |       |
| Output materials from waste treatment | kg             |       |
| Dust in the air                       | kg             |       |
| VOC emissions                         | kg             |       |

### Use (B1)

| . | Unit | Value |
|---|------|-------|
|   |      |       |

### Maintenance (B2)/Repair (B3)

| .                       | Unit           | Value |
|-------------------------|----------------|-------|
| Maintenance cycle*      | .              |       |
| Auxiliary               | kg             |       |
| Other resources         | kg             |       |
| Water consumption       | m <sup>3</sup> |       |
| Electricity consumption | kWh            |       |
| Other energy carriers   | MJ             |       |
| Material loss           | kg             |       |
| VOC emissions           | kg             |       |

### Replacement (B4)/Refurbishment (B5)

| .                         | Unit | Value |
|---------------------------|------|-------|
| Replacement cycle*        |      |       |
| Electricity consumption   | kWh  |       |
| Replacement of worn parts |      |       |

\* Described above if relevant

### Operational energy (B6) and water consumption (B7)

| .                         | Unit           | Value |
|---------------------------|----------------|-------|
| Water consumption         | m <sup>3</sup> |       |
| Electricity consumption   | kWh            |       |
| Other energy carriers     | MJ             |       |
| Power output of equipment | kW             |       |

### End of Life (C1, C3, C4)

| .                                     | Unit | Value |
|---------------------------------------|------|-------|
| Hazardous waste disposed              | kg   |       |
| Collected as mixed construction waste | kg   |       |
| Reuse                                 | kg   |       |
| Recycling                             | kg   |       |
| Energy recovery                       | kg   |       |
| To landfill                           | kg   |       |

### Transport to waste processing (C2)

| Type                 | Capacity utilisation (incl. return) % | Type of vehicle | Distance km | Fuel/Energy consumption | Unit  | Value (l/t) |
|----------------------|---------------------------------------|-----------------|-------------|-------------------------|-------|-------------|
| Truck                |                                       |                 |             |                         | l/tkm |             |
| Railway              |                                       |                 |             |                         | l/tkm |             |
| Boat                 |                                       |                 |             |                         | l/tkm |             |
| Other Transportation |                                       |                 |             |                         | l/tkm |             |

## LCA: Results

### System boundaries (X=included, MND=module not declared, MNR=module not relevant)

| Product stage |           |               | Construction installation stage |          | User stage |             |        |             |               |                        |                       | End of life stage          |           |                  |          | Beyond the system boundaries       |
|---------------|-----------|---------------|---------------------------------|----------|------------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|------------------------------------|
| Raw materials | Transport | Manufacturing | Transport                       | Assembly | Use        | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| A1            | A2        | A3            | A4                              | A5       | B1         | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                         | C2        | C3               | C4       | D                                  |
| X             | X         | X             | MND                             | MND      | MND        | MND         | MND    | MND         | MND           | MND                    | MND                   | MND                        | MND       | MND              | MND      | MND                                |

### Environmental impact

| Parameter | Unit                                 | A1-A3    |
|-----------|--------------------------------------|----------|
| GWP       | kg CO <sub>2</sub> -eq               | 3,65E+00 |
| ODP       | kg CFC11 -eq                         | 3,53E-08 |
| POCP      | kg C <sub>2</sub> H <sub>4</sub> -eq | 1,24E-03 |
| AP        | kg SO <sub>2</sub> -eq               | 1,78E-02 |
| EP        | kg PO <sub>4</sub> <sup>3-</sup> -eq | 4,85E-03 |
| ADPM      | kg Sb -eq                            | 2,27E-05 |
| ADPE      | MJ                                   | 4,99E+01 |

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009

### Resource use

| Parameter | Unit           | A1-A3    |
|-----------|----------------|----------|
| RPEE      | MJ             | 5,43E+00 |
| RPEM      | MJ             | 5,20E-01 |
| TPE       | MJ             | 5,95E+00 |
| NRPE      | MJ             | 5,43E+01 |
| NRPM      | MJ             | 0,00E+00 |
| TRPE      | MJ             | 5,43E+01 |
| SM        | MJ             | 0,00E+00 |
| RSF       | MJ             | 0,00E+00 |
| NRSF      | MJ             | 0,00E+00 |
| W         | m <sup>3</sup> | 4,87E-01 |

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3} = 0,009$

### End of life - Waste

| Parameter | Unit | A1-A3    |
|-----------|------|----------|
| HW        | kg   | 4,19E-05 |
| NHW       | kg   | 1,60E+00 |
| RW        | kg   | 0,00E+00 |

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3} = 0,009$

### End of life - Output flow

| Parameter | Unit | A1-A3    |
|-----------|------|----------|
| CR        | kg   | 0,00E+00 |
| MR        | kg   | 1,54E-03 |
| MER       | kg   | 3,47E-03 |
| EEE       | MJ   | 0,00E+00 |
| ETE       | MJ   | 0,00E+00 |

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3} = 0,009$

## Additional requirements

### Greenhouse gas emissions from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

| Electricity mix                         | Data source             | Amount  | Unit          |
|---|-------------------------|---------|---------------|
| Electricity, United Arab Emirates (kWh) | ecoinvent 3.3 Alloc Rec | 1113,82 | g CO2-ekv/kWh |

### Dangerous substances

The product contains no substances given by the REACH Candidate list.




### Indoor environment

The declared product is emission tested by RISE Research Institutes of Sweden/SP Technical Research Institute of Sweden or Eurofins in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010.

## Bibliography

ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations - Principles and procedures  
 ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines  
 EN 15804:2012+A1:2013 Environmental product declaration - Core rules for the product category of construction products  
 ISO 21930:2007 Sustainability in building construction - Environmental declaration of building products  
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 Vold et al (2017). EPD and LCA tool for Jotun - Technical description and background information, OR 01.17, Ostfold Research, Fredrikstad 2017  
 CEPE v3.0 Raw materials LCI database for the European coatings and printing ink industries  
 ecoinvent v3.2 Alloc Rec, Swiss Centre of Life Cycle Inventories

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 BREEAM International (2016): BREEAM International New Construction Technical Manual. SD233-2.0:2017  
 CARB SCM (2007): California Air Resources Board (CARB) Suggested Control Measure for Architectural Coatings  
 CDPH method 1.1 (2010): Standard method for the testing and evaluation of volatile organic chemical emissions from indoor sources. California Department of Public Health  
 EU Directive 2004/42/CE: The limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products  
 GC-03 (1997): Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition  
 LEED® (2009): LEED® 2009 for New construction and Major renovations Rating system. U.S. Green Building Council®  
 LEED® v4 (2013): LEED® v4 for Building design and construction, U.S. Green Building Council®  
 REACH (2006): Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006. REACH Authorization list – Annex XIV, the Restriction list – Annex XVII and the SVHC candidate list

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