

# Installation, Operation and Maintenance Instructions

Electric Storage Calorifier

## OM004 (Export)



*The operating and maintenance instructions contained within this package are for standard electric storage calorifiers (vessels fitted with an electric immersion heater). Please refer to separate instructions for standard calorifiers, indirect cylinders and direct cylinders. Please note that an electronic version of these instructions is available from our website. Please contact our sales office for further information.*

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## 1.0 Standard Unit Information & Description

The standard range of electric storage calorifiers range from 230 litres to 9000 litres. These are mostly used in systems to heat domestic hot water. The water is heated by an electric immersion heater. Other applications may also arise with different water temperatures and materials of construction. A choice of materials of construction is available.

Depending on the scope of the order the unit may be supplied complete with Ancillary Mountings (Thermometer, Altitude Gauge, Safety Valve & Drain Valve). Some or all of these items may be supplied loose with the unit to be fitted on site.

Units with copper -lined steel vessels will always be supplied with an anti-vacuum valve connection. This is an essential safe-guard. Vacuum will damage the thin copper lining.

The General Assembly drawing specific to each unit gives details. In any case some or all of the above items must be fitted to give safe and satisfactory operation.

| Standard Material Options Schedule |  |
|------------------------------------|--|
| Shell                              | Copper (CS)<br>Copper-Lined Steel (CL)<br>Galvanised Steel (GS)<br>Stainless Steel (SS)<br>Glass-Line Steel (PG) |
| (Other materials on request)       |  |

| Vessel Design Data       | Shell Side                |
|--------------------------|---------------------------|
| Maximum Working Pressure | Refer to Vessel Nameplate |
| Hydraulic Test Pressure  | Refer to Vessel Nameplate |
| Design Code              | Refer to Vessel Nameplate |

Please refer to our brochure for standard connection and dimensional data.

## 2.0 PED Information

The standard range of Electric Storage Calorifier are designed in accordance with the requirements of the Pressure Equipment Directive 2014/68/EU. Units classed as SEP in the PED category are not supplied with a CE mark. Units in category 1 and above are CE marked. 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, in accordance with the instructions supplied within this manual.

## 3.0 Installation

**Lifting & Handling:** Use lifting eyes where fitted. Do not lift a Calorifier using the insulation (if fitted). Straps may crush the insulation. The shell of the Calorifier may be made of relatively light gauge metal and care should be exercised when handling and moving the unit not to damage the shell. Do not lift the Calorifier using chains directly in contact with the shell. Do not allow operatives to stand on the Calorifier.

**Siting:** Unless specifically ordered for outside siting the Calorifier must be sited indoors. Foundations must be firm and level to prevent settling, pipe strain or distortion of the Calorifier. Unless specifically ordered differently, the Calorifier should be installed in a level position. For calorifiers with removable tube bundles, ensure enough room exists to withdraw the bundle from the shell. For calorifiers with inspection openings ensure enough room exists to gain access to the opening.

**Installation:** Protective covers/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 and remove any foreign material which may have got into the vessel. Pipe-work connected to the Calorifier should be supported to prevent loads being transmitted to the Calorifier. Provide for thermal expansion with bends and expansion joints. To avoid corrosion do not use copper pipework with galvanised steel calorifiers or vice-versa. Fit isolation valves prior to Calorifier 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. For screwed connections use a thread sealant approved for use with potable water by the local water authority. Ensure that the tube bundle can be isolated and easily disconnected for removal during maintenance. The vent must not be blocked so, if the unit may need to be isolated from the vent, fit a 3-way vent valve. Ensure adequate venting for air removal during filling and operation ("sealed" systems should have an auto-air-vent and a manual air vent valve for this). Pressure and temperature relief valves (and bursting discs if fitted) should have their outlets piped away to a safe disposal point, preferably via an air-break and Tundish so that discharge is unrestricted and easily visible. Water expansion must be accommodated by separate expansion vessel on the cold feed side (on sealed systems) or via the vent pipe on vented systems. Allowing expanded water back into the cold feed tank on vented systems is not recommended as the resultant warm water will encourage bacterial growth.

### De-stratification Pump-set

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.

### **Immersion Heaters**

The immersion heaters are tested before leaving the factory and are ready for installation. The immersion heaters are thoroughly dried prior to despatch 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

### **Control Panel**

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.

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

## **4.0 Commissioning and Operation**

Do not operate the equipment at pressures or temperatures in excess of those specified on the GMS nameplate attached to the Calorifier. Do not subject the equipment to conditions of vacuum or partial vacuum. 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 pipework 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.

Start with primary, secondary flow, return and cold feed valves closed, anti-stratification and secondary re-circulation pumps off.

Close the drain valve.

For sealed systems ensure auto-air vent is operational

For sealed systems open manual vent valves

For sealed systems open expansion vessel isolation valve

Open the cold feed valve and slowly fill the Calorifier with cold water.

For sealed systems when water reaches the manual vent valve, close it.

When the Calorifier is full, power up the immersion heater. Allow the unit to heat up.

If the Calorifier is open vented and shares a vent with other calorifiers, connect it to the common vent using the 3-way valve

Carefully open the secondary flow and return valves

Open anti-stratification pump isolation valves

Switch anti-stratification and secondary re-circulation pumps' power on

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.

## 5.0 Maintenance

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 the immersion heater and shell condition.

If a loss of performance or increase in primary pressure drop has been observed the following are possible causes:-

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

To drain the Calorifier down (secondary side)

Obtain a complete set of replacement gaskets from GMS Thermal Products Ltd.

It is assumed here that all isolation valves (except drain) are open at the start.

Power down the immersion heater and control panel.

Switch off the secondary system return pump and isolate secondary return to Calorifier.

Switch off anti-stratification pump power.

Isolate the secondary flow

Isolate the cold feed

For sealed systems reduce the residual Calorifier pressure by manually operating the safety valve - some hot water will come out

For sealed systems open the manual vent valve to allow air in during drain-down

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. 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).

Pipe the drain to a drain point and open the drain valve.

The Calorifier shell internal condition can be inspected by removing the inspection cover or the immersion heater to allow visual examination.

Re-fit new gaskets and re-fill the Calorifier according to the commissioning instructions above.

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.

## **6.0 End of Life Disassembly, Recycling & Disposal**

Please consult the general assembly drawing and product data sheets of the supplied unit for specific information regarding the materials used. Dispose of all material responsibly and in accordance with all local regulations. For more information, please contact the GMS Technical Team on 01457 835 700.

## **7.0 Recommended Spares**

The recommended spares for the Electric Storage Calorifier are;

- Inspection Opening Gasket
- Immersion Heater Gasket
- Immersion Heater Elements (if applicable)

Please contact our sales department for recommended spares prices and availability.