Gaseous Fuels (*American Gas Association*).

Comfort Heating (*American Gas Association*).

American Standard Approval Requirements for Central House Heating Gas Appliances, *ASA* Z21.13- (*American Standards Association*).

Vol. I. Steam and Hot Water Boilers, Z21.13.1-1956.

Vol. II. Gravity and Forced Air Central Furnaces, Z21.13.2-1956.

Vol. III. Gravity and Fan Type Floor Furnaces, Z21.13.3-1956.

Vol. IV. Gravity and Fan Type Vented Recessed Heaters, Z21.13.4-1955 with addenda Z21.13.4a, 1956.

American Standard Requirements for Installation of Domestic Gas Conversion Burners, *ASA* Z21.8-1948. (*American Standards Association*).

American Standard Requirements for Installation of Gas Burning Equipment in Large Boilers, Z21.33-1950. (*American Standards Association*).

American Standard for Installation of Gas Piping and Gas Appliances in Buildings, Z21.30-1954 (*American Standards Association*).

1951 *A.G.A.* Industrial Gas School Lectures (*American Gas Association*).

Radiant Gas Burners, by J. D. Keller, *A.G.A.* Sales Conference, 1949 (*American Gas Association*).

Industrial Furnaces, Vol. 1 & 2, by W. Trinks (John Wiley & Sons, 1944).

A Method for Determining Fuel Burning Rates in Heating Boilers Fired by Automatic Devices, by R. C. Cross (*Heating and Ventilating*, January, 1932).

Heat Losses and Efficiencies of Fuels in Residential Heating, by R. A. Sherman and R. C. Cross (A.S.H.V.E. TRANSACTIONS, Vol. 43, 1937, p. 185).

CHAPTER 16

HEATING BOILERS, FURNACES, SPACE HEATERS

BOILERS: Construction, Types, Design Considerations, Rating and Testing 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. SPACE HEATERS: Types: Solid Fuel, Oil, Gas; Materials and Construction, Testing and Rating, Design Considerations, Installation

IN presenting the subject of Boilers, Furnaces and Space Heaters this chapter is divided into three parts; the first dealing with boilers, the second treating warm air furnaces, and the third covering space heaters.

HEATING BOILERS

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

The nationally recognized code governing the construction of low-pressure steel and cast-iron heating boilers 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 for Low Pressure Heating Boilers to 15 psi for steam and 160 psi for hot water heating boilers, with a maximum temperature limitation of 250 F. Hot water boilers are generally designed for a working pressure of 30 psi and may be supplied for higher working pressures, for either heating purposes or for hot water supply, only when designed, tested and stamped for the higher pressure.

TYPES OF HEATING BOILERS

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

1. According to materials of construction. These are steel and cast-iron. Very few non-ferrous boilers are made.
2. 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.
3. According to the specific purpose or application for which the boiler is used, such as space heating or domestic hot water supply.
4. 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:

1. Square or rectangular boilers with vertical sections and rectangular grates, commonly known as sectional boilers.
2. Round boilers with horizontal pancake sections and circular grates.