Bellmouth Overflows and Raised Float Valve Housings

Maximising a tank's capacity

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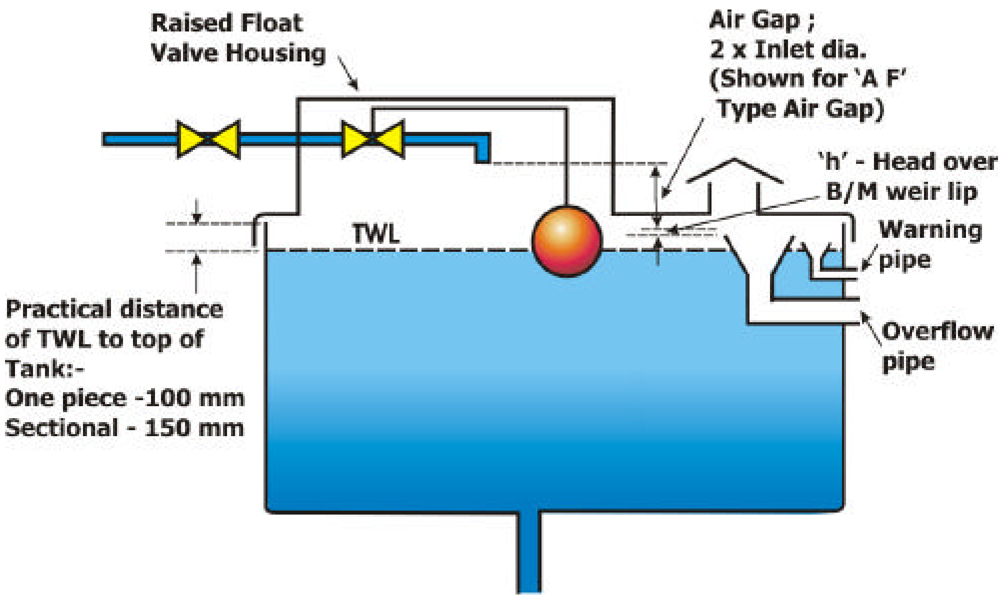
Maximising the actual holding capacity of any cistern or tank has to be beneficial both in space saving and overall cost.

Bellmouth Overflow and Raised Float Valve Housing fittings are important add on features available to the tank designer to assist in achieving this goal.

The sketch below advises a typical arrangement



It is a fact, most tanks and cisterns are 2 m deep or less.

Industry analysis advises 98% of GRP One Piece and 80% of Sectional Tanks are in this category. In fact 49% of all Sectionals Tanks installed are only 1 m in depth.

All Thermoplastic Cisterns are invariably less than 1 m in depth.

What is the implication of these facts?

Most cisterns and tanks actually contain liquid volumes that are well below their nominal capacity.

Resultant on Regulatory requirements and F/V design in conventional plumbing arrangements, considerable internal space is allocated to storing air. In general terms, as tank height reduces, the greater is the proportionate loss in **actual capacity**.

For a tank 1m deep, supplied via a 50mm Float Valve, set with a regulation air gap, O/F etc., maximum TWL could not be higher than 550mm above tank base level. Hence, 55% **actual capacity** available and resultant on outlet pipe location, probably only 40% **effective actual capacity.**

For small capacity tanks used for domestic purposes this actual loss of capacity will not be troublesome. The normally fitted 15 mm F/V will provide a TWL at a proportionately higher level and intermittent usage, allows replenishment to take place in good time for normal use.

Difficulty arises when larger actual storage capacities are required and where demand is greater, possibly a break tank duty and / or where space is restricted. The proverbial quart into the pint pot scenario.

So what to do? To maximise effective actual capacity it is necessary to raise the TWL and possibly install a Vortex Inhibitor on the Cold Feed Outlet to improve the draw-down capability.

Installing a Raised Inlet or Float Valve Housing coupled with a Bellmouth Overflow and Warning Pipe arrangement will almost double the effective capacity of a 1 m deep tank.

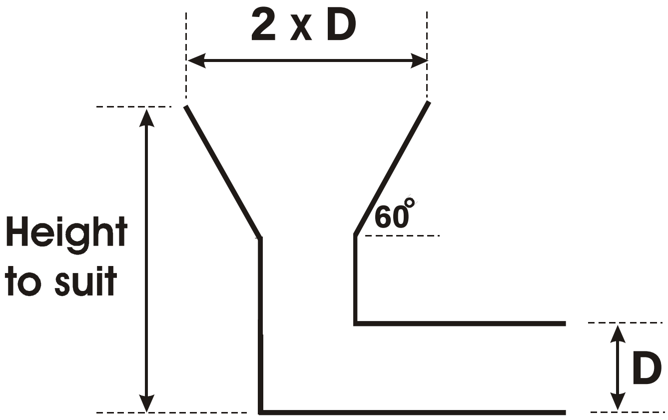
The benefit: - More efficient tank assemblies. An increase in working capacity or the option of a smaller tank for the same expected performance.

The advantages to tank manufacturers are, though the basic assembly will be smaller and hence carry potentially less value pro-rata, the inclusion of specialised fittings make it possible to provide the capacity requirement whilst reaping the benefits of a **higher added value product.**

In other words, everyone is a winner, both Customer and Manufacture.

Depicted is a practical design for a fabricated Bellmouth fitting.

Though this design, with its straight cut taper, is not the most efficient ever conceived, it is easily fabricated and will provide effective water level control within a tank in emergency conditions. Only a few mm head over the B/M weir lip are required to cope with the full discharge capability of a failed F/V.



Typical Bellmouth Design

Examples:

For a 50mm F/V at its maximum flow of 3m/s, the head over the "2 x D" B/M lip of a 100mm O/F is **32mm**.

For a comparable flow rate through a 25mm F/V, the head over the 50mm O/F with "2 x D" B/M lip is **20mm.**

For the technically minded the formula for determining the head (h) over a 60º "2 x D" Bellmouth Inlet lip of the design advised above is where the Overflow diameter is twice the Inlet pipe diameter.:-

$$h = 1.7765\,(D \times V)^{0.67}$$

Where; h = head over the B/M lip - mm
D = O/F outlet diameter - mm
V = O/F pipe flow velocity - m/s

Note: The information provided is advisory only.