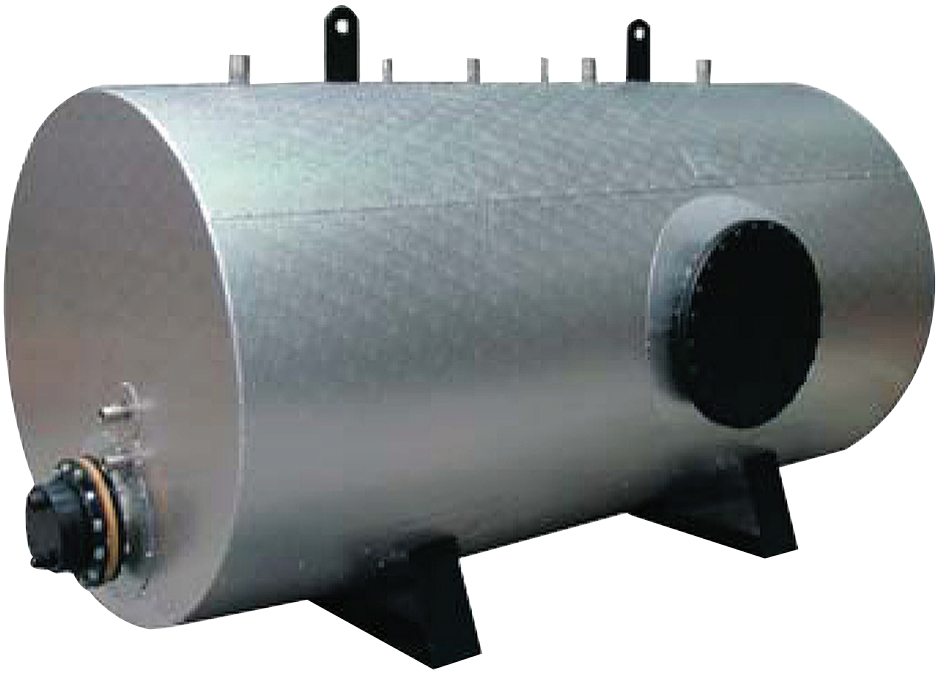
Ormandy Rycroft

Heating & Cooling Solutions



AquaCal

DHW Storage Calorifiers

Operating & Instruction Manual

Standard Storage Capacities - 300 to 10,000 litres

1. Description

The standard range of AquaCAL storage calorifiers (Calorifiers fitted with a removable heat exchanger) are mostly used in domestic hot water systems. In the majority of applications, the primary medium is LTHW (82/71°C) although the primary heat source may be supplied from MTHW & HTHW mediums.

Other applications may arise with different water temperatures and materials of construction. This manual covers stainless steel and copper vessels.

Specific Design Data.

Maximum Secondary Working Pressure:	**As design data**
Secondary Hydraulic Test Pressure:	**As design data**
Maximum Secondary Working Temperature:	**As design data**
Maximum Primary Working Pressure:	**As design data**
Primary Hydraulic Test Pressure:	**As design data**
Maximum Primary Working Temperature:	**As design data**
Design Code:	**HCS & PED 1999 (SI 1999-2001) Cat: SEP**

1. PED Information

The standard ranges of AquaCAL units are designed in accordance with the requirements of the Pressure Equipment Directive 97/23/EC, with the primary medium up to a maximum temperature of 110°C.

Units classed as SEP in the PED category are not supplied with a CE mark. Units in category I & II are CE marked and appropriate markings and certification is supplied with each unit.

It is the responsibility of the user and/or installer to ensure that the unit is installed and operated safely, and in accordance with the instructions supplied within this manual. The standard AquaCAL unit is designed for a water medium in the shell.

3. Installation

3.1 Lifting & Handling

- Use lifting lugs where fitted.
- Do not lift a vessel using the insulation (where fitted).
- Straps may crush or damage the insulation casing.
- Due to the insulation casing material thickness, care should be taken when moving and handling the vessel not to damage the insulation.
- Do not lift the vessel using chains directly in contact with the shell.
- Do not allow operatives to stand on the vessel.

3.2 Siting

- Unless specifically ordered for an external installation, the vessel must be sited indoors.
- Foundations or plinths must be firm and level to prevent settling, pipe strain or distortion of the shell.
- Unless specifically ordered differently, the vessel must be installed in a level position.
- Protective covers and plugs may be fitted to connections to protect them in transit.
- These must be removed prior to use.
- If a connection is not required, seal it appropriately.
- Check for any foreign material which may have got into the vessel.
- Pipe-work connected to the vessel must be adequately supported to prevent any loads being transmitted to the vessel.
- Provide for thermal expansion with bends and expansion joints. Fit isolation valves prior to the vessel connections to facilitate servicing (NOT TO THE VENT).
- For flanged connections, tighten bolts in a diametrically opposite sequence, to load the flanges evenly onto the gasket.
- Ensure adequate venting for air removal during filling and operation. (Pressurised systems should have an automatic air vent and a manual air vent for this).
- Safety valves should have their discharge pipes away to a safe disposal point, via an air- break and tundish, so that the discharge is unrestricted and easily visible.
- Water expansion must be accommodated by a separate expansion vessel fitted in the system.

3.3 Destratification Pumpset (where applicable)

To avoid damage in transit, the pipe-work and pump of a de-stratification set (if included) may be supplied loose for fitting on site. The pump should be installed to circulate water from the top of the cylinder to the bottom.

To ensure that the anti-stratification pump does not adversely affect performance of the calorifier during peak demand periods, the power supply to the pump should be timed to come on during periods of low demand if possible, but often enough to guarantee heating the calorifier contents fully for a period of at least 1 hour per day.

The unit should be flushed thoroughly with clean water prior to operation.

3.4 Immersion Heaters (where applicable)

The immersion heaters are tested before leaving the factory and are ready for installation. The immersion heaters are thoroughly dried prior to dispatch but moisture may collect in the heater during transit or site storage.

It is important that prior to connecting the heaters to the mains, an insulation test must be made across each element to earth. If the insulation resistance is less than 50,000 Ohms, the heaters must be dried out prior to connection. This can be done by placing the heaters in a low temperature oven or by passing a low voltage (maximum of 25% of the working voltage) through the elements in open air to a maximum temperature of 60°C.

The heaters should be switched off at regular intervals to prevent overheating.

For further instructions on the immersion heater, refer to separate literature.

3.5 Control Panel (where applicable)

Prior to commissioning and wiring to the immersion heaters, check all the control circuitry and main circuit connections are tight, using the appropriate tools.

Remove all loose items from inside the panel and other items that may be fastened to the cables.

The equipment must be connected to a suitable power supply in accordance with local regulations and the wiring diagram supplied. For units supplied without a factory fitted control panel the installer must ensure that thermostat maximum current is not exceeded. In most cases this will mean using suitable contactors to send power to the electric immersion heater elements.

Important Notes:

To avoid damage to the electric immersion heater elements, do not allow electric immersion heaters to be run dry.

Insulated vessels – When filling/in operation, take extra care to avoid any spillages or leaks from the connections - particularly top connections.

Any water between the insulated jacket and the shell will void any warranties as severe corrosion is likely. We will not take responsibility for any corrosion due to water ingress between shell and jacket.

Un-Insulated Stainless Steel Vessels:

Prior to insulation by others it is essential, for mineral wool insulation applications, that the vessel is wrapped with Aluminium foil prior to matting.

Mineral wool reacts with Stainless steel and can cause severe corrosion. Warranties will be void if Aluminium foil is missing.

4. Commissioning & Operation

Do not operate the equipment at pressures or temperatures in excess of those specified on the nameplate of the vessel marking.

Do not subject the equipment to conditions of vacuum or partial vacuum. This is particularly vital for copper-lined steel calorifiers, which are supplied complete with anti- vacuum valve - which must not be removed. For example: partial vacuum can be caused if the cold feed or the vent are restricted during draw off or drain down.

It is assumed here that the secondary pipe-work is already full of water.

For sealed systems it is assumed here that any cold water booster set and/or pressure reducing valve is already commissioned and set to the correct pressure.

1. Start with primary, secondary flow, return and cold feed valves closed, anti-stratification and secondary re-circulation pumps off.
2. Close the drain valve
3. For sealed systems ensure auto-air vent is operational
4. For sealed systems open manual vent valves
5. For sealed systems open expansion vessel isolation valve
6. Open the cold feed valve and slowly fill the calorifier with cold water
7. For sealed systems when water reaches the manual vent valve, close it
8. When the calorifier is full slowly introduce the hot fluid to the tube bundle.
9. Allow the unit to heat up.
10. Adjust the temperature control gradually and ensure that the correct operating temperature is maintained by it.
11. If the calorifier is open vented and shares a vent with other calorifiers, connect it to the common vent using the 3-way valve
12. Carefully open the secondary flow and return valves
13. Open anti-stratification pump isolation valves
14. Switch anti-stratification and secondary re-circulation pumps' power on

Important Notes:

Check that all gaskets are effective when the unit is operating - some bolt tightening may be necessary after the unit has been first heated and subsequently from time to time.

Following installation and commissioning it is advisable to remove, clean and re-assemble any strainers.

All fluids must be drained when the unit is out of operation to prevent freezing or possible corrosion.

5. Maintenance

The AquaCAL is designed to operate efficiently with a minimum of attention. A regular maintenance program will ensure continued high operating efficiency and trouble-free operation. Annual maintenance should include cleaning debris from the base of the calorifier to comply with guidelines on prevention of legionella bacteria proliferation. Also the site insurers may require annual inspection of heat exchanger and calorifier shell condition.

GENERAL POINTS:

Do not blow steam through single tubes - this will cause the tube to expand and disrupt the tube joint. Do not blow air through tubes if they may contain inflammable fluids (explosion hazard). It is recommended that a set of gaskets be carried for use when the unit is stripped down for insurance inspection, or cleaning.

Maintenance of the pump and other ancillary equipment should be carried out in accordance with the instructions supplied for these items by their respective manufacturers. Copies of these are included with these instructions. If a loss of performance or increase in primary pressure drop has been observed, the following are possible causes:

- Primary fluid restriction (blocked strainer, faulty control valve etc.)
- Air lock on primary side
- Scale deposits on the heat exchanger surfaces (primary or secondary side). This can severely affect heat transfer rates.

Check the thermostats every 12 months by removing and testing the contact resistance and comparing the switch point by immersion in hot water using a separate thermostat.

To drain the AquaCAL calorifier down (secondary side)

It is recommended that you first obtain a complete set of replacement gaskets. It is assumed that all isolation valves (except drain) are open at the start.

1. Isolate the primary fluid inlet and outlet - switch off primary pump and boilers if necessary.
2. Switch off secondary system return pump and isolate secondary return to calorifier.
3. Isolate the secondary flow.
4. Isolate the cold feed.
5. In sealed systems, reduce residual calorifier pressure by manually operating the safety valve. Some hot water will come out.
6. For sealed systems open a manual vent valve to allow air in during drain-down.
7. For copper-lined steel calorifiers ensure that the anti-vacuum valve is not stuck shut - also ensure that a vent is available at the top of the calorifier of flow area at least one half the flow area of the drain connection. Remove one of the fittings on the top of the calorifier if necessary to achieve this. Partial vacuum, caused by inadequate venting of copper-lined calorifiers during drain-down, will cause damage to the thin copper lining.
8. If the calorifier is open vented and shares a vent with other calorifiers, isolate it from the common vent using the 3 way valve (it will now vent to atmosphere).
9. If the calorifier is open vented and shares a vent with other calorifiers, isolate it from the common vent using the 3 way valve (it will now vent to atmosphere).
10. Pipe the drain to a drain point and open the drain valve.
11. The AquaCAL calorifier shell internal condition can be inspected by removing the inspection cover to allow visual examination.
12. Re-fit new gaskets and re-fill the calorifier according to the commissioning instructions above.

Important Notes:
Constant circulation through the AquaCAL heat exchanger minimises fouling. However, a clean heater gives maximum efficiency and capacity, and it is much easier to clean tubes with a light coat of scale, than it is to clean tubes which have been permitted to get excessively fouled. The Aqua-Velox should be cleaned periodically to ensure maximum efficiency.

Higher operating temperatures cause scale to accumulate in the heat exchanger more quickly than lower temperatures. Hard untreated water causes much faster scale accumulation than treated soft water. Cleaning frequency will be determined by experience

CLEANING THE HEAT EXCHANGER (SECONDARY SIDE):

Because U-tube bundles are fairly tightly packed, chemical cleaning, e.g. using a mild acid solution containing inhibitors, will generally give the best results. Take care that the chemicals used will not cause any adverse or hazardous reaction with the materials of the tube bundle or the deposits being cleaned.

1. Drain as above
2. Allow primary pipe-work to cool to a safe temperature
   a) Cleaning In Place (CIP)
3. Disconnect and remove the integral circulation pump and the secondary pipework above the heat exchanger.
4. Take care not to damage any control capillary tubes.
5. Connect CIP hoses directly to the heat exchanger and circulate cleaning chemicals as necessary.
6. Do not exceed normal heat exchanger flow-rate by more than 50%.
7. Fully remove all traces of cleaning chemicals by flushing with fresh water after the CIP process.
   b) If the heat exchanger tube bundle is to be removed for chemical cleaning
8. Disconnect primary pipe-work and remove primary header.
9. The tube bundle may be heavy, ensure that adequate facilities are available to withdraw the bundle without distortion or damage.
10. Avoid damaging surfaces of flanges.
11. When lifting or working on the tube bundle support it by the tubeplates and the support plates - ideally
12. on wooden blocks cut to fit the curvature of the tube bundle.
13. The tube bundle must not be supported on the tubes. Do not bend or distort supports and baffles
14. Re-fit the tube bundle using new gaskets and re-fill the calorifier. Check all gaskets and joints for signs of leaks

6. Spares

Please contact HRS Hevac Ltd regarding spares. We recommend as a minimum a set of heater gaskets and an inspection opening gasket be kept as spares.

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