EDILMODULO XP
INSTALLATION GUIDELINES

Handling and Storage

Edilmodulo XP – size "L" & "M"

When the material arrives, the unloading and storing operations must be carried out with due care by using suitable equipment, as described below.

Lift each roll by inserting a steel tube (approx. 3" in diameter and 550 cm in length minimum) through the cardboard core. Belts of a suitable length for lifting must then be attached to the ends of the steel tube. On request, rolls can be supplied complete with lifting belts, which are attached to the rolls when they are packed at the end of the production process. The lifting equipment must be able to take the weight of a single roll. To prevent damage to the barrier, the prongs of a fork-lift truck must not be inserted directly underneath the roll to lift it.

Belts for unloading are supplied by manufacturer with rolls and shall be used for unloading.

The rolls must be stored in a clean, dry, covered area. As contact with the ground must be avoided, the rolls can be stored on wooden pallets. Ensure that the rolls rest evenly on the support. If a covered storage area is not available, a polyethylene sheet must be used to provide additional cover.

All unloading and storing operations must ensure the complete integrity of the bentonite barrier until the time of installation.

Edilmodulo XP - size "S"

The material is packed on 110 x 110 cm pallets. Each pallet holds 20 rolls (giving a total surface area of 110 sq.m.) which are packed individually and covered with a protective polyethylene "hood".

Equipment suitable for handling materials packed on pallets must be used for the unloading operations. The rolls must be stored in a clean, dry and covered area to ensure the integrity of each roll.

If only part of the material from a pallet is used, the unused rolls must be kept in a clean, dry and covered area. Ensure that the rolls are covered with a polyethylene sheet, which will act as a substitution for the protective hood that has been removed.

Preparation of the Installation area

Foundation

For horizontal installation, a layer of concrete (poor concrete layer) should usually be cast to make a smooth base on which to lay down the clay geosynthetic barrier. The thickness of the lean concrete will be decided at the project stage on the basis of the load-bearing capacity of the foundation ground and on the surrounding hydro-geological conditions. However, it must not be less than 10 cm at all points.

The base of the installation must also be free from bumps and local depressions and it must be as even and smooth as possible. Any depressions in the lean concrete must be eliminated with non-contracting mortar.

The installation base must be dry and the local accumulation of water and/or ice must be pre-vented. In particular, where a well-point system is used, the water table level must be kept below the installation base until the foundation has been cast in order to ensure that the clay geosynthetic barrier is activated within an adequately confinement pressure.

If it is installed directly onto the ground (this is not recommended), the surface must

be compacted with a compacting force of 85% (in accordance with the Proctor Modified test). The ground must be cleared of any protuberances such as roots, sharp stones, etc.. All holes and cracks in the ground must be filled in and compacted. Before and during GCL installation, the ground must be kept stable, smooth and perfectly dry.

Foundations composed of very porous, gravelly ground, or ground with local rock formations that could pierce and damage the sheet, must be avoided.

Foundation wall

If the vertical foundation wall is to be waterproofed (waterproofing after casting), all protuberances must be removed. Any depressions must be levelled off with fibre-reinforced grout.

The caisson blades must be removed, taking care that nothing is left protruding from the installation floor. It is advisable to seal the space left by the caisson blades with fibre-reinforced mortar.

Similarly, any gravel nests in the cast floor of the foundation wall must be levelled off with non-contracting, fibre-reinforced mortar.

At the right angle between the foundation wall and the foundation bed scarp, it is advisable to make a grout “shell” which will provide a suitable support surface for joining the vertical and horizontal parts of the sheet at the laying stage. Alternatively, loose natural sodium bentonite in granules can be used at the right angle.

Diaphragm walls

If the material is to be installed vertically against concrete diaphragms (waterproofing before casting), the installation floor must be prepared and it must be free from bumps and depressions. All protruding objects must be removed. Depressions must be levelled off with anti-contracting, fibre-reinforced mortar.

The vertical joints between the diaphragm baffles must be sealed with quick-setting mortar.

The tops of the tension bars must be treated with water-expanding mastic and enclosed in suitably cut and shaped Edilmodulo XP elements.

GBR-C installation

When transporting the rolls of barrier to the installation point, they must be kept intact in accordance with the methods described in section 1. The rolls must not be dragged from the storage area to the installation point.

Horizontal installation

For horizontal installation, the rolls must be laid with the polypropylene woven geotextile (black) face downwards, in direct contact with the poor concrete layer; the polypropylene non-woven geotextile (white) must be face upwards and therefore visible. The sheets must be spread evenly over the concrete, but stretching caused by the excessive speed of the mechanical laying machine, must be avoided. Similarly, the barrier must be spread out correctly to avoid the creation of folds. As explained above, the installation floor must be even and completely free from bumps and local accumulations of water. Ice must also be removed before the barrier can be installed.

The sheet must adhere to the bed caisson and overlap it by approximately 20 cm. A rivet gun can be used to secure the sheet to the caisson. It is advisable to protect the end of the bentonite barrier (the bed caisson overlap) temporarily with a polyethylene sheet. After the bed has been cast, the polyethylene sheet must be held in position until the bed caisson has been removed and the overlap has been attached to the foundation scarp for connection to the vertical wall waterproofing.

Vertical installation

For post-casting, vertical installations, the rolls must be laid from the top to the bottom with the polyester geotextile (white) against the vertical structure to be protected (foundation wall); the geotextile polypropylene fabric (black) must be facing outwards and therefore visible. The black geotextile will therefore be in contact with the earth when the area is filled in.

For vertical installations, the barrier must be attached directly to the concrete structure

by means of wide-head steel rivets with a washer (minimum diameter 50 mm) inserted between the rivet head and the barrier. Attachment must guarantee overall close contact between the barrier and the concrete structure to be protected. The sheet must be attached:

- at the beginning of the roll at the top by means of wide-head rivets together with metal straps or strips of wood;
- along the vertical overlaps by means of rivets with not more than 50 cm between them.

Overlaps

When installing the Edilmodulo XP-L and XP-M, the following minimum overlaps between adjoining sheets must be guaranteed:

- minimum of 20 cm for lengthwise overlaps (overlaps in the direction the sheet is unrolled);
- minimum of 40 cm for crosswise overlaps (the ends of two rolls, i.e. at the short edges of the rolls).

When installing the Edilmodulo XP-S, the following minimum overlaps between adjoining sheets must be guaranteed:

- minimum of 10 cm for lengthwise overlaps (overlaps in the direction the sheet is unrolled); by the way 20 cm is recommended;
- minimum of 20 cm for crosswise overlaps (the ends of two rolls, i.e. at the short edges of the rolls).

The overlaps must be free from earth or any other extraneous matter. For foundation bed installations, a rivet gun can be used to ensure even and uninterrupted contact between the two over-lapping sheets and to prevent the infiltration of concrete during the protection layer casting stage.

The lengthwise and crosswise overlaps must always be made in the same direction (one direction for the lengthwise overlaps and one for the crosswise overlaps) and this must never be re-versed.

If the climate in the area of installation is characterised by high temperatures, it is advisable to increase the overlaps in both directions by about 50%; this will compensate for any shrinkage if the bentonite inside the barrier dries, which could lead to a slight shortening of the sheets.

Protection layer

For horizontal installations, it is recommended to protect the barrier by an even layer of concrete (poor concrete) cast at the end of the working day or in accordance with designer instructions. This will prevent the barrier from being activated prematurely and, in particular, it will prevent the bentonite from swelling freely, which could hamper the correct operation of the waterproofing system. For greater compatibility with the foundation structure, the class of concrete used for the protection layer should be of the same strength as that used for the foundation.

The layer should never be less than 5 cm thick all over; the recommended thickness is, however, 8-10 cm. The protection layer must be cast at the overlap in such a way as to avoid the infiltration of concrete between the two edges of the overlapping sheets.

The area of the sheet that is not covered by the concrete protection layer (and this area must be the point at which installation work begins the following day), must be adequately protected with a polyethylene sheet. This is a temporary protection and it must be removed when the barrier installation work starts again.

In order to ensure the correct hydration and operation of the clay geosynthetic barrier, it must not be laid directly onto water or when weather conditions are unfavorable. If it rains while the barrier is being installed and before the protection layer has been cast, a polyethylene sheet must be spread over the barrier to protect it. However, even if interruptions are temporary, the casting of the concrete protection layer (for horizontal installations) or filling in with earth (for vertical

installations) must be carried out as soon as possible.

Accidental damages repair

If the barrier is accidentally damaged during installation, the damaged section must be re-moved and barrier continuity restored.

For horizontal installations, an extra piece can be used to cover the torn section, ensuring a minimum overlap of 50 cm in all directions.

If there is damage to a vertical installation, it is in any case advisable to replace the torn section of the sheet.

Barrier Pre-hydration

If the water table at the installation area has a high salt content, or if it contains particularly aggressive substances, it is generally necessary to pre-hydrate the barrier with soft water. This operation must be carried out immediately before casting the concrete protection layer for horizontal applications, and before filling in vertical installations with earth. However, if the water contains high levels of aggressive substances, it is advisable to contact Laviosa's R&D laboratory for an analysis of the water and its interaction with the bentonite in the barrier.