Annex 2
ISO-DRAIN

by Interplast Kunststoffe GmbH

ENVIRONMENTAL PRODUCT DECLARATION

according to /ISO 14025/ und /EN 15804+A2/

Owner of the declaration	Interplast Kunststoffe GmbH
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Institut Bauen und Umwelt e.V.

General Information

See *Chapter 1, General Information, of the main EPD for ISO-DRAIN eco/nature*

Composition of the ISO-DRAIN dimpled sheet
The composition of the ISO-DRAIN dimpled sheet, expressed as a percentage by mass relative to the declared unit, is shown in the following table.

Name	Value	Unit
ISO-DRAIN		
HDPE	98	%
Carbon black Masterbatch	2,0	%

General Product Information

ISO-DRAIN dimpled membranes are single- or multi-layer plastic sheets made of polyolefins with round, square, or polygonal dimples. In addition to the shape and size of the dimples, the different models may also vary in color and type of lamination. This appendix to the ISO-DRAIN EPD covers the LCA results for the following product:

ISO-DRAIN: from virgin material

The product specifications in the EPD are also fully applicable to the product discussed here.

2. LCA: Calculation rules and scenarios

The LCA calculation rules and scenarios specified in Chapters 3 and 4 of the main EPD also apply without restriction to the product variant discussed here.

3. LCA: Results

The following section provides a detailed breakdown of the results of the life cycle assessment and impact assessment for the ISO-DRAIN dimpled sheets from virgin material that were examined. The EoL baseline scenario (100% energy recovery) includes modules C1, C2, C3, C4, and D; the EoL scenario 1 (100% material recovery) includes modules C1, C2, C3/1, C4/1, and D/1, and the EoL Scenario 2 (100% landfilling) includes modules C1, C2, C4/2, and D/2.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product Stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	perational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg dimpled sheet ISO-DRAIN

Parameter	Unit	A1 – A3	A4	A5	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
GWP-total	[kg CO_2-eq.]	2.40E+00	1.47E-02	1.63E-02	6.92E-01	6.82E-03	3.13E+00	2.74E-01	0	0	0	3.03E-02	-1.43E+00	-8.30E-01	-5.29E-03
GWP-fossil	[kg CO_2-eq.]	2.38E+00	1.42E-02	1.61E-02	7.00E-01	6.62E-03	3.13E+00	2.73E-01	0	0	0	3.02E-02	-1.42E+00	-8.23E-01	-5.25E-03
GWP-biogenic	[kg CO_2-eq.]	1.28E-02	6.76E-05	2.21E-05	3.83E-06	3.15E-05	9.42E-05	7.85E-04	0	0	0	0.00E+00	-7.37E-03	-6.35E-03	-2.72E-05
GWP-luluc	[kg CO_2-eq.]	2.10E-03	3.68E-04	1.18E-04	7.15E-03	1.71E-04	2.65E-05	1.94E-05	0	0	0	8.27E-05	-1.97E-03	-3.44E-04	-7.25E-06
ODP	[kg CFC11-eq.]	5.69E-12	4.00E-15	1.93E-15	8.19E-14	1.86E-15	1.75E-13	4.84E-13	0	0	0	1.03E-13	-1.34E-11	-3.69E-12	-4.95E-14
AP	[mol H^+-eq.]	3.47E-03	3.07E-05	8.82E-06	3.47E-03	1.11E-05	3.15E-04	1.74E-04	0	0	0	1.80E-04	-1.68E-03	-1.39E-03	-6.21E-06
EP-freshwater	[kg P-eq.]	2.64E-06	2.71E-08	8.80E-09	1.87E-06	1.26E-08	2.13E-08	9.53E-07	0	0	0	1.68E-05	-1.31E-06	-1.24E-06	-4.81E-09
EP-marine	[kg N-eq.]	8.85E-04	1.34E-05	3.42E-06	1.66E-03	4.60E-06	6.77E-05	4.90E-05	0	0	0	3.90E-05	-4.87E-04	-3.39E-04	-1.79E-06
EP-terrestrial	[mol N-eq.]	9.45E-03	1.49E-04	4.07E-05	1.79E-02	5.10E-05	1.49E-03	5.32E-04	0	0	0	4.25E-04	-5.44E-03	-3.58E-03	-2.00E-05
POCP	[kg NMVOC-eq.]	4.19E-03	2.89E-05	7.92E-06	4.50E-03	1.04E-05	2.01E-04	1.29E-04	0	0	0	1.23E-04	-1.32E-03	-1.73E-03	-4.87E-06
ADPE	[kg Sb-eq.]	2.09E-07	1.92E-09	6.23E-10	4.61E-08	8.92E-10	1.97E-09	3.47E-09	0	0	0	2.05E-09	-1.41E-07	-1.02E-07	-5.21E-10
ADPF	[MJ]	7.23E+01	1.86E-01	6.10E-02	8.84E+00	8.64E-02	3.67E-01	1.45E+00	0	0	0	5.00E-01	-2.52E+01	-3.24E+01	-9.29E-02
WDP	[m^3 world eq deprived]	3.11E-02	5.46E-05	1.09E-03	2.78E-03	2.54E-05	2.89E-01	2.24E-02	0	0	0	3.72E-03	-1.49E-01	-9.03E-03	-5.48E-04

Key	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg dimpled sheet ISO-DRAIN

Parameter	Unit	A1 – A3	A4	A5	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
PERE	[MJ]	2.64E+00	1.60E-02	3.28E+00	6.51E-01	7.45E-03	1.01E-01	9.37E-02	0	0	0	8.34E-02	-8.23E+00	-1.92E+00	-3.03E-02
PERM	[MJ]	3.68E+00	0.00E+00	-3.27E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	6.32E+00	1.60E-02	5.51E-03	6.51E-01	7.45E-03	1.01E-01	9.37E-02	0	0	0	8.34E-02	-8.23E+00	-1.92E+00	-5.06E-11
PENRE	[MJ]	7.24E+01	1.86E-01	2.21E-01	8.84E+00	8.64E-02	4.39E+01	3.63E+00	0	0	0	5.00E-01	-2.52E+01	-3.24E+01	-9.29E-02
PENRM	[MJ]	4.91E+01	0.00E+00	-1.70E-01	0.00E+00	0.00E+00	-4.35E+01	-4.13E+01	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	1.22E+02	1.86E-01	5.10E-02	8.84E+00	8.64E-02	3.67E-01	-3.77E+01	0	0	0	5.00E-01	-2.52E+01	-3.24E+01	-9.29E-02
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0.00E+00	0.00E+00	9.03E-01	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m³]	7.36E-03	1.14E-05	2.87E-05	3.14E-04	5.30E-06	6.76E-03	5.42E-04	0	0	0	1.09E-04	-6.41E-03	-3.26E-03	-2.36E-05

Key	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 = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg dimpled sheet ISO-DRAIN

Parameter	Unit	A1 – A3	A4	A5	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
HWD	[kg]	7.38E-09	9.68E-12	3.85E-12	3.20E-10	4.51E-12	2.00E-10	6.82E-11	0	0	0	1.12E-10	-1.59E-08	-4.83E-09	-5.88E-11
NHWD	[kg]	1.92E-02	2.76E-05	5.48E-05	1.16E-03	1.28E-05	1.24E-02	2.52E-03	0	0	0	9.96E-01	-1.26E-02	-8.52E-03	-4.63E-05
RWD	[kg]	3.41E-04	2.69E-07	1.64E-07	1.16E-05	1.25E-07	2.11E-05	7.23E-05	0	0	0	7.20E-06	-1.90E-03	-2.86E-04	-7.00E-06
CRU	[kg]	3.29E-01	0.00E+00	1.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	8.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ]	2.55E-02	0.00E+00	2.47E-02	0.00E+00	0.00E+00	6.68E+00	3.34E-01	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	4.54E-02	0.00E+00	4.40E-02	0.00E+00	0.00E+00	1.19E+01	5.94E-01	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Key	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 OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg dimpled sheet ISO-DRAIN

Parameter	Unit	A1 – A3	A4	A5	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
PM	[Disease incidence]	4.22E-08	2.43E-10	6.89E-11	4.03E-08	9.01E-11	1.84E-09	1.56E-09	0	0	0	1.85E-09	-1.37E-08	-1.65E-08	-5.06E-11
IRP	[kBq U235-eq.]	3.32E-02	2.65E-05	2.10E-05	1.61E-03	1.23E-05	3.38E-03	6.77E-03	0	0	0	9.67E-04	-3.13E-01	-4.10E-02	-1.15E-03
ETP-fw	[CTUe]	4.70E+01	2.05E-01	6.65E-02	1.15E+01	9.56E-02	1.36E-01	2.92E-01	0	0	0	1.14E+00	-2.22E+00	-2.06E+01	-8.20E-03
HTP-c	[CTUh]	7.79E-10	2.94E-12	1.02E-12	1.54E-10	1.37E-12	1.99E-11	1.16E-11	0	0	0	1.57E-11	-2.58E-10	-3.60E-10	-9.51E-13
HTP-nc	[CTUh]	1.39E-08	1.14E-10	3.69E-11	8.71E-09	5.30E-11	9.20E-11	6.75E-10	0	0	0	2.80E-10	-4.26E-09	-6.02E-09	-1.57E-11
SQP	[-]	2.12E+00	9.72E-02	3.16E-02	3.92E+00	4.53E-02	1.15E-01	2.19E-02	0	0	0	7.73E-02	-4.83E+00	-1.19E+00	-1.78E-02

Key	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.