ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for

EC 1370 Grade Aluminium Rods

from

Midal Cables International Limitada Mozambique

Programme :	The International EPD® System www.environdec.com
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EPD®
THE INTERNATIONAL EPD® SYSTEM

Midal Cables
Mozambique

Program Information

Programme	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com	EPD® THE INTERNATIONAL EPD® SYSTEM

Product Category Rules (PCR):
2019:14 Version 1.1. 2020-09-14. Construction Products
EN 15804:2012 + A2:2019 Sustainability of Construction Works

Independent third-party verification of the declaration and data, according to ISO 14025:2006

EPD process certification EPD verification ✓

Third party verifier: Vladimír Kočí, PhD
Approved by: The International EPD® System

System Boundaries :
Cradle to gate with Options

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 from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company Information

Midal Cables Limited was established in 1977 conceived between Intersteel, Bahrain and Olex Cables, Australia to manufacture Aluminium Rod and Overhead Electrical Transmission Cables, Conductors.

Since then, the company has developed into a significant player in the Aluminium and Electrical Transmission Industry in Kingdom of Bahrain. Its growth has contributed to the industrialization of Bahrain and Gulf countries while promoting a national skilled workforce within the company.

Midal supplies the world market with Rod Cast from the molten Aluminium delivered directly from Aluminium Bahrain (ALBA) Smelter adjacent to its manufacturing plant. The liquid Aluminium is exceptionally pure which allows Midal to cast Rod and further production of Wires an exceptionally high conductivity in various grades of Transmission Cables. Midal's EC grade and 6201 Alloy Rod are sold around the world as well as being used in-house to manufacture a full range of Overhead Electrical Conductors and Aluminum Wires.

Midal has participated in numerous transmission and distribution projects, meeting the most stringent technical standards and supply requirements. Midal has continued a policy of investment in the most up-to-date Technology its manufacturing plant and has put a great emphasis on work force training to ensure the technical excellence to manufacture its products.

Over 41 Years of Success, Midal Cables Limited is still looking forward for continuous growth and improvement of its business processes.

Midal Cable is proud of our rigorous quality control system. It ensures the highest quality standard for our end products from its entire supply chain management by keeping its testing results for possible traceability.

Midal has a fully equipped testing laboratory, we spectroanalyze the input molten aluminum for its purity, carry out tensile, elongation, wire wrap test and conductivity as required by various International Standards and Specification or Special Customer's demands. In addition Midal's highly experience personnel carry out many other online tests at each stage of production to eliminate any product defect.

Midal's quality management system has been instituted to give the customer total satisfaction. Certification under Integrated Management System (IMS) Midal has been awarded as True Recognition of what has been practice, Organizational Health & Safety (OHSAS 18001) into its existing quality (ISO 9001 and environmental (ISO 14001) Management System, making Midal as one of the Pioneers in the GCC to implement an integrated Management System for its Quality, Safety, Health and Environment (QSHE).

Company Information

MIDAL CABLES INTERNATIONAL LIMITADA, is a company, duly organized and existing under the laws of the Republic of Mozambique. The organization's core business is the manufacture and sale of Aluminium Rods for electrical and mechanical applications, Aluminium Wire and bare overhead Conductors for power Transmission and Distribution. Midal Mozambique started its operations late 2014 (commercial production beginning in 2015) and has shown steady growth in Production output and Sales volume since then. Midal Mozambique is a worldwide supplier with secured preferential supply contracts with clients in Europe, South and East Africa, Asia and USA, our market share has increased year after year and with positive trends.

> Established in 2013 - as a 100% subsidiary of Midal Cables Ltd.

> Strategically located next to Mozal smelter

> Caters International markets including Africa, Europe and US

> Rod Production Capacity – 50,000 MT/year

> Conductor Capacity – 24,000 MT/year

> Experience in up to, 400 KV transmission lines across the world

> Good track records in HTLS and line uprating projects

Product Information

Continuous cast and rolled Aluminium and Aluminium Alloy rod for electrical and mechanical purpose.

Some of the grades produced by Midal Cables Mozambique, among others, include 1050, 1100, 1120, 1350, 1370, 6061, 6101, and 6201.

Rod Sizes: 15mm, 12mm, 9.5mm

UN CPC Code: 41532

Midal supplies the world market with rod cast from the molten aluminium delivered direct from the Aluminium Smelter adjacent to its plant (Mozal). The liquid aluminium is super pure (minimum 99.7%) which allows Midal to cast an exceptionally high conductivity rod. Midal's EC grade and alloy rods are sold around the world as well as being used 'in-house' to manufacture a full range of overhead conductors and aluminium wires. Midal also supplies rods of various mechanical alloys.

The aluminium rods are suitably packed in two metric tonne coils for immediate export, in wooden pallet. Once the coils reach their destination various end products can be achieved, such as overhead conductors for electrical applications, screws, nails, rivets and even wire mesh screens to mention just a few.

Electrical Purpose Rod

Continuous cast and rolled Aluminium and Aluminium Alloy redraw rod for electrical purposes.

Midal Cables International Limitada Rods meets the following International Standard Specification:

> ASTM, BS, NFC, DIN etc.
> Designations: 1350, 1370, 6101, 6201 & 1120
> Size: 9.5 mm and 12 mm
> Coil Weight = 2MT approx.
Coil Height = 890 mm
> Coil ID = 570 mm
> Coil OD = 1400 mm

Mechanical Purpose Rod

ACSR conductors are recognized for their record of Continuous cast and rolled Aluminium Alloy rod for mechanical purposes

Midal manufactures rods of following designations and properties according to the client's specifications.

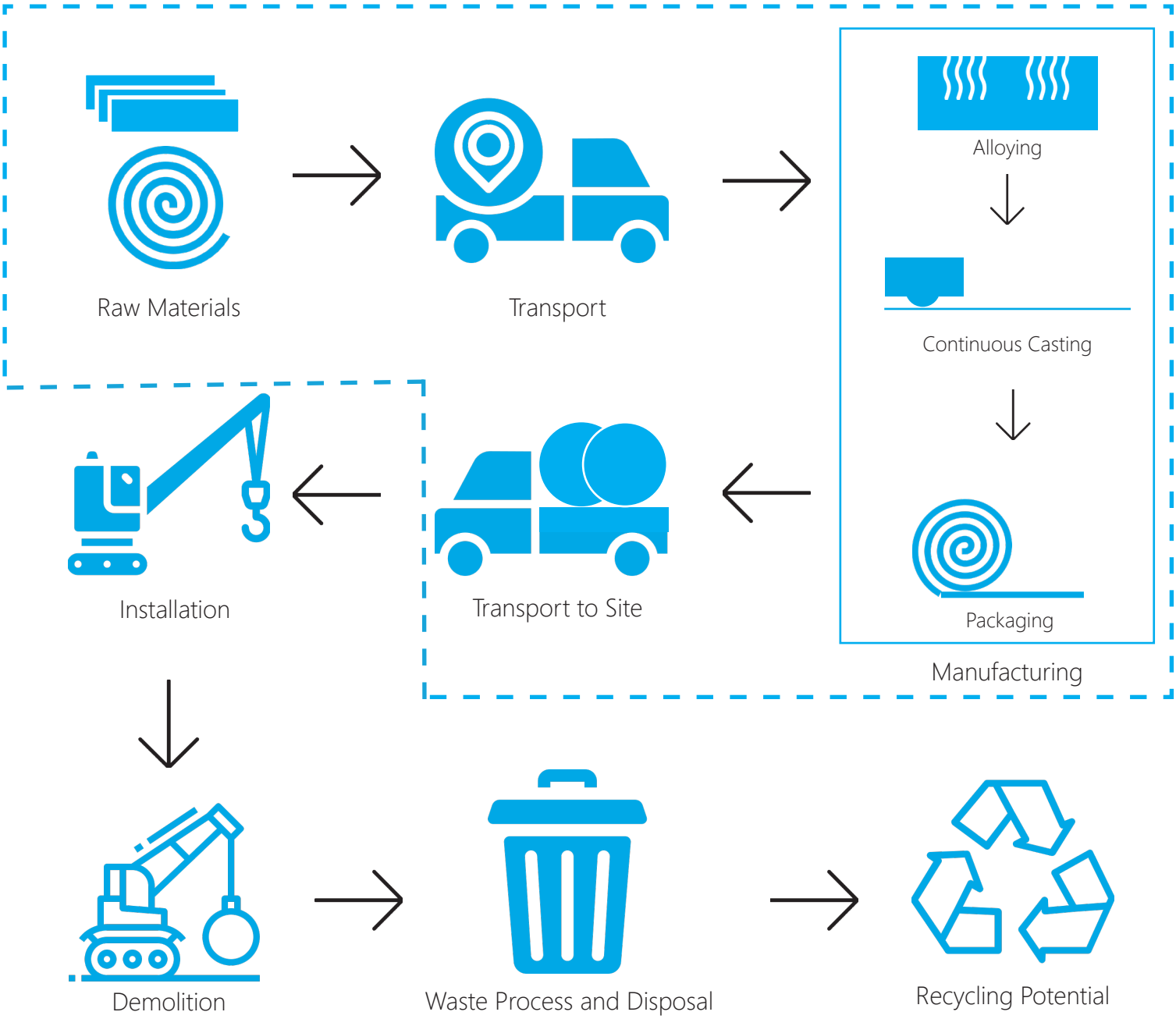
> Designations: 1050, 1100 & 6061
> Size: 9.5 mm and 12 mm
> Coil Weight = 2 MT approx.
> Coil Height = 890 mm
> Coil ID = 570 mm
> Coil OD = 1400 mm

LCA Information

Functional Unit	1 tonne of 1370 EC grade aluminium rod
Time Representativeness	2019
Database(s) and LCA Software Used	Ecoinvent 3.5., SimaPro 9.0

The inventory for the LCA study is based on the 2019 production figures for EC 1370 grade aluminium rod collected from Midal Cables production plant in Maputo, Mozambique.

System Boundary



Description of System Boundary

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw Materials Supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Reuse-Recycling-Recovery Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Description of the system boundary (X = Included in LCA. ND= Not Declared)

A1 : Raw Material
This stage includes raw material extraction and pre-treatment processes before production. For calculation, molten aluminium and alloying elements used for 1 tonne of aluminium rod were taken into account. Molten aluminium is sourced from the facility nearby, therefore, as the energy used for his process is not directly related to Midal Cables, it is included in A1 stage. The smelter uses electricity generated from hydro-power and this situation is reflected in the study.

A2 : Raw Material Supply
This stage is relevant for delivery of raw materials and intermediary products to factory gate. Transport direct from producer or producer to warehouses/intermediaries then to the factory were taken into account. Forklift usage within the factory is also included.

A3 : Manufacturing
This stage starts with with mixing the molten aluminium with alloying elements and continuous casting for the production of aluminum rods, thereof. Packaging material (PP sheet, PP bag, PET strap and pallets) used for final product's transportation is also included.

A4 : Transport to Site
This stage involves transportation of rods to the sites where they are turned into wires with further processing.

More Information

The results of the LCA with the indicators as per EPD requirement are given in the following pages for product manufacturing (A1, A2, A3) and construction process stage (A4).

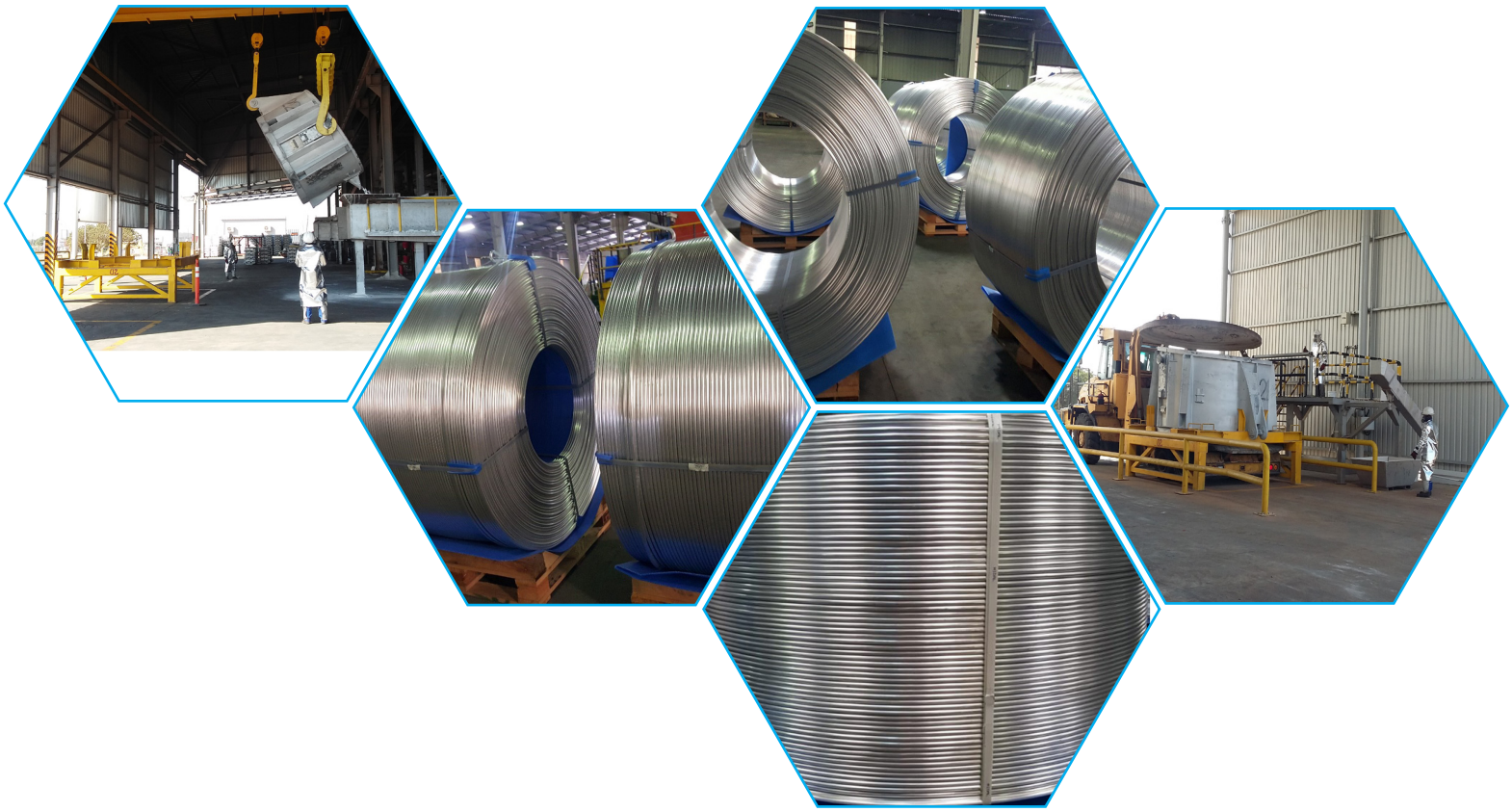
All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR.

Hazardous and non-hazardous waste amounts were also allocated from 2019 total waste amounts.
Transport is allocated according to tonnages for all raw materials bought by Midal Cables.

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in conductors. either above the threshold for registration with the European Chemicals Agency or above 0.1 % (wt/wt).

Products Content Information

Materials	%
Aluminium	99.7
Others (alloying elements & fluxes)	0.3



Resource Use for 1 Tonne 1370 EC Grade Aluminium Rod						
Resource	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**
PERE	MJ	51.2E+3	46.0E+0	1.02E+3	52.2E+3	59.4E+0
PERM	MJ	0	0	0	0	0
PERT	MJ	51.2E+3	46.0E+0	1.02E+3	52.2E+3	59.4E+0
PENRE	MJ	41.5E+3	2.09E+3	2.28E+3	45.8E+3	4.05E+3
PENRM	MJ	0	0	0	0	0
PENRT	MJ	41.5E+3	2.09E+3	2.28E+3	45.8E+3	4.05E+3
SM	kg	0	0	0	0	0
RSF	MJ	0	0	0	0	0
NRSF	MJ	0	0	0	0	0
FW	m^3	20.0E+0	258E-3	305E-3	20.6E+0	622E-3
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.					

Waste and Output Flows for 1 Tonne 1370 EC Grade Aluminium Rod						
Flow	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**
HWD	kg	0	0	2.90	2.90	0
NHWD	kg	0	0	7.72	7.72	0
RWD	kg	0	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	0	0	0	0	0
MER	kg	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal					
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2 and A3. A4: Transport to Site					

Environmental Impacts for 1 Tonne 1370 EC Grade Aluminium Rod						
Impact Category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**
GWP - Total	**kg CO_2 eq**	6.50E+3	146E+0	101E+0	6.74E+3	272E+0
GWP - Fossil	**kg CO_2 eq**	5.88E+3	146E+0	150E+0	6.17E+3	272E+0
GWP - Biogenic	**kg CO_2 eq**	104E+0	140E-3	-49.1E+0	55.2E+0	148E-3
GWP - Luluc	**kg CO_2 eq**	515E+0	74.4E-3	67.8E-3	515E+0	102E-3
ODP	**kg CFC-11 eq**	360E-6	28.9E-6	12.1E-6	401E-6	59.2E-6
AP	**mol H+ eq**	52.5E+0	3.53E+0	943E-3	57.0E+0	3.12E+0
EP - Freshwater	**kg P eq**	1.53E+0	19.0E-3	43.8E-3	1.59E+0	26.9E-3
EP - Marine	**kg N eq**	5.38E+0	705E-3	158E-3	6.25E+0	684E-3
EP - Terrestrial	**mol N eq**	58.9E+0	7.89E+0	1.68E+0	68.5E+0	7.63E+0
POCP	**kg NMVOC**	21.9E+0	2.08E+0	495E-3	24.5E+0	2.10E+0
ADPE	**kg Sb eq**	44.9E-3	48.7E-6	65.4E-6	45.0E-3	547E-6
ADPF	**MJ**	41.5E+3	2.09E+3	2.28E+3	45.8E+3	4.05E+3
WDP	**m^3 depriv.**	17.0E+3	13.5E+0	15.6E+0	17.0E+3	27.1E+0
PM	**disease inc.**	847E-6	5.36E-6	3.27E-6	855E-6	15.3E-6
IR	**kBq U-235 eq**	125E+0	12.8E+0	3.85E+0	142E+0	21.5E+0
ETP - FW	**CTUe**	155E+3	1.41E+3	2.07E+3	158E+3	2.81E+3
HTTP - C	**CTUh**	15.7E-6	46.6E-9	52.7E-9	15.8E-6	86.6E-9
HTTP - NC	**CTUh**	277E-6	1.09E-6	1.62E-6	279E-6	2.90E-6
SQP	**Pt**	-4.58E+3	371E+0	4.24E+3	27.2E+0	2.03E+3
Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-fw: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use.					
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2 and A3. A4: Transport to Site					

References

/GPI/General Programme Instructions of the International EPD® System. Version 3.01.

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/EN 15804/ EN 15804:2012 + A2:2019. Sustainability of Construction Works

/ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

/ISO 14040/44/ DIN EN ISO 14040:2006-10. Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

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/The International EPD® System/ The International EPD® System is a programme for type III environmental declarations. maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025.www.environdec.com

/Ecoinvent / Ecoinvent Centre. www.Eco-invent.org

/SimaPro/ SimaPro LCA Software. Pré Consultants. the Netherlands. www.pre-sustainability.com

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