LIFE CYCLE ASSESSMENT

of

AW50 curtain wall system

from

UAB ALUFLAM

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

Report v.2 2023 07 14

Company information

Owner of the EPD:
UAB ALUFLAM
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Description of the organisation: UAB “ALUFLAM” was founded in 2001 as a branch of the Danish company ALUFLAM A/S in Eastern Europe.
The main activity of the company – production and montage of various aluminium constructions in all Europe, especially production of fireproof aluminium-glass constructions
We offer a wide selection of fire-rated constructions, from fire-resistance classes E15 to EI120 such as facades, windows, doors, sliding doors, skylights, and glass roofs. Our designs range from standard to more complex, specially designed systems. We are able to make customized solutions.
Aluflam works closely with architects, contractors and building developers throughout the entire process, from the planning phase and delivery to installation of the finished product.
The company has implemented quality management in accordance with the standard requirements of LST EN ISO 9001: 2015

Product-related or management system-related certifications: AW50 system facades has CE marking and represents that products comply with the EU ‘s New Approach Directives. AW50 system facades are manufactured in compliance with these European standards which specifies all requirements for factory made glazed curtain walling:
a) EN 13830
b) EN 1363-1
c) EN 1364-3
d) EN 12488
e) EN13501-2
Company is ISO certified with certification for ISO 9001:2015 (Quality Standard)

Name and location of production site(s):
UAB ALUFLAM
Ukmergės g. 7, Jonava, 55101 Lithuania

Product information

Product name: AW50 curtain wall system.
Product description: AW50 aluminium profile system used for various facade constructions. Facades designed to integrate in a way that ensures optimum performance and visual appeal. The partitioning ranges share common design components, such as 50 mm aluminium profile tracks, each retained by a unique pressure and increases glass stability. Aluminium profile cavity can be filled with patented fire-retardant cooling core and with special fire rated glazing available in fire class E/EW/EI 30, 45 and 60 with 30, 45 and 60 minutes fire protection, respectively.
AW50 system may be glazed with glass up to 82 mm thickness, depending on the chosen track. Glass panels may be in either toughened, annealed, or laminated glass.
Offering many design options, Aluflam facade system AW50 can be supplied with aluminium surface which are powder coated to any RAL colour choice or anodized.

Impact and acoustic, fire resistance performance of all systems is rigorously tested at accredited test centres and all products are certified.
Product application: AW50 system facades are widely used for industrial and commercial or individual living buildings, logistic centres, sports arenas, warehouses, power plants and other structures that require to ensuring the rapid pace of construction, makes full use of natural light. The AW50 system enables the construction of safe buildings with glazed facades.
Product technical specifications: Products are available in various sizes, shapes and lengths.
Air permeability - AE 1050
Watertightness - class RE 1050
Resistance to wind load - 1600Pa
Wind, safety test - ±2400 Pa
Impact resistance - I5/E5 (height = 950 mm)

UN CPC code: 4212
Geographical scope: Europe

LCA information

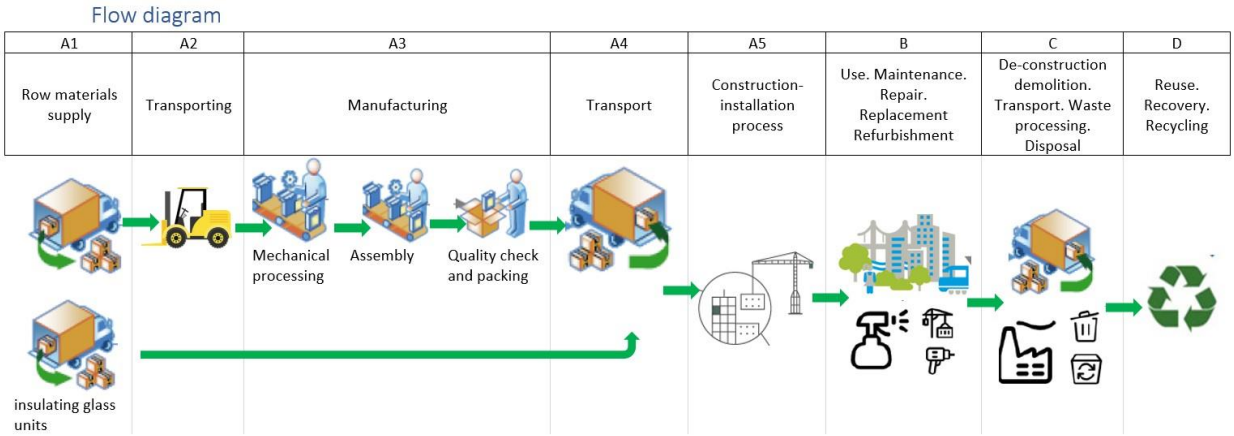
Declared unit: The declared unit is 1 m^2 of AW50 system facades with average weight 28,51 kg/m^2.
Reference service life: The service life is the same as for the building, and it is usually set at 50 years.
Time representativeness: Primary data was collected internally. The production data refers to the year of 2021.
Database(s) and LCA software used: The Ecoinvent database v.3.6 provides the life cycle inventory data for the raw and process materials obtained from the background system. The LCA software used is One Click LCA.
Description of system boundaries: Cradle to gate with options, modules C1–C4, module D and optional module A4, A5 and B4, B6, B7.

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

	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	x	x	MND	MND	MND	x	MND	x	x	X	X	X	X	X
Geography	EU	EU	LT	EU	EU	-	-	-	EU	-	EU	EU	EU	EU	EU	EU	EU
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

Description of the system boundary (X = Included in LCA; MND = Module Not declared)

System boundaries:



Data quality: The foreground data collected internally is based on yearly production amounts and extrapolations of measurements on specific machines and plants. Overall, the data quality can be described as good. The primary data collection has been done thoroughly.

Cut-off criteria: Life cycle inventory data for a minimum of 99% of total material and energy input flows have been included in the life cycle analysis. Although only materials having in summa less than 1% of weight of product were not used in calculations.

Product stage:

A1: Raw material supply

The environmental impacts of raw material supply include emissions generated when raw materials are taken from nature, transported to industrial units for processing and processed, along with waste handling from the various production processes. All major upstream processes are taken into consideration, including infrastructure. Raw material losses are also taken into account. This stage includes all raw materials which end up in the final products. Materials included in module A1 are listed in Annex 1.

A2: Transportation of raw materials to manufacturer

The raw materials are transported to the manufacturing plant. In this case, the model includes road transportation of each raw material.

A3: Manufacturing

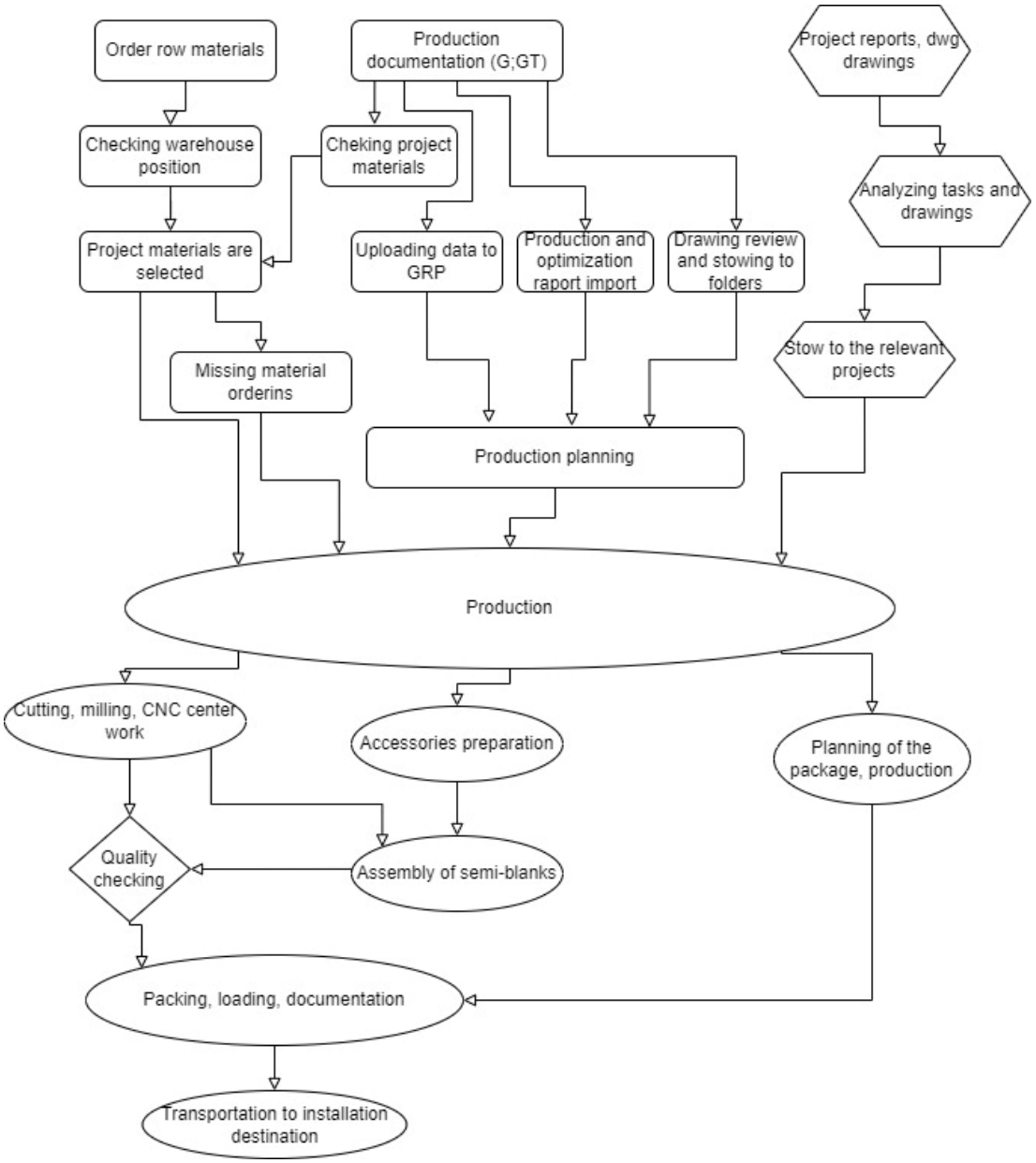
This module includes the manufacture of products and packaging. It also considers the energy consumption and waste generated at production plant. Materials and energy included in module A3 are listed in Annex 1.

Production process description

AW50 system facades consist of aluminium profiles and cover caps, insulating glass units and accessories: steel screws, polypropylene glazing packers, water drainage spout. All row materials are ordered and prepared according to customer requirements. Aluminium profiles and cover caps are cut and milled. Constructions are distributed into smaller elements. Every frame, separate mullions, transoms, pressure

plates and cover cap profiles are marked by label with their own unique numbers. All parts are packed and sending to installation destination. After facade frame and accessories installations the glass are installed which is attached by sealing cover caps. After installation all accessories AW50 system facades are cleaned of dirt, protective films and silicone residues and are ready for use.

Production process diagram:



Construction process stage:

A4: Transportation to construction site

This stage includes transport from the production gate to the construction site where the product shall be installed. Transportation is calculated based on data form manufacturer and a scenario with the parameters described in the following table. The transportation doesn't cause losses as products are packaged properly.

Parameter	Value/Description
Vehicle type used for transport	EURO 5 truck with a trailer with an average load of 16-32t
Distance	11 % of production: Truck – 67 km. 89 % of production: Truck – 442 km, Ship – 414 km.
Capacity utilization	56 % of the capacity in volume (truck), 50 % of the capacity in volume (ship)

A5: Construction installation

Installation is a manual operation also using power tools. Glass fitted into place with polymer glazing seals.

Use stage:

B1-B7: Use/maintenance/repair/replacement and etc.

Once the product is installed, no actions or technical operations leading to energy or water use are required during its service life (50 years) until the demolition of the construction. The partitions should be cleaned and inspected regularly. However, glass used in the AW50 aluminium profile system has shorter reference service life (25 years) than whole product, therefore glass with glazing seals should be replaced once in the life/use span of the declared product.

End of Life stage:

C1: Deconstruction, dismantling, demolition

Demolition is assumed to take 0.01 kWh/kg (Bozdağ, Ö & Seçer, M (2007) and the Level(s) project). It is assumed that 100% of the waste is collected. Consumption of fuel in demolition process is calculated according to transported mass. The source of energy is diesel fuel used by building machines.

C2: Transport of the discarded product to the processing site

It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed that it has the same weight with the declared product. All the end-of-life product is assumed to be sent to the closest facilities such as recycling. Transportation distance to the closest disposal area is estimated as 50 km and the transportation method is lorry which is the most common.

C3: Waste processing for reuse, recovery and/or recycling

When the facades glazed aluminium framed systems are removed without further re-installation intended, the main constituent materials should be separated for recycling. It is assumed that 50% of used glass and 95% of other non-glass materials are recycled.

Disposal of materials and components must be carried out safely environmental, health & safety regulations and disposal procedures.

C4: Discharge (disposal)

It is assumed that 50% of glass and 5% of other non-glass materials are landfilled.

D: Benefits and loads beyond the system boundary

Benefits of recyclable waste generated in the phase C3 are considered in the phase D.

Content information:

Product components	**Weight, kg**	**Weight, %**	**Post-consumer material, weight-%**	**Biogenic material, weight-% and kg C/kg**
Glass	17,59	61,70	0	0
Aluminium	7,96	27,92	0	0
Plastics	1,58	5,54	0	0
Other materials	0,86	3,01	0	0
Steel	0,51	1,79	0	0
Total	**28.51**	**100**	**0**	**0**
Packaging materials	**Weight, kg**		**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Wood	2,57		9,01	1,19
Plastic	0,36		1,26	0
Metal	0,05		0,17	0
TOTAL	**2,98**			

No dangerous substances from the candidate list of SVHC for Authorisation are present in the product.

Results of the environmental performance indicators

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	1,96E2	8,39E-1	6,14E0	2,03E2	1,62E0	4,69E1	MND	MND	MND	2,04E1	MND	0E0	0E0	9,4E-2	2,59E-1	8,92E0	9,61E-2	-9,06E1
GWP – fossil	kg CO_2e	1,91E2	8,38E-1	5,42E0	1,98E2	1,63E0	1,85E1	MND	MND	MND	2,04E1	MND	0E0	0E0	9,4E-2	2,59E-1	8,73E0	9,58E-2	-8,85E1
GWP – biogenic	kg CO_2e	3,37E0	6,03E-4	7,12E-1	4,08E0	1,04E-3	2,84E1	MND	MND	MND	0E0	MND	0E0	0E0	2,61E-5	1,88E-4	1,91E-1	1,99E-4	-5,75E-2
GWP – LULUC	kg CO_2e	1,32E0	2,54E-4	4,2E-3	1,32E0	5,46E-4	7,38E-5	MND	MND	MND	5,31E-3	MND	0E0	0E0	7,94E-6	7,8E-5	1,81E-3	3,9E-5	-2,05E0
Ozone depletion pot.	kg CFC_{-11}e	1,6E-5	1,97E-7	7,07E-7	1,69E-5	3,8E-7	3,80E-8	MND	MND	MND	2,38E-6	MND	0E0	0E0	2,03E-8	6,09E-8	2,54E-7	3,18E-8	-6,59E-6
Acidification potential	mol H^+e	1,55E0	3,51E-3	1,49E-2	1,57E0	1,09E-2	3,69E-3	MND	MND	MND	2,17E-1	MND	0E0	0E0	9,83E-4	1,09E-3	1,6E-2	7,99E-4	-6,81E-1
EP-freshwater	kg Pe	1,48E-2	6,84E-6	1,62E-4	1,5E-2	1,28E-5	3,66E-6	MND	MND	MND	3,92E-4	MND	0E0	0E0	3,8E-7	2,11E-6	1E-4	1,27E-6	-2,21E-3
EP-marine	kg Ne	2,43E-1	1,06E-3	5,08E-3	2,49E-1	3,03E-3	1,70E-3	MND	MND	MND	3,45E-2	MND	0E0	0E0	4,34E-4	3,28E-4	3,16E-3	2,78E-4	-8,48E-2
EP-terrestrial	mol Ne	2,86E0	1,17E-2	4,11E-2	2,91E0	3,35E-2	1,82E-2	MND	MND	MND	4,2E-1	MND	0E0	0E0	4,76E-3	3,62E-3	3,59E-2	3,06E-3	-9,31E-1
POCP (“smog”)	kg NMVOCe	8,17E-1	3,75E-3	1,47E-2	8,35E-1	9,98E-3	4,48E-3	MND	MND	MND	1,02E-1	MND	0E0	0E0	1,31E-3	1,16E-3	9,85E-3	8,82E-4	-3,16E-1
ADP-minerals & metals	kg Sbe	6,52E-2	1,45E-5	3,39E-5	6,53E-2	2,65E-5	5,27E-6	MND	MND	MND	6,23E-4	MND	0E0	0E0	1,44E-7	4,42E-6	6,09E-5	1,32E-6	6,61E-5
ADP-fossil resources	MJ	2,35E3	1,30E1	1,03E2	2,47E3	2,50E1	3,41E0	MND	MND	MND	2,3E2	MND	0E0	0E0	1,29E0	4,03E0	2,67E1	2,21E0	-8,01E2
Water use[2)]	m^3e depr.	6,92E1	4,85E-2	1,98E-3	6,92E1	9,02E-2	5,79E-2	MND	MND	MND	4,49E0	MND	0E0	0E0	2,41E-3	1,50E-2	6,02E-1	8,21E-2	-2,55E1

GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential.
EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy	MJ	4,62E2	1,65E-1	3,56E1	4,98E2	3,05E-1	6,82E-2	MND	MND	MND	1,11E1	MND	0E0	0E0	7,00E-3	5,07E-2	2,84E0	2,47E-2	-7,08E2
Renew. PER as material	MJ	2,82E0	0E0	4,23E1	4,51E1	0E0	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	4,65E2	1,65E-1	7,79E1	5,43E2	3,05E-1	6,82E-2	MND	MND	MND	1,11E1	MND	0E0	0E0	7,00E-3	5,07E-2	2,84E0	2,47E-2	-7,08E2
Non-re. PER as energy	MJ	2,39E3	1,30E1	9,84E1	2,5E3	2,50E1	3,41E0	MND	MND	MND	2,3E2	MND	0E0	0E0	1,29E0	4,03E0	2,67E1	2,21E0	-8,01E2
Non-re. PER as material	MJ	1,63E1	0E0	4,78E0	2,11E1	0E0	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	2,40E3	1,30E1	1,03E2	2,52E3	2,50E1	3,41E0	MND	MND	MND	2,3E2	MND	0E0	0E0	1,29E0	4,03E0	2,67E1	2,21E0	-8,01E2
Secondary materials	kg	6,65E0	0E0	4,4E-3	6,65E0	0E0	0E0	MND	MND	MND	5,19E-2	MND	0E0	0E0	0E0	0E0	0E0	0E0	-9,03E-2
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	3,25E0	2,71E-3	6,44E-2	3,32E0	5,01E-3	9,04E-3	MND	MND	MND	1,43E-1	MND	0E0	0E0	1,14E-4	8,39E-4	2,07E-2	2,00E-3	-5,00E-1

PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	4,38E1	1,27E-2	1,29E-1	4,39E1	2,47E-2	1,76E-1	MND	MND	MND	3,49E-1	MND	0E0	0E0	1,39E-3	3,92E-3	0E0	2,67E-3	-3,35E1
Non-hazardous waste	kg	6,80E2	1,40E0	5,27E0	6,87E2	2,52E0	1,25E1	MND	MND	MND	1,45E1	MND	0E0	0E0	1,49E-2	4,33E-1	0E0	1,12E1	-7,45E1
Radioactive waste	kg	8,46E-3	8,94E-5	1,51E-4	8,7E-3	1,72E-4	1,14E-5	MND	MND	MND	8,39E-4	MND	0E0	0E0	9,06E-6	2,77E-5	0E0	1,44E-5	-3,95E-3

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	2,88E-2	0E0	2,30E0	2,33E0	0E0	5,54E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	2,27E1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	7,03E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	2,46E0	0E0	0E0
Exported energy	MJ	1,40E-4	0E0	0E0	1,40E-4	0E0	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0	0E0	0E0

Environmental impacts – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,84E2	8,30E-1	5,48E0	1,90E2	1,62E0	1,85E1	MND	MND	MND	2,02E1	MND	0E0	0E0	9,33E-2	2,57E-1	8,70E0	9,43E-2	-8,58E1
Ozone depletion Pot.	kg CFC_{-11}e	1,45E-5	1,56E-7	5,55E-7	1,52E-5	3,02E-7	3,26E-8	MND	MND	MND	1,89E-6	MND	0E0	0E0	1,61E-8	4,84E-8	2,18E-7	2,53E-8	-6,78E-6
Acidification	kg SO_2e	1,17E0	1,71E-3	1,18E-2	1,18E0	6,74E-3	2,51E-3	MND	MND	MND	4,65E-2	MND	0E0	0E0	1,39E-4	5,27E-4	1,43E-2	9,41E-4	-5,77E-1
Eutrophication	kg PO_4^3e	5,46E-1	3,45E-4	5,99E-3	5,53E-1	1,03E-3	2,32E-3	MND	MND	MND	1,37E-2	MND	0E0	0E0	2,44E-5	1,06E-4	5,32E-3	9,13E-5	-1,16E-1
POCP (“smog”)	kg C_2H_4e	6,47E-2	1,08E-4	9,96E-4	6,58E-2	2,89E-4	5,18E-5	MND	MND	MND	1,82E-3	MND	0E0	0E0	1,43E-5	3,34E-5	5,28E-4	2,31E-5	-5,00E-2
ADP-elements	kg Sbe	6,52E-2	1,45E-5	3,39E-5	6,53E-2	2,65E-5	5,27E-6	MND	MND	MND	6,23E-4	MND	0E0	0E0	1,44E-7	4,42E-6	6,09E-5	1,32E-6	6,61E-5
ADP-fossil	MJ	2,35E3	1,30E1	1,03E2	2,47E3	2,50E1	3,41E0	MND	MND	MND	2,30E2	MND	0E0	0E0	1,29E0	4,03E0	2,67E1	2,21E0	-8,01E2

Reading example: 1,59E2 refers to 159

References

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

EN 15804+A2 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.