

HOT-DIP GALVANISED BUILDING PRODUCTS

ENVIRONMENTAL PRODUCT DECLARATION EN 15804 ISO 14025

RUUKKI

Energy-efficient steel solutions for better LIVING. WORKING. MOVING.

• General information

Owner of environmental product declaration	Ruukki Construction Suolakivenkatu 1, 00810 Helsinki, Finland tel. +358 20 5911
Product	Hot-dip galvanised steel building products
Manufacturer	Ruukki
Manufacturing sites	Vimpeli (Finland), Anderslöv (Sweden), Pärnu (Estonia), Zyrardow (Poland) and Kopylov (Ukraine)
Product applications	Building roofs, roofing, floors, studs, exterior and interior cladding, and roof safety products
Declared unit	1 kg hot-dip galvanised building products
Date declaration was issued	1 December 2014
Valid until	1 December 2019

This environmental product declaration contains several different hot dip galvanised steel products for building and other structures. The results of environmental indicators stated in this declaration are average values for these products. The EPD of construction products may not be comparable if they do not comply with the standard EN 15804 and EN ISO 14025.

The information in this environmental product declaration is based on production data for 2012.

CEN standard EN 15804 serves as the core PCR. Any EPD program has not been used for creating the environmental product declaration.

Independent verification of the declaration, according to EN ISO 14025:2010

☒ External ☐ Internal

Third party verifier:



Thomas Andersson, Insinööritoimisto Ecobio Oy

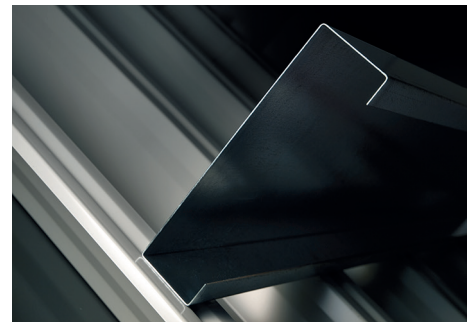
• Product

Application

Hot dip galvanised construction products are used as roofing, decking, floors, studs, external and internal wall cladding. Typical applications are residential buildings, industrial and commercial buildings, sports facilities, warehouses and power plants. Metal coating improves the corrosion resistance of steel and prolongs product lifetime.

The products made of hot-dip galvanised steel are:

- Load-bearing profiles for decking
- Profiles for roofing
- Profiles for wall cladding
- Light weight purlins
- Composite profile Steelcomp
- Arch profiles
- Liner trays
- Thermo purlins



Ruukki's building products can impact positively on the overall assessment of buildings for LEED and BREEAM certification. For more information, visit www.ruukki.com/breem and www.ruukki.com/leed.

Technical information

This environmental product declaration covers hot-dip galvanised products made by Ruukki in Vimpeli (Finland), Anderslöv (Sweden), Pärnu (Estonia), Zyrardow (Poland) and in Kopylov (Ukraine). Choice of production site is determined according to, for example, product requirements and construction site location. Ruukki has the right to use CE marking for the following product groups of hot-dip galvanised building products:

- steel structures and load-bearing profiles – EN 1090-1
- load-bearing roofing, cladding and ceiling products – EN 14782
- load-bearing 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
- guard rails intended for infrastructure applications – EN 1317-5
- structural hollow sections – EN 10219

By affixing CE marking to its products, the manufacturer declares that the product complies with all the relevant regulations and especially with essential health, safety and environmental regulations. Steel density is 7 850 kg/m³.

The masses and material strengths are specified in the product descriptions at www.ruukki.com. Other technical properties are selected by the customer.

• Product materials and composition

Steel is an alloy of mainly iron and carbon, with small amounts of 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.

Product composition

The products have been manufactured from hot-dip galvanised metal sheet in conformity with EN 10346. Zinc coating (Z) 100–450 g/m² provides a good level of corrosion protection for normal applications. The zinc coating is lead-free and has a minimum zinc content of 99%. The surface of the steel is normally protected by oil, Cr6+ free chemical passivation, Cr6+ free organic passivation or a combination of some of these. The maximum weight of surface protection on each side of the sheet is

- 3.0 g/ m² for oil,
- 200 mg/m² for Cr6+ free chemical passivation
- and 2 g/m² for Cr6+ free organic passivation.

In Cr6+ free chemical passivation, organic passivation and oiling, the contents of the elements classified as hazardous do not exceed the maximum concentration limits set by EU legislation.

Ruukki 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). Communication and cooperation throughout the supply chain plays an important role and Ruukki requires full REACH compliance from its subcontractors. Ruukki tracks the list of Substances of Very High Concern (SVHC) and other legislative requirements to ensure products meet legal and customer requirements. In addition, Ruukki observes and complies with the requests and recommendations of many customers to withdraw products containing hazardous substances in the construction sector.

Table 1 shows an example of the typical chemical composition of hot dip galvanized, cold formed formable building products with Hiarc coating (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.

Where the concentration % (w/w) in a product of substances restricted under the EU's chemical regulation (REACH) and recommendations phasing out hazardous substances in the building sector such as the requirements of BASTA (2014: A2) and Byggsvarubedömningen (Building Material Assessment, BVB, 2013) in Sweden and the priority list in Norway exceeds or corresponds to the limits referred to above, this is stated in Table 1. The guidelines for Swedish building product declarations (Föreningen för Byggsvarudeklarationer, BVD 3, 2007) have been taken into account with regard to the substances disclosed.

More detailed information about the composition of different steels is available from national and international standards as well as from Ruukki's website, at www.ruukki.com/products-and-solutions. 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.

Table 1. Example of the composition of hot-dip galvanised, cold-rolled formable steel (Dx51D)

Material	Content (%) of total product weight	Name of ingredient	Content % (w/w) of total product weight	CAS number	Risk and hazard phrases and other data on the ingredient
Hot-dip galvanised, cold formed, formable steel (Dx15D)	100	Iron (Fe)	> 89.8	7439-89-6	-
		Manganese (Mn)	1.2	7439-96-5	-
		Silicon(Si)	0.5	7440-21-3	-
		Titanium (Ti)	0.3	7440-32-6	-
		Carbon (C)	0.18	7440-44-0	-
		Phosphorus (P)	0.1	12185-10-3	R17-26/28-35-50 H250, H300, H314, H330, H400
Thickness: 0.45 mm		Zinc layer	<8.2	7440-66-6	-
		> 99% Zinc (Zn)			

Measurements are done to a level of 0.02 µg/g (0.0000002%). Concentrations below this degree of measuring accuracy cannot be determined. None of the constituent substances within the whole product exceeds the limits of the EU's chemical regulation (REACH) and recommendations phasing out hazardous substances in the building sector such as the requirements of BASTA (2014: A2) and Byggsvarubedomningen (Building Material Assessment, BVB, 2013), Swedish Building Product Declarations (Föreningen för Byggsvarudeklarationer, BPD 3, 2007) and the priority list in Norway. No product contains substances restricted under REACH or included on the candidate list (SVHC).

• Production

The products referred to in this EPD have been made by cold-roll forming, edging and cutting to the required size on production lines and in processes. Cold-rolled, metal-coated steel manufactured at SSAB's site in Hämeenlinna (Finland) is used as the raw material in the manufacture of Ruukki's hot-dip galvanised building products. The metal-coated steel is manufactured from hot-rolled steel produced at SSAB's steel mill in Raahe (Finland). The manufacture of the hot-rolled steel used as the raw material is based on the use of iron ore. The amount of scrap steel used varies between around 20-30 % of the steel charge depending on the steel grade and method of manufacture. In 2012, the average value was 20%. Use of energy and raw materials has been optimised in steel production.

When scrap steel is used instead of virgin raw materials in iron production, the carbon dioxide emissions originating in steel production decrease accordingly. Steelmaking 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.

Packaging

Products are wrapped to protect products during handling and transport. Packaging can consist of plastic film, wooden pallets, plastic straps, stretch wrap, corrugated plastic foam (EPS) plank wood and cardboard. All packaging materials are recyclable. Packaging material waste is sorted at construction sites according to local regulation and customer requirements.

Sourcing and transportation

The general terms and conditions of all sourcing contracts require compliance with Ruukki's Code of Conduct. Also ethical values, environmental concerns and energy efficiency are weighed up when choosing suppliers. Raw materials are mostly transported to production sites by road. Finished products are transported by truck, rail and boat combined. Ruukki's logistics unit is responsible for most of Ruukki's transportation of raw materials and products.

Ruukki's logistics unit manages environmental concerns through a certified environmental management system. Ruukki aims to increase the share of logistics contracts with partners who have signed up for energy efficiency agreements in the logistics and transport sector. Logistics firms currently outside energy efficiency agreements are regularly encouraged to sign up for an agreement. Ruukki's international partners have certified environmental management systems. Logistics aims to optimise transport and maximise payloads and to combine transport as efficiently as possible.

- **Recycling and waste management**

Steel is a fully-recyclable material and is an important raw material for new construction. No hazardous wastes originate from Ruukki hot dip galvanized building products.

Prefabrication results in close to zero waste at the construction site. Waste materials originating from construction, renovation and demolition are sorted and steel scrap is returned to the steel industry to be re-used. Scrap steel has a strong market position: an average of 95% of the steel removed from buildings at the end of their lifecycle is used in the production of new steel.

No hazardous waste is formed from end products and steel does not harm the environment. According to the European Waste Catalogue, the waste code for steel products manufactured by Ruukki after their useful life is 17 04 05 (iron and steel). All packaging materials for steel products can be recycled.

- **Information about safe installation and use**

Hot dip galvanised building products are pre-fabricated elements. Installation requires no welding or grinding and only a minimum amount of cutting. Ruukki's hot dip galvanised building products can be installed quickly and safely. Fast installation and easy lifecycle maintenance reduce costs and adverse environmental impacts.

Safety

- To avoid cuts from sharp steel parts, Ruukki requires installation workers to wear the appropriate protective clothing when installing Ruukki products. Hands must be protected at all times with the right protective gloves for each work stage.
- Never go under the steel products when they are being moved.
- Make sure the securing straps are sufficiently strong and firmly attached.
- Avoid handling the panels in heavy wind.
- Always follow the industrial safety provisions in force and find out whether the installation site is subject to any particular requirements regarding safety before beginning installation work.
- We recommend that goggles and respirators are used when cutting the steel product.
- Beware of slipperiness in winter and when wet
- Fasten roof sheets directly after layout.

Maintenance

Products have a useful life of up to 50 years. The material is easy-care, washable and re-paintable. The products are a practically low-maintenance solution. With periodic inspections and regular maintenance, the products have a very long life. Cleaning does not require the use of chemicals that are hazardous to health or the environment. It is important to keep the product clean. Deposits that are not rain rinsing de-away lines should be cleaned with a soft brush and water. In areas with polluted air, a cleaning detergent can be used.

• Environmental profile

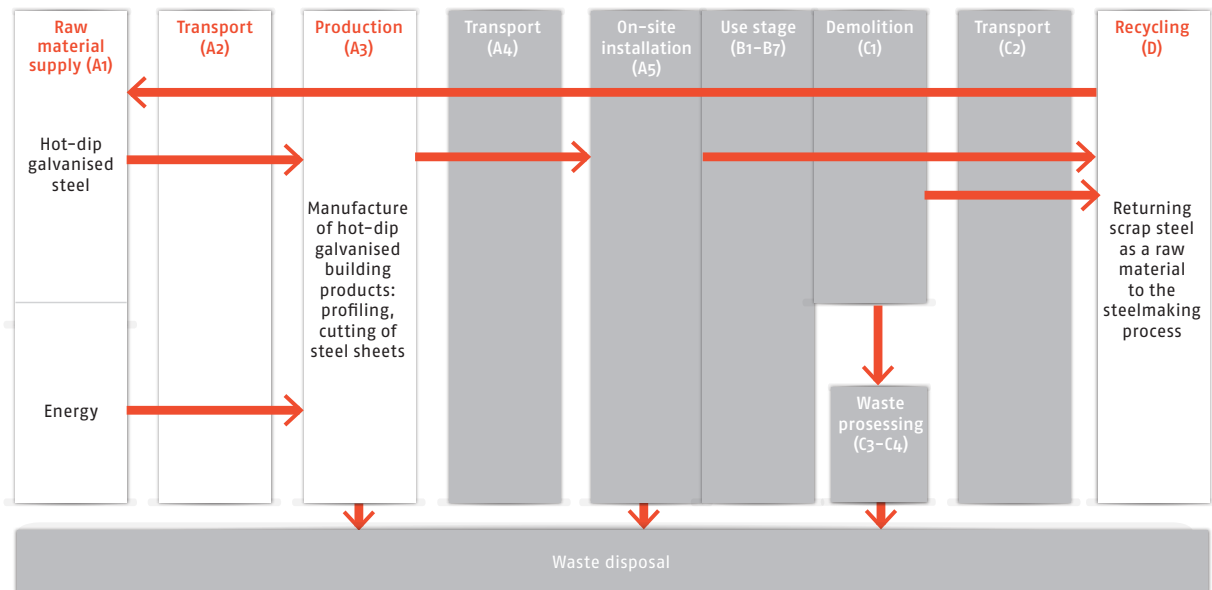


Figure 1. System boundaries of lifecycle assessment. The chart describes the lifecycle stages of steel structures. Lifecycle assessment excludes the lifecycle stages in a grey background.

This environmental product declaration covers the lifecycle of the product from cradle to factory gate, i.e. information modules A1, A2, A3, including an end-of-life recycling rate of 90% for steel, i.e. the external lifecycle impacts from information module D ("cradle to gate with options"). This means that a burden is allocated for the steel scrap that is used as an input to the steel making process in stage A1, and a credit for the end-of-life (EoL) steel that is recycled in stage D. The lifecycle assessment in the environmental production declaration does not include information in the building stage (A4 – A5), the use and operational stage (B1 – B5; B6 – B7) nor the demolition stage (C1 – C4).

The impact of recycling has been calculated based on worldsteel's (World Steel Association) LCA model so that the compensation is the difference between the primary and secondary production of a steel slab perceived with the acquisition of the recycling process. 1.092 kg of recycled steel is needed to produce 1 kg of steel in secondary production. The lifecycle benefits of the by-products originating in steel production have been allocated to steel production in accordance with worldsteel's lifecycle model.

The benefits and loads of the scrap steel used by a steel mill are accounted inside the worldsteel's life cycle model system boundary. To avoid double calculation, these are not reported again separately as use of secondary material in accordance with standard EN 15804. Allocation of by-products is calculated as reducing environmental impacts in the production of hot-rolled steel by 5–10%, and an average of 8%.

All values apply to 1 kg of hot dip galvanised building products. The tables below show the environmental indicators based on the lifecycle assessment of hot dip galvanized building products.

Table 2. Environmental profile of hot dip galvanized building products

Parameter	Unit	Product stage				Benefits and loads beyond the system boundary
		A1 Raw material supply	A2 Transport	A3 Manufacturing	A1 – A3 Product stage total	D Re-use, recovery, recycling potential
Parameters describing environmental impacts						
GWP Global warming potential	kg CO ₂ equiv.	2.73	1.39 x 10 ⁻²	1.28 x 10 ⁻²	2.75	-1.32
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv	1.04 x 10 ⁻⁸	6.70 x 10 ⁻¹⁴	2.40 x 10 ⁻¹⁰	1.06 x 10 ⁻⁸	4.14 x 10 ⁻⁴
AP Acidification potential of soil and water sources	kg SO ₂ equiv	6.33 x 10 ⁻³	1.08 x 10 ⁻⁴	2.34 x 10 ⁻⁴	6.67 x 10 ⁻³	-2.07 x 10 ⁻³
EP Eutrophication potential	kg (PO ₄) ⁻³ equiv	6.40 x 10 ⁻⁴	2.19 x 10 ⁻⁵	2.51 x 10 ⁻⁵	6.87 x 10 ⁻⁴	-9.16 x 10 ⁻⁵
POCP Formation potential of tropospheric ozone	kg ethene equiv	5.96 x 10 ⁻⁴	1.20 x 10 ⁻⁵	2.86 x 10 ⁻⁵	6.36 x 10 ⁻⁴	-6.52 x 10 ⁻⁴
ADP-elements Abiotic depletion potential	kg SB equiv	2.02 x 10 ⁻⁴	5.27 x 10 ⁻¹⁰	1.68 x 10 ⁻⁸	2.02 x 10 ⁻⁴	-1.32 x 10 ⁻⁵
ADP-fossil fuels Abiotic depletion potential	MJ, net calorific value	28.1	0.193	2.42	30.7	-14.0
Parameters describing resource use and primary energy						
Use of renewable primary energy used as energy carrier	MJ, net calorific value	1.03	7.61 x 10 ⁻³	0.941	1.98	0.818
Use of renewable primary energy resources used as raw material	MJ, net calorific value	0	0	0	0	0
Total use of renewable primary energy resources	MJ, net calorific value	1.03	7.16 x 10 ⁻³	0.941	1.98	0.818
Use of non-renewable primary energy used as energy carrier	MJ, net calorific value	17.6	0.194	2.83	20.6	-1.10
Use of non-renewable primary energy used as raw material	MJ, net calorific value	12.0	0	0	12.0	-11.3
Total use of non-renewable primary energy resources	MJ, net calorific value	29.5	0.194	2.83	32.5	-12.4
Use of secondary material	kg	-	-	-	-	-
Use of renewable secondary fuels	MJ, net calorific value	-	-	-	-	-
Use of non-renewable secondary fuels	MJ, net calorific value	-	-	-	-	-
Net use of fresh water	m ³	1.98 x 10 ⁻²	0	9.69 x 10 ⁻⁶	1.99 x 10 ⁻²	0
Other environmental information describing waste categories						
Hazardous waste disposed	kg	0.118	0	4.00 x 10 ⁻⁵	0.118	2.35 x 10 ⁻²
Non-hazardous waste disposed	kg	4.24 x 10 ⁻⁴	0	8.35 x 10 ⁻⁴	1.26 x 10 ⁻³	3.70 x 10 ⁻²
Radioactive waste disposed	kg	5.70 x 10 ⁻⁴	0	1.63 x 10 ⁻⁴	7.32 x 10 ⁻⁴	4.44 x 10 ⁻⁴
Other environmental information describing output flows						
Parameter	Unit	Product stage total				
Components for re-use	kg	-				
Materials for recycling	kg	-				
Materials for energy recovery	kg	-				
Exported energy	kg	3.89 x 10 ⁻²				

This environmental product declaration provides information about the environmental impacts of Ruukki's products. The declaration is based on the requirements of standards EN 15804+A1:2014, ISO 14025:2010 and ISO 14040:2006. An environmental product declaration contains information about the raw materials, energy consumption, emissions originating during production and about product recyclability.

Ruukki Construction serves customers in the construction business. We deliver products and services ranging from design to installation to promote the business of our corporate customers. Ruukki's corporate responsibility is defined in Ruukki's strategy, values, code of conduct, policies and management system. Ruukki's production sites operate in conformance with certified ISO 14001 environmental management and ISO 9001 quality management systems. Ruukki aims at continuous improvement and energy efficiency in all operations and customer solutions. Ruukki Construction is a subsidiary of SSAB, our brands are Ruukki and Plannja.

The most recent information about Ruukki's products and services, product safety and use and environmental and social responsibility can be found on Ruukki's website at www.ruukki.com.