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Type III Environmental Product Declaration No. 704/2024

DiMa STEEL STRUCTURES

Owner of the EPD:
DiMa Sp. z o.o. Poland
Address: Dobrzelińska 12,
99-320 Żychlin, Poland
Tel.: +48 697 188 500
Website: https://dima.pl/
Contact: kooperacja@dima.pl

EPD Program Operator:
Instytut Techniki Budowlanej (ITB)
Address: Filtrowa 1,
00-611 Warsaw, Poland
Website: http://www.itb.pl
Contact: Michał Piasecki
energia@itb.pl

Type III Environmental Product Declaration No. 704/2024

ITB is the verified member of The European Platform for EPD program operators and LCA practitioner - ECO-platform

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:	2024
Product standards:	EN 1090-1, EN 1090-2, ISO 3834-2
Service Life:	minimum 100 years
PCR:	ITB-PCR A
Declared unit:	1 ton
Reasons for performing LCA:	B2B
Representativeness:	Polish, European, 2023

MANUFACTURER

DiMa Sp. z o. o. has been operating on the Polish market since April 2006. It specializes in the steel welded structures industry. The plant is located in Żychlin near Kutno. Thanks to the high efficiency of production processes, the use of modern machines and devices and cooperation with the best partners and material suppliers, it offers competitive prices for steel welded structures.
The plant makes elements of agricultural machinery and equipment, structures for construction: stairs, balconies, welded steel elements for road and bridge infrastructure, structures for the machinery, chemical and energy industries. DiMa Sp. z o. o. is a company with ambition and trustworthy. Our priority is to keep our commitments in fulfilling individual orders of our clients. Information on DiMa Sp. z o.o. offer is available at: https://www.dima.pl/

PRODUCTS DESCRIPTION AND APPLICATION

EPD covers steel structures in execution classes from the lowest EXC1 to the highest EXC4 according to EN 1090-2. Maximum dimensions of manufactured structures: 8x8x50m. Maximum weight of shipping item: 50 tons. The structures are made of hot-formed and cold-bent open sections, hot-formed and cold-bent closed profiles and bars. Types of manufactured structural elements: beams, columns, bracing items, anchors. DiMa Sp. z o.o. produces structures that are components of stairs, balconies, welded steel elements for road and bridge infrastructure, structures for the machinery, chemical and energy industries, commercial and office buildings. Steel semi-finished products used for the manufacturing of the steel structures have steel rade from S235 up to S500 and originate from various steel mills (EAF and BOF).

Table 1. An average composition of steel structure manufactured by DiMa Sp. z o.o. according to the list of production materials

Component	Contribution (mass based)
Steel	96%
Ancillary materials (i.a. welding wire, gases)	4%
Anticorrosive coverings/paint	<1%

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit is 1 ton 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 as well as transportation of employees were not included in LCA.

Allocation

The allocation rules used for this EPD are based on general ITB’s document PCR A. In the aggregated module A1-A3, material losses in the assembly of the products in the factory are defined on the averaged specific values for the site. Input and output data from the production is inventoried and allocated to the production on the mass basis. The declaration covers a wide range of steel structural products. Their production resources and processing stages are basicly similar, so it is possible to average the production by product weigh so production is averaged for all products. Avoided burden approach is applied in the use of recycled and/or secondary raw materials, as well as loads and benefits beyond the system boundary from material recycling. No loads and benefits beyond the system boundary from energy recovery from the end of life of the product or packaging is included.

System limits

In the assessment, all available data from production have been considered, i.e. all raw materials/elements used as per assembly process, utilized thermal energy, and electric power consumption. Thus material and energy flows contributing less than 1 % of mass or energy have been considered. It can be assumed that the total sum of neglected processes does not exceed 5 % of energy usage and mass per module A, B, C or D. Machines and facilities required during production are neglected. The production of etiquettes, tape and glue was also not considered.

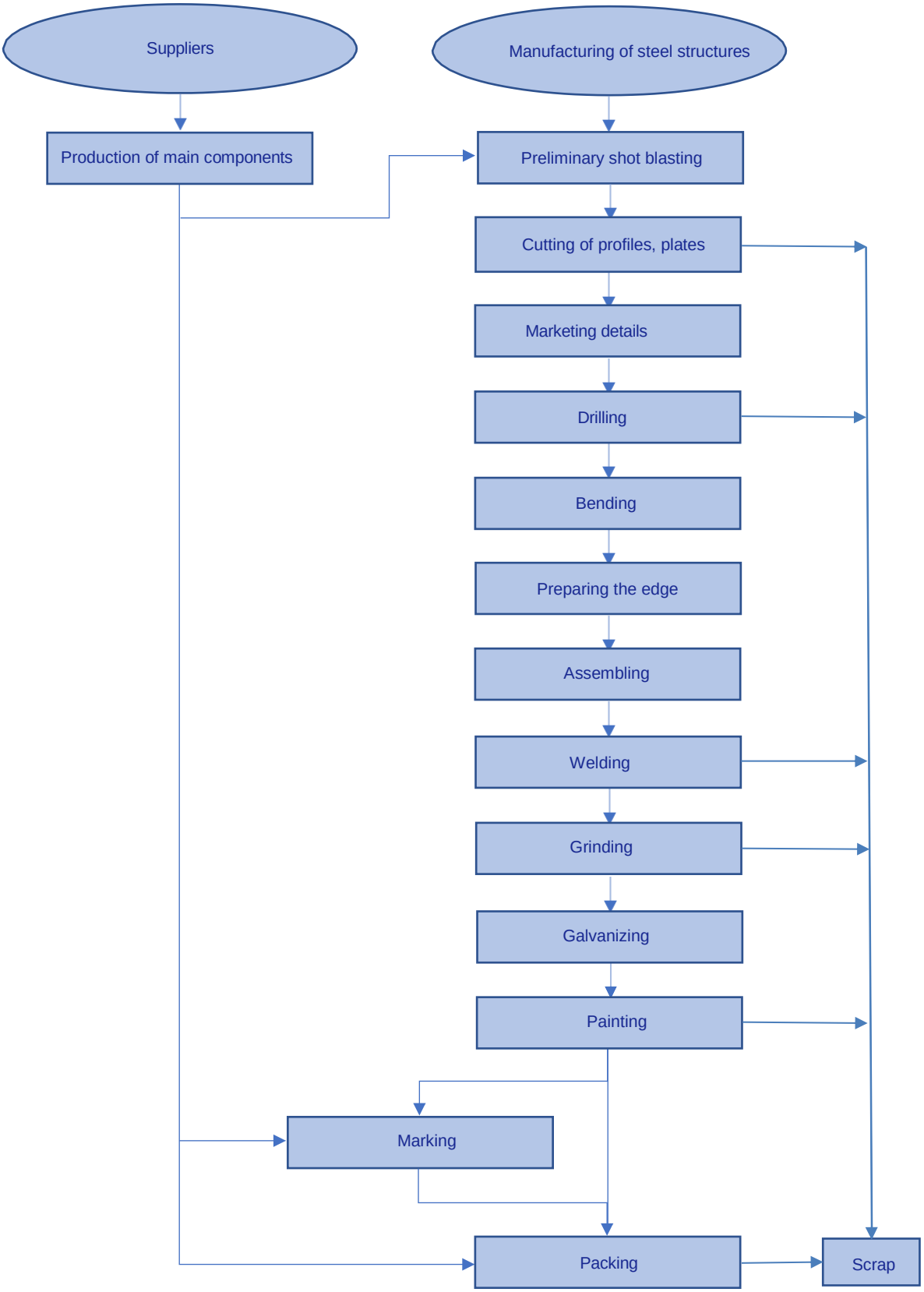
Modules A1 and A2: *Raw materials supply and transport*

Steel semi-finished products used for the production of the steel structures comes from various steel mills and are made of c.a. 60% recycled scrap. Ancillary materials such as welding wires, gases used for welding purposes, anticorrosive paints and packaging materials come from local Polish suppliers. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. The steel used comes from domestic suppliers producing steel in both EAF and BOF technology. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. Module A2 (transport) includes truck transport and uses European averages for fuel data

Module A3: *Production*

At the beginning of the production process, the required metal materials are collected, such as: Rolled sheets, Cold-bent profiles, Hot rolled profiles Steel pipes. Preliminary shot blasting initiates the formation process of each steel structure. Such prepared steel semi-finished products are subjected to cutting, marking, drilling and bending. the component undergoes operations providing the proper quality of its edges and is assembled and welded according to a project. In the next steps such obtained structure is strengthened, shot blasted, painted and marked. The production processes carried out at DiMa Sp. z o.o. are shown in Figure 2.

Figure 1. A basic scheme of the DiMa Sp. z o.o. steel structural product manufacturing process.



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

Due to the fact that the declaration covers a wide range of steel products for various purposes and usage scenarios, it is not possible to directly specify the de-construction technology and the amount of energy for disassembly in C1 module (so this module is generic based on literature). In the adapted end-of-life scenario, the de-constructed steel products are transported to a steel mill distant by 30 km on > 16t lorry EURO 4 where are used as steel scrap to produce a new steel. The recycling rate of C3 module is 98% and it is assumed that 2% 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 2. End-of-life scenario for the product components.

Material	Material recovery [%]	Recycling [%]	Landfilling [%]
Steel scrap	100	98	2

Electricity at end-of-life (module C) has been modelled using an average European 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 01.01.2023 – 31.12.2023 (1 year). 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 DiMa Sp. z o.o.. and verified.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 for steel). Specific (LCI) data quality analysis was a part of the input data verification.

Assumptions and estimates

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

Calculation rules

LCA was performed using openLCA tool developed in accordance with EN15804+A2. Emission of greenhouse gases was calculated using the IPCC 2021 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 3.9.1 supplemented by actual national KOBIZE data) emission factor used is 0.698 kg CO_2/kWh. As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 ton of the products manufactured by DiMa Sp. z o.o. The following life cycle modules (Table 3) were included in the analysis.

Table 3. 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**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MD**	**MD**	**MD**	**MD**	**MD**

Table 4. Life cycle assessment (LCA) results of the steel product – environmental impacts (DU: 1 ton).

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	2.85E+03	2.52E+01	5.76E+00	1.94E+03	1.88E-01	-1.94E+03
Greenhouse potential - fossil	eq. kg CO2	2.89E+03	2.50E+01	5.75E+00	1.94E+03	1.88E-01	-1.94E+03
Greenhouse potential - biogenic	eq. kg CO2	1.65E+01	0.00E+00	2.59E-03	1.76E-03	8.02E-07	-9.24E-03
Global warming potential - land use and land use change	eq. kg CO2	2.40E+00	7.42E-03	2.79E-03	1.28E+00	1.10E-04	-1.29E+00
Stratospheric ozone depletion potential	eq. kg CFC 11	8.21E-05	1.04E-07	1.57E-07	3.39E-05	4.95E-09	-3.39E-05
Soil and water acidification potential	eq. mol H+	1.49E+01	1.80E-01	2.38E-02	8.76E+00	1.25E-03	-8.76E+00
Eutrophication potential - freshwater	eq. kg P	1.70E+00	3.01E-02	4.09E-04	9.43E-01	1.84E-05	-9.44E-01
Eutrophication potential - seawater	eq. kg N	3.55E+00	2.59E-02	9.04E-03	2.01E+00	4.80E-04	-2.00E+00
Eutrophication potential - terrestrial	eq. mol N	3.20E+01	2.26E-01	9.65E-02	2.04E+01	5.20E-03	-2.04E+01
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.35E+01	6.51E-02	3.46E-02	9.23E+00	1.79E-03	-9.23E+00
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	6.67E-02	8.14E-06	1.89E-05	1.41E-02	2.95E-07	-1.41E-02
Abiotic depletion potential - fossil fuels	MJ	3.35E+04	2.87E+02	8.28E+01	2.05E+04	4.02E+00	-2.05E+04
Water deprivation potential	eq. m^3	1.10E+03	5.39E+00	4.06E-01	6.48E+02	2.05E-02	-6.48E+02

Table 5. Life cycle assessment (LCA) results of the steel product – environmental impacts (DU: 1 ton).

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	2.09E-04	2.97E-07	4.60E-07	1.70E-04	2.65E-08	-1.70E-04
Potential human exposure efficiency relative to U235	eg. kBq U235	1.31E+02	8.24E-01	1.07E-01	6.29E+01	4.64E-03	-6.29E+01
Potential comparative toxic unit for ecosystems	CTUe	2.95E+04	7.06E+01	3.95E+01	1.09E+04	1.90E+00	-1.09E+04
Potential comparative toxic unit for humans (cancer effects)	CTUh	1.91E-05	9.04E-09	2.57E-09	1.56E-05	9.53E-11	-1.56E-05
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	7.02E-05	4.02E-07	5.68E-08	4.45E-05	1.30E-09	-4.45E-05
Potential soil quality index	dimensionless	1.54E+04	6.05E+01	4.76E+01	6.54E+03	6.68E+00	-6.54E+03

Table 6. Life cycle assessment (LCA) results of the steel product – environmental impacts (DU: 1 ton).

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.01E+03	2.65E+01	1.27E+00	1.86E+03	4.98E-02	-1.86E+03
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
Total consumption of renewable primary energy resources	MJ	4.01E+03	2.65E+01	1.27E+00	1.86E+03	4.98E-02	-1.86E+03
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	7.76E+02	1.97E+00	7.00E+00	4.61E+02	3.53E-01	-4.61E+02
Consumption of non-renewable primary energy resources used as raw materials	MJ	2.92E+04	2.85E+02	7.36E+01	2.00E+04	3.66E+00	-2.00E+04
Total consumption of non-renewable primary energy resources	MJ	3.38E+04	2.87E+02	8.28E+01	2.05E+04	4.02E+00	-2.05E+04
Consumption of secondary materials	kg	4.05E+02	2.65E+01	1.24E+00	1.86E+03	4.98E-02	-1.86E+03
Consumption of renew. secondary fuels	MJ	1.08E+03	0.00E+00	5.51E-06	6.08E-06	8.42E-09	8.90E-05
Consumption of non-renewable secondary fuels	MJ	3.81E+03	2.65E+01	1.24E+00	1.86E+03	4.98E-02	-1.86E+03
Net consumption of freshwater	m^3	3.72E+00	7.93E-01	9.91E-03	-6.62E+00	3.26E-03	6.59E+00

Table 7. Life cycle assessment (LCA) results of the steel product – environmental impacts (DU: 1 ton).

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste	kg	1.19E+02	2.97E+00	4.87E-02	6.55E+01	4.50E-02	-6.55E+01
Non-hazardous waste	kg	2.58E+02	8.90E-01	6.51E-02	8.89E+00	4.22E+00	-8.88E+00
Radioactive waste	kg	5.86E+02	1.55E+00	8.88E-02	4.03E+02	-5.56E-02	-4.03E+02
Components for re-use	kg	8.16E+02	8.35E-01	7.47E-02	6.75E+02	3.32E-03	-6.75E+02
Materials for recycling	kg	5.51E+02	7.19E-01	3.84E+00	4.13E+02	2.00E+01	-2.06E+02
Materials for energy recovery	kg	1.05E+00	2.00E-04	2.61E-05	2.09E+02	1.13E-06	-1.57E-02
Exported Energy	MJ	1.19E+02	2.97E+00	4.87E-02	6.55E+01	4.50E-02	-6.55E+01

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 (sub clause 8.1.3.) [X] external [ ] internal
External verification of EPD: Michał Piasecki, PhD., D.Sc., Eng. LCA, LCI audit and input data verification: Bartosz Żymańczyk, BEng, Radosław Andrulewicz, BEng LCA verification: Bartosz Żymańczyk, BEng, Radosław Andrulewicz, BEng

Signature Not Verified
Dokument podpisany przez Michał Piasecki ITB
Data: 2024.11.12 10:38:54 CET

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 (see 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
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej. Grudzień 2023
- World Steel Association 2017 Life Cycle inventory methodology report for steel products

Instytut Techniki Budowlanej

Instytut Techniki Budowlanej

00-611 Warsaw, Filtrowa 1

Thermal Physics, Acoustics and Environment Department

02-656 Warsaw, Ksawerów 21

CERTIFICATE № 704/2024
of TYPE III ENVIRONMENTAL DECLARATION

Products:

DiMa Steel Structures

Manufacturer:

DiMa Sp. z o.o. Poland

Dobrzelińska 12, 99-320 Żychlin, 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 8th November 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, November 2024