

makers of air sealed tank in basement equipment furnish tank sizes for the different amounts of radiation as follows:

Square Feet of Radiation	Gallons	Square Feet of Radiation	Gallons
250 to 350.....	18	1400 to 1600.....	54
350 to 450.....	21	1600 to 1800.....	60
450 to 650.....	24	1800 to 2000.....	70
650 to 900.....	30	2000 to 2400.....	80
900 to 1100.....	35	2400 to 2800.....	90
1100 to 1400.....	40	2800 to 3000.....	110
		3000 to 3500.....	120

By using the sealed system of hot-water heating it has been found that there is a ready absorption of heat by the water, a rapid circulation and uniform distribution of the water in the radiator and the possibility of close regulation depending on the use of the pressure obtained by the expanding water against the air in the sealed tank. The pressures obtained for different temperatures when tank capacities are as outlined are as follows:

Outside Temperature	Temperature of Water Required to Heat Building	Approximate Position of the Hand on Pressure Gage
60 deg.	100 deg.	At the static head required to fill the system.
50 deg.	120 deg.	1 lb. pressure above static head.
32 deg.	140 deg.	2 lb. pressure above static head.
20 deg.	150 deg.	3 lb. pressure above static head.
15 deg.	160 deg.	4 lb. pressure above static head.
10 deg.	170 deg.	5 lb. pressure above static head.
0 deg.	180 deg.	6 lb. pressure above static head.
-10 deg.	190 deg.	7 lb. pressure above static head.
-20 deg.	200 deg.	8 lb. pressure above static head.
-25 deg.	210 deg.	9 lb. pressure above static head.
-30 deg.	220 deg.	10 lb. pressure above static head.

The table also gives the outside temperature and the corresponding boiler temperature of the water in the radiators necessary to warm to 70 deg., when radiation is figured on the basis of heating rooms to 70 deg.

CHAPTER V

HEATING BOILERS

Duty of Boiler, Boiler Selection, Boiler Ratings, Types of Boilers, Boiler Troubles, Operating Conditions, Burning Anthracite and Bituminous Coal, Pick-up Load, Hot Water Supply Boilers.

IT is important that the duty of the boiler be clearly understood. The boiler accomplishes its main purpose when a specified quantity of heat in dry steam or hot water is delivered at its outlet. If the boiler is equipped with automatic temperature or pressure control, this control should actuate dampers or other means for controlling the rate of combustion within certain limits. When equipped with devices intended to accomplish a certain combustion result, as, for example, to burn bituminous coal smokelessly, such results should be accomplished without undue attention.

Certain conditions affecting the operation of the boiler must be met if it is to accomplish its purpose. The most important of these are as follows:

- (1) There must be chimney or other means capable of supplying an adequate draft.
- (2) The fuel used must be as good as that contemplated when the boiler was selected.
- (3) The quality and frequency of attention must equal that upon which selection was based.
- (4) The system must be properly designed to quickly return the water to the boiler after its heat has been delivered to the desired points.
- (5) Dirt and grease must be kept from the system, leaving reasonably clean water.

BOILER SELECTION

Ordinarily, especially in residence heating and small installations, the information upon which the boiler is selected is very meager. This information usually consists of: the heat output of radiators under normal temperatures, the kind of fuel, whether anthracite or bituminous coal, oil or gas, and in a few cases the amount of piping. Selection of a boiler upon this information is largely guesswork based upon experience, with the result that the boiler is selected large enough to deliver the required quantity of heat under even the most adverse conditions. Boilers having large output and rapid pick-up are frequently selected in preference to boilers having more economical performance.

A proper heating boiler specification would contain the information given in the following items:

1. Maximum hourly output required during "pick-up" period which is made up of the following items: (a) The heat output of radiators and other heating units when

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