

The large water content of this type of boiler provides for heat storage capacity against sudden demands and minimizes water line fluctuations under sudden variations in load. Chimney heights for the larger sizes of fire-tube boilers as specified by the manufacturer generally are lower than for corresponding sizes of cast iron boilers.

Water-tube boilers may be of the horizontal brickset pattern with either horizontal or cross drums, the vertical brickset pattern, the bent or inclined tube brickset pattern, or the self-contained firebox pattern with any one of the above arrangements of tubes.

Water-tube boilers usually are constructed with steel or iron tubes, steel drums and either steel, cast steel or cast iron headers. They heat up and steam rapidly and also lose their heat and steam pressure quickly, since the water content is small.

The principal heating surface, consisting of tubes with the water inside and the heated gases outside, is easy to clean from the inside with hydraulic or pneumatic tube cleaners and from the outside with steam or air jet soot blowers. Water-tube boilers are to be avoided where the water contains large quantities of scale forming material.

Since water-tube boilers usually have limited steam-disengaging area at the water line, it usually is desirable to operate them at comparatively high pressure, and water-tube boilers operated at less than 15 lb. pressure in heating service are and should be, unusual.

SPACE ALLOWANCE FOR BOILERS

Boilers often are placed in quarters which are too cramped for convenient handling of the fire, the coal and the ashes. The space in front of the boilers should be sufficient for firing, stoking, ash removal and cleaning or renewal of flues, and should be at least 3 ft. greater than the length of the boiler firebox.

A space of at least 3 ft. should be allowed on at least one side of every boiler for convenience of erection and for accessibility to the various dampers, cleanouts and trimmings. The space at the rear of the boiler should be ample for the chimney connection and for cleanouts and with large boilers the rear clearance should be at least 3 ft. in width.

The boiler room height should be sufficient for location of boiler accessories and for proper installation of piping. In general the ceiling height for small steam boilers should be at least 3½ ft. above the normal boiler water line. With vapor heating especially the height above the boiler water line is of vital importance.

INSTALLING AND PREPARING BOILERS FOR SERVICE

The directions of the boiler manufacturer always should be read before the assembly or installation of any boiler is started, even though the contractor may be familiar with the boiler. All joints requiring boiler putty or cement, which cannot be reached after assembly is complete, must be finished as the assembly progresses.

Nuts or tie rods of sectional cast iron boilers always must be drawn up and then loosened about one thread to allow for expansion of the boiler,

when hot. The nuts should be just a little more than hand-tight when the boiler is at its operating temperature.

Flow piping connections should be full size of the manufacturers outlet and preferably should be vertical from the outlets to the maximum height available above the boiler. A large tall outlet pipe and a low outlet velocity are of great value in separating the steam from the water; especially if the boiler has accumulated grease and other foreign matter.

Maximum steam velocities of from 20 to 25 ft. per second at the boiler outlet are recommended.

The outlets from steam boilers should be placed as remotely as possible from the areas of the water surface at which steam separation is most violent.

There is usually some advantage to be obtained with low-pressure steam boilers by installing a large drip connection back to the boiler below the water line, from a point as near as practicable to the steam outlet.

Recommended methods of connecting piping to steam boilers are shown in Chapter 20, Piping for Steam Heating Systems.

WATER LINE IN STEAM BOILERS

Enough water only should be added to heating boilers to keep the water line at the height established by the manufacturer. Raising the water to a higher level may result in carrying over of water with the steam. Water from small steam heating systems should not be lost by leakage or withdrawn to serve as hot water supply as the fresh water required to make up the loss may introduce scale-forming or corrosive matter. On the other hand the occasional addition of new scale-forming water under some conditions may prevent excessive corrosion or pitting of the boiler interior.

CLEANING STEAM BOILERS

The grease used to lubricate the cutting tools during erection of new piping systems serves as a carrier for sand and dirt, with the result that a scum of fine particles and grease accumulates on the surface of the water in all new boilers, while heavier particles may settle to the bottom of the boiler and form sludge. The scum is best removed through an outlet at the surface of the water.

The method given has been used successfully for cleaning new boilers.

The boiler should be blown off within about one week after it has been placed in operation. This blowing off is to remove the unavoidable accumulation of oil, grease, etc. These impurities unless removed have a tendency to cause foaming; preventing the generation of steam and causing an unsteady water line. This blowing off should be done when the boiler is under fire. If one blowing off does not result in a steady water line and a clean water gage, the operation must be repeated and repeated; sometimes requiring the exercising of great patience and persistence.

An approved procedure for blowing off is as follows:

Close all radiator valves and remove the thermostatic members of all return line traps, if there are valves at the boiler, close both the supply and return valves. Remove the damper regulator and plug the opening. Remove the plug at the water line blow-off