



CERTIFICATE OF CONFORMITY
OF THE FACTORY
PRODUCTION CONTROL
1488-CPR-0139/Z

Geomembrane **GEOCHRON HDPE** **GEOMEMBRANE LLDPE**





Geomembrane GEOCHRON HDPE

Geosynthetic polymer barrier – geomembrane known by the trade name **GEOCHRON HDPE**, is an insulating material with a very wide range of applications in road construction, railway and in municipal investments such as landfill sealings. Permanently installed in the ground, **GEOCHRON HDPE** geomembranes meet various functions arising from design assumptions, such as improving physico-mechanical sub construction performance, strengthening the stability of slopes, changing the values and directions of groundwater filtration, form a permanent water resistance and gas-tight aperture in the ground.

The advantages of **GEOCHRON HDPE** geomembrane quickly proved to be in environmental conditions and thanks to high mechanical strength, lack of microbiological degradation, water resistance, ease of installation, resistance to aging and many other features have become almost indispensable in geotechnical projects.

Many years of experience in manufacturing and selling geomembranes HDPE in conjunction with the launch of a new production line for triple layer geomembrane HDPE with its production based on proved, high-quality materials make our products meet the high demands of users. By increasing the production capacity and obtaining even higher quality for smooth and textured geomembranes, our products are able to meet the needs of even the most demanding customers.

GEOCHRON HDPE geomembranes are of 5÷5.3 m width and of 0.75, 1.0, 1.5, 2.0, 2.5 mm thickness for smooth and of 1.0, 1.5, 2.0, 2.5 mm thickness for textured geomembranes. The choice of foil thickness for the application of sealing an object depends on its function.

GEOCHRON HDPE geomembrane meets all of the requirements of the harmonized standards: PN-EN 13491, PN-EN 13492, PN-EN 13493, PN-EN 13361, PN-EN 13362, PN-EN 15382 and most of the requirements of **GRI GM 13** towards polymeric geosynthetic barriers determined by the Geosynthetics Institute of Texas Research International Company (USA).

Waste seals

Hydraulic structure seals

Municipal and industrial landfills are investments which constitute a potential threat to the environment. The risks arise from the possibility of contamination of air, soil and ground and surface water.

The construction of a modern landfill, taking into account the maximum extent of protecting the environment, is a very difficult, responsible and demanding task that involves the best technology, engineering solutions and ideas. Proper sealing, and thereby protecting against the

infiltration of leachate, is just as much of a key element of the construction of a new landfill, the expansion of next quarters, as during rehabilitation or even closure. That is why most designers, investors and constructors decide to use **GEOCHRON HDPE** geomembrane for this purpose.

The advantages of GEOCHRON over other insulating materials involve:

- Physical properties and strength;
- Chemical resistance;
- Microbiological resistance;
- Aging resistance;
- Greater guarantee of joint tightness;
- Break elongation 800% causes the insulating shutter to fulfill it's task even during large building settlement.

The application of GEOCHRON foil as a barrier for preventing or restricting the flow of liquids:

- Sealing and reclamation of municipal waste landfills;
- Sealing within liquid fuel storage and distribution facilities;
- Municipal sewage treatment plants sealing (domestic and industrial wastewater) and slurry tanks;
- Construction of tunnels and underground structures;
- Construction of reservoirs and dams;
- Construction of channels.

geomembranes HDPE have been used for road construction in Western Europe for many years. Their use for this type of application was preceded by many years of observation and research of the material.

In order to protect the environment, in this case especially the groundwater, appropriate sealing of the substrate is necessary.

A particular threat to the purity of groundwater are leaking toxic fluids flowing from the road surface, dust produced during grinding tires, brakes and pavement and salt used for melting snow and ice. Contaminated water is acquired by groundwater basins or roadside ditches and thereby is creating a significant risk of groundwater contamination and the softening of grounds susceptible to moisture excess. To protect the environment, it is necessary to apply radical technical solutions: sealing through the use of impermeable materials, construction of efficient drainage and purification systems – sealed with the **GEOCHRON HDPE** geomembranes road ditches and evaporation reservoirs.

GEOCHRON HDPE geomembrane is used in communication engineering for:

- Forming insulating layers preventing from contaminated road runoffs;
- Strengthening the foundations of highways, airports, parking lots;
- Sealing of retention and evaporation reservoirs;

- Sealing of evaporation and drainage reservoirs;
- Sealing of road ditches;
- Insulation of water resistant building elements in contact with the ground, i.e.: retaining walls, bridge abutments, overpasses and communication tunnels, while strengthening high and steep earthen walls to prevent them from descending, etc.;
- Sealing and protecting embankments.

Laying and connecting

- Geomembrane should be laid on properly prepared substrate of smooth and uniformly densified surface cleaned of stones and other sharp elements which could cause damage to the material.

Conditions during the laying of geomembrane:

- Air temperature – it is recommended to perform the sealings at air temperature between +5°C and +40°C. Higher or lower temperatures have an adverse effect on transport, storage, handling, laying and connecting of particular geomembrane stripes.
- Wind – strong wind has an adverse effect on laying of particular geomembrane stripes, aligning tabs while performing the welds and on the cleanliness of the surface.
- Rain – dampness of the contact surfaces which are being connected during precipitation has a significant influence on the reduction of the quality of performed welds.

While performing the welds connecting particular geomembrane stripes it is recommended to use methods that ensure high quality of performed works. Surfaces of connected stripes should be free of contamination, dust, moisture and other foreign substances. They should also be aligned over the entire length of combined stripes with a welding hem appropriate for particular technology.



**Textured geomembrane
GEOCHRON HDPE has
smooth stripes on both
edges which enable
welding and
tightness testing**

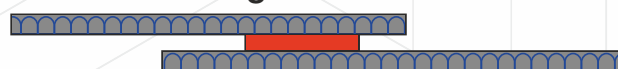
Methods recommended for connecting GEOCHRON geomembrane:

- Welding
- Soldering

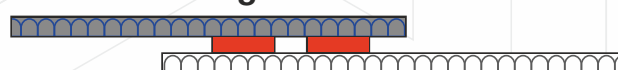
The soldering method is permitted only in places difficult to reach in which no other method can be applied as well as during the performance of all types of material repairs. For this purpose we recommend a HDPE wire 4mm in diameter. The most common and recommended method of connecting is welding, implemented as a one weld version or two welds separated by a test channel version.

The application of carefully selected and tested best quality raw materials in manufacturing GEOCHRON HDPE geomembrane ensures effective welding of the material. Whereas implementation of rigorous product testing procedures at every stage of its production in our own specialized laboratory provides the highest level of geomembranes!

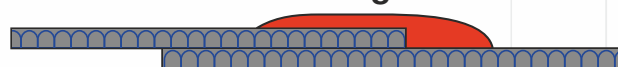
Welding with one weld



Welding with two welds



Soldering



- In every case the sealing barrier should be loaded with ground so it is not lifted by the working form underneath pressure of water or gas. The geomembrane should not be built-in directly under the surface of a roadside or an escarpment. The geomembrane should be stored and transported exclusively in pre-packaged rolls laid horizontally on an aligned surface. No loads should be laid on the rolls. The package of the rolls should not be removed until the building-in.
- During the loading, unloading and storage the rolls should be protected from mechanical or chemical damage and from the influence of high temperatures.
- The barrier should be laid so that it is aligned, without damage and foldings and so that it adheres well to the substrate. In case of application of geomembrane to perform objects located on territories of water protection and to perform tight water or effluent reservoirs, it is recommended to avoid welding connections. Tightness of such connections should be carefully checked after the completion of works. Connections of geomembrane should fulfill the requirements of PN-B-10290:1997 Standard.
- If the polymer barrier is being laid on a gravelly or stony ground or if it is being overwhelmed by such ground it should be protected by a special layer.
- To avoid barrier stripes movement e.g. by the wind, they should be temporarily loaded. The barrier is exposed to damage during building-in. Therefore, its condition should be checked in every case before covering with protective or other layers.



GEOCHRON HDPE smooth Geomembrane

Normative part							
Properties		Testing method	Value				
			GEOCHRON 0,75G	GEOCHRON 1,00G	GEOCHRON 1,50G	GEOCHRON 2,00G	GEOCHRON 2,50G
1.	Thickness, [mm]	PN-EN 1849-2	0,75 ±10%	0,75 ±10%	1,50 ±10%	2,00 ±10%	2,50 ±10%
2.	Water permeability, [m³ /m² /day]	PN-EN 14150	≤ 10 ⁻⁶				
3.	Gas permeability, [cm³ /sek*atm]	ASTMD 1434 (Procedura V)	≤ 2 x 10 ⁻⁷				
4.	Tensile strength, [N/mm²] along and across	PN-EN ISO 527-1 PN-EN ISO 527-3	30 (-4)				
5.	Static puncture resistance (CBR), [kN]	PN-EN ISO 12236	1,8 (-0,18)	3,0 (-0,3)	4,5 (-0,45)	5,5 (-0,55)	6,5 (-0,65)
6.	Durability and resistance for - oxidation - weathering conditions resistance - environmental stress crack resistance	PN-EN 14575 PN-EN 12224 ASTM D 5397 (zał.)	Fulfills the requirements				
7.	Hazardous substances	-	No hazardous substances				

Properties		Testing method	Value				
Information part							
1.	Mass per unit area, (average) [g/m ²]	PN-EN 1849-2	705 (±10%)	940 (±10%)	1410 (±10%)	1880 (±10%)	2350 (±10%)
2.	Width, [m]	PN-EN 1848-2	5,0-5,5 (±0,2)				
3.	Tear resistance, [kN/m] along and across	PN-ISO 34-1	100 (-10%)	130 (-10%)	130 (-10%)	130 (-10%)	130 (-10%)
4.	Reaction to fire	PN-EN ISO 11925-2	Class E				
5.	Resistance to roots	prCEN/TS 14416	Pass				
6.	Thickness, [mm] Lowest individual of 10 values	ASTM D 5199	0,75 (-10%)	1,0 (-10%)	1,5 (-10%)	2,0 (-10%)	2,5 (-10%)
7.	Density, [g/cm ³]	ASTM D 1505	≥0,940				
8.	Yield strength, [kN/m] min.	ASTM D 6693 Typ IV	11	15	22	29	37
9.	Break strength, [kN/m] min.		19	26	35	50	67
10.	Yield elongation, [%] min.		12				
11.	Break elongation, [%] min.		700				
12.	Stress at yield, [MPa]	PN-EN ISO 527-1 PN-EN ISO 527-3	16				
13.	Elongation at break, [%] along and across	PN-EN ISO 527-1 PN-EN ISO 527-3	≥800				
14.	Tensile strength, [kN/m] min.	PN-EN ISO 10319	-	15	23	30	
15.	Multi-Axial, [%]	ASTM D 5617	-			23	-
16.	Tear resistance, [N] min.	ASTM D 1004	93	130	187	249	290
17.	Puncture resistance, [N] min.	ASTM D 4833	240	320	480	640	730
18.	Resistance to impact, [mm] min.	DIN 16726, PN-EN 12691 met. A	-	500	800	1200	1600
19.	Resistance to static load, [kg]	PN-EN 12726 met. B	-	≤20			
20.	Environmental stress crack resistance, min.	ASTM D 5397 (zał.)	336				
21.	Carbon Black Content, [%]	ASTM D 1603	2,0-3,0				
22.	Carbon Black Dispersion	ASTM D 5596	9 in Categories 1 or 2 and 1 in Category 3				
23.	Oxidative Induction Time (OIT), [min] min.	ASTM D 3895	≥100				
24.	UV resistance ⁽¹⁾ HPOIT: % retained after 1600 hrs	ASTM D 5885	50%				
25.	Coefficient of Linear Thermal Expansion, [1/K]	ASTM D 696	1,56 x 10 ⁻⁴				
26.	Low temperature brittleness (-100°C)	ASTM D 746	Pass				
27.	Dimensional stability (1h, 100°C), [%]	PN-EN 1107-2	≤0,5				
28.	Resistance to leaching	PN-EN 14415	Fulfills the requirements				
29.	Resistance to chemicals	PN-EN 14414 (metoda C)					
30.	Microbiological resistance	PN-EN 12225					
31.	Cold folding resistance (-40°C)	PN-EN 495-5					

(1) The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.

⁽¹⁾ The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C

GEOCHRON HDPE textured Geomembrane



Normative part						
Properties		Testing method	Value			
			GEOCHRON 1000 T	GEOCHRON 1500 T	GEOCHRON 2000 T	GEOCHRON 2500 T
1.	Thickness, [mm]	PN-EN 1849-2	940 ±10%	1410 ±10%	1880 ±10%	2350 ±10%
2.	Water permeability, [m³ /m² /day]	PN-EN 14150	≤ 10 ⁻⁶			
3.	Gas permeability, [cm³ /sek*atm]	ASTM D 1434 (Procedure V)	≤ 2 x 10 ⁻⁷			
4.	Tensile strength, [N/mm²] along and across	PN-EN ISO 527-1 PN-EN ISO 527-3	23 (-4)			
5.	Static puncture resistance (CBR), [kN]	PN-EN ISO 12236	2,0 (-0,3)	3,0 (-0,4)	5,0 (-0,6)	5,6 (-0,7)
6.	Durability and resistance for - oxidation - weathering conditions resistance - environmental stress crack resistance	PN-EN 12224 PN-EN 14575 ASTM D 5397 (app.)	Fulfills the requirements			
7.	Hazardous substances	-	No hazardous substances			

Information part						
Properties		Testing method	Value			
			1000	1500	2000	2500
1.	Thickness, [mm] Lowest individual of 10 values	ASTM D 5994	1,0 (-10%)	1,5 (-10%)	2,0 (-10%)	2,5 (-10%)
2.	Mass per unit area, (average) [g/m²]	PN-EN 1849-2	940 (±10%)	1410 (±10%)	1880 (±10%)	2350 (±10%)
3.	Width, [m]	PN-EN 1848-2	5,0-5,5 (±0,2)			
4.	Tear resistance, [kN/m] along and across	PN-ISO 34-1	130 (-10%)	130 (-10%)	130 (-10%)	130 (-10%)
5.	Reaction to fire	PN-EN ISO 11925-2	Class E			
6.	Density, [g/cm³]	ASTM D 1505	≥0,940			
7.	Yield strength, [kN/m] min.	ASTM D 6693 Typ IV	15	22	33	37
8.	Break strength, [kN/m] min.		20	30	42	50
9.	Yield elongation, [%] min.		10			
10.	Break elongation, [%] min.		400			
11.	Elongation at break, [%] along and across	PN-EN ISO 527-1 PN-EN ISO 527-3	≥600			
12.	Tear resistance, [N] min.	ASTM D 1004	130	187	246	290
13.	Puncture resistance, [N] min.	ASTM D 4833	350	500	700	730
14.	Environmental stress crack resistance, min.	ASTM D 5397 (app.)	336 hours			
15.	Carbon Black Content, [%]	ASTM D 1603	2,0-3,0			
16.	Carbon Black Dispersion	ASTM D 5596	9 in Categories 1 or 2 and 1 in Category 3			
17.	Oxidative Induction Time (OIT), [min] min.	ASTM D 3895	≥100			
18.	UV resistance ⁽¹⁾ HPOIT- % retained after 1600 hrs	ASTM D 5885	50%			
19.	Low temperature brittleness (-100°C)	ASTM D 746	Pass			
20.	Dimensional stability (1h, 100°C), [%]	PN-EN 1107-2	≤0,5			
21.	Resistance to leaching	PN-EN 14415	Fulfills the requirements			
22.	Resistance to chemicals	PN-EN 14414 (method C)				
23.	Microbiological resistance	PN-EN 12225				

⁽¹⁾ The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C

Intended uses of the construction product:

- Fluid barrier in the construction of tunnels and underground structures.
- Fluid and/or gas barrier in the construction of liquid waste disposal sites, transfer stations or secondary containment.
- Fluid and/or gas barrier in the construction of solid waste storage and disposal sites.
- Fluid barrier in the construction of reservoirs and dams.
- Fluid barrier in the construction of canals.
- Fluid barrier in transportation infrastructure.



GEOMEMBRANE LLDPE

Intended uses :

- Fluid barrier in the construction of tunnels and underground structures.
- Fluid and/or gas barrier in the construction of liquid waste disposal sites, transfer stations or secondary containment.
- Fluid and/or gas barrier in the construction of solid waste storage and disposal sites.
- Fluid barrier in the construction of reservoirs and dams.
- Fluid barrier in the construction of canals.
- Fluid barrier in transportation infrastructure

Recommended especially in case of applications where increased flexibility is needed e. g.:

- Slopes with difficult access,
- Artificial reservoirs and channels,
- For reclamation of municipal waste landfills,
- Embankments.

The Geomembrane characterizes with:

- Excellent flexibility and ease of laying,
- High static puncture resistance,
- High stress corrosion cracking resistance,
- The product does not contain neither fillers nor plasticizers which can migrate during the use (in contrast to PCV geomembranes),
- Smooth stripes make the welding of geomembrane easier and faster,
- It comes in the form of a smooth or one or both side textured sheet,
- It is neutral to the water environment – it does not contain hazardous substances.

Geomembrane LLDPE smooth

Normative part						
Properties		Testing methods	Value			
			GEOMEMBRANE LLDPE 0,75G	GEOMEMBRANE LLDPE 1,00G	GEOMEMBRANE LLDPE 1,50G	GEOMEMBRANE LLDPE 2,00G
1.	Thickness [mm]	PN-EN 1849-2	0,75 ±10%	1,00 ±10%	1,50 ±10%	2,00 ±10%
2.	Water permeability [m ³ /m ² /day]	PN-EN 14150	≤ 10 ⁻⁶			
3.	Gas permeability [cm ² /sec*atm]	ASTM D 1434 (Procedure V)	≤ 2,9 x 10 ⁻⁸			
4.	Tensile strenght [N/mm ²] Along and across	PN-EN ISO 527-1 PN-EN ISO 527-3	28 (-3)			
5.	Elongation at break [%] Along and across	PN-EN ISO 527-1 PN-EN ISO 527-3	≥ 800			
6.	Static puncture resistance (CBR method) [kN]	PN-EN ISO 12236	1,8 (-0,18)	2,5 (-0,25)	3,2 (-0,32)	5,0 (-0,5)
7.	Durability and resistance for - oxidation - weathering conitions resistance - environmental stress crack resistance	PN-EN 14575 PN-EN 12224 ASTM D 5397 (App.)	Cover in one year Fulfills the requirements			
8.	Hazardous substances	-	No hazardous substances			

Information part						
Properties		Testing method	Value			
			Geomembrane LLDPE 0,75 G	Geomembrane LLDPE 1,00 G	Geomembrane LLDPE 1,50 G	Geomembrane LLDPE 2,00 G
1.	Width, [m]	PN-EN 1848-2	5,0 – 5,5 (± 0,2)			
2.	Tear resistance, [kN/m] along and across	PN-ISO 34-1	107 (-10%)	107 (-10%)	107 (-10%)	107 (-10%)
3.	Stress at yield, [MPa]	PN-EN ISO 527-1 PN-EN ISO 527-3	12			
4.	Yield strength, [kN/m] min.		7	11	17	24
5.	Break strength, [kN/m] min.	ASTM D 6693	20	27	40	54
6.	Yield elongation, [%] min.	Type IV	12			
7.	Break elongation, [%] min.		800			
8.	Resistance to folding at low temperature -35°C	PN-EN 495-5	-	Lack of scratches no cracks		
9.	Thickness, [mm] Lowest individual of 10 values	ASTM D 5199	0,75 (-10%)	1,0 (-10%)	1,5 (-10%)	2,0 (-10%)
10.	Density, [g/cm ³]	ASTM D 1505	≥0,939			
11.	Tear resistance, [N] min.	ASTM D 1004	80	107	160	214
12.	Puncture resistance, [N] min.	ASTM D 4833	265	310	465	620
13.	Environmental stress crack resistance, min.	ASTM D 5397 (app.)	336			
14.	Carbon Black Content, [%]	ASTM D 1603	2,0-3,0			
15.	Carbon Black Dispersion	ASTM D 5596	Categories 1-2			
16.	Oxidative Induction Time (OIT), [min] min.	ASTM D 3895	≥100			



Geomembrane LLDPE textured

Normative part					
Properties		Testing methods	Value		
			GEOMEMBRANA LLDPE 1000 T	GEOMEMBRANA LLDPE 1500 T	GEOMEMBRANA LLDPE 2000 T
1.	Mass per unit area [g/ m ²]	PN-EN 1849-2	935 ±10%	1403 ±10%	1870 ±10%
2.	Water permeability [m ³ /m ² /day]	PN-EN 14150	≤ 10 ⁻⁶		
3.	Gas permeability [cm ² /sec*atm]	ASTM D 1434 (Procedure V)	≤ 2,9 x 10 ⁻⁸		
4.	Tensile strenght [N/mm ²] Along and across	PN-EN ISO 527-1 PN-EN ISO 527-3	22 (-2)		
5.	Elongation at break [%] Along and across	PN-EN ISO 527-1 PN-EN ISO 527-3	≥600		
6.	Static puncture resistance (CBR method) [kN]	PN-EN ISO 12236	2,0 (-0,2)	3,2 (-0,32)	5,0 (-0,5)
7.	Durability and resistance for - oxidation - weathering conitions resistance - environmental stress crack resistance	PN-EN 14575 PN-EN 12224 ASTM D 5397 (zal.)	Cover in one year		
			fulfills the requirements		
8.	Hazardous substances	-	No hazardous substances		

Information part					
Properties		Testing method	Value		
			Geomembrane LLDPE 1000T	Geomembrane LLDPE 1500T	Geomembrane LLDPE 2000T
1.	Mass per unit area, [g/m ²]	PN-EN 1849-2	935 ± 10%	1403 ± 10%	1870 ± 10%
2.	Width, [m]	PN-EN 1848-2	5,0 – 5,5 (± 0,2)		
3.	Tear resistance, [kN/m] along and across	PN-ISO 34-1	107 (-10%)	107 (-10%)	107 (-10%)
4.	Stress at yield, [MPa]	PN-EN ISO 527-1 PN-EN ISO 527-3	12		
5.	Thickness, [mm] Lowest individual of 10 values	ASTM D 5994	1,0 (-10%)	1,5 (-10%)	2,0 (-10%)
6.	Density, [g/cm ³]	ASTM D 1505	≥0,939		
7.	Yield strength, [kN/m] min.	ASTM D 6693 Type IV	11	20	32
8.	Break strength, [kN/m] min.		20	30	45
9.	Yield elongation, [%] min.		12		
10.	Break elongation, [%] min.		600		
11.	Tear resistance, [N] min.	ASTM D 1004	107	160	214
12.	Puncture resistance, [N] min.	ASTM D 4833	310	465	620
13.	Environmental stress crack resistance, min.	ASTM D 5397 (app.)	336		
14.	Carbon Black Content, [%]	ASTM D 1603	2,0-3,0		
15.	Carbon Black Dispersion	ASTM D 5596	Categories 1 - 2		
16.	Oxidative Induction Time (OIT), [min] min.	ASTM D 3895	≥100		

The results of the same characteristics determined by different standards may effect in different values. These differences result from other conditions of the test.



REACH INFORMATION

This product is an article as defined in article 3 of regulation (EC) No 1907/2006 (REACH). It contains no substances which are intended to be released from the article under normal or reasonably foreseeable conditions of use. A safety data sheet following article 31 of the same regulation is not needed to bring the product to the market, to transport or to use it.

In accordance with our knowledge and assurance of our suppliers, polymers and all additives used for production of article do not contain substances (SVHC) from the candidate list.

ACCESSORIES

Tight system solutions in Water Engineering

HDPE wire for soldering

HDPE wire for folding is designed for performing extrusion welds in difficult to reach places and for all kinds of repairs of GEOCHRON HDPE Geomembrane. It is performed of the same kind of raw material as GEOCHRON HDPE Geomembrane which gives a guarantee of compatibility.

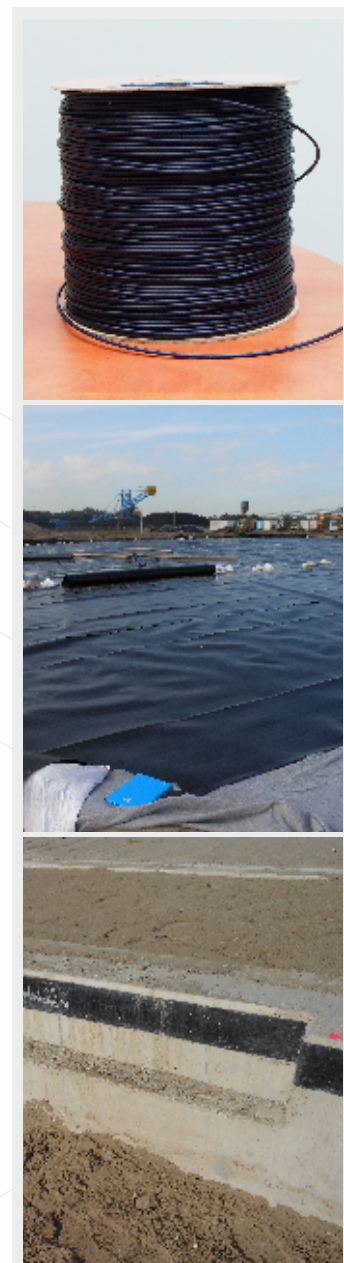
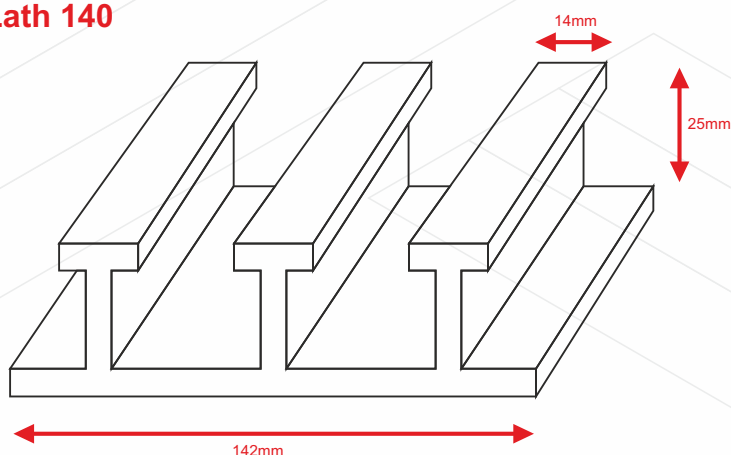
GeoLath

The HDPE GeoLath for concrete has perpendicular protruding profiles which perform a homogeneous element after the bonding of concrete.

Performing of the sealing:

During the performing of concrete elements which are connected with the GEOCHRON HDPE Geomembrane it is recommended to install HDPE GeoLathes. It is recommended to perform this stage at the moment of timbering of the concrete element. HDPE GeoLathes should be installed in an appropriate place according to the project. As a result of the concreting process the profile is being permanently connected with the concrete element of the construction. Afterwards the prepared profile should be folded with earlier prepared sheets of HDPE Geochron Geomembrane. The place of connection should be sealed with an extrusion weld. The adjacent sheets of GEOCHRON HDPE geomembrane and the connection places of the geomembrane and the GeoLathes should be connected by qualified specialists using special equipment.

Lath 140



WARTER
 **polymers**
OBR S.A. brand

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