Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Hot Dip Galvanized Pole and High Mast

From Skipper Limited

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
Licensee:	EPD India
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General Information

Programme Information

Programme:	The International EPD® System	Licensee: EPD India
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden	EPD India, a licensee of the International EPD® System 422, Midas, Sahar Plaza Mumbai, India- 400059
Website:	www.environdec.com	www.environdecindia.com
E-mail:	info@environdec.com	info@environdecindia.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction products, version 1.3.4
PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Life Cycle Assessment (LCA)
LCA accountability: Skipper Limited
LCA and EPD developer: Dr. Rajesh Kumar Singh Thinkstep Sustainability Solutions Pvt. Ltd., a Sphera Company
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: EPD verification by individual verifier Third-party verifier: Prabodha Acharya, Independent verifier, Mumbai, India Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, 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; apply identical cut-off rules and impact assessment methods (including the same version of characterization factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company Information

Owner of the EPD: Skipper Limited
Contact: Rajkumar Nanda
(Head-EHS & Sustainability)
Skipper Limited,
Address: 3A, Loudon Street, Kolkata- 700017, West Bengal, India.
Phone: +91 33 2289 5731/32/33
Email- rajkumar.nanda@skipperlimited.com
Website: - www.skipperlimited.com

Description of the Organization

Skipper stands as a beacon of innovation and excellence in the realm of infrastructure solutions, catering to the evolving needs of a dynamic world. With a rich legacy dating back to 1981, spanning over four decades of unwavering commitment to quality and reliability,

Skipper Limited has grown into a global leader in manufacturing Transmission and Distribution structures (Towers & Poles) within its engineering products segment. Skipper Limited is widely recognized as a trusted partner for executing critical Infrastructure EPC projects. Over more than four decades, Skipper has been instrumental in facilitating growth and development in India through our performance execution and innovative ideas. As India's largest T&D structure manufacturer and among the world's largest integrated transmission tower manufacturing companies, we undertake every aspect of the value chain. This includes design engineering, load testing, angle rolling, fabrication, galvanizing and EPC line construction. Our vision aims to ensure robust national infrastructure development and position India as a preferred global sourcing hub for infrastructure needs.

Skipper Limited operates on a global scale in the business of engineering and manufacturing of steel towers, poles and high masts for power transmission and distribution, solar, telecommunication, lighting, and transportation infrastructure. Headquartered in Kolkata, West Bengal, India.

Fully Integrated R&D Center

Skipper is among the handful in its sector investing heavily in research and innovation. The Company's R&D department is recognized by Dept. of Scientific and Industrial Research (DSIR), Govt. Of India. The Center is reinforcing the Company's strong commitment to innovative products and solutions for its customers. The In-house Research & Development Centre is located in Howrah, West Bengal.

The R&D center is a powerhouse of innovation with a dedicated team and complete infrastructure to constantly study and explore ways to improve a company's products and processes. It plays a vital

role in refining and customizing tower designs. This focus on continuous improvement translates to superior customer satisfaction.

The R&D Center is equipped with a Full-Scale Load Testing Station, which is one of the world's largest such facility. This expansive facility, situated on a 14-acre plot, is a marvel of modern engineering. The station holds NABL accreditation (Certificate No. TC9011), signifying its commitment to maintaining the highest testing standards. Our testing facility is one of the largest in India and the first of its kind in Eastern India. It offers a comprehensive suite of services, including full-scale load testing, a critical tool for validating the structural integrity of our towers. This capability allows us to test a wide range of structures, including lattice towers, monopoles, and guyed towers, all within a world-class testing environment. Skipper's testing facility has become the go-to destination for OHTL contractors and manufacturers seeking comprehensive prototype testing. Our advanced equipment and highly skilled personnel provide a reliable and efficient platform for evaluating the performance and safety of new tower designs.

Product-Related or Management System-Related Certifications:

Skipper Limited has ISI, PGCIL, DAkkS, TUV, ISOQAR, and Various International entities approved manufacturing units in Uluberia and Jangalpur in West Bengal.
All units are ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 certified.
Skipper Limited – Uluberia and Jangalpur Unit (SL1) are certified as per ISO-3834-2(welding Management system). Also, both units are certified as per EN-1090-1 and EN-1090-2.
Skipper In-house Mechanical and Chemical laboratory are certified as per ISO/IEC- 17025:2017.
Skipper Limited, Uluberia unit is certified as per CSA-W47.1.

Name and location of production site(s):

Hot dip galvanized Pole and High Mast are manufactured at Uluberia Unit while the testing occurs at Bagnan unit. This EPD is the total of the entire production from Uluberia unit only.

Skipper Limited (Factories)

Uluberia Unit: (Galvanized Steel Tower & Pole manufacturing)	NH6, Village: Madhabpur, Post: Uluberia, District: Howrah – 711 303, West Bengal, India.
Unit 01: (Galvanized Steel Tower manufacturing)	Gate No. 1, Jalan Complex, NH6, Village: Jangalpur, Post: Andul Mouri, District: Howrah – 711 302, West Bengal, India
BCTL Unit: (Galvanized Steel Tower manufacturing)	Gate No. 1, Jalan Complex, NH6, Village: Jangalpur, Post: Andul Mouri, District: Howrah – 711 302, West Bengal, India
Bagnan Unit: (R & D with tower testing facilities)	Village & PO: Barunda, Post: Bagnan, District: Howrah – 711 303, West Bengal, India

This EPD represents the Hot Dip Galvanized Steel Poles and High Mast production at Uluberia Unit.

The Galvanizing Processes of Pole & High Mast:

Hot dip galvanizing is one of the most popular treatments for steel corrosion protection and can be applied to a wide range of steel products that are characterized by many different dimensions, geometries and functions. The operational sequence of the plant is essentially the same and the dimension of the kettles (i.e., the bath of molten zinc) is determined by the typical mix of products to be coated.

Galvanizing is a corrosion protection process for steel, in which the steel is coated with zinc to prevent it from rusting. The process involves dipping cleaned iron or steel components into molten zinc (which is usually at around 450°C). A series of zinc-iron alloy layers are formed by a metallurgical reaction between the iron and zinc creating a strong bond between steel and the coating. A typical time of immersion is between two to five minutes depending upon the thickness of the material and the requirement of coating thickness but it can be longer for heavy articles that have high thermal inertia or where the zinc is required to penetrate internal voids. Upon withdrawal from the galvanizing bath, a layer of molten zinc will be deposited on top of the alloy layer stopping corrosion of steel in two ways – a physical barrier and Hot Dip Galvanizing protection. Typical coating thicknesses can range from 45 µm to over 200µm and in case of damaged area, a galvanic cell is formed: the zinc around the point of damage corrodes in preference to the steel and forms corrosion products that precipitate on the steel surface and protect it.

The hot dip galvanized coating is applied according to the requirements of EN ISO 1461: 2009; ASTM A 123/ A 123M-12; IS: 2629:1985; ASTM A 153/A, 153M-03; ASTM A 780/A780M-09; BS 729: 1971; BS EN 1179: 1995; IS 4759:1996; IS 1367.13.1985; IS 2633:1986.

The life of the coating varies depending on the exposure conditions and, for most situations, can be estimated using EN ISO 14713-1.

Product portfolio of Pole manufacturing (Applications):

Transmission Pole:

Transmission line poles support electrical conductors, ensuring safe power transmission over long distances. They're typically located in rural and urban areas, near power plants, alongside highways, and across natural obstacles. Their placement considers safety regulations, environmental impact, and existing land use for efficient and reliable electricity distribution. We have Design, Manufactured and installed Tallest and Heaviest Transmission Poles in INDIA.

Flag Mast:

Flag masts display flags, symbolize identity and pride, are used in ceremonies, indicate wind direction, and enhance visibility in public spaces or events. We have Design, Manufactured and installed Tallest Flag Mast of length 127.5 Mtr. in Attari – Wagah Border.

Tubular Telecom Tower:

Mobile tower structures provide cellular coverage, enable high-speed internet, facilitate emergency communication, support broadcasting, connect IoT devices, host weather monitoring equipment, and may assist in surveillance systems. We are the largest supplier of Telecom Tower in INDIA.

Lighting Pole:

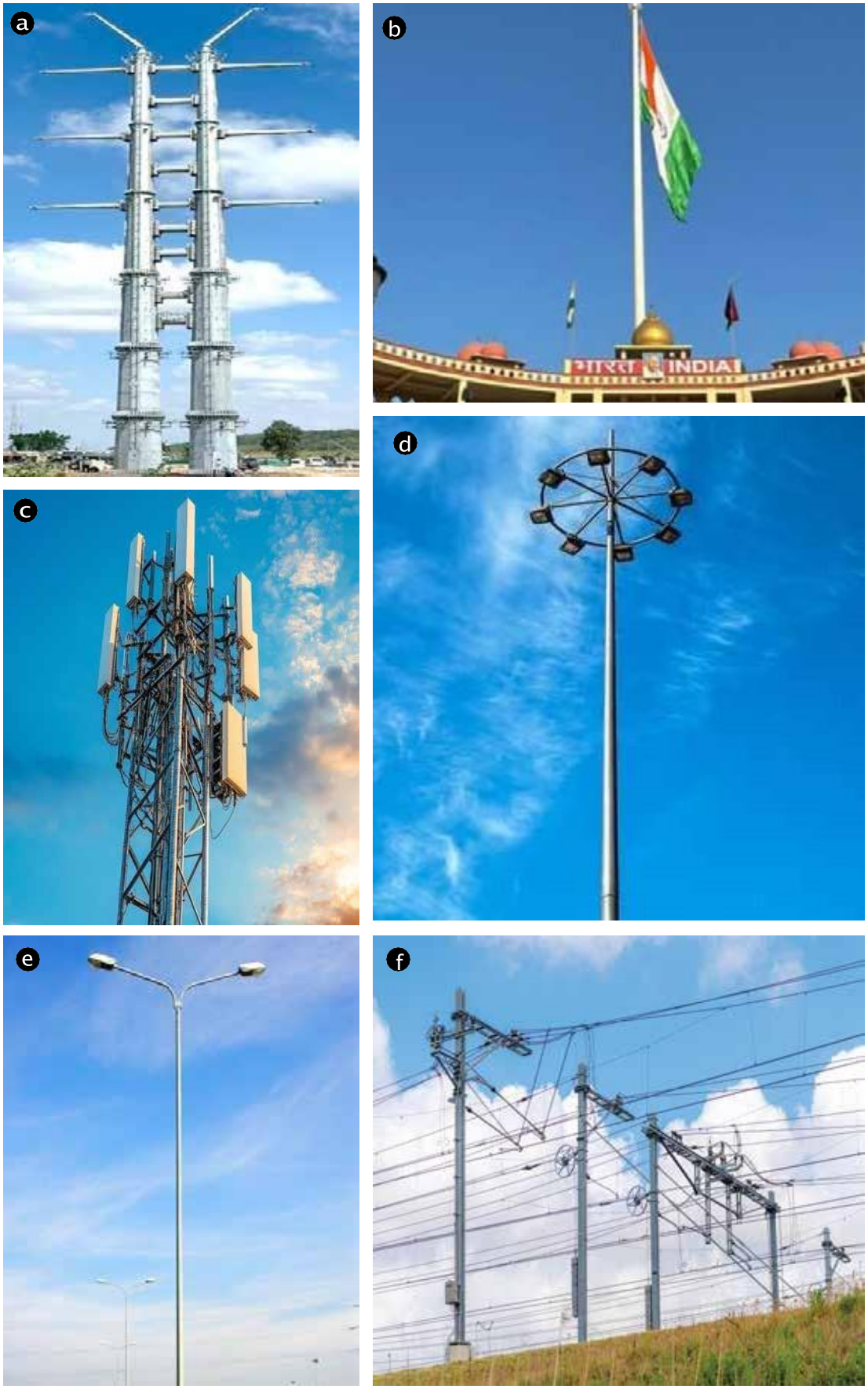
Lighting poles illuminate streets, parks, and public spaces, enhancing safety and visibility. They support various lighting types, improve night time aesthetics, and can also host cameras or signage for added functionality.

Swage Poles:

Swage poles are used for mounting lights, signage, and antennas. Their lightweight design allows easy installation in various environments, providing support for street lighting, decorative lighting, and communication equipment.

Railway Structures

Railway electrification structures, such as Portal, Mast, SPS, overhead lines and substations, supply electric power to trains. They enable efficient, high-speed travel, reduce emissions, and enhance service reliability. These structures also support signaling systems and improve safety for both passengers and freight operations.



a. Heaviest H-Frame Poles in INDIA
b. Tallest Flag Mast in INDIA
c. Tubular Telecom Tower
d. Lighting Pole
e. Swage Pole
f. Railway Structures

Product Information

Product Name:	Hot Dip Galvanized Pole and High Mast.
Product Identification:	Steel Poles, Telecom Tower & Structures- Electricity and Microwave Transmission.
Product Description:	Hot-dip Galvanized Steel Poles and Structures are used for transmission of electric energy from the power plants to the transformer stations in proximity of the electric consumption areas or the distribution thereof from these stations to end-users. Hot dip Galvanized Mobile tower structures provide cellular coverage, enable high-speed internet, facilitate emergency communication, support broadcasting, connect devices, host weather monitoring equipment, and may assist in surveillance systems.

Hot-dip Galvanized Lighting poles illuminate streets, parks, and public spaces, enhancing safety and visibility. They support various lighting types, improve nighttime aesthetics, and can also host cameras or signage for added functionality. Hot-dip Galvanized Swage poles are used for mounting lights, signage, and antennas. Their lightweight design allows easy installation in various environments, providing support for street lighting, decorative lighting, and communication equipment.

These Galvanized Poles and Structures are designed and manufactured considering the parameters such as routes of the energy transmission lines, geographical, land and atmospheric conditions, line voltages, carrying capacity and intended use specified. Poles are designed and manufactured as per CEA Guideline, IS 802, IEC 60826 and ASCE 48-19. Railway Structures are manufactured as per RDSO Guideline. Hot-dip Galvanized Steel Poles and Structures are manufactured in the forms of Polygonal; Tubular and Mast type and, are delivered as galvanized which protect the steel from atmospheric corrosion. Zinc coating process (galvanizing) is applied with the minimum average thickness coating thickness as stated in EN ISO 1461, ASTM A123 standards and IS 4759.

Hot-dip Galvanized Pole & High Mast are manufactured in the forms of lattice or pole type and, are delivered as galvanized and galvanized for the atmospheric corrosion resistance.

Surface area of final products can vary average value is 55 m^2/ton. Zinc coating process (galvanizing) is applied with the minimum average thickness coating thickness as stated in EN ISO 1461 and ASTM A123 standards.

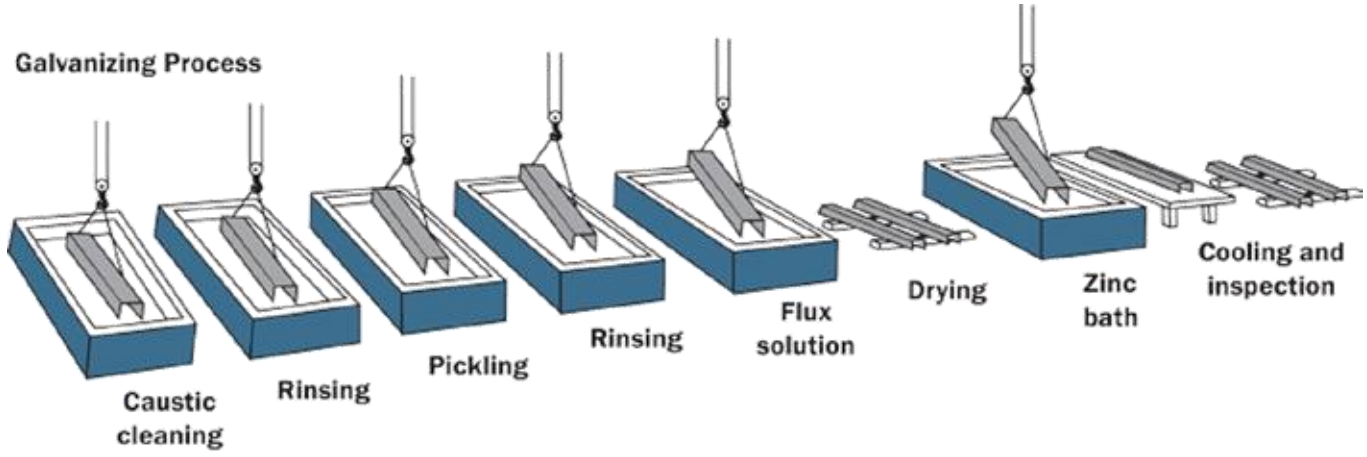
Manufacturing Process

The manufacturing of Pole and High Mast takes place in below steps:

- Fabrication
- Galvanization

Fabrication

Galvanization



Fully automated and imported galvanizing bath measuring 12.3 m long x 2.6 m wide x 3.0 m deep. Pole & High Mast galvanizing capacity 82000 MT per annum.

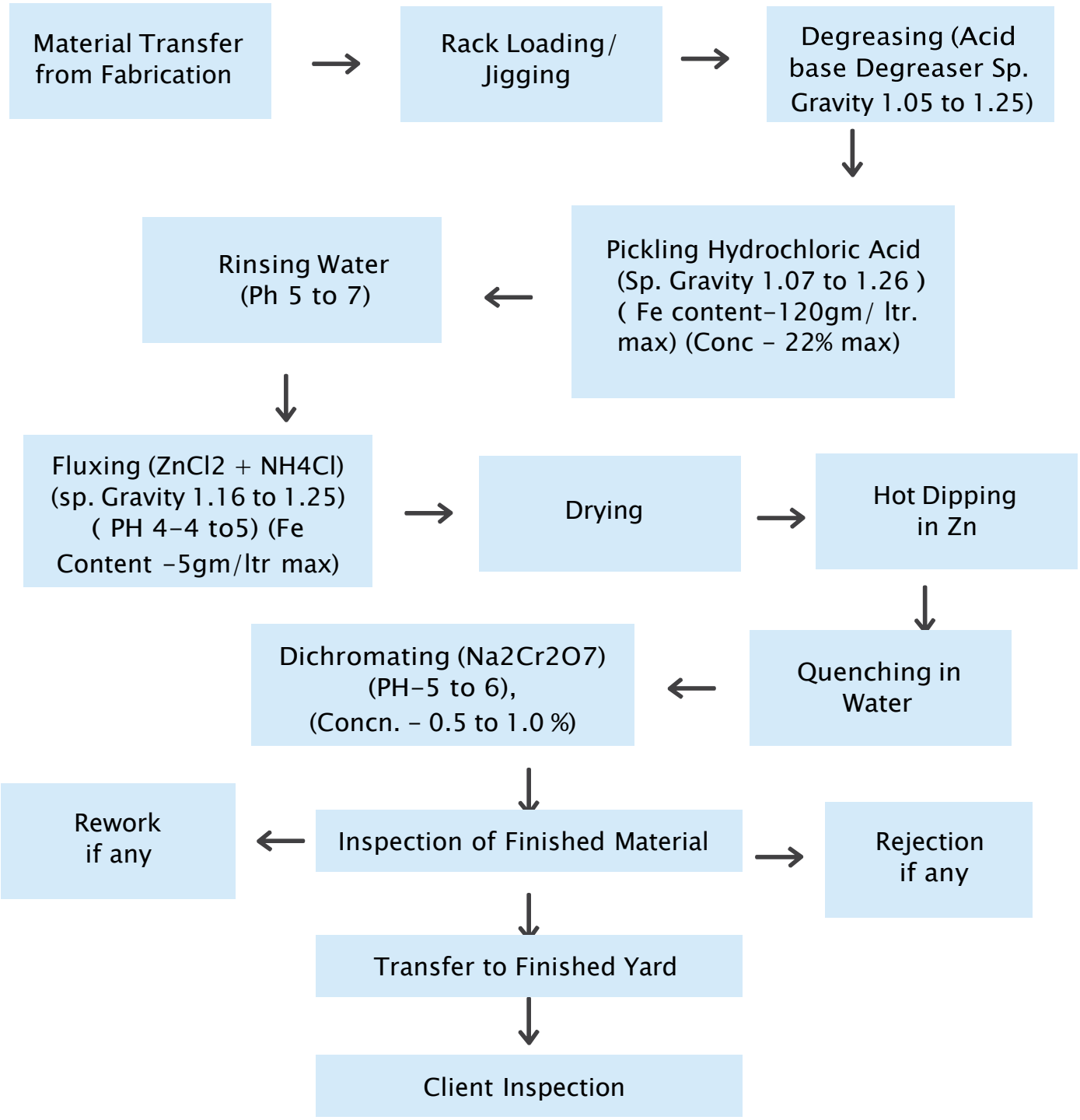
Hot dip galvanizing is one of the most popular treatments for steel corrosion protection and can be applied to a wide range of steel products that are characterized by many different dimensions, geometries and functions. The operational sequence of the plant is essentially the same and the dimension of the kettles (i.e., the bath of molten zinc) is determined by the typical mix of products to be coated.

Galvanizing is a corrosion protection process for steel, in which the steel is coated with zinc to prevent it from rusting. The process involves dipping cleaned iron or steel components into molten zinc (which is usually at around 450°C). A series of zinc-iron alloy layers are formed by a metallurgical reaction between the iron and zinc creating a strong bond between steel and the coating. A typical time of immersion is about four or five minutes, but it can be longer for heavy articles that have high thermal inertia or where the zinc is required to penetrate internal voids. Upon withdrawal from the galvanizing bath, a layer of molten zinc will be deposited on top of the alloy layer stopping corrosion of steel in two ways – a physical barrier and electrochemical protection. Typical coating thicknesses can range from 45 µm to over 200µm and in case of damaged area, a galvanic cell is formed: the zinc around the point of damage corrodes in preference to the steel and forms corrosion products that precipitate on the steel surface and protect it.

The hot dip galvanized coating is applied according to the requirements of IS 4759: 1996, EN ISO 1461 and ASTM A123.

Process Flowchart For Galvanizing (High Mast Division)

Process Flow



Fasteners are also manufactured following the similar production lines as poles and high mast division.

UN CPC code: 42110 (Bridges, bridge sections, towers and lattice masts, of iron or steel) Geographical scope: The product is manufactured in India while the use and the end of life of the product is global.

LCA Information

Functional unit / declared unit: 1tonne (1000 kg) of Hot Dip Galvanized Pole and High Mast

Reference service life: The life expectancy of galvanized items is dependent on the weather conditions it is exposed to.

Time representativeness: The foreground data collection period is April 2023 to March 2024.

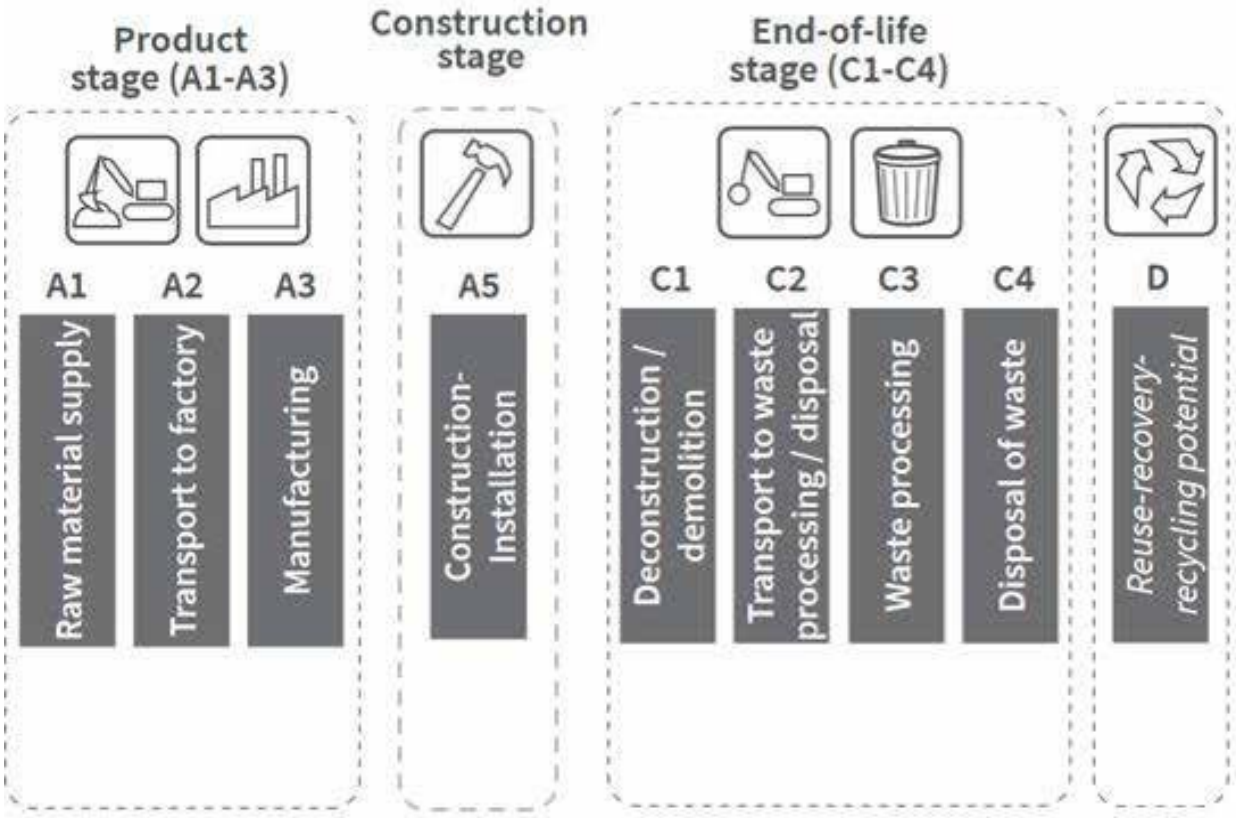
Database(s) and LCA software used:

The background data has been taken from the latest available Sphera Managed LCA Content 2024.1 using Sphera's LCA for Experts (LCA FE) software, version 10.8.

Description of system boundaries:

The system boundary: It includes cradle to gate stage with additional modules A1–A3, A5, C1–C4, and module D.

Reference package used: EN 15804 reference package based on EF 3.1.



More information:

This EPD's system boundary has been defined as Cradle to gate with options, module A5, C1-C4 and module D.

- Module A1 to A3:

The product stage includes provision of all materials, products and energy, as well as waste processing up to the end-of waste state or disposal of production residues during the product stage. The packaging of the hot dip galvanized pole and high mast is also considered. The electricity for the manufacturing process has been sourced from grid. The composition considered in the Electricity grid mix dataset is Electricity from lignite - 13.92%, Electricity from hard coal - 59.41%, Electricity from natural gas - 4.65%, Electricity from hydro - 9.55%, Electricity from wind - 4.06%, Electricity from nuclear - 2.35%, Electricity from photovoltaics-2.51%, Electricity from fuel oil - 0.50%, Electricity from coal gases - 0.15%, Electricity from biogas - 0.07%, and Electricity from waste to energy - 0.09%. The GHG-GWP impact for electricity used for manufacturing is 1.01 kg CO_2 eq./kWh.

- Module A5:

The module A5 includes the treatment of packaging.

- Module C1 to C4:

Within this EPD, the modules C1-C4 are included. These modules consider the dismantling of the considered product (C1), the transportation of the dismantled components to their End of Life (EoL) destination (C2), the waste processing for recovery or recycling (C3) as well as the disposal (C4), if given. At EoL, the steel material leaves the product system in C3 for recycling in Module D. The considered EoL scenario for the steel material is 88% recycling and 12% landfill.

- Module D:

Module D includes any declared benefits and loads from net flows leaving the product system that have not been allocated as co-products and that have passed the end-of-waste state in the form of reuse, recovery and/or recycling potentials.

Metals are assumed to reach the end of waste status directly at the construction site. The treatment as well as net benefits and loads of reuse or recycling potentials (for the net scrap amount only) are grouped to module D.

Data quality assessment and declaration:

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Manufacturing of product	Collected Data	EPD owner	2023	Primary data	2.12%
Generation of electricity used in manufacturing	Database	Sphera MLC 2024.1	2023	Primary data	1.79%
Transport of raw materials to the manufacturing site	Database	Sphera MLC 2024.1	2023	Primary data	1.59%
Production of steel	Database	Sphera MLC 2024.1	2023	Representative generic data	0%
Production of packaging	Database	Sphera MLC 2024.1	2023	Representative generic data	0%
Total share of primary data, of GWP-GHG results for A1-A3					**5.50%**

Note: The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that does not capture all relevant aspects of data quality. The indicator is not comparable across product categories

Cut-off criteria:

The environmental impact of the product studied has been assessed by considering all significant processes, materials, and emissions. Excluded flows are assumed to have a negligible impact, contributing less than 5% to the cumulative impact assessment categories. The production of capital equipment, facilities, and infrastructure required for manufacture has not been considered.

Data quality and sources:

Data quality is compliant with ISO 14025:2006. All primary data were collected for the year April 2023-March 2024. All background data come from the Sphera Managed LCA Content 2024.1 databases.

Allocation:

This study employs economic allocation to address the production of the main product and its co-products. This method assigns environmental impacts based on the relative market value of the main product and its co-products. Any allocation performed in the background processes is according to the PCR.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	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	ND	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	IN			–	GLO	–	–	–	–	–	–	–	GLO	GLO	GLO	GLO	GLO
Specific data used	5.50%			–	–	–	–	–	–	–	–	–	–	–	–	–	–
Variation – products	0%			–	–	–	–	–	–	–	–	–	–	–	–	–	–
Variation – sites	0%			–	–	–	–	–	–	–	–	–	–	–	–	–	–

X- Modules declared, ND- Modules not declared.

Content Information

Product Components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Steel Profiles (Pipes/Plates/Plates Channels and Beams)	930.3	0	0
Zinc	49.6	0	0
Fasteners	20.1	0	0
TOTAL	**1000**	0	0
Packaging Materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Wooden pallets	34.1	3.41	13.4
Steel wire	4.76	0.48	0
HDPE	1.29	0.13	0
Plastic	1.51	0.15	0
Misc.	1.91	0.19	0
TOTAL	43.6	4.36	

Products do not contain any substances that can be included in “Candidate List of Substances of Very High Concern for Authorization” and raw materials used are not part of the EU REACH regulation.

Results of The Environmental Performance Indicator

The environmental performance of the 1tonne (1000 kg) of Hot Dip Galvanized Pole and High Mast of reported below using the parameters and units as specified in PCR 2019:14 v1.3.4.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. The scenarios included are currently in use and are representative of one of the most probable alternatives.

Mandatory impact category indicators according to EN 15804+A2:2019

Environmental Impacts for 1 tonne of Hot Dip Galvanized Pole and High Mast								
Impact indicators	**Unit**	**A1-A3**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO2 eq.	3.24E+03	6.67E-01	0.00E+00	4.59E+00	0.00E+00	1.80E+00	-1.24E+03
GWP-biogenic	kg CO2 eq.	-5.11E+01	5.11E+01	0.00E+00	2.16E-03	0.00E+00	5.43E-02	0.00E+00
GWP-luluc	kg CO2 eq.	2.13E+00	4.01E-04	0.00E+00	1.03E-04	0.00E+00	1.08E-02	-1.65E-01
GWP-total	kg CO2 eq.	3.19E+03	5.17E+01	0.00E+00	4.59E+00	0.00E+00	1.86E+00	-1.24E+03
ODP	kg CFC -11 eq.	2.88E-09	1.70E-12	0.00E+00	8.61E-14	0.00E+00	4.84E-12	-1.67E-09
AP	Mole of H+ eq.	1.27E+01	4.79E-03	0.00E+00	5.25E-03	0.00E+00	1.28E-02	-3.04E+00
EP-freshwater	kg P eq.	3.31E-03	3.14E-06	0.00E+00	6.93E-07	0.00E+00	4.08E-06	-2.89E-04
EP-marine	kg N eq.	2.35E+00	1.29E-03	0.00E+00	1.76E-03	0.00E+00	3.28E-03	-4.88E-01
EP-terrestrial	Mole of N eq.	2.45E+01	1.41E-02	0.00E+00	2.00E-02	0.00E+00	3.62E-02	-4.37E+00
POCP	kg NMVOC eq.	7.27E+00	4.44E-03	0.00E+00	5.37E-03	0.00E+00	1.00E-02	-1.98E+00
ADP-minerals & metals*	kg Sb eq.	7.99E-02	2.64E-08	0.00E+00	5.34E-08	0.00E+00	1.16E-07	-7.03E-03
ADP-fossil*	MJ	3.84E+04	8.58E+00	0.00E+00	5.93E+01	0.00E+00	2.37E+01	-1.23E+04
WDP*	m^3 world equiv.	8.41E+02	6.84E-02	0.00E+00	5.56E-03	0.00E+00	2.06E-01	-8.38E+01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP- minerals & metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

*Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator. We discourage the use of the results of modules A1–A3 without considering the results of module C.

Additional mandatory and voluntary impact category indicators

Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq.	3.24E+03	1.92E+00	0.00E+00	4.56E+00	0.00E+00	1.79E+00	-1.24E+03

Resource use indicators according to EN 15804+A2:2019

Resource Use Impacts for 1 tonne of Hot Dip Galvanized Pole and High Mast								
Impact indicators	**Unit**	**A1-A3**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2.54E+03	6.47E+02	0.00E+00	7.06E-02	0.00E+00	4.13E+00	-4.87E+02
PERM	MJ	6.46E+02	-6.46E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.19E+03	1.22E+00	0.00E+00	7.06E-02	0.00E+00	4.13E+00	-4.87E+02
PENRE	MJ	3.83E+04	1.62E+02	0.00E+00	5.93E+01	0.00E+00	2.37E+01	-1.23E+04
PENRM	MJ	1.53E+02	-1.53E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.84E+04	8.58E+00	0.00E+00	5.93E+01	0.00E+00	2.37E+01	-1.23E+04
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	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
FW	m3	1.65E+02	1.93E-03	0.00E+00	1.71E-04	0.00E+00	6.28E-03	-1.26E+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 excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water							

Output flows & Waste Indicators according to EN 15804+A2:2019

Waste Flow Impacts for 1 tonne of Hot Dip Galvanized Pole and High Mast								
Impact indicators	**Unit**	**A1-A3**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	kg	4.18E-06	2.02E-09	0.00E+00	7.54E-10	0.00E+00	5.90E-09	-9.23E-07
NHWD	kg	8.09E+01	4.11E+01	0.00E+00	9.09E-04	0.00E+00	1.20E+02	-3.49E+01
RWD	kg	1.87E-01	7.51E-05	0.00E+00	7.44E-06	0.00E+00	2.48E-04	-1.35E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acronyms	HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, CRU = Components for re-use, MFR = Components for re-use, MFR = Materials for Recycling, EEE = Exported electrical energy, EET = Exported thermal energy.							

Additional mandatory and voluntary impact category indicators

Additional Environmental Impacts for 1 tonne of Hot Dip Galvanized Pole and High Mast								
Impact indicators	**Unit**	**A1-A3**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	Disease incidences	2.64E-04	5.82E-08	0.00E+00	5.17E-08	0.00E+00	1.60E-07	-2.85E-05
Ionising radiation, human health	kBq U235 eq.	2.60E+01	7.89E-03	0.00E+00	6.72E-04	0.00E+00	2.87E-02	-9.79E+00
Ecotoxicity, freshwater	CTUe	8.03E+03	4.74E+00	0.00E+00	2.67E+01	0.00E+00	1.58E+01	-6.48E+02
Human toxicity, cancer	CTUh	2.23E-04	1.00E-10	0.00E+00	4.23E-10	0.00E+00	3.22E-10	-5.07E-05
Human toxicity, non-cancer	CTUh	1.78E-05	5.65E-09	0.00E+00	8.80E-09	0.00E+00	1.25E-08	-2.42E-06
Land Use	Pt	1.09E+04	1.19E+00	0.00E+00	7.07E-02	0.00E+00	6.52E+00	-1.60E+02

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