# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

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|---|---|
| Owner of the Declaration | Aurubis Finland Oy |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
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| Valid to | 08/01/2023 |

Nordic Royal

## Aurubis Finland Oy

Institut Bauen und Umwelt e.V.

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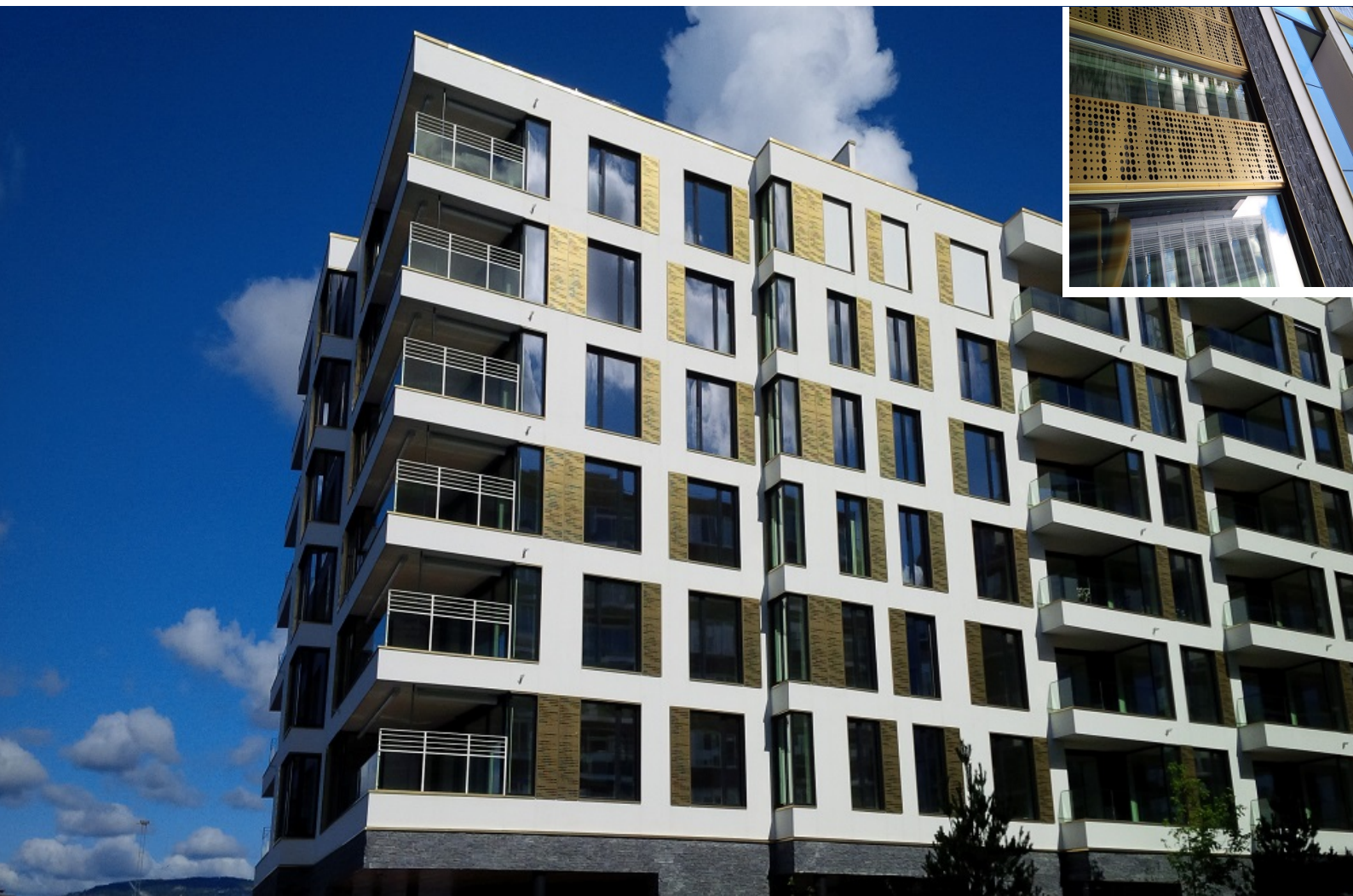

# General Information

## Aurubis Finland Oy

**Programme holder**
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

**Declaration number**
EPD-AUR-20160215-CBA1-EN

**This Declaration is based on the Product Category Rules:**
Building metals, 07.2014
(PCR tested and approved by the SVR)

**Issue date**
09/01/2017

**Valid to**
08/01/2023

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Dr. Burkhart Lehmann
(Managing Director IBU)

## Nordic Royal

**Owner of the Declaration**
Aurubis Finland Oy
P.O. Box 60
FI-28101 Pori, Finland

**Declared product / Declared unit**
1 kg Nordic Royal

**Scope:**
This Core environmental product declaration refers to copperstripes and copper sheets produced by Aurubis at Pori Oy site, Finland. Depending on the surface quality, the product is available in different qualities. This EPD refers to the product Nordic Standard. The Life Cycle Assessment is based on data from Aurubis Finland Oy in FI-28101 Pori. The plant is located in Pori, Finland. The data is based on the production year 2015.The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

**Verification**

The CEN Norm /EN 15804/ serves as the core PCR

Independent verification of the declaration according to /ISO 14025/

☐ internally ☒ externally

Manfred Russ
(Independent verifier appointed by SVR)

# Product

**Product description**
The Nordic Royal product is an alloy of copper with aluminium and zinc ( CuAl5Zn5Sn1), giving it a rich golden through-colour and making it very stable. It has a thin protective oxide layer containing all three alloy elements when produced. The surface retains its golden colour and loses some of its sheen as the oxide layer thickens with exposure to the atmosphere to give a matt finish. It does not develop a blue or green patina.

Nordic Royal alloy is available in sheets or coils.

- Thickness range: 0.5 – 1.5 mm
- Maximum width: 1000 mm.

This declaration is valid for the product Nordic Royal.

**Application**
Nordic products are used for facades, roofs , roof drainage systems and other architectural elements of all shapes, as well as interior applications, decorations, ceilings, wall claddings

Relevant standards are: /EN 1172/ in combination with /EN 1976/, /EN 1652/, /EN 504/, /EN 14783/.

**Technical Data**
Test standards are: EN ISO 6507-1;2005; EN-ISO 6507-2:2005 , EN ISO 6892-1:2009, ISO 1811-2:1988-10, ISO 4739:1985-05

**Physical and mechanical properties**

| Name | Value | Unit |
|---|---|---|
| Coefficient of thermal expansion | 18 | $10^{-6}K^{-1}$ |
| Tensile strength (min | 400 | $N/mm^2$ |
| Density | 8200 | $kg/m^3$ |
| Proof strength | min. 170 | N/mm^2 |
| Elongation | min. 45 | % |
| Hardness | min. 80 | HV |

**Base materials / Ancillary materials**
The Nordic Royal product consist of an alloy of copper with aluminium and zinc ( CuAl5Zn5Sn1), according to /EN 1172/. The copper (Cu) content is 88- 92 %, the aluminium (Al) content is 4 -6 %, the zinc (Zn) content is 4-6% and tin (Sn) content is 0.3-1.6%.

The cakes for Nordic Royal sheet production are supplied from Aurubis Schwermetall, in Germany, and only undergo rolling operations at Aurubis Pori.

Additives:

- Biodegradable rolling oil and emulsion which is used for cooling and lubrication during the rolling process
- Benzotriazole which is used as anticorrosive agent.

**Reference service life**
Copper has a long service life and durability. The rates of copper elutriation under normal atmospheric weathering are between 0.7 g/m²*a and 1.5g/m²*a.

## LCA: Calculation rules

**Declared Unit**
The declared unit is 1 kg of Nordic Royal.

**Declared unit**

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | kg |
| Conversion factor to 1 kg | 1 | - |

**System boundary**
Type of the EPD: cradle-to-gate - with options. According to "System limits" outlined in section 5.5. of the PCR, Part A: “Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report” the following life cycle stages are considered:

- Production, upstream raw materials & energy (Module A1-A3)
- Waste processing for reuse, recovery or recycling (Module C3)
- Benefits and loads beyond the product system boundary (Module D)

**Comparability**
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account. The used background database has to be mentioned. *For life cycle modelling of the considered products, the´/GaBi ts Software/, developed by thinkstep AG, has been used. All relevant background datasets are taken from the /GaBi ts Software/ database. The datasets from the GaBi database are documented in the online documentation /GaBi ts Data/.*

## LCA: Scenarios and additional technical information

**End of life (C1 - C4)**

| Name | Value | Unit |
|---|---|---|
| Collected separately | 1 | kg |
| Recycling | 0.99 | kg |

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

| Name | Value | Unit |
|---|---|---|
| Net scrap substituting primary material | 1,41 | kg |
| Material loss | 0 | % |

## LCA: Results

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

| PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | MND | MND | MND | MND | MNR | MNR | MNR | MND | MND | MND | MND | X | MND | X |

**RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 kg Nordic Royal**

| Parameter | Unit | A1-A3 | C3 | D |
|---|---|---|---|---|
| Global warming potential | [kg $CO_2$-Eq.] | 1.98E+0 | 0.00E+0 | -1.39E+0 |
| Depletion potential of the stratospheric ozone layer | [kg CFC11-Eq.] | 2.20E-8 | 0.00E+0 | -2.18E-8 |
| Acidification potential of land and water | [kg $SO_2$-Eq.] | 8.77E-3 | 0.00E+0 | -7.54E-3 |
| Eutrophication potential | [kg $(PO_4)^{3-}$-Eq.] | 6.41E-4 | 0.00E+0 | -5.27E-4 |
| Formation potential of tropospheric ozone photochemical oxidants | [kg ethene-Eq.] | 5.73E-4 | 0.00E+0 | -4.58E-4 |
| Abiotic depletion potential for non-fossil resources | [kg Sb-Eq.] | 3.81E-4 | 0.00E+0 | -3.79E-4 |
| Abiotic depletion potential for fossil resources | [MJ] | 2.14E+1 | 0.00E+0 | -1.39E+1 |

**RESULTS OF THE LCA - RESOURCE USE: 1 kg Nordic Royal**

| Parameter | Unit | A1-A3 | C3 | D |
|---|---|---|---|---|
| Renewable primary energy as energy carrier | [MJ] | 7.10E+0 | IND | IND |
| Renewable primary energy resources as material utilization | [MJ] | 0.00E+0 | IND | IND |
| Total use of renewable primary energy resources | [MJ] | 7.10E+0 | 0.00E+0 | -5.47E+0 |
| Non-renewable primary energy as energy carrier | [MJ] | 2.64E+1 | IND | IND |
| Non-renewable primary energy as material utilization | [MJ] | 0.00E+0 | IND | IND |
| Total use of non-renewable primary energy resources | [MJ] | 2.64E+1 | 0.00E+0 | -1.68E+1 |
| Use of secondary material | [kg] | 1.93E-1 | 0.00E+0 | 0.00E+0 |
| Use of renewable secondary fuels | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| Use of non-renewable secondary fuels | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| Use of net fresh water | [$m^3$] | 1.99E-2 | 0.00E+0 | -1.40E-2 |

**RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 kg Nordic Royal**

| Parameter | Unit | A1-A3 | C3 | D |
|---|---|---|---|---|
| Hazardous waste disposed | [kg] | 4.83E-6 | 0.00E+0 | -5.90E-7 |
| Non-hazardous waste disposed | [kg] | 2.31E-1 | 0.00E+0 | -2.27E-1 |
| Radioactive waste disposed | [kg] | 2.00E-3 | 0.00E+0 | -1.14E-3 |
| Components for re-use | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| Materials for recycling | [kg] | 0.00E+0 | 1.41E+0 | 0.00E+0 |
| Materials for energy recovery | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| Exported electrical energy | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| Exported thermal energy | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 |

## References


**Institut Bauen und Umwelt**
Institut Bauen und Umwelt e.V., Berlin(pub.): Generation of Environmental Product Declarations (EPDs);
www.ibu-epd.de

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

**EN 15804**
EN 15804:2012-04+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

**EN 1172**
EN 1172:2011: Copper and copper alloys - Sheet and strip for building purposes

**EN 1976**
EN 1976:2012: Copper and copper alloys - Cast unwrought copper products

**EN 1652**
EN 1652:1997: Copper and copper alloys - Plate, sheet, strip and circles for general purposes

**EN 504**
EN 504:1999: Roofing products from metal sheet - Specification for fully supported roofing products from copper sheet;

**EN 14783**
EN 14783:2013: Fully supported metal sheet and strip for roofing, external cladding and internal lining - Product specification and requirements;

**GaBi ts Data**
GaBi 7.3 dataset documentation for the software-system and databases, LBP, University of Stuttgart and thinkstep AG, Leinfelden-Echterdingen, 2016 (http://www.gabi-software.com/international/databases/gabi-data-search/)

**GaBi ts Software**
Software and database for life cycle Engineering, LBP, University of Stuttgart and thinkstep AG, Leinfelden-Echterdingen, 2016

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