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## Attenuation Installation Procedure

This document is to be provided to the contractor (or sub-contractor) to ensure the correct methods and procedures are followed to ensure a successful installation and through life performance of the selected Attenuation System.

### 2. Excavation and Ground Preparation

- 2.1 Excavate the trench / tank to the dimensions as detailed in the engineers drawing allowing for an additional 1000mm around the perimeter of the excavation for working space.
- 2.2 Remove any large objects and treat relevant soft spots.
- 2.3 Ensure that the slopes of the excavation are suitably protected with trench sheets or are battered in accordance with current health and safety guidelines.
- 2.4 Place Mot Type 1 granular material to engineers specification, rolled and compacted ensuring there are no sharp objects protruding from the surface. (Note for attenuation tanks only, for soakaways use 20mm single sized stone instead of Mot Type 1).
- 2.5 Mark out the dimensions of the tank using spray paint or stakes.
- 2.6 Any standing surface water must be pumped out of the excavation prior to installation commencement.



### 3. System Installation General

- 3.1 Materials may be delivered up to 1 week prior to installation commencement, therefore adequate provision must be made for mechanical off loading and storage in close proximity to the tank location.
- 3.2 The inlet / outlet pipes and vent pipes must be provided by the contractor.
- 3.3 The pipes must be a minimum of 50mm above ground level and 200mm from any corner. The pipes should be parallel and 90 deg to the box walls to ensure successful sealing to the tank.
- 3.4 The shoebox should not be installed in weather conditions that adversely affect the impermeable membrane's performance weldability, impermeability and working tolerances. The system should not be installed if there is continuous heavy rain, snow, heavy frost or high winds. Daily assessments should be made prior to commencement of installation.
- 3.5 No smoking permitted on or around the installation.
- 3.6 Only suitable footwear permitted on the geomembrane.
- 3.7 No vehicular traffic, plant or heavy equipment should be allowed directly upon the uncovered tank.

### Flowtex Protection Fleece

- 3.8 All seams to run vertically; no horizontal joints allowed on inclines greater than 30 deg or areas of high stress.
- 3.9 Overlaps to be a minimum of 100mm or as specified.
- 3.10 Geotextile to be placed across the base and side walls of the tank and battened on top of the excavation.
- 3.11 After the Shoebox and Attenuation units have been installed, the geotextile will cover the tank and envelop the tank.

### Attenuation Liner Installation

#### Option 1 - Prefabricated Shoebox

- 3.12 Lower the palletised Shoebox onto the protection fleece in the excavation. The shoebox will comprise a box, a sheet panel lid and some double sided mastic tape sufficient for taping the lid and sealing the pipe connections / top hats.
- 3.13 Open the shoebox after carefully removing all packing and position in the excavation.
- 3.14 Carefully place the attenuation units inside the shoebox.
- 3.15 Place the Attenuation units side by side inside the opened Shoebox.
- 3.16 Connect the units laterally with proprietary clips and shear connectors.



3.18 Only full units should be used.

3.19 Drainage pipes and vent pipes up to 150mm dia are connected to the units via pre-formed inlet knockout points within the units.

3.20 Make pipe connections as necessary, including the air vent. Top hats should ideally be installed from the inside of the shoebox using mastic tape, and the top hat should be fixed to the inlet / outlet pipe using a jubilee clip or double sided mastic tape.



3.21 Once all the units are installed the top panel sheet of the shoebox should be taped onto the top of the shoebox and then the protection fleece placed on top.

## Option 2 - Lid and Base

3.22 Lower the palletised Lid and Base onto the protection fleece in the excavation. The lid and base comprises a large base panel sufficient to line the base and sides of the tank, and a little bit onto the top of the tank, plus a sheet panel lid, double sided mastic tape sufficient for taping the lid, corners, and sealing the pipe connections / top hats.

3.23 Open the base panel after carefully removing all packing and position in the excavation, ensuring there is enough geomembrane to extend up the sides of the tank and slightly onto the top.

3.24 Carefully place the attenuation units onto the base panel (following the procedure 3.15), pull the geomembrane up the sides of the tank, create 'bedsheet folds' to the corners and tape into position.

3.25 Make pipe connections as necessary, including the air vent. Top hats should ideally be installed from the inside of the shoe box using mastic tape, and the top hat should be fixed to the inlet / outlet pipe using a jubilee clip or double sided mastic tape.

3.26 Once all the units are installed the top panel sheet of the shoebox should be taped onto the top of the tank and then the protection fleece placed on top.

## 4. Backfilling Operation

The backfilling operation should be carried out with great care and attention. It is vital that the correct material is selected for backfilling around and above the attenuation tanks.



4.14 For non trafficked areas, reasonable quality as dug material is acceptable. This material however should be approved by the engineer and must not be compacted with mechanical equipment.

4.15 For areas that are to be subjected to vehicular traffic we recommend that granular material such as a capping layer and Mot Type 1 backfill material is used surrounding and covering the tank. The minimum depth of structural cover required is 500mm.

- 4.16 The Mot type 1 backfill should be compacted in layers not exceeding 150mm. Compaction of the first layer will be carried out with a vibrating plate compactor with a mass of between 1800kg/m<sup>2</sup> and 2100kg/m<sup>2</sup> for five passes.
- 4.17 The second 150mm layer shall be compacted with a vibrating plate compactor with a mass of between 1800kg/m<sup>2</sup> and 2100kg/m<sup>2</sup> for 8 passes.
- 4.18 Subsequent layers of 150mm cover shall be compacted with a vibratory roller with a mass of between 1300kg/m<sup>2</sup> and 1800kg/m<sup>2</sup> for 8 passes.
- 4.6 Final surfacing options are Tarmac, Concrete, Block Paving, Landscaping etc. We must advise, however, that consideration should be given to the loading imposed by the tarmac laying machinery used, and if possible keep the machinery off the finished tank footprint.

### 5. Protection of Tank post installation

- 5.1 The Attenuation System is designed to withstand loadings from landscaping areas, car parks and service yards (subject to design criteria) however, after installation and backfilling, but prior to final surfacing, we suggest that the tank area is fenced off with high visibility fencing and traffic is prohibited from using the footprint area of the tank. These systems are not designed to provide a load platform for construction traffic and should be treated accordingly.
- 5.2 This action will protect the long term loading performance of the tanks structure.
- 5.3 The client may wish to provide sign posts indicating maximum loads allowable over the tank footprint, to ensure the long term stability of the system is assured.

**If you would like further assistance, please call the Stormwater Management engineering department on 01455 502 222.**