DESIGN AND CARE OF CLOSED HYDRONIC SYSTEMS | TECHNICAL DATA

File No: 10.450
Date: NOVEMBER 27, 2019
Supersedes: 10.450
Date: OCTOBER 25, 2019

FLEXIBILITY OF HYDRONICS

Hydronic systems for hot water heating, cooling or for combination heating-cooling are now universally accepted for buildings of every size and type.

Piping layouts may be arranged in elementary circuits, in zones or sections, in primary and secondary circuits, in vertical or horizontal risers to suit high rise buildings, or wide spread arrangements. This flexibility of layout design and the wide ranges of operating water temperatures available to the designer and the operator have contributed to the present hydronic acceptance and popularity.

NEW SYSTEMS - IMPORTANCE OF INITIAL DESIGNS

The design, installation and care of hydronic systems is not at all difficult and started in the initial design provides that extra bit of success that results in satisfied users. To gain that **extra** from this type of system, it is wise to arrange the location of the pumping equipment and its connected piping layout in such a way as to obtain good hydraulic function with attendant quiet operation. Various manuals are available to assist designers in this useful work just follow a few of the recognized good principles and you can do almost anything you want to with hydronic systems.

1 CLEANING NEW HYDRONIC SYSTEM

Handling piping and equipment with care during installation will reduce the cleaning problems that may come on start up. Cinders, sand and all foreign materials on the job site should be prevented from entering wherever possible; they don't do any good in a system and can do plenty of harm.

Initial washing out at fill time handled with a little extra attention will result in improved operation. Merely filling from the bottom up leaves foreign material in the system. Filling and then draining with a vent or vents at the top of the system open will wash out much of the foreign material.

Better still on high system of considerable size flushing out of loose foreign material can be ideally accomplished by connecting a water supply or fill hose to several places at the top of the system or part way up, and leaving the system open letting water run or tumble down through the piping.

On systems in large low buildings water run in at three or four locations will wash through to the drain. On a large system drain off should be large enough, at least 1" pipe size, to let the water flow through with considerable velocity and preferably there should be several, used successively around the system.

2 CLEANING CHEMICALS

The size and type of system will suggest to some extent what cleaning is required and whether detergent or boiling out compounds should be used. In housing developments, where the installation is quickly completed, especially with prefabricated materials such as copper tubing with formed turns rather than elbows, where little soldering is used and piping is kept clean right from the start little or no washing out is needed.

In large installations, particularly where steel pipe is used or where pipe is fabricated by welding mill scale and rust from the inside of the pipe and foreign material from the job site welding slag, etc. , are present, boiling out compounds are needed to loosen scale, rust, etc. and float it down to the bottom of the system where it can be drained off. Preliminary flushing by running clear water down through the system will clean out a large part of the loose material, but scale and mud may need additional attention.

The actual procedure will depend on the type of installation material used size of job care used during installation. It is recommended that such work be outlined by an experienced supplier of cleaning chemicals or a water treatment company where the piping installation also boiler and pumping equipment is considered to need corrosion protection.

Specification should cover complete procedure and the work should be carried out under the supervision of the consultant or qualified personnel of the chemical people.

3 WATER TREATMENT

Closed hydronic systems for low temperature operation properly designed and in proper operating condition i.e. Where there is very little loss or replacement of system fill water to bring in fresh oxygen, etc. are considered by some authorities to give satisfactory operation and long life without water treatment.

Whether water treatment is actually needed will depend on operating conditions, operating temperature, type of boiler equipment, size of system, fill water, etc. on smaller systems where proper supervision and attention cannot be given to chemical treatment of the system water, it may be much

better to pass up the use of chemical treatment. Excessive or improper treatment can be detrimental to the system and its equipment and sometimes do more harm than good.

The use of stop leak chemicals should be avoided if at all possible in modern hydronic systems and if known to be used must be completely drained and flushed before starting up the pumping equipment.

Cleaning detergents or boiling out compounds are better not used at all if it is the intention to leave them in the system. When they have served their purpose after a few hours, they must be removed from the system by replacement with clean fill water.

4 WHAT TO DO AFTER CLEANING - PASSIVATION OF SYSTEM

After cleaning with a chemical detergent or boiling out compound, the system must be kept filled with clean water; left empty for a short time corrosion tends to immediately start up in steel piping, boiler tubes, etc., which have been freshly cleaned.

In very large systems, where it is intended to follow up with the use of a water treatment such as chromate phosphate chemicals, the water treatment people may recommend a passivating procedure which will coat the inside of the system immediately after boiling out, in order to prevent initial corrosion of the exposed metal it is well to remember that thorough cleaning removes scale, oil, etc. and leaves the metal ideally clean but ready for corrosion if the system is left open to atmosphere right after cleaning.

Passivating is usually carried out by feeding in fresh fill water accompanied by the necessary chemical treatment of chromate and phosphate at the same lime as the old fill water with the boiling out compound is drained or displaced.

Strongly Alkaline chemical of the boiling out compound must be removed after it has served its purpose, otherwise mechanical troubles will be encountered with pumping equipment, vents, control valves, etc. of the system.

This displacement or transfer may require a period of time, say 24 hours a check on pH will indicate when the boiling out compound has been replaced.

Systems in small buildings do not usually need such procedure, but buildings of 10 to 30 storeys or those covering an acre or so in extent contain large and expensive piping and equipment, the protection of which should be given careful consideration by the consultant and whatever care or procedure is decided upon should be carefully carried out under adequate supervision.

5 PROCEDURE DETAILS

This bulletin attempts to outline in very general terms a re-commended procedure that will be a useful guide in designing and installing hydronic heating systems, especially those of large size. See **FILE NO. 10.451** For further information on cleaning and care of hydronic system. Consult a recognized chemical treatment concern for complete details where it is considered that the use of chemical treatment is required.

6 AIR CONTROL

Keep the system full of water at all times. Design the piping so that air is not drawn in through air vents due to pressure changes under flow conditions. On larger systems where high head pumps are used the location of the pump relative to the cushion tank is very important. Arrange and select the system accessories so the system will not lose water except in case of emergency.

Armstrong technical information on hydronic systems and equipment is available at all times, it is yours for the asking whenever systems are being designed or specific problems are encountered.

TORONTO
+1 416 755 2291

BUFFALO
+1 716 693 8813

BIRMINGHAM
+44 (0) 8444 145 145

MANCHESTER
+44 (0) 8444 145 145

BANGALORE
+91 (0) 80 4906 3555

SHANGHAI
+86 (0) 21 5237 0909

SÃO PAULO
+55 11 4785 1330

LYON
+33 (0) 420 102 625

DUBAI
+971 4 887 6775

MANNHEIM
+49 (0) 621 3999 9858