Thermal Products Ltd

Calorifiers & Vessels

Water Heating & Heat Recovery
For the Building Services Industry

ISO 9001 BUREAU VERITAS Certification

Intro

When domestic hot water is required in volume, the GMS range of storage calorifiers offer an ideal solution. Stored water is heated indirectly by a primary medium (via an internal u-tube battery or a coil). Alternatively, electric immersion heaters offer a clean and efficient primary heat source.
Within most of this leaflet we refer to storage calorifiers as vessels with tube bundles, however the majority of the information supplied is also applicable to indirect cylinders with tubular coils. The essential differences are explained in the section “Indirect Storage Cylinders”.

Factors affecting the choice of storage calorifiers include:
Cost - Storage calorifiers are often the most economical water heating solution. Electrically heated storage calorifiers, using off-peak electricity, also give savings in running costs.
Low Primary Power Requirement - The stored hot water meets high peak demands with relatively low primary power, keeping the primary supply capital costs lower than in instantaneous or semi-storage systems.
Economical Temperature Control - Simple on/off temperature control is often all that is required.
Reliability - Storage calorifiers are robust and uncomplicated, giving excellent reliability and availability.
Space - An instantaneous water heater may be more compact than a storage calorifier, but requires a larger primary heat source, negating some of the space saving.
Heat Loss - Correct insulation of the calorifier results in low heat loss. Compared to instantaneous heaters, the low, steady primary heat requirement reduces inefficient boiler cycling. Primary pipework is smaller and loses less heat.
Legionella Safe: Storage calorifiers and cylinders, correctly installed and operated, prevent the growth of legionella bacteria.
Environmental Benefits - Hot water storage is invaluable for storing solar thermal energy and waste heat.

Storage Volume

Storage calorifier volume and recovery time determine output. “Recovery time” is the time the calorifier takes to heat up from cold under zero demand. Long recovery times require low primary power and vice versa. The tube battery (or coil or immersion heater) is mounted low down in the calorifier. The contents are heated almost uniformly by natural convection. During draw-off, the calorifier design minimises mixing of incoming cold water with the hot water above. If draw-off is too high, the hot water layer becomes exhausted and the water drawn will be too cool. It is important to select an adequate storage volume to meet anticipated demand.
The “CIBSE Guide” gives design curves for storage calorifiers for various duties with worked examples, any sizing table should be used with a common sense estimate of the likely demand pattern. For example, a business hotel may have a sharper morning peak demand than a tourist hotel. Our sales team will be more than happy to advise you of recommended storage volume for the required demand.

Materials of Construction

Solid Copper - Copper is virtually impervious to attack by aggressive water. In the few areas where water is known to attack copper, the calorifier can be protected by a sacrificial aluminium anode which leaves a protective coating on the copper. The copper thickness required for a calorifier increases with pressure and diameter. Above a certain size, copper-lined steel is more economical.

Copper-Lined Steel - Carbon steel lined internally with copper. None of the steel is in contact with the water. The steel gives great strength, the copper prevents corrosion. Special techniques have been developed to ensure a close fit of copper to steel, to allow thermal expansion and contraction of the lining and to test the lining. An anti-vacuum valve is fitted as standard to prevent partial vacuum damaging the lining.

Galvanised Steel - Hot dip galvanising deposits a zinc layer which provides excellent protection against corrosion if the water is hard. Galvanised calorifiers should not be used with copper pipe-work or soft water. The copper causes electrolytic action and releases particles of copper which deposit in the calorifier, causing localised electrolytic action and corrosion. Soft water prevents formation of a protective scale. The copper tube bundle rapidly gets a film of scale because of its higher temperature. This prevents electrolytic action and corrosion. For added protection a magnesium sacrificial anode can be fitted. This must be replaced when exhausted. Also the copper tube bundle can be electro tinned which reduces the electrochemical potential.

Stainless Steel - Stainless steel calorifiers can be offered as an option to copper when a high working pressure is required. The thickness required can be substantially less than copper thus making it an economical alternative. Using stainless steel can also increase the lifespan of the calorifier with some water conditions.

Glass/Polymer Lined Steel - An alternative to copper-lined steel. The lining was developed for arduous conditions in industrial processes. It is generally more resistant to abrasion, chemical attack and impact damage than traditional glass linings. If damage occurs the surrounding coating will not be affected and the damage can be repaired. In the lining process minute glass flakes are combined with a special polymer, applied to the steel, cured and electrically tested. The lining is WRC approved for use with hot water.

Standards

BS853 – Is an internationally recognised standard. GMS will produce calorifiers to BS853 if required, both BS853 Part 1 & BS853 Part 2. There is scope within BS853 for 3rd party verification of design and construction. This adds to cost and delivery time, but can be arranged if required.

PD5500 - For very high working pressure, GMS Thermal Products can design and build calorifiers to PD5500. However, BS853 now includes higher pressures so it is often not necessary to resort to PD5500.

Other Standards - GMS Thermal Products will consider production of calorifiers to other standards. Please contact us with details.

All our storage vessels comply fully with the European Pressure Equipment Directive 97/23/EC

Thermal Insulation Options

Type S Insulation - Consists of 50mm fibreglass mattresses, secured to shell and enclosed in Stucco aluminium cladding. This gives good thermal insulation and a quality finish.

Extra's – At an additional cost, extra features can be added to the Type S Insulation. Features include;

- *Toggle Clips* – for removal at site
- *Aluminium Cladding replaced with Stainless Steel Sheet (Smooth)*
- *Vapour Sealed* – for outdoor use

Type L Insulation - Consists of 50mm fibreglass mattresses secured to shell with a steel angle frame.
Each side fitted with a removable panel to allow inspection or modification.
Type L is recommended for sites where damage to the casing maybe likely.

Type UF Insulation - For smaller cylinders, we can offer semi-rigid urethane foam insulation. This is sprayed on in a standard thickness of 25mm (up to 60mm on request). It's Ozone depletion potential (ODP) is zero, it does not support combustion and it resists water penetration. (Uniform thickness cannot be guaranteed)

Our sales team have over twenty years of experience and are more than happy to advise you on recommended materials, types of heat exchanger, design standards and insulation.

Please contact us on 01457 835 700 or email us at sales@gmsthermal.co.uk

For detailed information on our range of storage calorifiers and buffer vessels please continue reading.

Storage Calorifier

The standard range of GMS storage calorifiers are fitted with U-tube batteries and are the most common type of heater for storage type water heaters. Standard U-tube batteries are manufactured using 19mm o/d copper integron tube (finned on the outside). The batteries are removable which makes inspection, cleaning or replacement a possibility. (Please contact us for information on non-standard units/non-standard U-Tube battery requirements).

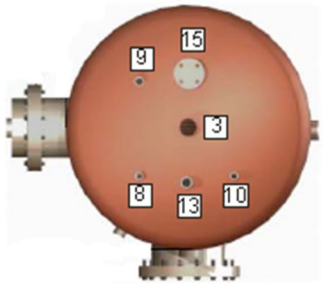
Connection Details

Ref	Description	Size
1	Primary Inlet	Varies
2	Primary Outlet	Varies
3	Secondary Flow	Varies
4	Secondary Return	Varies
5	Cold Feed	Varies
6	Drain	Varies
7	Control Thermostat	½"
8	Thermometer	½"
9	Safety Valve	Varies
10	Pressure Gauge	3/8"
11	Vent (Optional)	Varies
12	High Limit Thermostat	½"
13	Anti-Vacuum Valve	Varies
14	Immersion Heater (Optional)	Varies
15	Bursting Disc (if specified)	Varies

Please note connections are connections only, pockets can be purchased at an additional cost.

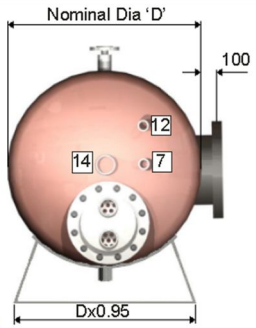
Please consult our spares brochure for more information on spares that we can provide, as well as unvented kits and immersion heaters.

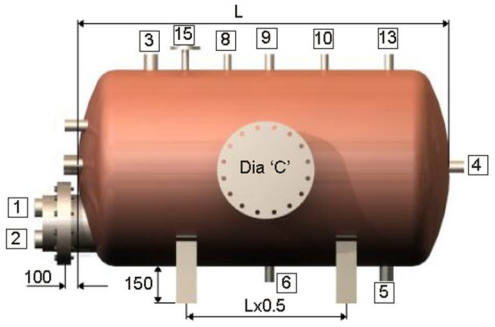
Alternatively contact us directly for a quotation.



Please note that the dimensions and connection sizes listed below are for standard units. All of our units are bespoke; therefore if you require alternative connection sizes or dimensions, this can be changed at order stage with one of our design engineers.

Capacity (Litres)	D (mm)	L (mm)	C (mm)	Main Connection Sizes					
				3	4	5	6	11	13
230	500	1270	250	1 ¼"	1"	1 ¼"	¾"	1"	¾"
270	500	1470	250	1 ¼"	1"	1 ¼"	¾"	1"	¾"
360	600	1370	250	1 ¼"	1"	1 ¼"	¾"	1"	¾"
450	600	1740	250	1 ½"	1"	1 ½"	¾"	1"	¾"
500	675	1470	250	1 ½"	1"	1 ½"	¾"	1"	¾"
550	675	1720	250	1 ½"	1"	1 ½"	¾"	1"	¾"
600	750	1450	250	1 ½"	1"	1 ½"	¾"	1"	¾"
700	750	1680	250	1 ½"	1"	1 ½"	¾"	1"	¾"
800	750	1930	250	1 ½"	1"	1 ½"	¾"	1"	¾"
900	750	2150	300	1 ½"	1"	1 ½"	¾"	1"	¾"
1000	900	1750	300	2"	1 ½"	2"	1"	1 ¼"	1"
1200	900	2050	300	2"	1 ½"	2"	1"	1 ¼"	1"
1500	1050	1950	450	2"	1 ½"	2"	1"	1 ¼"	1"
1750	1050	2175	450	2"	1 ½"	2"	1"	1 ¼"	1"
2000	1050	2400	450	2"	1 ½"	2"	1"	1 ¼"	1"
2250	1200	2200	450	65	2"	65	1 ½"	1 ½"	1 ¼"
2500	1200	2400	450	65	2"	65	1 ½"	1 ½"	1 ¼"
3000	1200	2850	450	80	2"	80	1 ½"	1 ½"	1 ½"
3500	1350	2700	450	80	2"	80	1 ½"	1 ½"	1 ½"
4000	1350	3000	450	80	2"	80	1 ½"	1 ½"	1 ½"
Copper-Lined, Galvanised or Stainless Steel Vessels only after 4000 Litres									
4500	1500	2770	450	80	2"	80	1 ½"	1 ½"	1 ½"
5000	1500	3050	450	80	2"	80	2"	2"	1 ½"
5500	1500	3350	450	100	65	100	2"	2"	2"
6000	1600	3250	450	100	65	100	2"	65	2"
7000	1600	3750	450	100	65	100	2"	65	2"
8000	1800	3450	450	125	65	125	2"	65	2x2"
9000	2000	3200	450	125	65	125	2"	65	2x2"
10,000	2000	3500	450	125	65	125	2"	65	2x2"





Standard Range of Storage Calorifiers

Indirect Cylinders

The standard range of GMS indirect cylinders are fitted with fixed copper heaters. These are not replaceable unless a bolted head is fitted to the cylinder. The heater is either in the form of a helical coil or as straight heater tubes fitted between headers (Please contact us for information on non-standard units).

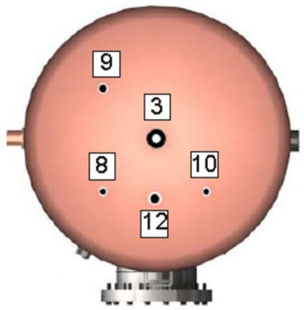
Connection Details

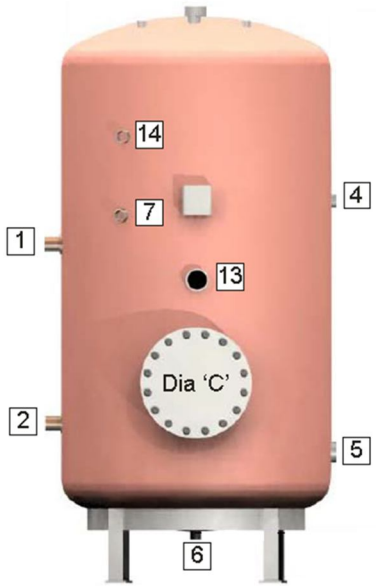
Ref	Description	Size
1	Primary Inlet	Varies
2	Primary Outlet	Varies
3	Secondary Flow	Varies
4	Secondary Return	Varies
5	Cold Feed	Varies
6	Drain	Varies
7	Control Thermostat	½”
8	Thermometer	½”
9	Safety Valve	Varies
10	Pressure Gauge	3/8”
11	Vent (Optional)	Varies
12	Anti-Vacuum Valve	Varies
13	Immersion Heater (Optional)	Varies
14	High Limit Thermostat	½”

Please note connections are connections only, pockets can be purchased at an additional cost.

Please consult our spares brochure for more information on spares that we can provide, as well as unvented kits and immersion heaters.

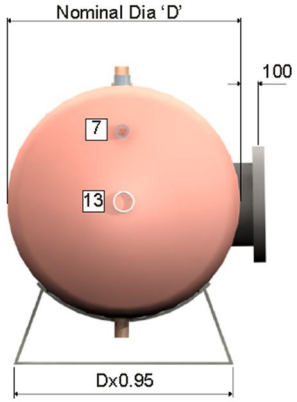
Alternatively contact us directly for a quotation.

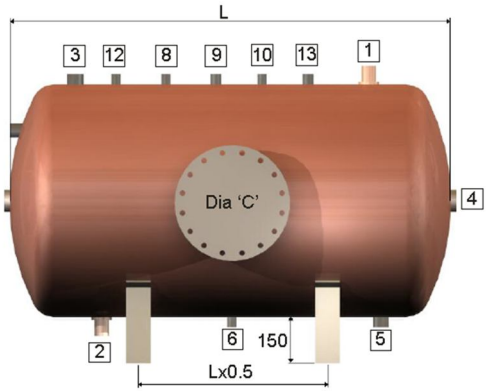




Please note that the dimensions and connection sizes listed below are for standard units. All of our units are bespoke; therefore if you require alternative connection sizes or dimensions, this can be changed at order stage with one of our design engineers.

Capacity (Litres)	D (mm)	L (mm)	C (mm)	Main Connection Sizes					
				3	4	5	6	11	12
230	500	1270	250	1 ¼”	1”	1 ¼”	¾”	1”	¾”
270	500	1470	250	1 ¼”	1”	1 ¼”	¾”	1”	¾”
360	600	1370	250	1 ¼”	1”	1 ¼”	¾”	1”	¾”
450	600	1740	250	1 ½”	1”	1 ½”	¾”	1”	¾”
500	675	1470	250	1 ½”	1”	1 ½”	¾”	1”	¾”
550	675	1720	250	1 ½”	1”	1 ½”	¾”	1”	¾”
600	750	1450	250	1 ½”	1”	1 ½”	¾”	1”	¾”
700	750	1680	250	1 ½”	1”	1 ½”	¾”	1”	¾”
800	750	1930	250	1 ½”	1”	1 ½”	¾”	1”	¾”
900	750	2150	300	1 ½”	1”	1 ½”	¾”	1”	¾”
1000	900	1750	300	2”	1 ½”	2”	1”	1 ¼”	1”
1200	900	2050	300	2”	1 ½”	2”	1”	1 ¼”	1”
1500	1050	1950	450	2”	1 ½”	2”	1”	1 ¼”	1”
1750	1050	2175	450	2”	1 ½”	2”	1”	1 ¼”	1”
2000	1050	2400	450	2”	1 ½”	2”	1”	1 ½”	1 ½”





Standard Range of Indirect Cylinders

Electric Storage Calorifier

Low installation, maintenance and off-peak costs can make electricity attractive. It can also be a cost effective back-up for other heat sources during periods of low demand and shut-down of the main primary heating source.

Fixed Element: Lowest cost option but if one element fails, the entire heater must be replaced.

Replaceable Elements: These are fixed to the element plate using special nuts and glands. A failed element can be replaced after draining the calorifier

Removable Core Elements: Each heater element can be withdrawn from the immersion heater and replaced without draining down the calorifier.

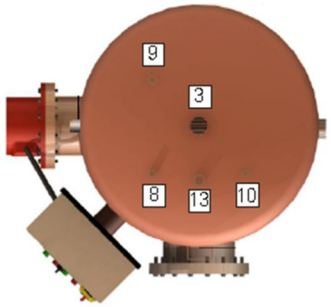
Connection Details

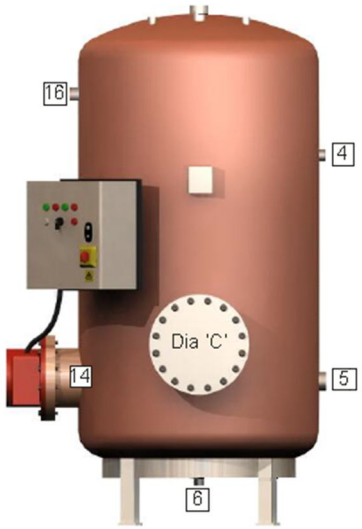
Ref	Description	Size
1	Primary Inlet	Varies
2	Primary Outlet	Varies
3	Secondary Flow	Varies
4	Secondary Return	Varies
5	Cold Feed	Varies
6	Drain	Varies
7	Control Thermostat	½”
8	Thermometer	½”
9	Safety Valve	Varies
10	Pressure Gauge	3/8”
11	Vent (Optional)	Varies
12	Low Water Cut-Out	½”
13	Anti-Vacuum Valve	Varies
14	Immersion Heater (Optional)	Varies

Please note connections are connections only, pockets can be purchased at an additional cost.

Please consult our spares brochure for more information on spares that we can provide, as well as unvented kits and immersion heaters.

Alternatively contact us directly for a quotation.





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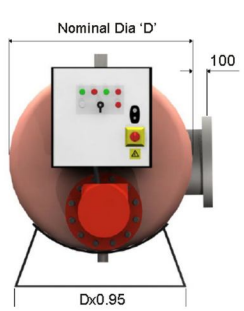
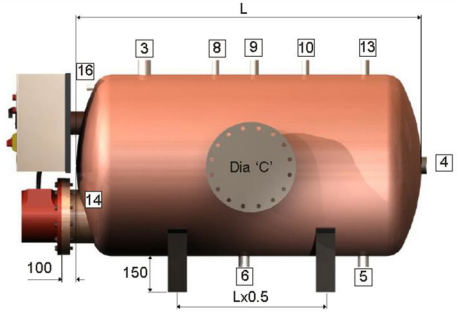
Capacity (Litres)	D (mm)	L (mm)	C (mm)	Main Connection Sizes					
				3	4	5	6	11	13
230	500	1270	250	1 ¼”	1”	1 ¼”	¾”	1”	¾”
270	500	1470	250	1 ¼”	1”	1 ¼”	¾”	1”	¾”
360	600	1370	250	1 ¼”	1”	1 ¼”	¾”	1”	¾”
450	600	1740	250	1 ½”	1”	1 ½”	¾”	1”	¾”
500	675	1470	250	1 ½”	1”	1 ½”	¾”	1”	¾”
550	675	1720	250	1 ½”	1”	1 ½”	¾”	1”	¾”
600	750	1450	250	1 ½”	1”	1 ½”	¾”	1”	¾”
700	750	1680	250	1 ½”	1”	1 ½”	¾”	1”	¾”
800	750	1930	250	1 ½”	1”	1 ½”	¾”	1”	¾”
900	750	2150	300	1 ½”	1”	1 ½”	¾”	1”	¾”
1000	900	1750	300	2”	1 ½”	2”	1”	1 ¼”	1”
1200	900	2050	300	2”	1 ½”	2”	1”	1 ¼”	1”
1500	1050	1950	450	2”	1 ½”	2”	1”	1 ¼”	1”
1750	1050	2175	450	2”	1 ½”	2”	1”	1 ¼”	1”
2000	1050	2400	450	2”	1 ½”	2”	1”	1 ¼”	1”
2250	1200	2200	450	65	2”	65	1 ½”	1 ½”	1 ¼”
2500	1200	2400	450	65	2”	65	1 ½”	1 ½”	1 ¼”
3000	1200	2850	450	80	2”	80	1 ½”	1 ½”	1 ½”
3500	1350	2700	450	80	2”	80	1 ½”	1 ½”	1 ½”
4000	1350	3000	450	80	2”	80	1 ½”	1 ½”	1 ½”
Copper-Lined, Galvanised or Stainless Steel Vessels only after 4000 Litres									
4500	1500	2770	450	80	2”	80	1 ½”	1 ½”	1 ½”
5000	1500	3050	450	80	2”	80	2”	2”	1 ½”
5500	1500	3350	450	100	65	100	2”	2”	2”
6000	1600	3250	450	100	65	100	2”	65	2”
7000	1600	3750	450	100	65	100	2”	65	2”
8000	1800	3450	450	125	65	125	2”	65	2x2”
9000	2000	3200	450	125	65	125	2”	65	2x2”
10,000	2000	3500	450	125	65	125	2”	65	2x2”





Standard Range of Electric Storage Calorifier

Direct Storage Cylinders

The standard range of GMS direct cylinders are specially designed to work with external heat sources such as plate heat exchangers and solar systems etc and are fitted with special internal baffles and sparges to ensure correct operation of the unit. Each unit is individually designed to suit site conditions and customer requirements. (Please contact us for information on non-standard units).

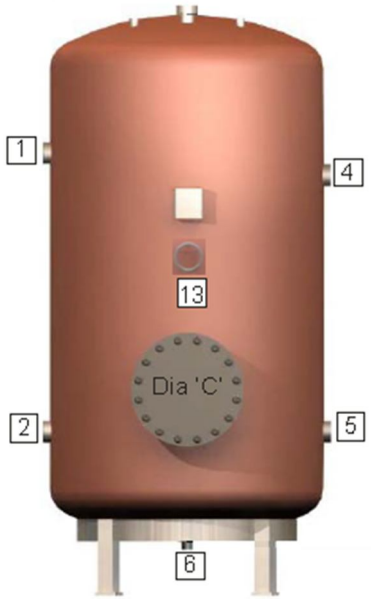
Connection Details

Ref	Description	Size
1	Primary Inlet	Varies
2	Primary Outlet	Varies
3	Secondary Flow	Varies
4	Secondary Return	Varies
5	Cold Feed	Varies
6	Drain	Varies
7	Not Applicable	-
8	Thermometer	½"
9	Safety Valve	Varies
10	Pressure Gauge	3/8"
11	Vent (Optional)	Varies
12	Anti-Vacuum Valve	Varies
13	Immersion Heater (Optional)	Varies

Please note connections are connections only, pockets can be purchased at an additional cost.

Please consult our spares brochure for more information on spares that we can provide, as well as unvented kits and immersion heaters.

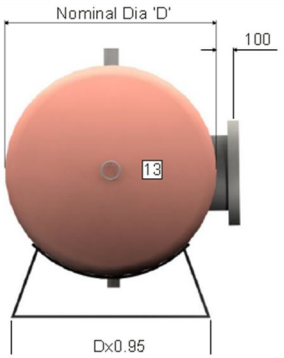
Alternatively contact us directly for a quotation.

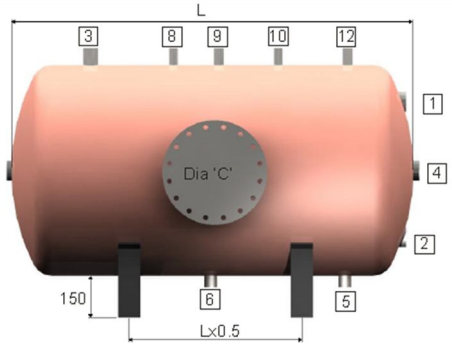


Standard Range of Direct Cylinders

Please note that the dimensions and connection sizes listed below are for standard units. All of our units are bespoke; therefore if you require alternative connection sizes or dimensions, this can be changed at order stage with one of our design engineers.

Capacity (Litres)	D (mm)	L (mm)	C (mm)	Main Connection Sizes					
				3	4	5	6	11	13
230	500	1270	250	1 ¼"	1"	1 ¼"	¾"	1"	¾"
270	500	1470	250	1 ¼"	1"	1 ¼"	¾"	1"	¾"
360	600	1370	250	1 ¼"	1"	1 ¼"	¾"	1"	¾"
450	600	1740	250	1 ½"	1"	1 ½"	¾"	1"	¾"
500	675	1470	250	1 ½"	1"	1 ½"	¾"	1"	¾"
550	675	1720	250	1 ½"	1"	1 ½"	¾"	1"	¾"
600	750	1450	250	1 ½"	1"	1 ½"	¾"	1"	¾"
700	750	1680	250	1 ½"	1"	1 ½"	¾"	1"	¾"
800	750	1930	250	1 ½"	1"	1 ½"	¾"	1"	¾"
900	750	2150	300	1 ½"	1"	1 ½"	¾"	1"	¾"
1000	900	1750	300	2"	1 ½"	2"	1"	1 ¼"	1"
1200	900	2050	300	2"	1 ½"	2"	1"	1 ¼"	1"
1500	1050	1950	450	2"	1 ½"	2"	1"	1 ¼"	1"
1750	1050	2175	450	2"	1 ½"	2"	1"	1 ¼"	1"
2000	1050	2400	450	2"	1 ½"	2"	1"	1 ¼"	1"
2250	1200	2200	450	65	2"	65	1 ½"	1 ½"	1 ¼"
2500	1200	2400	450	65	2"	65	1 ½"	1 ½"	1 ¼"
3000	1200	2850	450	80	2"	80	1 ½"	1 ½"	1 ½"
3500	1350	2700	450	80	2"	80	1 ½"	1 ½"	1 ½"
4000	1350	3000	450	80	2"	80	1 ½"	1 ½"	1 ½"
Copper-Lined, Galvanised or Stainless Steel Vessels only after 4000 Litres									
4500	1500	2770	450	80	2"	80	1 ½"	1 ½"	1 ½"
5000	1500	3050	450	80	2"	80	2"	2"	1 ½"
5500	1500	3350	450	100	65	100	2"	2"	2"
6000	1600	3250	450	100	65	100	2"	65	2"
7000	1600	3750	450	100	65	100	2"	65	2"
8000	1800	3450	450	125	65	125	2"	65	2x2"
9000	2000	3200	450	125	65	125	2"	65	2x2"
10,000	2000	3500	450	125	65	125	2"	65	2x2"





Buffer Vessels

The standard range of steel Buffer Vessels are suitable for both chilled water systems and heating systems. Each unit can individually designed to suit site conditions and customer requirements. (Please contact us for information on non-standard units).

Connection Details

Ref	Description	Size
1	System Connection	Varies
2	System Connection	Varies
3	Drain	Varies
4	Safety Valve	Varies
5	Pressure Gauge	3/8"
6	Thermometer	½"
7	Vent	½"

Please note connections are connections only, pockets can be purchased at an additional cost.

Please consult our spares brochure for more information on spares that we can provide, as well as vessel ancillaries and immersion heaters.

Alternatively contact us directly for a quotation.

Standard Range of Buffer Vessels

Please note that the dimensions and connection sizes listed below are for standard units. All of our units are bespoke; therefore if you require alternative connection sizes or dimensions, this can be changed at order stage with one of our design engineers.

Capacity (Litres)	D (mm)	L (mm)	C (mm)	Main Connection Sizes		
				3	4	5
230	500	1270	250	2"	2"	¾"
270	600	1100	250	2"	2"	¾"
300	600	1200	250	2"	2"	¾"
360	600	1370	250	2"	2"	¾"
400	600	1540	250	2"	2"	¾"
450	600	1740	250	2"	2"	¾"
500	700	1470	250	2"	2"	¾"
550	700	1580	250	2"	2"	¾"
600	700	1700	250	2"	2"	¾"
700	700	2000	250	2"	2"	¾"
800	800	1750	250	65	65	¾"
900	800	1950	300	100	100	¾"
1000	900	1750	300	100	100	1"
1200	900	2050	300	100	100	1"
1500	1000	2060	450	100	100	1"
1750	1000	2380	450	100	100	1"
2000	1100	2280	450	100	100	1 ½"
2250	1200	2200	450	150	150	1 ½"
2500	1200	2400	450	150	150	1 ½"
3000	1200	2850	450	150	150	1 ½"
3500	1400	2500	450	150	150	1 ½"
4000	1400	2850	450	150	150	1 ½"
4500	1500	2770	450	150	150	1 ½"
5000	1500	3050	450	150	150	2"
5500	1500	3350	450	150	150	2"
6000	1600	3250	450	200	200	2"
7000	1600	3750	450	200	200	2"
8000	1800	3450	450	200	200	2"
9000	2000	3200	450	200	200	2"
10,000	2000	3500	450	200	200	2"