

Table I—Fuel Costs for Heating; Northwest U. S.

Heat source	Price	Btu contained	Efficiency of use, %	Cost per million Btu	Annual cost*	Equivalent power cost for heat pump COP=3.5
Bituminous coal	\$9.00 per ton	30,000,000 per ton	65	\$0.89	\$115	\$0.0081 per kw-hr
Oil	0.09 per gal	140,000 per gal	75	0.86	138	0.01 per kw-hr
Gas, mfd	0.50 per m cu ft	570 per cu ft	75	1.40	334	0.017 per kw-hr

*Maximum demand = 65,000 Btu per hr; design temperature = +10 F; heating season = 4500 deg days

Table II—Fuel Costs for Heating; Northeast U. S.

Heat source	Price	Btu contained	Efficiency of use, %	Cost per million Btu	Annual cost*	Equivalent power cost for heat pump COP=3.5
Anthracite coal (moles)	\$11.10 per ton	37,000,000 per ton	65	\$0.83	\$120	0.0075 per kw-hr
Oil	0.087 per gal	140,000 per gal	75	0.83	128	0.007 per kw-hr
Gas, natural	0.75-0.38 per m cu ft	1,030 per cu ft	75	0.95-0.48	190-95	0.011-0.006 per kw-hr
Gas, mfd	0.65 per m cu ft	550 per cu ft	75	1.58	318	0.019 per kw-hr

*Maximum demand = 100,000 Btu per hr; design temperature = 0 F; heating season = 3400 deg days

THE HEAT PUMP

A Heat Pump in an Office Building, by J Donald Kroecker and Ray C Chewning, consulting engineers, Portland, Ore. Well water serves as the source of heat for the building's needs in the winter months. Its cost is that of pumping it to the required floor level. In addition, heat is recovered from exhaust ventilation air; and waste cooling water heats the ventilation air to produce an estimated one-third reduction of heat requirements. Automatic switchover from heating to cooling or the reverse is possible in this 12-story office building equipped with the largest heat pump in the U. S. Water is drawn at different temperatures from wells at two levels. Circulating air acts as the heat-transfer medium. *ASHVE Paper.*

Economic and Technical Aspects of the Heat Pump, by W E Johnson, Air Conditioning Dept, General Electric Co. The more southerly portions of the U. S. seem the most favorable market for the heat pump. Requirements for design heating about equal those for cooling. To be economical, advantage must be taken of full year-round heating and air conditioning. This limits the market to the field of higher-priced homes.

Commercial applications are more favored because they have a higher internal heat gain than do houses. Human beings, lights, motors, all tend to reduce winter heating load and increase

summer cooling load to give a more desirable balance between loads and seasons.

A typical domestic case showed that individual cost of the heat pump is determined by a balance between summer and winter loads set at 40 F for a winter design temperature. Below 40 F the cost of equipment is determined by the summer cooling load. Tables, above, show fuel costs for heating in the northeastern and northwestern sections of the country.

With a typical commercial installation, aided by internal heat gains that maintained a temperature difference of 15 degrees, loads equalized at 12 F, winter design temperature.

The heat pump becomes competitive in regions where (1) design temperatures are moderate (2) electrical energy costs one cent or less. Operating costs based on two commercial and one residential installation showed that power was consumed at the rate of 1/2 to 3/4 kw-hr per degree day per installed hp of compressor. *ASHVE Paper.*

State Laws Concerning Industrial Exhaust Ventilation, by Knowlton J Caplan, Michigan Dept of Health, and Allen D Brandt, Bethlehem Steel Co. Twenty-five states have only very general requirements concerning health conditions in industry.

Only six states have what may be regarded as a reasonably complete code or set of standards covering a number of typical operations or exhaust hood types. Two of these six require that

the area of the main duct equal combined area of all branches 20%. This criterion is held to be and inadequate.

The authors, after concluding analysis of the particular operation covered by codes, recommended specific and quantitative design criteria should not be included in legal regulations or in advisory standards. These should be incorporated in a greater flexibility in applying *ASHVE Paper.*

HEAT EXCHANGERS

The Effect of Baffle Height and Clearance on Heat Transfer and Pressure Drop in Heat Exchangers, by Byron E Short, University of Tennessee. Baffle height for a given weight of fluid flowing through the exchanger affects (1) velocity of fluid through the baffle opening (2) average velocity through the tube bundle (3) turbulence at the baffle and in the tube bundle.

As baffle height is increased, the traction effect of the fluid stream reduces through the baffle opening, but the core of the stream moves farther from the tube-bundle center. Turbulence also increases. In addition, the same fluid velocity through the baffle opening, heat transfer and pressure drop decrease with increased baffle height.

Baffle-to-shell clearance affects (Continued on page 138)

HOW TO OBTAIN COMPLETE TEXT

Material appearing in this month's briefs comes from one of these two sources:

American Society of Mechanical Engineers, annual meeting, Atlantic City, N. J., Dec. 1-5, 1947. Papers are identified by initials ASME and paper No. Available while supplies last at American Society of Mechanical Engineers, 39 W 39th St. New York, N. Y.

American Society of Heating and Ventilating Engineers, annual meeting, New York, N. Y., Feb. 14, 1948. Papers are identified by initials ASHVE. Available while supplies last at American Society of Heating and Ventilating Engineers, 51 Madison Ave, New York, N. Y.

having power GROWING PAINS?



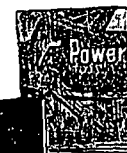
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