



Bitron Electronic China Company LTD
A Bitron Group Company



ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME

SITE

Waybox 4.0 – 3Ph RFID LTE Cable

Huangdao Branch - 102, HuangheWest Road

Waybox 4.0 – 3Ph RFID LTE Socket

Huangdao - China

In accordance with ISO 14025 and EN 50693

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration Number	Waybox 4.0 3Ph RFID LTE
Registration Number	EPDITALY0463

Issue date	27 / 10 / 2023
Valid to	27 / 10 / 2028



www.epditaly.it

GENERAL INFORMATION

EPD OWNER	
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PROGRAM OPERATOR	
EPDItaly	Via Gaetano De Castillia n° 10 - 20124 Milano, Italy

INFORMATION ON THE EPD	
Product name	Waybox 4.0 3Ph RFID LTE – Cable Waybox 4.0 3Ph RFID LTE – Socket
Site (s)	Huangdao Branch - 102, HuangheWest Road Huangdao - China
Short description and technical information of the product (s)	AC Charging Station device for Electric Vehicles with on board battery charger
Field of application of the product	
CPC Code (number) https://unstats.un.org/unsd/classifications/Econ	4621 « electricity distributor or control apparatus »

VERIFICATION INFORMATION	
PCR (title, version, date of publication or update)	Core-PCR: EPDITALY007 " Electronic and electrical product and systems" Rev. 3 del 13/01/2023 Sub-PCR: EPDITALY017 "ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS – CHARGING STATIONS " Rev. 1 del 11/12/2020 UNI EN 15804:2012+A1:2013+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
EPDItaly Regulation (version, date of publication or update)	Regolamento EPDITALY, Rev 5.2, del 16/02/2022
Project Report LCA	Report LCA: Waybox 4.0 3Ph RFID LTE
Independent Verification Statement	The PCR review was performed by EPDItaly - info@epditaly.it. Independent verification of the declaration and data, carried out according to ISO 14025: 2010. <input checked="" type="checkbox"/> Internal <input checked="" type="checkbox"/> External Third party verification carried out by: ICMQ S.p.A., via Gaetano De Castillia n ° 10 - 20124 Milan, Italy. Accredited by Accredia.
Comparability Statement	Environmental statements published within the same product category, but from different programs, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804: 2012 + A2: 2019.



Liability Statement

The EPD Owner releases EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence.

EPDItaly disclaims any responsibility for the information, data and results provided by the EPD Owner for life cycle assessment.

Introduction

This document represents EPD report of charging system Waybox 4.0 (3Ph with both RFID and LTE option in the two version cable and socket) produced by Bitron S.p.A, in compliance with EPDItaly program and related regulation. The product was previously called Juicebox 4.0, and there are no difference between Juicebox 4.0 and Waybox 4.0, except for the name. This report is developed in compliance to ISO 14025, aimed to provide rules for development, verification, and publication of Environmental Product declarations.

This study is compliant with “PCR EPDItaly017 – ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS – CHARGING STATIONS, which identifies the goal, scope, application field of information rules for production of environmental information, life cycle phases to be included in the study, parameters considered, how to collect those parameters and how to perform communication on the report.

Organization

Bitron Group is an Italian international corporation that helps companies to design and realize innovative solutions by guiding them in research, development and production of mechatronic components and systems for automotive, home appliance, heating & ventilation, eV-charging, energy measurement and management.

Bitron Group's global presence extends with several plants located in Italy, China, Poland, Mexico, Turkey, and Spain, as well as commercial offices situated in France, Spain, Brazil, Germany, the United States, China, Turkey, and Mexico. The company also has multiple technical research centers, located in Italy, Germany, and Romania, in addition to one after-market center in Italy.

Scope and goal of EPD

This study includes all phases of life cycle from extraction of raw material to the disposal including recycling processes, reuse and/or recovery of materials at the end-of-life as secondary raw materials.

It was adopted a “cradle to grave” approach and calculation was performed with software OpenLCA v2.0 with database Ecoinvent 3.8. To enhance the accuracy of the model, the Ecoinvent database has been enriched with new datasets/processes related to purchasing components/goods that are part of the _database (bitron eco analysis tool) supplementary to Ecoinvent v.3.8.



The modules included into evaluation are defined in accordance with PCR017 and are shown in Table 1.

Table 1: System boundaries in accordance with PCR017

Manufacturing STAGE		DISTRIBUTION STAGE	INSTALLATION STAGE	USE & MAINTENANCE STAGE	END OF LIFE STAGE
UPSTREAM MODULE	CORE MODULE	DOWNSTREAM			
Extraction of raw materials, including waste recycling processes and the production of semi-finished and ancillary products	Manufacturing of the product constituents, including all the stages	IN ACCORDANCE WITH EN 50693			
Transportation of raw materials to the manufacturing company	Product assembly				
	Packaging ¹				
	Waste recycling processes				

Functional unit

The functional unit object of the study is 1 single charging system designed for charging Electric Vehicles (with on board battery) considering 20 years of life as for PCR 017.

Product and processes description

Both versions (cable and socket) of Waybox 4.0 are outdoor 7kW/22kW AC Charging Station device for Electric Vehicles with on board battery charger.

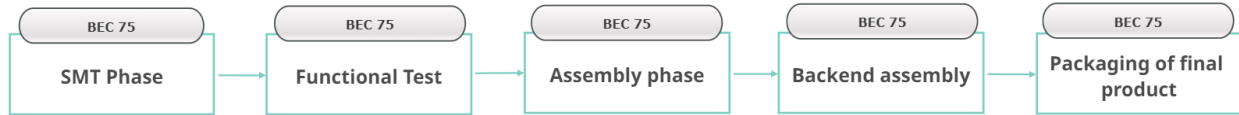
Production of charging system consist of 3 main processes due to complexity of components that compose the charging system itself:

1. The process involving the assembly of electronic parts on printed circuit board (PCB), called SMT phase, takes place in China plant (U75). In this plant components are assembled and soldered on the electronic boards. The line is completely automatic and provides full traceability and MLS automatic control (Moisture sensitivity level refers to packaging and handling precaution of some semiconductor), 3D inspection of soldering paste, test in-line ICT e AOI (2D/3D), X-ray test.
2. Plastic components are purchased already molded.

¹ Only Boxing, while raw material is considered upstream.

- Plastic and electronic components are assembled in China Plant (U75). The assembly line is semi-automatic and the product, when completed, is identified with a unique serial number.

Finally, the product is boxed and sent to the customer warehouses.



Component and characteristics of product

The characteristic data of the charging system analyzed are:

- Nominal voltage: 230/400V \pm 10%
- Type of operational condition: 3Ph
- Country or geographic cluster: Worldwide

Materials contents by weight are listed in Table 3

Table 3: Materials contents by weight

Cable version				Socket version			
Total weight [kg]	Material cluster	Materials	Quantity	Total weight [kg]	Material cluster	Materials	Quantity
8.774	Metals	Steel	7%	5.539	Metals	Steel	12%
		Other	15.54%			Other	0.04%
	Plastics	Polycarbonate	19%		Plastics	Polycarbonate	30%
		Other	18%			Other	4%
	Electr.	PCBA	7%		Electr.	PCBA	10%
		Other	3%			Other	10%
	Other	-	0.3%		Other	-	0.5%
	Packaging	Paper	23%		Packaging	Paper	26%
		Wood	6%			Wood	6%
		Plastic	0.1%			Plastic	0.2%
		Other	0.1%			Other	0.1%

Based on our current knowledge and verification:

- We have detected a presence greater than 0.1% wt/wt of substances included in “Candidate List of SVHC” (number of Substances on list: 224, last updated: June 14, 2023) (see Table 2).
- The listed groups of restricted substances in the current version of the European Directive 2011/65/UE (RoHS II) (and last updating 2015/863/UE) and 2011/37/UE (ELV) and their implementations, are not contained or are contained only in homogeneous proportions below the tolerance/exemption values.

Table 2: Presence of SVHCs and RoHS exemptions

Waybox 4.0 cable		Waybox 4.0 socket	
SVHCs	RoHS exemptions	SVHCs	RoHS exemptions
7439-92-1 LEAD	7A	7439-92-1 LEAD	7A
119-47-1 DBMC	7C1	119-47-1 DBMC	7C1
12060-00-3 LEAD TITANIUM MONOXIDE	6C	12060-00-3 LEAD TITANIUM MONOXIDE	6C



Reference service life (RSL)

According to PCR EPDItaly, the reference life service (RLS) 20 years.

LCA results

This section shows the LCA results calculated according to EN15804 methodologies.

Table 4: Results of LCA study for impact EPD impact categories.

Waybox 4.0 Cable version							
Impact categories	Unit	Total	Manufacturing Stage	Distribution stage	Installation Stage	Use and Maintenance stage	EoL
Climate Change – Total	kg CO2 eq	636.65	74.10	5.16	2.84	543.16	11.39
Climate change - fossil	kg CO2 eq	623.08	74.41	5.15	0.30	531.86	11.36
Climate change - biogenic	kgCO2eq	12.79	-0.47	7.20E-03	2.54	10.70	0.02
Climate change - land use and change in land use	kgCO2eq	0.73	0.15	2.87E-03	3.39E-05	0.57	8.10E-03
Ozone Depletion	kgCFC-11eq	4.77E-05	5.26E-06	1.12E-06	6.51E-08	4.03E-05	9.32E-07
Acidification	moli H+eq	4.26	1.41	7.14E-02	1.90E-03	2.74	0.04
Eutrophication of water	kgP eq	0.36	0.13	3.25E-04	6.56E-06	0.22	1.99E-03
Eutrophication, marine	kg N eq	0.63	0.12	1.91E-02	7.64E-04	0.48	1.23E-02
Eutrophication, terrestrial	molc N eq	6.78	1.44	0.21	8.38E-03	4.99	0.13
Photochemical ozone formation	kg NMVOCeq	1.87	0.44	5.60E-02	2.92E-03	1.33	0.04
Consumption of abiotic resources - minerals and materials	kg Sb eq	0.04	3.54E-02	1.74E-05	2.49E-07	4.08E-03	5.89E-05
Consumption of abiotic resources - fossil resources	MJ	5480.73	575.42	5.97	0.12	4862.02	37.20
Water consumption	m ³ eq	304.02	44.91	0.34	7.05E-03	256.90	1.87

Waybox 4.0 socket version							
Impact categories	Unit	Total	Manufacturing Stage	Distribution stage	Installation Stage	Use and Maintenance stage	EoL
Climate Change – Total	kg CO2 eq	616.69	58.50	3.29	2.00	543.16	9.74
Climate change - fossil	kg CO2 eq	603.63	58.57	3.28	0.21	531.86	9.72
Climate change - biogenic	kgCO2eq	12.31	-0.19	4.59E-03	1.79	10.70	0.02
Climate change - land use and change in land use	kgCO2eq	0.70	0.12	1.83E-03	2.37E-05	0.57	1.04E-02
Ozone Depletion	kgCFC-11eq	4.63E-05	4.51E-06	7.25E-07	4.55E-08	4.03E-05	7.50E-10
Acidification	moli H+eq	3.36	0.53	4.55E-02	1.33E-03	2.74	0.04
Eutrophication of water	kgP eq	0.29	0.06	2.07E-04	4.60E-06	0.22	2.54E-03
Eutrophication, marine	kg N eq	0.58	0.08	1.22E-02	5.35E-04	0.48	1.01E-02
Eutrophication, terrestrial	molc N eq	6.06	0.82	0.13	5.86E-03	4.99	0.11
Photochemical ozone formation	kg NMVOCeq	1.66	0.26	3.57E-02	2.04E-03	1.33	0.03
Consumption of abiotic resources - minerals and materials	kg Sb eq	0.02	1.57E-02	1.11E-05	1.74E-07	4.08E-03	7.63E-05
Consumption of abiotic resources - fossil resources	MJ	5373.93	460.74	3.81	0.08	4862.02	47.29
Water consumption	m ³ eq	287.12	27.81	0.22	4.94E-03	256.90	2.19

Table 5: Results of use of resource.

Waybox 4.0 cable version							
Impact categories	Unit	Total	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	EoL
PENRE	MJ	7123.21	701.53	7.35	0.13	6368.74	45.46
PERE	MJ	1902.40	100.96	0.74	1.14E-02	1795.57	5.13
PENRM	MJ	3965.07	598.44	67.01	3.89	3233.82	61.90
PERM	MJ	216.57	49.02	0.27	4.65E-03	166.37	0.90
PENRT	MJ	11088.29	1299.97	74.36	4.03	9602.57	107.36
PERT	MJ	2118.97	149.98	1.00	1.61E-02	1961.94	6.03
FW	m3	7.24	1.13	8.10E-03	1.70E-04	6.06	0.04
SM*	kg	230.85	7.69	0.08	9.82E-04	222.83	0.26
RSF*	MJ	130.20	0.96	1.91E-02	1.71E-04	129.11	0.12
NRSF*	MJ	18.22	1.65	0.08	2.75E-04	16.41	0.09

Waybox 4.0 socket version							
Impact categories	Unit	Total	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	EoL
PENRE	MJ	6995.15	563.88	4.68	0.09	6368.74	57.75
PERE	MJ	1868.02	65.62	0.47	7.98E-03	1795.57	6.35
PENRM	MJ	3723.04	392.54	42.71	2.72	3233.82	51.23
PERM	MJ	201.53	33.87	0.17	3.26E-03	166.37	1.11
PENRT	MJ	10718.18	956.42	47.40	2.82	9602.57	108.98
PERT	MJ	2069.54	99.49	0.64	1.12E-02	1961.94	7.46
FW	m3	6.84	0.73	5.16E-03	1.19E-04	6.06	0.05
SM*	kg	228.49	5.35	0.05	6.87E-04	222.83	0.27
RSF*	MJ	130.04	0.81	1.22E-02	1.19E-04	129.11	0.11
NRSF*	MJ	17.78	1.21	0.05	1.93E-04	16.41	0.11

Legenda:

- PENRE = Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as raw materials.
- PERE = Use of renewable primary energy resources excluding renewable primary energy resources used as raw materials.
- PENRM = Use of non-renewable primary energy resources used as raw materials.
- PERM = Use of renewable primary energy resources used as raw materials.
- PENRT = Total use of non-renewable primary energy resources.
- PERT = Total use of renewable primary energy resources.
- FW = Use of fresh water.
- SM = Use of secondary materials.
- RSF = Use of secondary renewable fuels.
- NRSF = Use of secondary non-renewable fuels.

*Considering impact category SM, RSF, NRSF for the use of secondary materials, we do not have specific secondary raw material usage in the BoM. All the value calculated are totally reasonable but are related to specific Ecoinvent datasets used for the model.

Table 6: Results for waste production and output flux.

Waybox 4.0 cable version							
Impact categories	Unit	Total	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	EoL
HWD	kgHW	2047.68	892.68	1.69	2.88E-02	1143.34	9.94
NHWD	kgW	32.01	5.50	2.33	0.04	21.78	2.36
RWD	kgRW	1.02	0.07	1.36E-03	4.14E-05	0.94	5.49E-03
MER	kg MER	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg MFR	220.95	7.18	0.06	7.44E-04	213.50	0.21
CRU	kg CRU	2.49E-03	2.46E-03	0.00	0.00	0.00	0.00
ETE	MJ ET	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ EE	0.00	0.00	0.00	0.00	0.00	0.00

Waybox 4.0 socket version							
Impact categories	Unit	Total	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	EoL
HWD	kgHW	1502.23	345.09	1.08	2.01E-02	1143.34	12.70
NHWD	kgW	28.62	3.60	1.48	0.03	21.78	1.73
RWD	kgRW	1.01	0.06	8.69E-04	2.89E-05	0.94	6.73E-03
MER	kg MER	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg MFR	220.30	6.55	0.04	5.20E-04	213.50	0.21
CRU	kg CRU	2.49E-03	2.46E-03	0.00	0.00	0.00	0.00
ETE	MJ ET	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ EE	0.00	0.00	0.00	0.00	0.00	0.00

Legenda:

- HWD = Hazardous waste disposal
- NHWD = Non-hazardous waste disposal
- RWD = Radioactive waste disposal
- MER = Materials for energy recovering
- MFR = Materials for recycling
- CRU = Components for reuse
- ETE = Thermal energy exported
- EEE = Electric energy exported

Calculation rules

The evaluation was carried out in accordance with the reference standard for life cycle analysis (UNI EN ISO 14040:2021 e UNI EN ISO 14044:2021) and others reference documents previously mentioned (PCR EPDItaly017- ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS – CHARGING STATIONS).

Data quality

In this study, almost all data related to core activities are primary data and documented through appropriate reference documentation (e.g., energy consumption records, bill of materials, etc).

Secondary data are referred to specific datasets or technical documentation, to ensure a good level of reliability.

Cut-off

In this study impact related to production of buildings, machineries, and equipment (except for dataset already available on Ecoinvent 3.8), packaging wastes of purchased electronic components, device for installation, extraordinary maintenance of product, energy and materials used for disposal of meter are not considered. There are no specific cut-off criteria applied for inventory data.

Allocation

Main primary data are Bitron data and directly referred to U.F.. Some production data were allocated to the U.F. based on volumes. Allocation methods are applied to following processes related to production phase of meter: Energy consumption for the production, Primary packaging of product, Waste/scraps, Auxiliaries materials.

Development of scenarios

All life cycle stages are considered, as shown in Table 1, according to EN 50693. Specifically, the activities included in Manufacturing stage (UPSTREAM and CORE modules) are:

- Extraction of raw materials and production of materials/semi-finished/ancillary products (UPSTREAM)
- Transport of materials/semi-finished/ancillary products to manufacturing company (UPSTREAM)
- Production and assembly of product (CORE)
- Packaging² (CORE)
- Waste recycling and disposal (CORE)

DOWNSTREAM considers:

² Only Boxing, while raw material is considered upstream.

- Transport of complete product in its packaging from manufacturer to customer warehouse and from customer warehouse to installation site
- Disposal of packaging and scraps during installation stage
- Energy consumption of the product during its use and over the RLS
- Disposal of product at the End-of-Life

Reference period

The reference period for LCA study is from March 2023 to August 2023. It should be noted that the activity data collected can be considered representative thanks to the absence of consistent variability.

Reference documents

- » UNI EN ISO 14040:2021 Environmental management - Life cycle assessment - Principles and framework
- » UNI EN ISO 14044:2021 Environmental management - Life cycle assessment - Requirements and guidelines
- » ISO 14020:2000 Environmental labels and declarations -- General principles
- » UNI EN ISO 14025:2010, Etichette e dichiarazioni ambientali - Dichiarazioni ambientali di Tipo III - Principi e procedure
- » EN 50693:2019 Product category rules for life cycle assessments of electronic and electrical products and systems
- » Regolamento EPDItaly rev. 5.2 del 16/02/2022
- » Core-PCR: EPDITALY007 " Electronic and electrical product and systems" Rev. 3 del 13/01/2023
- » PCR EPDItaly017 – ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS – CHARGING STATIONS"
- » Ecoinvent, 2018. The Swiss Centre for Life Cycle Inventories. Ecoinvent v3.8