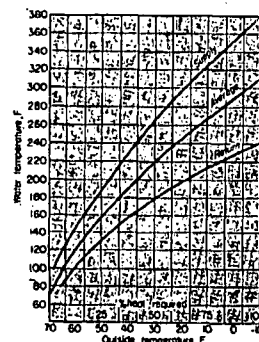
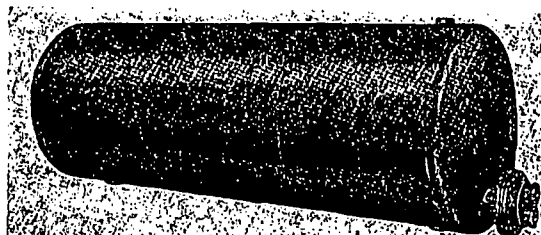


CONSIDER H-T WATER continued

High-Temperature Water Is Adaptable to Many Different Industrial and Commercial Uses in Process and Heating



11 In space heating, flow temperature depends on outdoor air temperature



12 Where large quantities of domestic water are needed you can use a heater like this instead of the unit shown in Fig. 3. Efficiency of these units is good

water into steam space, through the return main. Trays break it into a fine spray and leaving water has same temperature as saturated steam used for heating. Direct contact provides high heat-transfer efficiency.

Circulating pump is placed far enough below heater to obtain sufficient head to prevent steam flashing and water hammer in the lines. For large capacities, direct contact heaters may be mounted on horizontal expansion tanks in the form of domes, Fig. 4.

Using cascade heaters you can generate h-t water at any point in a steam plant. This makes them feasible for jobs like new space heating or for replacing worn-out steam systems. Heater needs only small floor area and can be located in production spaces, if necessary. No more maintenance is needed than with other types of heat exchangers in usual power-plant service.

Heat Storage. Heat consumption in most plants varies throughout the day. In steam-heating systems, variation of heat consumption changes boiler pressure, and boiler firing rate must be varied with load changes. In h-t water systems the large volume of water permits changes in heat demand without appreciable variation of boiler pressure. Boiler efficiency is higher because firing rate is more even.

Increase h-t water system capacity by connecting boilers in series, Fig. 8. Of the three boilers shown, No. 1 is the so-called steam boiler, No. 2 and 3 are filled with water. All boilers can be fired at the same time, but No. 2 and 3 must have a lower rate than No. 1.

Properly designed h-t water systems generally have enough spare capacity to meet fluctuations in heat demand. An extra accumulator is needed only in systems where power and heat peaks do not

coincide, and exhaust or bleed steam is used for water heating. The same is true of systems having boilers that are shut down during the night and that have a high peak load in morning.

H-t water accumulators are simpler and more effective than steam type because the latter run at varying pressures. Also, storage tanks for h-t water are much smaller than those for steam systems with the same heat-storage capacity. Cylindrical tanks with dished heads make suitable h-t water accumulators.

They may be placed outdoors, if desired. Piping, Fig. 6 shows one way of hooking up an accumulator. During charging, h-t water enters accumulator top at 320 F. It pushes cooler 220-F water from accumulator bottom to the cascade heater. During discharge, hot water is taken from accumulator top while cooler water returning from system enters the bottom.

A narrow layer about 1 ft deep separates the high-temperature water from the low-temperature water below it and eliminates mixing or turbulence of water in the accumulator. Regulating valves for charge and discharge are usually operated by hand because peak-load periods are short. But an automatic regulator may also be used as is shown in Fig. 6.

Tubular Heaters. Fig. 9 shows how a heater of this type is used to replace a boiler in a low-temperature hot-water heating system. In Fig. 10 a h-t water heater generates steam for process or other uses. Be sure temperature of h-t water is higher than that of steam to be generated.

Temperature Control. For space heating, system output is a function of outdoor temperature. The lower the outdoor temperature, the more heat needed. Since heating plants are designed for specific low outdoor temperature, output must be controlled on warmer days to avoid overheating.

Many different temperature regulators may be used for steam-heating systems but in water-heating systems indoor temperature is varied by changing the temperature of the water being circulated. Amount of variation, in turn, depends on the outdoor temperature at the time.

In h-t water systems, temperature is regulated at a central location. Bypass and mixing valve regulate temperature of leaving water so it is suitable for heating needed. Chart, Fig. 11, can be prepared for a given plant to simplify figuring of heat water temperatures.

Return water is bypassed either manually or by an automatic ratio controller. Most plants in Europe use manual bypasses except for some process heating where 3-way ratio controllers are used.

Power's DATA SHEET

Alloy Steel Pipe—ASTM Specification A-315 (1 Cr, ½ Moly)

No. 247

Pipe Size in.		Wall thick. in.	Temperature - F									
			Schedule 40									
			70	100	150	200	250	300	350	400	450	500
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000
Schedule 40			11,000	10,000	9,000							