Replaced Register, June 1983, Register # 330

PART IV—HEATING AND AIR-CONDITIONING EQUIPMENT AND SYSTEMS

Ind 63.20 Equipment efficiencies. (1) ELECTRICAL EQUIPMENT. All electrical heating and cooling equipment shall comply with the minimum coefficients of performance (COP) or energy efficiency ratios (EER) established in this section.

(a) *Air-conditioning equipment.* Air-conditioning equipment shall have minimum EER and COP values as indicated in Table 63.20-A.

(b) *Heat pumps.* Heat pumps in the cooling mode shall have EER and COP values as indicated in Table 63.20-A based on the standard rating conditions specified in Table 63.20-B. Heat pumps in the heating mode shall be rated at

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TABLE 63.20-A

MINIMUM EER AND COP FOR ELECTRIC HEATING, VENTILATING AND AIR-CONDITIONING SYSTEM EQUIPMENT, COOLING MODE†

Standard Rating Capacity	EER	COP
Under 65,000 Btu/hour (19,050 watts)	6.8	2.0
65,000 Btu/hour (19,050 watts) and over	7.5	2.2

†Adapted from Table 6.2, ASHRAE Standard 90-75, Energy Conservation in New Building Design (The American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 345 East 47th St., New York, NY 10017).

TABLE 63.20-B

HVAC SYSTEM EQUIPMENT STANDARD RATING CONDITIONS†—COOLING††

Item	Temperatures			
	Dry Bulb	Wet Bulb	Inlet	Outlet
Air Entering Equipment °F (°C)	80 (26.7)	67 (19.4)	—	—
Condenser Ambient (Air Cooled) °F (°C)	95 (35.0)	75 (23.9)	—	—
Condenser Water (Water Cooled) °F (°C)	—	—	85 (29.4)	95 (35.0)

†Standard ratings are at sea level.

††Reproduced with permission from ASHRAE Standard 90-75, Energy Conservation in New Building Design (The American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 345 East 47th St., New York, NY 10017).

TABLE 63.20-C

MINIMUM COP FOR HEAT PUMPS, HEATING MODE†

Source and Outdoor Temperature °F	Minimum COP
Air Source (return air 70° F) 47 db/43 wb	2.5
Air Source (return air 70° F) 17 db/15 wb	1.5
Water Source 60° Entering (return air 70°F)	2.5

†Adapted from Tables 6.7 and 6.8 ASHRAE Standard 90-75, Energy Conservation in New Building Design (The American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 345 East 47th St., New York, NY 10017).

(2) COMBUSTION HEATING EQUIPMENT. All gas-fired and oil-fired heating equipment shall have a minimum combustion efficiency of 75% at maximum rated output.

(3) HEAT-OPERATED EQUIPMENT, COOLING MODE. Heat-operated cooling equipment shall have a COP cooling not less than the values shown in Table 63.20-D when tested at standard rating conditions. These requirements apply to, but are not limited to, absorption equipment, engine-driven equipment and turbine-driven equipment.

(4) ELECTRICALLY OPERATED SYSTEMS COMPONENTS, COOLING MODE. Components of heating, ventilating and air-conditioning systems having entirely electric energy input shall have a COP cooling not less than the values shown in Table 63.20-E when tested at the standard conditions shown in Table 63.20-F.

TABLE 63.20-D

MINIMUM COP FOR HEATING, VENTILATING AND AIR-CONDITIONING SYSTEMS, HEAT-OPERATED COOLING EQUIPMENT†

Heat Source	Minimum COP
Direct-fired (gas, oil)	0.48
Indirect-fired (steam, hot water)	0.68

†Adapted from Table 6.6 ASHRAE Standard 90-75, Energy Conservation in New Building Design (The American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 345 East 47th St., New York, NY 10017).

TABLE 63.20-E

MINIMUM COP FOR ELECTRICALLY DRIVEN HEATING, VENTILATING AND AIR-CONDITIONING SYSTEM COMPONENTS†

Component	Condensing Means	Air		Water		Evaporative	
		EER	COP	EER	COP	EER	COP
Self-Contained Water Chillers	Centrifugal	7.8	2.3	13.6	4.0	—	—
	Positive Displacement	7.5	2.2	11.6	3.4	—	—
Condenserless Water Chillers	Positive Displacement	9.5	2.8	11.6	3.4	—	—
Compressor and Condenser Units 65,000 Btu/hour (19,050 watts and over)	Positive Displacement	8.5	2.5	11.9	3.5	11.9	3.5

†Adapted from Tables 6.4 and 6.5 ASHRAE Standard 90-75, Energy Conservation in New Building Design (The American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 345 East 47th St., New York, NY 10017).

TABLE 63.20-F

APPLIED HVAC SYSTEM COMPONENTS STANDARD RATING CONDITIONS†—COOLING††

Item			Centrifugal or Self-Contained Reciprocating Water Chiller	Condenserless Reciprocating Water Chiller
Leaving Chilled Water Temp		°F	44	44
Entering Chilled Water Temp		°F	54	54
Leaving Condenser Water Temp		°F	95	—
Entering Condenser Water Temp		°F	85	—
Fouling Factor, Water				
Nonferrous Tubes		*	0.0005	0.0005
Steel Tubes		*	0.0010	0.0010
Fouling Factor, Refrigerant		*	0.0000	0.0000
Condenser Ambient (Air or Evap. Cooled)		°F	95 db/75 wb	—
Compressor Saturated	Water Cooled (or Evap. Cooled)	°F	—	105
Discharge Temp	Air Cooled	°F	—	120

†Standard ratings are at sea level.

* $\frac{°F \text{ Sq. Ft. Hour}}{\text{Btu}}$

††Adapted from Table 6.3, ASHRAE Standard 90-75, Energy Conservation in New Building Design (The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc., 345 East 47th St., New York, NY 10017).

History: Cr. Register, May, 1978, No. 269, eff. 7-1-78; am. tables A, C, D and E, Register, January, 1980, No. 289, eff. 2-1-80.

Register, December, 1981, No. 312
Building and Heating,
Ventilating and Air Conditioning

Ind 63.21 Controls. (1) ZONE HEATING AND COOLING. Simultaneous heating and cooling by reheating or recooling supply air or by concurrent operation of independent heating and cooling systems serving a common zone shall be in accordance with the following:

(a) *Reheat systems:* Single zone reheat systems shall be controlled to sequence reheat and cooling. Multiple reheat systems serving multiple zones, other than those employing variable air volume for temperature control, shall be provided with controls that will automatically reset the system cold air supply to the highest temperature level that will satisfy the zone requiring the coolest air.

(b) *Dual duct and multi-zone systems.* These systems shall be provided with control(s) that will automatically reset:

1. The cold deck air supply to the highest temperature that will satisfy the zone requiring the coolest air, and

2. The hot deck air supply to the lowest temperature that will satisfy the zone requiring the warmest air.

(c) *Recooling systems:* Systems in which heated air is recooled, directly or indirectly, to maintain space temperature shall be provided with controls that will automatically reset the temperature to which the supply air is heated to the lowest level that will satisfy the zone requiring the warmest air.

1. *Exception.* A multiple zone heating, ventilating and air-conditioning system that employs reheating or recooling for control of not more than 5,000 cfm or 20% of the total supply air of the system, whichever is less, shall be exempt from the supply air temperature reset requirements of s. Ind 63.21 (1) (a), (b) and (c).

(d) Heat pump supplemental heater. The heat pump shall be installed with a control to prevent simultaneous operation of a supplemental heater when the heating load can be met by the heat pump alone. A two-stage thermostat, which controls the supplementary heat on its second stage, will be accepted as meeting this requirement. The cut-on temperature for the compression heating shall be higher than the cut-on temperature for the supplementary heat, and the cut-off temperature for the compression heating shall be higher than the cut-off temperature for the supplementary heat.

Note: Supplemental heater operation is permitted during transient periods, such as start-ups, following room thermostat set point advance, and during defrost.

(2) CONCURRENT OPERATION. Concurrent operation of independent heating and cooling systems serving common spaces and requiring the use of new energy for heating or cooling shall be minimized by one or both of the following:

(a) Providing sequential temperature control of both heating and cooling capacity in each zone;

(b) Limiting the heating energy input through automatic reset control of the heating medium temperature (or energy input rate) to only that necessary to offset heat loss due to transmission and infiltration and, where applicable, to heat the ventilation air supply to the space.