

Project	Accor Tribe Hotel
Specification Type	R12 Drainage Specification
Reference	1513-SPW-Z0-ZZ-SP-C-0001-A-D3
Revision	E

The following specification of drainage works is based on the requirements set out in Approved Document Part H and Sewers for Adoption 7th Edition. These documents are to be referred to prior to the commencement of any drainage works.

General Description

This development is phased and therefore the R12 specification [REVISION A] has been prepared for the works within the building and upto the first manhole chamber/ inspection chamber only. No further works on the external drainage has been done to date.

The contractor is reminded to use this specification for the drainage below ground only. Please ensure to review all other consultants drawings alongside the material prepared by Spillways Limited.

Revision E is a draft as-built record of the installation at the time of preparing the specification. Any products, devices or materials used which are other than those recommended by Spillways Limited are assumed to be designed by a specialist and Spillways Limited offer no design warranty on the performance or adequacy of that item. Revision P18 of the below ground drainage design should be referred to along with the Specification and details provided.

SURFACE WATER

Surface water routed by rainwater pipes and door threshold drainage will be conveyed into the below ground drainage system. Rainwater is aimed to be conveyed out of the footprint of the building in the shortest / efficient route.

FOUL WATER

Foul water is proposed to be generated within the development. Foul water will be routed by stacks and gullies and conveyed into the below ground drainage system.

General Below Ground Drainage System

Materials of pipe to be chosen by contractor as and where required however, consult the design engineer for any specific pipe requirements in instances of heavy loading during works or other special applications.

Pipes	Standards
Vitrified Clay (lateral drain connection to External Drains):	BS 65, BS EN 295-1
Ductile Iron (drainage internal to building):	BS EN 598

Surface water / rainwater drainage sources:

Rainwater downpipes (nonsiphonic), By Others.
Surface water gullies
Linear drainage channels

Foul drainage sources:

Discharge stack and branch pipes
Foul water gullies and shower gullies
Kitchen Drain Points
Plant Room Gullies
Kitchen Gullies

Pipes, bends and junctions:

To be confirmed by others

Accessories:

Access points;
Standard couplings;
Rodding points;
Sump pits;
Bitumen sealant.

Manholes:

Pre-cast Concrete Chambers (PCC)
Polypropylene Inspection Chambers (PPIC)

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Accessories: Manhole channels and branches
Slippers and benching
Access covers and frames

Disposal: To External Drainage

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Temporary Works

When required by the CA the contractor shall provide sufficient calculations and/or method statements to substantiate any proposed temporary works at least fourteen days prior to starting such works.

Adoptable Works and Standards

Works which are to be adopted shall be carried out in accordance with the adopting authority's standard specifications and requirements. Where inconsistencies occur between this Specification and the adopting authority standard specifications and requirements, the adopting authority standard specifications and requirement shall take precedence on adoptable works. The Contractor shall confirm with the adopting authority requirements with regard to inspection notices, approvals, procedures, submissions etc. in advance of any works. The above requirements shall also apply to areas of work already under the control of the Local Authority.

Below Ground Drainage System Design

Design:	Complete the design of the below ground drainage system in accordance with BS EN 752, BS EN 1295-1, BS EN 1610, and BS EN 437.
Ground conditions:	Refer to Site Ground Investigation Report. No evidence of contamination found however contractor should advise Spillways Limited of any contamination which may impact the robustness of the below ground drainage design.
Performance criteria:	Refer to Site Ground Investigation Report

Adaptors to Iron Drainage - Foul and Surface Water Drainage Internal to Building

Material and standard:	Cast Iron Fittings - to BS EN 598
Type:	DN 100 discharge stacks to DN 100 Iron Pipe DN 150 discharge stacks to DN 150 Iron Pipe
Manufacturer:	Hargreaves Foundry Drainage
Model:	Halifax Drain

Adaptors to Vitrified Clay Drainage – Lateral Drain Connection to External Drains

Material and standard:	Vitrified Clay Fittings - to BS 65, BS EN 295-1
Type:	DN 100 discharge stacks to DN 100 Vitrified Clay Pipe DN 150 discharge stacks to DN 150 Vitrified Clay Pipe
Manufacturer:	Naylor
Model:	Densleeve
Crushing Strength:	40kN/m

Pipe Bends and Junctions – Rigid Joints – Foul and Surface Water

Pipes and fittings:	From same manufacturer for each pipeline.
Material and standard:	Cast Iron - to BS EN 598 Vitrified Clay - to BS 65, BS EN 295-1
Manufacturer:	Cast Iron – Hargreaves Foundry Drainage Vitrified Clay - Naylor
Model:	Cast Iron - Halifax Drain Vitrified Clay - Densleeve
Sizes:	DN 100, DN 150

Surface Water Large Diameter Pipes

Pipes and fittings:	JFC Corripipe Twinwall Drainage System
Material and standard:	HDPE
Manufacturer:	JFC Plastics Ltd
Sizes:	DN 225, DN 300, DN 375, DN450

Perforated Land Drain Pipes – French Drain

Material and standard:	HDPE
Manufacturer:	JFC Plastics Ltd
Model:	JFC Corripipe Twinwall High Density Polyethylene Filter Pipe
Sizes:	DN 150mm
Accessories:	Pipe Couplers 67.5° Equal Junctions End Caps

Couplings

Standard:	Cast Iron - to BS EN 598 and Kitemark certified, or Agrément certified. Vitrified Clay - to BS 65, BS EN 295-1 and Kitemark certified, or Agrément certified. HDPE – to BS EN 681-1
Manufacturer:	Cast Iron – Hargreaves Foundry Drainage Vitrified Clay – Naylor HDPE – JFC Plastics Ltd
Model:	Cast Iron – Halifax Drain Two-Piece Ductile Iron Coupling – Standard and Transitional Vitrified Clay – Densleeve Couplings JFC Corripipe Twinwall High Density Polyethylene Filter Pipe

Saddle Connectors

Standards:	Cast iron: To BS 437 and Kitemark certified, or Agrément certified. Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified. Concrete: To BS 5911-6 and Kitemark certified, or Agrément certified. Plastics: To BS 4660 and Kitemark certified, or Agrément certified.
Material:	Clay.
Manufacturer:	Naylor
Sizes:	100, 150mm, 225mm, 300mm, 450mm

Manhole Chamber Internal Branches – Foul Water Manhole

Standard:	Vitrified Clay - to BS 65, BS EN 295-1
Manufacturer:	Naylor
Model:	Channel pipes and fittings
Material:	Vitrified Clay
Size:	As per latest drainage layout – Consult Spillways Limited for confirmation on latest drainage layout.
Channels and connections:	As per Spillways Limited drainage construction details drawing
Benching:	As per Spillways Limited drainage construction details drawing
Formwork for concrete surround:	As per Spillways Limited drainage construction details drawing

Access Covers And Frames

Standard:	To BS EN 124.
Types:	Double sealed and bolted for all Chambers Recessed Cover, Cast Iron Cover

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Loading: C250
D400

Manufacturer: R&B UK

Materials: To contractor design – details not available

Finishes: To contractor design – details not available



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Tracey-Concrete-Dra

Sizes: Refer to Manhole Schedule

Accessories: Stays to restrain covers
Standard Locking Bolts
Locking Keys
Lifting Keys (Ref: HKEY)
Moly Sealing Grease

Concrete Manhole Chambers – Surface, Foul and (INTERNAL)

Standard: BS EN 1917:2002/BS 5911-3:2010

Design: To structural engineers' details

Dimensions: Refer to drainage plan

Accessories: Cover Slabs
Catchpits
Sealing strips
Fixed Double Steps

Precast Concrete Manholes Chambers – Surface Water & Foul Water

Standard: To BS EN 1917, BS 5911-3

Manufacturer: Tracey Concrete

Model: Civils and Drainage Precast Concrete Manhole Chamber Rings

Material: Precast Concrete (Rings)

Size: 1000mm diameter
1200mm diameter
1500mm diameter
1800mm diameter

Accessories: Double stepped rungs
Catchpit bases
Sealing strips
Cover slabs
Adjusting units/Seating rings/Corbel slabs
Stepped Rungs

Additional Items: Refer to manhole schedule for catchpits 300mm Deep

Ground Stabilisation

Manufacturer: Tensar

Model: Geogrid – Design to be warranted by Tensar (specialist subject to detail design and levels).
Contractor to allow Geogrid to cover the entire area around the perimeter of the building. This

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product is recommended to be used for any pipes or foundations shallower than 600mm Cover for external areas immediately outside of the building footprint.

Manhole Chambers – PPIC – Foul and Surface Water Drainage

Standard:	To BS 7158:2001 & BS EN 13598
Manufacturer:	Wavin or Similar Approved (Contractor to Confirm)
Product reference:	Wavin Range 600 Inspection Chamber 450 Inspection Chamber - Code – 6D929 - Code – 6D928
Material:	Polypropylene
Shape:	Circular
Size:	As per latest drainage layout - Consult Spillways Ltd for confirmation on latest drainage layout.
Base units:	Wavin Inspection Chamber Base – Equal & Unequal – Various configurations 150mm INLETS + 100mm INLETS
Accessories:	Restrictor Access Caps Connector Kits

One Piece Gullies and Covers

Standards:	To BS EN 1253-1, -2, -3, -4 and -5; or
Cast iron:	To BS 437 and Kitemark certified, or Agrément certified.
Clay:	To BS EN 295-1 and Kitemark certified, or Agrément certified.
Concrete:	To BS 5911-6 and Kitemark certified, or Agrément certified.
Plastics:	To BS 4660 and Kitemark certified, or Agrément certified.
Polypropylene:	To BS EN 1852-1.

Gullies - Surface Water & Foul Water (INTERNAL)

Manufacturer:	WADE
Model:	Vari-Level - Cast Iron body with Foul Air Traps
Type:	Contractor's choice
Cover:	To architect's specification

Road Gully Pots - Surface Water (EXTERNAL)

Manufacturer:	FP McCann
Model:	Concrete Road Gully 450mm Internal Diameter
Type:	Depth 750mm
Cover:	Standard 100mm Thick Gully Cover

Road Gully Grating - Surface Water (EXTERNAL)

Manufacturer:	Wreckin
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Model: DGH0D6/4545/KT
Range: Tristar
Type: Depth 150mm
Grade: D400

Linear Channel Drains - Surface Water

Manufacturer: ACO
Model: M100D – Door Threshold
M200D – Landscape Drainage
Grating: To architect's specification
Accessories: Universal Sump Units
Multifunctional End Caps
Roddable Foul Air Traps
Step Connectors
Brickslot access points and covers

Cellular Surface Water Storage Tanks

TANK-01 & TANK-02

Manufacturer: SDS Water Infrastructure Systems
Model: GEOlight 400
Unit Dimensions: Refer to Drainage Details Sheet
Overall Dimensions: As per latest below ground drainage plan - Consult Spillways Ltd for confirmation on latest below ground drainage plan
Volume: As per latest below ground drainage plan - Consult Spillways Ltd for confirmation on latest below ground drainage plan
Invert Level: As per latest below ground drainage plan - Consult Spillways Ltd for confirmation on latest below ground drainage plan
Cover Level: Refer to landscaping strategy
Surround: Refer to Spillways typical drainage details

Tanking Membrane for Cellular Storage Tanks

Manufacturer: Visqueen
Model: High Performance Urban Drainage Geomembrane

Geotextile Surround for Cellular Storage Tanks

Manufacturer: As per SDS Specified
Model: As per SDS Specified

Flow Control Devices – Surface Water

Manufacturer: CROWN WATER
Model: 147mm QR5F Type Vortex Flow Control

Design Flowrate: 11.5.0 l/s
Chamber Size: ø1800mm
Outflow Pipe Dimensions: ø450mm
Note: TO BE UPGRADED AS PART OF THE PERMANENT DESIGN

Flow Meter – Foul Water

Manufacturer: Pulsar Measurement

Model: DB6 Ultrasonic Transducers
Microflow – 0.2 – 6 m/s
FlowCERT

Chamber Size: 1200mm
Outflow Pipe Dimensions: ø225mm

Petrol Interceptor

Manufacturer: Marsh Industries
Model: NSBP 15 GA
Note: TO BE UPGRADED AS PART OF THE PERMANENT DESIGN

Granular Sub-Base Material

Standard: To Highways Agency Volume 1, 'Specification for Highway Works', Type 1
Unbound mixtures for sub-base.
Recycled content: Contractor's choice

Execution

Stripping Out

To be carried out safely by a competent contractor. Ensure Health and Safety is adhered to at all times.

Extent of stripping out: As per Spillways Limited drainage layout drawing

Existing Drains

Every drain to be tested by the contractor prior to confirm if it is live or redundant. Spillways Limited to be notified immediately upon confirmation.

Setting out: Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against drawings. Report discrepancies.

Protection: Protect existing drains to be retained and maintain normal operation if in use

Excavated Material

Turf, topsoil, hardcore, etc: Set aside for use in reinstatement.

Selected Fill for Backfilling

Selected fill: As-dug material, free from vegetable matter, rubbish, frozen soil and material retained on a 40 mm sieve.

Compaction: By hand in 100 mm layers

Lower Part of Trench - General

Trench up to 300 mm above crown of pipe: Vertical sides, width as small as practicable.

Width (minimum): External diameter of pipe plus 300 mm or as advised by construction details.

Lower Part of Trench – Transition Depth

Trench widths up to 300 mm above crown of pipe (maximum):
 DN 100 pipelines more than 6.0 m deep: 600 mm.
 DN 150 pipelines more than 5.4 m deep: 700 mm.
 DN 225 pipelines more than 4.0 m deep: 800 mm.
 DN 300 pipelines more than 2.9 m deep: 900 mm

Type of Subsoil

General: Where type of subsoil at level of crown of pipe differs from that stated for the type of bedding, surround or support, give notice.

Formation for Beddings

Timing: Excavate to formation immediately before laying beddings or pipes.

Mud, rock projections, boulders, and hard spots: Remove. Replace with consolidated bedding material.

Local soft spots: Harden by tamping in bedding material.

Inspection of excavated formations: Give notice

Pipes at Different Levels in Common Trench

Subtrench: Permissible provided soil of step is stable and unlikely to break away.

Subtrench not permissible: Trench depth as required for lower pipe. Increase thickness of bedding to upper pipe as necessary.

Lower pipe: Backfill with compacted granular material to at least halfway up higher pipe.

Clear horizontal distance between pipes (minimum):
Pipes up to DN 700: 350 mm.
Pipes exceeding DN 700: 500 mm.

Class S Surround to Bends and Junctions

Type of subsoil: As per site investigation report.

Trench width up to 300 mm above crown of pipe (maximum):
DN 100 nominal pipe size: 600 mm.
DN 150 nominal pipe size: 700 mm.
DN 225 nominal pipe size: 800 mm.
DN 300 nominal pipe size: 900 mm.

Granular material: Contractor's choice.
Pipe sizes DN 100 and DN 150: Size 4/10.
Pipe sizes DN 225 and DN 300: Size 4/10, 10/20 or 4/20.
Pipe sizes DN 375-500: Size 10/20 or 4/20.
Pipe sizes DN 600 and above: Size 10/20, 20/40, 4/20 or 4/40.

Bedding material: Granular, compacted over full width of trench.

Thickness (minimum): 50 mm for sleeve jointed pipes, 100 mm for socket jointed pipes. Where trench bottom is uneven, increase depth by 100 mm.

Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.

Initial testing before placing surround: Required.

Surround material: Granular.

Depth: To 50 mm above crown of pipe.

Compaction: By hand in 100 mm layers.

Backfilling material: Protective cushion of selected fill.

Depth: 150 mm (250 mm for adoptable sewers) above crown of pipe.

Compaction: By hand in 100 mm layers

Class Z Surround to Pipework Less Than 1.2m Deep

Type of subsoil: As per site investigation report.

Blinding material: Concrete (general).

Thickness (minimum): 25 mm.

Width: Full width of trench. Allow to set before proceeding.

Pipes temporary support: Folding wedges of compressible board. Prevent flotation.

Clearance under pipes (minimum): 100 mm. Adjust pipes to line and gradient.

Initial testing before placing surround: Required.

Surround material: Concrete (general).

Depth: To 150 mm above crown of pipe.

Width: Full width of trench.

Vertical construction joints location: At face of flexible pipe joints.

Material: 18 mm thick compressible board precut to profile of pipe.

Socketed pipes: Fill gaps between spigots and sockets with resilient material to prevent entry of concrete

Concrete Surround for Pipe Runs Near Foundations

Class Z surround:	Provide in locations where bottom of trench is lower than bottom of foundation and as follows (horizontal clear distance between nearest edges of foundations and pipe trenches):
Trenches less than 1 m from foundations:	Top of concrete surround not lower than bottom of foundation.
Trenches more than 1 m from foundations:	Top of concrete surround not lower than Dmm below bottom of foundation, where D mm is horizontal distance of trench from foundation, less 150 mm
Laying Pipes	
Laying pipes:	To true line and regular gradient on even bed for full length of barrel with sockets (if any) facing up the gradient.
Ingress of debris:	Seal exposed ends during construction.
Timing:	Minimize time between laying and testing

Tolerances in Pipelines

The position of the internal face of any pipeline shall not deviate from the line and level described in the agreement by more than ± 10 mm, provided that no pipe shall have a reverse gradient.

Where rising mains are laid to curves, the deflection at any pipe joint as laid shall not exceed three quarters of the maximum deflection recommended by the manufacturer.

Jointing Pipelines

Connections:	Durable, effective, and free from leakage.
Junctions, including to differing pipework systems:	With adaptors intended for the purpose.
Cut ends of pipes:	Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets.
Jointing or mating surfaces:	Clean and, where necessary, lubricate immediately before assembly.
Allowance for movement:	Provide and maintain appropriate clearance at ends of spigots as fixing and jointing proceeds.
Jointing material:	Do not allow to project into bore of pipes and fittings

Concrete Surround for Crossovers

Class Z surround:	Provide where two pipelines (other than plastics pipes) cross with less than 300 mm separation.
Extent, on both pipes:	1 m centred on the crossing point, and beyond as necessary to come within 150 mm of nearest flexible joints.

Pipelines Passing Through Structures

Pipelines that must be cast in or fixed to structures (including manholes, catchpits, and inspection chambers): Provide 600 mm long rocker pipes adjacent to the external face of the structure (or both faces where appropriate, e.g., walls to footings), with flexible joints at both ends.

Distance to rocker pipe from structure (maximum): 150 mm.

Provision for movement for pipelines that need not be cast in or fixed to structures (e.g., walls to footings):

Rocker pipes as specified above or openings in the structures to give 50 mm minimum clearance around the pipeline.

Closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin

Bends at Base of Soil Stacks

Type:	Nominal 90° rest bends.
Radius to centreline of pipe (minimum):	200 mm.
Height of invert of horizontal drain at base of stack below centreline of lowest branch pipe (minimum):	450mm.
Bedding:	Do not impair flexibility of pipe couplings.
Material:	Concrete (general)

Installing Flexible Couplings

Ends of pipes to be joined:	Cut cleanly and square.
Outer surfaces of pipes to be joined:	Clean and smooth. Where necessary, e.g., on concrete or iron pipes, smooth out mould lines and/ or apply a cement grout over the sealing area.
Clamping bands:	Tighten carefully to make gastight and watertight seals.

Initial Testing of Pipelines

Before testing:	Cement mortar jointing: Leave 24 h. Solvent welded pipelines: Leave 1 h.
Method:	Block open ends of pipelines to be tested and pressurise. Air test short lengths to BS EN 1610.

Trench Supports

Removal of trench supports and other obstacles: Sufficient to permit compacted filling of all spaces.

Backfilling to Pipelines

Backfilling above top of surround or protective cushion: Material excavated from trench, compacted in layers 300 mm (maximum) thick.

Heavy compactors: Do not use before there is 600 mm (total) of material over pipes.

Backfilling Over Concrete

Minimum times from placing concrete: Backfilling generally: 24 h.
Heavy compactors and traffic loads: 72 h.

Backfilling Under Roads and Pavings

Backfilling from top of surround or protective cushion up to formation level: Granular sub-base material, laid and compacted in 150 mm layers.

Temporary Bridges

Trench bridges: To prevent construction traffic damaging pipes after backfilling.

Installing Concrete Inspection Chamber (refer to structural details)

Fixing Manhole Steps

Fixing:	Secure to chamber wall.
Positioning:	300 mm vertical centres staggered 300 mm horizontally, with lowest step 300mm (maximum) above benching and top step 450 mm (maximum) below top of cover.

Jointing Concrete Manhole Chambers Section

Jointing and sealing:	For concrete manholes.
Inner joint surface:	Trim surplus jointing material extruded into chamber and point neatly

Laying Conventional Channel, Branches and Benching

Main channel:	Bed solid in 1:3 cement: sand mortar.
Branches:	Connect to channel, preferably at half pipe level, so that discharge flows smoothly in direction of main flow.
Branches greater than nominal size 150 mm:	Connect the branch soffit level with the main drain soffit.
Connecting angles more than 45° to direction of flow: Use three-quarter section channel bends.	
Benching material:	Concrete (adoptable manhole benching and topping).
Profile:	Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.
Topping material:	Concrete (adoptable manhole benching and topping).
Application:	Before benching concrete has set, and with dense smooth uniform finish.

Installing Access Covers and Frames

Seating:	Concrete as instructed by structural engineers.
Bedding and haunching of frames:	Continuously.
Material:	1:3 cement:sand mortar.
Top of haunching:	30 mm below surrounding surfaces.
Horizontal positioning of frames:	Centred over openings. Square with joints in surrounding paving.
Vertical positioning of frames:	Level; or marry in with levels of surrounding paving.
Permissible deviation in level of external covers and frames: +0 to -6 mm	

Exposed Openings in Inspection Chambers, Access Points, Fittings and Equipment

General:	Fit purpose made temporary caps. Protect from site traffic.
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Removal of Debris and Cleaning

Preparation:	Lift covers to manholes, inspection chambers and access points. Remove mortar droppings, debris, and loose wrappings.
Timing:	Before cleaning, final testing, CCTV inspection if specified, and immediately before handover.
Cleaning:	Thoroughly flush pipelines with water to remove silt and check for blockages. Rod pipelines between access points if there is any indication that they may be obstructed.
Washings and detritus:	Do not discharge into sewers or watercourses.
Covers:	Securely replace after cleaning and testing.

Temporary Measures

Water used to stabilize tanks and the like during installation:	Drain
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Final Testing of Private Gravity Drains and Sewers up to DN 300

Before testing:	Cement mortar jointing: Leave 24 h. Solvent welded pipelines: Leave 1 h.
Standard:	To Building Regulations.
Method:	Contractor's choice

Final Testing of Adoptable Sewers

Standard (sewers up to and including size DN 1800): to Sewers for Adoption 7th Edition

Water Testing of Manholes and Inspection Chambers

Timing:	Before backfilling.
Standard:	Exfiltration: To BS EN 1610.
Method:	Testing with water (method W).
Infiltration:	No identifiable flow of water penetrating the chamber.

CCTV Inspection of Adoptable Pipelines

General:	Permit the Adopting Authority or its agent to carry out and record internal CCTV inspection of pipelines and associated manholes after completion.
Locations to be inspected:	As per Spillways Limited drainage layout drawing. Contractor to report back to Spillways Limited upon project completion. Spillways Limited will provide locations drawing
Pipelines under highways:	Complete construction, except for laying of wearing course, before inspection.

Lifting Keys

Lifting keys:	Supply suitable keys for each type of access cover.
Timing:	At completion.

Operation Manual

Contractor to:	Provide copies all material specifications Installation and Maintenance guides Operational manuals Maintenance manuals
For:	Copies of above to be left for occupiers of building. Copies to be sent to Spillways Limited

From: Steve Burns <steve@groundtechuk.co.uk>
Sent: 21 April 2023 12:59
To: johnhuyton@rubycivils.com
Subject: FW: New site- Manchester Airport. - MIM
Attachments: CUST NSBP 15 GA (Rev.B).pdf; MI-separators-installation-operation-manual-0921-RevB.pdf

Here you go John...

Bypass Separator Class 1	
Marsh product code	NSBP15
Product description	Hydroil Bypass Separator
Peak flow rate [l/s]	150
Drainage area [m ²]	8510
Length [m]	4.03
Diameter [m]	1.2
Height [m]	1.8
Inlet invert [m]	0.9
Inlet connection [mm]	315
Outlet invert [m]	0.95
Outlet connection [mm]	315
Number of turrets	2

All Marsh Hydroil Separators are designed and tested to **BS EN858 parts 1 & 2** and are manufactured from virgin resin offering exceptional durability including a **25 year Structural Guarantee**

Heavier duty units installed deeper than 2m to inlet invert are readily available and costed to site requirements

Venting: Vent should terminate 2.4m above ground & 1m away from opening windows, covered to prevent debris access.

Please see attached standard generic drawings and installation details and do not hesitate to contact me should you require any further assistance or information regarding this quotation

Quotation valid for 30 days

Site off load required ***

- Please note that due to production processes, dimensions of finished units are within a tolerance of +/- 2.5%.

Regards

Steve Burns
Managing Director



Unit D, Parkside Business Park
Kirkstead Way
Golborne
Warrington
WA3 3PY

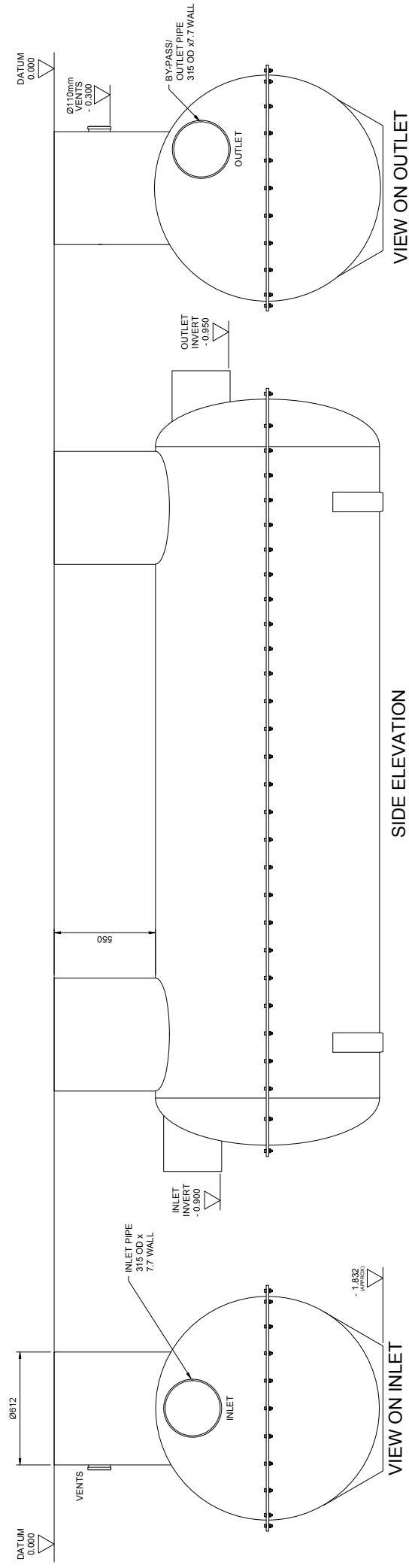
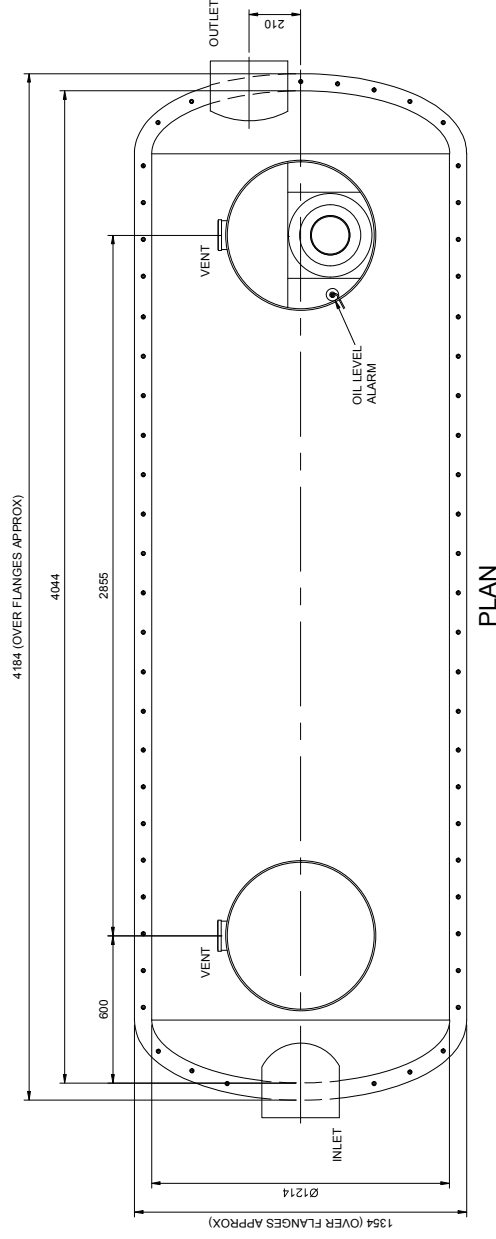
Tel: 01942 271784
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E-Mail Steve@groundtechuk.co.uk
Web: www.groundtechuk.co.uk



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MAX. FLOW RATE : 150 LPS.

[illegible]

Marsh Industries

Tank Warranty

This warranty covers the Marsh range of underground tanks (domestic and commercial sewage treatment plants, pump stations, oil separators, cesspools and septic tanks for off-mains drainage) if installed strictly in accordance with the company's installation procedures. These procedures are explained in the company's installation manuals that have accompanied the delivery of the tank.

The units must be installed and the design be by a qualified consultant or engineer. During installation, photographs of each stage should be taken and recorded to show the correct methodology has been undertaken throughout.

From the beginning to completion of the installation please take into account the following factors; the local ground conditions, water table/surface water and the depth of excavation. The backfill surround must meet the engineer's specifications taking into account the depth, seasonality, external loadings and traffic loadings, along with ground and surface water conditions.

This tanks must only be used for holding the effluent and water that it is designed for. Corrosive liquids, high temperatures or adverse ground conditions will invalidate the warranty.

This warranty covers manufacturing and material specification only and is valid for twenty five years from date of manufacture.

Marsh Industries' options for liability are limited to either repairing the tank, issuing a replacement tank to site or refunding the original purchase cost. Marsh Industries is not liable for installation and labour charges, delivery costs or any other consequential losses.

Damage to covers, frames, filters, pumps, compressors, alarms, pipework are not covered by this warranty. Damage by interference or tinkering will invalidate this warranty.



Marsh Industries

Marsh Hydroil: Oil separators

Bypass separators

Full retention separators

Forecourt separators

Wash-down separators and silt traps

Alarm systems



WE are the **innovators** in domestic, commercial and agricultural waste and surface water treatment products

WE are Marsh Industries

Our brand communicates the straight talking approach we have become known for

WE deliver world-class waste and surface water products and solutions to the domestic, commercial and agricultural sectors from our UK manufacturing plants in Kettering and Bridgwater.

WE think smarter

Efficiently meeting the demands of our customers

We strive to be recognised as a collaborative and trusted partner for our customers, aligned to their business, and with a reputation for providing quality products that really do add value.

WE innovate

Enabling technologies that deliver tangible benefits

Working across many areas of the UK and European construction sectors our specialist 'innovation' team combines 100+ years' experience of designing, manufacturing and testing water/wastewater treatment products that are proven to be economic, efficient and environmentally sensitive.

WE comply

With UK/EU building and environmental regulations

Our products are fully type-tested and certified to ensure compliance with relevant environmental permitting programmes and Building Regulations.

WE deliver

UK nationwide and overseas

With one of the largest merchant distributor networks available in Europe, customers specify Marsh products and services because they know WE deliver from a solid foundation of knowledge, experience, product quality and proven performance.

WE support

Specialist services to further enhance customer requirements

There are times when our customers need a little extra support. Whether this is on-site advice, backup support, specialist testing or bespoke project solutions, WE offer a range of services when and where required.

TOGETHER we are a strategic partnership

Our core strength lies in the knowledge, experience and enthusiasm of our staff and our customers combined



Marsh Hydrooil separators undergoing testing at PIA GmbH in Aachen, Germany



Marsh Hydrooil separators are tested and approved by PIA GmbH



Oil separators

Separation by flotation and settlement

Oil separators are designed to prevent oil and other hydrocarbons from entering the drainage system. They separate oil from water, and safely retain the oil until it is removed.

Oil cannot be treated easily and will therefore cause severe pollution if allowed to enter mains sewers or drainage fields. Statutory controls enforce strict regulations on the discharge of such pollutants.

Separators should be used in such applications as petrol stations, industrial yards and garages; or virtually anywhere that a risk of oil contamination exists.

Discharge requirements for oil separators may vary in different areas of the country and it is therefore essential to consult the appropriate environmental controlling authority prior to specifying an oil separator. If the discharge is to a public sewer then local Building Control, the Water Authorities and water companies should also be contacted.

Separator types and principles of operation

Classes

Separators are classed in two categories based on performance under standard test conditions.

Class 1 separators are designed to achieve a discharge concentration of less than 5mg/litre of oil. These separators are required for discharges to surface water drains and the water environment.

Class 2 separators are designed to achieve a discharge concentration of less than 100mg/litre of oil under standard test conditions. They are suitable for dealing with discharges where there is a lower quality requirement, such as discharges to the foul sewer.

Both classes can be produced as 'full retention', 'bypass' or 'forecourt' separators as explained below.

Bypass separators

Bypass separators treat all flows from rainfall events of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows higher than 6.5mm/hr are designed to bypass the separator.

These separators are used in a 'low risk' environment where there is no requirement to provide full treatment for the flow; for example a car park where the risk of a significant spillage is small.

Full retention separators

Full retention separators treat the full flow that is delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr.

These separators are used where there may be a 'high risk' of a significant fuel spillage, such as vehicle workshops

Forecourt separators

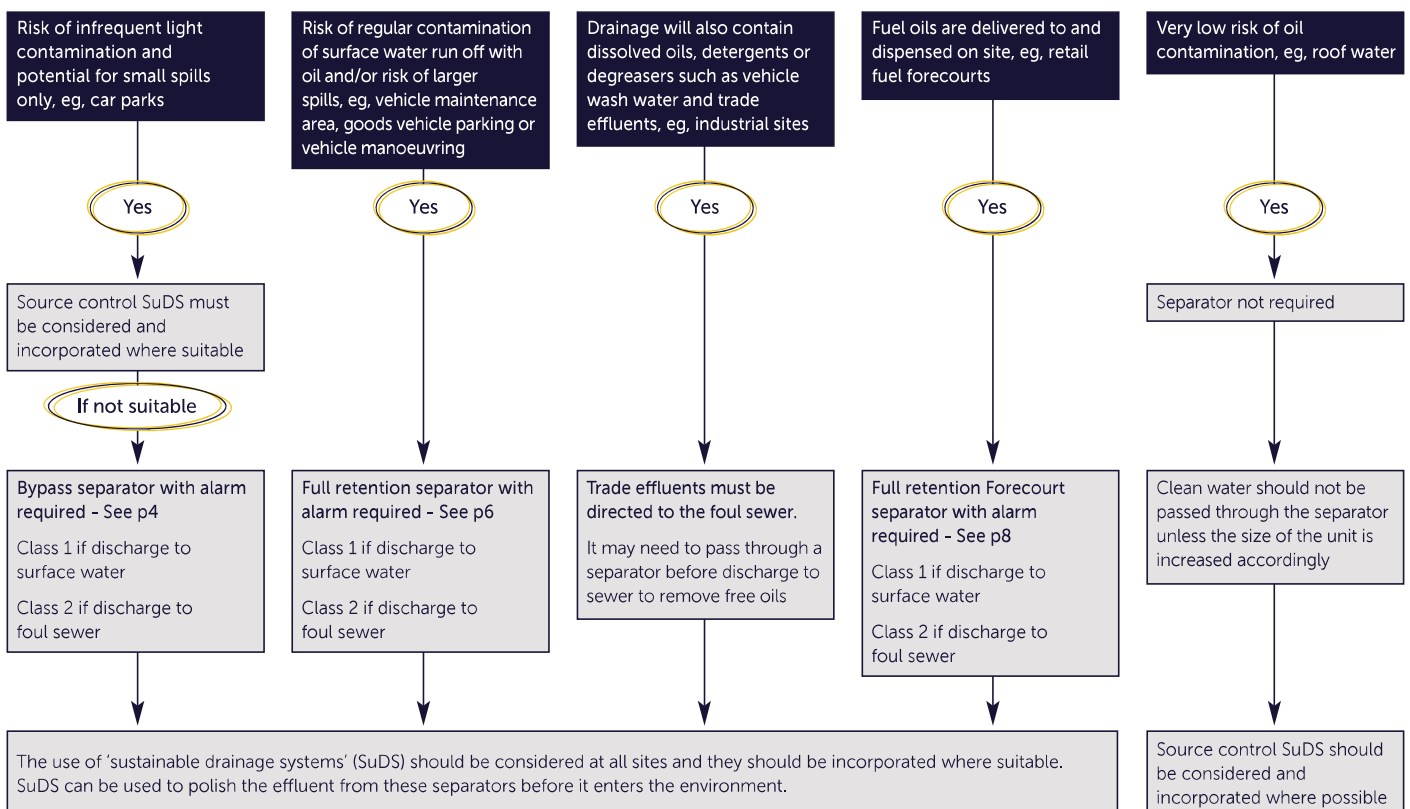
Forecourt separators are a type of full retention separator, however they are specifically designed to store the maximum spillage likely to occur on a petrol station forecourt.

These separators are manufactured to a specific size in order to retain the potential spillage from a single compartment of a road tanker – currently up to 7,600 litres in the UK.

Wash-down separators and silt traps

It is a legal requirement to install a silt trap or wash-down separator on commercial sites, such as vehicle wash bays, where there is an environmental risk of contamination from dirt, brake dust, traffic film residue, cleaning agents, oil, etc.

Choosing the right separator



Bypass separators

For areas at 'low risk' of oil contamination

Overview

Bypass separators are used in a 'low risk' environment where there is no requirement to provide full treatment for the flow; for example a car park where the risk of a significant spillage is small.

Designed and tested to BS EN858 parts 1&2, Marsh Hydrooil bypass separators are manufactured from virgin unfilled resin offering exceptional durability, impact resistance and are guaranteed to be watertight and of uniform thickness. These combined properties ensure that the full range of separators stand up to the most rigorous conditions during their service life.

Internal working components, such as coalescing filters, weirs, oil skimmer plates, and their configurations offer the most modern and efficient oil/water separation capability available to the market today.

A wide choice of inlet and outlet positions are available on the units - detailed requirements should be provided at time of order (standard inlet and outlet positions will otherwise be fitted).

Operating principle

Marsh Hydrooil bypass separators are designed to treat 10% of peak flow.

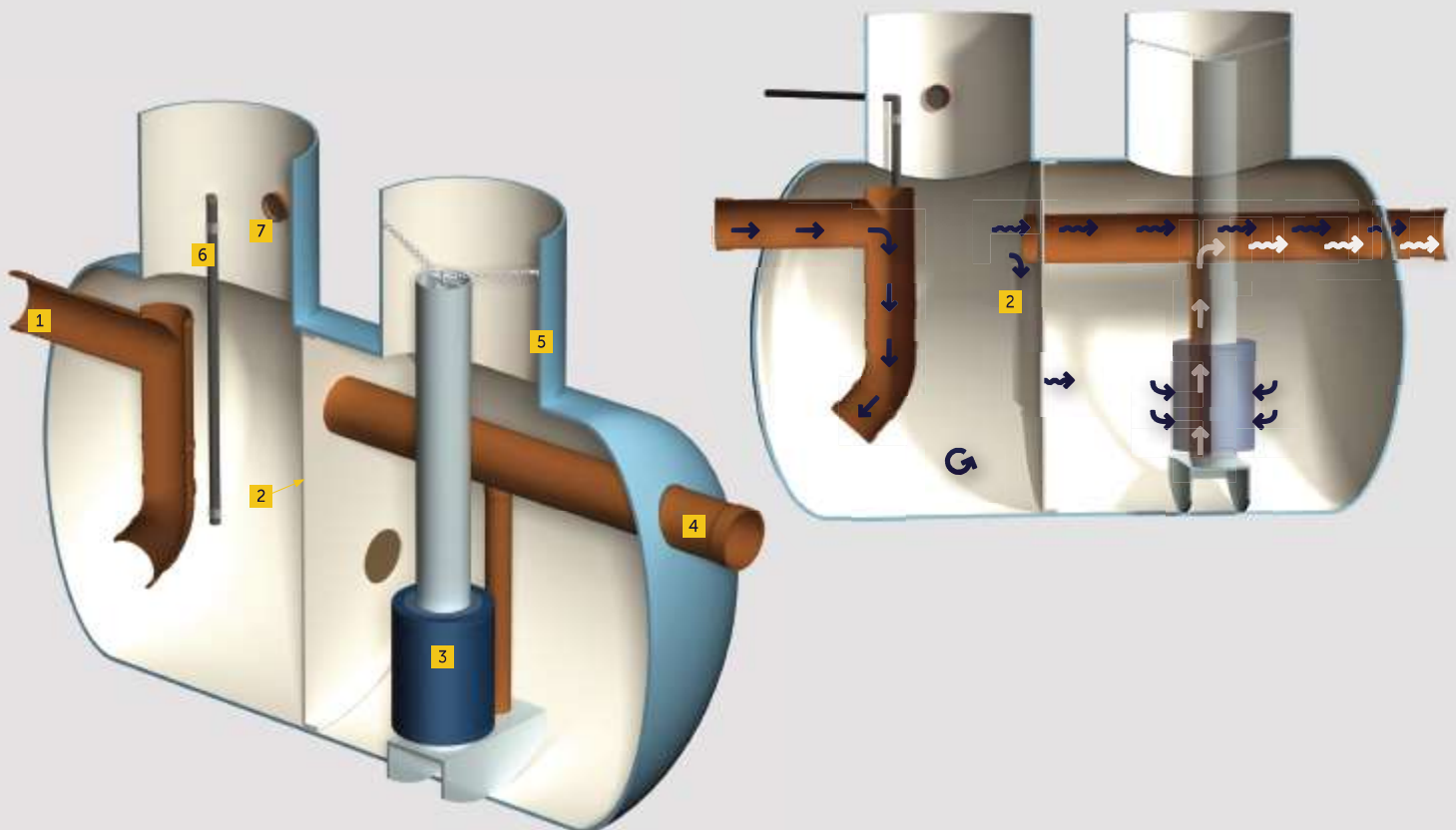
The drainage areas served by each separator are determined in accordance with both BS EN858 parts 1&2, but also with reference to a formula provided by the Environment Agency, where $NSB=0.0018 \times A$ (catchment area in m^2). Flows from higher rainfall rates are allowed to bypass the main separation chamber.

Key

- 1 Inlet
- 2 Oil skimmer plate
- 3 Coalescer
- 4 Outlet
- 5 Access turret
- 6 Level alarm dip pipe
- 7 Air vent

Flowpath

- ➡ Oil/water mixture
➡ Water



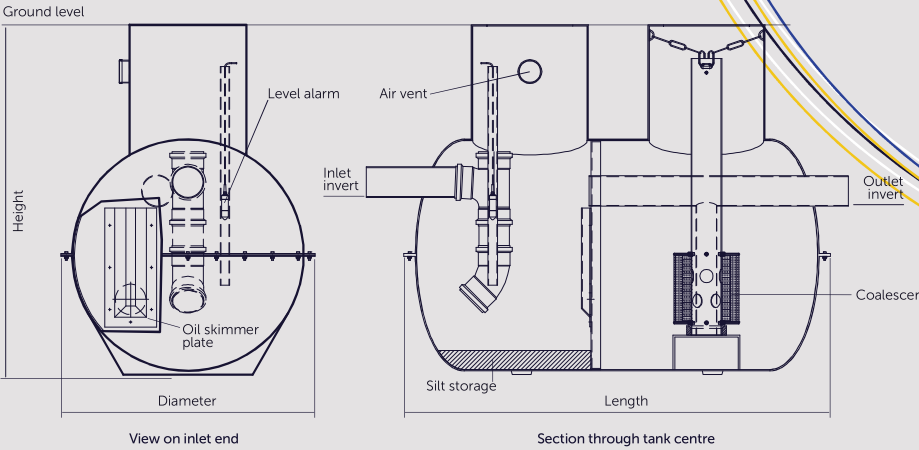
Benefits

- Designed and tested to meet latest UK and European standards
- Corrosion resistant
- Tank shells guaranteed for 25 years with a design life of 50 years
- Heavy duty shells enable installation in all ground conditions
- Easy access turrets for maintenance and servicing (Turret guards optional)
- Various alarm types available (Required by EN858-1)
- Variable invert depths and inlet/outlet configurations to suit individual site conditions
- Vented turrets dissipate excessive fumes and vapours

Typical applications

- Car parks
- Roadways
- Industrial estates
- SuDS

Specifications



Bypass separator range

Model	Max flow litre/sec	Drainage area m ²	Silt storage litres	Oil storage litres	Diameter	Length	Height	Connection size	Inlet invert	Outlet invert
NSBP 3	3	1700	300	45	1200	2100	1840	160	900	950
NSBP 4.5	4.5	2550	450	67.5	1200	2100	1840	160	900	950
NSBP 6	6	3400	600	90	1200	2100	1840	160	900	950
NSBP 8	8	4530	800	120	1200	2110	1840	160	900	950
NSBP 10	10	5660	1000	150	1200	2760	1840	160	900	950
NSBP 15	15	8510	1500	225	1200	4030	1840	200	900	950
NSBP 18	18	9940	1800	270	1800	2380	2440	200	900	1000
NSBP 20	20	11370	2000	300	1800	2620	2440	200	900	1000
NSBP 25	25	14185	2500	375	1800	3180	2440	250	900	1000
NSBP 30	30	17000	3000	450	1800	3740	2440	250	900	1000
NSBP 40	40	22650	4000	600	1800	4860	2440	315	900	1000
NSBP 45	45	25325	4500	675	1800	5420	2440	315	900	1000
NSBP 50	50	28000	5000	750	1800	5980	2440	315	900	1000
NSBP 60	60	32333	6000	900	2500	4006	3140	315	900	1000
NSBP 70	70	36665	7000	1050	2500	4566	3140	315	900	1000
NSBP 75	75	41000	7500	1125	2500	4886	3140	315	900	1000
NSBP 80	80	45330	8000	1200	2500	5126	3140	315	900	1000
NSBP 100	100	56660	10000	1500	3000	4674	3640	315	900	1000
NSBP 125	125	70820	12500	1875	3000	5713	3640	400	900	1000

- Notes:
- > The dimensions given on this page are for guidance only
 - > For precise tank sizes and configurations, please contact Marsh Industries
 - > Number of access shafts will be built to suit site specifications and to maintain safe access for emptying
 - > All dimensions in mm

Full retention separators

For areas at 'high risk' of oil contamination

Overview

Full retention separators are used where there may be a 'high risk' of a significant fuel spillage, such as vehicle workshops

Designed and tested to BS EN858 parts 1&2, Marsh Hydrooil full retention separators are manufactured from virgin unfilled resin offering exceptional durability, impact resistance and are guaranteed to be watertight and of uniform thickness. These combined properties ensure that the full range of separators stand up to the most rigorous conditions during their service life.

Internal working components, such as coalescing filters, automatic closure devices, weirs, oil skimmer plates, and their configurations offer the most modern and efficient oil/water separation capability available to the market today.

A wide choice of inlet and outlet positions are available on the units - detailed requirements should be provided at time of order (standard inlet and outlet positions will otherwise be fitted).

Operating principle

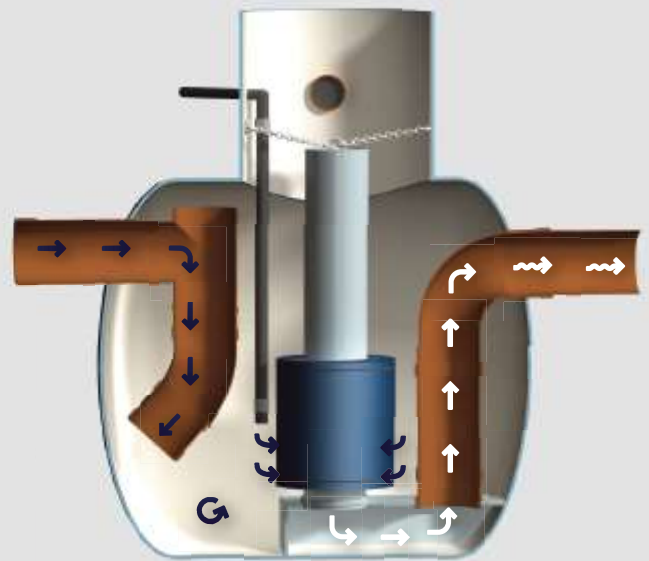
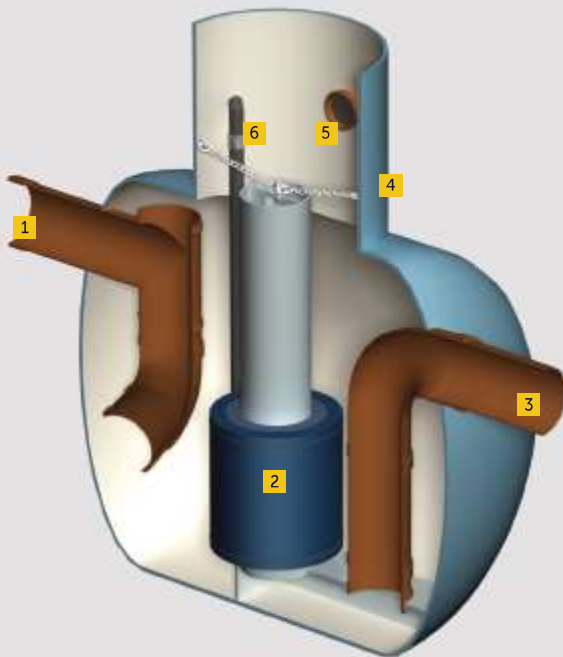
Marsh Hydrooil full-retention separators treat the full flow that is delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr.

Key

- 1 Inlet
- 2 Coalescer
- 3 Outlet
- 4 Access turret
- 5 Air vent
- 6 Level alarm dip pipe

Flowpath

- ➔ Oil/water mixture
➔ Water



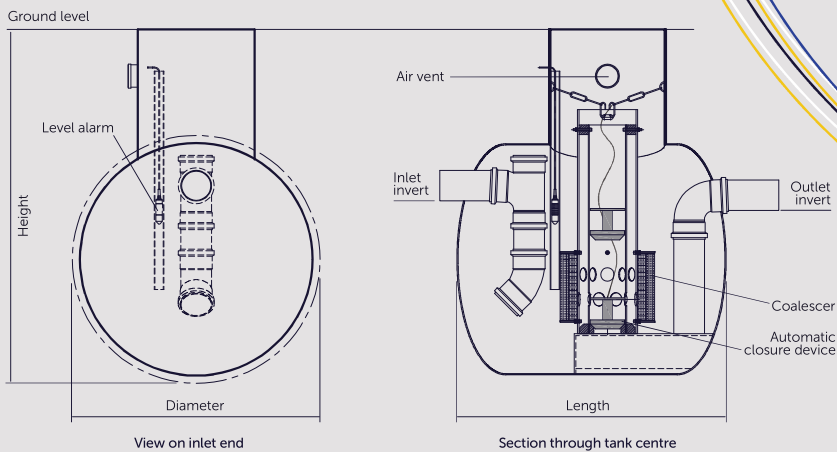
Benefits

- Designed and tested to meet latest UK and European standards
- Corrosion resistant
- Tank shells guaranteed for 25 years with a design life of 50 years
- Heavy duty shells enable installation in all ground conditions
- Easy access turrets for maintenance and servicing (Turret guards optional)
- Various alarm types available (Required by EN858-1)
- Variable invert depths and inlet/outlet configurations to suit individual site conditions
- Vented turrets dissipate excessive fumes and vapours

Typical applications

- Vehicle workshops
- Refuel facilities
- Fuel storage sites

Specifications



Full retention separator range

Model	Max flow litre/sec	Drainage area m ²	Silt storage litres	Oil storage litres	Diameter	Length	Height	Connection size	Inlet invert	Outlet invert
NSFR 3	3	170	300	30	1200	1400	1840	160	900	950
NSFR 4.5	4.5	255	450	40	1200	1700	1840	160	900	950
NSFR 6	6	340	600	60	1200	2400	1840	160	900	950
NSFR 8	8	453	800	80	1200	3200	1840	160	900	950
NSFR 10	10	566	1000	100	1200	3500	1840	160	900	950
NSFR 15	15	851	1500	150	1800	3600	2440	200	900	1000
NSFR 20	20	1137	2000	200	1800	4000	2440	200	900	1000
NSFR 30	30	1700	3000	300	1800	4800	2440	250	900	1000
NSFR 40	40	2265	4000	400	1800	6200	2440	315	900	1000
NSFR 50	50	2800	5000	500	1800	7500	2440	315	900	1000
NSFR 60	60	3233	6000	600	2500	5200	3140	315	900	1000
NSFR 65	65	3670	6500	650	2500	5600	3140	315	900	1000
NSFR 70	70	4318	7000	700	2500	6000	3140	315	900	1000
NSFR 80	80	4533	8000	800	2500	6600	3140	315	900	1000
NSFR 100	100	5666	10000	1000	2500	8600	3140	315	900	1000
NSFR 125	125	7082	12500	1250	3000	7200	3640	400	900	1000
NSFR 150	125	8500	12500	1500	3000	8400	3640	450	900	1000

Notes:

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- > Number of access shafts will be built to suit site specifications and to maintain safe access for emptying
- > All dimensions in mm

Forecourt separators

For areas at 'significant risk' of oil contamination

Overview

Designed and tested to BS EN858 parts 1&2, Marsh Hydroil forecourt separators are manufactured from virgin unfilled resin offering exceptional durability, impact resistance and are guaranteed to be watertight and of uniform thickness. These combined properties ensure that the full range of separators stand up to the most rigorous conditions during their service life.

Internal working components, such as coalescing filters, weirs, oil skimmer plates, and their configurations offer the most modern and efficient oil/water separation capability available to the market today.

A wide choice of inlet and outlet positions are available on the units - detailed requirements should be provided at time of order (standard inlet and outlet positions will otherwise be fitted).

Operating principle

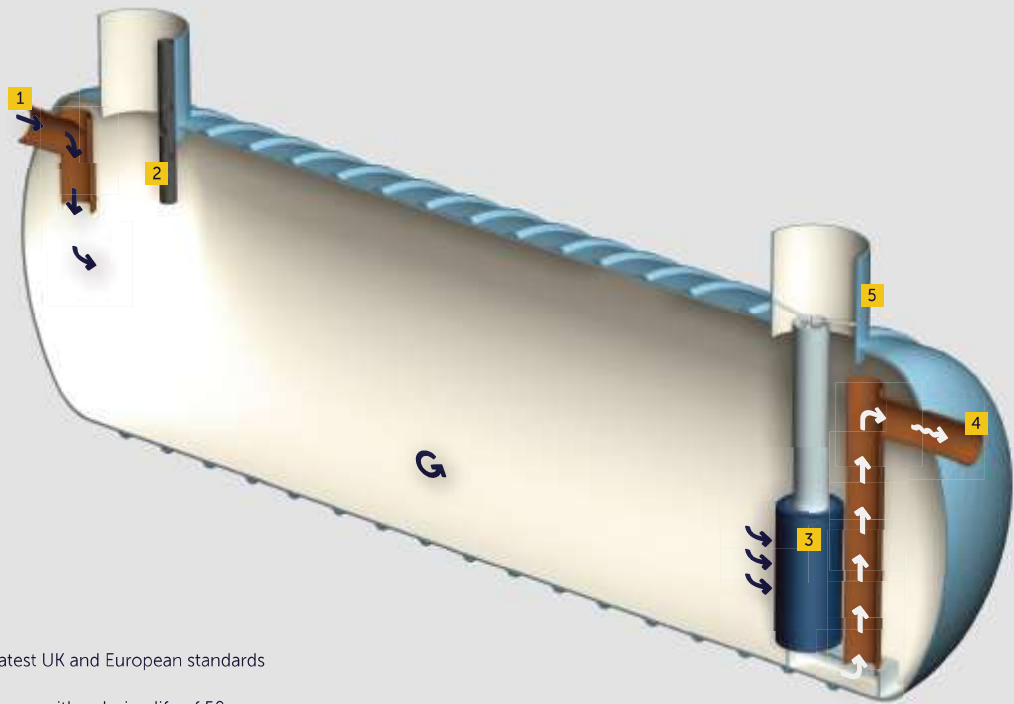
Marsh Hydroil forecourt separators are manufactured to a specific size in order to retain the potential spillage from a single compartment of a road tanker – currently up to 7,600 litres in the UK.

Key

- 1 Inlet
- 2 Oil level alarm (in 3" pipe)
- 3 Coalescer
- 4 Outlet
- 5 Access turrets

Flowpath

- Oil/water mixture
- Water



Benefits

- Designed and tested to meet latest UK and European standards
- Corrosion resistant
- Tank shells guaranteed for 25 years with a design life of 50 years
- Heavy duty shells enable installation in all ground conditions
- Easy access turrets for maintenance and servicing (Turret guards optional)
- Various alarm types available (Required by EN858-1)
- Variable invert depths and inlet/outlet configurations to suit individual site conditions
- Vented turrets dissipate excessive fumes and vapours

Typical applications

- Petrol stations
- Refuel facilities
- Fuel storage sites

Forecourt separator range

Model	Capacity litres	Diameter	Length	Height	Connection size	Inlet invert	Outlet invert
Class 1 C	10000	1800	4200	2200	160	700	800
Class 2 C	10000	1800	4200	2200	160	700	800
Class 1 PS	10000	1800	4200	2200	160	700	800
Class 2 PS	10000	1800	4200	2200	160	700	800

- Notes:
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 - > Number of access shafts will be built to suit site specifications and to maintain safe access for emptying
 - > All dimensions in mm

Illustrations shown for visual reference only

Wash-down separators / silt traps

Pollution prevention

Wash-down separators

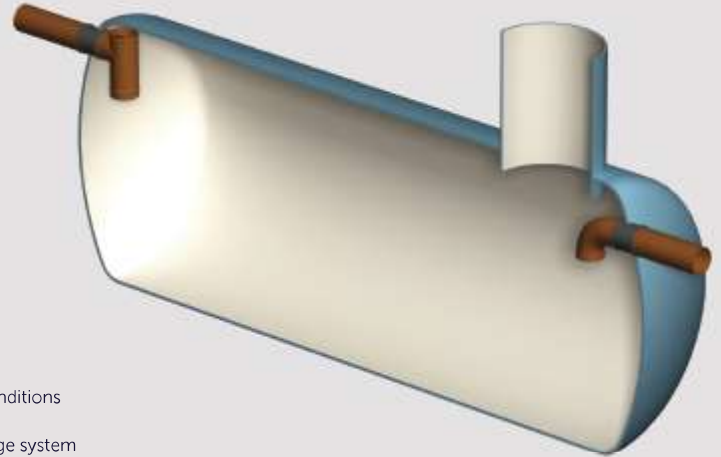
Available in capacities from 2000-20,000 litres, Marsh wash-down separators safely remove silt and debris from vehicle wash-down facilities.

These units are primarily used on car wash bays, pressure wash facilities or other cleaning facilities where the effluent must be discharged to the foul water drainage system.

It is a legal requirement to install a silt trap or wash-down separator on commercial sites, such as vehicle wash bays, where there is an environmental risk of contamination from dirt, brake dust, traffic film residue, cleaning agents, oil, etc. In all cases, you should contact your local building control or environmental agency for specific site requirements.

Benefits

- Heavy duty shells enable installation in all ground conditions
- Tank shells guaranteed for 25 years with a design life of 50 years
- Variable invert depths and inlet/outlet configurations to suit individual site conditions
- Easy access turrets for maintenance and servicing (Turret guards optional)
- Optional Polylok filter can further reduce pollutants from entering the drainage system
- Various alarm types available (Required by EN858-1)
- Corrosion resistant

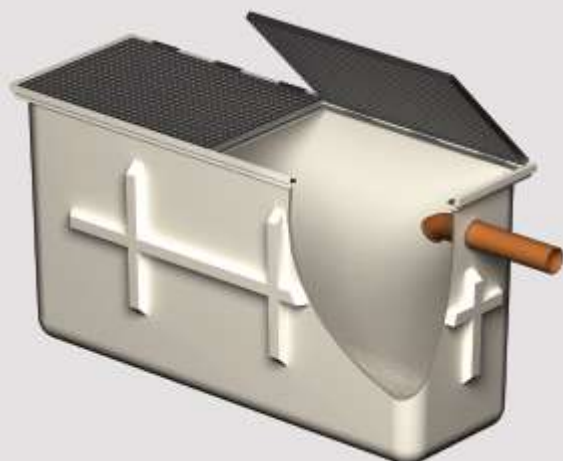


Wash-down separator range

Model	Capacity litres	Diameter	Length	Height	Connection size	Inlet invert	Outlet invert
WD2800	2800	1250	3000	1750	110	700	750
WD3800	3800	1250	4000	1750	110	700	750
WD4500	4500	1600	2650	2100	110	700	750
WD6000	6000	1800	2950	2300	110	700	750
WD8000	8000	1800	3600	2300	160	700	750
WD10000	10000	1800	4200	2300	160	700	750
WD12000	12000	1800	5000	2300	160	700	750
WD15000	15000	2500	3100	3000	160	700	750
WD18000	18000	2500	4100	3000	160	700	750
WD20000	20000	2500	4500	3000	160	700	750

Notes:

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- > For precise tank sizes and configurations, please contact Marsh Industries
- > Number of access shafts can be built to suit site specifications and to maintain safe access for emptying
- > All dimensions in mm



Silt traps

With a capacity of 1050 litres, Marsh silt traps provide effective storage of silt and debris from vehicle wash-down facilities.

Positioned ahead of an oil separator, the silt trap gathers and stores silt and sediment, and prevents it from entering the oil separator system.

Benefits

- Heavy duty body enables installation in all ground conditions
- Hinged, galvanised steel grating provides structural integrity and easy emptying
- Tank body guaranteed for 25 years with a design life of 50 years

Silt trap

Model	Capacity litres	Length	Width	Height	Connection size	Outlet invert
CST1	1050	2110	720	1140	110mm	315

Alarm systems

For oil separators, wash-down units and silt traps

Oil separator alarms monitor the level of liquid in separator units. An alarm signal is generated when there is an excessive level of oil, liquid or silt, or when the unit requires emptying.

An oil separator alarm is required on all separators to prevent hydrocarbons from entering the drainage system, and to ensure safe and economic operation of the unit.

Marsh Industries can supply various types of oil level, silt level and high level alarms, as well as bespoke options as required.

All alarms supplied by Marsh comply with EN858 parts 1&2, provide explosion protection and are ATEX approved.

Mains alarm

Suitable for sites where mains supply is available.

- Alert: Beacon or SMS text message (optional)
- High quality oil probe with 5m cable
- Probe range 200 metres max (dependent on cable style)
- 240V control panel
- IP65 ABS enclosure
- Supplied with junction box



Battery alarm

Battery alarms are suitable for sites where mains supply is not readily available or for retrofitting.

- Alert: Beacon or SMS text message (optional)
- Probe range: 200 metres max (dependent on cable style)
- Powered by 4x1.5V alkaline D cell batteries
- IP65 ABS enclosure
- Manual probe status check



Solar alarm

Suitable for remote locations and where mains power is unavailable.

- Alert: Beacon or SMS text message (optional)
- High quality oil probe with 5m cable
- Intuitive control panel
- Supplied with battery plus backup battery
- Supplied with clean contact relay
- Alarm stand rotates 360 degrees



For advice and guidance on choosing the right alarm for your site please contact Marsh Industries on +44 (0)1933 654582 or email separators@marshindustries.co.uk



Other products from the Marsh range

- o Domestic/commercial sewage treatment plants
- o Domestic/commercial Pump chambers
- o Septic tanks
- o Cesspools
- o Grease traps
- o Domestic/commercial rainwater harvesting systems

separators@marshindustries.co.uk
+44 (0)1933 654582
www.marshindustries.co.uk





Operation & Maintenance Instructions

Item: Crown Vortex Flow Control Unit

Operation.

The Vortex Flow Control unit is a surface water regulator. It is entirely self activating and requires no manual intervention.

Maintenance

The flow control unit requires no routine maintenance. Action is only required in the event of a blockage or suspected blockage.

Inspection

The chamber containing the flow control unit and disc valve should be inspected in line with normal practice. Any debris or silt should be removed. Any visible fixing bolts should be checked. If an internal blockage is suspected the vortex unit can be inspected internally and cleaned out by opening the inspection/access cover on the upstream end. The cover must be replaced and secured before the unit becomes operational.

Emergency Draindown

An emergency draindown valve is provided in the chamber to allow the upstream system to be drained independently, bypassing the flow control unit entirely. The draindown valve is operated by pulling the wire cable fixed near the chamber access.

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website: www.jfc.ie

Agrément Certificate
02/H069
Product Sheet 1

JFC CORRIPIPE TWINWALL DRAINAGE SYSTEM

**JFC CORRIPIPE TWINWALL HIGH-DENSITY POLYETHYLENE FILTER AND
CARRIER PIPES AND COUPLINGS**

This Certificate is issued under the Highway Authorities' Product Approval Scheme (HAPAS) by the British Board of Agrément (BBA) in conjunction with the Highways Agency (HA) (acting on behalf of the overseeing organisations of the Department for Transport; the Scottish Executive; the Welsh Assembly Government and the Department for Regional Development, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers' Group and industry bodies. HAPAS Agrément Certificates are normally each subject to a review every five years.

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to JFC CorriPipe Twinwall High-Density Polyethylene Filter and Carrier Pipes and Couplings, in a range of sizes for use in highway drainage for the collection and disposal of surface and sub-surface water.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal five-yearly review.



KEY FACTORS ASSESSED

Strength — the fittings have adequate strength to resist loads associated with installation and service (see section 5).

Performance of joints — the system will remain watertight under normal service conditions (see section 6).

Durability — the system will have a service life in excess of 50 years (see section 10).

The BBA has awarded this Agrément Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 18 July 2011

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
Chief Executive

Originally certificated on 28 March 2002 (150 mm, 225 mm and 300 mm) and on 23 December 2005 (375 mm, 450 mm and 600 mm).

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

HAPAS Requirements

Requirements

The general requirements for drains are contained in the Manual of Contract Documents for Highway Works (MCHW), Volume 1.

The general requirements for structural wall pipes and fittings are contained in the MCHW, Volume 1, Clause 518.

Further information and guidance is given in the MCHW, Volume 2 and Volume 3 (Drawing Numbers F1 and F2).

Additional site requirements may be included on particular contracts.

Regulations

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 1 *Description* (1.3), 2 *Delivery and site handling* (2.1), 3 *General* and 11 *General of the Installation* part of this Certificate.

General

This Certificate relates to JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm High-Density Polyethylene Filter and Carrier Pipes and Couplings.

The system is for use in highway drainage for the collection and disposal of surface and sub-surface water in accordance with Highways Agency (HA) requirements, *Manual of Contract Documents for Highway Works* (MCHW), Volume 1, Clause 518, and Volume 2, and the conditions set out in the *Design Considerations* and *Installation* parts of this Certificate.

Technical Specification

1 Description

1.1 JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm Diameter High-Density Polyethylene Filter and Carrier Pipes and Couplings are manufactured from a blended, black polyethylene by a twin extrusion process. The two high-density polyethylene pipes are extruded simultaneously, one inside the other, and heat-welded together in one continuous process.

1.2 The products tested and covered by this Certificate are manufactured from material with the specification given in Table 1.

Table 1 Material properties/specification

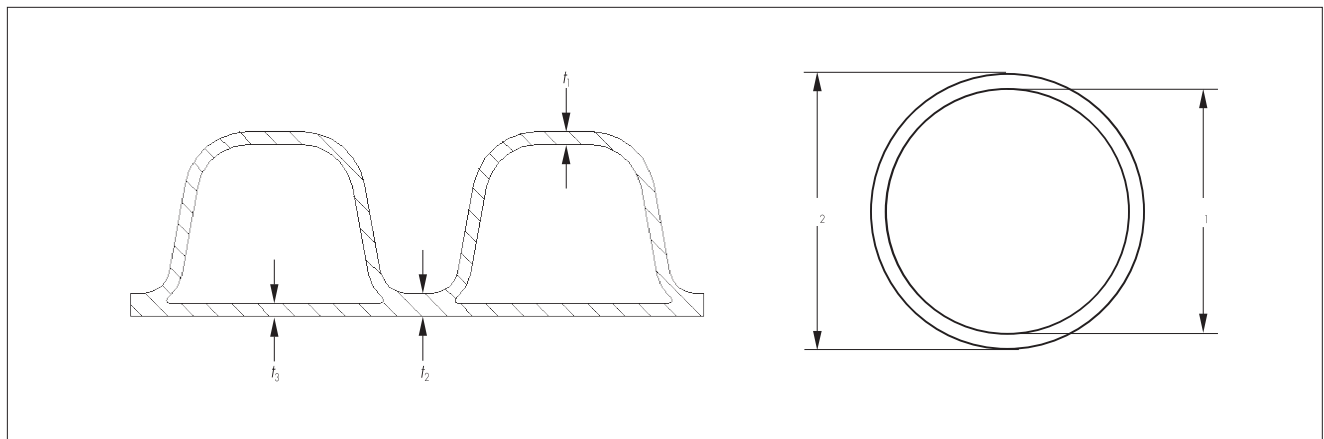
Property	Test method reference	Specification
Tensile properties	EN 638, ISO 527-2	≥18 MPa
Oxygen induction time	EN 728	≥4 mins
Melt flow rate	ISO 1133	≤0.75 g (10 mins) 2.16 kg at 190°C
Density	ISO 1183-3	≥935 kg·m ⁻³
Heat reversion	ISO 12091	N/A

1.3 The outer wall is corrugated and the inner wall is smooth finished. Details and dimensions are given in Table 2 and Figure 1.

Table 2 Pipe dimensions

Nominal internal pipe diameter d_1 (mm)	External pipe diameter d_2 (mm)	t_1 min (mm)	t_2 min (mm)	t_3 min (mm)	Nominal length (m)	Nominal weight (kg·m ⁻¹)	Pitch (mm)
150	178 ± 1.5	0.8	1.8	1.0	6	1.4	20.0
225	265 ± 2	0.9	2.6	1.2	6	3.0	25.5
300	354 ± 2.5	1.2	3.0	1.5	6	5.0	31.0
375	426 ± 3	1.5	3.5	1.5	6	6.0	39.9
450	512 ± 3	1.8	4.0	1.5	6	8.5	50.1
600	680 ± 4	2.1	4.3	1.8	6	14.5	66.9

Figure 1 Twinwall pipe



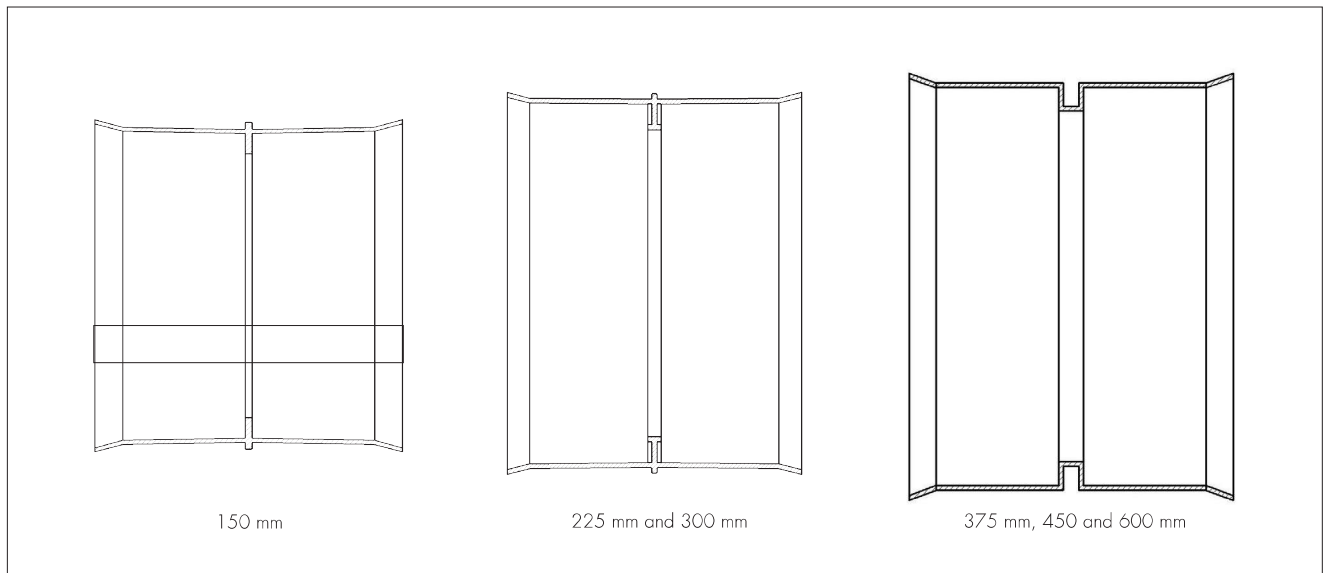
1.4 Black polypropylene couplings are available for the 150 mm, 225 mm and 300 mm sizes of pipe and black polyethylene for the 375 mm, 450 mm and 600 mm sizes (see Table 3 and Figure 2).

Table 3 Coupling dimensions

Nominal internal/external pipe diameter (mm)	Internal diameter		Nominal length (mm)	Nominal seal height (mm)
	at first dwell (mm)	at second dwell (mm)		
150/178	178	179	180	17.0
225/265	268	269	220	25.5
300/354	356	356.5	245	32.0
375/426	429	429	321	32.5
450/512	514	514	390	36.9
600/680	686	686	675	49.0

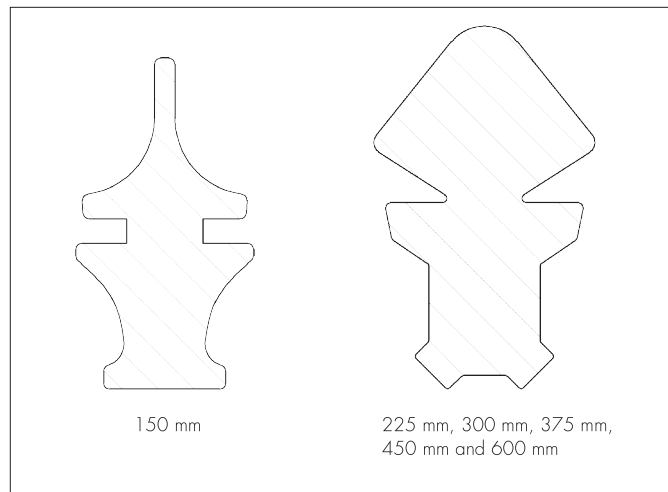
(1) Tapered along coupling length.

Figure 2 Couplings



1.5 Each coupling requires two rubber seals which are manufactured to BS EN 681-1 : 1996 (see Figure 3). The seals must be fitted in accordance with the installation instructions to ensure a watertight joint.

Figure 3 Seals

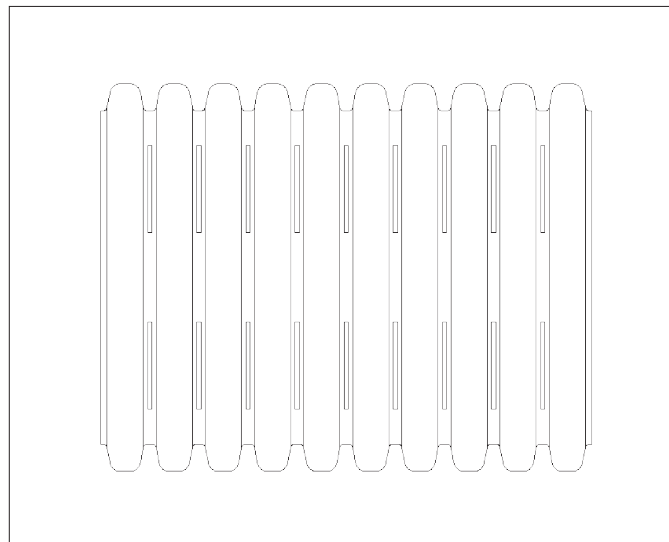


1.6 Pipes can be supplied either slotted or unslotted. Slotted pipe is available with the slots in the dwell between corrugations equally spaced around the circumference (see Table 4 and Figure 4).

Table 4 Slotted pipe details

Internal pipe diameter (nominal) (mm)	No of slots per alternate dwell	No of dwells per metre	Slot length (mm)	Slot width (mm)	Permeable area (minimum) (mm ² .m ⁻¹)
150	4	51	15 to 20	2.0 to 2.5	6120
225	4	39	15 to 30	2.0 to 2.5	4680
300	4	32	20 to 40	2.0 to 2.5	5120
375	3	25	42 to 85	2.7 to 3.3	4263
450	3	20	48 to 85	2.8 to 3.5	4024
600	3	15	76 to 106	2.9 to 3.5	4942

Figure 4 Details of slots (optional)



1.7 Continuous quality control is exercised during manufacture. Checks include:

Pipes

- dimensional accuracy
- impact resistance
- short-term stiffness

Couplings

- dimensional accuracy/visual check.

1.8 A label bearing the BBA identification mark is attached to each pipe length and fitting or to each pack of pipes.

2 Delivery and site handling

2.1 Handling, storage and transportation should be in accordance with BS 5955-6 : 1980.

2.2 When long-term storage is envisaged, JFC CorriPipe twinwall slotted and unslotted pipes and couplings should be protected from direct sunlight. If protection cannot be provided, consideration must be given to the effects of daily exposure to direct sunlight:

- up to 3 months — negligible UV degradation but possible extreme surface temperatures of up to 80°C may cause some localised distortion
- 3 months to 12 months — may have significant effect on the impact resistance and physical properties
- over 12 months — damage will occur unless protection provided.

2.3 The manufacturer has the option of adding chemicals to provide enhanced UV stability on request.

2.4 Pipes are generally delivered in prepacked bundles and should be retained in their packaging until installation.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm Diameter High-Density Polyethylene Filter and Carrier Pipes and Couplings.

Design Considerations

3 General

JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm Diameter High-Density Polyethylene Filter and Carrier Pipes and Couplings comply with the requirements of the Highways Agency (HA) *Manual of Contract Documents for Highway Works* (MCHW), Volume 1, Clause 518.5 for pipe, Clause 518.6 for couplings and Clause 518.7 for the system, and is suitable for use in highways for the collection and disposal of surface and sub-surface water.

4 Practicability of installation

The pipes are installed using traditional drain-laying methods in accordance with HA requirements and the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8. Due to the lightweight nature of the pipe material, handling and jointing are easily performed.

5 Strength

5.1 The pipes have a ring stiffness in excess of $6 \text{ kN}\cdot\text{m}^{-2}$, a creep ratio of less than 4 and adequate resistance to static loads.

5.2 The pipes have adequate resistance to impact loads to which they may be subjected during installation and in service.

6 Performance of joints

6.1 Joints on filter pipes made from pipe and couplings without the rubber seals are not partially watertight as defined in the MCHW, Volume 1, Clause 504.3.

6.2 Correctly made, the joints constructed from pipe and couplings with rubber seals remain watertight when subjected to deflection and distortion, and comply with the MCHW, Volume 1, Clauses 504.3 and 518.7 (see section 14).

7 Water infiltration

The slot area for the pipes exceeds the minimum requirement of 1000 mm^2 per metre length as given in the MCHW, Volume 1, Clause 518.3 (see Table 3).

8 Flow characteristics

8.1 The pipes will have normal flow characteristics associated with thermoplastics pipes.

8.2 Full-bore velocities are available from the *Tables for the Hydraulic Design of Pipes, Sewers and Channels*, Volume 2, 8th Edition, by H R Wallingford and D I H Barr. Appropriate values are based on the Colebrook-White equation. An appropriate value of roughness coefficient should be selected when designing the drainage system. For new pipes, a value of 0.006 is applicable, but for designs a value of 0.6 is generally used.

9 Maintenance

9.1 The slots are designed to restrict the ingress of silt into the drains.

9.2 Access to the system for cleaning should be provided by conventional methods.

9.3 The system can be rodded using flexible drain rods. In common with other standard plastic drainage systems, toothed root cutters and rods with metal ferrules, as used with some mechanical clearing systems, could damage the pipes and couplings and should not be used.

9.4 Tests indicate that the pipes have adequate resistance to cleansing using pressure jetting equipment (see section 13.1). It is recommended that low-pressure, high-volume systems are utilised in accordance with MCHW, Clause 520.

10 Durability

In the opinion of the BBA, the material from which the pipes and couplings are manufactured will not significantly deteriorate and the anticipated life of the system will be in excess of 50 years.

Installation

11 General

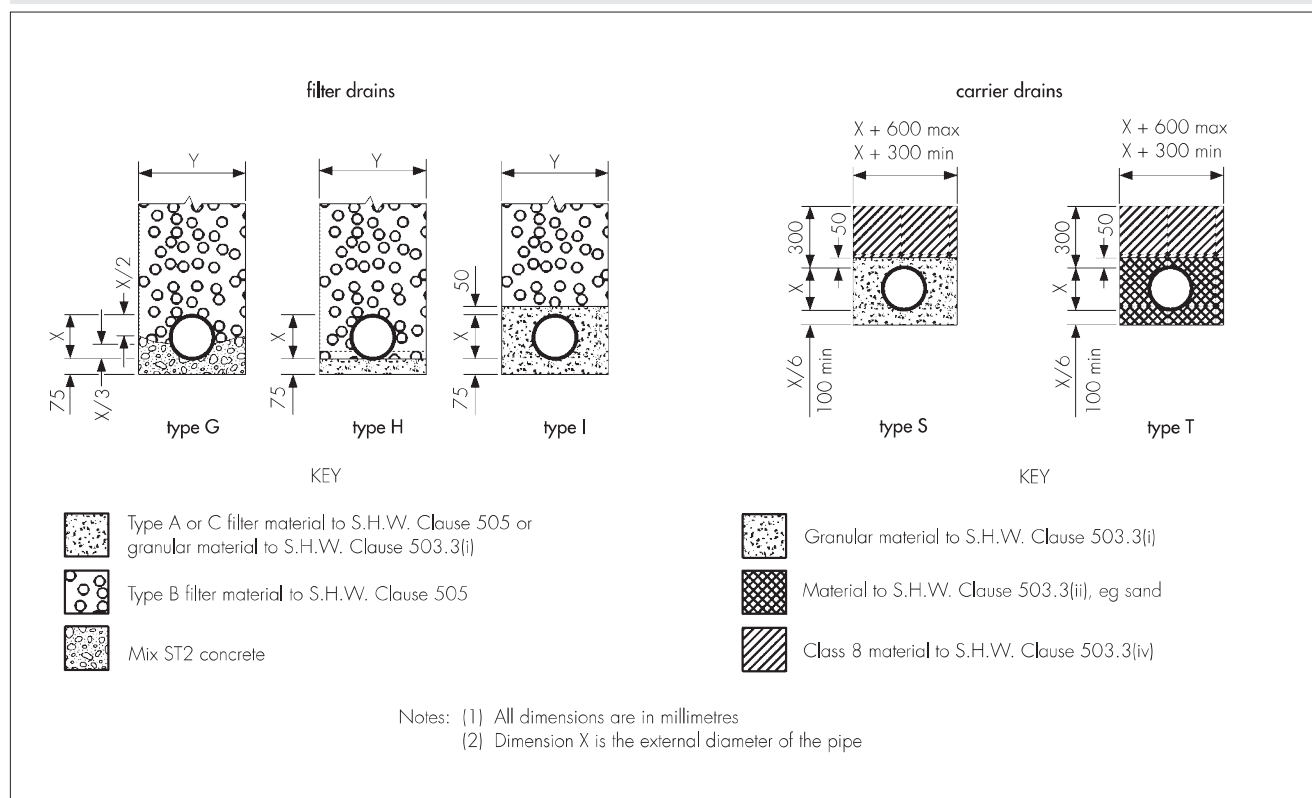
11.1 JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm Diameter High-Density Polyethylene Filter and Carrier Pipes and Couplings must be installed in accordance with HA requirements and the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8.

11.2 The pipes and couplings must be protected against damage from site construction traffic.

12 Procedures

12.1 For typical laying, trench and backfilling specification details, reference should be made to Figure 5 and the MCHW, Volume 3, Drawings No F1 (Type T and S) and No F2 (Type G, H and I).

Figure 5 Installation details



12.2 Pipes are cut easily using conventional hand tools, and should be cut square between the corrugations.

12.3 For a watertight joint, the pipe ends and coupling should be cleaned and the rubber seal fitted externally in the first or second dwell. The seal and inside of the coupling should be lubricated and the pipe pushed fully home to the central register either by hand, or using a lever if necessary.

12.4 Care should be taken during backfill to maintain the line and level of the pipeline. If necessary, the pipe should be restrained to prevent uplift.

13 Tests

13.1 Tests were carried out on the pipe in accordance with the MCHW, Volume 1, Clause 518.5 to determine:

- ring stiffness to BS EN ISO 9969 : 1995
- creep ratio to BS EN ISO 9967 : 1995
- longitudinal bending to the MCHW, Volume 1, Clause 518.11
- rodding resistance to the MCHW, Volume 1, Clause 518.12
- impact resistance at 0°C and 23°C to BS EN 1411 : 1996 with a striker of 1.0 kg mass and 25 mm diameter conical head
- water jetting WRc method.

13.2 Tests were carried out on the system to establish:

- leaktightness of joint to BS EN 1277 : 2003, Method 4, Conditions A, B and C
- insertion force (ease of jointing).

13.3 Tests were carried out to establish the dimensional accuracy of the pipe, coupling and ring seal.

14 Investigations

14.1 An examination was made of data in relation to the effect of the production tolerances on the performance of the products.

14.2 An evaluation of existing data was made to assess material properties, chemical resistance and durability.

14.3 Calculations were carried out to determine slot area.

14.4 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 5955-6 : 1980 *Plastics pipework (thermoplastics materials) — Code of practice for the installation of unplasticized PVC pipework for gravity drains and sewers*

BS EN 681-1 : 1996 *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Vulcanized rubber*

BS EN 763 : 1995 *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Test method for visually assessing effects of heating*

BS EN 1277 : 2003 *Plastics piping systems — Thermoplastics piping systems for buried non-pressure applications — Test methods for leaktightness of elastomeric sealing ring type joints*

BS EN 1411 : 1996 *Plastics piping and ducting systems — Thermoplastics pipes — Determination of resistance to external blows by the staircase method*

BS EN ISO 9967 : 1995 *Thermoplastics pipes — Determination of creep ratio*

BS EN ISO 9969 : 1995 *Thermoplastics pipes — Determination of ring stiffness*

EN 638 : 1994 *Plastics piping and ducting systems — Thermoplastics pipes — Determination of tensile properties*

EN 728 : 1997 *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time*

ISO 527-2 : 1993 *Plastics — Determination of tensile properties — Test conditions for moulding and extrusion plastics*

ISO 1133 : 1997 *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*

ISO 1183-3 : 1999 *Plastics — Methods for determining the density of non-cellular plastics — Gas pyknometer method*

ISO 4440-1 : 1994 *Thermoplastics pipes and fittings — Determination of melt mass-flow rate — Test method*

ISO 4451 : 1980 *Polyethylene (PE) pipes and fittings — Determination of reference density of uncoloured and black polyethylenes*

ISO 12091 : 1995 *Structural wall thermoplastics pipes — Oven test*

Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works, August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 2 Notes for Guidance on the Specification for Highway Works, August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 3 Highway Construction Details, March 1998 (as amended)

15 Conditions

15.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
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- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate
- remain in accordance with the requirements of Highway Authorities' Product Approval Scheme.

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