ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	Aurubis Finland Oy
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-AUR-20160219-CBA1-EN
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Valid to	08/01/2022

Nordic Green/Blue

Aurubis Finland Oy

Institut Bauen und Umwelt e.V.

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General Information

Aurubis Finland Oy	Nordic Green/Blue
Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the Declaration** Aurubis Finland Oy P.O. Box 60 FI-28101 Pori, Finland
Declaration number EPD-AUR-20160219-CBA1-EN	**Declared product / Declared unit** 1 kg Nordic Green/Blue
This Declaration is based on the Product Category Rules: Building metals, 07.2014 (PCR tested and approved by the SVR)	**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.
Issue date 09/01/2017	**Verification** The CEN Norm /EN 15804/ serves as the core PCR Independent verification of the declaration according to /ISO 14025/ ☐ internally ☒ externally
Valid to 08/01/2022	
Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)	
Dr. Burkhart Lehmann (Managing Director IBU)	Manfred Russ (Independent verifier appointed by SVR)

Product

Product description
The Nordic Green and Nordic Blue products consists of 100% Cu-DHP according to /EN 1172/, i.e. oxygen-free phosphorus de-oxidised copper with limited residual phosphorus. The Nordic Green product is surface treated with copper oxide layer and artificial patina

The oxide layer consists of Cu2O and CuO oxides. The oxide is covered by brochantite based patina, Cu4(SO4)OH6, with greenish colour in the case of Nordic Green and bluish colour in the case of Nordic Blue.

Nordic Green and Nordic Blue are available in sheets or coils with one surface treated.

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

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	17	$10^{-6}K^{-1}$
Tensile strength	220 - 300	N/mm^2
Thermal conductivity (at 20°C)	335	W/(mK)
Electrical conductivity at 20°C (min. 46)	46 - 52	$\Omega^{-1}m^{-1}$
Density	8940	kg/m^3
Thermal conductivity (at 20°C)	335	%W/Cm
Specific heat	385	J/kg K
Proof strength	min. 140 / 250	N/mm^2
Elongation	min. 8 / 33	%
Hardness	40 - 95	HV
Patina thickness	5 - 50	µm

Base materials / Ancillary materials
The Nordic Green products consists of 100% Cu-DHP according to /EN 1172/, i.e. oxygen-free phosphorus de-oxidised copper with limited residual phosphorus. The degree of purity is at least 99.90% copper in accordance with /EN 1976/ "Copper, semi-finished". The content of phosphorus is 0.015 – 0.040%. Mainly internal and external scrap (secondary material) is used in production (at least 97%). Max. 3% primary material is used within the production process. The oxide layer consists of Cu2O and CuO oxides . The patina consists of Cu4(SO4)OH6, in a characteristic colour.

Additives:

- Biodegradable rolling oil and emulsion with additives which is used for cooling and lubrication during the rolling process
- Benzotriazole which is used as anticorrosive agent
- For the oxidation process, rolling oil and emulsion is removed from the surface layer. In a further process step, a thermo-chemical oxidation process takes place**.**
- Forthe patina application process, pre-oxidized strips or sheets are treated with specifically formulated copper compounds to create the desired patina colours and heat-treated to chemically bind them to the copper.
- The patina consists of copper hydroxide sulfate, cupric and ferritic salts.

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 Green/Blue.

Declared unit

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

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.

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	0,019	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	MND	MND	MND	MND	MND	MND	MND	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 kg Nordic Green/Blue

Parameter	Unit	A1-A3	C3	D
Global warming potential	[kg CO_2-Eq.]	5.74E-1	0.00E+0	-3.94E-2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.08E-11	0.00E+0	-1.94E-12
Acidification potential of land and water	[kg SO_2-Eq.]	2.81E-3	0.00E+0	-2.53E-4
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	1.43E-4	0.00E+0	-2.11E-5
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	1.96E-4	0.00E+0	-1.35E-5
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.35E-5	0.00E+0	-8.09E-6
Abiotic depletion potential for fossil resources	[MJ]	6.58E+0	0.00E+0	-2.77E-1

RESULTS OF THE LCA - RESOURCE USE: 1 kg Nordic Green/Blue

Parameter	Unit	A1-A3	C3	D
Renewable primary energy as energy carrier	[MJ]	1.38E+0	-	-
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	-	-
Total use of renewable primary energy resources	[MJ]	1.38E+0	0.00E+0	-1.91E-1
Non-renewable primary energy as energy carrier	[MJ]	8.56E+0	-	-
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	-	-
Total use of non-renewable primary energy resources	[MJ]	8.56E+0	0.00E+0	-8.87E-1
Use of secondary material	[kg]	9.20E-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]	4.95E-3	0.00E+0	-1.77E-5

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 kg Nordic Green/Blue

Parameter	Unit	A1-A3	C3	D
Hazardous waste disposed	[kg]	2.30E-6	0.00E+0	2.11E-7
Non-hazardous waste disposed	[kg]	5.91E-3	0.00E+0	-3.47E-4
Radioactive waste disposed	[kg]	7.97E-4	0.00E+0	-1.57E-5
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	1.88E-2	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

The literature referred to in the Environmental Product Declaration must be quoted in full from the following sources. Standards and standards relating to evidence and/or technical features already fully quoted in the EPD do not need to be listed here. Part B of the PCR document on which they are based must be referred to.

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;

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