



# GSE StudLiner Concrete Protection Sheeting

## Product Data Sheet

**GSE StudLiner** is a high quality, high density polyethylene (HDPE) geomembrane, specifically design for durable protection systems of concrete structures. **GSE StudLiner** incorporates approximately 1,200 studs per square meter for a safe and strong embedment into the concrete. The studs are extruded during the sheet extrusion process and are an integral part of the sheet, getting their final shape during an additional process. The large number of studs provides optimum stress distribution, especially during temperature changes<sup>(1)</sup> or in case of water pressure between the liner and the concrete. **GSE StudLiner** has outstanding chemical resistance, mechanical properties and environmental stress crack resistance. **GSE StudLiner** is available in two standard colours. Black is suitable for exposed applications, providing excellent durability, whereas grey was specifically developed for non-exposed, indoor applications to provide better lighting conditions.

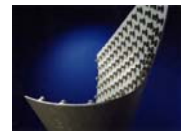
Tested Property	Unit	Method	Minimum Value				
			2.0	2.5	3.0	4.0	5.0
Thickness (minimum average) Lowest individual value	mm	DIN EN ISO 9863-1	2.0 1.87	2.5 2.37	3.0 2.85	4.0 3.80	5.0 4.75
Density	g/cm <sup>3</sup>	DIN ISO 1183-1/A	0.94	0.94	0.94	0.94	0.94
Tensile properties (each direction)		DIN EN ISO 527-3 Type 5; 100 mm/min, lo = 50 mm					
Stress at yield	MPa		15	15	15	15	15
Elongation at yield	%		9	9	9	9	9
Stress at break	MPa		20	20	20	20	20
Elongation at break	%		600	600	600	600	600
Carbon black content <sup>(1)</sup>	%	ASTM D 1603	2.0	2.0	2.0	2.0	2.0
Carbon black dispersion <sup>(1)</sup>	Category	ASTM D 5596	1/2	1/2	1/2	1/2	1/2
Melt flow index <sup>(2)</sup>	g/10 min	DIN EN ISO 1133 (190 °C / 5.0 kg) (190 °C / 2.16 kg)	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0

Reference Property	Unit	Method	Nominal Value				
			2.0	2.5	3.0	4.0	5.0
Thickness	mm	DIN EN ISO 2286-3	2.0	2.5	3.0	4.0	5.0
Stud pull-out strength (approx.) <sup>(3)</sup>	kN/m <sup>2</sup>	---	480	480	480	480	480
Low temperature brittleness	°C	ASTM D 746	-77	-77	-77	-77	-77
Standard Color	---	---	black or grey				
Roll width <sup>(4)</sup>	m	---	2.0	2.0	2.0	2.0	2.0
Roll length (approx.)	m	---	75	70	65	60	60
Roll weight (approx.)	kg	---	400	445	480	560	680

- (1): Values valid for the black colored product, only  
 (2): Standard test conditions: 190 °C / 5.0 kg.  
 (3): Short-term tensile test  
 (4): ± 2 cm

(\*): Coefficient of linear thermal expansion: approx.  $1.2 - 2.0 \times 10^{-4} [K^{-1}]$

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