Environmental
Product
Declaration
According to ISO14025 and EN15804+A2

This declaration is for:
Curtain wall EWS-111 of "Citi Tower" London

Provided by:
Scheldebouw b.v. – Permasteelisa Group



program operator
Stichting MRPI®
publisher
Stichting MRPI®
www.mrpi.nl

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1.1.00664.2024
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22-10-2024
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22-10-2029

COMPANY INFORMATION

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MRPI® REGISTRATION

1.1.00664.2024

DATE OF ISSUE

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EXPIRY DATE

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SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Ulbert Hofstra, SGS Intron b.v..The LCA study has been done by G.J. van Beijnum, NIBE, b.v..The certificate is based on an LCA-dossier according to EN15804+A2. It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPD's of construction products may not be comparable if they do not comply with EN15804+A2. Declaration of SVHC that are listed on the 'Candidate list of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

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Amsterdam

Ing. L. L. Oosterveen MSc. MBA
Managing Director MRPI

PRODUCT

Curtain wall EWS-111 of "Citi Tower" London

DECLARED UNIT/FUNCTIONAL UNIT

m²

DESCRIPTION OF PRODUCT

A typical curtain wall element EWS-111 of the project "Citi Tower", London, including fixings and closures. Size: 1.865 x 4.100 = 7.647 m2. The results are expressed per m2 of façade area by applying the conversion factor 1 / 7.646.

VISUAL PRODUCT



MORE INFORMATION

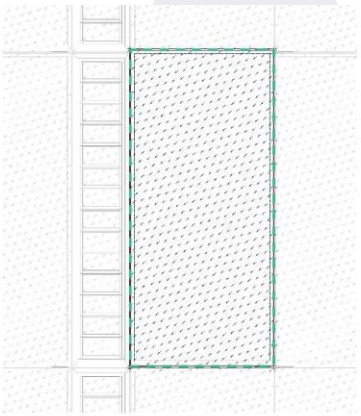
https://scheldebouw.permasteelisagroup.com

DEMONSTRATION OF VERIFICATION
CEN standard EN15804 serves as the core PCR(a)
Independent verification of the declaration an data according to ISO14025 and EN15804+A2 internal: external: x
Third party verifier: Ulbert Hofstra, SGS Intron b.v.
[a] PCR = Product Category Rules

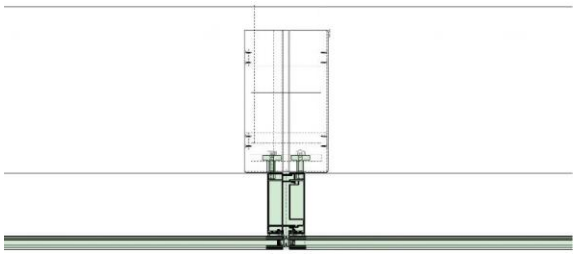
DETAILED PRODUCT DESCRIPTION

One typical curtain wall element EWS-111 of the project "Citi Tower", London, including fixings and closures.
Size: 1.865 x 4.100 = 7.647 m2.
Weight: 76.52 kg / m2.
Performance in accordance with DoP and CE-marking nr. 2023-91278.

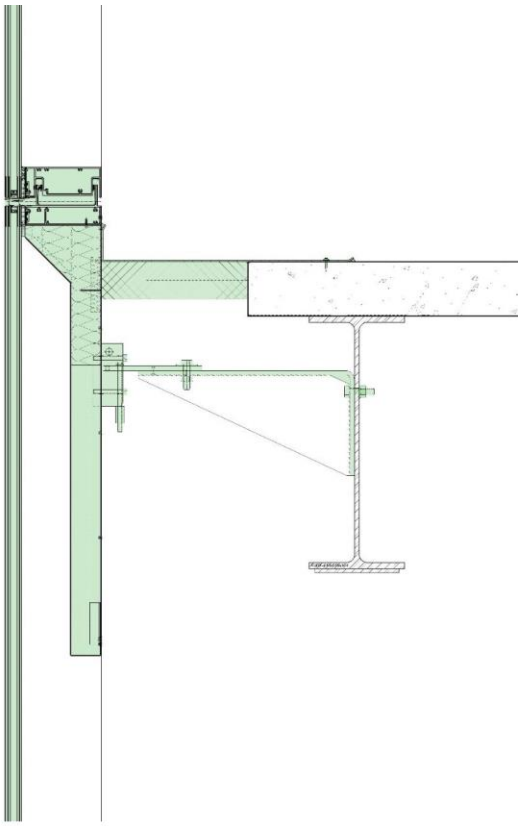
Consisting of the following parts:
Glazing: 66.2 - 16 - 55.2
Spandrel: 1.5 mm pre-galvanised steel sheet with powdercoating, 70 mm mineral wool insulation and 1.5 mm pre-galvanised steel sheet.
Firestop at floor edge: 350 mm x 75 mm mineral wool with 3 mm steel sheet on top.



EWS 111 – Typical elevation



EWS 111 – Typical mullion detail



EWS 111 – Typical floor edge detail

RSL Product
The curtain wall facade has a reference service life of 60 years.

RSL parts
The facade consists of various parts with different service lifetimes. During the reference service life (RSL) of the facade (60 years), several parts like glazing, sealants and gaskets need to be replaced. The replacement of these parts has been accounted for in life cycle stage B3.

The reference service life of the product parts in this report is based on the estimated service life, as defined in BS ISO 15686-1, which Scheldebouw provides to the client in their general guarantees and warranties schedule. For materials with varying service life categories the shortest period is taken as a conservative approach.

*The RSL of 25 years for the glazing and the sealant has been artificially modelled as 20 years to end up with a discrete number of replacement cycles, following the CWCT guideline.

Product part	RSL
Laminated double glazing	25 years*
EPDM gaskets	30 years
Sealant	25 years*
All other parts	60 years

Component (> 1%)	Kg per m2 facade
Laminated double glazing	55,82
Powdercoated aluminium extrusions	7,80
Anodised aluminium extrusions	0,38 *
Anodised aluminium sheets	0,04 *
Mineral wool insulation	0,94 *
Pre-galvanised steel sheets	5,07
Powdercoated pre-galvanised steel sheets	3,68
Galvanised steel bracket plate	1,30
Gaskets	0,48 *
Chromium steel parts e.g. fasteners	0,33 *
Sealant	0,68 *
Total	**76,52**

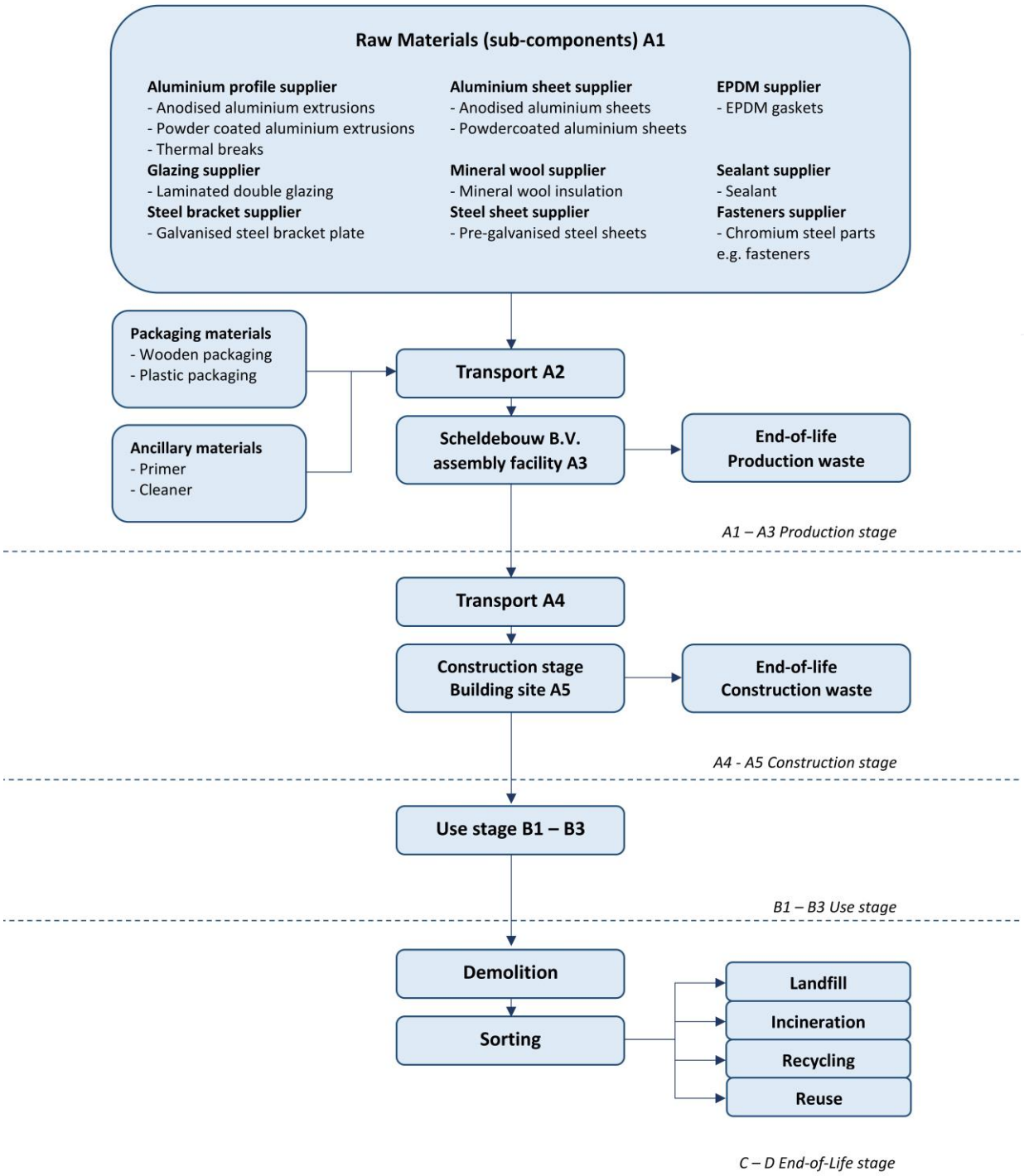
(*) < 1% of total mass, but included for completeness of the assessment

SCOPE AND TYPE

The input data are representative for facade type EWS-111 of the project “Citi Tower” in London, a product produced by Scheldebouw B.V. in Middelburg, The Netherlands. The data are representative for building site London and production location Middelburg with suppliers located in Europe. In absence of predefined waste / end-of-life scenarios for the United Kingdom, the Dutch scenarios are used, because they are deemed representative.

LCA method R<THINK: EN15804+A2:2019
LCA software**: Simapro 9.1.1
Characterisation method: EN 15804 +A2 Method v1.0
LCA database profiles: EcoInvent version 3.6
Version database: v3.17 (2024-05-22)
(**) Used for calculating the characterised results of the environmental profiles within R<THINK.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USER STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to 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	ND	ND	ND	ND	X	X	X	X	X
X= Modules Assessed ND= Not Declared																



REPRESENTATIVENESS

The input data are representative for facade type EWS-111 of the project "Citi Tower" in London, a product produced by Scheldebouw B.V. in Middelburg, The Netherlands. The data are representative for building site London and production location Middelburg with suppliers located in Europe.

ENVIRONMENT IMPACT per functional unit or declared unit (core indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	2,08 E+02	1,30 E+01	2,26 E+01	2,44 E+02	1,41 E+00	3,19 E+01	0,00 E+00	4,64 E+00	2,65 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,09 E+00	6,59 E-01	6,10 E+00	9,80 E-02	-1,12 E+02
GWP-fossil	kg CO2 eq.	2,06 E+02	1,30 E+01	2,82 E+01	2,48 E+02	1,41 E+00	2,60 E+01	0,00 E+00	5,68 E+00	2,63 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,09 E+00	6,59 E-01	5,74 E+00	9,74 E-02	-1,11 E+02
GWP-biogenic	kg CO2 eq.	4,96 E-01	6,01 E-03	-5,75 E+00	-5,25 E+00	5,09 E-04	5,90 E+00	0,00 E+00	6,44 E-03	1,70 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	7,83 E-04	3,04 E-04	3,50 E-01	5,76 E-04	-3,48 E-01
GWP-luluc)	kg CO2 eq.	1,12 E+00	4,77 E-03	1,00 E-01	1,23 E+00	5,89 E-04	6,28 E-02	0,00 E+00	1,69 E+00	2,29 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,42 E-03	2,41 E-04	1,43 E-03	2,59 E-05	-9,57 E-01
ODP	kg CFC11 eq.	2,33 E-05	2,87 E-06	2,30 E-06	2,84 E-05	3,08 E-07	2,66 E-06	0,00 E+00	4,26 E-07	3,89 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,11 E-07	1,45 E-07	2,14 E-07	3,96 E-08	-6,72 E-06
AP	mol H+ eq.	1,54 E+00	7,55 E-02	1,09 E-01	1,72 E+00	1,16 E-02	1,21 E-01	0,00 E+00	2,48 E-02	2,06 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,19 E-03	3,82 E-03	1,22 E-02	8,50 E-04	-6,57 E-01
EP-freshwater	kg P eq.	8,88 E-03	1,31 E-04	1,31 E-03	1,03 E-02	1,34 E-05	7,95 E-04	0,00 E+00	2,14 E-04	8,18 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,04 E-05	6,65 E-06	7,64 E-05	9,91 E-07	-4,48 E-03
EP-marine	kg N eq.	2,35 E-01	2,66 E-02	2,12 E-02	2,83 E-01	3,55 E-03	2,14 E-02	0,00 E+00	1,84 E-02	3,69 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	7,63 E-04	1,35 E-03	2,52 E-03	3,09 E-04	-8,72 E-02
EP-terrestrial	mol N eq.	2,75 E+00	2,93 E-01	2,44 E-01	3,29 E+00	3,93 E-02	2,51 E-01	0,00 E+00	8,25 E-02	4,31 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,05 E-03	1,48 E-02	2,77 E-02	3,40 E-03	-1,16 E+00
POCP	kg NMVOC eq.	8,18 E-01	8,37 E-02	7,23 E-02	9,74 E-01	1,10 E-02	6,84 E-02	0,00 E+00	1,42 E-02	1,14 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,30 E-03	4,24 E-03	7,80 E-03	9,75 E-04	-3,40 E-01
ADP-minerals & metals	kg Sb eq.	4,46 E-02	3,30 E-04	6,17 E-03	5,11 E-02	3,33 E-05	1,52 E-03	0,00 E+00	1,02 E-04	1,20 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	7,96 E-06	1,67 E-05	5,61 E-05	7,94 E-07	2,65 E-02
ADP-fossil	MJ, net calorific value	2,66 E+03	1,96 E+02	4,01 E+02	3,26 E+03	2,09 E+01	5,12 E+02	0,00 E+00	4,88 E+01	3,39 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,64 E+01	9,94 E+00	2,21 E+01	2,70 E+00	-1,18 E+03
WDP	m3 world eq. Deprived	6,72 E+01	7,02 E-01	7,34 E+00	7,52 E+01	7,14 E-02	3,11 E+00	0,00 E+00	3,43 E+00	7,63 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,75 E-02	3,55 E-02	3,73 E-01	1,69 E-02	-2,45 E+01

GWP-total = Global Warming Potential total
GWP-fossil = Global Warming Potential fossil fuels
GWP-biogenic = Global Warming Potential biogenic
GWP-luluc = Global Warming Potential land use and land use change
ODP = Depletion potential of the stratospheric ozone layer
AP = Acidification Potential, Accumulated Exceedence
EP-freshwater = Eutrophication Potential, fraction of nutrients reaching freshwater end compartment
EP-marine = Eutrophication Potential, fraction of nutrients reaching marine end compartment
EP-terrestrial = Eutrophication Potential, Accumulated Exceedence
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals = Abiotic Depletion Potential for non-fossil resources [2]
ADP-fossil = Abiotic Depletion for fossil resources potential [2]
WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ENVIRONMENT IMPACT per functional unit or declared unit (additional indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	1,59 E-05	1,17 E-06	9,13 E-07	1,80 E-05	1,18 E-07	7,94 E-07	0,00 E+00	2,91 E-07	2,05 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,36 E-08	5,93 E-08	1,55 E-07	1,75 E-08	-6,35 E-06
IRP	kBq U235 eq.	1,00 E+01	8,22 E-01	1,01 E+00	1,18 E+01	8,78 E-02	7,12 E+00	0,00 E+00	5,45 E-01	1,22 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,38 E-01	4,16 E-02	9,86 E-02	1,17 E-02	-3,85 E+00
ETP-fw	CTUe	9,72 E+03	1,75 E+02	6,55 E+02	1,05 E+04	1,82 E+01	6,06 E+02	0,00 E+00	1,80 E+02	1,45 E+04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,67 E+01	8,86 E+00	2,00 E+02	1,55 E+02	-2,97 E+03
HTP-c	CTUh	4,05 E-07	5,68 E-09	2,33 E-08	4,34 E-07	6,48 E-10	2,03 E-08	0,00 E+00	8,34 E-09	1,89 E-07	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,51 E-10	2,87 E-10	4,58 E-09	4,31 E-11	-1,38 E-07
HTP-nc	CTUh	5,27 E-06	1,91 E-07	4,65 E-07	5,93 E-06	1,96 E-08	3,77 E-07	0,00 E+00	1,31 E-07	3,94 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,18 E-08	9,69 E-09	7,25 E-08	1,46 E-09	3,46 E-07
SQP	----	8,18 E+02	1,70 E+02	8,16 E+02	1,80 E+03	1,68 E+01	2,92 E+02	0,00 E+00	1,49 E+02	1,51 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,52 E+01	8,62 E+00	2,11 E+01	5,84 E+00	-5,85 E+02

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]

Disclaimer [1]
- 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 nor due to radioactive waste.

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	3,43 E-02	4,97 E-04	2,08 E-02	5,56 E-02	5,00 E-05	3,23 E-03	0,00 E+00	7,38 E-05	1,29 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,95 E-05	2,52 E-05	5,10 E-02	3,06 E-06	6,28 E-02
NHWD	kg	4,12 E+01	1,24 E+01	3,80 E+00	5,75 E+01	1,21 E+00	4,07 E+00	0,00 E+00	8,73 E-01	1,01 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	7,06 E-02	6,30 E-01	1,97 E+00	1,83 E+01	-2,00 E+01
RWD	kg	9,89 E-03	1,29 E-03	1,02 E-03	1,22 E-02	1,38 E-04	3,74 E-03	0,00 E+00	3,23 E-04	1,37 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,17 E-04	6,52 E-05	1,11 E-04	1,80 E-05	-3,60 E-03
CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MFR	kg	0,00 E+00	0,00 E+00	2,64 E+00	2,64 E+00	0,00 E+00	1,99 E+00	0,00 E+00	0,00 E+00	8,29 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,68 E+01	0,00 E+00	0,00 E+00
MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
EEE	MJ	0,00 E+00	0,00 E+00	1,96 E+00	1,96 E+00	0,00 E+00	2,93 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
ETE	MJ	0,00 E+00	0,00 E+00	3,38 E+00	3,38 E+00	0,00 E+00	5,05 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

RESOURCE USE per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	4,08 E+02	2,46 E+00	9,11 E+01	5,02 E+02	2,53 E-01	9,24 E+01	0,00 E+00	2,96 E+01	2,37 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,95 E+00	1,24 E-01	2,20 E+00	5,18 E-02	-3,18 E+02
PERM	MJ	0,00 E+00	0,00 E+00	4,90 E+01	4,90 E+01	0,00 E+00	1,47 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
PERT	MJ	4,08 E+02	2,46 E+00	1,40 E+02	5,51 E+02	2,53 E-01	9,38 E+01	0,00 E+00	2,96 E+01	2,37 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,95 E+00	1,24 E-01	2,20 E+00	5,18 E-02	-3,18 E+02
PENRE	MJ	2,81 E+03	2,08 E+02	3,97 E+02	3,42 E+03	2,22 E+01	5,39 E+02	0,00 E+00	5,42 E+01	3,56 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,79 E+01	1,05 E+01	2,36 E+01	2,87 E+00	-1,25 E+03
PENRM	MJ	3,15 E+01	0,00 E+00	3,28 E+01	6,43 E+01	0,00 E+00	1,93 E+00	0,00 E+00	0,00 E+00	7,26 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-2,26 E+00
PENRT	MJ	2,84 E+03	2,08 E+02	4,30 E+02	3,48 E+03	2,22 E+01	5,41 E+02	0,00 E+00	5,42 E+01	3,63 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,79 E+01	1,05 E+01	2,36 E+01	2,87 E+00	-1,26 E+03
SM	kg	3,60 E+00	0,00 E+00	4,06 E-01	4,01 E+00	0,00 E+00	1,20 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
FW	m3	2,99 E+00	2,39 E-02	2,98 E-01	3,31 E+00	2,43 E-03	1,88 E-01	0,00 E+00	1,61 E-01	2,25 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,16 E-03	1,21 E-03	1,67 E-02	3,16 E-03	-1,64 E+00

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

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	Kg C	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
BCCpa	kg C	0,00 E+00	0,00 E+00	5,83 E+00	5,83 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

CUT-OFF CRITERIA

There is no cut-off applied for the inputs or outputs of any of the processes.

TIME PERIOD DATA COLLECTION

Background data is primarily based on EcoInvent 3.6. Foreground data is <2 years and background data <10 years. The data quality is considered to be good.
Material quantities: design specific
Suppliers: FY2023
Factory: FY2023
Building site: following CWCT
Emissions: n/a
Fiscal Year 2023 (referred to FY2023 henceforth) refers to the financial year starting from 1st of April 2022, and ending on 31st of March 2023.

ALLOCATION

Allocation is applied for recycling at end-of-life of various materials according to EN 15804 rules.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Life cycle stages A1-A3 (production)

Scheldebouw B.V. produce the curtain wall panels in their factory in Middelburg. The various parts and materials are sourced from various suppliers as semi-finished products, enter the factory and are assembled into a facade panel. After assembly, the facade elements are packed and made ready for transport to the building site together with the brackets and other materials for fixing and/or closure.
Semi-finished products of the suppliers (cradle to supplier gate) are included in stage A1 of this LCA study. The transport movements between suppliers and Scheldebouw are included in stage A2 and all activities in the Scheldebouw assembly location in Middelburg are included in stage A3.
The production stage consists of the extraction of raw materials, transportation of the raw materials, processing the raw materials into sub-components and the assembly of the sub-components into the end-product. The required energy for production, external treatments, ancillary materials, packaging material and production emissions are included.

Supplier distances (stage A2)	km
Glazing	1516
Aluminium profiles	1154
Aluminium sheet work	470
Mineral wool	86
Steel sheet work	167
Steel brackets	427
Gaskets	246
Fasteners	46
Sealant, incl. primer and cleaner	156
Wooden packaging	10
Plastic packaging	10

Life cycle stages A4-A5 (construction)

This stage consists of the transport of the product from production plant to the construction site. It also includes the loss of material during construction. The additional needed production, transport and end-of-life treatment of the lost material during construction is included. The end-of-life of packaging material up to the end-of-waste state or disposal of final residues is also included. The energy use for installation of the product is taken into account following the CWCT methodology.
The facade elements are delivered on the building site including fastening and closure materials (floor brackets and fire stop). The facade elements are lifted onto the floors of the building and installed. After that, the floor edge detail is completed by applying the mineral wool and steel sheets.

The transport movements between Scheldebouw Middelburg and the building site are included in stage A4. All activities on the building site are included in stage A5.

Transport to the construction site consists of the following:

Transport conveyance	Distance	Transported mass [kg]
Lorry (truck): Middelburg-Rotterdam	85 km	
Transoceanic ship: Rotterdam-Purfleet	282 km	
Lorry (truck): Purfleet-London	31 km	
Total:	398 km	80,53

Life cycle stages B1-B3 (use stage)
This stage consists of the impacts arising from components of the building and construction works during their use. The facade construction itself is assumed to have negligible environmental impact during its use stage B1. Cleaning of the facade needs to be done twice a year and is modelled in stage B2 following CWCT in accordance with EN 17074.
The facade consists of various parts with different service lifetimes. During the reference service life (RSL) of the facade (60 years), several parts like glazing, sealants and gaskets need to be replaced. The replacement of these parts has been accounted for in life cycle stage B3.
Product replacement (B4) and renovation (B5) are not considered. Operational water and energy use (B6-7) are not considered.

Life cycle stages C1-C4 (end of life)
When the end of the life stage of the building is reached, the de-construction/demolition begins. This EPD includes de-construction/demolition (C1), the necessary transport (C2) from the demolition site to the sorting location and distance to final disposal. The end of life stage includes the final disposal to landfill (C4), incineration (C3) and needed recycling processes up to the end-of-waste point (C3). Loads and benefits of recycling, re-use and exported energy are part of module D.
The default end-of-life scenarios of the annex (November 2020) to the NMD Determination method v1.1 have been used for the various materials in the product.

Waste scenario	Landfill [%]	Incineration [%]	Recycling [%]
Glazing	30	0	70
Aluminium	3	3	94
Thermal breaks	20	80	0
Mineral wool insulation	85	5	10
Steel sheets and brackets	5	0	95
Gaskets	10	85	5
Chromium steel	1	0	99
Sealant, primer, cleaner	0	100	0
Packaging, wood and plastic	10	85	5

Transport by "Lorry (Truck), unspecified (default) | market group for (GLO)"	Distance [km]
Landfill	100
Incineration	150
Recycling	50

Life cycle stage D (benefits and loads beyond the system boundary)
This stage contains the potential loads and benefits of recycling and re-use of raw materials/products. The loads contain the needed recycling processes from end-of-waste-point up to the point-of-equivalence of the substituted primary raw material and a load for secondary material that will be lost at the end-of-life stage. The loads and benefits of recycling and reuse are included in this module. The benefits are calculated based on the primary content and the primary equivalent. In addition, the benefits of energy recovery are granted at this stage. The amount of avoided energy is based on the Lower Heating Values of the materials and the efficiencies of the incinerators as mentioned in the NMD Determination method v1.1 or EcoInvent 3.6 (2019).

DECLARATION OF SVHC
The product does not contain any substances listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorisation” exceeding 0.1% of the weight of the product.

REFERENCES
CWCT
Centre for Window and Cladding Technology
"How to calculate the embodied carbon of facades: A methodology", Issue 1, September 2022

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

ISO 14040
ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044
ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

ISO 14025
ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

MRPI verification protocol
MRPI®-EPD verification protocol November 2020.v4.0

REMARKS
This declaration is only valid for the specific design of this project and facade type.