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Membrane LD-PE black standard

CE *CPD 89/106 → Appendice ZA of UNI EN 13984 :2007 – 13967:2007 – 13361:2008 – 13362:2005 – 13491:2008 – 13492:2008 – 13493:2008*

Applications : *Water vapour control layer (Type A according to EN 13984). Membrane against moisture rising from the basement (Type T acc. to EN 13967). Polymeric geosynthetic (GBR-P) barriers to fluids for use in reservoirs, dams, canals, tunnels, disposal sites and containments of liquids and solids waste.*

Notified Body (AoC2+)
N.o id. 1370 - BUREAU VERITAS ITALIA S.p.A.

N.o cert. FPC……

Notified Laboratory (AoC3)
N.o id. 0987 - LAPI S.p.A.

Year of Apposition of CE Marking

2010

MANUFACTURER : ***EIFFEL Industria Materie Plastiche S.p.A. I-43012 Fontanellato (PR)***
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Description of material : ***monolayer sheet composed of LDPE-EVA (low density polyethylene co-polymerized with ethylene-vinyl acetate) added with black master-batch (LD-PE + carbon black), derived from the blown film extrusion of the aforesaid blend and packaged in coils. The material does not contain flame retardants, resins or glues.***

Installation : flame light welding of overlapping flaps (at least 10 cm) of contiguous membranes.

Properties

Legend :MDV = Manufacturer Declared Value, given by the Nominal Value ± Tolerance
MLV = Manufacturer Limit Value (derived from the Nominal Value – o + the Tolerance)
Note : for intermediate thicknesses apply intermediate values of table properties

Dimensional characteristics CE (at 23°C)	Method	Unit	Nominal Values				Tolerance
Average thickness	EN 1849-2	mm	**0,50**	**0,80**	**1,00**	**1,50**	± 5%
Point to point thickness							± 15%
Weight or mass per unit area	EN 1849-2	g/m^2	477	762	953	1.430	± 6%
Length	EN 1848-2	m	Contractual nominal values				± 4%
Width	EN 1848-2	m	Contractual nominal values				Min 0%,Max+4%
Straightness	EN 1848-2	mm/10m	≤ 75				Limit required by std EN 13984 and 13967
Visible defects	EN 1850-2		Absent				Limit required by std EN 13984 and 13967

Mechanical characteristics CE	Method	Unit		Nominal Values			Tolerance
Tensile strength at break (MD direction)	EN 527-1,3 specimen type2 large 15 mm	N/mm^2		20			± 20%
Tensile strength at break (TD direction)		N/mm^2		18			± 20%
Tensile strength at break (MD direction)	EN 527-1,3 specimen type5 large 6 mm	N/mm^2		27			± 20%
Tensile strength at break (TD direction)		N/mm^2		24			± 20%
Elongation at break (MD direction)	EN 527-1,3	% elong.		600			± 100% elong.
Elongation at break (TD direction)	EN 527-1,3	% elong.		700			± 100% elong.
Tensile strength at break (MD direction)	EN 12311-2	N/50mm	415	660	830	1.200	± 20%
Tensile strength at break (TD direction)	EN 12311-2	N/50mm	370	600	740	1.100	± 20%
Elongation at break (MD direction)	EN 12311-2	% elong.		370			± 100% elong.
Elongation at break (TD direction)	EN 12311-2	% elong.		440			± 100% elong.
Resistance to impact	EN 12691	mm	≥ 180	≥ 300	≥ 380	≥ 590	Expressed in MLV
Resistance to static loading:perforates for	EN 12730 method A	kg		> 20			Expressed in MLV
Resistance to static loading:perforates for	EN 12730 method B	kg		> 20			Expressed in MLV
Static puncture test (CBR test)	EN 12236	kN	1,2	1,6	1,9	2,5	± 10%
Resistance to tearing (MD, TD directions)	EN 12310-1	N	≥ 70	≥ 120	≥ 150	≥ 230	Expressed in MLV
Shear resistance of flame light welded joints	EN 12311-2	N/50mm	To fully welded joints, the tensile strength is similar to that of the original material in the direction T.				
Deformation under load (at 7,32 N/mm^2)	App. B EN 13984	%	≤ 8	≤ 8	≤ 7	≤ 7	Expressed in MLV after 100 hrs of load

Ulterior mechanical characteristics	Method	Unit	Nominal Values	Tolerance
Tear resistance (trouser specimen)	EN 6383-1	N/mm	140	± 30 N/mm
Puncture resistance with punch		N/mm	80	± 15 N/mm
Puncture resistance with 7,5 mm sphere		N/mm	600	± 100 N/mm

Physical characteristics CE	Method	Unit	Nominal Values	Tolerance
Density at 23°C	EN 1849-2	kg / dm^3	0,953	± 0,010
Watertightness at 60 kPa	EN 1928 Method A		Confirmed	
Water vapour transmission (μ)	EN 1931		150.000	± 50.000
Coefficient of linear thermal expansion (α)	ASTM D696	°C^{-1}	2,1 * 10^{-4}	± 15%
Stress crack resistance	ASTM D5397	h	≥ 200	Expressed in MLV
Permeability to water	EN 14150	m^3/m^2/d	< 10^{-6}	Expressed in MLV
Gas permeability: oxygen (at 23°C, 1 bar)	ASTM D1434	ml / cm s bar	1,9 * 10^{-8}	± 20%
Reaction to fire	EN 11925-2	Classification	E (according to EN 13501-1)	

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Note : the results refer to the lowest thickness, except where otherwise indicated; higher thickness have better performance

Durability characteristics CE	Methods		Residual properties		Results
Thermic in air at 70°C for 84 days	EN 1296	EN 1931	Water vapour transmission (μ)		
			Difference from nominal value		- 20% (within ± 50%)
		EN 1928 B	Watertightness at 60 kPa		Confirmed
Chemical in milk of lime at 23°C for 112 days	EN 1847	EN 1928 Method B	Watertightness at 60 kPa		Confirmed
Compatibility with bitumen at 70°C for 28days	EN 1548	EN 1928 Method B	Watertightness at 60 kPa		Confirmed
To oxidation in air at 85°C for 90 days	EN 14575	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	95% ≥ 75%
			TD Tensile strength at break	(σ/σ_{IN})	99% ≥ 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	100% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	98% ≥ 75%
To leaching at 50°C for 56 days: With B simulant (milk of lime)	EN 14415	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	93% ≥ 75%
			TD Tensile strength at break	(σ/σ_{IN})	96% ≥ 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	88% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	100% ≥ 75%
To leaching at 50°C for 56 days: With C simulant (alcohols)	EN 14415	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	98% ≥ 75%
			TD Tensile strength at break	(σ/σ_{IN})	93% ≥ 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	92% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	98% ≥ 75%
To leaching at 50°C for 56 days: With A simulant (water)	EN 14415	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	99% ≥ 75%
			TD Tensile strength at break	(σ/σ_{IN})	100% ≥ 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	98% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	100% ≥ 75%
Chemical at 50°C for 56 days: With A simulant (sulphuric acid)	EN 14414	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	94% ≥ 75%
			TD Tensile strength at break	(σ/σ_{IN})	95% ≥ 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	100% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	100% ≥ 75%
Chemical at 50°C for 56days (0.50 mm thickness): With C simulant (alkanes)	EN 14414	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	59% < 75%
			TD Tensile strength at break	(σ/σ_{IN})	57% < 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	80% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	95% ≥ 75%
Chemical at 50°C for 56days (1.00 mm thickness): With C simulant (alkanes)	EN 14414	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	63% < 75%
			TD Tensile strength at break	(σ/σ_{IN})	67% < 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	88% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	92% ≥ 75%
Chemical at 50°C for 56 days: With D simulant (synthetic leachate)	EN 14414	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	75% ≥ 75%
			TD Tensile strength at break	(σ/σ_{IN})	78% ≥ 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	92% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	95% ≥ 75%
To weathering : In QUV at 340 nm for 3.000 hours	EN 12224	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	98% ≥ 75%
			TD Tensile strength at break	(σ/σ_{IN})	97% ≥ 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	94% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	98% ≥ 75%
Microbiological : In active soil at 26°C, H = 95% for 112 days	EN 12225	EN 527-1,-3	MD Tensile strength at break	(σ/σ_{IN})	100% ≥ 75%
			TD Tensile strength at break	(σ/σ_{IN})	93% ≥ 75%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	100% ≥ 75%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	97% ≥ 75%
Chemical to concrete at 90°C for 168 days	Append. C EN 13984	EN 12311-2	MD Tensile strength at break	(σ/σ_{IN})	93% ≥ 50%
			TD Tensile strength at break	(σ/σ_{IN})	92% ≥ 50%
			MD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	97% ≥ 50%
			TD Elongation at break	($\varepsilon/\varepsilon_{IN}$)	92% ≥ 50%