Nov 2016

96 Green Lane
Buxton
SK17 9DJ
Tel 01298 71761
07973 711589
enquiries@structech.co.uk

Infiltration basin

The infiltration area and incoming drainage should generally be constructed as shown in Drawing Penn/Plan6.

All water from the yard will go through a petrol/oil interceptor as detailed in Appendix C or similar. There will be a non-return valve fitted into the pipework on the downstream pipework to prevent any floodwater back flowing.

The surface water from the roof will flow through two 1200mm manholes with minimum 900mm deep silt traps in each.

The calculations for the pond size (Appendix A) have been carried out with rainfall information from an adjacent site (Appendix B) and infiltration rates determined previously. The pond size has been determined for the wort 100 year storm plus 30% contingency.

The interceptor, silt traps and the infiltration basin will be maintained on a weekly basis to prevent build up of silt or litter.

Generally the infiltration basin will be dug with a side slope of maximum 1 in 4 gradient and planted with associated scrub and rich damp grassland species.
The following procedures should be put in place.

LANDSCAPING AND VEGETATION

Immediately following basin construction, the base and side-slopes should be stabilised with a dense turf of water-tolerant grass. Plants in an infiltration basin should be able to withstand periods of ponding and dry periods and, ideally, maintain or enhance the pore space in the underlying soils via deep rooting systems. In order to reduce maintenance requirements, planting with wild flower meadow mixes can be considered.

Infiltration basins are typically grassed structures, but some additional vegetation can enhance the appearance of the basin, stabilise side slopes and prevent erosion, serve as wildlife habitat, and partially conceal unsightly litter and debris. It also increases the effectiveness of infiltration by slowing the flows across the basin.

Fencing is generally not desirable as it may reduce the amenity benefits provided by the infiltration facility, provide a barrier to easy maintenance, and provide a trap where litter and dead vegetative material could collect. Where fences are required, they should be low (toddler-proof), but facilitate movement of wildlife. Gentle slopes can contribute to minimising public safety risks.

Inlet and outlet pipes/culverts should not be accessible by small children. The headwalls of large pipes should be fenced to prevent accidents and deter access. Grills should also be considered to prevent entry into the pipe but these tend to clog rapidly, triggering more regular maintenance requirements and potentially affecting hydraulic performance.
Education boards should be provided to inform the public of the function of the basin, especially where the basin has a dual-use.

OPERATION AND MAINTENANCE REQUIREMENTS

Regular inspection and maintenance is important for the effective operation of infiltration basins as designed. Maintenance responsibility for an infiltration basin and its surrounding area should be placed with a responsible organisation.

Regular mowing in and around infiltration basins is required only along maintenance access routes, amenity areas (e.g. footpaths), across embankments and across the main storage area. The remaining areas can be managed as “meadow”, unless additional management is required for landscaping purposes.

Adequate access should be provided to the infiltration basin for inspection and maintenance, including for appropriate equipment and vehicles, e.g. mowing equipment.

S F Wherry

S F Wherry B.SC. (Civ.Eng) MRaPS, FCABE

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96 Green Lane
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Tel 01298 71761
07973 711589
enquiries@structech.co.uk

Appendix A

SuDS calculations

SuDS calculations

Yard area 6450sq.m.

Roof area 3150sq.m.

Design area = 3150 x 0.95 + 6450 x 0.9 = 2993 + 5805 = 8798sq.m.

From Appendix B

Rainfall intensity on 100 year storm is 18.4mm/hr over a 3.03 hr period.

With 30% contingency

Input I given by

3.03 x 18.4/1000 x 1.3 x 8798 = 638 cu.m.

Output O

Infiltration rate given as 4.2 10 E-5 from Appendix B

Area from 341.5.00 down to 340.5 is

(747 – 351) x 1.12 = 443 sq.m.
(slope)

O = 443 x 4.2 10E-5 x 3600 x 3.03 = 202cu.m.

Assume 50% of this effective as determined by BRE Digest 365

Storage S required

I -O = 638 – 101 = 537

Actual storage = (Area of 341.00 contour) x 1 = 551 x 1 = 551cum.

Storage adequate for 100 year storm plus 30% contingency up to height of 341.5

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Appendix B

Rainfall and infiltration calculations
(details provided by Penning Aggregates)

Project:	Buxton Industrial Estate for Brett Martin
Ref:	MC19/09-01 first designed 19/09/2016
Designer:	MC
Company:	Graf UK Ltd Target House, Thorpe Way Ind Est Banbury, OX16 4SP
Tel:	01608 661500
e-mail:	info@grafuk.co.uk web site: www.grafuk.co.uk

Catchment Details:

Buildings	2373	m2 x 95 %
Dense surfacing	6362	m2 x 90 %
Effective Area	7980.15	m2

Storage Details:

Product	RainBloc	
Length	20 units =	24 m
Width	20 units =	12 m
Depth	3 units =	1.26 m
Volume Ratio	95 %	

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	0 %
r value	0.35
M5-60	20 mm

Duration	Intensity mm	mm/h	Required storage(m3)
30 min	31.6	63.3	234.418
45 min	36.7	49.0	266.159
60 min	40.5	40.5	287.274
2 hours	50.0	25.0	327.058
6 hours	65.9	11.0	317.933
24 hours	90.6	3.8	224.666

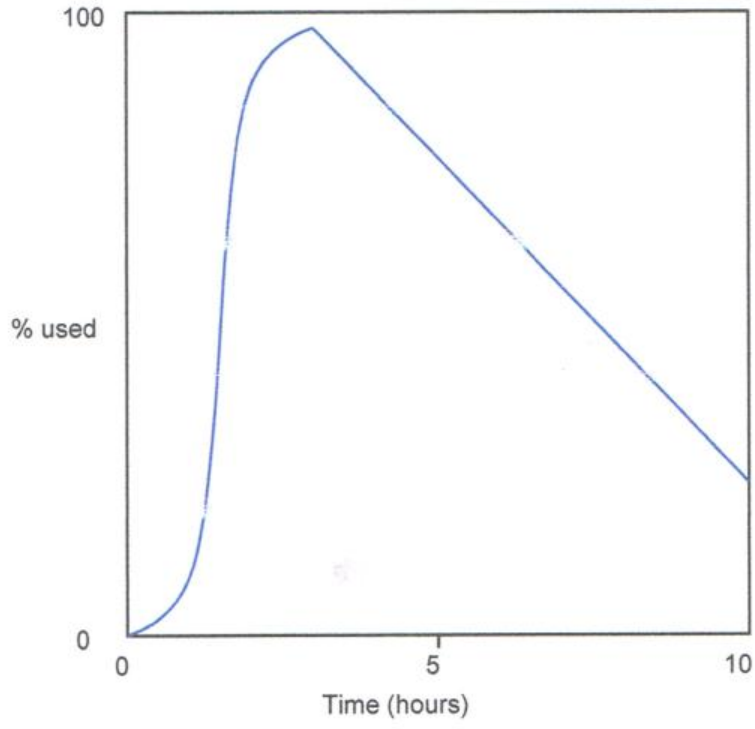
Outflow Details:

Infiltration rate	Attenuation only
Attenuation Control	Fixed Outflow
Discharge rate	10 l/s

Results:

Outcome	**Pass**
Critical Storm Duration	3.03 hrs
Critical Rainfall Rate	18.4 mm/h
Hmax	1.229 m
Time to half empty	4.7 hrs
Volume Required	336.254

Tank Operation:



Infiltration calculations 1

Groundwater table determined at approximately 4m.

A pit was dug 2.5m. deep 0.6m wide and 2.2m long

Hole was filled with water to an effective depth of 2.0m.

$V_{p75\text{-}25}$ = 2.2 x 0.6 x (1.5 – 0.5) = 1.32m³

Mean surface area taken as pit side to 50% effective depth plus the bottom

A_{p50} = (2.2 x 0.75 x 2) + (0.6 x 0.75 x 2) + (2.2 x 0.6) = 5.52m³

Time for outflow to drop from 75% to 25% = 109 – 12 = 97mins

$$f = \frac{1.32}{5.52 \times 97 \times 60} = 4.1\ 10E\text{-}5$$

Infiltration calculations 2

Groundwater table determined at approximately 4m.

A pit was dug 2.5m. deep 0.6m wide and 2.2m long

Hole was filled with water to an effective depth of 2.0m.

$V_{p75\text{-}25}$ = 2.2 x 0.6 x (1.5 – 0.5) = 1.32m³

Mean surface area taken as pit side to 50% effective depth plus the bottom

A_{p50} = (2.2 x 0.75 x 2) + (0.6 x 0.75 x 2) + (2.2 x 0.6) = 5.52m³

Time for outflow to drop from 75% to 25% for Test 2 = 103 – 10 = 93mins

$$f = \frac{1.32}{5.52 \times 93 \times 60} = 4.3\ 10E\text{-}5$$

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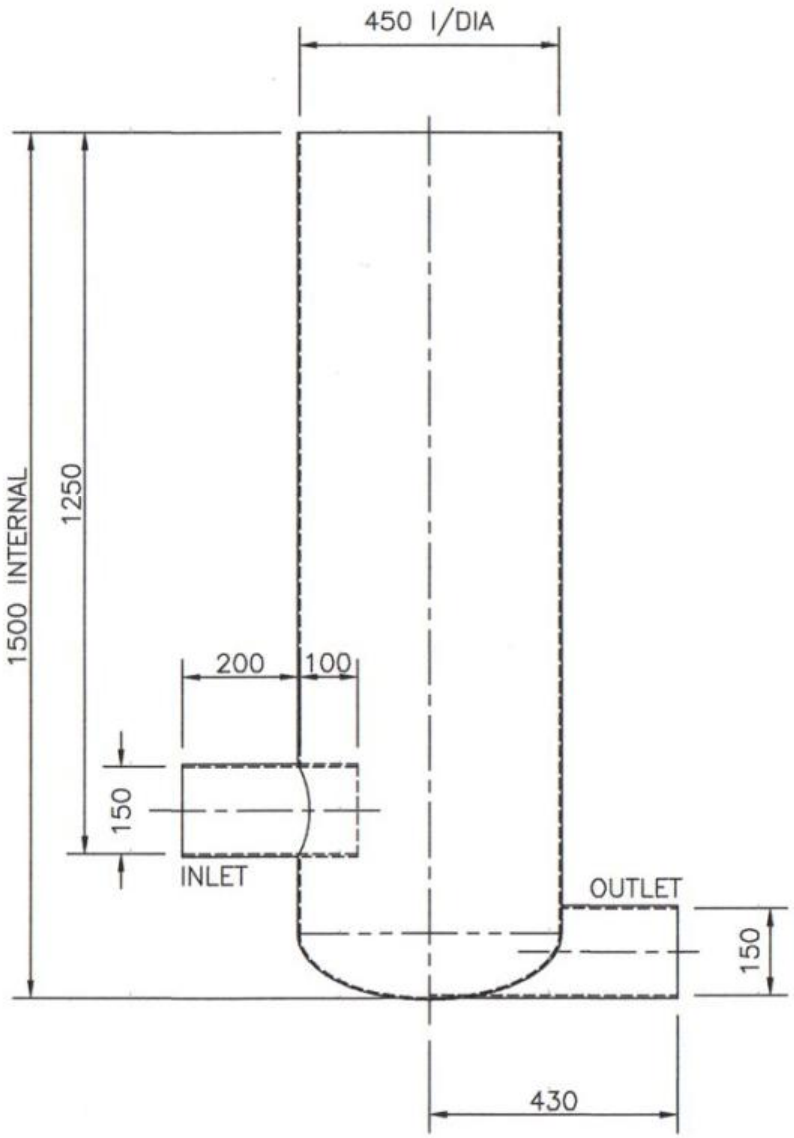
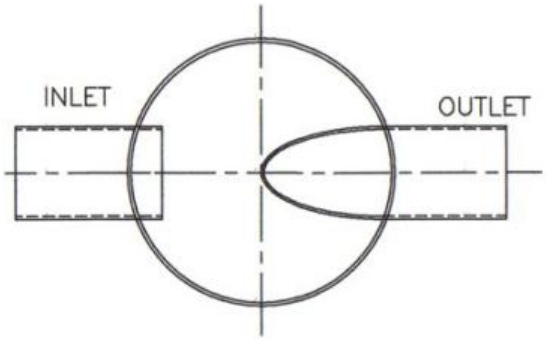
Appendix C

Oil/petrol interceptor





MATERIAL : 450 CSM CONSTRUCTION (33% GLASS).

OVERLAY PIPEWORK TO SHELL USING 3 LAYERS 450 CSM 150 WIDE

IMPORTANT NOTE – WALL THICKNESS TO BE A MIN. OF 6mm

PIPEWORK – 150 NB DRAINAGE PIPE.

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Newbridge Industrial Estate
Pitt Street
Keighley, West Yorkshire
BD21 4PQ, United Kingdom

REV.	DATE	BY	CHKD.	APPD.	DESCRIPTION
1	17.10.05	R.U.	I.W.	CPG	ISSUED FOR MANUFACTURE

TITLE: 450 DIA x 1250 Lg SAMPLING CHAMBER – 160 PIPEWORK

DRAWN BY	CHKD.	APPD.	SCALE	DRAWING No.	REVISION
R.U.	I.W.	CPG	1:10	SP/GA.1170	1
DATE 17.10.05	DATE 17.10.05	DATE 17.10.05			

A3

DO NOT SCALE
IF IN DOUBT ASK
ALL DIMENSIONS IN MM

TOLERANCES (unless noted otherwise)
GENERAL LINEAR DIMS : +/– 2mm
ANGULAR DIMENSIONS : +/– 1/2°

This drawing is sent in confidence and must not be copied, used or disclosed to third parties without our written permission.

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Keighley, West Yorkshire
BD21 4PQ, United Kingdom

Automatic Warning Devices / Alarm systems

Separators must be provided with a visual and audible alarm, remotely located if necessary. (Environment Agency Pollution Prevention Guidelines - EA PPG3)
This operates when the oil level reaches 90% of the oil storage volume and indicates that the separator needs immediate emptying for it to continue to work effectively.
Our **Standard Oil Alarm** (shown below) is hard wired, simple to install and is supplied with comprehensive instructions.

Upgrade options available;

- **Silt Probe** - alerts you to too much silt build up, reducing storage capacity.
- **High Liquid Probe** - designed to detect too high a liquid level. Often the result of a blockage.

Both of these options offer increased peace of mind and are installed to raise awareness of possible pollution incidents.

(A wireless oil alarm is also available, subject to satisfactory conditions)

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Technical Data Sheet UTG HSP/C

Installation Guidance Notes
Concrete Surround – Underground Tanks

Note : These guidance notes refer only to the installation of Concrete surround underground tanks.
These guidance notes cannot provide specific, site-related installation instructions.
If in any doubt whatsoever about any aspect of the installation please contact
Highspeed Group Limited on 0845 600 3572

Service Specification

These tanks are designed to be installed below ground and completely surrounded with concrete. Generally, the depth from finished ground level to the top crown of the main shell should be no more than 2 metres. This may vary dependant upon ground water conditions.
Deeper inverts may be accomodated on a standard shell providing the water table level does not exceed 2 metres above the top crown of the main shell.
For deeper burial with high water table conditions heavy duty shells are available.
Should you be in any doubt regarding suitable shell application please call us on 0845 600 3572
If the tank is installed outside these parameters it may suffer irreparable damage.

Concrete Specification

The specification for the concrete mix to surround the tank may be taken from BS 5328 : Part 1 : 1991 (including amendments), taking into account the site conditions and application requirements. For a typical non-structural application in non aggressive soils a Standard Mix ST4 with a 50mm slump is generally suitable, but also permits the equivalent Designated Mix GEN3 to be specified as an alternative. If for non typical applications, structural or other reasons a higher than normal designation is required, the purchaser of the fresh concrete can use table 6 in BS 5328: Part 2: 1991 (amendment 8759/October 1995) for guidance.

Lift height (rate of rise)
Determine the lift height (m), or rate of rise (m/h) for the specific concrete type used, to ensure that a design pressure **(*P max*) of 15kN/m^2** on the tank is not exceeded.

Vibration
The design of the tank assumes minimal compaction of the surrounding concrete. Where necessary, this may be extended to include light internal vibration. ***Never*** use deep revibration which will substantially increase the pressure on the tank, possibly causing failure.

Impact of Concrete on Discharge
The effects of impact on discharge are considerable. These are controlled by the vertical form height, the tank diameter and the method of discharge. Under no circumstances should concrete be discharged directly onto the tank.

Loadings
If the tank is installed in an area where traffic or other superimposed loadings can be applied, consult a structural engineer for the design of a reinforced concrete slab to prevent the load being transmitted to the tank (or its concrete surround). If this slab is constructed immediately above the tank, it should be separated from the concrete surrounding the tank by a compressible material.

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ClearWater Water Recycling Systems

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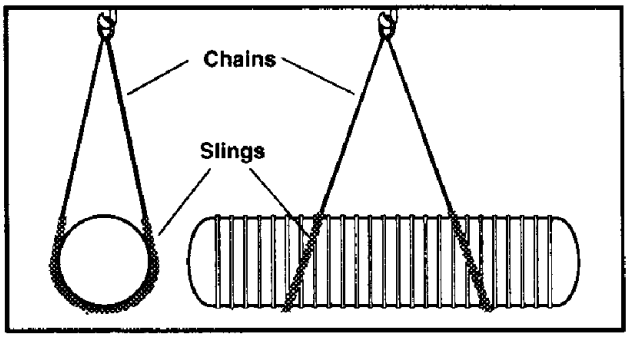
Tel: 0845 600 3572 Fax: 01535 611546 e-mail: info@highspeed.co.uk Web: www.highspeed.co.uk

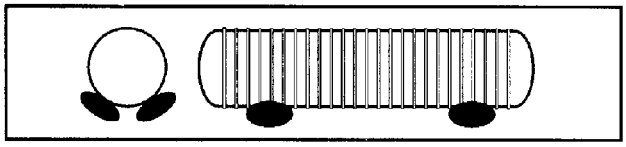
VAT No. GB 168 9697 83 Company Reg No. 947751

Transportation, unloading and storage of tanks

1. Tanks must be held down during transportation using nylon straps, do not use cables or chains to hold tanks
2. Do not over tighten straps to cause deformation of the tank shell
3. Tanks are best lifted by crane and webbing lifting straps – do not use chains or wire ropes in contact with the tank.
4. Highspeed Group Ltd recommends the use of a lifting beam for tanks longer than 8 metres
5. Smaller tanks may be lifted with other suitable site equipment but greater care is needed to control the lift and to ensure the tank is not damaged.



6. Move tanks only by lifting and setting, do not drag or roll
7. Do not drop or roll tanks from truck
8. Place tanks carefully onto a smooth level even surface, free from rocks, large stones or other debris that could cause point loads.
9. Chock tanks using tyres, sandbags or similar to prevent rolling



10. In high wind conditions, consideration should be given to strapping down the tanks to prevent damage

Pre-Installation Inspection

1. Tanks should be subject to a visual inspection prior to installation
2. Special consideration should be given to lifting strap positions
3. Any damage should be notified to the delivery driver and to Highspeed Group Ltd
4. Do not attempt to carry out any unauthorised repairs, as this will invalidate the warranty on the tank
5. Check for, fractures to the shell or ribs, delaminations, scratches or abrasions deeper than 1.5mm, stress cracks or star crazing
6. Check invert depth is correct and inlet and outlet pipe orientations are correct

Installation procedures must be in accordance with the Health and Safety at Work Act 1974, and other relevant legislation. Your procedures must also align with good building practice.

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ClearWater Water Recycling Systems

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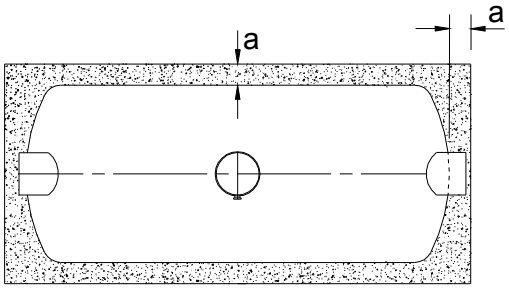
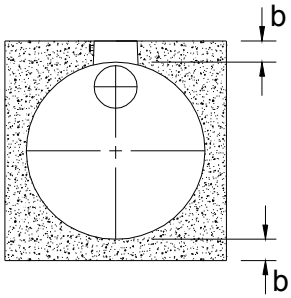
1 Excavate for the tank, allowing sufficient clearance for the minimum concrete surround thickness as shown in the table below, whilst also taking into account any shoring / trench supports used. The depth of the excavation is determined by the inlet and outlet pipe invert levels relative to the bottom of the tank, and allowing for the minimum base thickness shown. Dimensioned details of the separator can be taken from the relevant drawing. Ground instability at formation level e.g. running sand may necessitate over-excavation and stabilisation with hardcore or blinding concrete.

NOTE: Check that the depth to the base slab is within the Service Specification requirements for the tank.

PLAN



ELEVATION



Tank Diameter (mm)	'a' min (mm)	'b' min (mm)
1000	150	150
1200	150	150
1500	200	200
1800	250	250
2500	300	300
3000	300	300
4000	350	300

2 Maintain a completely dry excavation until the final pour of concrete has set. Failure to do this may result in voids beneath the tank and subsequent tank failure.

3 Pour the concrete into the bottom of the excavation to form a level and smooth base onto which the tank can sit. This should be to the minimum thickness given in the table above.

4 Place the tank onto the concrete base, while the concrete is still wet, and determine the correct orientation for the tank inlet(s) and outlet(s), i.e. the higher pipe on the tank is to be connected to your upstream (inlet) pipework, and the lower pipe on the tank is to be connected to your downstream (outlet) pipework. Connect and seal your pipework to the tank, checking alignment, and ensure that there is an adequate and correct fall for each pipe.

5 Fill each chamber of the separator with clean water to a depth of 300mm and recheck the pipework levels. Commence backfilling evenly around the tank with concrete ensuring there are no voids, particularly at the bottom of the tank shell. Continue filling the chambers with water whilst evenly backfilling with concrete ensuring that the progressive water level is no more than 300mm above the concrete level.

6 Connect and seal turret extensions prior to completing the concrete encasement of the main tank to the height shown in the table. Allow this concrete to set.

7 Using appropriate formwork, continue pouring concrete around the tank superstructure (i.e. bypass chamber, access turrets) in lift heights not exceeding 500mm, allowing initial set between each lift.

NOTE: Never increase the lift height or accelerate the rate of rise for the concrete type used, or allow the concrete to be compacted to an extent which will cause any part of the tank superstructure to distort. If you contravene this warning you will cause damage to the tank.

8 Complete backfill to ground level using free flowing material. Trim all access turrets and prepare suitable footings for each manhole frame ensuring that any loads on the covers are not transmitted to the tank access turrets or access extensions, if fitted.

Control of Groundwater

Tanks must not be subjected to buoyant forces during installation, taking account of ground water levels and surface water run-off, and their accumulation in the tank pit, even if tanks are anchored.

The excavation should be maintained dry by pumping or whatever suitable means until the concrete surround is cured

Access Shaft Extensions

Access extensions shall be surrounded with concrete poured in 500mm lifts allowing initial set between each lift. The pressure from concrete placed in higher lifts may cause access extensions to distort or collapse.
Please note that loose shafts should be sealed using silicon sealant sikaflex –291 or similar prior to installation to prevent ingress of groundwater under high water table conditions. It is the contractors responsibility to ensure a watertight seal.

Issued by Separators*Plus*.com
17th Sept. 09 Rev 1
Authority: DM/AV

Highspeed Group Ltd., Newbridge Ind. Est., Pitt Street, Keighley, BD21 4PQ, England
Tel: 0845 600 3572 Fax: 01535 611546 e-mail: info@highspeed.co.uk Web: www.highspeed.co.uk

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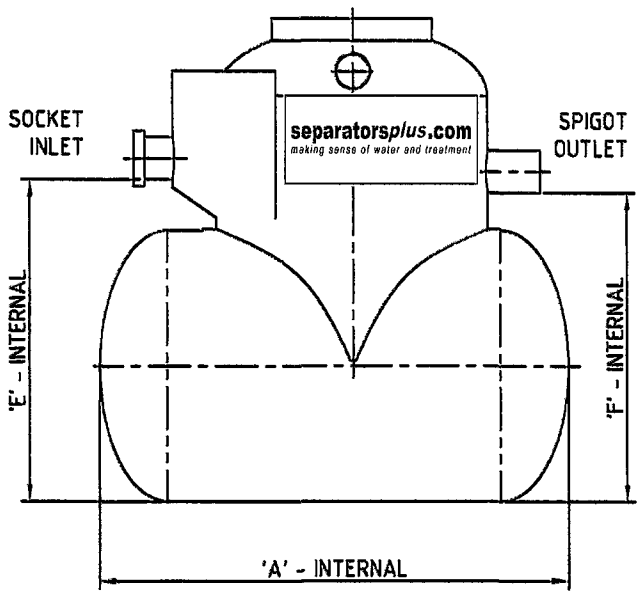

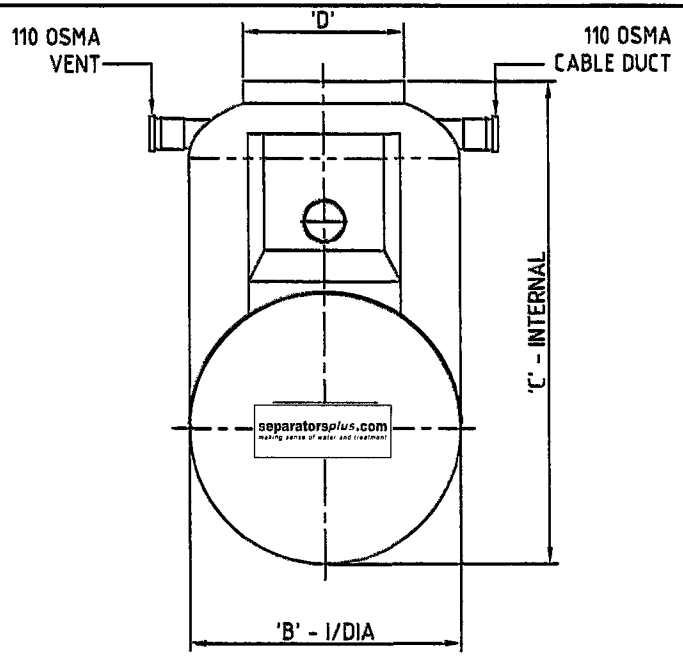

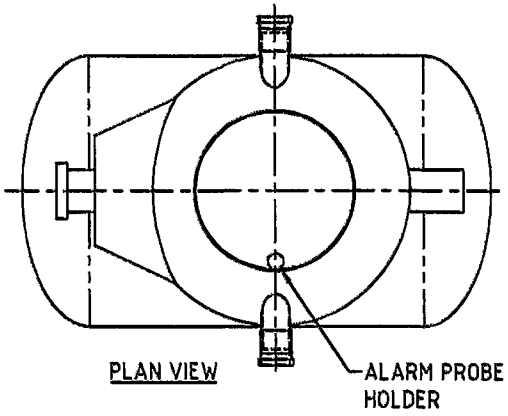

IMPORTANT NOTE

DUE TO THE COMPACT DESIGN AND EASE OF INSTALLATION, separatorsplus.com SEPARATORS ARE NOW SUPPLIED AS STANDARD WITH AN IN LINE CONFIGURATION.

PIPE SIZE VARIANTS

100, 150, 225 PVC

300, 375, 450, 600 GRP

TANK CODE	DIM – A	DIM – B	DIM – C	DIM – D	DIM – E	DIM – F
SPCNSB15S-21	2670	1210	2100	600	1400	1170

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Newbridge Industrial Estate, Pitt Street,
Keighley, England BD21 4PQ
Tel: +44 845 600 3572
E-mail: info@separatorsplus.com.

TITLE:
Bypass Separator Class 1 Range

DRAWING NO: SPCNSB15S-21

DRAWN BY: RU | CHECKED: IW

DATE DRAWN: 01.07.05

REVISION: 2 | File Ref: -

NOTES:

1. PRODUCT INFORMATION
The separatorsplus.com range of light liquid separators is produced from high grade GRP. Inlets are provided as sockets and outlets as spigots. Connections may be made by steel-banded flexible couplings, nitrile seal joints, rope-seal and mortar or any other appropriate jointing method.
Ventilation specifications should be in accordance with Local Authority requirements. Vent pipework from multiple chambers must never be manifolded below ground level.

2. PERFORMANCE CHARACTERISTICS
Separators are based on the requirements stated in European Standard EN858-1 and Environment Agency guideline PPG3, in particular:-
a. The nominal size has been established from performance tests where the residual oil at the outlet is less than 5mg/l for class 1 separators and less than 100mg/l for class 2 separators.

3. MAINTENANCE AND USE
It is important to recognise that light liquid separators require regular maintenance. The period between maintenance operations can vary depending on the location and use of the separator, therefore routine inspections shall be undertaken at least every six months and a log maintained of inspection date, depth of oil, depth of silt and any cleaning that is undertaken.
A separatorsplus.com **Oil Alarm** should be fitted to every separator to give automatic warning that the light liquid capacity has been reached.
Access to the separator should be kept clear and not used for storage.

4. PRODUCT DEVELOPMENT
In line with our policy of constant improvement and development, we reserve the right to change specification without prior notice.