Type III Environmental Product Declaration No. 572/2023

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Validation date: 20.02.2024
Validity date: 21.12.2028

Standard turnout 60E1-1200-1:18.5 with a monoblock manganese frog for V_{max} speed of 200 km/h

Owner of the EPD:

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org

Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment and their aspects verified by the independent body according to ISO 14025. Basically, comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A3, C1-C4 and D modules in accordance with EN 15804 (Cradle-to-Gate with options)

The year of preparing the EPD: 2023

Product standard: PN-EN 13674-2:2020-03, PN-EN 13674-1+A1:2017-07, BN-83-9313-04

Service Life: 50 years for standard product

PCR: ITB-PCR A (PCR based on EN 15804+A2)

Declared unit: 1 ton

Reasons for performing LCA: B2B

Representativeness: Polish, European

MANUFACTURER

Track Tec KolTram is a leading European manufacturer of materials for the construction of railway surfaces. Thanks to many years of experience and systematic implementation of innovative solutions, our products are characterized by the highest quality. High standards are confirmed by numerous international approvals, certificates and recommendations.

Fig. 1. The view of Track Tec KolTram Sp. z o.o. in Zawadzkie.

PRODUCTS DESCRIPTION AND APPLICATION

The Track Tec KolTram product range includes turnouts with a radius of up to 2,500 m, track crossings, single and double track connections, transition rails, as well as turnout parts such as monoblock manganese frog. We shape and machine needle profiles on modern, numerically controlled machines. Devices called turnouts are used to move railway (tramway) vehicles from one track to another. The turnout consists of the following elements: switch - used to direct rail vehicles from one track to another, intersection of rails called frogs and connecting rails. The dimensions of the most typical turnout (standard turnout 60E1-1200-1:18.5 with a monoblock manganese frog for V_{max} speed of 200 km/h) are: length 65 meters, width at the end 3.4 meters, weight 27.8 tons.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Declared unit
1 piece of standard turnout 60E1-1200-1:18.5 with a monoblock manganese frog for Vmax speed of 200 km/h with length 65 meters, width at the end 3.4 meters and weight 27.8 tons.

Allocation
The allocation rules used for this EPD are based on general ITB PCR A. Production of the turnouts a line process executed by Track Tec KolTram Sp. z o.o. in plant located in Zawadzkie (Poland). Allocation was done on product mass basis. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the global line production of Track Tec KolTram Sp. z o.o. were inventoried and 4,05% were allocated to the standard turnout 60E1-1200-1:18.5. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were takien into consideration.

System limits
The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, end of life – modules C1-C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804+A2 and ITB PCR A. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Modules A1 and A2: *Raw materials supply and transport*
The product includes steel components, auxiliary materials and packaging materials mainly from local suppliers. The means of transport are trucks. Polish and European fuel averages were used for calculations. The material composition of a railway turnout is, on average: steel rail elements (58%), steel plate elements (16%), cast iron elements (1%), steel accessories/screws/bolts (23%), PUR and other elements (1%).

Module A3: *Production*
The production of railway turnouts is assigned to specific orders. It includes a previous turnout design, then the turnouts are manufactured, packed. delivered and assembled at the recipient's site. The production process consists of the following steps: cutting, drilling, milling, bending, planning,

welding, flush butt welding, heat treatment, grinding and assembly into assemblies. The diagram of the production process is shown in Fig. 2.

Module A4: *Transport to consumer*

Transport of the product from the Factory to the construction site is carried out using specialized vehicles at own or customer's request, depending on the terms of the contract. Loads on trucks are secured with belts with tensioners or chains. Anti-slip mats and/or pads will be used on the car under the structure elements and between the structure and the chains or belts to protect the anti-corrosion coating against damage. Repair of any damage resulting from transport will take place during assembly on the construction site. Vehicle transport at distance 500 km is considered (emission standard: Euro 5) with 100% load capacity.

Modules *C1-C4 and D: End-of-life (EoL)*

It is assumed that at the end of their service life, railway turnouts are dismantled using power tools and torches. In the adapted end-of-life scenario, the de-constructed steel products are transported to a steel mill distant by 100 km on > 16t lorry EURO 5 where are used as steel scrap to produce a new steel. The recycling potential of C3 module is 90% and it is assumed that only 10% of the products will end up in a landfill – C4 module (Table 2). Module D presents credits resulting from the recycling of the steel scrap (used for steel production), calculated in accordance with the approach developed by World Steel Association.

Table 1 End-of-life scenario for the fabricated steel products

Material	Material recovery	Recycling	Landfilling
Steel scrap	100%	98%	2%
Other	100%	0%	100%

Electricity at end-of-life (module C) has been modelled using an average Polish electricity mix as the location where the product reaches end-of-life is unknown.

Data quality

The values determined to calculate the LCA originate from verified Track Tec KolTram Sp. z o.o. inventory data. No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency is judged as good. The background data for the processes come from the following resources database Ecoinvent v.3.10 and specific suppliers (EPDs: steel elements). Specific (LCI) data quality analysis was a part of the input data verification.

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2022 – 31.12.2022 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Assumptions and estimates

The impacts of the railway turnouts were aggregated using weighted average. Impacts were inventoried and calculated for standard turnout 60E1-1200-1:18.5 with a monoblock manganese frog for V_{max} speed of 200 km/h.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN15804+A2. Emission of greenhouse gases was calculated using the IPCC 2013 GWP method with a 100-year horizon. Emission of acidifying substances, Emission of substances to water contributing to oxygen depletion, Emission of gases that contribute to the creation of ground-level ozone, Abiotic depletion, and ozone depletion emissions where all calculated with the CML-IA baseline method

Additional information

Polish electricity (Ecoinvent v 3.10 supplemented by actual national KOBiZE data) emission factor used is 0.685kg CO_2/kWh (National for 2022). As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

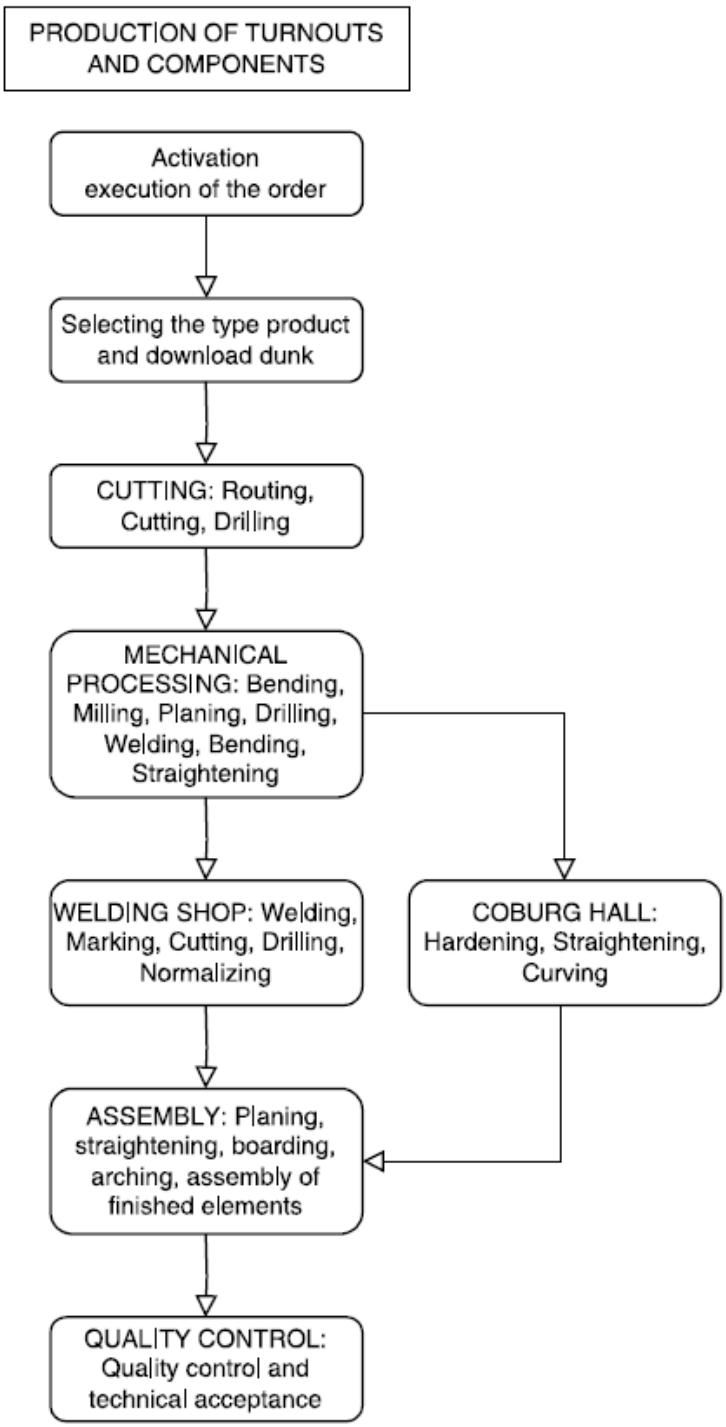

Fig. 2. The scheme of the turnouts production by Track Tec KolTram Sp. z o.o.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 piece of the standard turnout 60E1-1200-1:18.5 with a monoblock manganese frog for V_{max} speed of 200 km/h produced by Track Tec KolTram Sp. z o.o.

Table 2 System boundaries for the environmental characteristic of the product.

Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction 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**
MD	**MD**	**MD**	**MD**	**MD**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MD**	**MD**	**MD**	**MD**	**MD**

Table 3 Life cycle assessment (LCA) results for specific product – environmental impacts (DU: 1 unit)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	5.12E+04	7.49E+02	5.68E+03	5.76E+04	2.32E+03	3.43E+01	3.43E+01	4.65E+02	1.61E+03	1.47E+01	-2.48E+04
Greenhouse potential - fossil	eq. kg CO_2	5.45E+04	7.46E+02	5.68E+03	6.09E+04	2.31E+03	3.43E+01	3.43E+01	4.63E+02	1.61E+03	1.47E+01	-2.49E+04
Greenhouse potential - biogenic	eq. kg CO_2	2.18E+02	2.55E+00	1.66E+01	2.37E+02	7.91E+00	9.23E-02	9.23E-02	1.58E+00	3.36E-01	3.74E-02	8.43E+01
Global warming potential - land use and land use change	eq. kg CO_2	2.97E+01	2.93E-01	8.77E-01	3.08E+01	9.09E-01	5.36E-03	5.36E-03	1.82E-01	2.54E-01	1.38E-02	-1.94E+00
Stratospheric ozone depletion potential	eq. kg CFC 11	1.73E-03	1.73E-04	9.79E-05	2.00E-03	5.36E-04	1.88E-07	1.88E-07	1.07E-04	1.97E+04	5.93E-06	-8.90E-04
Soil and water acidification potential	eq. mol H+	2.55E+02	3.03E+00	5.87E+01	3.16E+02	9.39E+00	3.62E-01	3.62E-01	1.88E+00	1.34E+01	1.38E-01	-9.88E+01
Eutrophication potential - freshwater	eq. kg P	3.16E+01	5.02E-02	9.48E+00	4.11E+01	1.56E-01	5.90E-02	5.90E-02	3.11E-02	1.09E-02	1.37E-03	-1.07E+01
Eutrophication potential - seawater	eq. kg N	5.77E+01	9.14E-01	8.44E+00	6.70E+01	2.84E+00	5.13E-02	5.13E-02	5.67E-01	4.56E+01	4.80E-02	-2.16E+01
Eutrophication potential - terrestrial	eq. mol N	5.68E+02	9.97E+00	7.26E+01	6.50E+02	3.09E+01	4.47E-01	4.47E-01	6.19E+00	8.63E+01	5.25E-01	-2.36E+02
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.70E+02	3.05E+00	2.13E+01	1.94E+02	9.47E+00	1.29E-01	1.29E-01	1.89E+00	1.88E+01	1.53E-01	-1.24E+02
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	3.91E-01	2.65E-03	2.22E-03	3.95E-01	8.21E-03	1.29E-05	1.29E-05	1.64E-03	3.65E-04	3.36E-05	-4.65E-01
Abiotic depletion potential - fossil fuels	MJ	6.64E+05	1.11E+04	9.14E+04	7.67E+05	3.44E+04	5.41E+02	5.41E+02	6.87E+03	1.53E+03	4.02E+02	-2.07E+05
Water deprivation potential	eq. m^3	1.64E+04	5.12E+01	1.69E+03	1.82E+04	1.59E+02	1.03E+01	1.03E+01	3.18E+01	3.59E+01	1.28E+00	-3.63E+03

Table 4 Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 unit)

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 5 Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 unit)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	5.50E+04	1.59E+02	7.14E+03	6.23E+04	4.93E+02	4.45E+01	4.45E+01	9.86E+01	2.80E+01	3.49E+00	-1.72E+04
Consumption of renewable primary energy resources used as raw materials	MJ	1.88E+03	0.00E+00	0.00E+00	1.88E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	5.69E+04	1.59E+02	7.15E+03	6.42E+04	4.93E+02	4.45E+01	4.45E+01	9.86E+01	2.80E+01	3.49E+00	-1.72E+04
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	6.47E+05	1.11E+04	9.18E+04	7.50E+05	3.44E+04	5.41E+02	5.41E+02	6.87E+03	-7.43E+04	4.02E+02	-1.99E+05
Consumption of non-renewable primary energy resources used as raw materials	MJ	2.67E+04	0.00E+00	0.00E+00	2.67E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E+04	0.00E+00	0.00E+00
Total consumption of non-renewable primary energy resources	MJ	6.73E+05	1.11E+04	9.18E+04	7.76E+05	3.44E+04	5.41E+02	5.41E+02	6.87E+03	1.53E+03	4.02E+02	-1.99E+05
Consumption of secondary materials	kg	1.35E+04	3.71E+00	7.80E+00	1.35E+04	1.15E+01	4.70E-02	4.70E-02	2.30E+00	6.91E-01	8.45E-02	-3.28E+03
Consumption of renew. secondary fuels	MJ	4.33E+01	4.09E-02	3.86E-02	4.34E+01	1.27E-01	2.37E-04	2.37E-04	2.54E-02	9.39E-03	2.21E-03	-4.28E+00
Consumption of non-renewable secondary fuels	MJ	9.63E+01	0.00E+00	0.00E+00	9.63E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater	m^3	3.12E+02	1.39E+00	2.58E+02	5.72E+02	4.32E+00	1.55E+00	1.55E+00	8.65E-01	1.35E+00	4.40E-01	-1.77E+02

Table 6 Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 unit)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	1.32E+01	1.24E+01	6.74E+02	7.00E+02	3.86E+01	4.19E+00	4.19E+00	7.71E+00	1.10E-04	4.27E-01	-2.49E+00
Non-hazardous waste	kg	1.41E+04	2.21E+02	4.60E+03	1.90E+04	6.84E+02	2.82E+02	2.82E+02	1.37E+02	2.87E+02	6.02E+00	3.52E+03
Radioactive waste	kg	3.13E+01	8.27E-04	3.86E-02	3.14E+01	2.56E-03	8.12E-05	8.12E-05	5.13E-04	8.16E-03	2.67E-03	3.89E-01
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	4.01E+03	3.43E-02	1.36E+03	5.38E+03	1.06E-01	3.63E-03	3.63E-03	2.13E-02	1.02E-02	8.05E-04	0.00E+00
Materials for energy recovery	kg	3.64E+02	2.77E-04	1.01E-01	3.64E+02	8.60E-04	5.83E-06	5.83E-06	1.72E-04	1.27E-04	9.53E-06	0.00E+00
Exported Energy	MJ	2.97E+03	0.00E+00	2.79E+02	3.25E+03	0.00E+00	1.73E+00	1.73E+00	0.00E+00	1.56E+03	0.00E+00	0.00E+00

Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) ☒ external ☐ internal
External verification of EPD: PhD. Eng. Halina Prejzner LCI audit and verification: Filip Poznański, M.Sc. Eng. LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., Eng.

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability, see EN 15804+A2 and ISO 14025.

Note 2: Note: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- EN 14889-1:2006 Fibers for concrete. Steel fibers. Definitions, specifications and conformity
- LCI DATA FOR STEEL PRODUCTS at https://www.worldsteel.org/en/dam/jcr:04f8a180-1406-4f5c-93ca-70f1ba7de5d4/LCI%2520study_2018%2520data%2520release.pdf
- https://ecoinvent.org/

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02-656 Warsaw, Ksawerów 21

CERTIFICATE № 572/2023
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Standard turnout 60E1-1200-1:18,5 with a monoblock manganese frog for a V_{max} speed of 200 km/h

Manufacturer:

Track Tec KolTram Sp. z o.o.
ul. Rondo ONZ 1, 00-124 Warszawa, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

EN 15804+A2

Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.

This certificate, issued on 21st December 2023 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director
for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, December 2023