

This fact indicates that, while combustion processes involving common types of fuel may be regulated by experienced operators to produce the most efficient results, normal combustion processes can be so unbalanced as to create hazards unless both design and operation are planned with a knowledge of the fundamental principles of combustion.

Combustion may be defined as the chemical combination of a substance with oxygen resulting in the evolution of heat, and usually some light. The rate of combustion depends upon the rate of reaction of the substance with oxygen, upon the rate at which oxygen is supplied, and upon the temperature obtained due to surrounding conditions. This is combustion in its simplest form. All solid, as well as liquid and even gaseous fuels generally contain several combustible elements in combination with others which, depending on their nature, affect oxygen requirements and thus govern

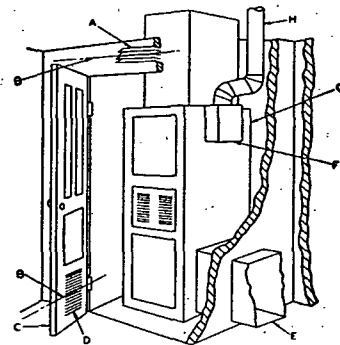


FIG. 5. ILLUSTRATION SHOWING AIR OPENINGS NECESSARY TO SUPPLY AIR FOR COMBUSTION WHEN APPLIANCE IS INSTALLED IN CONFINED SPACE

- A. Ventilating air outlet register for furnace room, 1 sq in. free area for each 1000 Btu per hr furnace input located above relief opening of draft hood. Register must not be blocked by drapes or other furnishings.
- B. Both registers must either face same large ventilated interior space or extend to such space by means of ducts. Vertical distance C/L to C/L of registers should be not less than 3 ft.
- C. Suggest room access door be not less than 6 ft high by a width sufficient to provide for installation or removal of furnace. At least 2 ft horizontal clearance should be provided in front of furnace when close door is open, or 18 in. when door is closed.
- D. Combustion and ventilation air inlet register for furnace room, 1 sq in. free area for each 1000 Btu per hr furnace input, located at or below combustion air inlet to furnace. Register must not be blocked by drapes or other furnishings.
- E. Air circulated by furnace must be handled by ducts which are sealed to furnace casing and are entirely separate from means provided for supplying combustion and ventilation air.
- F. Spacing between draft hood and wall at least 6 in. (unless approved for closer spacing). If flue products may be directed toward wall, 12 in. spacing recommended.
- G. No part of furnace casing closer than 6 in. to wall (unless approved for closer spacing).
- H. Flue should terminate above peak of roof and above nearby walls to assure satisfactory flue performance. In installations where the flue terminal is below nearby walls or roof peaks, an effective vent cowl should be used.

the combustion process. For a continuous reaction, as in heating processes, it is necessary to establish an effective balance between rates of removing heat and of supplying fuel and air or oxygen to keep the reaction going. In establishing such a balance, consideration must be given to the removal or venting of products of combustion, so that the entire process is one of flow wherein draft conditions in the combustion space play an important part.

Complete combustion is obtained when all combustible elements in a fuel are oxidized, by all of the oxygen with which they will combine. All oxygen or air supplied is generally not utilized, and this excess portion is

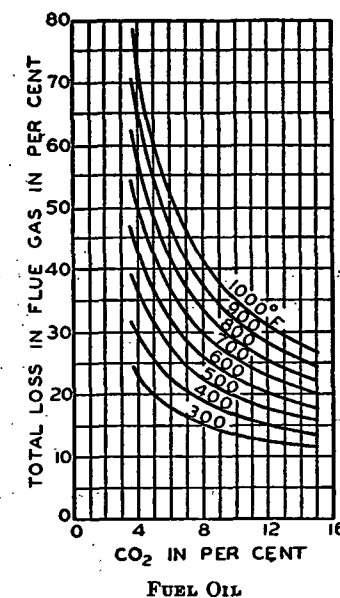
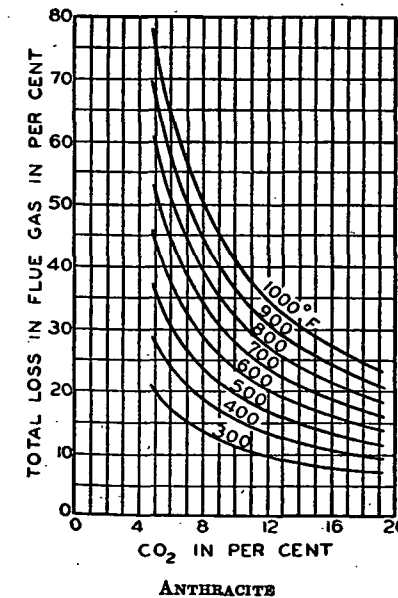
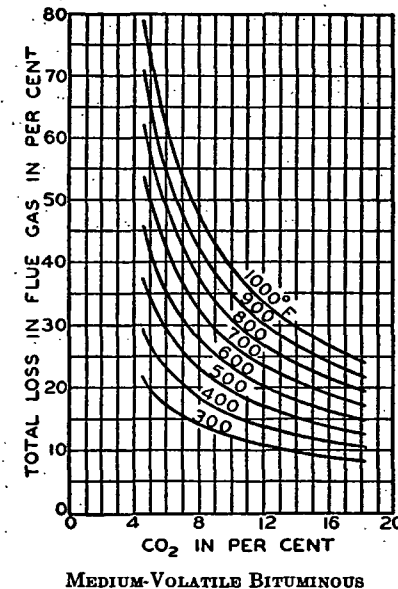
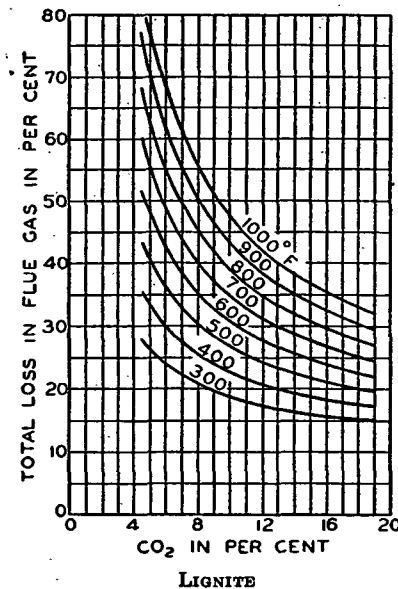


FIG. 6. FLUE GAS LOSSES WITH VARIOUS FUELS²

Flue Gas Temperature Shown. Loss is Based on 65 F Room Temperature.