

PROBLEMS IN PRACTICE

1 ● List some factors which might account for higher efficiencies with stoker firing than with hand firing.

a. The uniform rate of coal feed, *b.* Better distribution in the fuel bed, and *c.* Positive control of the air supplied for combustion.

2 ● Classify stokers as to construction and operation.

a. Overfeed flat grate, *b.* Overfeed inclined grate, *c.* Underfeed side cleaning type, and *d.* Underfeed rear cleaning type.

3 ● What main parts are found in an underfeed residential stoker?

A *hopper* is supplied to hold coal which is fed by a *screw* or *plunger* into a *retort* provided with air openings called *tuyeres*. A *blower* supplies air under pressure for combustion, and a *gear case* provides for changes in coal feeding rates.

4 ● What is a dead-plate?

A dead-plate is a flat surface without air supply openings upon which the fuel rests while combustion of the fixed carbon is completed. Generally the ash is removed from the dead-plate.

5 ● What features of furnace design are essential for the proper burning of the volatile coal gases above the fuel bed?

Adequate provisions should be made so that the furnace volume is sufficiently liberal and that the grates are a sufficient distance from the heating surfaces to permit the proper combustion of gases.

6 ● What methods of oil atomization are used?

a. Throwing the oil from a rotating cup or disc, *b.* Forcing the oil under high pressure through a nozzle, *c.* Propelling the oil with a high velocity jet of air or steam, and *d.* Forcing an oil and air mixture through a nozzle.

7 ● Is the furnace of much importance in oil burning?

In most cases it is very important. It is the function of the oil burner to supply the air and fuel in correct proportions; the furnace must provide heated space for proper mixing and combustion.

8 ● Which flame is considered better, the luminous or the non-luminous?

Laboratory tests show that they are equally efficient in the usual installation.

9 ● What CO₂ content should be attained in oil burning?

Ten per cent CO₂ is considered good practice, for it indicates the supplying of 50 per cent excess air.

10 ● Name five types of gas-fired space heaters.

a. Parlor furnaces or circulators, *b.* radiant heaters, *c.* gas-fired steam or hot water radiators, *d.* warm air radiators, and *e.* garage heaters.

11 ● How are gas heating units rated?

Gas-fired units are rated on the basis of output in Btu per hour.

12 ● What safety consideration is noted in establishing the ratings of gas-fired units?

The rating is limited by the amount of gas that can be burned without the liberation of harmful amounts of carbon monoxide.

Chapter 12

HEAT AND FUEL UTILIZATION

Fuel Consumption Records, Calculated Heat Loss Estimation Method, Maximum Rate of Fuel Burning, Degree-Day Method, Unit Fuel Consumptions per Degree-Day, Maximum Demands and Load Factors

MANY methods are in use for estimating in advance of actual operation the anticipated heat or fuel consumption of heating plants over long or short periods. With suitable modification in procedure these same general methods are frequently useful in checking the degree of effectiveness with which heat or fuel is utilized during plant operation.

In applying any of these estimating methods to the consumption of a particular building plant it should be noted that (a) reliable records of past heat or fuel consumptions of *this* building will usually produce more trustworthy estimates of future consumptions than will any data obtained by averages or from other similar buildings; (b) where no past records exist useful data can sometimes be obtained from records of similar buildings with similar plants *in the same locality*; (c) records of consumption which are averages from many types of plants in many types of buildings in various localities, can produce no better than an average estimate which may be far from accurate; (d) estimates based on computed heat losses without the benefit of operating data are wholly dependent on how well the computation represents the actual facts.

Where records of past consumptions are available they should be examined for reliability to be sure that the records show fuel or heat for the heating plant only, or else make a suitable allowance for fuel used for other purposes, such as heating service water. Weights and measures shown on invoices may not always agree with fuel used, for residues left in bins or tanks may represent a considerable fraction of the fuel charged to a building. Generally, plant operating records of fuel used are to be preferred to those obtained from accounting or bookkeeping offices from fuel invoices.

Records from similar buildings even in the same locality should be examined with care before being used as the basis of estimates. The type of heating system, the quality of supervision in manual plants, the kind of control in automatic plants, and the attention given to the plant operation are all factors in fixing the consumption in any building. Many times these factors do not show up in superficial examination and are even difficult to evaluate when known to be present. Especially check the