

Environmental Product Declaration

Chainable keuken - 600mm onderkast module

Chainable

Publisher:	Chainable
Program operator:	Chainable
Calculation number:	ReTHiNK-37439
Generation on:	21-04-2023
Issue date:	21-04-2023
Valid until:	21-04-2028
Status:	verified

R<THiNK



powered by nibe

1 General information

1.1 PRODUCT

Chainable keuken - 600mm onderkast module

1.2 VALIDITY

Issue date 21-04-2023

Valid until: 21-04-2028

1.3 OWNER OF THE DECLARATION



CHAINABLE

THE WAY TO CIRCULARITY

Manufacturer: Chainable

Address: Hercules 4, 5126 RK Gilze

E-mail: hello@chainable.nl

Website: www.chainable.nl

Production location: Chainable BV

Address production location: Hercules 4, 5126 RK Gilze

1.4 VERIFICATION OF THE DECLARATION

CEN standard EN 15804:2012+A2:2019 serves as the core PCR. In compliance with ISO 14040:2006 and 14044:2006.

Independent verification of the declaration according to EN ISO 14025:2011-10.

☐ Internal ☒ External

Msc. P.F. Stadhouders, EcoReview V.O.F.

1.5 THIS DECLARATION IS BASED ON THE PRODUCT CATEGORY RULES

NMD Determination method Environmental performance Construction works v1.1 March 2022

1.6 PURPOSE AND TARGET GROUPS

The purpose of this LCA is to compile environmental data of materials and products used in the built environment. So that the environmental data can be used in calculations of buildings and / or civil works. The purpose of this report is to draw up a review dossier with the results of 'set 1' and 'set 2' for the product as mentioned in the NMD Determination method Environmental performance Construction works v1.1 March 2022. This document defines a standardized method for a LCA in the Netherlands, of a product used in the build environment, in addition to EN 15084+A2. The review dossier is in accordance with EN15804+A2, ISO14040 and ISO14044.

The target groups of this LCA study are: Users of the NMD or programs that use this database, such as BREEAM-NL, GPR gebouw and GPR bouwbesluit, MRPI freetool, DuboCalc, etc..

1.7 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and

1 General information

general program instructions of different EPDs programs may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

1.8 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'Chainable keuken - 600mm onderkast module' with the calculation identifier ReTHiNK-37439.

2 Product

2.1 PRODUCT DESCRIPTION

General product description

Een Chainable keuken is modulair opgebouwd met een klikbaar stalen frame, waar de panelen met bevestigingsmiddelen op worden gemonteerd en gehard glazen achterwanden tussen de onder- en bovenkasten worden geplaatst. Een Chainable keuken is een samengesteld product en kan per module worden opgebouwd. Met deze Functional Unit kan de gebruiker, in combinatie met de bovenkast module, verschillende configuraties van de keuken maken en bijbehorende milieudata raadplegen.

Deze productkaart is representatief voor de materialisatie van een stuk onderkast module (600mm). Inclusief hang- en sluitwerk, ladebak, ladegeleiders, grepen, tussenschot, legplank, en bevestigingsmaterialen. Exclusief keukenblad, spoelbak en kraan. De Bill of Material is gebaseerd op een keukenopstelling met drie onderkasten en verrekend naar een stuk module van 600mm.

Het totaalproduct 'Chainable Keuken' is een combinatie van meerdere producten en bestaat minimaal uit de volgende onderdelen: onderkast modules, wasbak, kraan, granieten blad. Optioneel worden hier bovenkast modules, glazen achterwanden en stopcontacten aan toegevoegd.

Productions Sites

Deze EPD is representatief voor een 600mm onderkast van een Chainable keuken. Chainable beschikt over een kantoor en magazijnruimte van 1100m². In het magazijn komen de onderdelen van verschillende leveranciers binnen. Vanuit het magazijn worden de keukens vervoerd naar de adressen waar de keukens vervolgens worden gemonteerd.

Composition

De 600mm onderkastmodule bestaat uit de volgende componenten:

- 62,90% Unilin Evola spaanplaat
- 21,87% Magnelis uitvoering S250GD+ZM310MAC
- 7,91% Verbinding- en bevestigingselementen
- 6,43% Spaanplaat generiek

Verbinding- en bevestigingselementen bestaan uit hang- en sluitwerk, ladegeleiders, stelpootjes, grepen en zijpanelen van de ladebakken.

Dimensions

Een Chainable onderkast is beschikbaar in de maatvoeringen: 300, 470, 600, 620 en 900mm. Voor de verschillende mogelijkheden in keukenopstelling en beschikbare kleuropties, neem contact met ons op via hello@chainable.nl.

Technical properties

De EPD calculaties zijn gebaseerd op de volgende dichtheid per materiaal:

- Magnelis S250GD+ZM310MAC; 7,828 g/cm³; 0,15cm
- Unilin Evola spaanplaat; 0,652 g/cm³; 1,2cm
- Unilin Evola spaanplaat; 0,652 g/cm³; 1,8cm
- Egger spaanplaat; 0,66 g/cm³; 1,6cm

De EPD is gebaseerd op een Bill of Material bestaande uit totaal 71 onderdelen, waarvan 31 verschillende componenten.

Deze LCA is representatief voor de meest gebruikte kleur optie: UNILIN Evola 025CST front white.

2.2 REFERENCE SERVICE LIFE

RSL PRODUCT

De levensduur van de Chainable Onderkast Module is gebaseerd op de levensduur van het staalframe in combinatie met Magnelis coating, welke is vastgesteld op 60 jaar.

Onderbouwing levensduur staalframe

Leverancier van het staalframe, KS Profiel, gaat uit van een levensduur van minimaal 70 jaar bij C2 (indoor) environments voor Magnelis ZM310.

- Zie Levensduur; Expected lifetime of steel frame Magnelis.jpg

- Zie Levensduur; KS Profiel - levensduur staalframe Chainable keuken.msg

Chainable heeft door Kiwa laten bevestigen dat deze levensduur voor keukentoepassing aannemelijk is

- Zie Levensduur; Kiwa - galvanized steel kitchen application.msg

Overige info Magnelis

- Zie Levensduur; Magnelis_DIBtleaflet_EN.pdf

Onderbouwing overige materialen

2 Product

Chainable garandeert de levensduur van de producten door de materialen met een kortere levensduur dan het staalframe (materialen met levensduur <60 jaar) te onderhouden aan de hand van een servicecontract. Zie toelichting 'Source Reference Service Life (Rsl) Product parts'

USED RSL (YR) IN THIS LCA CALCULATION:

60

RSL PARTS

Chainable garandeert de levensduur van de producten door de materialen met een kortere levensduur dan het staalframe te onderhouden aan de hand van een servicecontract. Planmatig onderhoud wordt 1x per 7 jaar uitgevoerd. De materialen worden gedurende de gebruiksfase onderhouden, zodat de materialen in een goede staat blijven en zo lang mogelijk meegaan, om de levensduur te garanderen.

- zie B2; Servicecomponent Chainable.pdf
- zie B2; Refurbishen_service_toekomstig hergebruik.pdf
- Zie B2; Voorbeeld Service Overeenkomst Chainable.pdf

Aanvullend geeft Chainable een onderhoud handleiding mee aan klanten

- Zie B2; Handleiding Onderhoud Chainable Keuken.pdf

Description	Material	RSL [yr]
<i>Repairs (B3)</i>		
Panelen (Unilin Evola)	Particle board for indoor use (680kg/m3) production (EU) corr. acc. EN16449	20
Verbindingselementen (geleiders, scharnieren, zijpanelen ladebak) (Van Hoecke)	Steel coil 0.3-3.0mm cold rolled, galvanised (without zinc coating) [Steel federation NL]	20
Plaatmateriaal; spaanplaat	Particle board for indoor use (680kg/m3) production (EU) corr. acc. EN16449	20

2.3 DESCRIPTION PRODUCTION PROCESS

Production

Alle verschillende componenten benodigd voor een 600mm onderkastmodule worden vanuit toeleveranciers geleverd bij het magazijn van Chainable in Gilze. Alle componenten worden bij de toeleveranciers op maat gemaakt, waardoor er geen productieafval meer is op de productielocatie. De energie benodigd voor verwarming en verlichting van het magazijn is afkomstig van 100% Nederlandse Wind.

De tussenschotten worden prefab geassembleerd in het magazijn, hier is handgereedschap voor nodig. In het magazijn worden de onderdelen voor een keuken verzameld en ingepakt voor verzending.

De verpakking is meegenomen in de calculaties voor de LCA.

Product stage (A1-A3)

De productfase bestaat uit de winning van grondstoffen, transport van grondstof, verwerken van grondstof tot materiaal en productie van de verschillende componenten benodigd voor een 600mm onderkastmodule en transport naar het magazijn van Chainable.

De grondstoffen worden verwerkt tot materiaal door:

- Plaatmateriaal: Unilin
- Stalen frame: Arcelor Mittal

2 Product

- Ladegeleiders: Blum

Chainable ontvangt de componenten voor een onderkast vanuit verschillende toeleveranciers:

- Plaatmateriaal: Van Drenth
- Stalen frame: KS profile
- Grepen: Prodinter
- Ladegeleiders: Van Hoecke
- Bevestigingsmateriaal: Ferrofast

De benodigde energie voor de verwerking van de grondstoffen tot componenten zijn meegenomen in de EPD calculaties.

De materialen worden bij de partners op maat gemaakt en via de verschillende distributielocaties worden de componenten verzonden. De transportafstanden en wijze van vervoer naar Chainable zijn meegenomen in de EPD calculaties.

De materialen benodigd om de Functional Unit te verpakken zijn meegenomen in de EPD calculaties.

2.4 CONSTRUCTION DESCRIPTION

Construction

De constructiefase bestaat uit de opbouw van verschillende keukenmodules op het adres waar de keuken blijft staan gedurende de gebruiksfase. Chainable beschikt over eigen vervoer en de keukens worden geleverd door heel Nederland.

Construction process stage (A4-A5)

De constructiefase bestaat uit het transport van het de productonderdelen vanuit het magazijn van Chainable naar het adres waar de keuken wordt opgebouwd en de opbouw van de Functional Unit op de locatie.

Tijdens deze fase wordt de Functional Unit opgebouwd. Hulpmiddelen voor de constructiefase bestaan uit schroevendraaiers, poetsdoek microvezel en kit.

3 Calculation rules

3.1 FUNCTIONAL UNIT

st (keukenmodules)

Declared unit: piece (p)

De materialisatie van een stuk onderkast module (600mm). Inclusief hang- en sluitwerk, ladebak, ladegeleiders, grepen, tussenschot, legplank, en bevestigingsmaterialen. Exclusief keukenblad, spoelbak en kraan. Met deze Functional Unit kan de gebruiker, in combinatie met de bovenkast module, verschillende configuraties van de keuken maken en bijbehorende milieudata raadplegen.

Het totaalproduct 'Chainable Keuken' is een combinatie van meerdere producten en bestaat minimaal uit de volgende onderdelen: onderkast modules, wasbak, kraan, granieten blad. Optioneel worden hier bovenkast modules, glazen achterwanden en stopcontacten aan toegevoegd.

De belangrijkste functie van het product is om een werkplek te bieden voor het koken en bereiden van voedsel.

3.2 CONVERSION FACTORS

Description	Value	Unit
Declared unit	1	p
Weight per declared unit	37.764	kg
Conversion factor to 1 kg	0.026480	p

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with options, modules C1-C4 and module D LCA. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

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

The modules of the EN15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

3.4 REPRESENTATIVENESS

This EPD is representative for Chainable keuken - 600mm onderkast module, a product of Chainable. The results of this EPD are representative for Netherlands.

3.5 CUT-OFF CRITERIA

In the Life cycle assessment the following cut-off criteria are applied:

PRODUCT STAGE (A1-A3)

The production stage consists of the extraction of raw materials, transportation of the raw materials, processing the raw materials into materials and the production of the product. The required energy for production, external treatments, ancillary materials, packaging material and production emissions are included.

CONSTRUCTION PROCESS STAGE (A4-A5)

This stage consists 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 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.

3 Calculation rules

The installation of the product including manufacture, transportation and end-of-life of ancillary materials and any energy or water use required for installation or operation of the construction site are taken into account.

USE STAGE (B1-B3)

This stage consists of the impacts arising from components of the building and construction works during their use.

The stage also covers the combination of all planned technical and associated administrative maintenance actions during the service life to maintain the product installed in a building, in a construction works or its parts in a state in which it can perform its required functional and technical performance, as well as preserve the aesthetic qualities of the product. This will include preventative and regular maintenance activities.

Product replacement (B4) and renovation (B5) only apply when the product is considered in a lifespan (of a building, work , etc.). Operational water and energy use are not considered.

END OF LIFE STAGE (C1-C4)

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 (March 2022) to the NMD Determination method v1.1 have been used for the various materials in the product.

BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

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).

3.6 ALLOCATION

Allocation has not been applied in this LCA.

3.7 DATA COLLECTION & REFERENCE TIME PERIOD

2021-2022

3.8 DATA QUALITY

Het is niet mogelijk gebleken om specifieke achtergrond data te verkrijgen bij de toeleveranciers van het Plaatmateriaal, Verbindingselementen, RVS grepen en Bevestigingsonderdelen. Er zijn daarom generieke milieuprofielen gehanteerd op basis van Europese/Nederlandse gemiddeldes. Waar nodig zijn aanvullende emissies toegekend.

4 Scenarios and additional technical information

4.1 TRANSPORT TO CONSTRUCTION SITE (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD.

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default) market group for (GLO)
Fuel type and consumption of vehicle	not available
Distance	150 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.2 ASSEMBLY (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module A5.

FLOWS ENTERING THE SYSTEM

There are no significant environment impacts as a result of materials or energy used in the construction stage (A5).

FLOWS LEAVING THE SYSTEM

The following output flows leaving the system at module A5 are assumed.

Description	Value	Unit
Output materials as result of loss during construction	3	%
Output materials as result of waste processing of materials used for installation/assembly at the building site	0.000	kg
Output materials as result of waste processing of used packaging	3.365	kg

4.3 USE STAGE (B1)

Emissions to air/soil/water are applicable, the scenario accounted in module B1 is as follows in the table below.:

Description	Cycle (yr)	Number of cycles	Amount per cycle	Total Amount	Unit
Servicecomponent, preventief onderhoud (transport)	60	1	45.32	45.32	tkm

4 Scenarios and additional technical information

4.4 MAINTENANCE (B2)

No maintenance is needed to fulfil the requirements as stated in the applicable functional unit (chapter 3.1) and to achieve the stated reference service life (2.3).

4.5 REPAIR (B3)

The technical reference service life of some parts of the considered product does not equal the technical reference service life of the product. Therefore the following Repair scenarios are assumed for module B3.

Description	Cycles (yr)	Number of repair cycles (n)	Total Amount	Unit
Panelen (Unilin Evola)	20	2	22.18	kg
Verbindingselementen (geleiders, scharnieren, zijpanelen ladebak) (Van Hoecke)	20	2	2.877	kg
Plaatmateriaal; spaanplaat	20	2	2.337	kg

4.6 DE-CONSTRUCTION, DEMOLITION (C1)

No inputs are needed for the product at the de-construction / demolition phase

4.7 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
Steel coil cold rolled, galvanised Steel federation NL	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0
board material, 'contaminated' (large parts i.a. covering) (NMD ID 56) (u=10%, glue=12%) corr. acc. EN16449	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0
Metals, others (i.a. fasteners, fittings) (NMD ID 50)	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0
Zinc layer coil Steel federation NL	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0

4 Scenarios and additional technical information

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
finishes (adhered to wood, plastic, metal) (NMD ID 2)	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default) market group for (GLO)
Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.8 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables.
First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
Steel coil cold rolled, galvanised Steel federation NL	NL	0	5	0	95	0
board material, 'contaminated' (large parts i.a. covering) (NMD ID 56) (u=10%, glue=12%) corr. acc. EN16449	NL	0	5	95	0	0
Metals, others (i.a. fasteners, fittings) (NMD ID 50)	NL	0	5	5	90	0
Zinc layer coil Steel federation NL	NL	0	5	0	95	0
finishes (adhered to wood, plastic, metal) (NMD ID 2)	NL	0	0	100	0	0

4 Scenarios and additional technical information

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
Steel coil cold rolled, galvanised Steel federation NL	0.000	0.600	0.000	11.405	0.000
board material, 'contaminated' (large parts i.a. covering) (NMD ID 56) (u=10%, glue=12%) corr. acc. EN16449	0.000	1.226	23.295	0.000	0.000
Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0.000	0.013	0.013	0.231	0.000
Zinc layer coil Steel federation NL	0.000	0.015	0.000	0.287	0.000
finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	0.000	0.679	0.000	0.000
Total	0.000	1.854	23.987	11.923	0.000

4.9 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
Steel coil cold rolled, galvanised Steel federation NL	10.312	0.000
board material, 'contaminated' (large parts i.a. covering) (NMD ID 56) (u=10%, glue=12%) corr. acc. EN16449	0.000	325.896
Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0.160	0.000
Zinc layer coil Steel federation NL	0.287	0.000
finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	6.885
Total	10.760	332.781

5 Results

For the impact assessment, the characterization factors of the LCIA method Bepalingsmethode 'set 1', 'set2' & param (NMD 3.4) v1.00 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER PIECE

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbreviation	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
AP	mol H+ eqv.	2.34E-1	4.72E-3	9.46E-3	4.83E-3	9.25E-3	3.55E-2	0.00E+0	2.29E-1	0.00E+0	3.43E-3	1.08E-2	1.49E-4	-2.32E-1
GWP-total	kg CO2 eqv.	1.66E+1	8.15E-1	-3.94E+0	8.33E-1	7.49E+0	6.12E+0	0.00E+0	4.03E+1	0.00E+0	5.92E-1	3.63E+1	1.91E+0	-3.60E+1
GWP-b	kg CO2 eqv.	-3.58E+1	3.76E-4	-5.57E+0	3.84E-4	5.60E+0	2.82E-3	0.00E+0	2.12E-1	0.00E+0	2.73E-4	3.42E+1	1.89E+0	-9.39E-2
GWP-f	kg CO2 eqv.	5.23E+1	8.14E-1	1.62E+0	8.33E-1	1.88E+0	6.12E+0	0.00E+0	4.00E+1	0.00E+0	5.91E-1	2.15E+0	1.84E-2	-3.59E+1
GWP-luluc	kg CO2 eqv.	4.91E-2	2.98E-4	4.64E-3	3.05E-4	1.68E-3	2.24E-3	0.00E+0	6.55E-2	0.00E+0	2.17E-4	4.20E-4	8.65E-6	-3.99E-2
EP-m	kg N eqv.	4.12E-2	1.66E-3	2.28E-3	1.70E-3	2.11E-3	1.25E-2	0.00E+0	5.05E-2	0.00E+0	1.21E-3	4.21E-3	8.30E-5	-5.91E-2
EP-fw	kg P eqv.	2.60E-3	8.21E-6	7.94E-5	8.40E-6	8.53E-5	6.17E-5	0.00E+0	1.66E-3	0.00E+0	5.96E-6	9.65E-5	4.38E-7	-1.43E-3
EP-T	mol N eqv.	5.59E-1	1.83E-2	2.59E-2	1.88E-2	2.66E-2	1.38E-1	0.00E+0	6.83E-1	0.00E+0	1.33E-2	4.84E-2	5.32E-4	-8.54E-1
ODP	kg CFC 11 eqv.	2.79E-6	1.80E-7	1.66E-7	1.84E-7	1.21E-7	1.35E-6	0.00E+0	3.97E-6	0.00E+0	1.30E-7	7.16E-8	5.53E-9	-1.47E-6
POCP		1.66E-1	5.24E-3	1.04E-2	5.36E-3	7.72E-3	3.93E-2	0.00E+0	2.24E-1	0.00E+0	3.80E-3	1.27E-2	1.83E-4	-1.85E-1

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

5 Results

Abbreviation	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
	kg NMVOC eqv.													
ADP-f	MJ	5.95E+2	1.23E+1	2.82E+1	1.26E+1	2.10E+1	9.22E+1	0.00E+0	5.70E+2	0.00E+0	8.91E+0	6.59E+0	4.14E-1	-2.51E+2
ADP-mm	kg Sb-eqv.	2.45E-3	2.06E-5	3.62E-5	2.11E-5	7.78E-5	1.55E-4	0.00E+0	5.20E-4	0.00E+0	1.50E-5	6.86E-6	2.34E-8	-1.49E-3
WDP	m3 world eqv.	2.17E+1	4.39E-2	5.85E-1	4.49E-2	6.97E-1	3.30E-1	0.00E+0	2.46E+1	0.00E+0	3.19E-2	1.19E-1	1.85E-2	-4.19E+0

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15084+A2

Abbreviation	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
ETP-fw	CTUe	1.10E+3	1.10E+1	4.04E+1	1.12E+1	3.78E+1	8.23E+1	0.00E+0	8.19E+2	0.00E+0	7.95E+0	1.69E+1	3.07E-1	-2.02E+3
PM	disease incidence	3.73E-6	7.33E-8	1.96E-7	7.49E-8	1.39E-7	5.50E-7	0.00E+0	5.71E-6	0.00E+0	5.32E-8	1.04E-7	2.75E-9	-2.52E-6
HTP-c	CTUh	1.82E-7	3.55E-10	5.44E-9	3.63E-10	9.35E-9	2.67E-9	0.00E+0	3.49E-7	0.00E+0	2.58E-10	9.28E-8	9.22E-12	-7.81E-8
HTP-nc	CTUh	8.34E-7	1.20E-8	3.86E-8	1.22E-8	3.21E-8	9.00E-8	0.00E+0	6.42E-7	0.00E+0	8.69E-9	4.21E-8	3.76E-10	1.01E-6
IR	kBq U235 eqv.	1.40E+0	5.15E-2	7.25E-2	5.26E-2	5.34E-2	3.86E-1	0.00E+0	1.76E+0	0.00E+0	3.73E-2	2.52E-2	1.64E-3	-3.56E-1
SQP	Pt	1.65E+3	1.07E+1	6.82E+2	1.09E+1	7.24E+1	8.00E+1	0.00E+0	3.10E+3	0.00E+0	7.73E+0	8.77E+0	9.54E-1	-5.51E+3

ETP-fw=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP)

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None

5 Results

ILCD classification	Indicator	Disclaimer
ILCD type / level 2	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
	AAcidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	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 disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

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 experienced with the indicator.

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A1

Abbreviation	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
ADPE	Kg Sb	2.45E-3	2.06E-5	3.62E-5	2.11E-5	7.79E-5	1.55E-4	0.00E+0	5.20E-4	0.00E+0	1.50E-5	6.86E-6	2.34E-8	-1.49E-3
GWP		5.10E+1	8.07E-1	1.59E+0	8.26E-1	1.86E+0	6.06E+0	0.00E+0	3.94E+1	0.00E+0	5.86E-1	2.14E+0	9.64E-2	-3.47E+1

ADPE=Depletion of abiotic resources-elements | **GWP**=Global warming | **ODP**=Ozone layer depletion | **POCP**=Photochemical oxidants creation | **AP**=Acidification of soil and water | **EP**=Eutrophication

5 Results

Abbreviation	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
	Kg CO2 Equiv.													
ODP	Kg CFC-11 Equiv.	2.88E-6	1.43E-7	1.45E-7	1.46E-7	1.18E-7	1.08E-6	0.00E+0	3.65E-6	0.00E+0	1.04E-7	6.30E-8	4.42E-9	-1.72E-6
POCP	Kg Ethene Equiv.	3.93E-2	4.87E-4	2.42E-3	4.98E-4	1.48E-3	3.66E-3	0.00E+0	5.51E-2	0.00E+0	3.54E-4	1.20E-3	3.29E-5	-2.99E-2
AP	Kg SO2 Equiv.	1.75E-1	3.55E-3	7.51E-3	3.63E-3	6.86E-3	2.67E-2	0.00E+0	1.69E-1	0.00E+0	2.58E-3	7.73E-3	1.14E-4	-1.55E-1
EP	Kg PO43- Equiv.	2.69E-2	6.97E-4	1.30E-3	7.13E-4	1.18E-3	5.24E-3	0.00E+0	2.94E-2	0.00E+0	5.06E-4	1.90E-3	4.01E-5	-3.89E-2

ADPE=Depletion of abiotic resources-elements | **GWP**=Global warming | **ODP**=Ozone layer depletion | **POCP**=Photochemical oxidants creation | **AP**=Acidification of soil and water | **EP**=Eutrophication

NATIONAL ANNEX NMD

Abbreviation	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
ADPF	Kg Sb	3.57E-1	5.94E-3	1.45E-2	6.07E-3	1.23E-2	4.46E-2	0.00E+0	3.05E-1	0.00E+0	4.31E-3	3.27E-3	1.99E-4	-1.92E-1
HTP	kg 1.4 DB	3.27E+1	3.40E-1	1.79E+0	3.48E-1	1.19E+0	2.55E+0	0.00E+0	1.50E+1	0.00E+0	2.47E-1	9.46E-1	8.19E-3	-1.23E+1
FAETP	kg 1.4 DB	4.35E-1	9.92E-3	6.69E-2	1.01E-2	1.83E-2	7.45E-2	0.00E+0	5.10E-1	0.00E+0	7.20E-3	3.53E-2	2.10E-4	-2.04E-1
MAETP	kg 1.4 DB	1.27E+3	3.57E+1	5.78E+1	3.65E+1	4.85E+1	2.68E+2	0.00E+0	1.32E+3	0.00E+0	2.59E+1	5.78E+1	6.46E-1	-3.47E+2
TETP	kg 1.4 DB	1.31E-1	1.20E-3	1.55E-2	1.23E-3	4.71E-3	9.02E-3	0.00E+0	7.52E-2	0.00E+0	8.72E-4	2.00E-3	2.91E-5	3.14E-1

ADPF=Depletion of abiotic resources-fossil fuels | **HTP**=Human toxicity | **FAETP**=Ecotoxicity, fresh water | **MAETP**=Ecotoxicity, marine water (MAETP) | **TETP**=Ecotoxicity, terrestrial

5 Results

5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbreviation	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
PERE	MJ	4.92E+1	1.54E-1	6.36E+1	1.57E-1	3.54E+0	1.15E+0	0.00E+0	2.39E+1	0.00E+0	1.12E-1	7.29E-1	1.25E-2	-1.15E+3
PERM	MJ	3.02E+2	0.00E+0	4.91E+1	0.00E+0	1.05E+1	0.00E+0	0.00E+0	6.27E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	3.51E+2	1.54E-1	1.13E+2	1.57E-1	1.41E+1	1.15E+0	0.00E+0	6.51E+2	0.00E+0	1.12E-1	7.29E-1	1.25E-2	-1.15E+3
PENRE	MJ	6.35E+2	1.30E+1	2.87E+1	1.33E+1	2.23E+1	9.79E+1	0.00E+0	5.44E+2	0.00E+0	9.46E+0	7.04E+0	4.40E-1	-6.44E+1
PENRM	MJ	4.12E+1	0.00E+0	1.39E+0	0.00E+0	1.28E+0	0.00E+0	0.00E+0	8.55E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-3.66E-2
PENRT	MJ	6.76E+2	1.30E+1	3.01E+1	1.33E+1	2.36E+1	9.79E+1	0.00E+0	6.29E+2	0.00E+0	9.46E+0	7.04E+0	4.40E-1	-6.44E+1
SM	Kg	1.16E+0	0.00E+0	0.00E+0	0.00E+0	3.49E-2	0.00E+0	0.00E+0	5.39E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	7.02E-1	1.50E-3	1.77E-2	1.53E-3	2.38E-2	1.12E-2	0.00E+0	7.28E-1	0.00E+0	1.09E-3	1.29E-2	4.46E-4	-1.53E-2

PERE=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbreviation	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
HWD	Kg	2.68E-3	3.11E-5	6.41E-5	3.18E-5	8.80E-5	2.34E-4	0.00E+0	1.24E-3	0.00E+0	2.26E-5	2.13E-5	3.35E-7	-2.23E-4
NHWD	Kg	6.27E+0	7.79E-1	4.77E-1	7.97E-1	7.40E-1	5.85E+0	0.00E+0	1.10E+1	0.00E+0	5.65E-1	3.53E-1	1.86E+0	-2.08E+0
RWD	Kg	1.46E-3	8.06E-5	8.21E-5	8.25E-5	5.98E-5	6.06E-4	0.00E+0	1.95E-3	0.00E+0	5.85E-5	3.18E-5	2.53E-6	-3.42E-4

HWD=hazardous waste disposed | **NHWD**=non hazardous waste disposed | **RWD**=radioactive waste disposed

5 Results

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbreviation	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.31E-1	0.00E+0	0.00E+0	5.63E+0	0.00E+0	0.00E+0	1.19E+1	0.00E+0	0.00E+0
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EE	MJ	0.00E+0	0.00E+0	1.30E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.20E+2
EET	MJ	0.00E+0	0.00E+0	8.25E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.29E+2
EEE	MJ	0.00E+0	0.00E+0	4.79E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.91E+2

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EE**=Exported energy | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

5 Results

5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER PIECE

BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per piece:

Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0	kg C

5 Results

5.4 ENVIRONMENTAL COST INDICATOR NL PER PIECE

Using the environmental cost indicator (ECI) method, which is presented in the NMD Determination Method (2020), the results are aggregated to the single-point score. The ECI is a relevant valuation method, especially in the Dutch construction sector. In the Netherlands, it is a prerequisite for public tenders. The aim of the indicator is to show the shadow price for environmental impacts of a product or project. The application of single-point scores is an additional assessment tool for eco-balance results. However, it must be pointed out that weightings are always based on a value maintenance and not on a scientific basis (EN 14040). The ECI results are shown in the following table.

Module EN15804	ECI NL	Share in total (%)
A1 Raw Materials Supply	€ 6.72	73,3 %
A2 Transport	€ 0.10	1,1 %
A3 Manufacturing	€ 0.30	3,3 %
A4 Transport from the gate to the site	€ 0.10	1,1 %
A5 Construction - Installation process	€ 0.25	2,7 %
B1 Use	€ 0.73	8,0 %
B2 Maintenance	€ 0.00	0,0 %
B3 Repair	€ 4.57	49,9 %
C1 De-construction / demolition	€ 0.00	0,0 %
C2 Transport	€ 0.07	0,8 %
C3 Waste processing	€ 0.25	2,7 %
C4 Disposal	€ 0.01	0,1 %
D Benefits and loads beyond the product system boundary	€ -3.93	-42,9 %
ECI NL per functional unit	€ 9.17	

6 References

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

EN 15804+A1

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

EN 15804+A2

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

NMD-verification protocol

NMD-verification protocol version 1.0, July 2020, foundation NMD

NMD Determination method

NMD Determination method Environmental performance Construction works v1.1 March 2022, foundation NMD

7 Contact information

Publisher	Operator	Owner of declaration
 Chainable Hercules 4 5126 RK Gilze, NL E-mail: hello@chainable.nl Website: www.chainable.nl	 Chainable Hercules 4 5126 RK Gilze, NL E-mail: hello@chainable.nl Website: www.chainable.nl	 Chainable Hercules 4 5126 RK Gilze, NL E-mail: hello@chainable.nl Website: www.chainable.nl