



McDonald
Water Storage

Calorifier

Commercial Hot Water Cylinders Installation & Technical Manual



Tel: (01592) 611123

www.mcdonaldwaterstorage.com

April 2026

Commissioning Checklist Inside

Manual must be completed by Installer and left with Calorifier or Customer

Contents

Introduction2

Handling & Storage2

The Environment.....2

Design3

Immersion Heaters3

Pipework3

Pressure Equipment Directive.....4

Water Treatment5

Discharge Requirements5

Capacity6

Capacity (Example).....7

Secondary Connections.....7

Primary Connections7

Secondary Recirculation8

Relief Valve8

Expansion Vessel8

General Schematic: Direct Unvented Calorifier9

General Schematic: Indirect Unvented Calorifier10

Installation Schematic: Indirect Unvented Calorifier11

General Schematic: Horizontal Indirect Calorifier12

Installation Schematic: Horizontal Indirect Calorifier13

Commissioning.....14

Commissioning Checklist.....16

Troubleshooting.....19

Warranty.....20

Ancillary Descriptions.....22

Servicing.....24

General O & M25

Introduction

The Calorifier commercial hot water cylinder range has been specifically designed to fully optimise the performance of the heat source it is connected to and provide semi-instantaneous hot water through the Plate Heat Exchanger.

All McDonald Water Storage products are manufactured under an ISO 9001 & 14001 Quality Management System.

The Calorifier must be installed and maintained by a competent person as defined by the relevant regulations.

Handling & Storage

The Calorifier should be handled with care in order to avoid any damage to valves, fittings or external pipework, and mounted on level and prepared foundations.

DO NOT LIFT BY ANY FITTINGS OR EXTERNAL PIPEWORK, as this can result in loosening of connections and risking possible leaks. Any Calorifiers with a capacity of 500L or over include Lifting Lugs to assist with lifting and positioning. Check all joints before filling with water in case anything has been loosened in transit.

Vertical Calorifiers can be floor mounted, provided the floor is strong enough to support the **full weight** of the unit.

Horizontal Calorifiers are supported by cradles, positioned clear of the drain connection.

The Environment

This product has been manufactured using many recyclable materials, including the approved HCFC/CFC free polyurethane foam insulation. At the end of its useful life, it should be disposed of at a Local Authority Recycling Centre, to maximise the products full environmental benefits.

Design

The Copper Calorifiers are manufactured strictly in accordance with the guidelines of BS 853, which ensure they meet all current Health and Safety Legislation, and are subject to a hydraulic test at 1.5 times the maximum working pressure of the calorifier, with a minimum of 6 hours of testing our calorifiers are tested 12 times longer than the BS 853 requirements for the highest reliability.

In addition, a range of Stainless Steel Calorifiers are also available, manufactured externally and also subject to a hydraulic test at 1.5 times the maximum working pressure of the Calorifier.

All work and input into a Calorifier is checked at all stages from its design, costing, and manufacture to ensure the highest product quality is provided. During manufacture a 3 stage inspection process is in place at assembly, testing and final inspection once insulated to ensure the calorifier accurately reflects the requirements.

Immersion Heaters

- The Immersion Heater thermostats are preset with the control setting at **67°C** and the high limit setting at **85°C**. The control setting can be lowered or increased as required for the installation requirements
- If in any doubt of how to set the Immersion or what temperature we would advise for specific installations, please contact us on **01592 611123**.
- All Immersion Heaters should be wired by a qualified electrician, as shown in the literature provided with the Immersion

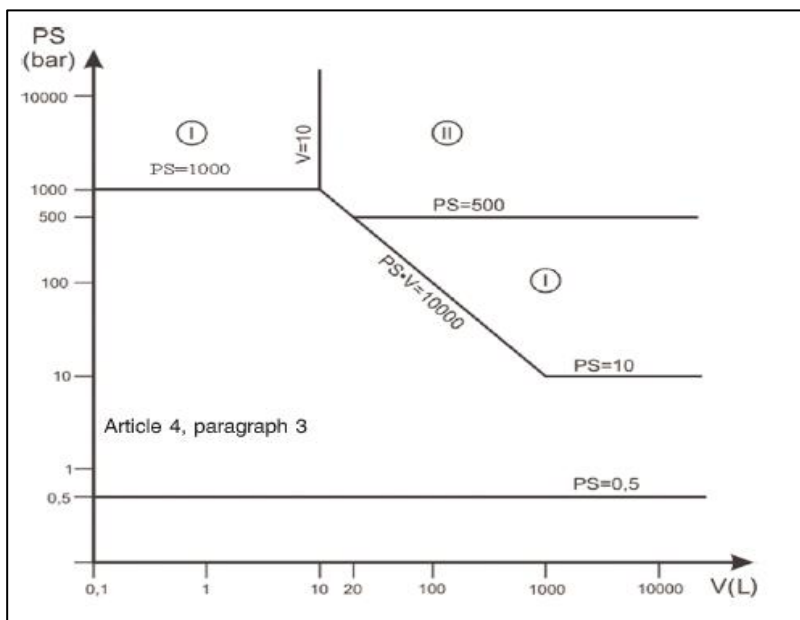
Pipework

All primary pipework should be secured with external supports and not by the Calorifier unit itself. Primary pipework should also include suitable bends or flexible joints to allow for expansion.

Pressure Equipment Directive

The Calorifiers are designed to meet the mandatory requirements of the Pressure Equipment Directive 2014/68/EU (PED). The majority of fluids used within our designed calorifiers (i.e. water, steam etc.) are classified as Group 2 Fluids, and thus follow the rules below:

1. Where the maximum design pressure (Bar) multiplied by the calorifier volume (Litres) is less than 10,000, or the design pressure is less than 10 bar, the calorifier must comply with the SEP (Sound Engineering Practice) and not carry the CE/UKCA mark.
2. Calorifiers which fall outside the previous parameters must carry the CE/UKCA mark.



The above graph (taken from Annex II Table 4 of the PED) demonstrates the previous rules for Vessels for Group 2 liquids. “Article 4, Paragraph 3” refers to design compliance with the SEP (Sound Engineering Practice).

Water Treatment

The hardness of the mains water should be checked by the installer and if necessary the optional factory fitted in-line scale inhibitor should be specified at the time of order for hardness levels between 200 and 300 ppm (mg/l).

Where the water is very hard i.e. 300ppm (mg/l) and above the optional polyphosphate type, seek advice on the best option.

The Primary system (**Indirect** Calorifiers only) will require the application of a protective scale and corrosion inhibitor such as Fernox to ensure adequate protection. This should avoid having corrosive material in the primary system and remove any build-up of sludge which can reduce the performance of the primary system. The volumes and concentration of inhibitor required should be calculated in accordance with the manufacturer's instructions.

If an inhibitor is installed, please follow the inhibitors maintenance instructions and replace when required. When replacing the inhibitor, please ensure to fully flush the water system before installing the new inhibitor.

Discharge Requirements

The Discharge pipework from all Safety Valves must be run to a suitable drain point where it is visible with no risk/danger to people.

The pipework should be metal, capable to withstand the hot temperatures of the discharged water. The diameter of the Discharge pipework should be no less than the nominal outlet size of the Safety Valves.

The Discharge pipework should also be installed so that any discharge will be directed away from electrical components if the discharge outlet should become blocked.

Capacity

When sizing hot water storage calorifiers, it is important to determine not only the correct size but also the correct relationship between storage and recovery to enable the most efficient usage from your hot water system. Oversizing the calorifier can lead to unnecessary costs both in your calorifier cost and running of your system, while inadequate storage can lead to the system not meeting the users requirements.

The following guide (extracted from BS853) shows the maximum hourly demand in different commercial environments.

Installation	Shower	Bath	WHB		Sink		Load Factor
			Dom.	Com.	Dom.	Com.	
Factory	120	-	5	20	50	80	1.0
Hospital	70	60	10	20	50	80	0.7
Hotel (Average)	50	50	10	15	50	100	0.5
Hotel (Upper Class)	60	60	15	20	60	120	0.5
Offices	-	-	5	10	40	40	1.0
Restaurant	-	-	-	25	100	140	1.0
School	180	-	5	20	40	80	0.8
Sports Centre	220	-	5	15	40	100	1.0
University	220	-	5	20	40	80	0.8

This guide should be utilised, along with the example on Page 7, to determine the correct Calorifier size required.

Also available is the **Commercial Sizing Tool** from the McDonald Water Storage Website to assist in calculating the required Capacity for Installation.

Follow the link below;

<https://mcdonaldwaterstorage.com/commercial-sizing-tool/>

Capacity (Example)

50 Hotel (High End)						
Background	Sizing for a 50 Bedroom Hotel with public bathrooms, cleaning, washing, cooking and bar facilities would give the following sizing:					
Shower & Bath Demand	50	x	60	=	3000	Litres
Domestic WHBs Demand	50	x	15	=	750	Litres
Commercial WHBs Demand	4	x	25	=	100	Litres
Washing Machine Demand	3	x	50	=	150	Litres
Load Factor					0.5	
Calculation	$(3000 + 750 + 100 + 150) \times 0.5$					
Maximum Hourly Demand					2240	Litres
Recovery Output (Per Hour)					2240	Litres
Calorifier Recommendation (1 Hour Recovery)					2240	Litres
Calorifier Recommendation (30 Min Recovery)					1120	Litres

Secondary Connections

Where a high water demand is required over a shorter period the correct sizing of the secondary connections (i.e. Cold Feed and Hot Draw) should be factored in to ensure the peak demand in litres per second is met.

It is generally bad practice for the Cold Feed to be smaller than the Hot Draw due to the potential for a vacuum to be created. If this is the case, an Anti-Vacuum Valve will be supplied with the unit.

Primary Connections

The size of the primary pipework is determined by the flow rate and length of run between the boiler and calorifier. Wherever possible the connection sizes on the primary pipework should not exceed 2 or 2 ½" so that the inlet velocity does not exceed tolerances.

Secondary Recirculation

The secondary return sizing should be factored in to allow an efficient flow rate at all points of the property but also be sized at a level that avoids excessive secondary recirculation as this can lead to increased heat loss.

Relief Valve

On a **Vented** System the Relief Valve must be sized in conjunction with the Cold Feed size.

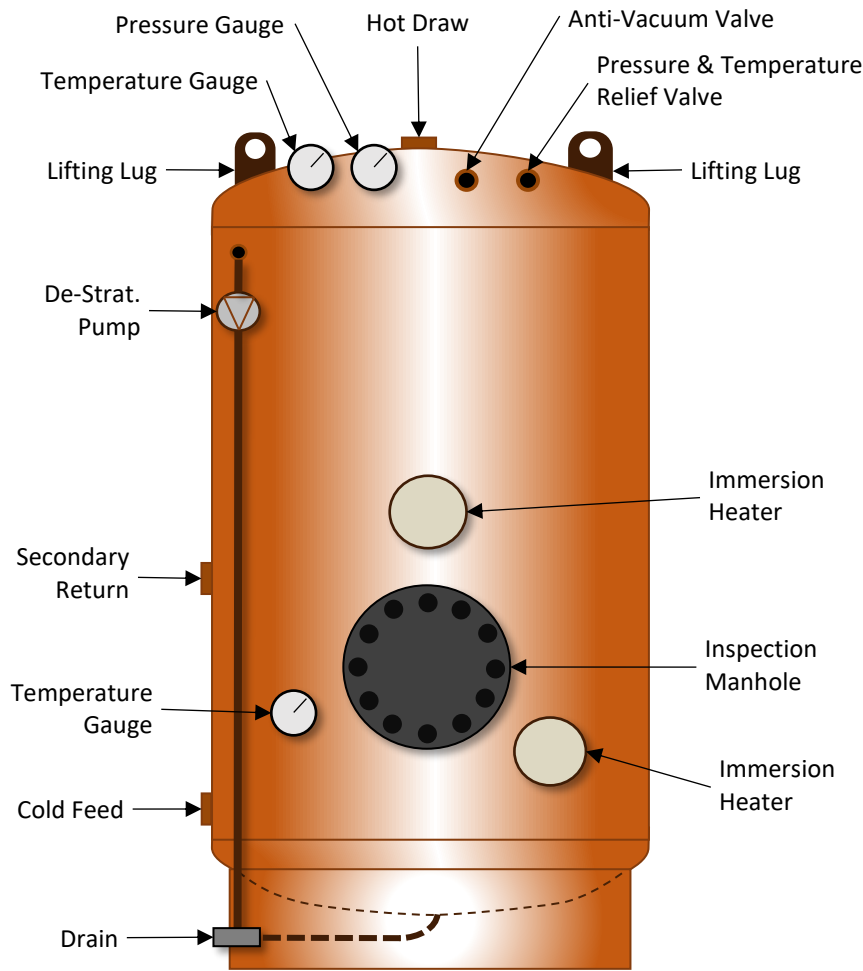
On an **Unvented** System, each unit is supplied with a DN20 Safety Valve for the Cold Feed, and an additional P & T (Pressure & Temperature) Relief Valve which must be sized to match the power input to the cylinder.

Expansion Vessel

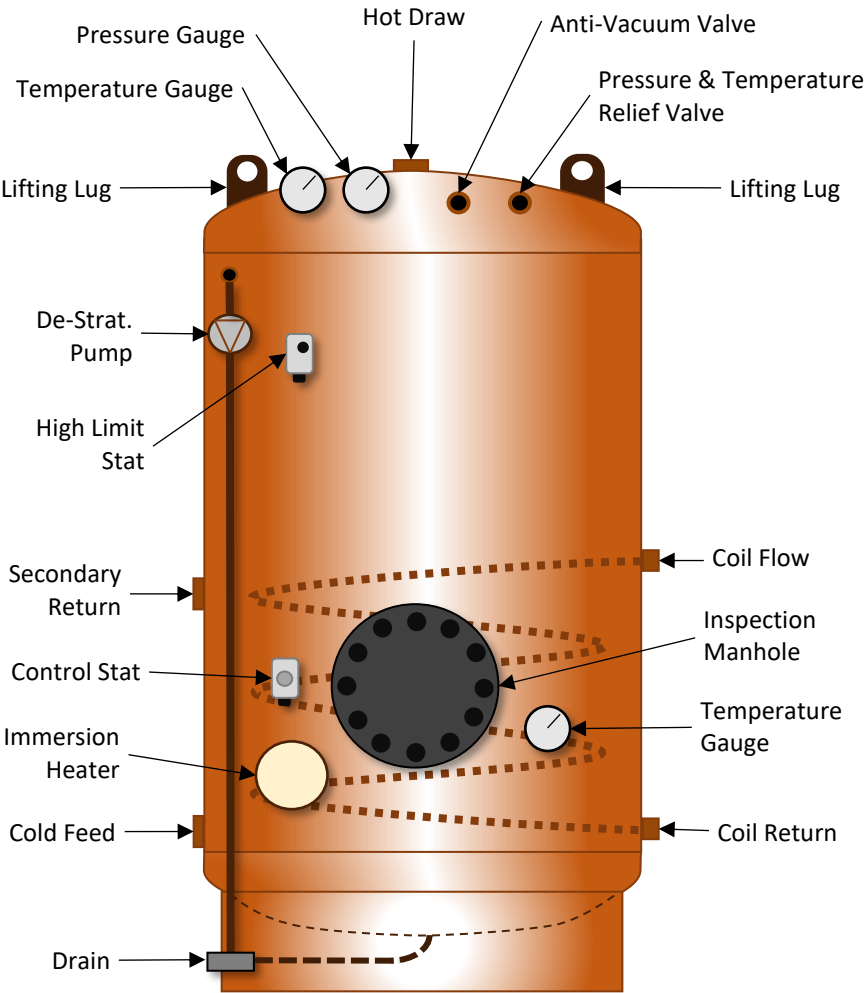
The Expansion Vessel is sized according to the capacity, cold inlet pressure and working pressure of the calorifier.

If required, Flow-Through Vessels are also available.

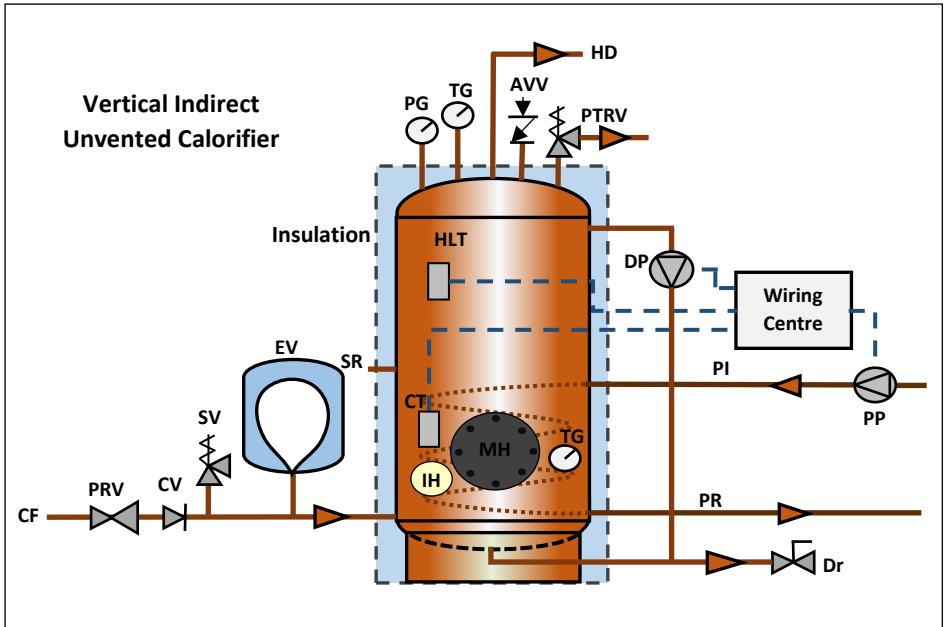
General Schematic: Direct Unvented Calorifier



General Schematic: Indirect Unvented Calorifier

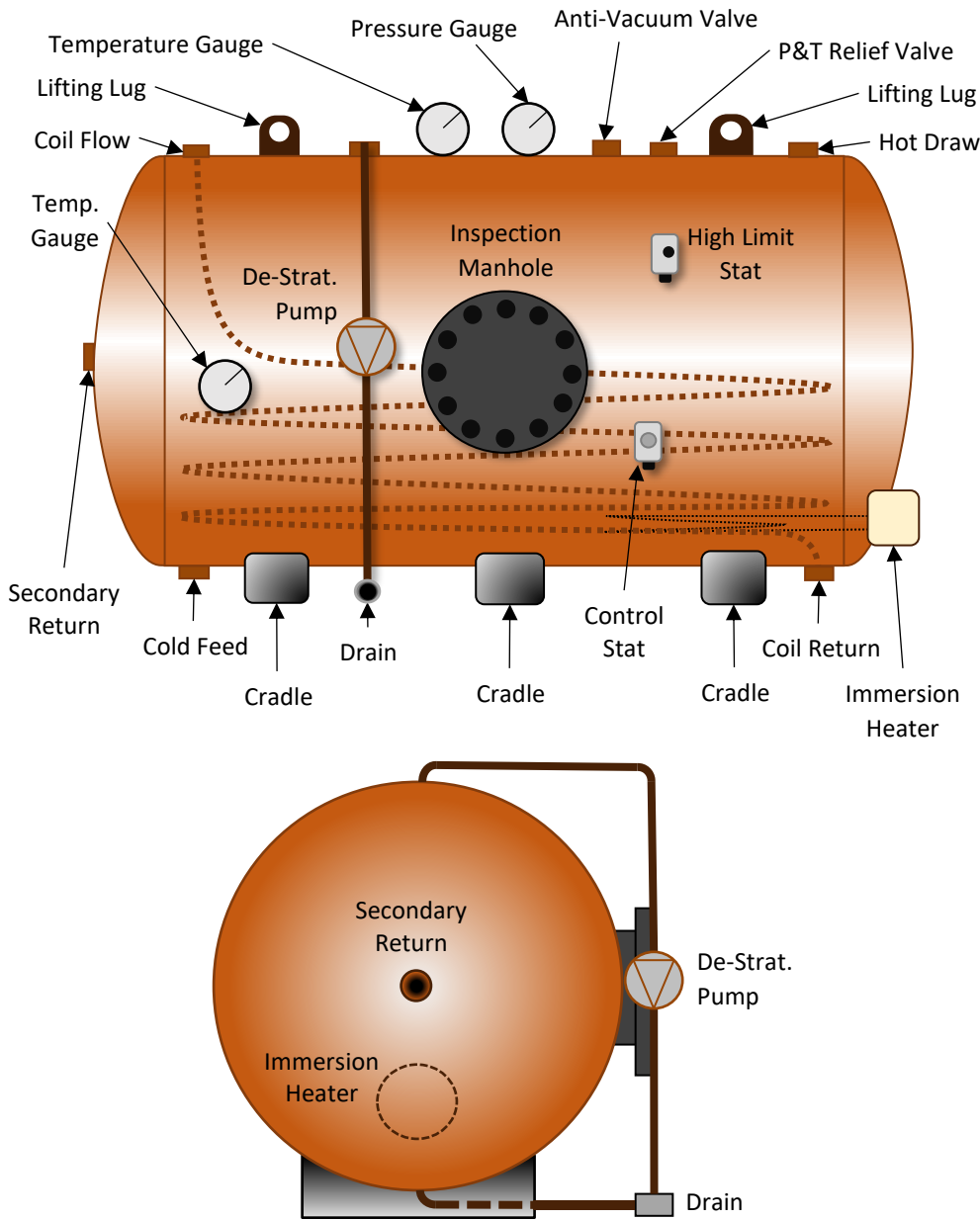


Installation Schematic: Indirect Unvented Calorifier

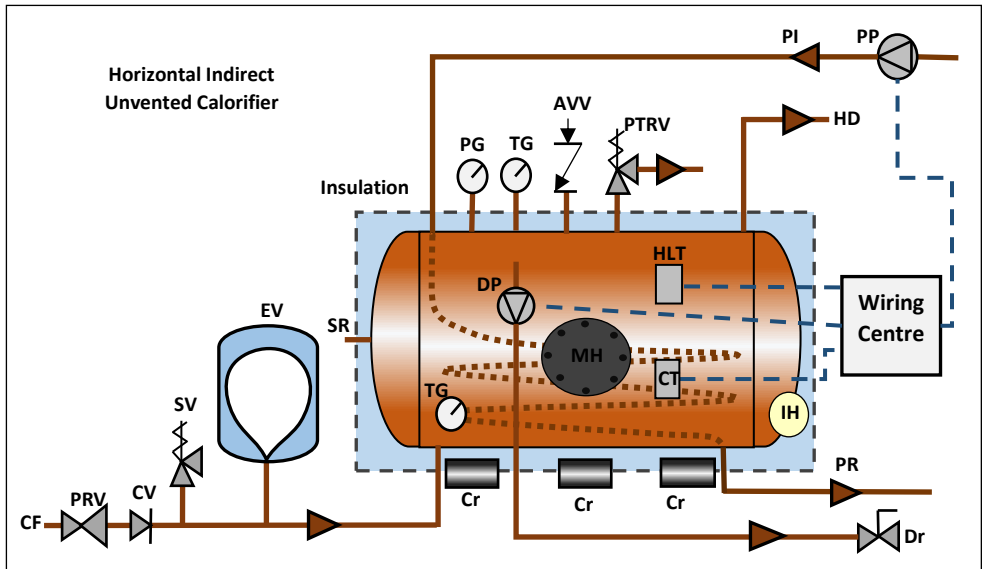


LEGEND			
AVV	Anti-Vacuum Valve	MH	Inspection Manhole
CF	Cold Feed	PG	Pressure Gauge
CT	Control Thermostat	PI	Primary Flow Inlet
CV	Check Valve	PP	Primary Pump
DP	De-Stratification Pump	PR	Primary Flow Return
Dr	Drain	PRV	Pressure Reducing Valve
EV	Expansion Vessel	PTRV	Pressure & Temperature Relief Valve
HD	Hot Draw	SR	Secondary Return
HLT	High-Limit Thermostat	SV	Safety Valve
IH	Immersion Heater	TG	Temperature Gauge

General Schematic: Horizontal Indirect Calorifier



Installation Schematic: Horizontal Indirect Calorifier



LEGEND			
AVV	Anti-Vacuum Valve	MH	Inspection Manhole
CF	Cold Feed	PG	Pressure Gauge
Cr	Cradle	PI	Primary Flow Inlet
CT	Control Thermostat	PP	Primary Pump
CV	Check Valve	PR	Primary Flow Return
DP	De-Stratification Pump	PRV	Pressure Reducing Valve
Dr	Drain	PTRV	Pressure & Temperature Relief Valve
EV	Expansion Vessel	SR	Secondary Return
HD	Hot Draw	SV	Safety Valve
HLT	High-Limit Thermostat	TG	Temperature Gauge
IH	Immersion Heater		

Commissioning

The below is a recommended guide of actions and checks that should be undertaken during commissioning:-

DO

- ✓ **During commissioning, complete all relevant sections of the Commissioning Checklist (Page 16 - 18). This must be completed during commissioning and left with product to meet the Warranty conditions.**
- ✓ Check and tighten pipework where applicable.
- ✓ Fit the Pressure Reducing Valve to the Incoming Mains and check it has been set to the correct Pressure.
- ✓ Ensure all Cold Feed Components (Pressure Reducing Valve, Check Valve, Safety Valve & Expansion Vessel) have been installed in the correct order as shown on schematics (**Page 11 & 13**) and in flow direction towards the Calorifier.
- ✓ Ensure that connections are fitted in accordance with the sketch supplied.
- ✓ Ensure the drain is connected to allow draining of the unit if required.
- ✓ Ensure all pipework is secured with external supports and not by the Calorifier itself.
- ✓ Allow 100mm clearance on any face of the unit with pipework / connections and allow minimum 200mm between the top of the tank and ceiling to allow access for top pipework / connections
- ✓ Check all connections including factory made, prior to and after installation, including pipework, immersion heaters, components etc.
- ✓ Check all Calorifier controls (e.g. Thermostats, Immersion Heaters, Safety Valve etc.) and inspection points (e.g. Manhole, Gauges etc.) have suitable access for inspection, servicing and maintenance.
- ✓ Check the Drain valve is closed before filling.
- ✓ Open the furthest tap from the Calorifier and fill.
- ✓ Run all taps and other hot outlets to remove all air from the system.
- ✓ Check for leaks throughout the system.
- ✓ Manually open the Pressure & Temperature Relief Valve (fitted on top of the Calorifier) for a few seconds, and check the discharged water runs freely through the discharge pipework.
- ✓ Manually open the Safety Valve (fitted onto the Cold Water Supply) for a few seconds, and check the discharged water runs freely through the discharge pipework.
- ✓ Direct only - Immersion Heaters should be set at 67°C to meet users' hot water requirements, and temperature confirmed on the Temperature Gauge 60 - 65°C. (**See Page 3**)
- ✓ Indirect only - Fill the indirect (primary) circuit in accordance with the boiler manufacturers commissioning instructions. Once filled, switch on the boiler and allow the Calorifier to heat up.

- ✓ Indirect only - Check the Control Stat and High Limit Stat operate correctly during the heating cycle.
- ✓ Ensure the store temperature is set to circa 60 - 65°C on the store temperature gauge. This can be increased but consideration should be made for the temperature and pressure rise, caused by “creeping”, where small draw offs are present.
- ✓ Check that no water is discharged from either the Safety Valve or Pressure & Temperature Relief Valve during the heating cycle.
- ✓ Ensure that all exposed pipework on the Calorifier is insulated to minimise any heat losses.

DON'T

- ✗ Use a combined feed and vent.
- ✗ Place any clothing or other combustible materials against or on the Calorifier.

Commissioning Checklist

MAINS PRESSURE HOT WATER STORAGE SYSTEM COMMISSIONING CHECKLIST

This Commissioning Checklist is to be completed in full by the competent person who commissioned the storage system as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights.

Customer Name:

Telephone Number:

Address:

Calorifier Make & Model:

Production Number:

Commissioned by (PRINT NAME):

Company Name:

Telephone Number:

Company Address:

Commissioning Date:

ALL SYSTEMS

What is the incoming static cold water pressure at the inlet to the system?				Bar
Has cold mains strainer been cleaned of installation debris?	Yes		No	
What is the maximum flow rate at set thermostat temperature (measured at high flow outlet)?				L/ min
Time and temperature controls have been fitted in compliance with Part L of the Building Regulations?	Yes			
What temperature is the Control Thermostat set to?				°C
If fitted, what is the Immersion Heater thermostat temperature?				°C
What is the hot water temperature at the nearest outlet?				°C
What is the maximum hot water temperature at the nearest outlet?				°C
Is the cylinder solar (or other renewables) compatible?	Yes		No	
All appropriate pipes have been insulated up to 1 metre or the point where they become concealed?	Yes			

ALL SYSTEMS PRIMARY SETTINGS (Indirect Heating Only)

Is the installation in a hard water area (above 200ppm)?	Yes		No	
If yes, has a water scale conditioner/inhibitor been fitted?	Yes		No	
What type of scale conditioner/inhibitor has been fitted?				

UNVENTED SYSTEMS ONLY				
Where is the pressure reducing valve fitted?				
What is the pressure reducing valve setting?				Bar
Has a combined temperature and pressure relief valve and expansion valve been fitted and discharge tested?	Yes		No	
The Discharge pipework has been connected and terminated to the appropriate Building Regulations				Yes
Are all energy sources fitted with a cut out device?	Yes		No	
Has the expansion vessel been checked?	Yes		No	

ALL INSTALLATIONS		
The hot water system complies with the appropriate Building Regulations.	Yes	
The system has been installed and commissioned in accordance with the manufacturer's instructions.	Yes	
The system controls have been demonstrated and understood by the customer.	Yes	
The manufacturer's literature, including this Checklist, has been explained and left with customer.	Yes	

Commissioning Engineer's Signature:
Customer's Signature:
(To confirm satisfactory demonstration and receipt of manufacturer's literature)

Troubleshooting

Below contains a troubleshooting and solution guide to the Calorifier. If this table does not resolve your problem, please contact either your installer or phone McDonald Water Storage Technical Team for further advice.

SYMPTOM	SOLUTION
The water at the tap is lukewarm or cold.	The Calorifier unit is designed to work best when the store temperature is at or approaching 60 - 65°C. Check the thermometer is showing the store temperature is at or approaching 60 - 65°C. If this is not the case; 1) On the Indirect model, ensure that the all indirect sources (e.g. Boiler) are working, that the control thermostat is set at 65°C and allow sufficient time for the store to reach working temperature. 2) On a Direct model, a qualified electrician should check that the immersion heaters are working, the control thermostat is set at 67°C, the safety cut-out has not tripped, and receiving the correct supply at the correct time (off-peak).
Water discharges whilst Cylinder is heating	1) If water is occasionally discharging as the water is heated, this would indicate the Expansion Vessel needs recharging. Switch off all power to the cylinder and recharge the vessel (as below). 2) If water is continually being discharged, firstly check with a gauge that the pressure allowed through the pressure reducing valve does not exceed the set pressure. If it does, remove filter and clean. For both instances, check the charge in the Expansion Vessel. If recharge is required, close the mains stopcock and open a hot outlet. Connect the pump with gauge to the air inlet on the Vessel and charge to the same as the pressure reducing valve. If after recharging the Expansion Vessel the cylinder is still discharging, this may be a result of cross flow. Ensure appropriate check valves are fitted.
Not enough hot water and less than 65°C on the temperature gauge.	Check the heat sources and their input in (kW) to the store as this will be lower than the kW output which will result in the store not producing enough heat for the exchanger to provide heated mains pressure water.

Flow rate from taps has dropped	This could be debris blocking the water flow. Check any installed Strainers have been cleaned of debris.
Overheated Hot Water Discharge	In the unlikely event of overheated (90°C) water being discharged, the heat source (i.e. Immersion Heaters or Boiler) should be switched off immediately and a qualified engineer must be contacted. Ensure that the discharge of hot water or steam at the final discharge point causes no danger and is not likely to injure anyone. DO NOT SHUT OFF THE COLD WATER SUPPLY TO THE UNIT. DO NOT RE-USE UNTIL CHECKED AND REPAIRED. ENSURE COMPONENTS ARE ISOLATED FROM ELECTRICITY BEFORE INVESTIGATION. Once cold water has entered the unit and displaced the overheated water thus cooling it, check the thermostat and energy cutout in the following: 1) Immersion Heater(s) 2) Thermostat(s) 3) Primary Heating Source (e.g. Boiler) Identify the faulty component and replace with the correct component as supplied by the manufacturer and ensure that it works before re-commissioning the system. DO NOT, FOR ANY REASON, BYPASS AN ENERGY CUTOUT.

Warranty

McDonald Water Storage guarantee the Calorifier shell against material defect or manufacturing fault for a period of 5 years from the date of delivery. Components are guaranteed for 2 years.

The above product guarantee is valid provided:

- It has been installed by a competent installer in accordance with the instructions detailed in our installation manual and all relevant Codes of Practice and Regulations in force at the time of installation.
- No factory fitted parts have been removed for unauthorised repair or replacement and the product has not been modified.
- All parts supplied loose with the unit must be fitted unless agreed in writing by McDonald Water Storage.
- Any replacement parts should be purchased from McDonald Water Storage.

- The hot water store has only been used for the storage of potable water supplied from the public mains (Max – 200mg/litre chloride). And treated as detailed in the installation instructions.
- The water quality shall be in accordance with **European Council Directive 98/93 EC**, or revised version at the date of installation, and is not fed with water from a private supply. Particular:
 - Chloride content: Max. 200mg/l
 - Sulphate content: Max. 200mg/l
 - Combination chloride/sulphate: Max. 300mg/l (in total)
- It has not been subject to wrong or improper use, left uncared for, or subjected to scale or frost damage.
- In accordance with the **Building Regulations L1A: New Dwellings/ L1B: Existing Dwellings**, the requirements set out in the **Domestic Building Services Compliance Guide** specify that “where the mains water hardness exceeds 200ppm provision should be made to treat the feed water to water heaters and the hot water circuit of combination boilers to reduce the rate of accumulation of lime scale”.
- Where appropriate the unit has been serviced annually by a competent, licenced engineer in accordance with the requirement set out in the installation manual.
- The Commission Checklist Service Record included in our manual has been completed and updated after each annual service where required.
- Any disinfection has been carried out strictly in accordance with **BS 6700**.
- For heavy use installation where constant usage / reheat is required titanium immersion heaters should be fitted.
- Please note, defects caused by corrosion or scale deposits are not covered by any guarantee.
- Without prejudice to any other term, we shall not be liable for any water damage caused directly or indirectly as a result of any leak or other defect in the goods. We cannot control the conditions of use of the goods or the time or manner or location in which they will be installed and the purchaser agrees to be fully responsible for testing and checking all works which include the goods at all relevant times (up to, including and after commissioning) and for taking all necessary steps to identify any leaks and prevent any damage being caused thereby.

Please see our full Terms & Conditions on our website:

<https://www.mcdonaldwaterstorage.com/>

Ancillary Descriptions

The following spare parts are available to purchase from the Website, with additional information provided.

Follow the link below;

<https://www.mcdonaldwaterstorage.com/store/spares>

or phone the office on **(01592) 611123**.

Note that all listed Ancillaries are Standard Stock Spares. If the Calorifier requires a bespoke Ancillary, phone the office for further details.

Cold Water Control Packs	1 ¼" Cold Water Control Pack Includes Pressure Reducing Valve & Check Valve (WUCWP3)	
	1 ½" Cold Water Control Pack Includes Pressure Reducing Valve, Gauge & Check Valve (WUCWP4)	
	2" Cold Water Control Pack Includes Pressure Reducing Valve & Check Valve (WUCWP5)	
Thermostats	Control Thermostat Range 30 – 90°C (WNCT)	
	High Limit Thermostat Pre-set 80°C (WNHLT)	
Gauges	Pressure Gauge (WCPG)	
	Temperature Gauge (WCTG) (Vertical Probe)	
	Temperature Gauge (WCTGS) (Horizontal Probe)	

Expansion Vessels	50 Litre Expansion Vessel (WU50EV)	
	100 Litre Expansion Vessel (WU100EV)	
	200 Litre Expansion Vessel (WU200EV)	
	300 Litre Expansion Vessel (WU300EV)	
	80 Litre Flow Through Expansion Vessel (WU80FEV)	
	170 Litre Flow Through Expansion Vessel (WU170FEV)	
Safety Valves	¾" (DN20) Safety Valve (3.5 Bar) (WCSV35)	
	¾" (DN20) Safety Valve (4.5 Bar) (WCSV45)	
	¾" (DN20) Safety Valve (6.5 Bar) (WCSV65)	
Pressure & Temperature Relief Valves	¾" (DN20) PTRV (4.5 Bar) (WUVTP20-45)	
	¾" (DN20) PTRV (6.5 Bar) (WUVTP20-65)	
	1" (DN25) PTRV (3.4 Bar) (WUVTP1)	
Anti-Vacuum Valves	22mm Anti-Vacuum Valve (WUAVV)	
	1" Anti-Vacuum Valve (WUAVV1)	
De-Stratification Pump	½" De-Stratification Pump (WCDP)	
Immersion Heaters	Standard RX Immersion Heater 6kW (WIH6) 9kW (WIH9)	
	Heavy Duty WR Immersion Heater 6kW (WIH6WR) 9kW (WIH9WR) 12kW (WIH12WR)	
	Titanium Immersion Heater 6kW (WIH6T) 9kW (WIH9T)	

Servicing

It is recommended that the Hot Water system is serviced regularly and that an appropriate Service Record is completed. In the case of an Unvented model, the Calorifier should be serviced at least once a year by an appropriately **Qualified Engineer**. Failure to maintain this system in accordance with these instructions will invalidate the manufacturer's warranty.

Before completing any Service Record, please ensure the service has been carried out as described in the manufacturer's instructions, and the following service checks have been performed.

Pressure Reducing Valve:- Clean the mesh filter in the Pressure Reducing Valve. To do this, close the mains stopcock, remove the cartridge, clean and replace.

Immersion Heaters:- Check that the installed Immersion Heaters are working and the internal thermostat is controlling the water at the required temperature.

Safety Valve:- Manually open the by the lever (or twist cap) and check the water is discharged and runs clearly through the discharge pipework and out at the final discharge point. Ensure that the valve reseats/reseals itself.

Pressure & Temperature Relief Valve:- Repeat the previous procedure. Ensure that the valve reseats/reseals itself.

Expansion Vessel:- Check the Pressure via the Air Inlet (under the black cap) of the Vessel, whilst a hot tap is running. Ensure the pressure is as per product specification. If recharge required, close the mains stopcock and open a hot outlet. Connect a pump with gauge to the Air Inlet and charge to the same as the Pressure Reducing Valve.

Maintenance of other ancillaries (e.g. pumps, inhibitors etc.) must be carried out in accordance with the instructions supplied for these items by their respective manufacturers.

General O & M

Installation

- Foundations must be adequate to ensure that the unit will not settle and cause pipe strain or distortion of the shell.
- It is recommended that the heat exchanger be installed in a level position.
- In the case of the cylinders having removable tube bundles, it is necessary to ensure that ample room exists for withdrawing the bundle clear of shell.
- Tightening of bolts should be evenly distributed over flanges, each bolt being gradually tightened in succession.
- Distortion can occur to pipe connections during transit/handling especially extended types, if this does happen they can be straightened by insertion of a threaded pipe and pulling square.
- If a de-stratification pump set is fitted, the pipework and circulator may be supplied loose for fitting on site, (this is to avoid damage in transit). The pump should be installed to circulate water from the top of the cylinder to the bottom. Reference should be made to the manufacturers specific instructions.
- The unit should be flushed thoroughly with clean water prior to operation.

Operation

- Do not operate the equipment at pressures or temperatures or other conditions in excess of those specified on the nameplates or vessel marking.
- Open all vents to prevent air locking.
- Slowly introduce secondary fluid into the shell and when all spaces are filled, close cold vents and slowly raise to required operating pressure.
- Gradually admit the primary fluid into the exchanger and when all spaces are filled close vents and slowly allow the unit to reach operating temperature.
- In the event of the secondary operating pressure being higher than the primary pressure, the primary tubes must never be emptied exposing them to secondary pressure. This could result in collapse of the primary tubes.
- In the event of pulsations occurring under start-up conditions, reduce the fluid until pulsations disappear.
- Check that all gaskets are effective when unit is operating. If leaks are evident remove and tighten bolts as necessary.
- In steam vapour heated units, ensure that the vessel is drained of cold condensate before admitting hot vapour.
- Cylinders fitted with anti-stratification pump sets should have circulators wired to run continuously. Please refer to manufacturers instructions for further details.

Maintenance

- The shell should be periodically cleaned of all dirt and sludge and sterilised thereafter. Inspect internal surfaces for pitting and corrosion. All cleaning etc. to be carried out in accordance with current legislation.
- When draining vessels ensure an adequate secondary vent is provided, and that it is open to atmosphere prior to opening drain valve.
- The inside and outside surfaces of all tubes should be periodically inspected to ensure that the tubes are clean and the bores unblocked.
- Blocked tubes prevent fluid from circulating and can cause overheating resulting in extremes of expansion which can weaken the tube joints.
- Any gradual fall off in performance or increase in pressure indicates that:-
 - a. An air or vapour lock exists which can be rectified by cracking the vents.
 - b. A coating or scale deposit is present on the tube walls which prevents the effective transference of heat through the tubes. The thickness of the deposit is related to the actual loss of heat transmission.
- Inspection of the outside surface of a fixed coil can be through the inspection opening (where fitted) or by removal through the bolted end (where fitted).
- To gain access to the tubes of a removable battery reduce all pressures and drain all fluids from the units, (open all vents and drain cocks). Remove header to expose tubes and tubeplates. It is advisable to mark all relative positions of covers, etc, to ensure correct reassembly. Inspect tube joints and tubeplates for leaks.
- By removal of the bundle or through the inspection opening (where fitted) inspect all tubes for deterioration/leakage. Pressure test if visual inspection does not highlight fractures.
- Leaks between tubes and tube-plates may be effectively sealed by releasing the pressure in the shell and lightly expanding the defective tube. Do not apply undue pressure when expanding and do not attempt to re-expand tubes which are not leaking. Always use roller type expanders.
- Great care should be taken where facilities exist for removing tube bundles from shells since it is important that no distortion or damage is caused by careless or improper handling. When withdrawing or handling the tube bundle do not use hooks or similar tools as these are liable to cause damage to the tube. Avoid damaging gasket seating surfaces of flanges. When lifting bundle horizontally, always ensure even distribution of weight along the length. The withdrawn bundle is to be entirely supported by the tube plate and support plates resting on wooden blocks cut to fit the curvature of the bundle, under no circumstances allow the tube bundle to be supported on the tubes. Take great care not to bend or distort baffles in any way as they are a close fit in the shell and if the clearance is increased, the performance of the unit will be seriously affected.
- Methods of cleaning tube deposits includes:-
 - a. Mechanical means involving brushes and scrapers. Care should be taken not to cut into metal surfaces.
 - b. Chemical cleaning using acid solution containing inhibitors.
 - c. Water soluble deposits are best removed by circulation of hot fresh wash or condensate.
 - d. Soft deposits can be removed by rapid circulating of hot wash oil or solvent.
- Do not blow steam through single tubes since this may cause the tube to expand and disrupt the tube joint.
- Do not blow air through units when fluids normally circulating are of an inflammable nature.
- It is recommended that a complete new set of gaskets be fitted when re-assembling the heat exchanger, bolted head or inspection opening.
- After reassembly, the unit may be hydraulically tested up to pressures shown on the nameplate, although a visual inspection at working conditions may suffice.
- For details of cylinders fitted with de-stratification pump sets, refer to the manufacturer's instructions.



McDonald Water Storage

Hot Water Storage Solutions

**Queensway Industrial Estate
Glenrothes
Fife
KY7 5QF**

Tel: (01592) 611123

Fax: (01592) 611166

Email: sales@mcdonaldwaterstorage.com



The HWA Charter Statement requires that all members adhere to the following:

- To supply fit for purpose products clearly and honestly described
- To supply products that meet or exceed appropriate standards and building and water regulations
- To provide pre and post technical support
- To provide clear and concise warranty details to customers