Puraflex VOC Membrane Data Sheet

The Cordek Puraflex VOC membrane is a high performance hydrocarbon and chemical resistant barrier with exceptional resistance to a wide range of pollutants including hydrocarbons, industrial chemicals, toxic waste, natural and radioactive gases. The Cordek Puraflex VOC membrane is generally used within construction applications, predominantly within the foundation design. It also acts as a high performance DPM.

Key Features

- High performance membrane comprising of protective polymeric layers on both sides of a chemical resistant inner core, for protection of buildings against hydrocarbons, VOCs and ground gases
- Provides additional damp proofing protection to the structure
- Robust membrane construction with excellent resistance to both puncturing and tearing
- Extensively tested with a depth of performance data supported by the Cordek Puraflex Permeation Modeller.

Installation

In order to provide a robust installation, it is recommended that the Cordek Puraflex VOC membrane is jointed using conventional thermal (hot air/wedge) welding equipment to provide adequate protection against VOC, chemical, ground gas and moisture ingress.

All laps and junctions within the membrane should be overlapped by a minimum of 150mm. Any penetrations within the membrane should be effectively sealed using the appropriate accessories and recommended details.

The membrane should be installed upon a suitably prepared level surface consisting of either Cordek's ventilation product Ventform, a well compacted sand layer or concrete blinding of a minimum 50mm depth. Surfaces should be swept clean and free from any sharp edges or protrusions.

For further information on the installation of the Cordek Puraflex VOC membrane please refer to the separate installation guide, available from Cordek's technical team upon request.

For further information on the full range of VOC & Ground Gas Protection, please contact the Cordek technical team on 01403 799600, techsupport@cordek.com or consult our website at www.cordek.com.

Protection & Repair

All welded and non-welded areas of the Cordek Puraflex VOC membrane should be inspected for defects, holes, blisters, un-dispersed raw materials, and any sign of contamination by foreign matter prior to covering. The surface of the membrane should be clean at the time of inspection and free from debris.

Following installation of the membrane, the installer and specifier should assess the requirement for additional protection prior to the positioning of reinforcement and pouring of concrete upon it. If additional protection is required, then the Cordek Correx protection system should be used directly above the membrane.

If the membrane is damaged, it should be repaired by means of patching. Pinholes and small holes can also be repaired via patching. The patch should be made of the same barrier membrane and should extend at least 150mm outside the damaged area in order to ensure that the damaged area is covered completely. The patch should be prepared and welded using a hot air gun with a fishtail nozzle. The two surfaces to be welded are heated with the hot air gun until melting occurs on both surfaces. Pressure is then applied to the patch by means of a hand roller until the weld cools.

Storage & Handling

Care should be taken when moving, transporting or handling to avoid physical damage, puncturing or tearing which may affect the performance of the membrane.

The membrane should be stored under cover to protect from puncture, dirt, grease, moisture, sunlight and excessive heat. Damaged material shall be quarantined and stored separately for repair or replacement. The rolls shall be stored on a prepared smooth dry surface (or fully boarded wooden pallets; note that slatted pallets with sharp corners will damage the rolls) and stacked no more than two rolls high. The bottom rolls need to be chocked to prevent them from rolling.

Storage between 5 to 30°C at 40 to 65% humidity under non-condensing conditions is recommended.

Product Data

Physical Properties:

Performance		Standard	Units	Values MD	Values XD	Min	Max
Physical Properties							
Mass		EN 1849-2	gsm	440		435	455
Thickness		EN 1849-2	µm	440		425	490
Tensile Strength at break		ISO R 527-3	N/mm	53	48	45 I 40	60 I 55
Elongation at break			%	920	780	850I700	995I950
Tear Strength – trouser		ISO 34 method B	N	57	60	50 I 50	65 I 70
Tear Strength		ASTM D1004	N	45	45	40 I 55	40 I 55
Puncture Resistance	Resistance	EN ISO 12236	N	1470		1200	1500
	Movement		mm	100		90	120
Burst Strength (Mullen)		ASTM 3786	kPa	145		125	160
Hydrostatic Resistance		ASTM D751-A	kPa	758		745	780
Low Temperature Resistance		EN 495-5		Pass		-	-
Seam Test	Peel	ASTM D6392	N	NA	167	-	-
Roll Size	18 rolls/pallet		m	2.1 x 50		-	-
Roll Weight	20cm dia		kg	47			
Durability Properties							
Temperature Range			°C	-40 to +70		-	
Flame Retardant		BS EN ISO 11925-2		Class F		-	
UV Resistance			kLy	150		-	
Co-efficient of Linear Thermal Expansion (CLTE)		ASTM D696	m/m/ °C	1.26E-04		BICS BS-G428/a	
Dimensional Stability		ASTM D1204-08	%			BICS BS-G428/a	
Resistance to Oxidation	Max Tensile Str.	EN 14575	%	-3.2	-3.2	BICS BS-E928-10	
Retained strength after ageing	Elongation		%	-2.2	-1.3	BICS BS-E928-10	
Oxidative Induction Time		ASTM D3895	min	58		BICS BS-E928-08	
Root Penetration		prCEN/TS 14416	-	Pass		TSUS 90-09-0319	
Micro-organisms		EN 12225	-	Pass		TSUS 09/0640	
Weathering		EN 12224	-	Not Applicable		Covered installation	
Env. Stress Cracking		ASTM D 5397-99	-	Not Applicable		BICS E928-09	

Chemical Resistance:

Group	Challenge Chemical 100% concentration	CAS	State	Permeation Rate [1] 20 °C at 100 mg/kg mg/m²/year	Chemical Resistance [2] ASTM D5322 / EN 14414 Performance after Chemical Attack				
					Attack on exposed surfaces	Weight %	Thick-ness %	Tensile Strength MD %	Tensile Strength XD %
OTHER CHEMICALS									
Carboxylic Carbocyclic Acids	Butyl benzl phthalate (BBP)	85-68-7	Liquid	5.80E-03	NT	NT	NT	NT	NT
	Di-n-octyl phthalate	117-84-0	Liquid	3.11E-03	NT	NT	NT	NT	NT
	Diethyl phthalate	84-66-2	Liquid	9.28E-01	NT	NT	NT	NT	NT
	Dimethyl phthalate	131-11-3	Liquid	8.30E-01	None	-0.9	-0.2	-20.0	+1.8
	Dibutyl phthalate	84-74-2	Liquid	2.54E-01	None	+0.9	-0.2	-16.9	-22.6
	Dioctyl phthalate	117-81-7	Liquid	1.06E-02	NT	NT	NT	NT	NT
Heterocyclics	Carbazole SVOC	86-74-8	Solid	1.58E-01	NA	NA	NA	NA	NA
	1,4-Dioxane	123-91-1	Liquid	9.45E+02	NT	NT	NT	NT	NT
	Tetrahydrofuran (THF)	109-99-9	Liquid	2.07E+03	NT	NT	NT	NT	NT
Inorganics	Carbon Disulphide	75-15-0	Liquid	5.45E-06	NT	NT	NT	NT	NT
Organics	2-Methoxy-2-methylpropane (MTBE)	1634-04-4	Liquid	1.45E+00	None	+1.2	-0.2	+7.7	+17.9
	2-Methylphenol	95-48-7	Solid	8.82E+02	NA	NA	NA	NA	NA
	4-Methylphenol (Cresol)	106-44-5	Solid	8.82E+02	NA	NA	NA	NA	NA
	Pentachlorophenol	87-86-5	Solid	1.70E+00	NA	NA	NA	NA	NA

Glossary

BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
PAH	Polycyclic Aromatic Hydrocarbons
SVOC	Semi Volatile Organic Compound
THM	Trihalomethanes
VOC	Volatile Organic Compound
NA	Not Applicable
NT	Not Tested

[1] Puraflex Permeation Modeller

100mg/kg contaminant at 20°C with No Soil Moisture Partition Coefficient applied.

Permeation Rates are influenced by site-specific variables including contaminant soil concentration, soil temperature, moisture etc. Soil moisture partition coefficients will have a significant effect on the effective concentration levels at the face of any geosynthetic membrane.

Please refer to Puraflex Permeation Modeller software to calculate Permeation Rates for appropriate soil moisture content and other site-specific variables.

[2] Chemical Resistance – ASTM D5322 / EN 14414 Method of Test

Chemical Resistance immersion test method are not applicable for Solids or Gaseous chemicals.

Performance data after Chemical Attack is the variation in Weight & Thickness and Retained Residual Strength & Elongation after immersion in challenge chemical at 50°C for 56 days, measured against control specimen.

Test procedure is equivalent to ASTM D5322 within EPA method 9090 and ASTM D5747.

Though these immersion tests are designed for mono-polymer homogeneous geosynthetic membranes, test results for Puraflex are included for completeness.

Group		Challenge Chemical 100% concentration		CAS	State	Permeation Rate [1] 20 °C at 100 mg/kg mg/m²/year	Chemical Resistance [2] ASTM D5322 / EN 14414 Performance after Chemical Attack				
							Attack on exposed surfaces	Weight %	Thick-ness %	Tensile Strength MD %	Tensile Strength XD %
		HYDROCARBONS									
	Aliphatics	1,2-Dichloropropane		78-87-5	Liquid	3.54E-01	NT	NT	NT	NT	NT
		Cyclohexane		110-82-7	Liquid	5.52E-06	None	-2.1	-0.2	-8.2	+4.2
		Diesel Fuel (DIN 14214)		68334-	Liquid	8.57E-04	None	+3.1	+2.0	-15.9	+7.7
		Hexane		30-5	Liquid	1.56E-06	None	-1.1	-1.7	-5.6	+6.0
		Hexachlorobuta-1,3-diene		110-54-3	Liquid	1.51E-01	NT	NT	NT	NT	NT
		Hexachloroethane		87-68-3	Gaseous	1.18E-05	NA	NA	NA	NA	NA
		Jet Fuel (Jet A1)		67-72-1	Liquid	1.34E-03	None	+0.5	0	+0.5	+7.1
		Petrol / Gasoline (unleaded)		91770-15-9	Liquid	2.38E-03	None	-0.2	-1.5	+11.8	+16.7
		White Mineral Oil		86290-81-5 8042-47-5	Liquid	1.34E-03	None	+1.2	0	-4.1	-3.0
Total Petroleum Hydrocarbons (TPHs) With aliphatic and aromatic hydrocarbons and halogen derivatives, the surface may show signs of swelling at high concentration. However the original properties of the protective outer polymer layer are usually restored upon evaporation of the liquid concerned without affecting the integrity of the chemical resistant core.	Aromatics	1,1-Biphenyl		92-52-4	Solid	7.99E-05	NA	NA	NA	NA	NA
		1,2,4-Trimethylbenzene	VOC	95-63-6	Liquid	3.25E-05	None	+1.7	-0.5	-1.5	+14.9
		1,3,5-Trimethylbenzene	VOC	108-67-8	Liquid	3.25E-05	None	+1.0	-1.0	-6.7	-1.2
		1-Methynaphthalene		90-12-0	Liquid	1.51E-02	None	+1.6	-0.2	-9.2	-6.5
		2-Chloronaphthalene		91-58-7	Solid	1.22E-02	NA	NA	NA	NA	NA
		2-Methynaphthalene		91-57-6	Solid	3.35E-03	NA	NA	NA	NA	NA
		2,4-Dimethylphenol		105-67-9	Liquid	1.52E+02	NT	NT	NT	NT	NT
		Acenaphthene	PAH	83-32-9	Solid	1.10E-02	NA	NA	NA	NA	NA
		Anthracene	PAH	120-12-7	Solid	1.54E-03	NA	NA	NA	NA	NA
		Benzene	BTEX	71-43-2	Liquid	3.52E-04	None	-0.3	-1.7	-1.5	-3.6
		Benzo(a)anthracene	PAH	56-55-3	Solid	7.24E-05	NA	NA	NA	NA	NA
		Benzo(a)pyrene	PAH	50-32-8	Solid	7.24E-05	NA	NA	NA	NA	NA
		Benzo(b)fluoroanthene	PAH	205-99-2	Solid	7.24E-05	NA	NA	NA	NA	NA
		Benzo(ghi)perylene	PAH	191-24-2	Solid	7.24E-05	NA	NA	NA	NA	NA
		Benzo(k)fluoroanthene	PAH	207-08-9	Solid	7.24E-05	NA	NA	NA	NA	NA
		n-Butylbenzene	VOC	104-51-8	Liquid	2.51E-05	NT	NT	NT	NT	NT
		sec Butylbenzene	VOC	135-98-8	Liquid	1.26E-03	None	-0.4	+0.2	+8.2	+33.3
		tert Butylbenzene	VOC	98-06-6	Liquid	3.47E-04	None	-0.5	-0.7	+7.2	+22.6
		Chrysene	PAH	218-01-9	Solid	3.57E-04	NA	NA	NA	NA	NA
		Dibenzo(a,h)anthracene	PAH	53-70-3	Solid	7.24E-05	NA	NA	NA	NA	NA
		Ethylbenzene	BTEX	100-41-4	Liquid	1.18E-04	None	-0.7	-0.7	-1.0	+13.1
		Fluoranthene	PAH	206-44-0	Solid	6.67E-04	NA	NA	NA	NA	NA
		Fluorene	PAH	86-73-7	Solid	3.23E-06	NA	NA	NA	NA	NA
		Hexachlorocyclohexane (HCH)		58-89-9	Solid	4.79E-05	NA	NA	NA	NA	NA
		Idendo(1,2,3-cd)pyrene	PAH	193-39-5	Solid	7.24E-05	NA	NA	NA	NA	NA
		Isopropyl benzene (Cumene)	VOC	98-82-8	Liquid	5.64E-05	None	-0.1	-0.2	-3.1	-8.3
		Naphthalene	PAH	91-20-3	Solid	7.76E-01	NA	NA	NA	NA	NA
		Pentachlorobenzene	SVOC	608-93-5	Solid	2.68E-06	NA	NA	NA	NA	NA
		Propylbenzene		103-65-1	Liquid	2.11E-03	None	+1.4	+1.2	+24.6	+31.0
		Pyrene	PAH	129-00-0	Solid	1.40E-07	NA	NA	NA	NA	NA
		Styrene	VOC	100-42-5	Liquid	3.98E-02	None	+0.3	-0.5	-0.5	+14.9
		Toluene (Methylbenzene)	BTEX	108-88-3	Liquid	1.14E-03	None	+1.1	-0.5	-7.2	-4.2
		Xylene	BTEX	1330-20-7	Liquid	6.09E-03	None	-0.3	+0.2	+2.6	+3.6

Group	Challenge Chemical 100% concentration		CAS	State	Permeation Rate [1] 20 °C at 100 mg/kg mg/m²/year	Chemical Resistance [2] ASTM D5322 / EN 14414 Performance after Chemical Attack				
						Attack on exposed surfaces	Weight %	Thick-ness %	Tensile Strength MD %	Tensile Strength XD %
HYDROCARBONS										
Halogenated Hydrocarbons	1,1-Dichloroethene	VOC	75-35-4	Liquid	1.17E+00	None	+2.6	+1.5	+31.8	+52.4
	1,1,2-Trichloroethane	VOC	79-00-5	Liquid	3.02E+02	None	0.0	+0.7	+17.4	+41.1
	1,1,2,2-Tetrachloroethane	VOC	79-34-5	Liquid	1.01E+01	None	+2.2	+0.5	-11.8	+14.3
	1,2-Dibromoethane	VOC	106-93-4	Liquid	1.04E+03	None	+2.7	-1.0	+13.8	+1.2
	1,2-Dichloroethane	VOC	107-06-2	Liquid	5.30E+00	None	+2.0	-0.5	-19.0	-2.4
	1,2,4-Trichlorobenzene	SVOC	120-82-1	Liquid	6.82E-03	None	+3.1	-0.2	-2.1	+16.1
	1,2,4,5-Tetrachlorobenzene	SVOC	95-94-3	Solid	3.00E-03	NA	NA	NA	NA	NA
	Bromobenzene	VOC	108-86-1	Liquid	3.90E-01	None	+2.4	+0.2	+33.3	+33.3
	Bromodichloromethane	THM	75-27-4	Liquid	1.42E+01	NT	NT	NT	NT	NT
	Bromoform	THM	75-25-2	Liquid	6.35E+01	Swelling	+3.9	+0.5	+17.4	+41.1
	Carbon Tetrachloride	VOC	56-23-5	Liquid	3.19E-05	NT	NT	NT	NT	NT
	Chlorobenzene	VOC	108-90-7	Liquid	3.82E-03	None	-1.2	-1.2	-1.0	+37.5
	Chloroethane	VOC	75-00-3	Gaseous	3.80E-01	NA	NA	NA	NA	NA
	Chlorotoluene		95-49-8	Liquid	7.19E-03	None	+0.3	-0.5	+2.1	+1.2
	Dichlorodiphenyltrichloroethane	DDT	50-29-3	Solid	1.84E-03	NA	NA	NA	NA	NA
	Dichloromethane	VOC	75-09-2	Liquid	1.87E+03	None	+0.8	-1.2	-7.2	-9.5
	Dieldrin		60-57-1	Solid	2.17E-03	NA	NA	NA	NA	NA
	Polychlorinated Biphenyl (PCB)		1336-36-3	Liquid	1.77E-05	NT	NT	NT	NT	NT
	Tetrachloroethene		127-18-4	Liquid	1.95E-04	None	-0.8	-3.7	3.1	+3.6
	Trichloroethene	VOC	79-01-06	Liquid	9.25E+00	None	-0.3	-2.0	+9.2	-3.6
	Trichloromethane(Chloroform)	THM	67-66-3	Liquid	2.58E+01	None	+0.7	-0.7	-7.2	-23.8
	Vinyl Chloride	VOC	75-01-4	Gaseous	1.67E-01	NA	NA	NA	NA	NA
Turpenes	Isopropyltoluene		99-87-6	Liquid	1.55E-03	None	+1.1	+0.7	-15.4	-25.0

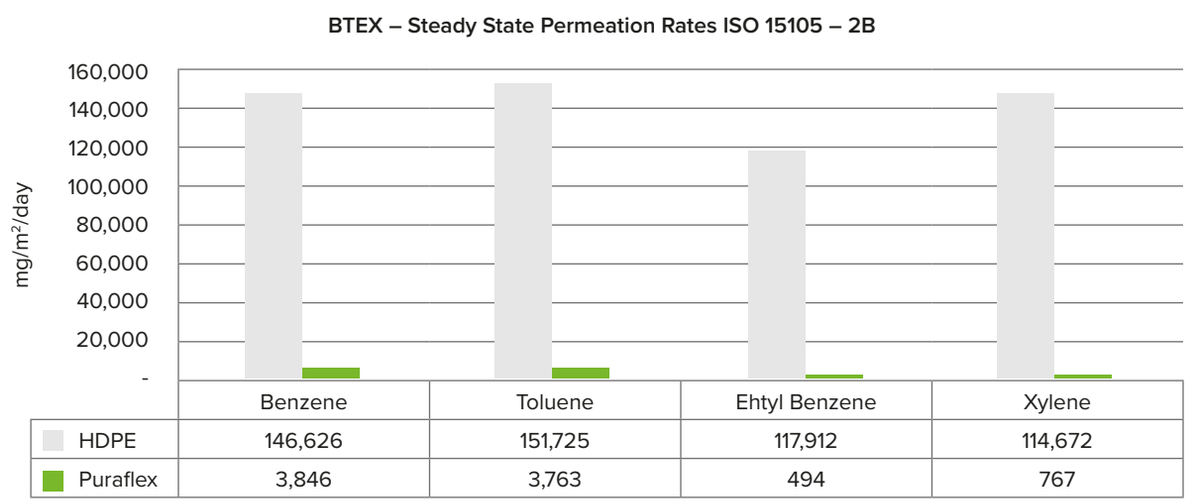
Permeation Data:

Group	Challenge Chemical 100% concentration		CAS	State	Permeation Rate	Unit		
PERFORMANCE TESTING PERMEATION DATA								
Liquids	Benzene	ISO 15105-2B	71-43-2	Liquid	3846	mg/m²/day		
	Ethyl Benzene	ISO 15105-2B	100-41-4	Liquid	494	mg/m²/day		
	Toluene	ISO 15105-2B	108-88-3	Liquid	3763	mg/m²/day		
	Xylene	ISO 15105-2B	1330-20-7	Liquid	767	mg/m²/day		
	Acetone	ISO 15105-2B	67-64-1	Liquid	<0.0001	mg/m²/day		
Gases	Methane	ISO 15105-1A	74-82-8	Gaseous	0.120	cm³/m².day.bar	23°C	0% RH
	Carbon Dioxide	ASTM D1434	124-38-9	Gaseous	1.958	cm³/m².day.atm	25°C	94.9% RH
	Oxygen	ASTM D1434	7782-44-7	Gaseous	1.460	cm³/m².day.atm	25°C	96.2% RH

Durability Testing:

Durability Testing Chemical Resistance Data						
EN 14414 Chemical Resistance Retained Strength after Chemical Attack - Immersion Test	EN 14414-A (Acids)	Tensile Strength	MPa MD | XD	25.2	20.8	Pass
		Elongation	% MD | XD	+18.0	+9.5	Pass
	EN 14414-B (Alkalies)	Tensile Strength	MPa MD | XD	24.4	22.0	Pass
		Elongation	% MD | XD	+17.6	+13.3	Pass
	EN 14414-C (Organic Solvents)	Tensile Strength	MPa MD | XD	26.9	23.6	Pass
		Elongation	% MD | XD	+24.1	+17.6	Pass
	EN 14414-D (Synthetic Leachate)	Tensile Strength	MPa MD | XD	18.2	19.3	Pass
		Elongation	% MD | XD	+9.9	-2.6	Pass
EN 14415 Chemical Resistance Retained Strength after Chemical Attack - Immersion Test	EN 14415-A (Hot Water)	Tensile Strength	MPa MD | XD	26.1	22.8	Pass
		Elongation	% MD | XD	-0.3	-2.5	Pass
	EN 14415-B (Alkalines)	Tensile Strength	MPa MD | XD	27.7	25.5	Pass
		Elongation	% MD | XD	+3.6	-1.3	Pass
	EN 14415-C (Organic Alcohols)	Tensile Strength	MPa MD | XD	24.9	25.2	Pass
		Elongation	% MD | XD	-2.6	+2.7	Pass
Resistance to Acids Retained Strength - Immersion Test	EN 14030	Tensile Strength	MPa MD | XD	26.5	25.0	Pass
		Elongation	% MD | XD	+7.0	+11.2	Pass
Resistance to Alkalis Retained Strength - Immersion Test	EN 14030	Tensile Strength	MPa MD | XD	24.3	24.7	Pass
		Elongation	% MD | XD	-1.6	+10.2	Pass

Comparative Performance Against HDPE Membranes:



	Benzene	Toluene	Ehtyl Benzene	Xylene
HDPE	146,626	151,725	117,912	114,672
Puraflex	3,846	3,763	494	767

Puraflex significantly outperforms HDPE

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