Type III Environmental Product Declaration No. 575/2023

Issuance date: 15.12.2023
Validity date: 15.12.2028

Pecor Optima pipes and fittings pipes

Owner of the EPD:

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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 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, A4, C1-C4 and D modules in accordance with EN 15804 (Cradle-to-Gate with options)

The year of preparing the EPD: 2023

Products standards: EN 13476-3+A1

Service Life: 50 years

PCR: ITB-PCR A v 1.6.

Declared unit: 1 ton

Reasons for performing LCA: B2B

Representativeness: Poland, European

MANUFACTURER

Fig. 1. A view of manufacturing plant

ViaCon Polska Sp. z o. o. is part of the ViaCon Group founded in 1986 in Sweden and Norway. It is the largest organization in Europe operating on the market of culverts made of spirally corrugated steel pipes and structural elements made of corrugated sheet metal. The ViaCon Group is present in 19 countries. Thanks to the support of the entire group and the opportunity to benefit from shared experience, each company offers the highest quality products and professional technical advice. ViaCon Polska has been operating on the domestic market since 1997. Currently, the group of companies organized under ViaCon in Poland includes companies from the Czech Republic, Slovakia, Austria, Hungary, Poland, Bulgaria and Turkey. In 2007, ViaCon Construction, a company belonging to the ViaCon Group, started its operations. Its task is to construct engineering structures for the needs of transport construction. In 2021, as a result of the merger of three companies operating in Poland, ViaCon Construction became part of ViaCon Polska. ViaCon Polska has a Pecor Optima high-density polyethylene pipe production line (covered by this EPD). Pipes can be produced in different lengths with inner diameters between 200mm and 1400mm. The Pecor Optima line is installed at the factory in Rydzyna. The company's mission is to constantly improve its products and to cooperate closely with its customers in order to be able to respond to market demands with products of the highest quality standard through design, technical assistance, consulting, but also through production quality.

PRODUCTS DESCRIPTION AND APPLICATION

Pecor pipes are made of high-density polyethylene (HDPE) with double wall. Corrugated outside wall of pipes provides high stiffness SN4 (4kPa). SN6 (6kPa). SN8 (8kPa). Smooth inside wall allows to achieve optimal hydraulic parameters. PECOR OPTIMA® system is widely used in civil engineering. Due to the fast assembly and very good strength and hydraulic parameters, the system has received wide recognition among designers and contractors. Unique spiral structural wall allows to get the optimal stress distribution on the whole pipe length and ensure the proper ring stiffness on each section. PECOR OPTIMA® pipes produced by ViaCon are perfect for use in engineered structures: roads and railway culverts, shaft construction, ecological passages (for animals), relining of existing old culverts,- forestry culverts. Pipes are light-weighted and easy to assembly thanks to structure and raw material used for the production. PECOR OPTIMA® pipes are produced with double wall, smooth inside and corrugated outside. The corrugation is stiff and can interact with surrounded soil. The standard lengths of PECOR OPTIMA® pipes are L= 6 m, 7 m, 8 m (pipes from DN 200 mm to 1400 mm), but also other required dimensions, from 3 m up to 12 m.

A specific information (on products) is available on the producer website.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Declared unit

The declaration refers to declared unit (DU) – 1 ton of the Pecor Optima pipe manufactured in Poland.

Allocation

The allocation rules used for this EPD are based on general ITB PCR A v. 1.6. Production of the plastic pipes and retention tanks is a line process conducted in the manufacturing plant of VIACON located in Rydzyna (Poland). All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the global line production were inventoried and 100% was allocated to the production of the steel products based on the products mass basis. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. The weighted average effect of the coatings is used. Utilization of packaging material was taken into consideration.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, A4, 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. 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 first module includes extraction and production of raw materials used in manufacturing process, mainly polyethylene granulates (HDPE), as well as additives used in small amounts. Up to 65% of HDPE is made of recycled content. Means of transport include lorries with loading capacity <10 t and > 16 t. European standards for average combustion were used for calculations. The first module includes extraction and production of raw materials used in manufacturing process, mainly polyethylene granulates, as well as additives used in small amounts.

Module A3: *Production*

A scheme of the plastic pipes production process presented in Fig. 2. HDPE compound is supplied (in either plastic bags or bulk form) and filled into silos and storage bins. From silos raw materials (including masterbatch and calcium carbonate) are carried to each pipe extruder through vacuum pressure transfer system, then dosed by gravimetric weighing system. The raw materials are melted at high temperature in the extruders and pushed through a die-head to form a double-layer sleeve Later a pipe is formed with initial cooling provided by the means of water applied evenly through the spraying nozzles.

Module A4: Transport to construction site

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions. Transportation from ViaCon factory to construction site creates impact to the environment and is calculated in product LCA. Product is delivered by lorry with average distance of 500 km, therefore emissions are caused by fuel. During transportation there is not product or packaging loss.

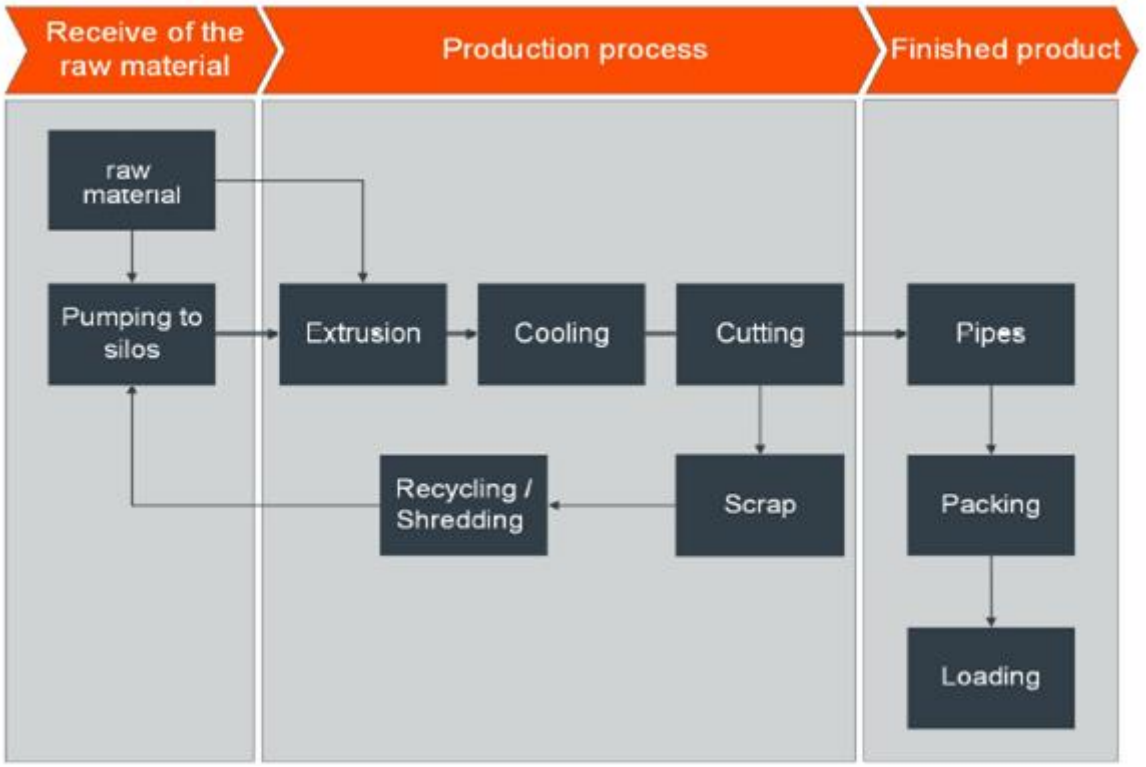

Fig. 2. PECOR OPTIMA® - a scheme of the production process

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

End of Life stage for product occurs when pipe needs to be replaced. Since the consumption of energy and resources is negligible for disassembling of the end-of-life product, a precise modeling of impacts occurring at the deconstruction stage -the module C1 was estimated based on the existing literature (energy consumption on the standard demolition process). In the adapted end-of-life scenario, the deconstructed products (100% recovery, Table 1) are transported to a waste processing plant distant by 100 km on > 16t lorry EURO 5, where undergo shredding (C3). Landfill scenario is 50% of products (C4), 25% is recycled and 25% incinerated. The recycled packaging material can be processed into granules for new HDPE products. Module D presents credits resulting from the recycling of the plastic scrap, and plastic incineration.

Table 1. End-of-life scenario for the plastic pipes manufactured by ViaCon Poland.

Material		Recycling	Incineration	Landfilling
Plastic scrap	100%	25%	25%	50%

Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by producer using the inventoried data and Ecoinvent v.3.9.1. No 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.

Data collection period

Primary data provided by VIACON covers a period form 01.01.2022 to 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 representative steel products were aggregated using weighted average. Impacts were inventoried and calculated for all steel products.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN 15804+A2.

Databases

The data for the LCA calculation comes from Ecoinvent v.3.9.1. Specific data quality analysis was a part of an external audit. The carbon footprint of Poland electricity used for calculation is 0.704 kg CO_2/kWh.

Other information

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

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 ton of the plastic pipes manufactured by VIACON in Poland.

Table 2. System boundaries (included life cycle modules) for the environmental characteristic of the plastic pipes.

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

Table *3. Life cycle assessment (LCA) results of **the plastic pipes**– environmental impacts (DU: 1 ton)*

Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	9.69E+02	8.37E+01	2.06E+02	1.26E+03	1.17E+02	2.34E+00	1.67E+01	1.56E+02	2.64E+00	-7.76E+02
Greenhouse gas potential - fossil	eq. kg CO_2	9.61E+02	8.34E+01	2.01E+02	1.25E+03	1.17E+02	1.17E+00	1.66E+01	1.59E+02	2.63E+00	-7.78E+02
Greenhouse gas potential - biogenic	eq. kg CO_2	-2.13E-01	2.85E-01	4.08E+00	4.15E+00	8.49E-02	1.05E-03	5.68E-02	2.09E+00	6.71E-03	-1.73E+00
Global warming potential - land use and land use change	eq. kg CO_2	7.83E+00	3.27E-02	1.36E+00	9.23E+00	5.37E-02	1.15E-04	6.52E-03	1.75E+00	2.49E-03	-1.00E-01
Stratospheric ozone depletion potential	eq. kg CFC 11	7.64E-06	1.93E-05	6.29E-06	3.32E-05	2.55E-06	2.48E-07	3.85E-06	1.66E-06	1.07E-06	-2.90E-05
Soil and water acidification potential	eq. mol H+	2.65E+00	3.38E-01	7.47E-01	3.74E+00	2.41E-01	6.96E-03	6.75E-02	1.68E+00	2.48E-02	-3.08E+00
Eutrophication potential - freshwater	eq. kg P	8.93E-02	5.60E-03	6.46E-02	1.60E-01	8.08E-03	3.65E-05	1.12E-03	1.70E-01	2.45E-04	-3.40E-01
Eutrophication potential - seawater	eq. kg N	7.63E-01	1.02E-01	1.72E-01	1.04E+00	5.99E-02	2.86E-03	2.04E-02	2.08E-01	8.62E-03	-6.78E-01
Eutrophication potential - terrestrial	eq. mol N	5.30E+00	1.11E+00	1.53E+00	7.94E+00	6.07E-01	3.14E-02	2.22E-01	1.90E+00	9.43E-02	-7.35E+00
Potential for photochemical ozone synthesis	eq. kg NMVOC	2.74E+00	3.41E-01	6.00E-01	3.69E+00	3.77E-01	8.57E-03	6.80E-02	9.50E-02	2.74E-02	-3.85E+00
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	3.64E-03	2.96E-04	5.97E-04	4.54E-03	3.84E-04	5.87E-07	5.89E-05	1.65E-04	6.04E-06	-1.34E-02
Abiotic depletion potential - fossil fuels	MJ	2.20E+04	1.24E+03	3.95E+03	2.72E+04	1.66E+03	1.56E+01	2.47E+02	1.62E+03	7.22E+01	-6.67E+03
Water deprivation potential	eq. m^3	2.76E+02	5.72E+00	6.81E+01	3.50E+02	8.00E+00	4.19E-02	1.14E+00	7.15E+01	2.29E-01	-1.42E+02

*Table 4. Life cycle assessment (LCA) results of **the plastic pipes**– additional impacts indicators (DU: 1 ton)*

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA	INA

*Table 5. Life cycle assessment (LCA) results of **the plastic pipes** manufactured by VIACON POLAND– the resource use (DU: 1 ton)*

Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.83E+02	1.77E+01	9.14E+02	1.31E+03	2.87E+01	8.91E-02	3.54E+00	5.16E+02	6.27E-01	-5.47E+02
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	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	4.89E+02	1.77E+01	9.14E+02	1.42E+03	2.87E+01	8.91E-02	3.54E+00	5.16E+02	6.27E-01	-5.47E+02
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	-1.81E+04	1.24E+03	3.82E+03	-1.31E+04	1.66E+03	0.00E+00	2.47E+02	1.23E+01	0.00E+00	-6.47E+03
Consumption of non-renewable primary energy resources used as raw materials	MJ	4.01E+04	0.00E+00	0.00E+00	4.01E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of non-renewable primary energy resources	MJ	2.22E+04	1.24E+03	3.96E+03	2.74E+04	1.66E+03	1.56E+01	2.47E+02	1.62E+03	7.22E+01	6.47E+03
Consumption of secondary materials	kg	6.47E+02	4.15E-01	1.11E+00	6.49E+02	7.13E-01	6.10E-03	8.27E-02	2.02E-01	5.02E+02	9.94E+01
Consumption of renewable secondary fuels	MJ	1.03E-02	4.57E-03	2.31E-03	1.72E-02	7.26E-03	1.99E-05	9.11E-04	9.70E-04	3.96E-04	-1.22E-01
Consumption of non-renewable secondary fuels	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	0.00E+00	0.00E+00
Net consumption of freshwater resources	m^3	6.86E+00	1.56E-01	3.59E+00	1.06E+01	2.02E-01	9.46E-04	3.10E-02	1.70E+00	7.90E-02	-5.39E+00

*Table 6. Life cycle assessment (LCA) results of **the plastic pipes** manufactured by VIACON POLAND – waste categories (DU: 1 ton)*

Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste neutralized	kg	8.86E+00	1.39E+00	5.10E+00	1.53E+01	1.03E+00	2.09E-02	2.77E-01	6.95E+00	7.67E-02	7.58E-02
Non-hazardous waste neutralized	kg	3.68E+02	2.47E+01	3.14E+02	7.07E+02	3.58E+01	1.47E-01	4.92E+00	8.14E+02	1.08E+00	7.90E+01
Radioactive waste	kg	1.07E-02	9.24E-05	1.08E-03	1.18E-02	6.53E-04	1.09E-04	1.84E-05	7.65E-05	4.79E-04	8.46E-03
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
Materials for recycling	kg	9.35E-02	3.83E-03	3.13E+00	3.23E+00	1.24E-02	2.08E-05	7.64E-04	7.73E-02	1.44E-04	0.00E+00
Materials for energy recovery	kg	1.49E-04	3.10E-05	4.60E-05	2.26E-04	3.32E-05	3.32E-07	6.18E-06	2.82E-05	1.71E-06	0.00E+00
Energy exported	MJ	8.36E+00	0.00E+00	1.61E+01	2.44E+01	2.34E+00	0.00E+00	0.00E+00	1.07E-01	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 v.1.6.
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) [x] external [ ] internal
External verification of EPD: Halina Prejzner, Ph.D. eng. LCA, LCI audit and input data verification: Michał Piasecki, Ph.D, D.Sc., eng, m.piasecki@itb.pl

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the for the information provided and contained I 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.

Signature Not Verified
Dokument podpisany przez Michał Piasecki; ITB
Data: 2023.12.20 14:47:10 CET

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- EN 13476-3:2018+A1:2020 Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 3: Specifications for pipes and fittings with smooth internal and profiled external surface and the system, Type B
- 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
- Ecoinvent. org

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CERTIFICATE № 575/2023
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Pecor Optima pipes and fittings

Manufacturer:

ViaCon Polska Sp. z o.o.

Przemysłowa 6, 64-130 Rydzyna, 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 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