

## **PERMAVOID INSTALLATION SPECIFICATION**

### **EXCAVATION AND PREPARATION**

**Excavation:** The excavation must provide a minimum of 500mm clear zone on all sides of the plan dimensions of the tank to allow working space for the installation. If required, suitable protection and earthwork support must be provided beyond the clear zone to all excavated faces.

**Base:** To be trimmed smooth and free from sharp objects and projections to provide an even formation that shall be free from undulations.

**Tolerance:** The formation shall be graded to achieve a maximum deviation of 5mm in 3.0m in any direction to prevent formation of voids below installation which will cause Permavoid units to 'rock'. A blinding layer may be used to achieve required tolerances.

**Blinding:** If required; A 50mm thick blinding layer of 20/6 clean crushed stone to BS EN13242:2002 shall be used to achieve a suitable bedding surface.

### **ENCAPSULATION TO UNITS**

**Membrane for Attenuation:** Waterproof geomembranes, where used, to be suitable for waterproofing to structures and for water containment. To be robust flexible impermeable membrane with high resistance to puncture and elongation. To be single layer cold applied and capable of being welded. To be nominal 1mm thick laid with minimum 120mm laps and welded seams.

Reference: **Permavoid Geomembrane**

**Installation:** To be carried out by a suitably qualified installer, under a strict on site CQA protocol in accordance with manufacturers recommendations. Proprietary membrane dispensers are recommended for handling and distribution of membrane. Adjacent sheets are to be joined using twin-wedge welder apparatus, wherever practicable. Corners to be formed into folded welts sealed using hot air-gun welding apparatus. All joints are to be tested in accordance with CQA Plan using appropriate air-testing method. Protect works from other site trades to prevent occurrence of puncture. Ensure membrane is dry, clean and free from debris before installing Permavoid.

**Protection:** Permatex Protection geotextile should be installed to the outside face of the base, top and sides of the installation as a protection layer to Geomembrane.

Reference: **Permatex® Geotextile**

**Installation:** Adjacent sheets to be lap jointed with a minimum lap of 300mm or to lap marker or heat sealed. Corners to be formed into folded welts and heat sealed if required. Ensure geotextile is clean and free from debris. Trafficking over placed material to be avoided.

**Geotextile for Infiltration:** Permafilter® SUDS heavy duty geotextile, non-woven needle-punched with specific oil treatment properties should be used. The geotextile should be laid with minimum 300mm overlaps or to lap marker and to be applied to all external surfaces of Permavoid drainage units.

Reference: **Permafilter® Geotextile**

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Roll size 2.4m wide x 100m long. Thickness/gauge: 300g/m<sup>2</sup>

**Installation:** Adjacent sheets to be lap jointed with a minimum lap of 300mm or heat sealed. Corners to be formed into folded welts and heat sealed if required. Ensure geotextile is clean and free from debris before installing Permavoid. Trafficking over laid material to be kept to a minimum.

### **INSTALLATION OF PERMAVOID**

Reference: **Permavoid unit**

### **DELIVERY AND STORAGE**

**Delivery:** Permavoid will be delivered to site on pallets. Palletised load measurements are approx. 1.2m x 1.1m x 2.3m high and each pallet will contain 72nr Permavoid.

Pallet weight circa 220kg.

Deliveries shall be unloaded using mechanical handling equipment.

**Storage:** Position pallets on stable, even level ground. Stacking of pallets is not recommended. Store away from direct source of heat or ignition

Transit banding not to be removed until at point of installation

**Overview:** Permavoid is a pre-formed modular geocellular unit for sub-base replacement with nominal 95% volumetric void ratio and minimum 52% effective perforated surface area.

**Permatie:** Adjacent Permavoid units are connected using Permatie interlocking pins, which have integral creep resistance. Permaties must be inserted in to all available slots where units butt together up to a maximum of 5nr Permaties per Permavoid unit. The Permatie provides rigidity and minimises deflections.

**Anti-Shear Pin:** Multi-layered Permavoid tank configurations shall be fixed with proprietary anti-shear connectors between each layer interface to maintain rigidity and minimise lateral displacement. A minimum of four anti-shear connectors per square meter at layer interface is recommended.

**Laying:** Ensure membrane is clean and free from debris before laying Permavoid. Check installation plan / details to confirm Permavoid orientation. Commence laying in corner of installation area and work forwards in a diagonal line to the opposite corner until layer is complete. Repeat for further layers.

**Drainage Connections:** Proprietary drainage connections are available for where a drainage connection is required to the Permavoid installation. There are several different options available subject to type of tank encapsulation and whether the connection is at invert or centrally located. Contact Permavoid distributor for full details and availability.

Installation to be carried out by suitably qualified installer, under a strict on site CQA protocol and manufacturers recommendations.

Trafficking over laid material to be avoided.

## **PIPES, DUCTS, CONNECTIONS**

**Attenuation applications:** Where required, all penetrations through an impermeable encapsulation shall be sealed. Create an impermeable seal using a rigid aproned spigot tank adaptor. Contact Permavoid distributor for full details and availability. The adaptors comprise a rigid body and spigot with a flexible outer membrane manufactured from compatible material to the geomembrane encapsulating the tank. Adaptors are available as invert or standard type and come in a range of diameters. The adaptors are fully welded to the main tank encapsulation.

**Infiltration applications:** To create drainage connections use a rigid spigot saddle adaptor, Contact Permavoid distributor for full details and availability. The adaptors comprise a rigid body and spigot. The rigid body is shaped to fit over the top and base of the Permavoid installation and is held in position using a securing pin. To complete the installation, the geotextile within the spigot aperture should cut and removed. The adaptors are available as invert type and come in a range of diameters and depths. Further supplementary drainage connections are available for infiltration applications to accommodate high flows and large pipe diameters. Information available on request.

## **DEPOSITION OF COVER MATERIAL**

**Pavement Construction Guidance:** Please find below information and recommendations with regard to temporary loads and construction methods relating to the permavoid attenuation units when installed within in the car park and access roads.

The Permavoid tanks shall be backfilled with an initial layer minimum 50mm thick of 20/6 clean crushed stone to BS EN13242:2002.

The preferred method of aggregate placement is for the plant to be situated on top of a minimum of 300mm thick aggregate layer. Recommended plant to be used for placement of the aggregate to be tracked machine with a maximum operating bearing pressure of 200kN/m<sup>2</sup>. Wheeled machines to have low bearing pressure tyres (maximum permitted pressure 30psi), maximum tread/cleat projection 15mm.

Under no circumstances should plant operate in direct contact with the permavoid units.

Compaction of the initial layer should be in accordance with the DOT Specification for Highway Works. Compaction to be carried out with non-vibrating roller.

Following compaction, the required tarmac formation level should be obtained by trimming the compacted layer and the surface made smooth with the equivalent roller without vibration or using a plate compactor.

Delivery wagons and other site vehicles should be prevented from trafficking the attenuation tanks. Once covered with an aggregate layer, it is recommended that physical barriers are used to prevent drivers using their own judgement on access routes.

Loading of the asphalt laying plant hopper must not take place on the Permavoid units as

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impact loading during tipping is indeterminable and this operation should therefore be undertaken on the traditional sub base construction away from the attenuation tanks.

As a guide to the selection of suitable asphalt laying equipment, a 300mm deep permavoid system will deflect 1mm per 77kN per square metre applied pressure. This relationship remains in the short term elastic zone with deflections up to 10mm, therefore equating to a maximum fully recoverable short term pressure of 770kN per square metre.

During machine laying operations on the attenuation tanks, movements of equipment must be restricted to straight lines as much as practicably possible. Slewing, braking, excessive traction forces and ruts should be avoided.

When installing the granular layer and finished surfacing adjacent to Permachannel, it is recommended that a protection board or geotextile protection layer is placed over the Permachannel prior to installation and remains in place until the pavement construction is completed.