



SPEL Tankstor[®]

Above & Below Ground Tanks

for underground & above ground applications & packaged pumping stations





SPEL Tankstor® Underground Tanks

SPEL Products is a quality assured company to BS EN ISO 9001 – design & manufacture.

We have been manufacturing glass reinforced plastic tanks since the mid 1960s and began making underground tanks in 1975.

These years of experience and our company's diversified operations have allowed us to design, engineer and manufacture the range of quality GRP tanks available today.

Our modern plant, equipment and quality assurance procedures ensure both quality and competitive pricing.

Design

Designed in accordance with BS EN 13121 / ISO 976, SPEL Tankstor® underground tanks are manufactured for many applications and in a wide range of specifications to handle such substances as water, sewage, farm effluent, petroleum products and chemicals.

Manufacturing Process

SPEL Tankstor® underground tanks are filament wound by the technically advanced chop hoop filament winding process (patented) which was chosen after careful investigation proved it produced the most desirable GRP underground tanks.

This process produces not only circumferential strength as found in helical wound tanks, but also longitudinal strength. The interlaminar shear strength permits tanks to be cut for manholes and pipe work without any undue loss in strength.

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.

Each tank has a smooth moulded resin-rich corrosion barrier inner layer and an external resin-rich water penetration barrier.

These layers can incorporate special resins to meet specific applications where the contents are highly corrosive or a potable water approved resin system is required or where surrounding soil is heavily contaminated.



Quality Assurance

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.

Advantages

Being manufactured in glass reinforced plastics, SPEL underground tanks are light, easy to handle and easy to install. They are not susceptible to rust, exhibit excellent corrosion resistant properties and have a life expectancy in excess of 50 years. The smooth internal moulded finish provides good flow characteristics and enables easy desludging and cleaning operations.



Each SPEL underground tank shell carries a 25 year warranty.

60
YEAR
ANNIVERSARY
1964 - 2024

Construction - Specifications

GRP laminate

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

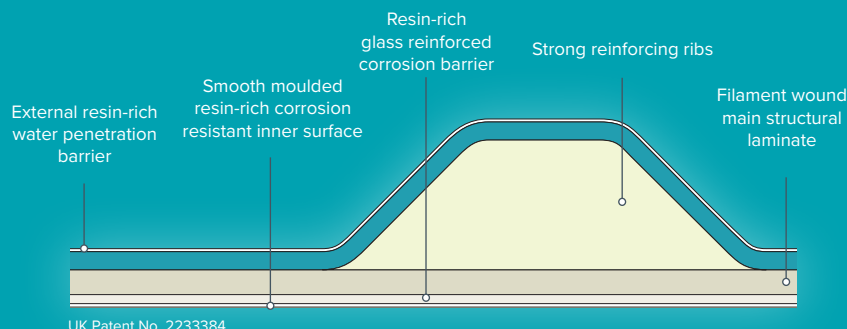
The quality and strength of glass reinforced plastic (GRP) laminates depends upon the following factors:

- 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 with resin-rich corrosion resistant internal surface, resin-rich glass reinforced corrosion barrier, main laminate and the external resin-rich water penetration barrier provides excellent corrosion resistance from internal contents and complete sealing of laminate from ingress of water and/or contaminants externally.

Tank Specifications

SPEL have a wide range of shell specifications available dependent upon tank burial depth and water table level in winter. The tables refer to tanks with a concrete surround. For further specification ranges and pea gravel surround refer to Section 7 SPEL Data Manual.

Materials, construction, application categories and type codes



GP – General purpose applications. Constructed throughout with orthophthalic 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.

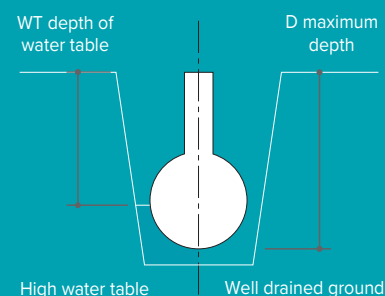
HCR – Highly chemical resistant. Aggressive chemicals and/or high temperatures. The smooth moulded resin-rich corrosion resistant internal surface and the resin-rich glass reinforced corrosion barrier are constructed from vinyl ester resins dependent upon chemical resistance and/or high temperatures.

Applications – transformer oil dump tanks, highly aggressive chemical process or holding tanks, and accidental chemical spillage containment tanks.

General guide for maximum burial depths with concrete surround

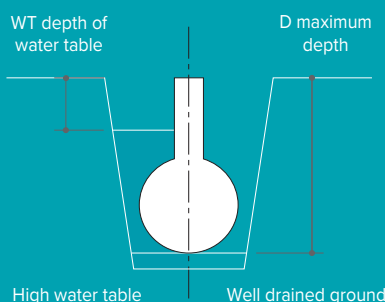
Standard Tanks

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 further shell specifications see section 7 of SPEL Data Manual

Range and Capacities

Tank capacity litres	200 Series 1.2m inside diameter length mm	300 Series 1.8m inside diameter length mm	400 Series 2.6m inside diameter length mm	500 Series 3.5m inside diameter length mm	600 Series 4.0m inside diameter length 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			
16,000		6,700			
17,000		7,060			
18,200		7,615	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		
45,000				5,390	
45,500			9,050		
50,000			9,950		
60,000			11,830	6,960	
70,000			13,710		
75,000			14,700	8,530	
80,000			15,600	9,030	
90,000				10,040	
90,400			17,560		
100,000			19,350	11,180	8,710
120,000					10,310
125,000				13,830	
140,000					11,910
150,000				16,330	12,690
160,000				17,550	13,510
170,000					14,320
175,000				18,930	14,740
180,000				19,430	15,110
190,000				20,530	15,880
200,000				21,530	16,650
220,000					18,260
240,000					19,890
250,000					20,660
260,000					21,470
270,000					22,270
280,000					23,020
290,000					23,850
300,000					24,660

Note: Intermediate sizes are available.

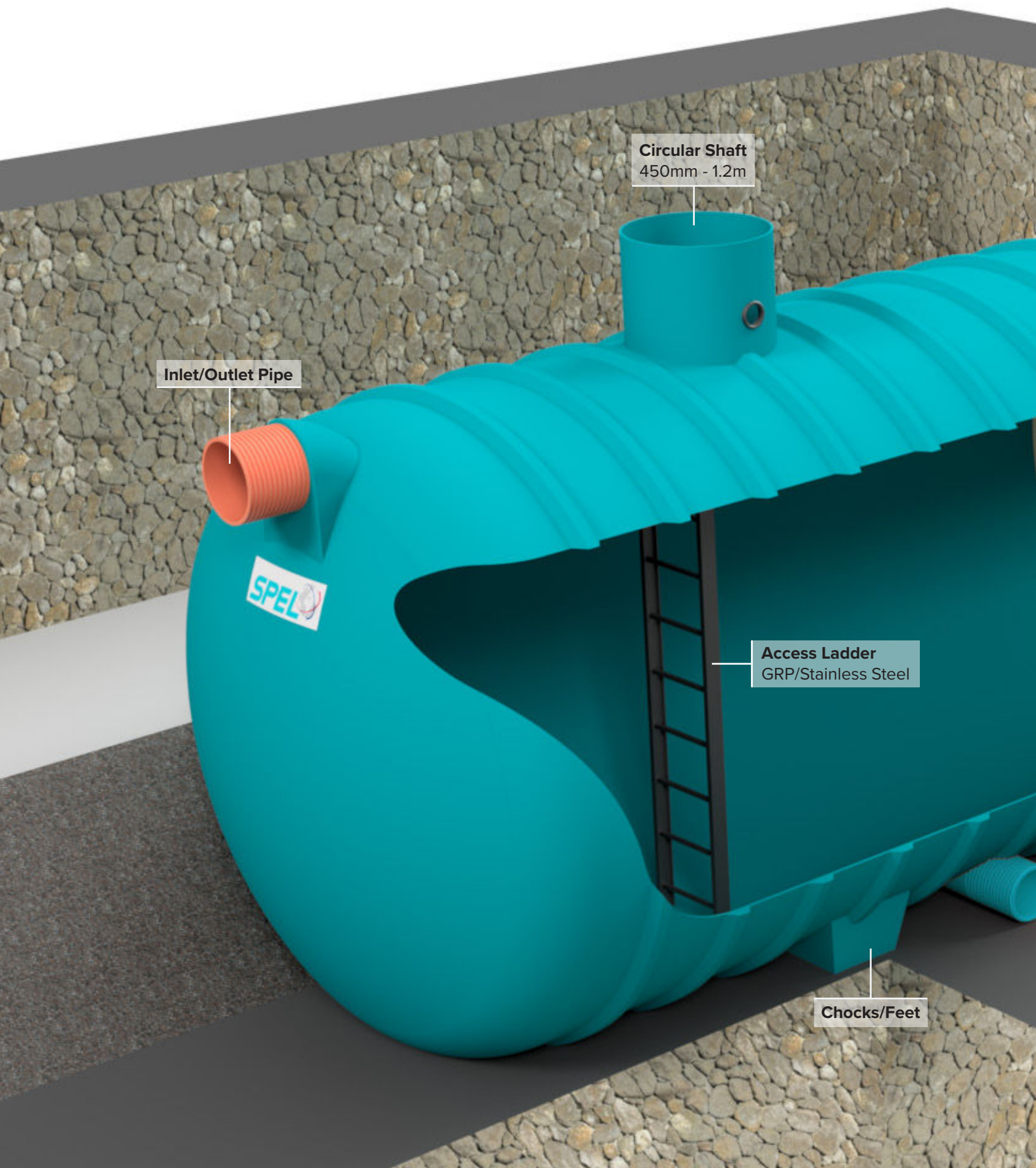
SPEL TANKSTOR® Example Options

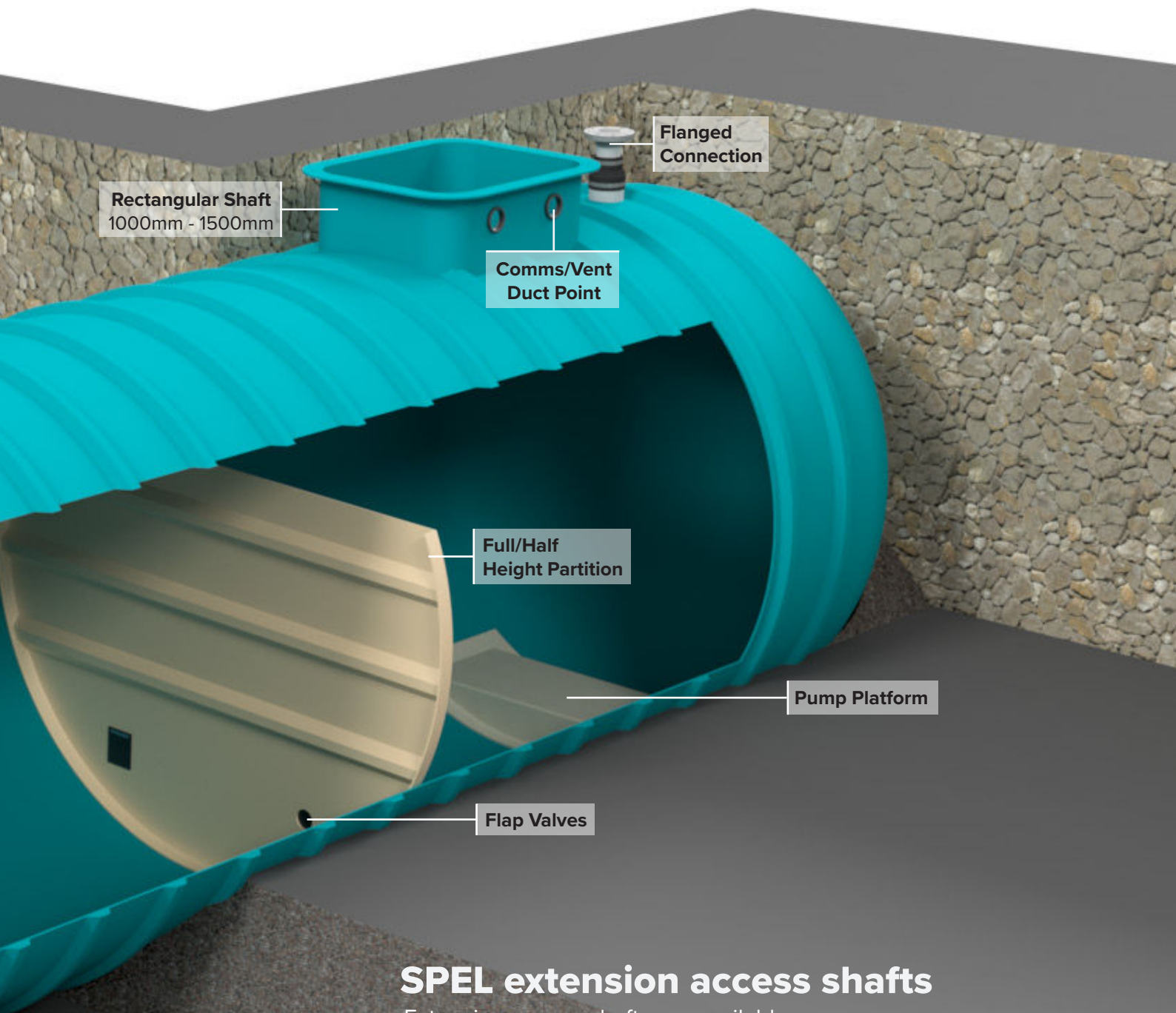
STATE-OF-THE-ART TECHNOLOGY IN GLASS REINFORCED PLASTICS

25 YEAR
TANK SHELL WARRANTY



IN EXCESS OF
50 YEAR
TANK SHELL LIFE EXPECTANCY





Rectangular Shaft
1000mm - 1500mm

Flanged Connection

**Comms/Vent
Duct Point**

**Full/Half
Height Partition**

Pump Platform

Flap Valves

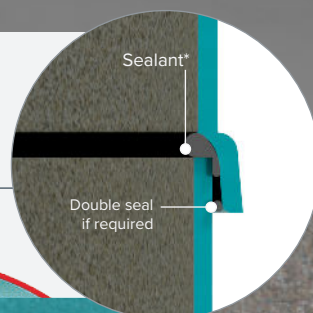
**Low Level
Connection Pipe**

SPEL extension access shafts

Extension access shafts are available for deep invert applications

Socket joint stub access shaft with extension shaft.
450mm, 600mm, 750mm,
900mm and 1200mm diameter.

**Sealant, or similar - Subject to ground conditions.
Sealant: Sikaflex, external.*



Septic/Settlement Tanks

Selecting and siting

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 Agreement Certificate in 1977. Since then SPEL have developed a large range of horizontal cylindrical septic tanks to BS 6297 from 3,000 litres capacity for single dwellings up to 300,000 litres capacity and over for larger communities.

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

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

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 absorption 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.



Chemical Process Tanks

Nitrate improvement scheme, Severn Trent.
SPEL Tankstor® 4 No. 11,000 litre capacity & chemical resistant underground tanks.

Client: Severn Trent Water

Consultant/Contractor: Mott MacDonald Bentley

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

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 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 StormBrake 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.

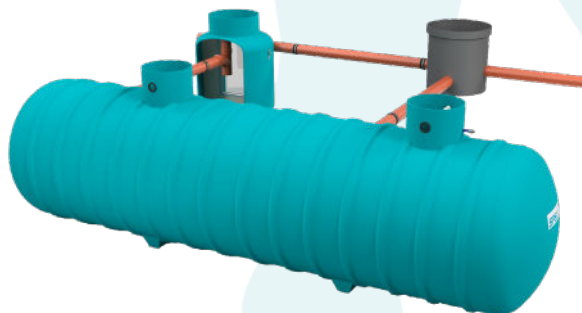
During storm conditions level will rise and pass over the weir into the storage compartment and as the storm abates and the level falls in the first chamber, non-return valves operate to allow the stored stormwater to pass back into the first chamber and through the flow controller.

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.

SPEL StormBrake/RainSave Systems

Where stormwater attenuation and rainwater harvesting are both required SPEL Storm-Brake/RainSave Systems offers a combined and very economic solution. The combined system saves on land space and installation costs.



SPEL Tankstor® Tanks - Applications

Stormwater Attenuation • Containment • Rainwater Harvesting • Chemicals

Gatwick Airport: Boeing GoldCare Hanger
Client: Boeing Corporation
Contractor: John Sisk
Products: 13 no. SPEL Tankstor® 600 Series 240,000L fire water storage tanks.
Total Capacity: 3.1 million litres



Dawley & Malinslee Attenuation
Client: Telford & Wrekin Council
Contractor: Birse Civils
Product: 4 No. SPEL Tankstor® 600 series 220,000L underground attenuation tank.
Total Capacity: 880,000 Litres

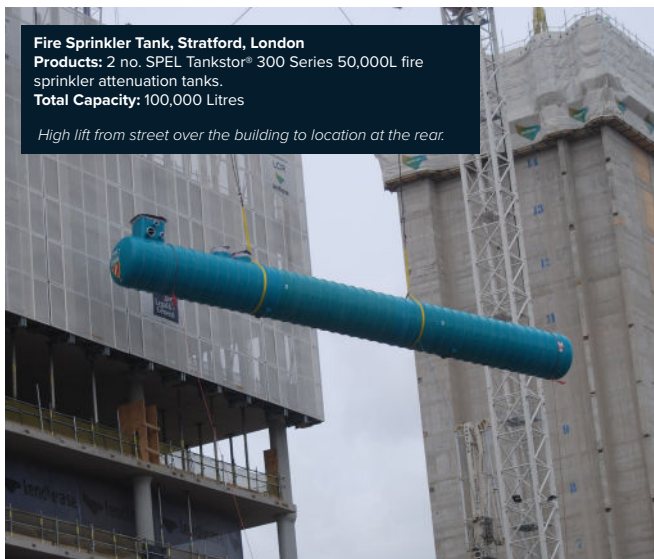


DigiPlex, Oslo, Norway
Contractor: Designer Group
Products: 6 no. SPEL 400 Series 36,400L RainSave Rainwater Harvesting tanks.
Total Capacity: 218,400 Litres



Fire Sprinkler Tank, Stratford, London
Products: 2 no. SPEL Tankstor® 300 Series 50,000L fire sprinkler attenuation tanks.
Total Capacity: 100,000 Litres

High lift from street over the building to location at the rear.



Nent Haggis Minewater Treatment Facility
Contractor: I & H Brown
Product: SPEL Tankstor® underground attenuation tank 200 series capacity 26,000L.

Due to site access restrictions, the tank was supplied in two parts and construction was completed on site.



Hyde Park Super Nursery
Client: The Royal Parks
Contractor: SB Civil Engineering
Products: 3 no. SPEL 300 Series 14,000L RainSave Rainwater Harvesting Tanks.
Total Capacity: 42,000 Litres



SPEL Packaged Pumping Stations

Offsite built & tested

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), 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; pipe work, valves, pedestals, guide rails factory fitted and tested. Expensive site work installing pumping equipment under difficult conditions is eliminated. The only site work 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 'initial' installation costs usually results 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 of the data manual.

SPEL have a good working relationship with the main pump and equipment suppliers thus ensuring full maintenance warranty and service back-up.

Vertical & Horizontal Package Pumping Stations

SPEL 'V' (vertical) and 'H' series (horizontal) package pumping stations are factory fitted out and tested with pipe work, pump pedestals, valves, guide rails, and level controls to meet your requirements and to Sewers for Adoption.

Eliminates inefficient and expensive 'confined space' site fitting out. It is indeed the way forward in the construction industry.

Whatever your requirements for package pumping stations SPEL have the answer you can put your trust in with absolute confidence.

Quality pumps (Grundfos, ITT Flygt and other reliable makes) at very competitive prices.



SPEL Products has received this independent certification and approval for the full range of **SPEL GRP Wet Wells**. The full range covers vertical and horizontal **SPEL Package Pumping Stations** up to 300,000 litre capacity.

SPEL Xspel Package Pumping Station

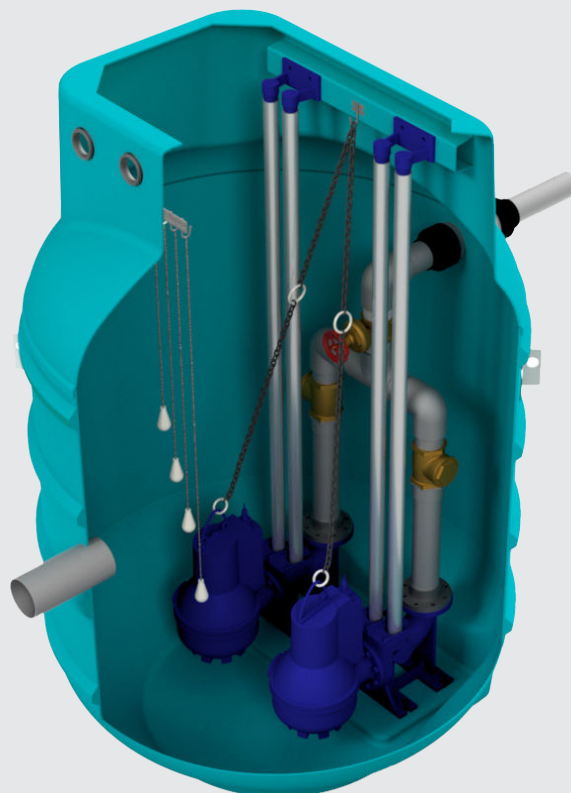
The chamber is filament wound GRP incorporating a smooth moulded internal corrosion resistant resin-rich layer. This smooth moulded finish provides excellent self-cleaning qualities. Under test the requirements of WIS 4-40-02 were met where the depth of sediment shall be less than the 10% of the difference between the pump inlet and the base of the chamber.

The chamber exhibits good chemical resistance.

Being moulded and assembled into a one piece moulding the chamber meets the leak tightness tests in accordance with WIS 4-04-02, clauses 12.1.2. and 3.

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 pipe work, valves etc. and 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



Specify with absolute confidence



Largest one-piece factory made unit

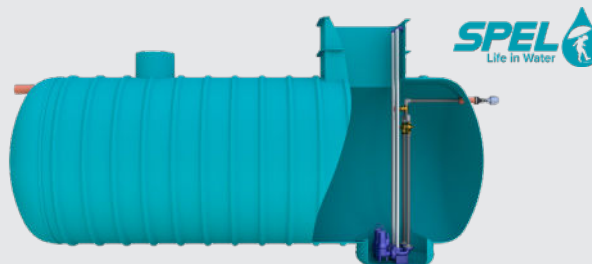
A 300m³ SPEL H-series Package Pumping Station, thought to be the largest one-piece factory made unit, being delivered to a waste transfer station in Yorkshire.

SPEL Products' capability to produce large pumping stations enables enormous savings in site costs and faster time schedules.

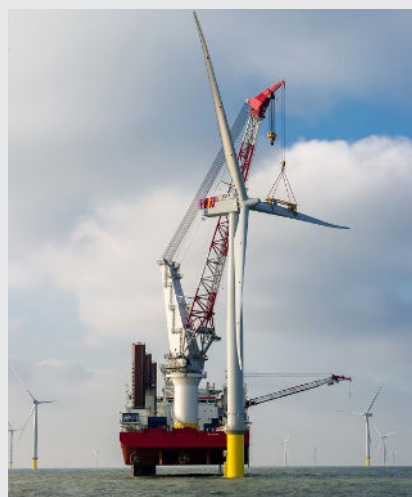


SPEL DrainGuard

Rainwater is directed from the transformer platform to the SPEL DrainGuard tank, here float switches 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 stops the pumps, ensuring the oil spill is captured (tanks are sized to 110% of the spill risk). The unit incorporates an anti-syphoning device to ensure hydrocarbons retained within the tank cannot, through static head pressure, pass out of the tank.



National Grid



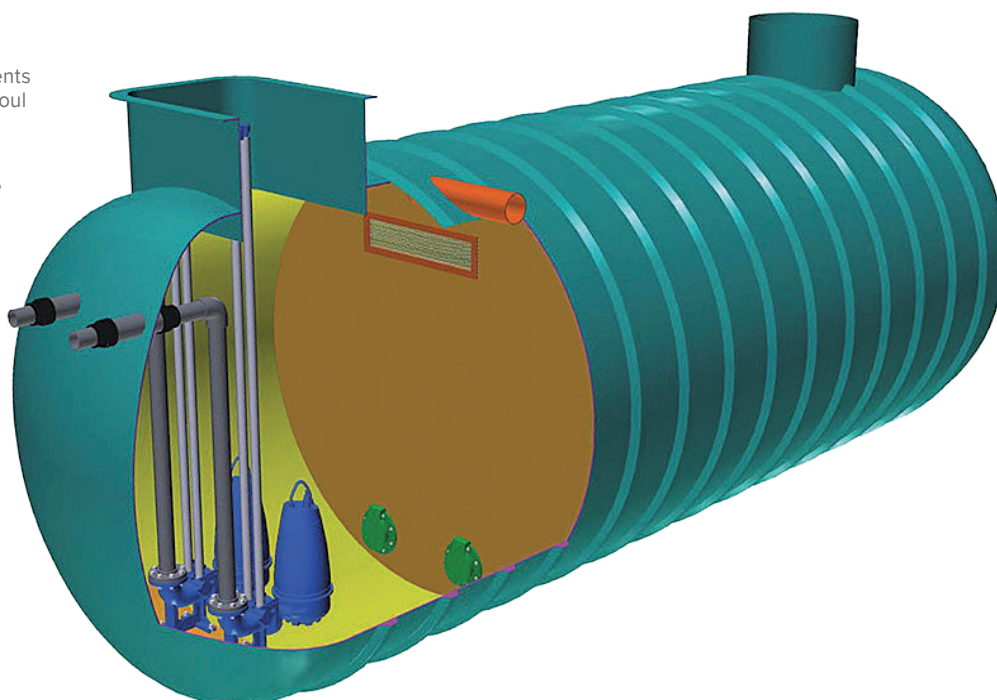
SPEL Products supply specialist monitoring, containment and treatment systems to safeguard large installations in the power generating industry.

These installations, and more recently, the largest wind farms incorporate SPEL Package Pumping Stations.

The SPEL 24 Pump Station

This range is designed to meet the requirements of The Building Regulations 2010 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.



SPEL 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 where the ground is contaminated or is unstable made up ground.

Horizontal SPEL Tankstor® tanks are mounted on adjustable galvanised steel cradles fixed to a suitable preformed concrete slab designed for the required loadings.

The tanks can be single skin or with secondary containment (bunded) or double wall units.

SPEL cavity monitoring units can be fitted to warn if any corrosion or accidental damage occurs during service.



SPEL Vertical Above Ground Range

All horizontal range tanks found on page 5 are available in above ground specification

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
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 storage vessel. 10,000 litre capacity with secondary containment, access ladder and platform.



SPEL Separators are also designed and manufactured for above ground installations. The separator can incorporate secondary containment (bund), galvanised access platform and servicing equipment.



SPEL Tankstor® rainwater attenuation scheme at the Ramsgate Traincare facility. Five, 400 Series 85,000 litre capacity.

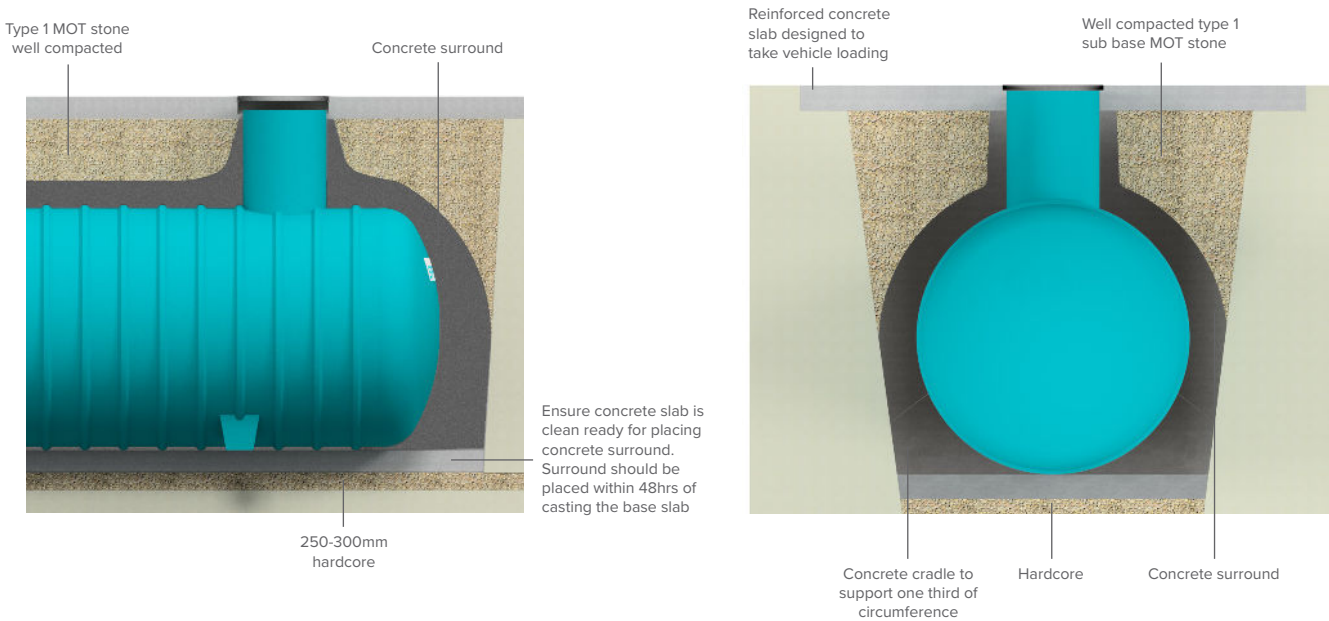


The tanks can be supplied with galvanised steel access ladders and platforms.

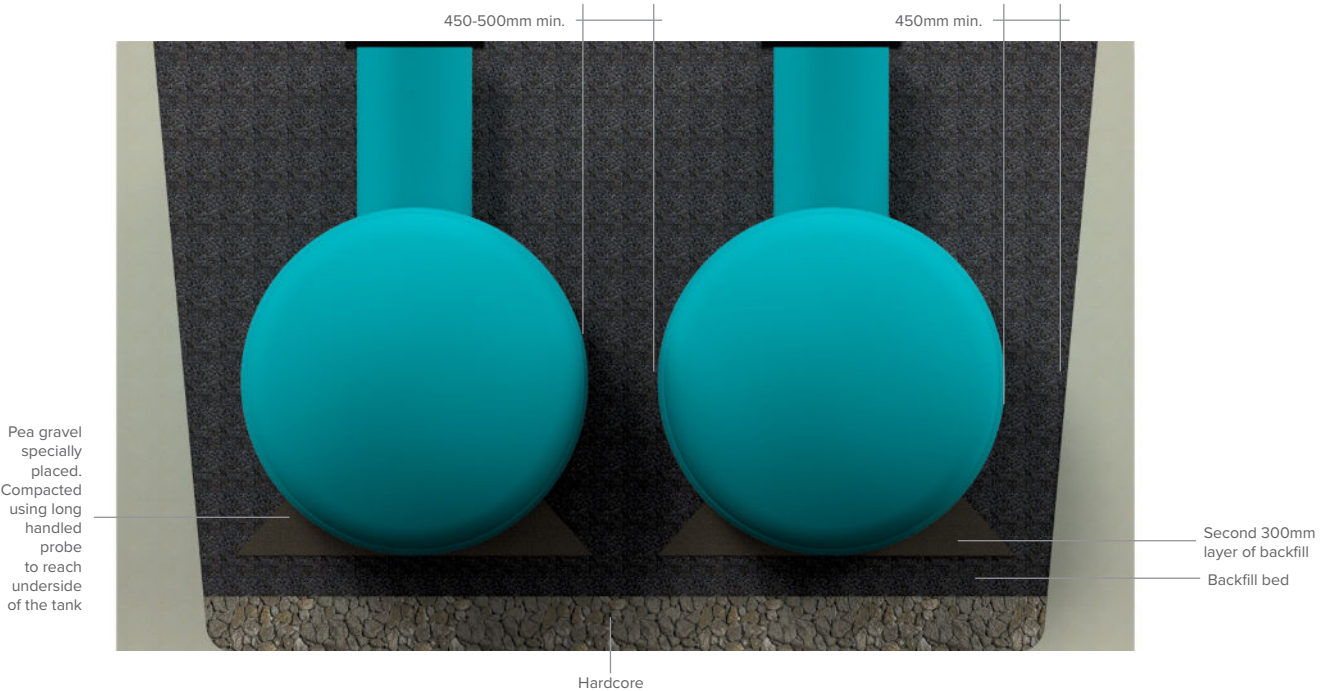


Typical Installation Guidance for Underground Tanks

Installation – Concrete



Installation – Pea gravel



Concrete Surround Dimensions

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 7.4-7.7 and 7.19					
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)	1,250/1,200	1,800	2,600	3,500	4,000
Tank external diameter (mm)	1,300/1,225	1,875	2,700	3,650	4,150

General Installation

Notes for general guidance on installation

SPEL Tankstor® tanks must be installed in accordance with the installation instructions in the SPEL Data Manual Section 7.

Some important installation steps are highlighted as follows.

Off-loading/handling

The contractor is responsible for off-loading the tank mechanically using a backhoe or crane. The tank must be handled with care to prevent accidental damage from impact or contact with sharp objects. Avoid jarring and bumps.

Use web slings not chains for lifting. Don't lift with water in it. Sling lifting positions are indicated on the tank. For large tanks a spreader bar may be required. Use guide lines when craning long tanks.

Storage

Set tank on smooth ground free of bricks and sharp objects, chock to prevent rolling and tie down against high winds.

Excavation size and design

Determine the size of the excavation from the dimensions of the tank and the incoming drain invert depth allowing for concrete/pea gravel all round the tank. Where difficult ground conditions exist, or the possibility of external loading, a concrete surround should be designed accordingly, eg. 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.

If the base of the excavation is of unstable ground – allow for 250-300mm of hardcore, and cover with a polythene membrane prior to placing concrete.

Tanks surrounded in concrete

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.

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.

3. 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.

4. Continue by placing concrete round the tank, at the same time filling with water to equalise pressure and resist floatation. Ensure all chambers are filled equally.

5. Connect up pipe work, fix extension access shaft with waterproof mastic/adhesive or bolt to the stub access shaft as appropriate.

6. Top up the tank with water to invert level and place remainder of concrete.

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. Important: Before surrounding circular or rectangular shafts with backfill, shutter internally to support the sides and safeguard against distortion.

8. Incorporate inspection cover frames in the normal manner.

For smaller tanks e.g. cesspools can be installed as follows:

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.

4. As 4-8 in method above, 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.

Tanks surrounded with pea gravel or similar

Where it is economical to do so, SPEL Tankstor® tanks can be surrounded in pea gravel or with similar free flowing clean rounded aggregate. Details of the installation procedure, approved backfill materials and the need for mechanical anchoring in specific circumstances are contained in the SPEL Data Manual. For guidance the basic steps are as follows

Dry hole procedure

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 to ensure a firm base for the backfill.

Installation

1. Place a minimum of 150-300mm of approved backfill over the excavation bottom.

2. Position tank carefully onto backfill bed and check for levels including inlet/outlet inverts.

3. 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 tank diameter. The remainder of the backfill can be poured without

consolidation except where required to support a cover slab.

4. Connect up inlet, outlet and vent pipe work, seat access shaft into socket and apply waterproof mastic/adhesive, or as applicable.

5. Where a concrete slab is to be constructed over the tank to take vehicle loading – see under concrete backfill step 7.

6. 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.

The SPEL mechanical anchoring system

For installations using pea gravel backfill this system is available to reduce the risk of floatation. The system locates over the designated ribs and ensures complete safety. Other systems will nullify the tanks warranty.

SPEL Tankstor®

Above and Below Ground Tanks

SPEL Tankstor® tanks have been developed with 60 years of experience in the market of underground GRP tanks. SPEL are a bespoke manufacturer and Tankstor® tanks have many uses including storage, stormwater attenuation, fire sprinkler systems, spill containment, potable water and chemical spill tanks, as well as wastewater applications.



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