

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

GREENHOUSE HEATING SYSTEMS

GENERALLY speaking greenhouses are heated either by hot water or steam systems, both being used in all forms: gravity hot water; accelerated circulation of hot water, i.e., where there is some circulation due to gravity and an accelerator or impeller is used to accelerate that circulation; forced circulation of hot water; gravity low pressure steam; gravity low pressure steam with return by means of automatic steam pump and return by means of an electrically driven automatic pump; vacuum return systems; high pressure steam systems with high pressure in mains and reduced pressures in the coils in the houses and even in some odd cases by high pressure steam throughout. There are countless modifications of all of these systems.

Hot water heating is older, simpler and the more common method in small houses and small ranges of greenhouses.

Although the same tables, formulae and other data that are used to estimate the heating requirements of systems in the usual types of buildings are also applicable to greenhouse heating and although the same pumps, traps, regulators, valves and other devices and fittings are used in greenhouses as in other systems, there are many differences that must be kept in mind so that due allowances may be made in the specification of a plant.

For instance—the highest temperatures in greenhouses are required at night, whereas with residence systems the maximum temperatures are required in the day time.

Greenhouse fires are banked during the day almost always throughout the firing season, even in midwinter when the sun is shining, and fuel consumption is heaviest at night; this in marked contrast to practically all other types of heating systems where the fires are banked at night.

Greenhouse radiation is almost exclusively made up of piping. The temperature demands are almost always below 70 deg. and horizontal piping carries a higher co-efficient of emission than the radiating surfaces used in other systems; special care must, therefore, be given to the selection of the boiler; the demands on it will be higher than with any other form of radiation in quiet air; its surplus must be greater than with boilers for any other sort of quiet air heating.

The usual boiler ratings, inflated as they many times are for residence heating purposes, must be discounted still more for greenhouse work, especially so where there is no night fireman, as with the smaller plants, and where fires are left for long periods without attention.