



Permavoid
NBS Specification

Example Specification

July 2014

R12 DRAINAGE BELOW GROUND

Polypipe Civils, Charnwood Business Park, North Road, Loughborough,
Leicestershire, LE11 1LE. Tel: 01509 615 100. Fax: 01509 610 215. Web:
www.polypipe.com/civils

STORAGE TANKS – PLASTIC UNITS

Manufacturer: Polypipe Civils
Product reference: Permavoid™
Material: Recycled plastic
Size: 708mm x 354mm x 150mm
Weight: 3kg
Storage Volume: 35.71 litres

Permavoid™ is a high strength sub-base replacement system incorporating interlocking ties to each face and conform to BS7533-13:2009, to create a structural raft. Having a 95% void ratio the system will provide either an attenuation or infiltration drainage solution.

Consult with Polypipe Civils for recommendations and details.

Refer to Engineer Drawings xxxxxx

Physical Properties of the Geocellular Units:

• Element	Value	Unit
• Unconfined Compressive Strength	715	KN/m ²
• Volumetric Void Ratio	95	%
• Effective Perforated Surface Area	52	%
• Flow rate per m width @ zero Gradient	9	l/s
• Flow rate per m width @ 5% gradient	21	l/s

Inlet Connections: xxx mm

Outlet pipe diameter: xxx mm.

Silt trap: Consult with Polypipe Civils for recommendations and details.

Installation: Consult with Polypipe Civils for recommendations and details.

- The Geocellular units shall be installed strictly in accordance with the manufacturer's recommendations and in a manner that will not cause damage.
- The constructed conduits shall be surrounded with a suitable separation/filtration geotextile prior to carefully backfilling with material approved by The Engineer. Bedding layers and backfills shall be as specified by the Engineer
- Jointing: each unit shall be connected to adjacent units with purpose made structural interlocking ties to prevent lateral displacement.
- The tie arrangement shall be in accordance with the design drawings
- Workmanship generally: Pre-laying checks: surface acceptability; before laying check that substrate surfaces are compacted and free from ridges and undulations

Accessories: Permavoid Permatie, Permavoid Shear Connector

Manufacturer: Polypipe Civils
Product reference: Permavoid™
Material: Recycled plastic
Size: 708mm x 354mm x 85mm
Weight: 2.25kg
Storage Volume: 19.17 litres

Permavoid™ is a high strength sub-base replacement system incorporating interlocking ties to each face and conform to BS7533-13:2009, to create a structural raft. Having a 92% void ratio the system will provide either an attenuation or infiltration drainage solution. Consult with Polypipe Civils for recommendations and details. Refer to Engineer Drawings xxxxxxx

Physical Properties of the Geocellular Units:

Element	Value	Unit
Unconfined Compressive Strength	715	KN/m ²
Volumetric Void Ratio	92	%
Effective Perforated Surface Area	52	%
Flow rate per m width @ zero Gradient	4	l/s
Flow rate per m width @ 2% gradient	7	l/s

Inlet Connections: xxx mm

Outlet pipe diameter: xxx mm.

Silt trap: Consult with Polypipe Civils for recommendations and details.

Installation: Consult with Polypipe Civils for recommendations and details.

- The Geocellular units shall be installed strictly in accordance with the manufacturer's recommendations and in a manner that will not cause damage.
- The constructed conduits shall be surrounded with a suitable separation/filtration geotextile prior to carefully backfilling with material approved by The Engineer. Bedding layers and backfills shall be as specified by the Engineer
- Jointing: each unit shall be connected to adjacent units with purpose made structural interlocking ties to prevent lateral displacement.
- The tie arrangement shall be in accordance with the design drawings
- Workmanship generally: Pre-laying checks: surface acceptability; before laying check that substrate surfaces are compacted and free from ridges and undulations

Accessories: Permavoid Permatie, Permavoid Shear Connector

SOAKAWAY SYSTEMS – PLASTIC UNITS

Manufacturer: Polypipe Civils
Product reference: Permavoid™
Material: Recycled plastic
Size: 708mm x 354mm x 150mm
Weight: 3kg
Storage Volume: 35.71 litres

Permavoid™ is a high strength sub-base replacement system incorporating interlocking ties to each face and conform to BS7533-13:2009, to create a structural raft. Having a 95% void ratio the system will provide either an attenuation or

infiltration drainage solution. Consult with Polypipe Civils for recommendations and details. Refer to Engineer Drawings xxxxxxx

Physical Properties of the Geocellular Units:

• Element	Value	Unit
• Unconfined Compressive Strength	715	KN/m ²
• Volumetric Void Ratio	95	%
• Effective Perforated Surface Area	52	%
• Flow rate per m width @ zero Gradient	9	l/s
• Flow rate per m width @ 5% gradient	21	l/s

Inlet Connections: xxx mm

Outlet pipe diameter: xxx mm.

Silt trap: Consult with Polypipe Civils for recommendations and details.

Installation: Consult with Polypipe Civils for recommendations and details.

- The Geocellular units shall be installed strictly in accordance with the manufacturer's recommendations and in a manner that will not cause damage.
- The constructed conduits shall be surrounded with a suitable separation/filtration geotextile prior to carefully backfilling with material approved by The Engineer. Bedding layers and backfills shall be as specified by the Engineer
- Jointing: each unit shall be connected to adjacent units with purpose made structural interlocking ties to prevent lateral displacement.
- The tie arrangement shall be in accordance with the design drawings
- Workmanship generally: Pre-laying checks: surface acceptability; before laying check that substrate surfaces are compacted and free from ridges and undulations

Accessories: Permavoid Permatie, Permavoid Shear Connector

Manufacturer: Polypipe Civils

Product reference: Permavoid™

Material: Recycled plastic

Size: 708mm x 354mm x 85mm

Weight: 2.25kg

Storage Volume: 19.17 litres

Permavoid™ is a high strength sub-base replacement system incorporating interlocking ties to each face and conform to BS7533-13:2009, to create a structural raft. Having a 92% void ratio the system will provide either an attenuation or infiltration drainage solution. Consult with Polypipe Civils for recommendations and details. Refer to Engineer Drawings xxxxxxx

Physical Properties of the Geocellular Units:

• Element	Value	Unit
• Unconfined Compressive Strength	715	KN/m ²
• Volumetric Void Ratio	92	%
• Effective Perforated Surface Area	52	%

- Flow rate per m width @ zero Gradient 4 l/s
- Flow rate per m width @ 2% gradient 7 l/s

Inlet Connections: xxx mm

Outlet pipe diameter: xxx mm.

Silt trap: Consult with Polypipe Civils for recommendations and details.

Installation: Consult with Polypipe Civils for recommendations and details.

- The Geocellular units shall be installed strictly in accordance with the manufacturer's recommendations and in a manner that will not cause damage.
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- Workmanship generally: Pre-laying checks: surface acceptability; before laying check that substrate surfaces are compacted and free from ridges and undulations

Accessories: Permavoid Permatie, Permavoid Shear Connector

GROUNDWATER PRESSURE RELIEF DRAIN FOR SURFACE/ SUB SURFACE WATER

Manufacturer: Polypipe Civils

Product reference: Permavoid™

Material: Recycled plastic

Size: 708mm x 354mm x 150mm

Weight: 3kg

Storage Volume: 35.71 litres

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Physical Properties of the Geocellular Units:

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• Volumetric Void Ratio	95	%
• Effective Perforated Surface Area	52	%
• Flow rate per m width @ zero Gradient	9	l/s
• Flow rate per m width @ 5% gradient	21	l/s

Inlet Connections: xxx mm

Outlet pipe diameter: xxx mm.

Silt trap: Consult with Polypipe Civils for recommendations and details.

Installation: Consult with Polypipe Civils for recommendations and details.

- The Geocellular units shall be installed strictly in accordance with the manufacturer's recommendations and in a manner that will not cause damage.
- The constructed conduits shall be surrounded with a suitable separation/filtration geotextile prior to carefully backfilling with material approved by The Engineer. Bedding layers and backfills shall be as specified by the Engineer
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- Workmanship generally: Pre-laying checks: surface acceptability; before laying check that substrate surfaces are compacted and free from ridges and undulations

Accessories: Permavoid Permatie, Permavoid Shear Connector

Manufacturer: Polypipe Civils
 Product reference: Permavoid™
 Material: Recycled plastic
 Size: 708mm x 354mm x 85mm
 Weight: 2.25kg
 Storage Volume: 19.17 litres

Permavoid™ is a high strength sub-base replacement system incorporating interlocking ties to each face and conform to BS7533-13:2009, to create a structural raft. Having a 92% void ratio the system will provide either an attenuation or infiltration drainage solution. Consult with Polypipe Civils for recommendations and details. Refer to Engineer Drawings xxxxxx

Physical Properties of the Geocellular Units:

Element	Value	Unit
Unconfined Compressive Strength	715	KN/m ²
Volumetric Void Ratio	92	%
Effective Perforated Surface Area	52	%
Flow rate per m width @ zero Gradient	4	l/s
Flow rate per m width @ 2% gradient	7	l/s

Inlet Connections: xxx mm

Outlet pipe diameter: xxx mm.

Silt trap: Consult with Polypipe Civils for recommendations and details.

Installation: Consult with Polypipe Civils for recommendations and details.

- The Geocellular units shall be installed strictly in accordance with the manufacturer's recommendations and in a manner that will not cause damage.
- The constructed conduits shall be surrounded with a suitable separation/filtration geotextile prior to carefully backfilling with material approved by The Engineer. Bedding layers and backfills shall be as specified by the Engineer
- Jointing: each unit shall be connected to adjacent units with purpose made structural interlocking ties to prevent lateral displacement.
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Accessories: Permavoid Permatie, Permavoid Shear Connector

GEOTEXTILE MEMBRANES – FILTER

Manufacturer: Polypipe Civils

Product reference: Permafilter SuDS Treatment Geotextile

Material: Non-woven, dimpled, needle punched polymeric material comprising a proprietary blend of polyester fibres

Size: 2.4m x 100m roll or 5.25 x 50m roll

The dimpled geotextile shall incorporate hydrophilic (water attracting / oil repellent) and hydrophobic (oil attracting / water repellent) properties to achieve oil retention.

Physical Properties shall be:

Element	Unit	Value
Physical Properties		
Weight per unit EN 965	g/m ²	300
Mechanical properties		
Tensile strength EN ISO 10319 (md / cmd)	KN/m	9 / 12
Elongation at max. load EN ISO 10319 (md / cmd)	%	56 / 55
Static puncture (CBR-Test) EN ISO 12236	N	1575
Push-through displacement EN 918 (cone drop test)	mm	27
Characteristic opening size, O ₉₀ EN ISO 12956	µm	77
Hydraulic Properties		
Water permeability EN ISO 11058	L/m ² /s	57
Other Properties		
Air permeability ISO 9237	L/m ² /s	1000
Maximum Oil Retention	L/10 m ²	6
Effluent discharge at max. oil loading	ppm	10

Jointing: 300mm overlap

Installation: Remove humps and sharp projections and fill hollows before laying.

Protect from damage due to:

- Exposure to light, except during laying (maximum five hours)
- Contaminants
- Materials listed as potentially deleterious by geotextile manufacturer
- Damage, until fully covered by fill
- Wind uplift, by laying not more than 15 m before covering with fill

GEOTEXTILE MEMBRANES – IMPERVIOUS

Manufacturer: Polypipe Civils

Product reference: Heavy Duty Impermeable Geomembrane

Material: Polypropylene

Size: 2m x 100m, 3m x 100m and 6m x 100m roll

A single layer cold applied robust welded flexible membrane suitable for waterproofing to structures and for water containment. Membrane to be nominal 1mm thick laid with welded seams.

Physical Properties shall be:

Property	Test Method	Value	Unit
Thickness	ASTM D-751	1	mm
Density	ASTM D-792	0.9	g/cm ³
Tensile Stress	ASTM D-638	18	N/mm
Elongation	ASTM D-638	>700	5
Puncture Resistance	FTMS 101C (method 2065)	150	N
Tear Resistance	ASTM D-1004	60	N
Dimensional Stability	ASTM D-1204 (1hr @ 100°C)	2	%
Stress Crack Resistance	ASTM 5397	100	%
Volatile Loss (5% loss max)	ASTM D-1203 (method A)	0.2	%
Ozone Resistance	ASTM D-1149	No Cracks	
Carbon Black Content	ASTM 1603	2-3	%
Moisture Vapour	ASTM E96	<0.1	g/m ² /day

Jointing: min. 120mm overlaps

- Application temperature of membrane shall be greater than 4°C
- Primer not required
- Number of Layers: One
- Extrusion welding shall be accepted only in areas where twin seam welding is in-appropriate

Installation: Remove humps and sharp projections and fill hollows before laying.

Protect from damage due to:

- Exposure to light, except during laying (maximum five hours)
- Contaminants
- Materials listed as potentially deleterious by geotextile manufacturer
- Damage, until fully covered by fill
- Wind uplift, by laying not more than 15 m before covering with fill

GEOTEXTILE PROTECTION FLEECE

Manufacturer: Polypipe Civils

Product reference: Permatex 300 Protection Fleece

Material: Polypropylene

Size: 2.4m x 100m roll or 5.25 x 50m roll

Heavy Duty reinforced protection geotextile fleece is a 3 layer composite, scrim reinforced, low elongation, heavy-duty needle punched geotextile, applied to all external surfaces of Permavoid attenuation tanks. The Geotextile is to be used as a protection layer in conjunction with Heavy Duty Waterproof Impermeable Geomembrane.

Physical Properties shall be:

Property	Test Method	Value	Unit
Mass per unit area	EN ISO 9864	300	g/sq.m
Thickness under load 2kPa	EN ISO 9863-1	2	Mm
CBR puncture resistance	EN ISO 12236	4000	N
Dynamic Cone Drop	EN ISO 13433	11	Mm
Tensile Strength (min) at max.load	EN ISO 10319	25	kN/M
Tensile Extension (max) at max. load	EN ISO 10319	50	%
Protection Efficiency	EN ISO 14575	300	N
Breakthrough Head	EN ISO 10319	nil	mm
Coefficient of Permeability	EN ISO 11058	55x10 ⁻³	m/s
Characteristic opening size	EN ISO 12956	70	microns

Jointing: 300mm overlap

Installation: Remove humps and sharp projections and fill hollows before laying.

Protect from damage due to:

- Exposure to light, except during laying (maximum five hours)
- Contaminants
- Materials listed as potentially deleterious by geotextile manufacturer
- Damage, until fully covered by fill

Wind uplift, by laying not more than 15 m before covering with fill

LINEAR DRAINAGE CHANNEL SYSTEM

Manufacturer: Polypipe Civils

Product reference: Permachannel

Combined surface water collector and silt/oil separator. The Permachannel system complies with the regulations of the treatment train criteria in a SUDS scheme as defined by PPG3.

Discharge shall be from the side of the channel via a weir & baffle component, which shall be capable of separating oils and silt from progressing beyond the channel into the rest of the drainage system.

Refer to Engineer Drawings xxxxxxx

Size: 210 x 150 x 1000mm

Weight: 29kg

Outlet pipe diameter: 40 mm.

Pollution prevention performance:

- Silt retention capacity - 7000ml/m
- Oil retention capacity - 5000ml/m
- Compressive Resistance - 96-104N/mm²
- Bending Strength - 15-22N/mm²
- Water absorption - <5%
- Density - 2300kg/m³
- Modulus of elasticity - 15-30kN/mm²
- Chemical Resistance - The polymer concrete shall be capillary free, non porous sealed structure and resistant to most chemical

Installation: Designed to be laid flat or max. 1:500

Accessories: Permachannel Universal Connector, Permachannel End Caps, Permachannel Blanking Plugs, Permachannel Deflector Plates.

Joints: Consult with Polypipe Civils for recommendations and details

Cover gratings: Ductile Iron Grid

Fixings: Consult with Permavoid for recommendations and details.

Loading grade to BS EN 1433: D400

OIL AND PETROL SEPARATOR UNITS - PLASTICS

Manufacturer: Polypipe Civils

Product reference: Permaceptor

Material: Recycled plastic

Size: 1062 x 708 x 300mm

Weight: 20kg

Permaceptor is a high-strength mini oil separator designed to be incorporated within the pavement construction zone adjacent to road/ yard gullies. The system is connected to the outlet pipe from the gully and incorporates prefabricated weir and baffles to separate floating oils, providing source control treatment of sub-catchment run-off to meet the requirements of PPG3 treatment levels.

Consult with Polypipe Civils for recommendations and details.

Refer to Engineer Drawings xxxxxxx

Pollution prevention performance:

- Silt/ Oil retention capacity - 25 litres

Inlet pipe size: DN 150 (Or less with adaptor)

Outlet pipe size: DN 150

Installation: Consult with Polypipe Civils for recommendations and details.

Manufacturer: Polypipe Civils

Product reference: Permavoid™ BioMat Unit

Material: Recycled plastic

Size: 708mm x 354mm x 150mm

Weight: 3 kg

Storage Volume: 35.71 litres

Permavoid™ BioMat is a high strength sub-base replacement system incorporating interlocking ties to each face and conform to BS7533-13:2009, to create a structural raft.

Hydrocarbon pollutants are removed from the surface water via a buoyant geocomposite located inside a Permavoid geocellular unit. The composite will interact with the free product oil, allow the formation of a biofilm on a solid surface and provide the opportunity for nutrient recycling within an active biofilm development. The system is intended to provide an environment which is ideal for the encouragement of oil degrading micro organisms where moisture, oil and oxygen from the atmosphere are all available in a situation supplied with a large surface area for oil adsorption and biofilm attachment.

Pollution prevention performance: Oil retention capacity - 56g/m²

Consult with Polypipe Civils for recommendations and details.

Refer to Engineer Drawings xxxxxx

Physical Properties of the Geocellular Units:

Element	Value	Unit
Unconfined Compressive Strength	715	KN/m ²
Volumetric Void Ratio	95	%
Effective Perforated Surface Area	52	%
Flow rate per m width @ zero Gradient	9	l/s
Flow rate per m width @ 5% gradient	21	l/s

Inlet Connections: xxx mm

Outlet pipe diameter: xxx mm.

Silt trap: Consult with Polypipe Civils for recommendations and details.

Installation: Consult with Polypipe Civils for recommendations and details.

- The Geocellular units shall be installed strictly in accordance with the manufacturer's recommendations and in a manner that will not cause damage.
- The constructed conduits shall be surrounded with a suitable separation/filtration geotextile prior to carefully backfilling with material approved by The Engineer. Bedding layers and backfills shall be as specified by the Engineer
- Jointing: each unit shall be connected to adjacent units with purpose made structural interlocking ties to prevent lateral displacement.
- The tie arrangement shall be in accordance with the design drawings
- Workmanship generally: Pre-laying checks: surface acceptability; before laying check that substrate surfaces are compacted and free from ridges and undulations

Accessories: Permavoid Permatie, Permavoid Shear Connector

Medium Duty Permavoid™ with Biomat Treatment Unit

Manufacturer: Polypipe Civils

Product reference: Medium Duty Permavoid™ with Biomat Treatment Unit

Material: Recycled plastic

Size: 1000mm x 500mm x 400mm

Weight: 9 kg

Storage Volume: 190 litres

Hydrocarbon pollutants are removed from the surface water via a buoyant geocomposite located inside a Polystorm geocellular unit. The composite will interact with the free product oil, allow the formation of a biofilm on a solid surface and provide the opportunity for nutrient recycling within an active biofilm development. The system is intended to provide an environment which is ideal for the encouragement of oil degrading micro organisms where moisture, oil and oxygen from the atmosphere are all available in a situation supplied with a large surface area for oil adsorption and biofilm attachment.

Pollution prevention performance: Oil retention capacity - 56g/m²

Consult with Polypipe Civils for recommendations and details.

Refer to Engineer Drawings xxxxxx

Physical Properties of the Geocellular Units:

• Element	Value	Unit
• Unconfined Compressive Strength	650	KN/m ²
• Volumetric Void Ratio	95	%

Inlet Connections: xxx mm

Outlet pipe diameter: xxx mm.

Silt trap: Consult with Polypipe Civils for recommendations and details.

Installation:

- The Geocellular units shall be installed strictly in accordance with the manufacturer's recommendations and in a manner that will not cause damage. The constructed conduits shall be surrounded with a suitable separation/filtration geotextile prior to carefully backfilling with material approved by The Engineer. Bedding layers and backfills shall be as specified by the Engineer
- Jointing: each unit shall be connected to adjacent units with purpose made structural interlocking ties to prevent lateral displacement. The tie arrangement shall be in accordance with the design drawings
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ONE PIECE GULLIES AND COVERS (EXTERNAL)

Standard: BBA Cert. 90/R054,

Manufacturer: Polypipe Civils

Product reference: Ridgigully corrugated polyethylene road gully

Sizes: 480mm

Outlet size: 150mm

COVER

Product reference: xxxxxx

Type: xxxxxxxx

Material: xxxxxxxx

Size: xxxxxxxx

Loading grade: xxxxxxxx

INSTALLING UNDERGROUND STORAGE TANK UNITS

The Installer will provide apparatus for the off-loading and handling of modular pipework and fittings in accordance with manufacturer's requirements/recommendations and good practice. Any components suffering damage resulting from any means, will be immediately rejected from the site. Making good of damaged components will not be permitted.

CONTACT:

Polypipe Civils
Charnwood Business Park
North Road
Loughborough
Leicestershire
LE11 1SP

Tel: +44 (0) 1509 615100
Fax: +44 (0) 1509 615215

Email: civilsenquiries@polypipe.com

www.polypipe.com/civils

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