# Structural steel





# Structural steel

**PROGRAM OPERATOR, PUBLISHER:** 

**OWNER OF THE DECLARATION:** 

NAME OF THE PRODUCT:

**DECLARATION NUMBER:** 

**ISSUE DATE:** 

VALID TO:

#### **SCOPE OF THE DECLARATION**

#### THIRD PARTY VERIFIER

![](_page_1_Picture_9.jpeg)

![](_page_1_Picture_10.jpeg)

KÉSZ Ipari Gyártó Kft.

Structural steel

RTS\_299\_24

15.5.2024

15.5.2029

This environmental product declaration covers the environmental impacts of the structural steel product. The declaration has been prepared in accordance with EN 15804:2012+A2:2019 and ISO 14025 standards and the additional requirements stated in the RTS PCR (English version, 26.8.2020). This declaration covers the life cycle stages from cradle-to-gate with options (modules A1-A4, C1-C4, and D).

Verified according to the requirements of EN 15804:2012+A2:2019 Independent verification of the declaration and data, according to ISO 14025:2010

Internal

Mari Kirss Product LCA/EPD Specialist | Rangi Maja OÜ - LCA Support www.lcasupport.com | mari.kirss@lcasupport.com

Manilán

![](_page_1_Picture_21.jpeg)

Building Information Foundation RTS | Malminkatu 16 A | 00100 Helsinki | cer.rts.fi/en/

External

### Owner of the declaration, manufacturer

KÉSZ Ipari Gyártó Kft. Postal address and location: Hungary, Kecskemét, Izsáki út 8/A, 6000 Phone: +36 76 515 200 Email: kecskemetiroda@kesz.hu

### Product name and number

Structural steel

### Manufacturing plant

Kecskemét, Hungary

### **Description of the Product**

KÉSZ Ipari Gyártó Kft. is one of the leading companies in the Hungarian construction market and a significant player in the Central European region. The most diverse references characterize their work in the field of industrial and other investments. They handle significant exports of steel structures made at their production base in Kecskemét. Their 25,000 m<sup>2</sup> steel structure factory center, equipped with special equipment, is the most modern facility of its kind in Hungary and Europe, with one of the largest production capacities at 16,000 tons per year. Its main profile is the technological steel structures and frame structures of heavy industry, energy, building material industry, chemical industry, and environmental protection facilities. In addition, the steel structures of buildings with different functions (production and storage halls, hangars, sports halls, shopping centers) form a significant part of their plant's order book.

KÉSZ Ipari Gyártó Kft.'s currently ongoing projects include the National Athletic Stadium, which also

![](_page_2_Picture_10.jpeg)

![](_page_2_Picture_11.jpeg)

hosts world athletics events, the SK Iváncsa battery factory, the expansion of the Lego factory, the building structure of the National Film Institute, the Alba Arena, and the BMW factory in Debrecen, as well as factories for SK Battery and for Mercedes.

### Product Category Rules and the scope of the declaration

The declaration has been prepared in accordance with EN 15804:2012+A2:2019 and ISO 14025 and 14040/44 standards and the additional requirements stated in the RTS PCR (English version, 26.8.2020) (SFS-EN 15804:2012+A2:2019).

EPD of construction products may not be comparable if they do not comply with EN15804 and seen in a building context.

### Author of the life-cycle assessment and declaration

Csongor Bajnóczki, denkstatt Hungary Kft. Csaba Fűzfa, denkstatt Hungary Kft. Hungary, 1037 Budapest, Seregély st. 6. https://denkstatt.eu/?lang=hu + 3612391206; denkstatt@denkstatt.hu

### Verification

This EPD has been verified according to the requirements of EN 15804:2012+A2:2019 and RTS PCR by a third party. The verification has been carried out by: Mari Kirss, Product LCA/EPD Specialist Rangi Maja OÜ - LCA Support, www.lcasupport.com mari.kirss@lcasupport.com

![](_page_2_Picture_20.jpeg)

![](_page_2_Picture_21.jpeg)

### **Declaration issue date and validity**

Declaration issue date is 15.5.2024. The declaration is valid 5 years.

### **Product description**

The declaration has been conducted for structural steel product manufactured in Hungary.

### Technical specifications, physical properties, and environmental/hazardous properties

#### **TECHNICAL SPECIFICATIONS**

Density

Modulus of elasticity

Coefficient of thermal expansion

Thermal conductivity at 20°C

Melting point depending on the alloy proportio

Shear modulus

### **Environmental/hazardous properties**

The basic and auxiliary materials used in the production of the product do not contain chemicals that are on the REACH list, the list of very hazardous substances (SVHC). The final product is not expected to produce significant adverse health effects when the recommended instruction for use is followed.

![](_page_3_Picture_15.jpeg)

	VALUE	UNIT
	7850	kg/m³
	210000	N/mm <sup>2</sup>
	12x10-6	1/K
	48	W/(mK)
ons	1536	°C
	81000	N/mm <sup>2</sup>

### Raw materials of the product and product information

#### PRODUCT COMPOSI **RAW-MAT**

Primary St

Recycled S

Welding w

Coating (P

\*Order of magnitude, not exact composition

#### Product main composition, at least metals, stone materials, fossil materials, bio-based materials

#### PRODUCT COMPOSI

Metal deriv

Stone-base

\*Order of magnitude, not exact composition

### Mass inputs for the packaging materials for the structural steel product:

#### PACKAGIN

EUR woode

<b>STRUCTURE /</b>			ORIGIN OF		
TION / FERIAL	QUANTITY p%*	RENEWABLE	NON- RENEWABLE	RECYCLED	THE RAW MA- TERIALS
teel from BOF	32%		Х		EU
Steel from EAF	66%		X	Х	EU
vire	1%		X		EU
Paint or zinc)	1%		X		EU

STRUCTURE /	QUANTITY P%*	ORIGIN OF THE RAW MATERIALS
vative	99%	EU
ed materials (minerals)	1%	EU

NG MATERIALS	WEIGHT, KG (PER FUNCTIO
len pallet	33.19

![](_page_3_Picture_37.jpeg)

DNAL UNIT)

![](_page_3_Picture_40.jpeg)

### Functional / declared unit

Indicators are for 1 t of structural steel product.

### System boundary

This EPD covers the following modules: Cradle-to-gate with module A4, modules C1–C4 and module D (A1–A3 + A4 + C + D). The scenarios included are currently in use and are representative for one of the most likely scenario alternatives.

![](_page_4_Figure_5.jpeg)

**Optional modules based on scenarios** 

![](_page_4_Figure_9.jpeg)

![](_page_4_Picture_11.jpeg)

![](_page_5_Picture_1.jpeg)

### **Cut-off criteria**

Al raw material supply, A2 transportation, A3 manufacturing. All used materials, energy, packaging, and transportation until the end-of-waste state have been included. The information from transportation A4 is also included in the LCA-calculation even though A4 module's GWP (global warming potential) is below 20% of the GWP of modules A1– A3. Information from B-module has not been calculated nor included in the LCA-calculations. Modules C1 – C4 have been included. Module D is also included.

![](_page_5_Picture_4.jpeg)

![](_page_5_Picture_5.jpeg)

### **Environmental impacts**

Structural steel product

INDICATOR	UNIT	<b>A1</b>	<b>A2</b>	A3	<b>TOT. A1-A3</b>	Α4	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	D
GWP-fossil	kg CO <sub>2</sub> eq.	1,58E+03	1,56E+02	1,67E+01	1,75E+03	3,08E+01	6,21E+01	8,33E+01	2,25E+01	0,00E+00	-5,07E+02
GWP-biogenic	kg CO <sub>2</sub> eq.	9,17E+00	1,35E-01	1,81E+01	2,74E+01	2,65E-02	1,34E-02	6,87E-02	0,00E+00	0,00E+00	8,96E-01
GWP-luluc	kg CO <sub>2</sub> eq.	3,39E+01	7,77E-02	4,11E-03	3,40E+01	1,50E-02	6,98E-03	4,88E-02	2,72E-02	0,00E+00	-1,95E-01
GWP-total	kg CO <sub>2</sub> eq.	1,59E+03	1,56E+02	3,48E+01	1,78E+03	3,09E+01	6,21E+01	8,34E+01	2,25E+01	0,00E+00	-5,06E+02
ODP	kg CFC 11 eq.	3,39E-05	3,40E-06	2,34E-07	3,75E-05	6,71E-07	9,88E-07	1,81E-06	3,54E-07	0,00E+00	-9,88E-06
AP	mol H+ eq.	6,79E+00	3,49E-01	1,32E-01	7,27E+00	1,01E-01	5,76E-01	2,55E-01	2,72E-01	0,00E+00	-2,06E+00
EP-freshwater	kg P eq.	6,92E-01	1,12E-02	2,74E-03	7,06E-01	2,16E-03	1,90E-03	7,06E-03	1,49E-02	0,00E+00	-2,41E-01
EP-marine	kg N eq.	1,41E+00	8,98E-02	2,54E-02	1,53E+00	3,46E-02	2,67E-01	8,22E-02	6,05E-02	0,00E+00	-4,82E-01
EP-terrestrial	mol N eq.	1,38E+01	9,16E-01	4,56E-01	1,52E+01	3,65E-01	2,90E+00	8,65E-01	6,79E-01	0,00E+00	-5,17E+00
POCP	kg NMVOC eq.	6,60E+00	5,38E-01	5,07E-02	7,19E+00	1,50E-01	8,59E-01	3,69E-01	2,01E-01	0,00E+00	-2,57E+00
ADP-minerals & metals <sup>1</sup>	kg Sb eq.	1,59E-02	5,30E-04	7,60E-05	1,65E-02	1,01E-04	2,17E-05	3,73E-04	1,59E-03	0,00E+00	-4,88E-03
ADP-fossil <sup>1</sup>	MJ	2,19E+04	2,23E+03	1,53E+02	2,43E+04	4,40E+02	8,19E+02	1,18E+03	3,07E+02	0,00E+00	-5,10E+03
WDP	m <sup>3</sup>	9,32E+02	1,12E+01	7,95E+00	9,51E+02	2,16E+00	2,02E+00	6,72E+00	5,46E+00	0,00E+00	-1,20E+02
Acronyms	GWP-total = Global Wa POCP = Formation po	arming Potential; ODP = otential of tropospheric (	Depletion potential of t ozone; ADP-minerals&m	he stratospheric ozone la netals = Abiotic depletio	ayer; AP = Acidification p n potential for non-foss	ootential, Accumulated E sil resources; ADP-fossil =	Exceedance; EP-freshwa = Abiotic depletion for fo	ter = Eutrophication po ossil resources potentia	tential, fraction of nutrie ; WDP = Water depletic	ents reaching freshwater on potential	r end compartment;
Disclaimer	<sup>1</sup> The results of this env	/ironmental impact ind	icator shall be used with	n care as the uncertaint	ies on these results are	high or as there is limite	ed experienced with the	indicator.			

![](_page_6_Picture_4.jpeg)

#### **RESULTS PER FUNCTIONAL OR DECLARED UNIT**

![](_page_6_Picture_8.jpeg)

![](_page_6_Figure_9.jpeg)

### Use of natural resources

Structural steel product

INDICATOR	UNIT	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>TOT. A1-A3</b>	<b>A4</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	D
PERE	MJ	2,26E+03	3,54E+01	4,77E+00	2,30E+03	6,78E+00	4,61E+00	2,55E+01	5,36E+01	0,00E+00	-2,37E+02
PERM	MJ	1,07E+02	0,00E+00	4,74E+02	5,82E+02	0,00E+00	0,00E+00	0,00E+00	-1,07E+02	0,00E+00	0,00E+00
PERT	MJ	2,37E+03	3,54E+01	4,79E+02	2,88E+03	6,78E+00	4,61E+00	2,55E+01	-5,38E+01	0,00E+00	-2,37E+02
PENRE	MJ	1,96E+04	2,23E+03	1,53E+02	2,20E+04	4,40E+02	8,19E+02	1,18E+03	3,07E+02	0,00E+00	-5,10E+03
PENRM	MJ.	7,55E+01	0,00E+00	3,13E+01	1,07E+02	0,00E+00	0,00E+00	0,00E+00	-7,55E+01	0,00E+00	0,00E+00
PENRT	MJ	1,97E+04	2,23E+03	1,85E+02	2,21E+04	4,40E+02	8,19E+02	1,18E+03	2,31E+02	0,00E+00	-5,10E+03
SM	kg	7,13E+02	0,00E+00	0,00E+00	7,13E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,87E+02
RSF	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
NRSF	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
FW	m <sup>3</sup>	9,32E+02	1,12E+01	7,95E+00	9,51E+02	2,16E+00	2,02E+00	6,72E+00	5,46E+00	0,00E+00	-1,20E+02

Acronyms

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources used as raw materials; PERT = Total use of non-renewable primary energy resources; PENRE = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of net fresh water

![](_page_7_Picture_6.jpeg)

#### **RESULTS PER FUNCTIONAL OR DECLARED UNIT**

![](_page_7_Picture_8.jpeg)

![](_page_7_Picture_9.jpeg)

### End-of-life – Waste

Structural steel product

INDICATOR	UNIT	<b>A1</b>	A2	A3	<b>TOT. A1-A3</b>	A4	<b>C1</b>	C2	<b>C3</b>	<b>C4</b>	D
Hazardous waste disposed	kg	1,90E+02	1,52E+00	5,48E-01	1,93E+02	2,95E-01	3,77E-01	8,87E-01	8,24E-01	0,00E+00	-9,94E+01
Non-hazardous waste disposed	kg	2,81E+03	4,67E+01	1,67E+01	2,87E+03	8,98E+00	7,51E+00	3,13E+01	5,85E+01	0,00E+00	-8,92E+02
Radioactive waste disposed	kg	6,40E-02	7,46E-04	0,00E+00	6,47E-02	1,42E-04	8,90E-05	5,76E-04	6,97E-04	0,00E+00	-2,24E-03

### End-of-life – Output flow

Structural steel product

RESULTS PER FUNCTIONAL OR DECLARED UNIT											
INDICATOR	UNIT	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>TOT. A1-A3</b>	<b>A4</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	D
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	7,00E+01	0,00E+00	0,00E+00
Material for recycling	kg	0,00E+00	0,00E+00	8,26E+01	8,26E+01	0,00E+00	0,00E+00	0,00E+00	9,30E+02	0,00E+00	0,00E+00
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	0,00E+00	0,00E+00
Exported energy, electricity	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
Exported energy, thermal	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

![](_page_8_Picture_7.jpeg)

#### **RESULTS PER FUNCTIONAL OR DECLARED UNIT**

![](_page_8_Picture_10.jpeg)

![](_page_8_Figure_11.jpeg)

![](_page_9_Picture_0.jpeg)

### Use of natural resources

Structural steel product

INDICATOR	UNIT	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>TOT. A1-A3</b>	<b>A4</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	D
GWP-total	kg CO <sub>2</sub> eq.	1,59E+00	1,56E-01	3,48E-02	1,78E+00	3,09E-02	6,21E-02	8,34E-02	2,25E-02	0,00E+00	-5,06E-01
ADP-minerals & metals	kg Sb eq.	1,59E-05	5,30E-07	7,60E-08	1,65E-05	1,01E-07	2,17E-08	3,73E-07	1,59E-06	0,00E+00	-4,88E-06
ADP-fossil	MJ	2,19E+01	2,23E+00	1,53E-01	2,43E+01	4,40E-01	8,19E-01	1,18E+00	3,07E-01	0,00E+00	-5,10E+00
WDP	m <sup>3</sup>	9,32E-01	1,12E-02	7,95E-03	9,51E-01	2,16E-03	2,02E-03	6,72E-03	5,46E-03	0,00E+00	-1,20E-01
SM	kg	7,13E-01	0,00E+00	0,00E+00	7,13E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,00E+00
Biogenic carbon content in product	kg C	N/A	N/A	3,54E-03	3,54E-03	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon content in accompanying packag- ing	kg C	N/A	N/A	1,48E-02	1,48E-02	N/A	N/A	N/A	N/A	N/A	N/A

tion-weighted water consumption; SM = Use of secondary material

![](_page_9_Picture_5.jpeg)

STRUCTURAL STEEL PRODUCT: KEY INFORMATION TABLE (RTS) - KEY INFORMATION PER 1 KG OF PRODUCT

|--|

![](_page_9_Picture_9.jpeg)

![](_page_9_Figure_10.jpeg)

### Energy in the manufacturing phase

A3 ELECTRICITY INFORMATION AND CO<sub>2</sub> EMISSION KG CO<sub>2</sub>-EQ./KWH

### Transport (A4)

Transportation impacts occur from final products delivery to construction site (A4). The transportation distance is from the place of manufacture (Kecskemét, Hungary) to the various customers. Transportation does not cause losses as products are packaged properly. Based on the annual average for 2022, the final product is transported 164 km by lorry. Vehicle capacity utilization volume factor is assumed to be 1.

#### VEHICLE TYPE USED FOR TRANSPORT AND I

#### **SPECIFIC TRANSPORT EMISSIONS**

#### **CAPACITY UTILIZATION**

#### **DENSITY OF TRANSPORTED PRODUCTS (KG/I**

**VOLUME CAPACITY UTILIZATION FACTOR** 

![](_page_10_Picture_10.jpeg)

![](_page_10_Picture_11.jpeg)

ELECTRICITY, LOW VOLTAGE, RESIDUAL MIX // HU, ELECTRICITY, LOW VOLTAGE (ECOINVENT 3.9.1)

DISTANCE	164 km by lorry
	0,19 kg CO <sub>2</sub> per tkm
	100% for truck
(M <sup>3</sup> )	7850

![](_page_10_Picture_14.jpeg)

0,39 KG CO<sub>2</sub>-EQ./KWH

![](_page_10_Picture_16.jpeg)

![](_page_10_Picture_17.jpeg)

![](_page_10_Picture_18.jpeg)

### End-of-life process description

**C1:** the environmental impacts associated with the dismantling are modelled accordingly. **C2:** the following distances are assumed for the respective waste destinations:

- To the sorting facility 100 km
- To the recycling facility 50 km and
- To the reuse plant 50 km

**C3 and C4:** the structural steel product is sold over many European markets with varying levels of waste treatment services. One waste treatment scenario is modelled – for broad European context (100% market share). Waste treatment options are considered for broader European context based on official statistics .

- Collection rate: 100%
- Recycling: 93%
- Reuse: 7%

**D:** for the calculation of module D, the benefits/loads from recycling are accounted.

![](_page_11_Picture_11.jpeg)

![](_page_11_Picture_12.jpeg)

#### PROCESSES

Collection process specified by type

Recovery system specified by type

Disposal specified by type

Assumptions for scenario development, e.g., tra

![](_page_12_Figure_6.jpeg)

Structural steel

Reused if me ments of the

![](_page_12_Picture_9.jpeg)

		UNIT (E)
		1,00 t col
		0,93 t for
		N/A
ansportation		The follo • To the s • To the r • To reus
		
monotc		Recycling
mponents	Recycling method	d
neeting the require- new application	Used as a raw ma heavy structural s	terial for new ections/tubes

#### **XPRESSED PER FUNCTIONAL UNIT)**

Ilected separately | 0 t collected with mixed construction waste

r recycling | 0,07 t for reuse

owing distances are assumed for the respective waste destinations: sorting facility – 100 km recycling facility – 50 km se – 50 km

![](_page_12_Figure_15.jpeg)

![](_page_12_Picture_16.jpeg)

RECOVERY SCENARIO 100%

## Disposal of product or material, including losses

N/A

![](_page_12_Picture_20.jpeg)

### Additional information

- » a) emissions to soil
- The information is not available
- » b) emissions to water
  - The information is not available
- » c) emissions to indoor air
  - The information is not available

### Product declaration

The information is available at the web pages, please see link.

### Information on biogenic carbon content

Structural steel product

#### **RESULTS PER FUNCTIONAL**

#### **BIOGENIC CARBON CONTENT**

Biogenic carbon content in product

Biogenic carbon content in packaging

![](_page_13_Picture_16.jpeg)

OR DECLARED UNIT	
UNIT	QUANTITY
kg C	3,54E+00
kg C	1,48E+01

![](_page_13_Picture_18.jpeg)

### References

Ecoinvent v3.9.1 database, 2022

EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products, 2019

ISO 14040:2006 (E) Environmental management — Life cycle assessment — Principles and framework, 2006-07

ISO 14044:2006 + Amd 1:2017 Environmental management — Life cycle assessment — Requirements and guidelines, 2018

RTS EPD, general rules, 2020

RTS PCR protocol: EPDs published by the Building Information Foundation RTS sr, The Finnish RTS EPD programme RTS EPD Guideline, 2021

The recycling and reuse survey: https://www.steelconstruction.info/The\_recycling\_and\_reuse\_survey

![](_page_13_Picture_27.jpeg)

![](_page_13_Picture_28.jpeg)

![](_page_13_Picture_29.jpeg)

![](_page_14_Picture_0.jpeg)

## THE INSIDE IS WHAT MATTERS. MATTER MATTERS.

![](_page_14_Picture_2.jpeg)