

referral to Schedule F which is issued by the *Bureau of Internal Revenue* and summarized in Table 2.

Interest

The interest charged to the cost of ownership may be based upon the average interest rate for the period during which the first cost of the equipment will be amortized. While some accountants do not include interest in the annual fixed charges and consider it a negligible item, the money invested in air conditioning, heating, or ventilating equipment, must be either borrowed or diverted from the owner's funds and converted to the

TABLE 2. PROBABLE USEFUL LIFE OF EQUIPMENT*

	LIFE IN YEARS
1. HEAT PRODUCING EQUIPMENT	
(a) Boilers.....	20
(b) Stokers and burners.....	20
2. HEAT DISTRIBUTING EQUIPMENT	
(a) Piping—copper.....	same as bldg.
(b) Piping—iron.....	20
(c) Radiation—concealed.....	25
(d) Radiation—direct.....	25
(e) Valves and specialties.....	10
3. AIR HANDLING EQUIPMENT	
(a) Filters—automatic.....	20
(b) Heating and cooling coils.....	20
(c) Spray humidifiers and dehumidifiers.....	10
(d) Fans.....	15
(e) Air conditioning units.....	10
(f) Motors.....	20
(g) Electrical starting equipment.....	20
(h) Pneumatic control systems.....	15
(i) Electric control systems.....	15
4. AIR DISTRIBUTING EQUIPMENT	
(a) Ductwork.....	same as bldg.
(b) Outlets, grilles.....	20
(c) Duct insulation.....	15
5. REFRIGERATING EQUIPMENT	
(a) Centrifugal refrigerating machines.....	20
(b) Reciprocating refrigerating machines.....	20
(c) Motors and starters.....	20
(d) Piping—copper.....	20
(e) Piping—steel.....	20
(f) Pumps.....	20
6. WATER SAVING DEVICES	
(a) Evaporative condensers.....	15
(b) Cooling towers.....	15
(c) Wells.....	25

* Taken from U. S. Bureau of Internal Revenue Schedule of Probable Useful Life, revised 1942.

purpose of making the installation. Whether it is borrowed or taken from surplus funds, the money that might have been earned as interest is properly chargeable to the operation of the system.

The formulas for computing interest and amortization are given in Table 3. This table also serves as a check list for the various items to be considered in calculating the cost of ownership and operation.

Taxes

The taxes which may be charged to the property as a result of the improvement due to the installation of an air conditioning system will vary according to the practice of the official agencies levying property taxes.

Insurance

Insurance against losses by fire is ordinarily secured by increasing the building fire insurance coverage to cover all or part of the first cost of installing the air conditioning and other mechanical systems. Various types of extended coverage are available for protection against a number of other types of losses.

Boiler insurance may be extended to cover the air conditioning equipment to protect against losses due to explosion, rupture of piping, and similar hazards. Since insurance rates vary widely depending upon the type of structure in which the equipment is located and the nature of the owner's business, the rates are usually set by rating organizations specializing

TABLE 3. OWNING AND OPERATING COST

FIRST COST	ANNUAL SERVICE COST
Cost of mechanical system.....	Electric Power Costs
Other costs.....	Fans.....
First Cost (FC)—Total.....	Pumps—Chilled water.....
ANNUAL FIXED CHARGES	Pumps—Condenser water.....
Amortization—Depreciation period.....	Pumps—Well water.....
Y years.....	Cooling tower fans.....
Interest rate 1%.....	Cooling tower pumps.....
Amortization and Depreciation.....	Refrigeration machines.....
FC.....	Miscellaneous or other.....
Y.....	Gas.....
Interest: $\frac{Y+1}{2Y} \times i \times \text{cost} =$	Coal.....
Taxes.....	Oil—for boilers or Diesel engines.....
Insurance.....	Steam.....
Rent.....	For Direct Heating.....
Annual Fixed Charges:	For Ventilation—preheaters.....
(Total).....	For Ventilation—reheaters.....
ANNUAL MAINTENANCE COSTS	For Turbine driven equipment.....
Replacement or servicing of air filters.....	For Engine driven equipment.....
Outside Maintenance service.....	Sewers.....
Water Treatment.....	Charges for discharging water into public drainage systems.....
Lubricating oil and grease.....	Condenser water.....
Painting for corrosion protection or other purposes.....	Annual Service Costs:
Replacement of worn parts.....	Total.....
Refrigerant.....	SUMMARY
Wages of engineer or operator.....	Annual Fixed Charges.....
Annual Maintenance Cost—Total.....	Annual Service Costs.....
	Annual Maintenance Costs.....
	Annual Owning and Operating Costs—Total.....

ing in this work. Exact figures on insurance cannot be determined without consultation with the owner's underwriter.

Rent

If the equipment under consideration is to be located in rented or leased quarters, or if additional space must be rented, such expense becomes a fixed charge.

MAINTENANCE COSTS

Maintenance charges consist of expense for labor and material necessary to make repairs and replace parts, as well as cleaning, painting, inspection, etc. for the purpose of eliminating or minimizing the need for repairs. Generally, routine maintenance labor requirements will be the function of an operating engineer or staff. If the responsibility of this group may