

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Grundfos Holding A/S
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-GRU-20240021-CCD2-EN
Issue date	05.06.2024
Valid to	04.06.2029

**ALPHA2, ALPHA1, ALPHA2 L, ALPHA1.1, ALPHA2.1, ALPHA2.2
(Cast Iron)
Grundfos Holding A/S**

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General Information

Grundfos Holding A/S

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-GRU-20240021-CCD2-EN

This declaration is based on the product category rules:

Pumps for liquids and liquids with solids, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

05.06.2024

Valid to

04.06.2029


Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)


Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

ALPHA2, ALPHA1, ALPHA2 L, ALPHA1.1, ALPHA2.1, ALPHA2.2 (Cast Iron)

Owner of the declaration

Grundfos Holding A/S
Poul Due Jensens Vej 7
8850 Bjerringbro
Denmark

Declared product / declared unit

1 piece of Alpha 2/3 pump cast iron.

Scope:

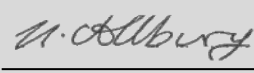
The declared product is 1 piece of ALPHA Cast Iron pump. The product is assembled in Bjerringbro, Denmark, and the life cycle assessment is based on data collected at the production site and from supplier up- and downstream of the supply chain. The declaration is for the variations 15-130, 25-130, 25-180 and 32-180, and 15-130, 25-130, 25-180 and GGES3 respectively.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR		
Independent verification of the declaration and data according to ISO 14025:2011		
☐	internally	☒ externally


Mrs Kim Allbury,
(Independent verifier)

Product

Product description/Product definition

This EPD includes the cast iron ALPHA pumps. They are produced in different models and each new models adds a variant expressed with an additional letter. This EPD represents a weighted average product that includes the data for the following models:

- ALPHA2 model B-E, and the modules that follow
- ALPHA1 Model B, and the modules that follow
- ALPHA2 L Model C, and the modules that follow
- ALPHA1.1 Model B, and the modules that follow
- ALPHA2.1 model B-E, and the modules that follow

The size of the pump housing distinguishes the different pumps. The production process and production location is the same for all pump modules.

For the placing on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the following legal provisions apply:

Low Voltage Directive (2014/35/EU)

Standards used: EN 60335-1:2012+AC:2014+A11:2014+A13:2017+A1:2019+A2:2019+A15:2021, EN 60335-2-51:2003+A1:2008+A2:2012.

EMC Directive (2014/30/EU)

Standards used: EN 55014-1:2017, EN 55014-2:2015, EN IEC 61000-3-2:2019, EN 61000-3-3:2013.

Ecodesign Directive (2009/125/EC)

Commission regulation (EC) No 641/2009
Commission regulation (EU) No 622/2012
Standards used: EN 16297-1:2012, EN 16297-2:2012.

RoHS Directives (2011/65/EU) and (2015/863/EU)

Standard used: EN IEC 63000:2018.

The CE-marking takes into account the proof of conformity with the respective harmonized standards based on the legal provisions above.

For the application and use the respective national provisions apply.

Application

Grundfos ALPHA high-efficiency circulator pumps with cast-iron pump housing are designed for circulating liquids in all kinds of HVAC systems.

Technical Data

The performance data of the product according to the harmonised norms, based on the harmonisation provisions above apply. The relevant technical specifications according to the PCR Part B are given in the table below. Characteristics that are the same for all three product groups are only given once. Others are given individually for all three groups.

Constructional data

Name	Value	Unit
Frequency	50	Hz
Voltage	230	V
Pumped liquid (e.g. water)	Water	-
energy efficiency class	0.15	-
Head max. Gr 1	4	m
Head max. Gr 2	6	m
Head max. Gr 3	8	m
Flow range Gr 1	0 - 2.6	m ³ h
Flow range Gr 2	0 - 3.5	m ³ h
Flow range Gr 3	0 - 2.14	m ³ h
Power input Gr 1 Average (from load profile describing use)	0.0091	kW
Power input Gr 2 Average (from load profile describing use)	0.015	kW
Power input Gr 3 Average (from load profile describing use)	0.023	kW
Max. input power Gr 1	0.018	kW
Max. input power Gr 2	0.034	kW
Max. input power Gr 3	0.05	kW

Performance data of the product according to the harmonised standards, based on provisions for harmonization.

Base materials/Ancillary materials

Name	Value	Unit
Steel and stainless steel	17.8	%
Plastic	1.3	%
Plastic packaging	3.9	
Plastic GF	1.4	%
Copper	6.6	%
Ceramic	0.9	%
Iron	41.6	%
Magnet Nd	0.3	%
Electronics	6.0	%
Aluminium	7.3	%
Plastic film	0.2	%
Plastic film packaging	0.2	
Paper	6.5	%
Cardboard	5.8	%
Rubber	0.2	%

REACH

The product does not contain substances listed in the Candidate List of Substances of Very High Concern for Authorisation (15.01.2018) exceeding 0.1 percentage by mass.

ISO 14001

The Bjerringbro production has been assessed and certified as meeting the requirements of ISO 14001:2015 (Certificate DE11/81829052.00).

Reference service life

No use stage scenario which refers to the lifetime of the product is declared. However, to facilitate building calculations, an estimated RSL of 10 years can be used. This is an EU consensus-based estimation, referenced on page 37 in Appendix 7: Lot 11 – Circulators in Buildings, prepared by AEA Energy & Environment for the European Commission in the context of the Eco Design Directive:

There is no definitive information on average circulator life available, there is consensus within the industry that it is at least 12 years. However, this is complicated by many factors, including many being scrapped prematurely when e.g. the boiler they are connected to is replaced.

LCA: Calculation rules

Declared Unit

The declared unit is 1 piece of product, including packaging.

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Mass reference *	2.21	kg/pce
conversion factor [Mass/Declared Unit]	2.21	-

The weighted average product has been calculated based on the mass of the inputs of all individual pump modules and their production volumes.

The LCA study to support these results is robust, based on the inclusion of different production locations, high geographical representativeness and careful selection of background datasets, thereby matching modeled production process and the actual production process.

System boundary

This LCA is a Cradle-to-Grave study. All major steps from the extraction of natural resources to the final disposal of the product are included in the scope of the analysis, following the modular approach of EN15804+A2:2019.

By decision no. 20170712-n of the SVR, the modules B3, B4 and B5 are by default declared as "MNR" (module not relevant).

Modules A1-A3 refer to the product stage and includes raw materials extraction and processing, transportation and distribution, and the manufacturing process. The product stage is included in this study, and according to EN 15804:2019 + A2 the system boundary with nature is set to include those processes that provide the material and energy inputs into the system and the following manufacturing, transport up to the factory gate as well as the processing of any waste arising from those processes.

Wastes and losses are included in the modules where they occur according to the polluter pays principle and the modular approach of EN 15804:2019+A2.

Module A4 regards the transportation to the construction place as well as the transport from the production site to the regional distribution centre, and finally to the point of sale.

Module A5 refers to the construction and installation process of the pumps, including the transportation of packaging waste to the treatment site and the waste treatment of packaging. The use of energy during application (i.e. an electric hand drill) is negligible for the selected functional unit and is therefore not included in the scope of this study. The auxiliary materials are considered capital goods. There are no direct emission

The RSL of the declared product is not directly influencing the results in this study, as no declared use stage scenario is dependent on the RSL. The use stage sub-module B6 is declared per year as required by the PCR Part B.

considered during the application process.

Modules B1-B7 refer to the use stage. In this study, all use stage modules are assessed, though B1, B2 and B7 are assessed to be zero. By decision no. 20170712-n of the SVR, the modules B3, B4 and B5 are by default declared as "MNR" (module not relevant). The modules include the provision and transport of all materials, products and related energy and water use, as well as waste processing up to the end-of-waste state or disposal of final residues during the use stage. They also include all impacts and aspects related to the losses during the use stage (i.e. production, transport, and waste processing and disposal of the lost products and materials).

Module B6 contributions to operational energy use during the use stage comes from the electricity consumption of the product. The annual electricity consumption is calculated by multiplying the average power input, which is based on a defined load profile, with the annual running hours.

Modules C1-C4 refers to the End-of-life stage. A product reaches the end-of-life of its service life when it no longer provides any functionality. This life cycle stage includes all activities from the end-of-life of the pump, until all materials and components are processed, reused, recycled or disposed of. In accordance with EN15804+A2 and the PCR Part A C1-C4 are included.

Module D refers to the burdens and benefits beyond the system boundaries. According to EN15804:A2+2019 module D includes the reuse, recovery and/or recycling potentials, expressed in net impacts and benefits. Contributions to module D comes from waste incineration processes in A5 and C4 as well as material recycling in C3. The specific fractions and net flows are shown in the scenarios section.

Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Europe

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. Software and database used Gabi TS / Ecoinvent 3.8

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The biogenic carbon content quantifies the amount of biogenic carbon in a construction product leaving the factory gate, and it shall be separately declared for the product and for any accompanying packaging. In the product there is no biogenic carbon that exceeds the minimal reporting requirement of 5%.

There is biogenic carbon in the cardboard packaging.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.12	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂. The following technical information forms the basis for the declared gate-to-grave modules and can be used for developing specific scenarios in the context of a building assessment.

Transport from the gate to the site (A4)

Name	Value	Unit
Litres of fuel	0.0322	l/100km
Transport distance	500	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	450	kg/m ³

Assembly (A5)

Name	Value	Unit
Packaging waste for incineration with energy recovery (plastic, paper and cardboard)	0.36	Kg

As the B6 indicator results for this product only come from the electricity consumption dataset, there is a linear correlation between the product groups based on the electricity consumption. By multiplying the reported impacts of B6 with the factors in the table below the impacts can be calculated for the other lifting weights.

Name	Value	Unit
Lifting weight 4m factor	1	
Lifting weight 6m factor	1.65	
Lifting weight 8m factor	2.53	

An estimated RSL of 10 years can be used to facilitate building calculations. This is an EU consensus-based estimation, referenced in Appendix 7: Lot 11 – Circulators in Buildings, prepared by AEA Energy & Environment for the European Commission in the context of the Eco Design Directive.

Operational energy use (B6)

Name	Value	Unit
Electricity consumption Gr 1	46.88	kWh/year
Electricity consumption Gr 2	78.85	kWh/year
Electricity consumption Gr 2	112.63	kWh/year

End of life (C1-C4)

Name	Value	Unit
Disassembly of the pump	1.85	Kg
Transport (C2)	500	Km
Recycling (cast iron, steel and stainless steel)	1.62	Kg
Plastic waste for incineration with energy recovery	0.28	Kg
Landfilling	0.15	Kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Net scenarios have been used to calculate module D.

Name	Value	Unit
Energy recovery from incineration (A5+C4)	-6.67	MJ/Kg
Cast iron, steel and stainless steel recycling	-1.62	Kg

LCA: Results

The LCA results in module B6 are given over a period of one year, according to PCR Part B. To obtain the results from module B6 over the entire life cycle, the LCA results of module B6 must be multiplied by the estimated RSL of 10 years.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 Piece Alpha 1/2 pump - Cast Iron

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	1.25E+01	2.87E-01	3.95E-01	0	0	MNR	MNR	MNR	1.45E+01	0	0	8.19E-02	6.49E-01	5.06E-01	-1.33E+00
GWP-fossil	kg CO ₂ eq	1.34E+01	2.88E-01	1.69E-01	0	0	MNR	MNR	MNR	1.43E+01	0	0	8.23E-02	6.5E-01	5.06E-01	-1.33E+00
GWP-biogenic	kg CO ₂ eq	-9.36E-01	-4.02E-03	2.25E-01	0	0	MNR	MNR	MNR	1.55E-01	0	0	-1.15E-03	-1.07E-03	9.36E-01	-7.65E-04
GWP-luluc	kg CO ₂ eq	1.47E-02	2.65E-03	1.25E-04	0	0	MNR	MNR	MNR	1.54E-03	0	0	7.56E-04	3.14E-04	4.7E-06	-2.47E-04
ODP	kg CFC11 eq	2.02E-07	3.72E-14	1.05E-09	0	0	MNR	MNR	MNR	2.61E-10	0	0	1.06E-14	1.1E-08	1.18E-09	-3.04E-08
AP	mol H ⁺ eq	1.88E-01	1.84E-03	1.77E-04	0	0	MNR	MNR	MNR	3.01E-02	0	0	5.25E-04	1.2E-03	1.18E-04	-3.51E-03
EP-freshwater	kg P eq	2.14E-03	1.04E-06	1.17E-05	0	0	MNR	MNR	MNR	5.3E-05	0	0	2.99E-07	7.6E-05	1.52E-06	-2.79E-04
EP-marine	kg N eq	5.04E-02	9E-04	8.95E-05	0	0	MNR	MNR	MNR	7.22E-03	0	0	2.57E-04	3.08E-04	6.63E-05	-9.37E-04
EP-terrestrial	mol N eq	1.59E-01	9.96E-03	8.68E-04	0	0	MNR	MNR	MNR	7.55E-02	0	0	2.85E-03	3.12E-03	5.67E-04	-1E-02
POCP	kg NMVOC eq	4.93E-02	1.74E-03	1.83E-04	0	0	MNR	MNR	MNR	1.93E-02	0	0	4.97E-04	8.2E-04	1.38E-04	-4.46E-03
ADPE	kg Sb eq	1.76E-03	1.88E-08	3.23E-08	0	0	MNR	MNR	MNR	2.19E-06	0	0	5.38E-09	6.36E-06	3.63E-08	-6.14E-07
ADPF	MJ	1.81E+02	3.89E+00	2.77E-01	0	0	MNR	MNR	MNR	2.97E+02	0	0	1.11E+00	2.29E+00	1.08E-01	-2.07E+01
WDP	m ³ world eq deprived	-3.13E+01	3.45E-03	1.51E-02	0	0	MNR	MNR	MNR	3.11E+00	0	0	9.87E-04	5.33E-02	3.24E-02	-1.06E-01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 Piece Alpha 1/2 pump - Cast Iron

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	4.95E+01	2.83E-01	1.58E-02	0	0	MNR	MNR	MNR	1.78E+02	0	0	8.1E-02	2.34E-01	3.74E-03	-3.1E+00
PERM	MJ	2.88E-06	3.73E-12	1.89E-09	0	0	MNR	MNR	MNR	4.86E-08	0	0	1.06E-12	3.79E-08	1.6E-09	-1.1E-07
PERT	MJ	4.95E+01	2.83E-01	1.58E-02	0	0	MNR	MNR	MNR	1.78E+02	0	0	8.1E-02	2.34E-01	3.74E-03	-3.1E+00
PENRE	MJ	1.81E+02	3.91E+00	2.77E-01	0	0	MNR	MNR	MNR	2.97E+02	0	0	1.12E+00	2.29E+00	1.08E-01	-2.07E+01
PENRM	MJ	1.75E-03	4.64E-08	2.08E-09	0	0	MNR	MNR	MNR	7.17E-07	0	0	1.33E-08	0	0	-2.14E-08
PENRT	MJ	1.81E+02	3.91E+00	2.77E-01	0	0	MNR	MNR	MNR	2.97E+02	0	0	1.12E+00	2.29E+00	1.08E-01	-2.07E+01
SM	kg	1.19E+00	0	0	0	0	MNR	MNR	MNR	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	MNR	MNR	MNR	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	MNR	MNR	MNR	0	0	0	0	0	0	0
FW	m ³	-7.07E-01	3.1E-04	3.61E-04	0	0	MNR	MNR	MNR	1.43E-01	0	0	8.87E-05	1.24E-03	7.54E-04	-3.64E-03

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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 Piece Alpha 1/2 pump - Cast Iron

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	8.57E-07	1.21E-11	5.44E-13	0	0	MNR	MNR	MNR	-2.32E-08	0	0	3.46E-12	0	0	-5.03E-11
NHWD	kg	3.59E-01	0	3.62E-01	0	0	MNR	MNR	MNR	0	0	0	0	0	2.4E-01	0
RWD	kg	5.43E-03	7.31E-06	3.29E-07	0	0	MNR	MNR	MNR	4.71E-02	0	0	2.09E-06	0	0	-7.81E-04
CRU	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MFR	kg	0	0	0	0	0	MNR	MNR	MNR	0	0	0	0	1.62E+00	0	0
MER	kg	0	0	3.13E-01	0	0	MNR	MNR	MNR	0	0	0	0	0	6.79E-02	0
EEE	MJ	0	0	4.35E-01	0	0	MNR	MNR	MNR	0	0	0	0	0	2.66E-01	0
EET	MJ	0	0	8.92E-01	0	0	MNR	MNR	MNR	0	0	0	0	0	5.2E-01	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:

1 Piece Alpha 1/2 pump - Cast Iron

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	1.7E-06	6.82E-09	1.11E-09	0	0	MNR	MNR	MNR	2.54E-07	0	0	1.95E-09	1.19E-08	5.74E-10	-5.28E-08
IR	kBq U235 eq	1.21E+00	1.09E-03	3.56E-04	0	0	MNR	MNR	MNR	7.83E+00	0	0	3.12E-04	1.68E-02	3.11E-04	-1.43E-01
ETP-fw	CTUe	6E+02	2.77E+00	9.6E-01	0	0	MNR	MNR	MNR	1.31E+02	0	0	7.9E-01	7.85E+00	1.07E+00	-2.44E+01
HTP-c	CTUh	1.4E-08	5.66E-11	4.83E-11	0	0	MNR	MNR	MNR	4.37E-09	0	0	1.62E-11	2.08E-10	4.58E-11	-3.9E-09
HTP-nc	CTUh	3.76E-07	3.22E-09	1.78E-09	0	0	MNR	MNR	MNR	1.07E-07	0	0	9.2E-10	1.88E-08	1.73E-09	-1.83E-08
SQP	SQP	9.04E+01	1.63E+00	1.4E-01	0	0	MNR	MNR	MNR	1.17E+02	0	0	4.65E-01	1.6E+00	4.2E-02	-3.48E+00

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

This EPD was created using a software tool.

References

Standards

EN 15804

EN 15804:2012+A1 2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14001

EN ISO 14001:2015-09 Environmental management systems - Requirements with guidance for use

ISO 14025

EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

Further References

Sphera LCA for Experts

Sphera LCA for Experts Software-System and Database for Life Cycle Engineering. Copyright 1992-2023 Sphera (version 10.7.0.183)

IBU 2021

Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021
www.ibu-epd.com

Low Voltage Directive (2014/35/EU)

EN 60335-1:2012/A15:2021 Household and similar electrical appliances – Safety – Part I: General requirements; EN 60335-2-51:2003/A2:2012 Household and similar electrical appliances – Safety – Part 2-51: Particular requirements for stationary circulation pumps for heating and service water installations.

EMC Directive (2014/30/EU)

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