

capacity. Coal-burning devices often have air leaks around the firebox, and the draft doors sometimes fit so poorly that the fire cannot be controlled at a low rate. The simplest remedy for such cases is the barometric damper which admits air into the flue pipe and thus reduces draft.

Where a chimney serves a fireplace, it is important that no other heating device be connected to it unless the fireplace is effectively sealed.

REFERENCES

¹ A Study of Flow Phenomena in the Wake of Smokestacks, by R. H. Sherlock and B. A. Stalker (*Department of Engineering Research, University of Michigan, Bulletin No. 29, 1941*).

² Notes on Power Plant Design, by E. F. Miller and James Holt (*Massachusetts Institute of Technology, 1930*).

³ Friction Factors for Pipe Flow, by L. F. Moody (*A.S.M.E. Transactions, Vol. 66, 1944, p. 671*).

⁴ Mechanical Engineers' Handbook, Eleventh Edition, by R. T. Kent, Editor in Chief (John Wiley and Sons, Inc.).

⁵ Handbook of Building Construction, by G. A. Hool and N. C. Johnson (McGraw-Hill Book Co., Inc., New York, 1929).

⁶ Performance of Residential Chimneys, by L. B. Schmitt and R. B. Engdahl (*A.S.H.V.E. JOURNAL SECTION, Heating, Piping and Air Conditioning, November 1948, p. 111*).

⁷ Observed Performance of Some Experimental Chimneys, by R. S. Dill, P. R. Achenbach and J. T. Duck (*A.S.H.V.E. TRANSACTIONS, Vol. 48, 1942, p. 351*).

⁸ Performance of Fourteen Masonry Chimneys Under Steady State Conditions, by P. R. Achenbach and S. D. Cole (*A.S.H.V.E. JOURNAL SECTION, Heating, Piping and Air Conditioning, October 1948, p. 119*).

⁹ National Bureau of Standards Commercial Standards: CS101-43 Oil-Burning Space Heaters Equipped With Vaporizing Pot-Type Burners, CS75-42 Automatic Mechanical Oil Burners Designed for Domestic Installations, CS(E)104-43 Warm Air Furnaces Equipped With Vaporizing Pot-Type Burners; and Trade Standards: TS3536a Solid-Fuel Burning Forced Air Furnaces, TS3518 Oil-Burning Floor Furnaces Equipped With Vaporizing Pot-Type Burners.

¹⁰ Comfort Heating, 1938, p. 71 (*American Gas Association*).

¹¹ Comfort Heating, 1938, p. 74 (*American Gas Association*).

¹² Chimneys and Draft (Chapter 32 in Winter Air Conditioning, by S. Konzo, published by National Warm Air Heating and Air Conditioning Association, 1939).

CHAPTER 17

ESTIMATING FUEL CONSUMPTION FOR SPACE HEATING

Basis of Fuel Estimates, Calculated Heat Loss Method, Degree-Day Method, Estimating Fuel Consumption, Degree-Day as an Operating Unit, Maximum Demands and Load Factors, Seasonal Efficiency

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 the building under consideration 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 types of 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 the degree to which the computation represents the actual facts.

Estimates based on computed heat losses alone are especially necessary where unusual operating conditions, such as excessive ventilation, abnormal inside temperatures, heat gains from external sources, etc., are encountered or where no information is available as to former consumption as in the case of proposed buildings of unusual design.

In preparing, interpreting and evaluating heat or fuel consumption estimates it is well to realize that any estimating method used will produce a more reliable result over a long period operation than over a short period. Nearly all of the methods in common use will give trustworthy results over a full annual heating season, and in some cases such estimates will prove consistent within themselves for monthly periods. As the period of the estimate is shortened there is more chance that some factor not allowed for in the estimating method will become controlling and thus give discrepant and even ridiculous results.

Of the various estimating methods in use attention is directed in this discussion to but two as they are illustrative of all, namely, (1) calculated heat loss method, and (2) degree-day method.

CALCULATED HEAT LOSS METHOD

This method is theoretical and constant temperatures are assumed for very definite hours each day throughout the entire heating season. It does not take into account factors which are difficult to evaluate such as opening of windows, abnormal heating of the building, poor heating systems, winter