Polystorm
Modular Cell System

Performance Specification

July 2014

Polystorm Modular Cell System

SCOPE OF WORKS

The geo-cellular structural system shall be installed in accordance with:

- CIRIA report C697 (2007); The SUDS manual
- CIRIA report C698 (2007); Site handbook for the construction of SUDS
- CIRIA report C680 (2008); Structural design of modular geocellular drainage tanks
- CIRIA Report 156 (1996); Infiltration drainage – Manual of good practice.
- BS 6031:1981 Code of practice for Earthworks
- BS EN 752 (2008) Drain and sewer systems outside buildings
- The Local Regulations and requirements

A modular storm water attenuation/soakaway system for water management requirements in excess of 500mm below finished ground levels, consisting of Polypropylene structural geo-cellular units, shear connectors and clips, geo textile/membrane and associated connections shall be installed in accordance with this specification and the Engineers drawings and details.

ENGINEERED DESIGN REQUIREMENTS

Designs shall be based on sound structural and hydraulic calculations, undertaken by a suitability qualified engineer.

Permanent (Dead) loads (including lateral loads) from overlying fill to be based upon the construction drawings and the associated ground conditions and materials given in the site specific geotechnical report.

Transient (Live) loadings from vehicles and activities at the surface should be considered
Modular geo-cellular systems must be designed as structural components, using structural design theory in accordance with CIRIA Report C680.

All calculations shall be submitted to the overseeing Engineer prior to any works commencing.

Geo-cellular systems require a geotextile wrapping when used as an infiltration tank and a sealed geomembrane to create an attenuation storage tank.
Consideration should be given to the selection of appropriate geosynthetic, taking into account:

- System usage, retention (attenuation) or infiltration (soakaway)
- Site investigation to establish soil parameters to enable lateral earth pressures and water flow conditions to be determined.
- Determine soil retention requirements from soil parameters and establish if additional bed and surround measures are required.

- Determine geosynthetic permeability requirements and ensure that the porosity of the geotextile, in conjunction with the specified bed and surround is sufficient to prevent premature clogging of the geotextile.
- The geosynthetic should be robust enough to endure installation activities
- Durability requirements, ensure suitability if subjected to significant chemical exposure present in stormwater run-off or within the ground water.

Unless otherwise specified in the Project Specification the material, equipment and systems to be provided must conform to the following requirements;

1. Life expectancy shall be in excess of 50 years under normal working conditions.
2. All components of the system must be able to resist the types and quantities of chemicals likely to be naturally found in rainfall and uncontaminated soils.
3. 3 dimensional flow within the completed system.
4. A means of inspecting, cleaning and maintaining the system;
5. Minimum 94% storage volume
6. The completed system must be structurally robust to suit burial depths and all material components must be able to resist the soil characteristics of the ground conditions encountered.

POLYSTORM MODULES

All Polystorm Modules are extruded and all system fittings are injection moulded.

Polystorm

Manufacturer and reference:	Polypipe Civils
Product code:	PSM1
Material:	Polypropylene
Unit dimensions:	Length 1000mm Width 500mm Depth 400mm
Module volume:	**0.20m³**
Module storage volume:	0.19m^3 (190 litres)
Ultimate Compressive Strength at yield:	
vertical loading (on top face)	440KN/m^2
lateral loading (on side face)	63KN/m^2
Short term deflection	
vertical loading (on top face)	1mm/83KN/m^2
lateral loading (on side face)	1mm/4.2KN/m^2

Polystorm Lite

Manufacturer and reference:	Polypipe Civils
Product code:	PSM2
Material:	Polypropylene
Unit dimensions:	Length 1000mm Width 500mm Depth 400mm
Module volume:	**0.20m³**
Module storage volume:	0.19m^3 (190 litres)
Ultimate Compressive Strength at yield:	
vertical loading (on top face)	200KN/m^2
lateral loading (on side face)	40KN/m^2
Short term deflection	
vertical loading (on top face)	1mm/43KN/m^2
lateral loading (on side face)	1mm/6.4KN/m^2

Polystorm - R

Manufacturer and reference:	Polypipe Civils
Product code:	PSM1A
Material:	95% recycled polypropylene
Dimensions:	Length 1000mm Width 500mm Depth 400mm
Module volume:	**0.20m³**
Module storage volume:	0.19m^3 (190 litres)
Ultimate Compressive Strength at yield:	
vertical loading (on top face)	610KN/m^2
lateral loading (on side face)	63KN/m^2
Short term deflection	
vertical loading (on top face)	1mm/60KN/m^2
lateral loading (on side face)	1mm/4.4KN/m^2

Polystorm Xtra

Manufacturer and reference:	Polypipe Civils
Product code:	PSM3
Material:	Polypropylene
Dimensions:	Length 1000mm Width 500mm Depth 210mm
Module volume:	**0.105m³**
Module storage volume:	0.0986m^3 (98 litres)
Ultimate Compressive Strength at yield:	
vertical loading (on top face)	834KN/m^2
lateral loading (on side face)	93KN/m^2
Short term deflection	
vertical loading (on top face)	1mm/97.8KN/m^2
lateral loading (on side face)	1mm/7.1KN/m^2

Polystorm Inspect

Manufacturer and reference:	Polypipe Civils
Product code:	PSM4
Material:	Polypropylene
Dimensions:	Length 1000mm Width 500mm Depth 400mm
Module volume:	**0.20m³**
Module storage volume:	0.188m^3 (188 litres)
Ultimate Compressive Strength at yield:	
vertical loading (on top face)	440KN/m^2
lateral loading (on side face)	63KN/m^2
Short term deflection	
vertical loading (on top face)	1mm/70.1KN/m^2
Access Opening	320mm H x 172mmW

Polystorm Access

Manufacturer and reference:	Polypipe Civils
Material:	Polypropylene

A 1000mm x 500mm access shaft shall be formed within the Polystorm geocellular structure.
Access base units to be provided at the base of the inspection shaft and to be interlocked with the Polystorm cells.
An access turret unit shall be installed on top of the Polystorm structure, above the inspection shaft
A 500mm diameter inspection shaft shall be extended from the access turret on the surface of the Polystorm structure to finished ground level.
A 350mm reduced access shaft cap at the top of the shaft shall be installed to conform with inspection chamber regulations.

Permavoid Medium Duty with Biomat

Manufacturer and reference:	Polypipe Civils
Product code:	PSM1 BM
Material:	Polypropylene
Dimensions:	Length 1000mm Width 500mm Depth 400mm
Module volume:	**0.20m³**
Module storage volume:	0.19m^3 (190 litres)
Ultimate Compressive Strength at yield:	
vertical loading (on top face)	450KN/m^2
lateral loading (on side face)	63KN/m^2
Short term deflection	
vertical loading (on top face)	1mm/70.1KN/m^2
lateral loading (on side face)	1mm/4.4KN/m^2

The transport, handling and storage of materials shall be carried out in accordance with Polypipe's recommendations, subject to the approval of the Engineer;

Shear connectors and clips are packed in sealed polythene bags and shall be stored in shaded areas out of direct sunlight.

Polystorm geo-cellular units shall be carefully unloaded and stored on level ground. Packs should not be stacked on site and loose individual units should not be stored more than 2 units high.

Polystorm Geo-cellular units shall be stored within a protected and shaded location and shall not be exposed to direct sunlight.

Effective precautions shall be taken to prevent damage to materials.

INSTALLATION

Performance Criteria

Excavation should be carried out in accordance with BS 6031:2009, Code of practice for earthworks, referencing all additional standards and / or codes of practice as appropriate.

Modular Polystorm geocellular units (typically 1000mm long x 500mm wide x 400mm high) shall be used to form the storm water attenuation/infiltration structure.

The geocellular structure shall allow differing layers of modular units to be used in its construction, in order to suit the expected imposed loading and provide the most cost effective solution.

3 dimensional flow must be provided within the completed modular storage tank.

Where pipe connections larger than allowed by standard Polystorm units are required, individual units incorporating pre-formed sockets shall be used.

Installation Generally

The modular tank shall be installed on a smooth and level prepared base

The base should be inspected for soft spots, any present should be excavated and replaced with a suitably compacted granular material.

The geocellular structure should be installed in accordance with the Engineer's drawings. Ensuring the modular units are arranged so that preformed sockets are in the correct alignment for inlet and outlet pipes.

Abutting geocellular units, in the same layer, should be clipped together using the manufacturer's proprietary clips. Subsequent layers shall be connected by means of the manufacturers proprietary shear connectors.

The geotextile or geomembrane wrapping to the base, sides and top of the 'tank' shall be completed and jointed in accordance with the manufacturer's requirements. It should be noted that certain installations may require the use of a protective geotextile fleece, which would be advised by the geosynthetic manufacturer

Ventilation must be provided to the structure. One 110mm air vent, or its equivalent, should be provided for every 7500m^2 of impermeable catchment area drained to the geocellular structure.

Silt traps/catchpits must be installed upstream of the Polystorm structure to limit the risk of silt and debris entering into the geocellular structure.

All connections and joints shall be installed in accordance with the manufacturer's specifications and fully inspected and tested on site prior to the commencement of any backfilling.

All joints for Attenuation tanks should be sealed using proprietary techniques recommended by the manufacturer. Advice on seam testing procedures is given in CIRIA report SP124.

Access

The Polystorm system is able to provide horizontal access tunnels and vertical inspection shafts for inspection and maintenance purposes.
Install vertical inspection shafts and access tunnels to be installed as the installation proceeds in accordance with the Engineer's drawings.

Specification Clause

The modular geocellular stormwater attenuation/infiltration system shall be Polystorm as manufactured and supplied by **Polypipe Civils**.
Polypropylene modular units shall be 1000mm L x 500mm W x 400mm D and/or 1000mm L x 500mm W x 210mm D. The units shall provide 3 dimensional flow within a minimum 94% void.
Modular units shall be connected using proprietary clips and shear connectors and shall be designed in accordance with current CIRIA guidelines.

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