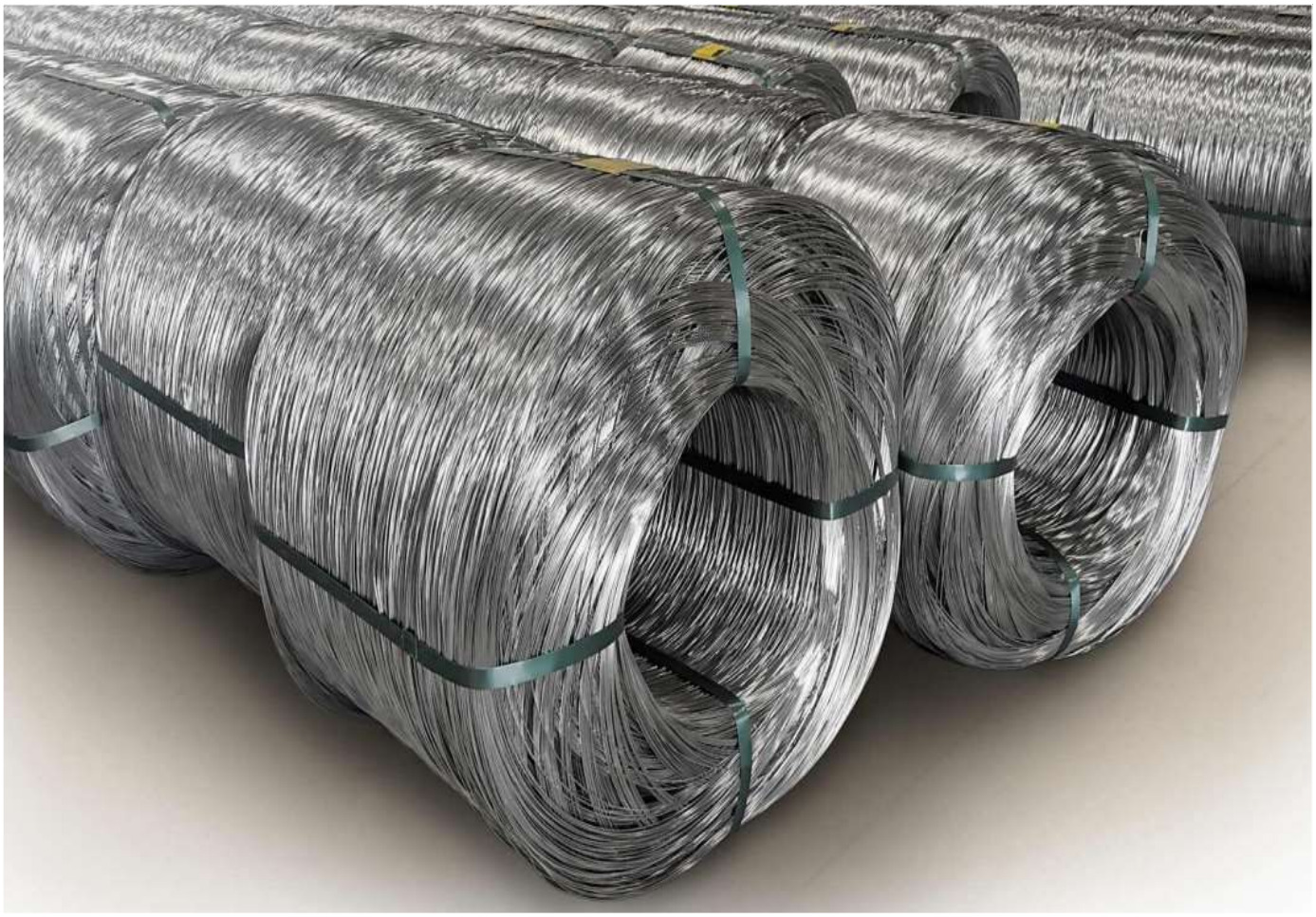
Environmental Product Declaration

In compliance with ISO 14025 and EN 15804:2012+A2:2019/AC: 2021 for

Hot Dip Galvanized Steel Wire



EPD Program	Title	Details
International Climate Intelligence System 71-75 Shelton Street Covent Garden London, WC2H 9JQ United Kingdom office@climateintell.com	Registration #	ICIS-202412-105
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	Date of Revision	-

The most recent data needs to be provided through an EPD, which may be updated when circumstances change. Thereby the claimed validity is contingent upon ongoing validation at www.climateintell.com

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1.0 PROGRAM INFORMATION

Program	International Climate Intelligence System 71-75 Shelton Street Covent Garden London, WC2H 9JQ United Kingdom office@climateintell.com
Product Group Classification	UN CPC 41263
Product Category Rules (PCR)	PCR 2020:17 Construction products(EN 15804:2012+A2:2019/ AC:2021) Version 1.2.5 dated 01.11.2022 EN standard EN 15804 serves as the Core Product Category Rules (PCR)
Registration Number	ICIS-202412-105
Date of Publication	30.12.2024
Validity Date	29.12.2029
Geographical Scope	Global

2.0 INTRODUCTION

This report contains the environmental performance of the manufacturing process of Hot Dip Galvanized Steel Wire manufactured by Essen Steel Industry LLC. This Environmental Product Declaration (EPD) has been developed using the Life Cycle Assessment (LCA) methodology. The environmental impact values calculated are expressed to 1 ton of Hot Dip Galvanized Steel Wire.

The assessed life cycle includes all phases in the manufacturing process of Hot Dip Galvanized Steel Wire in a "cradle to gate with options" scope. This LCA covers transportation of Raw materials, production, distribution of final product to the customer and end of life stages.

This EPD has been conducted according to the program operator regulations and it has been verified in accordance with the International Climate Intelligence System. The EPD regulation is a system for the international use of Type III Environmental Declarations, according to ISO 14025:2006. Not only the system, but also its applications, is described in the Programmer's Product Category Rules (PCR). This report has been made following the specifications given in the European standard EN 15804:2012+A2:2019/AC:2021.

3.0 COMPANY INFORMATION

With the quest to become the local manufacturer supplying globally, Essen Steel has been manufacturing various kind of low carbon and high carbon steel wires and strands (plain and galvanized) catering to different industries and sectors since 2016.

ESSEN Steel is the first company in the field of high & low carbon steel wires & strands manufacturing to be accredited with all three certifications i.e. ISO 9001; ISO 14001 and ISO 45001 in GCC. Our team has a cumulative experience of 100+ years in wire & wire products manufacturing & applications from various globally recognized brands in the same filed.

Essen Steel has latest state-of-the-art manufacturing facility at KIZAD, Abu Dhabi, UAE. The plant capacity is 79,200 MTPA of steel wires and strands. The company intends to increase the capacity level to 90,000 MTPA by end of 2021. The plant falls under one of the largest industrial promotion zone in the UAE (100 SQM) with close access to the largest port in the country, the Port Khalifa. Essen Steel facility has a land area of 564,000 Square Feet.

Through sustainable measures and green technology, ESSEN Steel envision to create value for the nation, enhance quality of life across the socio-economic spectrum and become the global leader in the manufacturing and supply of high grade low carbon and high carbon steel wires and strands (plain and galvanized).

Accreditation and Certifications

- ISO 9001:2015 - Quality Management System Certificate.
- ISO 14001:2015 - Environmental Management System Certificate.
- ISO 45001:2018 - Occupational Health & Safety Management System Certificate.
- DCL Certificate of Product Conformity - BS 5896: 1980 Amd. 1
- DCL Certificate of Product Conformity - ASTM A 416/A 416M: 17a
- UK Cares

4.0 PRODUCT INFORMATION

4.1 Analyzed Product

The assessed system in this Environmental Product Declaration (EPD) comprises the full life cycle of **Hot Dip Galvanized Steel Wire** by Essen Steel in its factory in Abu Dhabi. The assessment has been done using the production data from January – December 2023.

4.2 Product Specification

Size	
Diameter	0.80 mm - 6.00 mm
Tolerance	T1 and T2 according to EN10218-2
Coating	
Heavily Galvanized (EN10244-2 CLASS A, AB AND B) Commercial Galvanized (EN10244-2 CLASS C AND D)	
Tensile	
Soft (S)	350 - 550 N/mm2
Hard (H)	550 - 950 N/mm2
High Tensile (HT)	950 - 1860 N/mm2
For more details click https://www.essensteel.com/wp-content/uploads/2024/05/Essen-Corporate-Brochure_11.pdf	

4.4 Product Application

Essen Steel offers the specialized product with heavy coating hot dip galvanized wires for submarine applications with steel RM base from SAE 1006 to 1082 depending on strength requirements. offer tailor made product developed as per customer norms/ requirements.

Galvanized steel armor wire as per BS EN 10257 unless agreed otherwise. Wire shall be made from low carbon steel by hot-dipped galvanization.

The wire shall be well cleaned drawn and galvanized to the diameter specified.

[For more details https://www.essensteel.com/wp-content/uploads/2024/05/Essen-Corporate-Brochure_11.pdf]

5.0 LCA INFORMATION

5.1 Declared Unit

The Declared Unit of the Life Cycle Assessment is 1 ton of Hot Dip Galvanized Steel Wire.

All direct and indirect environmental impacts, as well as the use of resources, are reported referred to this unit. This EPD presents separately the environmental impacts associated to the LCA of all the Hot Dip Galvanized Steel Wire.

5.2 Time representativeness

Manufacturing facility specific data from Universal Metal Coating Company are based on 1 year average for process data (Reference year January to December 2023). The following rules for time scope of data were applied - < 10 years for background data and < 2 years for manufacturer's data.

5.3 LCA Software and Database

Version 3.17.4.0 of software Air.e LCA™ with Ecoinvent™ 3.10.0 database has been used for LCA modeling and impacts calculations.

5.4 System Boundaries

This EPD covers all product stages from “cradle to gate with options”, i.e this LCA covers Production stage A1-A3, Transportation A4, End of life stages C1-C4 and Resource recovery stage D according to EN 15804 + A2/AC:2021.

It covers transportation of Hot Rolled Steel Wire, production & transportation of other materials such as Zinc, Chemicals etc..., and galvanizing processes and up to the distribution of final product to the customer. End of life and recovery stages.

Essen Steel buys the raw materials (Hot Rolled Steel Wire, Zinc and Chemicals) from external suppliers. From this point Essen Steel controls all the process: wire rod preparation for wire drawing, which includes Mechanical descaling / surface cleaning, and drawing etc. Essen Steel buys raw materials from UAE, Europe, Asia and GCC countries. The procedures that are not controlled by the company, but are included in this environmental study, are:

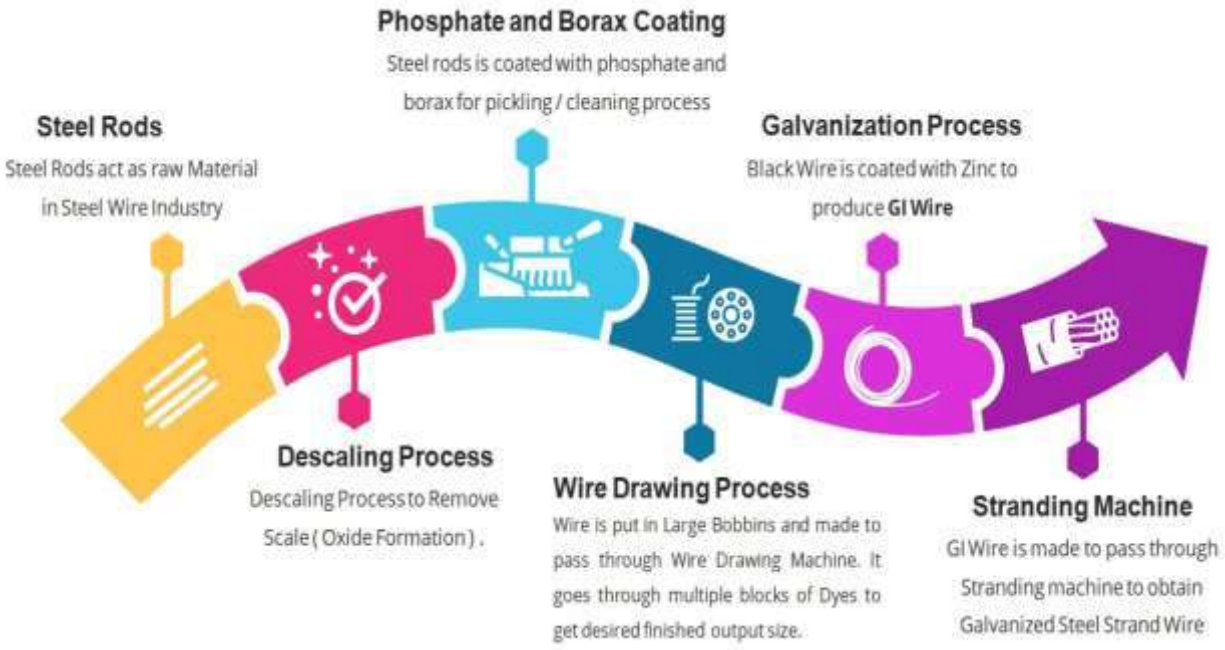
- The extraction and production of fuels and electricity.
- The production of the machinery, buildings, and vehicles.

All related direct and indirect environmental impacts related to these elements have been calculated and were included in the LCAs in this EPD.

Upstream Processes (**A1: Raw Material Supply**): Production of the product starts with mainly raw material production and transportation from UAE and some purchased outside from UAE. 'Raw material supply' includes raw material extraction before production. 10% recycled material used in the raw material (Steel).

Core Processes (**A2: Transportation**): Transport is relevant for delivery of raw materials to the plant and the transport of materials within the plant and in our case, the modelling included each raw material's road and sea distances (average values).

Manufacturing (module A3): The first phase in the LCA is the production of Hot Dip Galvanized Steel Wire. After the wire rod preparation for wire drawing, which includes Mechanical descaling / surface cleaning, and drawing etc. the Hot Dip Galvanized Steel Wires are packed.



Transport (module A4): To create a scenario of the A4 phase, all the products sold from January to December 2023 has been analyzed as representative of the international transport. The transport means 3.5-7.5t & >32t trucks, Euro 6.

Scenario	Parameter	Units	Value Per functional unit
A4 – Cargo Ship	Vehicle type used for transport	Transoceanic cargo ship	n/a
	Vehicle load capacity	Kg (dw)	50,000

	Fuel type and consumption	Liters of heavy fuel oil per km	0.24
	Bulk density of transported products	Kg/m3	n/a
	Volume capacity utilization factor	n/a	1
A4 - Truck	Vehicle type used for transport	>32t truck, 3.5-7.5t truck	n/a
	Vehicle load capacity	Kg	25,000
	Fuel type and consumption	Liters of diesel per km	0.38
	Bulk density of transported products	Kg/m^3	n/a
	Volume capacity utilization factor	n/a	1

Dismantling/demolition (module C1)

95% of the steel is removed during demolition with diesel consumption of machineries: 60.8 liters/hour; capacity approx. 15 m³/h) and 40% is dismantled with hydraulic excavator and tongs (diesel consumption of excavator: 36.1 liters/hour; capacity approx. 20 m³/h). The ratio of steel to concrete content is 4.8 %, corresponding to 120 kg reinforcing steel per m³ reinforced concrete (Source: German Environment Agency). Calculated diesel consumption for the demolition of 1 kg steel is 0.0013 liters.

Transportation of demolished items (module C2)

This module considers that 95% of the steel rod is recycled which is taken to a nearby recycling center averaged at a distance of 50 kms in a >32 ton truck and the remaining 5% of the waste is landfilled using the same transportation assumptions.

Type	Capacity utilization	Type of vehicle	Average distance
Truck	75%	Euro 3.5-7.5t	50 km

Waste processing (module C3)

Steel must be mechanically separated from concrete or any other material surrounding them prior to recycling so that the steel can be made available to a downstream product system as secondary material. 95% of the steel is recovered whereas the remaining 5% is assumed to be landfilled. This is considered in module C3.

Disposal (module C4)

This module represents the 5% of used steel wire which is to be disposed of in a landfill.

Reuse, Recycling, and Recovering Potential (module D)

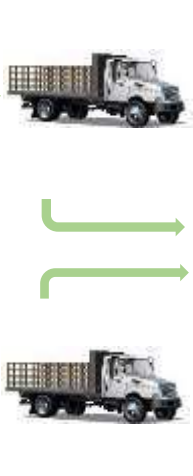
This module accounts for the benefits from the recycling potential of all the used packaging materials and steel.

Manufacturing and System Boundaries Diagram

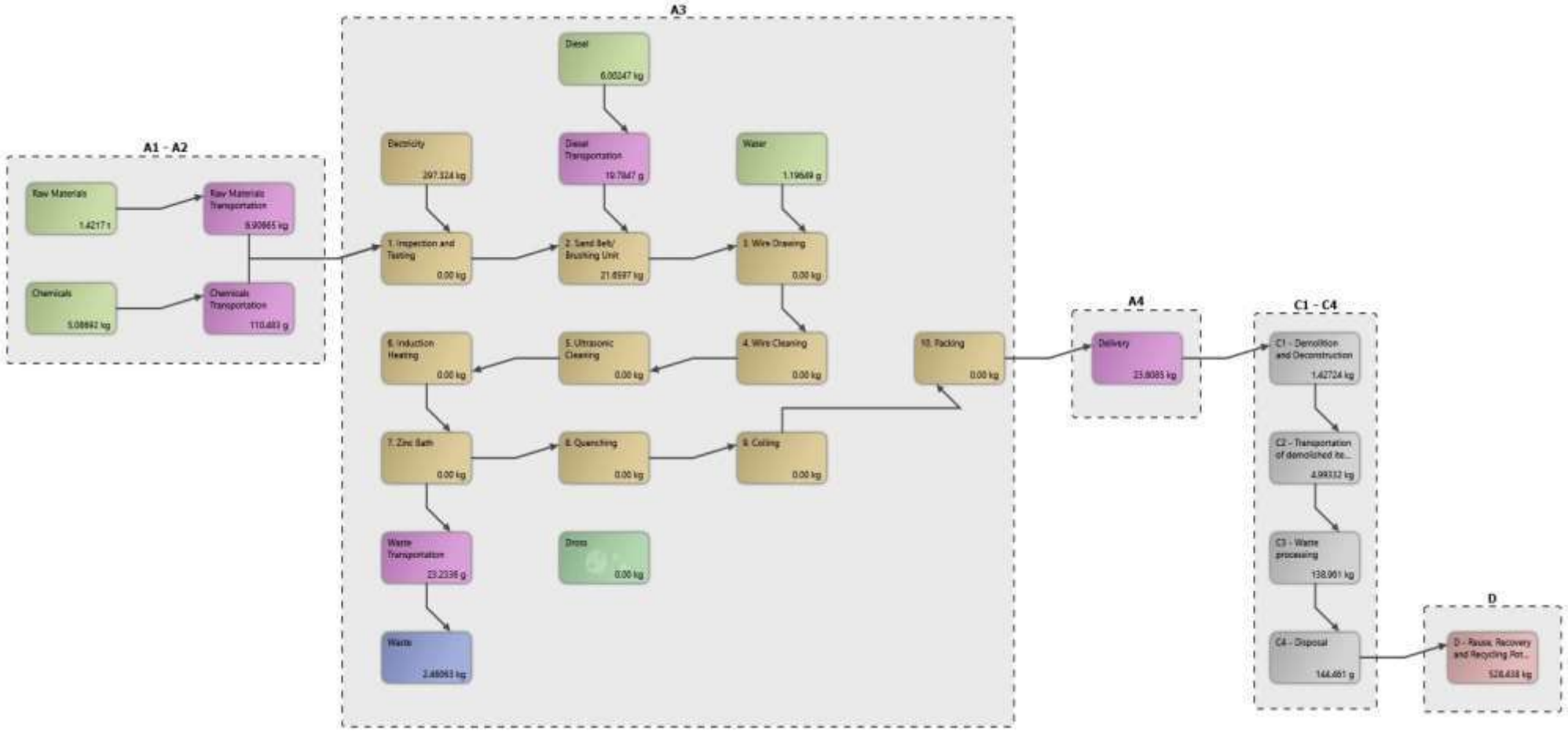
	Production Stage			Construction Process Stage		Use Stage							End of Life Stage				Resource Recovery Stage
	Raw Materials	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-construction Demolition	Transport	Waste Processing	Disposal	Reuse Recovery Recycling Potential
Module	**A1**	**A2**	**A3**	**A4**	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	**X**	**X**	**X**	**X**	ND	ND	ND	ND	ND	ND	ND	ND	**X**	**X**	**X**	**X**	**X**
Geography	UAE	UAE	UAE	GLO	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data	GWP > 90%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	One Product				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	One manufacturing center				-	-	-	-	-	-	-	-	-	-	-	-	-

X = Included, ND=Module not declared, NR= Module not relevant

Modules from A5 to B7 are not included (X refers to considered stage; N refers to not relevant stage and ND to not declared stage).

Scope of this Life Cycle Assessment 'Cradle to Gate with Options'					
A1 Raw Materials Production	**A2 Transport raw materials**	**A3 Manufacture**	**A4 Distribution**	**End of use Stage (C1-C4)**	**Recovering and Recycling (D)**
					
Raw Materials and Chemicals	Transport from supplier by Road	cleaning, galvanizing, chemical coating and packing	Transport to customers by trucks	Demolition, transport, disposal.	Reuse, recovery and recycling potential

5.5 The following diagram is a more detailed description of the modules.



5.6 Content Declaration

Product Components	Weight Kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Steel	970.50	10.00	0
Zinc	29.50	0	0
Total	**1000.00**	**10.00**	**0**

Packaging Materials			
Packaging Materials	**Weight Kg**	**Weight % (Versus the Product)**	**Weight biogenic carbon, kg C/kg**
Metal Straps	28220	1.14	0
Bags/LDPE	44616	1.80	0
Pet Strapping Roll	18740	0.56	0
Total	91,576	3.50	0
*Biogenic carbon content is not presents since the packaging weights less than a 5% over the product's weight.			

5.7 Substances listed in the "Candidate List of SVHC"

During the life cycle of the product, no hazardous substances listed in the "Candidate List of substances of very high concern (SVHC) for authorization" has been used in a percentage higher than 0.1% of the weight of the product.

5.8 More information

Cut-off rules: more than 99% of the materials and energy consumption have been included. The Polluter Pays Principle and the Modularity Principle have been followed.

Allocations: The allocation of common inputs and outputs is based on the general allocation rule what represents the proportion of production of every specific product in overall production expressed in Ton. Generic process data for production of input materials were used.

Electricity: A specific dataset with the Life Cycle Inventory (LCI) corresponding to the electricity mix of Abu Dhabi has been used for this LCA.

Calculation Rules: Datasets from Ecoinvent 3.10.0 with emission factors for raw materials and generic chemicals have been characterized to adjust them to the characteristics of manufacturing of suppliers or counties where suppliers are located. Specific datasets with the emissions factors corresponding to the fuel combustion of production plant and machinery have been developed for these LCAs. Indirect

emissions due to diesel production and transportation are also included in the environmental impact. Minor components are not directly related to the product, with less than 1% impact, such as office supplies, has been excluded from the assessment.

All transports of components have been included in the LCA considering real distances travelled by materials used for production. It is estimated in a global scale according to Ecoinvent™ criteria. As exact port locations are not known in detail, transport distances have been calculated from a one of the ports in the country of origin to the factory. Operation in port has also been excluded. Road distances calculated using Google Maps. Maritime distances calculated using Marine Traffic Voyage Planner.

By Products Assignment: Economic allocation was applied and the allocation was performed according to the PCR. Economic allocation was based on the income of each product. List of By Products used in this EPD are:

- Zinc Dross

6.0 ENVIRONMENTAL PERFORMACE

6.1 Potential Environment Impacts

In the following tables, the environmental performance of the declared units “One-ton of Galvanized Steel Wire” is presented for the Essen Steel Industry LLC. During the assessment it was not evident to distinguish the differences in the consumption of electricity, water and raw material during the manufacturing. Hence, the calculation is based on total production vs total consumption against manufacturing of the product. Environmental impacts are calculated using the EF-3.1, (ILCD).

Hot Dip Galvanized Steel Wire

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding thresholds values, safety margins or risks.

Core Environmental Impact Indicators

Impact Category	Unit	A1	A2	A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Climate change (GWP) – fossil	kg CO2e	1.42E+03	7.01E+00	3.27E+02	2.36E+01	ND	ND	1.43E+00	4.99E+00	1.38E+02	1.44E-01	-5.26E+02
Climate change (GWP) – biogenic	kg CO2e	2.49E+00	1.93E-03	6.17E-01	5.12E-03	ND	ND	3.00E-04	1.38E-03	1.07E+00	2.26E-05	-2.23E+00
Climate change (GWP) – LULUC	kg CO2e	1.48E+00	2.90E-03	2.25E-02	1.08E-02	ND	ND	2.23E-04	2.06E-03	3.40E-01	1.60E-05	-6.56E-01
Climate change (GWP) – total	kg CO2e	1.43E+03	7.02E+00	3.27E+02	2.36E+01	ND	ND	1.43E+00	4.99E+00	1.39E+02	1.44E-01	-5.28E+02
Ozone depletion	kg CFC11e	1.62E-05	9.96E-08	8.67E-06	2.87E-07	ND	ND	8.90E-08	7.11E-08	1.97E-06	2.09E-09	-9.73E-06
Acidification	mol H+e	2.96E+01	1.89E-02	5.58E-01	3.57E-01	ND	ND	4.30E-03	1.21E-02	1.02E+00	1.27E-03	-3.25E+00
Eutrophication, aquatic freshwater	kg PO4e	1.82E+00	1.51E-03	1.27E-01	3.72E-03	ND	ND	1.46E-04	1.08E-03	1.98E-01	2.13E-05	-7.89E-01
Eutrophication, aquatic freshwater	Kg P eq	5.94E-01	4.93E-04	4.14E-02	1.21E-03	ND	ND	4.75E-05	3.53E-04	6.45E-02	6.94E-06	-2.57E-01
Eutrophication, aquatic marine	kg Ne	2.68E+00	4.95E-03	4.89E-01	8.95E-02	ND	ND	7.40E-04	3.20E-03	1.96E-01	5.71E-04	-1.28E+00
Eutrophication, terrestrial	mol Ne	1.18E+02	5.33E-02	2.25E+00	9.90E-01	ND	ND	7.73E-03	3.44E-02	2.25E+00	6.24E-03	-6.45E+00
Photochemical ozone formation	kg NMVOCe	5.26E+00	2.75E-02	1.05E+00	2.89E-01	ND	ND	8.06E-03	1.87E-02	7.39E-01	1.89E-03	-2.64E+00
Abiotic depletion, minerals & metals	kg Sbe	6.45E-02	1.89E-05	2.08E-04	4.53E-05	ND	ND	9.79E-07	1.35E-05	6.15E-03	5.62E-08	-7.78E-03
Abiotic depletion of fossil resources	MJ	1.54E+04	1.01E+02	5.84E+03	2.96E+02	ND	ND	6.98E+01	7.24E+01	1.59E+03	1.93E+00	-6.08E+03
Water use	m3e depr.	1.08E+03	6.04E-01	4.48E+02	1.45E+00	ND	ND	1.07E-01	4.33E-01	4.28E+01	5.80E-03	-5.49E+02

EN 15804+ A2 disclaimers for Abiotic depletion and Water use indicators and all optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. "Reading example: 1.57E-03 = 1.57*10-3 = 0.00157"

Additional Environmental Impact Indicators

Impact Category	Unit	A1	A2	A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Particulate matter	Incidence	2.90E-04	5.31E-07	1.91E-06	1.29E-06	ND	ND	3.35E-08	3.80E-07	1.00E-05	3.49E-08	-9.00E-05
Ionizing radiation, human health	kBq U235e	6.12E+01	9.44E-02	5.46E-01	2.27E-01	ND	ND	1.20E-02	6.76E-02	7.22E+00	8.95E-04	-2.23E+01
Eco-toxicity (freshwater)	CTUe	4.80E+04	2.24E+01	2.59E+03	6.08E+01	ND	ND	3.40E+00	1.60E+01	2.36E+03	2.53E-01	-1.12E+04
Human toxicity, cancer effects	CTUh	7.00E-05	3.42E-08	1.01E-07	1.03E-07	ND	ND	3.30E-09	2.44E-08	3.90E-06	5.06E-10	-1.00E-05
Human toxicity, non-cancer effects	CTUh	1.00E-04	6.85E-08	8.46E-07	1.58E-07	ND	ND	4.83E-09	4.90E-08	6.15E-06	2.87E-10	-9.00E-05
Land use related impacts/soil quality	Dimensionless	9.75E+03	1.09E+02	1.18E+02	2.12E+02	ND	ND	3.97E+00	7.80E+01	2.18E+03	2.20E+00	-9.11E+03

EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Environmental impacts – GWP-GHG

Impact Category	Unit	A1	A2	A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-GHG	kg CO2e	1.42E+03	7.02E+00	3.27E+02	2.36E+01	ND	ND	1.43E+00	4.99E+00	1.38E+02	1.44E-01	-5.26E+02

This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013)
This indicator Is almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of Natural Resources

Impact Category	Unit	A1	A2	A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Renewable PER used as energy	MJ	2.23E+03	1.42E+00	1.03E+01	3.52E+00	ND	ND	1.41E-01	1.02E+00	2.44E+02	1.71E-02	-1.81E+03
Renewable PER used as materials	MJ	4.08E+00	6.20E-03	8.26E-02	1.53E-02	ND	ND	6.93E-04	4.44E-03	6.44E-01	5.68E-05	-2.29E+00
Total use of renewable PER	MJ	2.23E+03	1.43E+00	1.04E+01	3.54E+00	ND	ND	1.42E-01	1.02E+00	2.45E+02	1.72E-02	-1.81E+03

Non-renew. PER used as energy	MJ	1.54E+04	1.01E+02	5.84E+03	2.96E+02	ND	ND	6.98E+01	7.24E+01	1.59E+03	1.93E+00	-6.08E+03
Non-renew. PER used as materials	MJ	4.11E-03	1.38E-05	4.29E-05	2.79E-05	ND	ND	3.56E-07	9.89E-06	4.54E-04	5.42E-08	-1.40E-03
Total use of non-renewable PER	MJ	1.54E+04	1.01E+02	5.84E+03	2.96E+02	ND	ND	6.98E+01	7.24E+01	1.59E+03	1.93E+00	-6.08E+03
Use of secondary materials	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renew. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	0.00E+00	0.00E+00	9.59E-01	0.00E+00	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

End of Life - Waste

Impact Category	Unit	A1	A2	A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Hazardous waste	Kg	0.00E+00	0.00E+00	1.12E+01	0.00E+00	ND	ND	0.00E+00	0.00E+00	0.00E+00	5.00E+01	0.00E+00
Non-hazardous waste	Kg	0.00E+00	0.00E+00	6.73E-01	0.00E+00	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

End of Life - Outflows

Impact Category	Unit	A1	A2	A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Components for reuse	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-9.53E+02
Materials for recycling	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	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	ND	ND	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	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic Carbon Content

Details	Unit	A1-A3
Biogenic carbon content in product	Kg C	0
Biogenic carbon content in accompanying packaging	Kg C	0

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2. "Reading example: 1.57E-03 = 1.57*10-3 = 0.00157"

Disclaimer: "According to the EN 15804:2012+A2:2019 standard, the LCIA results are relative expressions translating impacts into environmental themes such as climate change, ozone depletion, etc. (midpoint impact categories). Thus, the LCIA results do not predict impacts on category endpoints such as impact on the extinction of species or human health. In addition, the results do not provide information about the exceeding of thresholds, safety margins or risks".

6.2 Interpretation of LCA Study Results

In general terms, as it is shown in the table of core environmental impact indicators, A1-A3 modules have the higher impact, representing above 80% of the whole impact. A4 module has a less impact. C2 and C4 module has little impact too, representing at most 0.16% and 0.01% respectively of the whole impact. Refer the below table 1 for more detailed explanations.

Concluding, the study provides fair understanding of environmental impacts during the various life cycle stages of galvanized steel wire production. It also identifies the hot spots in the value chain where improvement activities can be prioritized and accordingly actions can be planned. The scope covers the ecological information to be divided into raw material production (A1), transportation (A2), manufacturing (A3), delivery (A4), product dismantling (C1), transport of dismantled product to site (C2), waste processing (C3), waste disposal (C4) as well as the end of life stage recycling (D) considerations.

Table 1 - Interpretation of most significant contributors to life cycle parameters

Impact Indicator	Description	Most significant contributor
Depletion of abiotic resources – fossil fuels	Indicator of the depletion of natural fossil fuel resources.	The total cradle to gate impact is 2.13+04 (21328.26) MJ. In A1 – A3, the raw material (steel) (72.15%), production process (27.37%) has the highest impacts. A total credit of -6.08E+03 MJ is taken in module D.
Climate Change (Global Warming Potential- GWP-GHG)	Indicator of potential global warming due to emissions of greenhouse gases to the air. Divided into 3 subcategories based on the emission source: (1) fossil resources, (2) bio-based resources, and (3) land use change.	The total cradle to gate impact is 1.76E+03 (1758.18) kg CO2 eq. In A1 – A3, the raw material (steel) (81.01%) followed by production A3 (18.59%) has the highest impacts. A total credit of -5.26E+02(526.21) kg CO2 eq is taken in the module D.
Climate change (fossil)	Indicator of the depletion of natural fossil fuel resources.	The total cradle to gate impact is 1.76E+03 (1756.67) kg CO2e. In A1 – A3, the raw material (80.99%) followed by production (18.60%) A total credit of -5.26E+02(525.56) kg CO2 eq is taken in the module D.

7.0 MANDATORY STATEMENTS

Explanatory material can be obtained from EPD owner and/or LCA author. The verifier and The Program Operator do not make any claim or present any responsibility about the legality of the product. The EPD owner has the sole ownership, liability, and responsibility for the EPD. The LCA Author shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; have equivalent content declarations; and be valid at the time of comparison.

8.0 ADDITIONAL INFORMATION

8.1 Recycle Content

Recycling Content – Input Material (Hot Rolled Steel Rod/Wire)

Essen Steel has purchased Hot Rolled Steel Rods during the period of January to December 2023 has average of 10% recycled material as declared by their manufacturers.

Recycling Initiative – Processing Stage

Spent chemicals, Rinse Water used in the galvanizing process are recycled internally.

Recycling Content – End of Life

All steel products are recyclable at end of life. Current practice for the average hot dip galvanized steel consist of 95% recycling and 5% landfill according to the /European Commission Technical Steel Research.

Commitment to Sustainability

Essen Steel has invested in the latest technology on galvanizing wires. The Galva Green Technology is a chemical-free galvanizing technology with zero impact on the environment. The line operates at a highest DV in the world, enabling Essen Steel to achieve highest productivity performance. The line conserves energy by reducing the heat input levels to 30%. Essen Steel places high emphasis in promoting green culture within our team and key stakeholders in our production process that we have spent significantly on facilities to maintain a minimum impact in the environment.

E-PHOS Inline System enables us to produce high quality yet cost effective phosphate coated steel wires as this system allows us to process the wires with very short treatment periods, lower consumption of chemicals and lower operating temperature.

8.2 Information related to Sector EPD

This is not a sector EPD.

8.3 Differences versus previous versions

This is the first version of the EPD.

9.0 VERIFICATION

Diffusion Institution	International Climate Intelligence System 71-75 Shelton Street Covent Garden London, WC2H 9JQ United Kingdom
Registration Number	ICIS-202412-105
Date of Publication	30.12.2024
Valid until	29.12.2029
Geographical Scope	Global
Product category rules (PCR): PCR 2020:17 Construction products (EN 15804:2012+A2:2019/AC:2021) Version 1.2.5 dated 01.11.2022. EN standard EN 15804 serves as the Core Product Category Rules (PCR)	
PCR review was conducted by: International Climate Intelligence System.	
Independent verification of the declaration and data, according to ISO 14025:2006 and ISO 14040: ☐ EPD Process Certification (internal) ☒ EPD Verification (external)	
Third party verifier: Mr.Luis Manuel, San Adrián Accredited by: International Climate Intelligence System	

10.0 CONTACT INFORMATION

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Verifier Details	Name: Mr.Luis Manuel, San Adrián Location: Spain Accredited by: International Climate Intelligence System

11.0 REFERENCES

LCA Report: Life Cycle Inventory of Hot Dip Galvanized Steel Wire.

Software: Air.e LCA Version 3.17.4.0 www.solidforest.com

Main database: Ecoinvent 3.10.0 www.ecoinvent.org

Geographical scope of the EPD: Global

ISO 14040:2006 “Environmental management -- life cycle assessment -- principles and framework”; ISO 14044:2006 “Environmental management -- life cycle assessment -- requirements and guidelines”; ISO 14020:2000 “Environmental Labels and declarations - General Principles

ISO 14025:2006 “Environmental labels and declarations -- type III environmental declarations -- principles and procedures”. EN 15804+A2:2019/AC:2021 European Committee for Standardization: Environmental product declarations − Core rules for the product category of construction products.

General Programme Instructions of the International Climate Intelligence System.