ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	LOGSTOR Denmark Holding ApS
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-LOG-20240214-CBA3-EN
Issue date	03.09.2024
Valid to	02.09.2029

Steel insulated pipes

LOGSTOR Denmark Holding ApS

Institut Bauen und Umwelt e.V.

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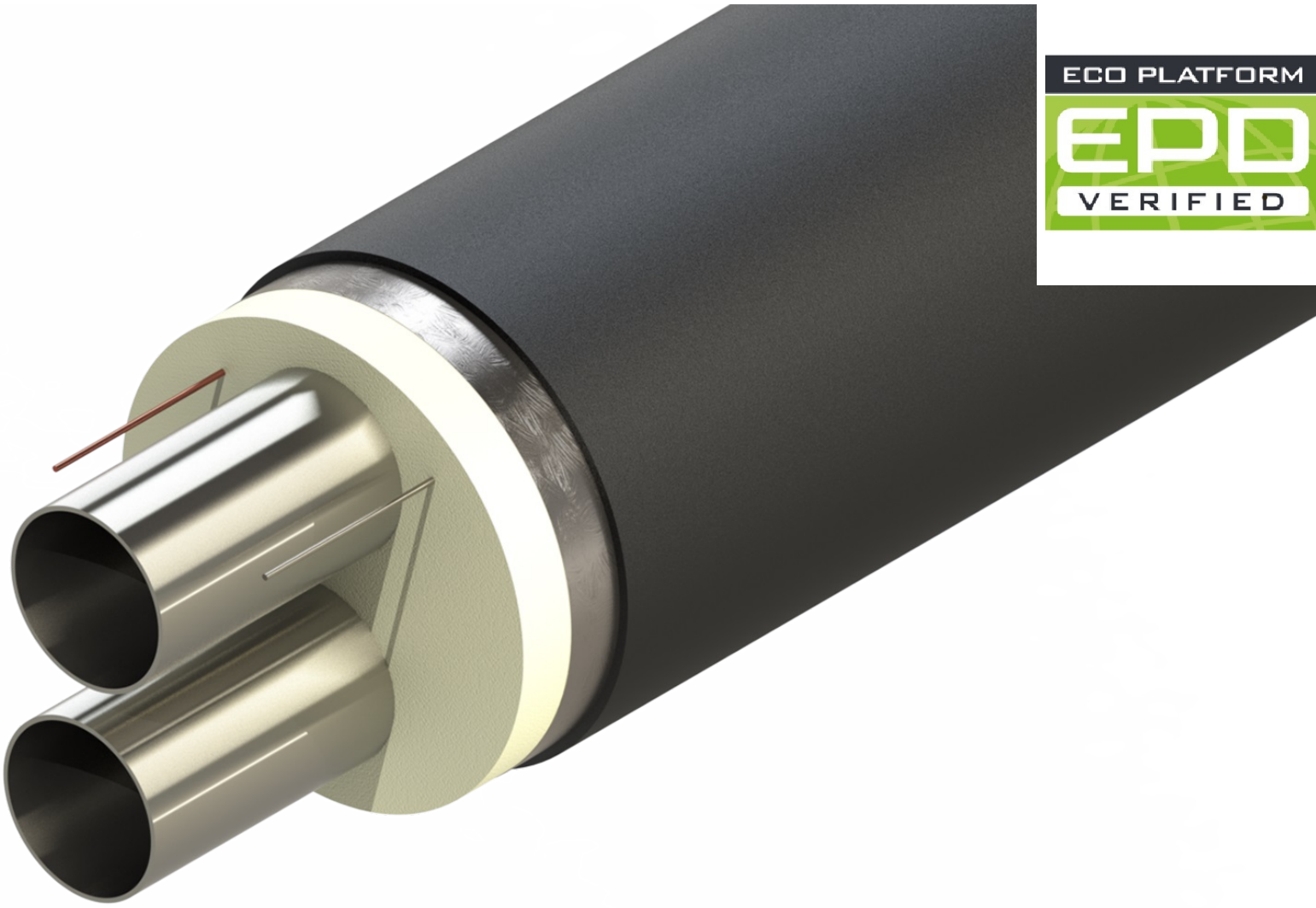

General Information

LOGSTOR Denmark Holding ApS

Programme holder

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

Declaration number

EPD-LOG-20240214-CBA3-EN

This declaration is based on the product category rules:

preinsulated pipes for district heating and cooling, 01.06.2023
(PCR checked and approved by the SVR)

Issue date

03.09.2024

Valid to

02.09.2029

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

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

Steel insulated pipes

Owner of the declaration

LOGSTOR Denmark Holding ApS
Danmarksvej 11
9670 Løgstør
Denmark

Declared product / declared unit

The EPD declares the product- *Preinsulated bonded TwinPipe 2x60.3/200-conti method* with the declared unit *1 tonne*.

Scope:

The declaration is for specific product - Preinsulated bonded TwinPipe 2x60.3/200- conti method. The declared product is produced by LOGSTOR Denmark Holding ApS in production plant in Løgstør, Denmark (DK).
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

Dr. Matthew Fishwick,
(Independent verifier)

Product

Product description/Product definition

Preinsulated bonded TwinPipe 2 x 60.3/ 200 – conti method – is a preinsulated pipe with 2 media steel pipes diam. 60.3 mm and casing pipe (200 mm). Length of product – 12 meters.

Conti TwinPipe (axial) is a complete transmission and distribution system for district heating. Using TwinPipe for district heating pipelines systems can lead to significant savings in terms of heat loss and CO_2 emissions, as well as investment and operating costs.

In the axial conti process pipes are made by casting the insulation onto the service pipes in a moving mould, after which the casing is extruded onto the insulation. The production takes place in continuous process. An effective diffusion barrier foil, preventing diffusion of insulating gases is embedded between the insulation and the casing. Consequently, continuously produced pipes with diffusion barrier foil do not age in relation to heat loss property.

Application

LOGSTOR TwinPipes are used for distribution pipelines within district heating/cooling systems.

Technical Data

Axial continuous production method:

- Straight TwinPipe
- Diameter of carrier pipe: 60.3 mmSteel carrier pipe
- Insulation serie 1
- With a diffusion barrier which ensures that the insulation property is kept constant over life time
- Lambda value λ_{50}: 0.023 W/mK

Used materials:

- Steel pipe: Longitudinally or spiral welded P235GH according to EN10217-2
- Insulation: Polyurethane foam; Properties: Minimum as required in EN 253
- Blowing agent: Cyclopentane
- Outer casing: Polyethylene, HDPE, bimodal (Minimum PE 80, ISO 12162); Properties: Minimum as required in EN 253.
- All parts are fully weldable within the melt flow index: MFR variation ≤ 0.5 g/10 min. Thermal stability: Oxydation induction time (OIT): > 20 min. at 210° C.
- Surveillance system: Wires: 1.5 mm^2 copper wires (one is tinned). The embedded copper wires are the backbone of the electronic surveillance systems which is available for most of our pipe systems.

Constructional data

Constructional data (selected parameters)

Name	Value	Unit
Steel pipe		
Yield strength pipe [EN 10217]	265	MPa
Tensile strength pipe [EN 10217]	410	MPa
Elongation pipe [EN 10217] min	21	%
Pre-insulated pipe – pipe assembly		
Thermal conductivity λ50	0.023	W/(mK)
Axial shear strength (23 + 2) °C min	0.12	MPa
Axial shear strength (140 + 2) °C min	0.08	MPa
Polyurethane foam		
Compressive strength min.	0.3	MPa
Foam density min.	55	kg/m^3
Casing		
Elongation at break min.	350	%
Heat reversion max.	3	%
Stress crack resistance min.	300	h

Base materials/Ancillary materials

Basic materials in declared product:

Name	Value	Unit
Steel pipe	69.10	%
PUR foam (55 - 65kg/m3)	13.90	%
HDPE casing	16.80	%
Copper (alarm wire)	0.20	%

The main materials of Polyurethane foam (PUR) are Polyether polyol including stabilizer and amine catalyst (36%), Polymeric Methylene Diphenyl Diisocyanate PMDI (61%). Polyurethane rigid foam between media pipe and casing is formed by the chemical reaction of these materials and adding a blowing agent (3%) with no ozone depletion potential. Due to the closed cell structure (conform with EN 253), the blowing agent remains in the foam.
In the current REACH regulations, Polyurethane foam insulation products are considered 'articles' and are exempt from the requirements of Article 57 and 59(1) of REACH Regulation (EC) No 1907/2006. These products are not classified as 'hazardous products' according to any current legislation, and can hence be declared as follows:

- This article contains substances listed in the candidate list (date: 23.01.2024) exceeding 0.1 percentage by mass: **no**.
- This article contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: **no**.
- Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Biocidal Products Regulation No. 528/2012 (BPR): **no**.

Reference service life

Service life = min. 30 years.
Max. operating pressure = 25 bar.
The pipe system fulfills the requirements of EN253 as well as EN13941 for continuous operation with hot water at various temperatures up to 120 ^{0}C and at individual time intervals with a peak temperature up to 140 ^{0}C. The sum of these individual time intervals shall, in average, not exceed 300 hours a year.

LCA: Calculation rules

Declared Unit

Declared unit of 1000kg = 82.37 m of pipe

Name	Value	Unit
Declared unit	1000	kg
Mass reference	12.14	kg/rm
Gross density	386.01	kg/m³

System boundary

The life cycle assessment addressees the life cycle of the pipe system from cradle to gate with options, modules C1-C4, and module D (A1-A3, C,D and additional modules. The additional modules include A4 and A5). The product stage comprises the modules A1 (raw material procurement), A2 (transport), A3 (production), A4 (delivery), A5 (assembly), C1 (dismantling), C2 (transport), C3 (waste treatment), C4 (disposal) and D (recycling potential) in accordance with /EN15804+A2/ including the provision of all materials, products and energy.

- Production stage (A1-A3): Extraction, processing and transport of raw materials (including steel pipes, PU foam, PE film, copper wire) used for the production of the pipe system.
- Delivery (A4): Transport of the the pipe system to the construction site by truck (assuming e.g. 100 km as a base value or an averaged distance)
- Installation (A5): Manual installation of the the pipe system and the offcuts or auxiliary materials during installation are not considered.
- Deconstruction (C1): Manual removal of the pipe system
- Transport (C2): Transport of the dismantled pipe system for waste management by truck transport (50 km).
- Waste treatment (C3): Waste treatment of the pipe system: 100% material recycling for the metal components of the pipe system (steel, copper and/or aluminium pipes) and 100% thermal utilisation of the plastic components of the pipe system in a waste incineration plant (MVA) with an R1 value > 0.6 with declaration of recovery potential in D from Energy substitution.
- Disposal (C4): no further expenses due to Landfill/disposal.
- Module D: Energy substitution and benefits from A5 and C3 are declared in module D.

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. LCAFE Database CUP 2023.2

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

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	-	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Transport from the gate to the site (A4)

Name	Value	Unit
Litres of fuel	2.41	l/100km
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%

Assembly (A5)

Name	Value	Unit
Output substances following waste treatment on site -Packaging	-	kg

End of life (C1-C4)

Name	Value	Unit
Recycling	693	kg
Energy recovery	307	kg

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

Energy substitution and benefits from A5 and C3 are declared in module D

LCA: Results

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	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 tonne TwinPipe 2x60.3/200- Conti Method

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	2.63E+03	7.1E+00	0	0	3.55E+00	6.93E+02	0	-1.45E+03
GWP-fossil	kg CO_2 eq	2.62E+03	7.02E+00	0	0	3.51E+00	6.93E+02	0	-1.45E+03
GWP-biogenic	kg CO_2 eq	9.37E+00	1.63E-02	0	0	8.16E-03	5.65E-02	0	1.1E+00
GWP-luluc	kg CO_2 eq	7.79E-01	6.6E-02	0	0	3.3E-02	2.87E-03	0	-5E-01
ODP	kg CFC11 eq	3.05E-07	6.24E-13	0	0	3.12E-13	1.02E-10	0	1.76E-09
AP	mol H^+ eq	6.45E+00	8.28E-03	0	0	4.14E-03	3.18E-01	0	-3.04E+00
EP-freshwater	kg P eq	6.38E-03	2.6E-05	0	0	1.3E-05	2.77E-05	0	-3.26E-04
EP-marine	kg N eq	1.71E+00	2.75E-03	0	0	1.38E-03	1.29E-01	0	-7.38E-01
EP-terrestrial	mol N eq	1.8E+01	3.35E-02	0	0	1.67E-02	1.67E+00	0	-7.98E+00
POCP	kg NMVOC eq	6.32E+00	7.07E-03	0	0	3.53E-03	3.32E-01	0	-2.48E+00
ADPE	kg Sb eq	6.98E-03	4.63E-07	0	0	2.31E-07	7.78E-07	0	-6E-03
ADPF	MJ	4.74E+04	9.69E+01	0	0	4.85E+01	1.89E+02	0	-1.71E+04
WDP	m^3 world eq deprived	3.26E+01	8.22E-02	0	0	4.11E-02	6.95E+01	0	-4.76E+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 tonne TwinPipe 2x60.3/200- Conti Method

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	3.24E+03	6.86E+00	0	0	3.43E+00	5.01E+01	0	8.34E+02
PERM	MJ	0	0	0	0	0	0	0	0
PERT	MJ	3.24E+03	6.86E+00	0	0	3.43E+00	5.01E+01	0	8.34E+02
PENRE	MJ	3.62E+04	9.72E+01	0	0	4.86E+01	1.14E+04	0	-1.72E+04
PENRM	MJ	1.12E+04	0	0	0	0	-1.12E+04	0	0
PENRT	MJ	4.74E+04	9.72E+01	0	0	4.86E+01	1.89E+02	0	-1.72E+04
SM	kg	1.5E+02	0	0	0	0	0	0	5.91E+02
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	5.43E+00	7.56E-03	0	0	3.78E-03	1.64E+00	0	-1.85E+00

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 tonne TwinPipe 2x60.3/200- Conti Method

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	1.03E-05	3.6E-10	0	0	1.8E-10	8.26E-09	0	-8.19E-07
NHWD	kg	1.11E+02	1.4E-02	0	0	7E-03	9.8E+00	0	-2.13E+01
RWD	kg	3.97E-01	1.26E-04	0	0	6.28E-05	5.17E-03	0	-3.21E-01
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	5.69E+01	0	0	0	0	6.93E+02	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	1.1E+03
EET	MJ	0	0	0	0	0	0	0	2.47E+03

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 tonne TwinPipe 2x60.3/200- Conti Method

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	8.71E-03	5.58E-08	0	0	2.79E-08	1.23E-06	0	-4.1E-05
IR	kBq U235 eq	5.01E+01	1.81E-02	0	0	9.07E-03	5.46E-01	0	-5.4E+01
ETP-fw	CTUe	1.65E+04	6.83E+01	0	0	3.41E+01	6.3E+01	0	-3.38E+03
HTP-c	CTUh	7.8E-07	1.38E-09	0	0	6.88E-10	6.28E-09	0	-1.75E-06
HTP-nc	CTUh	5.1E-05	6.08E-08	0	0	3.04E-08	2.2E-07	0	-1.84E-06
SQP	SQP	3.17E+03	4.04E+01	0	0	2.02E+01	5.15E+01	0	2.2E+02

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.

References

BS EN 253
BS EN 253:2019+A1:2023, District heating pipes. Bonded single pipe systems for directly buried hot water networks. Factory made pipe assembly of steel service pipe, polyurethane thermal insulation and a casing of polyethylene

EN 10217
EN 10217-2:2019, Welded steel tubes for pressure purposes - Technical delivery conditions - Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties

EN 10217
EN 10217-5:2019, Welded steel tubes for pressure purposes - Technical delivery conditions - Part 5: Submerged arc welded non-alloy and alloy steel tubes with specified elevated temperature properties

EN 13941
EN 13941-1:2019, District heating pipes - Design and installation of thermal insulated bonded single and twin pipe systems for directly buried hot water networks - Part 1: Design

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
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IBU 2021
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IBU PCR PART A
Product category rules for building- related products and services. Part A, PCR - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, version 1.3, Institut Bauen und Umwelt e.V., www.ibu-epd.com, 2022

IBU PCR PART B
PCR- Part B: Requirements on the EPD for preinsulated pipes for district heating and cooling, version 10, Institut Bauen und Umwelt e.V., www.ibu-epd.com, 2024

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

LCAFE Documentation
LCAFE dataset documentation for the software-system and databases, LBP, University of Stuttgart and Sphera Solutions GmbH, Leinfelden-Echterdingen, 2021

LCAFE Software
Sphera Solutions GmbH, LCAFE Software System and Database for Life Cycle Engineering, CUP Version: 2023.2, University of Stuttgart, Leinfelden Echterdingen

REACH
Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction ofChemicals

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