Type III Environmental Product Declaration No. 711/2024

Issuance date: 19.12.2024
Validity date: 19.12.2029

Injection polyurethane resins

Owner of the EPD:

DSI Schaum Chemie Sp. z o.o.
Address: Podleska 76
43-190 Mikołów, Poland
Contact: Info-SchaumChemie@sandvik.com
Website: www.dsi-schaumchemie.pl

EPD Program Operator:

Instytut Techniki Budowlanej (ITB)
Address: Filtrowa 1
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Contact: energia@itb.pl

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. Their aspects were verified by the independent body according to ISO 14025. Basically, a 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 modules in accordance with EN 15804+A2 (Cradle-to-Gate)
The year of preparing the EPD: 2024
Service Life: N/A
PCR: ITB-PCR A
Declared unit: 1 kg
Reasons for performing LCA: B2B
Representativeness: Poland, European

MANUFACTURER

DSI Underground, part of the Sweden based company Sandvik Group, is the world's leading supplier of ground support products, systems and solutions for the underground mining and tunneling industry. One of the company's Polish entities, DSI Schaum Chemie Sp. z o.o. located in Mikołów (Fig. 1), produces mainly resin cartridges for mining and tunneling.

Fig. 1. A view of the DSI Schaum Chemie Sp. z o.o. production plant located in Mikołów (Poland)

PRODUCTS DESCRIPTION AND APPLICATION

Injection polyurethane resins - commonly known as polyurethane two-component injection systems - are utilized in various industries, including: mining, tunnelling and civil engineering.
In applications, these systems are primarily used for rock reinforcement, strata consolidation, sealing, cavity filling and preventing water from penetrating mines and tunnels.

Types and trade names:

Injection polyurethane resin *DSI Inject PUR W*: A fast-reacting and high-strength polyurethane resin. Suitable for soil/rock consolidation, gas, and water sealing.

Injection polyurethane resin *DSI Inject PUR S*: A slow-reacting and high-strength polyurethane resin. Suitable for soil/rock stabilization, consolidation in rock formations, and for gas and water sealing.

Injection polyurethane resin *DSI Inject PUR LV*: A low-viscosity and slow-reacting polyurethane resin. Suitable for ground stabilization, rock consolidation, sealing and water stopping.

Injection polyurethane resin *DSI Inject PUR HF: A medium-reacting, foamed polyurethane resin*. Suitable for ground/strata stabilization, cavities filling, and gas sealing and water stopping.

Table 1. Types and technical data of 2-component injection polyurethane resins manufactured by DSI Schaum Chemie Sp. z o.o.

	Component A		Component B	
	colour	packaging [kg]	colour	packaging [kg]
DSI Inject PUR W	colourless liquid	20 / 25 / 200 / 1000	dark brown liquid	24 / 30 / 240 / 1200
DSI Inject PUR S	colourless liquid	20 / 25 / 200 / 1000	dark brown liquid	24 / 30 / 240 / 1200
DSI Inject PUR LV	pale yellow liquid	21 / 26 / 205 / 1050	dark brown liquid	24 / 30 / 240 / 1220
DSI Inject PUR HF	pale yellow liquid	20 / 25 / 200 / 1000	dark brown liquid	24 / 30 / 240 / 1220

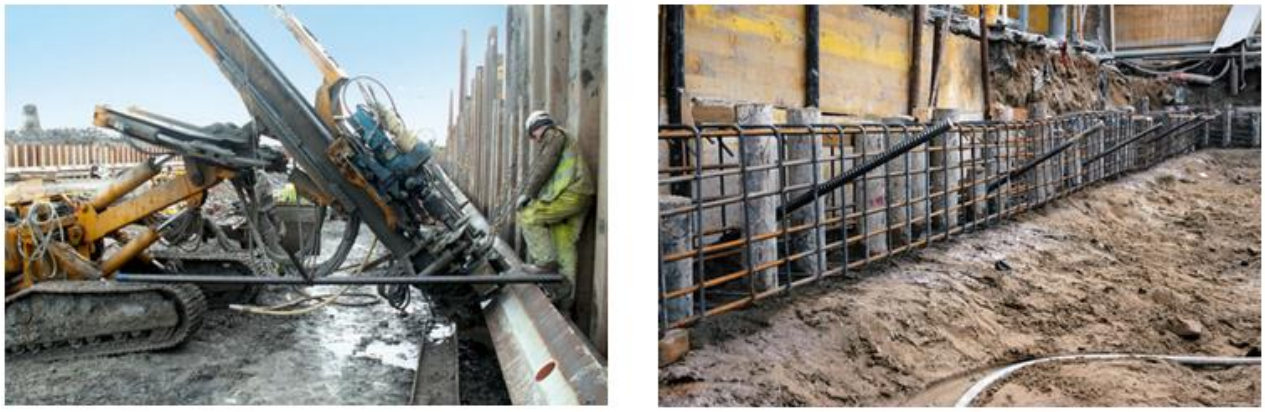

Fig. 2. Application operations of injection polyurethane resins.

More information about polyurethane resins can be found on the DSI Schaum Chemie Sp. z o. o. website *https://www.dsi-schaumchemie.pl/en*

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit is 1 kg of product of injection polyurethane resins.

Allocation

The allocation rules used for this EPD are based on general ITB-PCR A v. 1.6. Production of injection polyurethane resins is a line process (Fig. 3) conducted in the factory of DSI Schaum Chemie Sp. z o.o., located in Mikołów (Poland). Allocation was done on product mass basis. All impacts from raw materials and processing are allocated in module A1 of the LCA. Impacts from the on-site line production DSI Schaum Chemie Sp. z o. o. were inventoried and 14.9 % of total production were allocated to the production of injection polyurethane resins based on the annual production volume expressed in kg. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were taken into consideration.

System boundary

Modules A1-A3 are taken into consideration in the LCA: A1 Production of preliminary products, A2 Transport to plant, A3 Production (incl. provision of energy, production of auxiliaries and consumables or waste treatment). Polyurethane resins products were identified as physically integrated with other products during installation so they cannot be physically separated from them at the end of life and no longer identifiable at the end of life as a result of a physical or chemical transformation process. Therefore, they may omit the declaration of modules C1-C4 and D. This type of EPD declaration is called "cradle to gate".

System limits
According to the standard EN 15804+A2 and ITB PCR A v. 1.6, products used for the production of other products should be declared at the production stage. 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*
Raw materials such as polyols, isocyanates, oils and many additives used to produce injection polyurethane resins and packaging materials come from Polish and international suppliers. Data on transport of the different products to the manufacturing plant is collected and modelled for factory by assessor. Means of transport include big trucks (>16 t) and trains are applied. Based on data provided by the manufacturer, all input of transport resources was inventoried in details.

Module A3: *Production*
The production is done by DSI Schaum Chemie Sp. z o.o. plant in Mikołów, Poland. A scheme of polyurethane resins production process is presented in Fig. 3. The facility is ISO 14001, ISO 9001 and ISO 45001 certified.

Data quality
The data selected for LCA analysis originate from ITB-LCI questionnaires completed by DSI Schaum Chemie Sp. z o.o. using the inventory data, ITB database, Ecoinvent database v. 3.10 and KOBiZE. KOBiZE data is supplemented with Ecoinvent v. 3.10 data on the national electricity mix impact where no specific indicator data is provided. 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.

Data collection period
Primary data provided by DSI Schaum Chemie Sp. z o.o. covers a period of 01.2023 – 12.2023 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Assumptions and estimates
The impacts of the representative of polyurethane resins were aggregated using average weights. Impacts were inventoried and calculated for all products of polyurethane resins and they were presented in Tables 3-6.

Calculation rules
LCA was performed using ITB-LCA tool and own algorithms for impact calculations developed in accordance with EN 15804 + A2 and ITB PCR A v. 1.6 document.

Databases
The data for the processes comes from Ecoinvent v. 3.10 and ITB-Database. Specific data quality analysis was a part of external audit. Polish electricity mix used (production) is 0.685 kg CO_2/kWh (KOBiZE 2023).

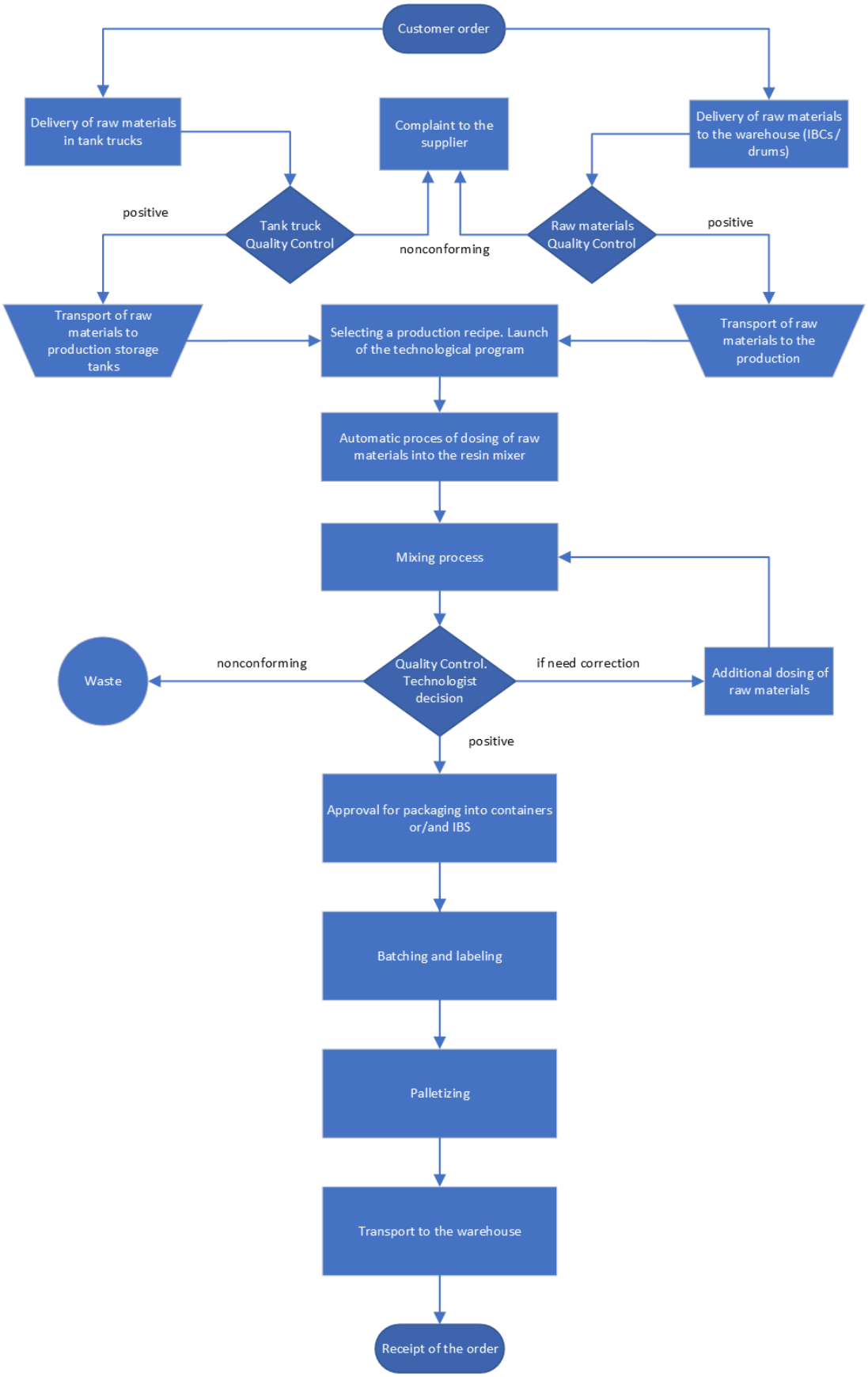

Figure 3. The scheme of injection polyurethane resins industrial process conducted by DSI Schaum Chemie Sp. z o.o.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of injection polyurethane resins manufactured by DSI Schaum Chemie Sp. z o. o.

Table 2. System boundaries for the environmental characteristic of polyurethane resins production process by DSI Schaum Chemie Sp. z o.o.

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	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**	**MND**	**MND**	**MND**	**MND**	**MND**

Table 3. Life cycle assessment (LCA) results of injection polyurethane resins manufactured by DSI Schaum Chemie Sp. z o.o. – environmental impacts (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
Global Warming Potential	eq. kg CO_2	3.78E+00	1.20E-01	2.09E-02	3.92E+00
Greenhouse gas potential - fossil	eq. kg CO_2	3.28E+00	1.20E-01	2.08E-02	3.42E+00
Greenhouse gas potential - biogenic	eq. kg CO_2	-1.35E-01	1.06E-04	1.12E-04	-1.35E-01
Global warming potential - land use and land use change	eq. kg CO_2	6.35E-01	4.52E-05	6.27E-06	6.35E-01
Stratospheric ozone depletion potential	eq. kg CFC 11	2.17E-06	3.02E-09	6.81E-10	2.17E-06
Soil and water acidification potential	eq. mol H+	2.17E-02	2.99E-04	1.88E-04	2.22E-02
Eutrophication potential - freshwater	eq. kg P	7.29E-03	8.99E-06	3.14E-05	7.33E-03
Eutrophication potential - seawater	eq. kg N	7.47E-03	8.09E-05	2.69E-05	7.58E-03
Eutrophication potential - terrestrial	eq. mol N	3.69E-02	8.75E-04	2.33E-04	3.80E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.62E-02	4.63E-04	7.03E-05	1.67E-02
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	3.53E-05	4.05E-07	2.74E-08	3.57E-05
Abiotic depletion potential - fossil fuels	MJ	7.74E+01	1.67E+00	3.50E-01	7.95E+01
Water deprivation potential	eq. m^3	3.35E+00	8.74E-03	6.15E-03	3.37E+00

Table 4. Life cycle assessment (LCA) results of polyurethane resins manufactured by DSI Schaum Chemie Sp. z o.o. – additional impacts indicators (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
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 of polyurethane resins manufactured by DSI Schaum Chemie Sp. z o.o. - environmental information describing waste categories (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
Hazardous waste neutralized	kg	4.05E-02	2.76E-03	2.29E-05	4.33E-02
Non-hazardous waste neutralised	kg	3.99E+00	5.50E-02	1.81E-03	4.05E+00
Radioactive waste	kg	4.69E-05	9.85E-07	2.53E-07	4.82E-05
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	4.85E-02	1.23E-05	1.85E-06	4.85E-02
Materials for energy recovery	kg	2.74E-05	1.15E-07	1.82E-03	1.84E-03
Energy exported	MJ	1.09E-01	8.57E-04	8.40E-04	1.11E-01

Table 6. Life cycle assessment (LCA) results of polyurethane resins manufactured by DSI Schaum Chemie Sp. z o.o. - environmental aspects related to resource use (DU: 1 kg)

Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	6.27E+00	3.12E-02	2.06E-02	6.32E+00
Consumption of renewable primary energy resources used as raw materials	MJ	4.84E+00	0.00E+00	0.00E+00	4.84E+00
Total consumption of renewable primary energy resources	MJ	1.11E+01	3.12E-02	2.06E-02	1.12E+01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	5.23E+01	1.67E+00	3.52E-01	5.44E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	2.56E+01	0.00E+00	1.95E-02	2.56E+01
Total consumption of non-renewable primary energy resources	MJ	7.80E+01	1.67E+00	3.72E-01	8.01E+01
Consumption of secondary materials	kg	2.09E-01	8.53E-04	2.83E-05	2.10E-01
Consumption of renewable secondary fuels	MJ	1.09E-03	9.76E-06	1.36E-07	1.10E-03
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater resources	m^3	6.61E-02	2.37E-04	9.32E-05	6.65E-02

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+A2 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) [x] external [ ] internal
External verification of EPD: Halina Prejzner, PhD Eng LCA, LCI audit and input data verification: Mateusz Kozicki, PhD Verification of LCA: Michał Piasecki, PhD. DSc. Eng

Note 1: The declaration owner has the sole ownership, liability and responsibility for the information provided and contained in EPD. Declarations within the same product category but from different programmes may not be comparable. 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. Depending on the application, a corresponding conversion factor such as the specific weight per surface area must be taken into consideration.

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 (17065/17025 certified). 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 v. 1.6 General Product Category Rules for Construction Products
- TDS for DSI Inject PUR W, TDS DSI Inject PUR S, DSI Inject PUR LV, DSI Inject PUR HF
- 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
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- 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
- EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- KOBiZE Emissions (CO_2, SO_2, NO_x, CO and total dust) from electricity, 2023

LCA, LCI audit and input data verification

Mateusz Kozicki, PhD

qualified electronic signature

Head of the Thermal Physic, Acoustics and Environment Department

Agnieszka Winkler-Skalna, PhD

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Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

CERTIFICATE № 711/2024
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Injection polyurethane resins

Manufacturer:

DSI Schaum Chemie Sp. z o.o.
Podleska 76, 43-190 Mikołów, 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 19th December 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

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director
for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, December 2024