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Steel expansion joint profiles to enable the movement of floor slabs Conecto Profiles Dowel/Sinus



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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 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: EN 1090-1

Service Life: 20 years

PCR: ITB-PCR A

Declared unit: 1 kg

Reasons for performing LCA: B2B

Representativeness: Polish, European, 2023

MANUFACTURER

Conecto Profiles Sp. z o.o., which is a part of the Conecto Group, is a leading global provider in the expansion joint profiles industry. Conecto Profiles offers a unique product range for the industrial flooring industry made of carbon steel, stainless steel, aluminium and plastics. A wide range of materials and services is available directly from warehouse (Ceków-Kolonia in a picture). For the building industry Conecto Profiles Poland offers an extended range of steel expansion joint profiles for industrial floors, formwork, most often with dowels.



PRODUCTS DESCRIPTION AND APPLICATION

Expansion joint profiles are used in concrete floor slabs to compensate for movements within the slabs. Concrete slabs are exposed to external and internal forces. The damage occurs mainly on the edges of the slabs, near the joints of the floors. The method of connecting floor slabs should compensate for mutual horizontal displacements of the slabs (perpendicular and parallel to the expansion joint), which are usually caused by the expansion and contraction of concrete under the influence of temperature. At the same time, the connection must block vertical movements of the floor resulting from vehicle traffic, heavy loads and uneven passive ground pressure. The Conecto Dowel system ensures even transfer of loads between floor slabs, preventing excessive local stresses. Expansion joints help eliminate the main cause of uncontrolled floor cracks. They extend the durability of the floor and improve the comfort of use.

The actual documents related to the products are available at website address <https://www.profiledylacyjny.com.pl> (Set of products covered by this EPD is shown in Table 1).

Table 1. Construction products offered by Conecto Profiles Sp. z o.o. in Poland

Product type	Grade	Class	Standard
Classic steel expansion joint profiles	S235/S355	EXC2	EN 1090-2
Sinusoidal steel expansion joint profiles	S235/S355	EXC3	EN 1090-2
Classic aluminium joint profiles	S235/S355	EXC3	EN 1090-2
Sinusoidal aluminium joint profiles	S235/S355	EXC2	EN 1090-2

Classic and sinusoidal expansion joint profiles are installed in concrete floor slabs to compensate for movements within the slabs.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit is 1 kilogram of product.

System boundary

The life cycle analysis of the declared products covers "Product Stage" A1-A3, C1-C4+D modules in accordance with EN 15804 and ITB PCR A (cradle to gate with options). Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculation. 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 were not included in LCA. Transportation of employees - fuel consumption of carfleet was included in LCA.

Allocation

The allocation rules used for this EPD are based on general ITB's document PCR A. Production of the covered steel products is a line process (as presented in figure 1) conducted in the manufacturing plant located in Ceków-Kolonia (Poland). Input and output data from the production is inventoried and allocated to the production on the mass basis. The declaration covers a short range of steel products, expansion joint profiles, classic and sinusoidal shape. Their production resources and processing stages are basically similar, so it is possible to average the production by product weight (classic and sinusoidal shape).

System limits

Minimum 99.0% input materials and 100% energy consumption (electricity, gas) were inventoried in a processing plant and were included in the calculation. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilized thermal energy, and electric power consumption, direct production waste and available emission measurements. Tires consumption for transport was not considered. The packaging products (wooden pallets etc) are included in the analysis. Fuel consumption by the car fleet was taken into account.

Modules A1 and A2: Raw materials supply and transport

The modules A1 and A2 represent the extraction and processing of raw materials (mainly steel) and transport to the production site. The steel sheets are semi-products commonly used to produce expansion joint profiles. For the production of the input steel it is declared that approx. 15% of steel used is based on recycled content. For A2 module (transport) European averages for fuel data are applied.

Module A3: Production

The product specific manufacturing process line is presented in Figure 1, an input steel/semi-product is processed to a dedicated shape. Electricity and gas are consumed in the process.

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Proces map – EPD card – Product: Conecto Dowel and Sinus expansion joint profiles



Figure 1. Production process diagram

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

The product (at the end of life in building) is to be removed from a building using electrical tools. The End of Life scenario is based on material split and respective recycling rates (Table 2). In the applied scenario, the steel parts (98% are assumed mainly to be recycle, plastics are incinerated (100%). The energy required for treatment of recycled materials

is included. In the adapted end-of-life scenario, the de-constructed steel products are transported to a steelmill distant 30km by the lorry 7,5-16t EURO5, where are used as steel scrap to produce a new steel. Module D presents credits resulting from the recycling (packaging), energy recovered (plastic incineration) and scrap steel use in a new steel production process.

Regarding incineration, model for waste incineration is adapted according to the material composition and heating value of the plastic material. The reuse, recovery and recycling stage is considered beyond the system boundaries (D). Net scrap is an amount of steel recycled at end-of-life minus scrap input from previous product life cycles. Each scenario assumes that rate % of the material is sent to that scenario (table 2).

Table 2. End-of-life scenario for the core products

Material	Material recovery	Recycling	Landfilling
Steel scrap	100%	98%	2%
Plastics	100%	0%	5%

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 collection period

The data for manufacture of the declared products refer to period between 01.01.2021 –31.12.2022 (2 years). The life cycle assessments were prepared for Poland and Europe as reference area.

Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by Conecto Profiles Poland S.A. using the inventory data, ITB and Ecoinvent v.3.9 database. No specific data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency are judged as good. The background data for the processes come from the following databases: Ecoinvent

v.3.9 (supplied materials factors, welding process, transport, energy carriers, heat, diesel, gas, other) and KOBIZE (Polish electricity mix and combustion factors for fuels). KOBIZE data is supplemented with Ecoinvent data on the national electricity mix impact where no specific indicator data is provided. Specific (LCI) data quality analysis was a part of the input data verification. The time related quality of the data used is valid (5 years).

Assumptions and estimates

The impacts of the representative of the steel products were aggregated using weighted average.

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

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LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kilogram of the specific steel expansion joint profile manufactured by Conecto Profiles Poland Sp. z o.o.

Table 3. System boundaries for the environmental characteristic of the steel structures

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

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Table 4. Life cycle assessment (LCA) results of the steel joint profiles manufactured by Conecto Profiles Poland Sp. z o.o. – environmental impacts (DU: 1 kilogram)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO ₂	3.39E+00	4.59E-02	6.85E-02	6.06E-02	8.02E-03	1.96E+00	2.75E-02	-1.44E+00
Greenhouse gas potential - fossil	eq. kg CO ₂	3.47E+00	4.59E-02	6.80E-02	6.02E-02	7.62E-03	1.95E+00	2.75E-02	-1.43E+00
Greenhouse gas potential - biogenic	eq. kg CO ₂	-8.65E-02	4.01E-05	4.9E-04	3.40E-04	1.10E-04	3.99E-03	2.64E-06	-4.30E-02
Global warming potential - land use and land use change	eq. kg CO ₂	2.84E-03	2.23E-05	1.95E-05	-2.29E-06	2.90E-04	1.30E-03	-2.71E-07	-1.47E-03
Stratospheric ozone depletion potential	eq. kg CFC 11	4.79E-08	9.98E-10	4.23E-10	1.02E-10	2.80E-10	3.41E-08	-1.12E-12	-3.55E-08
Soil and water acidification potential	eq. mol H ⁺	1.73E-02	1.50E-04	4.60E-04	2.50E-04	2.64E-05	8.83E-03	7.06E-05	-8.95E-03
Eutrophication potential - freshwater	eq. kg P	2.40E-03	3.21E-06	7.59E-05	5.05E-05	7.67E-07	9.50E-04	3.91E-01	-9.90E-04
Eutrophication potential - seawater	eq. kg N	4.51E-03	5.14E-05	7.38E-05	5.55E-05	1.05E-05	2.02E-03	3.58E-05	-3.80E-04
Eutrophication potential - terrestrial	eq. mol N	3.21E-02	5.40E-04	6.00E-03	5.10E-04	8.73E-05	2.05E-02	3.90E-04	-1.99E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.56E-02	2.20E-04	1.80E-03	1.80E-04	3.43E-05	9.30E-03	1.40E-04	-9.54E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	9.57E-06	1.51E-07	2.54E-08	-7.14E-07	-3.68E-08	-1.42E-05	-1.45E-08	-1.37E-05
Abiotic depletion potential - fossil fuels	MJ	4.15E+01	6.55E-01	7.82E-01	3.95E-01	1.09E-01	20.68E+00	-8.30E-04	-22.57E+00
Water deprivation potential	eq. m ³	2.68E+00	3.21E-03	1.40E-02	4.36E-02	5.50E-03	6.53E-01	1.18E-03	-9.39E-01

Table 5. Life cycle assessment (LCA) results of the steel joint profiles manufactured by Conecto Profiles Poland Sp. z o.o. – additional impacts indicators (DU: 1 kilogram)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	3.82E-07	3.65E-09	8.67E-10	2.89E-08	6.13E-10	1.70E-07	2.81E-08	-1.22E-07
Potential human exposure efficiency relative to U235	eg. kBq U235	9.12E-02	8.70E-04	2.13E-03	6.74E-05	1.2E-04	6.34E-02	-2.37E-05	-7.84E-02
Potential comparative toxic unit for ecosystems	CTUe	55.50E+00	3.21E-01	2.01E-01	6.40E-01	3.15E-01	11.02E+00	3.91E-01	-9.22E+00
Potential comparative toxic unit for humans (cancer effects)	CTUh	1.34E-08	2.09E-11	2.55E-11	4.28E-10	4.55E-12	1.58E-08	4.04E-10	-1.51E-08
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	3.92E-07	4.61E-10	1.04E-09	9.50E-10	1.10E-10	4.48E-08	1.10E-09	-4.06E-08
Potential soil quality index	dimensionless	19.57E+00	3.86E-01	1.60E-01	-7.36E-03	9.13E-02	6.59E+00	-1.99E-03	-6.37E+00

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Table 6. Life cycle assessment (LCA) results of the steel joint profiles manufactured by Conecto Profiles Sp. z o.o. - the resource use (DU: 1 kilogram)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.09E+00	1.01E-02	6.76E-02	1.75E-02	2.68E-03	1.87E+00	-4.60E-04	-1.98E+00
Consumption of renewable primary energy resources used as raw materials	MJ	0.00E+00	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	4.09E+00	1.01E-02	6.76E-02	1.75E-02	2.68E-03	1.87E+00	-4.60E-04	-1.98E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.64E+01	5.98E-01	7.74E-01	3.92E-01	1.02E-01	2.02E+01	-8.30E-04	-22.05E+00
Consumption of non-renewable primary energy resources used as raw materials	MJ	9.13E-01	5.68E-02	8.08E-03	2.95E-03	9.17E-03	4.65E-01	-9.00E-07	-0.52E+00
Total consumption of non-renewable primary energy resources	MJ	4.15E+01	6.55E-01	7.82E-01	3.95E-01	1.12E-01	2.07E+01	-8.30E-04	-22.57E+00
Consumption of secondary materials	kg	1.49E-01	7.10E-04	3.99E-03	-4.65E-01	1.40E-04	4.07E-01	-9.36E-04	-0.41E+00
Consumption of renewable secondary fuels	MJ	5.85E-03	1.90E-04	2.25E-03	1.05E-03	1.29E-05	8.96E-03	-6.03E-06	-1.12E-02
Consumption of non-renewable secondary fuels	MJ	5.05E-01	3.80E-04	1.03E-02	3.45E-01	5.55E-05	6.61E-02	6.82E-03	5.90E-02
Net consumption of freshwater resources	m ³	-2.58E-01	7.82E-05	1.92E-03	-7.80E-04	1.40E-04	-6.68E-03	-7.59E-06	-6.60E-04

Table 7. Life cycle assessment (LCA) results of the steel joint profiles manufactured by Conecto Profiles Sp. z o.o. – waste categories (DU: 1 kilogram)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste	kg	3.00E-01	6.10E-04	2.27E-03	1.10E-03	1.90E-04	6.81E-01	-1.96E-06	-6.89E-01
Non-hazardous waste	kg	1.14E-00	3.11E-02	3.85E-03	5.46E-01	7.19E-03	2.07E-01	1.09E-02	5.90E-02
Radioactive waste	kg	2.41E-05	2.12E-07	5.23E-07	3.87E-09	2.95E-08	1.58E-05	-6.07E-09	-1.95E-05
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
Materials for recycling	kg	2.71E-01	6.40E-04	3.81E-03	4.69E-01	8.71E-05	2.53E-01	9.34E-03	-2.63E-01
Materials for energy recovery	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

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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.) <input checked="" type="checkbox"/> external <input type="checkbox"/> internal
LCA, LCI audit and input data verification: Bartosz Żymańczyk, BEng 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 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: 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
- EN 1090-2:2018 - Execution of steel structures and aluminium structures - Technical requirements for steel structures
- 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
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- KOBiZE Wskaźniki emisyjności CO₂, SO₂, NO_x, CO i pyłu całkowitego dla energii elektrycznej. Grudzień 2021
- World Steel Association 2017 Life Cycle inventory methodology report for steel products



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CERTIFICATE № 603/2024

of TYPE III ENVIRONMENTAL DECLARATION

Products:

**Steel expansion joint profiles to enable the movement of floor slabs
Conecto Profiles Dowel/Sinus**

Manufacturer:

Conecto Profiles Sp. z o.o.

ul. Przemysłowa 39, 61-541 Poznań, 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.

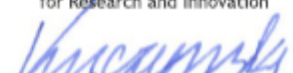
This certificate, issued on 15th March 2024 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department


Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, March 2024