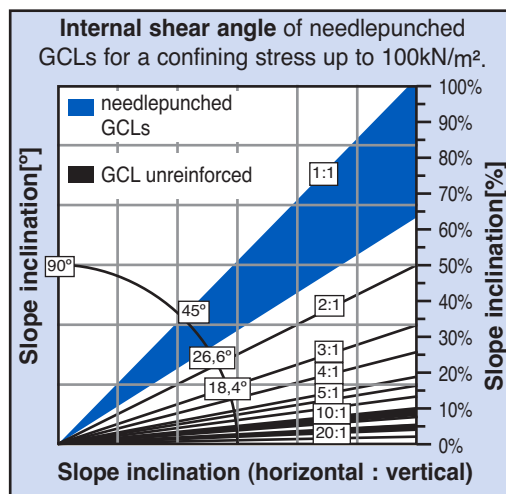


Alderprufe Bentonite GCL

- Versatile sealing applications with different GCL types and natural sodium bentonite
- Can reduce construction costs by replacing compacted clay
- Robust geotextiles encapsulate and contain the bentonite
- Withstands differential settlement
- Uniform peel strength provides multi-directional shear strength
- Thermal Lock process increases internal shear strength and interface friction angles
- Self-sealing overlaps available
- Installation advantages with 4.85m wide rolls
- ISO 9001 certified
- Quick and easy to install



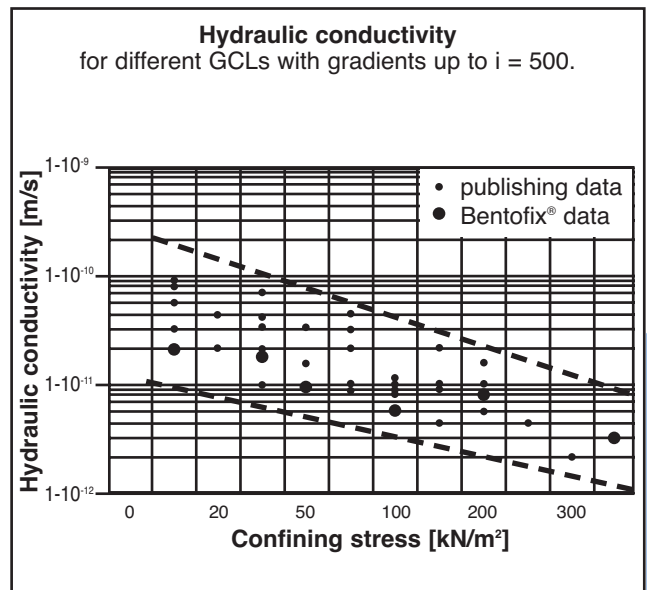
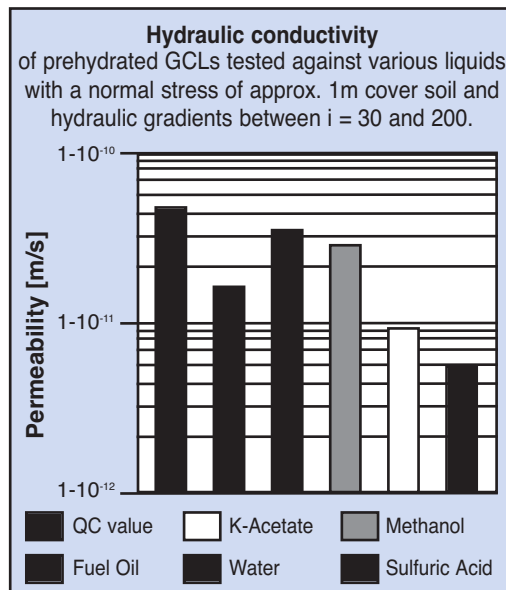
Application	Alderprufe GCL	GCL 5000
Dyke and dam barrier		1
River and canal liner (underwater installation)		1
Retention pond		1
Landfill caps or covers		1
Landfill base seal		1
Reclamation of contaminated sites		1
Groundwater/ Environmental protection		1
Infrastructure sealing system		1
Storm water retention pond		1
Basement waterproofing		1

Special remarks	
	all overlaps self sealing
	interface shear angles up to approx. 18.4° (3:1)*
	robust cover and carrier geotextiles

Geosynthetic Clay Liners are manufactured hydraulic barriers consisting of natural sodium bentonite and geotextiles.

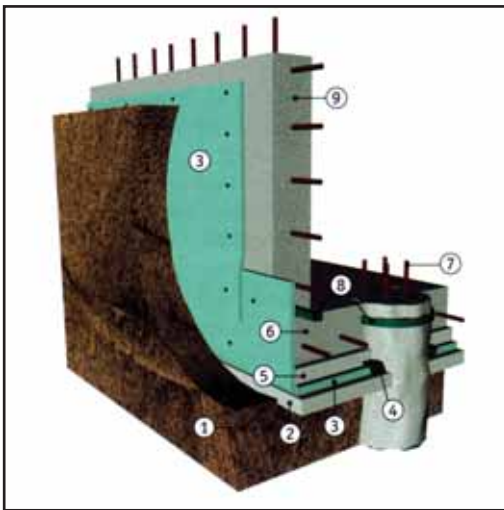
The uniform and direction independent shear stress transfer is created by needlepunching and then thermal locking all layers together. GCLs are used mainly as a replacement of thick, difficult to build, compacted clay liners.

*Higher interface friction angles are possible. The specific design values must be determined with project specific shear tests



Geosynthetic Clay Liners

Values	Test Method	Test Frequency	Value
Montmorillonite content	XRD	yearly	approx 90%
Montmorillonite content	Methylenblue Test, VDG P 69	every 50 t *	≥ 300 mg/g
Water content	DIN 18121 (5h, 105° C)	every 50 t *	≤ 15%
Water absorption	DIN 18132 (24h)	every 50 t *	≥ 600%
Free swell index	ASTM-D 5890	every 50 t *	≥ 25 ml
Fluid loss	ASTM-D 5891	every 50 t *	≤ 15 ml



Sealing of foundation piles

- 1.) Soil.
- 2.) Optional lean concrete with the function to level the surface on which **Alderprufe® Bentonite GCL 5000** is installed.
- 3.) **Alderprufe® Bentonite GCL 5000**.
- 4.) Pre-swollen sodium bentonite around pile.
- 5.) Optional concrete top-blinding protection layer.
- 6.) Reinforced concrete pile cap.
- 7.) Steel reinforcement for e.g. connection wall
- 8.) **Alderprufe** waterstop.
- 9.) Concrete wall.

Alderprufe	GCL 5000	
		QC frequency [m²]
Dimension width x length	4.85m x 40m	
Mass per unit area, cover nonwoven DIN EN 965	300 g/m²	1,300
Mass per unit area, bentonite layer DIN EN 965	4,200 g/m² + 800 g/m² (powder)	800
Mass per unit area, carrier geotextile DIN EN 965	200 g/m²	3,000
Mass per unit area, total product DIN EN 965	5,500 g/m²	800
Raw material geotextiles	PP	*
Max. tensile strength long./transv. DIN EN ISO 10319	20kN/m / 11kN/m	6,500/13,000
Elongation at break long./transv. DIN EN ISO 10319	10% / 5%	6,500/13,000
Peel strength DIN EN ISO 10319	≥ 60N / 10cm	3,000
Peel strength ASTM-D-6496	≥ 360N/m	3,000
Puncture force DIN EN ISO 12236	2,500N	50,000
k-value DIN 18130 & ASTM-D-5887	≤ 5.0 x 10 ⁻¹¹ m/s	22,000
Permittivity DIN 18130	≤ 5.0 x 10 ⁻⁹ l/s	22,000



Sealing of foundation piles

The area around the foundation piles to be sealed must be completely clean and free from any surface irregularities. This surrounding area is then covered with sodium bentonite (4.) A pre-trimmed **Alderprufe®** panel is then slipped over the protruding steel reinforcement pile or is laid against the pile. It might be necessary to pull **Alderprufe®** up the pile. Alternatively a waterproofing slurry (10.) might be recommended.

It is important to check that no unsealed areas remain around the pile. Over the **Alderprufe®** paste covered area, another micro liner or an accurately re-trimmed membrane panel fixed with nails to the lower layer should be placed to protect the pre-hydrated sodium bentonite layer (4.) from possible wash-out caused by the pouring of fresh concrete.

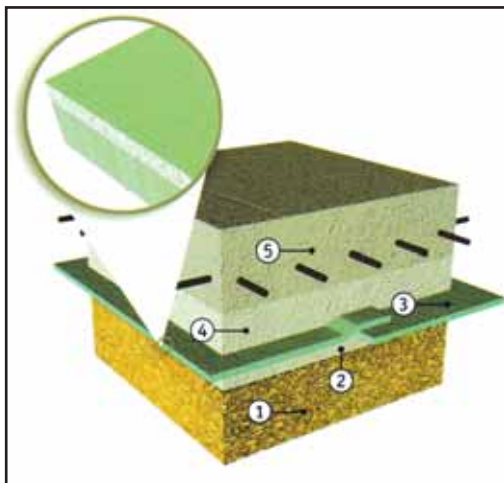
* Frequently tested at our facility during quality assurance

Alderprufe Bentonite GCL

Examples of interface shear values between different geosynthetics and soil. The indicated approximate values result from over 15 years of project experience. The specific design values must be determined on a project by project basis and follow as close as possible on-site conditions.

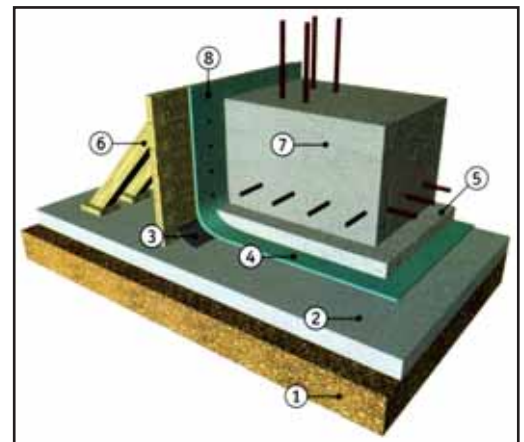
	needle punched nonwoven, e.g. Secutex	thermally fused nonwoven from special Secudrän	Carbofol® smooth	Carbofol® Orgakron	Carbofol® Karo Noppe	Carbofol® Megakron	Sand 0/2 mm	Gravel 8/16 mm	Mixed grained top soil
GCL cover nonwoven	19°	25°	11°	18°	25°	30°	29°	32°	26°
GCL nonwoven impregnated with bentonite	18°	22°	10°	15°	22°	25°	28°	30°	25°
GCL Thermal Lock carrier nonwoven	27°	-	11°	17°	22°	27°	27°	30°	-
GCL Thermal Lock carrier woven	28°	-	11°	17°	20°	25°	26°	28°	-

GCL with a peel strength of 60N / 10 cm achieves at confining stress of 80kN/m² (24 h prehydrated under 80 kN/m²) an internal shear stress of approx. 70kN/m², with a peel strength of 100N/10 cm even approx. 80kN/m²



Sealing of reinforced concrete floor slabs

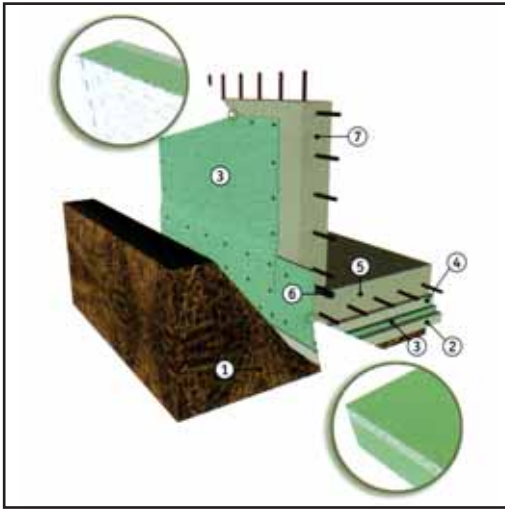
- 1.) Compacted and level subsoil.
- 2.) Optional lean concrete blinding layer, thickness variable from 40 to 60 mm, as an alternative to lean concrete a sand or gravel layer may be used.
- 3.) **Alderprufe® Bentonite GCL 5000.**
- 4.) Optional lean concrete top-blinding protection layer, thickness variable from 40 to 60 mm, useful as a surface site traffic.
- 5.) Reinforced concrete base slab.



Installation against a shutter

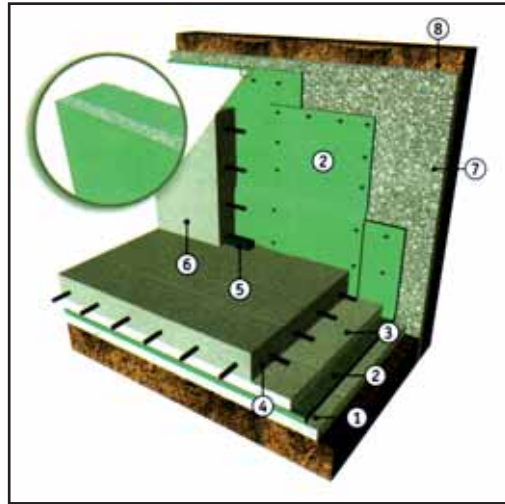
- 1.) Compacted and level subsoil.
- 2.) Optional lean concrete blinding layer, thickness variable from 40 to 60 mm, as an alternative to lean concrete a sand or gravel layer may be used.
- 3.) Sodium bentonite or approved fillet.
- 4.) **Alderprufe® Bentonite GCL 5000.**
- 5.) Optional concrete blinding protection layer.
- 6.) Shuttering.
- 7.) Reinforced concrete slab.
- 8.) Nails.

Geosynthetic Clay Liners



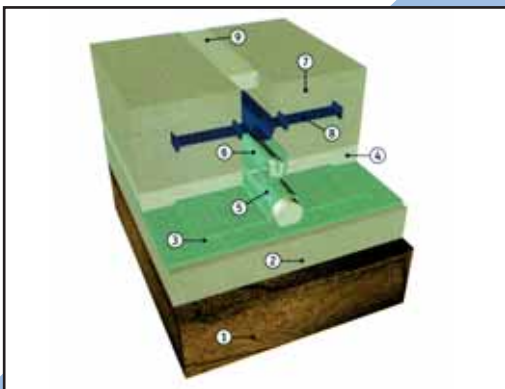
Installation on vertical walls

- 1.) Compacted and level subsoil.
- 2.) Optional lean concrete blinding layer, thickness variable from 40 to 60 mm, as an alternative to lean concrete a sand or gravel layer may be used.
- 3.) **Alderprufe® Bentonite GCL 5000.**
- 4.) Optional concrete protection layer, for load distribution and support of the reinforcement in a thickness, variable from 40 to 60 mm, useful to facilitate site traffic.
- 5.) Reinforced concrete base.
- 6.) **Alderprufe** waterstop.
- 7.) Vertical wall.



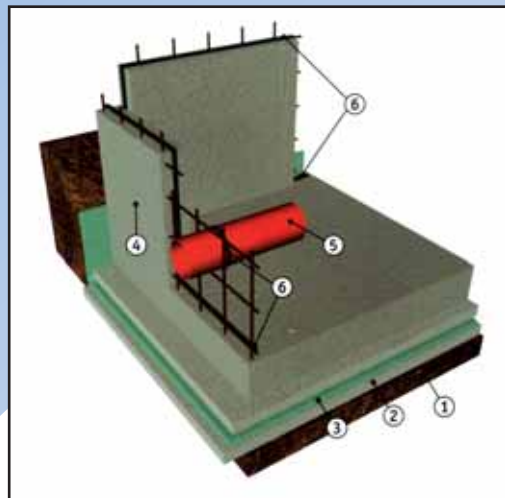
Sealing of vertical walls against retaining structures

- 1.) Optional lean concrete blinding layer.
- 2.) **Alderprufe® Bentonite GCL 5000.**
- 3.) Optional concrete protection layer.
- 4.) Reinforced slab.
- 5.) **Alderprufe** waterstop.
- 6.) Concrete wall.
- 7.) Soil.
- 8.) Retaining structure e.g. shotcrete



Making of a horizontal expansion joint

- 1.) Soil.
- 2.) Optional lean concrete blinding, on which **Alderprufe® Bentonite GCL 5000** is laid.
- 3.) Double-layered **Alderprufe® Bentonite GCL 5000.**
- 4.) Optional concrete layer for protection of **Alderprufe® Bentonite GCL 5000.**
- 5.) **Alderprufe® Bentonite GCL 5000**, which has been put up and protrudes into the joint area.
- 6.) Strip of **Alderprufe® Bentonite GCL 5000.**
- 7.) Base plate/ foundation plate.
- 8.) Waterbar.
- 7.) Polystyrene



Alderprufe waterstop

- 1.) Soil.
- 2.) Optional lean concrete blinding layer.
- 3.) **Alderprufe® Bentonite GCL 5000.**
- 4.) Concrete wall.
- 5.) Penetration.
- 6.) **Alderprufe** waterstop