

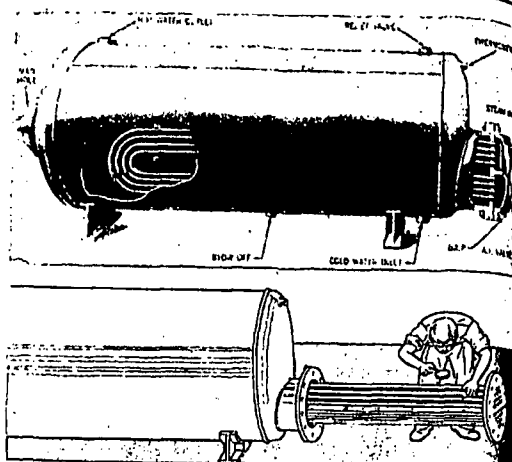
APPLICATION CHECKS

HEATER SHELL must be flange-quality steel, at least 1/4 inch thick. Have the equipment design meet the ASME Pressure Vessel Code.

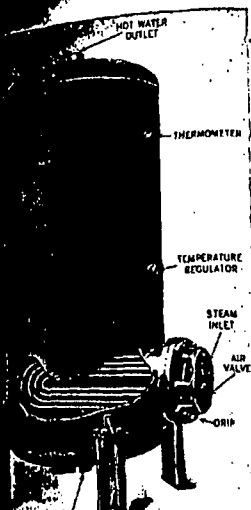
LINING material has to resist corrosion, hold up under operating temperatures. Whatever you choose for liner service—cement or copper—know that it's applied right, is free of cracks and bulges, has right thickness to withstand temperature, pressure change.

OUTSIDE. Be certain you give the heater a good insulating coat—at least 3 inches of 85% magnesio block, troweled over with cement.

TUBE BUNDLE must be made up of hard copper with a support of softer metal, usually brass. Annealed copper used for the tubes in the bundle will develop sag.



HORIZONTAL hot-water storage heaters are a natural where water demands are not constant, nor continuous. With proper controls they give the desired temperature.



VERTICAL storage heaters work best where the floor space is tight, the head room plentiful. Tube bundle is very short and permits easy handling and maintenance.

MATERIAL HIGHLIGHTS

PIPING. Make steam supply and return lines as short as possible. If steam line has to be long, put in traps before going into the heater.

MOUNT heater as high as possible to give a substantial head on the receiving tank, plus a good hydrostatic head on the trap. Be sure the heater's supports set solid. See that it is exactly level. You may have to brace the support legs to prevent sway.

OPERATION. Blow down a few gallons from the mud-blow every morning, surely once a week, to keep the heating coil free of dirt accumulations.

MAINTENANCE. Drain and examine heater interior every six months for first few years, once a year thereafter. Check lining and tube condition, bundle support.



Lick Your Storage-Heater Problems By Proper Application, Auxiliaries

By F P LANKOW, Patterson-Kelley Co

► THE HOT-WATER STORAGE HEATER enjoys a basically simple design. With this start in life, you can look for and should get long, troublefree service. Problems you run into usually result from poor application, improper materials or faulty selection of auxiliaries like traps, check valves, thermostatic temperature-regulating valves.

Horizontal storage heater, photo above, is the most common design. All it consists of is a shell and a removable heating section, made up of a nest or bundle of copper tubes formed into a horizontal U- or hairpin-shaped element. The lower you can spot a coil into this shell, the better the heater performance. Here's why:

When unit is operating, cold water enters the shell beneath, but preferably very close to, the tube bundle. It picks up heat from the tube surfaces and then natural convection currents take over. Cold, denser water by sheer weight shoves aside and replaces warmer,

lighter water, and soon the hottest water appears at top of shell. The ideal place to draw off hot water is at this level and that is exactly how it is done, photo above. So, with a tube bundle set at lowest practical point in the shell, you supply heat where you need it most—to coldest water.

This tube bundle in itself presents special engineering problems. As you could expect, you want steam and steam alone to enter the coil. Then you must be sure any condensate that forms in the bundle gets out as fast as possible. These jobs should definitely be part of the original engineering. They entail an understanding of right trap size, value of a vacuum breaker, and so on. These auxiliaries and their problems could make an article by themselves. For the time being, let's stick to the heater.

Heater Application. Any plant where hot-water demands are not constant and continuous is a natural for a hot-water

storage heater. Where demands are sudden, and you've a heavy process or heating load as well, these heaters are vital to good operation. With them you can pull a relatively small, steady steam supply and heat a large volume of water over a period of time. With proper controls, such as a thermostatic temperature-regulating valve, you can hold the water at almost any temperature. What's more, with the right-sized storage you should never have to put any strain on boiler output.

Installation follows these basic rules: (1) Put in hot-water storage heater with its steam supply and return lines as short as possible, even at the expense of extending your water lines. (2) Mount heater as high as possible. (This gives a substantial head to receiving tank and a good hydrostatic head on trap.) (3) Be sure heater supports are solidly set.

Over and above the simple rules above are these expected precautions: (1) Check that heater is absolutely

level; (2) See that insulation is applied—at least 3 in. of 85% magnesio block troweled over with cement. (If heater is exposed to the elements, give it an additional canvas-duck covering, several coats of paint. Be sure, though, you leave nameplate of heater exposed.)

Proper Materials. Heating element, or coil, should be hard copper (for example, 1 1/4-in. OD, No. 16 BWC seamless drawn copper tubing, mill tested to 1000 psi with just the bends annealed at time of fabrication). It's our experience that soft or annealed tubing sags between supports shortly after going into operation. These sags cause pockets to form; condensate collects in them to upset heater operation.

But usually you find no severe problems from tubing materials. More often than not, it's additions and attachments to the heater that act up.

The shell may be of many different substances—carbon steel, copper alloy, stainless steel—and supplied, for

steel, with special linings of copper, aluminum or cement, depending on the application. Steel is by far the most widely used shell material. It should be flange quality, of sufficient thickness (never less than 1/4 in.) to allow for corrosion, usually fabricated in keeping with ASME Pressure Vessel Code (par U-69). But, even so, nagging corrosion and electrolysis problems keep cropping up.

Avoid Electrolysis. It's never good practice to install a steel shell and hook it up with nonferrous piping, particularly when hot water circulates through a system and back through the heater. What you've got is just like a big storage battery with the steel shell as one terminal and the dissimilar nonferrous piping as the other. The water acting as an electrolyte, gets better each time it moves around the system. Pretty soon inside surface of steel shell is plating off fast.

We've run into heaters suffering from

this cause. If you catch them soon enough, putting in a cement lining salvages them. Often this answers another complaint—rusty or red water.

There are definite limitations, though. Never use a cement lining where storage temperatures above 180 F are considered. Cement tends to break down at temperatures above this point. Copper linings or copper silicon prove better materials for this service. The silicon compound has the tensile strength of steel combined with high corrosion-resisting properties. It works particularly well with solutions that have a corrosive action commercially pure copper cannot withstand.

Copper lining, properly installed, with seams electrically welded and the lining extended to nozzle and manhole openings, gives excellent service. By spinning the copper lining into tube holes and expanding the tubes against this lining you get watertight joints, a further operating advantage.