Data Manual

This is a comprehensive manual that covers a wide range of products and systems for underground and above ground tankage, hydrocarbon, silt and soluble metal separators, SuDS surface water treatment and control, automatic pollution monitoring and containment systems, package pumping stations and rainwater harvesting and utilisation systems.

Engender and maintain a culture of ingenuity that continuously contributes to sustainable improvement of the world's water and waste water quality and compliance standards.

The Company has a Quality Management System to BS EN 9001 an monitored by the BSI

The Company is Achilles accredited - Supplier Number: 061556

Water Technology Listed

The rainwater harvesting systems are WTL approved

SPEL Products
Lancaster Road, Shrewsbury
Shropshire SY1 3NQ. England.

Telephone +44 (0)1743 445200
Sales Hotline +44 (0)1743 457977
Fax +44 (0)1743 465442
info@spelproducts.co.uk
sales@spelproducts.co.uk

Over 56 years

of technical innovation and progress with quality solutions protecting our global environment

SPEL

Contents

SECTION

1

Introduction


SPEL
Seacom

Mission Statement

We are committed to consistency at all times, in every transaction and equally with small or large customers… and to take a long-term view to ensure continuing customer satisfaction.

SPEL values

We strive to follow quality values as they are key to customer confidence; quality approach, quality response, quality presentation, quality supply and quality service.

Vision Statement

To be viewed as a technically advanced, quality driven organisation that delivers long-life effective solutions.

SPEL is a global organisation exporting to over 35 countries

Examples of countries SPEL have exported to:
Iceland, Gibraltar, Norway, Romania, Qatar, Ascension Island, Ghana, American Samoa, Belgium & Turkmenistan

1.3 SPEL Data Manual

The SPEL objective

Engender and maintain a culture of ingenuity that continuously contributes to sustainable improvement of the world's water and waste water quality and compliance standards.

Introduction

This Data Manual reflects more than 50 years of expertise in the design and manufacture of chop hoop filament wound tanks and vessels for many applications, particularly in relation to surface water handling, package pumping stations, pollution control and associated systems.

Since the establishment of SPEL Products in 1964, the Company has gained experience in a wide range of fields which are briefly covered in this manual. We are proud to pass on our extensive knowledge to our valued customers and ensure the projects proceed to a satisfactory installation through the correct use of SPEL products and systems.

In general we can offer suitable products and systems for a wide range of applications. This Data Manual will aid you to choose the most suitable products and systems suited to your requirements.

The extensive range of products and specifications provides scope for meeting your needs but if further help is required we invite you to contact our technical sales team to support and work along with you. We look forward to assisting and helping towards success.

Overview of organisation

The Company has an experienced management team covering design, technical input, manufacture and an experienced technical sales team to help liaise with consultants and customers alike.

The Special Products Division specialises in advanced mechanical and electronic systems involving monitoring and pumping.

History

The Company was established in 1964, designing and manufacturing a wide range of products from vehicle cabs and roofs, purpose designed building cladding, the SPEL Fascia System for motorway bridges, SPEL Manhole Shutters for casting around concrete chamber rings and chemical plant; fume stacks and process vessels

In the early 70's – 80's the Company turned to the increasing need for sewage and surface water treatment with the SPEL Septic Tanks and fuel/oil Interceptors

 T. +44 (0)1743 445200 F. +44 (0)1743 465442 E. info@spelproducts.co.uk

SPEL Products today is a global company supplying GRP tankage, both horizontal and vertical, above and below ground, pollution control products, package pumping stations, automatic pollution monitoring and containment systems etc. to over 35 countries.

Modern factory with the 'state of the art' plant and equipment ensure quality at competitive prices.
Modern air conditioned offices provide an efficient and pleasant environment for the team to help you.

1.5 Facilities and Location

Excellent central location with good access to motorway networks

ACCREDITATIONS

The Company has a Quality Management System to BS EN 9001 and monitored by the BSI

The Company is Achilles accredited Supplier Number: 061556

The Rainwater Harvesting Systems are WTL approved

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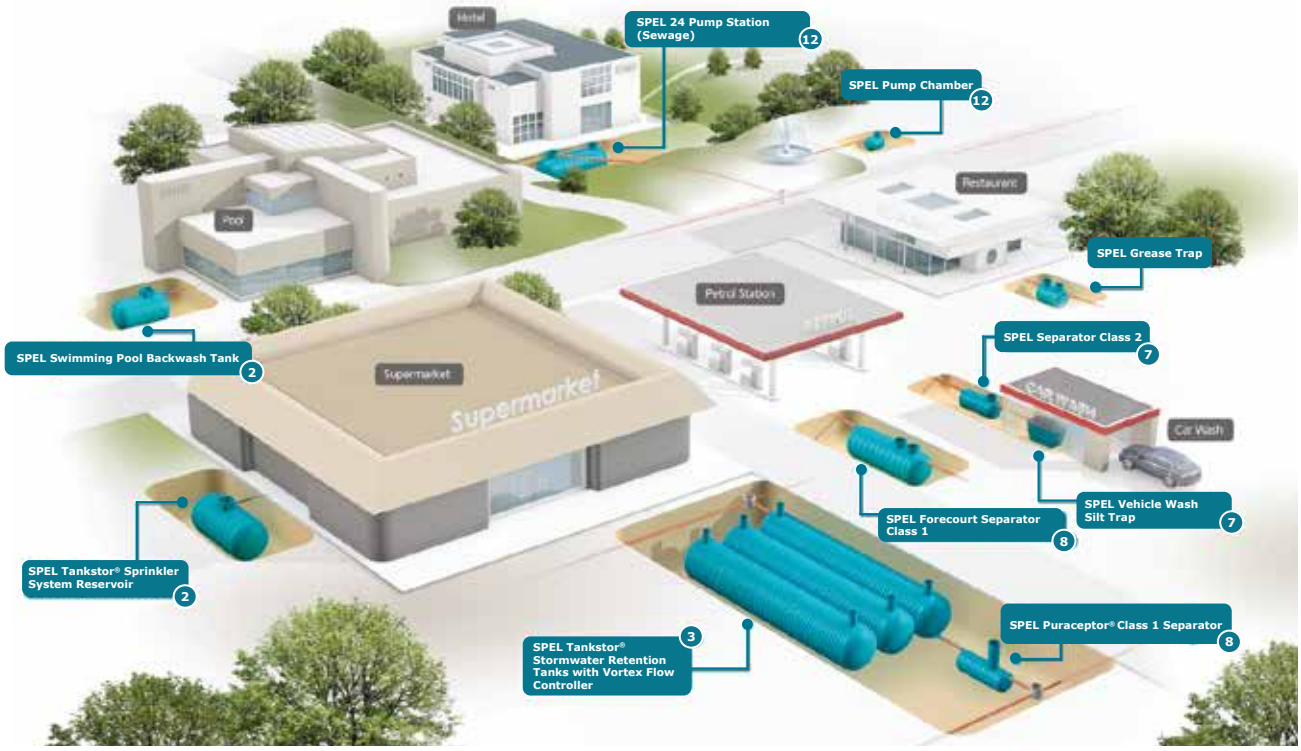
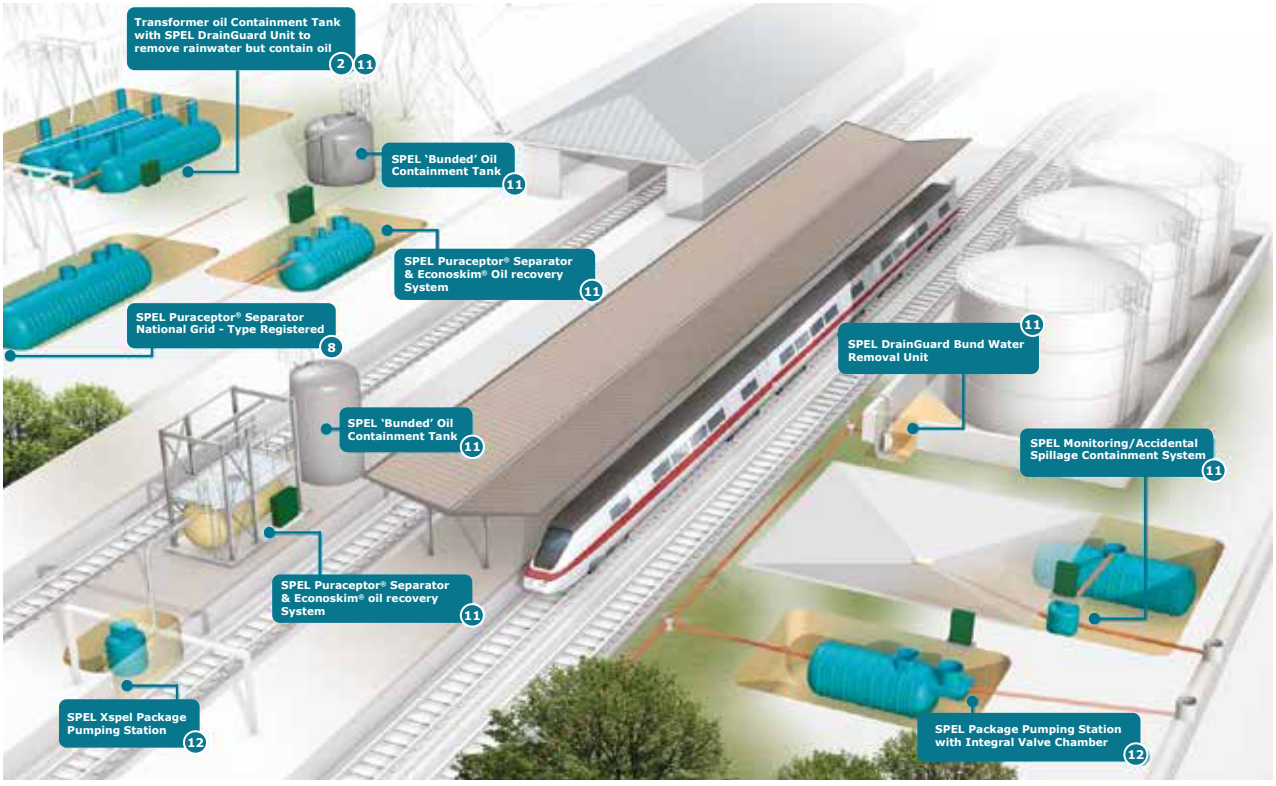
Commercial Applications

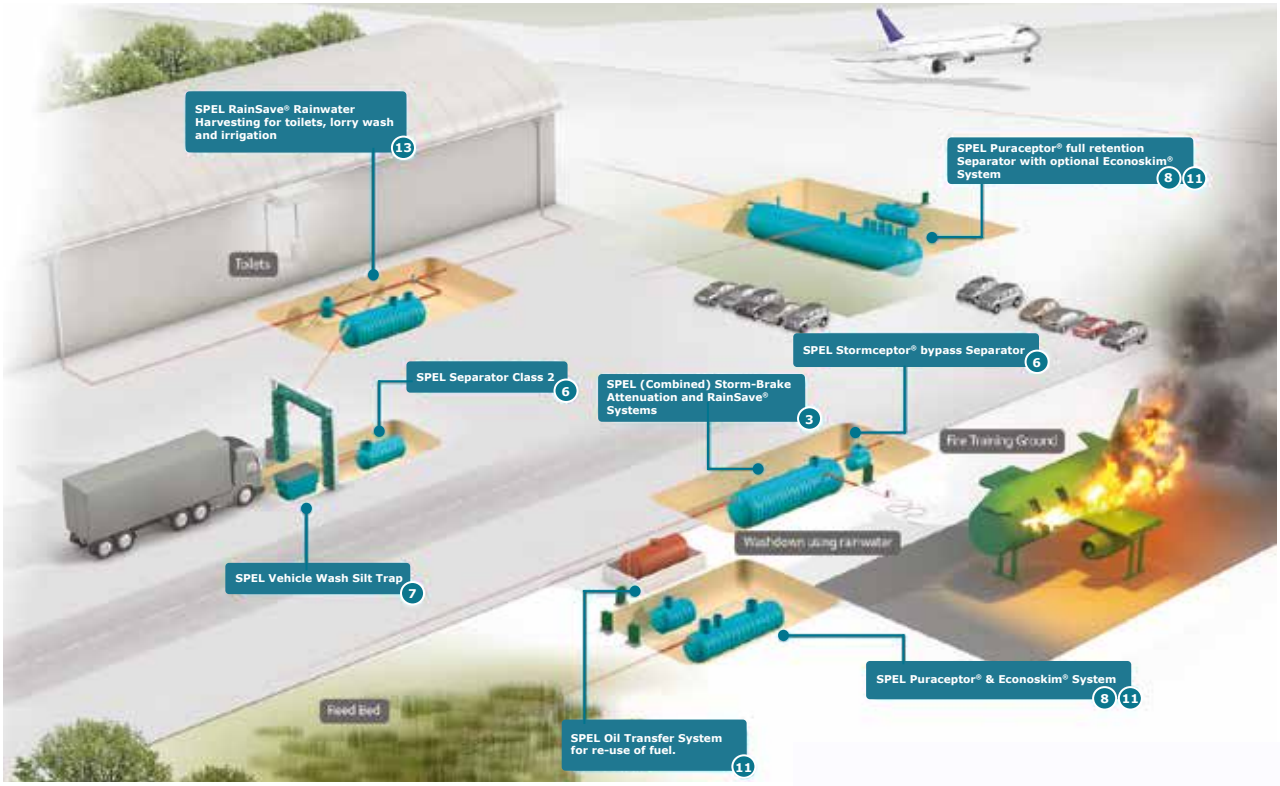


Industrial Applications

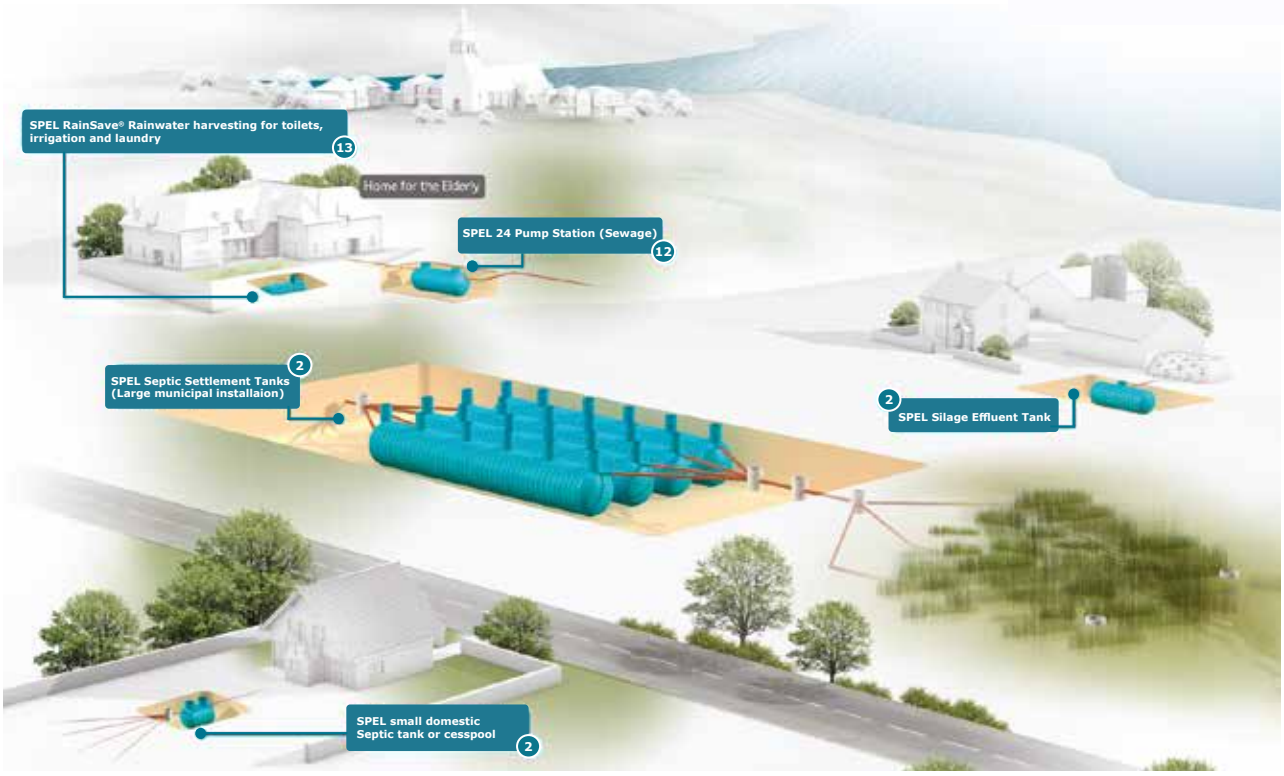


1.7 Applications

Airport & Military Applications

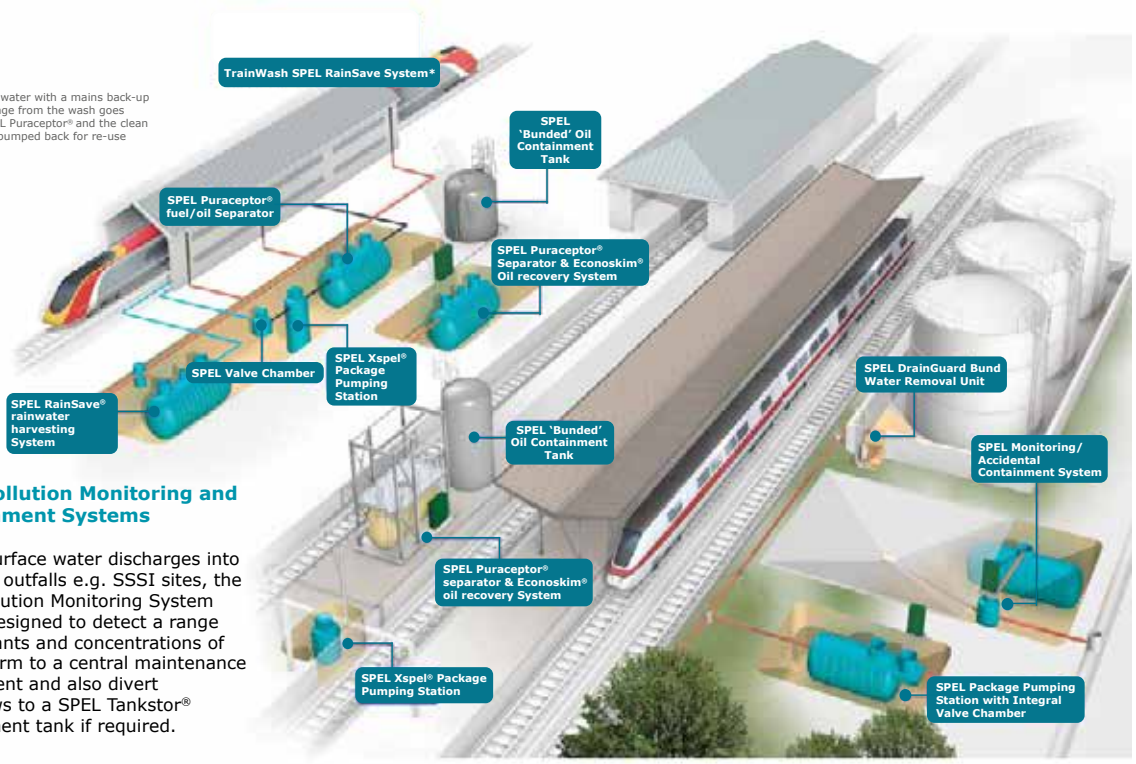


Rural Applications



Rail Applications

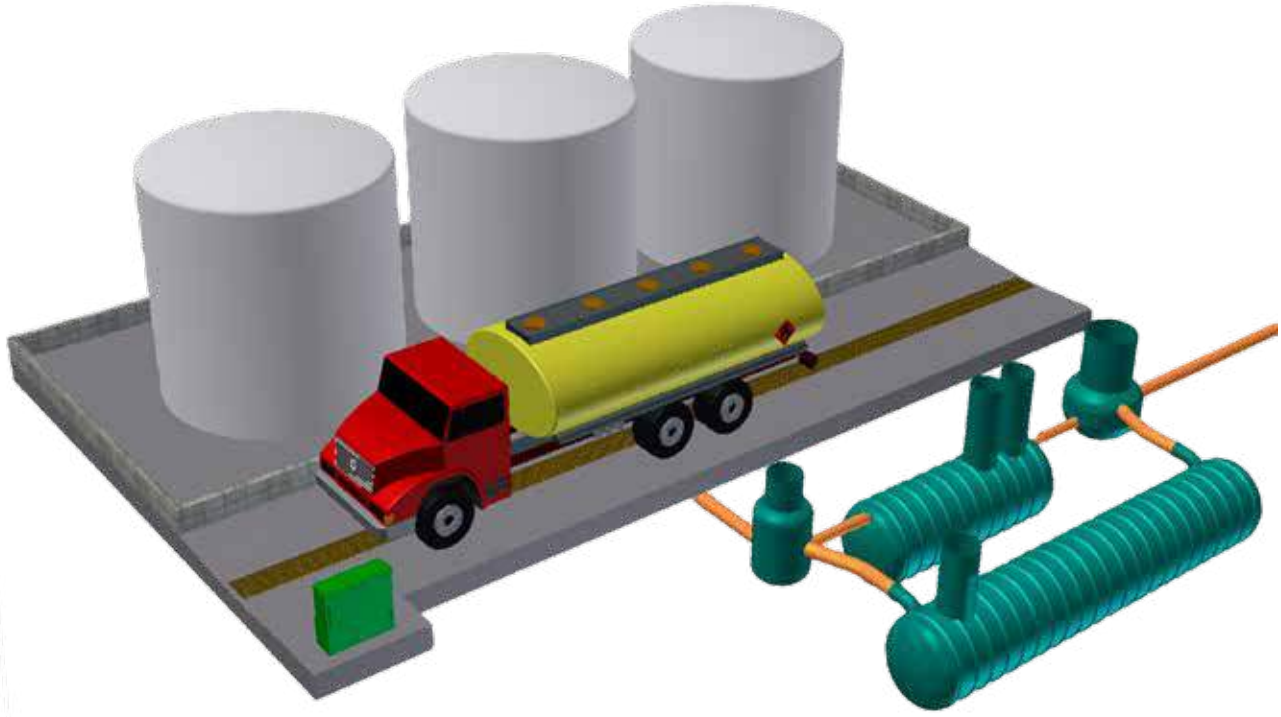
*Supplied rainwater with a mains back-up and the drainage from the wash goes through a SPEL Puraceptor® and the clean water is then pumped back for re-use



SPEL Pollution Monitoring and Containment Systems

Where surface water discharges into sensitive outfalls e.g. SSSI sites, the SPEL Pollution Monitoring System can be designed to detect a range of pollutants and concentrations of such, alarm to a central maintenance department and also divert such flows to a SPEL Tankstor® containment tank if required.

Automatic Pollution Monitoring & Containment Applications



Terms & Conditions

APPLICATION

1.1 In these Conditions, unless the context otherwise requires:
"Company" means SPEL Products (Company registration no. 787747)
"Contract" means the contract for the sale and/or supply and purchase of the Goods hereunder
"Customer" means the person so described overleaf
"Goods" means the goods, works and/or services described overleaf and includes any or any part of them
"Product Liability" means any loss of or damage to any tangible property caused by the Goods or any other products or services supplied or work done by the Company to or for the Customer or any third parties
"supply of the Goods" includes (if the Company has agreed to do so) installation and/or commissioning of the Goods
"writing" includes facsimile transmission and other electronic means of communication
"person" includes any body corporate or unincorporated
Words denoting the singular only include the plural and vice versa

1.2 These Conditions of Sale, the terms specified overleaf and any special conditions agreed to in writing by the Company constitute the entire agreement for the sale and/or supply of the Goods and supersede any terms or representations referred to in the Company's sales literature or elsewhere. If any terms specified overleaf and/or any special conditions conflict with these Conditions of Sale, the former will prevail

ORDERS AND SPECIFICATIONS

2.1 Orders (including any accepting any estimate or quotation of the Company) will only bind the Company when it accepts them in writing

2.2 The Customer must provide any necessary information and free issue materials which it is to provide under the Contract within sufficient time for the Company to perform its obligations

2.3 The Goods' may be changed to conform with product development (but without materially adversely affecting their quality or performance) or any applicable safety or other statutory requirements

2.4 Drawings provided by the Company must be approved in writing before the relevant Goods are manufactured, and any failure to approve any drawings within 24 hours of their being provided to the Customer may result in delay in delivery for which the Company will not be responsible. Dimensions given on drawings are subject to manufacturing tolerances and should be checked by the Customer before any Goods are installed

PRICE

3.1 The price of the Goods will be the Company's quoted price or, where no price has been quoted (or a quoted price is no longer valid), the price stated overleaf. Subject to paragraph 2.1, all prices quoted and quotations are valid for 30 days only or (unless previously withdrawn) until earlier acceptance by the Customer. All prices and other charges will be subject to any applicable value added tax and other taxes or duties which will be payable at the same time as the price of the Goods

3.2 Unless otherwise stated overleaf delivery is ex works.

3.3 Where a transport cost is shown it includes 'goods in transit' insurance in accordance with the policy in place at the time of transit. Any claim must be made in accordance with 7.2.

PAYMENT

4.1 The Company may invoice the Customer for all sums payable under the Contract on or at any time after delivery or, if the Goods are to be collected by or for the Customer or it wrongfully fails to take delivery or procure the unloading of the Goods or fails to give proper delivery instructions, at any time after it has notified the Customer that the Goods are ready for collection or it has tendered delivery of the Goods. The time for payment shall be of the essence

4.2 Except where the payment is to be made prior delivery, the Company's invoices will be payable within thirty days of their date, notwithstanding that delivery may not have taken place and the property in the Goods has not passed. The Company may withhold delivery of the Goods if and for so long as any sum due to the Company from the Customer under any other contract has not been paid

4.3 If the Customer fails to make any payment on the due date then, without prejudice to any of its other rights, the Company may:
(a) terminate the Contract or suspend any further deliveries;
(b) appropriate any payment by the customer to such of the Goods (or any other good and/or services supplied by the Company to the Customer) as the Company decides despite any purported appropriation by the Customer; and/or
(c) charge the Customer interest on the amount for the time being unpaid at a rate equivalent to 3% above the base rate (or if it is replaced, its successor) from time to time of Lloyds TSB Bank Plc until payment in full is made. Such interest shall accrue on a daily basis and be payable both before and after judgement

4.4 Where the commissioning cost is included in the price of the goods, payment shall be in accordance with the terms of the invoice irrespective of whether commissioning has been undertaken or not.

4.5 All sums payable shall be made in sterling without any deduction and regardless of any set-off, counterclaim or other claim or right

4.6 If any sum due from the Customer pursuant to the Contract or any order or judgement given or made in relation to it has to be converted from the currency ("the first currency") in which the same is payable into another currency ("the second currency") for the purposes of making any claim or obtaining or enforcing any order or judgement against the Customer, it will indemnify the Company against any loss suffered as a result of any discrepancy between (a) the rate of exchange used for such conversion and (b) the rate(s) of exchange at which the Company may in the ordinary course of business purchase the first currency with the second currency upon receipt of a sum paid to it in satisfaction, in whole or in part, of any such order, judgement or claim

DELIVERY

5.1 The Company will use its reasonable endeavours to supply the Goods in accordance with any estimated delivery date but the time for delivery will not be of the essence of the Contract

5.2 Any transport cost quoted is for the Company's 'Standard' service for up to three days from date of despatch, UK mainland. For a specific day and/or type of transport vehicle eg with self off load, rear steerable trailer, our 'Premium' service is available at extra cost.

5.3 Where the Company arranges for the delivery, the Goods will be delivered at the place at or nearest to the delivery location which provides easy access and good hard ground and is safe and suitable for off loading. The Customer will procure at its cost that such a place and all equipment and personnel necessary for offloading are provided at the time of delivery and be responsible for off loading the Goods from the delivery vehicle

5.4 Provided it has given prior notice, the Company may deliver the Goods by instalments as and when they are available. Where the Goods are or are to be delivered by instalments, each delivery shall constitute a separate contract

5.5 If the time taken in delivering any of the Goods at the delivery location (including the time taken in off loading) exceeds 2 hours, the Company may charge at its then prevailing rate for the excess time spent by its or its carrier's personnel and vehicles

5.6 Delivery of the Goods is subject to a suitable route being available at the relevant time. The Customer will pay to the Company all costs and expenses incurred by it in relation to escort charges, the removal and replacement of any road signs or other street furniture or overhead wires, the carrying out of any other works or the obtaining of any licences or approvals required in connection with the transportation of the Goods or which arise from a police/private escort not being provided by the relevant time plus a 5% administration charge (except to the extent any of the foregoing is caused by the negligence of the Company or its carrier). If any Goods cannot be transported by the route intended by the Company when the Contract is entered into, it may charge the Customer any costs and expenses incurred by the Company arising from the Goods being transported by a different route. The Customer will indemnify the Company in respect of any loss of or damage to any vehicle of the Company or its carrier occurring whilst it is at the delivery location unless caused by the Company's or carrier's negligence

5.7 If the Customer fails to collect or accept delivery or procure the unloading of the Goods or otherwise comply with its obligations under paragraph 5.3 or to give proper delivery instructions (unless due to the Company's default) or, in the case of sub-paragraph (b) below, the Company terminates the Contract, without prejudice to its other rights, the Company may:
(a) arrange for storage of the Goods at the Customer's risk and expense until they are delivered or collected, including if applicable storage charges at the Company's then prevailing rates and the cost of any redelivery; or
(b) sell the Goods in its discretion notwithstanding that any of them or their packaging may bear or have affixed to them any name, trade or service mark ("Trade Marks") of the Customer or (at the Customer's request) any third party and, after deducting from the sale proceeds all sale costs and other sums owing to the Company, retain any surplus for its own benefit. The Customer will indemnify the Company against any claim, proceedings, costs, liabilities, loss, damage and expenses incurred by the Company as a result of the Goods sold pursuant to this paragraph or paragraph 8.3 or their packaging bearing or having affixed thereto any of the Trade Marks

INSTALLATION, COMMISSIONING & SERVICING

6 If the Company is to install any Goods or carry out any other work under the Contract, the Customer will procure access for the Company and its personnel to the relevant site(s) during the Company's normal working hours, that all work, goods or other items to be done or supplied by the Customer or any third party are done or supplied in a timely and orderly fashion so as not to affect or delay the performance of any of the Company's obligations under the Contract and (unless otherwise agreed) the Company is provided free of charge with all electricity and other services and plant and machinery required in connection with any such installation or other work

TESTING, INSPECTION AND ACCEPTANCE OF GOODS

7.1 If the Company is required to carry out tests other than its normal ones or in the presence of the Customer the Company may charge for those tests at its then prevailing rates. The Company may carry out and charge for the tests if the Customer fails to attend on the notified dates

7.2 The Customer will notify in writing (otherwise than on a delivery or consignment document) (a) the Company and any carrier of any claim regarding the quantity or condition of Goods delivered or any damage to them within 3 days of delivery and (b) the Company of any claim regarding any defect which should be apparent on reasonable inspection within 5 working days of delivery, time being of the essence. Paragraph 9 will apply to any such defect or damage. If no such notice is given, so far as concerns those matters the Customer will be deemed to have accepted the Goods and that they conform with the Contract

TITLE AND RISK

8.1 Notwithstanding delivery and the passing of risk or any other provision of these Conditions, the legal and beneficial ownership of the Goods will remain with the Company, which retains the right of disposal, until the Company has received payment in full of:
(a) all sums payable to the Company in relation to the Contract; and
(b) all other sums due from the Customer to the Company, when the sums referred to in (a) are paid, in respect of the supply of any other goods or services

8.2 Until the property in the Goods passes to the Customer it shall:
(a) hold the goods as fiduciary agent and bailee for the Company which may, at any time and without prior notice, require the Customer to deliver up the Goods to the Company (whether or not the same form part of or are affixed to any land, buildings or other item) and, if it fails to do so forthwith, enter upon any land or buildings where the Goods may be situated with its representatives and appropriate transport, remove them from any land, building and other item and repossess them. The Company will use reasonable skill and care in removing Goods but, subject thereto, the Customer will be responsible for and indemnify the Company in respect of all damage to any land, building or other item caused by such removal;
(b) not sell, part with possession of, use or do anything else inconsistent with the Company's ownership of any of the Goods and will ensure that they are not affixed to or become part of any land and that they are kept separate from any other item, properly stored and protected and clearly identified as the Company's property and are not lost, destroyed or damaged

8.3 After the Company has repossessed any Goods it may sell the same and the proceeds of sale will belong to the Company absolutely and the Customer will have no right or interest therein. If the net proceeds received by the Company are less than the amount payable to it in relation to the Contract it may recover the balance from the Customer

8.4 Subject to paragraph 5.7, risk in the Goods will pass on delivery if they are to be delivered ex works or otherwise when the vehicle carrying them arrives at the delivery location

8.5 All insurance proceeds receivable by the Customer in respect of the Goods shall be held in trust by the Customer for the Company in a separate account and first be applied in or towards discharging any sums payable under the Contract

8.6 Notwithstanding that property in the Goods has not passed to the Customer, the Company may recover all sums payable to it in relation to the Contract

WARRANTY

9.1 The following warranty will apply to the Goods (except for any accessories referred to in paragraph 9.3):
The Goods will correspond with their specification and description and sample (if any) at the time of delivery and if within:
(a) 12 calendar months of the Goods being delivered by the Company or, as the case may be, completion of the supply of any services (or such other period as the Company may agree in writing) any defect in the Goods is discovered under normal use which is directly attributable to faulty design, materials or workmanship; or
(b) twenty five years from delivery the tank shell leaks under normal use as a result of any structural failure; or
(c) a valid claim is made under paragraph 7 The Company will at its option and expense remedy the defect or damage by replacement or repair or refund the purchase price of the defective or damaged Goods

9.2 The warranty in paragraph 9.1 will be subject to the following conditions:
(a) it will not apply to any defect or damage resulting from any:
(i) alteration of the Goods without the Company's prior written consent, incorrect installation (except by the Company), incorrect storage, overloading, normal wear and tear, misuse or use other than for the Goods' intended purpose, accident, abnormal conditions of use or maintenance, repair or use which is not in accordance with the Company's or manufacturer's instructions or procedures issued from time to time; or
(ii) any act or omission of the Customer or any third party (other than the Company's agents or sub-contractors involved in the supply of the Goods) or any fault in any other goods or equipment
(b) the Company will not be liable for any defect in the Goods arising from any drawing, design or specification or free issue materials furnished by or on behalf of the Customer
(c) warranty work will be carried out during the Company's normal business hours so far as is practicable at the Company's premises and/or elsewhere at its option. The Customer will procure that the Company's personnel will have such access to the Goods as they may require to investigate alleged defects or damage and carry out any warranty work
(d) except for any installed in any land, Goods must be returned carriage paid to the Company's trading premises as required by the Company. Repaired or replacement Goods will be delivered to the Customer's premises within the United Kingdom or, in the case of exports, FOB UK port or airport at the cost and discretion of the Company. The Company will reimburse the Customer the reasonable carriage costs incurred by it in returning by road from the place of delivery any Contract Goods which are repaired or replaced under the warranty or whose purchase price is refunded. Replaced Goods will belong to the Company
(e) the Customer must give to the Company in writing full particulars of any alleged defect or damage within the period stated in paragraph 7 or, in the case of a warranty claim, within 7 days after it becomes aware of the same and in any event within 7 days of the end of the warranty period (time being of the essence)
(f) no sum shall be due and unpaid under the Contract when the Company is to fulfil its obligations under the warranty
(g) if the Customer makes any claim falling outside the terms of the warranty the Company may charge for examining the Goods and any work done or goods supplied by it in respect of that claim at its then prevailing rates and any cost or expense incurred by the Company
(h) the warranty will apply to Goods or components replaced or repaired under the warranty for the balance of the original warranty period

9.3 The Company will transfer to the Customer (so far as it may lawfully do so) the benefit of any warranty received by the Company from any supplier of any accessories including in the Goods but the Company will have no further liability under the contract to the Customer in relation to those accessories

LIABILITY

10.1 The warranty will be in substitution for all other terms, warranties and conditions, express or implied, statutory or otherwise in relation to the Goods (except for the Company's title to them) which are hereby excluded to the fullest extent permitted by law. All descriptions, illustrations and performance figures relating to the Goods contained in any catalogues, sales or other material are intended to provide a general indication of the goods and services described in them and will not form part of the Contract unless expressly otherwise agreed in writing by the Company

10.2 Neither the Company nor its employees or agents will be liable in contract or in tort (including negligence) or in any other way for any consequential or indirect loss, liability or damage nor for any other claim for consequential compensation whatsoever (including loss of profit, costs or expenses) arising howsoever from or in connection with the Contract or the Goods

10.3 Subject to paragraph 10.2 and excluding any liability falling within paragraph 10.4 (a), the Company's liability for all and any damage to or loss of any tangible property which occurs in any period of the Company's insurance for Product Liability and results from any breach of the Contract by the Company or the negligence of or any other breach of duty by the Company shall be limited in aggregate to damages of an amount equal to £1,000,000 less the Company's total liabilities in relation to all other claims for Product Liability which are made by claimants in respect of that period and are covered by such insurance

10.4 Subject to paragraph 10.2 and excluding the Company's liability arising under paragraph 9 or referred to in paragraph 10.3 the Company's aggregate liability whether arising in contract or tort (including negligence) or otherwise howsoever for any loss, cost, damage, injury or liability (whether consequential or indirect or otherwise) arising from or in connection with the Contract or the Goods will be limited to damages of an amount equal to:
(a) in the case of any pollution or contamination of any land, building or water or the atmosphere occurring in any period of the Company's insurance for such pollution or contamination, £1,000,000 less the Company's total liabilities in relation to all other claims for such pollution and/or contamination which are made in respect of that period by claimants and are covered by such insurance; and
(b) in all and any other cases, an amount equal to the net invoice value of the Goods (excluding VAT)

10.5 The limits on the Company's liability stated in paragraphs 10.3 and 10.4 shall include the Company's legal liability to the Customer for all costs (including legal costs) and expenses relating to the liability concerned

10.6 The Company will have no liability under or in respect of the liabilities referred to in paragraphs 10.3 and 10.4 (a) unless the Customer has given written notice of it to the Company within 7 days of the date when the Customer became aware of the event giving rise to that liability or the date when it ought reasonably to have become so aware (whichever is the earlier)

10.7 Provided that the insurance is available to it generally in the market on reasonable commercial terms, the Company will maintain during the continuance of the Contract and for at least 1 year after completion of the supply of the Goods public and product liability insurance in respect of the liabilities referred to in paragraphs 10.3 and 10.4 (a) for not less than the amounts stated respectively in those paragraphs

10.8 The limitations on and exclusions from liability contained in these Conditions shall be subject to the provisions of section 2 (1) of the Unfair Contract Terms Act 1977 and shall not apply to any liability for fraud

10.9 The Customer undertakes to indemnify the Company from and against all claims and proceedings brought against the Company by any third party arising from any act or omission (including negligence) on the part of the Customer (or any other person for whom it is vicariously liable) in relation to the Goods or their supply together with all expenses, costs (including legal costs on a full indemnity basis), damage, losses and liabilities incurred by the Company in connection with any such claims or proceedings

10.10 The Customer agrees that it accepts the limitations on and exclusion from liability contained in these Conditions as reasonable and that if they had not been included the price of the Goods would have been materially increased

10.11 The Customer warrants that in purchasing the Goods it is not dealing as a consumer (as defined in the Unfair Contract Terms Act 1977)

ACCELERATED PAYMENT

11 Without prejudice to its other rights, if the Company has serious doubts about the Customer's ability to pay any sum under the Contract on the due date the Customer will within seven days of written notice from the Company pay the balance of all sums payable under the Contract (including any sum held or to be held by way of retention) or provide security for such payment to the Company's satisfaction pending which the Company may suspend the performance of all or any of its obligations under the Contract

FORCE MAJEURE

12.1 The Company will not be deemed to be in breach of the Contract or otherwise be liable to the Customer for any delay in performing or any failure to perform any of its obligations under the Contract by reason of any cause or event beyond the Company's reasonable control (including breakdown of plant or machinery, strike or industrial dispute, shortage of materials or failure of or delay in receiving supplies)

12.2 If any such delay or failure:
(a) continues for more than 14 consecutive days the Company may terminate the Contract forthwith by written notice to the Customer. In that event, (without affecting its accrued rights) the Company will be entitled to be paid the price payable under the Contract in respect of all Goods delivered or tendered for delivery or notified to the Customer as being available for collection or delivery before the notice of termination is served
(b) occurs, the Customer will pay to the Company as part of the price of the Goods concerned an amount equal to all additional costs and expenses incurred by the Company in performing its obligations under the Contract beyond the estimated time for performance stated in the Contract

TERMINATION

13.1 If the Customer:
(a) makes any arrangement or composition with its creditors generally or (being an individual) has an interim order (within the meaning of The Insolvency Act 1986) made against him or becomes bankrupt or (being a firm or body corporate or unincorporate) enters into compulsory liquidation or voluntary liquidation or the equivalent or shall be dissolved; or
(b) has a receiver and/or manager, administrative receiver, supervisor or administrator or any other person having similar powers or function appointed over or in relation to the Customer or any part of its assets or undertaking; or
(c) is unable to pay its debts within the meaning of sections 123 or 268 Insolvency Act 1986; or
(d) commits any breach of any of the provisions of the Contract (express or implied) Without prejudice to its other rights (including its accrued rights) the Company may determine the Contract or the balance of the Contract or suspend deliveries or the supply of any services forthwith by written notice to the Customer without any liability whatsoever

13.2 The Customer will indemnify the Company against all claims, proceedings, loss, damage, liabilities, costs and expenses incurred by the Company arising out of or in connection with any breach by the Customer of, or any act or omission of the Customer, in relation to the Contract

CANCELLATION

14 The Customer may only cancel the Contract (whether in whole or in part) with the Company's previous written consent, which shall be given or withheld at the Company's discretion and upon such terms as the Company deems fit.

GOVERNING LAW AND JURISDICTION

15 The Contract will be governed by the laws of England and all claims and legal proceedings arising in connection with the Contract will be subject to the non-exclusive jurisdiction of the Courts of England to which the Customer irrevocably and unconditionally submits

PATENTS AND INTELLECTUAL PROPERTY RIGHTS

16.1 Any specifications, drawings or other documents in any medium provided or created by or for the Company in connection with the Contract, and the intellectual property rights in them, remain with the Company or the relevant third party unless otherwise agreed in writing by the Company and must be returned to the Company on request, including all copies, be treated as confidential and not be disclosed to any person or copied or used except strictly for the purposes of the Contract.

16.2 The Customer will indemnify the Company against all loss, damage, proceedings, liabilities, costs and expenses incurred by the Company in connection with any claim for infringement of any intellectual property rights, or for unlawful use or disclosure of any confidential information, of any third party arising from the Company's use of any specification or other material provided by the Customer in relation to the Contract

EXPORTS

17.1 In these Conditions "Incoterms" means the International Rules for the Interpretation of Trade Terms of the International Chamber of Commerce as in force at the date when the Contract is made. Unless the context otherwise requires, any term or expression which is defined in or given a particular meaning by the provisions of Incoterms will have the same meaning in these Conditions, but if there is any conflict between the provisions of Incoterms and these Conditions, the latter will prevail

17.2 Where Goods are supplied for export from the United Kingdom, the provisions of this paragraph 17 will (subject to any special terms agreed in writing between the parties) apply notwithstanding any other provision of these Conditions

17.3 The Customer will be responsible for complying with all legislation or regulations (including obtaining at its own cost all necessary licences and authorities) governing the importation of the Goods into countries of destination outside the United Kingdom and for payment of all taxes and duties in relation thereto

17.4 Delivery of the Goods or any instalment thereof will be subject to the granting of all necessary export licences and the Customer will provide all reasonable assistance and information to the Company to enable it to apply for or obtain the same. The Company will not be liable for any loss, damage, liability or expense whatsoever arising from any delay in obtaining or failure to obtain any export licences. Where Goods are ordered for export from the Customer's address in the United Kingdom or by the Customer's agent in the United Kingdom the Customer or its agent will be responsible for obtaining such licences

17.5 Unless otherwise agreed in writing, the Goods will be delivered FOB the air or sea port of shipment and the Company will not be obliged to give notice under section 32(3) of the Sale of Goods Act 1979

HEALTH AND SAFETY

18 In manufacturing the Goods the Company will comply with its duties under the Health and Safety at Work etc Act 1974 and other applicable legislation relating to health and safety at work. Subject thereto, it is the Customer's responsibility to ensure that the Goods comply with all health and safety regulations and other legislation in force where the Goods are used. Any additions or modifications required to be made to any Goods by the Customer for the purpose of compliance with any such regulations or legislation shall be at the Customer's expense but no warranty or representation is given by the Company that any such additions or modifications will cause the Goods so to comply. The Customer will make available to its employees and any third party who may handle, store, resell or use the Goods any safety information, warnings and instructions that may be appropriate, including any supplied by the Company and all revisions thereto

DATA PROTECTION & ELECTRONIC COMMUNICATION

19.1 The Customer acknowledges and agrees that their details; name, address and payment details, can be used as necessary to fulfil orders and provide you with information on products and services.

19.2 Electronic communications are capable of data corruption and therefore we do not accept responsibility for any errors or problems that may arise through the use of electronic communication.

MISCELLANEOUS

20.1 The provisions of the Contract are severable, and if any provision or part of it is held to be invalid or unenforceable by any court or other body of competent jurisdiction that will not affect the other provisions or the remainder of the relevant provision

20.2 Any variation of the Contract or waiver of any breach by the Customer must be agreed in writing by the Company's authorised representative

20.3 The Customer may not assign or otherwise deal with any of its rights or obligations in relation to the Contract without the Company's prior written consent but the Company will be free to do so

20.4 Any time or indulgence given by the Company will not in any way prejudice any of its rights in respect of the Contract

20.5 Any notice or claim under the Contract shall be in writing and shall be effectively served if it is personally delivered or sent by pre-paid first class post or facsimile transmission to the addressee at its address overleaf or any other address for service notified to the other in accordance with this paragraph

20.6 Telecommunications may be recorded to ensure service standards are met.

SECTION

2

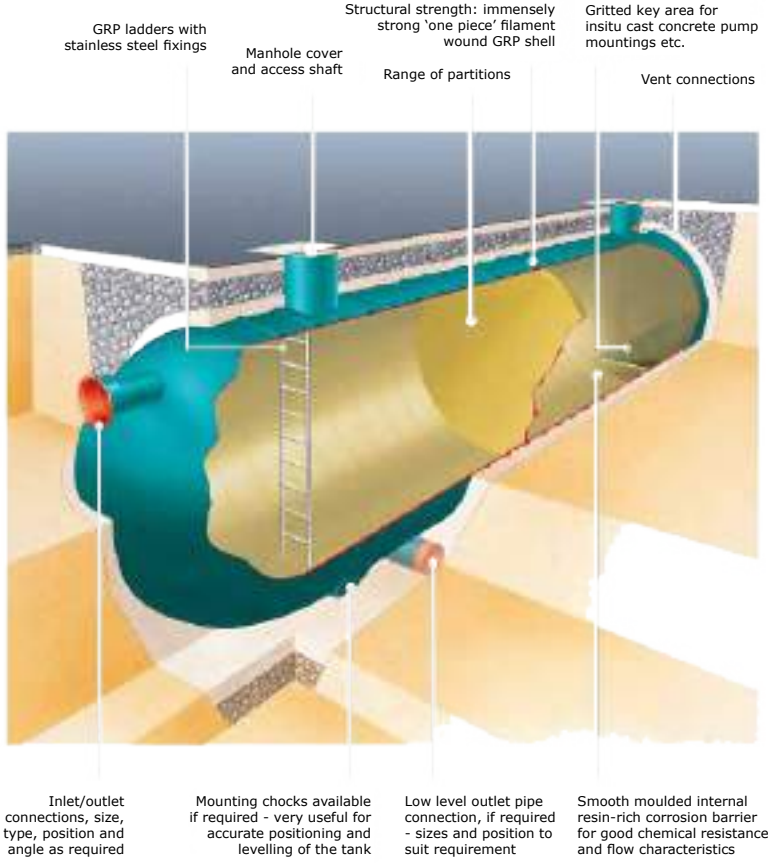
SPEL Tankstor® Underground Tanks

SPEL Septic/Settlement tanks

Case Studies Included


SPEL

Introduction



SPEL Tankstor® underground tanks have been developed over 45 years of experience in the market of underground GRP tanks.

In 1989 SPEL Products developed the technically advanced chop-hoop filament winding process to provide the most structurally sound and economic solution. This was patented in 1989 and further improved to the current wide range of tanks available in five diameters (1.2, 1.8, 2.6, 3.5 and 4m dia.) Designed originally to the well-recognised British Standard BS4994 and BS EN 976 they carry a 25 year shell Warranty and have a life expectancy of over 50 years depending on the tanks contents and process details.

SPEL Tankstor® underground tanks have many uses; storage, storm water attenuation, fire sprinkler system restoration tanks, separation, treatment and accidental spillage containment.

Connections are available in a range of diameters, types and couplings to suit site drainage. Access shafts in a range of diameters, square or rectangular can be fitted to suit requirements. Partitions (non-load bearing and load bearing) can be fitted to provide chambers or baffles. Pump platforms, access ladders and other fittings can be incorporated see left.

Modern Production Facilities

SPEL Products have modern factories with the latest 'state of the art' chop-hoop filament winders, computer controlled machines for the end domes and seven axis robotic spray-up for components. This ensures proper quality control and most economic production. Modern dust extraction and fire sprinkler system are included.

Quality Control

The manufacturing process is carefully monitored with a digital read out system. Chopping glass, winding glass, the resin-rich inner layer and main laminate resins are kept within specification parameters thus minimising human error.

Quality control procedures require each tank to be carefully inspected and tested. Ultrasonic thickness readings, material content weights, etc are checked and recorded against the tank's unique serial number. Additional periodic laminate testing is carried out by independent testing facilities including stress and strain analysis and also physical property tests to meet specific design criteria.

25 Year Warranty

Each SPEL underground tank shell carries a **25 year** warranty.

2.2 SPEL Tankstor® Underground Tanks

Technical Information

Process

SPEL underground tanks are manufactured by the chop hoop filament winding process developed in the US and specifically designed for underground tanks by SPEL Products, Patent No. 2233384.

GRP laminate

Design and specification for SPEL underground tanks

The SPEL underground tanks have been designed with reference to BS EN 13121, BS EN 976-1, 978 and BS EN 858-1:2002.

The quality and strength of glass reinforced plastic (GRP) laminates depends upon the following factors:

- The design criteria, eg. chemical resistance, temperature, internal and/or external loading.
- The efficiency and consistency of the manufacturing process and the high level of control to maintain resin and reinforcements within strict design parameters.
- The laminate construction from resin-rich corrosion resistant internal surface, resin-rich glass reinforced corrosion barrier, main laminate and the external resin-rich water penetration barrier providing excellent corrosion resistance from internal contents and complete sealing of laminate from ingress of water and/or contaminants externally.

Prior to determining the laminate construction and thickness using requirements, actual specimens are taken from filament wound laminates and independently tested. From the ongoing material tests and consideration of the various partial influence factors, which include the chemical resistance and a tank shell life to be excess of 25 years, a generous final design factor is determined.

The design of GRP laminates is clearly different from, for example, a steel structure where the material and loadings are clearly defined.

Tank manufacturers can cut their quality and price depending on the design factor determined.

SPEL underground tank laminates are designed to meet specific requirements, for example, hydrostatic load on tanks surrounded either in concrete or a free flowing pea gravel.

With experience gained in the United States, high quality underground tanks do not suffer from degradation to the degree envisaged in the British Standard, in fact tests carried out on laminates taken from underground tanks in the US after 25 years use, have shown very little loss of strength.

The important factors are the construction and composition of the laminate to resist the corrosive action of the internal chemicals and the water or contaminated underground water externally.

BS EN 978 – Tests to this Standard determine the alpha and beta, 'the long term deterioration due to creep and the effects of water or chemicals on the plastics'. Tests have been carried out, on pieces of shell cut from the tank barrel, by an independent test laboratory. The results are used in the equations (BS EN 976-1) to determine the stability of underground GRP horizontal cylindrical tanks for the non-pressure storage of liquid petroleum based fuels.

Chemical resistance and long term degradation

Further independent tests have been carried out in accordance with BS EN 858-1:2002 Section 8.1.4 'Chemical resistance of internal surfaces'. The tests involve full immersion of three test specimens for 1000 hours in four solutions; de-mineralised water at 40°C, fuel oil at 23°C, unleaded fuel at 23°C, caustic solution at 40°C.

The requirement in Section 6.2.7.1.3. 'Plastic materials' (BS EN 858-1) is for the glass reinforced test specimens under test to retain 80% of their strength when compared with the control specimen. The results of tests for tensile strength and flexural modulus have shown very little reduction, if any, in performance. In each case there was a reduction in flexural strength but an increase in modulus. Initially this might seem odd but it is possible that this could be part explained by at least two samples being immersed at 40°C hence a post cure compared to the control. All samples appeared to have passed seeing they came within the 80% retention of the control specimen.

Quality control

The SPEL chop hoop filament winding process specially developed for underground tanks is carefully monitored to Work Instructions. All materials are fully documented (digital read-out of resin and glass reinforcements) against each unique serial numbered tank shell.

All items are cured in accordance with the resin supplier's instructions. Where required eg. highly chemical resistant linings, the tank is post cured in accordance with the Work Instructions.

Ultrasonic thickness checks are made on all shells together with Barcol hardness checks. The acetone test is included where applicable.

The laminate is inspected visually to ensure proper laminate consolidation and surface finish.

Workshop conditions, Health & Safety and Environmental considerations.

Included in process controls is work shop temperature, fume extraction to keep within Health & Safety occupational exposure limits and odour control to meet the strict Environmental Protection Act 1990 Part 1 requirements as dictated by the Local Authority 'Authorisation' requirements.

The record maintained since 1989, when the chop-hoop filament winding process was introduced, is that no tank has failed due to a design or manufacturing fault. Since 1989 thousands of underground tanks have been manufactured. The few tanks damaged were due to faulty installation or handling.

With this exceptional track record we are fully satisfied and confident that we have a specification and process control that produces exceptionally high quality laminates that have a life expectancy well in excess of 50 years.

The SPEL underground tank shell carries a 25 year warranty.

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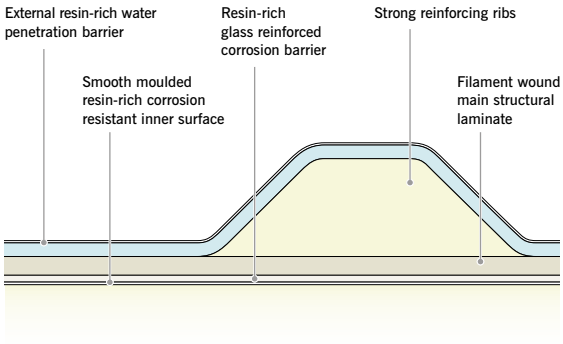
Laminate Specifications



GP – General purpose applications.

Constructed throughout with orthophalic polyester resin and glass reinforcement.
Applications – potable water, sewage, surface water and mild chemicals.

CR – Chemical resistant lined tanks.

The smooth moulded resin-rich corrosion resistant internal surface and the resin-rich glass reinforced corrosion barrier are constructed from isophthalic polyester resin or terephthalic NPG polyester resin.
Applications – suitable for silage effluent, chemicals (acidic) and hydrocarbon materials.

HCR – Highly chemical resistant.

Aggressive chemicals and/or high temperatures. The smooth moulded resin-rich corrosion resistant internal surface and the resin-rich glass reinforced corrosion barrier are constructed from vinyl ester resins dependent upon chemical resistance and/or high temperatures.
Applications – transformer oil dump tanks, highly aggressive chemical process or holding tanks, and accidental chemical spillage containment tanks.

Suffix CG – Contaminated ground conditions.

The external resin-rich water penetration barrier can also be in chemical resistant or highly chemical resistant where tanks are to be installed in contaminated ground.

Filament wound shell	GP	CR	HCR	Suffix CG
Resin-rich corrosion resistant internal surface	Orthophalic polyester resin	Isophthalic polyester resin	Vinyl ester resin	
Resin-rich glass reinforced corrosion barrier	Orthophalic polyester resin	Isophthalic polyester resin	Vinyl ester resin	
Main laminate	Orthophalic polyester resin	Orthophalic polyester resin	Orthophalic or isophthalic polyester or vinyl ester resin	
External resin-rich water penetration barrier	Orthophalic polyester resin	Orthophalic polyester resin	Orthophalic polyester resin	Isophthalic polyester or vinyl ester resin

Tank end domes	GP	CR	HCR	Suffix CG
Gelcoat internal surface or resin-rich glass reinforced internal surface	Isophthalic polyester gelcoat	Isophthalic polyester gelcoat	Vinyl ester resin	
Resin-rich glass reinforced corrosion barrier		Isophthalic polyester resin	Vinyl ester resin	
Main laminate	Orthophalic polyester resin	Orthophalic polyester resin	Orthophalic or isophthalic polyester or vinyl ester resin	
External resin-rich water penetration barrier	Orthophalic polyester resin	Orthophalic polyester resin	Orthophalic or isophthalic polyester or vinyl ester resin	Isophthalic polyester or vinyl ester resin

Reinforcement materials for shell and end domes	GP	CR	HCR	Suffix CG
Resin-rich corrosion resistant internal surface	C-glass surfacing tissue (shell only)	C-glass surfacing tissue (shell only)	C-glass surfacing tissue or synthetic veil	
Resin-rich glass reinforced corrosion barrier	E-glass chopping roving	E-glass chopping roving	E-glass chopping roving	
Main laminate	E-glass chopping roving	E-glass chopping roving	E-glass chopping roving	
Filament wound shell	Plus E-glass winding roving	Plus E-glass winding roving	Plus E-glass winding roving	
External resin-rich water penetration barrier	No reinforcement	No reinforcement	No reinforcement	No reinforcement

Water Regulations Advisory Scheme Ltd

GP specification* is approved for contact with wholesome water for domestic purposes having met the requirements of BS6920-1:2000 and/or 2014 'Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water'.

2.4 Chop-hoop Filament Wound Shells

Laminate Construction to BS4994

SPEL Tankstor® underground tanks and separator shells are chop-hoop filament wound in quality glass reinforced plastics in accordance with the British Standard BS EN 13121.

To ensure a life expectancy in excess of 50 years underground and containing contaminated water or chemicals, the laminate construction must incorporate a chemical or corrosion barrier as defined in:

Section two (BS EN 13121)
7. Construction of chemical barrier

7.3 Where a thermoset lining is used, in order to achieve the optimum properties, the construction of the laminate in contact with the corrodent shall consist of the following:

(a) Surface layer

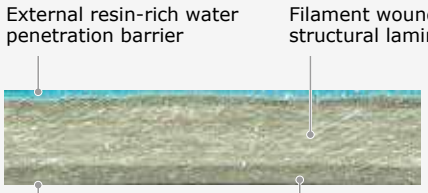
A resin-rich surface layer reinforced with C glass surfacing mat, synthetic fibres or other suitable material, with a thickness between 0.25mm and 0.50mm.

(b) Backing layer

A backing layer normally containing a minimum of 1.2kg/m^2 chopped glass strand or CSM with a soluble binder with between 25% and 33% glass content, by mass.

For tanks and vessels which are constructed in accordance with categories II and III, it is permissible to reduce the backing layer to 0.6kg/m^2 chopped glass strand or CSM if agreed between the purchaser and the manufacturer.

SPEL Laminate Construction



The construction provides complete protection of the structural filament wound laminate from water/chemical penetration.

A Competitor Laminate Construction

None of the above features are present in this sample. Note: porous and pitted surface greatly reduces water and chemical resistance.

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Questionnaire

Date _____
Company _____
Address _____
Business of Company _____
Contact _____ Position in Company _____
Telephone _____ Email _____
Project Title _____
Site Address _____

Requirements

Product Description _____
Operation or Process _____
Quantity Required _____ Working Capacity Required (litres) _____ Maximum Capacity (litres) _____
Contents (full description & concentrations _____
_____
_____
pH Value _____ Specific Gravity (if known) _____ Viscosity _____
Maximum Working Temperature _____ Minimum Working Temperature _____
Will Tank be Filled by Pressure Discharge from Tanker? _____
Will the Contents be Agitated? _____

Tank Design Details (Please provide drawing if available)

Tank Dimensions: Select from SPEL Data Manual Section 2
Or Tank Series preferred:
Series 200 (1.2m dia.) ☐
Series 300 (1.8m dia.) ☐
Series 400 (2.6m dia.) ☐
Series 500 (3.5m dia.) ☐
Series 600 (4m dia.) ☐

Fittings

Inlet/s & outlet/s: Number, diameter, type & position (please provide drawing)
Access openings: Dia. number & position _____

Optional Extras

Extension Access Shafts _____
Pump Requirements _____
Pump/s Required: Type _____ Number _____ Duty/Standby or Duty/Assist _____
Flow Rate _____ Distance _____ Static Head _____
Agitator requirements _____
Inlet Tank Protection Abrasion Plate - **Yes/No**
Bauer Suction Pipe/s for Removing Contents/Silt etc _____
Level Indicators _____
Secondary Containment (double wall tanks) _____
Other

Installation Details

Tank Invert Depth _____ Water Table Depth (in winter) _____Tank surround: pea gravel/concrete

Main dimensions for 200, 300 and 400 Series tanks

Tank capacity	200 Series	300 Series	400 Series
	1.2m inside diameter	1.8m inside diameter	2.6m inside diameter
litres	length in mm	length in mm	length in mm
1,000	1,160		
2,000	2,040		
3,000	2,930		
4,000	3,810	1,950	
5,000	4,700		
6,000	5,578	2,755	
7,000	6,470		
7,300		3,200	
8,000	7,346	3,535	
9,000	8,236		
9,270		4,015	
10,000	9,120	4,285	
12,000	10,888	5,070	
13,650	12,347	5,755	3,390
16,000		6,700	
17,000		7,060	
18,200		7,615	4,250 4,000
20,000		8,255	4,400
25,000		10,215	5,250
27,300			5,700
30,000		12,175	6,170
35,000		14,155	
36,400			7,400
40,000		16,120	
40,600			8,200
45,500			9,050
50,000			9,980
60,000			11,830
70,000			13,710
75,000			14,700
80,000			15,600
90,400			17,560

Note: Intermediate sizes are available at extra cost.

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Main dimensions for 500 and 600 Series tanks

Tank capacity	500 Series	600 Series
	3.5m inside diameter	4.0m inside diameter
litres	length in mm	length in mm
45,000	5,390	
60,000	6,960	
75,000	8,520	
80,000	9,040	
90,000	10,040	
100,000	11,140	8,710
120,000		10,310
125,000	13,840	
140,000		11,891
150,000	16,340	12,690
160,000	17,540	13,485
170,000		14,320
175,000	18,940	
180,000	19,440	15,079
190,000		15,871
200,000	21,540	16,635
220,000		18,259
240,000		19,899
250,000		20,651
260,000		21,450
270,000		22,250
280,000		23,020
290,000		23,850
300,000		24,650

Note: Intermediate sizes are available.

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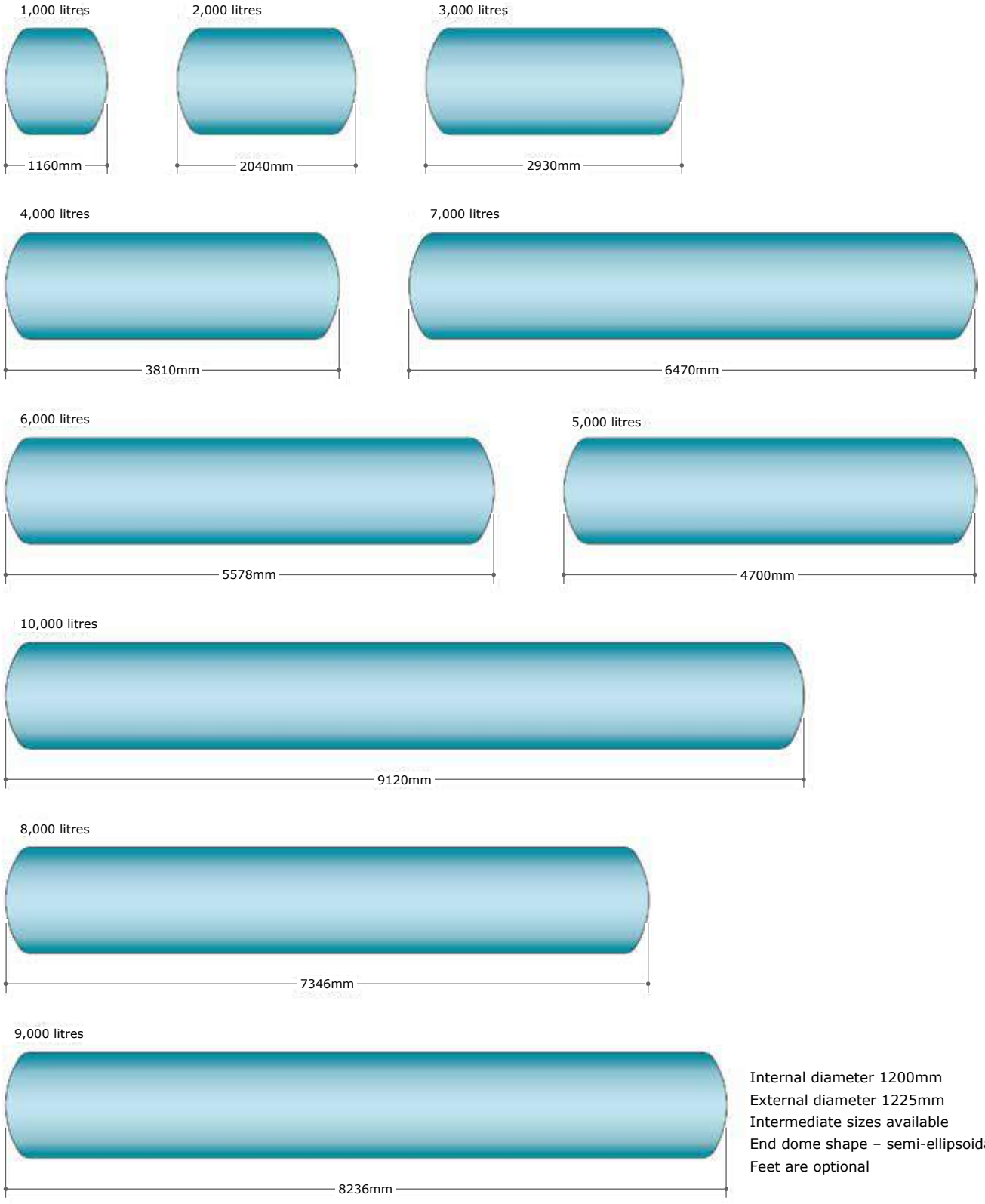
200 Series Profiles



Internal diameter 1200mm
External diameter 1225mm
Intermediate sizes available
End dome shape – semi-ellipsoidal
Feet are optional

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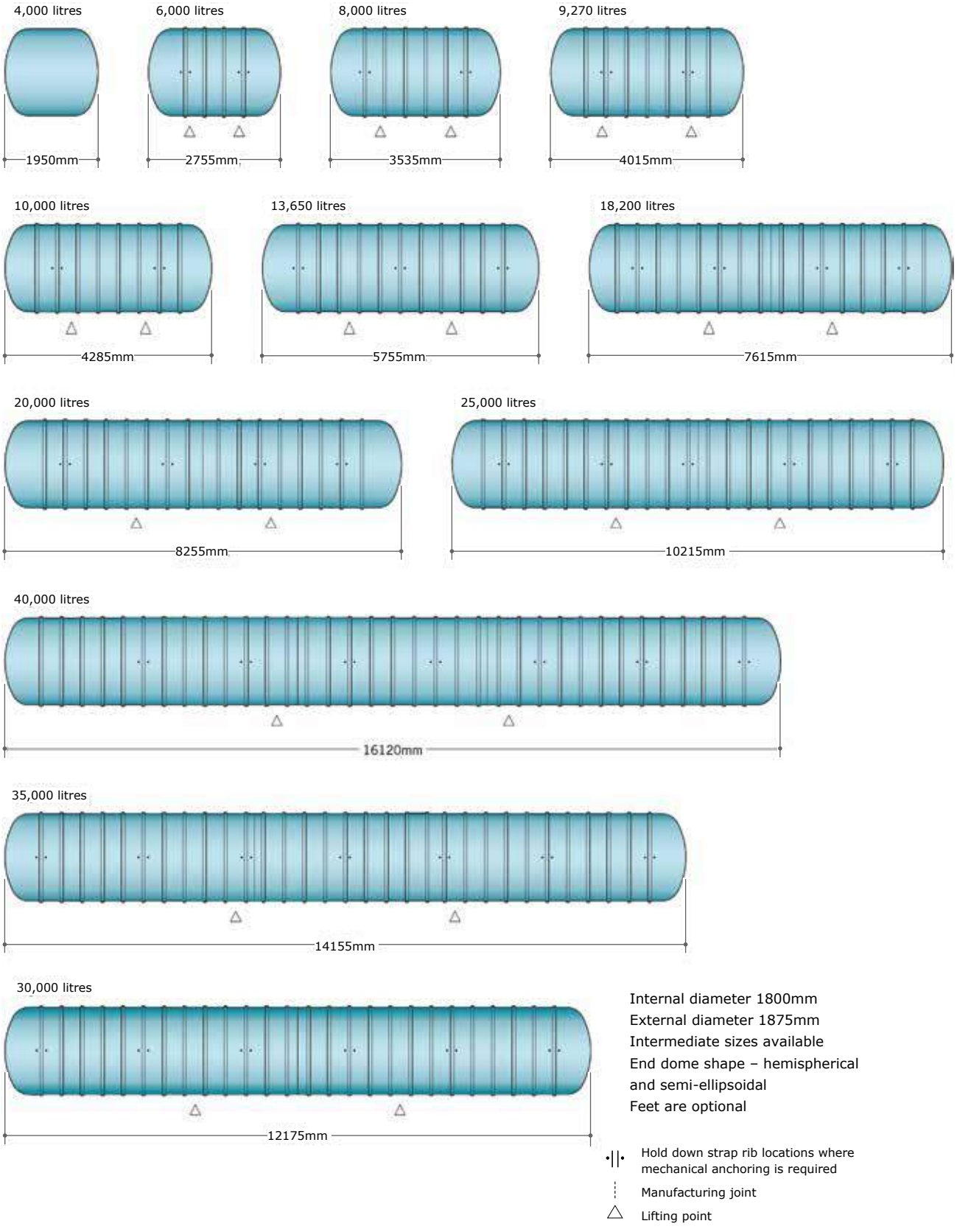
300 Series Profiles



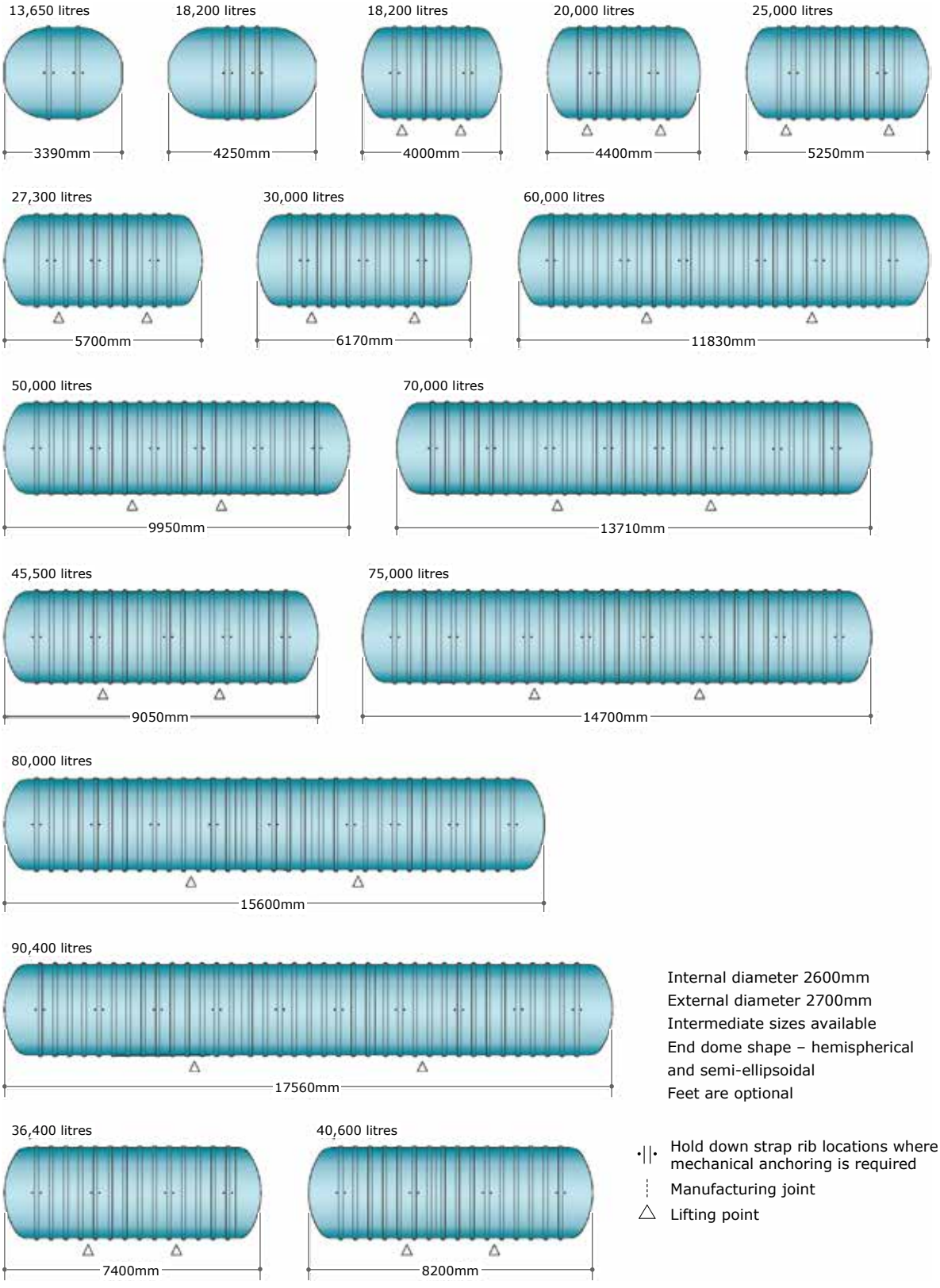
Internal diameter 1800mm
External diameter 1875mm
Intermediate sizes available
End dome shape – hemispherical and semi-ellipsoidal
Feet are optional

Hold down strap rib locations where mechanical anchoring is required

Manufacturing joint

Lifting point

400 Series Profiles



Internal diameter 2600mm
External diameter 2700mm
Intermediate sizes available
End dome shape – hemispherical and semi-ellipsoidal
Feet are optional

Hold down strap rib locations where mechanical anchoring is required

Manufacturing joint

Lifting point

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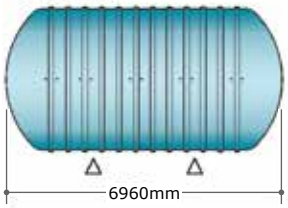
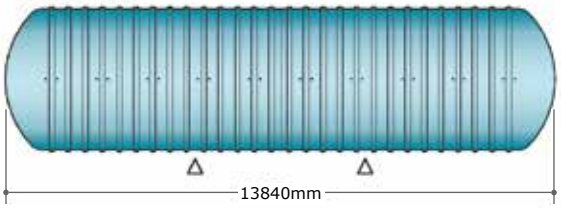
500 Series Profiles

60,000 litres

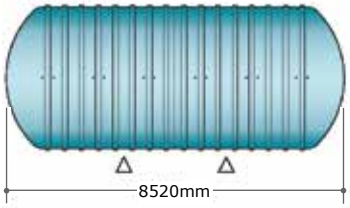


125,000 litres

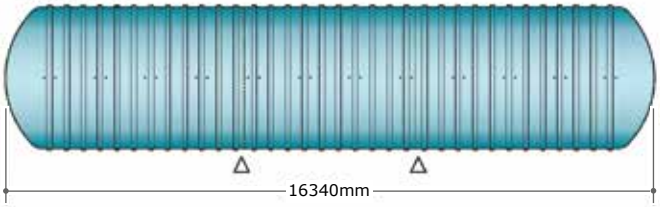


Internal diameter 3500mm
External diameter 3650mm
Intermediate sizes available
End dome – torispherical
Chocks are optional

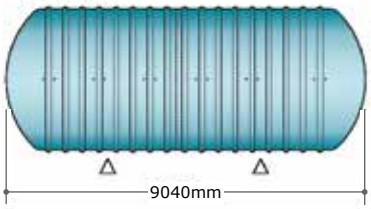
75,000 litres



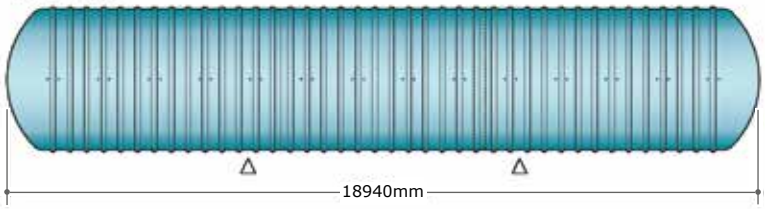
150,000 litres



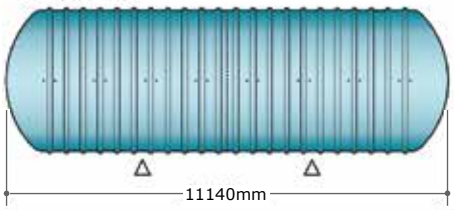
80,000 litres



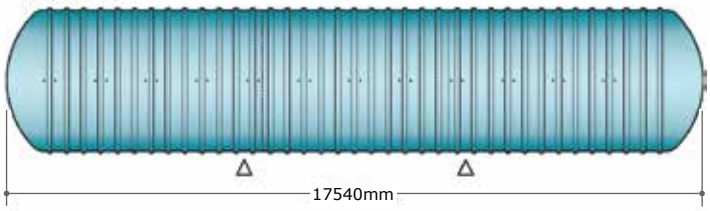
175,000 litres



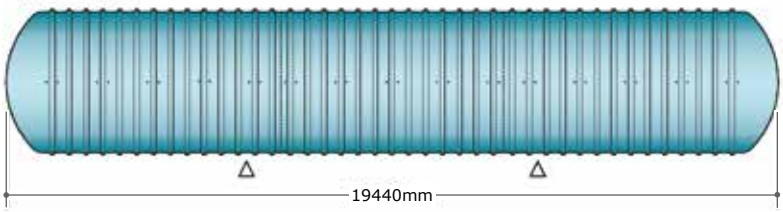
100,000 litres



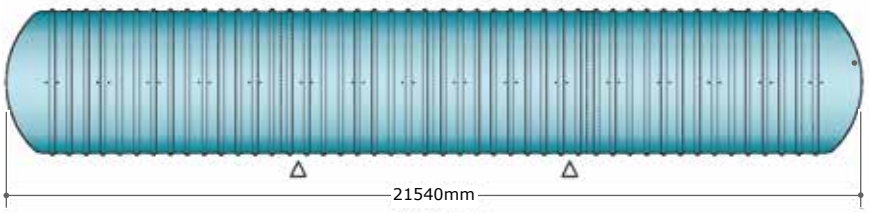
160,000 litres



180,000 litres



200,000 litres



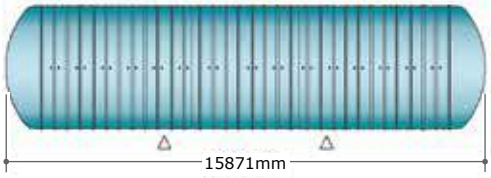
Hold down strap rib locations if mechanical anchoring is required

Manufacturing joint

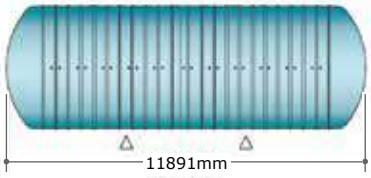
Lifting point

600 Series Profiles

190,000 litres

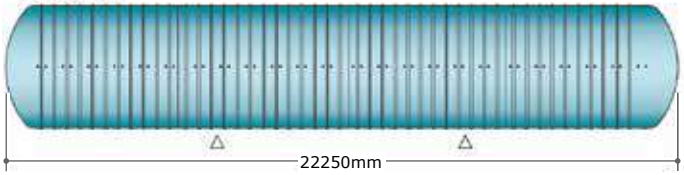


140,000 litres

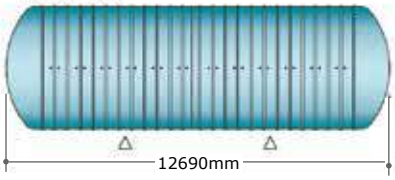


Internal diameter 4000mm
External diameter 4150mm
Intermediate sizes available
End dome – torispherical
Chocks are optional

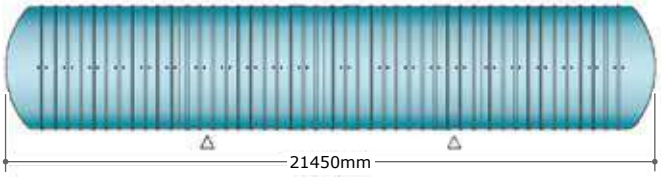
270,000 litres



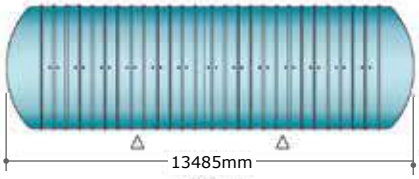
150,000 litres



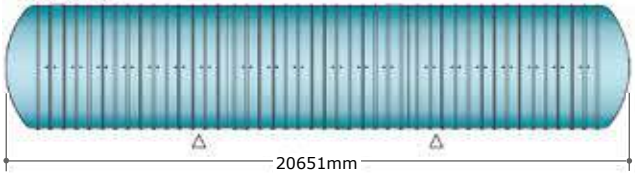
260,000 litres



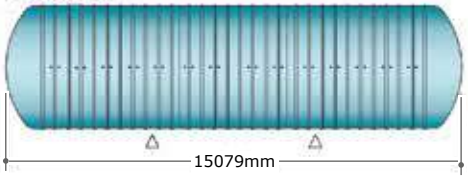
160,000 litres



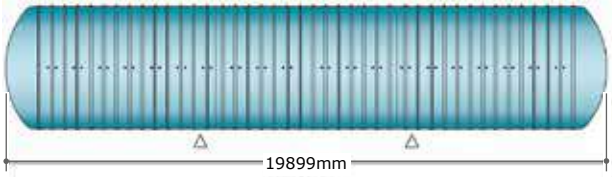
250,000 litres



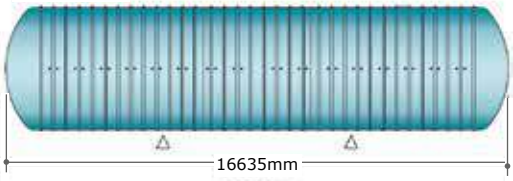
180,000 litres



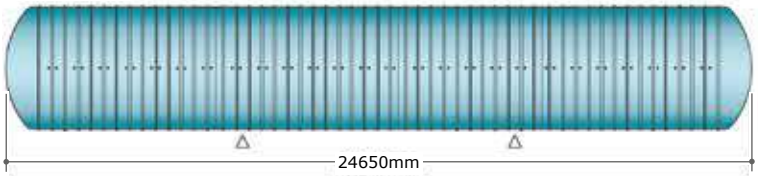
240,000 litres



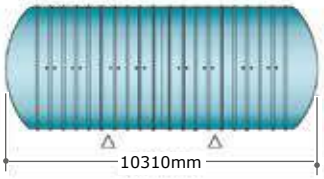
200,000 litres



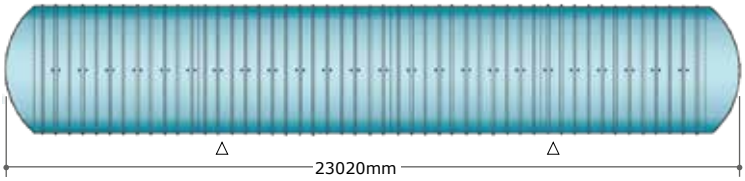
300,000 litres



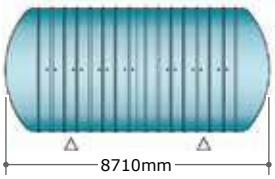
120,000 litres



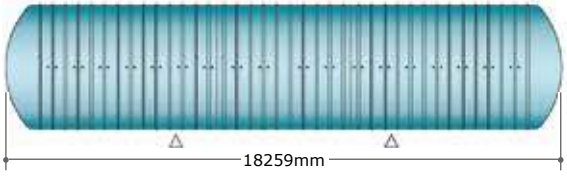
280,000 litres



100,000 litres



220,000 litres



Hold down strap rib locations if mechanical anchoring is required

Manufacturing joint

Lifting point

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Access shafts, extension access shafts, ladders and partitions

Normally, circular access shafts are supplied in 450, 600, 750, 900 and 1200mm diameter. Larger square access shafts can be fitted to suit specific requirements. GRP ladders can be incorporated if required, complete with stainless steel fixings.

200/300 Series

Shafts can be laminated onto the tank up to a maximum height of 1000mm. Above this height extension shafts can be supplied separately for on-site fixing.

400 Series

Shafts up to 400mm high are laminated onto the tank. Above this height the shafts are supplied separately to be site fixed in sockets provided and sealed using Sikaflex or similar sealant/ adhesive.

Alternatively, extension shafts can be provided to be site fixed onto stub shafts.

500 Series

Shafts up to 300mm high are laminated onto the tank. Above this height the shafts are supplied separately to be site fixed onto stub shafts.

600 Series

Stub access shafts are fitted 200mm high and extension access shafts fitted as 500 series.

Extention Access Shafts

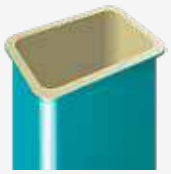
These are supplied in 500mm increments

Partitions

Partitions for many applications available to meet clients' requirements.

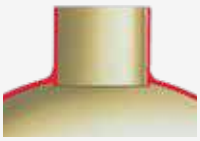
Socket access shaft

Access shafts over 500mm high supplied separately to be site fixed in socket provided. (Applies to 400 series only).

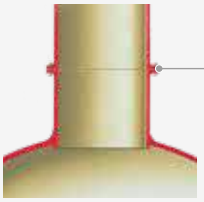


Rectangular shafts

800 x 1000/1250/1500
900 x 1000/1250/1500
1000 x 1000/1250/1500



Stub access shaft



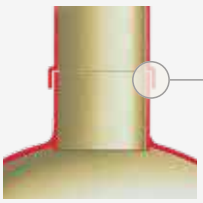
Bolted flange with neoprene gasket

Flanged joint stub access shaft with extension shaft

600, 750 and 900mm diameter.

Extension access shaft and ladder

(min. 750 diameter with GRP ladder).

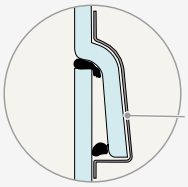


Sealant

Double seal if required

Socket joint stub access shaft with extension shaft

600, 750, 900 and 1200mm diameter.



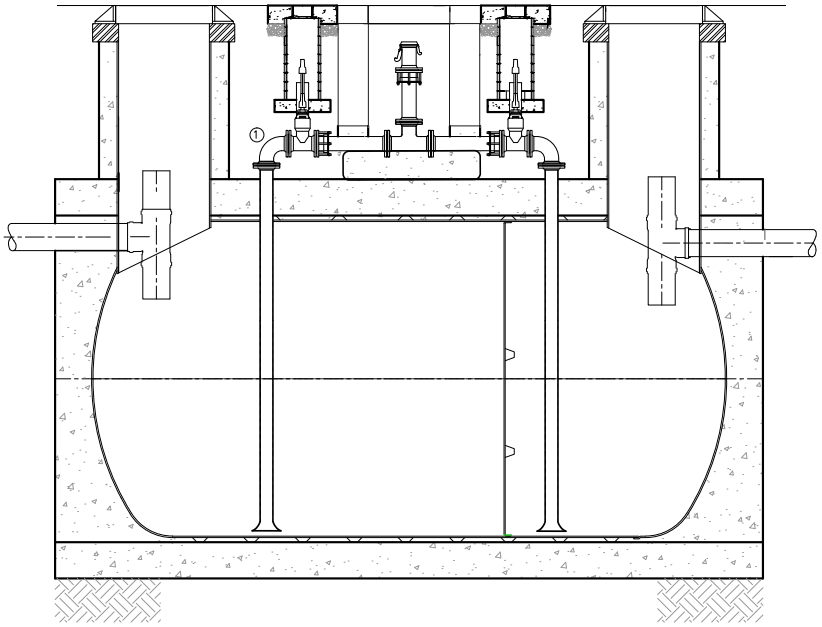
For extra water proofing use a self-adhesive flashing strip e.g. Flashband or Bituthane

Partition with by-pass duct and pressure release valves.

Load bearing partition.

Vortex flow controllers & Bauer connections

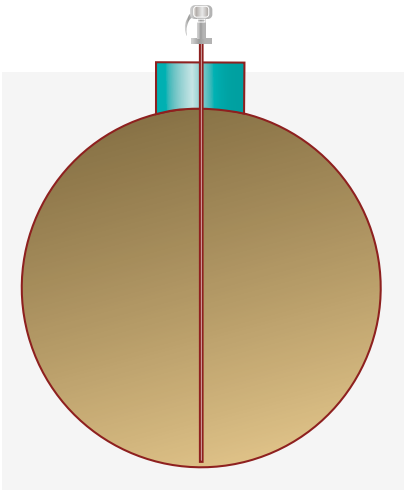
Scottish water sludge removal tank



Multiple sludge removal pipes can be linked to one tanker connection for emptying.

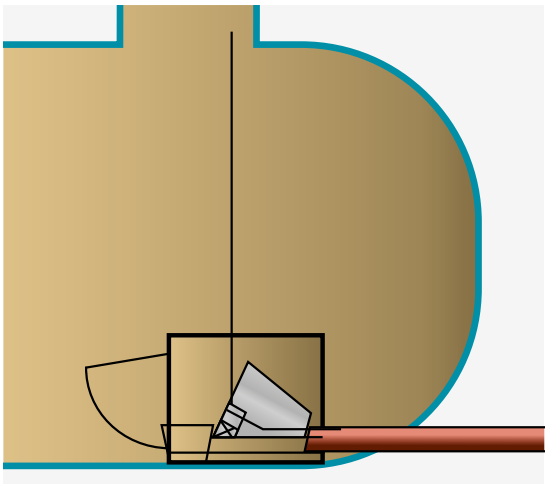
Emptying/sludge removal

Emptying/sludge removal available

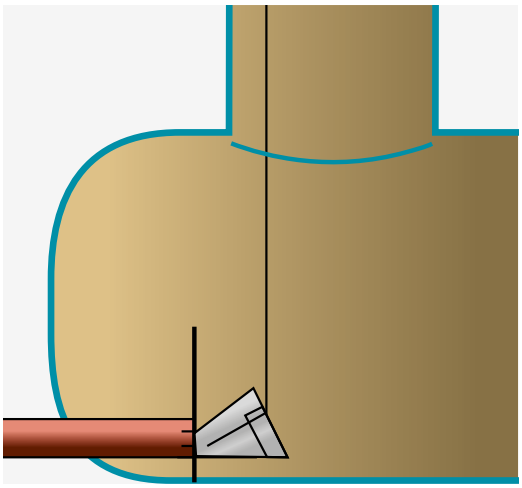


SPEL Storm-Brake stormwater attenuation system

Vortex flow controller with stainless steel debris cage and service access



Vortex flow controller with rodding access swivel plate and high level operation cable



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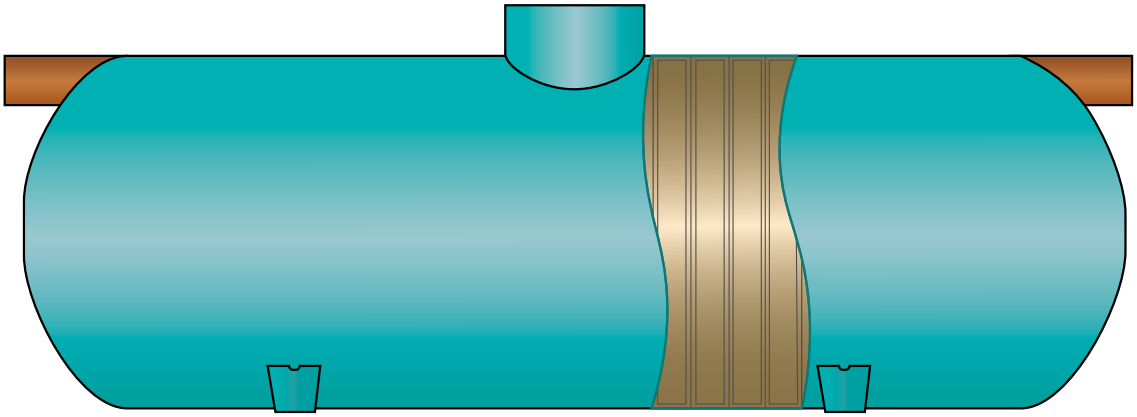
SPEL Above Ground Tanks



Where there is particular concern about leakages occurring from tanks, an alternative to bunding is to provide a second skin to collect material lost. Monitoring of the cavity using liquid sensing probe can alert operators to the problem. Such systems are sometimes used for underground or tanks in remote areas, where undetected leaks to the environment may occur. Similarly tanks within process buildings may also be doubled skin.

Examples of SPEL tanks with secondary containment for above and below ground applications

2.16 SPEL Septic/Settlement Tanks

Selecting and siting the tank

Septic tanks have been used for many years for the primary treatment of sewage from rural properties not connected to the public sewer.

Building a conventional brick or concrete tank however has always been a laborious undertaking and leaks due to subsequent settlement are common.

SPEL Products commenced manufacturing septic tanks in 1974 and acquired an Agrément Certificate in 1977. Since then SPEL have developed a large range of horizontal cylindrical septic tanks to BS 6297/ BS EN 12566-1:2000/A1: 2003 from 3m³ capacity for single dwellings up to 200m³ litres capacity and over for larger communities.

Thousands of SPEL Septic tanks are in use today because of their proven performance and are a factory made sealed unit.

The ease and speed in which they can be installed in any ground conditions makes them very attractive to the installer.

SPEL septic tanks should be used in conjunction with a form of secondary treatment (eg. a drainage field, drainage mound or constructed wetland).

- 25 year warranty.
- Life expectancy of over 50 years.
- Designed and manufactured with reference to BS4994/ISO976.
- Scottish Water Solutions kit framework supplier.

Basic design principles

The primary function of a septic/ settlement tank is to provide quiescent conditions to enable suspended solids to settle out, be retained and to produce a final effluent of as high a quality as possible. The higher the quality, the greater the efficiency and life of the soil infiltration system.

The controlled flow principle of the SPEL tank through two chambers provides excellent conditions for settlement and sedimentation. The tank has been so designed to extend the flow path between the inlet and outlet as far as possible for maximum overall efficiency.

Nominal capacity

SPEL septic tanks for domestic properties are based upon the following table for number of persons served. For larger installations the nominal capacity will depend on one or more of the following design criteria:

a) Population total loading;
b) minimum sizing criteria including sludge storage capacity;
c) additional design criteria for domestic wastewater flows from sources such as hotels, restaurants or commercial premises.

Series	Nominal capacity (m³)	Length (m)	Number of persons to be served	
			Normal flow 180L/ person/day	Extra flow* 250L/ person/day
200	3	2.93	5	4
200	4	3.81	11	8
200	5	4.70	16	12
200	6	5.8	22	16
300	5.86	2.69	21	15
300	8	3.54	33	24
300	10	4.19	44	32
300	13.65	5.76	64	46
300	20	8.25	100	72

*Where a sink waste disposal unit is fitted.

Siting the tank

British Standard BS 6297: 1983 recommends that sewage treatment works should be as far from habitable buildings as is economically practicable. The direction of the prevailing wind should be considered in relation to any properties when siting the works.

In accordance with the Building Regulations 2000. H2 2002 edition SPEL septic tanks should be sited at least 7m from any habitable parts of buildings, and preferably downslope.

The tank should not be installed near a road or driveway, where it could be subjected to high external loads, unless the installation is designed to withstand such loadings so they are not transferred to the tank shell.

Where the tank is to emptied using a tanker, it should be sited within 30m of a vehicle access provided that the invert level of the septic tank is no more than 3m below the level of the vehicle access. This distance may need to be reduced where the depth to the invert of the tank is more than 3m. There should also be a clear route for the hose such that the tank can be emptied and cleaned without hazard to the building occupants and without the contents being taken through a dwelling or place of work.

Ventilation

Adequate ventilation of the septic tank and the inlet pipework shall be provided to prevent the accumulation of fermentation gases.

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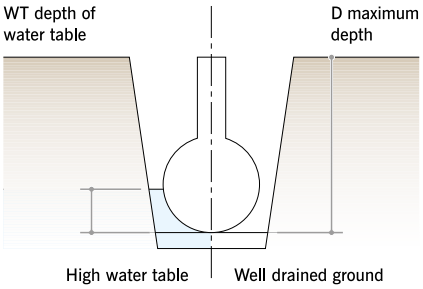
Specifications and installation methods

Selecting the tank specification

Standard, heavy, extra heavy or special tank specifications are available dependent upon tank burial depth and water table level in winter.



Standard tanks

Series	WT(m)	Surround Concrete D(m)	Surround Pea Gravel
D(m)			
200	1.0	4.0	2.0
300	0.9	4.0	2.6
400	1.3	5.0	4.0
300	20	8.25	100

For other specifications refer to burial depth charts in section 13 of this manual or contact technical sales.

Installation – quick and simple

Installation is a quick, simple and uninterrupted operation. The following recommendations are for guidance only. More detailed instructions are provided with each tank.

Dry, well-drained ground

Excavate sufficiently to permit easy placing and backfilling around tank allowing for timbering and sheeting to retain subsoils liable to move laterally.

Check excavation depth taking into account the drain invert depth and a concrete foundation of 150-200mm. Place the concrete in centre of excavation base and lower tank into position 'puddling' it into the concrete to form a cradle.

Check tank is truly vertical and connections marked IN and OUT are in their right position.

Backfill with dry sand, pea gravel or selected non-cohesive material, free from large stones, bricks or sharp objects. Consolidate thoroughly to prevent voids and localised stress concentrations. Connect pipework.

Wet or clay ground

Where there is a possibility of a high water table or the ground consists of dense or wet non-cohesive soils where drainage is slow, the tank should be surrounded in 10-1 semi dry mix concrete to an approximate thickness of 200-250mm. This is to prevent the possibility of floatation.

If the ground is saturated or consists of heavy clay which can exert high swelling pressures the tank should be surrounded in concrete as follows:

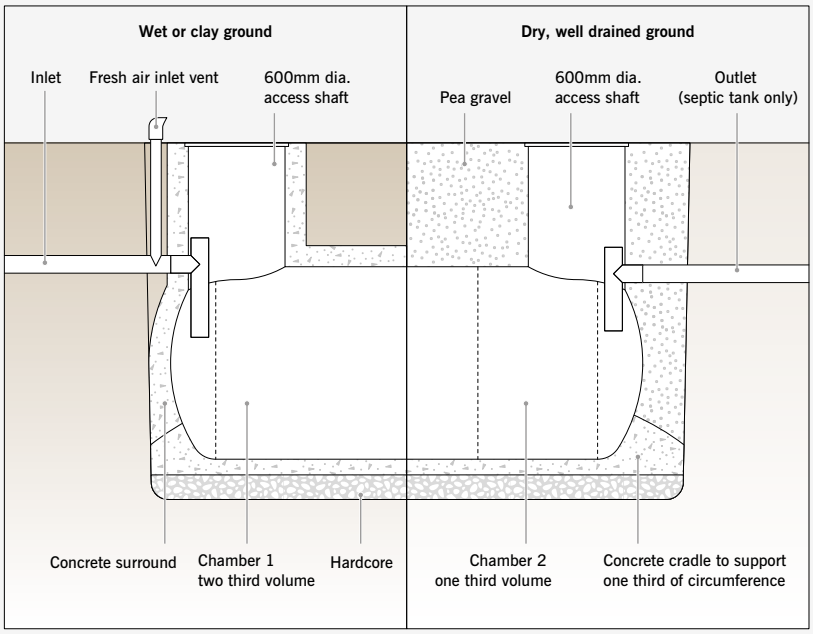
Using interlocking trench sheeting, shore the sides of the excavation placing timber walings to support the sheeting as required.

If pumping is necessary, dig a pump well in one corner of the excavation. Excavate as above but allow for 250-300mm of hardcore in addition. Lay the hardcore, consolidate it and cover with a polythene membrane prior to placing concrete and position the tank as described previously.

After the foundation concrete has reached its initial set, proceed with backfilling with concrete to a thickness of approximately150-200mm.

At the same time as the concrete backfill is being placed, pump water into the tank to a corresponding level to equalise the pressures on the tank wall and to prevent floatation.

After the tank has been surrounded with concrete keep the excavation free from water by pumping until the concrete has set. Connect pipework and install the manhole cover and vent connection.



Typical installation for SPEL septic tanks

For detailed installation instructions refer to section 13.

Effluent disposal and tank emptying

Effluent disposal

If conditions are suitable the cheapest and one of the most efficient means of disposal is by means of a subsurface irrigation system. It is simple to install but requires careful design and installation to work efficiently.

To determine the most suitable siting and area of land required for a subsurface irrigation system a percolation test in accordance with the British Standard BS 6297: 1983 may be necessary. However, we recommend seeking advice from the Local Authority officers whose experience and knowledge of local conditions can be invaluable.

Percolation test in accordance with BS6297

To determine the area of land required a percolation test is essential; the following method should be adopted.

Excavate a hole 300mm square to a depth 250mm below the proposed invert level of the land drain. Where deep drains are necessary the hole should conform to this shape at the bottom but may be enlarged above the 250mm level to enable safe excavation to be carried out. Fill the 300mm square section of the hole to a depth of at least 250mm with water and allow it to seep away overnight. Next day, refill the test section with water to a depth of at least 250mm and observe the time, in seconds, for the water to seep away completely.

Divide this time by the depth in millimetres of water placed in the hole. The answer gives the average time required for the water to drop 1 mm. Take care, when making the test, to avoid abnormal weather conditions such as heavy rain, severe frost or drought. Carry out the test at least three times and take the average figure.

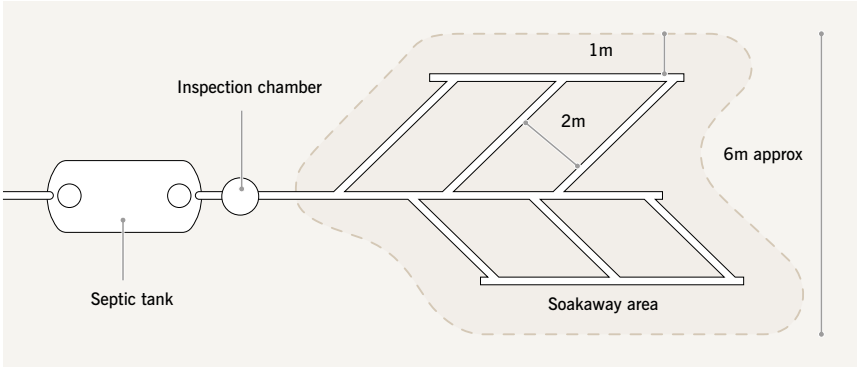
Where deep excavations are necessary a modified test procedure may be adopted using a 300mm earth auger. Bore the test hole vertically to the appropriate depth taking care to remove all loose debris.

Make water level observations referring to a fixed datum using a dip stick or some suitable alternative water level indicator.

	Number of persons to be served							
Time to fall	3-4		5-6		7-10		11-14	
25mm (mins)	**m**	**ft**	**m**	**ft**	**m**	**ft**	**m**	**ft**
2 or less	11	36	16	52	27	90	37	120
3 or less	16	52	24	80	40	130	56	180
4 or less	21	70	32	105	53	175	75	250
5 or less	27	90	40	130	67	220	93	305
10 or less	53	175	80	260	134	440	186	610
15 or less	80	260	120	400	200	660	280	920

A guide to the length of perforated land drain requirements. The table above is for guidance only. It is based on a trench floor width of 450mm. You should consult your local authority for their recommendations.

Typical land drain arrangement. Average installation for single dwelling – 30m of land drain.



The value found in this way is called the percolation value (Vp in s) of the soil and can be used to determine the area of drainage trench floors required to disperse effluents.

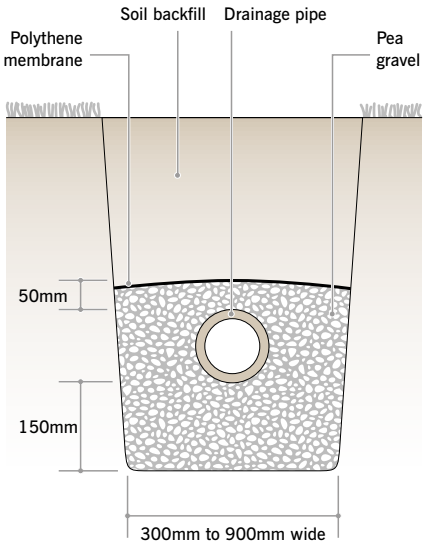
The floor area of subsurface drainage trench (A t in m^2) required to disperse effluents from septic tanks may be calculated from:

A t = P x Vp x 0.25

Where P is the number of persons served by the tank; and Vp is the percolation value obtained as described.

The area determined should be used to calculate either a length of land drain, or alternatively the floor area of one or more shallow soakaways. Drainage trenches should be from 300mm to 900mm wide, and areas of undisturbed ground 2m wide should be maintained between parallel trenches.

Section through a land drain.



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Effluent disposal and tank emptying

Siting

A drainage field or mound serving a wastewater treatment plant or septic tank should be located:

a) at least 10m from any watercourse or permeable drain;
b) at least 50m from the point of abstraction of any groundwater supply and not in any zone 1 groundwater protection zone;
c) at least 15m from any building;
d) sufficiently far from any other drainage fields, drainage mounds or soakaways so that the overall soakage capacity of the ground is not exceeded

The disposal area should be downslope of groundwater sources.

Design and construction

To achieve even distribution, land drains should be laid in a herringbone or similar pattern depending on the site. Unglazed earthenware joint-less pipes or rigid perforated plastic or vitrified clay pipes should be laid with a fall of 1 in 200 at a minimum depth of 500mm. The pipes should be laid on a 150mm layer of clinker, clean gravel or broken stone 20mm to 50mm grade and trenches filled to a level 50mm above the pipe and covered with strips of plastic material laid to prevent the entry of silt. The remainder of the trench can be filled with normal soil.

If the winter water table level rises to within 1m of the invert of the irrigation system an alternative method of disposal may be necessary. This can sometimes be achieved by discharging into shallow trenches laid in the topsoil. Alternatively the effluent can be pumped to a suitable area.

Constructed wetlands/reed beds

Reed bed treatment systems or other constructed wetland treatment systems can be used to provide secondary or tertiary treatment of effluent from septic tanks or packaged treatment works. The systems purify wastewater as it moves through the gravel bed around the rhizomes and roots, by removing organic matter (BOD), oxidizing ammonia, reducing nitrate and removing a little phosphorous. The mechanisms are complex and involve bacterial oxidation, filtration, sedimentation and chemical precipitation.

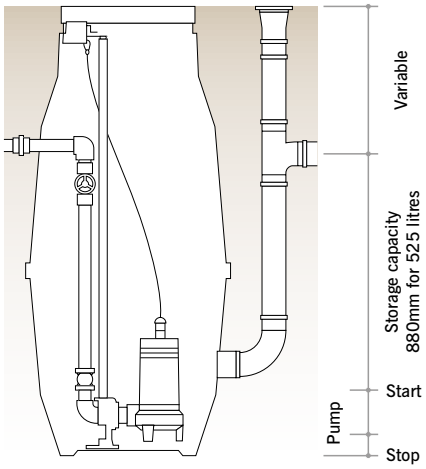
Reed bed treatment systems should be designed and constructed in accordance with BRE Good Building Guide No. 42. Other forms of constructed wetland treatment system should be designed and constructed by specialists.

Emptying the tank

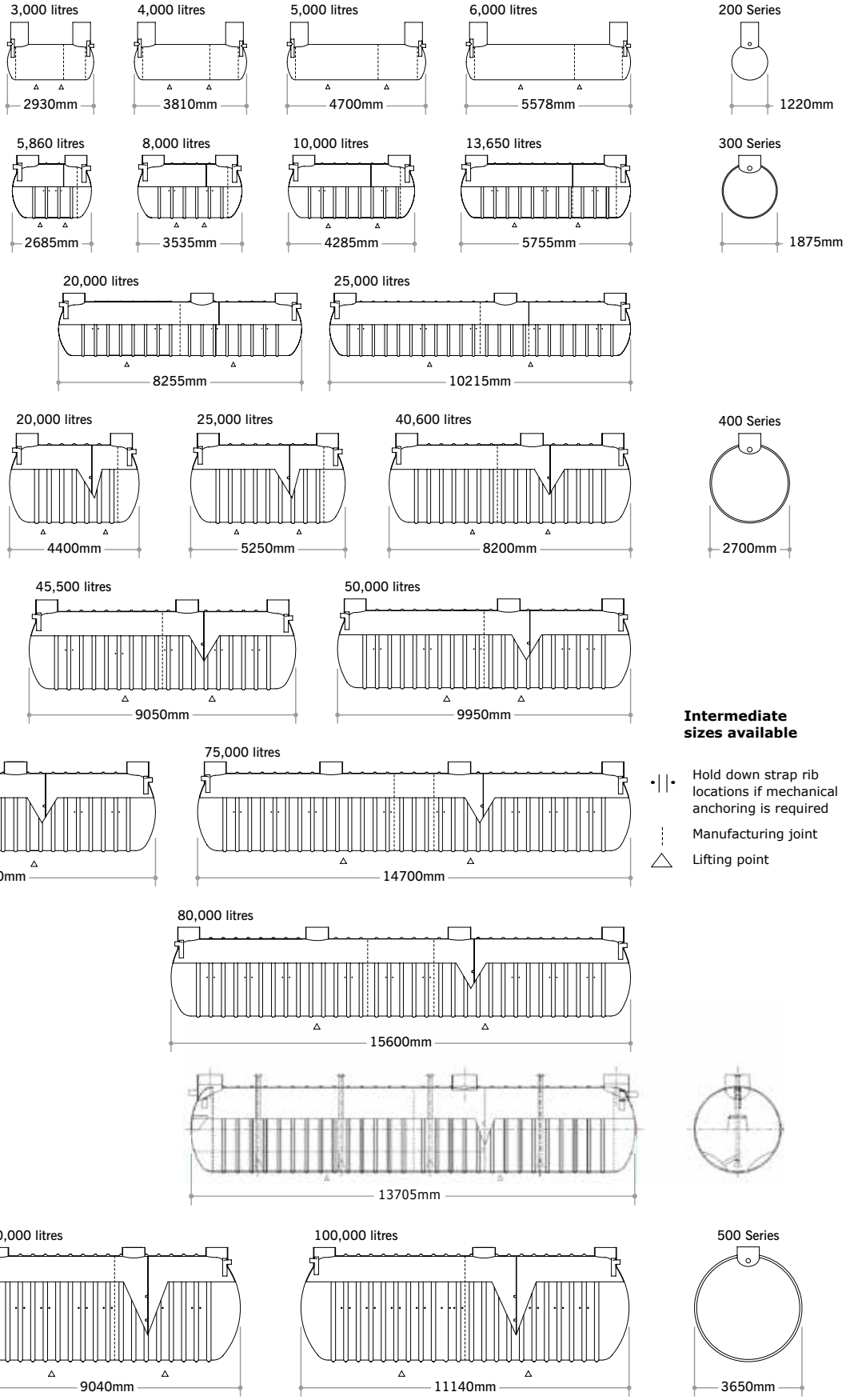
To maintain the efficiency of the SPEL septic tank, it should be de-sludged approximately every twelve months. For efficient and quick sludge removal from the larger SPEL septic tanks, sludge draw-off pipes can be fitted complete with Bauer type couplings. Where access for servicing the septic tank is difficult the draw-off pipes can be extended.

SPEL Package Pumping Stations

Available where it is necessary to raise the effluent to a suitable filtration area or public sewer (see section 9) The SPEL pumping stations are available with a range of pump capacities to suit most situations. Full technical details will be forwarded on request.



Constructed to BS6297



Intermediate sizes available

Hold down strap rib locations if mechanical anchoring is required

Manufacturing joint

Lifting point

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Options available

Pipe configurations, baffles, vent holes, chocks, access shafts and sludge removal pipework

Inlet and outlet configurations

Standard inlets and outlets can be replaced with bespoke pipework, including twin (T) pipes, large diameter pipes and weir fittings, to suit site conditions. Baffles can be fitted as required.

Vent connections

Vent connections can also be specified.

Benching

Internal benching can be incorporated into the first chamber to facilitate sludge removal.

Chocks

Chocks can be moulded to the tank shell to stabilise the tank and ensure it is maintained in a vertical position on a flat concrete slab.

Sludge removal pipework

Any desired configuration can be supplied including vertical and inclined pipes with male or female Bauer or similar connections. Also with GRP bellmouth or 'T' inlet. (As shown right).

Access shafts

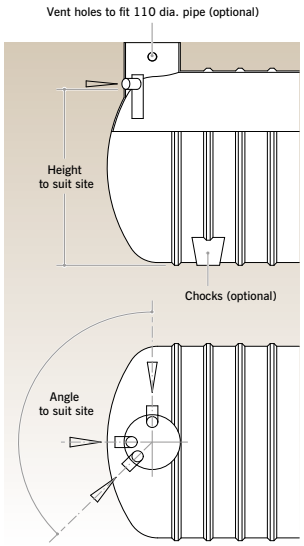
Access shafts can be situated at any location on the tank and are available in a range of standard sizes and configurations.

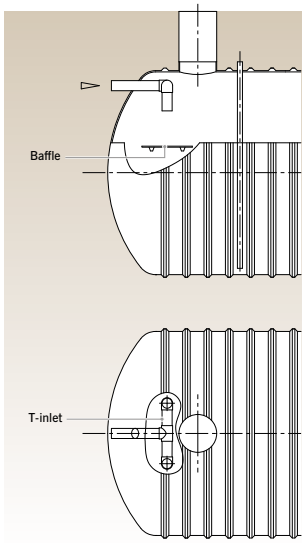
Standard sizes available are:
600, 750, 900, and 1200 diameter.
800x1000/1250/1500 rectangular.
900x1000/1250/1500 rectangular.
1000x1000/1250/1500 rectangular.

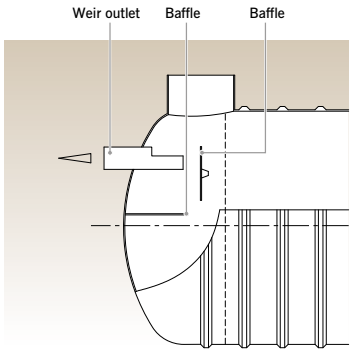
For further details and illustrations see 2.13.

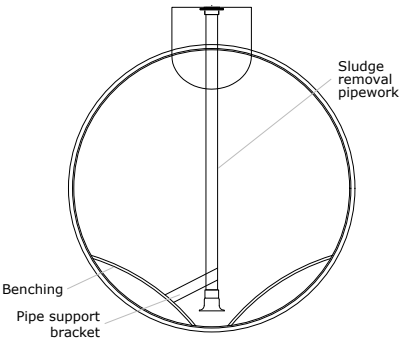
Adjustable inlet level

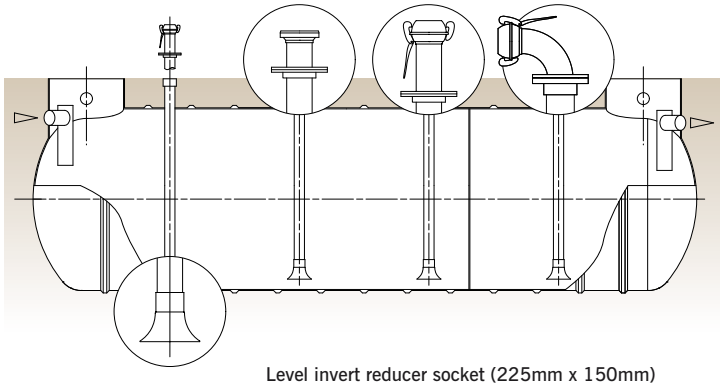
Multiple tank installations (see opposite).

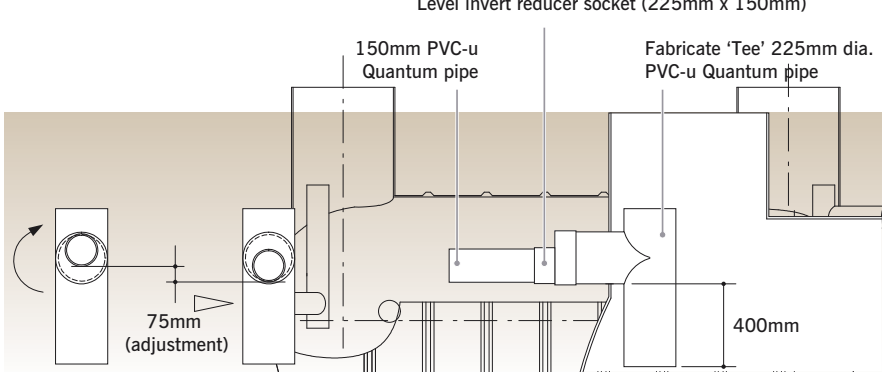












2.22 SPEL Cesspools

SPEL cesspools are available where a septic tank and drainage field/sub surface irrigation system for disposal of the effluent is unacceptable.

SPEL cesspools are a factory made watertight underground tank for storage of sewage and comply with BS EN 12566-1.

Siting

SPEL cesspools should be sited at least 7m from any habitable building and preferably downslope. They should however be sited within 30m of a sludge removal tanker access and at such levels and position to operate and without hazard to the building occupants.

Design and construction

SPEL cesspools are designed and manufactured generally in accordance with BS4994/ISO976 and meet the requirements of BS EN 12566-1.

Filament wound in glass reinforced polyester GRP they are strong yet light in weight for easy handling on site. An inlet connection – 160mm UPVC socket, or as required, is fitted in a 600mm dia. access opening. Extension access shafts are available to suit tank invert depth and ground level.

Specification

SPEL cesspools are suitable for well drained or wet ground conditions. The correct specification depends on the tank invert depth and the water table in winter – see section 13 for burial depth/water table level charts. For general guidance see table opposite.

Sizing

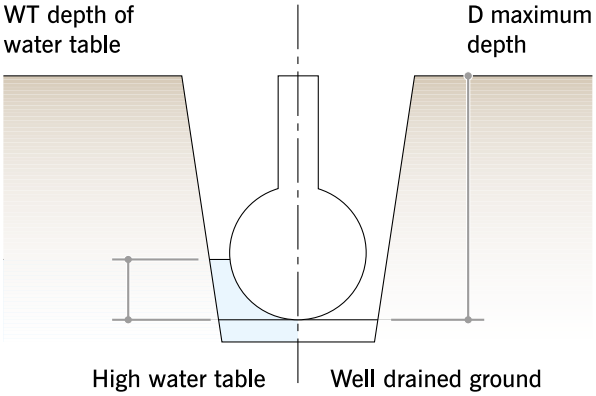
SPEL cesspools should be sized according to the Building Regulations 2000 – H2 as follows:

2 persons – 18200 litre capacity. This size should be increased by 6800 litres (6.8m3) for each additional user.

Note: For installation see section 13.

Standard tanks *(other specifications see section 13)*

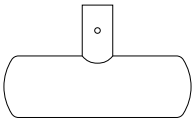
Series	WT(m)	Surround Concrete D(m)	Surround Pea Gravel D(m)
200	1.0	4.0	2.0
300	0.9	4.0	2.6
400	1.3	5.0	4.0



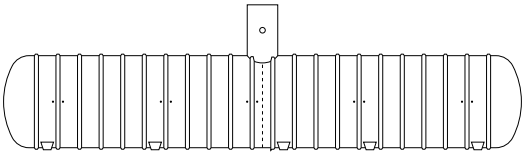
Typical SPEL Cesspools

Tanks are custom built so extra shafts, extension shafts and fittings can be supplied if required.

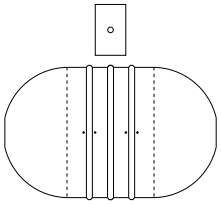
Shafts supplied loose for 400 series tanks to be sealed into socketed access opening. Length of shaft supplied to suit site requirements.



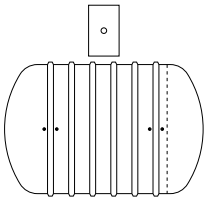
200 series available 4,000 – 10,000 litres
for temporary non residential applications



300 series 25,000 litres



400 series (HE)
18,200 litres



400 series
18,200 litres

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Endmoor WWTW, Cumbria

CASE STUDY

Project: **Endmoor WWTW**

Client: **United Utilities PLC**

Consultant/Contractor: **C2V Plus**

Products:
2 no. SPEL Primary Settlement/Septic tanks 500 Series 130,000 litre to BS 6297:2007

The two SPEL Primary Settlement/Septics were supplied complete with the SPEL Mechanical Anchoring sets for installation in this difficult hilly terrain for the primary treatment of sewerage.

United Utilities are working to improve and increase capacity at Endmoor wastewater treatment works. This works discharges into Peasey Beck, however, the population in Endmoor is forecast to increase by 38% in coming years. Therefore, if work wasn't undertaken to increase capacity to cope with the increased demands there would be negative impacts on water quality in the beck. Peasey Beck is a 19.6-kilometre-long beck flowing through Cumbria. It rises on Lambrigg Fell where it is known as the Killington Beck, flows through Killington Reservoir and converges with Stainton Beck to form the River Bela at Milnthorpe.

The source of the neck is on Lambrigg Fell at 300 metres between Kendal and Sedbergh

Scottish Water

CASE STUDY

Client: **Scottish Water Kit Framework Supply**

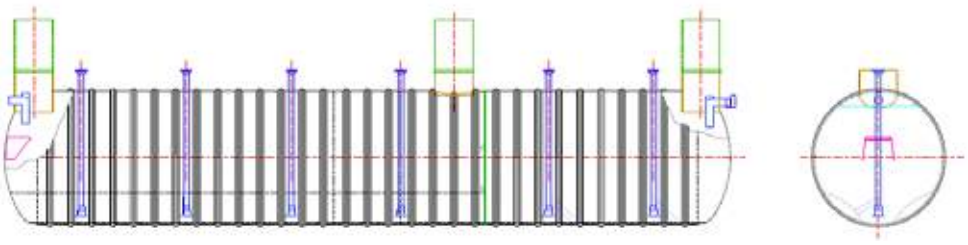
Products:
SPEL Primary Settlement/Septic tanks
SPEL Spillage Containment tanks
SPEL 'H' Series Package Pumping Stations

SPEL Products have been a Kit Framework Supplier for primary settlement and septic tank to Scottish Water since 2007. The Company has also been working closely with the Scottish Water appointed consultants and contractors for many years building up a trust and support that has continued until the current time.

Improvements in the design and performance of the septic tanks includes the feature of benching to improve flow characteristics, Bauer sludge removal pipes and fittings and adjustable invert level outlet connections for multiple tank installations.

SPEL Septic Tanks 600 Series 240,000 litre
Port Ellen, Islay, Western Isles

SPEL Septic Tanks 600 Series 200,000 litre
Kinlochard WWTW, Aberfoyle



Typical SPEL Primary Settlement/Septic tank with Bauer sludge removal pipes and benching

Designed with reference to BS6297:2007

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Scottish Water

CASE STUDY

Transporting to outlying places, especially the western isles sometimes requires ferrying

SPEL CR Chemical Holding tanks

SPEL Chemical Containment/Holding Tanks are supplied with specifications to suit the chemicals present. Both CR, chemical resistant with isophthalic based resins and HCR, highly chemical resistant with vinyl ester resins, are available to suit conditions.

SPEL HCR Chemical Holding tank

Sample products supplied

Whitehillocks WWTW
SPEL Tankstor® 300 Series 5,860 Litre Lime Spillage Tank - HCR specification
SPEL Tankstor® 400 Series 30,000 Litre Aluminium Sulphate Spillage Tank - HCR specification

Loch Ness WTW
SPEL Tankstor® 500 Series 100,000 Litre Tanks – 2 No. HCR specification suitable for Citric Acid, Sodium Hypochlorite & Sodium Metabisulphate

Lomond Hills WTW
SPEL Tankstor® 300 Series 15,000 Litre Tank - HCR specification suitable for Sodium Hydroxide

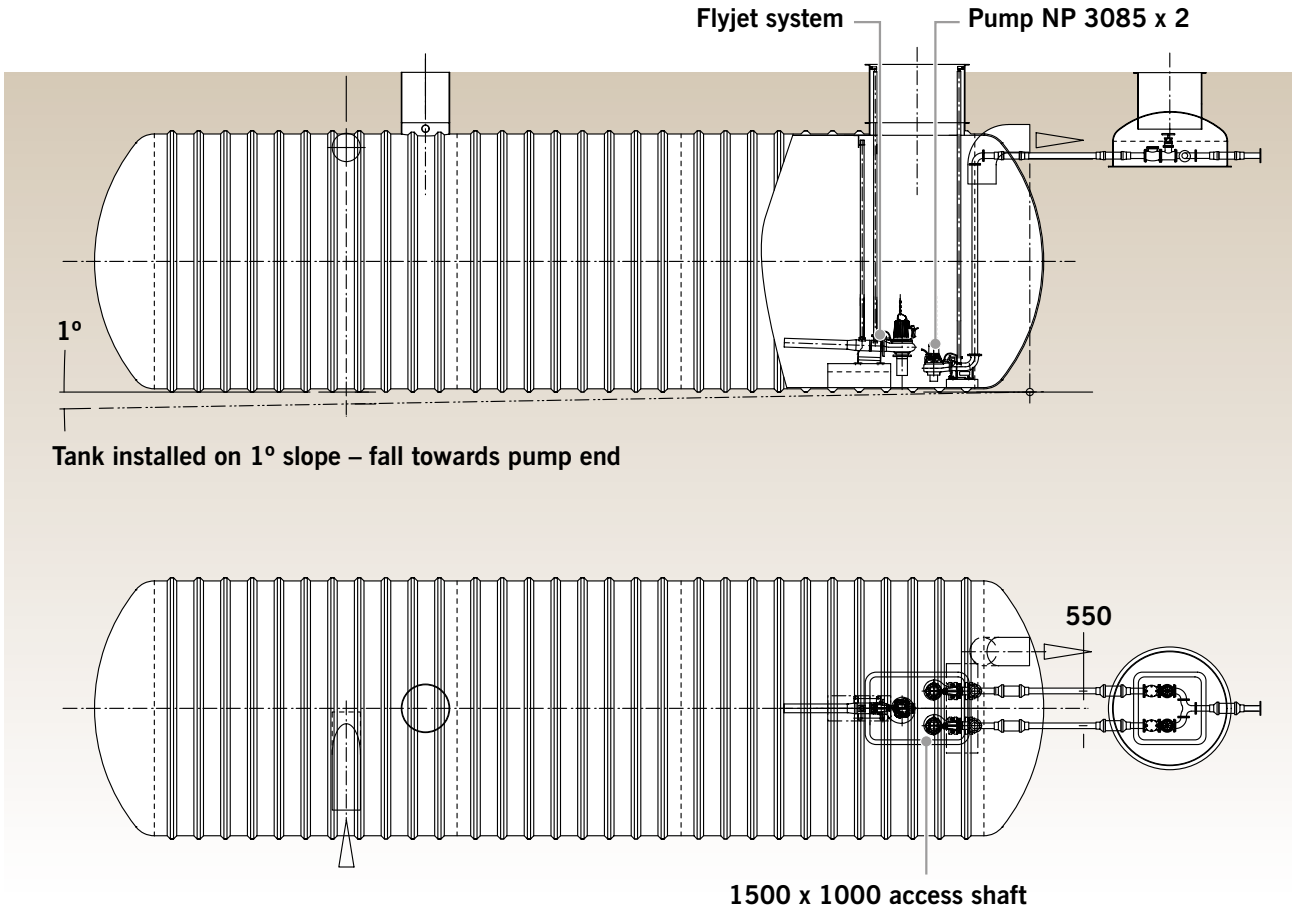
Scottish Water

CASE STUDY

SPEL 'H' Series Package Pumping Stations

SPEL 'H' series Package Pumping Stations have also have been supplied; at Fortrose and Rosemarkie WWTW in Ross-shire are examples.

These SPEL Package Pumping Stations are available for Sewers for Adoption schemes and are WRc approved in sizes up to 300m cube in a single unit. The advantages of factory built off-site is providing substantial savings e.g. factory fitted complete with tested pipe work, valves and associated pump stools eliminating the expensive 'confined space' site work. Control panels pumps and commissioning can also be provided.



SPEL 600 series 180,000 litre capacity incorporating ITT Flygt pumps, Flyjet unit, separate valve chamber with stainless steel pipework, Tomeet Sewers for Adoption 5th edition. Fortrose and Rosemarkie WWTW Ross-shire, Scotland.

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Boeing at Gatwick Airport

CASE STUDY

Project: **Boeing GoldCare Hangar, Gatwick Airport**

Client: **Boeing Corporation**

Contractor: **John Sisk**

Products:
13 no. SPEL Tankstor® 600 Series 240,000 litres capacity

The tanks were installed on a concrete base slab with a granular bedding and backfill. To ensure the tanks were solidly held in position and no possibility of shifting they were anchored down with the SPEL Mechanical Anchoring System.

Galvanised sinkers were provided to cast into the concrete slab. However these strap sinkers were modified and fixed into the concrete slab by drilling and bonding with Fischer injection mortar FIS EM Plus, a high-quality epoxy mortar for top load-bearing capacity in cracked and non-cracked concrete and for seismic applications.

An alternative is to use the standard strap holding down brackets and expansion anchor bolts which SPEL can provide.

See Data Manual Section 13.

Shifford’s Bridge Nitrate Improvement Scheme

CASE STUDY

Project: **Nitrate improvement scheme**

Client: **Severn Trent Water**

Consultant/Contractor: **Mott MacDonald Bentley**

Products:
SPEL Tankstor® 4 No. 11,000 litre capacity
CR - chemical resistant underground tanks

The borehole at Shifford’s Bridge is located in Shropshire, a rural agricultural area, where rising nitrate trends required improvements to maintain supplies within strict water quality limits.

Two schemes were put forward by Mott MacDonald Bentley (MMB), one, to provide blending in order to maintain nitrates within acceptable limits and the other to construct a nitrate removal plant. Severn Trent Water opted for the latter due to the nature of the facility. The new nitrate plant is capable of treating 3.3ML/d.

The delivery team worked closely with the supply chain partners to ensure a ‘right first time’ approach. This involved utilising the knowledge and experience of the integrated design team and 3D modelling.

SPEL Tankstor® underground attenuation tanks were incorporated with high level sensors to reduce the risk of overspill/ leakage and preventing pollution to the principal aquifer.

The final product has met or exceeded the Severn Trent Water’s expectations with the new plants greater efficiency and reduced maintenance.

We have been privileged to work with MMB on this successful project.

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Scottish Water

CASE STUDY

Project: **Ardersier WWT**

Client: **Scottish Water**

Products:
SPEL H-Series Package Pumping Station - 150,000 litres capacity
SPEL Tankstor® Underground Tank - 125,000 litres capacity

Supplied complete with internal pipework, pump pedestals, stainless steel guide rails and lifting chains and Flygt pumps all as per Scottish Water specification

SECTION

3

SPEL Fuel/Oil Separators - Overview

For the removal of hydrocarbons, silt and soluble metals as sediment bound


INDIAN AIR FORCE

It is a known fact the planet's atmosphere and climate have been changing for decades, and hydrocarbons are one of the main culprits. Spillages of oil and fuel from industrial sites, filling stations and the emissions from automotive leaks can have a cumulative effect that can damage the environment in devastating ways.

Highway surface runoff discharges contain pollutants that have accumulated on the carriageway, particularly following periods of dry weather.

These pollutants can then be transported via the surface water drainage system to discharge to ground or receiving watercourses.

Previous studies have demonstrated that highway runoff affects the quality of waters and sediments. Increased concentrations of metals, hydrocarbons and anions are associated with changes in the structure and functioning of biological communities.

Spills and leaks from fuel handling facilities using containers, tanks, drums, intermediate bulk containers (IBCs) and mobile containers called 'bowsers', can course serious pollution incidents.

The common saying is 'prevention is better than cure'. To fit a SPEL Separator to capture fuel, oil and silt prior to SuDS attenuation schemes is far better than hoping for the best and then have to instigate remedial work. All have a responsibility to cater for any possible pollution incidents.

- General Guidance by the Environment Agency regarding fuel/oil separators
- They are typically needed for any site with a risk of oil contamination, such as:
- Car parks larger than 800m2 in area or for 50 or more car parking spaces
- Smaller car parks discharging to a sensitive environment, such as a marsh that has been designated as a nature reserve
- Vehicle maintenance areas
- Roads
- Refuelling facilities

The type and class of separator needed will depend on the activity and where the discharge is directed to.

Fuel/oil separators do not work if there is detergent in the water, e.g. from car washing (see Section 6).

Testing and independent accreditation

The highly successful and well known SPEL fuel/oil/silt Separators are the result of extensive testing by H R Wallingford, the hydraulics research testing station, for hydrocarbon removal performance against the stringent European Standard BS EN 858 -1:2002. The tests required the hydrocarbons introduced into the separator at 5ml/litre to be reduced to a maximum of 5mg/litre in the outlet.

H R Wallingford started the testing in 1999.The SPEL Stormceptor® by-pass class 1 by-pass separator was the first to be accredited under the standard in the UK.

Hydrocarbon removal performance

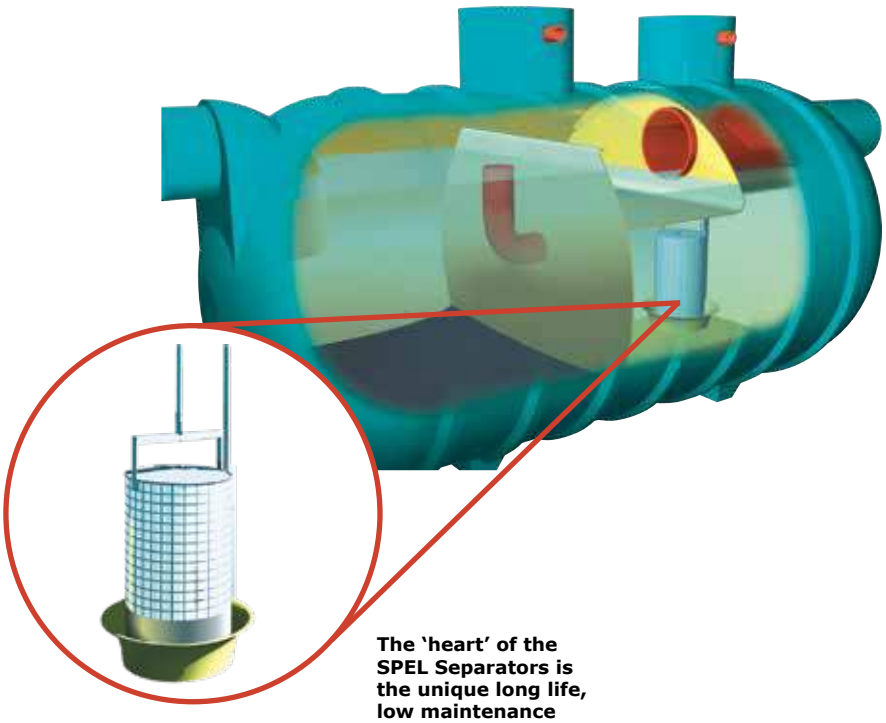
All models performed well within the European Standard with an average of 0.64mg/l.

Since then the SPEL Stormceptor® Class 1 by-pass and the Puraceptor® Class 1 full retention Separators have advanced in performance and construction as a result of technological advances in design and manufacture.

The 'heart' of the SPEL Separators is the unique long life, low maintenance coalescer unit/s which 'polishes' the final effluent AFTER 90% hydrocarbon and silt have been separated out.

Coalescer units comprise a stainless steel holder with a robust and efficient high volume reticulated foam insert. The coalescing process brings the smaller globules of oil into larger and buoyant forms to separate by gravity. The high volume foam safeguards against blockages due to silt and ensures a long life between servicing.

The coalescer inserts are easy to clean with normal pressure water and rarely require replacing.



The 'heart' of the SPEL Separators is the unique long life, low maintenance coalescer unit/s

25 Year Warranty (life expectancy of over 50 years)

Manufacture

The full range of models is manufactured in glass reinforced plastics using the latest computerised equipment to ensure consistent quality. The shells are chop-hoop filament wound (see Section 2), the end domes using a specialised computer controlled machine and the components sprayed up by an eight axial robotic machine.

Quality control procedures ensure each serial numbered tank is tested and inspected to the strict quality parameters required.

The design and construction

The SPEL Separators are designed to meet the requirements of underground tanks with a generous safety factor and meet the external load requirements depending on the burial depth and water table level as detailed in Section 3 with tables for each tank series. The quality shells have a chemical resistant inner lining suitable for aviation fuels with a smooth moulded finish to ensure easy desludging and cleaning.

Tests 'in the field' in other countries

SPEL being used globally has allowed us to obtain 'in the field' performance data in other countries for total suspended solids (TSS) with 75% removal and the reduction in soluble metals e.g. zinc, lead, copper, nickel, cadmium, arsenic and mercury.


CERTIFICATE

LIGHT LIQUID SEPARATOR TEST PERFORMANCE CERTIFICATE

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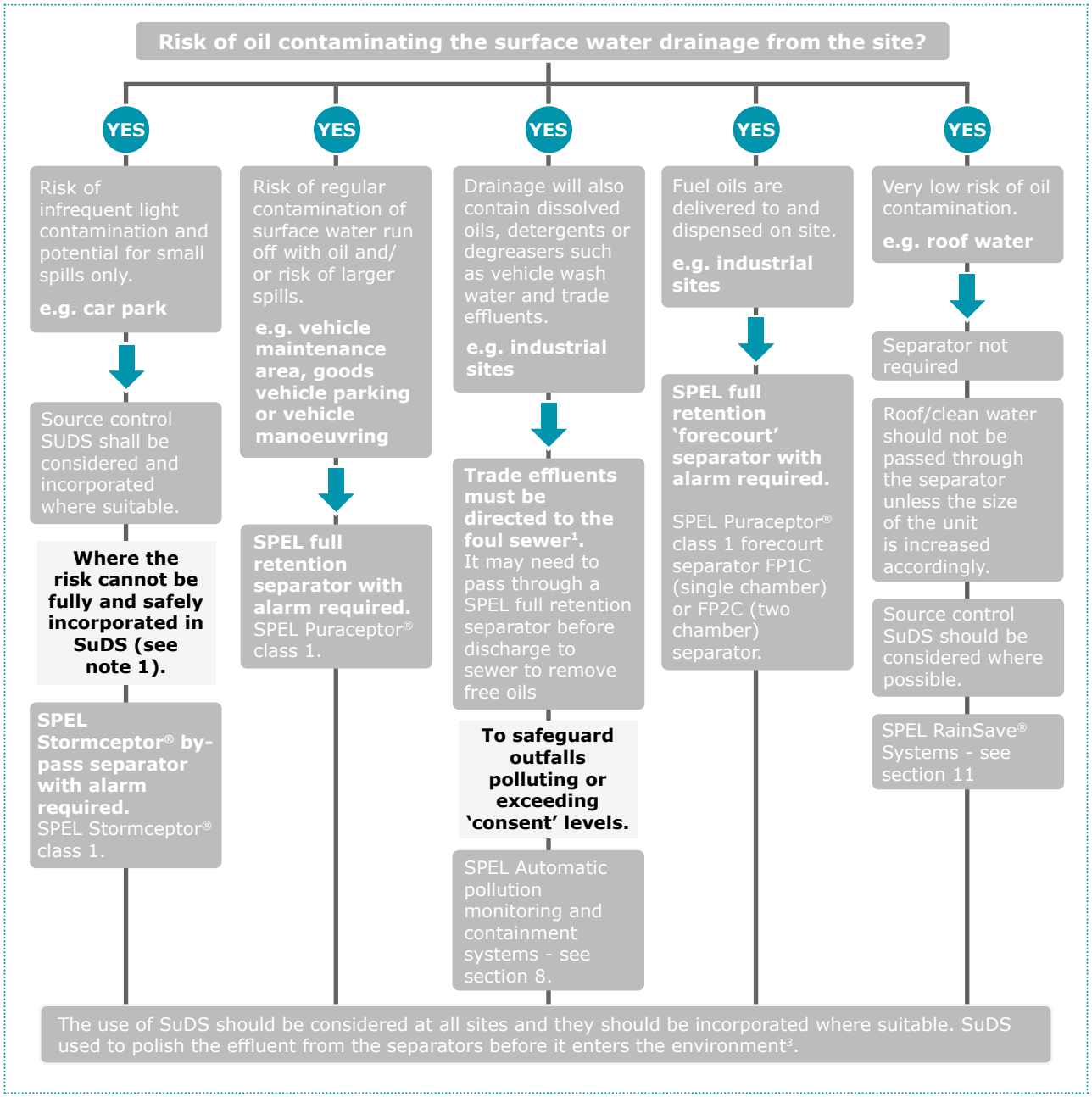
Where are separators needed?

Surface water can be contaminated by oil and other contaminants depending on the site use. Sites with this risk need to have measures in place to prevent polluting the environment. These sites include:-

- Car parks typically larger than 800m2 or for 50 or more car parking spaces
- Smaller car parks discharging to a sensitive environment
- Areas where goods vehicles are parked or manoeuvred
- Vehicle maintenance areas
- Roads
- Industrial sites where fuel and oil are stored or handled
- Refuelling facilities
- Any other site with a risk of contamination

3.4 How to Select and Specify Separator Type & Class



Selecting the appropriate type of SPEL Separator

This flow chart is to aid selection of the most suitable and appropriate type of SPEL Separator for use in surface water drainage systems that discharge to rivers and soakaways. However, the appropriate provision on any site will require detailed consideration of the local circumstance and risk factors including:

- The discharge point of your proposed separator.
- The environmental sensitivity of your location.
- Activities on your site.

Notes to accompany the flowchart

[1] You must seek prior permission from your local sewer provider before you decide which separator to install and before you make any discharge.

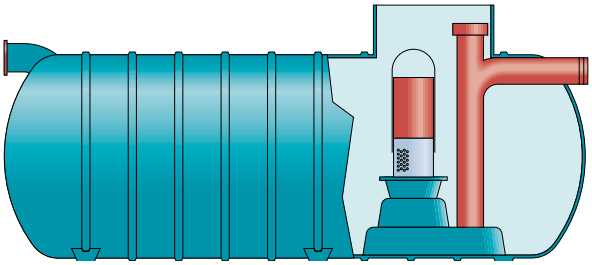
[2] Drainage from higher risk areas such as vehicle maintenance yards and goods vehicle parking areas should be connected to foul sewer in preference to surface water.

[3] A separator may be one of the devices used in the SuDS scheme.

SPEL Puraceptor® separators have been designed and tested to meet the stringent European Standard BS EN 858-1 for installations for separator of light liquids where the maximum hydrocarbon concentration in the outlet does not exceed 5mg/l. Suitable for discharging into a surface water drain. For further details see section 5.

The 'heart' of SPEL Separators is the unique long life, low maintenance coalesce unit which 'polishes' the final effluent AFTER 90% hydrocarbons of SPEL

SINGLE CHAMBER MODELS



Typical sites

- Medium to high risk oil/fuel storage and handling areas.
- Filling stations (SPEL Puraceptor® forecourt separator FP1C).
- Commercial vehicle/plant maintenance yards and heavily contaminated industrial areas.

Features

Good access to all parts for desludging.

Sampling point incorporated into outlet.

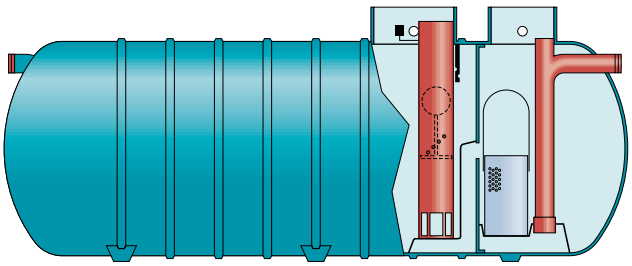
Stainless steel/plastic or copper ball automatic closure device. (ACD).

Robust stainless steel coalescer unit with long life foam insertion and lifting handle. These strong stainless steel units incorporate robust high volume reticulated foam inserts. The inserts efficiently coalesce the finer globules of hydrocarbons for gravity separation and due to their large volume, last for long periods before requiring cleaning.

Cleaning is then a simple operation using normal pressure water. The inserts can be reused again and again, rarely requiring replacement.

One access shaft for desludging tank and servicing of ACD and coalescer unit.

TWO CHAMBER MODELS



Typical sites

High risk oil/fuel storage and handling areas, filling stations (SPEL Puraceptor® forecourt separator FP2C), heavily contaminated industrial areas, commercial vehicle/plant maintenance yards, power stations and sub-stations.

Two chamber models provide protection to the coalescer foam inserts from silt and heavy fuel/oil contamination resulting in less frequent maintenance and easier cleaning of the coalescer foam inserts.

Features

Good access to all parts for desludging.

Coalescer unit/s incorporated into second chamber.

Stainless steel, plastic or copper ball automatic closure device (ACD).

Two access shafts for generous access to the desludging tank and servicing of the ACD and coalescer units.

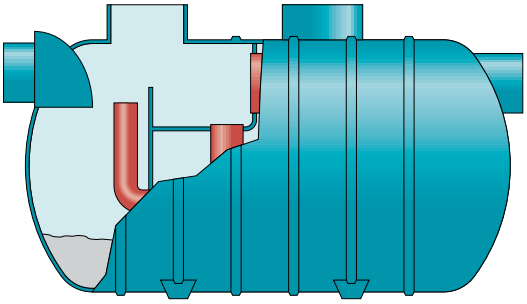
Sampling point incorporated into outlet.

Robust stainless steel coalescer unit with long life, high volume foam insert and lifting handle. These strong stainless steel units incorporate robust high volume reticulated foam inserts. The inserts efficiently coalesce the finer globules of hydrocarbons for gravity separation and due to their large volume, last for long periods before requiring cleaning. Cleaning is then a simple operation using normal pressure water. The inserts can be reused again and again, rarely requiring replacement.

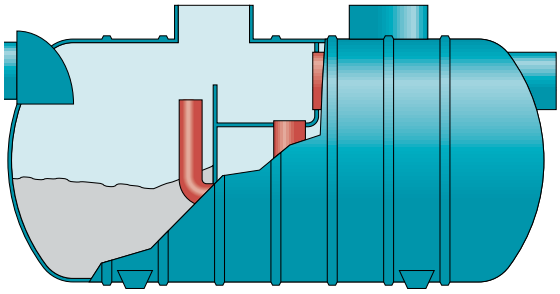
- Sized for working capacity PLUS fuel/oil and silt containment, ensuring optimum performance between maintenance periods.
- Designed for a long life span of high performance with low maintenance.

3.6 SPEL Separators Stormceptor® By-Pass Seperator

By-Pass Separator with Minimum Silt Capacity



By-Pass Separator with Silt Capacity BS EN 858



SPEL Stormceptors® are the most widely used separators where it is acceptable to treat the first flush and normal flows up to 6.5mm/hr rainfall. This covers approximately 99% of all rainfall events in the UK. Any excess rainfall is by-passed without treatment.

Class 1 separators, which are designed to achieve a concentration of less than 5mg/l of oil under standard test conditions, should be used when the separator is required to remove very small oil droplets, such as those arising from car park run-off.

These are used when it is considered an acceptable risk not to provide full treatment for high flows, for example, where the risk of a large spillage and heavy rainfall occurring at the same time is small. They are especially suitable for situations where the main requirement is to trap spillages.

The SPEL Stormceptor® is the first by-pass separator certified to BS EN 858-1.
For further details see section 4.

Typical sites and range

200/300 series the popular range of Stormceptors® for small to medium parking areas associated with smaller supermarkets and industrial estates.

400 series large capacity Stormceptors® for supermarkets, hypermarkets and large vehicle parking areas, industrial complexes, docks, airport aprons etc.

500/600 series the largest Stormceptor® range, for catchment areas from eight hectares upward to in excess of 30 hectares. Details are supplied against specific schemes.

Features

- Good access to all parts for desludging.
- Large and fully accessible primary chamber for silt capacity and its removal.
- Outlet junction chamber-approved sampling point.
- Dip pipe inlet for minimum turbulence and to prevent inflammable vapours passing upstream in drainage system.
- Most models can provide a choice of nine different inlet/outlet orientations to suit site drainage lay-out (check before specifying). See section 4.
- Coalescer unit/s incorporated within the main separation chamber provide an efficient coalescing separation process to reduce the hydrocarbon content in the outlet to 5mg/litre or less. These strong stainless steel units incorporate robust high volume reticulated foam inserts. Cleaning is then a simple operation using normal pressure water. The inserts can be reused again and rarely require replacement.
- Handle and/or lifting retaining cables with security fixing provided with each coalescer unit (see optional extra systems). See 3.4.
- Designed for high performance and low maintenance over a long life span.

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SPEL coalescer unit guide rails

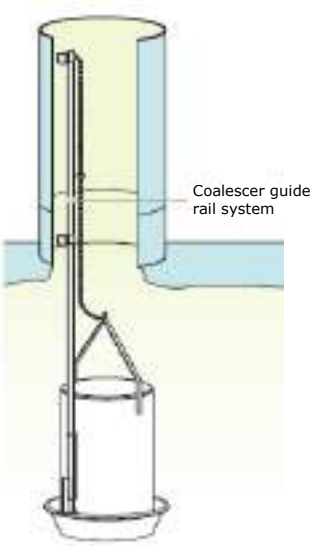
Normal servicing of the smaller SPEL Separators frequently requires emptying the unit completely providing access for the coalescer units to be taken out, cleaned and returned and guided accurately to their seating positions. However larger SPEL Separators may only require the hydrocarbon pollutants and silt to be removed.

In order to limit the servicing to sucking off the fuel/oil from the top and the silt from the bottom guide rails are required to ensure coalescer units are replaced into their correct positions.

The system is robust, manufactured throughout in stainless steel and the action positive, leaving no doubt the coalescer unit is located properly.

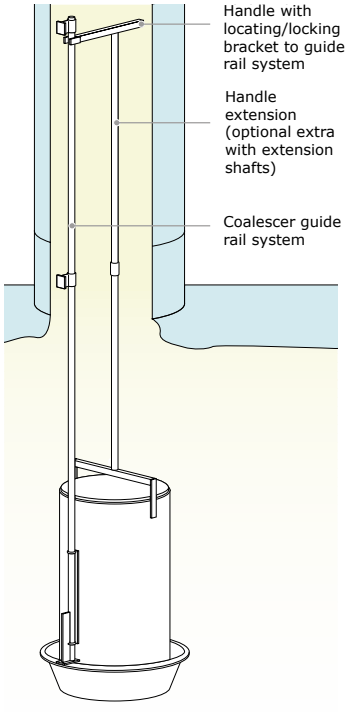
Brackets fixed to the top and bottom of the coalescer unit simply engage the stainless steel guide rail fixed to the top of the stub access shaft. The coalescer is then lowered in the normal way, being guided at the correct angle into the conical base unit which locates the coalescer unit into its final position.

Extension guide rails can be incorporated into SPEL extension shafts to suit (preferably when ordered with the separator).



SPEL coalescer unit guide rail system

SPEL coalescer unit lifting/locating/locking system for positive location and security locking



SPEL coalescer unit guide rail system/lifting, locating and locking system

SPEL coalescer units lowered into the separator with the SPEL guide rail system are easily guided into the base unit's conical moulding to automatically seat correctly.

However, when the separator is full of water, debris or sludge accumulated over a period, this could prevent the coalescer unit from re-seating correctly after servicing.

The coalescer unit lifting/locating/locking system provides assurance the coalescer unit is seated correctly and can be locked into position to prevent tampering.

The system is particularly suitable in SPEL Separator + Econoskim® systems where the total contents of the separator are not emptied on servicing.

The system comprises a robust stainless steel lifting and lowering handle that locates on the guide rail system. When the coalescer unit is correctly located in the conical seating in the separator, the handle will align with guide rail top bracket ie. the handles slotted holes with the top bracket clip locking groove, see diagram.

When aligned the stainless steel clip can be located through the slots and lock into position on the top bracket.

The stainless steel lifting handle can be extended to suit deep tank inverts and provide easy access for lifting manually or with the SPEL tripod and hoist.

3.8 How to Specify SPEL Separators

Type and model

Follow these steps to specify your requirements

Determine the type of separator – full retention or by-pass – see chart 3.4.

Specify whether silt capacity is required integrally or separately upstream of the separator.

Against the catchment area within which your requirements fall, the SPEL Separator nominal size can be ascertained or

To meet projected 'climate change' requirements – e.g. return storm frequency and percentage for climate change.

Optional extras available:

SPEL automatic alarm/monitoring system (section 3).

Extension shafts (see 2.13).

SPEL coalescer unit guide rail system (see 3.7).

SPEL mechanical anchoring system (see 13.11 – 13.12).

SPEL Econoskim® light liquid skimming and separate containment system (section 7).

SPEL automatic alarm/monitoring system (section 3).

Tank specification

SPEL Separators are available in four specifications to suit invert depths and ground water conditions. Standard, Heavy, Extra Heavy and Special, see tables alongside.

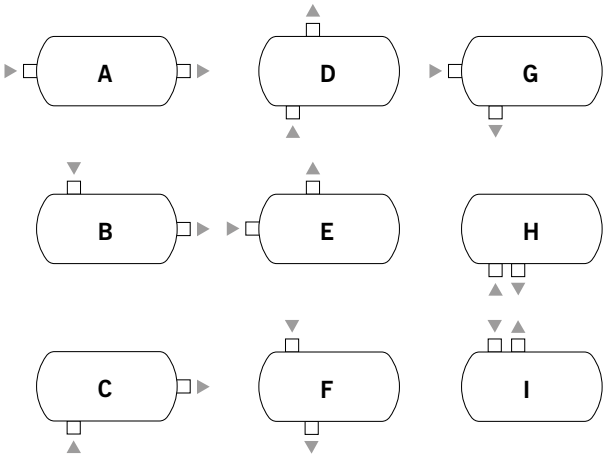
Concrete surround

Connections

110 & 160mm diameter mm PVCu/Quantum
Inlets are socket and outlets are spigots.

225mm diameter and larger
Inlet and outlets are spigots and can be connected to the site pipework using Flex-Seal, Band-Seal or similar flexible couplings.

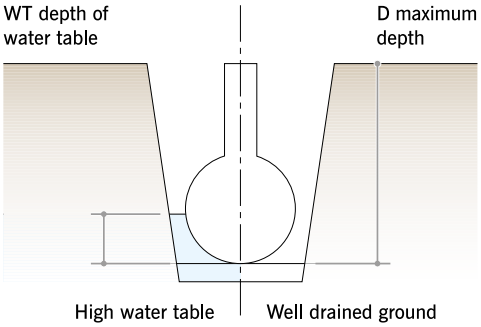
Inlet/outlet pipe connection orientation A-I
(see options below).

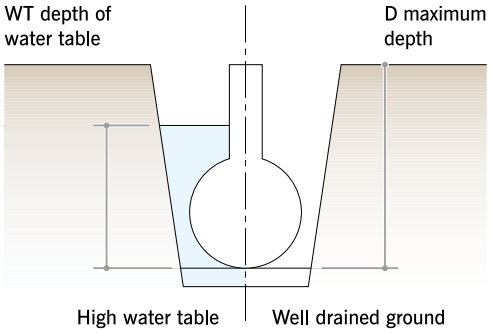


For extra heavy and special specification range and pea gravel surround refer to section 13 or contact technical sales.

Standard tanks		
Series	**WT(m)**	**D(m)**
100/200/300	1.0	4.0
400	1.3	5.0
500	1.9	5.7
600	2.4	6.2

Heavy tanks		
Series	**WT(m)**	**D(m)**
100/200/	2.0	6.0
300	2.8	5.6
400	3.5	6.0
500	4.5	7.25
600	4.7	7.3





For detailed tables – see section 13.4 & 13.5

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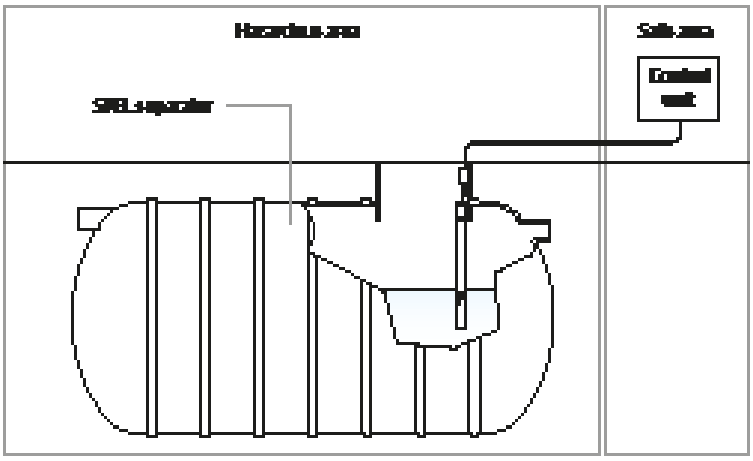
Installation, operation and maintenance instructions

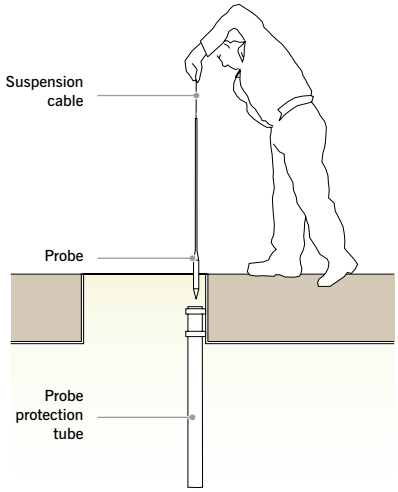
SPEL Automatic Alarm/Monitoring Systems – Overview

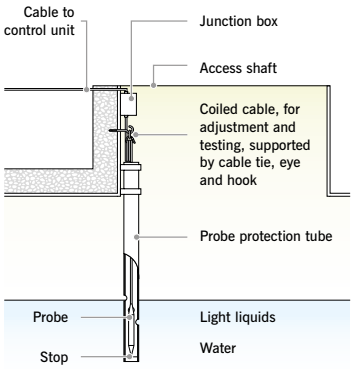
The SPEL automatic alarm/monitoring systems provide visual and audible warning when the level of the oil in the SPEL Separator reaches 90% of the storage volume under static liquid level conditions.

The systems comprise a conductive 'fail safe' probe mounted in the main separation chamber which senses when the designed volume of light liquids has accumulated and sends a signal to the electronic control unit activating a red 'empty now' warning light and an audible alarm.

Cabinets







Maintenance

When the separator is maintained, lift the probe out of the probe protection tube, check it operates the alarm (see under Ref. 3.18) and at the same time wipe oil and contaminants from the probe to prevent a fake alarm after re-inserting.

It is a legal requirement in the UK to kit and oil alarm/monitor construction. Product regulation trading standards. It is less expensive to fix appropriate tube during construction.

Operation

The probe is freely suspended in the probe protection tube in the separator at the correct level. When the oil-layer or depth of hydrocarbons reaches the predetermined level, the top of the probe will be immersed in the oil, breaking the circuit and activating the alarm. It is a 'fail-safe' system providing complete assurance that it is operative. If a fault occurs it will be signalled immediately.

Installation

Control unit (general positioning)

The control unit has been designed to be located indoors and outdoors, within a non-hazardous area. It should be wall mounted and positioned such that the LED display and push switches on the front panel can be readily seen and accessed. The unit can be secured to the wall using the four mounting holes provided. Included within the control is an intrinsically safe circuit (approved according to ATEX Directive 94/9/EC), to which the probe unit is connected.

Inserting probe on site

All that is required on site is to undertake the electrical installation in accordance with the instructions provided. Fix the plated hook provided in the position indicated and lower the probe into the probe protection tube until it locates onto the stop at the base. Coil excess cable and secure with the nylon cable-tie provided. The cable-tie eyelet is then hooked onto the hook to maintain the probe in the vertical position just touching the stop.

The probe protection tube is factory fitted and positioned to ensure the probe activates the alarm when the light liquids retained reach 90% of the storage volume the SPEL Separator is designed for.

3.10 SPEL Automatic Oil Alarm/Monitoring System Model ALARM-DY14400

Ideal for new build sites or where mains supply is readily available, making installation efficient and cost effective. The unit has an audible alarm and mute button. there is provision for a remote low power beacon.

Alarm warnings allow you time to take corrective action ensuring the safe and economic operation of separators preventing oil passing through the separator and polluting watercourses which may result in expensive fines and clean up costs.

Benefits

The alarm system and sensors guarantee an increased level of safety and requires simple installation for bespoke monitoring of oil and petrol separators.

Warn of excessive oil level

Tells you when a separator needs emptying

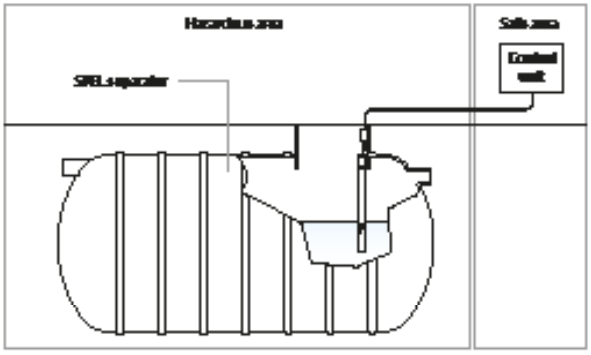
Reduces waste management costs

Designed to comply with EN858-1 and 2

Can be fitted to interceptors from all manufacturers

Reduces interceptor servicing costs

Ensures safe and economic operation of interceptors



Specifications

- Mains powered: 230VAC
- IP65 ABS Enclosure: 180 x 130 x 60mm
- Output: Remote Beacon Only (11volt. 100m Amax
- Alarm: Audible (local)
- Probe Range: 200 metres max. (dependent on cable style)
- ATEX approved: Baseefa 13ATEX0172
- Specific Marking of Explosion Protection: Ex II (1) G [Ex ia Ga] IIB (-20°C ≤ Ta ≤ 50°C)
- ATEX Directive Marking: Ex II (1) G
- Notified Body: Baseefa 1180 Buxton UK

Compatible probe types:

- High Oil

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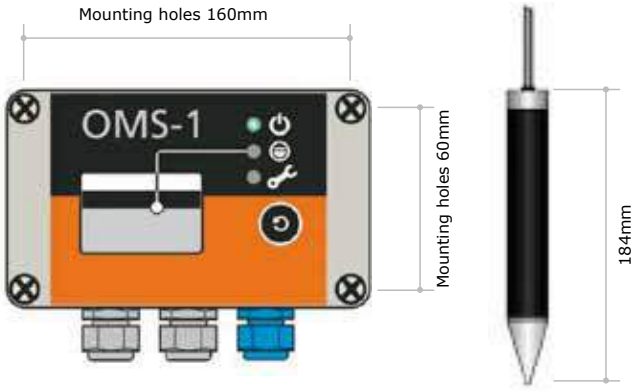
Oil separator alarm device

The SPEL OMS-1 alarm device is specially designed for oil separators. It indicates when it is time to empty the oil separator and thus prevents harmful hydrocarbon emissions to the sewer system.

SPEL OMS-1 control unit and SPEL OMS sensor

Accessories: Cable joint

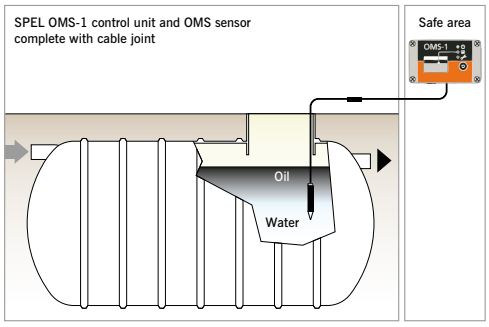
Control unit	SPEL OMS-1
Dimensions:	175 mm x 75 mm x 35 mm (L x H x D)
Material:	Polycarbonate
Enclosure:	IP65
Operation temperature:	-30 °C...+50 °C
Supply voltage:	230 VAC ± 10 %, 50/60 Hz The device is not equipped with a mains switch.
Power consumption:	1 VA
Sensors:	OMS sensor
Relay outputs:	Potential-free relay output 250 V, 5 A, 100 VA Operational delay 10 sec. Relay de-energize at trigger point
Electrical safety:	IEC/EN 61010-1, Class II ⧈, CAT II
Insulation level sensor/mains supply voltage:	375 V (IEC/EN 60079-11)
EMC:	EC/EN 61000-6-3 (Emission) IEC/EN 61000-6-1 (Immunity)
Ex-classification: **Special conditions** **ATEX** **IECEx**	⟨Ex⟩ II (1) G [Ex ia] IIB (Ta = -30 °C...+50 °C) VTT 12 ATEX 003X IECEx VTT 12.0001X
Electrical parameters:	U_o = 6,6 V I_o = 20,2 mA P_o = 33,3 mW
Manufacturing year: Please see the serial number on the type plate	xxx x xxxxx xx YY x Where YY = manufacturing year (e.g. 12 – 2012)



Mounting holes diameter ø 4.5mm Enclosure depth 35mm

Sensor	SPEL OMS
Principle of operation:	Measurement of conductivity
Material:	PVC, AISI 316
Enclosure:	IP68
Temperature:	Operation: 0 °C...+60 °C Safety: -30 °C...+60 °C
Cable:	Oil-proof cable 2 x 0,75 mm², standard length 5 m. Other lengths optional. The max. length of the fixed cable is 15 m. Can be extended up to 100 m.
EMC:	IEC/EN 61000-6-3 (Emission) IEC/EN 61000-6-1 (Immunity)
Ex-classification:	⟨Ex⟩II 1 G Ex ia IIA T6 Ga According to IEC/EN 60079-11 simple apparatus.
Manufacturing year: Please see the serial number on the type plate	x xxx x xxxxx xx YY x Where YY = manufacturing year (e.g. 12 – 2012)

Application



3.12 IdOil® Sensors

idOil sensors are an integral part of the idOil oil separator alarm system and they are to be used with the idOil control units. All idOil sensors are digital and polarity free.

	idOil-LIQ	idOil-OIL	idOil-SLU
Measurement principle	Vibration	Conductive	Ultrasonic
Mounting	Suspension		
Wetted parts	PVC, aluminium, PA, CR, Viton	PVC, AISI 316, PA, CR, NBR	PP, AISI 316, PA, CR, Silicon
Weight incl. 5m cable	240g	395g	530g
IP classification	IP68		
Ambient temperature	-30°c...+60°C		-25°c...+60°C
Supply voltage	12 V DC		
Fixed cable	Length 5m, 2 x 0.75 mm² PUR unshielded		
EMC	IEC/EN 61000-6-2 Emission IEC/EM 61000-6-3 Immunity		
ATEX	VTT 17 ATEX 005X	VTT 17 ATEX 004X	VTT 17 ATEX 006X
IECEx	IECEx VTT 17.0003X	IECEx VTT 17.0002X	IECEx VTT 17.0004X
Ex-classification	II 1 G Ex ia IIb T5 Ga	II 1 G Ex ia IIA T5 Ga	II 1 G Ex ia IIB T5 Ga
Exi Interface Values	U_i=16 V, I_i=80 mA, P_i=400 mW	U_i=16V, I_i=80 mA, P_i=400 mW	U_i=16V, I_i=80 mA, P_i=400mW
Max values in IIB	C_i ≤ 5.2 nF, L_i ≤ 1,6 mH	C_i ≤ 5.2 nF, L_i ≤ 1.6 mH	C_i ≤ 4.0 nF, L_i ≤ 1.6 mH

idOil-LiQ high liquid level sensor

Indicates when the liquid level in the oil separator rises excessively e.g. in an outlet blockage situation.

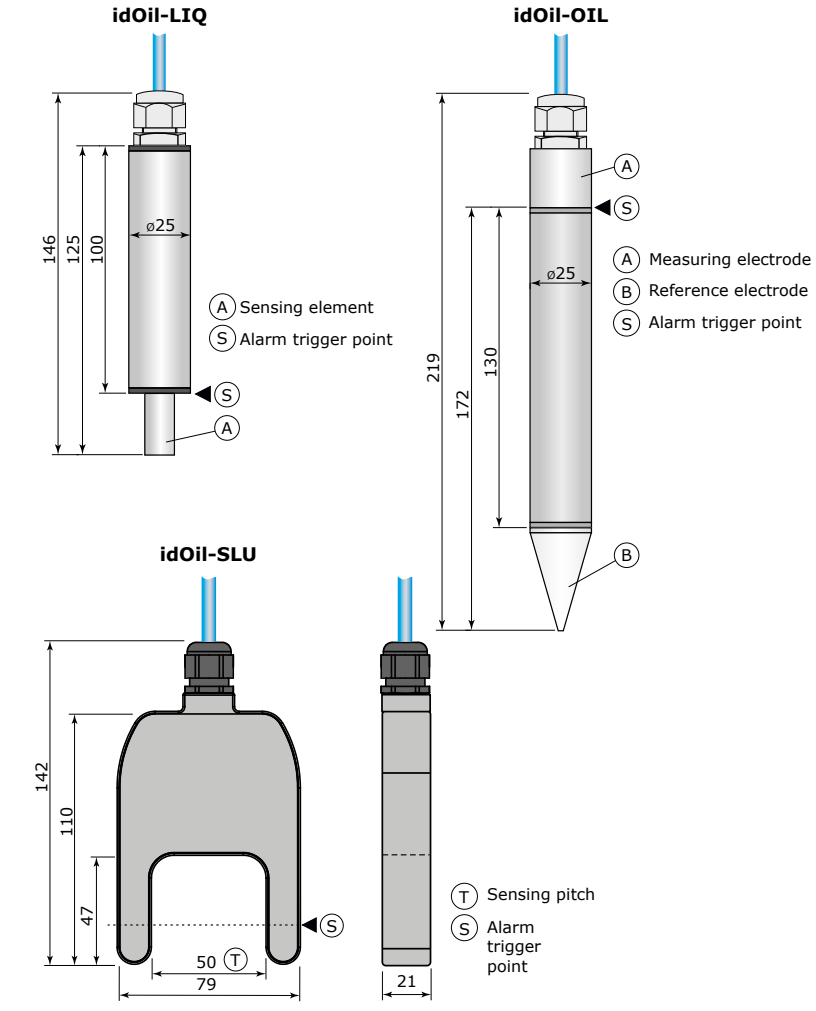
idOil-OIL oil sensor

Detects oil and indicates when the separator's oil storage is full.

idOil-SLU sludge sensor

Monitors the sludge layer in the oil separator and indicates when the sludge layer has reached its maximum level.

Dimensions (mm)



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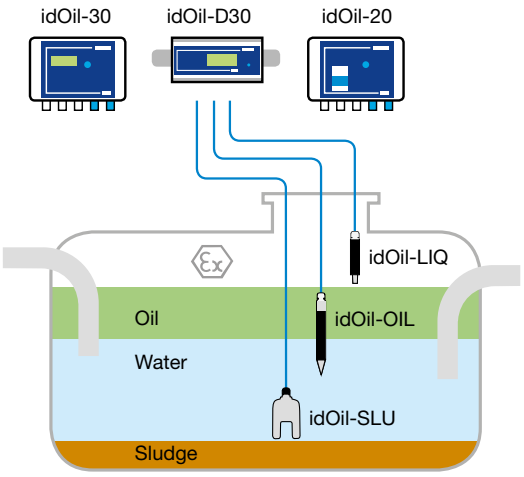
Application



Cable connectors

Cable connectors are used for cable extension between the sensors and the control unit. They are oil resistant, IP68 and suitable for ATEX Zone 0. Simple apparatus according to IEC/EN 60079-11.

LCJ1-1
Cable connector for one sensor

LCJ1-2
Cable connector for two sensors

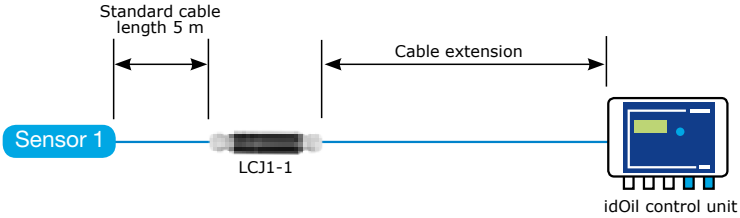
LCJ1-3
Cable connector for three sensors

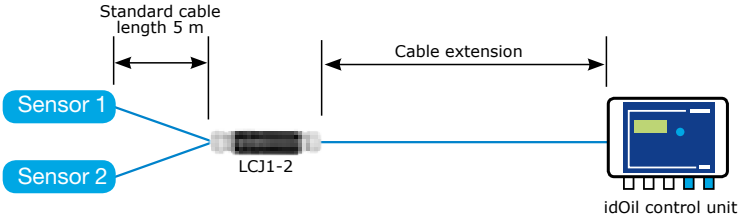
Sensor cable extension with installation

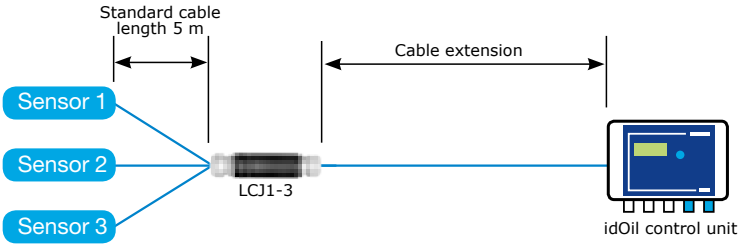
Sensor cable extension with Labkotec cable connector
LCJ1-1 for one sensor
LCJ1-2 for two sensors
LCJ1-3 for three sensors

Extension cable example
Twisted pair cable, 2 x 0.75 mm²

Extension cable diameter
LCJ1-1: Ø 4mm...9mm
LCJ1-2 and LCJ1-3: Ø 5mm...10mm
Max. extension cable resistance 68 Ohms.







3.14 IdOil®-20 Oil Separator Alarm Control Unit

Fulfils requirements of EN 858-1&2 standards

The idOil-20 is an easy to use oil separator alarm control unit that offers all necessary basic features. It can be equipped with up to three different types of idOil sensors that are identified automatically with a one-touch commissioning feature.

- High liquid level alarm, when the liquid level in the oil separator rises excessively e.g. in an outlet blockage situation.
- Oil layer thickness alarm, when the oil separator's full capacity for oil or petrol has been reached.
- Sludge layer thickness alarm, when the sludge layer in the bottom of the separator has reached its maximum level.
- Separator leakage alarm, when the liquid level drops unexpectedly.

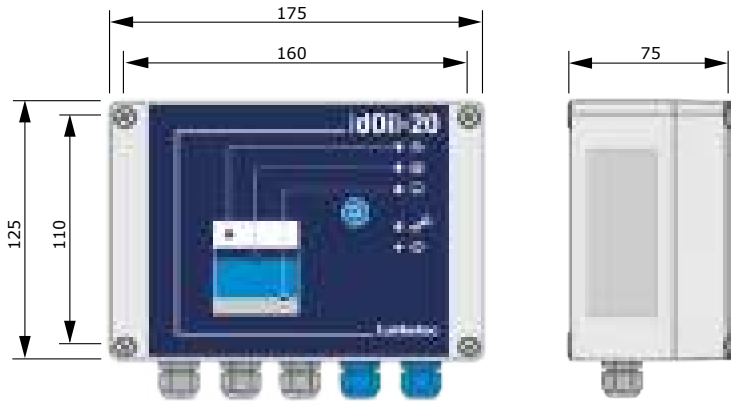
In these situations, an integrated alarm buzzer will sound, the display will show the alarm information and the relay(s) will switch.

Features

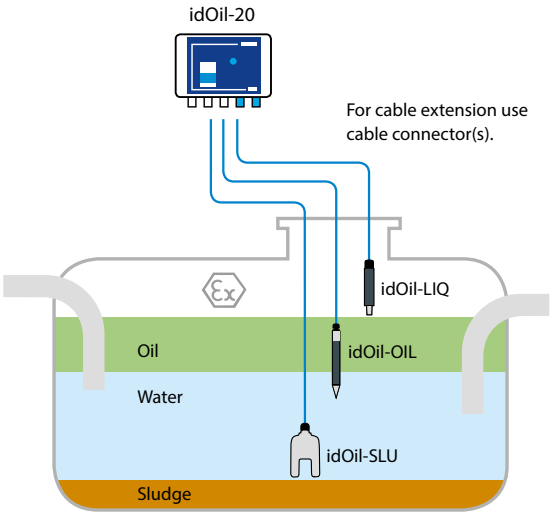
- Multi supply voltage
- Sensor combination with up to three different idOil sensors
- Polarity-free sensor connection
- Automatic sensor and sensor type detection
- Quick one-touch commissioning
- LED lights for alarms, sensor fault and power
- Buzzer for alarm indication
- Two potential free relay outputs. One for alarms and one for faults

Mounting	Wall mounting
Enclosure material	Polycarbonate
Weight	750g
IP classification	IP65
LED Lights	For alarms, sensor fault and power
Ambient temperature	-30°C...+60°C
Supply voltage	100-240 V AC, 50/60 Hz
Supply power fuse	Max. 10 A
Power consumption	Max. 8 VA
Relay outputs	5 A, 250 V AC/30 V DC, 100 VA potential free changeover contracts, 2 pcs
EMC	IEC/EN 61000-6-2 IEC/EN 61000-6-3
Electrical safety	Class I, CAT II IEC/EN 61010-1, UL 61010-1 CAN/CSA-C 22.2 NO. 61010-1-12
Ex-classification	II (1) G [Ex ia Ga] IIB
ATEX **IECEx**	VTT 16 ATEX 018X IECEx VTT 16.0005X
Exi interface values	U_o - 14.5 v, I_o = 78 mA, P_o - 367 mW, R = 243 Ω
Max values in IIB	C_o = 4.0 µF, L_o = 16.7 mH
Compatible sensors	idOil-LIQ high liquid level sensor idOil-OIL oil sensor idOil-SLU sludge sensor
Accessories	LCJ1-1 cable connector for one sensor LCJ-1 cable connector for two sensors LCJ1-3 cable connector for three sensors LMS-SAS5 mounting set for one sensor

Dimensions (mm)



Application



Cable connectors

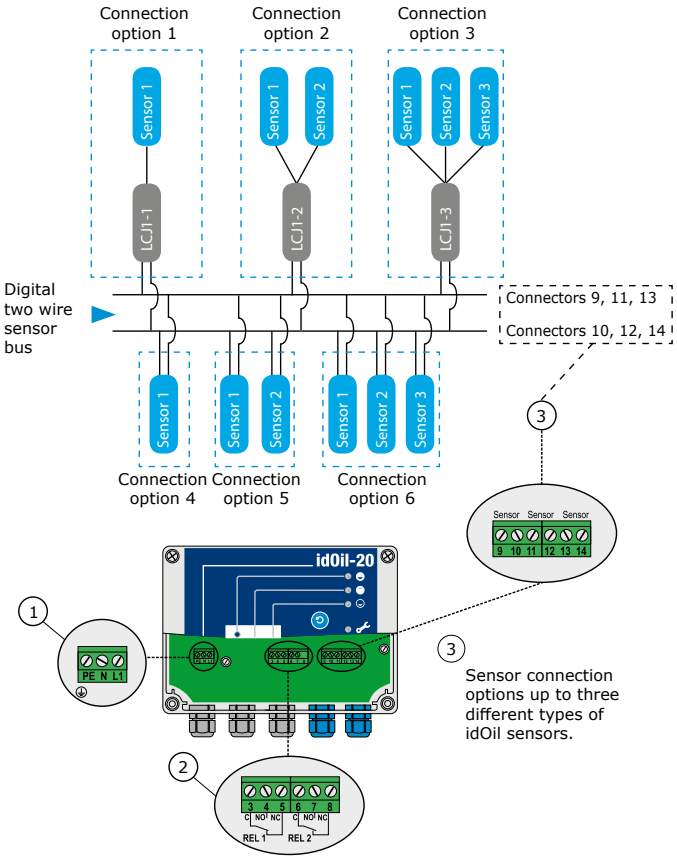
Cable connectors are used for cable extension between the sensors and the control unit. They are oil resistant, IP68 and suitable for ATEX Zone 0. Simple apparatus according to IEC/EN 60079-11.

LCJ1-1
Cable connector for one sensor

LCJ1-2
Cable connector for two sensors

LCJ1-3
Cable connector for three sensors

Installation



1 Supply voltage 100-240 V AC
PE = Ground conductor
N = Neutral conductor
L1 = Phase conductor

2 Supply voltage 100-240 V AC
Relay 1
3 = Common pole
4 = Opening pole when alarm
5 = Closing pole when alarm
Relay 2
6 = Common pole
7 = Opening pole when alarm
8 = Closing pole when alarm

3 Sensor connectors
9 = Sensor 1 connection 1
10 = Sensor 1 connection 2
11 = Sensor 2 connection 1
12 = Sensor 2 connection 2
13 = Sensor 3 connection 1
14 = Sensor 3 connection 2

3.16 IdOil®-30 Oil Separator Alarm Control Unit

Fulfils requirements of EN 858-1&2 standards

idOil-30 is a control unit for oil separator alarm systems. It can be equipped with up to three types of idOil sensors. With the idOil-30 and applicable Labkotec sensors following alarms can be monitored:

- High liquid level alarm, when the liquid level in the oil separator rises excessively e.g. in an outlet blockage situation.
- Oil layer thickness alarm, when the oil separator's full capacity for oil or petrol has been reached.
- Sludge layer thickness alarm, when the sludge layer in the bottom of the separator has reached its maximum level.
- Separator leakage alarm, when the liquid level drops unexpectedly.

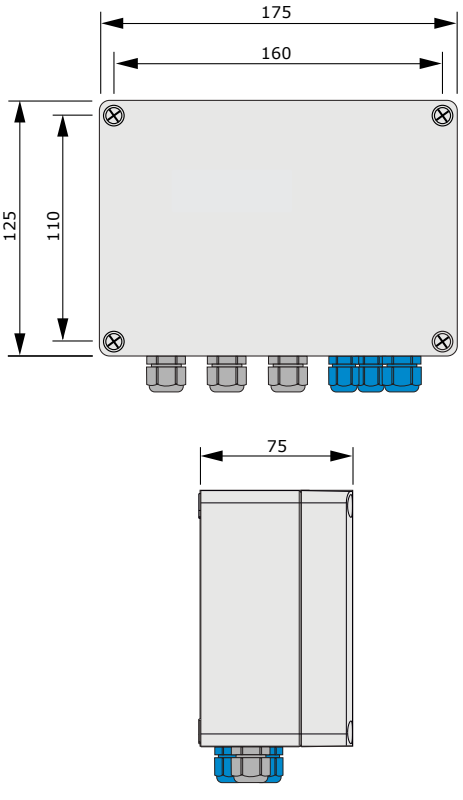
In these situations, an integrated alarm buzzer will sound, the display will show the alarm information and the relay(s) will switch. idOil-30 can be connected locally to laptop/tablet/smartphone via WLAN to access the inbuilt browser user interface for further configurations and settings.

Features

- Multi supply voltage
- Selectable sensor combination with up to three sensors
- Polarity-free sensor connection
- Automatic sensor and sensor type detection
- Quick one touch commissioning
- Display for system status and alarm information
- Two fully configurable potential free relay outputs
- Alarm log
- Service and maintenance diary
- WLAN connection locally between control unit and laptop/tablet smartphone to access the built in browser user interface for settings and configuration

Mounting	Wall mounting
Enclosure material	Polycarbonate
Weight	780g
IP classification	IP65
Display	4 line monochrome LCD
Ambient temperature	-30°C...+60°C
Supply voltage	100-240V AC, 50/60 Hz
Supply power fuse	Max. 10 A
Power consumption	Max. 12 VA
Relay outputs	5 A, 250 V AC/30 V DC, 100 VA potential free changeover contacts, 2 pcs
EMC	IEC/EN 61000-6-2 IEC/EN 61000-6-3
Electrical safety	Class 1, CAT II IEC/EN 61010-1, UL 61010-1 CAN/CSA-C 22.2 NO. 61010-1-12
Ex-classification	II (1) G [Ex is Ga] IIB
ATEX **IECEx**	VTT 16 ATEX 018X IECEx VTT 16.0005X
Exi interface values	U_o = 14.5 V, I_o = 78mA, P_o = 367 mW, R = 243 Ω
Max values in IIB	C_o = 4.0 µF, L_o = 16.7 mH
Compatible sensors	idOil-LIQ high liquid level sensor idOil-OIL oil sensor idOil-SLU sludge sensor
Accessories	LCJ1-1 cable connector for one sensor LCJ1-2 cable connector for two sensors LCJ1-3 cable connector for three sensors LMS-SAS5 mounting set for one sensor

Dimensions (mm)



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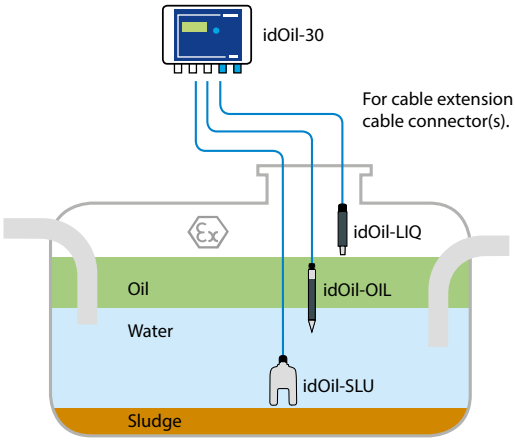
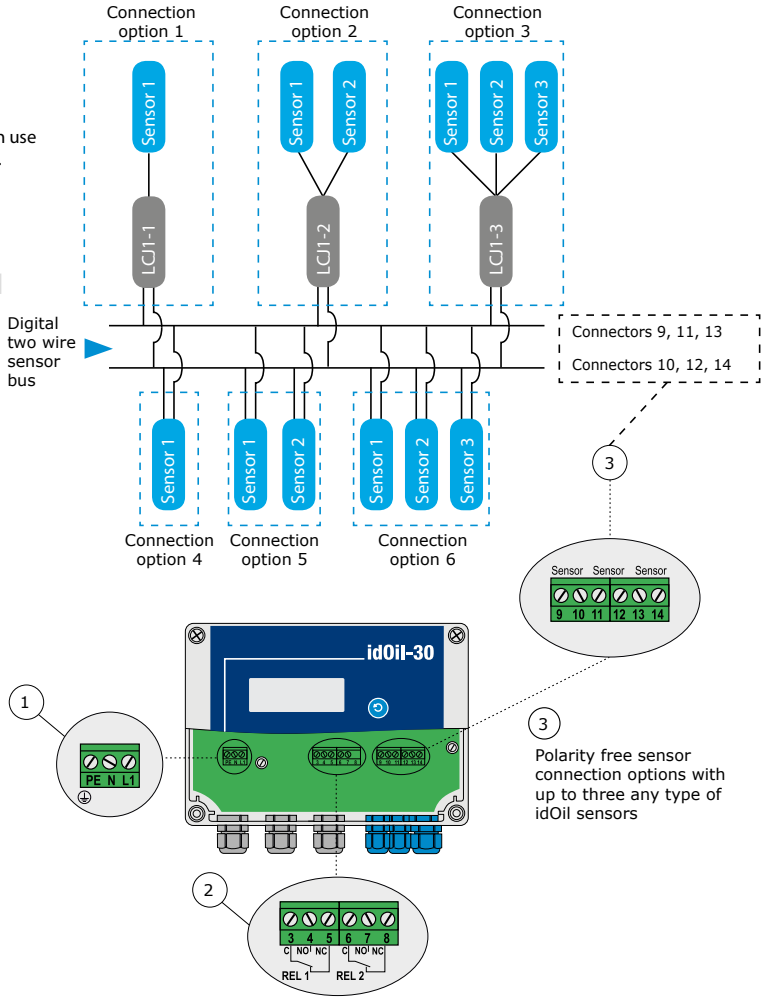
Application



Installation



Polarity free sensor connection options with up to three any type of idOil sensors

Settings, configurations and information via browser user interface

- System status view with current alarms
- Date and time settings
- Language selection
- Alarms log, downloadable
- Inspection settings
- Write inspection notes
- Inspection diary, downloadable
- Customer data input for display
- Alarm settings
- Sensor identification and naming
- Relay configuration
- Software update

Cable connectors

LCJ1-1
Cable connector for one sensor

LCJ1-2
Cable connector for two sensors

LCJ1-3
Cable connector for three sensors

(1) Supply voltage 100-240 V AC
PE = Ground conductor
N = Neutral conductor
L1 = Phase conductor

(2) Supply voltage 100-240 V AC
Relay 1
3 = Common pole
4 = Opening pole when alarm
5 = Closing pole when alarm
Relay 2
6 = Common pole
7 = Opening pole when alarm
8 = Closing pole when alarm

(3) Sensor connectors
9 = Sensor 1 connection 1
10 = Sensor 1 connection 2
11 = Sensor 2 connection 1
12 = Sensor 2 connection 2
13 = Sensor 3 connection 1
14 = Sensor 3 connection 2

3.18 IdOil®-D30 Oil Separator Alarm Control Unit

Fulfils requirements of EN 858-1&2 standards

idOil-D30 is a control unit for oil separator alarm systems. It can be equipped with up to three types of idOil sensors. With the idOil-D30 and applicable Labkotec sensors following alarms can be monitored:

- High liquid level alarm, when the liquid level in the oil separator rises excessively e.g. in an outlet blockage situation.
- Oil layer thickness alarm, when the oil separator's full capacity for oil or petrol has been reached.
- Sludge layer thickness alarm, when the sludge layer in the bottom of the separator has reached its maximum level.
- Separator leakage alarm, when the liquid level drops unexpectedly.

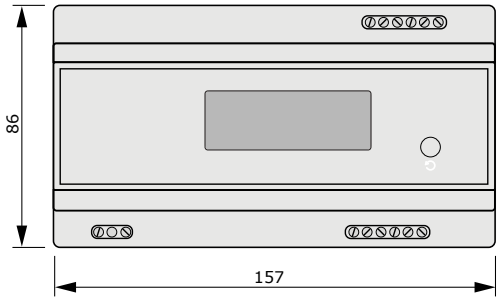
In these situations, an integrated alarm buzzer will sound, the display will show the alarm information and the relay(s) will switch. idOil-D30 can be connected locally to laptop/tablet/smartphone via WLAN to access the inbuilt browser user interface for further configurations and settings.

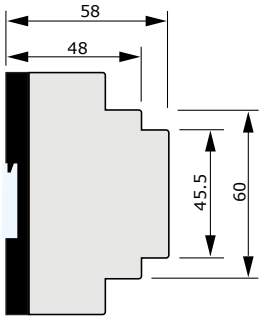
Features

- Multi supply voltage
- Selectable sensor combination with up to three sensors
- Polarity-free sensor connection
- Automatic sensor and sensor type detection
- Quick one touch commissioning
- Display for system status and alarm information
- Two fully configurable potential free relay outputs
- Alarm log
- Service and maintenance diary
- WLAN connection locally between control unit and laptop/tablet/ smartphone to access the built in browser user interface for settings and configuration

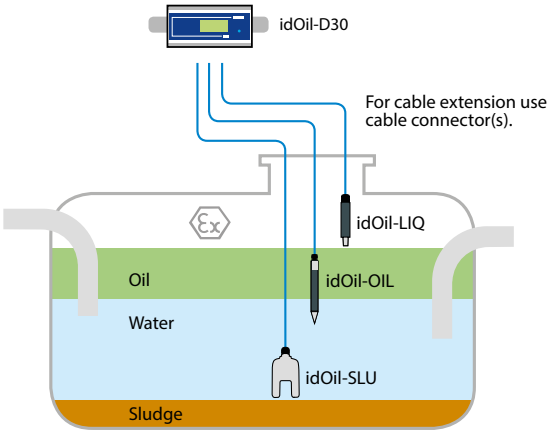
Mounting	M36 DIN rail mounting
Enclosure material	Lexan 940 (top), Noryl VO 1550 (base)
Weight	380g
IP classification	IP20
Display	4 line monochrome LCD
Ambient temperature	-30°C...+60°C
Supply voltage	100-240V AC, 50/60 Hz
Supply power fuse	Max. 10 A
Power consumption	Max. 12 VA
Relay outputs	5 A, 250 V AC/30 V DC, 100 VA potential free changeover contacts, 2 pcs
EMC	IEC/EN 61000-6-2 IEC/EN 61000-6-3
Electrical safety	Class 1, CAT II IEC/EN 61010-1, UL 61010-1 CAN/CSA-C 22.2 NO. 61010-1-12
Ex-classification	II (1) G [Ex is Ga] IIB
ATEX **IECEx**	VTT 16 ATEX 018X IECEx VTT 16.0005X
Exi interface values	U_o = 14.5 V, I_o = 78mA, P_o = 367 mW, R = 243 Ω
Max values in IIB	C_o = 4.0 µF, L_o = 16.7 mH
Compatible sensors	idOil-LIQ high liquid level sensor idOil-OIL oil sensor idOil-SLU sludge sensor
Accessories	LCJ1-1 cable connector for one sensor LCJ1-2 cable connector for two sensors LCJ1-3 cable connector for three sensors

Dimensions (mm)





Application



Settings, configurations and information via browser user interface

- System status view with current alarms
- Date and time settings
- Language selection
- Alarms log, downloadable
- Inspection settings
- Write inspection notes
- Inspection diary, downloadable
- Customer data input for display
- Alarm settings
- Sensor identification and naming
- Relay configuration

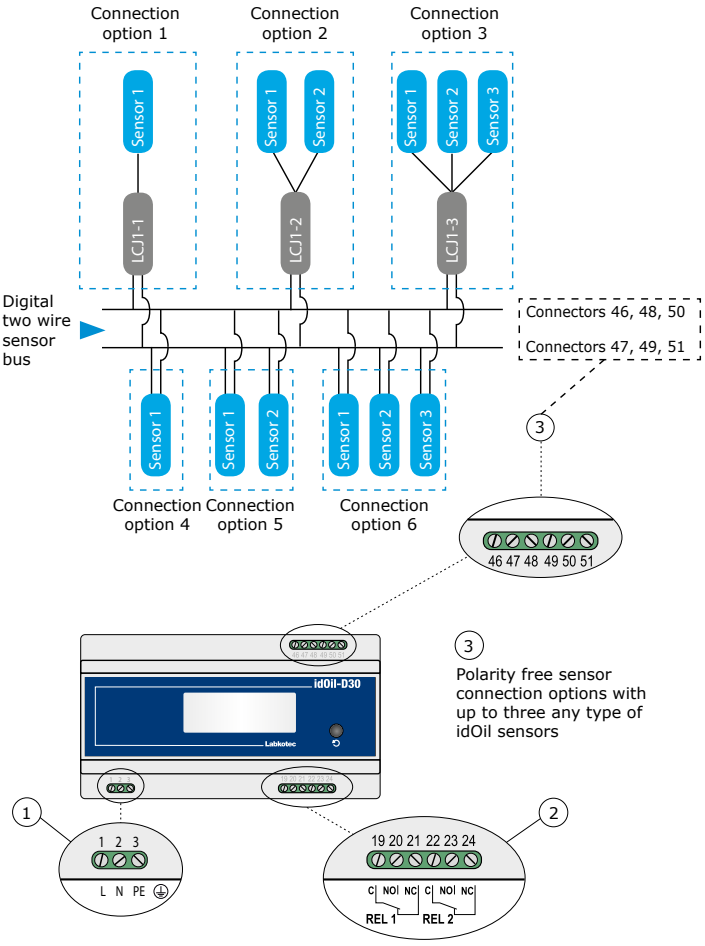
Cable connectors

LCJ1-1
Cable connector for one sensor

LCJ1-2
Cable connector for two sensors

LCJ1-3
Cable connector for three sensors

Installation



(1) Supply voltage 100-240 V AC
1 = L, phase conductor
2 = N, neutral conductor
3 = PE, ground conductor

(2) Relay output
Relay 1
19 = Common pole
20 = Opening pole when alarm
21 = Closing pole when alarm
Relay 2
22 = Common pole
23 = Opening pole when alarm
24 = Closing pole when alarm

(3) Sensor connectors
46 = Sensor 1 connection 1
47 = Sensor 1 connection 2
48 = Sensor 2 connection 1
49 = Sensor 2 connection 2
50 = Sensor 3 connection 1
51 = Sensor 3 connection 2

3.20 IdOil® Solar Oil Separator Alarm

idOil Solar with beacon light

idOil Solar

idOil Solar oil separator alarm

The idOil Solar is a solar powered oil separator alarm for off-grid areas. It can be equipped with a beacon light and/or 3G modem.

In an alert situation, the beacon light will flash and/or an alarm message will be sent to the user's mobile phone. The idOil Solar control unit has the same features as the idOil-30.

Enclosure material	Polycarbonate
Weight	8000g
IP classification	IP43 with two ventilation devices
Ambient temperature	-30 °C...+60 °C
Supply voltage	11-17 V DC
Compatible sensors	idOil-LIQ, idOil-OIL, idOil-SLU
Relay outputs	5 A, 30 V DC, 100 VA potential free, 2 pcs
EMC	IEC/EN 61000-6-2 IEC/EN 61000-6-3
Electrical safety	Class III, IEC/EN 61010-1, UL 61010-1 CAN/CSA-C 22.2 NO. 61010-1-12
Overvoltage category	
ATEX	VTT 16 ATEX 018X
IECEx	IECEx VTT 16.0005X
Ex-classification	ⓔ II (1) G [Ex ia Ga] IIB

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The purpose of the automatic closure device (ACD) is to close the separator off automatically when the maximum storage capacity of light liquid is attained.

The ACD is to ensure that in the event of a major spillage, pollutants do not pass into the drainage system; it should not be regarded as a substitute for an automatic alarm/monitoring system.

Prior to installation

Prior to installation the ACD retaining tube should be covered with polythene to prevent ingress of concrete etc., which would fall onto the ACD and upset its calibration.

Operation and maintenance

If the tank should fill with light liquid the ACD, which is calibrated for a specific gravity of 0.85, will automatically fall and close off the SPEL Puraceptor®.

Normally routine maintenance would include removing light liquid intercepted within the Puraceptor®. If a SPEL automatic alarm/monitoring system is incorporated, it will automatically indicate when the Puraceptor® should be emptied. Only in an emergency will the Puraceptor® fill to its maximum and operate the ACD.

In such an event the Puraceptor® should be completely sucked out and the ACD lifted out (see Maintenance Procedure – Ref: 5.5).

SPEL Puraceptor® class 1 separators two chamber models and full retention class 2 separators

Commissioning

After the tank has been installed, leave the water in.

1. Remove the ACD from the packing box, taking care not to cause damage.
2. Remove the retaining cap from the top of the retaining tube in the separator.
3. Insert the ACD into the retaining tube using the lifting eye provided, ensuring it floats correctly with the float just visible above the water level.
4. Replace the retaining cap. This is to safeguard against the removal of the float by unauthorised persons or rising above the tube under abnormal conditions.

Note: If the tank's invert depth exceeds 1m it is advisable to remove the retaining cap prior to installation and only replace after inserting the ACD, if it is possible to do so from ground level.

SPEL Puraceptor® class 1 separators single chamber models

Models P004/1C to P050/1CSC.

Commissioning

After the tank has been installed, leave the water in.

1. Remove the ACD from the packing box, taking care not to cause damage.
2. Remove the retaining cap from the top of the retaining tube in the separator.
3. Insert the ACD into the retaining tube using the lifting eye provided. Allow it to sink to the bottom. The stainless steel retaining plate should seat on the base flange and the ACD attain its operating position as shown in the open position.
4. Replace the retaining cap. This is to safeguard against the removal of the float by unauthorised persons or rising above the tube under abnormal conditions.

Note: If the tank's invert depth exceeds 1m it is advisable to remove the retaining cap prior to installation and only replace after inserting the ACD, if it is possible to do so from ground level.

Larger Models

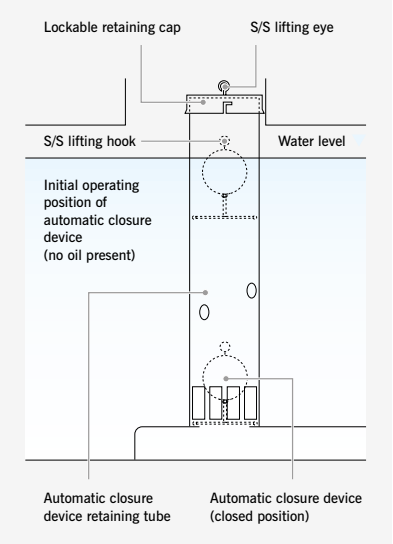
Where the ACD is already positioned in the unit, proceed as follows:

1. Before putting any water in the tank, lift rope attached to ACD up to the next knot and hang it from the rope hook. This is now in the 'operating position'.
2. As soon as the water level in the tank is above the ACD, the rope must be removed altogether and the rope hook must be unbolted. Do not leave the rope hook attached to the shaft. Ensure the ACD automatically remains in the 'operating position'.
3. Tape up or fill the hole(s) in the shaft where the rope hook was attached to prevent any backfill seeping into the shaft.

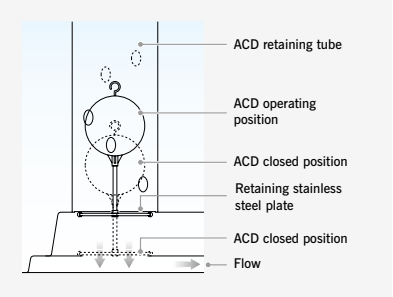
Maintenance

Dependent upon site conditions it is advisable to remove the ACD periodically taking care not to raise it too quickly and damage the plastic/copper float. Clean from debris/silt to prevent premature closing. Check the seating in the base unit is free of debris/silt that could prevent proper closing in an emergency.

Automatic closure device Type F (Floating) SPEL Puraceptor® class 1 separators (two chamber) & full retention class 2 separators.



Automatic closure device Type R (Retained) SPEL Puraceptor® class 1 separator (single chamber).

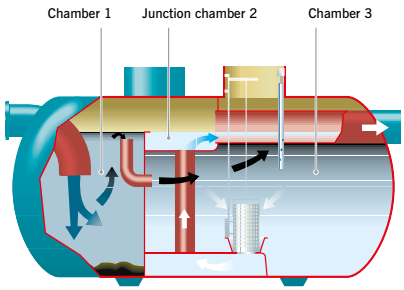


Maintenance

The SPEL Stormceptor® by-pass separator is a well proven high quality factory made unit, designed and tested in accordance with the European Standard BS EN 858-1 and meets the requirements of the Environment Agency and the Construction Products Regulations.

SPEL Stormceptors® are designed for long term performance and with SPEL high volume coalescer units, low maintenance.

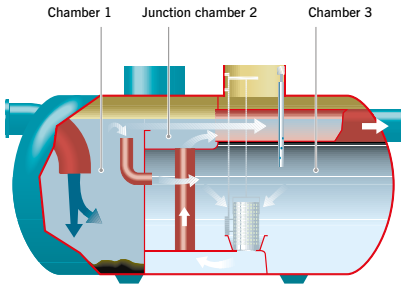
SPEL Stormceptor® by-pass separators are manufactured in class 1 and class 2 models and with or without silt capacity in accordance with BS EN 858-1. The range of models is listed in section 4 or on the SPEL Stormceptor® selection chart – available on request.



Flows according to nominal size (NSB)

The polluted surface water first enters the primary chamber where silt settles out and is retained. The fuel, oil and other pollutants lighter than water, rise to the surface and are efficiently skimmed off and transferred to the separation chamber.

In normal conditions all the flow is through the separation chamber, where the quiescent conditions allow the pollutants to separate out efficiently. Water from the cleanest zone in the separation chamber flows through a coalescer unit, to remove smaller globules of oil, up to the junction chamber and thence to the outlet



Storm flows above NSB

During a storm the level in the primary chamber rises and the stormwater passes over the weir into the junction chamber and to the outlet.

The design keeps the turbulence within the separation chamber to a minimum which avoids disturbing the contaminants retained.

Maintenance requirements

The SPEL automatic alarm/monitoring system will automatically warn you when the SPEL Stormceptor® requires emptying of light liquids, however, silt will accumulate and require removing at intervals depending on the site conditions.

We recommend the SPEL Stormceptor® is checked at 3, 6, or 12 monthly intervals to determine the depth of silt in the primary chamber.

Where a SPEL automatic alarm/monitoring system is not fitted, the SPEL Stormceptor® should be checked at 3, 6, 12 monthly intervals, depending upon site conditions, to determine the depth of retained pollutants. When the depth of light liquids retained has reached the predetermined design level in accordance with the European Standard BS EN 858-1, or if excessive silt has accumulated, it should be emptied.

When emptying ensure both chambers (primary - chamber 1 and separation - chamber 3) are emptied equally to prevent unequal pressure on the internal partition.

Chamber 1

The inlet connects directly into chamber 1 - the primary chamber where silt etc. is deposited and light liquids are skimmed off to be transferred to the main separation chamber, chamber 3.

Maintenance requires the removal of accumulated silt etc., checking the skim pipe is not blocked and removing floating debris.

Chamber 2

This is the junction chamber where the clean water passing out of the main separation chamber and the storm flow over the weir from the primary chamber meet and pass to the outlet. This chamber is an approved sampling point if samples are required for analysis. As it is mainly clean water passing though the chamber, maintenance is confined to checking the weir plate is free of debris.

Chamber 3

The main separation chamber is where the light liquids are retained and in the case of class 1 Stormceptors®, where the coalescer units are incorporated.

If coalescer units are incorporated, these should be removed and cleaned in accordance with the requirements set out in Data Sheet ref. 3.23 steps 1 to 5.

Retained light liquids should be removed from the top and any sediment from the bottom. Small Stormceptor® by-pass separators generally need to be completely emptied.

SPEL automatic alarm/monitoring system

If a SPEL automatic alarm/monitoring system is fitted this will automatically signal when the Stormceptor® requires light liquids to be removed. If this system is fitted see 3.10 – 3.19.

When emptying take care not to damage or shift the probe protection tube situated in the access shaft of chamber 3.

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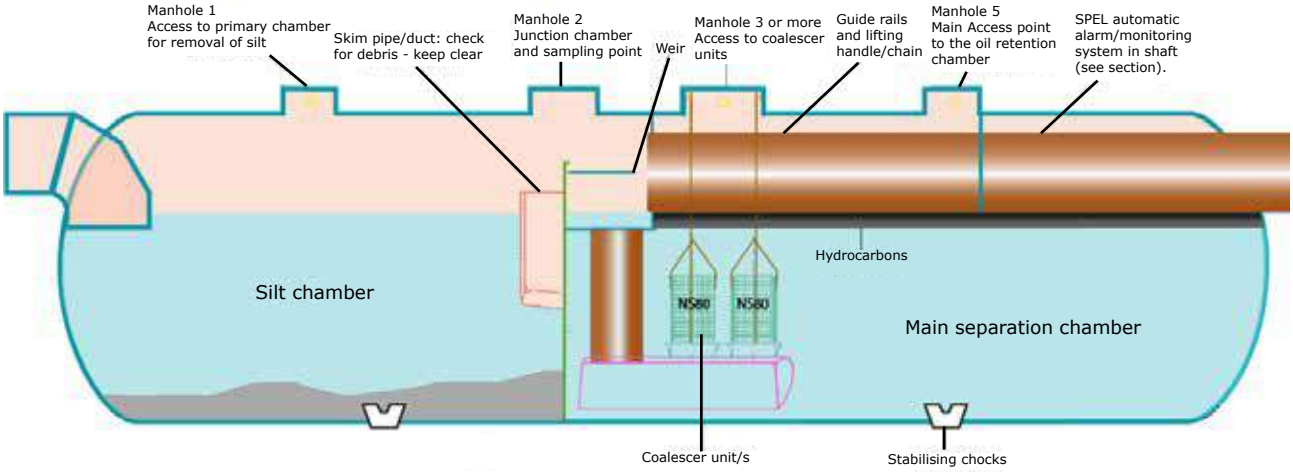
Maintenance Access

SPEL Stormceptor® class 1 by-pass separators 400, 500 & 600 Series



A wide range of SPEL Stormceptor® class 1 by-pass separators is available incorporating coalescer unit/s for small to large catchment areas.

When emptying ensure both chambers (primary – chamber 1 and separation – chamber 3) are emptied equally to prevent unequal pressure on the internal partition.

Manhole access 1

This is the access to the primary chamber for removal of silt, the inspection of the skim pipe and clearing of any floating debris.

Manhole access 2

This provides access to the junction chamber which is suitable as a sampling point for the final discharge.

Manhole access 3 & 4 (larger models)

These provide access for the inspection, the removal and reinsertion of the coalescer units and the removal of hydrocarbons and silt.

The SPEL automatic alarm/monitoring system probe is generally situated at the base of this access shaft (see section on alarms).

Maintenance

SPEL Puraceptor® class 1 separators

The SPEL Puraceptor® class 1 separator is available in single chamber or two chamber models.

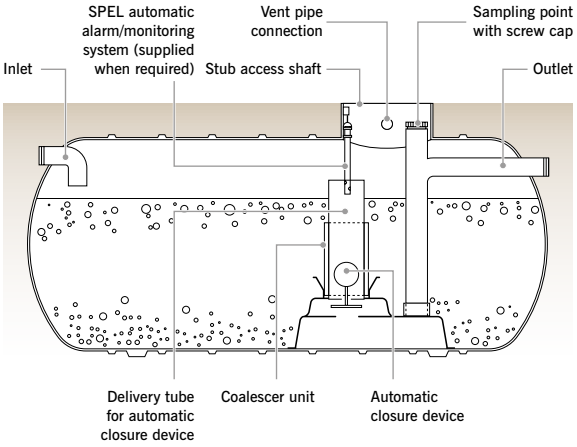
Single chamber models (Figure 1)

These incorporate a coalescer unit and an automatic closure device type 'R'. For maintenance see 3.20.

Two chamber models (Figure 2)

The maintenance procedure for the SPEL Puraceptor® class 1 two chamber models is detailed on sheet 3.20.

Figure 1



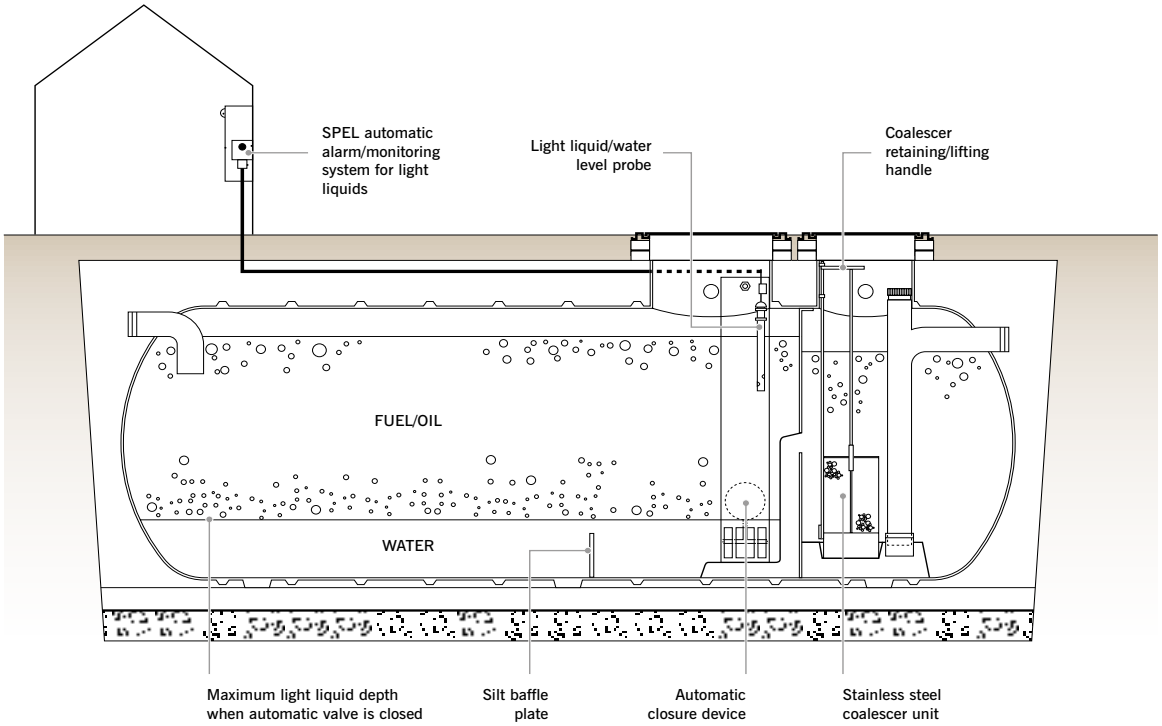
Maintenance requirements

The SPEL automatic alarm/monitoring system will automatically warn you when the SPEL Separator requires emptying of light liquids. See ref. 3.10 – 3.19. However, silt will accumulate and require removing at intervals depending on the site conditions.

We recommend the SPEL Separator is checked at 3, 6 or 12 monthly intervals to determine the depth of silt in the primary chamber.

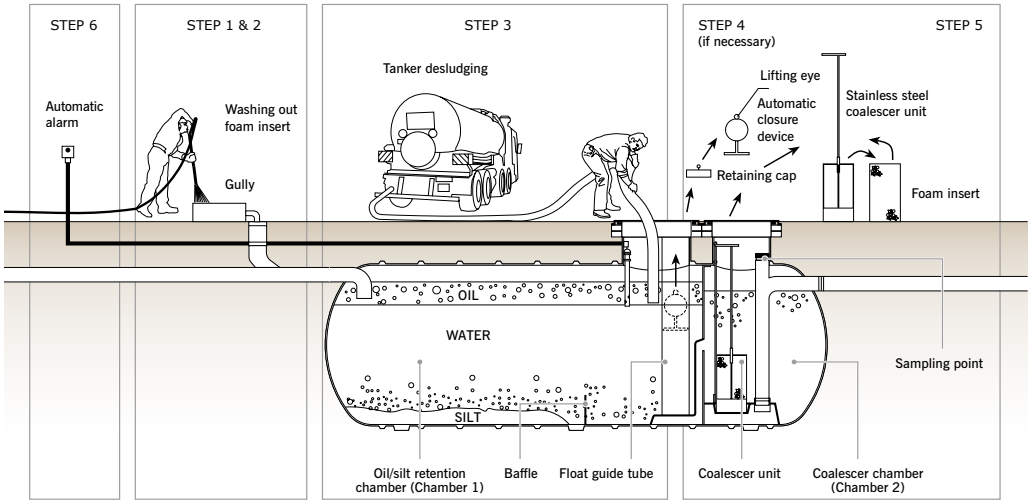
Separators must be provided with a remote device to provide visual and audible warning when the level of oil reaches 90 per cent of the oil storage volume (V) under static liquid level conditions. This automatic warning device indicates that the separator is in need of immediate emptying for it to continue to work effectively.

Figure 2



Maintenance

SPEL Puraceptor® separator - two chamber model



Step 1: Coalescer unit

Use the lifting handle or unclip the retaining clip for the wire rope and lift the coalescer unit out of the tank and place ahead of the Puraceptor®.

Step 2: Cleaning foam insert

Remove foam insert and wash with normal water pressure ensuring the dirty water runs into the Puraceptor®.

Step 3: Sucking out oil/fuel and silt

Suck off the retained oil from both chambers of the Puraceptor® and then the silt deposited on the bottom, leaving sufficient water to ensure the ACD remains floating.

Step 4: Sucking out complete contents (if necessary)

If the quantity of pollutants exceeds recommended levels, the complete contents of the Puraceptor® may need to be removed.

After sucking out completely, remove the ACD in the ACD retaining tube by first removing the retaining cap (this is to safeguard against the removal of the float by unauthorised persons).

Then, by means of a pole with a hook, lift out the ACD using the lifting eye on the float. Check the seating at the base of the retaining tube is free of debris/silt that could prevent the ACD closing off in an emergency.

Step 5: Re-insert coalescer unit and ACD

Re-insert the foam insert into the stainless steel coalescer unit and re-insert the coalescer unit into the Puraceptor®. Re-clip the wire rope or location pin as provided with the SPEL lifting/locating/locking system (see 3.7).

Partially fill the Puraceptor® with clean water to ensure the ACD when re-inserted remains floating. Check the ACD is not damaged and the closure plate is clean. Re-insert the ACD.

Finally check the ACD is floating and the retaining cap has been replaced to safeguard against its removal by unauthorised persons, unless depth of tank precludes doing so from ground level.

ACD closes off in emergency due to oil spill

If the ACD closes off, the oil/fuel spill needs to be removed by a suction tanker. With a single chamber model, the complete contents will need to be removed in order to release the ACD. With the two chamber models, insert the suction hose into the first chamber (oil/silt retention chamber) and then the head in the second chamber will normally provide a back pressure and automatically release the ACD.

Precaution: never try to pull the ACD off its seating by force.

Step 6: SPEL automatic alarm /monitoring system

The SPEL automatic alarm/monitoring system probe should be lifted out of the probe protection tube, wiped clean and re-inserted. The system should now be reset according to instructions.
See 3.10 – 3.19.

Maintenance procedure

The SPEL automatic alarm/monitoring system will automatically warn you when the Puraceptor® requires emptying. See 3.10 – 3.19. Where a SPEL automatic alarm/monitoring system is not fitted, SPEL Puraceptors® should be checked at three, six or twelve-monthly intervals depending on site conditions, to determine the depth of retained pollutants and silt in both chambers and the correct operating of the ACD (automatic closure device). When the depth of the oil/fuel retained has reached the predetermined design level, in accordance with BS EN 858-1, it should be emptied.

Important Note: When emptying, ensure both chambers are emptied equally starting with the oil retention chamber and then the coalescer chamber and back again until empty.

SECTION

4

SPEL Stormceptor® Class 1
By-Pass Separators

4.1 SPEL Stormceptor® Class 1 By-Pass

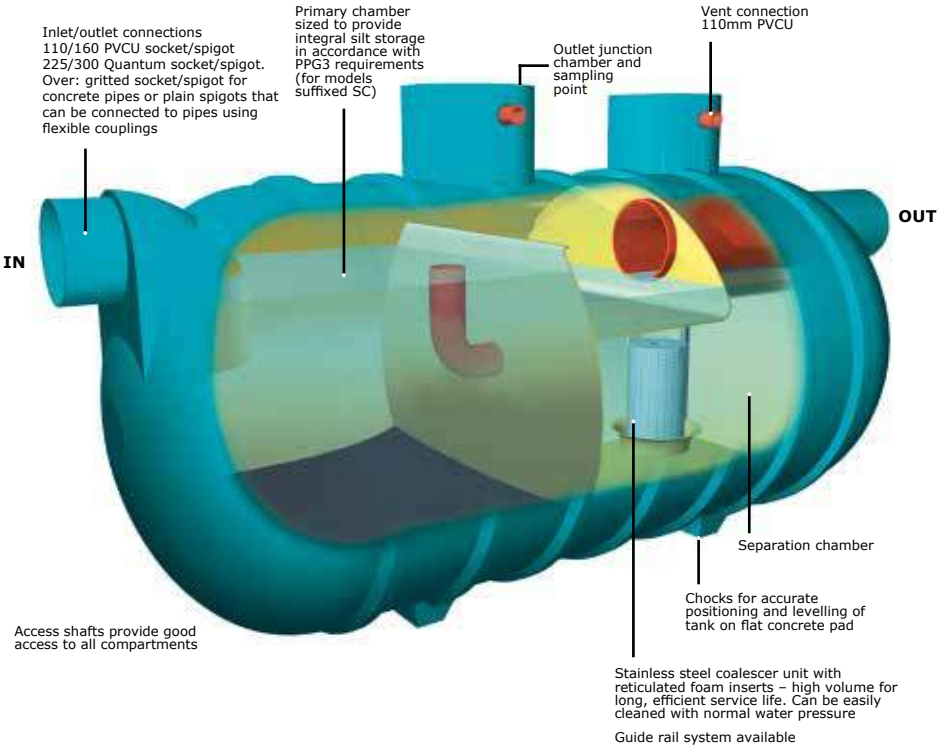
Compliant to the European Standard BS EN 858-1 and the construction

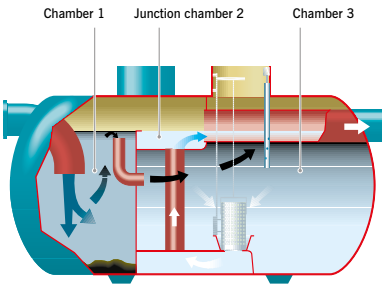
The 'heart' of the SPEL Stormceptor® is the unique long life, low maintenance coalescer unit which 'polishes' the final effluent AFTER 90% hydrocarbons of silt have been separated out.

The SPEL Stormceptor® is a well proven high quality factory-made unit specially designed and fabricated to provide a very effective means of separating oil and other light liquids from stormwater drainage systems.

The SPEL Stormceptor® was the first Environment Agency listed class 1 by-pass separator to BS EN 858-1:2002.

The SPEL Stormceptor® has been used effectively throughout the UK and abroad since 1985. All sizes and types of development have been catered for, including industrial development sites, hypermarkets and airports. Areas of up to 30 hectares can be covered with a single unit.

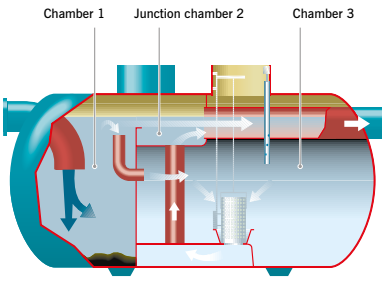




Flows according to nominal size (NSB)

The polluted surface water first enters the primary chamber where silt settles out and is retained. The fuel, oil and other pollutants lighter than water, rise to the surface and are efficiently skimmed off and transferred to the separation chamber.

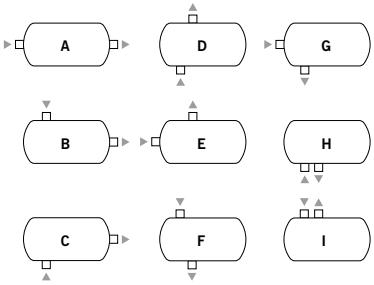
In normal conditions all the flow is through the separation chamber, where the quiescent conditions allow the pollutants to separate out efficiently. Water from the cleanest zone in the separation chamber flows through a coalescer unit, to remove smaller globules of oil, up to the junction chamber and thence to the outlet.



Storm flows above NSB

During a storm the level in the primary chamber rises and the stormwater passes over the weir into the junction chamber and to the outlet.

The design keeps the turbulence within the separation chamber to a minimum which avoids disturbing the contaminants retained.



Choice of pipe connections orientations

The orientation of inlet/outlet connections indicated depends on the pipe diameter (see under A–I and D–I 4.2). Any special requirements contact Technical Sales.

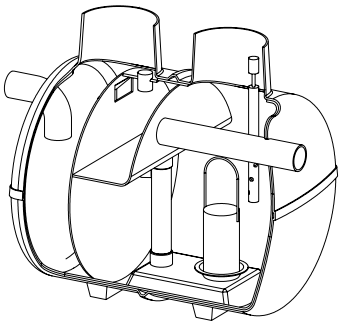
Both inlet and outlet connections are spigots (GRP or PVCU) and can be connected to the site pipework using Flex-Seal, Band-Seal or similar flexible couplings.

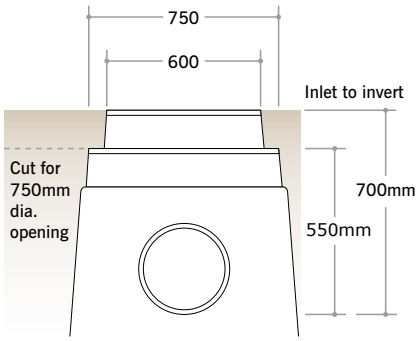
100 and 200 Series, Class 1

Compliant to the European Standard BS EN 858-1 and the Construction Products Regulations

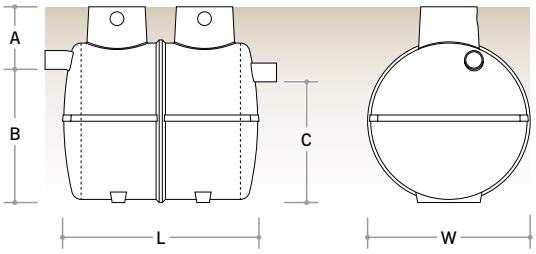
Model	Nominal size (NSB) Flow (l/s)	Peak Flow (l/s)	Catchment area (m^2)	Oil storage (litres) NSB x 15	Silt storage (litres) NSB x 100	Length (mm) L	Diameter (mm) W	Inlet Invert (mm) A	Base to inlet (mm) B	Base to outlet C	Max in/out pipe diameter (mm) for orientation A-C	D-I	450	Number of access shafts Diameter (mm) 600/750*	900
103 C1/SC	3	30	1667	45	300	1550	1300	500	1015	965	160	160	2	-	-
204 C1/SC	4	40	2222	60	400	1860	1225	550/700*	1350	1300	300	300	-	1	-
206 C1/SC	6	60	3333	90	600	2120	1225	550/700*	1350	1300	300	300	-	1	-
208 C1/SC	8	80	4444	120	800	2270	1225	550/700*	1350	1300	300	300	-	1	-
210 C1/SC	10	100	5556	150	1000	2920	1225	550/700*	1350	1300	300	300	-	1	-
212 C1/SC	12	120	6667	180	1200	3570	1225	550/700*	1350	1300	300	300	-	1	-
215 C1/SC	15	150	8333	225	1500	4237	1225	550/700*	1350	1300	300	300	-	1	-

* 200 Series Stormceptors® have a dual size access shaft. For units that will collect silt we recommend using the 750mm diameter access which provides enough room for the silt removal hose to be lowered into the tank during maintenance. The value of 'A' here is 550mm for the 750mm diameter access and 700mm for the 600mm diameter access.

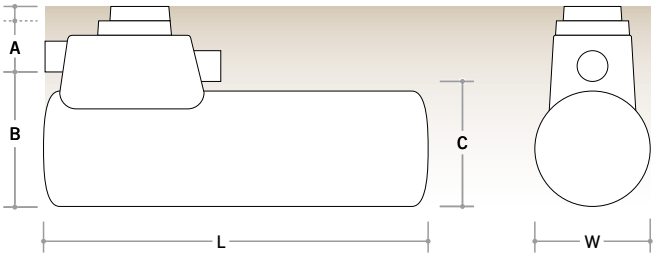




100 Series



200 Series



Dual access shaft openings

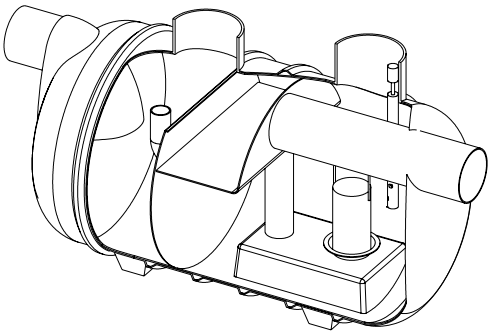
For access to desludge primary chamber, cut to 750mm dia. access shaft opening. Where a silt trap is incorporated upstream or silt build up will not occur 600mm diameter access shaft may be adequate.

Refer to 4.5 for more comprehensive data including installation.

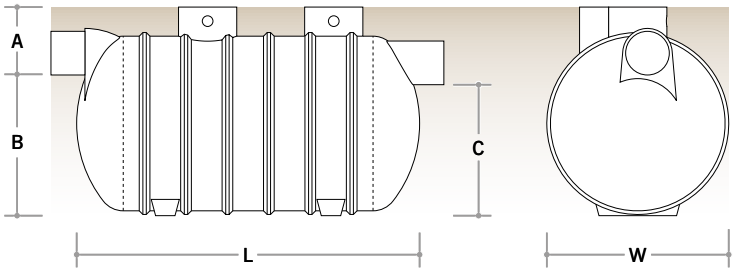
300 and 400 Series, class 1

Compliant to the European Standard BS EN 858-1 and the Construction Products Regulations

	Nominal size (NSB)		Catchment area (m^2)	Oil storage (litres)	Silt storage (litres)	Length (mm)	Diameter (mm)	Inlet Invert (mm)	Base to inlet (mm)	Base to outlet	Max in/out pipe diameter (mm) for orientation			Number of access shafts Diameter (mm)		
Model	Flow (l/s)	Peak Flow (l/s)		NSB x 15	NSB x 100	L	W	A	B	C	A-C	D-I	450	600	750	900
320 C1/SC	20	200	11111	300	2000	3200	1875	700	1450	1350	450	600	-	2	-	-
325 C1/SC	25	250	13889	375	2500	3540	1875	700	1450	1350	450	600	-	2	-	-
330 C1/SC	30	300	16667	450	3000	4420	1875	700	1450	1350	450	600		-	1	1
340 C1/SC	40	400	22222	600	4000	5760	1875	740	1410	1310	450	600	-	1	1	-
345 C1/SC	45	450	25000	675	4500	6570	1875	740	1410	1310	450	600	-	1	1	-
350 C1/SC	50	500	27778	750	5000	7060	1875	740	1410	1310	450	600	-	1	1	-

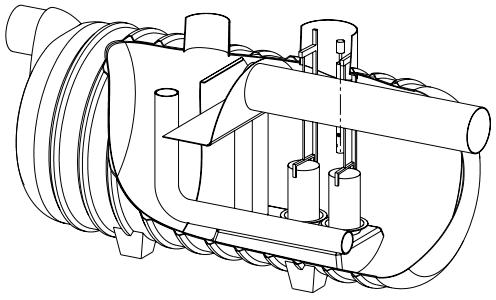


300 Series

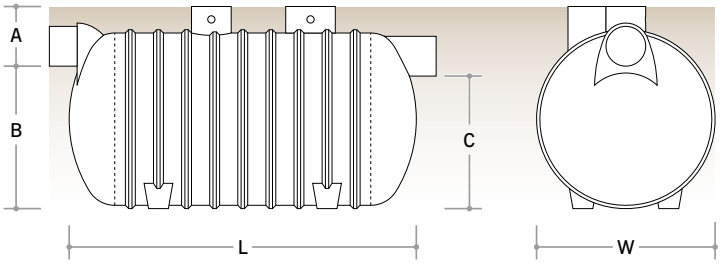


	Nominal size (NSB)		Catchment area (m^2)	Oil storage (litres)	Silt storage (litres)	Length (mm)	Diameter (mm)	Inlet Invert (mm)	Base to inlet (mm)	Base to outlet	Max in/out pipe diameter (mm) for orientation			Number of access shafts Diameter (mm)		
Model	Flow (l/s)	Peak Flow (l/s)		NSB x 15	NSB x 100	L	W	A	B	C	A-C	D-I	450	600	750	900
460 C1/SC	60	600	33333	900	6000	4400	2700	950	2100	2000	600	750	-	1	-	1
470 C1/SC	70	700	38889	1050	7000	5250	2700	950	2100	2000	600	750	-	1	-	1
480 C1/SC	80	800	44444	1200	8000	6170	2700	950	2100	2000	600	750	-	1	-	1
4100 C1/SC	100	1000	55556	1500	10000	7400	2700	1100	1950	1850	750	900	-	1	-	1
4125 C1/SC	125	1250	69444	1875	12500	9050	2700	1100	1950	1850	750	900	-	1	-	1
4150 C1/SC	150	1500	83333	2250	15000	9950	2700	1100	1950	1850	750	900	-	-	-	2
4160 C1/SC	160	1600	88889	2400	16000	11830	2700	1250	1800	1700	750	900		1	1	1

400 Series – models without silt capacity are available if required – details on application.



400 Series



500 and 600 Series, class 1

Compliant to the European Standard BS EN 858-1 and the Construction Products Regulations

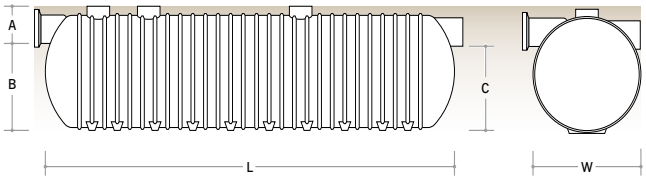
These Stormceptors® are individually designed in accordance with specific site requirements according to catchment area, class, silt capacity, inlet/outlet connection size and orientation. The following is an approximate guide to the range of models available. Please contact our technical department for your specific requirements.

	Nominal size (NSB)		Catchment area	Oil storage (litres)	Silt storage (litres)	Length (mm)	Diameter (mm)	Inlet Invert (mm)	Base to inlet (mm)	Base to outlet	Max in/out pipe diameter (mm) for orientation	
Model	Flow (l/s)	Peak Flow (l/s)	hectares	NSB x 15	NSB x 100	**L**	**W**	**A**	**B**	**C**	**A-C**	**D-I**
5180 C1/SC	180	1800	10	2700	18000	7470	3650	1185	2690	2550	900	900
5200 C1/SC	200	2000	11.1	3000	20000	8530	3650	1185	2690	2355	1200	1200
5250 C1/SC	250	2500	13.9	3750	25000	10040	3650	1185	2690	2355	1200	1200
6300 C1/SC	300	3000	16.7	4500	30000	10310	4150	1325	2850	2675	1200	1200
6350 C1/SC	350	3500	19.4	5250	35000	11470	4150	1325	2850	2675	1200	1200
6400 C1/SC	400	4000	22.2	6000	40000	12690	4150	1325	2850	2675	1200	1200
6500 C1/SC	500	5000	27.8	7500	50000	15870	4150	1325	2850	2675	1200	1200
6600 C1/SC	600	6000	33.3	9000	60000	18260	4150	1325	2850	2675	1200	1200
6700 C1/SC	700	7000	38.9	10500	70000	22250	4150	1325	2850	2675	1200	1200
6500 C1	500	5000	27.8	7500	Nil	11910	4150	1325	2850	2675	1200	1200
6600 C1	600	6000	33.3	9000	Nil	13510	4150	1325	2850	2675	1200	1200
6700 C1	700	7000	38.9	10500	Nil	16650	4150	1325	2850	2675	1200	1200
6750 C1	750	7500	41.7	11250	Nil	18260	4150	1325	2850	2675	1200	1200
6800 C1	800	8000	44.4	12000	Nil	19890	4150	1325	2850	2675	1200	1200

Pipe size and orientation designed to suit site pipework and class 1.

Series 500
Inside diameter 3500mm, outside diameter 3650mm.

Series 600
Inside diameter 4000mm, outside diameter 4150mm.



Features

Filament wound shells are lightweight but have great strength and durability.

Life expectancy in excess of fifty years.

Smooth, high gloss, corrosion resistant, resin-rich internal surface.

External 'flow coat' water penetration barrier.

25 year warranty.

Stainless steel coalescer units (class 1 separators) with durable high volume reticulated foam inserts for long life and long term efficiency.

SPEL automatic alarm/monitoring system

This is to indicate when separator requires emptying or SPEL Tankstor® with Econoskim®. See section 3.

Optional extras

SPEL coalescer unit guide rail system. See 3.7.

SPEL coalescer unit lifting/locating/locking system with lifting chains. See 3.7.

SPEL Econoskim® light liquid skimming and separator containment system. Manual or automatic systems which save conventional emptying costs by 90%. Section 7.

SPEL pollution monitoring and containment systems. Section 8.

SPEL mechanical anchoring systems. See 13.11/13.12.

GRP non slip ladder/s with stainless steel fixings.

Regulation/specification compliance as appropriate

European Standard

Compliant to BS EN 858-1 and the Construction Products Regulations.

Underground tanks of glass reinforced plastics (GRP) BS EN 976-1 : 1997.

British Standard

Specification for design and construction of vessels and tanks in reinforced plastics BS EN 13121.

Materials to BS 3532, BS 3691 and or BS 2782 or equivalent standards.

4.5 SPEL Stormceptor® Class 1 By-Pass Separator

Brief installation instructions – for details refer to Section 13: SPEL Underground Tanks

Handling

Tanks should be lifted using slings not chains or wire ropes. DO NOT drag tanks along the ground for any distance and avoid jarring or bumps. DO NOT lift with water in the tank. See 13.2.

Installation guidance notes

Installation should be carried out by a competent contractor in accordance with the following procedures, Health & Safety at Work legislation and good building practice. For detailed instructions see section 13 or installation instructions supplied with every tank.

Tank dimensions

Dimensions given on the drawings and literature are subject to manufacturing tolerances and should be checked physically prior to installation. This applies to overall length, connection positions, their size and invert dimensions. Also check the correct way the tank shall be installed and alignment with site drainage.

1. Determine the size of the excavation allowing for the drain invert depth and a concrete surround. Allowance should be made for consolidating concrete under the unit when backfilling.

2. Pour concrete base to correct depth and level off.

3. When the concrete has set sufficiently, place the tank in position, check for levels (including inlet/outlet inverts) and fill with water to a maximum depth of: 200 series – 200mm, 300 series – 300mm, 400 series – 400mm. Ensure concrete slab is clean ready for placing concrete surround. Surround should preferably be placed within 48 hours of casting the base slab.

4. Place backfill concrete (ST4 mix) up to the depth of the water in the tank ensuring the concrete is properly consolidated under the tank to prevent voids. Consolidate by hand – do not use vibrating pokers. Connect up pipework.

5. Continue backfilling with concrete and at the same time filling the tank with water to equalise pressure and resist floatation. Where the tank is divided into chambers ensure all chambers are filled equally.

6. Extension access shafts are available in 500mm increments with socket joints or if required, flanged joints with neoprene gaskets.
Prior to surrounding in concrete if required, ensure rectangular access shafts are shuttered internally to support the sides and prevent distortion. This is especially important when guide rails are installed for pumps or coalescer units.
With a high water table ensure all joints are double sealed to prevent ingress of water.

7. Top up the tank with water to inlet/outlet invert level and place remainder of concrete to a depth of approximately 200-250mm above the top of the tank. Where extension access shaft is fitted, this can be surrounded in concrete once the main tank concrete surround has set. (See Extension access shafts 13.1).

8. Where the concrete slab over the tank is to take vehicle loading it should be reinforced in accordance with good practice to take the maximum load and should be extended onto unexcavated ground. It is important that vehicle loading is not transferred to the tank shell or its concrete surround.

9. Incorporate inspection cover and frame.

Venting

SPEL Separators are governed by the requirements of petroleum regulations: Petrol filling stations: Construction and Operation HS(G)41, ISBN 0-11885449-6. These state in paragraph 45, that each chamber of a petrol interceptor should be vented and vent pipes should extend to not less than 2.4m above ground level, should not be less than 75mm diameter and of a robust construction, and should be manifolded above ground.

SPEL automatic alarm/monitoring system

The SPEL automatic alarm/monitoring system shall be fitted for continuous monitoring of the separator contents by sensing when the light liquid within the separator has filled to a predetermined level (with design safety margins), and provides a simple audio-visual warning to alert the operator that the separator needs to be emptied. The system is very easy to install and comprises two parts: a compact control unit and a probe unit. It is self-contained and requires only a normal 240v AC electrical supply. The control incorporates a ATEX approved intrinsically safe circuit, which enables the probe unit to be used in Zone Zero Environments. See section 3.

Maintenance

The SPEL Separators have good access for periodic emptying of retained light liquids and sludge which is essential to maintain the units optimum performance. Periods between emptying will have to be determined depending on site conditions but normally at least twice a year. For further details see Section 3.

Note: The above must be read in conjunction with the Installation Instructions in Section 13.

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RAF Brize Norton

CASE STUDY

Project: **RAF Brize Norton**

Contractor: **Tamdown Group Ltd**

Products:
SPEL Stormceptor® Class 1 By-pass Separators:
1 No. 460C1/SC
1 No. 325C1/SC
1 No. 6400C1/SC

Puraceptor® Class 1 Full Retention Separator:
1 No. P050/1CSC

A C17 aircraft taxies past one of the new Voyager aircraft with its hangars under construction.

RAF Brize Norton in Oxfordshire is the largest station in the RAF and is home to the Strategic and Tactical Air Transport Force as well as the Air to Air Refuelling Squadron.

This Air Base is extremely busy, being the air hub for all British troops and equipment moving to and from the various areas of conflict and training around the globe. It has undergone a major expansion program in recent years to accommodate the consolidation of this vital role from a number of other bases, with a number of new facilities being built to house the introduction of 3 new aircraft types. The Boeing C17 Globemaster is the RAFs big lifter being able to swallow a Chinook helicopter but it can also be configured for troop transport or Medivac. The Airbus A300 Voyager has two key roles, firstly as a liner style troop transport and also as a tanker providing in flight fuel to other aircraft. The newest is the Airbus A400 Atlas, the first of which arrived in November 2014, this aircraft will progressively replace the Lockeed C130 Hercules by 2022 in the equipment, paratrooper and humanitarian support role.

New hangars and service facilities for these aircraft have been built at RAF Brize Norton with SPEL Products Separators being installed to ensure the best quality pollution control is an integral part of the drainage network for the huge structures and surrounding parking areas.

RAF Marham

CASE STUDY

Project: **Taxiway drainage**

Contractor: **GallifordTry/Lagan**

Products:
SPEL Stormceptor® Class 1 By-pass Separators:
8no 215's C1/SC
1no 206 C1/SC
1no 204 C1/SC
1no 208. C1/SC

SPEL Puraceptor® Class 1 Full Retention Separator:
P400 1CSC (treating 400l/sec)

RAF Marham is a Royal Air Force station and military airbase near the village of Marham in the county of Norfolk, East Anglia. It is home to No. 138 Expeditionary Air Wing and, as such, is one of the RAF's Main Operating Bases. It was home to the frontline squadrons of the RAF's Tornado Force, ready for operations across the globe. Tornados from RAF Marham have been involved in operations in the Middle East for over 25 years and are supporting the fight against Daesh in the skies over Iraq and Syria.

Extensive infrastructure changes are being completed across the base with the arrival of the F-35 Lightning last year. The F-35 Lightning is a 5th Generation, multi-role, stealth fighter. The squadron is the famous No. 617.

617 Squadron
This squadron is undoubtedly the most famous RAF squadron of the Second World War, earning that fame on its first operational sortie, the famous dams raid of 16/17 May 1943. The squadron was formed on 21 March 1943 as an 'elite within a elite' with selected crews. Its original purpose was to use Barnes Wallis's 'bouncing bomb' in a raid on several Ruhr dams. The hope was that the destruction of these dams and the resulting loss of water would have a devastating impact on German industrial potential.

Barnes Wallis, a British engineer, began working on plans for a bomb that could skip across water. He developed the idea by experimenting with bouncing marbles across a water tub in his back garden. Wallis thought the new weapon could be used to attack moored battleships, but research soon focused on using it against the dams that were vital to German industry. This research and development steadily progressed, albeit with failures and successes, to be proven sufficiently to be considered viable.

617 Squadron was formed on 21 March 1943 and Wing Command Guy Gibson, already a very experienced bomber pilot, was chosen to lead it. The crews were amongst the best in Bomber Command. The operation required then to train in low level flight and navigation and to perfect the demanding run-ins, different for each dam.

From 9.28pm on 16 May, 133 aircrew in 19 Lancasters took off in three waves to bomb the dams. Gibson was flying in the first wave and his aircraft was first to attack the Möhne (pictured here) at 12.28am, but five aircraft had to drop their bombs before it was breached.
The remaining aircraft still to drop their bombs then attacked the Eder, which finally collapsed at 1.52am.
Meanwhile, aircraft from the two other waves bombed the Sorpe but it remained intact.
The mission proved a costly success. Eight of the nineteen aircraft were lost, and only three of their crew survived.

Continued overleaf

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RAF Marham

CASE STUDY

The breaching of the Möhne caused short and medium term disruption and water rationing that lasted into the following winter. The Sorpe Dam, which was of a different type, wasn't breached, and it provided just enough water to prevent a major disaster for German production.

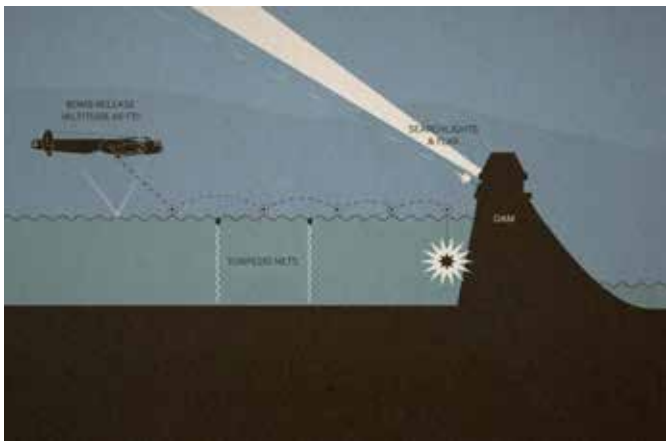
The 'dambusters' went on to become a highly accurate precision bombing squadron, reserved for special targets – either small scale, difficult to hit or that required the use of Barnes Wallis's other special bombs of the Second World War, the Tallboy and Grand Slam.

The squadron was involved in the destruction of the German battleship Tirpitz. In September 1944 she was moored in Altenfjord but out of range from the UK. In an attempt to solve this problem number 9 and 617 Squadrons flew to Yagodnik, near Archangel. The attack (Operation Paravane) was made on 15 September but the German smoke screens prevented most of the aircraft from hitting their target. One Tallboy did hit home, causing significant damage. The Tirpitz was repaired and in a fatal error moved to Tromso to be repaired.

This brought her into range of home based bombers but clouds foiled a first attack on 29 October. However on 12 November Nos.9 and 617 Squadrons got their chance. The smoke screen didn't deploy in time and the Tirpitz was hit by three Tallboys. This time the damage proved fatal and the Tirpitz capsized.

During the first two years of existence No.617 Squadron took part in 100 bombing raids, flying 1,478 Lancaster sorties. During these raids a total of 32 aircraft were lost. However this loss was not dissimilar to the loss rates in normal squadrons except thirteen of 617 Squadron's loses were concentrated in two raids (the dams and the Dortmund-Ems Canal raids). In the remaining ninety eight raids their loss rate was only 1.3%, at the lower end for a Lancaster squadron.

The three main targets, the Möhne, Eder and Sorpe dams. The Möhne dam was a curved 'gravity' dam and was 40m high and 650m long. There were tree-covered hills around the reservoir, but any attacking aircraft would be exposed on the immediate approach. The Eder dam was of similar construction but was an even more challenging target. Its winding reservoir was bordered by steep hills. The only way to approach would be from the north. The Sorpe was a different type of dam and had a watertight concrete core 10m wide. At each end of its reservoir the land rose steeply, and there was also a church spire in the path of the attacking aircraft.



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SECTION

5

SPEL Puraceptor® Full Retention Class 1 Separators

Single and Two Chamber Models

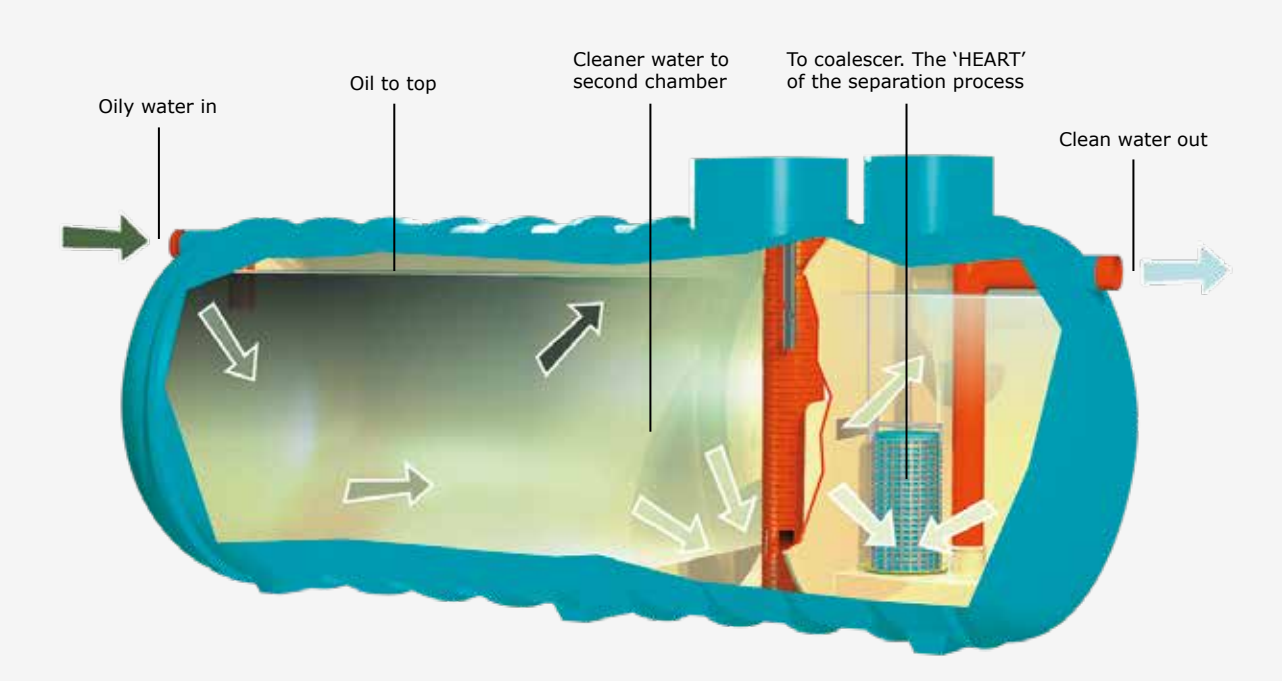
Airports & Airfields

Distribution Centres

National Grid - Sub Sections

Docks

Separator type & class



Introduction and operation

The SPEL Puraceptor® models are designed for high performance and long service life between maintenance periods.

The Puraceptor® is available in two versions, single or two chamber, dependent upon the site application and requirements.

An automatic closure device (ACD) is fitted to close off the separator when the contained oil exceeds the maximum oil storage volume.

Why all SPEL class 1 separators perform best - even on heavily polluted sites

The 'HEART' of the separation process is the robust and highly efficient coalescer unit or units. These strong stainless steel units incorporate robust high volume reticulated foam inserts. The inserts efficiently coalesce the finer globules of hydrocarbons for gravity separation and due to their large volume, last for long periods before requiring cleaning. Cleaning is then a simple operation using normal pressure water.

Performance

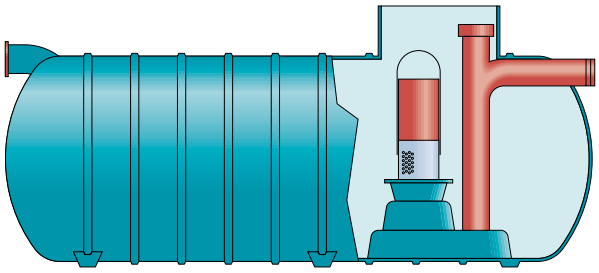
SPEL Puraceptors® have been tested in accordance with the European Standard BS EN 858-1 and the results were substantially within the maximum hydrocarbon concentration in the outlet of 5mg/l. The average for all units tested was 1.2mg/l.

The 'heart' of the SPEL Separators is the unique long life, low maintenance coalescer unit/s

5.2 SPEL Puraceptor® Class 1 Single & Two Chamber Separators

Separator type & class

SPEL Puraceptor® class 1 single chamber separators



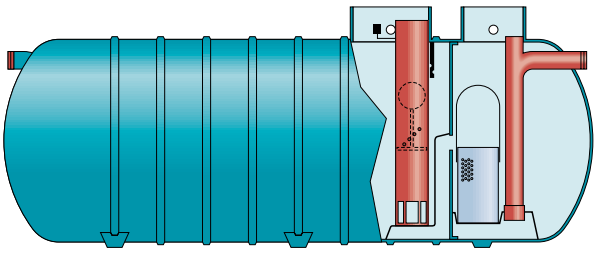
Typical applications are:

- Medium to high risk oil/fuel storage and handling areas.
- Filling stations, (SPEL Puraceptor® forecourt separator FP1CSC).
- Commercial vehicle/plant maintenance yards and heavily contaminated industrial areas.

Features

- Robust stainless steel coalescer unit with long life, high volume foam insert and lifting handle.
- Stainless steel, plastic or copper ball automatic closure device (ACD).
- Good access to all parts for desludging.
- Sampling point incorporated into outlet.
- One access shaft for desludging and servicing of ACD and coalescer unit.
- Sized for working capacity PLUS fuel/oil and silt containment, ensuring optimum performance between maintenance periods.
- Designed for a long life span of high performance with low maintenance.

SPEL Puraceptor® class 1 two chamber separators



The coalescer unit is mounted in the second chamber, providing a coalescence process for the separation of smaller globules of light liquid pollutants before final discharge to the surface water drain.

Being incorporated in the second chamber prevents contamination or blockage of the coalescer insert in water. It can be simply lifted out for cleaning during routine maintenance.

Typical applications are:

- High risk oil/fuel storage and handling areas.
- Filling stations, (SPEL Puraceptor® forecourt separator FP2CSC).
- Heavily contaminated industrial areas, commercial vehicle/plant maintenance yards, power/substations, fire training grounds and railway light maintenance and fuelling depots.

Features

- Robust stainless steel coalescer unit with long life, high volume foam insert and lifting handle.
- Coalescer unit/s in second chamber protected from bulk of oil and silt.
- Stainless steel, plastic or copper ball automatic closure device (ACD).
- Good access to all parts for desludging.
- Sampling point incorporated into outlet.
- Two access shafts for generous access for desludging and servicing of the ACD and coalescer unit/s.
- Sized for working capacity PLUS fuel/oil and silt containment, ensuring optimum performance between maintenance periods.
- Designed for a long life span of high performance with low maintenance.

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Full retention

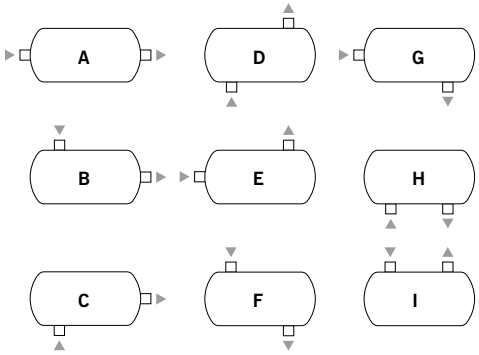
Features, specifications and models available

SPEL Puraceptor® class 1 single and two chamber separators are compliant to the European Standard BS EN 858-1 and the Construction Products Regulations.

Design and manufacture with reference to BS EN 13121/BS EN 976 and BS 8301. SPEL Puraceptor® separators are filament wound in glass reinforced polyester and have a life expectancy in excess of fifty years.

SPEL Puraceptor® separators have been designed and tested to meet the stringent European Standard BS EN 858-1 for installations for separators of light liquids where the maximum hydrocarbon concentration in the outlet does not exceed 5mg/l, suitable for discharging into a surface water drain.

One important feature of SPEL class 1 separators is the design and construction of the coalescer units. These strong stainless steel units incorporate robust high volume reticulated foam inserts. The inserts efficiently coalesce the finer globules of hydrocarbons for gravity separation and due to their large volume, last for long periods before requiring cleaning. Cleaning is then a simple operation using normal pressure water. The inserts can be reused again and again, rarely requiring replacement.



Choice of pipe connections

Orientation of inlet/outlet pipe connections.

Features

- Tank shell designed in accordance with BS4994/BS EN 976.
- Filament wound shell – the embodiment of strength and durability – yet lightweight.
- Life expectancy in excess of 50 years.
- Smooth, high gloss internal corrosion resistant surface.
- External ‘flow coat’ water penetration barrier.
- Good access to all parts for desludging.
- Coalescer unit/s incorporated into second chamber.
- Coalescer unit/s provided with lifting handle.
- Access shafts for generous access for desludging tank and servicing of ACD and coalescer units.
- Sampling point incorporated into outlet
- Robust stainless steel coalescer unit with long life foam insertion and lifting handle.
- Sized for working capacity PLUS fuel/oil and sludge containment ensuring optimum performance between maintenance periods.
- Generous sizing extends maintenance free periods and reduces desludging costs.
- Stainless steel/plastic or copper ball automatic closure device ACD).
- Designed for high performance and low maintenance over along life span.
- Dip pipe inlet for minimum turbulence and to prevent inflammable vapours passing upstream in drainage system.

5.4 SPEL Puraceptor® Class 1 Single & Two Chamber Separators

Full retention

Features, specifications and models available

Optional extras

- Chemical resistant inner lining for aviation fuels, toluene etc. (CR and HCR specification available – see 2.3).
- Extension shafts available ex. stock in standard lengths of 0.5, 1.0, 1.5 and 2.0m.
- Extension/access shafts for man access – 750 or 900 diameter available to order.
- Extension/access shafts with GRP ladder and stainless steel fixings available to order.
- Coalescer unit guide rail and lifting/locating/locking systems available for easy removal and re-insertion of coalescer units during maintenance – see 3.7.
- SPEL tripod and hoist for raising and lowering coalescer units during maintenance – see 5.5.
- SPEL Econoskim® light liquid/oil skimming and separate containment system for 400, 500 & 600 series separators – see section 7.
- Flex-Seal/Band-Seal or similar flexible couplings are available for connecting to site pipe work if required.
- Access shaft safety grating can be incorporated under the manhole cover for additional safety when carrying out an inspection.

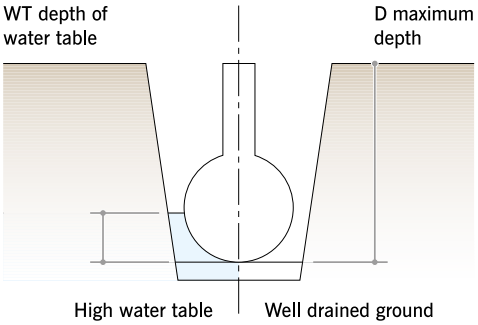
Inlet/outlet connections

160/225/300mm diameter PVCU socket/spigot.
450mm diameter GRP spigot only.

For connecting to site pipework Flex-Seal/Band- Seal or similar flexible couplings can be used.

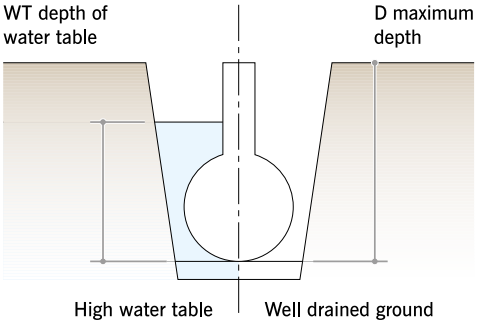
Standard Tanks

Series	WT(m)	D(m)
100/200	1.0	4.0
300	0.9	4.0
400	1.3	5.0
500	1.9	5.7
600	2.4	6.2



Heavy Tanks

Series	WT(m)	D(m)
100/200	2.0	6.0
300	2.8	5.6
400	3.5	6.0
500	4.5	7.25
600	4.7	7.3



For other specifications see section 13

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Brief installation instructions - for details refer to section 13

Handling

Tanks should be lifted using slings not chains or wire ropes. DO NOT drag tanks along the ground for any distance and avoid jarring or bumps. DO NOT lift with water in the tank. See 13.2.

Installation guidance notes

Installation should be carried out by a competent contractor in accordance with the following procedures, Health & Safety at Work legislation and good building practice. For detailed instructions see section 13 or installation instructions supplied with every tank.

Tank dimensions

Dimensions given on the drawings and literature are subject to manufacturing tolerances and should be checked physically prior to installation. This applies to overall length, connection positions, their size and invert dimensions. Also check the correct way the tank shall be installed and alignment with site drainage.

1. Determine the size of the excavation allowing for the drain invert depth and a concrete surround. Allowance should be made for consolidating concrete under the unit when backfilling.

2. Pour concrete base to correct depth and level off.

3. When the concrete has set sufficiently, place the tank in position, check for levels (including inlet/outlet inverts) and fill with water to a maximum depth of: 200 series – 200mm, 300 series – 300mm, 400 series – 400mm. Ensure concrete slab is clean ready for placing concrete surround. Surround should preferably be placed within 48 hours of casting the base slab.

4. Place backfill concrete (ST4 mix) up to the depth of the water in the tank ensuring the concrete is properly consolidated under the tank to prevent voids. Consolidate by hand – do not use vibrating pokers. Connect up pipework.

5. Continue backfilling with concrete and at the same time filling the tank with water to equalise pressure and resist floatation. Where the tank is divided into chambers ensure all chambers are filled equally.

6. Extension access shafts are available in 500mm increments with socket joints or if required, flanged joints with neoprene gaskets. Prior to surrounding in concrete if required, ensure rectangular access shafts are shuttered internally to support the sides and prevent distortion. This is especially important when guide rails are installed for pumps or coalescer units.
With a high water table ensure all joints are double sealed to prevent ingress of water.

7. Top up the tank with water to inlet/outlet invert level and place remainder of concrete to a depth of approximately 200-250mm above the top of the tank. Where extension access shaft is fitted, this can be surrounded in concrete once the main tank concrete surround has set. (See Extension access shafts).

8. Where the concrete slab over the tank is to take vehicle loading it should be reinforced in accordance with good practice to take the maximum load and should be extended onto unexcavated ground. It is important that vehicle loading is not transferred to the tank shell or its concrete surround.

9. Incorporate inspection cover and frame.

Venting

SPEL Separators are governed by the requirements of petroleum regulations: Petrol filling stations: Construction and Operation HS(G)41, ISBN 0-11885449-6. These state in paragraph 45, that each chamber of a petrol interceptor should be vented and vent pipes should extend to not less than 2.4m above ground level, should not be less than 75mm diameter and of a robust construction, and should be manifolded above ground.

SPEL automatic alarm/ monitoring system

The SPEL automatic alarm/ monitoring system shall be fitted for continuous monitoring of the separator contents by sensing when the light liquid within the separator has filled to a predetermined level (with design safety margins), and provides a simple audio-visual warning to alert the operator that the separator needs to be emptied. The system is very easy to install and comprises two parts: a compact control unit and a probe unit. It is self-contained and requires only a normal 240v AC electrical supply. The control incorporates a ATEX approved intrinsically safe circuit, which enables the probe unit to be used in Zone Zero Environments. See section 3.

Maintenance

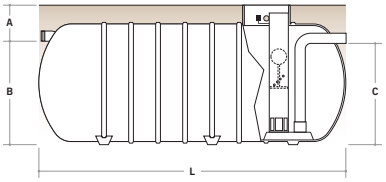
The SPEL Separators have good access for periodic emptying of retained light liquids and sludge which is essential to maintain the units optimum performance. Periods between emptying will have to be determined depending on site conditions but normally at least twice a year. For further details see section 3.

Note: The above must be read in conjunction with the Installation Instructions in section 13.

5.6 SPEL Puraceptor® Class 1 Single Chamber Separators

Full retention

Model	Nominal size (NS) Series	Flow (l/s)	Catchment area (m²)	Oil storage (litres)	Silt capacity (litres)	Overall length* (mm) L	Overall diameter (mm)	Inlet In-vert (mm) A	Base to inlet (mm) B	Base to outlet (mm) C	Max in/ out pipe diameter (mm)	Number of access shafts (dia. mm) 600	750	900	1200
P004 1C/SC	200	4	222	40	400	1,720	1,225	630	1,110	1,050	160	-	1	-	-
P006 1C/SC	200	6	333	60	600	2,310	1,225	630	1,110	1,050	160	-	1	-	-
P010 1C/SC	200	10	556	100	1,000	3,410	1,225	630	1,110	1,050	160	-	1	-	-
P015 1C/SC	300	15	833	150	1,500	3,200	1,875	350	1,800	1,740	225	-	1	-	-
P020 1C/SC	300	20	1,111	200	2,000	3,540	1,875	350	1,800	1,740	225	1	1	-	-
FP 1C/SC	300	20	1,111	200	2,000	4,290	1,875	350	1,800	1,740	225		1	-	-
P030 1C/SC	300	30	1,667	300	3,000	4,420	1,875	390	1,760	1,700	300	1	-	1	-
P040 1C/SC	300	40	2,222	400	4,000	5,760	1,875	390	1,760	1,700	300	1	-	1	-
P050 1C/SC	300	50	2,778	500	5,000	7,060	1,875	390	1,760	1,700	300	1	-	1	-
P065 1C/SC	400	65	3,611	650	6,500	4,860	2,700	425	2,625	2,525	300	1	-	2	-
P080 1C/SC	400	80	4,444	800	8,000	5,700	2,700	425	2,625	2,525	300	1	-	2	-
P100 1C/SC	400	100	5,555	1,000	10,000	7,400	2,700	475	2,575	2,475	450	1	-	2	-
P125 1C/SC	400	125	6,944	1,250	12,500	8,580	2,700	475	2,575	2,475	450	-	1	2	-
P150 1C/SC	400	150	8,333	1,500	15,000	10,180	2,700	475	2,575	2,475	450	-	1	2	-
P165 1C/SC	400	165	9,166	1,650	16,500	11,200	2,700	500	2,550	2,450	450	2	1	1	-
P200 1C/SC	400	200	11,110	2,000	20,000	13,710	2,700	660	2,390	2,290	600	2	1	1	-
P250 1C/SC	400	250	13,888	2,500	25,000	16,750	2,700	660	2,390	2,290	600	2	1	2	-
P280 1C/SC	400	280	15,555	2,800	28,000	18,800	2,700	660	2,390	2,290	600	1	2	2	-
P300 1C/SC	500	300	16,665	3,000	30,000	12,410	3,650	805	3,070	2,970	750	1	2	2	-
P400 1C/SC	500	400	22,220	4,000	40,000	15,760	3,650	805	3,070	2,970	750	2	2	2	-
P500 1C/SC	500	500	27,775	5,000	50,000	20,530	3,650	955	2,920	2,820	900	2	2	1	1
P500 1C/SC	600	500	27,775	5,000	50,000	16,040	4,150	925	3,250	3,150	900	2	2	1	1
P600 1C/SC	600	600	33,330	6,000	60,000	19,080	4,150	925	3,250	3,150	900	2	2	-	2
P700 1C/SC	600	700	38,888	7,000	70,000	21,460	4,150	925	3,250	3,150	900	3	2	3	-
P800 1C/SC	600	800	44,440	8,000	80,000	23,020	4,150	925	3,250	3,150	900	3	2	2	1
P900 1C/SC	600	900	49,846	9,000	90,000	24,658	4,150	925	3,250	3,150	900	3	2	-	3
P040 1C	300	40	2,222	400	-	4,020	1875	390	1,760	1,700	300		-	1	-
P050 1C	300	50	2,778	500	-	5,070	1,875	390	1,760	1,700	300	-	-	1	-
P065 1C	400	65	3,611	650	-	3,710	2,700	425	2,625	2,525	300		-	2	-
P080 1C	400	80	4,444	800	-	4,400	2,700	425	2,625	2,525	300	-	-	2	-
P100 1C	400	100	5,555	1,000	-	5,250	2,700	475	2,575	2,475	450		-	2	-
P125 1C	400	125	6,944	1,250	-	6,090	2,700	475	2,575	2,475	450	-	-	2	-
P150 1C	400	150	8,333	1,500	-	7,400	2,700	475	2,575	2,475	450	-		2	-
P165 1C	400	165	9,166	1,650	-	7,960	2,700	500	2,550	2,450	450	2		1	-
P200 1C	400	200	11,110	2,000	-	9,600	2,700	660	2,390	2,290	600	2	1	1	-
P250 1C	400	250	13,888	2,500	-	11,830	2,700	660	2,390	2,290	600	2		2	-
P300 1C	400	300	16,665	3,000	-	14,120	2,700	660	2,390	2,290	600	2		2	-
P400 1C	500	400	22,220	4,000	-	11,180	3,650	805	3,070	2,970	750	2	1	2	-
P500 1C	500	500	27,775	5,000	-	14,340	3,650	955	2,920	2,820	900	2	2	1	1
P500 1C	600	500	27,775	5,000	-	11,470	4,150	925	3,250	3,150	900	2	2	1	1
P600 1C	600	600	33,330	6,000	-	13,510	4,150	925	3,250	3,150	900	2	2	-	2
P700 1C	600	700	38,888	7,000	-	15,880	4,150	925	3,250	3,150	900	3	2	3	-
P1000 1C	600	1,000	55,550	10,000	-	21,407	4,150	925	3,250	3,150	900	3	2	1	3

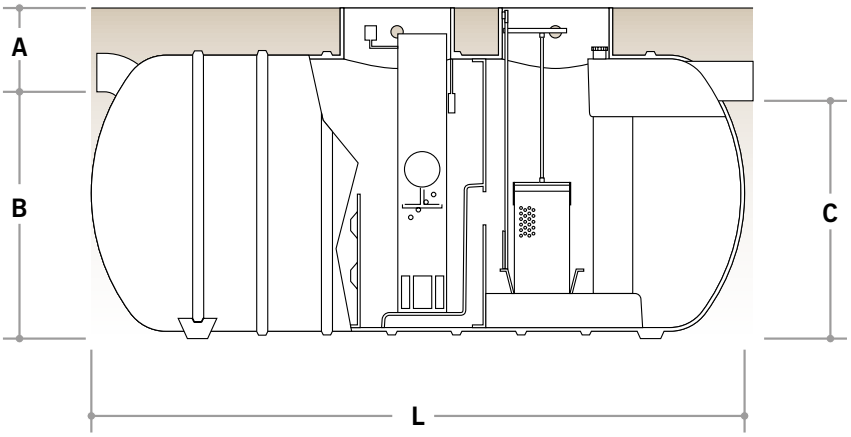


Note: Model FP1C/SC is a special forecourt unit with 7600 litre spillage holding capacity.
*Overall length subject to inlet/outlet size and orientation.

Full retention

Model	Series	Nominal size (NS) Flow (l/s)	Catchment area (m²)	Oil storage (litres)	Silt capacity (litres)	Overall length* (mm) L	Overall diameter (mm)	Inlet Invert (mm) A	Base to inlet (mm) B	Base to outlet (mm) C	Max in/ out pipe diameter (mm)	Number of access shafts (dia. mm) 450	600	750	900	1200
P006 2C/SC	200	6	333	60	600	3,050	1,225	340	1,200	1,140	160	-	1	1	-	-
P010 2C/SC	200	10	556	100	1,000	3,820	1,225	340	1,200	1,140	160	-	1	1	-	-
P015 2C/SC	300	15	833	150	1,500	4,020	1,875	350	1,800	1,740	225	-	-	2	-	-
P020 2C/SC	300	20	1,111	200	2,000	4,020	1,875	350	1,800	1,740	225	-	-	2	-	-
P025 2C/SC	300	25	1,389	250	2,500	4,290	1,875	350	1,800	1,740	225	-	-	2	-	-
P030 2C/SC	300	30	1,667	300	3,000	4,420	1,875	390	1,760	1,700	300	-	1*	2	-	-
FP 2C/SC	300	20	1,111	200	2,000	5,500	1,875	350	1,800	1,740	225	-	-	2	-	-
P035 2C/SC	300	35	1,944	350	3,500	5,070	1,875	390	1,760	1,700	300	-	1*	2	-	-
P040 2C/SC	300	40	2,222	400	4,000	5,760	1,875	390	1,760	1,700	300	-	1*	2	-	-
P050 2C/SC	300	50	2,778	500	5,000	7,060	1,875	390	1,760	1,700	300	-	1*	2	-	-
P065 2C/SC	300	65	3,611	650	6,500	9,180	1,875	390	1,760	1,700	300	1	-	2	-	-
FP15 2C/SC	400	15	833	150	1,500	7,400	2,700	425	2,625	2,525	300	-	1	2	-	-
P080 2C/SC	400	80	4,444	800	8,000	5,700	2,700	425	2,625	2,525	300	-	-	1	1	-
P100 2C/SC	400	100	5,555	1,000	10,000	7,400	2,700	475	2,575	2,475	450	-	-	1	1	-
P125 2C/SC	400	125	6,944	1,250	12,500	8,580	2,700	475	2,575	2,475	450	-	-	2	1	-
P150 2C/SC	400	150	8,333	1,500	15,000	10,180	2,700	500	2,550	2,450	450	-	-	2	1	-
P200 2C/SC	400	200	11,110	2,000	20,000	13,710	2,700	660	2,390	2,290	600	-	1	2	1	-
P250 2C/SC	400	250	13,888	2,500	25,000	16,752	2,700	660	2,390	2,290	600	-	2	1	2	-
···P300 2C/SC	500	300	16,665	3,000	30,000	12,530	3,650	675	3,200	3,100	600	-	1	2	-	1
P350 2C/SC	500	350	19,443	3,500	35,000	13,950	3,650	675	3,200	3,100	600	-	2	2	2	-
···P400 2C/SC	500	400	22,220	4,000	40,000	15,980	3,650	675	3,200	3,100	600	-	2	2	2	-
P500 2C/SC	600	500	27,775	5,000	50,000	16,260	4,150	925	3,250	3,150	900	-	2	1	1	1
P500 2C/SC	500	500	27,775	5,000	50,000	20,530	3,650	955	2,920	2,820	900	-	2	2	1	1
P600 2C/SC	600	600	33,330	6,000	60,000	19,080	4,150	925	3,250	3,150	900	-	2	2	3	-
P700 2C/SC	600	700	38,888	7,000	70,000	22,270	4,150	925	3,250	3,150	900	-	3	2	3	-
P800 2C/SC	600	800	44,440	8,000	80,000	23,020	4,150	925	3,250	3,150	900	-	3	2	2	1
P900 2C/SC	600	900	50,000	9,000	90,000	24,658	4,150	925	3,250	3,150	900	-	3	2	1	2

Note: Model FP2C/SC is a special forecourt unit with 7600 litre spillage holding capacity.
*Optional for ease of silt removal. **Overall length subject to inlet/outlet and orientation. ***500 or 600 series available – designed to suit specific requirements.

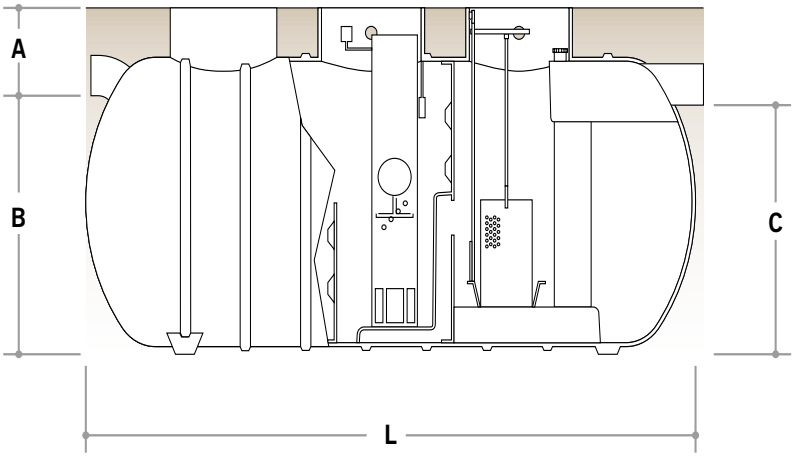


5.8 SPEL Class 1 Two Chamber Separators

Full retention NGC type registered

Model	Series	Nominal size (NS) Flow (l/s)	Catchment area (m²)	Oil storage (litres)	Silt capacity (litres)	Overall length* (mm) L	Overall diameter (mm)	Inlet Invert (mm) A	Base to inlet (mm) B	Base to outlet (mm) C	Max in/ out pipe diameter (mm)	Number of access shafts (dia. mm) 450	750	900	1200
P006 2C/SC/NG	200	6	333	60	600	3,050	1225	427	1,110	1,050	160	-	1	1	-
P010 2C/SC/NG	200	10	556	100	1,000	4,700	1225	427	1,110	1,050	160	-	3	-	-
P015 2C/SC/NG	300	15	833	150	1,500	4,020	1875	540	1,610	1,550	225	-	3	-	-
P020 2C/SC/NG	300	20	1111	200	2,000	4,020	1875	540	1,610	1,550	225	-	3	-	-
P025 2C/SC/NG	300	25	1389	250	2,500	4,290	1875	540	1,610	1,550	225	-	3	-	-
P030 2C/SC/NG	300	30	1667	300	3,000	5,070	1875	550	1,600	1,500	300	-	2	1	-
P040 2C/SC/NG	300	40	2222	400	4,000	6,570	1875	550	1,600	1,500	300	-	2	1	-
P050 2C/SC/NG	300	50	2778	500	5,000	8,260	1875	550	1,600	1,500	300	-	2	1	-
P065 2C/SC/NG	300	65	3611	650	6,500	10,220	1875	550	1,600	1,500	300	1	2	1	-
P065 2C/SC/NG	400	65	3611	650	6,500	5,470	2700	665	2,385	2,285	300	1	1	1	-
P080 2C/SC/NG	400	80	4444	800	8,000	6,170	2700	665	2,385	2,285	300	1	1	1	-
P100 1C/SC/NG	400	100	5555	1000	10,000	7400	2700	665	2385	2285	450	1	1	1	-
P125 2C/SC/NG	400	125	6944	1250	12,500	9,600	2700	765	2,285	2,185	450	1	2	-	1
P150 2C/SC/NG	400	150	8333	1500	15,000	11,200	2700	790	2,280	2,180	450	1	2	-	1
P200 2C/SC/NG	400	200	11110	2000	20,000	16,400	2700	940	2,130	2,030	600	2	2	-	1
P300 2C/SC/NG	500	300	16665	3000	30,000	12,530	3650	875	3,000	2,900	600	2	2	-	1
P400 2C/SC/NG	500	400	22220	4000	40,000	16,330	3650	875	3,000	2,900	600	3	2	2	-

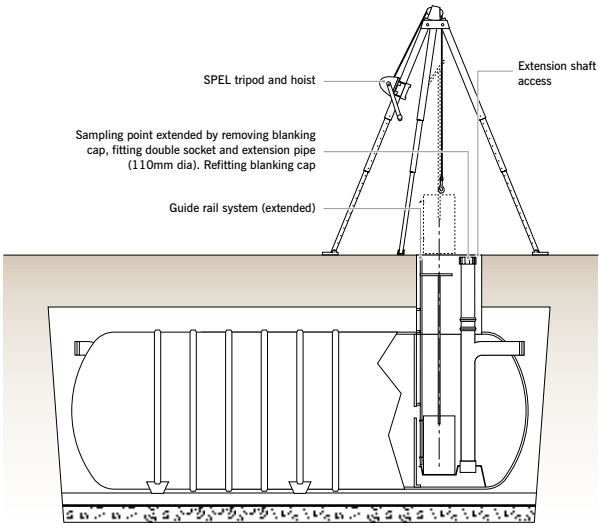
*A minimum oil storage volume of 4000 litres is provided for in all models except P006 and P010 which have 60 and 100 litres of oil capacity respectively.



SPEL tripod and hoist

Where surface water run-off has a high silt content the coalescer units can become filled, making them heavy to lift out. In order to facilitate easy withdrawal of coalescer units the SPEL tripod & hoist is recommended.

Note: The SPEL tripod and hoist can be used for servicing pumps in SPEL package pumping stations. For further details see SPEL Data Manual section 9.



 T. +44 (0)1743 445200 F. +44 (0)1743 465442 E. info@spelproducts.co.uk

Dover Western Docks Revival

CASE STUDY

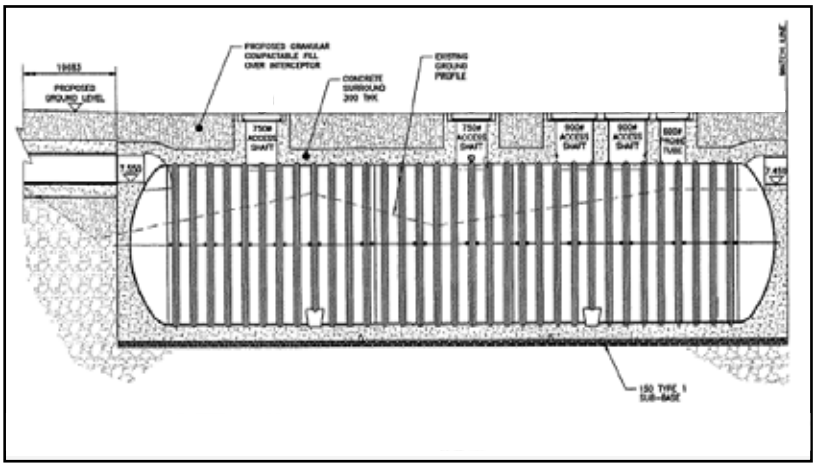
Project: **Revamping and upgrading the Port of Dover**

Client: **Port of Dover**

Contractor: **VolkerFitzpatrick**

Products:
SPEL Puraceptor® Class 1 Full Retention Separators:
2 No. P500/1CSC
2 No. P800/1CSC
1 No. P400/1CSC

The Port of Dover is one of the busiest ports in the world and the Dover Harbour Board is investing overall of £250m in a huge upgrade and redevelopment of the former hovercraft terminal. The project includes two deep water berths, an extension to the existing Prince of Wales pier, a new marina and pier with channel and lock, as well as berthing facilities and cold storage warehousing.



Logistics Centre - Rugby Gateway

CASE STUDY

Project: **Logistic centre**

Client: **Prologis**

Contractor: **Winvic Construction Ltd**

Products:
SPEL Puraceptor® Class 1 P800/1CSC

Rugby Gateway is located at the heart of the Logistics 'Golden Triangle'. It is immediately adjacent to junction 1 of the M6 motorway and in a very strategic position for logistic operators.

Prologis have taken advantage of this location to build an advanced facility to operate from and SPEL have provided the essential fuel/oil separator to cater for the large area of hard standing and protect the main outfall from pollution.

The Puraceptor® Class 1 full retention Separator treats 800 litres/second and meets the European Standard discharge quality.

 T. +44 (0)1743 445200 F. +44 (0)1743 465442 E. info@spelproducts.co.uk

RAF Coningsby

CASE STUDY

Client: **Ministry of Defence**

Contractor: **S&B Utilities**

Products:
1 No. SPEL Forecourt Separator FP15/2CSC

Previous models supplied:
SPEL Puraceptor® P400/1CSC & P200/1CSC in 2011
SPEL Full Retention Class 1 FR400 in 1996

RAF Coningsby in Lincolnshire was built before the Second World War as a station for Bomber Command and hosted the world-famous 'Dambusters' of 617 Squadron. (See case study RAF Marham) It is now one of two RAF Quick Reaction Alert (QRA) Stations which protect UK airspace (RAF Lossiemouth is the other). It is home to two front line, combat ready Typhoon squadrons.

SPEL Products have supplied RAF Coningsby with SPEL Puraceptors® Separators over many years and SPEL Products conducted a survey in May 2015 to inspect these for operation and advice given as to the needs for servicing.

Immingham New Container Port

CASE STUDY

Contractor: **Britcon**

Products:
SPEL Puraceptor® Class 1 Full Retention Separator P800/1CSC

Previous models supplied:
SPEL Puraceptor® P400/1CSC & P200/1CSC
SPEL Full Retention Class 1 FR400

Night time delivery success as busy port receives one of the largest SPEL Class 1 full retention Separator that meets the European Standard BS EN 858

At 8pm on Thursday 21st September 2017, CRO Ports at North Killingholme, Immingham in South Humberside, closed its busy road to receive the SPEL P800/1CSC Puraceptor® Class 1 full retention separator - 4.15m in diameter and 25m long (approximately 300,000 litres) and was delivered as an abnormally wide load on low-bed rear steerable trailer and unit accompanied by a private escort vehicle. This huge separator will provide unrivalled protection from hydrocarbon pollution for the demanding environmental requirements for this port.

Up to 4.4 hectares of hard-standing area with a rainfall of 65mm per hour of rainfall can be treated to meet less than 5mg/litre of hydrocarbons in the outlet under the standard test conditions of the European Standard. Britcon UK Ltd purchased this impressive separator via Keyline builder's merchants in Lincoln and were pleased to be able to install the SPEL tank in challenging ground conditions. The separator invert as installed is 5.3m deep and is surrounded in pea gravel, solidly held to a concrete base slab with 21 of SPEL's mechanical anchor strap sets. The supplied 'heavy specification' product has a superior light weight yet immensely strong shell, chop hoop filament wound by 'state of the art' process, and is suitable for long term ground-water exposure up to 1m from paving level even when the tank is empty.

Despite the darkness, the 10 tonne tank was delivered, prepared, and lifted into the giant excavation in just 2 hours. This speedy turnaround meant the busy port could be back to business quickly and with a future level of protection from oil/fuel pollution that will provide peace of mind with an expected life of over 50 years.

T. +44 (0)1743 445200 F. +44 (0)1743 465442 E. info@spelproducts.co.uk

SECTION

6

SPEL Full Retention Class 2 Separators
SPEL Vehicle Wash Silt Traps
SPEL Grease Separators

6.1 SPEL Full Retention Class 2 Separators

Features, specifications and models available

SPEL full retention class 2 separators are designed to meet the European Standard BS EN 858.

Design and manufacture with reference to BS EN 13121/BS EN 976 and BS 8301. SPEL full retention separators are filament wound in glass reinforced polyester and have a life expectancy in excess of fifty years.

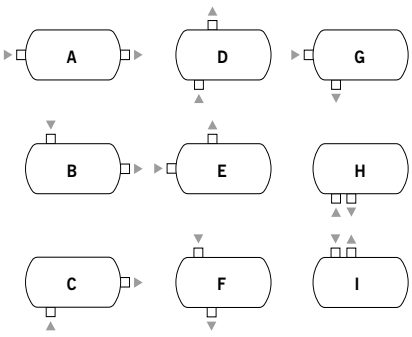
SPEL full retention separators are single chamber units that treat the flow generated by a rainfall of 65mm per hour and are designed to achieve a concentration of less than 100mg/l oil under standard test conditions. They are for dealing with discharges where a lower quality requirement applies, for example, where the effluent passes to a foul sewer.

Features of all SPEL Separators

- Tank shell designed in accordance with BS4994/BS EN 976.
- Filament wound shell – the embodiment of strength and durability – yet lightweight.
- Life expectancy in excess of 50 years.
- Smooth, high gloss internal corrosion resistant surface.
- External 'flow coat' water penetration barrier.
- Dip pipe inlet for minimum turbulence and to prevent inflammable vapours passing upstream in drainage system.
- Nine different inlet/outlet orientations to suit site drainage layout.
- Automatic closure device (ACD).

Inlet/outlet connections

- 160/225/300mm diameter PVCU socket/spigot.
- 400/450mm diameter GRP spigot only. For connecting to site pipework Flex-Seal/Band-Seal or similar flexible couplings can be used.



Typical sites

- Oil/fuel and handling areas.
- Industrial yards.
- Vehicle maintenance and wash down areas.
- Garage forecourts – SPEL forecourt separator FS2.

Optional extras

- Chemical resistant inner lining for aviation fuels, toluene etc. (CR and HCR specification available), See 2.3.
- Extension shafts available ex stock in standard lengths of 0.5, 1.0, 1.5 and 2.0m lengths.
- Extension/access shafts for man access – 750 or 900 diameter available to order.
- Extension/access shafts with GRP ladder and stainless steel fixings available to order.
- SPEL Econoskim® light liquid/ oil skimming and separate containment system for 400, 500 and 600 Series separators. See section 7.
- Flex-Seal/Band-Seal or similar flexible couplings are available for connecting to site pipe work if required.
- Access shaft safety grating can be incorporated under the manhole cover for additional safety when carrying out an inspection.

Choice of pipe connections

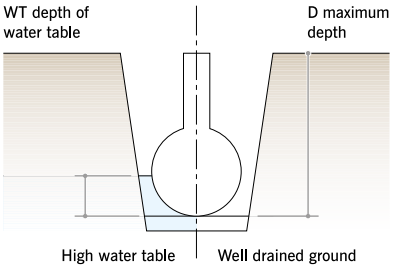
Orientation of the inlet/outlet pipe connections

Specification

Standard, heavy, extra heavy or special specification available dependent upon tank burial depth and water table level in winter. The tables below refer to tanks with a concrete surround. For extra heavy and special specification range and pea gravel surround refer to section 13 or contact technical sales.

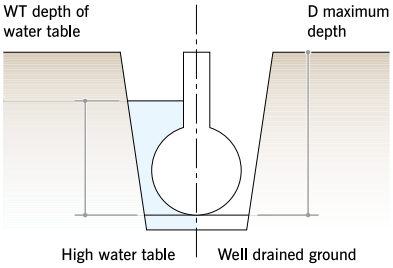
Standard tanks

Series	WT(m)	D(m)
100/200	1.0	4.0
300	0.9	4.0
400	1.3	5.0
500	1.9	5.7
600	2.4	6.2



Heavy tanks

Series	WT(m)	D(m)
100/200	2.0	6.0
300	2.8	5.6
400	3.5	6.0
500	4.5	7.25
600	4.7	7.3



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Handling

Tanks should be lifted using slings not chains or wire ropes. DO NOT drag tanks along the ground for any distance and avoid jarring or bumps. DO NOT lift with water in the tank. See 13.2.

Installation guidance notes

Installation should be carried out by a competent contractor in accordance with the following procedures, Health & Safety at Work legislation and good building practice.

For detailed instructions see section 13 or installation instructions supplied with every tank.

Tank dimensions

Dimensions given on the drawings and literature are subject to manufacturing tolerances and should be checked physically prior to installation. This applies to overall length, connection positions, their size and invert dimensions. Also check the correct way the tank shall be installed and alignment with site drainage.

1. Determine the size of the excavation allowing for the drain invert depth and a concrete surround. Allowance should be made for consolidating concrete under the unit when backfilling.

2. Pour concrete base to correct depth and level off.

3. When the concrete has set sufficiently, place the tank in position, check for levels (including inlet/outlet inverts) and fill with water to a maximum depth of: 200 series – 200mm, 300 series – 300mm, 400 series – 400mm. Ensure concrete slab is clean ready for placing concrete surround. Surround should preferably be placed within 48 hours of casting the base slab.

4. Place backfill concrete (ST4 mix) up to the depth of the water in the tank ensuring the concrete is properly consolidated under the tank to prevent voids. Consolidate by hand – do not use vibrating pokers. Connect up pipework.

5. Continue backfilling with concrete and at the same time filling the tank with water to equalise pressure and resist floatation. Where the tank is divided into chambers ensure all chambers are filled equally.

6. Extension access shafts are available in 500mm increments with socket joints or if required, flanged joints with neoprene gaskets.

Prior to surrounding in concrete if required, ensure rectangular access shafts are shuttered internally to support the sides and prevent distortion.

This is especially important when guide rails are installed for pumps or coalescer units.

With a high water table ensure all joints are double sealed to prevent ingress of water.

7. Top up the tank with water to inlet/outlet invert level and place remainder of concrete to a depth of approximately 200-250mm above the top of the tank. Where extension access shaft is fitted, this can be surrounded in concrete once the main tank concrete surround has set. (See Extension access shafts).

8. Where the concrete slab over the tank is to take vehicle loading it should be reinforced in accordance with good practice to take the maximum load and should be extended onto unexcavated ground. It is important that vehicle loading is not transferred to the tank shell or its concrete surround.

9. Incorporate inspection cover and frame.

Venting

SPEL Separators are governed by the requirements of petroleum regulations: Petrol filling stations: Construction and Operation HS(G)41, ISBN 0-11885449-6. These state in paragraph 45, that each chamber of a petrol interceptor should be vented and vent pipes should extend to not less than 2.4m above ground level, should not be less than 75mm diameter and of a robust construction, and should be manifolded above ground.

SPEL automatic alarm/monitoring system

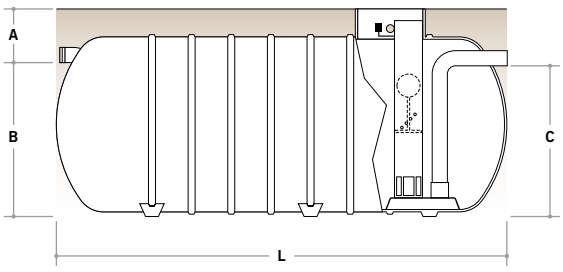
The SPEL automatic alarm/monitoring system shall be fitted for continuous monitoring of the separator contents by sensing when the light liquid within the separator has filled to a predetermined level (with design safety margins), and provides a simple audio-visual warning to alert the operator that the separator needs to be emptied. The system is very easy to install and comprises two parts: a compact control unit and a probe unit. It is self-contained and requires only a normal 240v AC electrical supply. The control incorporates a ATEX approved intrinsically safe circuit, which enables the probe unit to be used in Zone Zero Environments. See section 7.

Maintenance

The SPEL Separators have good access for periodic emptying of retained light liquids and sludge which is essential to maintain the units optimum performance. Periods between emptying will have to be determined depending on site conditions but normally at least twice a year. For further details see section 3.

6.3 SPEL Class 2 Single Chamber Separators Full Retention

Model	Series	Nominal size (NS) Flow (l/s)	Catchment area (m²)	Oil storage (litres)	Silt capacity (litres)	Overall length* (mm) L	Overall diameter (mm)	Inlet Invert (mm) A	Base to inlet (mm) B	Base to outlet (mm) C	Max in/ out pipe diameter (mm)	Number of access shafts (dia. mm) 450	600	750
FR004 SC	200	4	222	40	400	1,720	1225	630	1,110	1,050	160		1	
FR006 SC	200	6	333	60	600	2,270	1225	630	1,110	1,050	160		1	
FR010 SC	200	10	556	100	1,000	3,410	1225	630	1,110	1,050	160		1	
FR015 SC	300	15	833	150	1,500	2,760	1875	350	1,800	1,740	225			1
FR020 SC	300	20	1111	200	2,000	3,200	1875	350	1,800	1,740	225			1
FS2 SC	300	20	1111	200	2,000	4,290	1875	350	1,800	1,740	225			1
FR030 SC	300	30	1667	300	3,000	4,420	1875	390	1,760	1,700	300			1
FR040 SC	300	40	2222	400	4,000	5,760	1875	390	1,760	1,700	300			1
FR050 SC	300	50	2778	500	5,000	7,060	1875	390	1,760	1,700	300			1
FR065 SC	400	65	3611	650	6,500	4,810	2700	425	2,625	2,525	300	1	1	
FR080 SC	400	80	4444	800	8,000	5,700	2700	425	2,625	2,525	300	1	1	
FR100 SC	400	100	5555	1000	10,000	7,400	2700	475	2,575	2,475	450	1	1	
FR125 SC	400	125	6944	1250	12,500	8,580	2700	475	2,575	2,475	450	1	1	
FR150 SC	400	150	8333	1500	15,000	10,180	2700	475	2,575	2,475	450	1	1	
FR165 SC	400	165	9166	1650	16,500	11,200	2700	500	2,550	2,450	450		2	
FR200 SC	400	200	11110	2000	20,000	13,710	2700	660	2,390	2,290	600		2	
FR250 SC	400	250	13888	2500	25,000	16,750	2700	660	2,390	2,290	600		2	
FR040	300	40	2222	400		4,020	1875	390	1,760	1,700	300			1
FR050	300	50	2778	500		5,070	1875	390	1,760	1,700	300			1
FR065	400	65	3611	650		3,710	2700	425	2,625	2,525	300	1	1	
FR080	400	80	4444	800		4,400	2700	425	2,625	2,525	300	1	1	
FR100	400	100	5555	1000		5,250	2700	475	2,575	2,475	450	1	1	
FR125	400	125	6944	1250		6,090	2700	475	2,575	2,475	450	1	1	
FRI50	400	150	8333	1500		7,400	2700	475	2,575	2,475	450	1	1	
FR165	400	165	9166	1650		7,960	2700	500	2,550	2,450	450		2	
FR200	400	200	11110	2000		9,600	2700	660	2,390	2,290	600		2	
FR250	400	250	13888	2500		11,830	2700	660	2,390	2,290	600		2	
FR300	400	300	16665	3000		14,120	2700	660	2,390	2,290	600		2	
FR400	500	400	222222	4000	optional	*	3650					-	3	-
FR500	500	500	27777	5000	optional	*	3650					-	1	3
	600						4150							
FR600	500	600	333333	6000	optional	*	3650					-	-	4
	600						4150							
FR700	600	700	38888	7000	optional	*	4150					-	-	4
FR800	600	800	44444	8000	-	*	4150					-	-	4
FR1000	600	1000	55555	10000	-	*	4150					-	-	5



Note: Model FS2SC is a special forecourt unit with 7600 litre spillage holding capacity.

*Overall length subject to inlet/outlet size and orientation

Vehicle wash installations, especially with underbody washing facilities send large volumes of dirt and grit down the drainage system causing blockages.

SPEL vehicle wash silt trap ST800/5 and ST800/12

Whichever type of vehicle washing installation, the SPEL vehicle wash silt trap is essential to solve this problem. Dirty water flows directly into the VW silt trap where the sludge and grit settle out prior to the water passing through the high level outlet to the drainage system.

Moulded in glass reinforced plastic (GRP) it is easy to handle, robust and corrosion proof. The heavy duty, hot dipped galvanised gratings comply with slow moving wheel load bearing requirements of FACTA Class B gratings available in 5 or 12 tonnes.

Large volume to contain sludge and grit.
Prevents blockage of drains.
Simple and quick to install.
Heavy duty galvanised hinged grating.

For ease of access and to empty the VW silt trap the grating is hinged and held open with an integral stay. Sludge can then be removed manually or by tanker.

Off-loading/handling

The contractor is responsible for off-loading. The tank must be handled with care to prevent accidental damage from impact or contact with sharp objects. Use web slings NOT chains for lifting. Do not lift with water in it.

Storage

Set tank on smooth ground free of bricks and sharp objects.

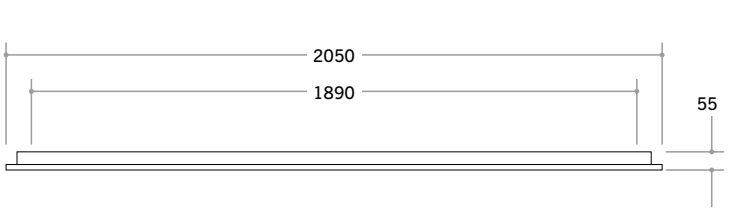
Installation

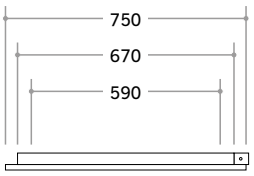
The SPEL VW silt traps are designed to be installed where the grating is at ground level.

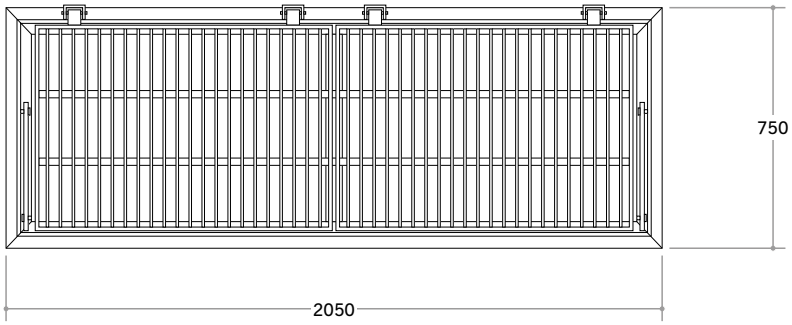
The installation procedure is as follows:

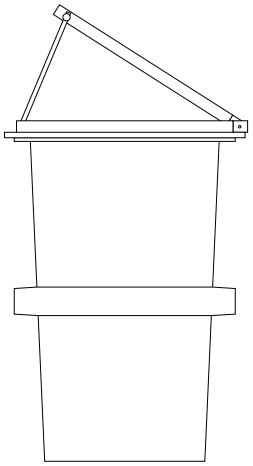
1. Excavate allowing for a minimum thickness of concrete around the tank of 150mm.
2. Ensure the base of the excavation is stable ground or excavate to allow for 200mm of hardcore and cover with a polythene membrane prior to placing concrete.
3. Ensure the excavation is dry or dig a well in the corner of the excavation and pump water away.
4. Pour the concrete base slab, level off and allow to set.
5. Insert the tank, check inlet/outlet levels and position the grating onto the top flange.
6. Fill the tank with water to the outlet.
7. Backfill with concrete to half the height (500mm) and consolidate by hand. Do not use vibrating pokers. Allow to set.
8. Complete the backfilling with concrete up to the underside of the top tank flange. IMPORTANT – Ensure the flange is completely supported so that vehicle loadings are transferred from the grating through to the concrete surround.

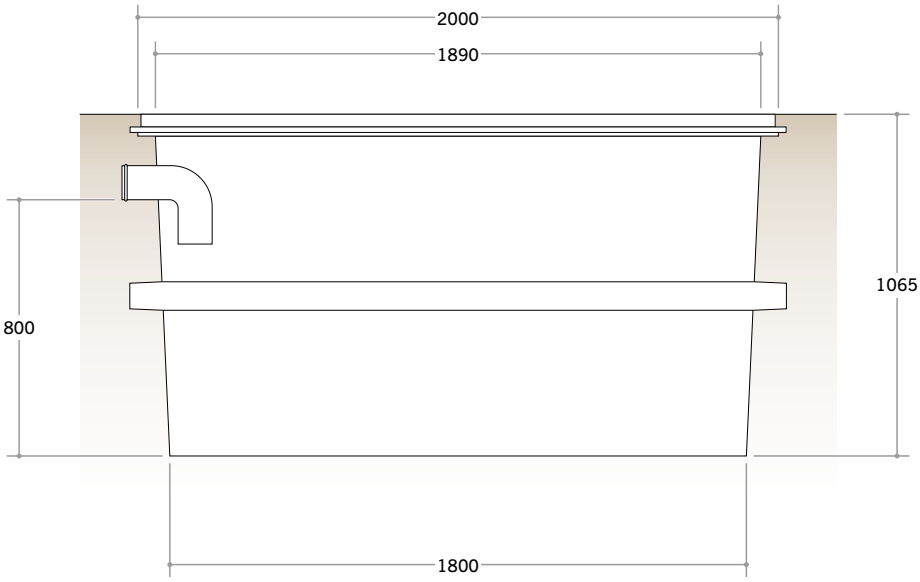
6.5 SPEL Vehicle Wash Silt Traps

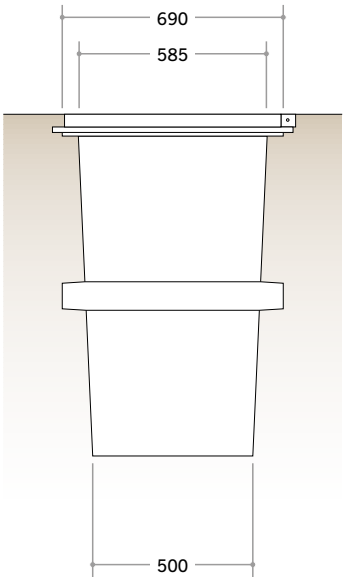












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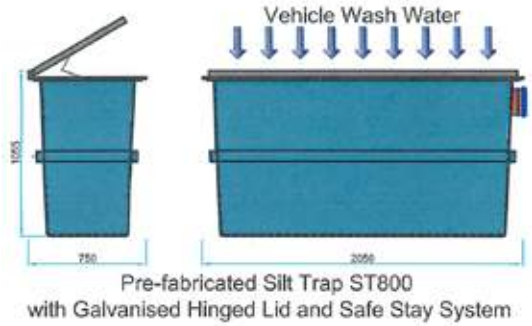
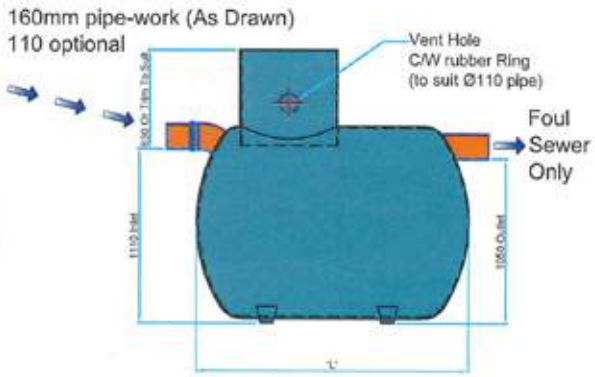
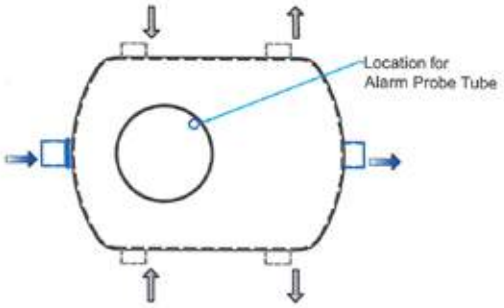
SPEL 200 Series Class 2 Single Chamber Separators - Full Retention Compliant to BS EN 858-1







Model	Facta class	Application	Silt Storage (Ltrs)
ST800/5	B	Cars / Vans	800
ST800/12	D	PSV / HGV	800

Full Retention Class 2 Price List Jan 2015 - Quote Ref 'FRC2LP1A'

Model	Catchment Area (m^2)	Nominal Size (NSB) Flow (l/s)	Overall Length, L (m)	Oil Storage (Ltrs)	Silt Storage (Ltrs)
FR004	222	4	1,720	40	400
FR006	333	6	2,270	60	600
FR010	556	10	3,410	100	1000

Bigger models also available

6.7 SPEL Grease Separators

SPEL Grease Separators are designed for use wherever it is necessary to separate greases and oils of vegetable and animal origin from wastewater, such as in trade or industrial plants/establishments

The units have two chambers, the first chamber is to remove and capture sludge, a sludge trap and the second chamber to separate out the grease.
SPEL Grease separators are available from 2,000litre to 10,000litre depending on the specific site requirements.

Example sites

- Commercial kitchens and large catering establishments, e.g. in inns, hotels, motorways service stations, canteens; grilling, roasting and frying facilities
- Food distribution points (with returnable crockery)
- Butcher's shops, with or without slaughtering facilities
- Meat and sausage factories, with or without slaughtering facilities
- Abattoirs; poultry slaughterers; tripe preparation plants; animal rendering plants; bone and glue boiling plants; soap factories
- Oil mills and vegetable oil refineries
- Margarine factories
- Pickling plants
- Fast-food preparation plants
- Chip and crisp producers
- Peanut roasting plants

Hotel, fast-food outlet site

To establish the size of unit for a typical hotel, restaurant or fast food outlet site the following information is required to calculate the model most suited.

- Number of meals
- Maximum waste water flow in litres
- Average waste water volume per day in m3
- Opening hours
- Average duration of operation each day
- Quantity of meat products per day

For other sites SPEL can advise the data required to establish the correct model size required.

Wastewater containing a considerable proportion of grease in a non-separable form (i.e. emulsified) from applications such as dairy, cheese making and fish processing, or from distribution points having only dish washing facilities, or from "wet waste compactors", will only be effectively treated in a SPEL Grease Separator under certain conditions. The wastewater may require further treatment.

Installation

Installation shall be in accordance with the Installation Instructions supplied with each mode.
They are for gravity flows and the upstream pipeline should be installed at a gradient of 2% (1:50) to prevent accumulation of grease.

The pipelines connected to the SPEL Grease Separator shall be adequately ventilated. Vent connections are provided for this purpose. A stack vent, if required, should be installed according The Building Regulations.

Temperature of the wastewater at the point of connection to the public sewer may be governed by the local authority.

Inspection and servicing

SPEL Grease Separators are designed to be simply and efficiently de-sludged using a suction tanker. Far simpler to removing baskets etc by hand.
They should be inspected weekly or monthly and emptied in accordance with operational experience.
The retained solids in the SPEL Grease Separator should be removed, the unit thoroughly flushed with clean water and refilled with clean water

SPEL Automatic Alarm Monitoring System

GA-1 USER INTERFACE FEATURES

1. LED indicator for mains
2. LED indicator for alarm
3. LED indicator for fault
4. Alarm Reset/Test push button
5. Connector for GA-SG1 sensor
6. Relay output for monitoring and control purposes
7. Supply voltage

For total protection and peace of mind it is essential to install a SPEL GA-1 Automatic Alarm Monitoring System

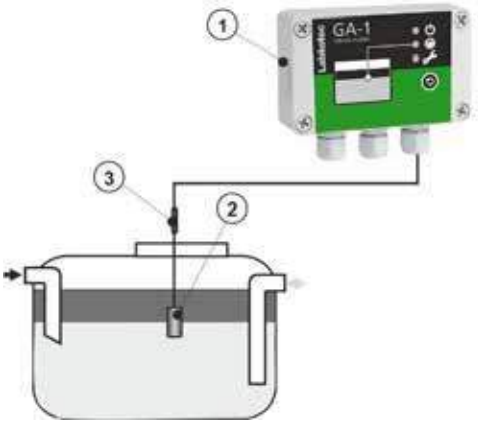
The GA-1 unit is an alarm device for monitoring the thickness of the grease layer accumulating in a grease separator.

The system consists of GA-1 control unit, GA-SG1 sensor and a cable joint.

SPEL GA-1 control unit features

The GA-SG1 sensor is installed into the grease separator and it supervises thickness of grease layer.

The LED indicators, push button and interfaces of the SPEL GA-1 control unit as above.



SYSTEM COMPONENTS:

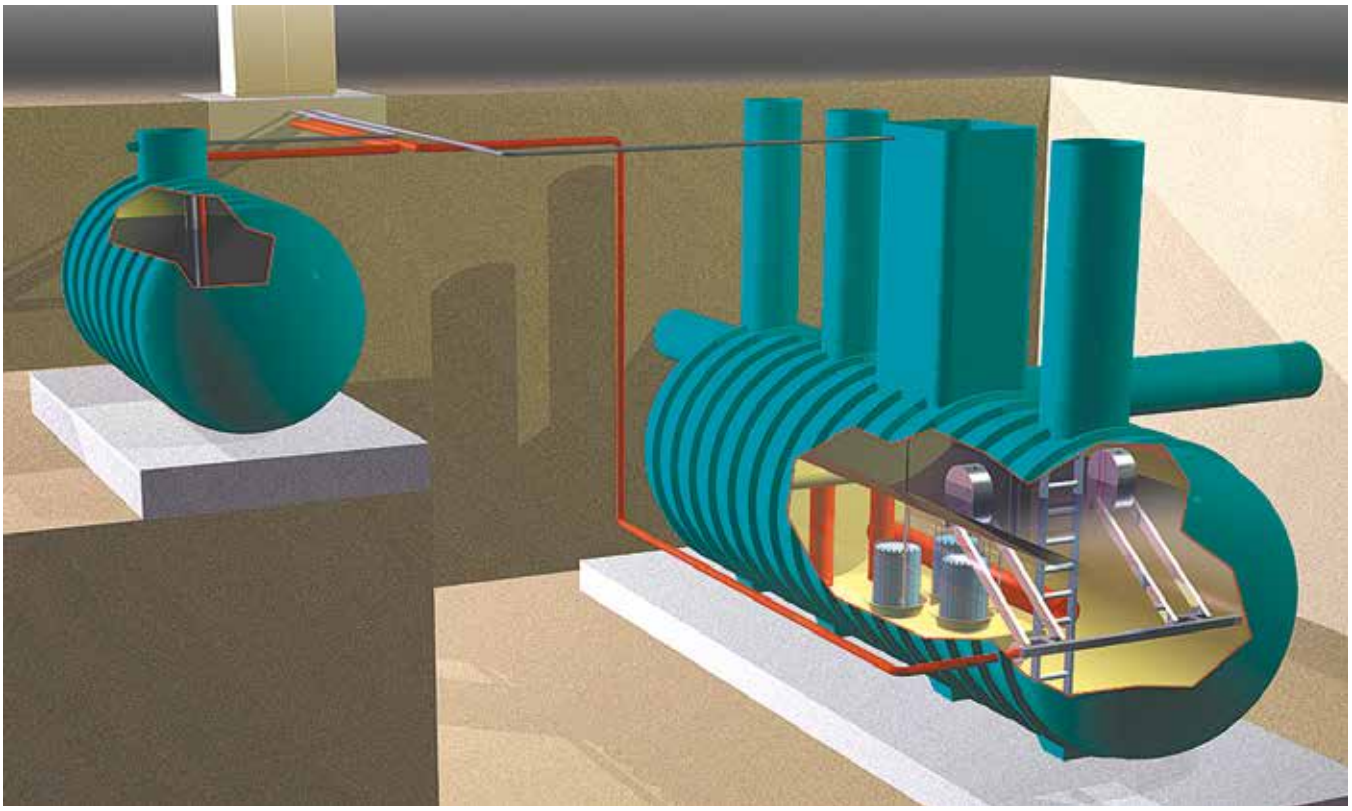
1. GA-1 control unit
2. GA-SG1 sensor (grease alarm) with fixed cable
3. Cable joint

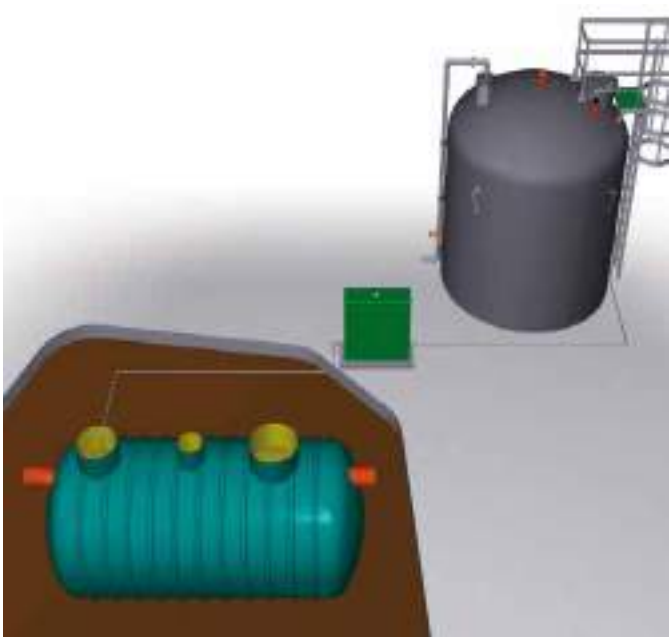
SECTION

7

SPEL Econoskim® Automatic Light Liquid Skimming and Separate Containment Systems for Separators

Saves 90% of the cost of servicing
Maintains Separator at 'peak' performance 24/7





Light liquid skimming & separate containment system

The essential to maintain separator peak performance 24/7 and reduce servicing costs up to 90%
UK patent No. 2355211

The improved environmental protection and economics benefits

Fuel/oil separators are frequently installed and forgotten about. With legislation today you cannot ignore your responsibilities to prevent pollution reaching surface water sewers and eventually water courses, reservoirs and rivers with the disastrous effect on plants and wildlife.

To cater for the large impermeable drainage areas and the more heavily contaminated areas associated with industrial and commercial sites, refineries, airports, railway depots, fuel distribution depots, truck stops and large transport depots, you need an efficient separator system that keeps you within the law continuously, economically and with complete peace of mind. That is what the SPEL Separator + Econoskim® system offers.
A system that does what is needed, automatically and saves you costs; the costs associated with conventional emptying of separators.

The conventional way of emptying the complete contents from a separator involves large volumes of waste water. In an endeavour to save some costs, emptying contractors may try the 'hit and miss' method of sucking pollutants from the surface by lowering the suction hose accordingly. This cannot guarantee a satisfactory job and still requires the removal of large amounts of waste water.

Seeing the need to reduce high emptying costs and at the same time provide continuous high performance treatment with simple low cost maintenance, SPEL Products introduced the SPEL Econoskim® light liquid skimming and separator containment system in 1995.
Emptying costs are reduced by around 90% or more and performance of the separator is maintained at peak performance.

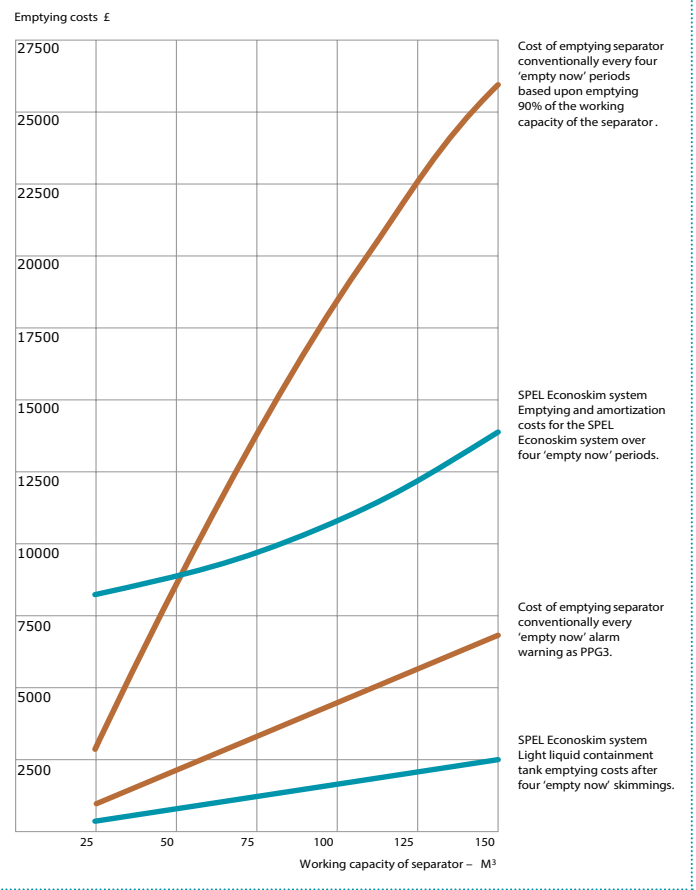
Consider the cost of maintenance first

With the increasing demand for large SPEL Stormceptor® by-pass separators, SPEL Puraceptor® full retention class 1 separators etc, to cater for catchment areas up to 30 hectares, the periodic emptying of pollutants and sludge can be extremely costly and therefore must be considered with a long term view.

Tank emptying contractors will often prefer to remove the entire contents of a large separator involving up to several thousand pounds a year in tankerage and administration costs.

With the SPEL Econoskim® System the tank emptying contractor is only required to remove the liquid pollutants from the SPEL Tankstor® containment tank. The light liquid pollutants have a minimum of water volume and therefore the emptying contractor's disposal costs are dramatically reduced.

'Empty now' signal is the time when light liquids have reached 90% of the oil storage capacity under static liquid level conditions. Calculations are, however, based upon the removal of the total oil storage capacity as defined as per model in the appropriate product range tables. You can achieve 90% saving.



Proven 'in the field' List of sample sites

East Midlands Airport,EMA 2000, Air Express Facility, Castle Donnington
Luton London Airport, Car Parks B & E
East Midlands Airport, Rexo Site Compound, Castle Donnington
Newcastle International Airport, Fire Training Ground
Gatwick Airport Fire Training Ground for BAA Belfast City Airport
Liverpool John Lennon Airport, Fire Training Ground
Bristol International Airport, Western Apron Extension
Railtrack, Neville Hill Leeds
English, Welsh & Scottish Railways (EWS), Allerton, Liverpool
Network Rail, Whitemoor LDC, March, Cambs.
Network Rail, Colwyn Bay Railway Station, North Wales
Bombardier Transportation UK Central Rivers, Barton-Under-Needwood
Laing Rail, Wembley Light Maintenance, Wembley, Middlesex
Barrow-in-Furness LMD, Lancs
Blackpool LMD
Nottingham Eastcroft LMD
Hull Botanic Gardens LMD, Hull
Reading Rail Depot, Network Rail
Acton Dive Under & Yard Engineering Plant, Network Rail
Nuneaton & Bedworth Borough Council, Bermuda Park, Nuneaton
Nuneaton & Bedworth Borough Council, Black Horse Road, Longford,
Hemdale Development, Attleborough Business Park, Nuneaton, Warwickshire
Jaguar Cars Ltd. Castle Bromwich
British Steel/Avesta Sheffield Ltd., Sheffield
Rosyth 2000, Rosyth, Fife
Ford Motor Company, Body Group Drainage, Dagenham
BPA Ltd, Shell Refinery, Stanford Le Hope, Essex
Kildare County Council, Kildare Town By-pass, County Kildare, Ireland
Network Rail, Inverness LMD

Light liquid skimming & separate containment system

The essential to maintain separator peak performance 24/7 and reduce servicing costs up to 90%
UK patent No. 2355211

How it operates

The system comprises pivoting suction booms with floats that rise and fall with the liquid level and skim at a constant depth.

Constructed in stainless steel, the suction booms inside the SPEL Separator are linked through a low friction pivoting assembly (no flexible hoses) via interconnecting pipe to the adjacent controls and pump for transferring the hydrocarbon pollutants to the SPEL Tankstor® containment tank.

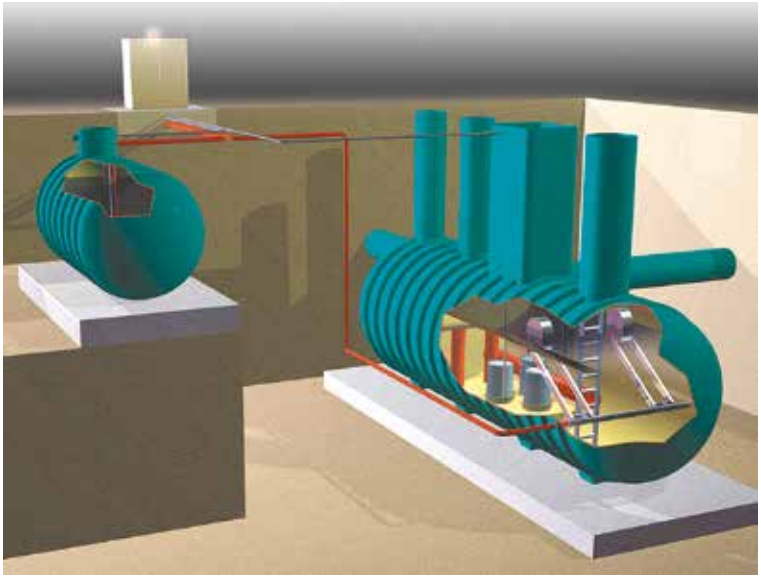
When separated light liquid pollutants reach the depth and volume defined in the European Standard BS EN 858:1 (6.5.2) the system automatically skims the pollutants from the SPEL Separator transferring them to the SPEL Tankstor® containment tank.

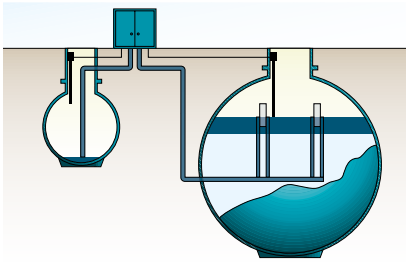
The small percentage of water transferred during the skimming operation is automatically returned to the SPEL Separator, thus maximising the SPEL Tankstor® containment tank's capacity for light liquids.

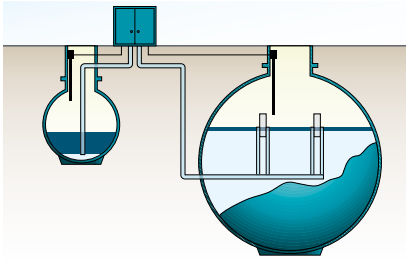
When the SPEL Tankstor® containment tank is 90% full, the alarm notifies 'empty now'. The SPEL Tankstor® containment tank's contents of light liquid pollutants accumulated over a long period can now be removed by the waste disposal emptying contractor.

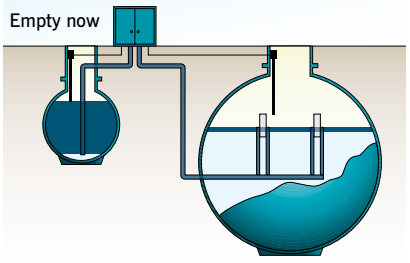
The high percentage of light liquids and low water content enhances the value of the waste which is reflected in a lower, or even nominal cost for its removal and disposal

It can be an advantage to install the SPEL Tankstor® containment tank away from the SPEL Separator. This may be essential to facilitate emptying without disrupting normal activity such as aircraft movements on airport aprons.









1. When the SPEL constant monitoring system detects the level of fuel/oil pollutants has reached the pre-determined volume, the skimmers are brought into operation, transferring these pollutants from the SPEL separator to the SPEL Tankstor® containment tank. When the transference of light liquid pollutants has been completed, the system automatically stops the skimming process and re-sets.

2. During the skimming cycle a small amount of water is transferred from the SPEL separator into the SPEL Tankstor® containment tank. In order to maximise the capacity of the SPEL Tankstor® containment tank for pollutants, accumulated water is automatically transferred back to the SPEL separator.

3. The process repeats automatically every time pollutants reach the pre-determined volume.
When the SPEL Tankstor® containment tank is 90% full, the SPEL constant monitoring system signals 'EMPTY NOW' with an audible and visual alarm.

 T. +44 (0)1743 445200 F. +44 (0)1743 465442 E. info@spelproducts.co.uk

Light liquid skimming & separate containment system

Railway refuelling and maintenance depots

SPEL Products, over many years of experience with rail sites, have acquired specialised knowledge and expertise in the particular pollution problems encountered.

Fuelling and maintenance depots generally have small rainfall catchment areas but high volumes of fuel and oil entering the drainage system. Standard separators cannot cope with this loading over a period and will require frequent emptying at high cost with the risk that discharges will be outside consent levels.

The SPEL Puraceptor® Class 1 two chamber separator and the 'automatic' Econoskim® system skims pollutants from the Puraceptor® directly into a SPEL containment tank installed above or below ground.

The system maintains the Puraceptor® separator at peak performance and the discharge within consent levels.

Recovered and contained fuel waste normally has a value and can be reused or sold enabling further substantial cost savings.

Our experience and success on many difficult sites have not only solved a polluting problem but saved substantial costs in maintenance, up to 130% or more where fuel saved is reused or sold.

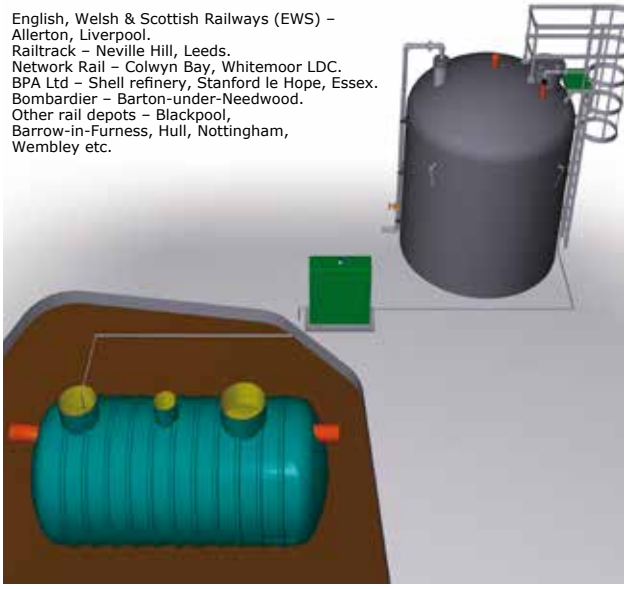
Complete systems are supplied for above ground or below ground installations. The above ground SPEL Puraceptor® fuel/oil separator incorporates secondary containment and is mounted on galvanised steel adjustable cradles. Pipework and kiosks can be frost protected. The steel access platform is galvanised and incorporates grating, access ladder, handrails and lifting hoist for servicing the coalescer units. The containment tank is filament wound in GRP with secondary containment, GRP access ladder and safety cage.

Example site

It was estimated, at a busy railway depot, Neville Hill Depot, Leeds that 1,000 litres of fuel/oil was entering the drainage system every week and passing into the SPEL Puraceptor® separator. To reduce the heavy costs of emptying the separator's complete contents every 3-4 weeks the 'automatic' Econoskim® light liquid skimming and separate containment system was installed.

Some installations:

English, Welsh & Scottish Railways (EWS) – Allerton, Liverpool.
Railtrack – Neville Hill, Leeds.
Network Rail – Colwyn Bay, Whitemoor LDC.
BPA Ltd – Shell refinery, Stanford le Hope, Essex.
Bombardier – Barton-under-Needwood.
Other rail depots – Blackpool, Barrow-in-Furness, Hull, Nottingham, Wembley etc.



The frequency of emptying was substantially reduced from every 3-4 weeks for the complete separator contents to every 3-4 months for the fuel/oil only, substantially reducing the emptying costs.

Performance testing and effluent monitoring from SPEL Puraceptor® + Econoskim® systems 2008

Monitoring was carried out by Scientifics Ltd to determine specific parameters within the effluent discharge and compare against the current discharge consent conditions.

The monitoring exercise established the concentrations Total Petroleum Hydrocarbons (TPH's) and also the pH level within the effluent discharge.

The highest TPH result obtained was 47 mg/l and the lowest 10 mg/l, average around 30mg/l. The pH results recorded were between 6.7 and 7.9 showing no abnormally high or low levels.

The performance of the SPEL system was well within the requirements of BS EN 858 & PPG3 Class 2 limit for hydrocarbons at 100 mg/l.

Servicing

The easy access allows simple servicing of coalescers, cleaning detection probes, checking operation of skimmer and silt build up (using the depth stick provided).

Service intervals depend upon site conditions. It is recommended monthly until a programme based upon findings can extend this to bi monthly or quarterly.

Typical above ground installation as installed at Edinburgh, Glasgow, Aberdeen, Inverness, Perth etc.

Ashford traincare facility

Note: If detergents are used for under-frame, carriage washing, etc. it is important 'fast break' detergents are used which de-emulsify/ release hydrocarbons over a short period – less than the designed retention time of the SPEL Puraceptor® separator.

Light liquid skimming & separate containment system

The essential to maintain separator peak performance 24/7 and reduce servicing costs up to 90%
UK patent No. 2355211

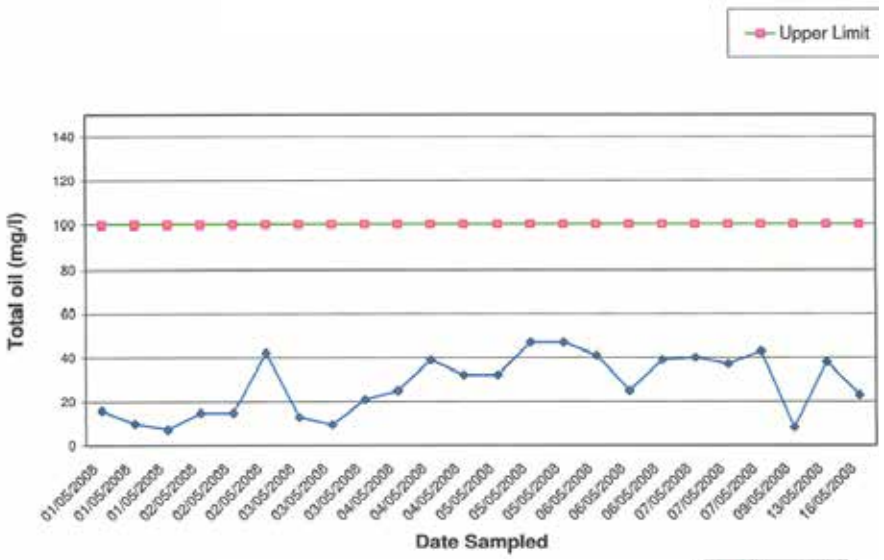
Rail Maintenance Depot Testing

The Puraceptor® + Econoskim® was independently tested by Scientifics Ltd to establish the concentrations of Total Petroleum Hydrocarbons (TPH's) and also PH level within the effluent discharge.

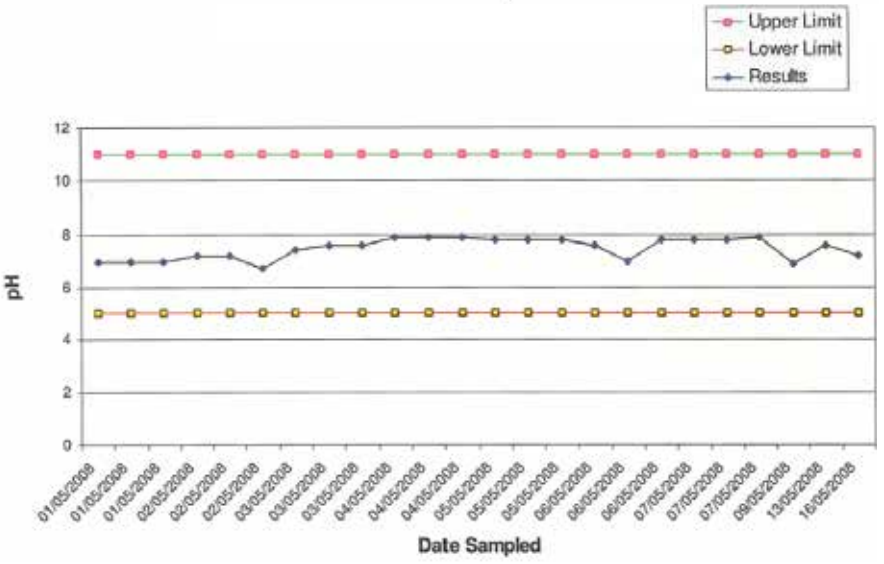
The purpose of this monitoring was to establish the SPEL Puraceptor® + Econoskim® System was effective at treating and discharging effluent into the foul drainage system that complied with the existing discharge consent.

Puraceptor® + Econoskim® being tested by Scientifics Ltd

SPEL Discharge - Clayhills SDD Total Petroleum Hydrocarbons (TPH) (mg/l)



SPEL Discharge - Clayhills SDD pH Level



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SPEL Puraceptor® separator sizing recommendations where wastewater and rainwater are being pumped

SPEL Puraceptor® two chamber separators meet the requirements of the European Standard BS EN 858-1.

SPEL Puraceptor® two chamber separators could be sized in accordance with the BS EN 858-2 formula with the density fd = 1.5 or 2.0 and the impediment factor fx = 4 where pumping. However, the following guidelines are recommended dependent upon the specific site conditions where both wastewater and rainwater are pumped.

Warning: You should not expect separators to always perform within these limits under field conditions. Regular maintenance is essential and general 'good housekeeping' pollution prevention measures taken on site.

NOTE: A dual pumping system with duty for wastewater flows and assist for rainwater flows are preferred. The pumps must be low shear and non-emulsifying.

SPEL Puraceptor® Model	NS BS EN 858-1	Max. wastewater constant flow rate l/sec (Duty pump)				Rainwater Max. l/sec (Assist pump)*
		Oil concentration:				
		5 - 50 ml/l		**50 - 100 ml/l**		
		Density fd:				
		2.0	**1.5**	**2.0**	**1.5**	
P025/2CSC	25	1.80	2.50	1.12	1.25	5
P030/2CSC	30	2.10	3.00	1.35	1.50	6
P035/2CSC	35	2.50	3.50	1.58	1.75	7
P040/2CSC	40	2.85	4.00	1.80	2.00	8
P050/2CSC	50	3.60	5.00	2.25	2.50	10
P065/2CSC	65	4.68	6.50	2.93	3.25	13
P080/2CSC	80	5.70	8.00	3.60	4.00	16

*It is preferable where flows are attenuated in a chamber prior to pumping to the SPEL Puraceptor®, the assist pump cuts out before any accumulated hydrocarbons on the surface reach this pump. These hydrocarbons can be sucked out during the periodic desludging of the separator.

The performance of the SPEL Puraceptor® separator + Econoskim® light liquid skimming and separate containment system has been monitored over an extended period at railway fuelling/maintenance depots. The monitoring proved the system to be effective at treating and discharging into the foul sewer system within the PPG3 Class 2 limit for hydrocarbons at 100mg/litre. Results were between 10 and 47 mg/litre with an average around 30mg/litre.

7.6 SPEL Separator & Econoskim®

Light liquid skimming & separate containment system

The essential to maintain separator peak performance 24/7 and reduce servicing costs up to 90%
UK patent No. 2355211

Airports

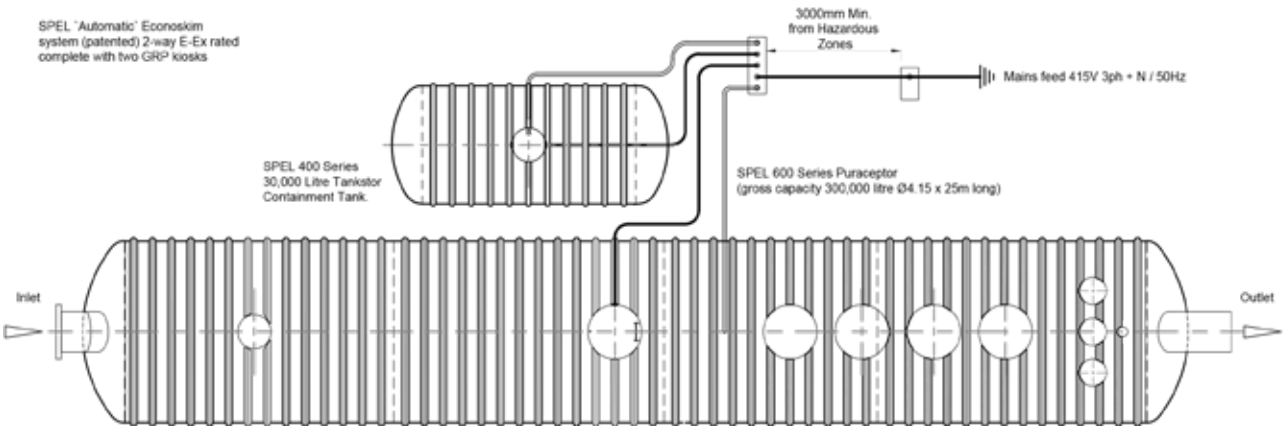
Aprons, taxiways and runways are large with the potential for heavy fuel spills even during rainfall conditions.

Heavy fuel spills during a catastrophic accident could overcharge a conventional Separator if not maintained regularly or incorrectly sized.

With the Econoskim® system the SPEL Separator is maintained to ensure peak performance and the spill capacity are maintained 24/7.

Bristol International Airport

SPEL Puraceptor® NS942. Caters for hardstanding (aprons, runways) up to 50 hectares and fuel 'catastrophic' spill of 170,000 litres.



Other Econoskim® sites include:
Gatwick Airport - Fire Training Ground. Luton Airport - Car parks B&E. East Midlands Airport - Air Express Fac. Castle Donington and Rexo Site Compound. Belfast City Airport, John Lennon (Liverpool) - Fire Training Ground.

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Light liquid skimming & separate containment system

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UK patent No. 2355211

Newcastle International Airport - Fire Training Ground

Cost Comparison with conventional separators

Original cost of maintenance per annum		£10,000
Current maintenance cost for SPEL Puraceptor® + Econoskim® system		
Clean coalescers 4 times per year	£400	
One full emptying cost for silt	£2,000	
Total maintenance cost per annum	£2,400	£2,400
Annual maintenance saving		£7,600
If fuel reused, say 20,000 litres @ 30p a litre		£6,000
Possible total saving per annum **(total saving = 136%)**		£13,600

With details of your existing fire training sessions, the number over a given period and the frequency of such sessions will enable us to estimate the size of the Puraceptor® and containment tank.

SPEL Fuel/Oil Transfer System

This system transfers the aviation fuel separated and stored in the SPEL Econoskim® system oil containment tank back to the fuel supply tank.

A floating oil skimmer is mounted in the oil containment tank and will draw off the light oil approx. 200mm below the surface, to obtain oil as clean as possible.

A 25mm bore pumping main will be required from the kiosk to the fuel storage tank. The outlet of this requires a high level stop valve/device to prevent overflow.

Airport Fire Training Grounds

Fire training sessions, using aviation fuel or similar, result in large quantities of unburnt fuel. A typical training session may use 200 litres of fuel with 50% unburnt reaching the surface water drain.

Standard separators cannot cope with this loading over a period and will require frequent emptying at high cost with the risk that discharge will be outside consent levels.

The SPEL Puraceptor® Class 1 two chamber separator and the Automatic Econoskim® system skims pollutants from the first chamber directly into a SPEL containment tank installed above or below ground.

The system removes the fuel for reuse (SPEL oil transfer system) or sale, maintains the SPEL Puraceptor® separator at peak performance and maintains discharge consent levels.

The effect of training or front-line fire-fighting foams on run-off containing hydrocarbons depends on their type. Synthetic based foams have caused problems with the operation of separators but the protein based foams, now commonly used, do not break-up hydrocarbons but the molecules repel hydrocarbons allowing them to separate out in separators. Research at the Moreton-in-Marsh Fire Training School confirms protein based foams cause no problems with separators.

7.8 SPEL Puraceptor® & Econoskim® Systems

For airport training grounds

The SPEL Puraceptor® full retention Class 1 separators with the patented Econoskim® light liquid skimming and separate containment systems are in use at fire training grounds, airport runway and taxiways, light maintenance depots for railway fuelling and servicing facilities, industrial and manufacturing complexes etc.

Site specific information *(please complete and forward to sales@spelproducts.co.uk for quotation)*

Site description:

Catchment area/s: Hard standing:

Concrete: m^2

Tarmacadem: m^2

Grass areas included in drainage system: m^2

Drainage system:

Existing size: mm dia. Type:

Invert depth: Inlet: m Outlet: m

Ground condition (eg. clay, made up ground, peat, virgin soil etc.):

Water table level: m from ground level

Fire training operations

Frequency:

Duration:

Procedure:

Start time: Minutes duration

Step 1

Step 2

Step 3

Step 4

Foam type:

Flurosurfactant front line

and/or flurine free protein based training foams

Amounts of products used in each training session:

Water:

Foam:

Fuel: Pumping rate l/s Total used litres

Fuel type:

Notes:

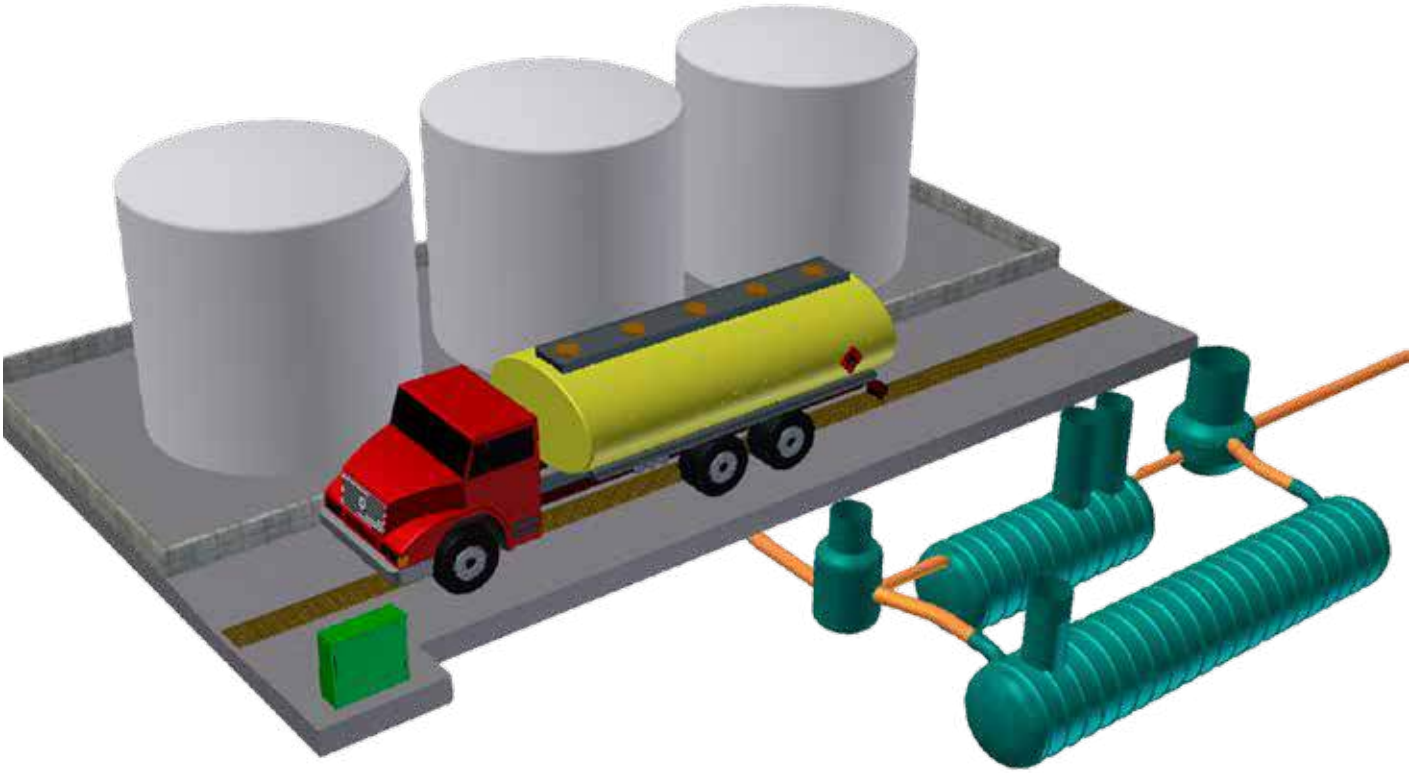
SPEL Fuel Transfer System
The fuel from the containment tank can be returned for reuse with this system.
Please indicate the pipeline route, diameter and distance:-

SECTION

8

SPEL Pollution Monitoring and Containment Systems

Case studies included



Protecting drainage outfalls from discharging pollutants is key to safeguarding our environment, prosecution, heavy fines and clean-up costs.

The Special Products Division of SPEL Products design, manufacture and commission pollution monitoring and containment systems that operate 24/7.

Warning!

Anyone who ignores the advice to safeguard surface water outfalls is exposing themselves to the risk of prosecution for pollution offences. The law is now very tough and the Environment Agency has the power to enforce it. The evidence of recent years suggests that the Agency does not hesitate to prosecute when serious pollution incidents occur.

The Agency was created by the Environment Act 1995, and it has responsibility for the control of pollution in 'controlled waters' as defined in Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 which covers practically all natural waters in England and Wales. The responsibility extends to monitoring, controlling and remedying pollution.

The Environmental Permitting (England and Wales) Regulations 2010 sets out the powers to prevent and control pollution and requirements to take precautions against pollution.

SPEL Pollution monitoring and containments systems

SPEL offer systems for manual or automatic operation: Hydrocarbon, pH monitoring etc available for diverting accidental monitoring, controlling and remedying pollution.

No matter how careful everyone concerned is, accidents and mistakes do happen

SPEL Products have supplied accidental chemical spillage containment tanks for many years. The SPEL Tankstor® range provides underground storage capacity from 4,000 to over 300,000 litres (or multiples thereof) into which flows can be diverted or a spillage safely contained. SPEL fuel/oil separators are available in sizes to cater for even the largest catchment areas. These can be used in conjunction with SPEL flow diverter chambers and SPEL Tankstor® accidental spillage containment tanks.

We have also developed SPEL pollution monitoring and containment systems for situations on industrial sites where it is essential to safeguard surface water outfalls. The system can be designed to incorporate a range of options, from simple monitoring instruments which provide warnings for manual control to divert flows to a SPEL Tankstor® underground tank, to fully automated systems which stand guard each minute of every day.

There are now about 2,000 industrial processes which discharge prescribed substances to water or generate prescribed waste, and which, therefore, fall within a system of integrated pollution control (IPC).

No industrial process proscribed for IPC can operate unless it has an authorisation from the Environment Agency. The Agency examines and authorises the process technology and methods of operation for a scheduled process as well as for the levels of discharge to air, land and water.

There is implied in every authorisation a condition that the person carrying on the process must use 'Best Available Techniques Not Entailing Excessive Cost' (BATNEEC) to prevent the release of substances prescribed for any environmental medium into that medium. Where prevention is not practicable, the release must be reduced to a minimum. There is also an obligation to render harmless any substances so released and also any substances which might cause harm if released into any environmental medium.

The Special Products Division of SPEL Products have proven systems to suit clients' particular needs to safeguard surface water outfalls from pollution and operators from increasing fines plus costs levied against polluters.

For plants wishing to ensure that consent limits on their effluent discharge are not exceeded, SPEL can provide a site specific system to monitor for pollution.

The analysis can be used simply to provide monitoring information to comply with a particular authorisation, to warn operators to take corrective measures or combine with an automated system to divert contaminated flows to containment in the event of a serious occurrence.

Typical SPEL Monitoring Chamber

Where particular substances could accidentally spill and contaminate surface water drains alternative methods of analysis can be provided as follows:

Risk from acids and bases

If acids or bases are stored on site then it is prudent to monitor the surface water for unacceptable deviations in pH. Some basic maintenance of the installed system is required but the technology is simple and relatively low cost. The instrument comprises a surface mounted controller with display and a pH sensor which can be mounted directly into a subsurface tank or in a flow cell when using a pumped sample feed. The response time of the sensor is typically 10-20 seconds so the measurements offer a very effective real time control to identify, alarm and divert the release of polluted surface water.

Risk from dissolved organic contamination

Many organic compounds dissolve in water and cannot be removed by a SPEL fuel/oil separator. It is therefore necessary to determine whether there is a risk from ingress of solvents and other products which may either dissolve or remain in a separate phase. Where the risk of uncontrolled release is identified, the ProToc TOC analyser offers a recognised methodology which can reliably report the organic contamination with a typical response speed of 5 minutes. The instrument requires sample preparation to remove organic compounds so the analysis is a reliable representation of organic contamination. The instrumentation must be fitted into a frost protected kiosk and requires regular maintenance including replenishment of reagents.

Indicator measurements

Many sites use a diverse range of chemicals within production and it is difficult to identify every parameter which should be installed. These sites may also benefit from the additional installation of a number of indicator measurements.

Turbidity can indicate the physical quality of the surface water by identifying high concentrations of suspended solids or "cloudy samples" affected by suspended solids, chemical precipitates or emulsified machine oils. The turbidity sensor can be mounted directly into a SPEL Monitoring/Diverter Chamber or in a kiosk on a pumped sample feed.

The instrumentation is again relatively simple, low cost and offers a fast response speed of 20 seconds.

Conductivity, reports the dissolved ionic strength of the sample and indicates the presence of dissolved salts. The conductivity sensor can be mounted directly into a SPEL Monitoring/Diverter Chamber, or in a kiosk on a pumped sample feed. The instrumentation is again relatively simple, low cost and offers a fast speed of response from 10 seconds.

Dissolved Oxygen (DO) is also often fitted to indicate general water quality. The presence of oxidising agents which cause an oxygen demand and lower the dissolved oxygen concentration can be detected in periods of low flow. The DO sensor can be mounted directly into a SPEL Monitoring/Diverter Chamber or in a kiosk on a pumped sample feed. The instrumentation is again relatively simple, low cost and offers a fast response speed of 3 minutes.

SPEL DrainGuard Bund Water Control unit and containment see 8.4

This unit removes rainwater from bunded areas using advanced technology ensuring oil/fuel is prevented from passing to the drainage system.

The unit incorporates an anti-syphoning device to ensure hydrocarbons retained within the tank cannot, through static head pressure, pass out of the tank.

The unit comes complete with control panel sealed to IP66 for external mounting, fitted with indicator lights for power on, pump running and tank level warning.

The unit can be linked to remote alarms or telemetry to ensure 24 hour surveillance.

SPEL double skin/secondary containment tanks – see 2.15

Where there is particular concern about leakages occurring from tanks, an alternative to bunding is to provide a second skin to collect material lost. Monitoring of the annulus using specific analysers or level detection can alert operators to the problem. Such systems are sometimes used for underground or tanks in remote areas, where undetected leaks to the environment may occur. Similarly tanks within process buildings may also be doubled skinned.

Example sites

Northfleet Sub-Station, National Grid Co. plc.
Drax Power Station, Yorkshire.
The National Assembly for Wales.
M6 JV, Moffat, The Scottish Office.
Airbus UK, Filton, Bristol.
Biogas Plant, Hoddesdon
RAF Spadeadam
Mercia Envirecover, Kidderminster

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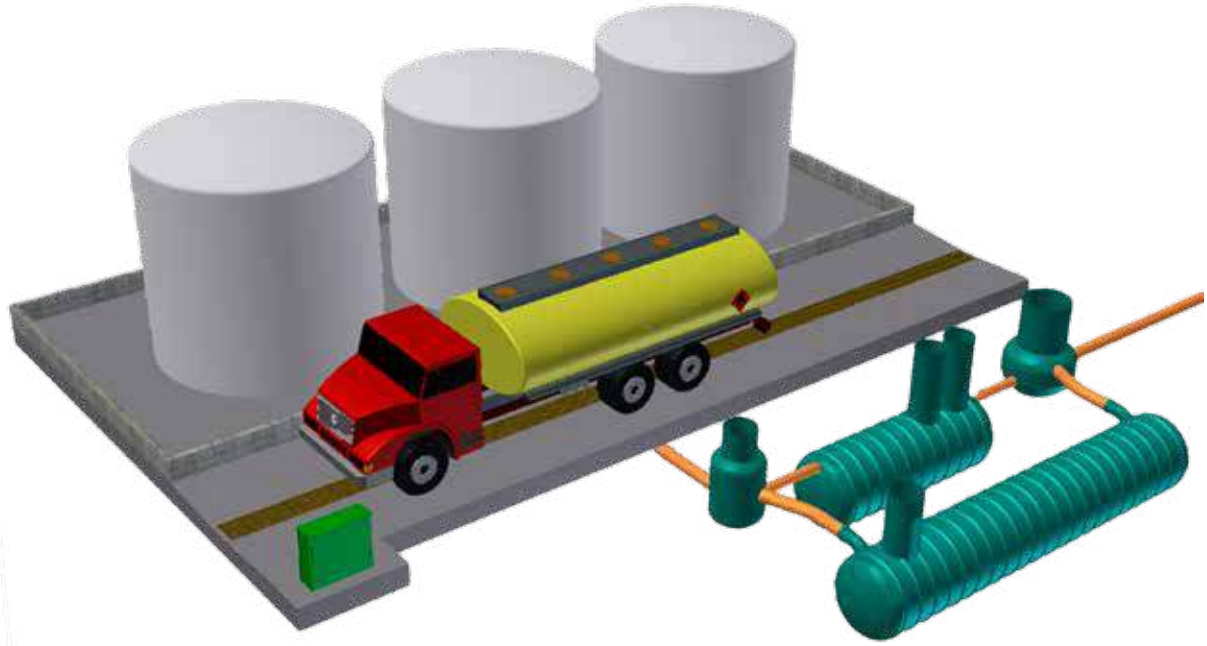


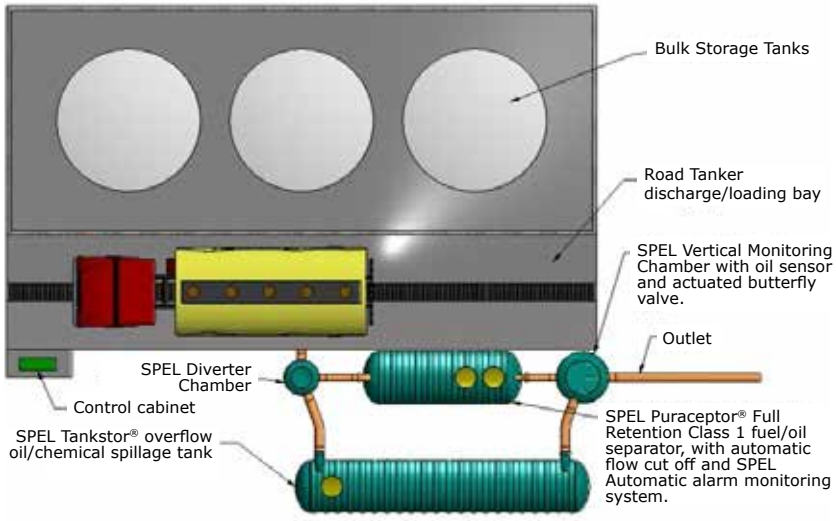
Spillages and leaks that can occur in the handling and storage of hydrocarbons and chemicals are always a danger to our environment, therefore, as with such high profile developments as the new engine plant at Jaguar Land Rover any potential risks must be carefully considered at design stage.

SPEL Pollution Monitoring, Diverting and Containment Systems typically comprise of a diverter chamber followed by a SPEL Puraceptor® (two chamber model) full retention Class 1 fuel/oil Separator to remove hydrocarbons as a result of minor spillages washed down during normal rainfall events.

Following the SPEL Puraceptor® is the monitoring and valve chamber. The monitoring system incorporated is designed to detect the pollutants posing a risk. The level of concentration of these pollutants can be set to within the sites allowable discharge limits and when exceeded to close off the drainage route and divert the contaminants to containment.

If such a spillage occurs and fills the containment tank the pollutants require sucking out and dealing with by a specialist waste company.

Unless a spillage occurs the discharge from the SPEL Puraceptor® continues to the drainage system and off site.



Typical Layout - SPEL Pollution Monitoring and Containment System

Complete protection of the drainage system is provided 24/7 by the SPEL system and, in addition, the SPEL Puraceptor® separator incorporates an automatic closure device (ACD) in the case of a heavy spill. This double protection provides a 'belt and braces' safeguard for complete peace of mind.

8.4 SPEL DrainGuard Tank Unit

Legislation

The Control of Pollution (oil storage) regulations (England 2001)(Wales 2016).

Operation

The SPEL DrainGuard Tank unit removes rainwater from tanks connected to bunded areas using advanced technology to ensure oil/ fuel is prevented from passing to the drainage system.

The unit incorporates an anti-syphoning device to ensure hydrocarbons retained within the tank cannot, through static head pressure, pass out of the tank.

The unit comes complete with control panel sealed to IP66 for external mounting, fitted with indicator lights for power on, pump running and tank level warning. The unit can be linked to remote alarms or telemetry to ensure 24 hour surveillance.

System Control

Probes monitor liquid levels in the tank and automatically activate the submersible pumps to remove rainwater once it has accumulated. An electronic capacitance probe senses the presence of oil and inhibits the pump, whilst float switches control the pumping of the water. Should the pump fail or block, a high level alarm is provided. A digital display on the control panel provides visual warnings of the presence of oil or high water level and additional information of the system status. Volt free, normally closed, contacts give remote indication of the oil and water alarms and mains failure.

Power Supply

Controls and pumps can be supplied to operate with either 230 volt single phase or 400 volt 3 phase supplies.

Pumping Unit

The submersible pumps are ATEX rated and sized to suit the required duty.
Mechanical oil filled seals ensure long trouble free operation.

Important features:

- Contacts for remote indication.
- Anti-syphon device.
- Intrinsically Safe capacitance probe and float switches for safer operation where flammable vapours present.

Maintenance

It is recommended that six monthly maintenance is carried out to ensure that the performance of the pump system is maintained.

1. The pump unit should be removed and any debris blocking the strainers removed and any silt cleaned away.

2. The operation of the unit should be checked by removing the detectors from the containment tank.
a) Lift the float to the top position. The pump should not start and after a short time the oil alarm pilot will illuminate. (Reset the system after this test).
b) Remove probe protection tube and dip the end of the capacitance detector in water and again lift the float – the pump should start. If the float is held at the top position the high level pilot will illuminate.

3. Check the insulation resistance of the pump windings (Megger test).

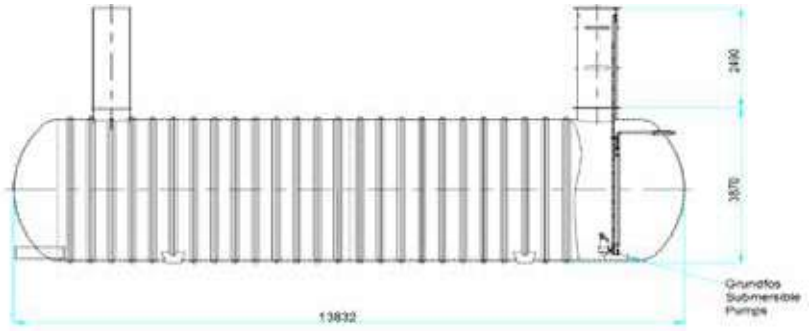
Any reduction in resistance will provide early indication of pump seal failure.

4. Perform mandatory electrical safety checks on the system.

Commissioning Service

SPEL Products can provide a commissioning service.

Walney



Recent sites where SPEL DrainGuard - Tank system has been installed:
London Array, Walney
Cumbria – *the world's largest Working offshore windfarm*
Javelin Park

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The SPEL DrainGuard Bund Water Control Unit is a robust and efficient unit to remove bund water from bunded areas whilst safeguarding against the release of hydrocarbons using the latest conductivity controls and technology.

Other possible pollutants can be catered for.

Introduction

Bunds act as a secondary containment and are used as a second line of defence for preventing, controlling or mitigating major hazardous events.

Bunds are generally used around storage tanks or drum storage areas where flammable or toxic liquids are held. Bunds are also sometimes used within plant buildings for reactors and other process vessels.

It is normal to limit the number of tanks in a single bund to 60,000 m3 total capacity. However, incompatible materials should have separate bunds. Tanks often have individual bunds.

Bunds should be sized to hold 110% of the maximum capacity of the largest tank or drum. This will allow some latitude for the addition of foam during response to the emergency.

Drainage systems both within and outside process buildings should take account of the need to segregate spillages of hazardous materials. Drain systems include sewers and stormwater drains.

For process effluents arising from leaks or plant wash down, good practice is to provide a local sump which is sampled before emptying. It is recommended such sumps incorporate a SPEL DrainGuard Bund Water Control Unit that pumps surface water away but automatically detects hydrocarbons or (as site specific designed with conductivity probes) to prevent other pollutants from being discharged to the sewer or surface water drain.

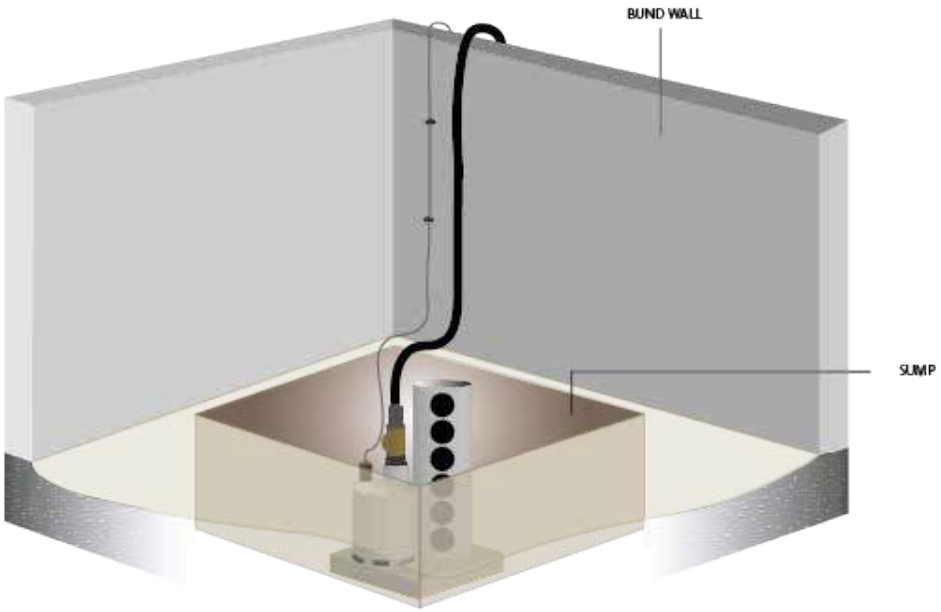
Warning – precaution

A particular concern is the discharge of non-water miscible flammable liquids, which form a top layer.

These could ignite considerable distances from the plant after discharge. SPEL fuel/oil Separators can also be incorporated to facilitate removal of floating flammable liquids.

The SPEL DrainGuard bund water removal units maintain bunds and sumps free of rainwater, while retaining any spillages or leaks of hydrocarbons using advanced technology, providing a fail-safe system and ensuring oil/fuel is prevented from passing to the drainage system.

SPEL DrainGuard Bund Water Control Unit installed with surface water discharge to drain



Legislation
The Control of Pollution (oil storage) (England) Regulations 2001.

8.6 SPEL DrainGuard Bund Water Control Unit

System control

Probes monitor liquid levels in the bund and automatically activate the stainless steel submersible pump to remove rainwater once it has accumulated to a predetermined level.

The SPEL DrainGuard unit incorporates an anti-syphoning device to ensure hydrocarbons retained within the bund cannot, through static head pressure, pass over and out of the bund.

The unit comes complete with control panel sealed to IP66 for external mounting, fitted with indicator lights for power on, pump running and bund level warning.

The units can be linked to remote alarms or telemetry to ensure 24 hour bund surveillance.

Maintenance

It is recommended that six monthly maintenance is carried out to ensure that the performance of the pump system is maintained.

1. The pump unit should be removed and any debris blocking the strainers removed and any silt cleaned away.

2. The operation of the unit should be checked by removing the detectors from the perforated cage.

a) Lift the float to the top position. The pump should not start and after a short time the oil alarm pilot will illuminate. (Reset the system after this test).

b) Dip the end of the capacitance detector in water and again lift the float – the pump should start. If the float is held at the top position the high level pilot will illuminate.

3. Check the isolation resistance of the pump windings (Megger test). Any reduction in resistance will provide early indication of pump seal failure.

4. Perform mandatory electrical safety checks on the system.

Power supply

240v AC single phase 10amp fused supply.

Pumping unit

The stainless steel submersible pump incorporates mechanical oil filled seals ensuring long trouble free operation.

Important features:

- Stainless steel construction for durability.
- Pump has mechanical seals for long reliable life.
- Contacts for remote indication
- Anti-syphon device.
- Capacitance probes for safer operation (where flammable hydrocarbons present.)

Installation service

SPEL Products can provide installation and commissioning including provision of GRP sump moulding.

SPEL double skin/secondary containment tanks

Where there is particular concern about leakages occurring from tanks, an alternative to bunding is to provide a second skin to collect material lost. Monitoring of the annulus using specific analysers or level detection can alert operators to the problem. Such systems are sometimes used for underground or tanks in remote areas, where undetected leaks to the environment may occur. Similarly tanks within process buildings may also be doubled skinned. See Section 2.

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Jaguar Land Rover

CASE STUDY

Project: **New engine manufacturing plant, Wolverhampton**

Client: **Jaguar Land Rover Ltd**

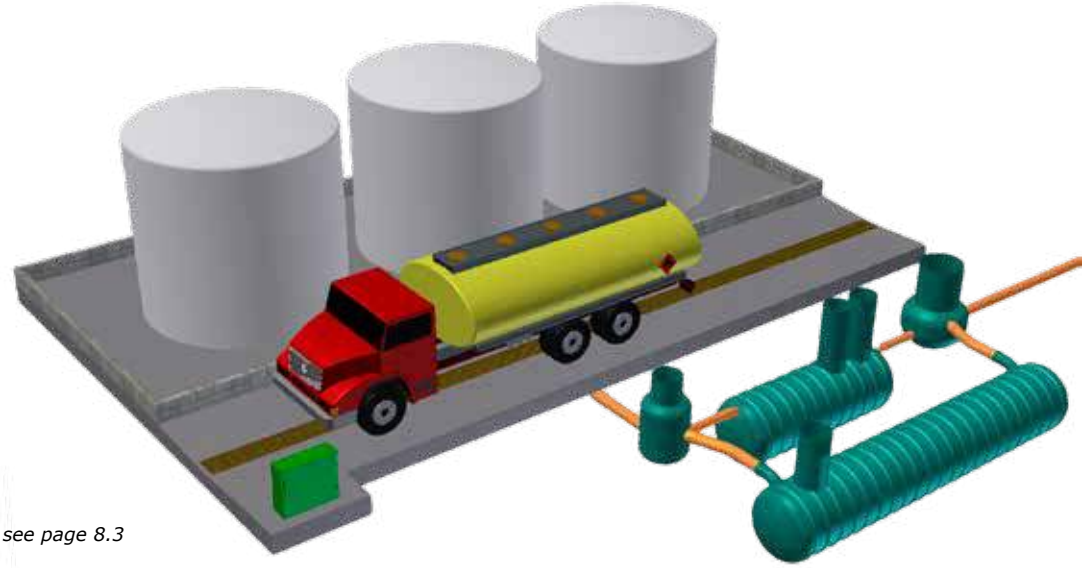
Products: **SPEL Automatic Monitoring and Containment System for fuel storage facilities**

Protecting drainage outfalls from discharging pollutants is key to safeguarding our environment, prosecution, heavy fines and clean-up costs.

SPEL Pollution Monitoring Systems are being installed together with provision for containment of spillages to provide 24/7 protection.

Spillages and leaks that can occur in the handling and storage of hydrocarbons and chemicals are always a danger to our environment, therefore, as with such high profile developments as the new engine plant at Jaguar Land Rover any potential risks must be carefully considered at design stage.

The Special Products Division of SPEL Products design, manufacture and commission pollution monitoring and containment systems that operate 24/7.



For details see page 8.3

Fuel handling & storage areas

SPEL Pollution Monitoring, Diverting and Containment Systems typically comprise of a diverter chamber followed by a SPEL Puraceptor® (two chamber model) full retention Class 1 fuel/oil Separator to remove hydrocarbons as a result of minor spillages washed down during normal rainfall events.

Following the SPEL Puraceptor® is the monitoring and valve chamber. The monitoring system incorporated is designed to detect the pollutants posing a risk. The level of concentration of these pollutants can be set to within the sites allowable discharge limits and when exceeded, to close off the drainage route and divert the contaminants to containment.

If such a spillage occurs and fills the containment tank the pollutants require sucking out and dealing with by a specialist waste company.

Unless a spillage occurs the discharge from the SPEL Puraceptor® continues to the drainage system and off site.

Typical layout

SPEL Pollution Monitoring and Containment System
Complete protection of the drainage system is provided 24/7 by the SPEL system and, in addition, the SPEL Puraceptor® separator incorporates an automatic closure device (ACD) in the case of a heavy spill. This double protection provides a 'belt and braces' safeguard for complete peace of mind.

Melgarve 400kv Substation

CASE STUDY

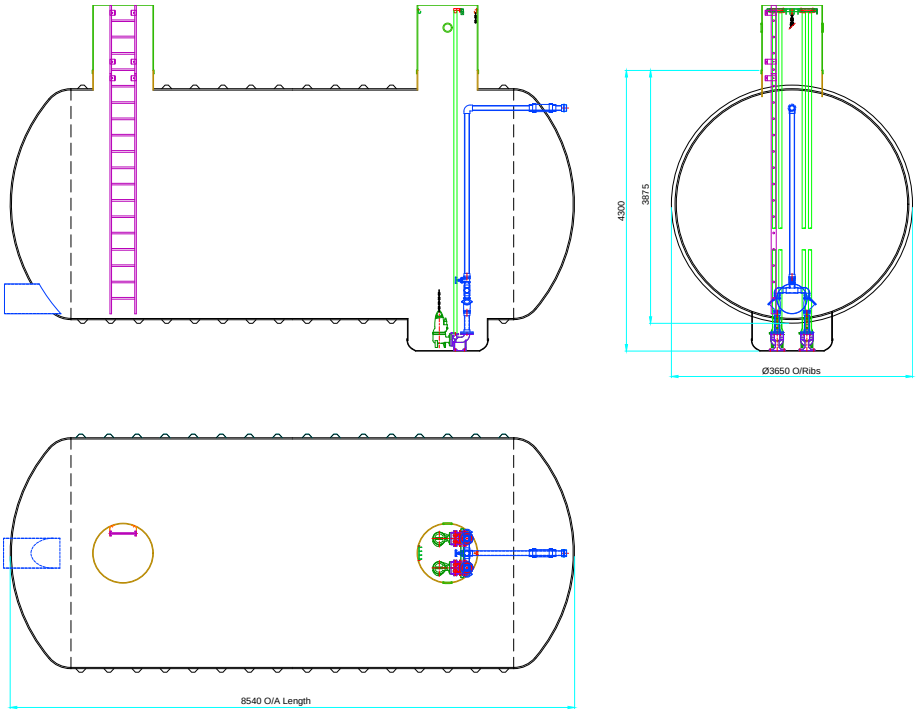
Laggan Newtonmore

Client: **SHE Transmission plc**

Contractor: **BAM Nuttall Limited**

Products:
SPEL Tankstor® HCR (Highly chemical resistant) transformer oil dump with tanks with SPEL DrainGuard System
SPEL RainSave® Rainwater Harvesting System

SPEL Tankstor® tanks. One with pump sump for the SPEL DrainGuard System



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Javelin Park, Gloucester Waste

CASE STUDY

Project: **Energy from waste facility**

Client: **Gloucester County Council**

Contractor: **Urbraser Balfour Beatty**

Products:
SPEL Puraceptor® Class 1 Full Retention Separators:
P165/1CSC
P150/1CSC
SPEL Forecourt Separator 2 No. FP1C/SC

SPEL Package Pumping Stations:
1 No. SPEL Package Pumping Station V335
1 No. SPEL Package Pumping Station V340
2 No. SPEL DrainGuard Bund Water Control Units (one fitted with PH and fuel detector).

1 No. SPEL Tankstor® Underground Tank 300 Series 8,000 litres Capacity
SPEL X-SPEL V-Series Package Pumping Station VPPS 340

The Energy from Waste facility now under construction at Javelin Park near Gloucester will massively reduce the county's dependence on landfilling, whilst recovering value from waste in the form of electricity, recyclable metals, and aggregate.

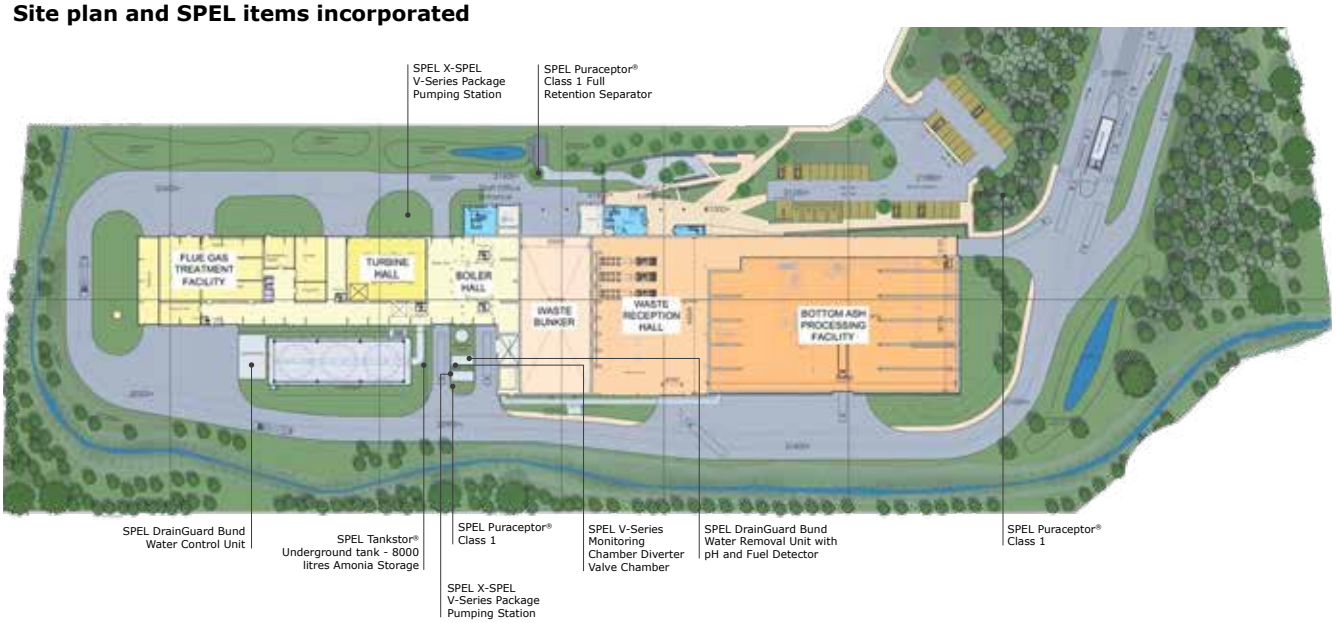
The planned facility will process up to 190,000 tonnes of residual household waste collected by local authorities in Gloucestershire each year, generating an estimated 116,000 megawatt hours of electricity annually, enough to power round 26,000 homes. It will also produce around 30,000 tonnes of aggregates a year, as well as recovering around 3,000 tonnes of metals each year.

Danish energy-from-waste technology producer Babcock & Wilcox Vølund has been appointed by UBB to provide the technology for the facility, which will include combustion equipment, a boiler, an air-cooled steam turbine, generator, water treatment and control systems. The combined value is £73 million.

The company handed over the plant for operations in July 2019.

Ground view from the West

Site plan and SPEL items incorporated



Power Generating Business

CASE STUDY

Project: **London Array**

Client: **National Grid**

Products:
SPEL Tankstor® 250,000 litre Transformer Oil Dump Tank with SPEL DrainGuard system to remove bund rainwater.
SPEL Puraceptor® Class 1 (two chamber) Separator (NGC specification)

SPEL Products supply specialist monitoring, containment and treatment systems to safeguard large installations in the power generating industry. National Grid and Scottish Power have specified products and systems to contain hydrocarbon spillages from transformers and bunds over many years which have proved to be reliable and efficient.

These installations, and more recently, the largest wind farms incorporate SPEL Transformer Oil Dump Tanks, SPEL Puraceptor® hydrocarbon separators, SPEL DrainGuard Bund Control Units, SPEL RainSave® rainwater harvesting and utilisation systems for toilets on site and SPEL Package Pumping Stations.

Image Credit: London Array

Each turbine stands 623 ft (190m) high
About twice the height of Big Ben

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Power Generating Business

CASE STUDY

Project: **Walney Offshore Wind Farm**

Client: **National Grid**

Contractor: **Amey**

Products:
2 No. SPEL Cesspools 300 Series/9270 litre
2 No. SPEL Tankstor® 500 Series 100,000 litres dump tanks with SPEL Drainguard System
1 No. SPEL Puraceptor® P100/2CSC/NG (NG Specification)
2 No. SPEL Tankstor® 500 Series 125,000 litres (one with pumps for attenuation)
6 No. SPEL DrainGuard Bund Water Control Units


Image Credit: Orsted

The world's largest working offshore wind farm - covering an area equal to 20,000 football pitches - has opened off the coast of Cumbria.

The £1bn Walney facility already had 102 turbines before the completion of a further 87 earlier this year - dubbed the Walney Extension. Each turbine stands 623ft (190m) high, with the wind farm covering an area of 55 sq miles (145 sq km). It can generate 659 megawatts - enough power for 600,000 homes. Sitting in the Irish Sea 12 miles (19km) off Barrow-in-Furness, the wind farm overtakes the current largest operational facility, London Array, in the Thames Estuary.

SPEL Tankstor® 500 series 100,000 litre Dump Tanks with SPEL DrainGuard System

SPEL DrainGuard Bund Wall Control Units

These units are supplied to automatically drain the bunded areas of rainwater which are fitted with sensors for retention of hydrocarbons.

SPEL DrainGuard Bund Water Control Units supplied on this contract being inspected.

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Rolls Royce Project Canaveral 2

CASE STUDY

Surface Water Pollution Monitoring / Containment System

Introduction

AECOM Infrastructure & Environment UK Limited prepared a conceptual design at the Precision Casting Facility (PCF) at Rolls Royce, Sinfin, Derby, to provide pollution control for surface water runoff.

The PCF handles materials of varying nature, including hazardous and/or contaminating chemicals, as well as bulk materials of a loose/silty nature. Many of these materials are delivered to and stored in external yards surrounding the PCF building.

As the loading bays and storage areas are located outside, any spillage would be exposed to a possible rainfall event which would wash the contaminant into the surface water drainage system. As the intensity of the storm cannot be predicted, nor the quantity or nature of the material spilled, it is not possible to predict the concentration of the contaminated runoff that would require treatment and therefore an automated system is not considered viable. Instead a containment system is considered the most practicable solution, which would involve an automatic monitoring valve that would divert contaminated flows to an offline containment tank. This would then be manually tested and either treated on site and discharged to the watercourse or transported for treatment off site, as necessary.

AECOM worked closely with SPEL Products in order to identify an appropriate solution for the PCF surface water drainage. Each of the sites above would have a SPEL oil separator, followed by a pollution monitoring / divert chamber, and finally an off line containment system for temporary contaminated discharge prior to treatment or disposal.

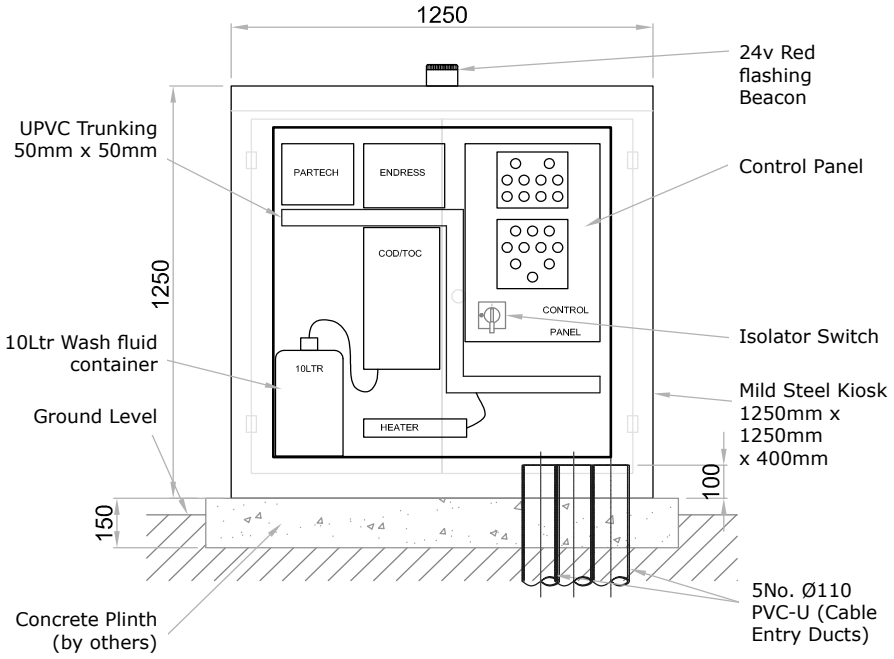
The SPEL separators would be fitted with automatic alarm / monitoring systems, which will provide a visual and / or audible warning when the level of oil reaches 90% of the storage volume under static liquid level conditions.

Monitoring / Diverter Chamber

Downstream of the bypass separator would be a monitoring / diverter chamber in which would be housed the appropriate pollution sensors and analysers. The following sensors are available and it is proposed that all but the turbidity sensor are installed in the monitoring / diverter chamber:

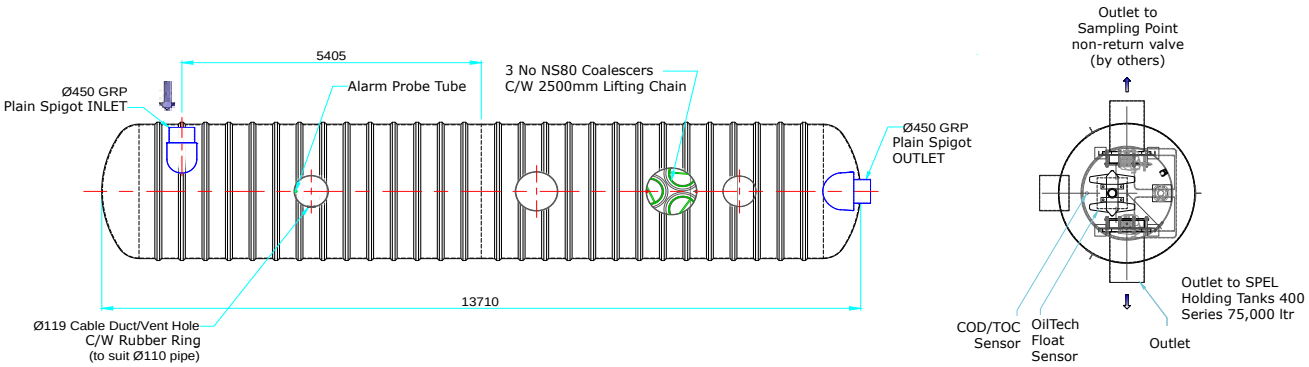
- pH sensor - detects deviations.
- Conductivity - reports dissolved ionic strength of the discharge and indicates presence of dissolved salts.
- Dissolved oxygen sensor - indicates general water quality by monitoring for the presence of oxidising agents.
- Total Organic Carbon (TOC) analyser - dissolved organic contamination, including solvents. Some TOC sensors require a pumped sample feed.

Remote alarm to provide immediate warning of detection of pollution.

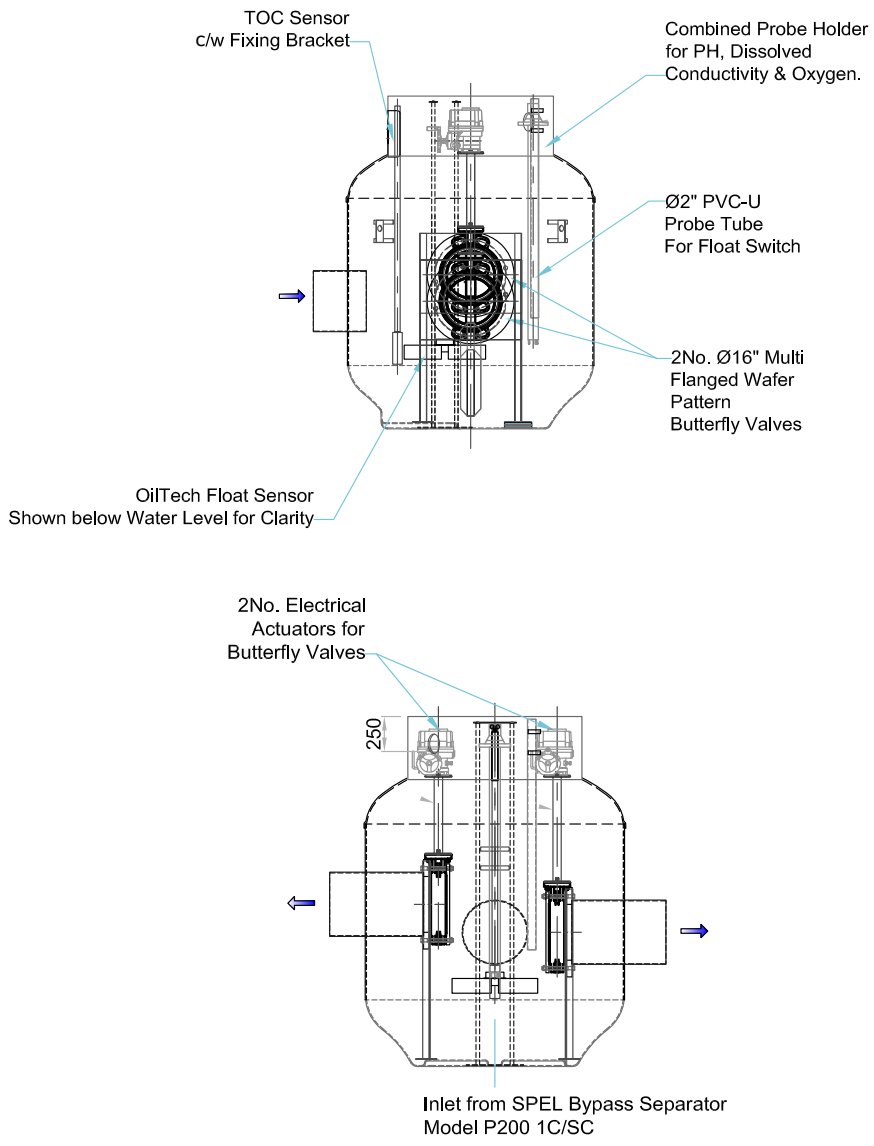


System Controls

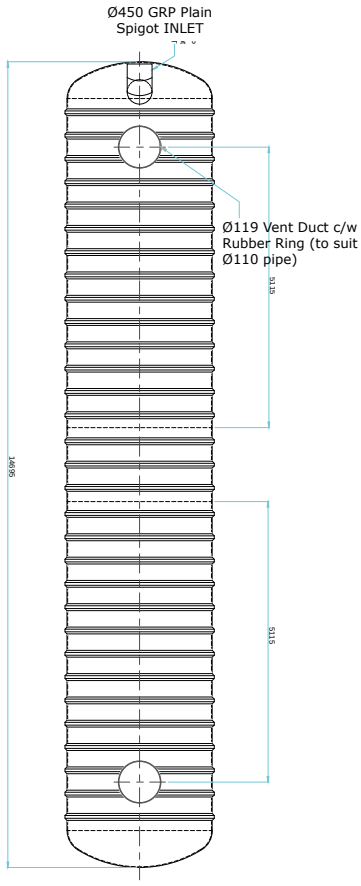
Roll Royce Project Canaveral 2



SPEL Puraceptor® P200 1C/SC



SPEL Monitoring Diverter Chamber



SPEL Holding Tanks 400 Series 75,000 ltr

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SECTION

9

SPEL Package Pumping Stations

SPEL Package Pumping Stations

V SERIES - VERTICAL

SPEL Package Pumping Stations

H SERIES - HORIZONTAL

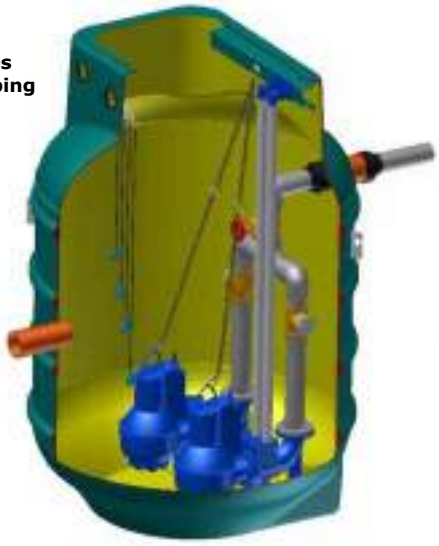
wrc approved PT/429/0818

SPEL

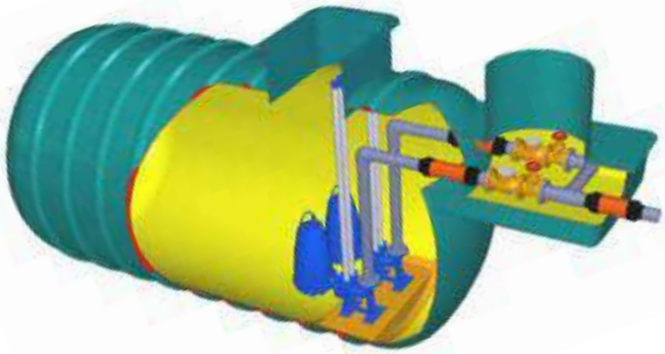
The range of SPEL Package Pumping Stations

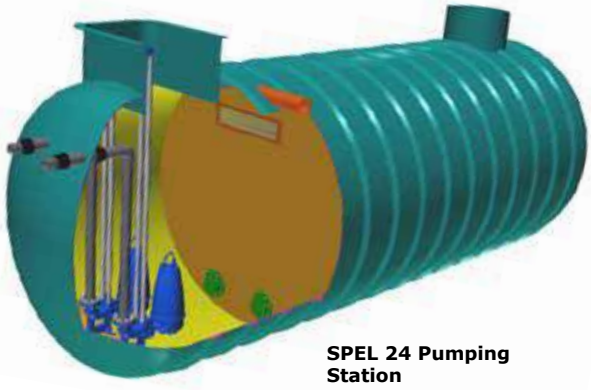
SPEL 'H' Series Horizontal Package Pumping Stations

SPEL 'V' Series Vertical Pumping Stations



SPEL 'Integral' Pumping Stations





SPEL 24 Pumping Station

SPEL 'H' Series Horizontal Package Pumping Stations

*Off*site - built & tested

The way forward for the construction industry

Introduction

Off-site built and tested, SPEL Package Pumping Stations are the most efficient and economical solution for both the client and the contractor. With all pipework, valves, pedestals, guide rails and controls factory fitted and tested under controlled conditions. The completed chamber only requires simple installing and final commissioning.

SPEL products have been supplying package pumping stations for over 40 years and during that time have developed them to include the latest technology in controls.

The pumping chambers can be vertical as with 'V' series or horizontal with 'H' series and capacities up to 300,000 litres. They are sealed 'one piece' chambers incorporating the valves in an integral valve chamber to meet the Sewers for Adoption requirements.

With SPEL you can be assured of long trouble free operation with the quality components selected and specified to achieve that result. Our policy is not to cut quality to reduce the initial cost as this usually results in high maintenance and higher life cycle costs (LCC). It is the long term customer relationship we value the most.

SPEL package pumping stations incorporate all pumping equipment, valves, pump pedestals and guide rails all factory fitted and tested.

Expensive site work is reduced to the minimum and 'confined space' operations eliminated. Final commissioning is undertaken by SPEL engineers.

When choosing the right pumping station 3 elements are critical to consider:

1. The right pump
2. A quality assured WRc approved chamber. Filament wound in GRP with smooth chemical resistant internal surface and **30 year Warranty**
3. Quality internal pipework, valves, level controls - factory fitted and tested (test certificate supplied).

SPEL pumping chambers are manufactured in GRP by the filament winding process, are lightweight, immensely strong, corrosion resistant and self-cleaning.

Important considerations

Design & specification

To ensure most economical operation, low maintenance and low life cycle cost.

To be designed for surface water or sewage in accordance with the Water Industry Specifications (WISs), Sewers for Adoption and the relevant Water Authority's specific requirements.

Technical details required include incoming peak design flow, storage capacity to ensure flooding does not occur at or upstream of the chamber during plant or power failure, typically 24hr emergency storage. Pumps need to be sized to cover the peak flows and ensure the minimum flow velocity in the rising main.

Benching design and the internal surface finish are very important to ensure sludge does not accumulate. The SPEL chambers have smooth sloping internal surfaces for superior self-cleansing and to maintain turbulence for keeping solids in suspension. This is important as sludge tends to settle when the pipes are idle and then clogs the pumps during subsequent operation.

Applications

SPEL Package Pumping Stations are used for many applications including raw sewage, surface water, rain water harvesting (SPEL RainSave System®), surface water attenuation etc.

Extensive SPEL range

Today the range of vertical and horizontal package pumping stations is extensive with five diameters and capacities from 2000 to 300,000 litres

Capacities

'V' series vertical chambers range from 2,000 litres to 100,000 litres capacity in diameters 1.2, 1.8, 2.6, 3.5, & 4m.

'H' series horizontal pumping chambers are available from 2,000 up to 300,000 litres in five diameters as above.

Siting

Siting of the wet well needs to be a minimum distance from habitable buildings according to incoming flows (0.25 l/s = 5m, over 0.25 l/s = 10m, over 1 l/s = 15m)

9.2 SPEL Package Pumping Station

Offsite - built & tested *The package pumping station with a difference that excels over others*

SPEL pumping stations are manufactured and assembled in our factory and delivered to site ready to be placed in a suitable excavation and connected to the relevant drainage pipework.

A simple commissioning visit is all that is necessary for the system to be put into operation. Pipework, valves, pedestals and pump guide rails are factory fitted, inspected and tested under controlled conditions. This eliminates expensive 'confined space' installation on site, which is usually carried out under adverse conditions. They can be buried to depths of 6m and more and offer very good resistance to corrosive chemicals and effluent fluids.

The pumps are mounted on a superior self-cleaning geometric base which reduces silt and sludge build up to a minimum. Single or dual pump systems are available with the option of PVC or stainless steel pipework.

Valves are epoxy coated cast iron and can be mounted either in the tank or in a separate valve chamber with over-pumping connection as required. Level control can be by ultrasonics, float switches or probes and a wide choice of control panels and enclosures completes the package.

A full 'Sewers for Adoption' package can be offered to meet the specific needs of your water authority.

Our pump package is the first to have received WRc approval in recognition of the quality and system design.

Manufacturing standards

SPEL tanks are manufactured to BS EN 13121 under a strict quality control system with checks at all stages of construction. The chop-hoop filament winding process produces not only circumferential strength but also strong longitudinal strength. After a long evaluation process our package pump systems have been awarded the coveted WRc approval which signifies compliance with BS EN 752-6 for SPEL Package Pumping Stations and 'Sewers for Adoption'.

Choosing the right pump/s and operation

SPEL Package Pumping Stations are normally fitted with a submersible pump or pumps. The twin pump installations can be for duty/standby or duty/assist or three pumps, duty/assist and standby.

Duty/standby allows for a pump failure and for the pumps to run alternately for even usage and wear. Duty/assist allows for a situation where there are varying flow rates as in the case of the difference between average rainfall flows and storm flows.

To cater for varying flow rates and for a possible pump failure it may be prudent to install three pumps, duty/assist and standby.

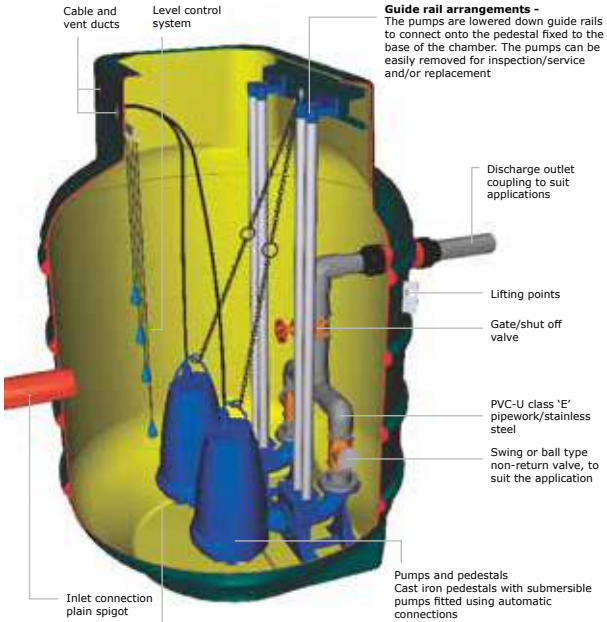
Although there are many different types of pumps, some very cheap, SPEL prefer to supply Grundfos, Lowora or ITT Flygt pumps to ensure long service life, good maintenance and parts service.

Typical sites

Domestic properties, housing estates/flats, offices/commercial, land fill sites, industry, transport infrastructure, construction sites.

Features

- Superior self-cleaning geometric base – efficiently expels the solids and prevents silt build-up
- Smooth self-cleaning internal surface
- Filament wound GRP construction (to BS EN 13121 as appropriate)
- Longer time between inspections
- Quality, efficient pumping systems by Grundfos or ITT Flygt.
- Factory fitted and tested pipework, valves etc. with a test certificate.
- Long life and corrosion resistance using top quality resins
- 25 year warranty or WRC 30 years
- Shell life expectancy – over 50 yrs



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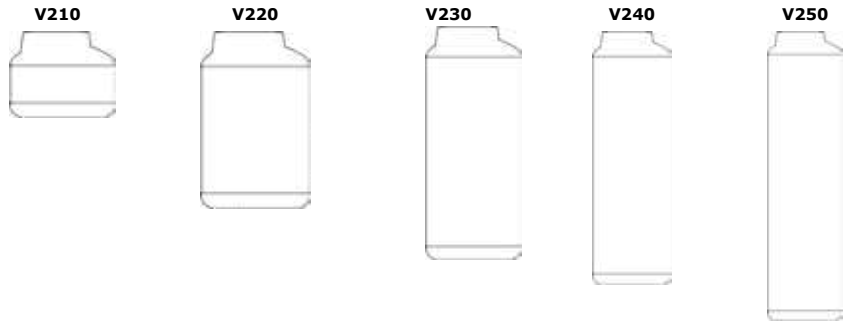
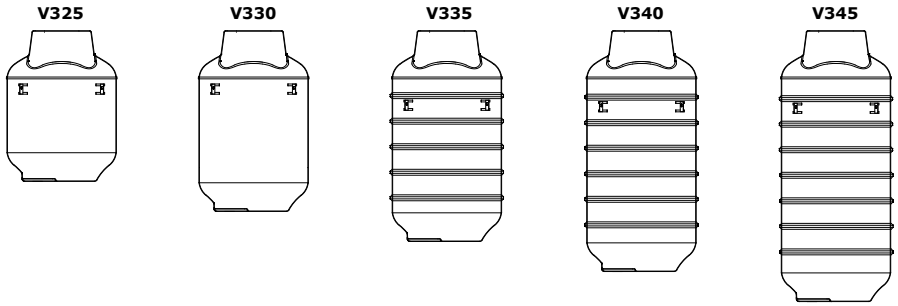
There is a model to meet your requirements, with or without 'integral' valve chambers



'Xspel®' V200

1.2m diameter
2.0m - 4.0m high
(in 500mm increments)

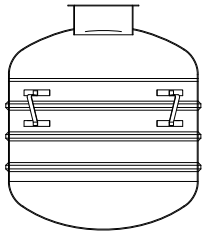
Models V220 - V240



'Xspel®' V300

1.8m diameter
2.5m - 4.5m high
(in 500mm increments)

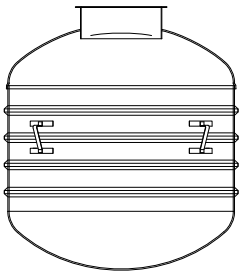
Models V325 - V345



V400

2.6m diameter
3.0m - 8.0m high
(in 500mm increments)

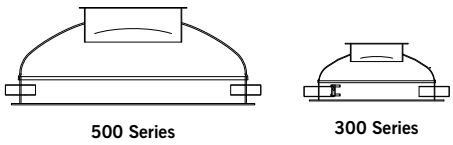
Models V430 - V480



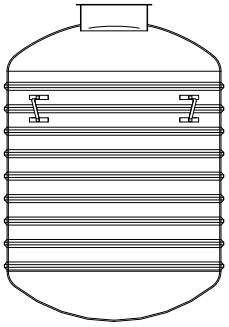
V500

3.5m diameter
4.0m - 8.0m high
(in 500mm increments)

Models V540 - V580



Separate valve chambers are available in each range.



V600

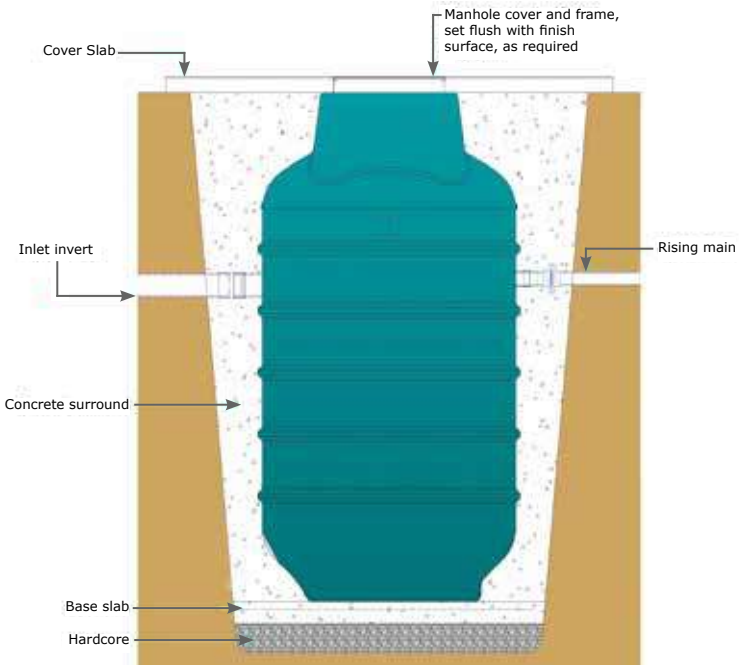
4.0m diameter
4.0m - 9.0m high
(in 500mm increments)

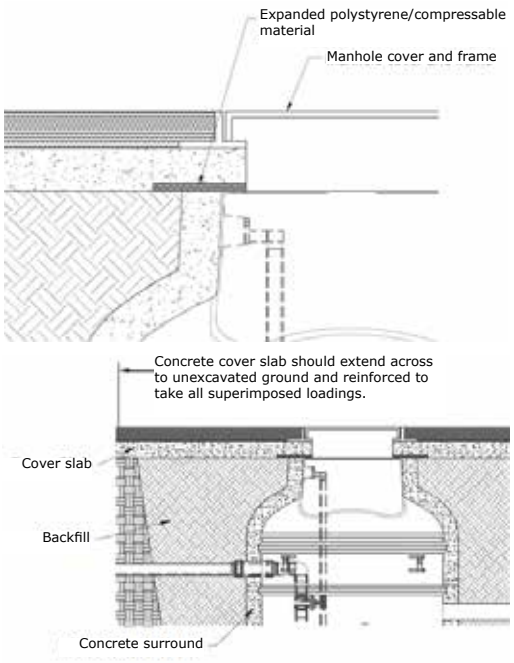
Models V640 - V690

Connections: Sizes and orientation to suit site requirements.

Access openings: Circular or rectangular in range of sizes (see 2.13).

9.4 SPEL Package Pumping Station Installation





These instructions shall be read in conjunction with the Installation Instructions:- Section 13

Preliminary

Determine the size of the excavation from the dimensions of the tank and the incoming drain invert depth allowing for a minimum of 200-250mm (250-300mm for 500/600 Series tanks) of concrete all round the tank. Where difficult ground conditions or the possibility of external loading exist, the concrete surround should be designed accordingly, i.e. extra thickness and/or the use of reinforcing.

Excavation

Excavate allowing for easy placing of the tank and concrete and for consolidating concrete around the bottom half of the tank when backfilling. Allowance should be made for any timbering or sheeting that may be required. If the base of the excavation is of unstable ground – loose gravel, running sand, landfill type areas, peat, swamp or in clay areas subject to swelling/shrinking etc., excavate to allow for 250-300mm of hardcore and cover with a polythene membrane prior to placing concrete.

Procedure

1. Pour concrete base to correct depth and level off. Base to be reinforced as necessary.

2. When this concrete has set sufficiently, place the tank in position, check for levels including inlet/outlet inverts and fill with water in accordance with table below. Ensure concrete slab is clean ready for placing concrete surround. Surround should preferably be placed within 48hrs of casting the base slab.

3. Place backfill concrete (ST4 mix) up to the depth of the water in the tank ensuring the concrete is properly consolidated under the tank to prevent voids. Consolidate by hand – do not use vibrating pokers.

4. Continue by placing concrete around the tank at the same time filling with water to equalise pressure and resist floatation. Where the tank is divided into chambers ensure all chambers are filled equally.

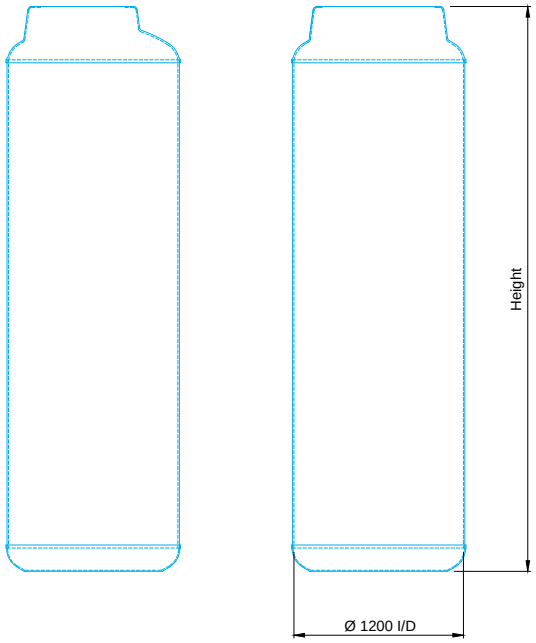
5. Connect up pipework, seat access shaft into socket and apply waterproof mastic/adhesive, or as applicable.

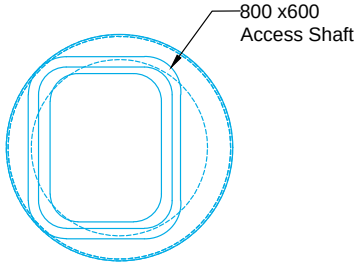
6. Top up the tank with water to inlet/outlet invert level and place remainder of concrete to a depth of approximately 250mm above the top of the tank. Where extension access shafts are fitted, these can be surrounded in concrete once the main tank surround concrete has set. Important: Before surrounding circular or rectangular shafts with concrete, shutter to safeguard against distortion.

7. Where the concrete slab over the tank is to take vehicle loading, it should be reinforced in accordance with good practice to take the maximum load and should be extended onto unexcavated ground. It is important that vehicle loading is not transferred to the tank itself.

8. Incorporate inspection cover frames in the normal manner.

Excavation details (mm)	Series 100/200	Series 300*	Series 400	Series 500	Series 600
Minimum hardcore thickness - dependent on ground conditions	100	200	250	300	300
Concrete base slab thickness	150	150	220-240	240-300	250-300
Concrete surround thickness - dependent on ground conditions	100-150	150	200-250	250-300	250-300
Maximum initial water fill depths prior to backfilling	200	300	400	500	500
Tank internal diameters	1200	1800	2600	3500	4000
Tank external diameter including ribs	1250	1875	2700	3650	4150

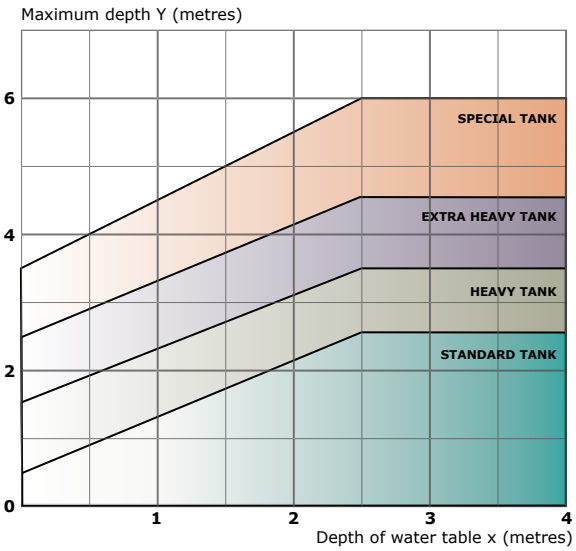


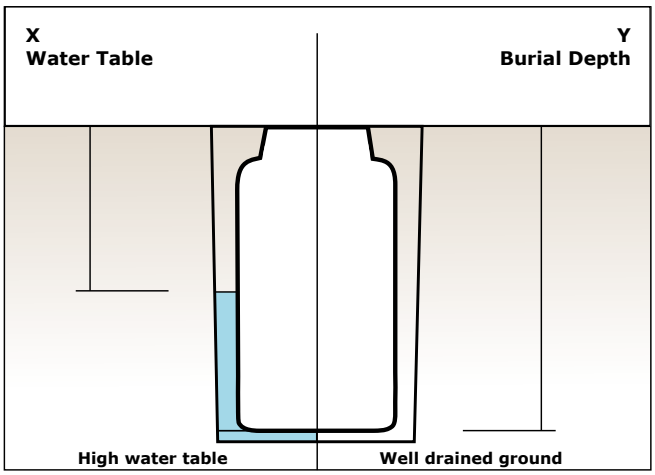


Model	o/a height mm	Gross capacity - liters
V220	2000	1700
V225	2500	2250
V230	3000	2800
V235	3500	3400
V240	4000	4000
V245	4500	4500
V250	5000	5000

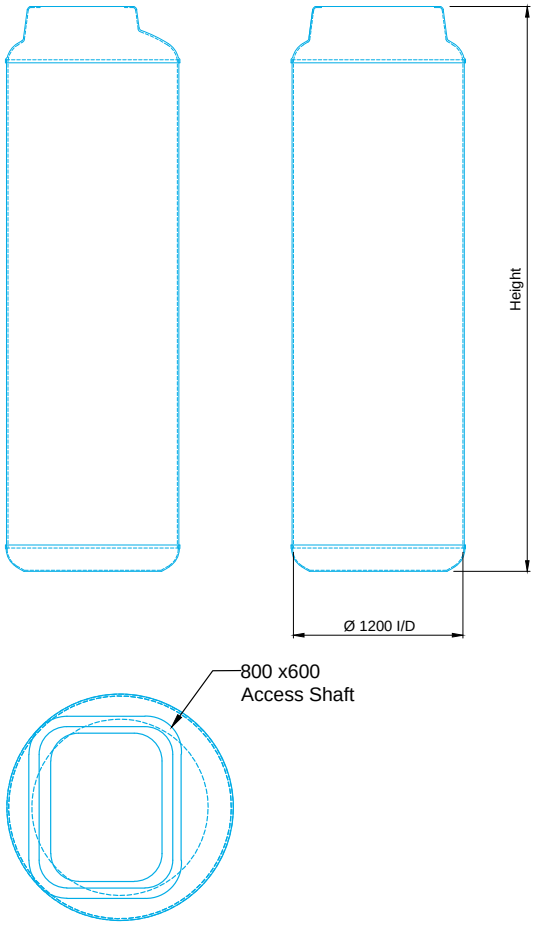
Specification

Specifications to suit chamber invert depth and water table (in winter) with concrete surround





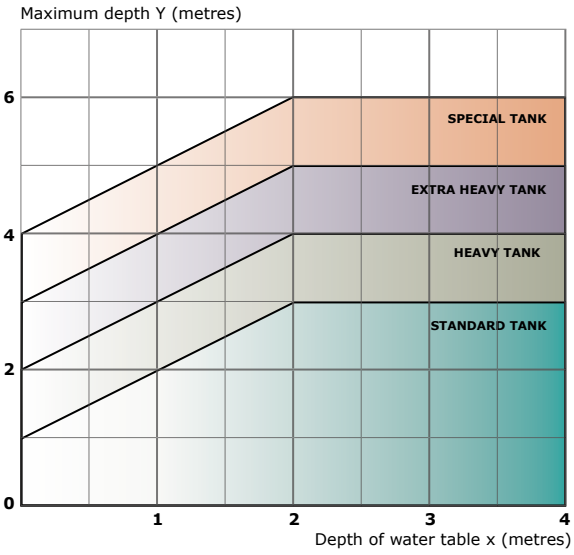
9.6 Xspel® V200 Series - Pumping Chambers

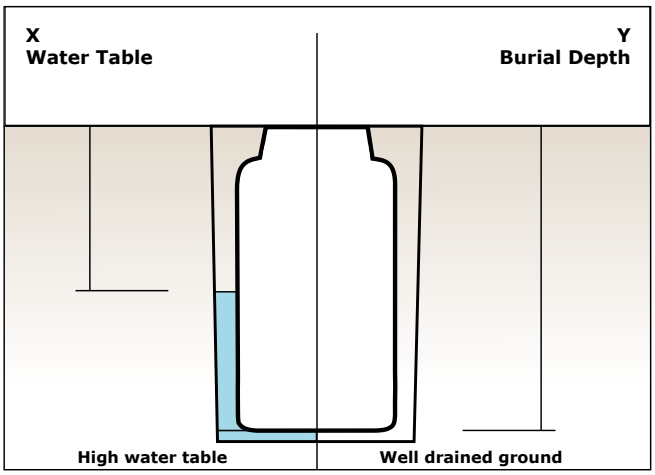


Model	o/a height mm	Gross capacity - litres
V220	2000	1700
V225	2500	2250
V230	3000	2800
V235	3500	3400
V240	4000	4000
V245	4500	4500
V250	5000	5000

Specification

Specifications to suit chamber invert depth and water table (in winter) with concrete surround





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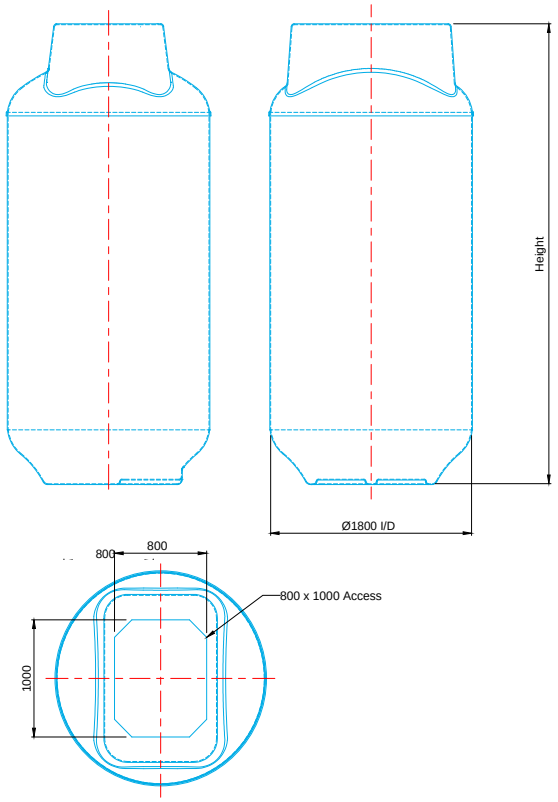
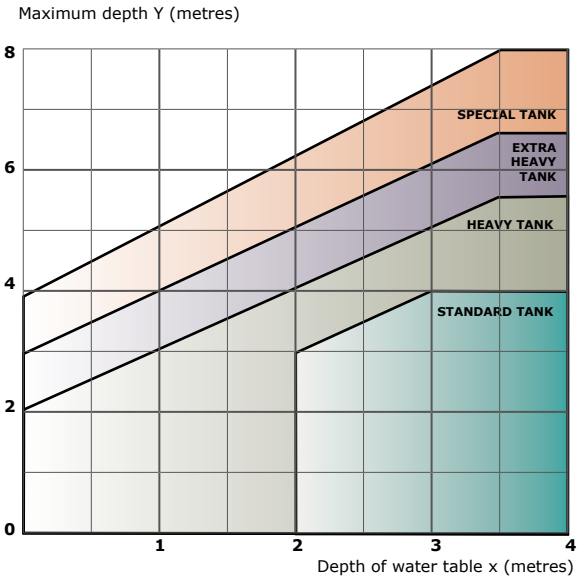
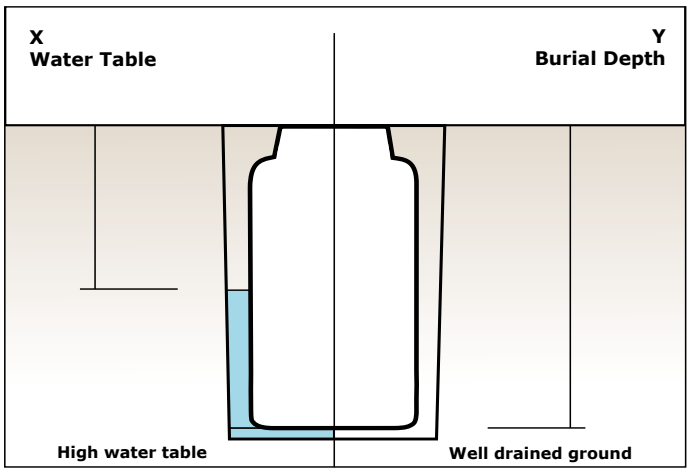


Model	o/a height mm	Gross capacity - litres
V325	2500	5000
V330	3000	6250
V335	3500	7500
V340	4000	8750
V345	4500	10000
V350	5000	11250
V355	5500	13000
V360	6000	13750
V365	6500	15000

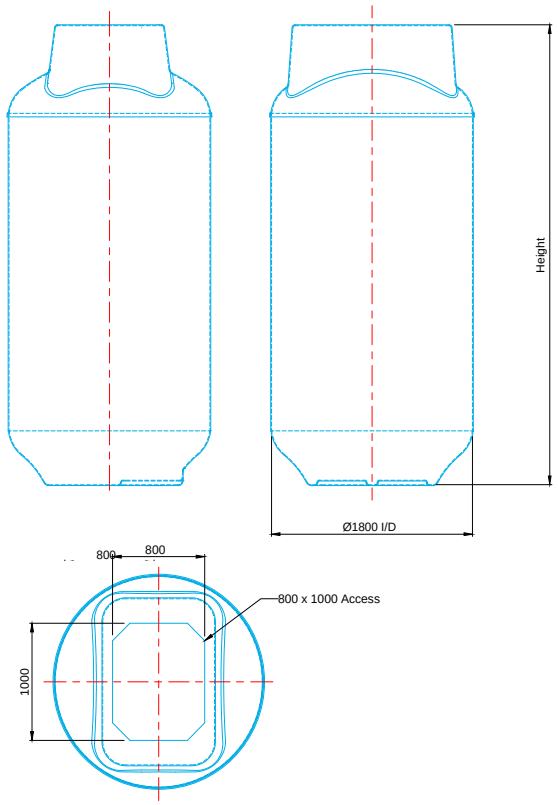
Specification

Specifications to suit chamber invert depth and water table (in winter) with concrete surround





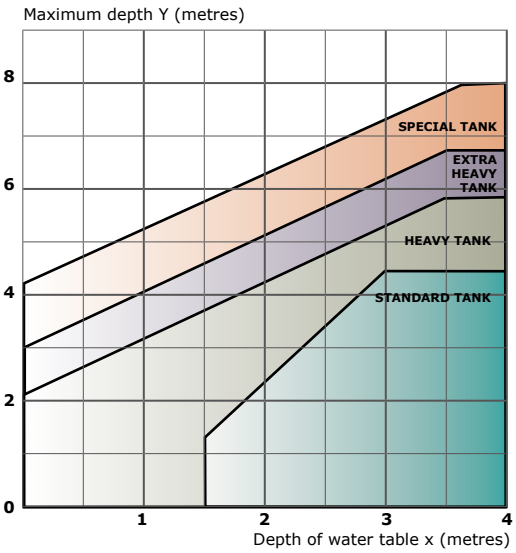
9.8 Xspel® SPEL V300 Series - Pumping Chambers

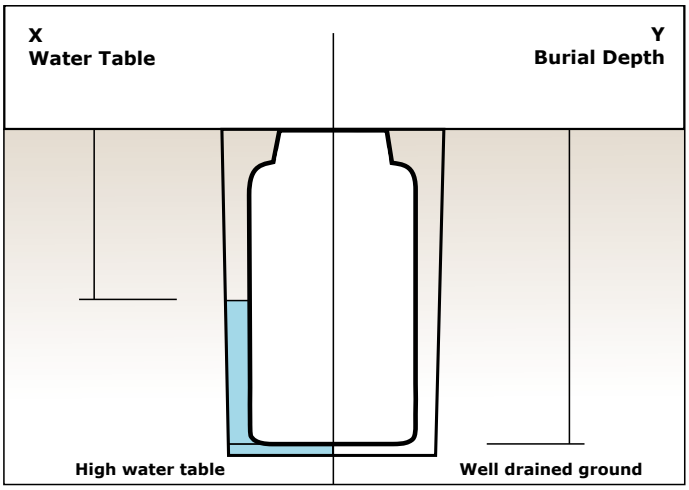


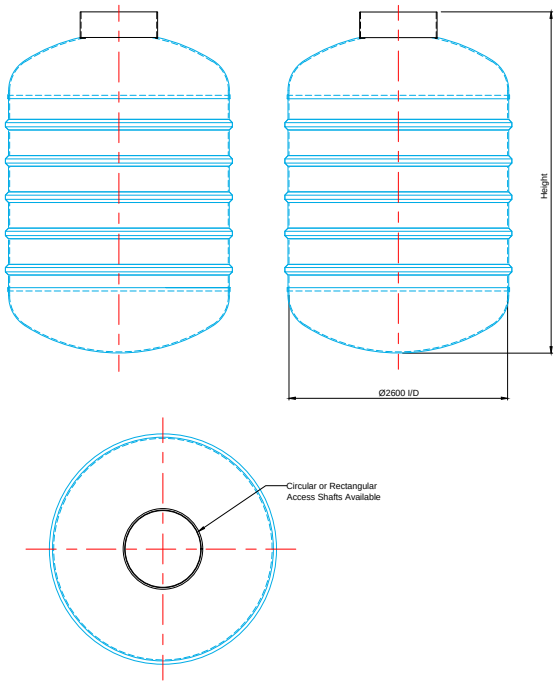
Model	o/a height mm	Gross capacity - litres
V325	2500	5000
V330	3000	6250
V335	3500	7500
V340	4000	8750
V345	4500	10000
V350	5000	11250
V355	5500	13000
V360	6000	13750
V365	6500	15000

Specification

Specifications to suit chamber invert depth and water table (in winter) with concrete surround



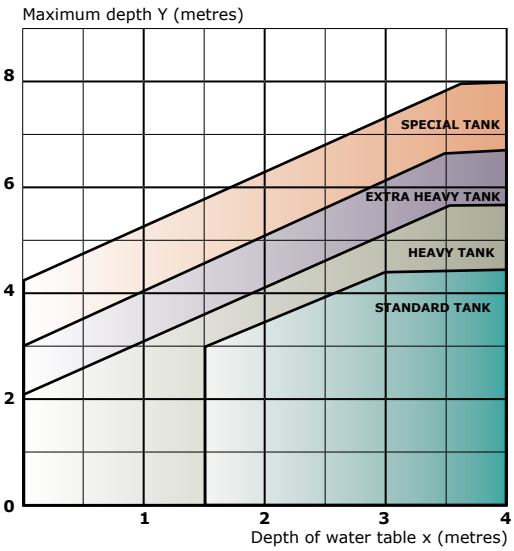


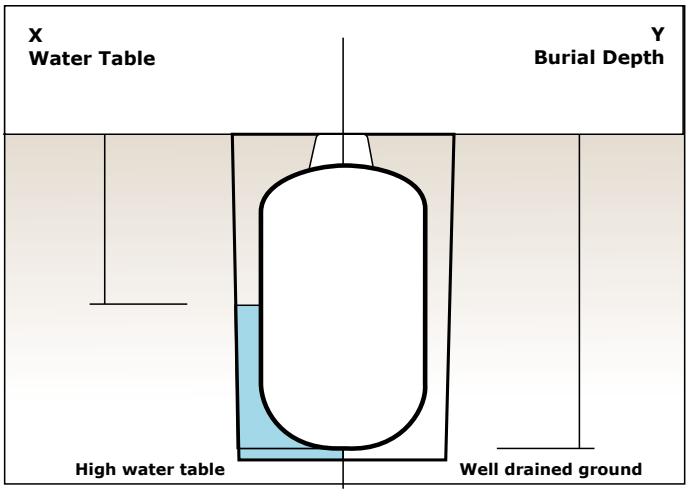


Model	o/a height mm	Gross capacity - litres
V430	3000	10000
V435	3500	12800
V440	4000	15500
V445	4500	18000
V450	5000	20000
V455	5500	23000
V460	6000	26000
V465	6500	28750
V470	7000	31000
V475	7500	34000
V480	8000	36500

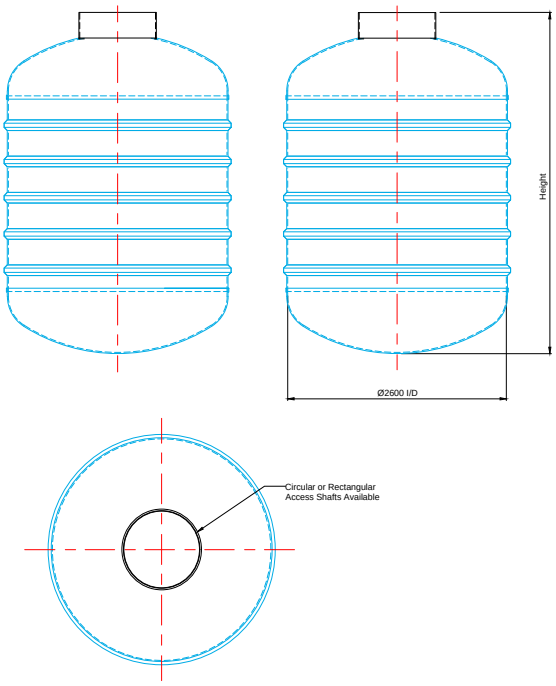
Specification

Specifications to suit chamber invert depth and water table (in winter) with concrete surround





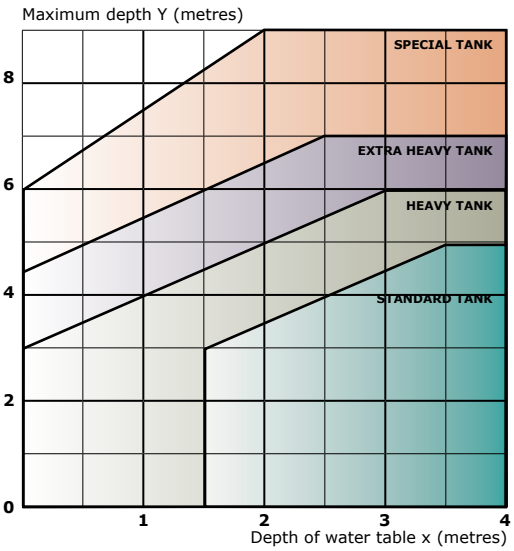
9.10 SPEL V400 Series - Pumping Chambers

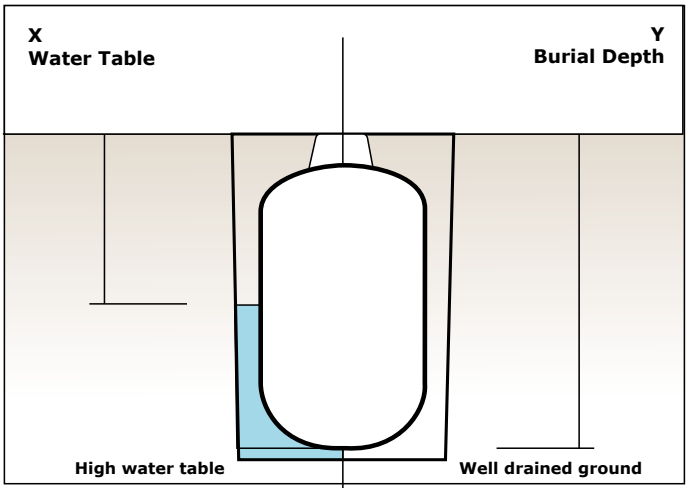


Model	o/a height mm	Gross capacity - litres
V430	3000	10000
V435	3500	12800
V440	4000	15500
V445	4500	18000
V450	5000	20000
V455	5500	23000
V460	6000	26000
V465	6500	28750
V470	7000	31000
V475	7500	34000
V480	8000	36500

Specification

Specifications to suit chamber invert depth and water table (in winter) with concrete surround





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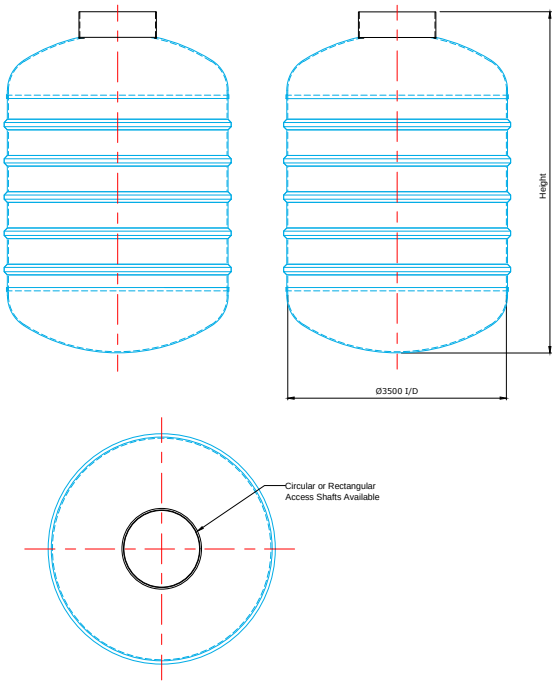
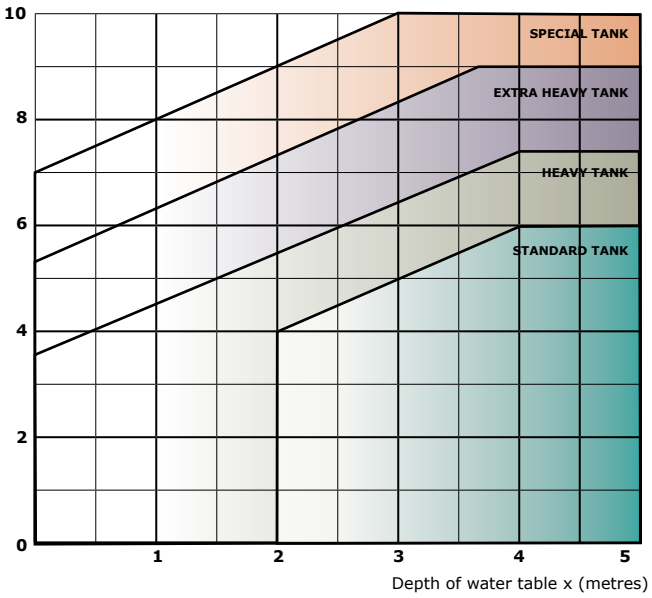
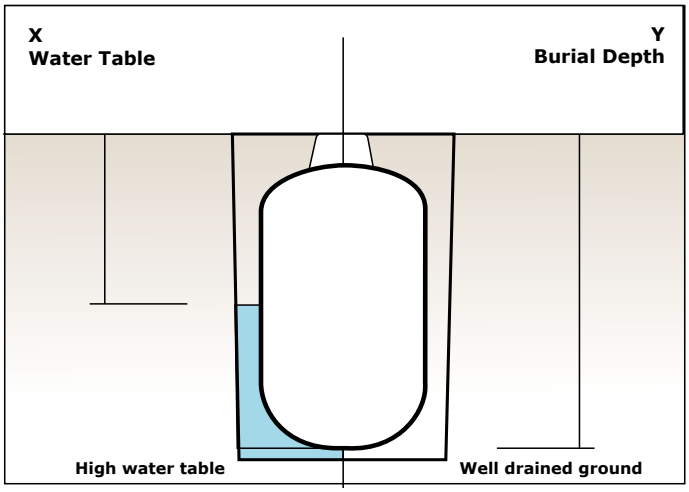


Model	o/a height mm	Gross capacity - litres
540	4000	50400
545	4500	55368
550	5000	60330
555	5500	65290
560	6000	70250
565	6500	75210
570	7000	80170
575	7500	85130
580	8000	90100

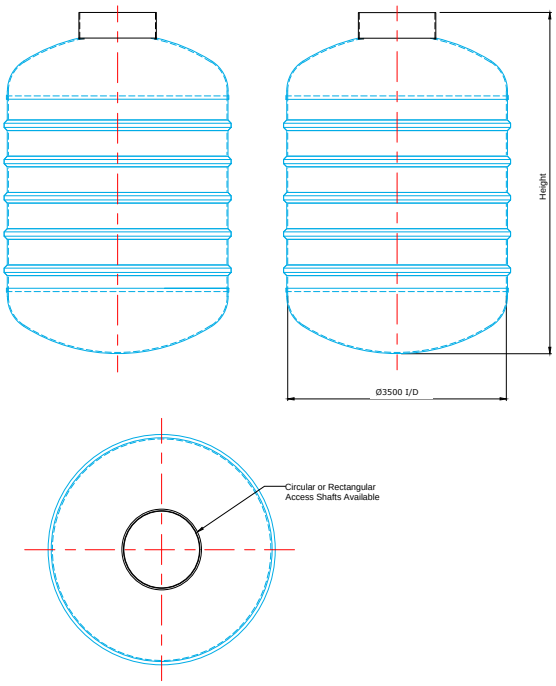
Specification

Specifications to suit chamber invert depth and water table (in winter) with concrete surround





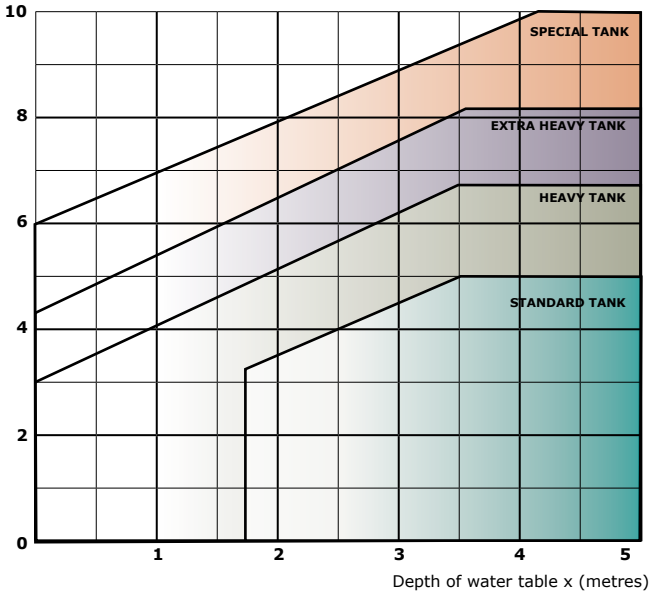
9.12 SPEL 500 Series - Pumping Chambers

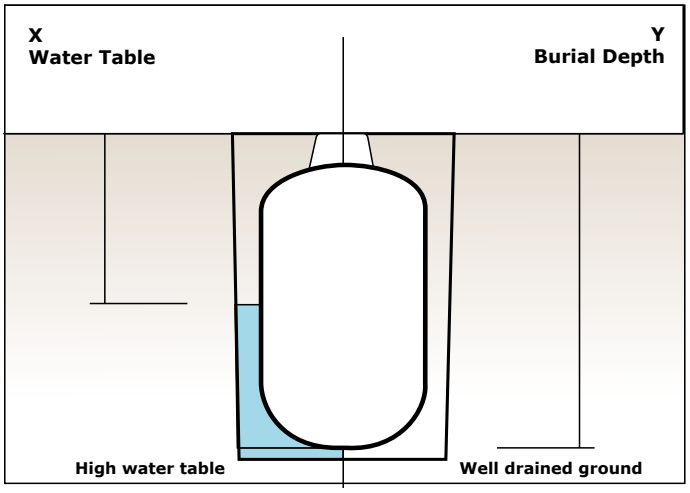


Model	o/a height mm	Gross capacity - litres
540	4000	50400
545	4500	55368
550	5000	60330
555	5500	65290
560	6000	70250
565	6500	75210
570	7000	80170
575	7500	85130
580	8000	90100

Specification

Specifications to suit chamber invert depth and water table (in winter) with concrete surround





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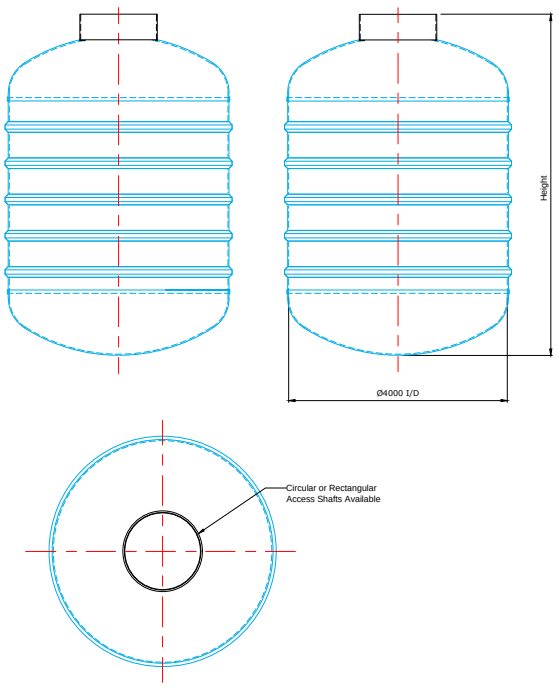
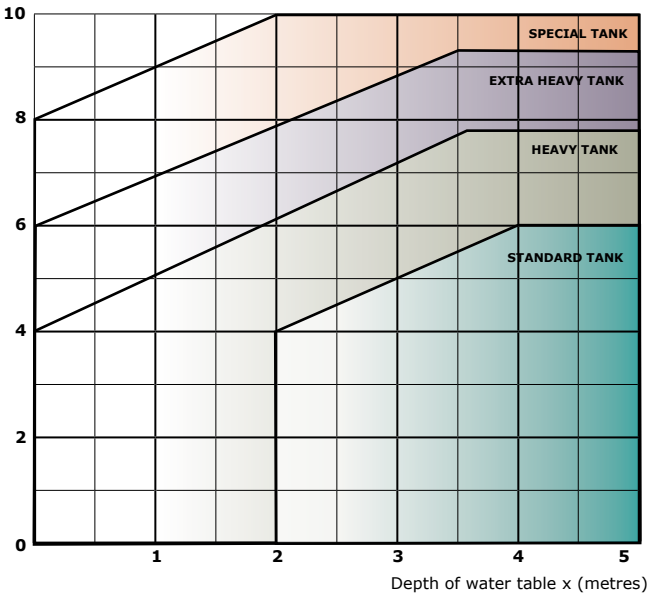


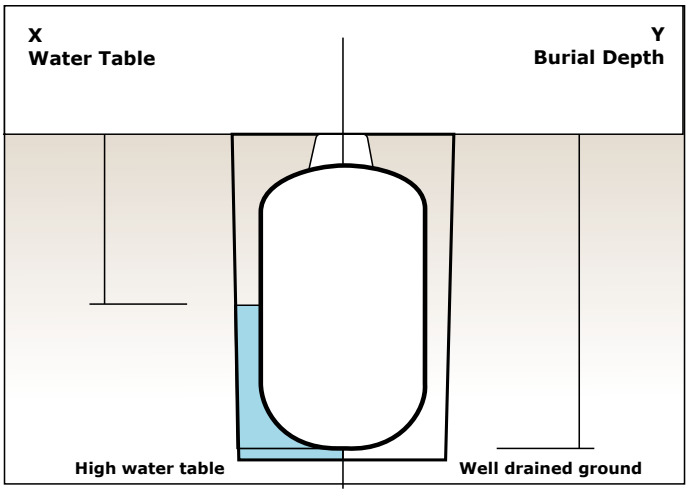
Model	o/a height mm	Gross capacity - litres
640	4000	65668
645	4500	71950
650	5000	78234
655	5500	84517
660	6000	90800
665	6500	97080
670	7000	103370
675	7500	109650
680	8000	115930

Specification

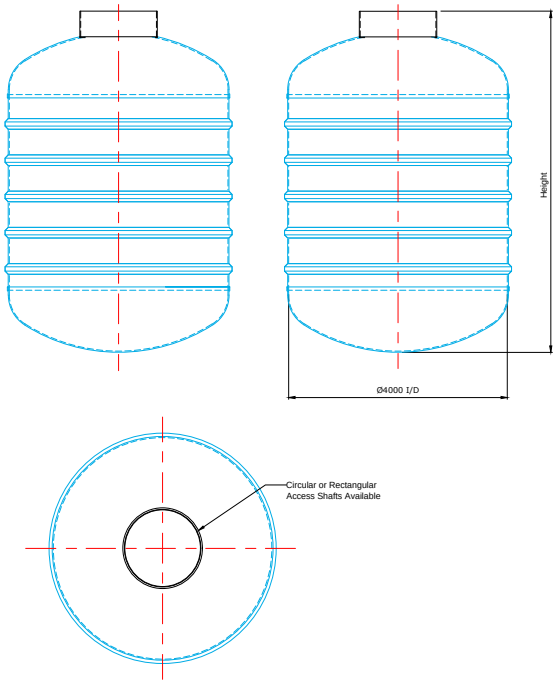
Specifications to suit chamber invert depth and water table (in winter) with concrete surround

Maximum depth Y (metres)





9.14 SPEL V600 Series - Pumping Chambers

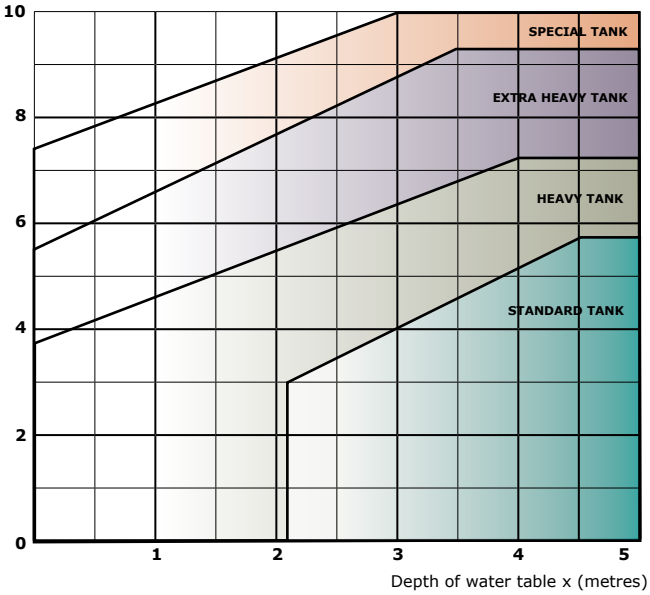


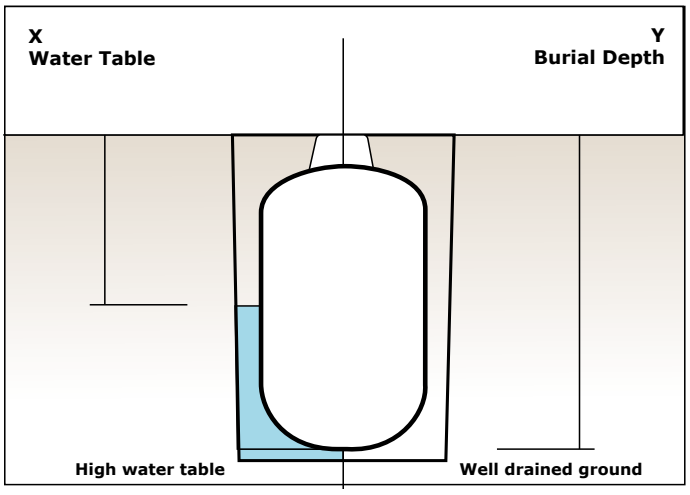
Model	o/a height mm	Gross capacity - litres
640	4000	65668
645	4500	71950
650	5000	78234
655	5500	84517
660	6000	90800
665	6500	97080
670	7000	103370
675	7500	109650
680	8000	115930

Specification

Specifications to suit chamber invert depth and water table (in winter) with concrete surround

Maximum depth Y (metres)





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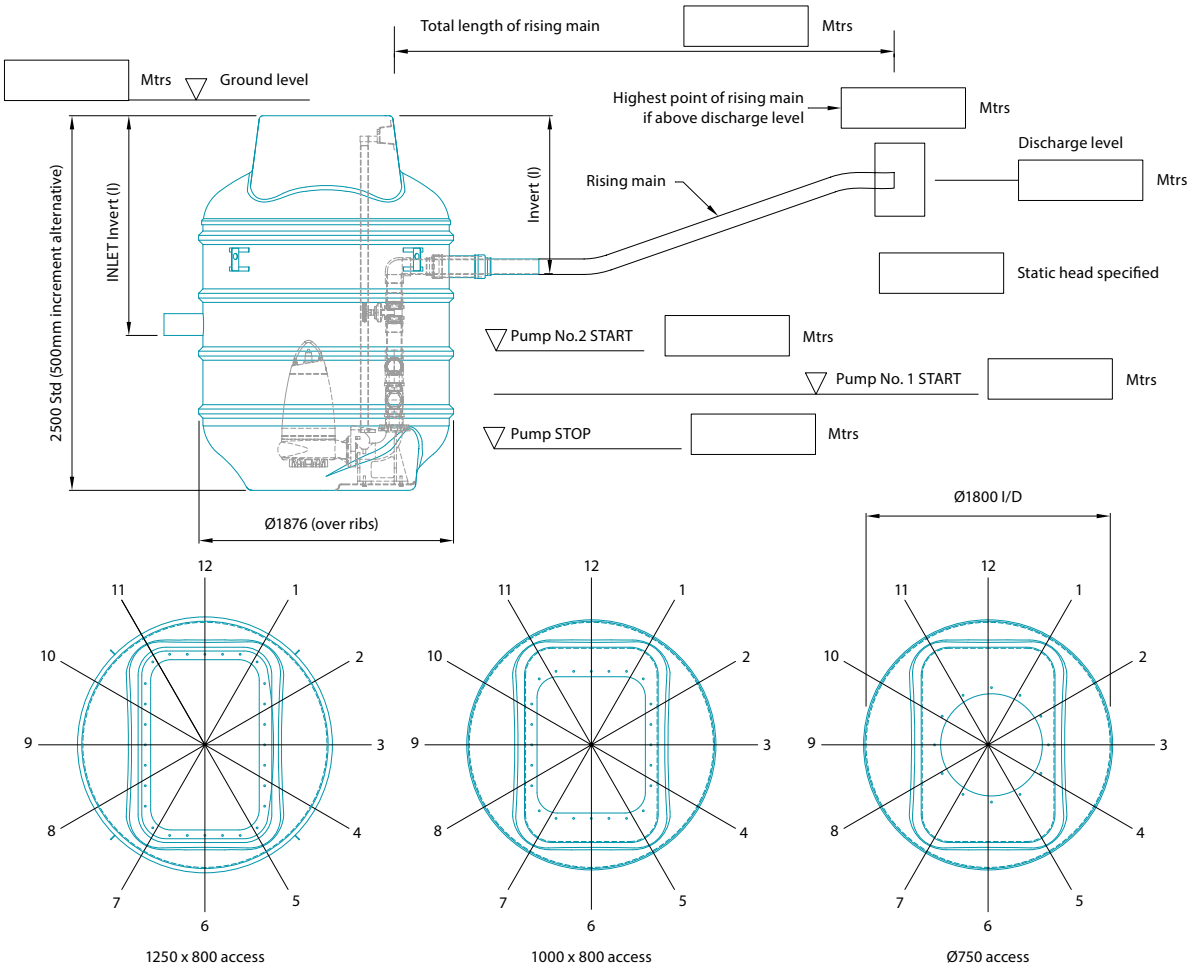


SPEL Xspel® V300 (400-600 Series have circular access shafts)
Pumping station levels = distance

Please complete this table so we can supply an accurate quotation.

Description	Position 1-12	Invert level (1)	Pipe size
Discharge pipe	3		--
Inlet pipe A			
Inlet pipe B			
Inlet pipe C			
Inlet pipe D			
Air vent			
Cable duct			

Media to pump:

Rate:

L/sec

Electrical supply available

◯ Single phase (230 Volts)
◯ 3 Phase (415 Volts)

To adoptable standard

◯ YES ◯ NO

WRC approved ◯

Distance from panel to tank

◯ 10m ◯ 20m or Other:

m

Water table

Maximum level:

m

Options

9.16 SPEL H-Series Horizontal Pumping Stations

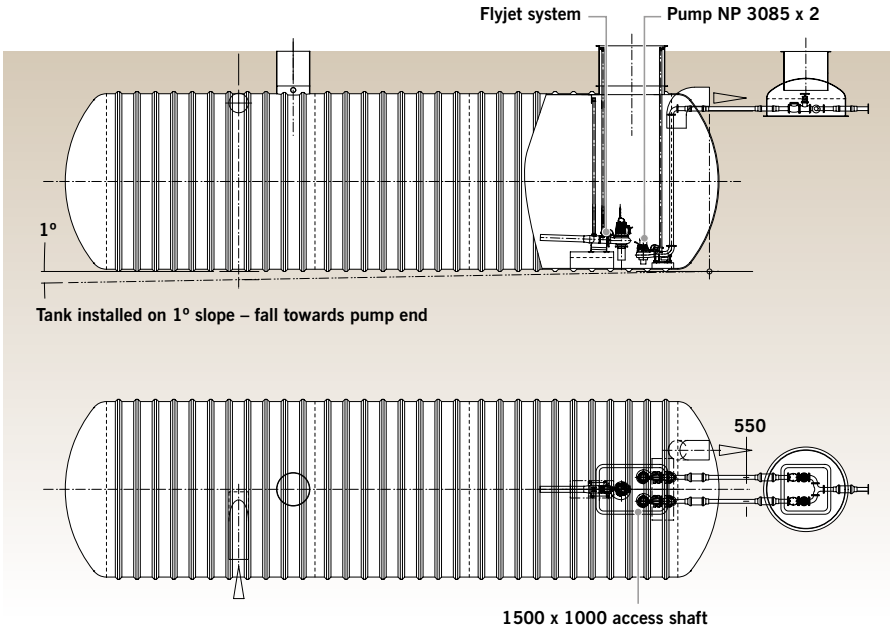
There are many applications where underground tanks are used with pumps, eg. stormwater buffer storage or attenuation, sprinkler fire fighting reservoirs, grey and rainwater storage and utilisation systems (SPEL RainSave System®), surface water and/or sewage pumping stations.

SPEL design and build complete pumping systems for water and local authorities, industrial and commercial developments.

SPEL H-series package pumping stations incorporate all pumping equipment; pipework, valves, pedestals and guide rails are factory fitted and tested. Expensive sitework installing pumping equipment under difficult conditions is eliminated. The only sitework is final commissioning by expert engineers which is a simple and efficient operation with no 'confined space' requirements.

For a quality package providing long, trouble free service all component parts must be selected and specified to achieve that end result. Cutting component quality to reduce cost will result in high maintenance costs and higher life cycle cost (LCC).

For the range of tank capacities and examples of internal components refer to SPEL Tankstor® tanks in Section 2.



SPEL 600 series 180,000 litre capacity incorporating ITT Flygt pumps, Flyjet unit, separate valve chamber with stainless steel pipework, to meet Sewers for Adoption 5th edition. Fortrose and Rosemarkie WWTW Ross-shire, Scotland

Typical SPEL 'H' series package pumping station

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This range is designed to meet the requirements of The Building Regulations 2002 edition for foul water pumping stations.

The unit provides a standard sized pumping chamber with overflow to emergency storage sized to contain the required 24-hour inflow allowance for disruption of service.

Designed and built for efficiency and durability.

The basic shell is chop-hoop filament wound in glass reinforced plastics as a one piece unit to the British Standard BS4994 and ISO 976.

Pumps incorporated can be ITT Flygt or Grundfos to suit specific site requirements. The pipework and valves are factory fitted and tested enabling the unit to be connected up on site with the minimum amount of site labour.

The valves can be incorporated in a separate valve chamber to comply with 'Sewers for Adoption' requirements. (See 9.18)

Reliability

SPEL Products have been manufacturing for over 45 years and pumping stations since the 1970's. The SPEL Package Pumping Stations have been supplied to Scottish Water Solutions, St Andrews Golf Course, Yorwaste Ltd, Avana Bakeries, hospitals, hotels, universities, fire stations, RNAS Yeovilton, Robert Wiseman Dairies, Ashford Traincare etc..

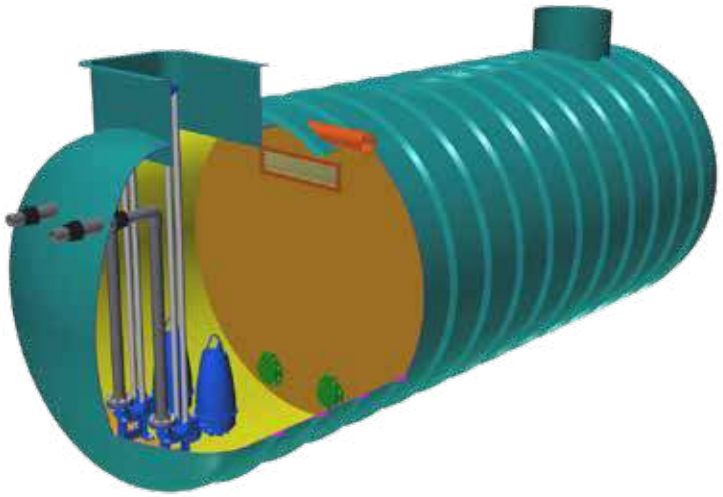
Warranty

The shell carries a 25 year warranty, whilst WRc approved models include a 30 year warranty.

Features

- Generously sized pumping chamber with curved and smooth base that is self cleansing.
- Quality pipework in Class E PVC-U or stainless steel.
- Mesh screen to overflow to prevent solids being transferred to emergency storage.
- Two quality non-return flap valves to allow emergency storage overflow to return to the pumping chamber after reinstatement of power.
- Orientations and sizes of connections to serve specific site requirements.

Site commissioning available.



Sizing

The minimum daily discharge of foul drainage should be taken as 150 litres per head per day for domestic use.

For other types of building, the capacity of the receiving chamber should be based on the calculated daily demand of the intake for the building. Where only a proportion of the foul sewage is to be pumped, then the capacity should be based pro-rata.

The controls are arranged to optimise pump operation.

Site dimensions for site specific unit

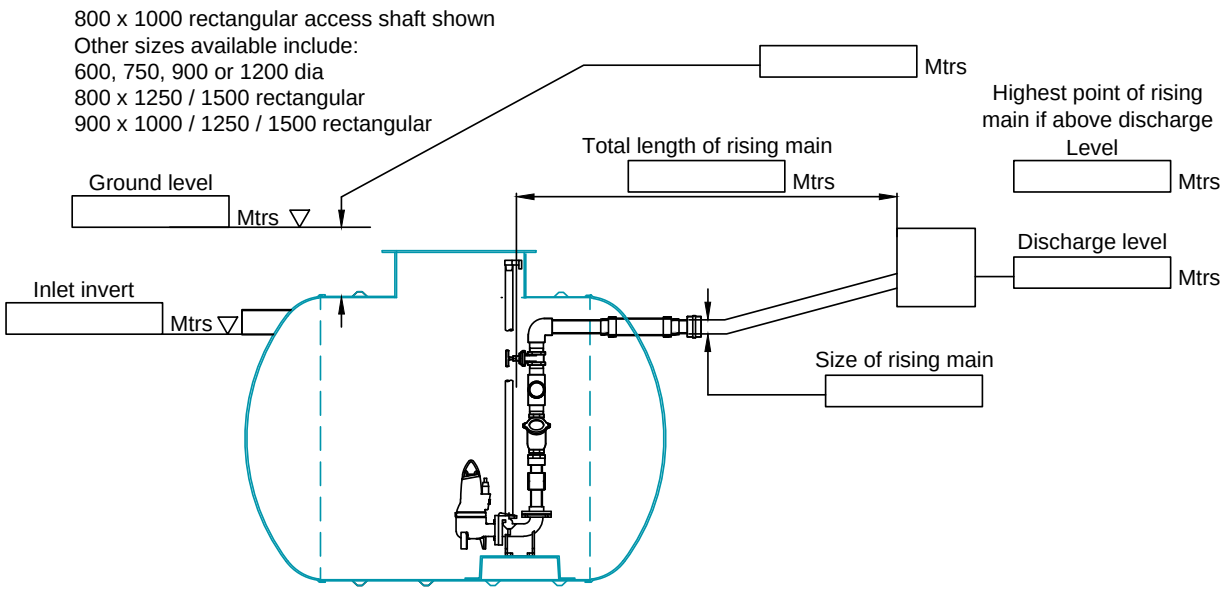
The sewer invert levels and location/ direction, their sizes together with the distance to pump and the invert level of the receiving manhole chamber will be required.

Installation

Installation is a simple and quick operation. Instructions are contained in the Installation Instructions TS11 (supplied with the tank or available on request).

Model	Gross capacity (litres)	Overall length (m)	Storage capacity (max.litres)
400/18	18,200	4.00	17,400
400/20	20,000	4.40	19,400
400/25	25,000	5.25	24,250
400/27	27,000	5.70	26,500
400/30	30,000	6.17	29,000
400/36	36,400	7.40	35,000
400/40	40,600	8.20	39,000
400/45	45,500	9.05	43,500
400/50	50,000	9.95	48,000
400/60	60,000	11.83	57,000
400/70	70,000	13.71	67,000
400/75	75,000	14.70	72,000
400/80	80,000	15.60	77,000

Questionnaire for SPEL pumping station



Pumping station levels = distance

Please complete this table so we can supply an accurate quotation.

Media to pump:

Rate:

L/sec

Electrical supply available

◯ Single phase (230 Volts)
◯ 3 Phase (415 Volts)

To adoptable standard

◯ YES ◯ NO

WRC approved ◯

Pump/s arrangement

◯ Duty only
◯ Duty/Standby (fixed discharge rate)
◯ Duty Assist (variable discharge rate)

	Size	Level (mtrs)
Inlet pipe A		
Inlet pipe B		
Inlet pipe C		
Inlet pipe D		

Water table level (max)	**Mtrs**

Standard Control Panel (3 phase DOL)

Steel construction with ingress protection rating IP54 and concealed hinges provides for hours run, ammeters, pump running/tripped, hand/auto/off, high level and cancel alarm.

Distance from panel to tank

◯ 10m ◯ 20m or Other: m

Options

Commissioning - if you require SPEL to commission please indicate when you will require this:

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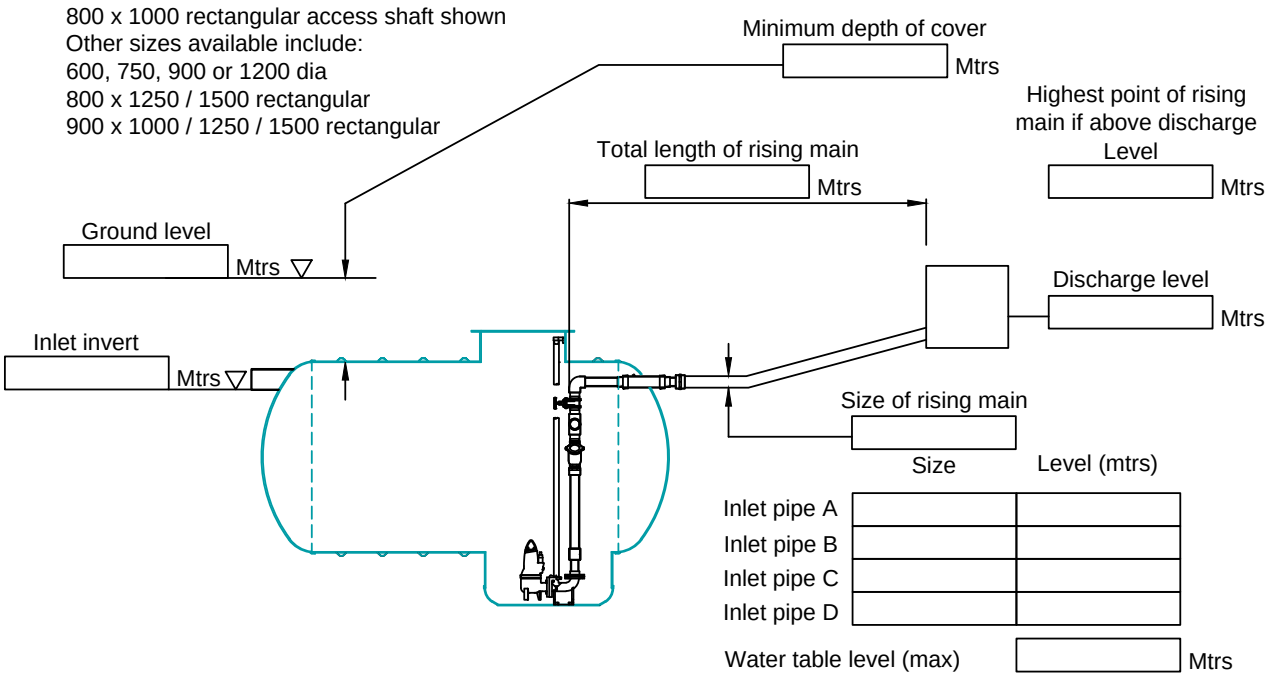
Questionnaire for SPEL pumping station (with sump)



Please complete this table so we can supply an accurate quotation.

Media to pump:

Rate:

L/s

Electrical supply available

- ◯ Single phase (230 Volts)
- ◯ 3 Phase (415 Volts)

To adoptable standard

◯ YES ◯ NO

WRC approved ◯

Pump/s arrangement

- ◯ Duty only
- ◯ Duty/Standby (fixed discharge rate)
- ◯ Duty Assist (variable discharge rate)

	Size	Level (mtrs)
Inlet pipe A		
Inlet pipe B		
Inlet pipe C		
Inlet pipe D		

Water table level (max)	**Mtrs**

Standard control panel

Steel construction with ingress protection rating IP54 and concealed hinge. To include: hours run counter, ammeters, pump running/ tripped, hand/auto/off, high level and cancel alarm.

Distance from panel to tank

◯ 10m ◯ 20m or Other:

Options

Commissioning - if you require commissioning please indicate site location.

Valve chamber required

◯ YES ◯ NO

Tank volume required

Ltrs

Please supply a site reference for correspondence

Examples of site specialist applications

SPEL H-series horizontal pumping stations are also designed to meet customers' specific requirements. The illustrations on these pages include a variety of pumping station designs supplied.

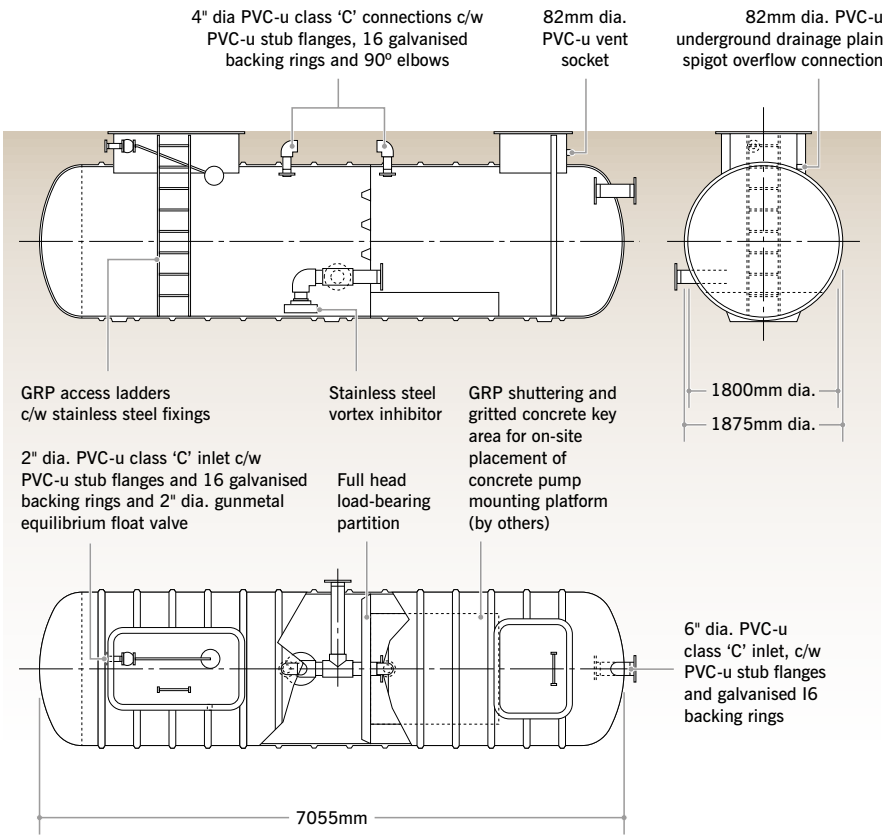
Where tanks are divided into several chambers that could empty alternately, domed partitions are included for the larger diameter 500 and 600 series tanks. For the smaller tanks load bearing partitions are incorporated.

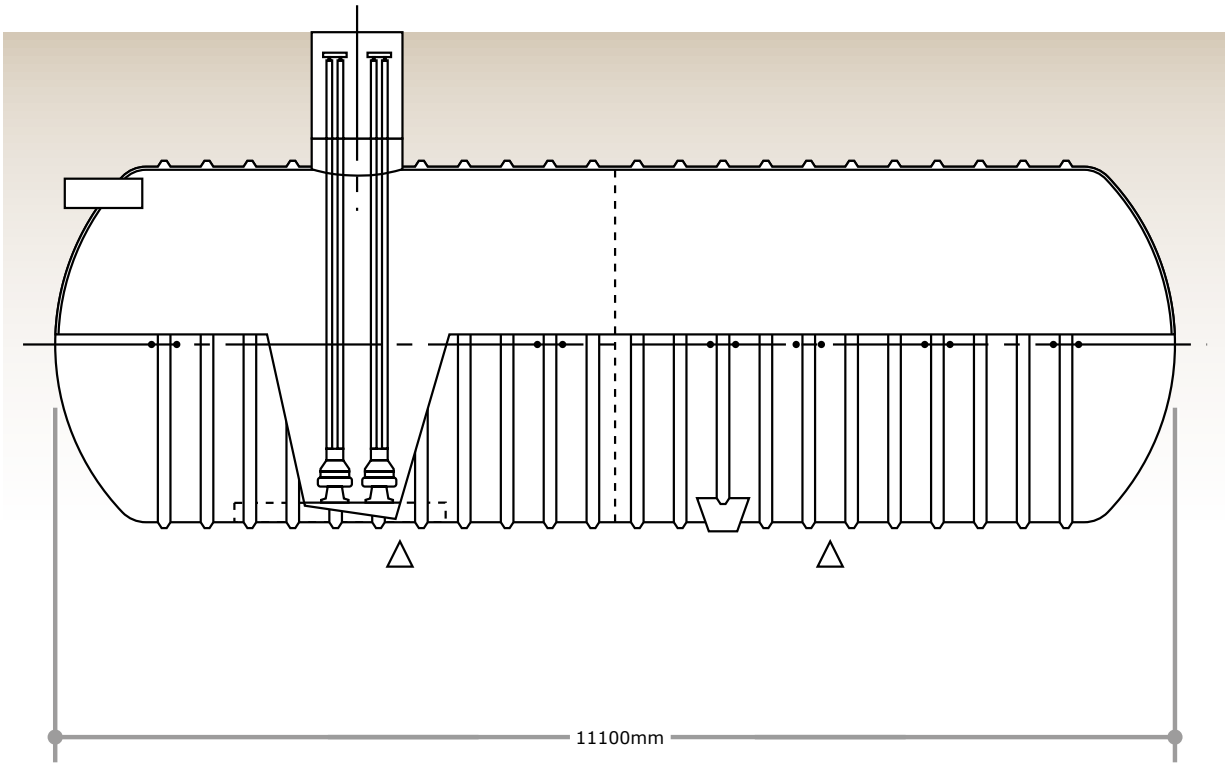
The tanks are normally supplied complete with internal pipework, pump pedestals, any valves required, access ladders etc. for simple installation and connecting on site.

Commissioning after installation and ongoing regular servicing is available by fully trained and skilled engineers.

Right: Fire fighting sprinkler reservoir tank, Leeds School PFI project.

Below: Stormwater attenuation tank with pumping to two separate outfalls.





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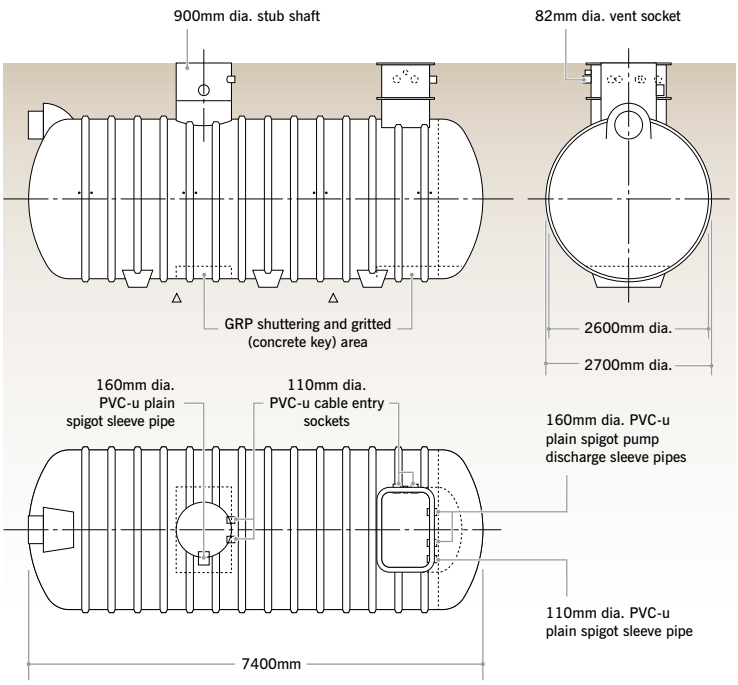
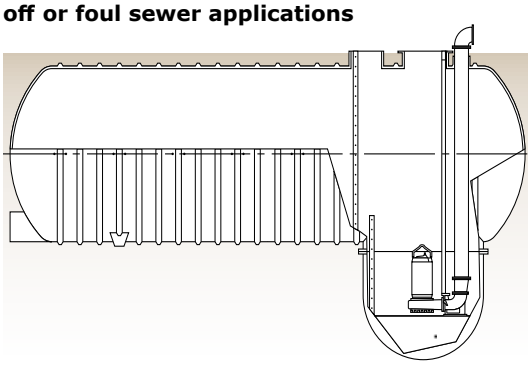
Typical package pumping station

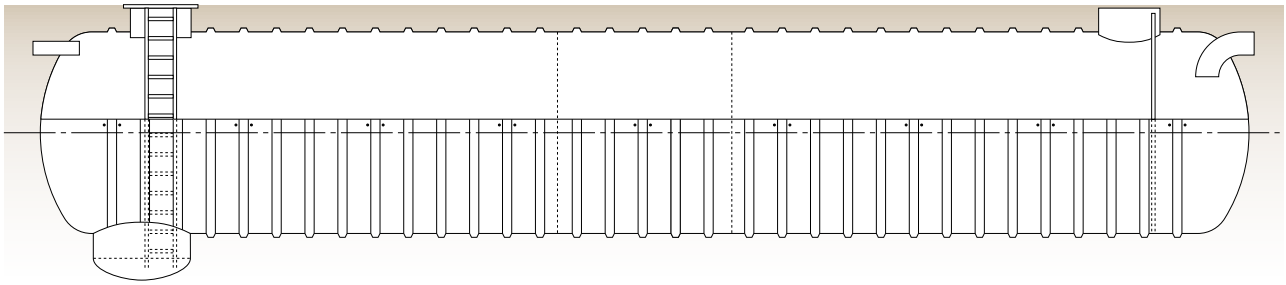


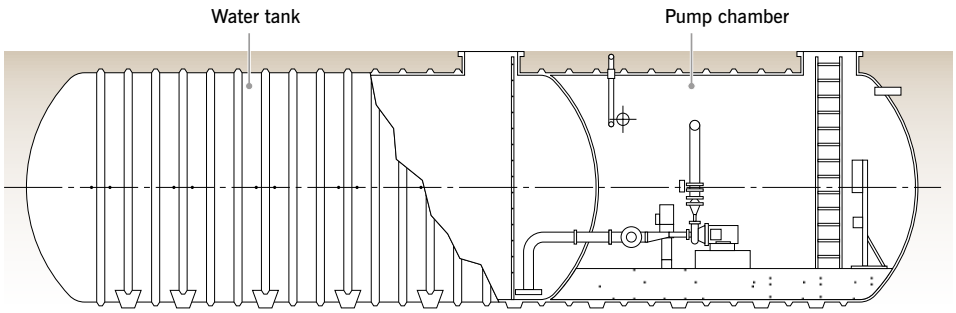
Large sump for handling surface water run off or foul sewer applications



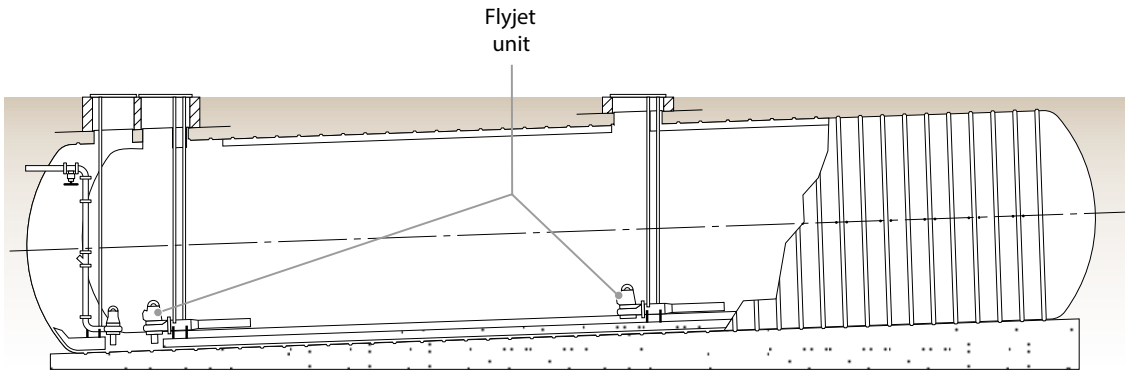
Sumps

For applications requiring 100% drain, a sump can be incorporated to suit pumps, flow rates, media to be pumped etc.





Package pumping station incorporating a dry pump chamber e.g. water reservoirs for fire fighting sprinkler system.



Where silt, grit or other particles present in waste or process liquids are to be kept in suspension.

9.22 SPEL Valve Chambers

Separate valve chambers allow for easier access for maintenance and are required for pumping stations designed for adoption in accordance with 'Sewers for Adoption' which includes the following:

1. The valve chamber should be separate from the wet well to accommodate different settlement. (Particularly in relation to conventional concrete chamber constructed chambers.)

2. The valve chamber should house the following:

• One gate valve per pump mounted horizontally in the pumpset outlet pipework and arranged to isolate the pumpsets from the rising main;

• One check valve per pump mounted horizontally in the pumpset outlet upstream of the gate valves and arranged to prevent mass flow reversal under normal operating conditions; and

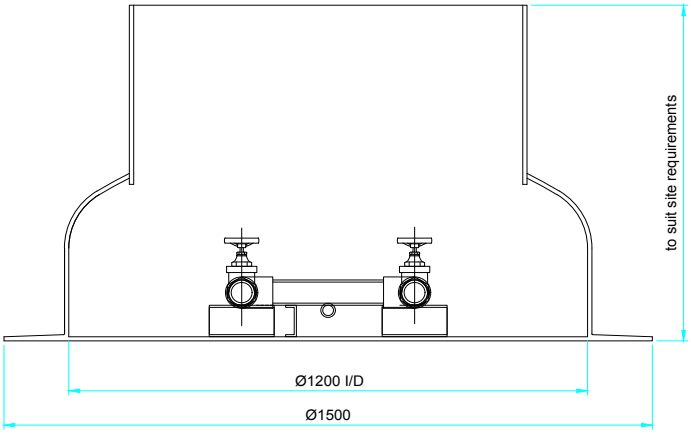
• A gate valve and 100 mm diameter female Bauer coupling, mounted vertically in a Tee piece in the rising main, downstream of the gate and check valves, and suitable for connecting to a flexible hose pumping out the wet well by mobile pump/tanker during plant maintenance or failure.

3. The valve chamber should be provided with a gravity drain into the wet well.

Other requirements include the specification for the valves, access opening, protection against surface water entry, the type of covers, venting etc. SPEL Products can advise in the design to meet specific requirements.

SPEL Valve Chambers are available as separate units in different sizes or, where convenient, can be supplied as an 'integral' part of the main unit, saving installation time on site and with the benefits of a factory fitted and tested 'one piece' unit.

Typical Valve Chamber



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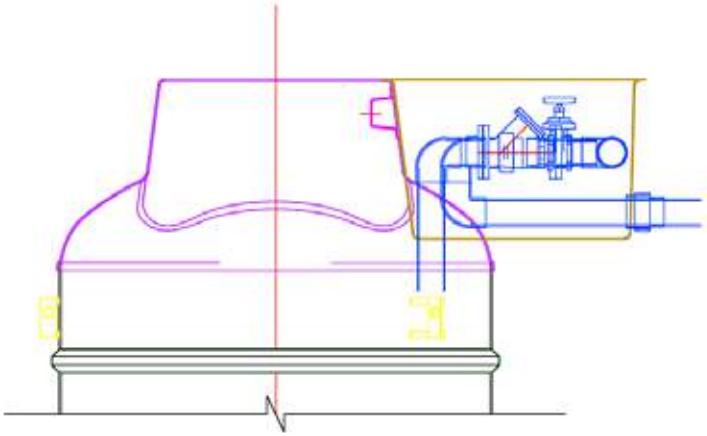
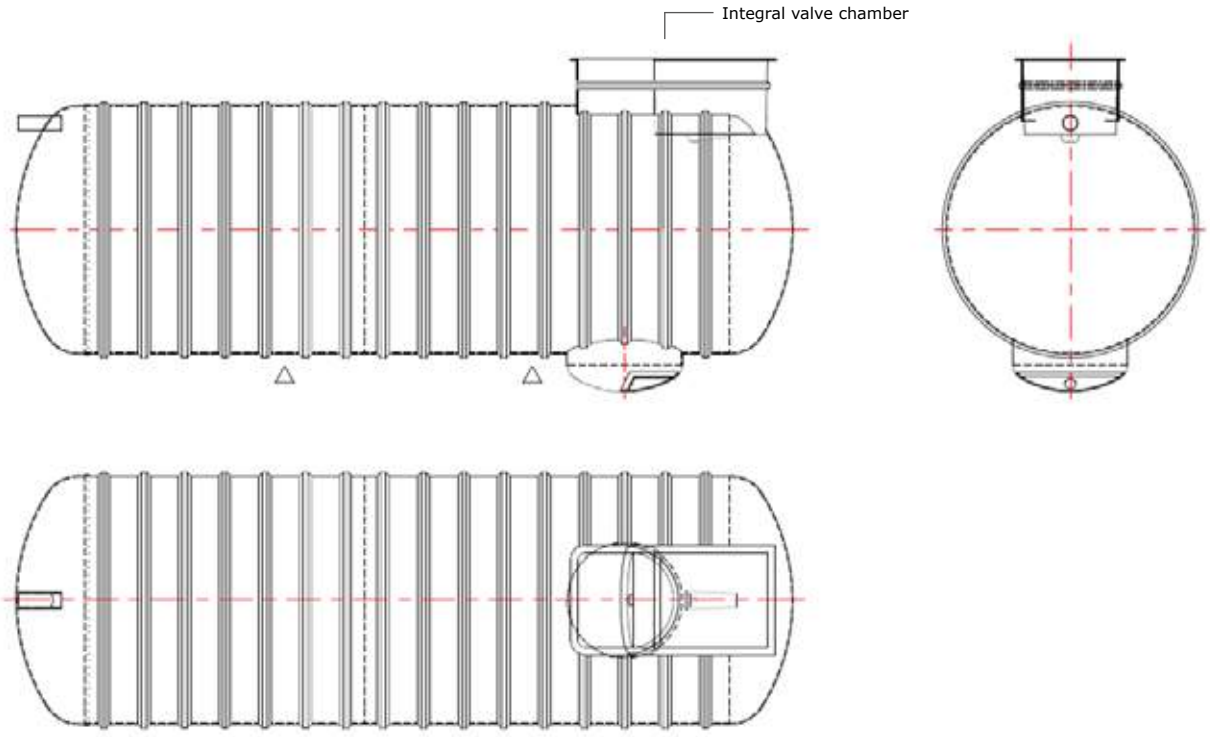
SPEL 'Integral' Package Pumping Stations

Where appropriate 'Integral' valve chambers eliminate site connection to a separate valve chamber and saves on installation costs. Examples of SPEL 'Integral' Package Pumping Stations are shown below:

Vertical



Horizontal



9.24 SpelGuard Servicing®

Investing in a SPEL system means the customer appreciates the superior quality of our systems and will expect after service of equal quality.

As with all systems regular inspection and servicing is recommended to maintain the system's operation and efficiency and avoid breakdowns and any accompanying emergency.

SPEL engineers are trained to service the many systems (SPEL Package Pumping Stations, SPEL DrainGuard, SPEL Econoskim® light liquid skimming and separate containment Systems, SPEL Monitoring & Containment Systems etc.)

For emergencies we endeavour to attend within 48 hrs but this depends on the location. However, we will attend to emergencies as quickly as possible and liaise accordingly.

Two types of service are available as follows:-

SpelGuard® – *Premium*

This agreement covers all parts that regularly require replacement (as listed per system) and labour. Parts that are found damaged that are not normally replaced in a service will be subject to a special quotation for supply and fitting. Where a pump is faulty and within the warranty period it will be subject to the manufacturers' warranty.

SpelGuard® – *Standard*

This service includes the above but all parts requiring replacement are extra. This may involve a second visit if parts are not immediately available and require ordering.

Service check list

The installation will be inspected and checked for any damage, malfunctioning and the sump condition reported on. The specific items as follows:-

1. Pumps

1.1. Check operation of pumps
1.2. Flow rate
1.3. Lifting chains
1.4. Valves

2. Level control

2.1. Condition check
2.2. Level settings

3. System controls

3.1. Earthing on all items
3.2. Function of all components
3.3. Check electronic logic control programme as applicable
3.4. Insulation test of motors
3.5. Running current check of motors
3.6. Winding resistance check of motors
3.7. All electrical connections for tightness

4. Apply labelling/warning signs etc. if applicable.

On completion of installation and commissioning this must be passed to the site operator or facilities management to ensure ongoing servicing requirements are met.

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Aldi Distribution Centre

CASE STUDY

Project: **Aldi Distribution Centre**

Client: **Aldi**

Consultant/Contractor: **Craddy Pitchers/Moortown**

Products:

SPEL Puraceptor® Class 1 Two Chamber Separators:

2 No. P100 2C/SC
1 No. P400 2C/SC
1 No. P150 2C/SC
1 No. P125 1C/SC
2 No. FS2 SC

SPEL Package Pumping Stations:

1 No. 'H' Series PS500/39500
1 No. 'H' Series PS400/25000
1 No. 'H' Series PS400/30500
1 No. 'V' Series V340
1 No. 'V' Series V440

This new regional distribution centre and offices for discount supermarket chain Aldi on the outskirts of Cardiff will create more than 400 new jobs and is being backed with financial support from the Welsh Government.

It is anticipated the investment in the new centre could result in the opening of up to 10 new stores in Wales over the next five years with the potential to create a further 500 jobs.

The new centre will supply stores in South Wales and the South West of England, creating 414 jobs in a variety of roles from graduate level to senior management and operational roles.

The £59.m investment is supported by the Welsh Government with £4.5m business finance which ensured the project was secured for Wales.

Funding support is towards the abnormal land development costs of more than £5m to get the site ready for construction.

National Football Centre Burton-on-Trent

CASE STUDY

Project: **National Football Centre**

Client: **Football Association**

Consultant/Contractor: **Bowmer & Kirkland**

Products:

1 No. SPEL Stormceptor® Class 1 By-pass Separator 215C1/SC
2 No. SPEL Tankstor® Underground Rainwater Storage Tank 300 Series 10,000 litres capacity
1 No. SPEL RainSave® Underground Debris Filter Tank RSDC 450 300 Series
SPEL RainSave System®
SPEL 'H' Series Package Pumping Station with 60,000 litres tank and SPEL 15850 litres Swimming Pool Filter Backwash tank and pumps.


Image Credit: FA

The FA's National Football Centre, St George's Park, set in 330 acres of beautifully landscaped park land, is the training base for the 24 England teams and will provide a platform for the communication of The Future Game Philosophy, which outlines a vision for the development of English football.

"Everything is the best; there is the best equipment, the best facilities, the best medical facilities, the best food and hotels. Every one of the pitches is of the highest quality of anywhere in the world"
(Sir Bobby Charlton CBE).

The Future Game will be brought to life in the football centre which includes a full-sized indoor third generation football pitch equipped with a viewing gallery for up to 200 people, a 60mx40m multi-purpose indoor sports hall, 11 full size outdoor pitches and one elite DESSO training pitch which is an exact replica of Wembley.

This world class facility is available for use by national and international football clubs, as well as other sports and business organisations to drive excellence in performance.

Stoke Gifford Train Maintenance Centre

CASE STUDY

Project: **Stoke Gifford Train Maintenance Centre**

Client: **VolkerFitzpatrick**

Contractor: **Network Rail**

Products:

SPEL 'H' Series Horizontal Package Pumping Stations

PS 300/30,000 Litre
PS 300/18,200 Litre

'V' Series Vertical Package Pumping Station V460
'V' Series Vertical Package Pumping Station V340

SPEL Puraceptor® Class 1 Fuel/Oil Separators:
P150/1CSC
P040/1CSC
P065/1CSC
P200/1CSC

The Bristol based depot is one of three Hitachi Rail Europe depots to house a fleet of long-distance InterCity Express trains that operate on the Great Western.

The state of the art, purpose-built facility incorporates a ten-car storage maintenance depot, a carriage wash building, an associated rail infrastructure and three connections to the Great Western Main line.

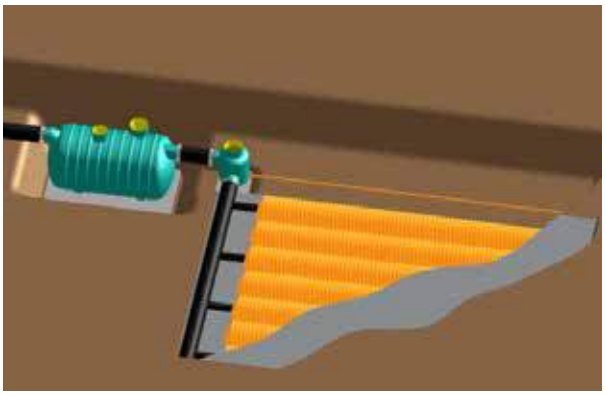
The type of work being carried out at the Stoke Gifford depot includes readying trains for passenger services as well as inspecting and servicing the fleet.

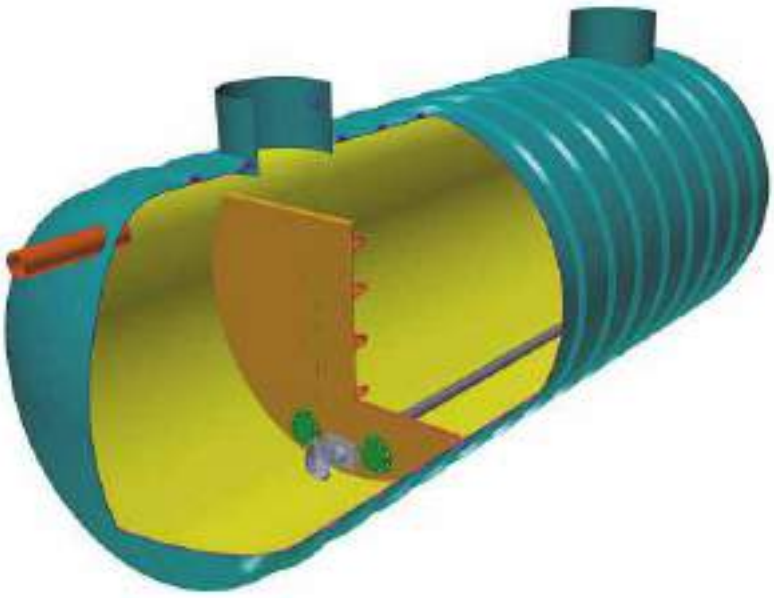
SECTION

10

SPEL SuDS - SPEL Tankstor® Attenuation Tanks
SPEL Storm-Brake Tanks
SPEL StormCheck® Vortex Flow Control Chambers

Case studies included





Introduction to SuDS

Sustainable Drainage Systems or SuDS are now the preferred approach to managing surface water, to reduce the risk of flooding and eliminate pollution.

Without proper stormwater management the increased volumes of surface water directed to existing older sewer networks and watercourses, most of which were never intended to receive these increased flows, will cause overloading and a risk of flooding.

The SuDS approach is designed to mimic natural drainage as far as possible. This is achieved by incorporating different components designed to allow infiltration into the ground, provide storage on site, and/or slow down (attenuate) flows of rainwater. In addition to the rainwater flow being controlled, improvements in the water quality can also be achieved.

It is essential the rainwater is controlled at source and a treatment train incorporating the most suitable components is designed to correctly manage and provide the needed filtration and removal of gross pollutants, trash, silt, hydrocarbons (fuel/oil) and heavy metals as sediment bound.

Useful guidance information

BS 8582:2013 Code of practice for surface water management for development sites

Sustainable Drainage Systems (SUDS) A guide to developers - Environment Agency

What is Sustainable Drainage?

The widespread implementation of sustainable drainage systems (also known as "SuDS") best management practices (BMP) should be integral to any development's surface water management strategy.

A contemporary sustainable drainage methodology for managing surface water runoff should use techniques which focus on three key areas, each where applicable; controlling surface water quantity (reducing off-site flow rates), improving surface water quality and providing added development amenity value, although not always in equal measures.

Contemporary sustainable drainage should be a design and implementation combination of natural and proprietary techniques, complemented by traditional drainage techniques where required.

Flood Risk Management

Artificial drainage systems designed to manage surface water runoff can pose a flood risk if the system is overwhelmed.

Current planning policy guidance considers surface water management a key flood risk issue and sustainable drainage techniques should be employed to manage residual flood risk wherever feasible.

Climate Change

Increasing global temperatures and changing weather patterns confirm that climate change is a reality. Allowances for the impact of climate change are a critical part of any assessment of flood risk and should be included in the design and implementation of sustainable drainage. This would typically be an increase in peak rainfall intensity.

The Water Framework Directive

The EU Water Framework Directive (WFD) is a major opportunity to improve the entire water environment and promote the sustainable management of water for the benefit of people and wildlife alike. The WFD aims to deliver long-term protection of the water environment and improve the quality of all waters to "good" status.

Whole Life Issues

Experience has underscored the importance of considering the construction of sustainable drainage components and ensuring whole life maintenance, thus, delivering authentic sustainable drainage implementation and longevity.

Glossary

SuDS Sustainable drainage systems or sustainable (urban) drainage systems: a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques: they are design philosophies rather than defined process solutions.

Attenuation. Reduction of peak flow and increased duration of a flow event.

Catchment. The area contributing surface water flow to a point on a drainage or river system.

Disconnection. Removing surface water discharges into sewers by use of appropriate SUDs structures such as soakaways. This has a positive impact by recharging aquifers and reducing flood risk.

Diffuse pollution. Pollution arising from land-use activities (urban and rural) that is dispersed across a catchment and does not arise as a process effluent, municipal sewage effluent, or an effluent discharge from farm buildings.

Evapotranspiration. The process by which the Earth's surface (water and soil) loses moisture by evaporation of water and by uptake and then transpiration (water loss) from plants.

Filter drain (infiltration trench). Linear drain consisting of a trench filled with a permeable material, often with a perforated pipe in the base to assist drainage, to store and conduct water, may also permit infiltration.

Flow control device. Device to control the rate of surface water flow at a location within a drainage network.

Geocellular system. Modular structure which provides for underground water storage or infiltration with variable complexity of internal structure, including load bearing supports.

Continued overleaf

Green roof. Roof with specific plants growing on its surface providing a degree of retention, attenuation and treatment of rainwater, it also promotes evapotranspiration.

Impermeable surface. An artificial non-porous surface that generates a surface water runoff after rainfall.

Infiltration device. Device designed to aid infiltration of surface water into the ground.

Misconnections. Foul water discharged to surface water sewers causing pollution. Foul water must be discharged to foul sewers, septic tanks or cesspools as appropriate.

Orifice plate. Structure with a fixed aperture to control the flow of water.

Permeable/previous surfaces. A surface that allows surface water into the underlying construction or soil. These include soft surfaces that permit the passage of water, e.g. grass or gravel; hard surfaces formed of a material that is impervious to water but with voids in the surface which allows water a route to the sub-base, e.g. concrete block paving; a hard surface that allows the passage of water, e.g. permeable asphalt or concrete.

Rainwater harvesting. Process to collect and store rainwater for reuse, rather than allowing it to drain away.

Reed bed. System using reeds to reduce pollutants in surface water.

Soakaway. Subsurface structure into which surface water flows to allow infiltration into the ground.

Source control. Control of runoff at or near its source, e.g. rainfall on a car park.

Suspended solids (SS). Undissolved particles in a liquid.

Throttle pipe. Pipe, generally smaller diameter than the upstream pipe, used to control the pass forward flow by limiting the carrying capacity of the network.

Weir. Flow control structure with a number of shapes/ geometries that only permits flow to pass forward when a predetermined water depth is achieved.

Vortex flow control. Process which induces spiral water flow in a device to control flow rates.

There is a general expectation that a drainage system should be adequate, this applies particularly to drains created by developments subject to Building Regulations. Overland flow paths as a result of an excess of surface water, above the design limit, or due to a blockage in foul sewerage must be considered.

SPEL can provide effective methods of control, improve water quality and save on maintenance particularly in relation to commercial and industrial developments

SPEL Products have been involved with stormwater and pollution control for many years.

SPEL SuDS component products when used effectively can satisfy local authorities, planners, consultants and developers to deliver a greener infrastructure

SPEL Tankstor® Attenuation Tanks

SPEL Tankstor® attenuation tanks are used efficiently to attenuate where inverts allow gravity discharge or where pumps can be incorporated. Pumped systems are very reliable and cost effective.

While attenuation tanks require a deeper excavation than cellular units, the plan area of site is dramatically smaller and installation quicker and simpler.

SPEL Tankstor® tanks

- Are easily serviced by removing silt and heavy metals (sediment bound)
- Maintain the attenuation capacity to the maximum over years
- Take up less of a foot print than cellular crates thus reducing the loss of valuable site area for development to a minimum.
- Can be used for attenuation and rainwater storage where the catchment area is preferably from roofs.

With capacities from 2,000 litre to 300,000 litre and in five diameters from 1.2m to 4.0m they can be installed singly or by interconnecting them to increase the attenuation capacity as required.

Vortex flow controllers are fitted to restrict the discharge flow to an acceptable rate for gravity systems or pumps (Grundfos or similar) which are efficient and trouble free, can be fitted for non-gravity systems.

The efficiency of a gravity system can be increased with a SPEL Storm-Brake design which incorporates the vortex controller in an inlet chamber with an over weir to storage volume enabling optimum efficiency and reducing the storage volume required.

Cellular crates are frequently used which prohibit easy maintenance for removing silt and hydrocarbon pollutants. They also render vast areas of valuable ground useless except for light traffic and car parking. Even then the design of the installation is critical to provide long term stability.

SPEL StormCheck® Vortex Flow Control Chamber

Vertical GRP chambers incorporating a vortex flow controller and overflow means to divert stormwater to attenuation and return for controlled discharge. Can be used for any types of attenuation.

SPEL Separators

These are designed to remove the trash, gross pollutants, silt, heavy metals as sediment bound and hydrocarbons prior to attenuation

SPEL RainSave® rainwater harvesting

Irrigation – railway carriage washes– colleges – visitor centres – botanical gardens – industry etc

The **SPEL RainSave®** storage and utilisation systems can combine attenuation with rainwater harvesting and substantially reduce installation costs and increase BREEAM rating, while maintaining maximum site usage.

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There are many uses and applications where SPEL RainSave® has been used effectively:

Edinburgh Tram Depot *– carriage wash facility*

Oxford University
Irrigating playing fields with SPEL RainSave System® incorporated underground with rainwater storage and dry chamber for pumps.

National Botanical Garden of Wales
Irrigation is a cost effective use of rainwater and better for plant life.

Shrewsbury Schools *– playing fields*

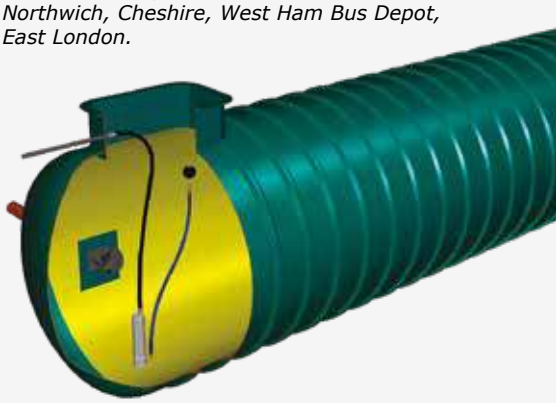
Lifelong Learning Centre, Pontypridd and Rhonda Cynon TAF *- Toilets and irrigation*

Attenuation and rainwater harvesting as a combined system is now gaining ground with the SPEL RainSave® & Storm-Brake system. Cost savings on installation and servicing are proving to be worthwhile, especially where the roof water can be isolated and directed into the system.

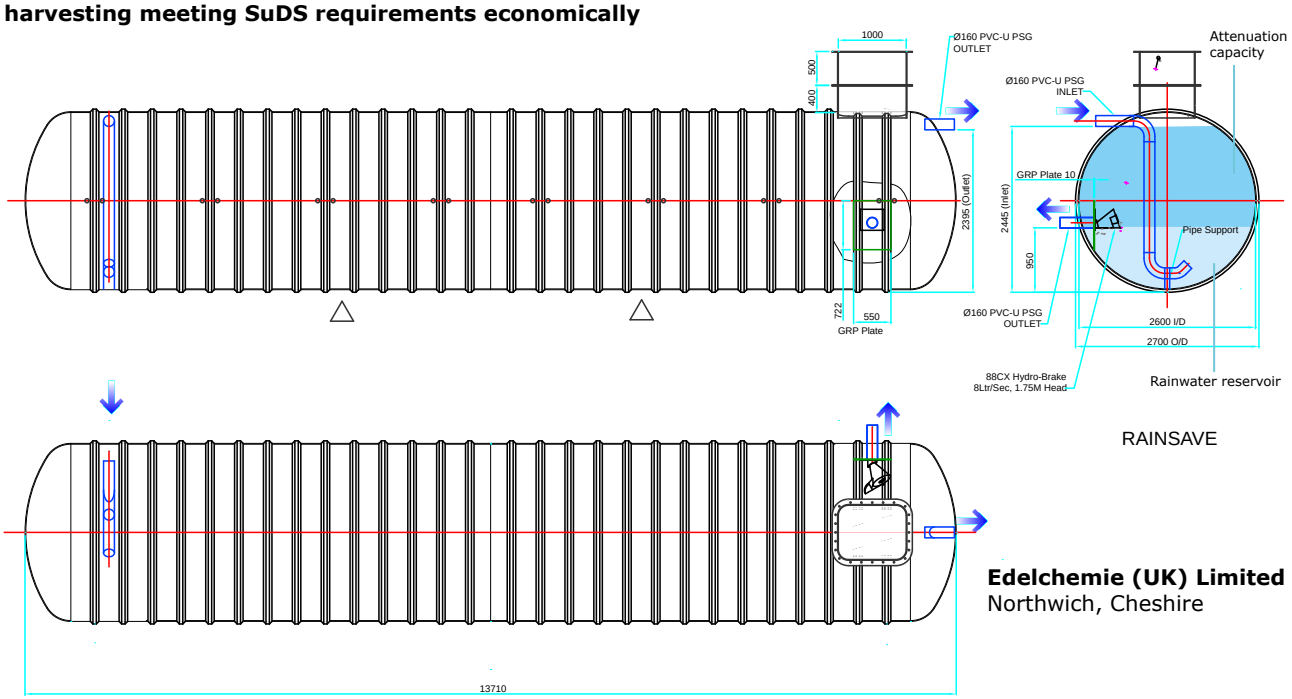
Including paved area is acceptable if the runoff is intercepted with a SPEL Class 1 fuel/oil Separator prior to storage or attenuation.

Whatever the application SPEL Products design rainwater harvesting and attenuation systems to meet specific requirements, particularly in the larger applications where storage can be included in a single underground tank up to 300,000 litre capacity.

Sites completed:
Newbold Quarry, Barton under Needwood.
Northwich, Cheshire, West Ham Bus Depot, East London.



Combining Stormwater attenuation with SPEL RainSave rainwater harvesting meeting SuDS requirements economically



Edelchemie (UK) Limited
Northwich, Cheshire

10.4 Storm-Brake & SPEL Tankstor® Stormwater Attenuation

In recent years, high unprecedented rainfall has put the managing of flood risk high on the agenda. Although SuDS may not prevent flooding during exceptionally heavy rainfall events, much can be done to manage flood risk.

SuDS techniques such as stormwater attenuation and rainwater harvesting are two ways to manage rainwater in high density developments. The reduction in site runoff can be even lower than greenfield runoff rates.

SPEL Products have an efficient range of stormwater attenuation systems incorporating vortex flow controllers or pumps depending on sewer outfall invert levels to meet the allowable discharge rate.

SPEL Storm-Brake attenuation systems

The SPEL Storm-Brake attenuation tank is a two compartment unit with a weir overflow to storage. The first compartment incorporates the inlet and flow controller and, being small in capacity, quickly attains the head for optimum performance of the flow controller.

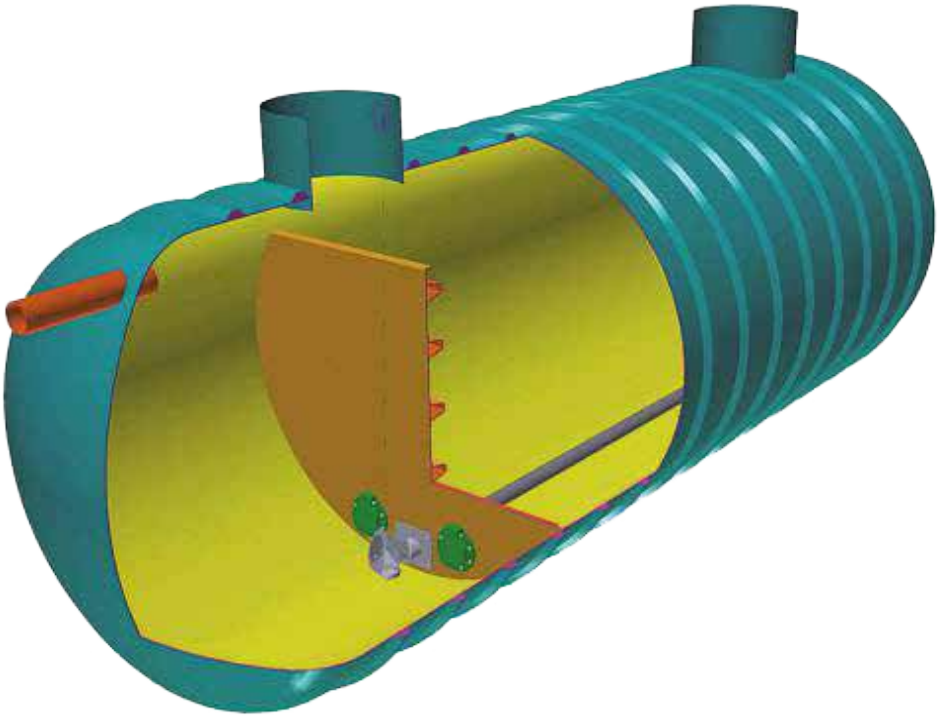
During storm conditions levels will rise and pass over the weir into the storage compartment and as the storm abates and the level falls in the first chamber, non-return valves operate to allow the stored stormwater to pass back into the first chamber and through the flow controller.

The most common systems are on-line where the tank forms part of the drainage system with all flows passing through the tank or interconnected tanks. However, the SPEL Storm-Brake can also be designed for off-line attenuation.

Gravity systems have a vortex flow controller designed to meet the required discharge rate. Where sewer levels cannot accommodate this type of system, a range of pumps and controls are available including site commissioning.

Mainslee attentuation scheme, four 600 series 220,000l totalling 880m³

Boing at Gatwick Airport, thirteen 600 series 4m dia. tanks totalling 3.1 million litres capacity



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With the increasing development of greenfield land and redevelopment of urban areas, impermeable areas of roofs, roads, car parks and hardstanding are replacing previously permeable land through which rain percolated with only a small percentage reaching the surface water sewers.

As a result of such development, increased volumes of surface water are being directed to the existing sewers and watercourses which were never intended to accept these increased flows. To prevent overloading and the risk of flooding, Water plcs, the Environment Agency and local authorities are insisting that surface water discharge from many new developments is restricted to flows as low as 5 litres/sec per hectare. This immediately creates a need for attenuating flows within the drainage system. A flow restriction and a stormwater attenuation facility must be provided.

Where the amount to be attenuated is small, the required storage volume may be able to be incorporated within the drainage system by increasing the diameter of a length of outfall drain. Where large volumes of storage are required, the Storm-Brake or SPEL Tankstor® stormwater attenuation tanks offer a simple, effective and quick to install solution to this problem.

The most common method is on-line tanks forming part of the sewer system with all flows passing through the tank or interconnected tanks. The rate of flow out of the tank system is regulated by a vortex flow control device.

For the large stormwater attenuation systems a SPEL Storm-Brake tank can offer savings in the required attenuation volume.

This is a two compartment tank providing an inlet chamber where the incoming water level rises quickly to the required head for the flow control, situated at low level, to operate at its optimum performance. A high level weir allows stormwater to pass over into the stormwater attenuation storage capacity in the second compartment and interconnecting tanks as required.

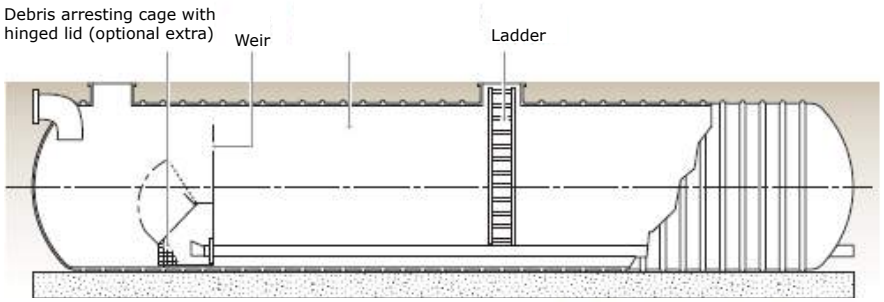
As the storm abates and the level falls in the inlet chamber, non-return valves operate to allow stored stormwater to pass back into this chamber and out through the vortex flow control device.

Where a gravity system cannot be accommodated within the drainage system, SPEL Tankstor® tanks can be fitted with pumps sized to provide the permitted discharge rate. (See Section 2).

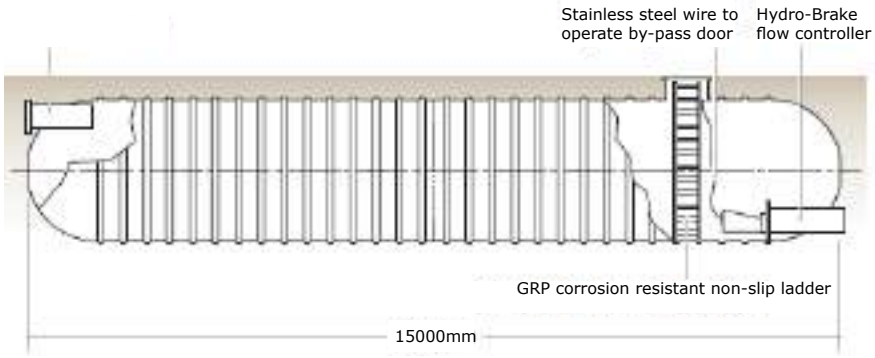
Engineers can establish the tanks' storage volumes using one of the proprietary hydraulic models. The basic information needed is the geographical location or National Grid reference of the site, the storm return period to be catered for, the permissible peak discharge in litres/sec allowable from the site, the impermeable area, the time of concentration and, where available, a site plan with levels and drainage layout.

Given the above information, our technical department will be pleased to advise on the options available.

Eight SPEL Tankstor® 600 series Stormwater attenuation tanks have been installed at Buntsford Hill, Bromsgrove to provide 2,100m³ of capacity



SPEL Storm-Brake attenuation tanks incorporating Hydro-Brake flow controller and baffle/weir for improved performance



SPEL Tankstor® stormwater single chamber attenuation tank with Hydro-Brake flow controller.

10.6 Storm-Brake & SPEL Tankstor® Stormwater Attenuation

Tanks were used extensively until the advent of the cellular crate systems. These offer a very flexible system to incorporate into a landscape or parking area covering a wide area at a shallow depth for a gravity system.

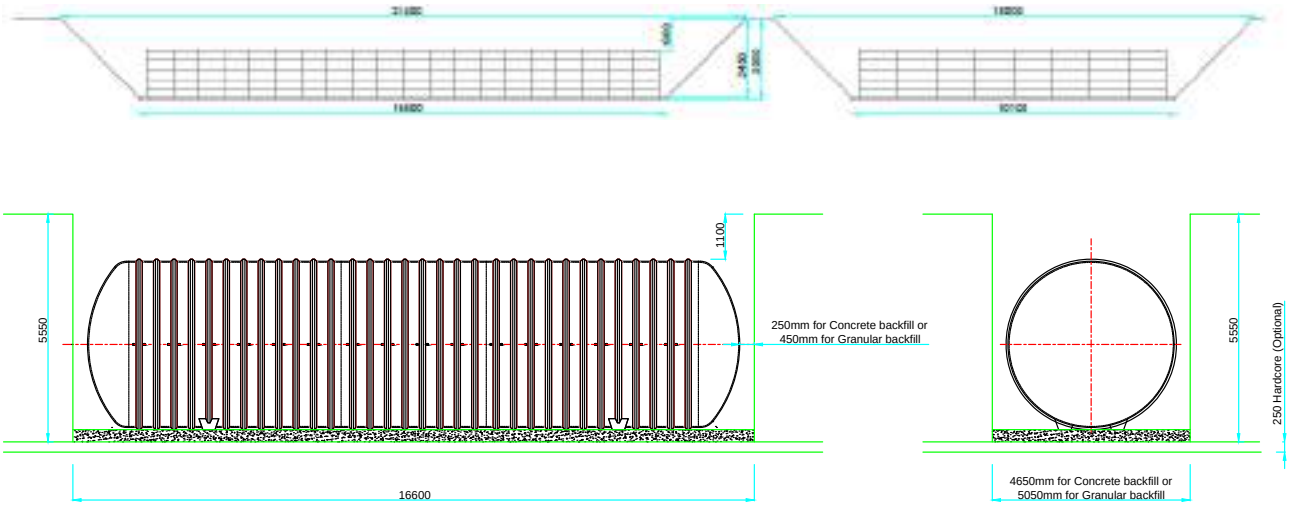
While effective as first installed, silt build up is difficult and virtually impossible to remove completely, thus, the effectiveness for attenuation decreases over time. Along with the silt retained are the soluble metals as sediment bound and hydrocarbons as trapped with the resultant increasing risk of pollution.

Access is a key matter to remove sediment and hydrocarbons. With tanks it is a simple operation to maintain the attenuation system completely free with access shafts provided.

SPEL attenuation tanks have a smooth cylindrical internal surface which provides an excellent channel for flows to maintain the system.

SPEL attenuation tanks are available in 1.2m, 1.8m, 2.6m, 3.5m and 4m diameters. Where tank a diameter cannot be incorporated to provide gravity flow, pumps are installed which are very reliable and cheap to run.

Installation of tanks is very favourably compared to cellular crates in the below drawings and calculations. The dig and spoil volumes are less with SPEL Storm-Brake or SPEL Tankstor® attenuation tanks in many cases.



General installation cost comparison of cellular type crate and SPEL Storm-Brake or SPEL Tankstor® underground tanks

	Total cost	Cost/m3	Result
SPEL Tankstor® 190,000 Tank in shored excavation and concrete surround	£90,800	£478.00	
SPEL Tankstor® 190,000 Tank in shored excavation and granular surround	£89,060	£469.00	24.53% cheaper than crates
Typical installation using cellular crates and battered back excavation and granular surround	£118,000	£621.00	

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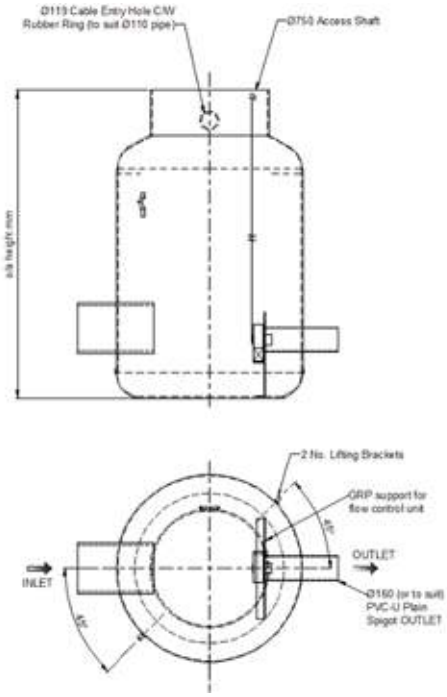

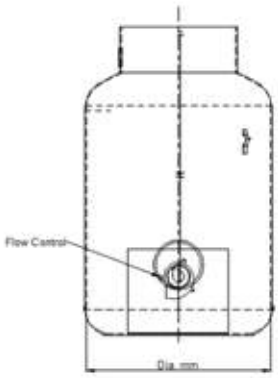

Model	Series	Dia.mm	o/a height mm	Inlet size range	Outlet size range	Outlet invert mm (to suit site)	Access shaft dia. mm
VFC220	200	1200	2000	150 - 300	110 - 150	1750	750
VFC230	200	1200	3000	150 - 300	110 - 225	2600	750
VFC240	200	1200	4000	150 - 300	110 - 450	3500	750
VFC320	300	1800	2000	150 - 750	110 - 450	1500	750/900
VFC330	300	1800	3000	150 - 750	110 - 450	2650	750/900
VFC340	300	1800	4000	150 - 750	To suit	3600	750/900
VFC350	300	1800	5000	150 - 750	To suit	4500	750/900
VFC360	300	1800	6000	150 - 750	To suit	5500	750/900
VFC450	400	2600	5000	To suit	To suit	To suit	750/900
VFC460	400	2600	6000	To suit	To suit	To suit	750/900

SPEL StormCheck® Vortex Flow Control Chambers are manufactured in filament wound GRP in 'one piece' providing a chamber of exceptional strength and flow characteristics.

They are pre-fabricated complete with integral vortex flow control device to provide specific site discharge rates and, if required, with a combined silt trap.

They are factory built and tested ready for immediate simple installation, reducing on-site times and costs together with lower Health and Safety risks compared with in-situ constructed chambers.

Please complete for a quotation:-

Max. Inflow l/s

Allowable discharge l/s

Inlet required dia. mm

Inlet invert depth mm

Outlet required size dia. mm

Outlet invert depth mm

Silt capacity required

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Malinslee

CASE STUDY

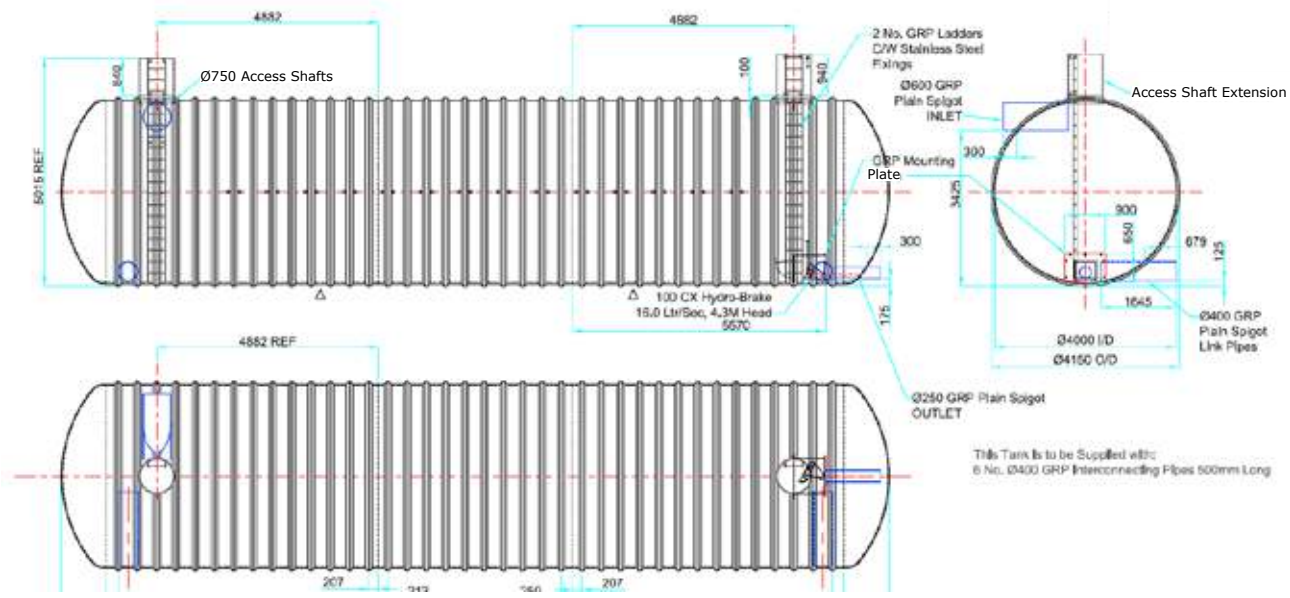
Project: **Dawley & Malinslee Attenuation, Telford**

Client: **Telford & Wrekin Council**

Contractor: **Birse Civils**

Products:
4 No. SPEL Tankstor® Underground Attenuation tank 600 Series capacity 220,000 litres totalling 880m3.

The above projects employed SPEL Tankstor® attenuation tanks with gravity discharge.



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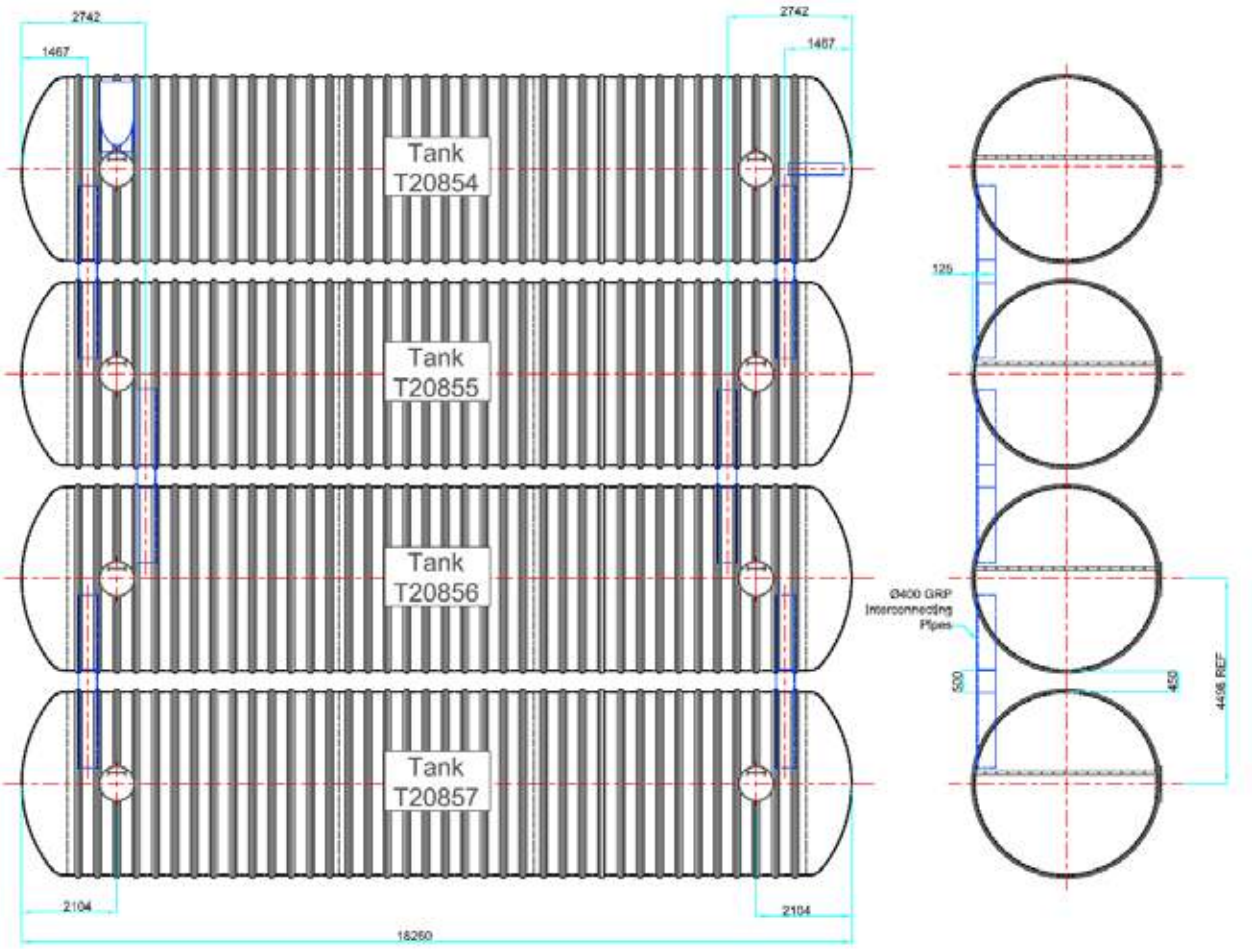
Malinslee

CASE STUDY



SECTION

11

SPEL RainSave® Rainwater Harvesting and Utilisation Systems

WTL approved

Water Technology Listed

11.1 Complete Rainwater Harvesting & Utilisation Systems

St. Asaph Business Park
Contractor: Balfour Kilpatrick
System supplied 2003

Making rainwater work for you

SPEL RainSave® rainwater harvesting systems are designed in relation to the British Standard BS EN16941-1:2018 'Rainwater harvesting systems – Code of practice'. They are fully automatically controlled incorporating high quality pump/s and SPEL Tankstor® filament wound GRP underground or above ground storage tanks designed and manufactured to BS EN 13121/BS EN 976.

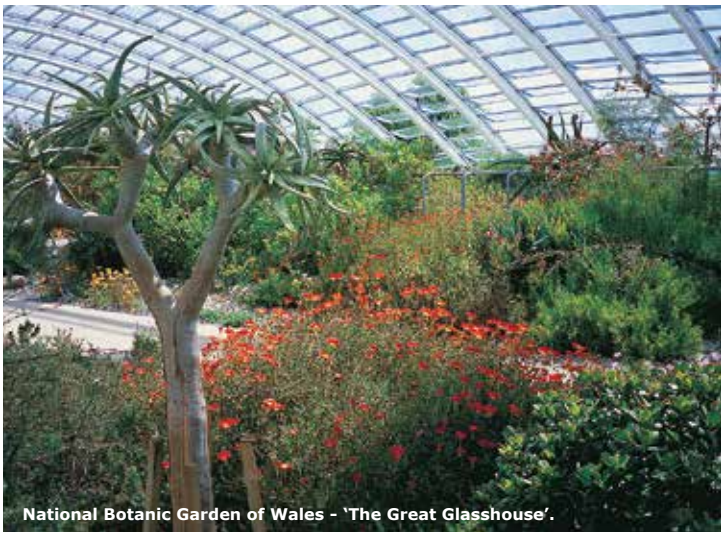
SPEL RainSave Systems® are listed under the Water Technology List (WTL) as managed by Defra and the Inland Revenue. This allows businesses to write off 100% of the cost of investments in qualifying sustainable technologies and products against the taxable profits of the year of investment.

The following covers the benefits of rainwater harvesting, design considerations, alternative systems, tank sizing, system efficiency rating, after tank treatments, system operation and maintenance.

Rainwater harvesting - the increasing need

The growing demand and cost of meeting strict drinking water standards is making potable water an increasingly expensive commodity. Many users do not require potable water and providing the rainwater harvesting and utilisation system has been properly evaluated, worthwhile savings can be made.

Large commercial properties such as supermarkets, distribution centres, schools, colleges, large retail outlets, etc. have large roof areas and are ideally suited to harvesting rainwater for toilets, irrigation, vehicle washes, cleaning down operations, etc.



National Botanic Garden of Wales - 'The Great Glasshouse'.

400 Series, 60,000L SPEL Tankstor® rainwater storage tank providing 400,000L a year for irrigation and toilet flushing.

Snowdon Cafe and Visitor Centre - installed at the summit of Snowdon (Yr Wyddfa) 1085 metres.

10,000L SPEL Tankstor rainwater storage tank - supplied 2008.

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"Every cloud has a silver lining"

SPEL RainSave® rainwater harvesting & utlisation systems

To ensure efficiency and low maintenance choose wisely. As is often quoted 'you only get what you pay for'. A cheap system is not usually the most cost effective in the long run.

For the right system to meet your requirements most effectively, complete the answers to the questionnaire below and return to us for a comprehensive quotation.

SITE / CONTRACT	
Site / Contract name	
Site address	
	Post code

CONSULTANT	
Consultant name	
Contact name	
Consultants address	
	Post code
Telephone no.	Email

CLIENT / CONTRACTOR		
Client / Contractor name		
Contact name		
Client / Contractor address		
	Post code	
Telephone no.	Email	

CATCHMENT	Hardstanding m^2
Roof m^2	◯ Concrete ◯ Stone
Pitch	◯ Tarmacadam ◯ Grass

WATER USAGE	Estimated per annum m^2	***or*** measured per annum m^3
WC's no.	Vehicle wash	Washing machines
Urinals no.	Irrigation	Other

To enable us to accurately price please forward a site plan indicating the position of the mains electricity supply, area for the storage tank, level and location of the items to serve.

Don't forget that SPEL RainSave Systems® are listed under the Water Technology List (WTL) to allow 100% right off against taxable profits in the year of investment. Ask us for details.

Return by fax 01743 465442 or email sales@spelproducts.co.uk

QUALIFIED
WATER TECHNOLOGY LIST
AUTHORISED
USER NO. 12345

11.3 Complete Rainwater Harvesting & Utilisation systems

SPEL RainSave Systems® are for the larger industrial, commercial and horticultural applications where potable water is not required.

This publication is to acquaint architects, consulting engineers, horticultural businesses, colleges, building and contracts' managers with the range of systems and scope of design packages that SPEL can provide to utilise rainwater to an advantage.

SPEL Products design, manufacture and provide system installation and commissioning together with full instructions for the installation of the SPEL Tankstor® storage reservoir.

Why use a rainwater harvesting system?

While the British climate is considered to be very wet with an abundance of rainwater, the population is growing which puts water resources under pressure. In addition to this, the drainage from urban areas is causing concerns with regard to flooding. The Environment Agency is promoting the use of Sustainable Drainage Systems (SuDS) which includes the use of rainwater harvesting to retain and control surface water.

The Building Regulation G requires a water efficiency standard of 125 litres per person a day for new homes. It clarifies the safe usage of both greywater and rainwater harvesting.

SuDS - SPEL Drainage Solutions

In recent years, especially in 2007, high unprecedented rainfall has put the managing of flood risk high on the agenda. Although SuDS may not prevent flooding during exceptionally heavy rainfall events, much can be done to manage flood risk.

SuDS techniques such as stormwater attenuation and rainwater harvesting are two ways to manage rainwater in high density developments. The reduced site runoff can be even lower than greenfield runoff rates.

400 Series, 30,000L SPEL Tankstor® rainwater storage tank - supplied 2008

'Melton House', Distribution Centre for Paragon

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Design considerations

The objective is to provide a system that maximises the available suitable catchment area/s, economic and efficient storage capacity and the pre-treatment most suitable for the application.

For catchment areas, roofs are the best, although hard standing such as car parking and aircraft aprons can be included. The risks of hard standing areas are the possible additions of hydrocarbons and faecal material into the system.

Pre-filters are recommended to remove leaves and other debris prior to storage.

The SPEL Tankstor® rainwater storage tanks incorporate a calmed inlet, anti-backflow valve overflow to prevent contamination of the tank by backflow, silt baffle (optional), pump with strainer and controls.

The larger systems have larger pumps with all associated pedestals, guide rails, pipework and valves 'factory fitted and tested'. Dual pumps can be duty/assist or duty/standby or with a third pump; duty, assist and standby.

Two basic SPEL RainSave Systems® are available as follows:

SPEL Direct System – Rainwater is supplied direct under pressure from the storage tank thus, simplifying plumbing and the need for a header tank. This system is used for irrigation and vehicle or plant washing. Mains backup can be into the storage tank or preferably into the system to ensure continuity of supply in the event of a power or pump failure and also to save energy in pumping mains water.

SPEL Indirect System – This is a gravity system using a header tank. It enables simpler controls for a multiplicity of applications. The mains backup can be simply connected to the header tank.

Catchment areas

Catchment areas are typically roofs and hard standing. Roofs are preferable as hard standing areas can introduce hydrocarbons (fuel/oil) and animal faeces. However this could be insignificant where the hard standing is part of SuDS and the volumes of surface water far exceed the requirements for the expected use intended.

Storage tanks

The SPEL Tankstor® range of tanks are incorporated into SPEL RainSave Systems®.

Designed in accordance with BS EN 13121/ISO 976, SPEL Tankstor® underground tanks are manufactured by the technically advanced chop hoop filament winding process (patented). This was chosen after careful investigation and proved to produce the most desirable GRP underground tanks. Capacities range from 1,000 litres up to 300,000 litres in a single unit.

Storage tank sizing

Calculating the most efficient tank capacity requires the following procedure:

Annual rainfall: Obtain the annual rainfall for the area from your local Environment Agency office or the Meteorological Office.

Drainage coefficients:
See the table to the right.

Surface yield coefficients

Type	Coefficient
Pitched roof with profiled metal sheeting	0.9
Pitched roof with tiles	0.8
Flat roof without gravel	0.8
Flat roof with gravel	0.8
Green roof, intensive**	0.5
Green roof, extensive**	0.7
Permeable areas, various**	0 - 0.3

11.5 Calculating Storage Tank Size

The rainwater storage tank can be sized based on the expected usage or on the maximum potential volume of rainwater that can be captured. We recommend both methods are considered.

To calculate the size of the tank from the demand requirements

$$\text{Tank size (litres)} = \frac{\text{20 days storage x Annual usage}}{365}$$

To calculate the size of tank from rainfall for maximum catchment

Annual rainwater yield = catchment area x surface yield coefficient x rainfall m x hydraulic efficiency 90% - ..... m^3

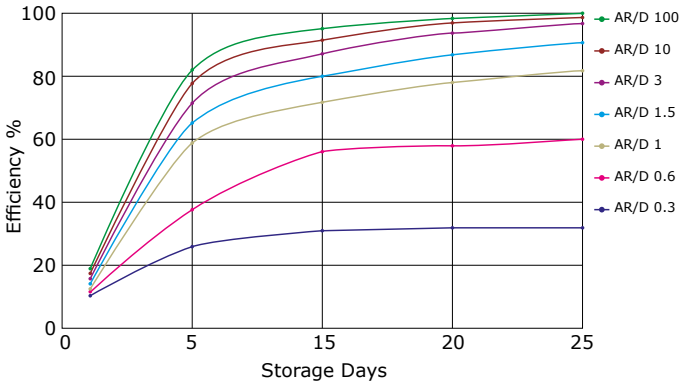
$$\text{Tank size (20 days storage)} = \frac{\text{above } m^3}{18.25} = \text{..... } m^3$$

To obtain the efficiency rating

See chart 'Rainwater collection efficiency' below

$$\text{Ratio - } \frac{\text{Catchment area (A) x Annual rainfall (R)}}{\text{Annual demand (D)}} = \frac{AR}{D}$$

* Yield efficiency = Run off less Depression Storage



Two systems installed providing 125,500L of rainwater for toilet flushing - supplied 2005

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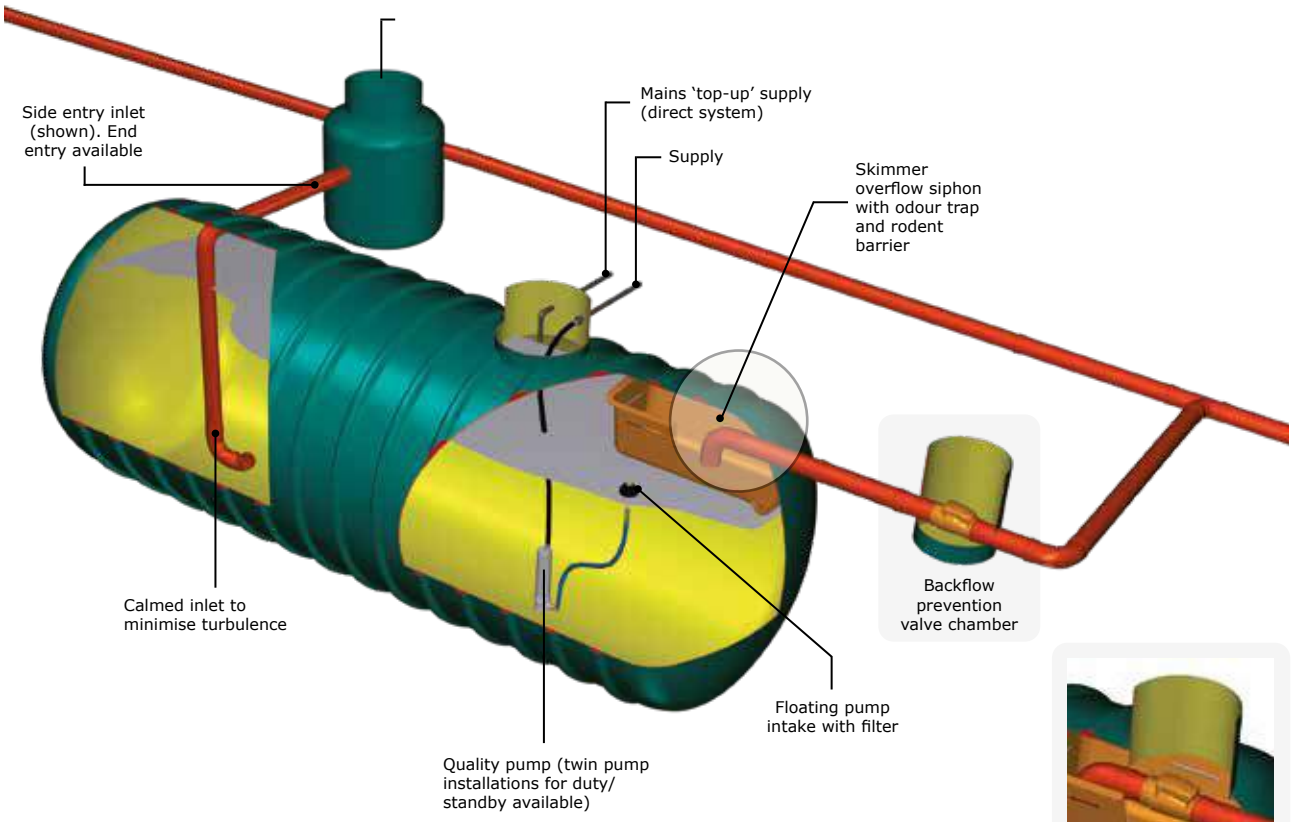
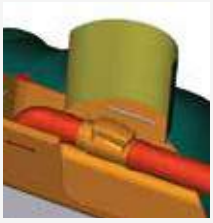
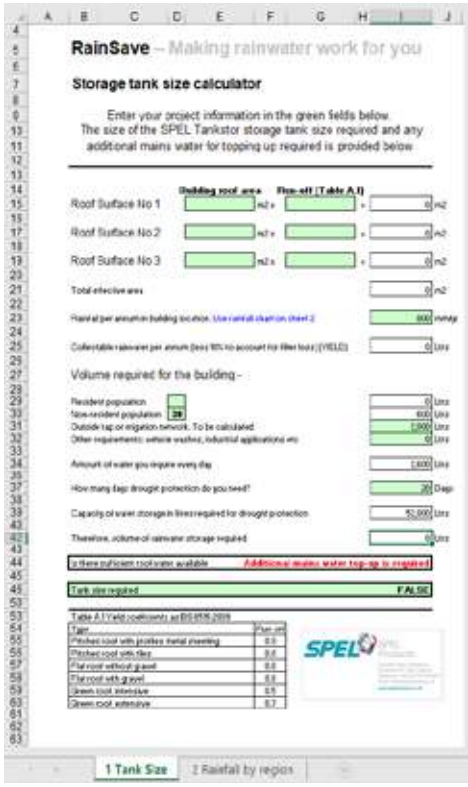




Optional: Backflow prevention valve incorporated integrally as above, or in a separate chamber as shown left

Storage Volume Calculator



Visit our website to download our Tank Storage Volume Calculator for a more accurate reading or alternatively use the formula provided on page 11.5

11.7 SPEL RainSave®

Treatment

The first stage of treatment is the SPEL pre-filter. Three models are available; the small downpipe model for small roof areas, the RSVF.1 for areas up to 500m2 and the RSDC 15-30 suitable for flows from 10-100 litres/sec.

These incorporate a stainless steel mesh filter with a mesh opening size of 1.25mm. The filter is easily removed for maintenance.

These filters prevent leaves and other solid debris from entering the tank. For toilet flushing and irrigation further treatment is not normally required.

After tank treatment

To maintain the system, pipework, header tank and appliances in good working order or where the installation is feeding to a public amenity it is recommended further treatment is provided.

The standard treatment is in two stages; first a 2 micron filter to remove suspended solids and a second through an activated carbon filter to remove odours and colour that may be present in the winter.

After filtration the water is passed through an ultraviolet disinfection unit to kill any harmful coliforms or bacteria that may be present.

System commissioning

On completion of the installation and confirmation that the electrical power supply is connected and available for the SPEL RainSave® control panel/skid position together with the mains water back-up supply, a SPEL engineer will visit site and commission the system.

Installation

SPEL Products provide drawings for approval for the SPEL Tankstor® storage tank and associated pre-filter.

Installation should be carried out in accordance with Section 13 of the SPEL Installation Instructions 'TSII' as supplied with every tank and the other elements (electrical, plumbing, etc.) in accordance with good practice and appropriate regulations.

Attention is drawn to the local planning and national building regulations, including the Water Supply (Water Fittings) Regulations 2018 (available from SPEL Products, WRAS or the local water supplier).

Monitoring unit

The monitoring unit displays the rainwater used and mains water used in litres. A reset button allows you to reset at any time. You can record the usage over any period and, if desired, make a log on the SPEL RainSave® Record & Analysis Sheet which makes an interesting history of usage patterns during the year.

Controls incorporated into 'dry chamber' section of the storage tank

SPEL RainSave® monitoring unit (and information panel, if required)

An Education Pack is available.

Standard control panel

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Edinburgh Tram Depot

This recently completed site incorporated several SPEL products and systems. A SPEL RainSave System®, SPEL H-series horizontal package pumping station, SPEL Tankstor® settlement tank and a SPEL Stormceptor® Class 1 by-pass Separator and automatic alarm monitoring system.

Edinburgh Tram Depot

Bus and Tram applications

As with carriage washers, bus and tram washes have also been supplied with cost saving SPEL RainSave Systems® e.g. Edinburgh Tram Depot (see photo and description), West Ham Bus Depot, East London and the Emirates Cable Car.

A combined SPEL RainSave® and stormwater attenutation system with 2 no,. SPEL Tankstor® 500 series with 60,000 capacity each.

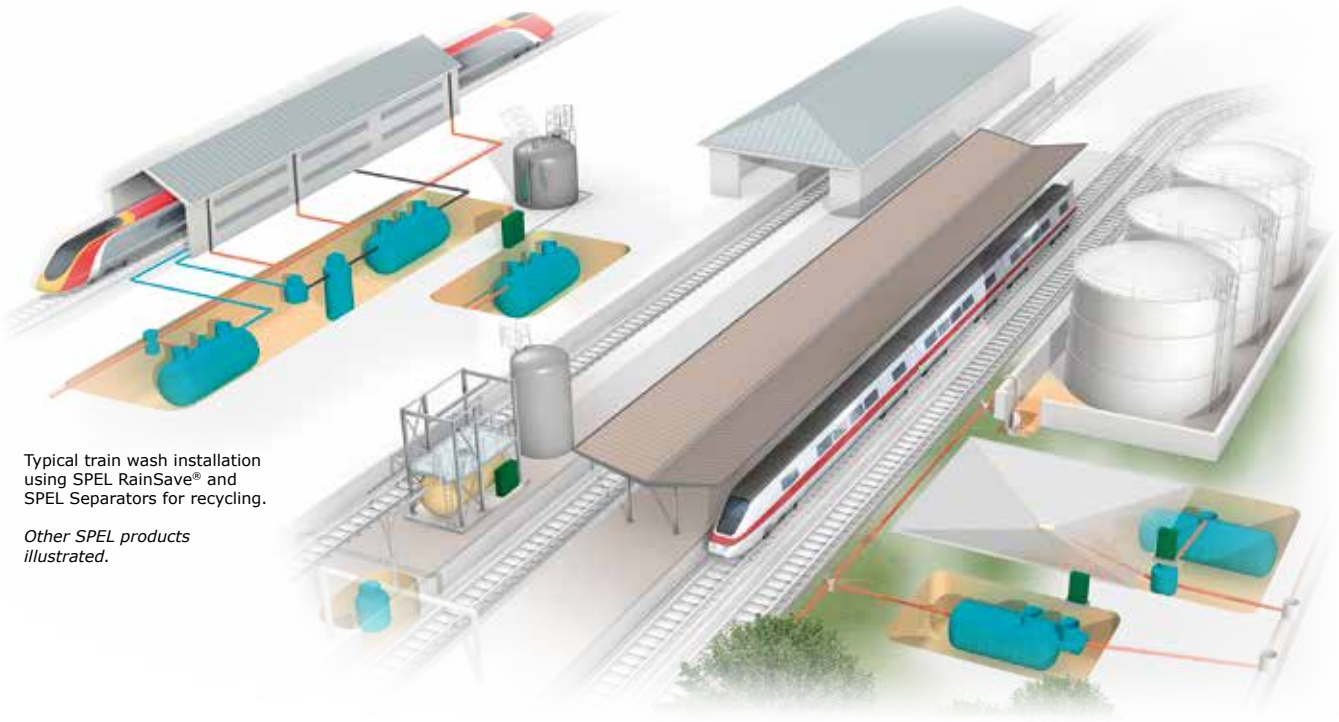
West Ham Bus Depot

Rail applications

Rail rolling stock (carriages and motive units) require large amounts of water for washes and to conserve water supplies, an efficient system to remove silt and hydrocarbons which can be recovered for reuse. This is where SPEL have considerable experience.

SPEL RainSave Systems® including SPEL fuel/oil Separators have been installed in many carriage washes in the UK. Recent contracts included the various train wash facilities on Crossrail, the new high-frequency, high capacity service linking Maidenhead and Heathrow in the west through to Shenfield in the east.

Train wash



Typical train wash installation using SPEL RainSave® and SPEL Separators for recycling.

Other SPEL products illustrated.

11.9 SPEL RainSave® Maintenance

Investing in a quality SPEL RainSave System® ensures the system operates efficiently and consistently. However, regular servicing is essential to maintain the system's efficient performance.

SPEL SafeGuard Servicing offer service agreements for two types of service; Premium, a complete service including the regularly replaced parts and Standard Service plus any parts required to be replaced.

O & M Manual – is supplied with the system at the time of commissioning which provides an overview, operation and maintenance and parts list. Check the recommendations for the site specific installation. *Annually*

Water sampling – Frequent water sample testing is not necessary. However, observations for water quality should be made during maintenance visits to check the performance of the system. Tests should then be undertaken to investigate the cause of any system that is not operating satisfactorily and any complaints of illness associated with water use from the system. Sampling for tests should be carried out in accordance with Annex D, BS 8515:2009.

Pre-storage filter – Check the condition of the filter and clean as necessary. *Annually*

SPEL Tankstor® storage tank – Person entry should be avoided wherever possible. Where entry is essential, it should be undertaken by trained personnel with personal protective equipment suitable for confined spaces.

Check the system has no leaks. Check any build up of debris, silt and floating matter. *Annually*

Empty/suck out contents, silt and other debris, and clean. *Every 10 years*

Check the water level gauge (if fitted) is functioning and responds correctly to the water level in the tank. *Annually*

General system – The systems are designed for low and simple maintenance. The filter replacement interval is determined by the site conditions. *Check annually*

Where fitted, check gas charge within the expansion chamber or shock arrestors. *Annually*

The UV lamp – requires annual replacement and has a lamp life timer incorporated to provide warning of failure. *Annually*

Pumps – Test run and check for leaks. *Annually*

Mains back-up supply – Check the supply is functioning correctly, that there are no leaks and the air gaps are maintained. *Annually*

Wiring – Visual check that the wiring is electrically safe. *Annually*

Pipework – Check there are no leaks and overflows are clear. *Annually*

Markings – Check warning notices and pipework identification are correct and in place. (See Marking and labeling on page 11). *Annually*

Shrewsbury School (sprinkler irrigation)

Oxford University – Preserving the prestigious grounds

The SPEL RainSave System® comprised 4 no. SPEL 500 Series 38,000 litre SPEL Tankstor® underground storage tanks interlinked. One tank included a 'dry chamber' control room to house the pumping, filtration system and controls underground.

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The risk assessment is carried out at the design stage to ensure the system is safe and fit for purpose.

The risk assessment considers design, installation, testing and commissioning, operation and maintenance of the system, including water quality, structural stability, electrical safety and access provision.

The client needs to include a risk assessment to cover the effects of exposure to, and the potential impacts of the system on:

- People, including operators, installers, maintainers, and water users, particularly those who might be more susceptible to poor water quality (e.g. children or the elderly)
- The environment, including domestic and feral animals, birds and fish, water courses and groundwater
- Physical assets, including buildings, foundations, drains, paved areas and gardens.

The risk assessment should be used to identify additional actions, process improvements or enhanced controls that can reduce risks in a cost-effective manner.

Note: the use of rainwater for WC flushing and general garden watering is considered to be a low-risk application due to the low level of human exposure. However, there are some factors, such as the use of pressure washers and irrigation sprinklers, that increase the extent of exposure, thus making risk assessment necessary.

Water quality

The World Health Organisation endorses the 'water safety plan' approach to protect the safety of water supplies. This involves a system of risk assessment and risk management.

The risk assessment should consider potential sources of contamination of water entering or already in the system.

The risk assessment should be used to identify the need for any further water quality control measures, including additional monitoring, for systems where a ground-level and/or highly trafficked collection surface is to be used.

Marking and labelling

The Water Supply (Water Fittings) Regulations 2018 require that any water fitting conveying rainwater be identified so as to be easily distinguished from any supply pipe or distributing pipe supplying wholesome water. This is to prevent any inadvertent cross-connection between waters of different qualities, particularly drinking water.

Financial analysis

It is recommended the payback period is calculated bearing in mind both the capital and the maintenance costs. The running costs are small and the cost of treated drinking water will only go up.

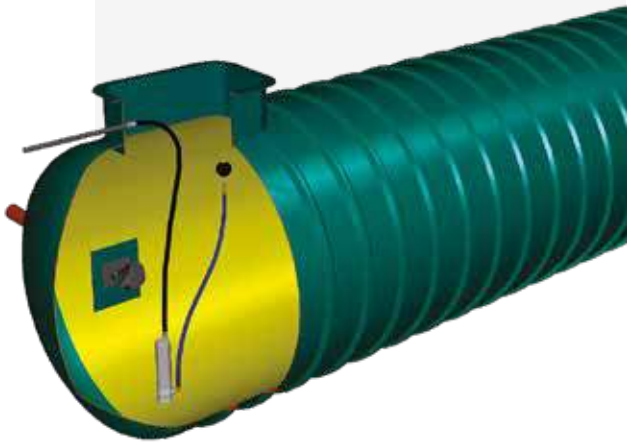
Combining stormwater attenuation with SPEL RainSave® to meet SuDS requirements economically

Attenuation and rainwater harvesting as a combined system is now gaining ground with the SPEL RainSave® & Storm-Brake system. Cost savings on installation and servicing are proving to be worthwhile, especially where the roof water can be isolated and directed into the system.

Including paved area is acceptable if the runoff is intercepted with a SPEL Class 1 fuel/oil Separator prior to storage or attenuation.

Whatever the application SPEL Products design rainwater harvesting and attenuation systems to meet specific requirements, particularly in the larger applications where storage can be included in a single underground tank up to 300,000 litre capacity.

Sites completed:
Newbold Quarry, Barton under Needwood. Northwich, Cheshire. West Ham Bus Depot, East London.



Example Sites

St Mary's School, Jersey
Biddesden House Farm, Hampshire
Saxelbye Hill Top Farm, Leicestershire
Leebotwood Substation, Shrewsbury
Tomatin Substation, Inverness
Llangefni College, Anglesey
Melgarve Substation, Cairngorms
Beatrice Windfarm, Moray
Plumstead Rail Depot - Crossrail
Ilford Stabling Rail Depot - Crossrail
Quarry Bank Mill – National Trust

Hyde Park Botanical Garden

CASE STUDY

Project: **Hyde Park Super Nursery**

Client: **Royal Parks**

Contractor: **SB Civil Engineering**

Products (Rainwater Harvesting):

3 No. Tankstor® underground tanks 300 series 42,000 litres capacity

Hyde Park is a Grade I-listed major park in Central London established in 1637. It is the largest of four Royal Parks that form a chain from the entrance of Kensington Palace through Kensington Gardens and Hyde Park, via Hyde Park Corner and Green Park past the main entrance to Buckingham Palace.

Hyde Park considered is one of the best city parks in the world that extends to about 625 acres.

The nursery recently established has incorporated SPEL Tankstor® rainwater harvesting tanks.

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SECTION

12

SPEL Above Ground Vertical and Horizontal Tanks

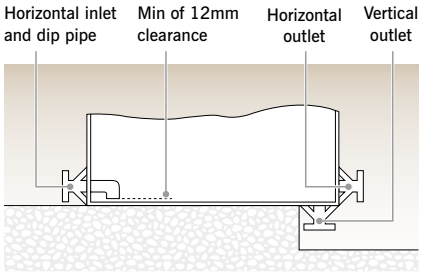
SPEL Tankstor® vertical above ground tanks are filament wound in glass reinforced thermosetting resins to provide storage or process vessels with high tensile strength, excellent chemical resistance to many chemicals (especially acids) and a wide range of process temperatures.

They are designed with reference to the British Standard BS4994 and BS EN 13121.

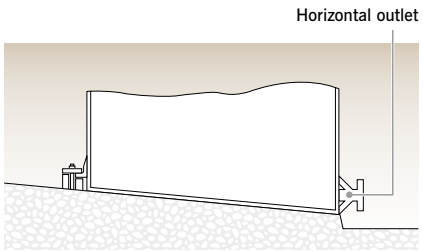
Model	Litres	Dia. m	Height m c/w dome top
VCT300	8,000	1.8	2.4
	10,000	1.8	3.6
VCT400	15,000	2.6	3.2
	20,000	2.6	4.6
	25,000	2.6	5.5
	30,000	2.6	6.4
	35,000	2.6	7.3
	40,000	2.6	8.3
VCT500	50,000	3.5	6
	60,000	3.5	7.3
	75,000	3.5	8.8
	80,000	3.5	9.3
VCT600	50,000	4	5
	60,000	4	5.7
	70,000	4	6.5
	80,000	4	7.2
	90,000	4	8
	100,000	4	9
	110,000	4	9.8
	120,000	4	10.6
	130,000	4	11.4
	140,000	4	12.2
	150,000	4	13

SPEL Tankstor® - vertical above ground tanks are available in four diameters; 1.8, 2.6, 3.5 & 4m dia. They can be supplied with secondary containment to eliminate storage bunds if suited to the particular application.

The tanks can be supplied with galvanised steel access ladders and platforms.



Flat base



The tanks can be supplied colour pigmented to four standard colours:

Black Dark Green Dove Grey Turquoise

Note: With pigmentation in the resin the colour can vary slightly depending on catalyst reaction and rate of cure which cannot be avoided. However, with the above colours the variation is minimal.

12.2 SPEL Tankstor® Above Ground Tanks

SPEL Products are increasingly supplying tanks for above ground installation where below ground installation costs are high and surface area is not at a premium. This is particularly so where the ground is contaminated or is unstable made up ground.

SPEL Tankstor® Horizontal above ground GRP tanks

Horizontal SPEL Tankstor® tanks are mounted on adjustable galvanised steel cradles fixed to a suitable preformed concrete slab designed for the required loadings.

SPEL Tankstor® vertical 10,000 litre capacity with secondary containment, access ladder and platform.

ABOVE: SPEL Separators are also designed and munfactured for above ground installations. The separator can incorporate secondary containment (bunded), galvanised access platform and servicing equipment.

LEFT: SPEL Tankstor 500 Series 110,000 litre capcity double wall tanks.

SPEL Tankstor® tanks can be single skin, double skin (as above) or incorporate secondary containment.

SPEL cavity monitoring can be fitted to verify the integrity of the construction on-going. This is particularly a recommended option for highly corrosive chemicals or where the inner or outer skin could be accidentally punctured.

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Vertical cylindrical / horizontal cylindrical

Enquiry form

Company _____

Address _____

_____

Business of Company _____

Telephone No. _____ Email _____

Contact _____ Position in company _____

Date _____ Project reference _____

Tank Configuration & Operating Conditions

Vertical cylindrical ☐ Horizontal cylindrical ☐ **Location:** Indoors ☐ Outdoors ☐

Quantity required _____ Working capacity (litres) _____ Maximum capacity (litres) _____

Contents (full details & concentrations) _____ pH Value _____

Specific gravity (if known) _____ Viscosity (if tank agitated) _____

Max. working temperature _____ Min, working temperature _____

Working pressure _____ Will tank be filled by pressure discharge from tanker? _____

Tank Dimensions (see data sheets see page 12.1)

Diameter _____ Height _____ Length _____

If you wish us to determine sizes to suit your specified capacity, please detail any site restrictions or provide drawings

Vertical Tanks

Type of Base

Flat ☐ Sloping ☐

Type of Top

Open ☐ Open with flange ☐ Open with cover: loose fit ☐ Moulded dome top ☐

Closed with access manway & cover: push fit ☐ Bolt-on* ☐ Clamp-on ☐

*bolts supplied galvanised mild steel unless otherwise specified

Manway - vertical & horizontal

Manway size (mm): 600 dia 750 dia 1000x750 or other (please specify) _____ Top ☐ Side ☐

Ancillary Equipment (specify fully on a separate sheet)

Fittings (provide drawing) Flanges: Full face ☐ or Stub flange & backing ring ☐ (Specify standard) _____

Level indication type - sight gauge tube/cat & mouse/pneumatic/other _____

Pump/agitator support ☐ _____

Site address _____

_____

_____

Installation Instructions

Introduction

These installation guidelines are set out to ensure that the SPEL Vertical Tanks are properly handled and installed. Failure to follow these installation instructions will make our warranty void and may result in tank failure.

Site access and conditions

It is the responsibility of the contractor to ensure sufficient access to good hard ground that is safe and suitable for off-loading.

Wide/long loads

Where the tank is of such size that police/private escort is required, delivery times given are estimates only. In the event of delays outside our control eg. police re-routing or escort delays, any extra charges that result will be forwarded to the contractor.

Off-loading/handling

The contractor is responsible for off-loading. Tank handling during off-loading must be carried out with care to prevent rolling off the vehicle. Care must also be exercised to prevent accidental damage from impact or contact with sharp objects. Tanks should be lifted using slings, not chains or wire ropes. Do not drag tanks along. Do not lift with water in the tank.

Note: Where transport height restrictions prevent the tank being loaded in the vertical position on the transport vehicle, the tank will be loaded horizontally.

A spreader bar and lines to appropriate lifting lugs, or a clevis and lines to lifting lugs shall be used to unload tanks delivered on a flat-bed trailer. The angle between the lifting lines and top of tank must always be 60° or greater. When lifting lugs are not provided, tanks should be lifted off using two webbing slings and a spreader bar.

This method of unloading is shown in Figure 1. Large tanks should be righted, as shown in Figure 2, by hoisting with spreader bar and lines to lifting lugs. Adequate padding is necessary to protect the pivot joint. Care should be taken to keep control over the tank with guidelines to ensure the tank is gently brought to rest upon its base.

Use a spreader bar and lines or clevis lines to appropriate lift lugs to move tank when in an upright position. Ensure lifting equipment, lines and clevises are capable of handling the weight of the tank.

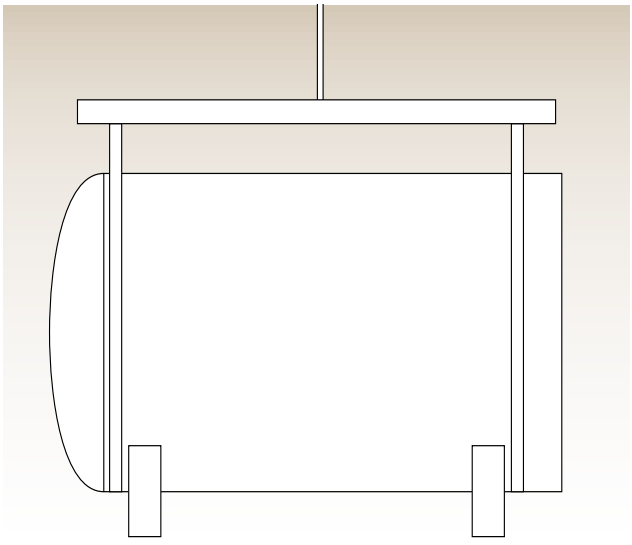

Figure 1 Lifting using two webbing slings and a spreader bar.

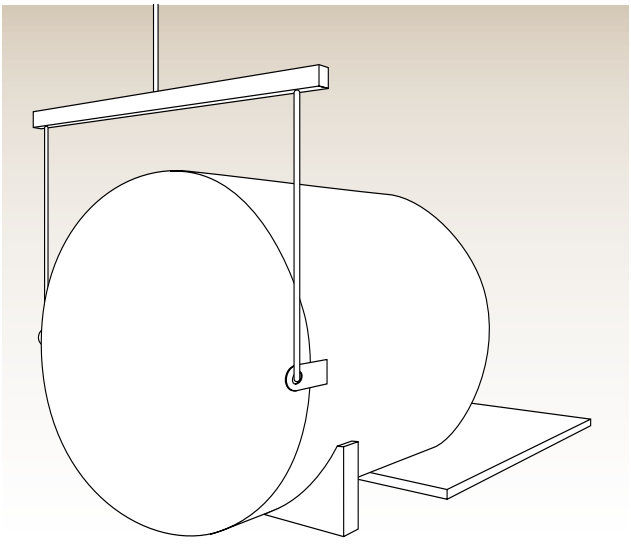

Figure 2 Hoisting with spreader bar and lines to lifting lugs

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Installation Instructions

SPEL Tankstor® tanks are designed to withstand normal handling procedures. Here are some normal precautions to follow to prevent damage to the tank.

1. Operators of hoist equipment should follow the proper rigging procedures at all times. Care should be taken to prevent the tank from swinging out of control.

2. Always lift - NEVER roll or slide a tank.

3. When moving a tank, do not drop or allow hard impact.

4. Never let tools strike or drop on either the inside or outside of the tank.

5. Ladders used inside the tanks should be wooden or have rubber protectors.

6. Workmen entering a tank should wear soft-soled shoes.

7. Never use cables or chains around the tank.

8. Never lift a tank by using any fittings or appurtenance other than lift lugs. When lifting lugs are not provided as part of the equipment, webbing slings of 75mm (3”) minimum are recommended.

Note: Lifting brackets have been tested to 1/5 tonne each without failure. Using four brackets provides a minimum 4 tonne capacity.

9. When storing tanks prior to installation, tie down securely. Tanks should be placed only on firm level surfaces which are free of stones, tools and other small hard objects because these cause high stress points. When stored outdoors, vessels should be adequately secured to prevent movement due to wind or water floatation.

10. Do not allow cables, hooks, or the spreader bar to swing against the tank.

Storage

Set the tank on smooth ground free of bricks and sharp objects. Chock/tie down to prevent rolling and movement especially in high winds.

Tank dimensions

Dimensions given on drawings and literature shall be subject to manufacturing tolerances and it is crucial that they are physically checked prior to installation.

Health and safety

Installation should be carried out by a competent contractor in accordance with the above procedures, Health and Safety at Work legislation and good building practice.

It is not possible to cover every condition in these instructions, therefore if in doubt contact us.

Installation procedures

1. The support for flat bottomed vertical vessels should provide full and uniform support over the entire bottom area. The support base should be properly designed to prevent settling or deflection under maximum design loads.

2. The support base surface should be non-porous and free of cracks, depressions and vertical projections.

3. Vertical equipment having a cone or dished bottom will have an alternate type of mounting arrangement such as GRP skirt or steel support for legs. These must be considered as special cases, for each unit will have its own condition of load concentration. Special support design is therefore required for each individual installation.

4. Each flat bottomed unit should be set on a cushioning pad to minimise stresses caused by seams, shrinkage distortion and/or support base irregularities. Recommended supports for vertical vessels and tanks.

   The recommended supports for vertical vessels and tanks are either:-

   a. a properly prepared concrete plinth; or
   b. a steel plate supported on an adequate grillage and of sufficient thickness to ensure that local strains in the flat bottom are not greater than the design’s strain.
   c. sand or other granular material are not adequate supports and should not be used

When concrete bases are specified, departure from nominal level should not exceed ±1mm/m. Before bedding the tank or vessel, the concrete should be covered with bitumen sand to a thickness of 25mm.

A suitable bitumen sand can be produced by hot-mixing in the following proportions by mass:-

- 9% ± 0.5% non-toxic cut back bitumen (ie fluxed with kerosene and not creosote)
- 10% ± 1% filler either limestone dust passing a sieve of nominal aperture (size 75um in accordance with BS410) or Portland cement. 81% ± 1.5% clean dry washed sand in accordance with table 2 of BS 882:1992.

As an alternative to the sand, crushed rock types 1 to 7, slag or limestone in accordance BS 4987 may be used/

An an alternative a suitable 25mm thick bedding mat that can stand a minimum 12 tonne/m2 pressure can be used. (Polymaz Protek available from Poymax Ltd.)

12.6 SPEL Tankstor® Horizontal (above ground) tanks

Installation using Galvanised Adjustable Cradles

The cradle assemblies are designed to give adjustment vertically and laterally and will need setting up on site.

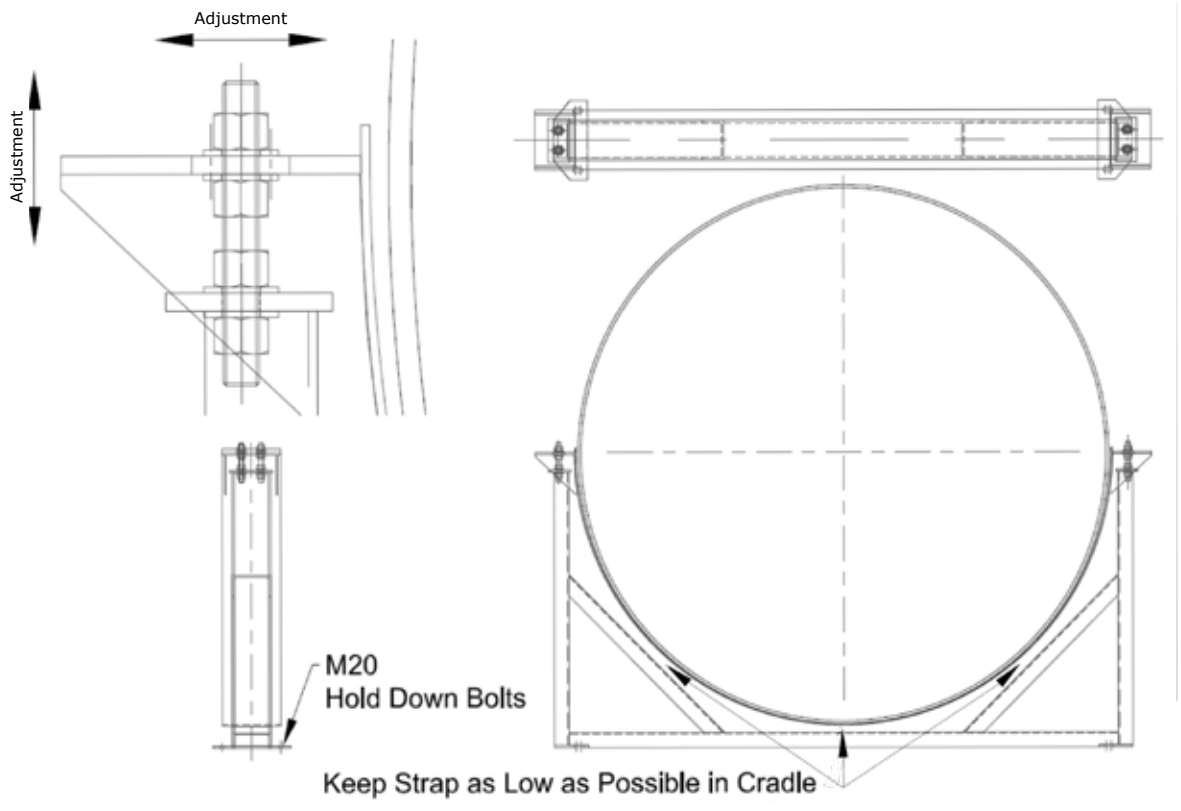
Position cradles on a flat smooth concrete base designed to take the required loadings. When lining them up, line up against the vertical channel sections, NOT against the adjustable top plates.

Cradles need to be adjusted so that the tank shell is a snug fit in the cradles for the full area of the cradle slings.

The tank should sit as low as practical in the cradles (ie. the cradle straps should be as low as practical) to minimise any bending movement applied to the threaded studs.

It is suggested that two outer cradles are adjusted first, while the inner cradles are in the lowered position. Raise the inner cradle slings to just touch the shell nearby without raising the tank off the end cradle supports. Water ballast can then be put in the tank (maximum 400mm deep) and the inner cradle straps raised to bring them against the tank, preferably using a torque wrench to ensure even support.

Important note: Use anchor bolts to fix to concrete slab <u>after</u> tank installation



DS.150 June 2008 Amended Dec 09

Note: we require a minimum 5-10mm gap above steel frame

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SECTION

13

Installation Instructions for SPEL Tankstor®, Separators & Other Underground Tanks

13.1 SPEL Underground Tanks

Introduction to Installation

SPEL Separators (Stormceptor® by-pass separators, Puraceptor® class 1 separators and full retention class 2 separators) and SPEL Tankstor® underground tanks, septic/settlement tanks, cesspools and stormwater attenuation tanks, etc.) must be installed according to these instructions and the SPEL Tankstor® and Separator installation instructions TSII (supplied with every tank).

The local authority and the local region of the Environment Agency should also be consulted as to whether any particular code applies to installation. Failure to follow these installation instructions will make our warranty void and may result in tank failure.

Site access and conditions

It is the responsibility of the contractor to ensure suitable access to good hard ground that is safe and suitable for off-loading.

Wide/long loads

Where the tank is of such size that police/private escort is required delivery times given are estimates only. In the event of delays outside our control e.g. police re-routing or escort delays, the extra charges that result will be forwarded to the contractor.

Off-loading/handling

The contractor is responsible for off-loading. Tank handling during off-loading must be carried out with care to prevent rolling off the vehicle. Care must also be exercised to prevent accidental damage from impact or contact with sharp objects.

Do not drag tanks along the ground for any distance and avoid jarring or bumps. Tanks should be lifted using slings, not chains or wire ropes. For large tanks a spreader bar may be required. Use guidelines when craning long tanks. Do not lift with water in the tank (see page 2).

Note: Where transport height restrictions prevent the tank being loaded in the vertical position on the transport vehicle, the tank will be loaded at 45 degrees or as required to keep within the restrictions. In such cases it will be necessary for the tank to be off loaded onto a level area or well supported planks positioned adjacent to the 'lift' points and supporting at least four ribs. The area must allow room to enable the tank to be rolled into the vertical position before lifting the tank into the excavation.

Storage

Set the tank on smooth ground free of bricks and sharp objects. Chock/tie down to prevent rolling and movement especially in high winds. (See 13.2).

Tank dimensions

Dimensions given on drawings and literature shall be subject to manufacturing tolerances and should be physically checked prior to installation. This applies to overall length, connection positions, their size and invert dimensions. Also check the correct way the tank shall be installed and alignment with site drainage.

Installation procedures

The alternative methods of installation depend on the ground conditions, water table and the tank's location.

Installation should be carried out by a competent contractor in accordance with the above procedures, Health & Safety at Work legislation and good building practice.

It is recommended to cover the access shaft openings with polythene or plywood sheets to prevent concrete and debris entering the tank.

It is not possible to cover every condition in these instructions, therefore if in doubt contact us.

Tank specification

Check that you have received the correct specification tank.
SPEL underground tanks are available in specifications to suit invert depths, concrete or pea gravel surround and ground water conditions, the specification options are Standard, Heavy, Extra Heavy and Special. (See pages 13.4 and 13.5). For most applications the standard or heavy specifications are adequate. If the tank invert depth and/or water table depth is outside the range specified we shall be pleased to advise accordingly.

Siting SPEL septic tanks

British Standard BS 6297: 1983 recommends that sewage treatment works should be as far from habitable buildings as is economically practicable. The direction of the prevailing wind should be considered in relation to any properties when siting the works.

In accordance with the Building Regulations 2000. H2 2002 edition SPEL septic tanks should be sited at least 7m from any habitable parts of buildings, and preferably downslope.

The tank should not be installed near a road or driveway, where it could be subjected to high external loads, unless the installation is designed to withstand such loadings, so they are not transferred to the tank shell.

Where the tank is to be emptied using a tanker, it should be sited within 30m of a vehicle access, provided that the invert level of the septic tank is no more than 3m below the level of the vehicle access. This distance may need to be reduced where the depth to the invert of the tank is more than 3m. There should also be a clear route for the hose such that the tank can be emptied and cleaned without hazard to the building occupants and without the contents being taken through a dwelling or place of work.

Siting SPEL cesspools

SPEL cesspools should be sited at least 7m from any habitable building and preferably downslope. They should, however, be sited within 30m of a sludge removal tanker access and at such levels and position to operate without hazard to the building occupants.

Access openings

It is recommended that the access openings are covered prior to back filling to keep the internal shell and fittings clean.

Extension access shafts

Check if extension shafts are required.

These are available in 500mm high increments with socket joints or if required, flanged joints with neopreme gaskets.

Prior to surrounding in concrete, if required, ensure rectangular access shafts are shuttered internally to support the sides and prevent distortion. This is especially important when guide rails are installed for pumps or coalescer units.

With high water table ensure all joints are double sealed to prevent ingress of water.

Note: Where coalescer units or pumps are incorporated that require guide rails, or ladders are fitted, the height of the extension access shaft/s should be measured accurately before ordering.

Health and safety

Installation should be carried out by a competent contractor in accordance with the above procedures, Health & Safety at Work legislation and good building practice.

A warning notice should be visible at the top of each access shaft – 'danger, harmful fumes' and 'respirators must be worn in this tank'. Before entering persons must be qualified in accordance with 'confined space' requirements.

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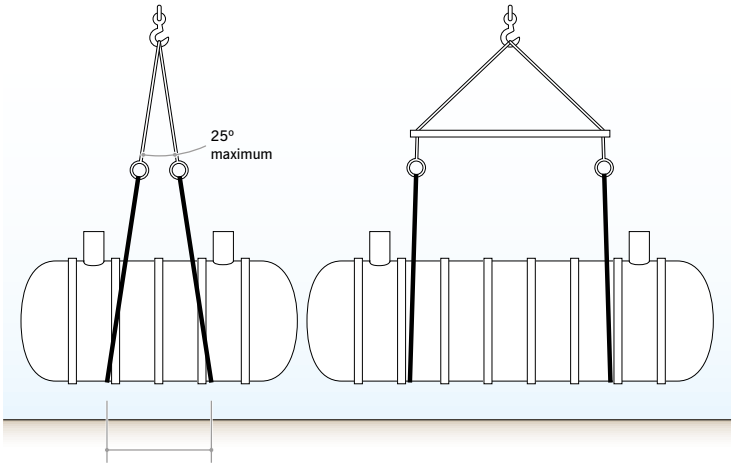
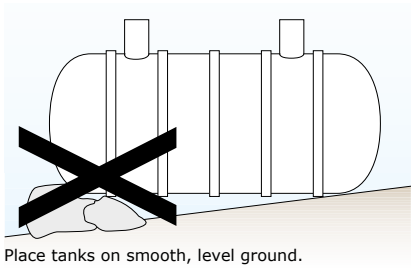
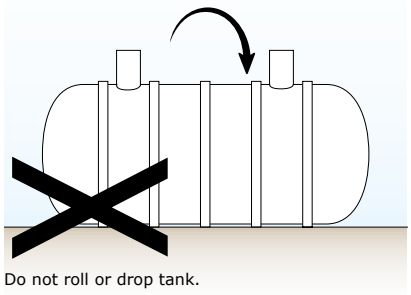
Lifting, handling and storage

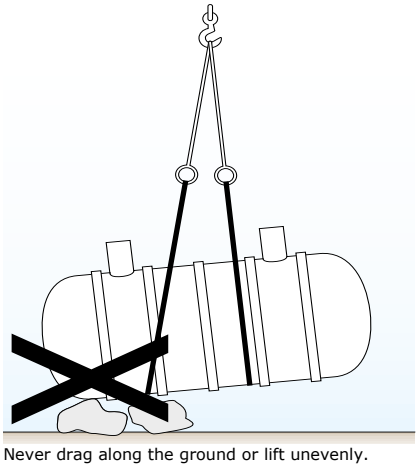
Lifting and handling - preferable methods

- Do not roll or drop tanks. Only move tanks by lifting. Rolling tanks could damage fittings
- Tanks can be lifted using slings/webbing straps as illustrated.
- Where necessary a spreader bar should be used.
- Guide the tank with guide lines.
- Never use chains or steel cables around tank shell.
- Do not drag tanks along ground for any distance.
- Avoid jarring or bumps.
- Do not lift with liquid in the tank.
- Set tanks on smooth ground, free of rocks or other sharp objects.




Place tanks on smooth, level ground.

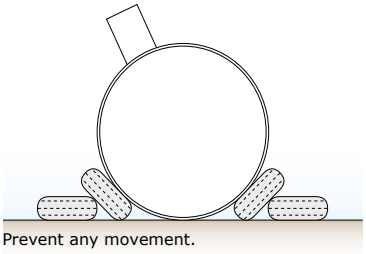

Do not roll or drop tank.

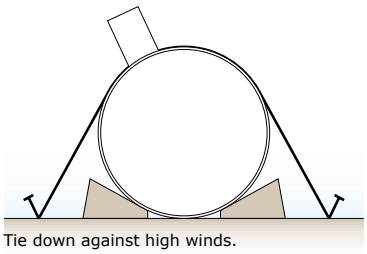

Never drag along the ground or lift unevenly.

Storage

If tanks have to be stored temporarily prior to installation, they should be located:

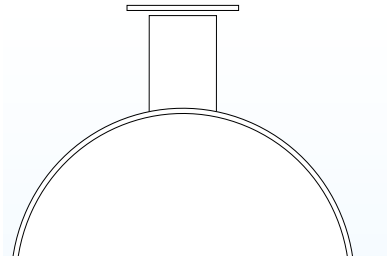
- In an area where the chance of accidental damage or vandalism will be minimised.
- On a flat surface free from small or sharp objects.
- With efficient temporary anchorage to prevent high winds causing damage.

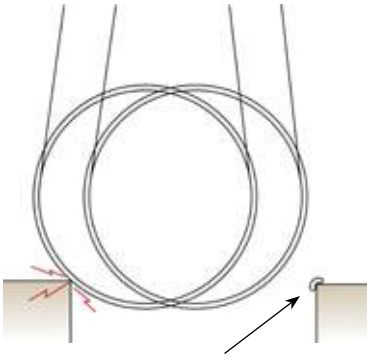

Prevent any movement.


Tie down against high winds.

Protecting the tank internally during the installation

Use a board or polythene to cover the access shaft/s to prevent concrete / backfill falling into the tank (particularly where the internal fittings eg. Pump guide rails, Separator automatic closure device (ACD) are present).

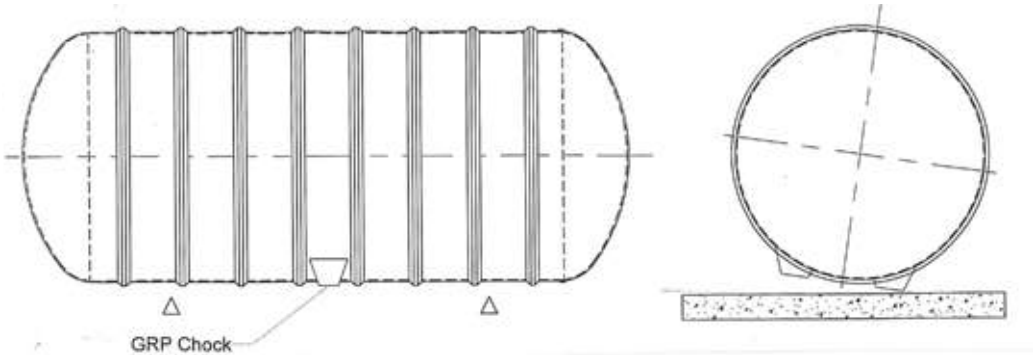

Protect tank opening with board or polythene.


Fender to protect the tank

When lowering tanks into shored excavations ensure:

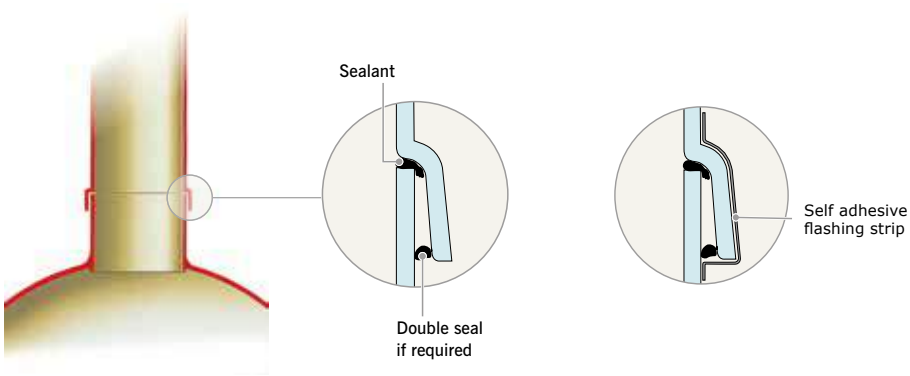
- Lower carefully using two guidelines,one each end, to avoid contact with piling sheets or projections.
- It is recommended that 'fenders' are placed over projecting shoring braces etc.

Stabilising Chocks



Chocks can be fitted to maintain the tank in a truly vertical position on a flat base slab. These chocks are not load-bearing. If fitted, the tank should be handled with care to ensure the tank is lowered squarely onto the flat base slab. Avoid lowering the tank at an angle with a chock impacting on the base slab and taking the full weight of the tank as this impact could damage both the shell and the chock.

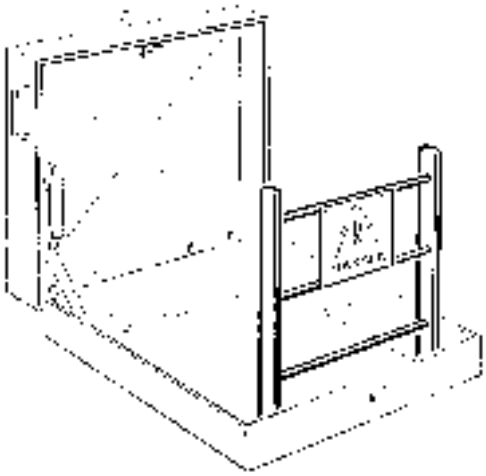
Flanged joint stub access shaft with extension shaft
600, 750 and 900mm diameter.



Socket joint stub access shaft
with extension shaft
600, 750, 900 and 1200mm diameter.

Manhole Covers and Frames

Where access to a tank or package pumping station is required for routine maintenance a fall protection and security locking is recommended. The double skinned covers are predominantly used for the protection of potable water and single skin covers for most other applications, including waste water pumping stations.



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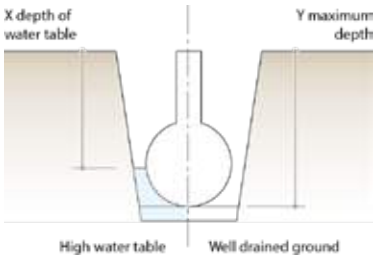
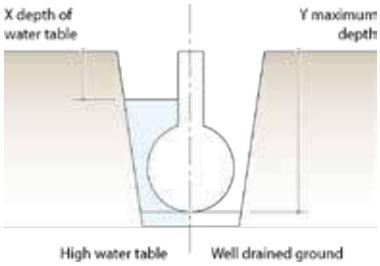
Specifications to suit invert depths and ground water conditions - pea gravel and concrete surrounds

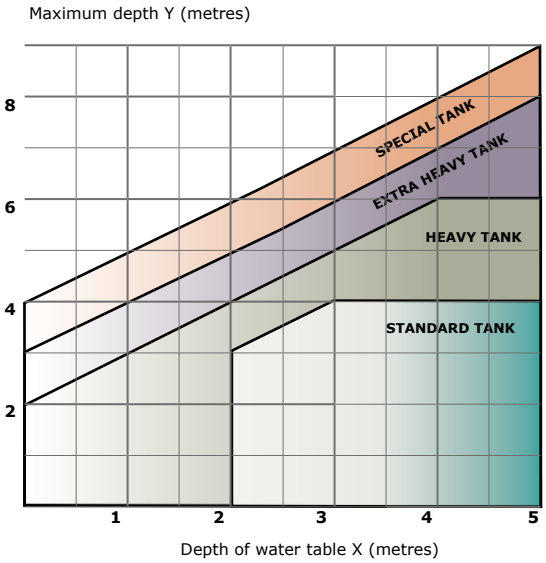
Standard tanks



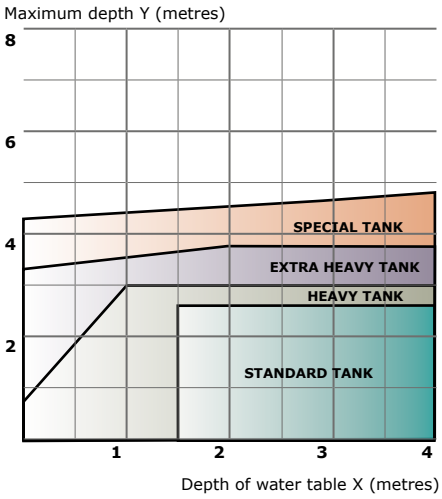
Heavy, Extra Heavy & Special tanks



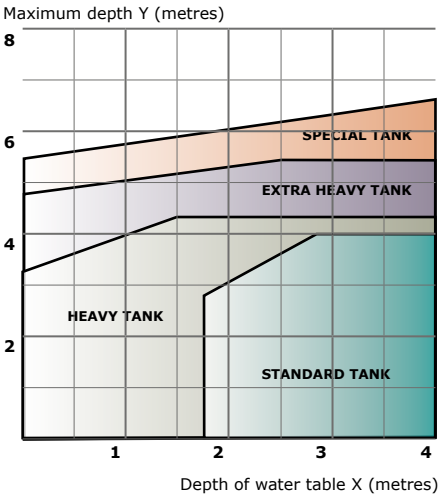
100 & 200 Series with concrete surround



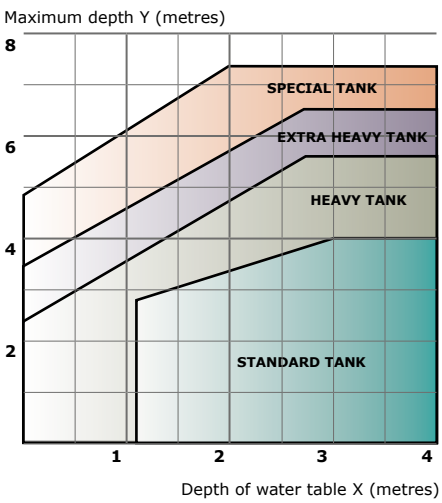
300 Series with pea gravel surround



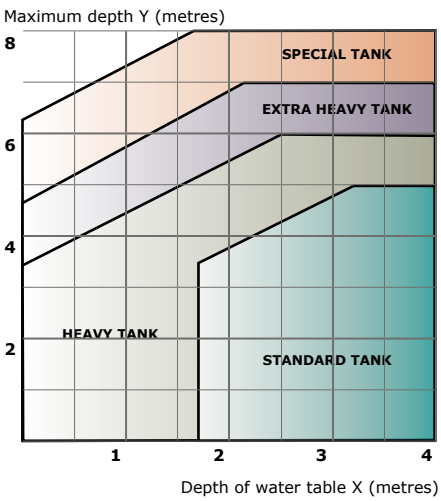
400 Series with pea gravel surround



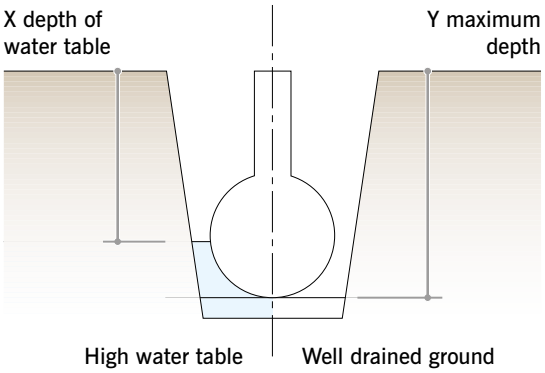
300 Series with concrete surround

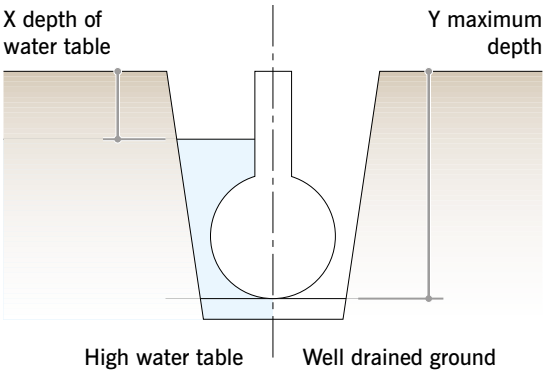


400 Series with concrete surround



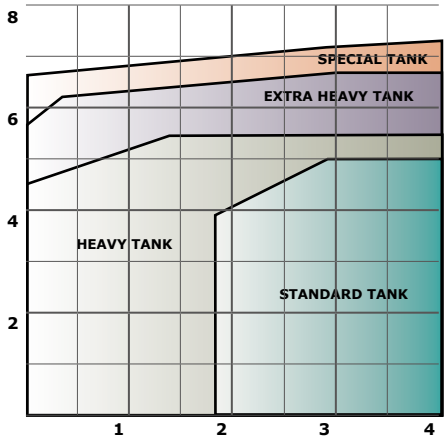
Specifications to suit invert depths and ground water conditions - pea gravel and concrete surrounds





500 Series with pea gravel surround

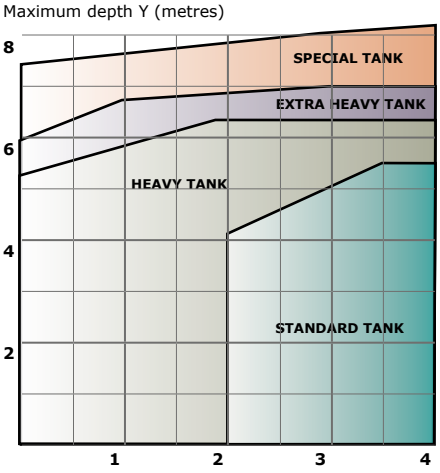
Maximum depth Y (metres)



Depth of water table X (metres)

600 Series with pea gravel surround

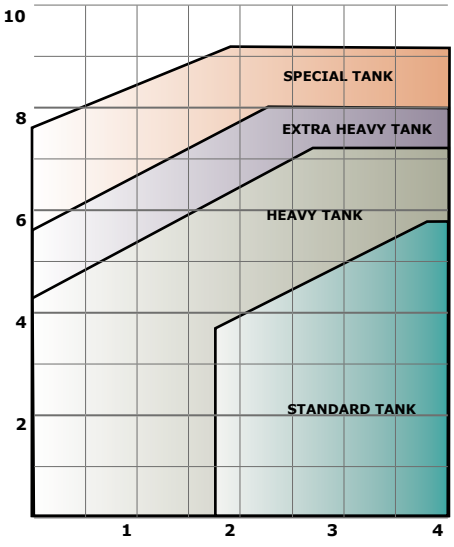
Maximum depth Y (metres)



Depth of water table X (metres)

500 Series with concrete surround

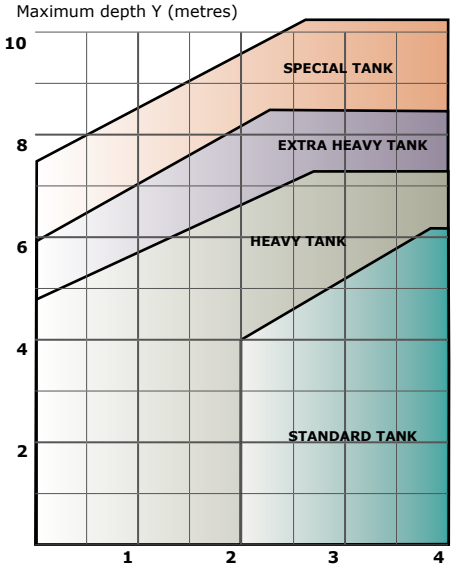
Maximum depth Y (metres)



Depth of water table X (metres)

600 Series with concrete surround

Maximum depth Y (metres)



Depth of water table X (metres)

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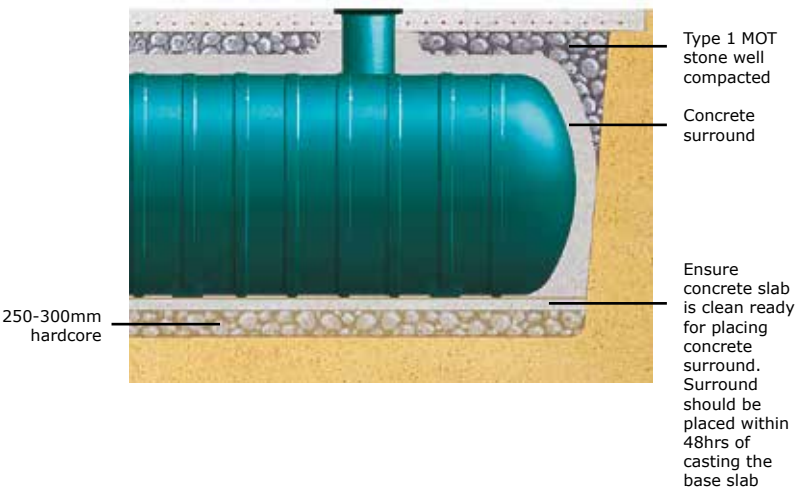
Typicalinstallation of a SPEL tank

Installation with feet/chocks

Installation of SPEL Tankstor® tank with chocks and load bearing cover slab.



Excavation details for concrete surround			Series 100/200	Series 300	Series 400	Series 500	Series 600
Max. burial depths (m) For your specific requirements refer to burial depth and water table depth charts on pages 13.4 and 13.5	Standard	dry excavation	4.0	4.0	5.0	5.7	6.2
	Heavy	dry excavation	6.0	5.6	6.00	7.25	7.3
		high water table	-	3.0	3.75	5.0	5.2
	Extra heavy	dry excavation	-	6.5	7.0	8.0	8.4
	Special	dry excavation	-	7.3	8.0	9.2	10.2
Minimum hardcore (mm), dependent on ground conditions			150	200	250	300	300
Concrete base slab (mm)	Slab thickness		100-150*	150*	220-240	240-300	250-300
Concrete surround (mm), dependent on ground conditions			100-150	150	200-250	250-300	250-300
Maximum initial water fill depths, prior to backfilling (mm)			**200**	**300**	**400**	**500**	**500**
Tank internal diameter (mm)			1250/1200	1800	2600	3500	4000
Tank external diameter (mm)			1300/1225	1875	2700	3650	4150

**If using SPEL mechanical anchoring straps, a 220mm concrete base slab is required.*

Preliminary

Dimensions given on the drawings and literature are subject to manufacturing tolerances and should be physically checked prior to installation. This applies to overall length, connection positions, their size and invert dimensions. Also check the correct way the tank shall be installed and alignment with site drainage.

Determine the size of the excavation from the dimensions of the tank and the incoming drain invert depth allowing for a minimum of 200-250mm (250-300mm for 500/600 Series tanks) of concrete all round the tank. Where difficult ground conditions or the possibility of external loading exist, the concrete surround should be designed accordingly, ie. extra thickness and/or the use of reinforcing.

Wet hole procedure

Where there is water entering the excavation, the water level should be maintained below the foundation level by pumping with or without the aid of a pump well in one corner of the excavation.

Excavation

Excavate allowing for easy placing of the tank and concrete and for consolidating concrete around the bottom half of the tank when backfilling. Allowance should be made for any timbering or sheeting that may be required. If the base of the excavation consists of unstable ground – loose gravel, running sand, landfill type areas, peat, swamp or in clay areas subject to swelling/shrinking etc., excavate to allow for 250-300mm of hardcore and cover with a polythene membrane prior to placing concrete.

Procedure

Where the level of the tank is important, chocks can be fitted during manufacture to enable the tank to be placed on a flat concrete base and levelled up prior to surrounding with concrete.

Note: It is recommended to cover the access shaft openings with polythene or plywood sheets to prevent concrete and debris entering the tank.

1. Pour concrete base to correct depth and level off. Base should be reinforced as necessary.

2. When the concrete is set sufficiently, place the tank in position and check for level. Place the initial fill of water to a depth of 300mm – 500mm depending on the tank diameter to provide ballast for the first concrete pour.

Continued overleaf

3. Place the initial water fill depth in accordance with chart above.

4. Place back-fill concrete up to the depth of the water in the tank ensuring the concrete is properly consolidated under the tank to prevent voids. Consolidate by hand – do not use vibrating pokers.

5. Continue by placing concrete round the tank, at the same time filling with water to equalise pressue and resist floatation. Ensure all chambers are filled equally.

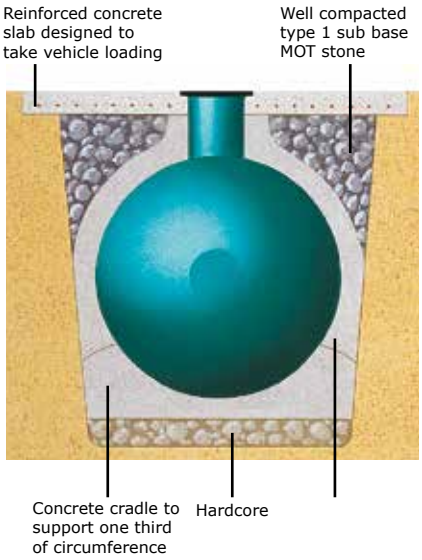
6. Connect up pipework, fix extension access shaft with waterproof mastic/adhesive or bolt to the stub access shaft as appropriate (see below).

7. Fit extension shafts if required:
Extension access shafts are available in 500mm increments with socket joints or if required, flanged joints with neoprene gaskets. Prior to surrounding in concrete if required, ensure rectangular access shafts are shuttered internally to support the sides and prevent distortion. This is especially important when guide rails are installed for pumps or coalescer units. With a high water table ensure all joints are double sealed to prevent ingress of water.

8. Top up the tank with water to invert level and place remainder of concrete.

9. Where the concrete slab over the tank is to take vehicle loading it should be reinforced in accordance with good practice to take the maximum load and should be extended onto unexcavated ground. It is important that vehicle loading is not transferred to the tank itself.

9. Incorporate inspection cover frames in the normal manner.



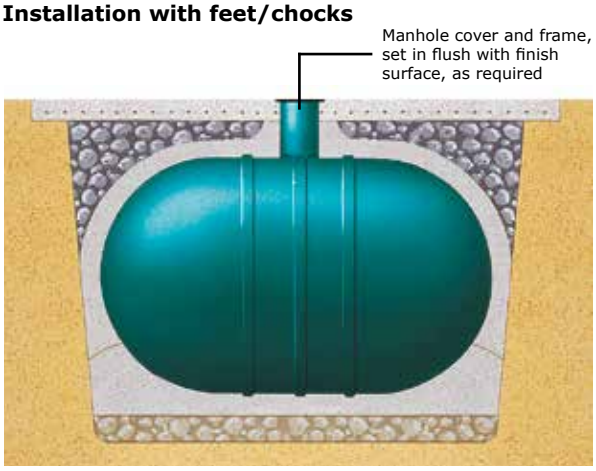
For smaller tanks e.g. cesspools, with concrete cradle

1. Place concrete along the centre of the excavation base and lower the tank into position 'puddling' it into the concrete to form a cradle. Consolidate under the tank to prevent voids. Consolidate by hand – do not use vibrating pokers.

2. Check the tank is truly vertical and level.

3. After the concrete has reached its initial set, fill with water to approximately 500mm deep.

Installation with feet/chocks



Cesspool tanks/silage tanks etc.
When the concrete surround has fully cured, cesspools should be completely emptied ready for use.

4. As per instructions 4-9 on page 13.6, or if suitable, the tank can be surrounded in pea gravel or approved free flowing crushed rock. (See under tanks installed with granular backfill) When the concrete surround has fully cured, cesspools should be completely emptied ready for use.

Venting SPEL septic tanks and cesspools

Adequate ventilation of the septic tank and the inlet pipework shall be provided to prevent the accumulation of fermentation gases.

Venting SPEL Separators

SPEL Separators should be vented in accordance with BS EN 752 (BS8301:1985 Building Drainage) or Health and Safety Guidance Notice HS (G) 41 for filling stations, subject to local authority requirements. In multiple chamber separators, vent pipework must not be combined into a common stack below a point where pollutants contained could be transferred to other chambers.

SPEL Separator automatic alarm/monitoring systems

The SPEL automatic alarm/monitoring system provides continuous monitoring of the separator contents by sensing when the light liquid within the separator has filled to a predetermined level (with design safety margins), and provides a simple audio-visual warning to alert the operator that the separator needs to be emptied.

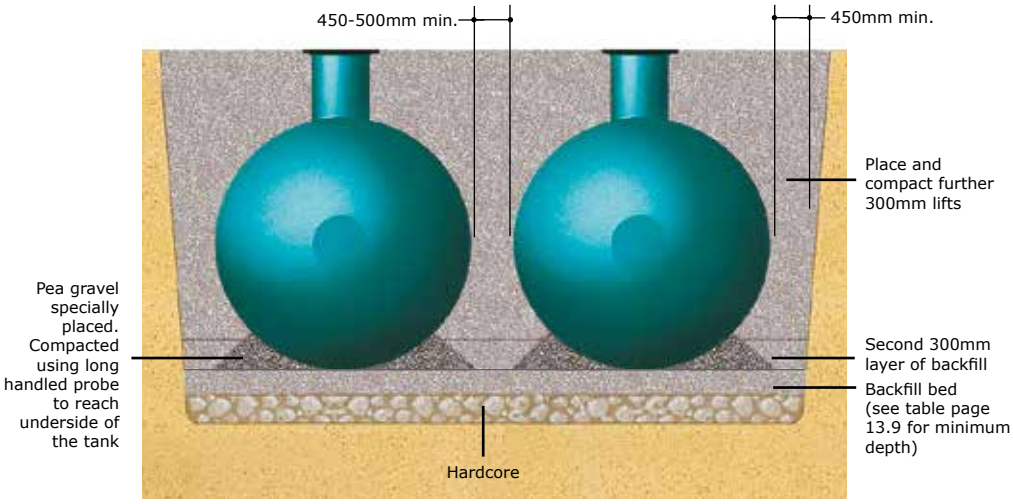
The system comprises 2 parts: a compact control unit and a probe unit. The control unit is installed in a non-hazardous area remote from the probe. It is self-contained and requires only a normal 240v AC electrical supply. The control incorporates an ATEX approved intrinsically safe circuit, which enables the probe unit to be used in Zone Zero Environments. For technical and installation details see Section 13.

Tank dimensions

Dimensions given on the drawings and literature are subject to manufacturing tolerances and should be physically checked prior to installation. This applies to overall length, connection positions, their size and invert dimensions. Also check the correct way the tank shall be installed and alignment with site drainage

If you have an installation situation that is not covered by this Data Manual please contact our technical services department.

It is important that only properly trained and experienced contractors perform this method of installation.



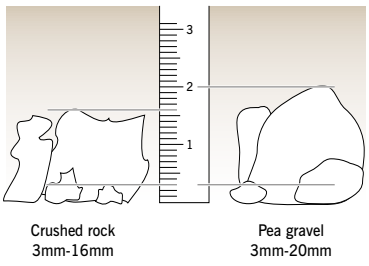
Backfill material

Pea gravel or crushed rock is preferred as backfill material.

Requirements for backfill material are:

- Clean and washed.
- Non-cohesive, inert material.
- Pea gravel or crushed rock.
- Particle not larger than 20mm.
- Material free from rocks, ice, snow or organic material.

Approved backfill material for tanks and pipes



Excavation size - unstable ground conditions

Where the ground is unstable, eg. landfill type areas, peat, swamp or in clay areas subject to swelling/ shrinking, the width of the backfill must be increased to a minimum of half the tank diameter between the tank sides and the ends of excavation.
If the base of the excavation is also of unstable ground, allow for 250-300mm of hardcore. After placing the hardcore, consolidate to ensure a firm base for the backfill.

Excavating - general

Excavate allowing for easy placing of the tank and backfill around the bottom half of the tank. Allowance should be made for any timbering or sheeting that may be required.

Filter fabric

Where there is a risk of the migration of pea gravel with the native soil, an approved filter fabric/ geotextile is recommended.

Filling tanks

Do not fill tanks until backfill is to the top of the tank. (Exception; Wet Hole see page 13.9).

Where the tank is divided into chambers ensure all chambers are filled equally.

Note: Where the chambers may require to be separated by load bearing partitions to accommodate different liquid levels the tank must be surrounded in concrete.

Depth of cover for standard and heavy specification tanks

No vehicle loads

100/200/300/400 series tanks are designed for a minimum cover of 600mm of backfill or 300mm plus 100mm reinforced concrete slab.

500/600 series 1100mm backfill or 900mm backfill plus 100-150mm reinforced concrete slab.

Vehicle loads

100/200/300/400 series tanks subjected to vehicle loading must have a minimum cover of 600mm of backfill plus a minimum 150mm reinforced concrete slab designed to take the maximum load without such loadings being transferred to the tank itself.

500/600 series as above but 1000mm backfill plus a minimum 150mm reinforced concrete slab as above.

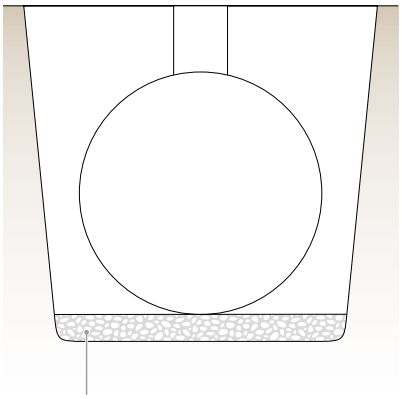
The maximum depth of the cover is governed by the maximum drain invert depth and periodic high water table when encountered.

For the depth of cover for Extra Heavy and special specification tanks, contact our technical services department.

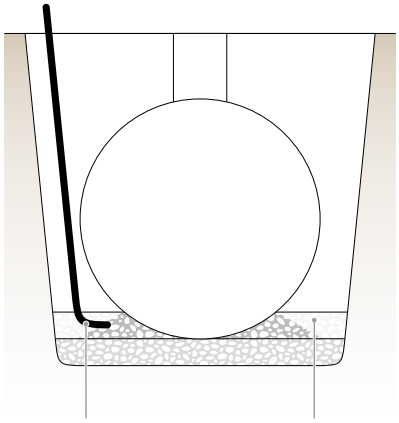
SPEL Mechanical Anchoring System

If you are using this system and a concrete base slab, the tank must be bedded on pea gravel - see 13.11.

13.9 Installation of Tanks Surrounded with Pea Gravel Backfiill

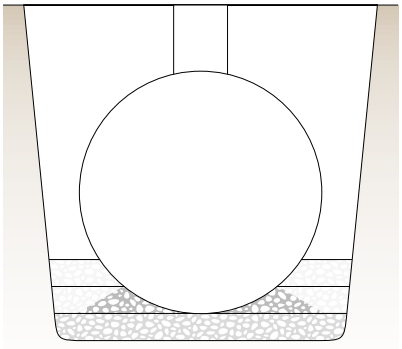


300mm bed



Curved, long handled probe to reach underside of the tank

Second 300mm layer of backfill



Installation - Dry hole

1. Place a minimum of 150-300mm of approved backfill over the excavation bottom. Refer to table below.

2. Position the tank carefully onto backfill bed and check for levels including inlet/outlet inverts.

3. It is recommended to cover access shafts with polythene or plywood to prevent backfill entering the tank.

4. Place first 300mm lift of backfill evenly around the tank by shovelling and pushing beneath the tank bottom, between ribs and end domes to ensure complete support and to eliminate voids. (Where access is confined, long handled probes, curved to enable reaching the underside of the tank, can be used). Place and compact further 300mm lifts, as above, to a minimum depth of 1/3rd of the tank diameter. The remainder of the backfill can be poured without consolidation except where required to support a cover slab.

5. Connect up inlet, outlet and vent pipework, seat access shaft into socket and apply waterproof mastic/ adhesive or as applicable.

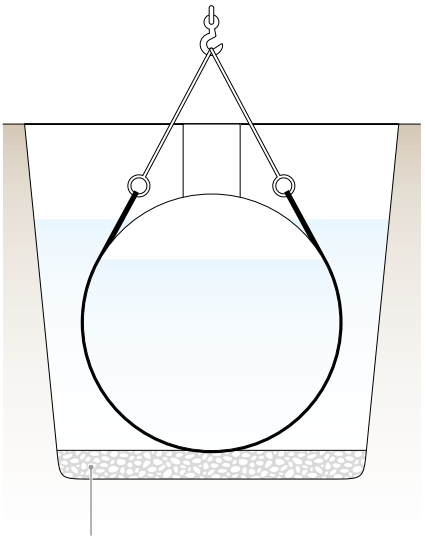
6. Where a concrete slab is to be constructed over the tank to take vehicle loading, it should be reinforced in accordance with good practice to take the maximum load and should be extended onto unexcavated ground. It is important that vehicle loading or any superimposed loads are not transferred to the tank itself.

Important: Before surrounding circular or rectangular shafts with backfill, shutter internally to support the sides and safeguard against distortion.

7. Incorporate inspection cover frames in the normal manner.

Wet hole procedure

Where there is water entering the excavation, the water level should be maintained below the foundation level by pumping with or without the aid of a pump well in one corner of the excavation.



300mm bed

If the water level cannot be lowered you will need to ballast the tank very carefully. Place the tank in the excavation adding only enough water ballast to sink it. The water level in the tank must never exceed the water level in the excavation. While adding then ballast use only a lifting strap to keep the tank in position.

It is essential the backfill is distributed evenly round the base of the tank and thoroughly consolidated with the aid of long handled probes to eliminate any voids as set out in point 4 'Dry hole procedure'.

To prevent flotation, mechanical anchoring may be required.
See page 13.12.

Backfill bed

Please refer to this table for the minimum amount of approved backfill to be used over the excavation bottom for your series tank.

Tank	min backfill bed
100 Series	150mm
200 Series	150mm
300 Series	200mm
400 Series	250mm
500 Series	300mm
600 Series	300mm

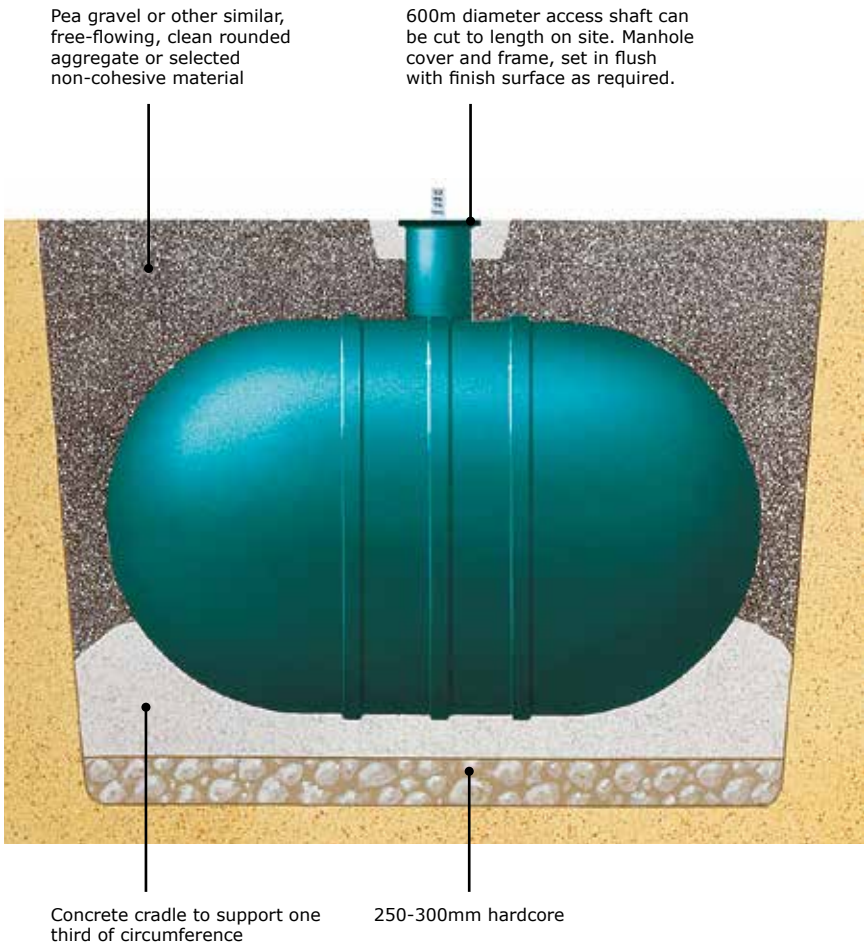
This method of installation combines the economy of pea gravel backfill and the safety of a concrete cradle. For the less experienced contractor this is a safer option than bedding on pea gravel.

Excavation size – stable ground conditions

Determine the size of the excavation from the dimensions of the tank and the incoming drain invert depth, allowing for a minimum of 450mm of backfill between the tank sides and the ends of the excavation.

Excavation size – unstable ground conditions

Where the ground is unstable, eg. landfill type areas, peat, swamp or in clay areas subject to swelling/shrinking, the width of the backfill must be increased to a minimum of half the tank diameter between the tank sides and the ends of the excavation.



If the base of the excavation is also of unstable ground, allow for 250-300mm of hardcore. After placing the hardcore, consolidate and cover with a polythene membrane prior to placing concrete.

Note: If mechanical anchoring is required, sinkers will need to be cast into the concrete cradle. See mechanical anchoring on page 13.11 and 13.12.

1. Place concrete along the centre of the excavation base and lower the tank into position 'puddling' it into the concrete to form a cradle. Consolidate under the tank to prevent voids. Consolidate by hand – do not use vibrating pokers.

2. Check the tank is truly vertical, level and inlet/outlet invert levels are correct.

3. Place first 300mm lift of backfill evenly around the tank by shovelling and pushing around the tank sides, between ribs and end domes to ensure complete support and to eliminate voids. (Where access is confined long handled probes, curved to enable reaching the underside of the tank, can be used). After placing first lift of backfill the remainder of the backfill can be poured without further consolidation by hand.

4. Connect up inlet, outlet and vent pipework, seat access shaft into socket and apply waterproof mastic/adhesive or as applicable. (see page 2.13).

5. Where the concrete slab is to be constructed over the tank to take vehicle loading it should be reinforced in accordance with good practice to take the maximum load and should be extended onto unexcavated ground. It is important that vehicle loading is not transferred to the tank itself.

6. Incorporate inspection cover frames in the normal manner.

Note: Where the tank is divided into chambers ensure all chambers are filled equally. Where the chambers may require to be separated by load bearing partitions to accommodate different liquid levels the tank must be surrounded in concrete.

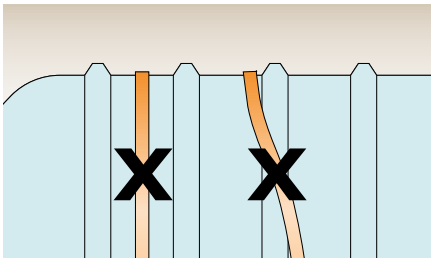
13.11 SPEL Underground Tanks Mechanical Anchoring

Minimum burial depth

The following table shows minimum burial depths when mechanical anchoring is not required.

Tank Series	Dia. (mm)	No cover slab (mm)	150mm cover slab (mm)
300	1800	1200	1100
400	2600	1500	1400
500	3500	1800	1700
600	4000	2100	2000

Do not strap here



Straps must not be placed between the ribs or passed over from one side to the other as stress will be transferred to the weakest part of the tank wall. Unless the SPEL system is used and positioned correctly the 25 year warranty will be nullified.

The 'holding down' ribs are indicated on the tank by a 'strap' label

SPEL mechanical anchoring system

Mechanical anchoring is required where the tank is to be surrounded in pea gravel and where water could enter into the excavation (underground water table, rainwater run-off etc.) or where the tank is to be surrounded in concrete and it is imperative the tank does not shift during the placement of this concrete.

SPEL mechanical anchoring straps are available for all tanks. These are located over the designated ribs and held in position by locators positioned over the said ribs. Cables or straps should not be used between the ribs on the tank.

It is the responsibility of the tank owner or their technical representative to determine if mechanical anchoring is required for a specific installation.

If water could enter the excavation (underground water table, rainwater run-off etc.) we recommend the tank is mechanically anchored unless the minimum depth from tank top is, as in table on left.

The weight of over burden on top of the concrete anchor pad provides the anchoring force.

The pad is to prevent buoyancy but should be designed taking into account soil conditions eg. thickness and reinforcement.

Anchor points should be spaced equal to the tank diameter plus 300mm on each side of the tank regardless of tank diameter. The anchor points must be aligned in accordance with the designated ribs plus or minus 25mm.

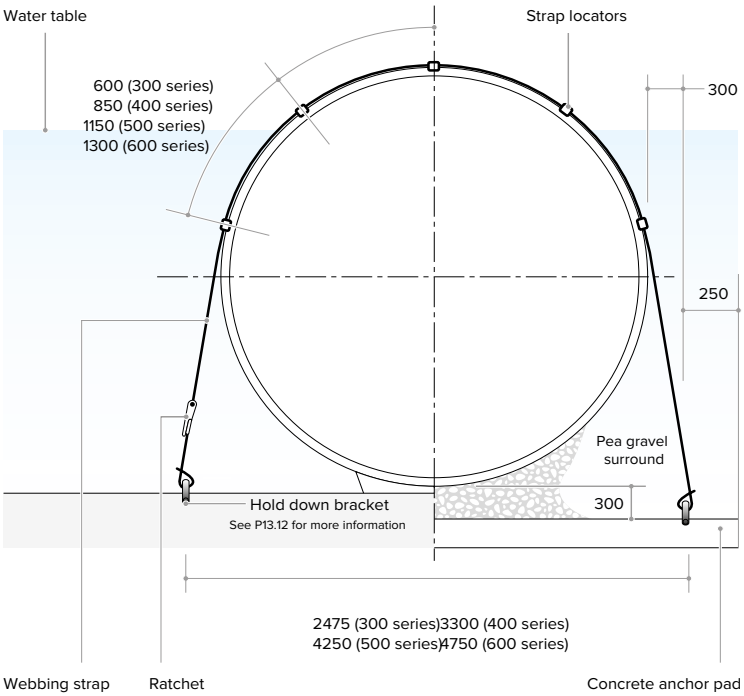
All anchor straps must be uniformly tightened with the ratchets. Straps should be a tight, snug fit to the ribs but must not cause the tank to deflect. It is recommended that the ratchets are positioned on alternate sides of the tank to ensure the tank remains vertical during tensioning.

Check the tanks internal diameter before and after tensioning the straps with a gauge rod to ensure against deflection.

Do not fill with product or water until backfill is level with top of tank except when backfilling with concrete.

When backfilling with concrete, we advise that the tank is filled with water to a corresponding level with the concrete to equalise pressure. Where the tank is divided into chambers, ensure all chambers are filled equally. See installation procedure for surrounding in concrete.

Figure 1



Procedure for 'anchoring' tanks down

1. Check contents of kit.

2. Hold-down Brackets:

   a) Position brackets so they line up with the ribs of the tank as indicated by 'strap' label. Check position from side of tank and edge of slab as shown in Figure 1 on previous page.

   b) Thread loop of short length through hold-down bracket (see Sketch 1). *Note: the arm of the ratchet should be facing outwards.* (Do the same for long length on opposite side of the tank.)

   c) Drill a 20mm dia x 150mm deep hole in concrete slab.

   d) Clear the hole of dust and hammer in the anchor bolt.

   e) Drill the second hole and hammer in the second anchor bolt.

   f) Tighten the nuts to 200Nm.

   NB. For strength the bolts must be at least 130mm deep into the slab and the concrete strength C25/30 or higher.

3. Then throw the remaining length of the long length of webbing over the tank, making sure that the webbing is not twisted.

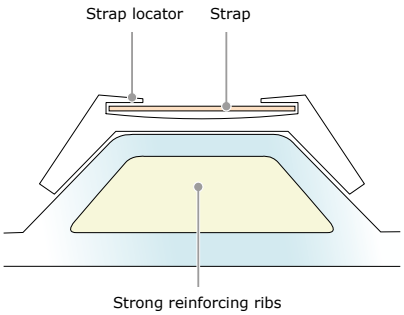
4. Position the 'long' length of webbing over the designated rib and 'clip in' the strap locators underneath the webbing and position as shown in the drawing (see Figure 1 previous page).

5. Taking the end of the 'long' length of webbing, thread it through the slot of the ratchet (see Sketch 1) and tighten up using the ratchet arm to give required tension.

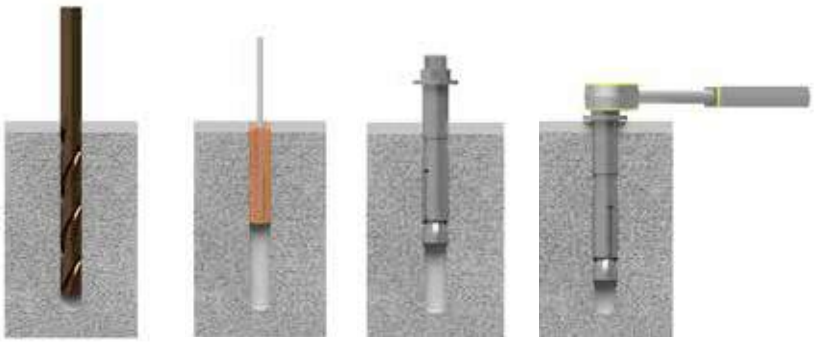
6. On completion the ratchet tensioners should be well wrapped in 'DENSO' or similar tape for long-term protection if the tank is surrounded in pea gravel or similar backfill.

Sketch 1

Sketch 2



Anchoring kit contents for 300 series:	**Anchoring kit contents for 400, 500 and 600 series:**
Ratchet c/w short length of webbing x 1	Ratchet c/w short length of webbing x 1
Long length of webbing x 1	Long length of webbing x 1
Hold-down brackets x 2	Hold-down brackets x 2
GRP strap locators x 3	GRP strap locators x 5
Bolts x 4	Bolts x 4

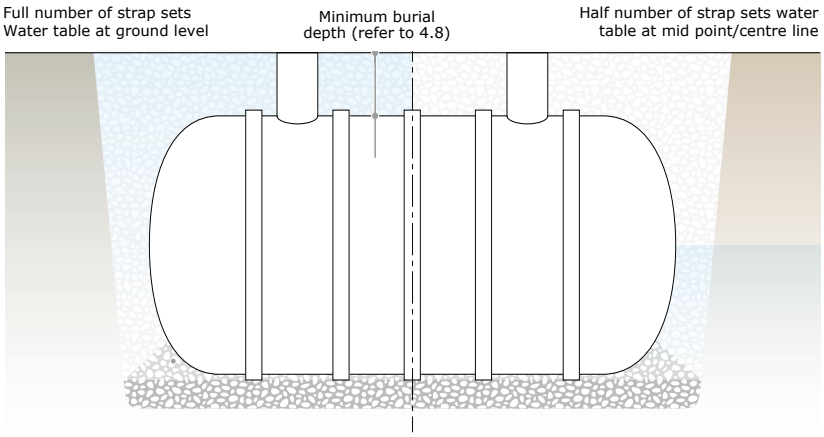


Position fixture and drill correct diameter hole to correct depth

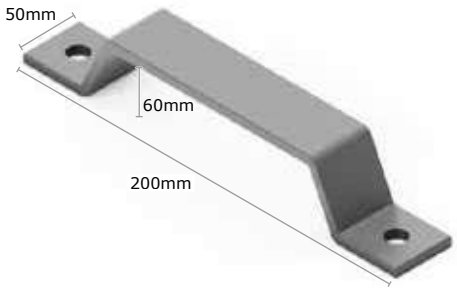
Clean hole by brushing and blowing to remove dust and drilling debris

Insert assembled anchor through fixture into concrete

Tightern with torque wrench to Insallation Torque



Hold-down Brackets



13.13 SPEL Underground Tanks Wellpoint Dewatering & Long Excavations

Wellpoint dewatering

Where sandy, permeable ground is saturated with water, wellpoint dewatering is a technique that lowers the ground water level over a defined area. This is achieved by simultaneously pumping from a number of wellpoints inserted into the water table.

Without wellpoint dewatering the contractor would be trying to work or dig in ground that is virtually quicksand. The sides of the excavated hole would keep collapsing and any sand removed would be replaced by more sand running in, thus, filling up the hole. This can result in danger to men, adjacent structures, roads, etc.

Once the wellpoints have been installed and the system has been running for some time, the contractor can then excavate in stable conditions.

As a general rule, any dewatering system must be kept running 24 hours a day because the water removed from the ground is replaced from the surrounding areas.

Modular bracing systems

Where excavations exceed 4m and extend to 22m or more, a propriety bracing system, where no internal cross bracing is required, should be used.

Systems available comprise telescopic, hydraulic and rough adjustment walling modules connected to fixed length extension beams designed to provide support to interlocking sheet piling.

Where excavations are 20m or more in length a goal post arrangement is normally required to provide cross bracing support at the central point. This arrangement enables the SPEL tank to be passed under and into the excavation.

For up to 20m long excavations, temporary bracing can be provided by Mabey Hire Ltd. to provide a clear opening for installing the SPEL Tankstor® or separator as illustrated.

Dewatering at RAF Coningsby

SPEL Separator being installed at an RAF base.

T. +44 (0)1743 445200 F. +44 (0)1743 465442 E. info@spelproducts.co.uk