

4. In some burners a special *thermostatic element* serves to shut off the gas in the event that the gas pilot goes out.

Low Water Safety: Due to rapid evaporation on starting, particularly with steel and copper tube boilers of small water content, a low-water safety is essential. This device consists of a float chamber mounted at the water line between the boiler and the glass gage. A lowering of the water line causes the float to depress one end of a mercury tube switch stopping the burner. Even with slow heating boilers of large water content and weight of metal, the low-water safety is necessary, as an oil-fired boiler is not subjected to the same observation and care as a boiler fired two or three times a day with coal.

Burner Installations

Most oil burners are installed in heaters which are designed for coal, and the results are usually quite satisfactory. Where a heater is being purchased for use with oil heating equipment care should be taken to select one that has long flue passes, that do not short-circuit the gases from the combustion chamber to the flue. There are several boilers which have been designed especially for oil burning and which are very efficient and economical. Every oil fuel boiler should be provided with an automatic feed water regulator or a low-water cut-off as the boiler is often neglected; since the automatic features eliminate the necessity of a daily inspection.

With many of the cast iron water-tube sectional boilers it has been found possible to increase the rating by using oil as a fuel. This increase amounts to from 10 to 25 per cent, but boiler equipment should not be selected on this basis without the knowledge and approval of the boiler manufacturer. This increase in rating usually is not possible with round boilers. Where round boilers are used with oil heating equipment it is best to select a boiler that has extra indirect heating surface in the form of intermediate sections.

In applying oil heating equipment to existing coal burning boilers it is often advisable to baffle the passes in order to lengthen the travel of the hot flue gases and also to keep them in closer contact with the heating surface. In fire-tube boilers it is often desirable to use retarders inserted in the tubes so as to give the flue gases a spiral motion and keep them in contact with the surface of the tube.

Warm air furnaces are used satisfactorily with oil burners. It is, of course, important that they shall have very tight joints, and these should be maintained carefully, with an inspection and cementing at least every year. A good chimney draft especially is important with warm air furnaces, as it will tend to insure that inleakage of air shall be more common than outleakage of products of combustion through the furnace cracks.

Installations should always be made by trained men under the direction of the burner manufacturer as every burner has peculiarities that should be given consideration when the installation is made. It is also important that the burner should be correctly adjusted for each installation as loss in efficiency more often results from poor adjustment rather than from poor design. A burner should have sufficient capacity to develop full

rating of the heater which it serves and it is preferable that it have some excess; it should also be adjustable over a range from 50 to 100 per cent rating (See Fig. 3). The flame adjustment is best determined by a flue gas analysis, but a good check can be made by noting the color of the flame. A white flame indicates excess air or insufficient oil; a red, smoky flame insufficient air or excess oil, and an orange flame just tipped with red indicates efficient and clean combustion. The boiler room should be well ventilated so that the burner can obtain an adequate supply of air at all times.

Burner and tank installation and all electrical work should be installed in accordance with local ordinances. If no local rules are in force the

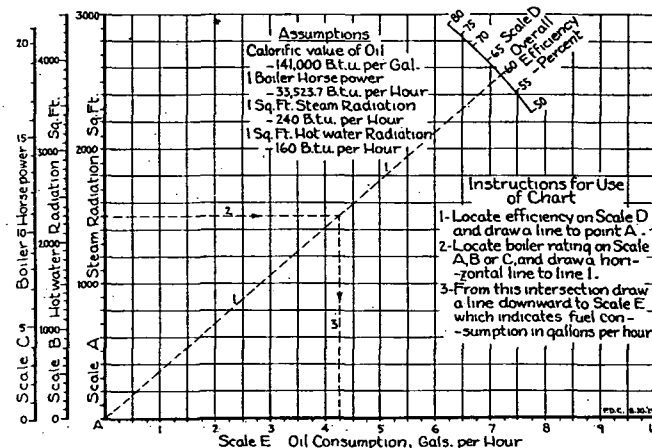


FIG. 3. FULL LOAD RATE OF OIL CONSUMPTION FOR HEATING BOILERS

rules recommended by the *National Board of Fire Underwriters* should be followed.

Domestic Hot Water Heating

For domestic hot water supply a steam coil heater is quite satisfactory when steam or vapor is used, and with suitable controls on the hot-water tank, can be used the year round at a very reasonable cost. An iron shell type of heater with local hot water circulating lines between the shell and the water of the boiler and with a copper coil in the shell, through which the water in passing is heated, is very satisfactory with either steam or hot-water boilers, but care must be taken to have such heaters of ample capacity and connected to ample-sized storage tanks, especially with hot water boilers. This system may also be very successfully used the year around if an automatic control such as described above under Temperature Control is used. Small size oil burners are made which are suitable for installing under small hot-water heaters and which may be controlled automatically by a thermostat in the hot-water tank. A coil in the combustion chamber is not generally satisfactory for service hot-water heating.