

Colour-coated building products

Environmental product declaration

In accordance with EN 15804 and ISO 14025

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General information

Owner of the declaration	Ruukki Construction Oy, Panuntie 11 00620 Helsinki. www.ruukki.com Terhi Leiviskä, terhi.leiviska@ruukki.com
Product	Colour-coated steel building products
Manufacturer	Ruukki Construction Oy, Panuntie 11 00620 Helsinki
Manufacturing sites	Vimpeli (Finland), Anderslöv, Järforsen and Landsbro (Sweden), Pärnu (Estonia), Zyrardow (Poland) and Kopylov (Ukraine)
Product applications	Building roofs, roofing, rainwater systems, floors, studs, exterior and interior cladding
Declared unit	1 kg of colour-coated steel building products
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Verified by	Anastasia Sipari Bionova Oy, Hämeentie 7 A 00500 Helsinki. www.bionova.fi
Product category rules	RTS PCR (English version 14.6.2018)
Program operator, publisher	Building Information Foundation RTS, Malminkatu 16 A 00100 Helsinki. http://epd.rts.fi

This environmental product declaration covers the environmental impacts of colour-coated steel building products manufactured by Ruukki Construction Oy under the Ruukki and Plannja brands. The results of environmental indicators stated in this declaration are average values for steel building products and covers all Ruukki manufacturing sites. The results have been calculated based on weighted average of yearly production volume. According to supplier notifications, none of the product components contains substances restricted under REACH or included on the candidate list of Substances of Very High Concern (SVHC).

The declaration has been prepared in accordance with EN 15804:2012+A1:2013 and ISO 14025 standards and the additional requirements stated in the RTS PCR (English version 14.6.2018). This declaration covers the life cycle stages from cradle to gate with options.

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

Verified according to the requirements of EN 15804+A1 (product group rules)
Independent verification of the declaration, according to EN ISO 14025:2010

External Internal

Third party verifier:



Anastasia Sipari / Bionova Oy

Verified 30.3.2020

Product

APPLICATION

Colour-coated building products are used as roofing, rainwater systems, decking, external and internal wall cladding. Typical applications are residential buildings, industrial and commercial buildings, sports facilities and warehouses. The products made of colour-coated, hot-dip galvanised steel are:

- Tile sheets for roofing: Tiilikainen, Aaltokainen, Elite, Teräskivi, Monterrey, Adamante, Decorrey, Finnera, Hygge, Frigge, Royal, Regent, Regal, Smart, Scandic line
- Standing seam roof: Classic, Classic Silence, Nordic, Emka, Trend, Modern, Traditional
- Profiled sheets for roofing
- Flat sheets for roofing
- Roof finishing soffits and flashings
- Load-bearing profiles for decking
- Rain water systems: Ruukki, Plannja, Siba
- Studs
- Purlins
- Composite sheet
- Rainscreen panels: Liberta Original, Liberta Elegant
- Cladding lamellas: Groove, Sharp, Lap, Straight
- Design profiles: Venice, Tokyo, Rome, Paris
- Low-profile sheets

Steel construction products can positively affect the overall assessment of buildings for LEED and BREEAM certification. For more information, visit www.ruukki.com.

TECHNICAL INFORMATION

A colour-coating protects the top surface of hot-dip galvanised steel, and the underside is protected by a backing coat to protect the colour-coated surface from roll marking during coiling and transportation. It also prevents the formation of white rust on the underside and protects the underside of a hot-dip galvanised steel sheet in roofing products from condensation. If the underside is subject to technical or aesthetic requirements, the backing coat must be chosen according to requirements. Colour-coated steels are made in conformity with EN 10169 and hot-dip galvanised steel is made in conformity with EN 10346.

The steel thickness of the products is 0.45 to 1.50 mm. Steel density is 7 850 kg/m³. Product weight varies depending on steel thickness, coating and profiling selected on the product. Table 1 describes product weight for typical colour-coated building products. Detailed technical information on products can be found on the Ruukki website at www.ruukki.com and on the Plannja website at www.plannja.com.

Table 1. Product weight for typical colour-coated building products

Product	Thickness (mm)	Weight (kg/m ²)
Roofing sheets (Tile sheets, Standing seam sheets, Profiled sheets)	0.50	4.5-5.2
	0.60	5.4-6.4
Load-bearing sheets	0.70	8.9-9.8
	1.50	19.0-21.0
Rainscreen panels	1.20	11.6
Cladding lamellas	1.20	13.1
Design profiles	0.60	5.4-8.7
Low-profile sheets	0.45	3.9
	0.70	7.6

The technical performance of colour-coated steel roofs and cladding applications is guaranteed for 20 to 50 years. Colour-coated steel is washable and easy to care for, and it can be repainted to prolong its useful life.

Ruukki and Plannja have the right to use CE marking for the following product groups of colour-coated building products:

- Load-bearing profiles – EN 1090-1 and EN 1090-4
- Roofing, cladding and ceiling products – EN 14782
- Metallic sheeting products for roofs, exterior and interior wall claddings – EN 14783
- Purlins and studs – EN 14195
- Pre-fabricated elements – EN 13830
- Safety equipment for the installation of ceilings – EN 795

By affixing CE marking to a product, the manufacturer indicates that the product conforms to all relevant legislative requirements, in particular to health, safety and environmental protection requirements.

Product materials

Colour-coated building products are manufactured from colour-coated, hot-dip galvanised steel sheet. Steel is an alloy of mainly iron and carbon, with small amounts of other elements used as alloying elements. These elements improve the chemical and physical properties of steel such as strength, durability and corrosion resistance. The alloying elements of steel are closely linked to its chemical matrix. The thickness of the zinc (Z) coating varies between 100–350 g/m² in products. The zinc coating is lead-free and has a minimum zinc content of 99%.

COATINGS

The product portfolio includes a wide colour range, with many surface gloss and structural options to choose from. In many products, GreenCoat colour-coated steel is used. GreenCoat is Bio-based Technology (BT) coating where a substantial portion of the traditional fossil oil is replaced by Swedish rapeseed oil. This patented solution reduces the environmental footprint of GreenCoat products. GreenCoat products are highly resistant to corrosion, UV radiation as well as scratches.

The various coating options and their applications are as follows:

- GreenCoat Pural BT – Extremely durable product with highly scratch-resistant coating for roofing applications
- GreenCoat Mica BT – Roofing product with exclusive, glittery surface
- GreenCoat Crown BT – Roofing product with optimised properties for tiles and profiles
- GreenCoat Pro BT – Highly durable roofing product with optimised properties for tiles and profiles
- GreenCoat Cool – Roofing product with heat-reflecting properties
- Polyester – A standard product for roofing, façade and walls
- Polyester Rough Matt – Roofing product with a rough appearance and good profiling properties
- Hard Coat – Durable product with highly scratch-resistant coating for roofing applications
- GreenCoat RWS – Double-sided, high-quality product for rainwater systems
- GreenCoat Hiarc and GreenCoat Hiarc Max – Extremely durable product for high-quality façades
- Laminate FoodSafe – Product for food handling environments

INFORMATION ON RELEASE OF DANGEROUS SUBSTANCES

Soil and water impacts during the use phase have not been studied, since harmonised testing methods of European product standards are not available.

Colour-coated building products main use of area is outdoors. Some colour-coated building products are used in indoor applications as well. Indoor emissions have been tested for GreenCoat Hiarc, Laminate FoodSafe and Polyester coatings and they hold an M1 Emission Classification of Building Materials certificate.

Product composition

Ruukki and Plannja actively tracks and anticipates future changes in environmental, safety and chemical legislation and complies with valid EU chemical regulations, such as REACH (1907/2006/EC) and CLP (1272/2008/EC). By monitoring the list of Substances of Very High Concern (SVHC) and other legislative requirements, we ensure that products meet legal and customer requirements. According to supplier notifications, none of the product components contains substances restricted under REACH or included on the candidate list (SVHC).

Table 2 shows an example of the typical chemical composition of colour-coated, hot-dip galvanised building products with maximum coating content in products (excluding packaging materials) when delivered to the customer. Product composition varies according to customer requirements and the selected materials and coatings. The information is based on steel produced at SSAB's steelworks in Finland.

Material	Material origin	Content (%) of total product weight	Name of ingredient	Maximum part content, % (w/w)	Content % (w/w) of total product weight	CAS number	Risk and hazard phrases
Hot-dip galvanised steel (HDG) 0.50 mm; Z275	EU	≥ 96.6	Steel	92.6		-	-
			Iron (Fe)	90.2	87.1	7439-89-6	-
			Manganese (Mn)	1.6	1.5	7439-96-5	-
			Silicon (Si)	0.6	0.6	7440-21-3	-
			Carbon (C)	0.2	0.2	7440-44-0	-
			Zinc layer > 99% Zinc (Zn)	7.4	7.1	7440-66-6	-
Colour-coating, chromium-free pre-processing	EU	≤ 3.4	Other constituents	100	≤ 3.4	-	-

Measurements are done to a level of 0.02 µg/g (0.0000002%). Concentrations below this degree of measuring accuracy cannot be determined. More detailed information about the composition of different steels is available from national and international standards, as well as from SSAB's website, www.ssab.com. The values provided are based on European Standards EN 10219-1, EN 10025-2, EN 10025-3, EN 10025-4, EN 10025-6, EN 10130, EN 10268, EN10346 and EN 10169 requirements on maximum concentrations.

Production

This environmental product declaration covers colour-coated building products made by Ruukki in Vimpeli (Finland), Anderslöv (Sweden), Pärnu (Estonia), Zyrardow (Poland) and Kopylov (Ukraine) and by Plannja in Järforsen and Landsbro (Sweden). Choice of production site is determined according to, for example, product requirements and construction site location. Prefabrication results in minimum waste at the construction site.

PRODUCTION PROCESS

Colour-coated building products have been made by roll-forming, edging and cutting to the required size at production lines and processes. Colour-coated steel manufactured at SSAB's site in Hämeenlinna and Kankaanpää (Finland) or Finnsång (Sweden) is used as the raw material in the manufacture of colour-coated building products. The colour-coated steel is manufactured from hot-rolled steel produced at SSAB's steel mill in Raahe (Finland) and then cold-rolled at the Hämeenlinna site. The manufacture of the hot-rolled steel used as the raw material is based on the use of iron ore. The amount of total scrap steel used in hot-rolled steel is approximately 20% including pre- and post-consumer steel scrap.

When scrap steel is used instead of virgin raw materials in iron production, the carbon dioxide emissions originating in steel production decrease accordingly. Steel-making at SSAB Raahe production uses scrap material from SSAB's own production processes and material sourced from the scrap steel market. For reasons of process technology, the content of scrap steel in blast-furnace-based steel production cannot exceed around 30%. In addition, the amount of scrap steel in steel production is limited due to its availability. Once steel has been made, it can be recycled endlessly without weakening its properties.

Ruukki uses also steel from suppliers that manufacture steel from recycled steel scrap. The electric arc steel manufacturing method can use up to 100% of scrap steel in the process.

Information of energy in colour-coated building products manufacturing phase (A3) is described in Table 3.

Parameter	Value	Data quality
A3 Electricity information and CO ₂ emissions kg CO ₂ equiv. / kWh for Finnish production	0.171	Thinkstep dataset (2016) for Electricity grid mix in Finland
A3 Electricity information and CO ₂ emissions kg CO ₂ equiv. / kWh for Swedish production	0.036	Thinkstep dataset (2016) for Electricity grid mix in Sweden
A3 Electricity information and CO ₂ emissions kg CO ₂ equiv. / kWh for Ukrainian production	0.578	Thinkstep dataset (2016) for Electricity grid mix in Ukraine
A3 Electricity information and CO ₂ emissions kg CO ₂ equiv. / kWh for Estonian production	0.899	Thinkstep dataset (2016) for Electricity grid mix in Estonia
A3 Electricity information and CO ₂ emissions kg CO ₂ equiv. / kWh for Polish production	0.916	Thinkstep dataset (2016) for Electricity grid mix in Poland

PACKAGING

Colour-coated products are wrapped to protect products during handling and transport. Packaging can consist of plastic film, wooden pallets, plastic straps, stretch wrap, metal bands, corrugated plastic foam (EPS) plank wood and cardboard. All packaging materials are recyclable as material or alternatively utilised as waste to energy (WtE). Packaging materials are sorted at construction sites according to local regulations and customer preferences.

TRANSPORTATION

Raw materials are mostly transported to production sites by road. Finished products are transported by truck and ship combined. Ruukki's and Plannja's logistics units are responsible for most of the transportation of raw materials and products. Logistics aims to optimise transport, maximise payloads and combine transport as efficiently as possible.

Environmental impacts for transport of finished product to the building site (A₄), have been calculated based on the weighted average of the market shares of each production unit. Table 4 describes parameters for the A₄ transport scenario.

Parameter	Value
Fuel type and consumption of vehicle used for transport	Truck: maximum load capacity 40 t and average diesel consumption 0.30 l/km. Specific transport emissions 0.02 kg CO ₂ /tkm Ship: load capacity 10 000 t and average LFO consumption 69.2 l/km. Specific transport emissions 0.014 kg CO ₂ /tkm
Distance (km)	Average transport distance 370 km
Capacity utilization (%)	43–86% for truck and 70% for ship
Bulk density of transported products (kg/m ³)	7 850 kg/m ³
Volume capacity utilization factor	1

End-of-life recycling and waste processing

Waste materials from construction, repair and demolition are sorted, and steel scrap is cycled back to the steel industry by the scrap trade. Scrap steel has a strong market position: an average of 95% of the steel removed from buildings at the end of their life cycle is used in the production of new steel. Prefabricated structures can also be re-used. Table 5 describes scenario for the end-of-life processing.

Process flow	Unit	Value
Collection process specified by type	kg collected separately	1.0 kg
	kg collected with mixed construction waste	–
Recovery system specified by type	kg for reuse	–
	kg for recycling	0.95 kg
	kg for energy recovery	–
Disposal specified by type	kg product or material for final deposition	0.05 kg
Assumptions for scenario development	units as appropriate	Building products are transported 150 km by truck to recycling facility with a truck capacity utilisation of 45%

No hazardous waste is formed from colour-coated building products and steel does not harm the environment. According to the European Waste Catalogue, the waste code for steel products after their useful life is 17 04 05 (iron and steel).

LCA calculation information

This environmental product declaration covers the following life cycle stages: A1 Raw material supply, A2 Transport, A3 Manufacturing and A4 Transportation of the product to construction site and end-of-life modules, C1 Deconstruction, C2 Transport end-of-life, C3 Waste processing and C4 Disposal, as well as module D benefits and loads beyond the system boundary; see Figures 1 and 2. The benefits of steel recycling in module D are calculated based on a recycling rate of 95% for steel.

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

Product stage			Construction stage		Use stage								End of life stage				Beyond the life cycle		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D	
X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	MNR	MNR	X	
Raw material supply			Transport	Construction-installation process								De-construction demolition				Reuse	Recovery	Recycling	
Transport				Use	Maintenance			Repair	Replacement	Refurbishment	Operational energy use	Operational water use		Transport	Waste processing	Disposal			

- Mandatory modules
- Mandatory as per the RTS PCR section 6.2.1 rules and terms
- Optional modules based on scenarios

Figure 1. System boundaries of life cycle assessment (LCA)

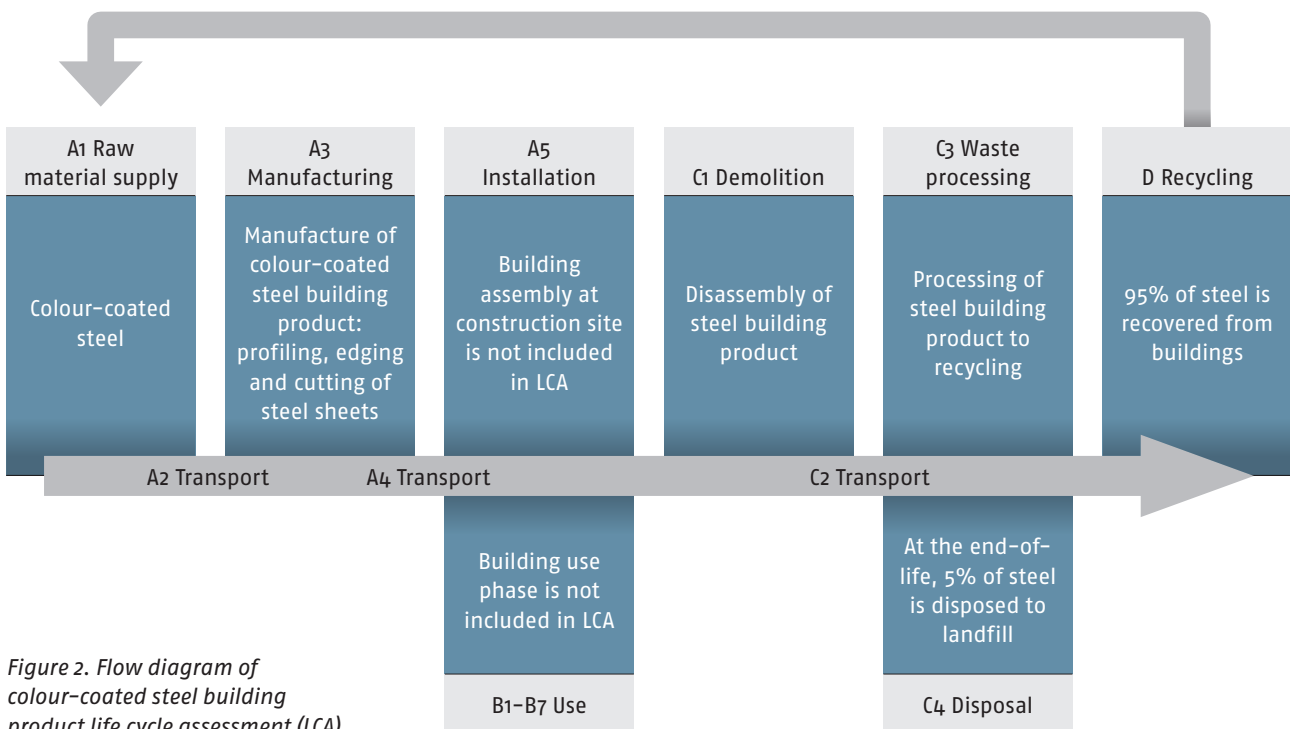


Figure 2. Flow diagram of colour-coated steel building product life cycle assessment (LCA)

DATA QUALITY

Life cycle inventory data has been collected from all production sites from 2018 production. When site specific data was not available, Vimpeli (Finland) production has been considered as representative of the other sites also. Steel made at the SSAB steel mill in Raahе (Finland) and European steel are used in colour-coated building products. The steel data is from 2017. No data is more than 10 years old. Gabi 9 software was used to calculate the environmental impact categories.

CUT-OFF CRITERIA

Life cycle inventory data for a minimum of 99% of total material and energy input flows have been included in the life cycle analysis.

ALLOCATION

Physical allocation was applied for different product groups based on yearly production volumes (kg).

Environmental profile

All environmental impact values apply to 1 kg of colour-coated steel building products. The table 6 shows the environmental indicators based on the life cycle assessment of colour-coated building products.

The deviation in the environmental impact values related to the variation in colour-coating and zinc layer thickness of the products is not higher than 10%.

Reading example in environmental profile tables: $2.80E-02 = 2.80 \cdot 10^{-2} = 0.028$

Table 6. Environmental profile of colour-coated steel building products

Environmental impacts	Unit	Life cycle stage				
		A1	A2	A3	A1-A3 TOTAL	A4
GWP Global warming potential	kg CO ₂ equiv.	2.69	2.80E-02	2.44E-02	2.74	3.31E-02
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	2.24E-11	4.63E-18	5.48E-11	7.72E-11	5.34E-18
AP Acidification potential of soil and water sources	kg SO ₂ equiv.	6.04E-03	6.10E-05	1.08E-04	6.21E-03	8.15E-05
EP Eutrophication potential	kg (PO ₄) ³⁻ equiv.	6.50E-04	1.47E-05	1.54E-05	6.80E-04	1.94E-05
POCP Photochemical ozone creation potential	kg ethene equiv.	6.22E-04	-1.97E-05	1.21E-06	6.04E-04	-8.84E-06
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	1.62E-04	1.99E-09	4.85E-09	1.62E-04	2.22E-09
ADP Abiotic depletion potential of resources – fossil fuel	MJ	31.7	0.380	0.440	32.5	0.446
Resource use and primary energy	Unit	A1	A2	A3	A1-A3 Total	A4
Use of renewable primary energy used as energy carrier	MJ	2.15	2.21E-02	0.380	2.55	2.40E-02
Use of renewable primary energy resources used as raw material	MJ	0	0	0	0	1.79E-10
Total use of renewable primary energy resources	MJ	2.15	2.21E-02	0.380	2.55	2.40E-02
Use of non-renewable primary energy used as energy carrier	MJ	33.3	0.380	0.690	34.4	0.447
Use of non-renewable primary energy used as raw material	MJ	0	0	0	0	2.17E-05
Total use of non-renewable primary energy resources	MJ	33.3	0.380	0.690	34.4	0.447
Use of secondary material	kg	3.35E-02	0	0	3.35E-02	0
Use of renewable secondary fuels	MJ	4.79E-10	0	0	4.79E-10	0
Use of non-renewable secondary fuels	MJ	6.08E-09	0	0	6.08E-09	0
Net use of fresh water	m ³	2.07E-03	3.74E-05	4.80E-04	2.59E-03	4.06E-05
Waste categories	Unit	A1	A2	A3	A1-A3 Total	A4
Hazardous waste disposed	kg	6.15E-02	2.13E-08	2.69E-06	6.15E-02	2.30E-08
Non-hazardous waste disposed	kg	8.11E-02	3.10E-05	3.68E-02	0.120	3.37E-05
Radioactive waste disposed	kg	6.43E-04	5.17E-07	1.00E-04	7.44E-04	0
Output flows	Unit	A1	A2	A3	A1-A3 Total	A4
Components for reuse	kg	0	0	2.83E-05	2.83E-05	0
Materials for recycling	kg	0	0	3.43E-02	3.43E-02	0
Materials for energy recovery	kg	0	0	2.05E-03	2.05E-03	0
Exported electrical energy	MJ	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0

Environmental impacts	Unit	Life cycle stage				
		C1	C2	C3	C4	D
GWP Global warming potential	kg CO ₂ equiv.	2.82E-02	1.67E-02	2.43E-03	7.81E-04	-1.41
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	5.09E-09	2.73E-18	7.89E-18	4.32E-18	-8.57E-08
AP Acidification potential of soil and water sources	kg SO ₂ equiv.	2.14E-04	4.41E-05	1.71E-05	4.42E-06	-6.08E-03
EP Eutrophication potential	kg (PO ₄) ³⁻ equiv.	5.10E-05	1.08E-05	4.10E-06	5.00E-07	-2.43E-03
POCP Photochemical ozone creation potential	kg ethene equiv.	2.23E-05	-1.58E-05	1.89E-06	3.42E-07	-1.40E-03
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	9.46E-09	1.18E-09	2.72E-09	7.41E-11	-1.08E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	0.406	0.224	4.68E-02	1.04E-02	-20.1
Resource use and primary energy	Unit	C1	C2	C3	C4	D
Use of renewable primary energy used as energy carrier	MJ	2.37E-03	1.31E-02	3.46E-03	1.37E-03	-0.914
Use of renewable primary energy resources used as raw material	MJ	0	0	0	0	0
Total use of renewable primary energy resources	MJ	2.37E-03	1.31E-02	3.46E-03	1.37E-03	-0.914
Use of non-renewable primary energy used as energy carrier	MJ	0.410	0.225	4.86E-02	1.08E-02	-22.2
Use of non-renewable primary energy used as raw material	MJ	2.07E-08	1.18E-05	1.77E-06	3.99E-07	-3.21E-06
Total use of non-renewable primary energy resources	MJ	0.410	0.225	4.86E-02	1.08E-02	-22.2
Use of secondary material	kg	0	0	0	0	0
Use of renewable secondary fuels	MJ	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	0	0	0	0	0
Net use of fresh water	m ³	5.55E-05	2.21E-05	1.45E-05	2.72E-06	-8.15E-03
Waste categories	Unit	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0	1.26E-08	1.52E-09	1.84E-10	0
Non-hazardous waste disposed	kg	0	1.83E-05	9.85E-06	5.01E-02	0
Radioactive waste disposed	kg	0	0	0	0	0
Output flows	Unit	C1	C2	C3	C4	D
Components for reuse	kg	0	0	0	0	0
Materials for recycling	kg	0.950	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0

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We make steel-based products for walls and roofs, for both commercial buildings and private homes. We're a supplier of high-quality products, systems and solutions, developed sustainably and to live up to the highest demands on durability in harsh conditions.

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