Instruction guide for the installation of CBS silage clamp retaining walls

Step 1 - Foundation

It is important to get a good understanding of the stability of the soil before commencing the ground works. In the first instance contact CBS for the calculation notes of the required elements. This guide assumes that the consulting civil engineers or contractors on site have made this assessment.

Step 2 – Application of the blinding layer

To prepare the area for the arrival of your walls, you will need to remove the topsoil layer and prepare a compacted frost proof sub base layer following the instructions given to you by your consulting civil engineer and taking in to account the CBS calculation notes. Make sure that the sub base layer finish is as smooth as possible thus preventing penetration of the impermeable geotextile (HDPE) liner that is placed on top of this base layer.

Step 3 – Geotextile impermeable liner (HDPE)

In between the bottom base layer and the top base layer, it is recommended that a welded impermeable geotextile liner (HDPE) is to be installed. This liner has to extend the bottom base layer allowing installation of drainage pipes and a return of the liner to both ends of the foot of the element. CBS can provide you the correct dimensions for every pre cast concrete retaining wall element.
Step 4 – Application of the sand/cement layer

On top of the HDPE liner a 10cm thickness layer of compacted stabilised sand with a minimum cement ratio of 150 kg/m³ is to be applied. This layer should extend to a minimum of 20 cm width of the base of the element in each direction. When installing the 10cm layer of compacted stabilised sand with a minimum cement ratio of 150 kg/m³ it is important to use only CEM I or CEM II cement (in accordance to the BS EN 197-1:2011). CBS do not recommend the use of CEM III or higher as we know that the buildup of the strength is not fast enough. It is recommended that this layer is finished as smooth as possible.
**Step 5 – lifting operations**

If CBS are lifting the walls into final position for your site, we will require the foundation for the walls to be ready in entirety. All loads will be delivered on articulated lorries (28T – 16.5m long). The client is responsible for ensuring access for CBS deliveries.

CBS will supply you with a lift plan/method statement and risk assessment for the delivery and installation of your walls. Our experienced installation team can expect to install up to 100m of CBS walls per day. We commonly lift the units with a hydraulic manipulator from the back of the lorry itself. The L and T walls commonly exclude any lifting anchors. If the lifting anchors are required please make this clear at point of order.

**Step 6 – the jointing system**

When installing the elements allow a 1cm gap between each element. The plastic positioning slat can provide the required gap needed between elements when it is installed in to the groove-groove connection detail.

It is recommended that within the groove of the joint detail a thin layer of Sika sealant is applied. Following this apply the plastic positioning slat in to the groove. At either side of the Plastic positioning slat apply the supplied foam strip. At either side of the foam strips apply the Sikaflex TS plus sealant after having the surface primed. Once the retaining wall elements are in place, please see below. Once the elements have been installed there will be a free 1cm gap between the bases of the elements, it is recommended that this gap is filled in with a hot bitumen sealant.
**Step 7 – Precautionary measures**

Once the retaining walls have been installed it is recommended that a preventative measures are taken to protect the local environment from contamination in the event of any escaping leachate. This is the responsibility of your contractors and consulting civil engineers to design the most appropriate solution for your specific project.

One recommended potential solution is to install an 80mm diameter drainage tube at each side of the stabilised sand base and on top of the impermeable geotextile liner, with fast draining gravel placed on top to allow any effluent to drain through. It is recommended that the drainage channel has a longitudinal fall to allow sufficient drainage.

**Step 8 – Silage clamp base**

When installing the HRA (Hot Rolled Asphalt) base it is important, and the responsibility of your contractor that the asphalt base complies with all SAFFO regulations and can withstand the aggressive nature of the environment. It is recommended that a shutter with a thickness of 1cm is placed between the retaining wall element and the HRA base. Once the HRA has set the shutter should be removed, in turn leaving a 1cm gap between the HRA and the retaining wall element. To form a good connection it is recommended this gap is filled with hot bitumen sealant.
Step 9 – Impermeable geotextile liner (HDPE)

It is recommended that the HDPE liner should be attached and sealed to the rear of the retaining wall at a height of 50cm from the base. This will act as an extra defense against the escape of Leachate from the silage clamp.
**Step 10 – protecting your new silo**

CBS concrete products retaining walls meet with the most severe demands in aggressive chemical environments. Despite this CBS cannot guarantee that the concrete design is able withstand all chemical attacks as the exposure class XA3 has its limits.

In conditions where the concrete walls are exposed to chemical aggression (maize, grass, sugar-beet) extra protective measure are to be taken. One of the best protective measures is an Epoxy resin coating, combined with a plastic covering system that covers the toe (20cm) of the wall and the entire vertical wall.

A minimum dry matter content for maize of 33% must be observed due to the aggressive behavior of the leachate. Our calculations are made with a maximum silage angle of 28° above the top of the silo and a density of maximum 830kg/m³. For every type of wall, there is a maximum axle load to take into consideration, for more information on maximum axle loads please contact the CBS technical department.

CBS will supply a 10 year warranty subject to the above conditions being observed.