

TECHNICAL LITERATURE SUBMISSION DOCUMENT



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Project Name

Tariff St, Manchester

Rev

C01

Description of
Submission

Hewitech Variobox & control box product manual

COMMENT ON THE FOLLOWING DOCUMENT IS REQUIRED

Equipment Specifying Schedule Yes

Builder's Work Requirements No

Manufacturer's Data Yes

Assembly / Installation Details Yes

Design Check Calculations Yes

O & M Manuals No

Certified Performance Data No

Reports No

Additional Submission Details

Signed (Originator) David McPherson

Date Issued
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Date Comments Required

Checked and approved before submission by Originator

STATUS OF THE ABOVE



Status A = No comment, can be incorporated into the scheme

Status B = Minor discrepancies found as listed below. Submission can be incorporated

Status C = Submission unacceptable (as listed below), Resubmission required

Comments on submission

Signed

Position

Date

Name

Representing



Hewitech Variobox & Controlbox Product Manual

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Introduction

About Hewitech

Hewitech is a major European extrusion and injection molding plastic manufacturer based in Ochtrup, Germany. Since 1993 Hewitech has been developing and producing plastic solutions for cooling towers, stormwater management and waste-water applications.

We believe our investment in modern in-house tooling is the reason behind Hewitech's quality products. Our machines run automatically to ensure continual production with the highest level of quality control.

Hewitech now employs over 100 people with production in Poland, Russia, Romania, England as well as Germany

Hewitech originated in the field of Customised Engineering. After a sustained period of growth Hewitech then expanded into the Plastic injection molding industry. Specialised processes for cooling tower installations were soon added to our portfolio, which included a twin cooling tower for testing and measuring, leading the way in research and development.

Injection molding

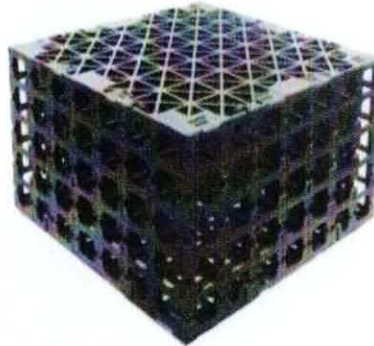
Injection-molded components are continuously innovated and developed for our markets. Specialised production processes and continuous testing of new materials in our in-house test facilities guarantee precision and high performance.

Research and Development

Potential innovations are modeled in the Hewitech CAD design department. Our in-house CNC tool-making and advanced mechanical engineering expertise deliver the shortest possible development and production time for new machinery and plastic components.



Variobox Plus and Variobox Traffic



Product Type

Defined by module height e.g. Variobox 200 = Variobox 600 x 600 x 200mm height

Weight & Volume

	Type 100	Type 150	Type 200	Type 300	Type 400	Type 600
Length	600mm	600mm	600mm	600mm	600mm	600mm
Width	600mm	600mm	600mm	600mm	600mm	600mm
Height	100mm	150mm	200mm	300mm	400mm	600mm
Structure Volume m3	0.036	0.054	0.072	0.108	0.144	0.216
Storage Volume m3	0.034	0.0513	0.0684	0.1026	0.1368	0.2052
Weight	1.8kg	2.7kg	3.6kg	5.4kg	7.2kg	10.8kg

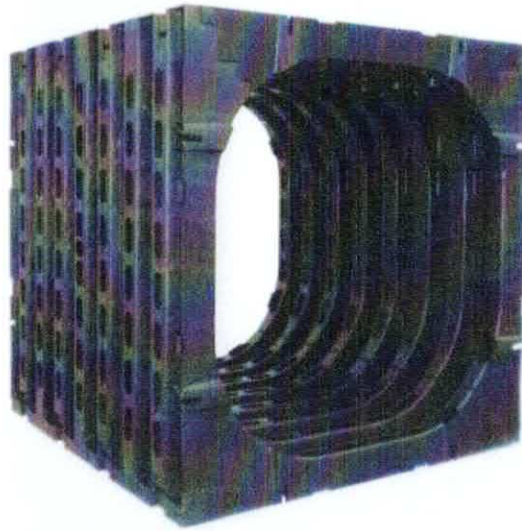
Short Term Compressive Strength

Product	Vertical	Lateral
Variobox Plus	700kN/m2	200kN/m2
Variobox Traffic	400kN/m2	100kN/m2

Volumetric Void Ratio 95%

Average effective perforated surface area 60%

Controlbox



Weight & Volume

	Type 300	Type 600
Length	300mm	600mm
Width	600mm	600mm
Height	600mm	600mm
Structure Volume	.108m ³	.216m ³
Storage Volume m ³	.103m ³	.205m ³
Weight	5.18kg	10.36kg

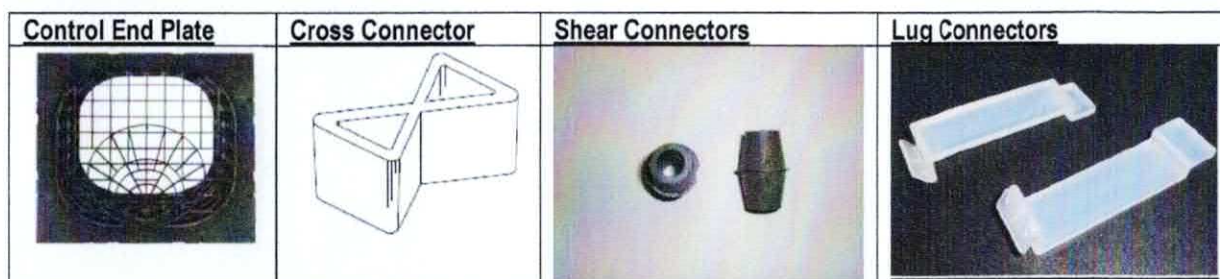
Short Term Compressive Strength

Vertical	Lateral
200kN/m ²	200kN/m ²

Volumetric Void Ratio

95%

Ancillaries



Legislation and Standards

Surface water attenuation systems should be designed in accordance with current planning regulations – England, Planning Policy Statement 25 – Development and Floods, Wales, Technical Advice Note 15, and covered in Scotland by Planning Advice Note 61.

The *Floods and Water Management Act 2010* became law in April 2010. The Act defines the assessment of flood risk and mitigating measures within Sustainable Drainage Systems (SUDS). In the near future enactment of the measures and approval of systems will be the responsibility of newly founded SUDS Approval Bodies (SABs)

Soakaway storage volumes and surface area are designed in accordance with *BRE Digest 365* or *CIRIA Report 156*.

Variobox tank structures should be designed following guidance within *CIRIA C680 "Structural Design of Modular Geocellular Drainage Tanks"*.

Site installations should be compliant with recommendations within *CIRIA C697 – "The SUDS Manual"* and *CIRIA C698 "Site Handbook for the Construction of SUDS"*

Design Considerations

Minimum Cover Required

Variobox Traffic and Variobox Plus

Car Park areas 600mm

HGV trafficked area 800mm

For lesser cover a detailed design is necessary, please contact Hewitech technical department

Maximum Burial Depth

A detailed design in accordance with *CIRIA C680 "Structural design of modular geo-cellular drainage tanks"* to take into account live and dead loads imposed and soil conditions should be carried out.

For assistance with calculations to define the design loads, please contact Hewitech technical department who have software compliant with C680 calculations.

Factors of Safety

Partial factors of safety should be applied to material properties and loads.

For Variobox the following material factors should be used:

Ultimate Limit State – 2.75

Serviceability Limit state – 1.5

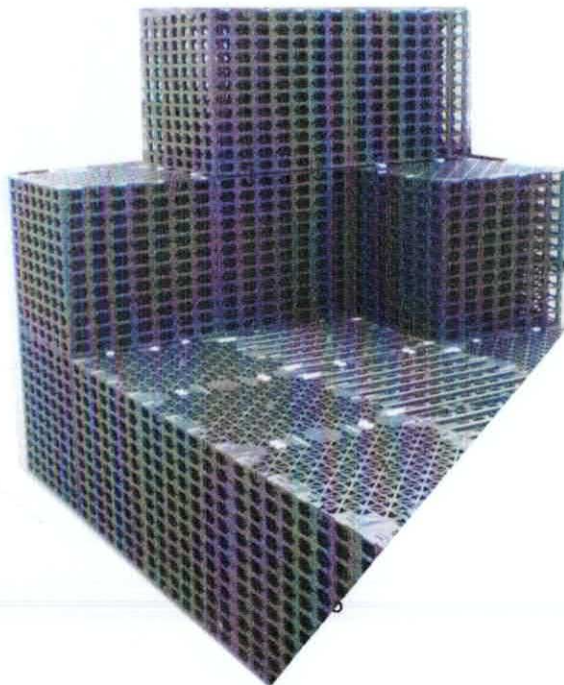
Appropriate partial safety factors for loads in the ultimate limit state are typically:

Live load – 1.5 and Dead load – 1.35

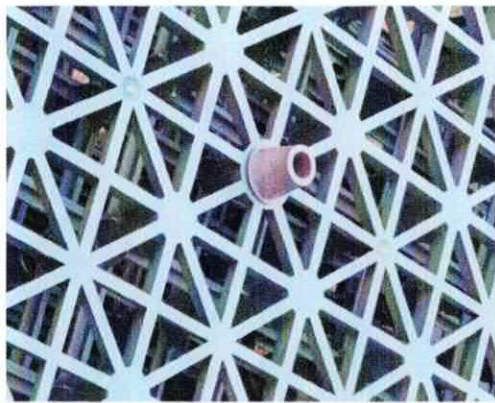
Installation

Variobox and Controlbox

Adjacent single rows of Variobox using Cross Connectors. This is also the jointing method for the top row of units.



Two rows of Variobox and Controlbox above one another can be jointed vertically the Shear Connector.



Varioboxes are connected laterally to Controlboxes with Lug Connectors.

Controlboxes are connected to other Controlboxes longitudinally with Cross Connectors.

Attenuation Membranes

Membranes are installed following guidelines within CIRIA 698 Site handbook for the construction of SUDS_C698_states – “All storage tanks should be fully sealed in accordance with waterproofing standards, i.e. Welded joints rather than adhesive tape, and the integrity of the seal checked through non-destructive testing, to ensure it is leak-proof”.

Wedge Welding techniques, (conforming CQA standards taken from landfill applications), are employed to seal membrane sheets, which are then air tested to ensure the integrity of the joint.



Hewitech's dedicated installation team provide a quality assured supply and fix site installation service to industry standards.

Hewitech Installation is a SMAS "Worksafe" contractor as recognised by SSIP – Safety Schemes IN Procurement – SMAS certificate number 22365

Hewitech Soakaway Geotextile Specification – HSG1000

Mechanical Properties	Test Method	Units	HSG1000
Tensile Strength – MD	EN ISO 10319	kN/m	6.0
Tensile Strength – XD	EN ISO 10319	kN/m	6.0
Elongation at break – MD	EN ISO 10319	%	40.0
Elongation at break – XD	EN ISO 10319	%	40.0
CBR Puncture Resistance	EN ISO 12236	N	1000
Dynamic Cone Drop	EN ISO 13443	mm	40.0
Protection Efficiency	EN ISO 14574	N	48.0

Hydraulic Properties	Test Method	Units	HSG1000
Characteristic Opening Size	EN ISO 12956	$\mu^{\circ}\text{m}$	140.0
Permeability	EN ISO 11058	m/s	120×10^{-3}
Waterflow normal to the plane	EN ISO 11058	$1/\text{m}^2.\text{s}$	120
Waterflow in the plane	EN ISO 12958	m^2/s	1×10^{-7}

Physical Properties	Test Method	Units	HSG1000
Thickness under 2 kPa	EN ISO 9863-1	mm	0.80
Weight	EN ISO 9864	g/m^2	80
Roll Size		m	$4.5 \times 100\text{m}$

Hewitech Attenuation Protective Fleece Specification - HPF40

Mechanical Properties	Test Method	Value	Tolerance
Tensile Strength MD	EN ISO 10319	40 kN/m	-5.2 kN/m
Tensile Strength CD	EN ISO 10319	40 kN/m	-5.2 kN/m
Elongation MD	EN ISO 10319	55%	+/-12.7%
Elongation CD	EN ISO 10319	55%	+/-12.7%
Static puncture resistance – CBR	EN ISO 12236	6.50kN	-1.30 kN
Dynamic perforation resistance – cone drop	EN ISO 13433	5mm	+1.3mm
Protection efficiency	EN ISO 14574	617N	-123.4N

Hydraulic Properties	Test Method	Value	Tolerance
Water permeability normal to the plane	EN ISO 11058	$35 \times 10^{-3} \text{ m/s}$	$-11 \times 10^{-3} \text{ m/s}$
Water flow normal to the plane	EN ISO 11058	$35 \text{ l/ m}^2.\text{s}$	$-11 \text{ l/ m}^2.\text{s}$
Water flow capacity in the plane 20kPa	EN ISO 12958	$8,5 \times 10^{-6} \text{ m}^2/\text{s}$	-10% log g
Characteristic opening size (AOS)	EN ISO 12956	70,0 μm	+/-21.0 μm

Physical Properties	Test Method	Value	Tolerance
Thickness under 2 kPa	EN ISO 9863-1	3,00 mm	+/-0.60mm
Composition	100% polypropylene non-woven geotextile		
Durability	Predicted to be durable for a minimum of 25 years in natural soil with $4 < \text{pH} < 9$ and soil temperatures $< 25^{\circ}\text{C}$		

Attenuation Standard Membrane Specification .75mm

Tested Property	Unit	Test Method	Value
Thickness	mm	UNE EN 1849-2	0.75
Confidence level 95%	%	-	Tolerance ± 6
Confidence level 90%	%	-	Tolerance ± 4

Tensile Properties (*)	Unit	Test Method	Value
Tensile strength at break	N/mm	UNE-EN ISO 527 (type V)	23(19)
Elongation at break	%	UNE-EN ISO 527 (type V)	≥ 700
Tear Resistance	N	ISO 34-1	≥ 75
Puncture Resistance	KN	UNE-EN ISO 12236	2.10
Exploding Resistance	%	Pr EN 14151	< 15
Dimensional Stability	%	UNE EN ISO 14632 (100°C, 1h)	± 1.5

	Parameter	Units	0.75
PRESENTATION (Standard Sizes)	Roll Width	m	6/6.30
	Roll Length	m	280
	Surface	m ²	1680/1764

Attenuation Membrane for Contaminated Land Specification 1mm

Tested Property	Unit	Test Method	Value
Thickness	mm	UNE EN 1849-2	1.00
Confidence level 95%	%	-	Tolerance ± 6
Confidence level 90%	%	-	Tolerance ± 4

Tensile Properties (*)	Unit	Test Method	Value
Tensile strength at break	N/mm	UNE-EN ISO 527 (type V)	31 (26)
Elongation at break	%	UNE-EN ISO 527 (type V)	800 (> 750)
Tear Resistance	N	ISO 34-1	≥ 100
Puncture Resistance	KN	UNE-EN ISO 12236	2.50
Exploding Resistance	%	Pr EN 14151	< 15
Dimensional Stability	%	UNE EN ISO 14632 (100°C, 1h)	± 1.5

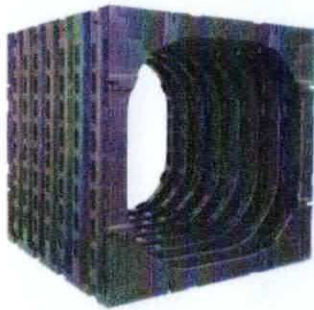
	Parameter	Units	1.00
PRESENTATION	Roll Width	m	6

(Standard Sizes)	Roll Length	m	210
	Surface	m ²	1260

System Access and Maintenance

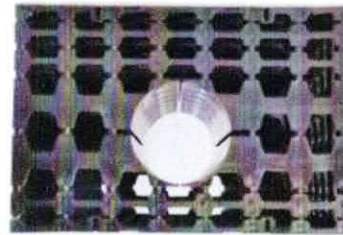
The Hewitech system offers two maintenance channel options dependant on structure size.

Large Tanks



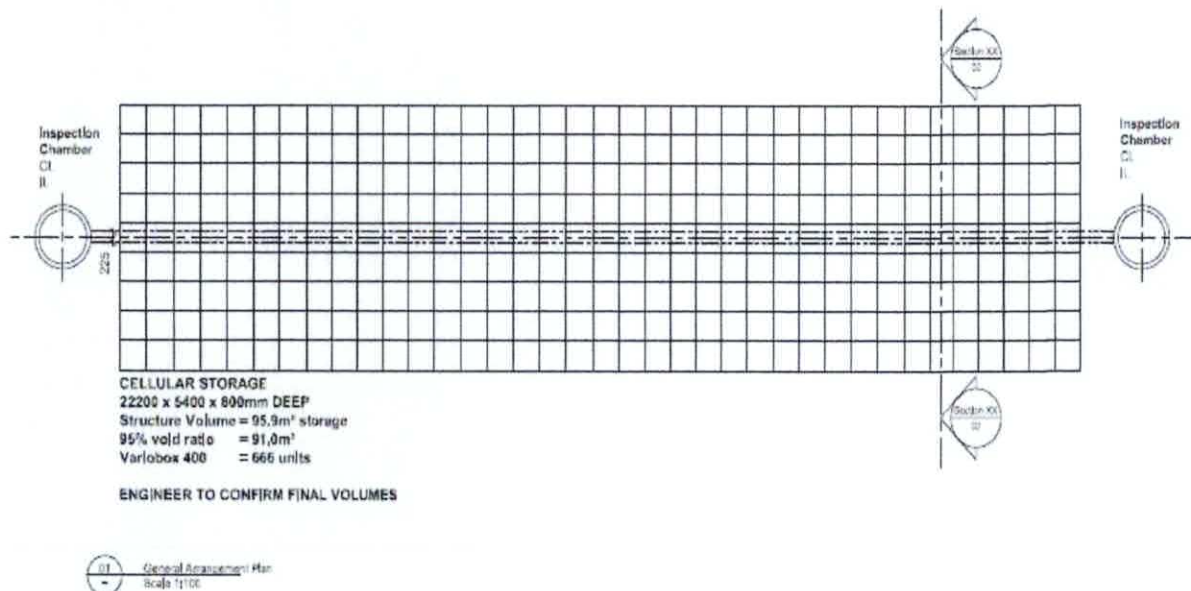
Controlbox 500mm Access

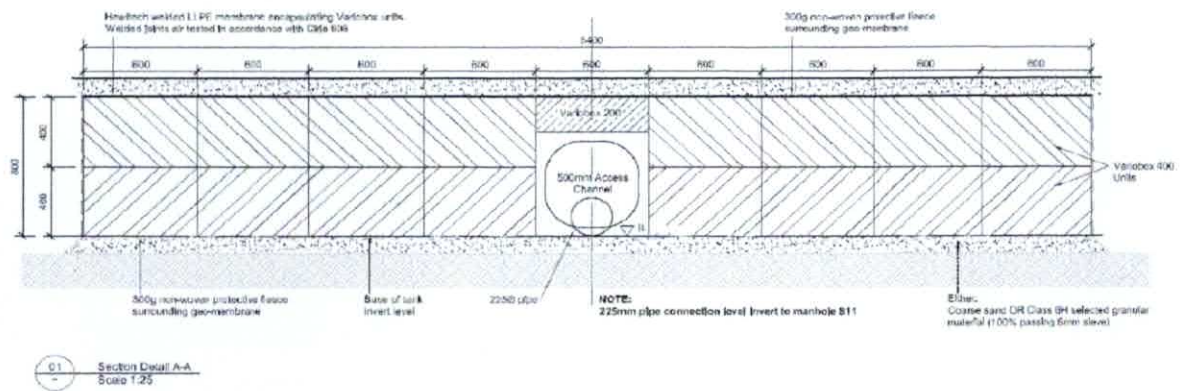
Small Tanks



Variobox 170mm Access

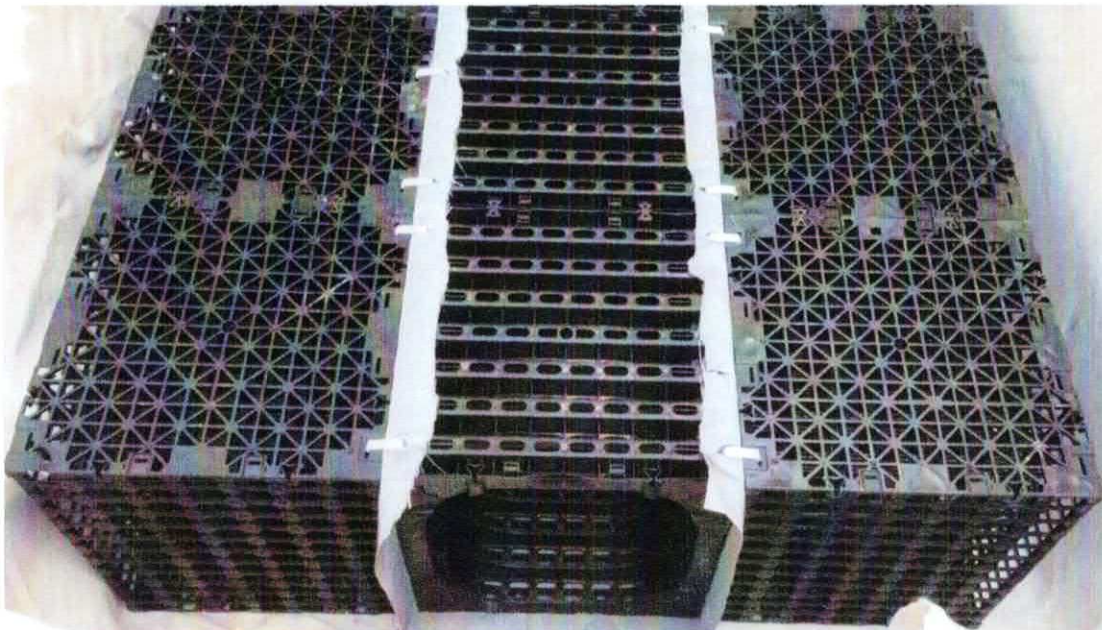
Attenuation systems should be designed with access upstream to downstream manhole through the tank.



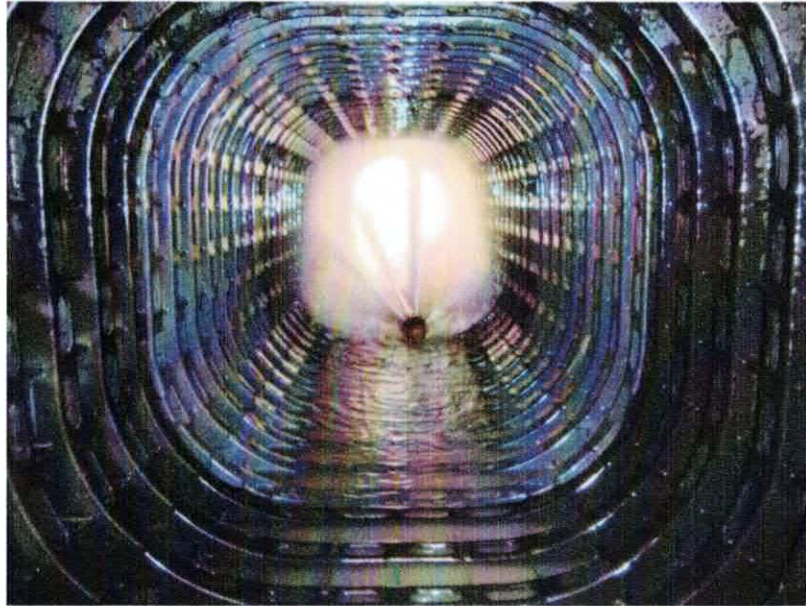


Siltation Control

For siltation control wrap the Controlbox 500mm access channel and maintenance channel with a needle punched non-woven geotextile (HSG100). Any silt entering the system will be contained within the Controlbox maintenance channel.



Debris and silt entering the system can be removed using standard industry jetting techniques via the upstream or downstream manhole.



Site Construction Sequence

Installation procedures should be carried out in accordance with the Health and Safety at Work Act (1974) and any other relevant legislation. Special attention should be paid to temporary work requirements in excavations.

Excavate to the required plan dimensions and level, ensuring that the excavation orientation will allow easy installation of connecting pipework. Consideration should be given to maintaining construction plant access for reinstating around the installed Variobox units. A minimum 300mm working space is required around the structure but 500mm is recommended for safe working practice.

Ensure that the ground bearing capacity at the formation level is sufficient for the proposed operational loads. The base of the excavation should be smooth and level, free of large stones and soft spots. Any soft spots should be excavated and replaced with suitable compacted granular material.

a) Attenuation Application

Place and compact a 100mm thick bedding layer of coarse sand. The base should be level and free of any undulations. Line the base and sides of the excavation with a 300g needle punched non- woven protective geotextile before placement of the impermeable geomembrane.

Install the geomembrane. Hewitech or the contractor seals the joints by wedge welding in accordance *Ciria 698 Site Handbook For The Construction of SUDS*, making an allowance for the connecting pipework or adapters. To ensure that the integrity of the geomembrane has been maintained, it is recommended that an inspection of the material is carried out, and welded joints are air tested in accordance with *Ciria 698 Site Handbook for the Construction of SUDS*.

If water is present, we recommend that the excavation depth is over dug by 200mm, with a base layer of 'TERRAM', overlaid by 150mm of compacted 'Type 1 road stone', topped off with a 50mm layer of pipe bedding. A sump should be excavated below the base layer of stone to allow the extraction of water via a drainage pump.

Variobox connectors are placed between all layers of Variobox units to give structural support to the tank. Sufficient Variobox clips are placed connecting Variobox units to maintain rigidity of the tank prior to backfilling the sides, the adjacent units being connected with two Variobox clips.

Place the Variobox crossconnector into the recess at the edge of the unit, two per unit as indicated. Place a shear connector in the middle of the Variobox and install the next layer of Variobox units, positioning the units in the upper layer so that they exactly mirror the position of the units in the lower layer. Repeat the above procedure until the necessary depth of Variobox structure has been achieved.

Pipe connections to the tank are made by cutting out the Controlbox End Plate and inserting a length of pipe, or by forming the membrane around a pipe coupler.

A Variobox attenuation structure requires ventilation to ensure proper hydraulic performance. Consideration should be given as to how this ventilation is to be installed, generally utilising a vent pipe to the downstream manhole (detail 1), or alternatively a vertical vent pipe (detail 2). One 110mm vent pipe per 7500m² of drained area is recommended within *CIRIA C680 Structural Design of Modular Geocellular Drainage Tanks*.

Complete the geomembrane encapsulation of the entire Variobox structure, forming and testing joints where appropriate. Complete the geotextile protective fleece encapsulation of the Variobox structure, re-examining the geotextile for damage and joint integrity.

b) Soakaway Application

The installation sequence is the same as the attenuation sequence with the following amendment

- 300g protective fleece and geo-membrane are not required
- the Soakaway tank is surrounded in a needle punched non- woven geotextile (see page 8 – HSG1000 specification)

Contractor

Backfill around the sides of the encapsulated units, forming a thick layer of coarse sand or Class 6H selected granular material immediately adjacent to the units. Where required, remaining excavated areas around the units should be backfilled with Class 6N or 6P selected granular material, in accordance with *MCHW, Volume 1, Series 600* or similarly approved specification.

Above the wrapped Variobox units, place and lightly compact a minimum 100mm thick layer of either coarse sand or Class 6H selected granular material (with 100% passing the 5mm sieve), in accordance with *MCHW, Volume 1, Series 600*.

Final backfilling of the installation is dependent on the expected operational loads. (NB. Compaction plant over and immediately adjacent to the Variobox units shall not exceed 2300 kg/m width).

Field conditions (e.g. landscaped areas)

The backfill material that lies within 300mm above the Variobox units should be free from particles exceeding 40mm in diameter, in accordance with Class 8 material to *MCHW, Volume 1, Series 600*. Final backfilling up to finished ground level may be achieved using selected as-dug material. Backfill material should be placed and compacted in layers no greater than 300mm, or in compliance with the approved specification.

Lightly trafficked (e.g. restricted access car park)

Backfill with Class 1 or 2 material in accordance with *MCHW, Volume 1, Series 600*. Backfill material should be placed and compacted in layers not greater than 150mm. Where the Variobox units are installed beneath a paved area, the pavement sub-base may form part of the backfill material provided that minimum cover depths are maintained.

Heavily trafficked (e.g. service areas or roads)

Contact Hewitech for further information and guidance. Hewitech can provide site specific calculations including live and dead loads to ascertain product and design suitability.

Complete pavement construction or landscaping over the Variobox system.

It should be noted that infiltration systems are not generally installed under roads due to the reduction in load bearing capacity of saturated soils. Specialist advice should be sought where this type of installation is proposed.

In attenuation and soakaway systems, where groundwater may be present, a buoyancy check should be undertaken by a qualified engineer to ensure that the imposed overburden pressure exceeds any uplift forces generated.

Storage and Transport

Variobox and Controlbox units are stored on pallets 4 units per layer, with a product height of either 2.4m or 2.8m dependant on transport requirements.

Pallets should be offloaded with suitable machinery with fork attachments.

Machinery used for offloading and transportation must be LOLER rated for the application and conform to current safety requirements.

Technical Support

For further technical support please visit the Hewitech website or contact Hewitech Technical Services:

- Telephone 01242 821678
- Fax 01242 821510
- Email sales@hewitech.co.uk
- Web www.hewitech.co.uk

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Particular application and specific site conditions can be discussed in further detail with our technical representative.