EPD®
THE INTERNATIONAL EPD® SYSTEM

vossloh

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

RMS VNSS TRANSITION RAILS 60E1/50E3 R350LHT

VOSSLOH COGIFER KIHN

TRAFIKVERKET

Programme: The International EPD® System, www.environdec.com	Programme operator: **EPD International AB**	EPD registration number: S-P-05341	Publication date: 2021-12-21	Revision date: 2022-03-04	Valid until: 2027-03-06

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Vossloh Cogifer Kihn
Address	17 rue de l'Usine, 3754 Rumelange, Luxembourg
Contact details	contact-kihn@vossloh.com
Website	www.vossloh.com

PRODUCT IDENTIFICATION

Product name	RMS VNSS Transition Rails $60^{E}1/50^{E}3$ R350LHT
Additional label(s)	RMS VNSS Transition Rails $60^{E}1/50^{E}3$ R350LHT Left or Right 12m
Product number / reference	1013024 and 1013025 (1013124 and 1013125 are referenced in annexe 2)
Place(s) of production	Rumelange, Luxembourg
CPC code	412 - Products of iron or steel

The International EPD System

EPDs within the same product category but from different programs may not be comparable.

EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	EPD International AB
EPD standards	This EPD is in accordance with EN 15804+A1 EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the Int'l EPD System PCR 2019:14 Construction products, version 1.11 (05.02.2021) is used.
EPD author	Tim SANDERS and Fadi FIKANI at Simon-Christiansen & Associés Ingénieurs-Conseils S.A.
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Verification date	Started on 2021-12-07
EPD verifier	Hetal Parekh Udas, One Click LCA Ltd
EPD number	S-P-05341
Revision date	2022-03-04
Publishing date	2021-12-21
EPD valid until	2027-03-06

EXECUTIVE SUMMARY

Rail profiles $60^{E}1$ and $50^{E}3$ are shipped from Austria to Vossloh Luxembourg. Upon arrival, the profiles are forged and welded to form a 12m RMS VNSS Transition Rails $60^{E}1/50^{E}3$ R350LHT Right or Left. All raw material quantities, manufacturing steps, energy requirements, and ancillary materials are exactly the same for the Right and Left Transition Rails that are represented in this EPD. The installation module (A5) is included in the EPD to balance the wood beams packaging Biogenic carbon mass as per EN 15804+A2 requirements.

The finished products are then shipped to Sweden where they get installed in the country's rail network. Trafikverket, the Swedish Transport Administration, is the final customer. It orders the track components from VNSS, for which VC Kihn produces the transition rails. Trafikverket is responsible for the long-term planning of the transport system for road, rail, shipping, and aviation. Its role is to develop an efficient and sustainable transport system. In this context, Trafikverket requires its suppliers to provide an EPD.

The same manufacturing process applies to the production of the 18m RMS VNSS Transition Rails $60^{E}1/50^{E}3$ R350LHT Left or Right that are not part of this EPD but are referenced in annexe 2. The manufacturing (A1 to A3) GWP factor per kg declared unit, in accordance with EN 15804+A1, is 2.81 kg CO_2-e for the 12m RMS VNSS Right or Left and 2.77 kg CO_2-e for the 18m RMS VNSS Right or Left.

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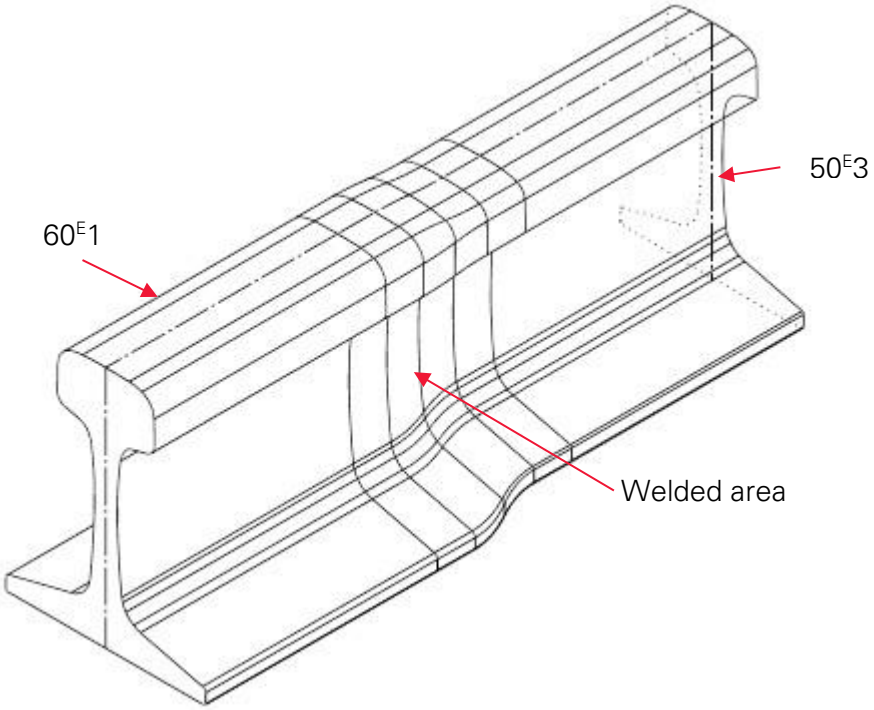


Transition rail profiles $60^{E}1$ and $50^{E}3$ welded section

PRODUCT INFORMATION

PRODUCT DESCRIPTION

Welded mixed rail: profile $60^{E}1$ and profile $50^{E}3$ welded together to a length of 12m (18m length is referenced in annexe 2).

PRODUCT APPLICATION

Transition rail in a railway switch. Transition rail between the track rail and the tong rail in the switch. The tong rail allows a change of direction.

TECHNICAL SPECIFICATIONS

Steel quality = LHT: low carbon heat treatment.

PRODUCT STANDARDS

EN 16273 norm for forging.

EN 14587-1 norm for welding.

PHYSICAL PROPERTIES OF THE PRODUCT

100% recyclable steel transition rails.

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at www.vossloh.com.

PRODUCT RAW MATERIAL COMPOSITION

Product and Packaging Material	Weight, kg	Weight, Share %	Post-consumer %	Renewable %	Country Region of origin
Steel Rail	1.0	99.6	20	-	EU
Rust proof surface	<0.0001	0.0099	-	-	EU
Wood packaging	0.004	0.398	-	100	EU

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

Vossloh receives two rail profiles $60^{E}1$ and $50^{E}3$ from Austria by train. They are unpacked and transported to a waiting area. Broken wood packaging beams and Polystyrene strapping are set aside for recycling. Profile $60^{E}1$ is then transferred to a manual station and get heated using a torch burning propane and oxygen from pressurized gas containers. While hot, the rail is transferred to a forging machine nearby. The machine forges the hot end to conform its profile to match the profile of $50^{E}3$ steel rail, in preparation for butt welding. The steel rail is then transferred to a manual grinding station to grind and square the forged end allowing a perfect surface match with its $50^{E}3$ counterpart. Profile $50^{E}3$ is also transferred and its end manually ground and squared, as needed, to match its counterpart. Both steel rails are then transferred to the soldering machine where they are introduced with their recently ground profiles facing each other in preparation to electric arc welding. The electric welding process does not require any additional metal, ancillary gases, or flux products.

After welding, the Mixed Welded Rail (Rail Mixte Soudé or RMS) is transferred to an on-site supplier to grind and smooth the welded area. The RMS is then transferred to the Press machine where it undergoes horizontal and vertical pressing as well as a last touch grinding. Next, the RMS is transferred to the control zone where the quality of the weld is checked with Ultrasound and Magnetic Crack Testing. Before leaving the control zone, the welded area of the RMS is coated with rustproof paint. The finished RMS is then transferred to the expedition area waiting for shipping. Shipping trucks lay the RMS on 8x 10x 2500 cm wood beams and strap them tight with reusable strapping.

The consumption of hydraulic oil by manufacturing machines is reported. The manufacturing process requires various sources of energy: namely electricity, diesel, compressed oxygen, and propane. The factory is provided heat and hot water from natural gas and electric lighting.

TRANSPORT AND INSTALLATION (A4-A5)

The transportation module is out of the EPD scope.

Installation module A5 accounts for wood packaging biogenic carbon balancing. It also accounts for RMS rail installation in the field assuming a fastening system that includes 4 Coach screws, 2 hook bolts, and 2 rail clips evenly spaced every 0.7m.

PRODUCT USE AND MAINTENANCE (B1-B7)

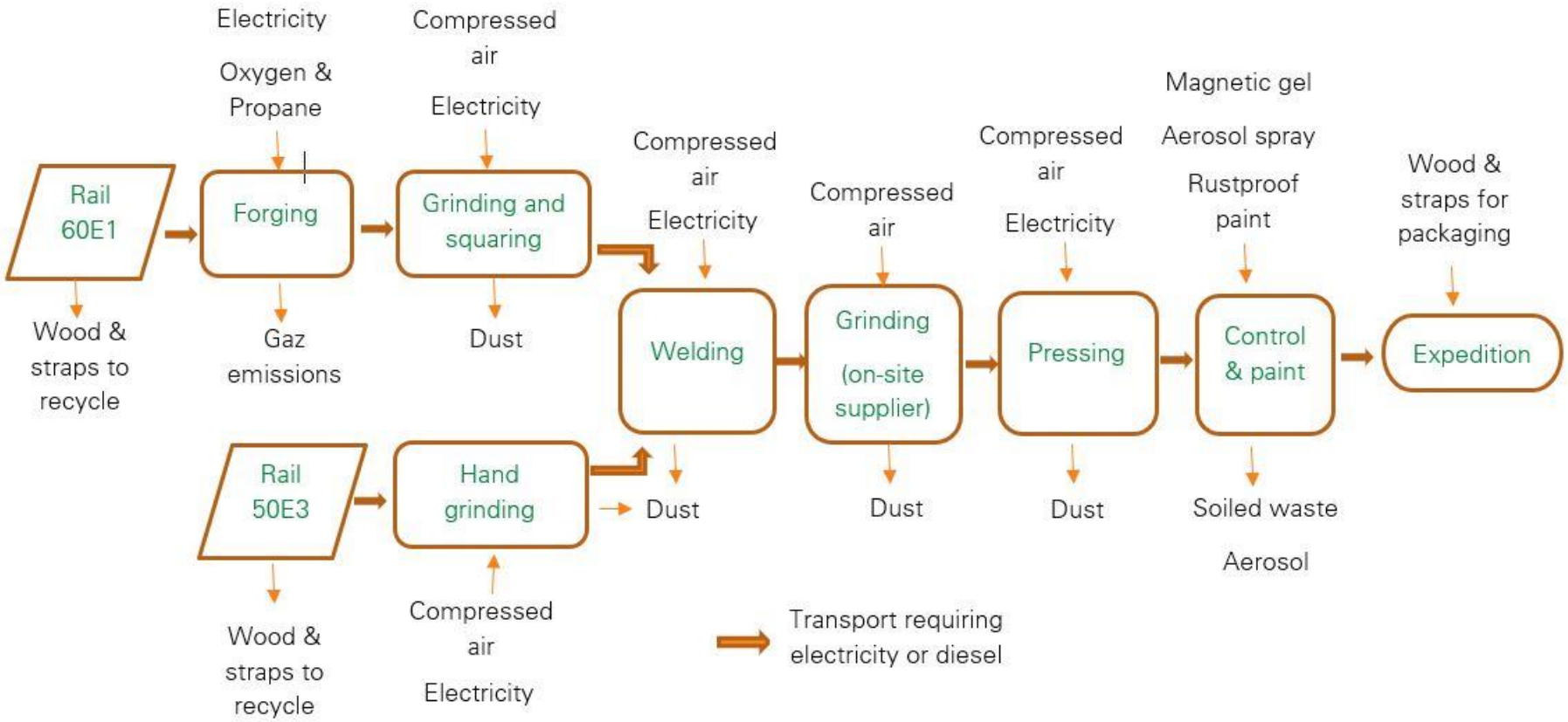
This EPD does not cover the use phase. Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Railway's dismantling is assumed to be done with an excavator consuming 28,15 kWh per ton of railways for diesel used by work machines. The source of energy is diesel fuel used by building machines (C1). Transportation distance to the treatment centre is assumed to be

50 km and the transportation method is assumed to be lorry (C2). Approximately 92% of steel is assumed to be recycled (C3). It is assumed that the 1 % of steel is taken to landfill for final disposal (C4). The remaining 7% of railway steel is assumed to be reused (D). Due to the recycling process, the end-of-life product is converted into recycled steel, while the shipping wooden beams are incinerated for energy recovery (D).

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	Data represents the 2019 calendar year.

DECLARED AND FUNCTIONAL UNIT

Declared unit	1 kg of RMS VNSS Transition Rails 60E1/50E3 R350LHT
Mass per declared unit	1 kg

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in packaging, kg C	0.0018

SYSTEM BOUNDARY

This EPD covers the *cradle to gate with options* scope with following modules: A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A5 (Assembly) as well as C1 (Deconstruction), C2 (Transport at end-of-life), C3 (Waste processing) and C4 (Disposal). In addition, module D - benefits and loads beyond the system boundary is included.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	MND	x	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x	x	x
Geography, by two-letter ISO country code or regions. The International EPD System only.																		
EU	EU	-	EU	EU	-	-	-	-	-	-	-	EU	EU	EU	EU	EU		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

For easier modelling and because of lack of accuracy in available modelling resources some constituents under 0,15% of product mass are excluded from modules A1-A3. These include ancillary materials present in the product in very small amounts. The mass percentage per declared unit of those ancillary products is 0.16%.

The production of capital equipment, construction activities, and

infrastructure, maintenance, and operation of capital equipment (except for use of hydraulic lubrication oil), personnel-related activities, energy (except for electrical and heating manufacturing area needs) and water use related to company management and sales activities are excluded.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order:

1. Allocation should be avoided.
2. Allocation should be based on physical properties (ex. mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

A general allocation for EPD input concerns calculating the weight ratio between 1 RMS VNSS unit and 1 RMS VNSS kg (which represents 1 declared unit). As the EPD is done for the smallest RMS VNSS that weighs 661 kg, the weight allocation rate is = 1/ 661 = 0.00151 or 0.151%.

Materials flow allocation could not be avoided for ancillary material and waste production, as the information was only measured on production process level. The inputs were allocated to studied product based on annual production volume. Those allocations were done by the customer before submitting the data to the EPD team.

Energy flow allocation regarding the heat and electricity consumption in the factory halls where the RMS are produced is done by the EPD team. The allocation, based on the 2019 energy consumption data, relies on the number of RMS VNSS produced relative to the total number of rails produced in the Forging unit halls. Since the production processes of these products are similar, the annual production percentages are used for allocation.

This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs.

Allocation used in Ecoinvent 3.6 environmental data sources follows the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the EN 15804 -standard.

AVERAGES AND VARIABILITY

Not relevant.

THE INTERNATIONAL EPD SYSTEM ADDITIONAL DATA REQUIREMENTS

Data specificity and GWP-GHG variability for GWP-GHG for A1-A3.

Supply-chain specific data for GWP-GHG	58 %

ENVIRONMENTAL IMPACT DATA

Notes:

1. The following environmental impact data is for the 12m long RMS VNSS Transition Rails 60E1/50E3 R350LHT. Right and Left Transition Rails have identical impacts.
2. EN 15804+A1 additional environmental impact data are presented in annexes.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	2,49E0	4,96E-2	1,15E-1	2,65E0	MND	3,78E-2	MND	MND	MND	MND	MND	MND	MND	9,28E-3	4,55E-3	2,14E-2	5,28E-5	-1,15E0
GWP – fossil	kg CO_2e	2,48E0	4,93E-2	1,33E-1	2,66E0	MND	3,02E-2	MND	MND	MND	MND	MND	MND	MND	9,28E-3	4,54E-3	2,27E-2	5,27E-5	-1,17E0
GWP – biogenic	kg CO_2e	4,79E-3	2,81E-4	-1,72E-2	-1,21E-2	MND	7,57E-3	MND	MND	MND	MND	MND	MND	MND	2,58E-6	3,3E-6	-1,3E-3	1,04E-7	2,16E-2
GWP – LULUC	kg CO_2e	1,41E-3	5,93E-5	7,79E-5	1,55E-3	MND	2,33E-5	MND	MND	MND	MND	MND	MND	MND	7,84E-7	1,37E-6	2,58E-5	1,56E-8	-8,29E-5
Ozone depletion pot.	kg CFC_{-11}e	1,36E-7	6,75E-9	2,5E-8	1,68E-7	MND	3,1E-9	MND	MND	MND	MND	MND	MND	MND	2E-9	1,07E-9	3,26E-9	2,17E-11	-3,6E-8
Acidification potential	mol H^+e	1,25E-2	4,2E-4	7,32E-4	1,37E-2	MND	1,45E-4	MND	MND	MND	MND	MND	MND	MND	9,7E-5	1,91E-5	2,75E-4	5E-7	-4,69E-3
EP-freshwater[2)]	kg Pe	1,12E-4	2,12E-6	1,18E-6	1,16E-4	MND	1,62E-6	MND	MND	MND	MND	MND	MND	MND	3,75E-8	3,7E-8	1,57E-6	6,36E-10	-4,99E-5
EP-marine	kg Ne	2,29E-3	1,47E-4	3,04E-4	2,74E-3	MND	3,33E-5	MND	MND	MND	MND	MND	MND	MND	4,29E-5	5,75E-6	6,07E-5	1,72E-7	-9,31E-4
EP-terrestrial	mol Ne	2,55E-2	1,63E-3	3,35E-3	3,05E-2	MND	3,47E-4	MND	MND	MND	MND	MND	MND	MND	4,7E-4	6,35E-5	7,05E-4	1,9E-6	-9,86E-3
POCP ("smog")	kg NMVOCe	1,12E-2	4,43E-4	9,3E-4	1,26E-2	MND	1,24E-4	MND	MND	MND	MND	MND	MND	MND	1,29E-4	2,04E-5	1,92E-4	5,51E-7	-6,1E-3
ADP-minerals & metals	kg Sbe	2,89E-5	3,98E-7	1,97E-7	2,95E-5	MND	5,83E-7	MND	MND	MND	MND	MND	MND	MND	1,42E-8	7,75E-8	1,26E-6	4,81E-10	-3,07E-6
ADP-fossil resources	MJ	2,14E1	7,22E-1	2,61E0	2,48E1	MND	3,97E-1	MND	MND	MND	MND	MND	MND	MND	1,28E-1	7,07E-2	3,14E-1	1,47E-3	-9,21E0
Water use[1)]	m^3e depr.	1,62E0	7,84E-3	1,25E-2	1,64E0	MND	1,06E-2	MND	MND	MND	MND	MND	MND	MND	2,38E-4	2,63E-4	4,46E-3	6,81E-5	-2,17E-1

1) GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. 3) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO_4e.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy	MJ	1,05E0	6,22E-2	1,46E-1	1,26E0	MND	3,54E-2	MND	MND	MND	MND	MND	MND	MND	6,91E-4	8,9E-4	4,94E-2	1,19E-5	-9,74E-2
Renew. PER as material	MJ	0E0	0E0	1,48E-1	1,48E-1	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	-8,9E-2
Total use of renew. PER	MJ	1,05E0	6,22E-2	2,93E-1	1,41E0	MND	3,54E-2	MND	MND	MND	MND	MND	MND	MND	6,91E-4	8,9E-4	4,94E-2	1,19E-5	-1,86E-1
Non-re. PER as energy	MJ	2,18E1	7,22E-1	2,61E0	2,52E1	MND	3,97E-1	MND	MND	MND	MND	MND	MND	MND	1,28E-1	7,07E-2	3,14E-1	1,47E-3	-9,21E0
Non-re. PER as material	MJ	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	2,18E1	7,22E-1	2,61E0	2,52E1	MND	3,97E-1	MND	MND	MND	MND	MND	MND	MND	1,28E-1	7,07E-2	3,14E-1	1,47E-3	-9,21E0
Secondary materials	kg	1,56E-1	0E0	1,48E-6	1,56E-1	MND	4,92E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	4,48E-1
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	5,84E-3	2,53E-4	3,51E-4	6,45E-3	MND	3,3E-4	MND	MND	MND	MND	MND	MND	MND	1,13E-5	1,47E-5	1,28E-4	1,61E-6	-8,32E-3

6) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	6,65E-5	3,16E-3	2,52E-3	5,75E-3	MND	6,27E-3	MND	MND	MND	MND	MND	MND	MND	1,37E-4	6,87E-5	0E0	1,37E-6	-1,68E-1
Non-hazardous waste	kg	2,06E-2	1E-1	4,48E-2	1,66E-1	MND	7,24E-2	MND	MND	MND	MND	MND	MND	MND	1,47E-3	7,6E-3	0E0	1E-2	-1,79E0
Radioactive waste	kg	1,76E-4	4,27E-6	1,59E-5	1,96E-4	MND	1,66E-6	MND	MND	MND	MND	MND	MND	MND	8,94E-7	4,85E-7	0E0	9,74E-9	2,01E-6

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	7E-2	0E0	0E0
Materials for recycling	kg	0E0	0E0	4,5E-4	4,5E-4	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	9,2E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	8,85E-4	8,85E-4	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG	kg CO_2e	2,48E0	4,93E-2	1,33E-1	2,66E0	MND	3,02E-2	MND	MND	MND	MND	MND	MND	MND	9,28E-3	4,54E-3	2,27E-2	5,27E-5	-1,17E0

8) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013) This indicator Is almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity, high voltage, import from be (Reference product: electricity, high voltage)
Electricity CO_2e / kWh	0.24

BIBLIOGRAPHY

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

Ecoinvent database v3.6 (2019) and One Click LCA database.

EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

Int'l EPD System PCR 2019:14 Construction products, version 1.11 05.02.2021)

General Programme Instructions of the international EPD® system. Version 4.0

RMS VNSS TRANSITION RAILS $60^{E}1/50^{E}3$ R350LHT background report 16.12.2021

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Vossloh Cogifer Kihn
EPD author	Tim SANDERS and Fadi FIKANI at Simon-Christiansen & Associés Ingénieurs-Conseils S.A.
EPD verifier	Hetal Parekh Udas, One Click LCA Ltd
EPD program operator	The International EPD System
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Primary Steel and Aluminium and all Metal-Based Products

DIFFERENCES VERSUS PREVIOUS VERSIONS

The released EPD had a greater than 10% total GWP variation (modules A1-A3) between standards EN 15804 +A1 (EPD data used) and EN 15804 +A2 (ecoinvent data used).

As there is no steel rail EPD (for module A1) released according to EN 15804 +A2, the revised EPD resorts to a conservative generic ecoinvent steel data point.

The highest contributor to GWP is the data steel component. The revised EPD replaces that steel with a conservative one, chromium steel, that has the highest GWP contribution among the other available steel data points in ecoinvent 3.6.

As a result, the revised EPD has a total GWP (modules A1-A3) within 10% between old EN 15804 +A1 and new EN 15804 +A2 standards.

There is no change regarding EN 15804 +A1 GWP calculation between the released and the revised EPD versions.

ABOUT THE MANUFACTURER

Vossloh is a globally active, listed technology company with a core focus on rail infrastructure. The company provides an integrated offer for rail transportation, all from a single source. This includes unique, high-performance key products and complex systems such as track fastening systems, concrete ties, switch systems, crossings and the innovative services associated with the life cycle of rail tracks.

The Vossloh Group is represented in 20 countries worldwide. With an average of 3,482 employees, the Group generated sales worth €869.7 million in 2020 (45 percent from outside Europe). Vossloh solutions are benchmarks in many countries around the world. Global presence means that Vossloh customers receive integrated solutions for their infrastructure wherever they are, from one source.

Vossloh cogifer Kihn is an entity of the division Railway infrastructure. VC Kihn, the Luxembourg subsidiary, was founded in 1893 with the opening of a forge in a region rich in iron ore. For many years, VC Kihn has been a world-renowned specialist in the design and construction of tramway turnouts, crossings, and turnout combinations. VC Kihn is unique in the Group in its ability to forge switch tongs. The company offers a varied and increasingly demanding clientele its design skills, its large stock of numerically controlled machines, and its diversified experience that is more than a century old, all backed by a solid industrial shareholding. The support of the worldwide Vossloh group enables it to offer "turnkey" solutions to its customers, from integrated signalling solutions to assistance in the installation and maintenance of the equipment.

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents, and compliancy with EN 15804, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The background report (project report) for this EPD

Why does verification transparency matter? Read more online.

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier third-party verifier for EPD	Hetal Parekh Udas, One Click LCA Ltd
EPD verification started on	2021-12-07
EPD verification completed on	2021-12-17
Supply-chain specific data %	58
Approver of the EPD verifier	The International EPD System

Author & tool verification	Answer
EPD author	Tim SANDERS and Fadi FIKANI
EPD author training completion	2021-08-17
EPD Generator module	Primary Steel and Aluminium
Independent software verifier	Ugo Pretato, Studio Fieschi & soci Srl.
Software verification date	2021-05-11

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of

- the data collected and used in the LCA calculations,
- the way the LCA-based calculations have been carried out,
- the presentation of environmental data in the EPD, and
- other additional environmental information, as present

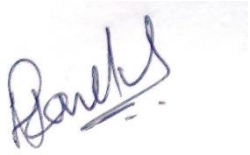
with respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Signature :



VERIFICATION AND REGISTRATION (ENVIRONDEC)

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)	
PCR	PCR 2019:14 Construction products, version 1.11
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Third party verifier	Hetal Parekh Udas, One Click LCA Ltd
	Approved by: The International EPD® System Technical Committee, supported by the Secretariat

Procedure for follow-up during EPD validity involves third party verifier	☐ yes ☑ no

THE INTERNATIONAL EPD® SYSTEM

EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com

ANNEX 1 : ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	2,63E0	4,85E-2	1,31E-1	2,81E0	MND	2,97E-2	MND	MND	MND	MND	MND	MND	MND	9,21E-3	4,5E-3	2,23E-2	5,17E-5	-1,12E0
Ozone depletion Pot.	kg CFC_{-11}e	4,28E-11	5,82E-9	2,25E-8	2,83E-8	MND	2,7E-9	MND	MND	MND	MND	MND	MND	MND	1,59E-9	8,49E-10	2,77E-9	1,72E-11	-3,18E-8
Acidification	kg SO_2e	6,74E-3	3,12E-4	1,69E-4	7,23E-3	MND	1,05E-4	MND	MND	MND	MND	MND	MND	MND	1,37E-5	9,25E-6	1,71E-4	2,08E-7	-3,67E-3
Eutrophication	kg PO_4^3e	7,98E-4	1,13E-4	4,94E-5	9,6E-4	MND	6,48E-5	MND	MND	MND	MND	MND	MND	MND	2,41E-6	1,87E-6	6,98E-5	4,03E-8	-2,09E-3
POCP (“smog”)	kg C_2H_4e	1,17E-3	1,14E-5	1,55E-5	1,2E-3	MND	1,12E-5	MND	MND	MND	MND	MND	MND	MND	1,41E-6	5,86E-7	8,02E-6	1,53E-8	-8,84E-4
ADP-elements	kg Sbe	2,89E-5	3,98E-7	1,97E-7	2,95E-5	MND	5,83E-7	MND	MND	MND	MND	MND	MND	MND	1,42E-8	7,75E-8	1,26E-6	4,81E-10	-3,07E-6
ADP-fossil	MJ	2,14E1	7,22E-1	2,61E0	2,48E1	MND	3,97E-1	MND	MND	MND	MND	MND	MND	MND	1,28E-1	7,07E-2	3,14E-1	1,47E-3	-9,21E0

ANNEX 2: COMPARISON OF THE 2 DIFFERENT WELDED TRANSITION RAILS ENVIRONMENTAL IMPACTS – EN 15804+A1 (CML / ISO 21930)

		Total A1-A3 stages per 1 kg steel				
Product Description	Length	Global Warming Potential	Ozone depletion Potential	Acidification	Eutrophication	POCP (“smog”)
RMS VNSS welded Transition Rail Right	12m	2,81 kg CO_2e	2,83E-8 kg $CFC_{11}e$	7,23E-3 kg SO_2e	9,6E-4 kg PO_4^3e	1,2E-3 kg C_2H_4e
RMS VNSS welded Transition Rail Left						
RMS VNSS welded Transition Rail Right	18m	2,77 kg CO_2e	2,04E-8 kg $CFC_{11}e$	7,16E-3 kg SO_2e	9,43E-4 kg PO_4^3e	1,17E-3 kg C_2H_4e
RMS VNSS welded Transition Rail Left						