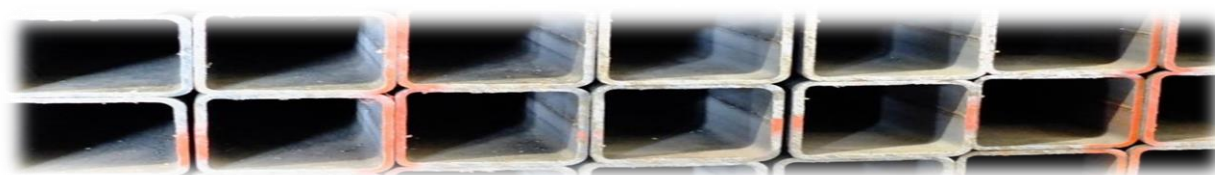




Issuance date: 29.06.2021

Validity date: 29.06.2026

## Cold formed welded hollow sections from non-alloy and fine grain structural steel



### EPD Program Operator:

Instytut Techniki Budowlanej (ITB)  
Address: Filtrowa 1, 00-611 Warsaw, Poland  
Website: [www.itb.pl](http://www.itb.pl)  
Contact: Michał Piasecki  
[m.piasecki@itb.pl](mailto:m.piasecki@itb.pl), [energia@itb.pl](mailto:energia@itb.pl)

### Owner of the EPD:

FERRUM S.A.  
Ul. Poreclanowa 11  
Katowice, Poland  
Contact: +48 730 44 03  
Office: [zarzad@ferrum.com.pl](mailto:zarzad@ferrum.com.pl)  
Website: <https://www.ferrum.com.pl>

ITB is the verified member of The European Platform for EPD program operators and LCA practitioner [www.eco-platform.org](http://www.eco-platform.org)

### Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804 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 (see point 5.3 of the standard).

**Life cycle analysis (LCA):** A1-A4, C1-C4 and D modules in accordance with EN 15804.

(Cradle to Gate with options)

**Standards:** PN-EN 10219-1, PN-EN 10219-2

**The year of preparing the EPD:** 2021

**Service Life:** depending on application type

**PCR:** ITB-PCR A (PCR based on EN 15804+A1)

**Declared unit:** 1 ton (Mg) of cold formed welded hollow sections from non-alloy and fine grain structural steel

**Reasons for performing LCA:** B2B

**Representativeness:** Polish production, year 2020

## PRODUCTS DESCRIPTION

FERRUM S.A. is a company whose origins are dated back to 1874, when Huta FERRUM (steel mill) was established. Construction Plant FERRUM S.A. is located in Katowice, Poland. Currently, the plant is engaged in the production of several types of steel products like pipes and sections.

Cold formed welded structural hollow sections covered by this EPD are made of non-alloy and fine grain steels and manufactured in accordance with the requirements of PN-EN 10219-1, PN-EN 10219-2 standards and under provisions of Regulation CPR 305/2011. The hollow sections are manufactured by applying high frequency induction technology of the SMS Meer Company, which for many years has been used for production construction pipes. "FERRUM" S.A. is certified by the "B", Ü and CE signs authorizing to mark the manufactured hollow sections intended for building engineering in the European Union. Square hollow sections are manufactured in the range from 100 mm x 100 mm to 300 mm x 300 mm and wall thicknesses from 3.0 mm to 14.3 mm. Rectangular hollow sections are manufactured in the range from 100 mm x 80 mm to 300 mm x 200 mm and wall thicknesses from 3.0 mm to 14.3 mm. The hollow sections are offered in the standard steel grades: S235JRH, S275J0H, S275J2H, S355J0H, S355J2H, S355K2H, S460MH, S460MLH. Hollow sections may be produced in length from 6 m to 18 m. Standard length of hollow sections are 6 m, 12 m and 16 m. Technical data are available at manufacturer web-site <http://www.ferrum.com.pl>.

## LIFE CYCLE ASSESSMENT (LCA) – general rules applied

### Unit

The declared unit is 1 Mg of cold formed welded hollow sections from non-alloy and fine grain structural steel.

### System boundary

The life cycle analysis of the declared product covers "Product Stage" A1-A4 modules, "End of Life stage" C1, C2, C3, C4 modules and gains beyond system in D module (Cradle to Gate with options) in accordance with EN 15804:2012+A1 and ITB PCR A.

### Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of steel hollow sections is the line process located in "FERRUM" S.A. located in Katowice. Allocation between Ferrum products is done on product mass basis. The impacts from raw materials extraction are allocated in A1 module of the EPD (including input materials, and energy consumption, transportation, emissions and wastes resulting from the production of steel). 100% of impacts from line production were inventoried and allocated to steel section production. Municipal waste and waste water of whole factory were allocated to module A3. Energy supply was inventoried for whole production process. Emissions in the factory are calculated and were allocated to module A3. Energy supply (gas and electricity) was inventoried for whole factory and 100% was allocated to the product assessed. Emissions in the factory are assessed using national KOBIZE emission factors for energy carriers were allocated to module A3.

### System limits

99.9% of input materials and 100% energy consumption (electricity, gas,) was inventoried in factory and were included in 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 taken into account. Ancillary items, precomponents with a percentage share of less than 0.1% were not included in the calculations. It is assumed that the total sum of omitted processes does not exceed 1% of all impact categories. In accordance with EN 15804 machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

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

Process starts with sourced raw materials. Raw material supply includes raw material extraction and pre-treatment processes. The low alloy steel (99% mass based input material) used in the manufactory plant are produced in the mixed technologies in in several steel mills in Europe (Poland, Czech, Latvia, Germany). Transport is relevant for delivery of raw materials and other auxiliary materials to the plant and the transport of materials within the plant. Data on transport of the different input products to the manufacturing plants were inventoried in detail and modelled by assessor. For calculation purposes European fuel averages are applied in module A2.

## **A3: Production**

During the manufacturing process flat steel plate is gradually changed in shape to become round where the edges are presented ready to weld. The edges are then welded together to form the mother tube. Cold-formed steel framing is made from strips of structural quality sheet steel that are fed through roll forming machines with a series of dies that progressively shape the steel into desired shaped section, or formed into a variety of shapes.

## **A4: Transport to construction site**

Transport of final product to construction site is taken as the weight average values for transport to customers. The following transport scenario to the place of use was assumed based on the manufacturer's declaration: large vehicle, 75% capacity over an average distance of 800 km. For calculation purposes European fuel averages are applied in module A4.

## **End of life scenarios (C and D modules)**

The end-of-life scenario for all products has been generalized. The steel sections are disassembled (C1 module) by lift, crane and power tools. It is assumed that the recovered steel will be prepared (C3) for further steel production process (from scrap – net scrap approach used). It is assumed that at the end of life the transport distance from the product deconstruction place to waste processing (C2) is 50 km on > 16 t loaded lorry with 75% capacity utilization and fuel consumption of 35 l per 100 km.

The reuse, recovery and recycling potential for a new product system is considered beyond the system boundaries (module D) based on World Steel recommendations and national practice (see references). On average, 43% scrap steel is used in the A1 steel production. Net scrap is an amount of steel recycled at end-of-life minus scrap input from previous product life cycles.

*Table 1. End of life scenarios for steel sections products*

Products	Material recovery	Recycling	Landfilling
Steel sections	100%	99%	1%

## **Data collection period**

The data for manufacture of the declared products refer to period between 01.01.2020 – 31.12.2020 (1 year). The life cycle assessments were done for Poland as reference area.

## **Data quality - production**

The values determined to calculate A3 originate from verified LCI inventory data. A1 values were prepared considering several specific and generic data for the european made steel products. Allocation for steel production impacts is done in accordance with LCI *data for Steel products Report* compiled by Brian Hughes and William Hare (World Steel Association). The background data for the secondary inputs come from the Ecoinvent v.3.7 data base.

## **Assumptions and estimates**

All production processes (A3) inputs and outputs were assigned to different types of products on specific process data as it was impossible mass based allocation was done. For steel suppliers without specific environmental information, generic data was used.

## Environmental Product Declaration Type III ITB No. 235/2021

### Calculation rules

LCA was done in accordance with ITB PCR a document. Characterization factors are CML ver. 4.2 based. ITB-LCA algorithms were used for impact calculations. A1 was calculated based on data from the database and specific EPD for steel, A3 and A2 are calculated based on the LCI questionnaire provided by the manufacturer. 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

### Databases

The background data for the processes come from the following databases: Ecoinvent v.3.7, specific EPD for a steel producers, energy KOBIZE (Polish electricity mix and combustion factors for fuels). Specific (LCI) data quality analysis was a part of the audit. The time related quality of the data used is valid (5 years).

### Additional information

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in steel sections, either above the threshold for registration with the European Chemicals Agency or above 0.1 %

The electricity mix represents the average Polish specific electricity supply for final consumers, including electricity own consumption, transmission/distribution losses and electricity imports from neighbouring countries. Reference year is 2020 and carbon impact of electricity mix is 0.25 kg CO<sub>2</sub>/MJ.

## LIFE CYCLE ASSESSMENT (LCA) – Results

### Declared unit

The declaration refers to the unit DU– 1 Mg of the steel section produced by Ferrum S.A. in Poland. The following life cycle modules are included in the declaration (table 2).

Table 2. System boundaries (life stage modules included) in a product environmental assessment

Environmental assessment information (MA – Module assessed, MNA – Module not assessed, 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
MA	MA	MA	MA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MA	MA	MA	MA	MA

# Environmental Product Declaration Type III ITB No. 235/2021

*Table 3. Environmental product characteristic – steel profiles SHS*

Environmental impacts: (DU) 1 Mg										
Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Global warming potential	kg CO <sub>2</sub>	1.58E+03	1.64E+01	1.03E+02	8.31E+01	1.99E+01	5.19E+00	4.38E+00	5.29E-02	-6.81E+02
Depletion potential of the stratospheric ozone layer	kg CFC 11	6.82E-06	0.00E+00	1.54E-06	0.00E+00	5.89E-06	0.00E+00	1.06E-08	1.90E-08	-2.93E-06
Acidification potential of soil and water	kg SO <sub>2</sub>	3.28E+00	1.26E-01	3.28E-01	6.38E-01	1.54E+05	3.99E-02	1.59E-02	4.59E-04	-1.41E+00
Formation potential of tropospheric ozone	kg Ethene	5.74E-01	8.48E-03	4.10E-01	4.29E-02	1.64E-02	2.68E-03	1.12E-03	3.68E-05	-2.47E-01
Eutrophication potential	kg (PO <sub>4</sub> ) <sup>3-</sup>	4.20E-01	2.23E-02	9.59E-03	1.13E-01	3.58E-02	7.06E-03	1.97E-03	8.43E-05	-1.80E-01
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb	5.51E-01	0.00E+00	1.03E+00	0.00E+00	2.25E-01	0.00E+00	2.03E-06	7.72E-04	-2.37E-01
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1.45E+04	2.24E+02	1.03E+03	1.13E+03	4.99E+02	7.09E+01	4.90E+01	0.00E+00	-6.22E+03
Environmental aspects: (DU) 1 Mg										
Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.19E+03	2.24E+00	6.15E+01	1.13E+01	2.75E+00	7.09E-01	2.29E+01	3.53E-02	-5.10E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.05E+04	2.35E+02	1.31E+03	1.19E+03	5.04E+02	7.44E+01	7.38E+01	1.70E+00	-4.50E+03
Use of secondary material	kg	4.31E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.85E+02
Use of renewable secondary fuels	MJ	1.15E+00	1.18E+01	0.00E+00	5.96E+01	0.00E+00	3.72E+00	1.62E-22	0.00E+00	-4.94E-01
Use of non-renewable secondary fuels	MJ	2.08E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-21	0.00E+00	-8.94E-01
Net use of fresh water	m <sup>3</sup>	6.89E+01	2.40E-03	2.05E-02	1.21E-02	1.70E-01	7.59E-04	3.14E-02	0.00E+00	-2.96E+01
Other environmental information describing waste categories: (DU) 1 Mg										
Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.12E+00	8.63E-03	7.97E-02	4.37E-02	2.12E-04	2.73E-03	9.42E-07	1.09E-06	-9.12E-01
Non-hazardous waste disposed	kg	3.01E+01	1.02E+01	7.97E+00	5.18E+01	1.05E+00	3.24E+00	6.01E+01	1.00E+01	-1.30E+01
Radioactive waste disposed	kg	2.70E-01	0.00E+00	0.00E+00	0.00E+00	3.30E-03	0.00E+00	9.47E-03	1.07E-05	-1.16E-01
Components for re-use	kg	1.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+02	0.00E+00	-5.07E-04
Materials for recycling	kg	2.64E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+03	0.00E+00	-1.14E+01
Materials for energy recover	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
Exported energy	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

## RESULTS INTERPRETATION

The environmental impact of is mainly dependent on the energy-intensive production of steel on which the manufacturer has a limited influence. The global warming potential expressed in carbon dioxide for production stage is 1.7 ton of CO<sub>2</sub> / ton of products. Depletion of abiotic resources-fossil fuels is 15.7 GJ/ton.

## Environmental Product Declaration Type III ITB No. 235/2021

### VERIFICATION

The process of verification of this EPD was 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 15804:2012+A1 and ITB PCR A
Independent verification corresponding to ISO 14025 (sub clause 8.1.3.)  <input checked="" type="checkbox"/> external <input type="checkbox"/> internal
External verification of EPD: Ph.D. Eng. Halina Prejzner LCA. LCI audit and input data verification: D.Sc.Ph.D. Eng. Michał Piasecki. m.piasecki@itb.pl Verification of LCA: Ph.D. Eng. Justyna Tomaszewska. j.tomaszewska@itb.pl

The EPD owner has the sole ownership liability. and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

### Normative references

- EN 15804:2012+A1 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- TB PCR A General Product Category Rules for Construction Products
- PED 2014/68/UE Directive
- PN-EN 10219-1 Kształowniki zamknięte ze szwem wykonane na zimno ze stali konstrukcyjnych niestopowych i drobnoziarnistych -- Część 1: Warunki techniczne dostawy
- PN-EN 10219-2:2019-07 Kształowniki zamknięte ze szwem wykonane na zimno ze stali konstrukcyjnych -- Część 2: Tolerancje, wymiary i wielkości statyczne
- API Spec 5L Seamless & welded pipe
- PN-EN 10217-1 Rury stalowe ze szwem do zastosowań ciśnieniowych -- Warunki techniczne dostawy -- Część 1: Rury ze stali niestopowych zgrzewane elektrycznie i spawane łukiem krytym z określonymi własnościami w temperaturze pokojowej
- PN-EN 10217-3 Rury stalowe ze szwem do zastosowań ciśnieniowych -- Warunki techniczne dostawy -- Część 3: Rury ze stali stopowych drobnoziarnistych zgrzewane elektrycznie i spawane łukiem krytym z określonymi własnościami w temperaturze pokojowej, podwyższonej i obniżonej
- 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://www.worldsteel.org/en/dam/jcr:04f8a180-1406-4f5c-93ca-70f1ba7de5d4/LCI%2520study_2018%2520data%2520release.pdf)
- 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



**Instytut Techniki Budowlanej**

00-611 Warszawa, Filitrowa 1

**Thermal Physics, Acoustics and Environment Department**

02-856 Warszawa, Ksawerów 21

**CERTIFICATE No 235/2021  
of TYPE III ENVIRONMENTAL DECLARATION**

Products:

**Cold formed welded hollow sections  
from non-alloy and fine grain structural steels**

Manufacturer:

**Ferrum S.A.**

ul. Porcelanowa 11, 40-246 Katowice, Poland

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

**PN-EN 15804**

Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

This certificate, issued for the first time on 29<sup>th</sup> June 2021 is valid for 5 years  
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics  
and Environment Department

  
Agnieszka Winkler-Szałna, PhD



Deputy Director  
for Research and Innovation

  
Krzysztof Kulczyński, PhD

Warsaw, June 2021