McCallum Water Heating Operating and Maintenance Instructions

A General Guide for Storage Calorifiers

Application

McCallum calorifiers, , depending on their specification, are mainly intended for water heating in commercial, industrial, educational and hospital type installations. The calorifiers can be either vertical or horizontal and are designed to use primary sources of heat such as hot water, steam or electricity. Each cylinder is fitted with an identification plate, which gives the parameters of the design of the unit.

Construction

The cylinders are constructed from copper, stainless steel, mild steel or cupro nickel sheet depending on individual customer requirements but are mostly constructed from copper sheet C 106. The pipework connections utilised on the unit are of copper, brass or stainless steel to suit the design and unit requirements. Inspection accesses are fitted to most cylinders. Where the primary heat in the cylinder is transferred through a tube bundle, this is generally constructed from finned copper tube, a brass tube plate and cast iron header or nest. Every vertical calorifier comes with a fitted base ring or supporting legs and a horizontal calorifier will be supplied with loose cradles. Cylinders will be supplied either un-insulated or insulated with either foam or fibre material with a metal cladding or flexible coat. Cylinders are manufactured from a client approved works drawing.

Delivery

Cylinders are generally delivered on transport without craneage facilities unless specifically requested. Great care should be exercised when off loading cylinders. A considerable weight factor is involved with some larger cylinders. Lifting eyes are fitted to certain cylinders to facilitate off loading. Chains should not be used when off loading units. Straps may be used when the unit is not fitted with metal clad type insulation. Ensure that vertical cylinders are transported in an upright position where possible. If it is necessary to transport the unit horizontally it is preferable to remove the battery. The weight of any individual cylinder can be provided on request to assist with off loading and positioning.

Installation

Ensure that the base area which has been allocated to the cylinder is level and free from obstructions. For horizontal calorifiers pay special attention to the position of the cradles that they do not interfere with any connections on the cylinder or any adjacent services or pipework. Always make sure that there is room around the cylinder to allow for access to the manhole if fitted and for withdrawal of the tube bundle. When the unit is in final position make sure that the above precautions have been taken, that the unit is stable and that the cylinder connections are aligned to those for the supply, flow etc. From the manufacturer's drawing all connections should be identifiable. Please ensure that all the connections are used for the purpose intended as shown on the drawing for the unit. Connections will be of the screwed or flanged type. PTFE tape on secondary & hemp/paste on primarys may be used for fittings where the cylinder connection is of the screwed type and the male thread is tapered, parallel type threads will require a back nut and jointing ring.

We would ask that all pipework is connected up using good procedures and by persons suitably qualified or experienced in work of this nature. Two spanners should be used when joining screwed type connections. Avoid the use of unnecessary torque, use correct bolting procedures, and keeping flanges square. When a system is used that incorporates an expansion vessel supplied by us the complete unit may come pre-assembled and mounted on a skid platform. If the expansion vessel is supplied loose with the necessary pipework to complete the connection to the calorifier please follow the drawing detailing the positioning of the items of pipework. If the expansion vessel is not supplied by us or is supplied by us but with no fittings, and calorifier is to be part of that system, please ensure that the items are connected up correctly. Do not allow the calorifiers to support any external weight by making sure all pipework is supported by means of individual pipe supports not fixed to the calorifier. Please check that all the combinations of materials are compatible avoiding the use of copper and galvanised steel.

Start Up

Care must be taken when filling the cylinder. Ensure the drain to the cylinder is closed and air vents are open. Always fill the cylinder slowly to prevent any air becoming trapped. The cylinder is designed to operate at a specific pressure. If air is trapped, there is a risk that shock waves will be produced when air is subsequently released and accordingly the pressure in the cylinder may exceed its design criteria. Also exercise care when filling the primary system, fill slowly and ensure no trapped air is in the system. Always make sure the primary system is clean by flushing out before the control valve is fitted. Once satisfied that the system is ready to fill, close the air vents and run the circulating pumps ensuring that any air created by the movement of the water is vented. When the cylinder is filled check all connections, flanges, bolts etc for any evidence of leaks or seepage. Check for stability of the installation.

Testing & Running

It is worth considering before running commences several points that can influence the efficiency of the cylinder during its operation. The control valve will have to be adjusted carefully to allow the unit to settle to the required water temperature. The inlet temperature on the primary system to the unit together with the flow rate of the primary supply must be checked to operate within the design parameters. Make sure that you are familiar with all pressures and design parameters as shown on the manufacturer's plate. Constantly check for any signs, changes or increases in pressures. On the first start up always bring the thermostatically operated control valve to the correct temperature and ensure that it will maintain this temperature. Raising the temperature slowly till the correct temperature is achieved will assist in the process. With steam as the primary source of heat several things can occur during running. If air is still contained in the tubes the steam will not reach the unit and heat up will not take place. Similarly with low pressure steam in the primary system and the unit starting from cold, a complete loss of pressure may occur in the tube bundle and the battery tubes will become flooded with condensate. A larger steam valve suitable for overload conditions may be fitted to help eliminate this problem should it occur. With the use of steam as a primary source, steam hammer can sometimes be heard. It is usually a sign of trapped air which needs venting. Surface boiling on the tubes can occur when high temperature hot water is the primary source. A crackling sound in the tubes is a sign of this. It can usually be eliminated by increasing the secondary flow or working head. If you need to check recovery times of the unit once installed on site, we must stress that it is difficult to test accurately in such conditions. However the procedure would be as follows: isolate the secondary return, ensure there is no flow from the secondary outlet, maintain the primary flow and temperature valve at their

Servicing/Inspection

Generally calorifiers should produce very few problems in the course of their life. However there are steps we would recommend to our customers to ensure their satisfaction with the unit and its fittings throughout its operational usage. After several months in commission we would recommend that you carry out an internal inspection first by isolating and draining down the cylinder and removing the inspection access cover. Look for any signs of corrosion or scaling on the surface of the battery, throughout the internals of the unit, and on the internals looks clear it is likely that annual inspections would be sufficient. However there is we would be sufficient. However, there is evidence of scaling or corrosion and everything on the internals looks clear it is likely that annual inspections would be sufficient. However, Please check with a specialist as to what the cause may be. If the cylinder has been fitted with an anode check its condition. At the first initial inspection plate and refill the unit and system slowly as per instructions. Annual checks should be made for corrosion, scaling and silt and cleaned out if necessary. If it is felt necessary to remove the tube bundle for cleaning or inspection please consider the following points: The weight of the header and tube bundle may be considerable so ensure facilities are available for supporting the unit as they are withdrawn. Unbolt the header and remove. Ensure no obstructions either internally in the unit or externally will hinder removal of the tube bundle. Ease the tube plate off the battery from the cylinder. Remember the weight may be considerable and it must be supported throughout to allow a horizontal withdrawal. Care must be taken at this stage. Note the position of the hairpins as the battery is being withdrawn i.e. vertical or horizontal as this is critical when re-installing the battery. When the battery is removed check its overall conditions.

If required the battery can be manually cleaned or chemically cleaned. If you clean the unit chemically make sure that you use the correct cleaning agent suitable for the materials of the tubes and that all traces of the cleaning agent are removed before replacing the battery. Again if you encounter corrosion please check with a specialist in corrosion analysis. Always take the chance of inspecting the anode if fitted and where it is of a sacrificial type, replace if required. Check all the fittings on the cylinder for their general condition. Check the unit for any signs of leakage and that the insulation is in good condition. It is also important to check the condition of safety equipment fitted to the calorifier; are bursting discs still fitted and in good order, do valves look in clean and good condition, is the manufacturer's plate still intact? To refit the battery ensure that the alignment of the tubes will be the same as it was when they were withdrawn. Make sure all flange faces are clean and new jointing material is available. Gently ease the battery into the unit again making sure it is supported throughout and entered to the unit without undue force. Remember , when fitting the header or chest that the centre bar of the header is correctly aligned to the tube plate. Tighten all bolts diametrically opposite one another. When the complete unit is reassembled the system can again be filled in the usual manner. Check the operation / setting of the safety valve when the unit is empty by using a hydraulic test or if the cylinder is full and the valve fitted, by increasing the unit working pressure to the valve set pressure. It is important to check that the valve will rise on the set pressure and then return and seat correctly when the pressure is reduced. If this does not happen there could be some dirt below the seating. Operate the valve again means of the easing lever and check for correct re-seating. Should any problems be encountered with the valves it is imperative that they be replaced or returned to the valve manufacturer for servicing. Please remember that safety equipment is critical in the operation of the installation and every attention should be paid to its condition. A check should also be made that the unit is operating within its design parameters and correct temperatures are being achieved and correct working pressures being maintained. It is always worthwhile ensuring good quality fittings are used in conjunction with the cylinder. Regular inspections and maintenance should assist in achieving an efficient working output from the cylinder.

For Cylinders fitted with Electrical Equipment

When a cylinder is fitted with an immersion heater as an additional primary source of heating or is completely supplied with electric immersion heaters and control panels, operating and maintenance instructions will be supplied for the electrical equipment by the manufacturers of that equipment. These instructions should be read in conjunction with the cylinder manufacturer's instructions. Always check when installing an electric calorifier that provision has been made for, and that the unit will be fitted with, a High Limit Cut Out to monitor any risk of damage through overheating. It cannot be over emphasised that all safety precautions must be taken when installing electrical equipment and that any such installation be carried out by a qualified or experienced person.

Please ensure that all safety precautions are taken when installing, maintaining and servicing this item of equipment.

A brief condensed check list is included which read with these instructions we hope will assist in the operation the unit.

For any further assistance relating to the unit please contact the manufacturer quoting the reference numbers obtained from the calorifier identification plate.

Some Points worth Checking: To be read in conjunction with the Operating and Maintenance Instructions.

- Do not use chains for off loading cylinders. •
- Do not use straps for off loading cylinders fitted with metal clad insulation. •
- Always ensure the unit is positioned on a sound level base and can cause no obstruction to passageways or other items of plant.
- The unit must be correctly aligned. .
- Identify all connections on the cylinder from the manufacturer's drawing.
- The diameter of the feed pipe to the cylinder is equal to, or greater than, the diameter of the secondary flow pipe.
- The design parameters of the unit are noted from the nameplate and must not be exceeded during operation.
- Have you, in your possession, operating and maintenance instructions for any ancillary equipment that is supplied with, or fitted to, the unit?
- No restrictions should occur on the supply pipework.
- With a vented system, ensure that there is a vent to the atmosphere at the highest point of the system.
- No isolating valve should be fitted to the vent pipe.
- All materials utilised in the installation should be compatible; avoid the incompatibility of copper and galvanised steel. •
- Make sure the primary system is vented.
- If your system is pressurised it should incorporate an automatic air vent. •
- Should no provision have been made for an atmospheric vent, a correctly sized and fitted expansion vessel should be included in the system, complete with all valves.
- Do not use unnecessary torque when tightening connections and use two spanners when tightening screwed type connections.
- Ensure good practice is used in the tightening of bolted joints i.e. tighten bolts in a diametrically opposite sequence and not consecutively round the flange.
- Flanges must be fitted square.
- Always ensure that gauges, where fitted, are easily readable.
- Do not allow the unit to be subjected to additional loads; ensuring that all pipework is supported by external supports.
- The safety valve should be fitted directly to the cylinder and in a vertical configuration to ensure no obstruction or other item can be fitted between the calorifier and safety valve.
- Any discharge pipe from a safety valve or bursting disc is constructed in a downward direction only, from the valve or disc and should be directed clear of the • unit to a suitable drainage area and in a manner which will prevent injury from the discharge but still be a visible indication of a failure.
- When a bursting disc is required to be fitted, ensure that the disc manufacturer's instructions are complied with in the fitting process. •
- Always ensure that the disc, where supplied with the unit or is required to be fitted, is actually fitted.
- An anti vacuum valve must be fitted to all cylinders of steel construction having a copper lining or constructed from light gauge copper.
- Ensure that all connections on the cylinder have been connected to or fitted with the correct supplies or fittings as per the manufacturers drawing.
- Always check that the connections on insulated cylinders are as per the manufacturer's drawing.
- Fittings for all steam-heated calorifiers are correctly sized and positioned correctly for their application.
- When a steam trap is fitted it is likely to have an automatic air vent but if the system contains a lengthy steam line an additional vent may be useful.
- Ensure the primary system is flushed and clean before filling and fitting the control valve.
- Before filling, always ensure the drain is shut and vents are open. •
- Always ensure that the primary and secondary systems are filled slowly.
- Check for any leaks after filling.
- When draining the cylinder always make sure that there is no risk of implosion through incorrect venting.
- On removing the tube bundle, during servicing, ensure that the bundle is properly supported.
- When removing the tube bundle note carefully the position of the tubes, i.e. vertical or horizontal.
- Any electrical equipment should be fitted as per the equipment's manufacturer and installed by a qualified person.
- Please ensure, where possible, that any electric controls in the system will be fail safe.
- A separate High Limit Cut Out has been fitted if the unit is heated only by immersion heater/s.
- Carry out regular inspections of the unit and keep it in good condition throughout its operational life.
- McCallum calorifiers are generally designed to work on low temperature hot water, 82 71 Degrees C, on the primary system and to raise to cold water contents from 10 - 65 Degrees C in a specified time: details as per the manufacturer's plate.
- Please note that there may be mandatory regulations in your local Building Regulations, which apply to unvented systems and these should be checked.
- Operating and Maintenance Instructions are available for other types of calorifiers.
- Annual inspection & cleaning if necessary as in line with legionella recommendations.

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