

This appendix refers to the EPD MD-20009-EN, revision 4, developed according to EN15804+A2:2019.

Results in the appendix communicates LCA results in the format described in EN15804+A1:2013, in order to accommodate a need in the transition period between the two standard revisions. The appendix cannot stand alone, as the reference EPD describes the basis of the assessment.

Results per functional unit – System 1

PTM BituFlex (top layer) & PTM DuraFlex Kombi (bottom layer)

ENVIRONMENTAL IMPACTS PER [m2 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
GWP	[kg CO ₂ -eq.]	3,37E+00	1,02E-01	1,86E+00	0	0	1,02E-01	0,00E+00	0,00E+00	-1,11E+00	4,47E-02	1,50E+01	6,13E-03	-5,27E+00
ODP	[kg CFC11-eq.]	8,73E-08	1,21E-14	1,29E-07	0	0	1,21E-14	0,00E+00	0,00E+00	-4,15E-08	5,32E-15	6,38E-08	9,96E-10	-1,28E-08
AP	[kg SO ₂ -eq.]	1,33E-02	8,54E-05	4,19E-03	0	0	8,53E-05	0,00E+00	0,00E+00	-1,42E-02	3,75E-05	4,24E-03	4,51E-05	-7,79E-03
EP	[kg PO ₄ ³⁻ -eq.]	1,61E-03	1,75E-05	7,00E-04	0	0	1,75E-05	0,00E+00	0,00E+00	2,67E-04	7,71E-06	1,66E-03	1,09E-05	-6,35E-04
POCP	[kg ethene-eq.]	6,82E-03	-1,46E-06	1,26E-03	0	0	-1,46E-06	0,00E+00	0,00E+00	-1,14E-02	-6,42E-07	2,40E-04	5,34E-06	-3,91E-03
ADPE	[kg Sb-eq.]	1,54E-06	1,06E-08	3,42E-06	0	0	1,06E-08	0,00E+00	0,00E+00	4,37E-07	4,65E-09	7,35E-06	9,13E-09	-8,60E-07
ADPF	[MJ]	2,65E+02	1,36E+00	4,85E+01	0	0	1,36E+00	0,00E+00	0,00E+00	-3,90E+02	5,97E-01	3,41E+00	8,32E-02	-1,90E+02
Caption	GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential of soil and water; EP = Eutrophication potential; POCP = Photochemical ozone creation potential; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources													

RESOURCE USE PER [m2 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
PERE	[MJ]	1,73E+01	9,53E-02	2,50E+00	0	0	9,52E-02	0,00E+00	0,00E+00	-1,20E+00	4,19E-02	1,49E-01	6,40E-04	-4,71E+01
PERM	[MJ]	7,20E-01	0	8,64E-02	0	0	0	0	0	0	0	0	0	0
PERT	[MJ]	1,80E+01	9,53E-02	2,59E+00	0	0	9,52E-02	0,00E+00	0,00E+00	-1,20E+00	4,19E-02	1,49E-01	6,40E-04	-4,71E+01
PENRE	[MJ]	7,91E+01	1,38E+00	2,64E+01	0	0	1,38E+00	0,00E+00	0,00E+00	1,30E+02	6,07E-01	1,35E+02	8,38E-02	-3,24E+01
PENRM	[MJ]	2,02E+02	0	2,42E+01	0	0	0	0	0	-5,45E+02	0	0	0	-1,70E+02
PENRT	[MJ]	2,81E+02	1,38E+00	5,06E+01	0	0	1,38E+00	0,00E+00	0,00E+00	-4,15E+02	6,07E-01	3,60E+00	8,38E-02	-2,02E+02
SM	[kg]	2,04E-01	0,00E+00	2,47E-02	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m ³]	1,64E-02	1,10E-04	6,49E-03	0	0	1,10E-04	0,00E+00	0,00E+00	-3,05E-03	4,84E-05	8,26E-03	4,53E-06	-1,74E-02
Caption	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 AND OUTPUT FLOWS PER [m2 installed 2-layer roof waterproofing during 50 years]

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
NHWD	[kg]	4,75E-02	2,25E-04	8,61E-03	0	0	2,25E-04	0,00E+00	0,00E+00	4,59E-01	9,88E-05	0,00E+00	0,00E+00	5,89E-02
RWD	[kg]	9,25E-04	2,56E-06	6,85E-05	0	0	2,56E-06	0,00E+00	0,00E+00	-3,21E-05	1,13E-06	0,00E+00	0,00E+00	-1,85E-03

CRU	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	0,00E+00	0,00E+00	1,14E-01	0	0	0,00E+00	9,08E+00	0,00E+00	0,00E+00	0,00E+00	2,73E+00	0,00E+00	0,00E+00
MER	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0,00E+00	0,00E+00	4,49E-01	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,47E+01	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	8,68E-01	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,78E+01	0,00E+00	0,00E+00

Caption HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

Results per functional unit – System 2

PTM BituFlex Kombi (top layer) & PTM DuraFlex (bottom layer)

ENVIRONMENTAL IMPACTS PER [m2 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
GWP	[kg CO ₂ -eq.]	3,55E+00	1,02E-01	1,88E+00	0	0	1,02E-01	0,00E+00	0,00E+00	-1,11E+00	4,47E-02	1,50E+01	6,13E-03	-5,27E+00
ODP	[kg CFC11-eq.]	7,26E-08	1,21E-14	1,26E-07	0	0	1,21E-14	0,00E+00	0,00E+00	-4,14E-08	5,32E-15	6,38E-08	9,96E-10	-1,28E-08
AP	[kg SO ₂ -eq.]	1,33E-02	8,54E-05	4,07E-03	0	0	8,52E-05	0,00E+00	0,00E+00	-1,41E-02	3,75E-05	4,24E-03	4,50E-05	-7,77E-03
EP	[kg PO ₄ ³⁻ -eq.]	1,34E-03	1,75E-05	6,62E-04	0	0	1,75E-05	0,00E+00	0,00E+00	2,67E-04	7,70E-06	1,65E-03	1,09E-05	-6,35E-04
POCP	[kg ethene-eq.]	7,05E-03	-1,46E-06	1,28E-03	0	0	-1,46E-06	0,00E+00	0,00E+00	-1,14E-02	-6,42E-07	2,40E-04	5,34E-06	-3,91E-03
ADPE	[kg Sb-eq.]	1,00E-06	1,06E-08	3,35E-06	0	0	1,06E-08	0,00E+00	0,00E+00	4,36E-07	4,64E-09	7,35E-06	9,12E-09	-8,60E-07
ADPF	[MJ]	2,76E+02	1,36E+00	4,94E+01	0	0	1,36E+00	0,00E+00	0,00E+00	-3,90E+02	5,97E-01	3,41E+00	8,32E-02	-1,90E+02
Caption	GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential of soil and water; EP = Eutrophication potential; POCP = Photochemical ozone creation potential; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources													

RESOURCE USE PER [m2 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
PERE	[MJ]	1,80E+01	9,53E-02	2,54E+00	0	0	9,51E-02	0,00E+00	0,00E+00	-1,20E+00	4,19E-02	1,49E-01	6,40E-04	-4,71E+01
PERM	[MJ]	5,99E-01	0	7,18E-02	0	0	0	0	0	0	0	0	0	0
PERT	[MJ]	1,86E+01	9,53E-02	2,62E+00	0	0	9,51E-02	0,00E+00	0,00E+00	-1,20E+00	4,19E-02	1,49E-01	6,40E-04	-4,71E+01
PENRE	[MJ]	8,76E+01	1,38E+00	2,69E+01	0	0	1,38E+00	0,00E+00	0,00E+00	1,32E+02	6,06E-01	3,60E+00	8,38E-02	-3,10E+01
PENRM	[MJ]	2,05E+02	0	2,46E+01	0	0	0	0	0	-5,46E+02	0	0	0	-1,71E+02
PENRT	[MJ]	2,93E+02	1,38E+00	5,15E+01	0	0	1,38E+00	0,00E+00	0,00E+00	-4,14E+02	6,06E-01	3,60E+00	8,38E-02	-2,02E+02
SM	[kg]	1,73E-01	0,00E+00	2,07E-02	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m³]	1,40E-02	1,10E-04	6,22E-03	0	0	1,10E-04	0,00E+00	0,00E+00	-3,04E-03	4,83E-05	8,26E-03	4,52E-06	-1,74E-02
Caption	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 AND OUTPUT FLOWS PER [m2 installed 2-layer roof waterproofing during 50 years]

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
NHWD	[kg]	5,43E-02	2,25E-04	9,37E-03	0	0	2,24E-04	0,00E+00	0,00E+00	4,58E-01	9,88E-05	0,00E+00	0,00E+00	5,86E-02
RWD	[kg]	9,58E-04	2,56E-06	5,08E-05	0	0	2,56E-06	0,00E+00	0,00E+00	-3,21E-05	1,13E-06	0,00E+00	0,00E+00	-1,85E-03

CRU	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	0,00E+00	0,00E+00	1,09E-01	0	0	0,00E+00	9,08E+00	0,00E+00	0,00E+00	0,00E+00	2,72E+00	0,00E+00	0,00E+00
MER	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0,00E+00	0,00E+00	4,49E-01	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,47E+01	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	8,68E-01	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,78E+01	0,00E+00	0,00E+00

Caption: HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

Results per individual sheet (modules A1-A3).

ENVIRONMENTAL IMPACTS PER [m2 produced waterproofing]					
Parameter	Unit	System 1 components (modules A1-A3)		System 2 components (modules A1-A3)	
		DuraFlex Kombi (bottom layer)	BituFlex (top layer)	DuraFlex (bottom layer)	BituFlex Kombi (top layer)
Global warming (GWP)	[kg CO2-Equiv.]	1,36E+00	2,01E+00	1,47E+00	2,08E+00
Ozone depletion (ODP)	[kg R11-Equiv.]	4,89E-08	3,84E-08	3,19E-08	4,06E-08
Acidification for soil and water (AP)	[kg SO2-Equiv.]	5,97E-03	7,30E-03	5,57E-03	7,75E-03
Eutrophication (EP)	[kg Phosphate-Equiv.]	9,09E-04	6,98E-04	6,13E-04	7,26E-04
Photochemical ozone creation (POCP)	[kg Ethene-Equiv.]	2,90E-03	3,92E-03	2,95E-03	4,10E-03
Depletion of abiotic resources-elements (ADPe)	[kg Sb-Equiv.]	1,03E-06	5,02E-07	4,70E-07	5,31E-07
Depletion of abiotic resources-fossil fuels (ADPf)	[MJ]	1,10E+02	1,55E+02	1,15E+02	1,61E+02

RESOURCE USE PER [m2 produced waterproofing]					
Parameter	Unit	System 1 components (modules A1-A3)		System 2 components (modules A1-A3)	
		DuraFlex Kombi (bottom layer)	BituFlex (top layer)	DuraFlex (bottom layer)	BituFlex Kombi (top layer)
Renewable primary energy resources used as energy carrier	[MJ]	8,31E+00	8,97E+00	8,74E+00	9,25E+00
Renewable primary energy resources used as raw materials	[MJ]	3,60E-01	3,60E-01	2,99E-01	2,99E-01
Total use of renewable primary energy resources	[MJ]	8,67E+00	9,33E+00	9,04E+00	9,55E+00
Non-renewable primary energy resources used as energy carrier	[MJ]	3,07E+01	4,84E+01	3,70E+01	5,04E+01
Non-renewable primary energy resources used as raw materials	[MJ]	8,64E+01	1,15E+02	8,52E+01	1,20E+02
Total use of non-renewable primary energy resources	[MJ]	1,17E+02	1,64E+02	1,22E+02	1,70E+02
Use of secondary materials	[kg]	1,22E-01	8,25E-02	8,45E-02	8,82E-02
Use of renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	[m ³]	8,79E-03	7,59E-03	6,21E-03	7,81E-03

WASTE CATEGORIES AND OUTPUT FLOWS PER [m2 produced waterproofing]					
Parameter	Unit	System 1 components (modules A1-A3)		System 2 components (modules A1-A3)	
		DuraFlex Kombi (bottom layer)	BituFlex (top layer)	DuraFlex (bottom layer)	BituFlex Kombi (top layer)
Hazardous waste disposed*	[kg]	4,50E-09	7,57E-09	4,87E-09	7,39E-09
Non-hazardous waste disposed*	[kg]	2,82E-02	1,93E-02	3,03E-02	2,40E-02
Radioactive waste disposed*	[kg]	4,04E-04	5,21E-04	4,16E-04	5,42E-04
Components for re-use	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Checked and approved by



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