ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	voestalpine AG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-VOE-20230456-IBA1-EN
Issue date	18.12.2023
Valid to	17.12.2028

Rail expansion joint - superstructure

voestalpine Turnout Technology Germany GmbH

Institut Bauen und Umwelt e.V.

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1. General Information

voestalpine Turnout Technology Germany GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-VOE-20230456-IBA1-EN

This declaration is based on the product category rules:

Rails forming a track for vehicles, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

18.12.2023

Valid to

17.12.2028

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Rail expansion joint - superstructure

Owner of the declaration

voestalpine AG
voestalpine-Straße 3
4020 Linz
Austria

Declared product / declared unit

1 ton of rail expansion joint 60-600

Scope:

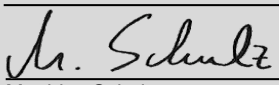
This EPD is based on a declared unit of 1 ton of rail expansion joint (REJ) of voestalpine Turnout Technology Germany GmbH produced at the production sites in Butzbach and Brandenburg (Germany). The given results refer to REJ 60-600 with an expansion length of 600 mm. In addition conversion factors for REJ 60-300 and REJ 60-1200 with respective expansion lenghts of 300 mm and 1200 mm are given in chapter 6. The EPD considers the superstructure of the rail expansion joints without sleepers.

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.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally



Matthias Schulz,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The products of voestalpine Turnout Technology Germany GmbH are manufactured according to applicable European and international standards, guidelines and specifications.

For the use and application of the product, the respective national provisions at the place of use apply, in Germany, for example, the building codes of the federal states and the corresponding national specifications.

Rail Expansion Joints (REJ, see *EN 13232-8*) are used in bridge constructions in order to compensate for the different variations in length between the track system and the bridge, resulting from thermal forces, braking and acceleration forces as well as creeping and shrinkage of concrete.

REJ can be supplied for different expansion lengths. The basic geometry of the rail expansion joints is designed for 300 mm, 600 mm and 1200 mm bridge expansion compensation. In special cases, the design and additional components can vary due to customer specifications.

REJ can be manufactured and assembled according to the curvature and pre-bent at the factory (if required by design). A possible preassembly takes place in a separate work step within the plants and is not taken into account in this EPD.

REJ system are usually installed on concrete sleepers and in special cases on wooden sleepers or directly on special slab track systems.
For representation, the data refers to a typical REJ 60-600 of voestalpine Turnout Technology Germany GmbH. The sleepers or a slab track system are excluded from the scope.

2.2 Application

The declared rail expansion joints of voestalpine Turnout Technology Germany GmbH are mainly used in the following types of railway traffic:

- High Speed Traffic
- Mixed Traffic
- Urban Traffic

and there particularly in the following areas:

- bridge constructions
- geologically unstable areas, where it´s required

2.3 Technical Data

This EPD refers to the declared REJ 60-600 of voestalpine Turnout Technology Germany GmbH. The typical types of REJ are presented in the following technical sheet.

Constructional data

Name	Value	Unit
Track form	Ballasted track or slab track type (e.g., type Rheda 2000)	
Usage of Eddy brake	is possible	
Track gauge	1435 ± 1 (Accurate up to the pointed area of the switch rail)	mm
Rail inclination	1:40, 1:20	
Curve Radius	≥ 2000	m
Bridge Construction	Steel or solid (concrete) structure	
Expansion length	≤ 300 [REJ 60-300] (± 150 from neutral point) ≤ 600 [REJ 60-600] (± 300 from neutral point) ≤ 1200 [REJ 60-1200] (± 600 from neutral point)	mm
Rail profile (stock rail)	60E1 (UIC60)	
Steel grade (stock rail)	R350HT (according to EN 13674-1)	
Rail profile (switch rail)	60E1A1	
Steel grade (switch rail)	R350HT (according to EN 13674-2)	
Sleeper type for ballasted track	Turnout sleeper, length 3.00 m, connected with a steel strap at the sleeper ends	
Sleeper distance	600 (Except the bridge gap or if customer specification is required)	mm
Rail fastening	Vossloh Skl	
Base plate fixation	bold connection	
Construction length of REJ	16.880 [REJ 60-300] 17.200 [REJ 60-600] 17.550 [REJ 60-1200]	mm
Bridge temperature difference ΔT	70 (solid bridge), 90 (steel bridge)	K

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE marking) depends on every individual product.

2.4 Delivery status

The products of voestalpine Turnout Technology Germany GmbH are supplied in specified lengths. Rail expansion joints can be delivered as assembled onto different types of sleepers or as half set of rail expansion devices assembled only on base plates for an assembly at trackside. Usually, the rail expansion joints are delivered in a neutral position (adjusting value a = 0) or, on request, according to the position depending on the temperature during installation at the construction site. Customer supply can be just in time for every traffic station in Europe.

2.5 Base materials/Ancillary materials

The REJ consist of different components. The main volume is steel material like the rails and fixation parts. A small proportion of the components at the fixation area are made of different types of plastic materials (2.7 – 3.4 wt % of REJ).

This product contains substances listed in the *candidate list* (05.08.2023) exceeding 0.1 percentage by mass: no.

This product contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no.

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) *Ordinance on Biocide Products* No. 528/2012): no.

2.6 Manufacture

The steel and plastic parts are coming from external suppliers. Rails are coming from the voestalpine Donawitz site. Further steel and plastic parts are coming from other external suppliers.

Depending on customer specifications for REJ, the rails are then at voestalpine Turnout Technology Germany GmbH cut and prepared to achieve desired properties. This includes the following works:

- Precise shaping of the rails through vertical and horizontal straightening.
- Cutting by sawing the rails on the required length.
- Drilling holes in the components for further processing.
- Assembling the prefabricated individual parts.
- Final acceptance of the system by the customer (on-site).
- Storage and shipping of the REJ.

The voestalpine Turnout Technology Germany GmbH production facilities are certified according to *ISO 9001*.

2.7 Environment and health during manufacturing

The voestalpine Turnout Technology Germany GmbH production facilities are certified according to *ISO 14001*, *ISO 50001* and occupational health- and safety assessment series *ISO 45001*.

At the voestalpine Turnout Technology Germany GmbH sites, investments are made on a regular basis in an effort to expand the environmental protection measures to reduce air and water emissions to a minimum. Compliance with all statutory emission limit values has been verified. All production systems approved in accordance with applicable environmental impact analyses are also inspected on a regular basis as part of environmental audits.

2.8 Product processing/Installation

The processing and assembly of the declared products take place in the factory or directly at the installation site of the REJ. The installation is carried out in accordance with the applicable standards, guidelines and specifications of the customers.

2.9 Packaging

The products of voestalpine Turnout Technology Germany GmbH are delivered mainly unpacked to the customer (fastened for transport with Signode or steel straps). In special cases are special packaging for sea freight required or other methods the customer requires.

When supplied without sleepers, respective transport protections shall be installed.
Deliveries to the installation site or storage place can be made by rail, by truck or by plane.

Most materials used for transport can be reused for further deliveries.

2.10 Condition of use

When the rail expansion joints are in use, no changes in the quality of the material are to be expected if they are used as intended. The maintenance and inspection requirements are based on the applicable standards, guidelines and specifications of the end customers.

2.11 Environment and health during use

No effects on human or animal health or harmful emissions into the air, soil or water are to be expected during the use of the rail expansion joints.

2.12 Reference service life

When used as intended, the lifespan of the declared products is based on the applicable standards and can be normally more than 25 years. The service life of the product is optimized by regular maintenance performed by the end-user or professionals in accordance with manufacturer installation and maintenance manuals. Proper selection of the product can significantly increase the service life of REJ.

With the preventive use of spare parts for individual components, the life span of the whole system and main components can increase.

2.13 Extraordinary effects

Fire

As the products do not contain any space for liquid or gas, environmental effects by losing these can be excluded.
Rail expansion joints are "non-flammable". No toxic gases and vapours can arise.

Fire protection

Name	Value	Unit
Building material class	n.a.	-
Smoke gas development	n.a.	-
Burning droplets	n.a.	-

n.a. = not applicable

Water

No negative effects on the environment are expected from water (including flooding).

Mechanical destruction

Unforeseeable mechanical effects on the declared product would not have an environmental impact.

In case of mechanical overload (e.g. impact stress), the products can be destroyed, but negative consequences for the environment depend on the use of the defective products.

2.14 Re-use phase

Steel can either be reused or used as a valuable secondary raw material in the steelmaking industry. Steel is a permanent material that can be recycled as many times as necessary.

Some components can be manufactured in a way, that steel parts are vulcanised with elastomer plastic. There the recycling has to be done according to national or local requirements.

2.15 Disposal

After the disassembly of REJ and the separation into the specific chemical materials (if it´s feasible), the steel parts and plastic components can be recycled.

The waste codes according to the *European waste catalogue* are:

07 02 13 waste plastic
17 04 05 iron and steel

2.16 Further information

More information on the product is available on the website

www.voestalpine.com/railwaysystems

3. LCA: Calculation rules

3.1 Declared Unit

This environmental product declaration refers to a declared unit of 1 ton of 60-600 rail expansion joint.

Declared unit

Name	Value	Unit
Declared unit	1	t
Weight per REJ (type 60-600)	8.91	t
Gross density	7850	kg/m³

Rail expansion joints are also produced with expansion lengths of 300 mm and 1200 mm. Therefore chapter 6 presents conversion factors for the environmental impacts of 1 ton REJ 60-300 and REJ 60-1200. The respective total weight of the REJ 60-300 and REJ 60-1200 arrives at 6.36 to and 9.32 to.

3.2 System boundary

The life cycle assessment of rail expansion joints refers to a cradle-to-gate analysis with modules (A1–A3 + C +D). The following life cycle phases are part of the analysis:

Module A1–A3 | Production stage
The production stage includes the upstream burdens of raw material supply (mainly steel), their transports and the manufacturing of the rail expansion joint at the production sites of the voestalpine Turnout Technology Germany GmbH (TTG) located at Butzbach and Brandenburg, Germany. The production sites are supplied with electricity from the regional power grid (residual grid mix) and thermal energy from natural gas. The rails are delivered from upstream suppliers which are part of voestalpine group. Thus, the upstream environmental impact of the production of the rails is represented based on primary data.
Rail expansion systems are delivered mainly unpacked to the customer. No packaging is considered in the LCA.

Module C1 | Deconstruction and demolition
Energy demand for the deconstruction of the REJ from the track (e.g. loosening of screws) is strongly dependent on the conditions at site and considered to be negligible. This results in a declaration of '0' in module C1.

Module C2 | Transport to disposal
The transport to the disposal is accounted for assuming a default scenario referring to a transport distance of 50 km via truck.

Module C3 | Waste processing
The product flow that reaches Module D for recycling leaves the product system in C3. Crushing and sorting of the steel scrap are not included due to the insignificance of the expected environmental impact.
The plastic parts of the REJ are separated and processed in a waste incineration plant. Module C3 therefore accounts for the environmental impacts from plastic waste incineration.

Module C4 | Disposal
Module C4 refers to the emissions from the disposal of the losses from waste processing. The chosen scenario therefore includes the environmental burdens of landfilling of 5 % of the steel.

Module D | Benefits and loads beyond the system boundary
Module D declares the recycling of the recovered steel (95 % of the steel) and referring substitution potentials. In addition, substitution potentials from energy recovery of the incineration of the polymers are accounted for in this module. The energy recovered from the incineration is assumed to substitute the average European electricity grid mix and thermal energy from natural gas.

3.3 Estimates and assumptions

All assumptions are verified through detailed documentation and correspond to the best possible representation of reality based on the available data. Regional applicability of the used background data refers to average data under European or German conditions taken from the *GaBi* database.

3.4 Cut-off criteria

All inputs and outputs for which data are available are included in the LCA model. Data gaps are filled with conservative assumptions from average data (when available) or with generic data and are documented accordingly. Only data with a contribution of less than 1 % were cut off. Ignoring such data is justified based on the irrelevance of the expected effect. Processes, materials, or emissions known to make a significant contribution to the environmental effects of the products under examination have not been neglected. All relevant data were collected comprehensively. It is assumed that the data have been completely recorded and the overall total of ignored input flows do not amount to more than 5 % of total energy and mass flows. Environmental impacts of machines, plant and infrastructure were not included

3.5 Background data

This study uses generic background data for the evaluation of upstream environmental impacts from *GaBi*-database 2022.2 and is modelled in *GaBi*-software version 10.

3.6 Data quality

The foreground data collected at voestalpine Turnout Technology Germany GmbH are based on the quantities used and volumes produced annually. All process data were collected by voestalpine in the course of reporting to official agencies. Data on material and energy use originate from material-specific throughput measurements of various processes as well as from controlling. The technological, geographical and time related representativeness of the data base was kept in mind when selecting background data. Whenever specific data were missing, either generic datasets or representative average data were used instead. The implemented *GaBi* background datasets are not more than ten years old.

3.7 Period under review

Foreground data were collected in the 2021 production year, and the data are based on the volumes produced on an annual basis.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Germany

3.9 Allocation

The primary data for the upstream production of the steel billets were allocated using the partitioning approach developed by *worldsteel 2014* for calculating life cycle inventories of co-products in steel production, which is in line with the provisions of *EN 15804*. The so-called partitioning approach provides for the allocation of environmental effects on the steelmaking process and the emerging byproducts based on physical relations. Material-inherent flow properties are, thus, taken into account. Scrap used for the production is considered as burdenfree input material. The net flows are calculated by deducting the external steel scrap in A1–A3 from the overall mass of the product.

The specific evaluation of energy flows is not possible.

Therefore, the annual energy use is scaled down to the product based on the processing time of the individual components. This approach is considered as most representative for the allocation of the total energy input of the sites to the specific products. Land use was allocated to the product based on the mass of REJs produced.

3.10 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 *GaBi* background database was used to calculate the LCA (*GaBi* 10; 2022.2).

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The declared products do not contain any biogenic carbon. No packaging is considered in this study.

End of life (C1-C4)

Name	Value	Unit
Collected separately waste type steel	972	kg
Recycling 95 %	924	kg
Landfilling 5 %	48	kg
Collected separately plastics	28	kg
Energy recovery 100 %	28	kg

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

Name	Value	Unit
Net flow of steel scrap	853	kg

The steel recycling scenario contains a recycling rate of 95 %. Since voestalpine externally purchases scrap for steel production, this is offset against the steel scrap for recycling (net flow).

5. LCA: Results

The following table contains the LCA results for a declared unit of 1 ton of 60-600 rail expansion joint.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

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	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 ton rail expansion joint 60-600

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	3.36E+03	0	3.03E+00	5.5E+01	2.33E+00	-1.5E+03
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	3.36E+03	0	3.01E+00	5.5E+01	2.33E+00	-1.5E+03
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	5.41E+00	0	0	6.82E-03	0	6.29E-01
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	8.18E-01	0	2.02E-02	3.39E-04	1.41E-03	-3.32E-02
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	1.82E-09	0	2.95E-13	6.66E-12	3.09E-12	-1.68E-10
Acidification potential of land and water (AP)	mol H^+ eq	8.23E+00	0	1E-02	9.47E-02	7.41E-03	-3.2E+00
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	5.78E-03	0	1.07E-05	2.93E-06	1.8E-06	-3.02E-04
Eutrophication potential aquatic marine (EP-marine)	kg N eq	1.99E+00	0	4.59E-03	4.85E-02	1.81E-03	-5.67E-01
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	2.14E+01	0	5.14E-02	5.37E-01	1.98E-02	-4.99E+00
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	6.65E+00	0	9E-03	1.24E-01	5.71E-03	-2.29E+00
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	1E-02	0	3.03E-07	2.09E-07	1.64E-07	-3.68E-03
Abiotic depletion potential for fossil resources (ADPF)	MJ	3.61E+04	0	3.94E+01	2.84E+01	3.33E+01	-1.4E+04
Water use (WDP)	m^3 world eq deprived	1.82E+02	0	3.36E-02	6.13E+00	-2.22E-02	-2.77E+02

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 ton rail expansion joint 60-600

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	1.95E+03	0	2.73E+00	3.83E+00	2.72E+00	7.41E+02
Renewable primary energy resources as material utilization (PERM)	MJ	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	1.95E+03	0	2.73E+00	3.83E+00	2.72E+00	7.41E+02
Non renewable primary energy as energy carrier (PENRE)	MJ	3.55E+04	0	3.96E+01	7.69E+02	3.33E+01	-1.4E+04
Non renewable primary energy as material utilization (PENRM)	MJ	7.41E+02	0	0	-7.41E+02	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	3.62E+04	0	3.96E+01	2.84E+01	3.33E+01	-1.4E+04
Use of secondary material (SM)	kg	2.24E+02	0	0	0	0	8.53E+02
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	0
Use of net fresh water (FW)	m^3	8.08E+00	0	3.15E-03	1.45E-01	4.67E-04	-6.31E+00

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 ton rail expansion joint 60-600

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	3.58E-06	0	2.09E-10	4.67E-09	5.03E-09	-1.61E-07
Non hazardous waste disposed (NHWD)	kg	9.1E+01	0	6.45E-03	2.22E+00	4.87E+01	2.05E+02
Radioactive waste disposed (RWD)	kg	5.22E-01	0	7.34E-05	7.65E-04	4.01E-04	-3.1E-02
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	1.53E+02	0	0	9.24E+02	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0	0
Exported electrical energy (EEE)	MJ	0	0	0	1.1E+02	0	0
Exported thermal energy (EET)	MJ	0	0	0	1.97E+02	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 ton rail expansion joint 60-600

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	ND	ND	ND	ND	ND	ND

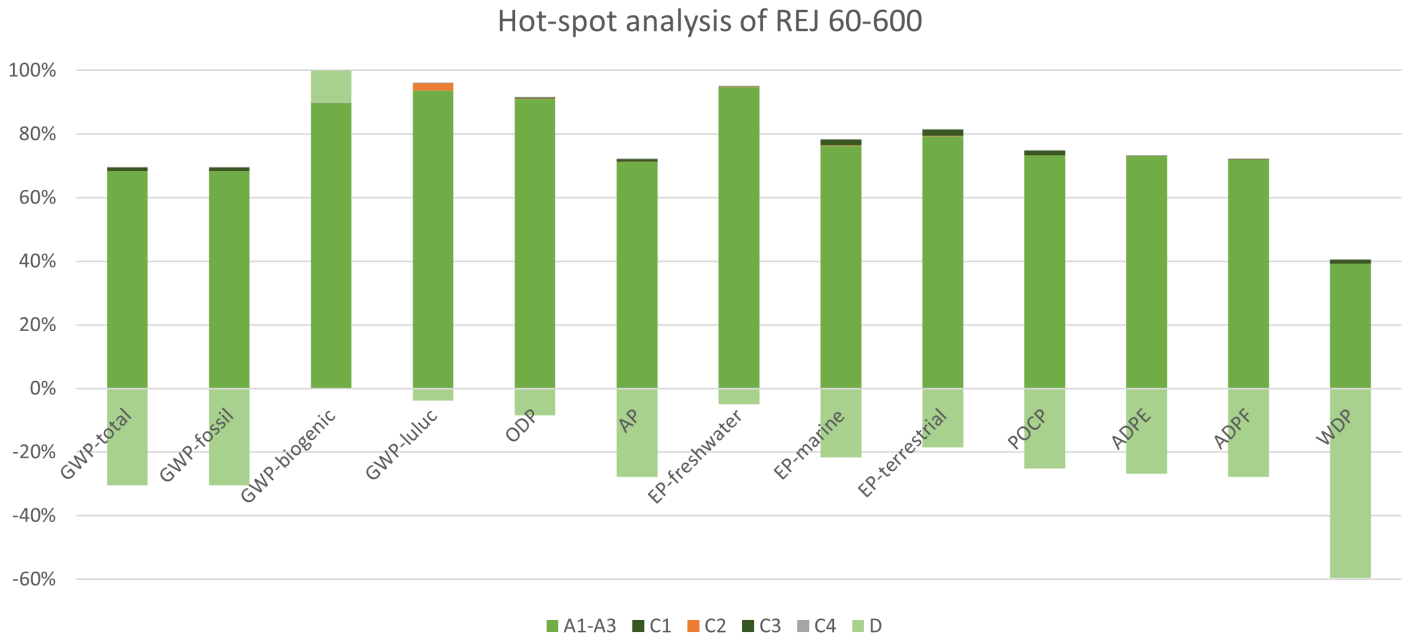
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	ND	ND	ND	ND	ND	ND
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	ND	ND	ND	ND	ND	ND
Soil quality index (SQP)	SQP	ND	ND	ND	ND	ND	ND

The additional and optional impact categories according to *EN 15804*+A2 are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption', 'potential comparative toxic unit for ecosystems', 'potential comparative toxic unit for humans – cancerogenic', 'Potential comparative toxic unit for humans - not cancerogenic', 'potential soil quality index'.
The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

The following interpretation contains a summary of the LCA results referenced to a declared unit of 1 ton of 60-600 rail expansion joint.



The comparison of the products' life cycle phases shows a clear dominance of the **production phase** (modules A1–A3).

Environmental impacts in module C3 mainly refer to emissions from the **energetic treatment** of the polymers in a waste incineration plant. Module C4 declares impacts from **landfilling** of steel losses making up a minor fraction of the total environmental impact of the panels.

As a result of material recyclability, the steel fraction removed at the **end of life** can substitute primary steel. Module D shows the recycling potential of steel at the end of its product life. This results in potentials ("benefits") from the substitution of primary steel. In addition, the incineration of the polymers in the product results in substitution potentials from energy recovery.

The hot-spot analysis of the production phase shows the production of the support point as a main contributor to all impact categories except for eutrophication potential freshwater (**EP-freshwater**). The high influences from the support point result from the upstream supply chain of steel, constituting the main material for the support point. The comparably high contribution to the potential abiotic depletion of minerals and metals (**ADPE**) can be traced back to the additional use of zinc for the galvanization for some of the steel components.

In addition, the upstream supply chain of the rails also plays an important role in most indicators, especially in the case of eutrophication potential freshwater (**EP-freshwater**). The main influence of the rails on the EP-freshwater stems from the upstream supply chain of the steel billets used for manufacturing of the rails.

A comparison of the different REJ types shows a deviation of less than 2 % for most environmental impact indicators when scaled to 1 ton of REJ. For the indicators majorly influenced by the upstream supply chain of the rails, the variance of the results is comparably higher for the REJ 60-300, since the weight share of the rails is higher for this REJ type.

In the following table conversion factors for the environmental impacts of REJ 60-300 and REJ 60-1200 are shown:

Parameter	REJ 60-300	REJ 60-1200
GWP-total	0,98	1,00
GWP-fossil	0,98	1,00
GWP-biogenic	1,21	0,97
GWP-luluc	0,98	0,99
ODP	0,92	0,99
AP	1,00	0,99
EP-freshwater	1,23	0,97
EP-marine	1,02	0,99
EP-terrestrial	1,02	0,99
POCP	1,02	0,99
ADPE	1,16	1,03
ADPF	1,00	1,00
WDP	1,19	1,05

To obtain the specific results per to for the respective REJ, the respective conversion factor must be multiplied with the results in module A1–A3 from chapter 5 of this EPD.

7. Requisite evidence

Not relevant for this EPD.

8. References

Standards

EN 13232-8
EN 13232-8:2012-01, Railway applications – Track – Switches and Crossings – Part 8: Expansion devices.

EN 13674-1
EN 13674-1:2011+A1:2017, Railway applications – Track – Rail – Part 1: Vignole railway rails 46 kg/m and above.

EN 13674-2
EN 13674-2:2020-01, Railway applications - Track - Rail - Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above.

EN 15804
DIN EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

ISO 9001
DIN EN ISO 9001:2015, Quality management systems – Requirements.

ISO 14001
DIN EN ISO 14001:2015, Environmental management systems – Requirements with guidance for use.

ISO 14025
DIN EN ISO 14025:2011, Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

ISO 14044
ISO 14044:2006, Environmental Management – Life cycle assessment – Requirements and guidelines.

ISO 45001
ISO 45001:2018, Occupational Health and Safety Management Systems – Requirements with guidance for use.

ISO 50001
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Publisher

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