

Application of EUROBENT CS

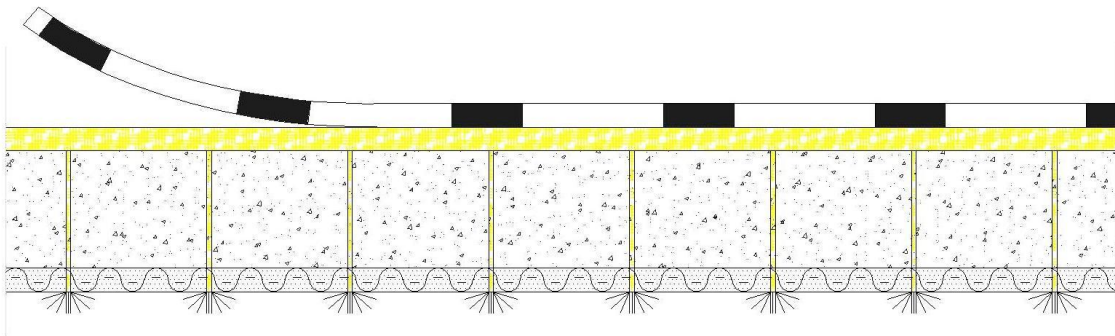
Eurobent CS is a double waterproofing geosynthetic clay liner material composed of two waterproofing materials:

- Bentonite mat (GCL),
- PE geomembrane 0.2 mm – 2.0 mm thick.

These two materials are connected by gluing procedure, which produces one homogeneous material.

Upon request, the PE geomembrane may be glued to a woven or nonwoven geotextile.

As required by the customer, a free 30 cm non-glued margin for hot air welding.



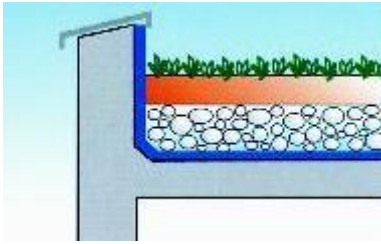
The self-healing properties of the bentonite secure the integrity of the system in case of the geosynthetic barriers damage.

Additional advantages of EUROBENT CS:

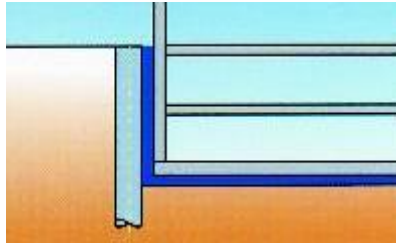
- Upgraded mechanical parameters,
- Extremely tough
- Double lining system
- Self healing properties
- Puncture resistance
- Environment safety

Typical usage of EUROBENT CS

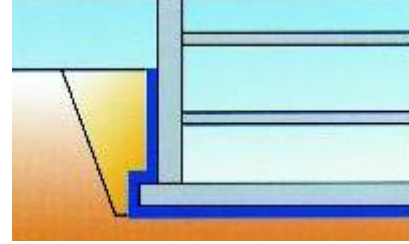
Flat roofs



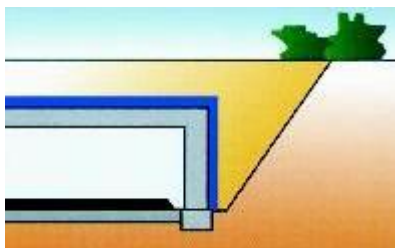
Concrete piles



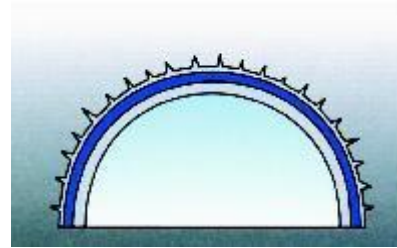
Foundations



Cut-and-cover tunnel construction



Tunnels (inner lining)



EUROBENT CS is most widely used in ground and underground structures, where it protects against pressure water.

EUROBENT CS Placement

- 1) **Before placing EUROBENT CS bentonite mats, make sure of the following:**
 - a) Water ingress to the installation site is prevented (ground water rise).
 - b) The installation may only take place during dry weather conditions; in rainy weather, remove water from the waterproofed surface.
 - c) Dry and flat place for sheet preparation near the site of installation.
 - d) Free bentonite mat end behind the construction joint of the previous bay at least 300 mm wide, i.e. without reinforcement for joining the bentonite mat sheets of the next waterproofing bay. At the expansion joint, overlap the bentonite mat 600 mm over the joint on the prepared subgrade.

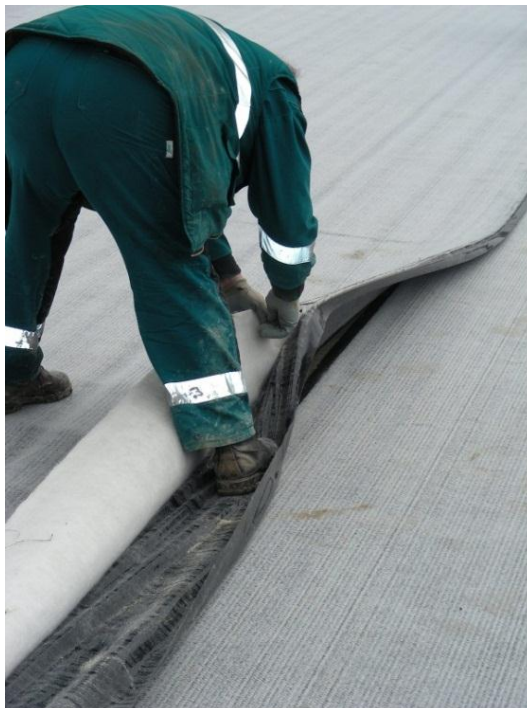


e) Prevent bentonite washing away from the mat by prolonged exposure to free flowing water, for example from a hose when ground water is extracted.

f) When people come to do the follow-up work on the accepted partially waterproofed surface, provide for heavy movement of people at the site and protect the bentonite mat against treading with bearing plates, where necessary. The area to be covered must be assessed on site, usually 6 to 10 m².

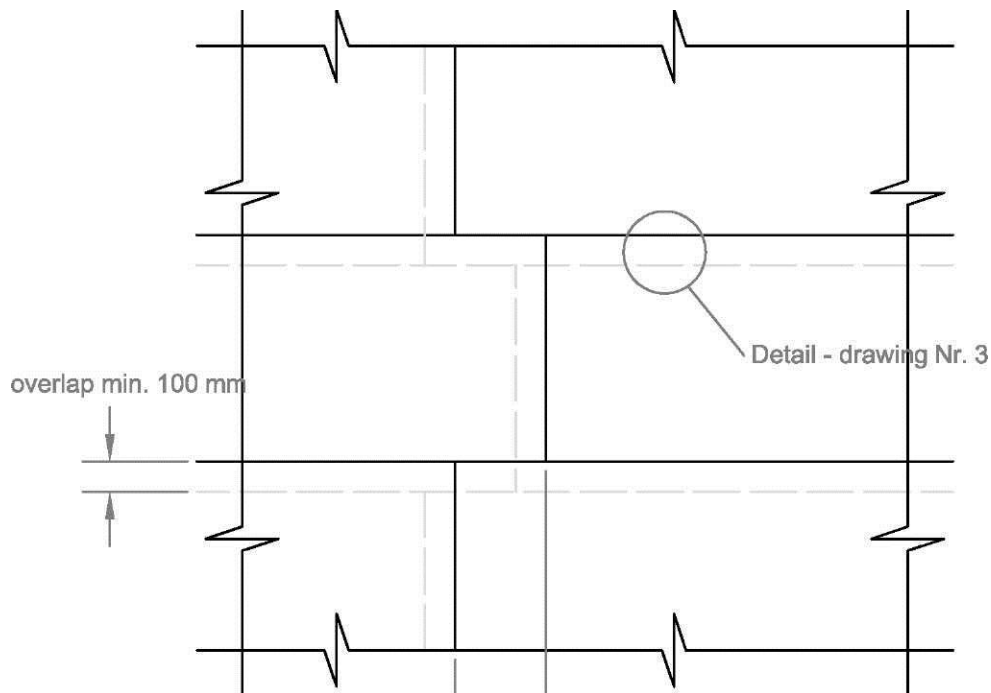
2) Mat installation – horizontal surface

a) Bentonite mats are placed with the nonwoven (white) geotextile facing to the concrete construction and the PEHD geomembrane facing to the concrete base (outside).



Stagger the mats with mat overlap of at least 100 mm in both directions

b) Join the horizontal waterproofing mats as follows:



- Welding of PEHD foil strips min. 0.5 mm thick

Weld the bottom PEHD geomembrane over the width of at least 30 mm (single weld – shorter uneven sections and poorly accessible places), or 50 mm (double weld – long, even sections).

Welding is possible at geomembrane and ambient temperatures above 0°C on the provision of preheating during welding. PE foil welding must be according to applicable standards.

Subsequently, the bentonite mat is placed with each mat overlap of at least 100 mm. Bentonite mat edges are filled with bentonite powder to the width of 100 mm, and welded together to avoid bentonite mix leaking between the bentonite mat layers during foundation plate concreting.

- Overlapping and/or self-adhesive tape sticking foil thickness 0.2 mm

Each bentonite mat sheet overlap is at least 100 mm. The bottom PEHD geomembrane is join with a self-adhesive tape. Then the bentonite mats are folded and bentonite mat edges filled with bentonite powder to the 100 mm width and welded together to avoid bentonite mix leaking between the bentonite mat layers during foundation plate concreting.



c) The horizontal membrane transition to vertical membrane is made by inserting the PEHD membrane and the bentonite mat into the external foundation plate formwork built on the concrete base (or bracing wall). The upper mat edge is anchored with gunned-in clips to avoid mat deflection from the formwork (brace). After the foundation plate formwork removal, the bentonite mat is firmly fixed in the foundation plate concrete, and thus protected against slipping down and subsequent damage by the site traffic.

The waterproofed area size will be chosen depending on the steelwork procedure on the site to be able to proceed to plate reinforcing after the EUROBENT CS mat placement. The side part of the mat must have a free, not reinforced edge of at least 300 mm (working surface) for joining the next construction bay. This overlap must be protected by covering to avoid bentonite treading out of the mat or other damage by movement of people (access to the site and installation paths for steelworks). When additional material is placed on the previously installed waterproofing, concentrated load should be distributed over a larger area to avoid damage to the bentonite mat.

d) The bentonite mat installation will start according to the construction work schedule with a follow-up to the subsequent works as agreed with the site management. All details such as cutout, tension pile and leading heads will be finished during the installation.

e) Continuous, permanent water level is allowed on the installed waterproofing protected against mechanical damage (reinforcement). The mat design is resistant to the exposure to water.

f) It is not necessary to anchor the EUROBENT CS bentonite mats to the subgrade when installed on a horizontal surface.

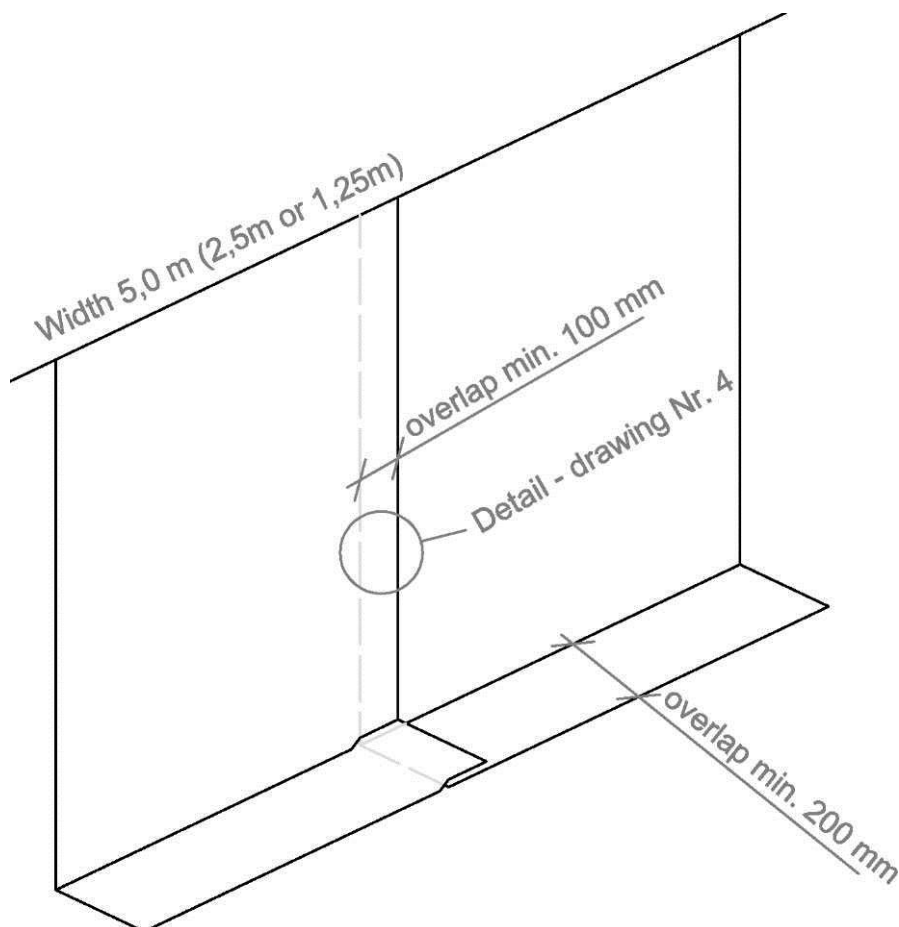
3. Mat installation - vertical surface

a) The bentonite mats are placed with the nonwoven (white) geotextile facing to the concrete construction and the PEHD geomembrane facing to the backfilling (outside) and are anchored to the vertical structure with $\varnothing 6$ mm strutting rivets with a 3 mm crown plate. The anchors are only placed on the upper mat edge with spacing depending on the mat length (1 rivet per 4 m²; Example: mat length 4 m, width 5 m = 5 rivets).

b) Join the vertical waterproofing mats as follows:

- Welding of PEHD foil strips min. 0.5 mm thick

Join the EUROBENT CS sheets in the same way as waterproofing on the horizontal surface, but in the reverse order. First, connect the bentonite mat – stagger the bentonite mat edges with at least 100 mm overlap, apply bentonite paste to the joint of at least 50 mm and weld using hot air. Then cover with the PEHD foil and weld using hot air.



- Overlapping and/or self-adhesive tape sticking, foil thickness 0.2 mm

Join the EUROBENT CS sheets in the same way as waterproofing on the horizontal surface, but in the reverse order. First, connect the bentonite mat – stagger the bentonite mat edges with at least 100 mm overlap, apply bentonite paste to the joint of at least 50 mm and weld using hot air. Then cover with the top PEHD geomembrane and joint with a self-adhesive tape.

c) Vertical EUROBENT CS waterproofing installed on the previously built wall must be protected against damage during backfilling using protective geotextile with specific gravity of 1000 g/m², or using extruded polystyrene, where thermal insulation is designed. The backfilling material must be fine grained and easily compacted with the greatest grain size of 30 mm. The backfilling material must be compacted layer by layer 30 to 50 cm thick to provide a uniform pressure on EUROBENT CS. Where waterproofing is installed on the bracing wall, the minimum protective geotextile specific gravity is 500 g/m². The protective geotextile is placed directly on the timber or shotcrete.

d) The mats are usually fixed on the timber over the floor height to get the overlap over the future raised ceiling upper edge of at least 300 mm.

e) The mats are installed on the vertical wall (open cut) in parts (bays) due to the wall and backfill height. Each working part (bay) should be protected against water ingress under the waterproofing when concrete is cured with water or when it rains.

