B-EPD ENVIRONMENTAL PRODUCT DECLARATION

Muylle Facon
Rubio Monocoat Oil Plus 2C

Amount of oil in kg needed to protect and decorate 1 m^2 of substrate for 60 years with a minimum opacity level of 98%

Issued 20.04.2021
Valid until 20.04.2026

Third party verified
Conform to EN 15804+A2, NBN/DTD B08-001 and ISO 14025

Modules declared Cradle to gate with options					
A123	A4	A5	B2 B4 B6	C	D
●	●	●	●	●	●

[B-EPD n° 21_0083_002_00_00_EN]

OWNER OF THIS ENVIRONMENTAL PRODUCT DECLARATION
Muylle Facon bvba

EPD PROGRAM OPERATOR
Federal Public Service of Health, Food Chain Safety and Environment
www.b-epd.be

The intended use of this EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings. This EPD is only valid when registered on www.b-epd.be. The FPS Public Health cannot be held responsible for the information provided by the owner of the EPD.

PRODUCT DESCRIPTION

PRODUCT NAME

Muylle Facon Rubio Monocoat (RMC) Oil Plus 2C, a hardwaxoil

PRODUCT DESCRIPTION AND INTENDED USE

Rubio Monocoat Oil Plus 2C is a (coloured) hardwaxoil containing mainly vegetable oils and hardwaxes produced by Muylle Facon (component A) and a chemical accelerator (component B).

The product colours and protects wooden surfaces for indoor use (e.g. interior wooden floor coverings) in one single layer. The product does not contain water or solvents. Colours without overlaps.

The oil is available in different forms. Approximately 62% of the production volume of the oil is sold together with an accelerator in two separate metal drums with a plastic joint (see figure). Component B is the accelerator and component A is the oil. The other 37% of the oil is sold without component B in a metal drum or plastic bottle. The advantage of using component B is that the oil will dry faster, but the service life time is not affected if only component A is used. Further, the oil is available in a wide range of different colours (even colours on custom demand can be delivered), each with different amounts of pigments. In this EPD an average content, based on the yearly production, is used. The variability of the product group has been investigated using the guidelines of the B-PCR (NBN/DTD B 08-001:2017). This analysis showed that the variability between the average product and the worst-cases is relatively small. Therefore one can consider that the average product is representative for the product group.

This a specific EPD for a hardwaxoil produced by Muylle Facon.

REFERENCE FLOW / DECLARED UNIT

Environmental Product Declaration (EPD) describes the environmental impacts of the amount of oil in kg needed to protect and decorate 1 m^2 of wooden substrate for 60 years with a minimum opacity level of 98%.

The weight per reference flow is 0,012 kg.
The density of the product is 1022 kg / m^3.
For maintenance every 5 years 0,0024 kg/m^2 is reapplied. Thus, over the total reference service life (RSL) 0,0384 kg/m^2 is applied. (see further in paragraph ‘Reference service life’ and ‘B - Use stage’)

Packaging is included.

INSTALLATION

Materials for application and installation are included. Following materials are needed for mounting and/or installing the product on a wooden surface of 60 m^2: 2 metal polish nets, 1 cotton rag and 2 polishing pads. A polishing machine is used to prepare the floor and to apply the oil. The polishing machine consumes electricity from the grid.

IMAGES OF THE PRODUCT AND ITS INSTALLATION

COMPOSITION AND CONTENT

Components	Composition / content / ingredients	Quantity
Product	*- Linseed oil* *- Wax* *- Leadfree catalytic dryer* *- Pigments* *- Accelerator (hexamethylene diisocyanate)* *- Others*	*63%* *12%* *2%* *6%* *17%* *<1%*
Fixation materials	*NA*	
Jointing materials	*NA*	
Treatments	*Energy consumed by polishing machine* *Maintenance every 5 years*	*6,50E-02 kWh*
Packaging	*If component A and component B are sold together the product is packed in one of following sets:* *- 1,3 liter set: component A in 1 liter metal drum and component B in 0,3 liter metal drum. Both metal drums are connected with a plastic joint* *- 3,5 liter set: component A in 2,75 liter metal drum and component B in 0,75 liter metal drum. Both metal drums are connected with a plastic joint* *- 0,350 liter set: component A in 0,275 liter metal drum and component B in 0,075 liter metal drum. Both metal drums are connected with a plastic joint* *If only component A is used, the product can be packed in a range of metal drums and plastic bottles of different volumes:* *- a plastic bottle of 20 ml or 100 ml, or a metal drum of 275 ml, 0.5 liter, 1 liter, 2.75 liter or 5 liter is used.*	

The product does not contain materials listed in the “Candidate list of Substances of Very High Concern for authorization”.

REFERENCE SERVICE LIFE

The reference service life is estimated at 60 years, equal to the building lifetime defined in MMG (Servaes et al., 2013).

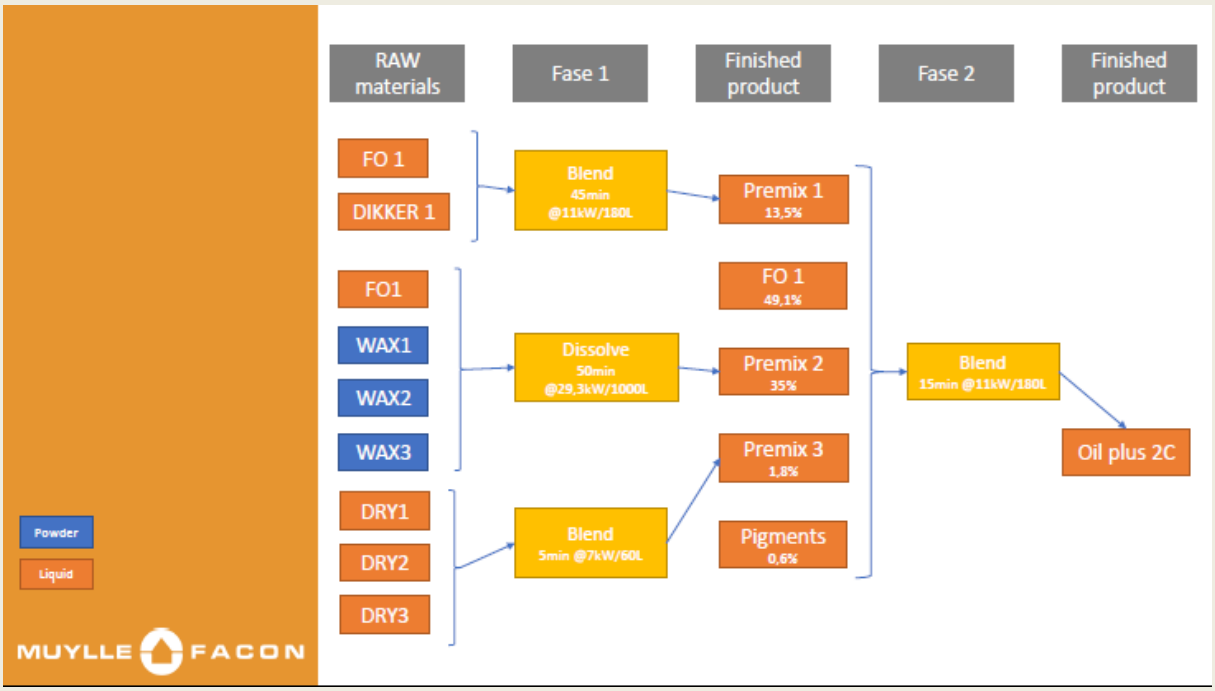
RMC Oil Plus 2C is applied to wooden surfaces for indoor use. When well maintained, the life span of the treated product can easily go up to 60 years or more. Based on the current available technical 'in-house'-knowledge obtained during the last 12 years, Muylle Facon declares that -when well maintained- the wooden surface will look like as if it was freshly installed. Depending on the use frequency of the wooden surface (e.g. persons passing over a floor) and the type of wood, a certain amount of the product detaches over time due to wear. It is assumed that over 5 years on average 0,0024 kg/m^2 detaches. Therefore, maintenance (with the same product RMC Oil Plus 2C) should be done every 5 years. A maintenance requires approximately 0,005 kg/m^2, of which 0,0024 kg/m^2 is absorbed in the wood and 0,0026 kg/m^2 is lost during application (see further in A5 – Installation in the building). In this EPD an analysis over the RSL taking into account wear off and reapplicaton was done

DESCRIPTION OF GEOGRAPHICAL REPRESENTATIVITY

The EPD is representative for the Belgian market. The manufacturing occurs at the Muylle Facon production site in Izegem, Belgium, and the product is applied, used and reaches its end-of-life in Belgium.

DESCRIPTION OF THE PRODUCTION PROCESS AND TECHNOLOGY

First the different raw materials are weighed (= weighing process). The second step is the mixing process, which consists of two phases. In the first phase the raw materials are blended or dissolved to obtain intermediate products or premixes. In the second phase of the mixing process the premixes are blended, which eventually results in the final product. Finally, the metal drums with the blend (= component A) are emptied according to the desired final packaging (= filling process). The mixing process to obtain component A is shown in the schematical overview below. The accelerator or component B (i.e. hexamethylene diisocyanate) is bought in bulk by Muylle Facon, packed in the appropriate metal drums and sold together with component A.



TECHNICAL DATA / PHYSICAL CHARACTERISTICS

Technical property	Standard	Value	Unit	Comment
VOC content	/	0%	/	VOC test results from Ecca
Consumption	/	25	g/m^2	
Overlaps	/	No	/	due to the very low film forming and the molecular bonding with the wood (cellulose)
Density	/	1022	kg/m^3	

LCA STUDY

DATE OF LCA STUDY
April 2021

SOFTWARE
For the calculation of the LCA results, the software program SimaPro 9.1.1.1 (PRé Consultants, 2021) has been used.

INFORMATION ON ALLOCATION
At Muylle Facon, different types of oils for surface treatment are produced. For every oil specific data was available for the use of raw materials, the use of electricity, natural gas, etc. No specific data was available for the fraction of the area of the site and factory used to produce the analyzed product. The area of the facility has been allocated to the analyzed product using the respective annual production volume (physical relationship).

INFORMATION ON CUT OFF
The following processes are considered below cut-off:
- benefits and loads of recycling, incineration and reuse of packaging waste in module D;
- benefits and loads from incineration and recycling of 5% transport and installation losses in module D;
- manufacturing of the polishing machine;

INFORMATION ON EXCLUDED PROCESSES
Following processes were excluded for the inventory:
- manufacturing of the polishing machine;
- packaging of ancillary materials used during manufacturing and installation of the product;
- impact of the losses due to use of the wooden surface (e.g. persons passing over a floor);
- environmental impacts caused by the personnel of the production plants, e.g. waste from the cafeteria and sanitary installations, accidental pollution caused by human mistakes, or environmental effects caused by commuter traffic; heating or cooling of the plants in order to ensure a comfortable indoor climate for the personnel for example is also neglected. The total of neglected input flows is less than 5% of energy usage and mass as prescribed by EN15804+A2

INFORMATION ON BIOGENIC CARBON MODELLING
The oil contains linseed oil, derived from linseeds, and Carnauba wax, derived from palm leaves. Netto uptake of biogenic CO2 within both materials is reported in module A1, netto release of biogenic CO2 related to these flows is reported in A3 and C4.
The accompanying packaging does not contain biogenic carbon.

	Biogenic carbon content (kg C / FU)
Biogenic carbon content in product (at the gate)	2,25E-02
Biogenic carbon content in accompanying packaging (at the gate)	0

INFORMATION ON CARBON OFFSETTING
Carbon offsetting is not allowed in the EN 15804 and hence not taken into account in the calculations.

ADDITIONAL OR DEVIATING CHARACTERISATION FACTORS
The characterization factors from EC-JRC were applied. No additional or deviating characterisation factors were used.

DESCRIPTION OF THE VARIABILITY
The oil is available in different forms. Approximately 62% of the production volume of the oil is sold together with an accelerator in two separate metal drums with a plastic joint. Component B is the accelerator and component A is the oil. The other 37% of the oil is sold without component B in a metal drum or plastic bottle. Further, the oil is available in a wide range of different colours (even colours on custom demand can be delivered), each with different amounts of pigments. In this EPD an average content, based on the yearly production, is used. The variability of the product group has been investigated using the guidelines of the B-PCR (NBN/DTD B 08-001:2017). This analysis showed that the variability between the average product and the worst-cases is relatively small. Therefore one can consider that the average product is representative for the product group.

DATA

SPECIFICITY

The data used for the LCA are specific for this product which is manufactured by a single manufacturer in a single production site. The composed datasets for this life cycle assessment are representative and relevant for oil-based products produced by Muylle Facon to protect and decorate wooden surfaces for indoor use.

PERIOD OF DATA COLLECTION

Manufacturer specific data have been collected from November 2017 until November 2018.

INFORMATION ON DATA COLLECTION

Company specific data for the product stage have been collected by Muylle Facon and were provided to VITO through an online data collection questionnaire and additional excel-files. The LCI data for the product stage have been checked by the EPD verifier (Vinçotte) during a factory visit. VITO uses publicly available generic data for all background processes such as the production of electricity, transportation by means of a specific truck, etc.

DATABASE USED FOR BACKGROUND DATA

The LCI source used in this study is the Ecoinvent 3.6 database (Wernet et al., 2019).

ENERGY MIX

The Belgian electricity mix (consumption mix + import) has been used to model electricity use in life cycle stages A3, A5, C1 and C4. The used record is the Ecoinvent record 'Electricity, low voltage {BE}| market for | Cut-off, U' (Wernet et al., 2019).

PRODUCTION SITES

Muylle Facon, Izegem, Belgium

SYSTEM BOUNDARIES

Product stage			Construction installation stage		Use stage							End of life stage					Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	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
☒	☒	☒	☒	☒	**MND**	☒	**MND**	☒	**MND**	☒	**MND**	☒	☒	☒	☒		☒

X = included in the EPD
MND = module not declared

The product is 100% incinerated at its end-of-life. The benefits from the potential use of exported electricity and heat during incineration are declared in module D.

No coproducts are produced.

The product does not contain recycled content.

POTENTIAL ENVIRONMENTAL IMPACTS PER REFERENCE FLOW

	Production			Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling	Total excl module D
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal		
GWP total (kg CO2 equiv/FU)	2,46E-02	2,51E-04	5,01E-03	2,28E-04	1,25E-01	MND	7,77E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	2,08E-04	0,00E+00	3,32E-02	-1,09E-02	9,65E-01
GWP fossil (kg CO2 equiv/FU)	4,68E-02	2,51E-04	4,51E-03	2,28E-04	1,23E-01	MND	7,70E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	2,08E-04	0,00E+00	1,08E-02	-1,09E-02	9,56E-01
GWP biogenic (kg CO2 equiv/FU)	-2,25E-02	1,10E-07	4,97E-04	1,03E-07	6,66E-04	MND	3,90E-03	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	8,48E-08	0,00E+00	2,24E-02	-1,54E-05	4,96E-03
GWP luluc (kg CO2 equiv/FU)	3,33E-04	9,09E-08	3,07E-06	8,94E-08	4,92E-04	MND	2,61E-03	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	7,27E-08	0,00E+00	4,77E-07	-8,74E-06	3,43E-03
ODP (kg CFC 11 equiv/FU)	2,98E-09	5,67E-11	2,71E-10	5,14E-11	9,05E-09	MND	6,71E-08	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	4,73E-11	0,00E+00	1,89E-10	-1,78E-09	7,97E-08
AP (mol H^+ equiv/FU)	6,22E-04	1,04E-06	2,52E-05	9,30E-07	9,54E-04	MND	4,97E-03	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	8,50E-07	0,00E+00	5,26E-06	-1,49E-05	6,58E-03
EP - freshwater (kg P-equiv/FU)	7,40E-06	2,09E-09	1,40E-07	2,01E-09	1,09E-05	MND	5,58E-05	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	1,63E-09	0,00E+00	2,11E-08	-1,05E-07	7,42E-05
EP - marine (kg N-equiv/FU)	2,82E-04	3,10E-07	3,99E-06	2,69E-07	3,90E-04	MND	1,87E-03	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	2,52E-07	0,00E+00	1,53E-06	-3,48E-06	2,55E-03
EP - terrestrial (mol N-equiv/FU)	2,03E-03	3,43E-06	6,46E-05	2,98E-06	2,89E-03	MND	1,40E-02	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	2,79E-06	0,00E+00	1,71E-05	-4,06E-05	1,90E-02
POCP (kg Ethene equiv/FU)	1,64E-04	1,05E-06	1,49E-05	9,38E-07	3,59E-04	MND	2,34E-03	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	8,54E-07	0,00E+00	4,62E-06	-1,20E-05	2,88E-03

ADP Elements (kg Sb equiv/FU)	7,42E-08	4,94E-10	8,08E-08	4,92E-10	2,58E-07	MND	1,50E-06	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	4,05E-10	0,00E+00	1,70E-09	-9,61E-09	1,92E-06
ADP fossil fuels (MJ/FU)	5,33E-01	3,78E-03	5,59E-02	3,45E-03	1,89E+00	MND	1,56E+01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	3,14E-03	0,00E+00	1,09E-02	-2,59E-01	1,81E+01
WDP (m^3 water eq deprived /FU)	2,08E-02	1,08E-05	1,22E-03	1,12E-05	5,91E-02	MND	4,40E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	8,73E-06	0,00E+00	1,96E-03	-1,39E-03	5,23E-01

GWP total = total Global Warming Potential (Climate Change); GWP-luluc = Global Warming Potential (Climate Change) land use and land use change; ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; WDP = water use (Water (user) deprivation potential, deprivation-weighted water consumption)

RESOURCE USE

	Production			Construction process		Use stage							End-of-life stage					
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	Total excl module D
PERE (MJ/FU, net calorific value)	4,82E-01	5,46E-05	1,09E-02	5,34E-05	7,72E-01	MND	3,56E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	4,33E-05	0,00E+00	7,88E-02	-1,56E-02	4,90E+00
PERM (MJ/FU, net calorific value)	7,96E-02	0,00E+00	-1,54E-03	0,00E+00	3,47E-10	MND	1,72E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	-7,81E-02	0,00E+00	1,72E-01
PERT (MJ/FU, net calorific value)	5,62E-01	5,46E-05	9,34E-03	5,34E-05	7,72E-01	MND	3,73E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	4,33E-05	0,00E+00	7,66E-04	-1,56E-02	5,07E+00
PENRE (MJ/FU, net calorific value)	5,27E-01	3,81E-03	7,13E-02	3,49E-03	2,06E+00	MND	1,68E+01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	3,16E-03	0,00E+00	5,57E-02	-2,80E-01	1,95E+01
PENRM (MJ/FU, net calorific value)	6,13E-02	0,00E+00	-5,74E-03	0,00E+00	7,40E-03	MND	1,38E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	-4,36E-02	0,00E+00	1,58E-01
PENRT (MJ/FU, net calorific value)	5,88E-01	3,81E-03	6,56E-02	3,49E-03	2,07E+00	MND	1,69E+01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	3,16E-03	0,00E+00	1,21E-02	-2,80E-01	1,97E+01
SM (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,64E-03	0,00E+00
RSF (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

NRSF (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW (m^3 water eq/FU)	5,16E-04	3,86E-07	3,23E-05	3,93E-07	1,66E-03	MND	1,15E-02	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	3,11E-07	0,00E+00	1,72E-04	-4,43E-05	1,39E-02

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 = Net use of fresh water

WASTE CATEGORIES & OUTPUT FLOWS

	Production			Construction process stage		Use stage							End-of-life stage					
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	Total excl module D
Hazardous waste disposed (kg/FU)	8,12E-07	1,31E-08	1,78E-07	8,93E-09	2,21E-06	MND	1,27E-05	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	8,22E-09	0,00E+00	2,39E-07	-2,58E-07	1,62E-05
Non-hazardous waste disposed (kg/FU)	6,20E-03	1,77E-04	3,23E-03	2,04E-04	2,89E-02	MND	1,07E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	1,50E-04	0,00E+00	1,02E-02	-2,98E-04	1,57E-01
Radioactive waste disposed (kg/FU)	9,66E-07	2,57E-08	1,57E-07	2,34E-08	8,45E-06	MND	8,20E-05	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	2,14E-08	0,00E+00	5,85E-08	-1,44E-06	9,17E-05
Components for re-use (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (kg/FU)	0,00E+00	0,00E+00	2,64E-04	0,00E+00	1,38E-03	MND	3,61E-03	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,64E-03	5,26E-03
Materials for energy recovery (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy (MJ/FU)	0,00E+00	0,00E+00	2,73E-03	0,00E+00	3,95E-02	MND	9,30E-02	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	2,92E-02	-7,15E-02	1,64E-01

IMPACT CATEGORIES ADDITIONAL TO EN 15804

		Production			Construction process		Use stage							End-of-life stage					
		A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	Total excl module D
	*PM (disease incidence)*	4,43E-09	1,78E-11	2,97E-10	1,64E-11	7,04E-09	MND	3,66E-08	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	1,45E-11	0,00E+00	5,11E-11	-6,47E-11	4,84E-08
	*IRHH (kg U235 eq/FU)*	8,44E-04	1,65E-05	1,64E-04	1,51E-05	9,47E-03	MND	9,45E-02	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	1,37E-05	0,00E+00	4,70E-05	-1,66E-03	1,05E-01
	*ETF (CTUe/FU)*	7,15E-01	3,08E-03	1,06E-01	2,88E-03	1,88E+00	MND	1,07E+01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	2,51E-03	0,00E+00	2,15E-01	-6,90E-02	1,36E+01
	*HTCE (CTUh/FU)*	5,25E-11	1,01E-13	2,88E-11	8,39E-14	1,12E-10	MND	5,31E-10	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	7,06E-14	0,00E+00	1,02E-12	-2,05E-12	7,27E-10
	*HTnCE (CTUh/FU)*	2,16E-09	3,39E-12	1,37E-10	3,13E-12	3,25E-09	MND	1,52E-08	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	2,74E-12	0,00E+00	6,81E-11	-4,64E-11	2,09E-08
	*Land Use Related impacts (dimensio nless)*	1,99E+00	2,56E-03	5,74E-02	2,84E-03	2,69E+00	MND	1,24E+01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	2,16E-03	0,00E+00	9,19E-03	-3,92E-02	1,71E+01

HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; ETF = Ecotoxicity – freshwater; (potential comparative toxic unit)
PM = Particulate Matter (Potential incidence of disease due to PM emissions);
IRHH = Ionizing Radiation – human health effects (Potential Human exposure efficiency relative to U235);

	*Global Warming Potential*	*The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.* *It is split up in 4:* - *Global Warming Potential total (GWP-total) which is the sum of GWP-fossil, GWP-biogenic and GWP-luluc* - *Global Warming Potential fossil fuels (GWP-fossil) : The global warming potential related to greenhouse gas (GHG) emissions to any media originating from the oxidation and/or reduction of fossil fuels by means of their transformation or degradation (e.g. combustion, digestion, landfilling, etc).* - *Global Warming Potential biogenic (GWP-biogenic) : The global warming potential related to carbon emissions to air (CO2, CO and CH4) originating from the oxidation and/or reduction of aboveground biomass by means of its transformation or degradation (e.g. combustion, digestion, composting, landfilling) and CO2 uptake from the atmosphere through photosynthesis during biomass growth – i.e. corresponding to the carbon content of products, biofuels or above ground plant residues such as litter and dead wood.[1]* - *Global Warming Potential land use and land use change (GWP-luluc): The global warming potential related to carbon uptakes and emissions (CO2, CO and CH4) originating from carbon stock changes caused by land use change and land use. This sub-category includes biogenic carbon exchanges from deforestation, road construction or other soil activities (including soil carbon emissions).*
	*Ozone Depletion*	*Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbonsor halons), Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.*
	*Acidification potential*	*Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.*
	*Eutrophication potential*	*The potential to cause over-fertilization of water and soil, which can result in increased growth of biomass and following adverse effects.* *It is split up in 3:* - *Eutrophication potential – freshwater: The potential to cause over-fertilization of freshwater, which can result in increased growth of biomass and following adverse effects.* - *Eutrophication potential – marine: The potential to cause over-fertilization of marine water, which can result in increased growth of biomass and following adverse effects.* - *Eutrophication potential – terrestrial: The potential to cause over-fertilization of soil, which can result in increased growth of biomass and following adverse effects.*
	*Photochemical ozone creation*	*Chemical reactions brought about by the light energy of the sun creating photochemical smog. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.*
	*Abiotic depletion potential for non-fossil ressources*	*Consumption of non-renewable resources, thereby lowering their availability for future generations. Expressed in comparison to Antimonium (Sb).* *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.*
	*Abiotic depletion potential for fossil ressources*	*Measure for the depletion of fossil fuels such as oil, natural gas, and coal. The stock of the fossil fuels is formed by the total amount of fossil fuels, expressed in Megajoules (MJ).* *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.*
	*Ecotoxicity for aquatic fresh water*	*The impacts of chemical substances on ecosystems (freshwater).* *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.*
	*Human toxicity (carcinogenic effects)*	*The impacts of chemical substances on human health via three parts of the environment: air, soil and water.*

[1] Carbon exchanges from native forests shall be modelled under GWP - luluc (including connected soil emissions, derived products or residues), while their CO2 uptake is excluded.

		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.
	*Human toxicity (non-carcinogenic effects)*	*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.*
	*Particulate matter*	*Accounts for the adverse health effects on human health caused by emissions of Particulate Matter (PM) and its precursors (NOx, SOx, NH3)*
	*Resource depletion (water)*	*Accounts for water use related to local scarcity of water as freshwater is a scarce resource in some regions, while in others it is not.* *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.*
	*Ionizing radiation - human health effects*	*This impact category deals mainly with the eventual impact on human health of low dose ionizing radiation 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.*
	*Land use related impacts*	*The indicator is the "soil quality index" which is the result of an aggregation of following four aspects:* - *Biotic production* - *Erosion resistance* - *Mechanical filtration* - *Groundwater* *The aggregation is done based on a JRC model. The four aspects are quantified through the LANCA model for land use.* *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.*

DETAILS OF THE UNDERLYING SCENARIOS USED TO CALCULATE THE IMPACTS

A1 – RAW MATERIAL SUPPLY

This module takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process.

A2 – TRANSPORT TO THE MANUFACTURER

The raw materials are transported to the manufacturing site. Transport distances and types have been provided by Muylle Facon.

A3 – MANUFACTURING

The manufacturing process consists of 3 steps. First the different raw materials are weighed (= weighing process). During the mixing process the different raw materials are mixed in a metal drum with a plastic liner using consecutive mixing steps. The plastic liner is used in order to avoid contamination between the different grades. Solvesso® 100 is used for cleaning the different stirrers in the mixing process. Finally, the metal drums containing the blend or component A are emptied according to the desired final packaging (= filling process). The mixing process to obtain component A is shown in Figure 1. The accelerator or component B (i.e. hexamethylene diisocyanate) is bought in bulk by Muylle Facon, packed in the appropriate metal drums and sold together with component A.
The raw material's packaging are released at the manufacturing site. The production waste is 1,94% of the total production.

A4 – TRANSPORT TO THE BUILDING SITE

Fuel type and consumption of vehicle or vehicle type used for transport	Truck 7.5-16 ton 0,186 l diesel / km	Truck >32 ton 0,366 l diesel / km	Truck 7.5-16 ton 0,186 l diesel / km	Truck 3.5-7.5 ton 0,128 l diesel / km
Distance	100	100	35	35
Capacity utilisation (including empty returns)	50%	50%	50%	50%
Bulk density of transported products	Ecoinvent	Ecoinvent	Ecoinvent	Ecoinvent
Volume capacity utilisation factor	Ecoinvent	Ecoinvent	Ecoinvent	Ecoinvent

The B-PCR provides default transport scenarios for the transport to the building site for cases where specific data on transport are missing. The B-PCR provides scenario's for this life cycle stage. Hardwaxoils to cover and protect wooden surfaces are categorized as 'Finishing products: paints and varnishes' in table 5 of the B-PCR. The following transport steps apply:

- 10% directly to the construction site over 100 km with a 7.5-16 ton lorry (ecoinvent record: 'Transport, freight, lorry 7.5-16 metric ton, EURO5 {RER}| transport, freight, lorry 7.5-16 metric ton, EURO5 | Cut-off, U')
- 90% to a supplier over 100 km with a >32 ton lorry (ecoinvent record: 'Transport, freight, lorry >32 metric ton, EURO5 {RER}| transport, freight, lorry >32 metric ton, EURO5 | Cut-off, U')
- 80% of these 90% is transported over 35 km from supplier to construction site with a 7.5-16 ton lorry (ecoinvent record: 'Transport, freight, lorry 7.5-16 metric ton, EURO5 {RER}| transport, freight, lorry 7.5-16 metric ton, EURO5 | Cut-off, U')
- 20% of these 90% is transported over 35 km from supplier to construction site with a 3.5-7.5 ton lorry (ecoinvent record: 'Transport, freight, lorry 3.5-7.5 metric ton, EURO5 {RER}| transport, freight, lorry 3.5-7.5 metric ton, EURO5 | Cut-off, U')

A5 – INSTALLATION IN THE BUILDING

A polishing machine is used to prepare the wooden surface and to apply the hardwaxoil. The surface is first treated with metal polishing nets to remove scratches. To apply the hardwaxoil the metal nets on the polishing machine are replaced by polishing pads. Finally, after waiting a few minutes to let the wood absorb the oil, cotton rags are used to remove all excess of oil. During the application 0,02509 kg oil per m^2 is used, of which 0,012 kg is absorbed in the wood and 0,01309 kg is taken up by the cotton rags and is discharged. The production, transport and end-of-life of this excess oil is also considered in this module.
In industrial applications the oil is sprayed on the wood using Rubio Monocoater Sprayspray machine. In this case you have less losses when using pads. However, in this EPD it is assumed that a polishing machine is used for all the applications.
At the construction site, packaging materials are released. Also a default value of 5% material losses have been taken into account, in line with MMG (Servaes R. et al., 2013).

Parts of the installation	quantity	Description
Processes necessary for the installation of the product	*6,50E_02 kWh*	*Energy consumption of the polishing machine*
Fixation materials	*NA*	
Jointing materials	*NA*	
Treatments	*0,0375 p* *0,025 p* *0,05 p*	*Polishing nets (nylon and zirconium oxide)* *Cotton rags (Recycled cotton)* *Polishing pads (PE foam)*
Material losses	*0,013 kg* *5%*	*Material losses during the application (oil absorbed by the cotton rags)* *Material losses due to breakage etc*
Packaging	*4,65E-04 kg* *1,23E-04 kg*	*Metal waste* *Plastic waste*

Ancillary materials for installation (specified by material);	0,0375 p metal polish nets (nylon and zirconium oxide)	0,025 p cotton rags (woven cotton)	0,05 p polishing pads (PE foam)
Water use	Not applicable		
Other resource use	Not applicable		
Quantitative description of energy type (regional mix) and consumption during the installation process	The polishing machine consumes 65 W/m^2		
Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	0,01309 kg product waste 5% product losses	4,65E-4 kg tin drums (finished product packaging)	1,23E-4 kg plastic bottles (finished product packaging)

Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	100% incinerated 75% incinerated, 25% recycled	5% landfill, 95% recycling	5% landfill, 60% incineration, 35% recycling
Direct emissions to ambient air, soil and water	Not applicable		
Distance	Not applicable		

B – USE STAGE (EXCLUDING POTENTIAL SAVINGS)

B1: MND
B2: Depending on the use frequency of the wooden surface (e.g. persons passing over a floor) and the type of wood, a certain amount of the product detaches over time due to wear. This EPD assumes an average of 0,0024 kg/m2 product losses every 5 years. These losses are considered as no impact losses in the model. Maintenance is done every 5 years with the same product to replace the losses due to use. In order to absorb 0,0024 kg/m2 of oil in the wood, 0,005 kg/m2 is used (0,0024 kg is absorbed in the wood and 0,0026 kg is discharged during the application). Over the RSL of 60 years, 11 re-applications are needed, this equals 0,055 kg of RMC Oil Plus 2C in total.

Cleaning with water and soap is not considered, as this is done for maintenance of the wooden surface and not of the oil itself.
B3:MND
B4: No replacement
B5:MND
B6: No operational energy use
B7: MND

C: END OF LIFE

The B-PCR provides default scenario's for waste processing of finishing layers such as paints and varnishes adhered to wooden, metal or plastic surfaces: 100% of finishing layers adhered to wooden, metal or plastic surfaces are incinerated.

C1: It is assumed that no impacts are related to the demolition of the product.
C2: The default scenario for finishing layers from B-PCR describes that the end-of-life waste is transported to a sorting facility over a distance of 30 km. Afterwards, 100% is transported to an incineration plant over a distance of 100 km.
C3: No recycling/reuse
C4: 100% incineration

Module C2 – Transport to waste processing					
Type of vehicle (truck/boat/etc.)	Fuel consumption (litres/km)	Distance (km)	Capacity utilisation (%)	Density of products (kg/m^3)	Assumptions
Truck 16-32 ton	0,260 l diesel/km	30	50%	ecoinvent scenario	ecoinvent scenario
Truck 16-32 ton	0,260 l diesel/km	50	50%	ecoinvent scenario	ecoinvent scenario
Truck 16-32 ton	0,260 l diesel/km	100	50%	ecoinvent scenario	ecoinvent scenario

End-of-life modules – C3 and C4		
Parameter	Unit	Value
Wastes collected separately	kg	0
Wastes collected as mixed construction waste	kg	9,60E-03
Waste for re-use	kg	0
Waste for recycling	kg	0
Waste for energy recovery	kg	0
Waste for final disposal	kg	9,60E-03

D – BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES

In module D, the benefits and loads beyond the system boundaries are quantified. Following waste streams per FU are 100% incinerated: 0,0096 kg hardwaxoil adhered to the wooden surface and 0,01309 kg hardwaxoil that remains in the polishing pads, cotton rags and polishing nets after application onto the wooden surface. In addition, the discharged hardwaxoil that remains in the cotton rags during the 5-yearly maintenance step is considered in module D. The benefits from the potential use of exported electricity and heat during incineration has been declared in module D.

Quantitative description of the loads beyond the system boundaries	Not applicable
Quantitative description of the benefits beyond the system boundaries	Avoided production of 0,104 MJ of heat using natural gas
	Avoided production of 0,052 kWh of Belgian electricity mix

ADDITIONAL INFORMATION ON RELEASE OF DANGEROUS SUBSTANCES TO INDOOR AIR, SOIL AND WATER DURING THE USE STAGE

INDOOR AIR

No significant emissions to indoor air are expected. This product has the Indoor Air Comfort Gold® label, based on test results from Eurofins. Criteria for this label mention that 3 days after the application the total VOC concentration in the air (CEN/TS 16516) is less than 1000 µg/m^3 (460 µg/m^3 for this product) and after 28 days less than 100 µg/m^3 (6.1 µg/m^3 for this product).

SOIL AND WATER

No emissions to soil or water are expected (CEN TC 351)

DEMONSTRATION OF VERIFICATION

EN 15804+A2 serves as the core PCR
Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010 Internal ☐ External☒
Third party verifier: Evert Vermaut (Vincotte) Jan Olieslagerslaan 35 1800 Vilvoorde, Belgium evermaut@vincotte.be

APPLICATION UNIT

This paragraph gives information on the applied product and how the reference flow relate to different applications. For the hardwaxoil there is only one application, i.e. the colouring and protection of indoor wooden surfaces. The ratio to the functional unit is 1.

BIBLIOGRAPHY

- ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework.
- ISO 14044:2006: Environmental Management-Life Cycle Assessment-Requirements and guidelines.
- ISO 14025:2006: Environmental labels and Declarations-Type III Environmental Declarations-Principles and procedures.
- NBN EN 15804+A2:2019
- NBN/DTD B 08-001 (BE-PCR)
- CEN/TR 16970:2016. Sustainability of construction works - Guidance for the implementation of EN 15804
- CEPE, 2018. Product Environmental Footprint Category Rules - Decorative Paints v1.0
- Frischknecht R, Steiner R, & Jungbluth N, The Ecological Scarcity Method - Eco-Factors. 2008 A method for impact assessment in LCA. 2009, Federal Office for the Environment FOEN: Zürich und Bern.
- Humbert, S. 2009. Geographically Differentiated Life-cycle Impact Assessment of Human Health. Doctoral dissertation, University of California, Berkeley, Berkeley, California, USA.
- JRC. 2018. https://eplca.jrc.ec.europa.eu/ELCD3/
- Milà i Canals L., Romanyà J. and Cowell S.J. (2007): Method for assessing impacts on life support functions (LSF) related to the use of 'fertile land' in Life Cycle Assessment (LCA). Journal of Cleaner Production 15: 1426-1440.
- Rosenbaum R.K., Bachmann T.M., Gold L.S., Huijbregts M.A.J., Jolliet O., Juraske R., Köhler A., Larsen H.F., MacLeod M., Margni M., McKone T.E., Payet J., Schuhmacher M., van de Meent D. and Hauschild M.Z. (2008): USEtox - The UNEP-SETAC toxicity model: recommended characterisation factors for human toxicity and freshwater ecotoxicity in Life Cycle Impact Assessment. International Journal of Life Cycle Assessment 13(7): 532-546, 2008
- Servaes, R., Allacker, K., Debacker, W., Delem L., De Nocker, L., De Troyer, F. Janssen, A., Peeters, K., Spirinckx, C., Van Dessel, J. (2013). Milieuprofiel van gebouwelementen. Te raadplegen via: www.ovam.be/materiaalprestatie-gebouwen.
- Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230. Available at: <http://link.springer.com/10.1007/s11367-016-1087-8> .

General information

Owner of the EPD, Responsible for the data, LCA and information	**Muylle Facon bvba** **Ambachtenstraat 58** **8870 Izegem** **Belgium** Tel : +32472 67 69 89; *For more information you can contact* *Johan Boonaert, johan.boonaert@muyllefacon.be*
EPD program Program operator Publisher of this EPD	**B-EPD** **FPS Health / DG Environment** Galileelaan 5/2 1210 Brussels Belgium www.environmentalproductdeclarations.eu
Contact programma operator	epd@environment.belgium.be
Based on following PCR documents	EN 15804+A2:2019 NBN/DTD B 08-001 and its complement Insert others
PCR review conducted by	Federal Public Service of Health and Environment & PCR Review committee
Author(s) of the LCA and EPD	Lisa Damen (VITO), Arthur De Jaegher (VITO) epd@vito.be / arthur.dejaegher@vito.be
Identification of the project report	Life cycle assessment of Muylle Facon RMC oil Plus 2C, March 2021, version 1
Verification	External independent verification of the declaration and data according to EN ISO 14025 and relevant PCR documents
Name of the third party verifier Date of verification	Evert Vermaut (Vinçotte) 20.04.2021
www.b-epd.be	**www.environmentalproductdeclarations.eu**

Comparing EPDs is not possible unless they are conform to the same PCR and taking into account the building context.
The program operator cannot be held responsible for the information supplied by the owner of the EPD nor LCA practitioner.

MUYLLE FACON

vito

LCA practitioner

www.vito.be

totem
CREATE | EVALUATE | INNOVATE

Building calculator of the regiona authorities

www.totem-building.be

.be

Federal Public Service of Health, Food Chain Safety and Environment

www.b-epd.be

Digitally signed by Dieter (De Lathauwer (Signature