

GRP Sectional Cold Water Storage Tanks
Manufacturing Tanks Since 1973



TRICEL
WATER STORAGE

Consultants
**Sectional Tank
Manual**



www.tricel.ie

101 Rev15 Oct. 19

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1 Introduction

Tricel (Killarney) Unlimited Company is one of the foremost companies in the business of producing Glass Fibre Reinforced Plastic (G.R.P.) sectional water tanks.

Tricel (Killarney) Unlimited Company is a group of companies headquartered in Ireland and is a global supplier of composite products and technology. Tricel (Killarney) Unlimited Company has four core product groups: Building and Automotive Products, Sewage & Effluent Treatment Systems, Reinforced Compounds and Safety Products.

We are one of the few companies who possess the technical expertise and the advanced manufacturing facilities - not only to manufacture our tanks by hot compression moulding but also to produce in-house, the most important single element without which the term hot press moulding means nothing.

This element, an advanced composite known as Sheet Moulding Compound (S.M.C.) is manufactured in our Killarney plant with all the necessary characteristics incorporated into the design and tested in advance.

Tricel (Killarney) Unlimited Company has achieved a pre-eminent position in this field. Our experience in composite materials extends over 30 years, during which period we have grown to become a market leader - being in sole control of the key elements in the excellence of our product.

All our products are manufactured to ISO9001:2000

Range of Panels

Tank panels are available in metric (1 x 1meter, 1 x 0.5 meter & 0.5 x 0.5meter) configurations



2 Guidelines for locating water tanks

2.1 General

The following recommendations are generally for elevated tanks, as tanks at elevated positions can cause serious damage to the surrounding area in the event of wall, pipe or structural support failure resulting in water spilling out at a fast rate. Consideration must be given to minimise the effects of such an occurrence, in terms of the positioning of the tank and regular inspections.

- Water tanks should be located so as to prevent water damage or consequential loss in the event of leakage howsoever occurring.
- All tanks which are located above water sensitive areas should have a bund wall around them with adequate evacuation ducts.
- All other tanks should have plumbed Condensation or Drip trays to prevent nuisance damage and to keep floors dry.

Problems may arise with the tanks due to failure of the structural supports underneath the tanks, contaminated water attacking the internal fittings, ball valve failure where overflows were not fitted, vandalism etc.

2.1.1 Water tanks on top of buildings

Water tanks located on top of any building should be sited at least 1.2 meters away from the edge of the building.

It would be preferable if the water tank was sited 1.5 times the height of the tank away from the edge of the building. In the event of failure, this would allow the water to spread itself over a much wider area before spilling over the edge of the building and possibly taking personnel or debris with it.

2.1.2 Guiderails on tank roofs - Health & safety requirements

Guiderails may be necessary to satisfy Health & Safety Regulations. The type of railing required is dependant on the tank height, distance from ground level, access etc. Please confirm which guiderail arrangement is required so that we can make the necessary inclusion. We can supply and install ladders and railings, but we must be informed of the exact details prior to quoting the project. We assume that the end user is making his own arrangements unless we are informed otherwise.

2.1.3 Water tanks on elevated structures

For water tanks located on top of elevated structures, a walkway of at least 1 meter should be provided around the water tank to allow for maintenance and inspection. This walkway should comply with health and safety regulations.

Potable water tanks

To comply with the Health & Safety Executive regulations on the Control of Legionellosis 1998, Cold Water Storage Tanks must be located in areas that are "*readily accessible for cleaning*".

Regular Maintenance and Inspections as required by Health & Safety Legislation.

3 Guidelines for sizing water tanks

- Hotels: 1045 Litres (actual capacity) per bedroom per day
- Offices: 45 Litres (actual capacity) per person per day
- Schools: 36 Litres (actual capacity) per person per day
- House with 2 bathrooms: 682 Litres (actual capacity) per day

The mains pressure must be sufficient to re-fill the tank while the premises are closed or in between peak time usage. In areas of low water pressure, the above figures would need to be increased. In our experience, the water pressure has been reducing gradually for the past number of years, particularly in the cities and in areas where there have been large developments.

Note: The above figures are based on Dublin Corporation guidelines. The minimum requirements do not include for fire-fighting.

Nominal versus actual capacity

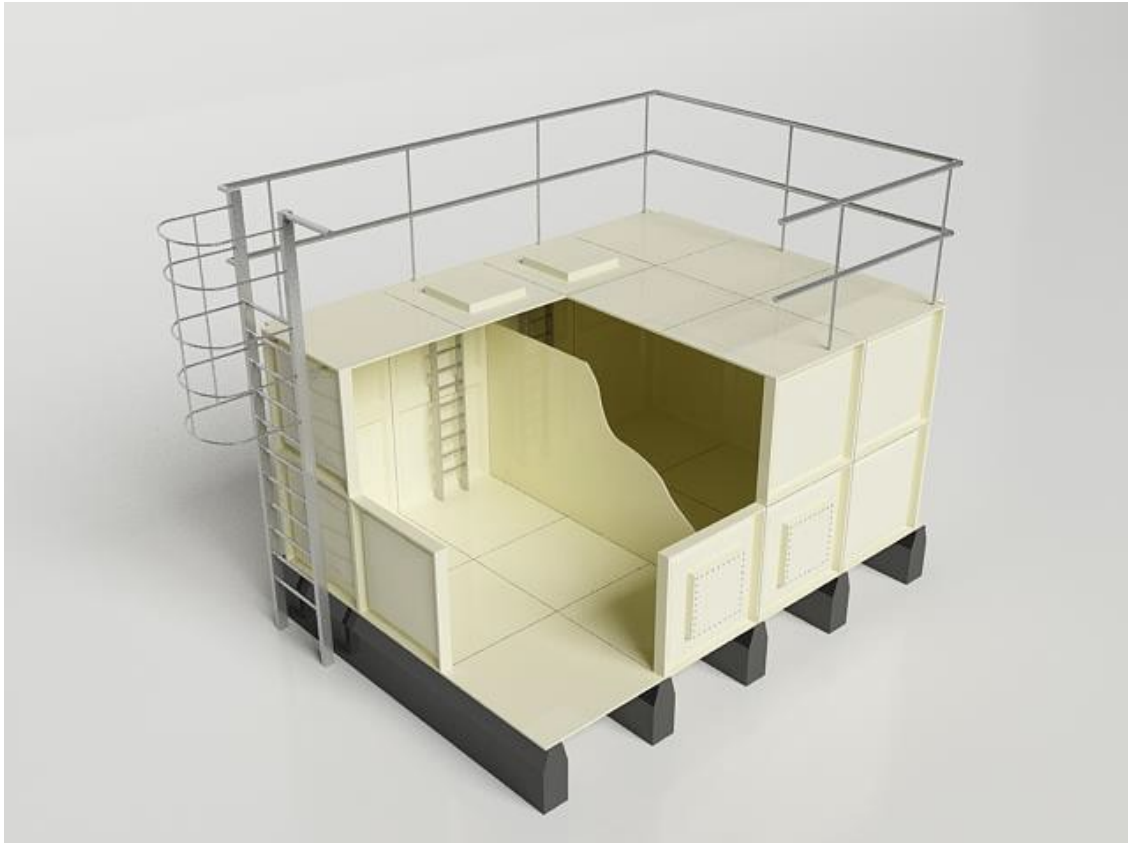
Tank height (mm)	Metric	
	% loss in capacity for 51mm (2") overflow	% loss in capacity for 89mm (3 ½") overflow
500	42	51
1000	21	26
1500	14	17
2000	11	13
2500	8	10
3000	7	9
3500	6	7
4000	6	7

The above figures are approximate and are based on a 51mm (2") and 89mm (3 ½") overflows. If a larger overflow is used, the percentage loss will be greater. The capacity of the tank can be increased by using a ball valve housing.



15150 x 4140 x 2000mm 120,000 litre (26,000 gallons) sectional water tank insulated to Format 30. Installed 1998.

4 Guidelines for different models of tanks



Standard tank: This tank is complete with internally flanged base, externally flanged side walls. All under water stays are stainless steel and all external bolts are galvanised to BS EN ISO 1461:1999. Stainless steel bolts also available.

Heavy duty cover: Suitable for indoor and outdoor use, and for the storage of foul water. These tanks have internally flanged lid panels, similar to those used in the base.

Heavy duty cover and finished to Format 30: Suitable for indoor, outdoor use and for the storage of drinking water, as defined in our specification, Tricel (Killarney) Unlimited Company Format 30 on page 8.

Note:

- To comply with current legislation all tanks that store water that may be used for drinking must be protected, they must meet the requirements set out in the water byelaws
- BS EN 806 states that because any cold water tap is likely to be used to drink from, all such taps not directly connected to the mains shall be supplied only from tanks that are protected.
- Where drinking water has been stored in an inadequately protected tank, a water analysis should be considered and adequate protection installed.
- Tanks of over 1000 litres (220 gallons) shall be divided or have standby tanks to facilitate repairs and maintenance. It should also have a wash out pipe or drain out taps, these to terminate above an outside gully to prevent wastage and backflow contamination.
- Tank insulation materials should not suffer permanent structural damage from contact with water generally Phenolic and Polyurethane closed cell foams comply. Where pipe

cut outs go through insulation panels, bezels should be fitted to protect the exposed insulation from the ingress of moisture, insects and vermin and preserve the integrity of the insulation with a protective finish.

Types of bolts: Standard Tanks come complete with Bolts galvanised to BS EN ISO 1461:1999, we recommend that Consultants specify Stainless Steel grade 316 S16 bolts under water and on lid.

Dividers: In any situation where there is only one water storage tank in a building and the capacity is greater than 1000 litres (220 gallons), BS EN 806 states "*To avoid interruption of the water supply when carrying out repairs or maintenance, the cistern shall be provided with compartments or standby cistern*". Where drinking water is being stored, two separate tanks are recommended as it is difficult to detect cross contamination from one side of a division wall to another.

Condensation trays: They should be used in any instance where condensation, drips from pipe work, or from the tank could cause nuisance damage or render floors wet and slippery.

Ball valve housing: Enclosed chamber containing an access hatch above the level of the cover, permitting the level control mechanism to be mounted at a higher level than would otherwise be possible. The overflow(s) must be placed on the tank side wall and not on the Ball Valve Housing. Water must be kept below tank roof level. This is only necessary where very large ball valves are used.

Ladders: Where tank depth is 1m or greater, internal and external ladders should be specified. If the tank is on a raised platform then ladders may be required on tanks lower than this height. Where the tank is 2m or more from the top of the tank to the finished floor level external ladders should be fitted with safety cages and comply to BS 4211:2005+A1:2008. **Guiderail:** A guiderail should be fitted enclosing all access points to the tank roof, where a tank is 2m or more from the top of the tank to the finished ground level. Additional safety guards maybe required for ladders depending on their location. A risk assessment should be carried out by the end users to determine if this is required.

Reverse base tanks: (Externally flanged base) These types of tanks allow the tank to be totally drained down, as the base is flat, they also allow access to all the bolts from outside the tank. 600 mm clearance is required underneath the tank for access to the base bolts.

The client shall ensure that potable water is not stored in tank compartments that are adjacent to compartments storing foul water due to risk of contamination.

5 Side access hatch



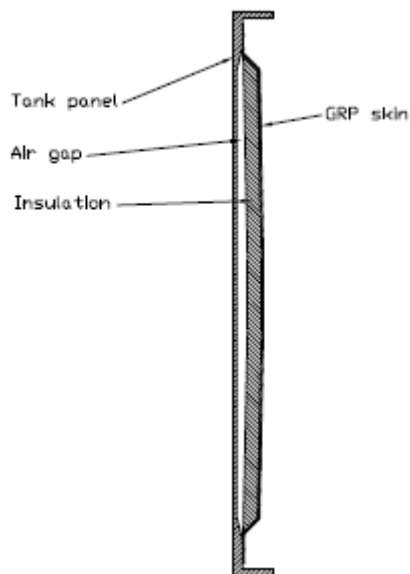
The Side access hatch has an opening of 600mm x 600mm. It is available as a 1000mm x 1000mm metric panel. The side access hatch is a useful choice when there are height restrictions on site. It also provides easier access to the inside of a tank, particularly when there is restricted space above the tank.

The side access hatch comprises of three main components: panel, flange and flat hatch sheet. To open the hatch, the flat hatch sheet is simply unbolted from the flange. It can only be opened when the water level inside the tank is lower than the access hatch.

This Access Hatch was designed so that both the head of the bolt and the nut are accessible. This allows a wrench to be placed on the bolt head as well as the nut and prevents a scenario of the bolt simply spinning without opening.

Please note that the 'tank sealant' between the flat access sheet and the will need to be in good condition or replaced, prior to the reattachment of the flat access hatch.

6 Tanks insulated and finished to Format 30



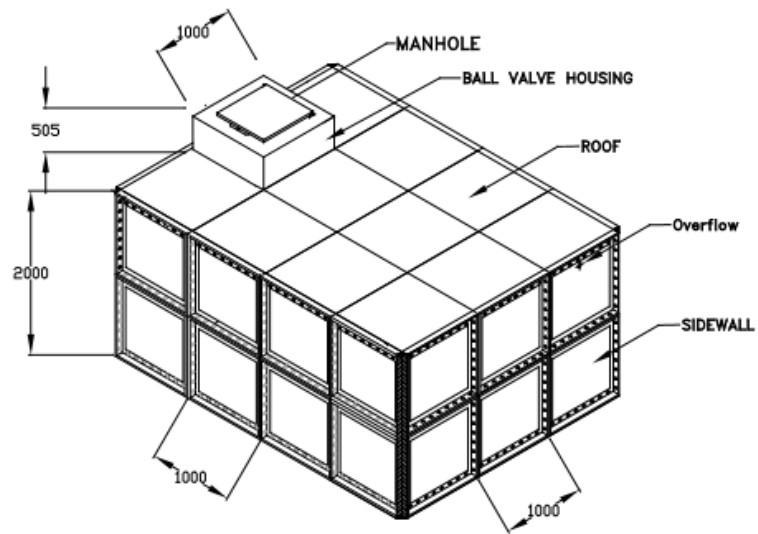
Note: This is an example of one type of insulation skin, there are different arrangements for different types of tanks.

- Current legislation states that water hot or cold, in any premises that might be used for human consumption must be of potable quality.
- In addition to tank material specifications, there are now further requirements for lid design, the screening of vents, breathers, overflows, warning tell-tale pipes and the provision of insulation which will help prevent freezing and also help keep water as cool as practicable, ideally less than 20°C.
- Format 30 is our description of tank with heavy duty panel covers, complete with screened vents, overflows, warning pipes etc and having side wall and roof panels with a (u) value of 2.5 w/m²K, (tanks under 1m high have a slightly higher value). This value meets the requirements of section 30 of the water bye laws in the majority of situations. Tanks in boiler rooms etc may also need base insulation. The purchaser can specify extra requirements or thermal transmittance after considering the period of protection necessary, the tank location and the surrounding conditions. **Please Note:** Insulation slows down but does not prevent heat loss or gain over protracted periods. Additional information is available in BS EN 13280:2001.



4150 x 4150 x 1500mm 24,000 Litre water tank insulated to F30

7 Ball valve housing



Note: All dimensions are in mm

Isometric view of a ball valve housing on a 4000 x 3000 x 2000 mm sectional cold water storage tank. A ball valve housing is an enclosed chamber containing an access hatch above the level of the cover, which leaves space for larger ball floats to raise up and shut off the water supply.

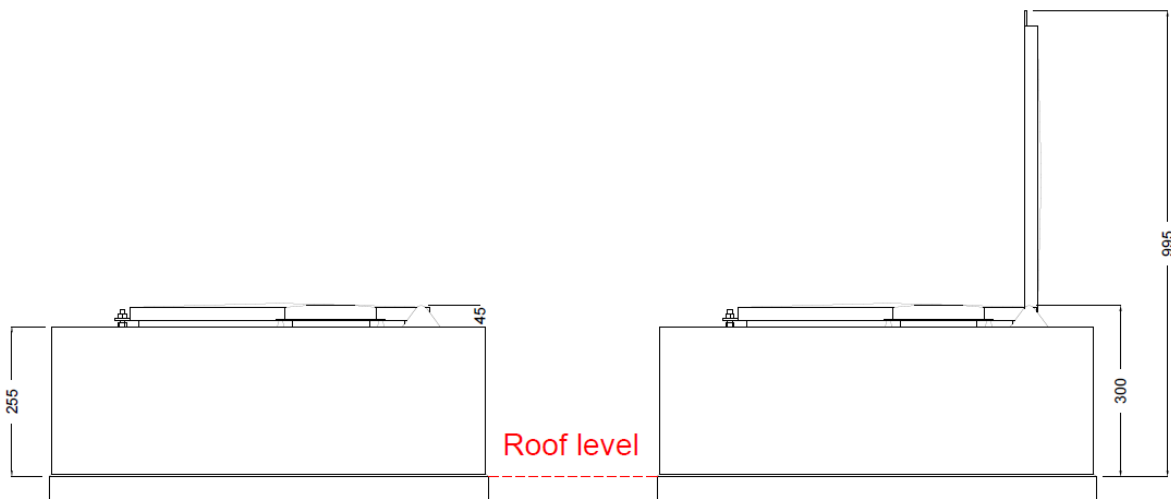


7.1 Ball valve housing specification

Standard Housing



Reduced height



Specification

Standard: External Dimensions: 1000 x 1000 x 555 mm high

Reduced Height: External Dimensions: 1000 x 1000 x 300 mm high

Space required: 1201 mm clearance space is required above the roof of the tank, i.e.

For a 2m high tank the room needs to be 3201 mm high.

For tanks with roof height restrictions a lift off lid is also available*

Note: The overflow(s) must be placed on the tank side wall and not on the ball valve housing. Water must be kept below tank roof level.

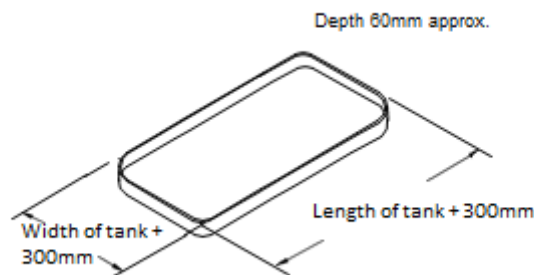
*Site assessment by end user needs to be completed, as adequate access is required to tank for maintenance. Refer to Base Details on page 15 for access guidelines.

8 Condensation tray

We manufacture condensation trays to suit all sizes of water storage tanks. Condensation trays should be used in any instance where condensation, drips from pipe work or from the tank could cause nuisance damage or render floors wet and slippery.

For sectional cold water storage tanks, the tray extends round the tank by 150 mm. i.e. a sectional tank with dimensions 4000mm x 3000mm will have a tray approximately 4300 x 3300 mm.

Trays for large sectional tanks are joined on site.



Condensation trays should be water tested at time of testing tank.

A condensation tray is not a substitute for a bund wall or for tanking out a room.

APPROPRIATE OVERFLOWS MUST BE FITTED AS CLOSE AS POSSIBLE TO THE BASE OF THE DRIP TRAY. THESE MUST BE FITTED BEFORE THE TANK IS FILLED. TRAYS ARE DESIGNED TO HOLD A MAXIMUM OF 25MM OF WATER.

9 Tank divisions

In any situation where there is only one water storage tank in a building and the capacity is greater than 1000 litres (220 gallons), BS EN806, states "*To avoid interruption of the water supply when carrying out repairs or maintenance, the cistern shall be provided with compartments or standby cistern*". Where drinking water is being stored, two separate tanks are recommended as it is difficult to detect cross contamination from one side of a division wall to another.

Offset and 50:50 division options are available. We can also supply weirs and baffles if required.

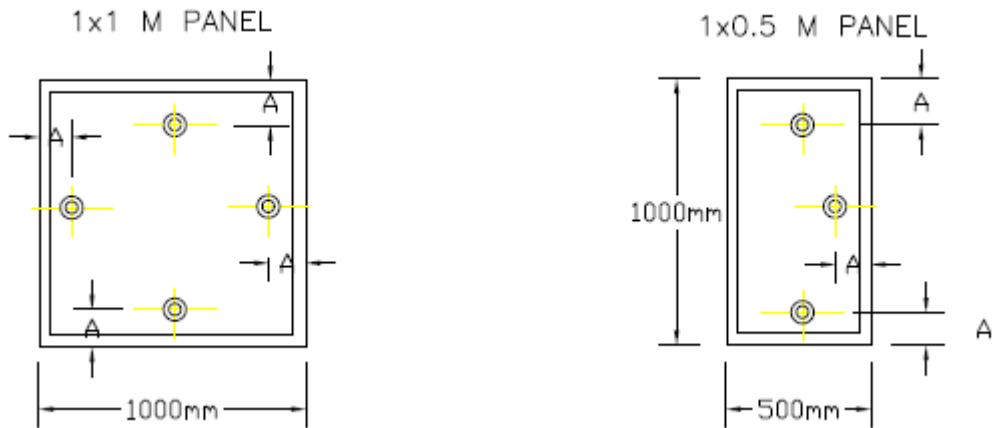
9.1 Maintenance on tanks with dividers

Extra care should be taken during the maintenance of tanks with divisions as maintenance staff will be working in an enclosed space, adjacent to a large volume of water in relation to the size of the space. (See Health & Safety Act)

10 Pipe Connections for cold water storage tanks

- If the tank is to be drained down at a fast rate or by pumps etc, we should be contacted so that adequate vents can be placed on the tank. The standard vent is 2"
- Connections of 100mm (4") nominal bore or over require studded flange pads to suit BS 10:2009, table D&E flanges for pipework connections
- Connections below 100mm (4") nominal bore may be made by cutting holes in situ. First determine whether single or double-sided connections are required and cut hole in panel to suit external pipe diameter.
- For connections over 50mm (2") nominal bore use two flanges screwed BS21 taper thread, drilled to BS10. Offer one flange to panel concentric with hole and transfer drill bolt holes into panel. Set one flange to external pipe and using appropriate gasket, assemble external flanged pipe using other flange as an internal backing plate. Finally bolt up.
- For double sided connections proceed as above, replacing internal flange with the required fitting, e.g. ball valve, strainer basket etc.
- For connections of 50mm (2") nominal bore or less proceed as above or alternatively use threaded flanges or backnuts (with rubber gaskets) on standard long screws to BS1387.

Table 3, shows hole diameter for in situ pipe fitting and minimum dimensions for the location of connections from panel edges.



Nominal bore diameter (mm/inch)	Nominal hole size(mm/inch)	Dimension A (mm/inch)
12.7 (½)	22	156 (6 ¼)
19	28 (1 31/32)	161 (6 3/8)
25.4 (1)	35 (1 3/8)	167 (6 5/8)
31.7 (1 ¼)	44 (1 31/32)	170 (6 3/4)
38.1 (1 ½)	50 (1 31/32)	177 (7)
50.8 (2)	61 (2 13/32)	186 (7 3/8)
63.5 (2 ½)	78 (3 1/16)	193 (5/8)
76.2 (3)	90 (3 9/16)	202 (8)
89	105 (4 1/8)	212 (8 3/8)

Table:3

General notes

All pipe work must be self-supporting. If welded or brazed-on flanges are used, all heat must be dissipated before connections are made to the tank. Holes may be cut with normal metal working tools.

Note: These figures only apply to un-insulated tanks

10.1 Pipe connections for insulated cold water storage tanks.

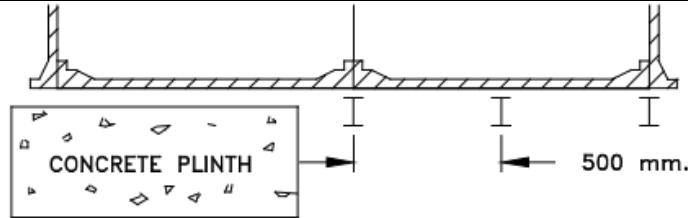
The areas where pipe connections can be made on insulated tanks are more restricted than in standard tanks, the picture below shows a recess in the insulation panel to allow for the pipe connection. Standard insulated tanks come with three insulation panels with recesses. More can be supplied if required. These are generally 190mm diameter. Large recesses are available if required.



11 Base details/design considerations

11.1 Internally flanged base tank

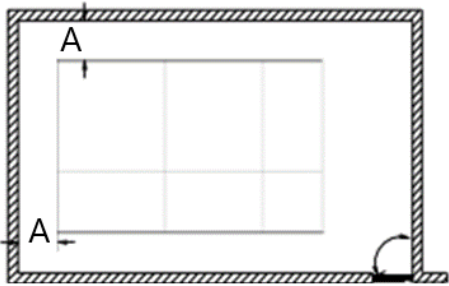
Tanks based on 1m x 1m & 1m x .5m panels



Standard base tanks (internally flanged) may be laid directly on a concrete plinth having a smooth finish, brushed clean and free from any local protuberances. It should be flat, level and not vary more than 6mm in any 6m, measured laterally or diagonally with a maximum variance of 2mm per metre. The plinth must exceed the nominal tank dimensions by a minimum of 200mm

Tanks erected on elevated structures RSJ beams or brick courses in one direction only). Bearers must be at 500mm or 1m centres depending on tank design. Bearer length must exceed nominal tank dimensions by a minimum of 150mm plus any extra for fixings. All bearer walls to be flat and level. For bearer width see chart below

Typical tank room (plan)

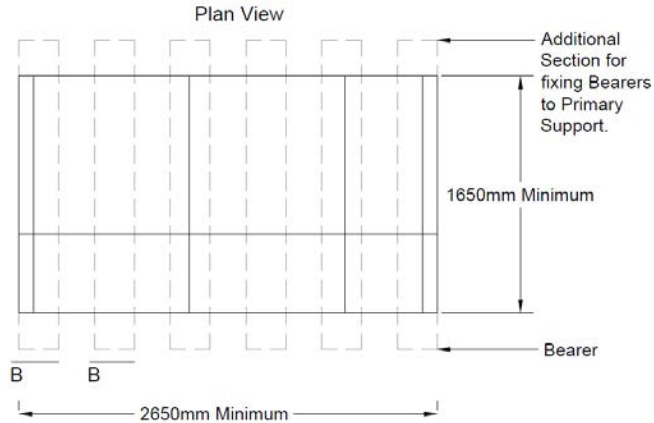


For dimension 'A' see chart below. This clearance should be on all sides of the tank, also a top clearance of 750* mm is required for standard access hatch to open.

Where hooped external ladder(s) and guardrail are fitted, a height clearance of 1200mm above the tank is required. If the tank is pushed closer to any wall after assembly or if the working space is reduced (dimension 'A') at a later stage, by the building of walls etc, responsibility will rest with others.

*This can be reduced to 500mm in accordance with WRAS guidelines where a lift off access hatch is fitted. We must be notified of this prior to tank despatch.

Example: Tank 2650 x 1650mm



General notes:

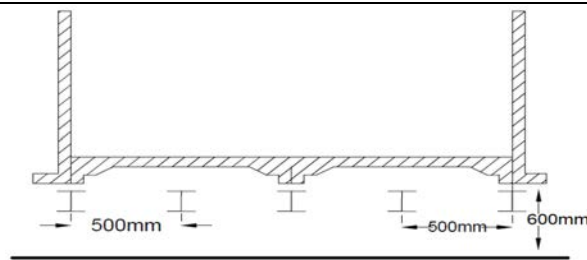
1. Client to design suitable bearers to suit load conditions. Water load = 1000 kg/m³ + 20 % for tank.
2. Bearers can run in either direction.
3. Deflection must not exceed 1/500th of the unsupported span of the bearers. The unsupported span can only be in one direction.
4. Adequate overflows should be fitted to prevent the tank from being pressurised.
5. Tanks in exposed places may be susceptible to movement in high winds, especially when empty. These may need to be anchored to the base, this work is to be carried out by others.
6. Weight of the tank does not include the weight of the tank supports.

Working space and bearer width.

Tank height mm	Minimum Working space "A" mm	Bearer Width "B" mm
500	500	75
1000	500	100
1500	500	100
2000	500	150
2500	800	150
3000	800	150
3500	1000	150
4000	1000	150

11.2 Externally flanged base tank

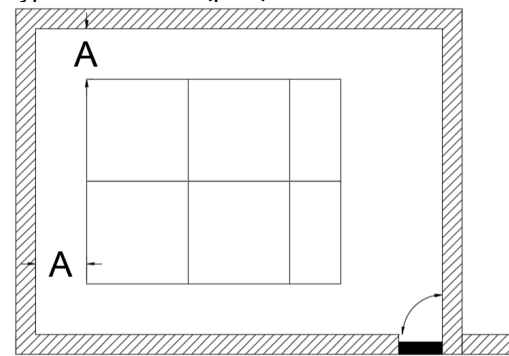
Tanks based on 1m x 1m & 1m x .5m panels



Externally flanged base tanks must be erected on elevated structures RSJ beams or brick courses (in one direction only). A clearance space of 600mm is required below the tank in accordance with BSEN806.

Tanks erected on bearers must be at 500mm or 1m centres depending on tank design. Bearer length must exceed nominal tank dimensions by a minimum of 150mm plus any extra for fixings. All bearer walls to be flat and level. For bearer width see chart below.

Typical tank room (plan)



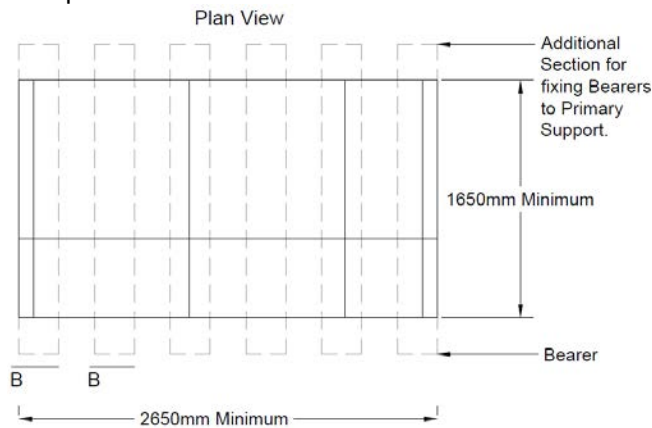
For dimension 'A' see chart below. This clearance should be on all sides of the tank.

A top clearance of 750* mm is required for standard access hatch to open.

Where hooped external ladder(s) and guardrail are fitted, a height clearance of 1200mm above the tank is required. If the tank is pushed closer to any wall after assembly or if the working space is reduced (dimension 'A') at a later stage, by the building of walls etc, responsibility will rest with others.

*This can be reduced to 500mm in accordance with WRAS guidelines where a lift off access hatch is fitted. We must be notified of this prior to tank despatch.

Example: Tank 2650 x 1650mm



General notes:

1. Client to design suitable bearers to suit load conditions. Water load = $1000 \text{ kg/m}^3 + 20\%$ for tank.
2. Bearers can run in either direction.
3. Deflection must not exceed $1/500^{\text{th}}$ of the unsupported span of the bearers. The unsupported span can only be in one direction.
4. Adequate overflows should be fitted to prevent the tank from being pressurised.
5. Tanks in exposed places may be susceptible to movement in high winds, especially when empty. These may need to be anchored to the base, this work is to be carried out by others.
6. Weight of the tank does not include the weight of the tank supports.

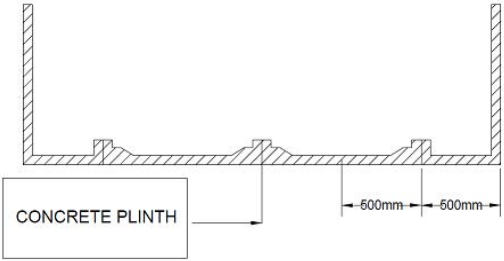
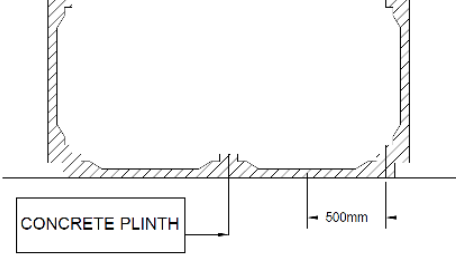
Working space and bearer width.

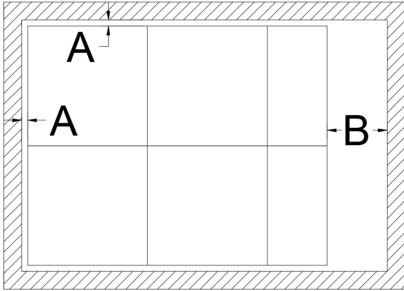
Tank height mm	Minimum Working space "A" mm	Bearer Width "B" mm
500	500	75
1000	500	100
1500	500	100
2000	800	150
2500	800	150
3000	1000	150
3500	1000	150
4000	1000	150

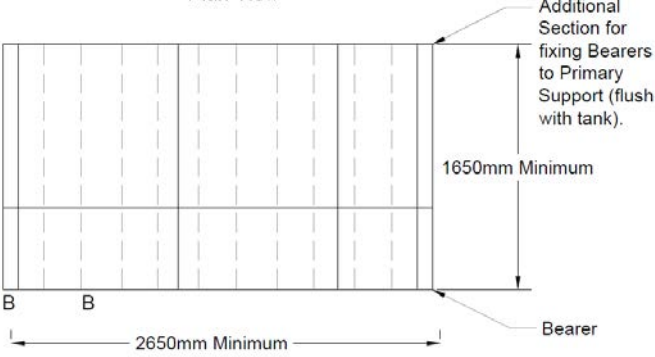
Clearance figures shown above must be provided from *internal* tank dimension

11.3 T.I.F Tanks (Hot Press and HLU)

Tanks based on 1m x 1m & 1m x .5m panels

HLU - TIF	Hotpress TIF
 <p>HLU - TIF</p> <p>CONCRETE PLINTH</p> <p>600mm 600mm</p>	 <p>Hotpress TIF</p> <p>CONCRETE PLINTH</p> <p>500mm</p>
<p>T.I.F tanks may be laid directly on a concrete plinth having a smooth finish, brushed clean and free from any local protuberances. It should be flat, level and not vary more than 6mm in any 6m, measured laterally or diagonally with a maximum variance of 2mm per metre.</p>	<p>Tanks erected on elevated structures (RSJ beams or brick courses in one direction only). Bearers must be at 500mm or 1m centres depending on tank design. All bearer walls to be flat and level. For bearer width see chart below.</p>

<p>Typical tank room (plan)</p> 	<p>For dimension 'A' & 'B' see chart below. A top clearance of 750* mm is required for standard access hatch to open.</p> <p>Where hooped external ladder(s) and guardrail are fitted, a height clearance of 1200mm above the tank is required.</p> <p><i>*This can be reduced to 500mm in accordance with WRAS guidelines where a lift off access hatch is fitted. We must be notified of this prior to tank despatch.</i></p>
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<p>Example: Tank 2650 x 1650mm</p> <p>Plan View</p>  <p>Additional Section for fixing Bearers to Primary Support (flush with tank).</p> <p>1650mm Minimum</p> <p>2650mm Minimum</p> <p>Bearer</p>	<p>General notes:</p> <ol style="list-style-type: none"> 1. Client to design suitable bearers to suit load conditions. Water load = 1000 kg/m³ + 20 % for tank. 2. Bearers can run in either direction. 3. Deflection must not exceed 1/500th of the unsupported span of the bearers. The unsupported span can only be in one direction. 4. Adequate overflows should be fitted to prevent the tank from being pressurised. 5. Tanks in exposed places may be susceptible to movement in high winds, especially when empty. These may need to be anchored to the base, this work is to be carried out by others. 6. Weight of the tank does not include the weight of the tank supports.
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Working space and bearer width.

Tank height mm	Minimum Working space "A" mm	Minimum Working space "B" mm	Bearer Width "B" mm
500	50	500	75
1000	50	500	100
1500	50	500	100
2000	50	500	150
2500	50	500	150
3000	50	500	150
3500	50	500	150
4000	50	500	150

Clearance figures shown above must be provided from **external** tank dimension

12 Capacity table

Panel sizes available: 1m x 1m, 1m x .5m, .5m x .5m

Tank sizes given in this table are based on their external dimensions which are 150 mm greater than the internal dimensions. Nominal capacities are calculated based on internal dimensions as follows:

INTERNAL LENGTH X WIDTH X HEIGHT IN M = M³ x 1000 = Litres ÷ 4.546 = Gallons

Ext. Length	Ext. Width	1m high		1.5 m		2m high		2.5 m	
m	m	litre	gallons	litres	gallons	litres	gallons	Litres	gallons
1.15	1.15	1000	220	1500	330	2000	440	2500	550
1.65	1.15	1500	330	2250	495	3000	661	3750	826
2.15	1.65	3000	660	4500	991	6000	1322	7500	1651
2.65	1.15	2500	550	3750	825	5000	1101	6250	1377
2.65	1.65	3750	825	5625	1278	7500	1652	9375	2065
2.15	1.15	2000	440	3000	660	4000	880	5000	1,100
2.15	2.15	4000	880	6000	1,320	8000	1,760	10000	2,200
3.15	1.15	3000	660	4500	990	6000	1,320	7500	1,650
3.15	2.15	6000	1,320	9000	1,980	12000	2,640	15000	3,300
3.15	3.15	9000	1,980	13500	2,970	18000	3,960	22500	4,949
4.15	1.15	4000	880	6000	1,320	8000	1,760	10000	2,200
4.15	2.15	8000	1,760	12000	2,640	16000	3,520	20000	4,399
4.15	3.15	12000	2,640	18000	3,960	24000	5,279	30000	6,599
4.15	4.15	16000	3,520	24000	5,279	32000	7,039	40000	8,799
5.15	1.15	5000	1,100	7500	1,650	10000	2,200	12500	2,750
5.15	2.15	10000	2,200	15000	3,300	20000	2,200	25000	5,499
5.15	3.15	15000	3,300	22500	4,949	30000	6,599	37500	8,249
5.15	4.15	20000	4,399	30000	6,599	40000	8,799	50000	10,999
6.15	1.15	6000	1,320	9000	1,980	12000	2,640	15000	3,300
6.15	2.15	12000	2,640	18000	3,960	24000	5,279	30000	6,599
6.15	4.15	2400	5,279	36000	7,919	48000	10,559	60000	13,198
6.15	5.15	3000	6,599	45000	9,899	60000	13,198	75000	16,498
6.15	6.15	36000	7,919	54000	11,879	72000	15,838	90000	19,798
7.15	1.15	7000	1,540	10500	2,310	14000	3,080	17500	3,850
7.15	2.15	14000	3,080	21000	4,619	28000	6,159	35000	7,699
7.15	3.15	21000	4,619	31500	6,929	42000	9,239	52500	11,549
7.15	6.15	42000	9,239	63000	13,858	84000	18,478	105000	23,097
7.15	7.15	4900	10,799	73500	16,148	98000	18,478	122500	26,947
8.15	1.15	8000	1,760	12,000	2,640	16000	21,557	20000	4,399
8.15	2.15	16000	3,520	24000	5,279	32000	7,039	40000	8,799
8.15	3.15	24000	5,279	36000	7,919	48000	10,559	60000	13,198
9.15	1.15	9000	1,979	13500	2,969	18000	3,960	22500	4,949
9.15	1.15	18000	3,960	27000	5,939	36000	7,919	45000	9,899
9.15	3.15	27000	5,939	40500	8,908	54000	11,818	67500	14,848
9.15	4.15	36000	7,919	54000	11,878	72000	15,838	90000	19,797
10.15	5.15	50000	11,103	75000	16,520	100000	22,026	125000	27,533
16.15	6.15	96000	21,145	14400	31,178	19200	42,290	240000	52,863
48.15	24.15	1.15	25,330	1.73m	381,05	2.31m	508,810	2.88m	634,361

Ext Length	Ext width	3m high		3.5 m		4m high	
m	m	litres	gallons	litres	gallons	litres	gallons
1.15	1.15	3000	660	3500	770	4000	880
1.65	1.15	4500	991	5250	1,155	6000	1,320
2.15	1.65	9000	1982	10500	2,310	12000	2,640
2.65	1.15	7500	1652	8750	1,925	10000	2,200
2.65	1.65	11250	2478	13125	2,887	15000	3,300
2.15	1.15	6000	1,320	7000	1,539	8000	1,760
2.15	2.15	12000	2,640	14000	3,079	16000	3,520
3.15	1.15	9000	1,980	10500	2,310	12000	2,640
3.15	2.15	18000	3,960	21000	4,619	24000	5,279
3.15	3.15	27000	5,939	31500	6,929	36000	7,919
4.15	1.15	12000	2,640	14000	3,080	16000	3,520
4.15	2.15	24000	5,279	28000	6,159	32000	7,039
4.15	3.15	36000	7,919	42000	9,239	48000	10,559
4.15	4.15	48000	10,559	56000	12,319	64000	14,078
5.15	1.15	15000	3,300	17500	3,850	20000	4,399
5.15	2.15	30000	6,599	35000	7,699	40000	8,799
5.15	3.15	45000	9,899	52500	11,549	60000	13,198
5.15	4.15	60000	13,198	70000	15,398	80000	17,598
6.15	1.15	18000	3,960	21000	4,619	24000	5,279
6.15	2.15	36000	7,919	42000	9,239	48000	10,559
6.15	4.15	72000	15,838	84000	18,478	96000	21,117
6.15	5.15	90000	19,798	10500	23,097	120000	26,397
6.15	6.15	10800	23,757	12600	27,717	140000	31,676
7.15	1.15	21000	4,619	24500	5,389	28000	6,159
7.15	2.15	42000	9,239	49000	10,779	56000	12,319
7.15	3.15	63000	13,858	73500	16,168	84000	18,478
7.15	6.15	12600	27,717	14700	32,336	168000	36,956
7.15	7.15	14700	32,336	17150	37,725	196000	43,115
8.15	1.15	24000	5279	28000	6,159	32000	7,039
8.15	2.15	48000	10559	56000	12,319	64000	14,078
8.15	3.15	72000	15838	84000	18,478	96000	21,117
9.15	1.15	36000	7,919	31500	6,929	36000	7,919
9.15	2.15	54000	11,878	63000	13,858	72000	15,838
9.15	3.15	81000	17,817	94500	20,788	108000	23,757
9.15	4.15	10800	23,571	12600	27,717	144000	31,676
10.15	5.15	15000	33,039	17500	38,495	200000	43,995
16.15	6.15	28800	63,436	33600	73,911	384000	84,470
48.15	24.15	3.45 m	759,91	4.03m	886,93	4.6m	1.1m

Access for tank assembly:

Adequate space must be available for safe tank assembly purposes and across the cover for access to the inside of the tank. See base/design considerations.

13 Commissioning of sectional water storage tanks.

Tanks should not be left unattended during commissioning.

Sectional water tanks should be filled within 14 days of end of build

1. Ensure that if there is a drip tray present that it has a functioning overflow to ensure no water ingress onto surrounding area. Appropriate overflows must be fitted to the condensation tray before the tank is filled.
2. Ensure that an appropriately sized overflow and warning pipe if required, are connected to the tank such that, if activated, they would discharge to waste in a way that would prevent any damage to the surrounding area.
3. Start filling the tank to operational level. Monitor fill to ensure there are no weeps. If minor weeps are present (and it does not cause nuisance to surrounding areas), leave tank settle for a couple of days and the weep may self-rectify. If weep does not stop, contact the office for further assistance.
4. If a major leak occurs, shut off the water, drain down the tank and contact the office for further assistance.

Commissioning Sectional water tanks after 14 days of end of build, or lying empty for several weeks or months.

1. If the tank is not commissioned within the 14 day period outlined above, or if the tank is decommissioned for a long period of time, you may need to re-torque the bolts to prevent minor weeps.
2. We recommend the tank is filled within 14 days after build and kept full of water (except for cleaning/maintenance) throughout its operating lifespan.

In the event of draining down the water tank for maintenance, cleaning or other purposes, ensure that it is refilled within a 14 days period detailed in the above commissioning information.

Where water tanks are exposed to temperature $>35^{\circ}\text{C}$, the tank should be refilled within 2 days.

14 Maintenance recommendations for sectional water storage tanks

In accordance with the "The control of legionella bacteria in water systems. Approved Code of Practice and guidance" (L8) - 2000, (see Appendix I) if there is a reasonable, foreseeable risk of exposure to legionella bacteria then water tank temperatures need to be taken by competently trained personnel, recorded in a logbook and kept for 5 years.

Do not stand on internal stays while maintenance is being carried out.

Minimum maintenance interval: Annually or as required by site specific risk assessment

Maintenance advice extracted from BS EN806-5:2012, 13.1 - Cisterns

Cisterns, as points of debris collection and subsequent contamination, should be inspected to ensure that overflow and warning pipes are unobstructed, that covers are not airtight but exclude light and insects and are securely fixed, and that there are no signs of leakage or deterioration likely to result in leakage. Cisterns storing water should be inspected annually or more frequently if fouling is suspected. Cleaning and disinfection should take place annually or sooner if monitoring indicated deterioration in aesthetic or microbiological quality.

Overflow and warning pipes should be checked at least annually to ensure that they conform to 4.3.13. Cisterns should have all debris removed and they should be emptied, cleaned and disinfected. Where drinking water has been stored in an inadequately protected cistern, microbiological testing should be carried out (see 6.1.4) and adequate protection installed.

In cistern installation, a check should be made for stagnant water. If stagnant water is found, the cistern(s) should be flushed and the flow configuration modified so that the flow displaces the whole of the contents continually when the cistern is in routine use. This check should be made by assessing the stored water age and carrying out microbiological analysis together with checks on the concentration of residual disinfection. Stagnation in cisterns occurs if the residual disinfection at any point in the system is below the value defined as the minimum recommended to prevent the formation of microbiological regrowth.

Measures should be taken in accordance with 4.3.32.2 to prevent the colonization of the system with Legionella and Pseudomonas bacteria.

Further guidelines

3. In accordance with the "The control of Legionella bacteria in water systems. Approved Code of Practice and Guidance" (L8) – 2000, (see Appendix). If there is a reasonably foreseeable risk of exposure to legionella bacteria then water tank temperatures need to be taken by competently trained personnel, recorded in a logbook and kept for 5 years.
4. Do not stand on internal stays while maintenance is being carried out.
5. All internal supports should be checked for corrosion, if corrosion is found it should be rectified immediately.
6. Check generally for leaks or drips. If there is a weep from a bolt or the seal, it may be rectified.

by tightening the bolts in a systematic order to a torque of 40Nm/30ft lb. Only calibrated torque should be used for this task. If the leak is at an external flange, torque the bolts around the leak. Start four bolts away from the leak, work over to the leak and then go to the fourth bolt on the opposite side and torque back to the leak. If the leak is at a joint between four panels, this procedure will be repeated in the opposite direction i.e. torque the vertical flange first and then the horizontal.

7. Check that all pipe work connected to the tank is suitably braced.
8. Check ball valve armature pins for corrosion.
9. When cleaning the inside of the tank, do not interfere with the joint seals.
10. When cleaning the tank do not overfill or pressurize the tank.
11. Check that overflows are fitted and sized correctly. Check the overflow(s) and the air inlet screens vent(s). Ensure that they are not blocked. The overflow should be twice the size of the cross-section area of the inlet
12. If insulated check that insulation and the manhole is securely fixed and not damaged, if they are damaged then the tank is not in compliance with Byelaw 30.
13. If not insulated in accordance with Byelaw 30, ensure that people cannot consume water from the tank. We can advise on upgrading the tank to Byelaw 30 standard.
14. If there is a condensation tray with the tank, ensure that it has an overflow fitted and that it is not damaged.
15. If there are ladders fitted to the tank, ensure that they have not been damaged and are securely fastened to the tank.
16. If the area underneath / adjacent to the tank has become water sensitive check that the tank room is banded with adequate escape ducts.
17. If the tank room is banded, check that it is in good condition.
18. With tanks for drinking water, check that the water surface is clean and shiny and that the water doesn't contain any debris or contamination.
19. Check for evidence of stagnation of the water.
20. Check for excessive build-up of sediment.
21. Check for presence of algae, biofilm.
22. Check for scaling of the tank sidewalls.
23. The cold water storage tank should be cleaned, disinfected and faults rectified, if considered necessary.
24. After maintenance of the tank is complete, ensure that the manhole seal is intact and the manhole is securely closed.

Maintenance on tanks with dividers

Extra care should be taken during the maintenance of tanks with dividers, as maintenance staff will be working in an enclosed space, adjacent to a large volume of water in relation to the size of the space. (See Health & Safety Act)

Note:

- Further information on the Health & Safety aspect, reference water quality is available in BS EN 806 & BS 8558.
- Legal. (L8) (L 8) supersedes earlier editions and guidance published with ISBNs 0118821504, 0717604519, 0717607321 (HSG70) (HSG 70) (HS G 70) entitled, 'The control of legionellosis including Legionnaires' disease'. It also replaces guidance note environmental health 48. (GNEH48) (GNEH 48) (GNEH48)(GNEH 48) ISBN 011883939X supplemented by MISC150 (MISC150) entitled, 'The control of legionellosis in hot and cold water systems'.

Appendix I

This approved code of practice and guidance gives practical advice on the requirements of the Health and Safety at Work etc Act 1974, and the Control of Substances Hazardous to Health 1999, concerning the risk from exposure to legionella bacteria. The Code also gives guidance on compliance with the relevant parts of the Management of Health and Safety at Work Regulations 1999. Contents: Notice of approval; Acknowledgements; Introduction; Part 1: The approved code of practice; Scope and application; Identification and assessment of the risk; Managing the risk: management responsibilities, training and competence; Preventing or controlling the risk from exposure to legionella bacteria; Record keeping; Responsibilities of manufacturers, importers, suppliers and installers; Part 2: Guidance on the control of legionella in water systems; Cooling systems; Management of cooling towers; Treatment program's; Monitoring; Cleaning and disinfection; Hot and cold water services; Design and construction; Management of hot and cold water systems; Treatment and control program's; General monitoring; Cleaning and disinfection; Other risk systems; Protection of personnel; Appendix 1 Recommended inspection frequencies for risk systems; Appendix 2 Action in the event of an outbreak; Glossary; References and further reading.

15 Guidelines for tender specification

1. The cold water tank shall be sectional, constructed from panels 1m (3.28 ft.) square using half and quarter panels where necessary.
2. Panels shall be hot pressed from specially formulated potable water grade of Glass reinforced plastic (G.R.P.)
3. All corner angles, gussets, divider carriers and roof supports shall be from the same material.
4. All underwater and lid bolts, tie bars, joiners etc., shall be stainless steel grade 316 S16, external bolts shall be mild steel to BS 3692 and galvanised BS 4211:2005+A1:2008.
5. The lid shall be heavy duty, formed from panels as per base design, have vertical supports at each panel intersection.
6. All vents, warning pipes, overflows, shall have mesh screens of maximum 0.65mm x 0.65mm holes to protect contents.
7. The tank shall be insulated on the sides and lid. The insulation material shall be of rigid closed cell polyurethane foam, have a protective skin securely fixed and sealed to the tank panel surface using a gasket type seal. All pipe cut outs shall have bessels, securely fitted and sealed to both the outer skin and panel face. All insulation to be to Tricel (Killarney) Unlimited Company Format 30 finish or approved equal.
8. Where the tank depth is greater than 1m (or the top of the tank is more than 1m from the ground) Internal and External ladders shall be fitted in each compartment. Where the tank is 2m or more from the top of the tank to the finished floor level external ladders should be fitted with safety cages and comply to BS 4211:2005+A1:2008. Internal ladders may be constructed from GRP or stainless steel. External ladders may be constructed from Aluminium.
9. A guiderail should be fitted enclosing all access points to the tank roof, where a tank is 2m or more from the top of the tank to the finished ground level.
10. A divider shall be fitted to facilitate maintenance and repairs.
11. A side access hatch in each compartment situated on the lowest 1m x 1m panel.
12. The client shall ensure that potable water is not stored in tank compartments that are adjacent to compartments storing foul water due to risk of contamination.
13. The contractor shall ensure that the base supports conform to the tank manufacturer's recommendations.
14. Tanks to be commissioned and maintained in accordance with BS6700.
15. The plumber should not leave the tank unattended during commissioning (first filling with water).
16. The tank shall be manufactured to Format 30 specification by Tricel (Killarney) Unlimited Company Ph. 00353 64-6632421 or approved equal.

16 One piece tanks

Tricel (Killarney) Unlimited Company manufacture a variety of one piece cold water storage tanks. These durable one piece constructions are easy to install and represent excellent value for money. They are available in sizes from 45-4546 litres.

One piece tanks can also be supplied insulated to Format 30, thus meeting Dublin Corporation requirements for break tanks.

		Non - Insulated			Insulated		
Litres	Gallons	Length	Width	Height	Length	Width	Height
45	10	495	370	345	495	370	345
114	25	1180	505	340	1210	540	350
182	40	1030	510	457	1055	550	480
182	40	670	530	565	700	575	575
227	50	1142	500	465	1240	535	480
318	70	1230	575	584	1240	585	585
454	100	1425	725	585	1448	737	599
454	100	1040	761	680	1185	800	736
682	150	1630	1045	535	1725	1120	535
909	200	1620	1040	685	1725	1120	690
909	200	1300	950	880	1440	1135	890
1136	250	1670	1075	845	1725	1120	845
1363	300	1665	1235	845	1690	1270	935
1818	400	2520	1290	610	2520	1390	775
2275	500	1880	1380	1125	1910	1405	1230
2700	600				2030	1500	1290
3637	800	2665	1775	965	2715	1800	1015
4546	1000	2665	1715	1245	2665	1715	1320

- The above capacities are nominal
- Insulated one piece tanks come complete with insulated covers
- GRP covers and condensation trays are available for all sizes
- When the tanks are installed space is required above the tanks for access.

17 Maintenance recommendations for one piece water storage tanks

Maintenance interval: Minimum of once yearly.

Checklist

1. All internal supports should be checked for corrosion, if corrosion is found it should be rectified immediately.
2. Check generally for leaks of drips.
3. Check that all pipework connected to the tank is suitably braced.
4. Check that the structural supports under the tank are in good condition.
5. If overflow and/or air inlet screens are fitted, check that they have not become blocked.
6. If insulated check that the insulation and the manhole is securely fixed and not damaged, if they are damaged then that tank is not in compliance with Bye law 30.
7. If not insulated in accordance with Byelaw 30, ensure that people cannot consume water from the tank. We can advise upgrading the tank to Byelaw 30 standard.
8. If there is a condensation tray with the tank ensure that it has an overflow fitted and that it has not been damaged.
9. If the tank has a light duty cover and is sited out of doors, check that the cover has not suffered structural damage. (This type of cover is not suitable for potable water or outdoor use).
10. If the area underneath/adjacent to the tank has become water sensitive check that the tank room is bunded with adequate escape ducts.
11. If the tank room is bunded, check that it is in good condition,
12. After maintenance of the tank is complete, ensure that the manhole seal is in tact and the manhole is securely closed.

Note: Further information on the health and safety aspect, reference water quality is available in BS EN 806 & BS 8558.

18 Modular building systems – Tank & equipment enclosures

The modular building system is constructed of GRP (fibreglass) modules to various sizes and colours to meet customers specifications.

Architecture.

Modular building systems can help you meet strict planning regulations, by hiding unsightly booster-sets, pumps, air-conditioning systems & water tanks. These modular systems from Tricel (Killarney) Unlimited Company can help blend roof-tops into a more natural surroundings.



External Finish.

The external finish is a light, easy to clean, horizontal ribbing. All Gelcoats are UV stabilised and may be chosen from most colours in the BS5252 or Ral ranges. Our systems are available in a range of 1000mm and 1200mm modules, with special modules to suit customer requirements.



Fire Resistance.

Fireresistance materials to Class 0, Class 1 or Class 2 can be offered as an option.

19 Glossary of terms

Sectional tank: Rectangular fixed container assembled from panels for the storage of water at atmospheric pressure and at a maximum temperature of 30°C.

Note: This temperature is higher than is acceptable for drinking water, which should not normally exceed 20°C.

Nominal capacity: Volume contained in a tank, measured up to the top edge of the side walls.

Actual capacity: Volume contained in the tank up to the maximum working level, this can be between 10 and 50% less than the nominal capacity, depending on the height of the tank.

Bund wall: Structure situated underneath water tanks. It's purpose is to protect the building from water damage. All water tanks located above areas that are water sensitive should be banded.

Ball valve housing: Enclosed chamber containing an access hatch above the level of the cover, permitting the level control mechanism to be mounted at a higher level than would otherwise be possible.

Vent: Opening to the atmosphere to allow for the movement of air resulting from changes in the water level so that the water always remains at atmospheric pressure.

Warning pipe: Pipe so fixed that it's outlet, whether inside or outside a building, is in a conspicuous position where the discharge of water can be readily seen.

Overflow pipe: Pipe connected to the tank to discharge any overflow therefrom.

Division plate: Construction of one or more panels within a tank which divides the tank into two separate compartments.

Note: In any situation where there is only one water storage tank in a building, it is to be recommend that a weir or a division plate be used. This will facilitate maintenance of the tank without effecting the water supply to the building.

Weir: Construction of one or more panels within a tank, which divides the tank but to less than its full depth such that the contents can spill over from one side of the weir to the other.

Baffle: Construction of one or more panels within a tank, which partially subdivides the tank in order to increase the length of the flowpath between the inlet and the outlet from the tank.

Leakage test: The duration of the test should be a minimum of 24 hours, commencing at least 2 hours after the tank has been filled. The test shall be carried out within 10 days of erection unless the manufacturer agrees to a longer period after assembly. The tank should be inspected at regular intervals and not deserted during commissioning (first filling with water). The leakage test is not carried out by Tricel (Killarney) Unlimited Company

BS EN 13280:2001. Specification for glass fibre reinforced cisterns of one-piece and sectional construction, for the storage, above ground, of cold water.

BS 6700:1997: Specification for design, installation, testing and maintenance of services supplying water for domestic use within building and their curtilages.

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