

Cooling Load Check Figures

Classifications	Occupancy m ² /Person			Lights and other Electrical Watts/m ²			Refrigeration m ² /kW†			Supply Air Rate L/s m ²								
	Lo	Av	Hi	Lo	Av	Hi	Lo	Av	Hi	East-South-West			North			Internal		
										Lo	Av	Hi	Lo	Av	Hi	Lo	Av	Hi
Apartment, High Rise	30.2	16.3	9.3	7.5	9.7	11.8	11.9	10.6	9.2	4.1	6.1	8.6	2.5	4.1	8.6	0.0	0.0	0.0
Auditoriums, Churches, Theaters	1.4	1.0	0.6	5.4	7.5	9.7	10.6	6.6	2.4	-	-	-	-	-	-	5.1	10.2	15.2
Educational Facilities	2.8	2.3	1.9	8.1	10.8	11.8	6.3	4.9	4.0	10.2	8.1	11.2	4.6	6.6	10.2	4.1	6.1	9.7
Schools, Colleges, Universities	4.6	3.3	2.3	27†	43†	59†	6.3	4.0	2.4	-	-	-	-	-	-	10.2	18.3	27.9
Factories Assembly Areas	18.6	13.9	9.3	81†	97†	118†	5.3	4.0	2.6	-	-	-	-	-	-	8.1	12.7	19.3
Light Manufacturing	27.9	23.2	18.6	129†	269†	323†	2.6	2.1	1.6	-	-	-	-	-	-	12.7	20.3	33.0
Heavy Manufacturing*	7.0	4.6	2.3	5.4	8.1	10.8	7.3	5.8	4.4	5.1	7.6	10.2	4.1	6.1	7.1	3.6	5.1	5.6
Patient Rooms	9.3	7.4	4.6	5.4	8.1	10.8	4.6	3.7	2.9	5.1	6.4	7.4	5.1	5.6	6.1	4.8	5.1	5.6
Public Areas	18.6	13.9	9.3	5.4	8.1	10.8	9.2	7.9	5.8	5.1	7.1	7.6	4.6	6.1	7.1	-	-	-
Hospitals	7.4	5.6	3.7	5.4	8.1	10.8	9.0	7.4	5.3	5.1	8.1	10.7	4.6	5.6	6.6	4.6	5.1	5.6
Hotels, Motels, Dormitories	12.1	10.2	7.4	22†	27†	43†	9.5	7.4	5.0	5.1	8.1	11.2	4.6	6.6	10.2	4.1	5.1	6.1
Libraries and Museums	13.9	11.6	9.3	5.4	8.1	10.8	-	-	-	6.1	9.1	12.2	5.6	7.6	9.1	4.1	6.1	7.1
Office Buildings (General)	9.3	7.9	6.5	10.8	13.5	16.1	-	-	-	-	-	-	-	-	-	4.6	6.6	10.2
Private Offices	55.7	37.2	18.6	5.4	10.8	16.1	15.8	13.2	10.0	4.1	6.1	8.1	2.5	4.1	6.6	-	-	-
Stenographic Department	55.7	33.4	18.6	5.4	10.8	16.1	18.5	14.5	10.6	3.6	5.6	7.1	2.5	3.6	6.1	-	-	-
Residential	1.6	1.4	1.2	5.4	10.8	16.1	3.6	2.6	2.1	9.1	12.2	18.8	6.1	8.1	10.7	4.6	5.6	7.1
Large				5.4	10.8	16.1	4.0	3.2	2.6	7.6	10.2	15.2	5.6	7.1	9.1	4.6	5.1	6.6
Medium				5.4	10.8	16.1	4.0	3.2	2.6	7.6	10.2	15.2	5.6	7.1	9.1	4.6	5.1	6.6
Large				5.4	10.8	16.1	4.0	3.2	2.6	7.6	10.2	15.2	5.6	7.1	9.1	4.6	5.1	6.6
Medium				5.4	10.8	16.1	4.0	3.2	2.6	7.6	10.2	15.2	5.6	7.1	9.1	4.6	5.1	6.6
Shopping Centers, Department Stores and Specialty Shops	4.2	3.7	2.3	32.3†	53.8†	96.9†	6.3	4.2	2.8	7.6	13.2	21.3	5.6	8.6	13.2	4.6	6.6	10.2
Beauty and Barber Shops																		
Malls	9.3	7.0	4.6	10.8	16.1	21.5	9.6	6.1	4.2	-	-	-	-	-	-	5.6	9.1	12.7
Refrigeration for Central Heating and Cooling Plant																		
Urban Districts																		
College Campuses																		
Commercial Centers																		
Residential Centers																		

Refrigeration and air quantities for applications listed in this table of cooling load check figures are based on all-air system and normal outdoor air quantities for ventilation except as noted.

*Air quantities for heavy manufacturing areas are based on supplementary means to remove excessive heat.

†Refrigeration loads are for entire application.

Notes:

**Summary of Load Sources and Equations for
Estimating Space Design Cooling Load**

Load Source	Equation	Reference, Table, Description
External Roof	$q = UA(\text{CLTD})$	Design heat transmission coefficients, pp. 148-155 Areas calculated from plans, CLTD, pp. 156-157
Walls	$q = UA(\text{CLTD})$	Design heat transmission coefficients, pp. 148-156 Areas calculated from plans, CLTD, pp. 158-160
Glass Conduction	$q = UA(\text{CLTD})$	Glass area calculated from plans CLTD for conduction load through glass, p. 145
Glass Solar	$q = A(\text{SC})\text{SCL}$	Net glass area from plans Shading coefficient for combination of glass and internal shading, p. 161 Externally shaded glass, use north orientation Compute shaded area from building projections
Partitions, Ceilings, Floors	$q = UA(\text{TD})$	Design heat transmission coefficients, pp. 148-155 Area calculated from plans
Internal Lights	$q = \text{INPUT}$	Input rating from electrical plans or lighting fixture data, pp. 163-165
People Sensible	$q_s = \text{No. (Sens. H.G.) CLF}$	Number of people in space Sensible heat gain from occupants, p. 162
Latent	$q_l = \text{No. (Lat. H.G.)}$	Latent heat gain from occupants
Appliances	$q_s = \text{HEAT GAIN}$	Recommended rate of heat gain, pp. 167-174
Power	$q = \text{HEAT GAIN}$	p. 166
Infiltration Air	$Q = L/s$	
Sensible	$q_s = 1.20 Q \Delta t$	Inside-outside air temperature difference, °K
Latent	$q_l = 3.0 Q \Delta W$	Inside-outside air humidity ratio differ- ence, g/kW
Total	$q = 1.20 Q \Delta h$	Inside-outside air enthalpy difference psychrometric data, kJ/kg

CAUTION: Approximate data—Use for preliminary computations only. See ASHRAE *Cooling and Heating Load Calculation Applications Manual* (Spitler 2008) and *Load Calculation Toolkit*.