

The correct fuel burning rate can be determined directly from the several charts for oil or gas burning installations, as these customarily operate on a strictly intermittent basis. These fuel burning devices usually introduce the fuel at a single fixed rate during the *on* periods and this rate should be sufficient to carry the gross load. In the case of coal stokers, which are usually capable of variable rates of firing, it is desirable to operate at as low a rate as weather conditions will permit, but the maximum firing rate of the stoker should be sufficient to carry the gross load. This rate may be determined by the same method as used for oil or gas.

REFERENCES

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- 2—Stoker Manufacturers Association Manual: Industry Standards, Recommended Practices, Technical Information. Published by Stoker Manufacturers Association, 307 N. Michigan Ave., Chicago 1, Ill.
- 3—Code for Determination of Rated Capacities of Anthracite Underfeed Stokers, adopted June 1, 1944, and a Code for Determination of Rated Capacities of Bituminous Underfeed Stokers, adopted May 3, 1944. See Stoker Manufacturers Association Manual.
- 4—Automatic Mechanical Draft Oil Burners Designed for Domestic Installations (U. S. Department of Commerce, National Bureau of Standards, Commercial Standard No. CS75-42). Flue Connected Oil Burning Space Heaters Equipped with Vaporizing Pot Type Burners (U. S. Department of Commerce, National Bureau of Standards, Commercial Standard No. CS101-43). Warm-Air Furnaces Equipped with Vaporizing Pot-Type Oil Burners (U. S. Department of Commerce, National Bureau of Standards, Commercial Standard No. CS(E)104-43).
- 5—Gas Floor Furnaces, Gravity Circulating Type (U. S. Department of Commerce, National Bureau of Standards, Commercial Standard No. CS99-42).

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Heating Boilers and Furnaces

BOILERS: Construction, Types, Design Considerations, Testing and Rating Codes, Efficiency, Rating, Selection, Space Limitations, Connections and Fittings, Erection, Operation and Maintenance. **FURNACES:** Types, Materials and Construction, Ratings, Testing and Rating Codes, Efficiency, Design Considerations, Humidification Equipment

IN presenting the subject of Boilers and Furnaces this chapter is divided into two parts; the first dealing with boilers and the second treating warm air furnaces.

HEATING BOILERS

Steam and hot water boilers for low pressure heating are built in a wide variety of types and sizes, many of which are illustrated in the *Catalog Data Section*. They are made of steel or cast-iron.

CONSTRUCTION

The only code governing the construction of low-pressure heating steel and cast-iron boilers that has gained recognition on a national basis is the *ASME Boiler Construction Code for Low Pressure Heating Boilers*. Some states and municipalities have their own codes which apply locally but these are usually patterned after the *ASME Code*.

The maximum allowable working pressures are limited by the *ASME Code* to 15 psi for steam and 30 psi for hot water heating boilers. Hot water boilers may be used for higher working pressures for heating purposes or for hot water supply when designed and tested for the higher pressure.

TYPES OF HEATING BOILERS

Heating boilers are classified in a number of different ways, such as:

- (a) According to materials of construction. These are steel and cast-iron. Very few non-ferrous boilers are made.
- (b) According to the fuels for which the boilers are designed. These are coal, hand fired or stoker fired; oil; gas; or wood. Some boilers are designed specifically for one fuel but many boilers are designed for more than one fuel.
- (c) According to the specific purpose or application for which the boiler is used, such as space heating or domestic hot water supply.
- (d) According to the design or construction of the boiler such as, sectional, round, fire-tube, water-tube, magazine feed, Scotch, etc.

Cast-Iron Boilers

Cast-iron boilers are generally classified as:

- (a) Square or rectangular boilers with vertical sections and rectangular grates commonly known as sectional boilers.
- (b) Round boilers with horizontal pancake sections and circular grates.

Cast-iron boilers are usually shipped in sections and assembled at the place of installation. In the majority of boilers the sections are assembled with push nipples and tie rods. Many sectional boilers are provided with