

Selection of AIR FLOW to cool an apparatus

P : represents the power to be dissipated (in watts)

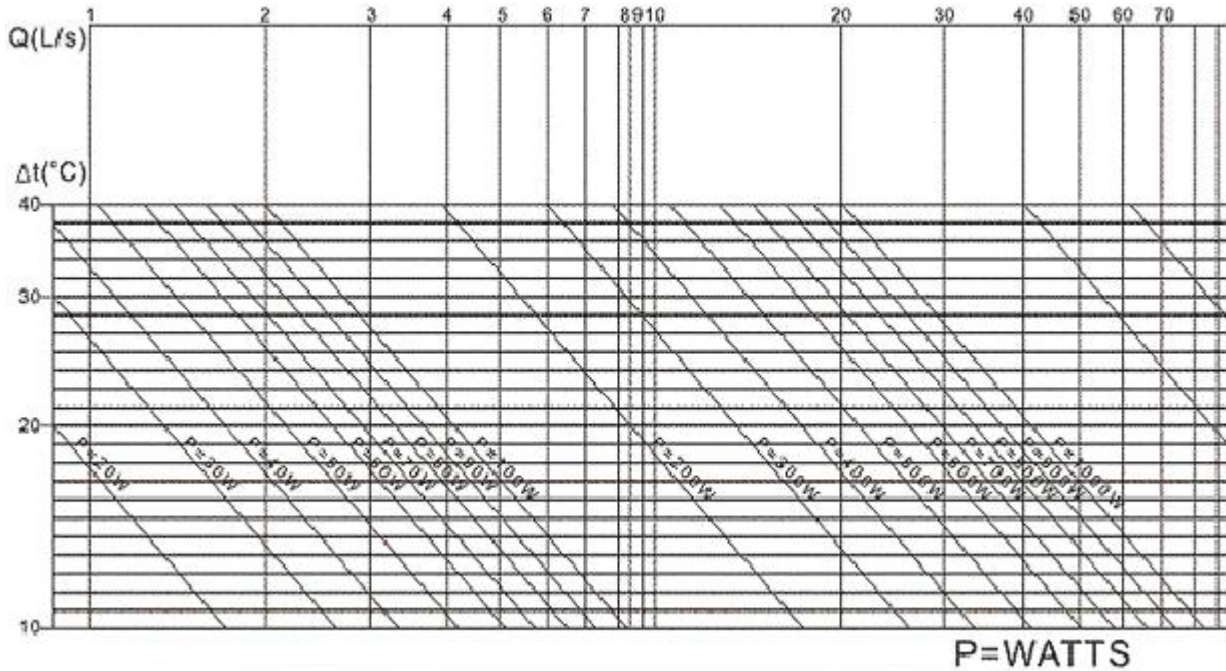
Δt : represents the temperature difference between internal temperature of the equipment and ambient temperature

Q : represents the air flow of the fan = $P(w)1.2X\Delta t$ L/s

THE AIR FLOW IS DETERMINED BY THE PROJECTION ON THE GRAPH BELOW FROM THE INTERSECTION POINT OF THE LINES AND Δt ON THE AIR FLOW SCALE.

Example given a power to dissipate of 400 W and t of 10°C

REQUIRED AIR FLOW TO COOL = 34 L/s = 72 CFM



Conversion Chart

(CFM = L/s x 0.0353 x 60)

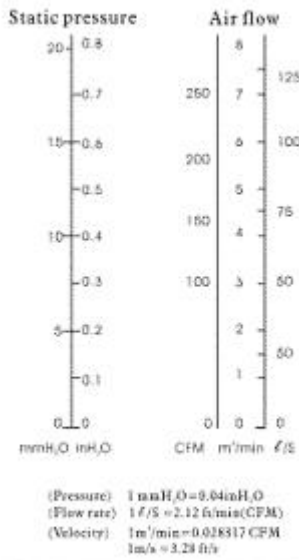
L/s	1	2	3	4	5	6	7	8	9	10	15	20
CFM	2.2	4.24	6.35	8.48	10.6	12.7	14.8	16.9	19	21	31.8	42.2
CMM	0.06	0.12	0.18	0.24	0.3	0.36	0.42	0.48	0.54	0.59	0.9	1.2
CMH	3.73	7.2	10.8	14.4	18	21.6	25.1	28.7	32.2	35.6	54	72
L/s	25	30	35	40	45	50	60	70	80	90	100	
CFM	53	63.5	74	85	95	106	127	148	169	190	212	
CMM	1.5	1.8	2.09	2.4	2.69	3	3.59	4.19	4.78	5.37	6	
CMH	90	108	126	144	161	180	216	251	287	322	360	

CONVERSION°C = $^{\circ}F - 321.8^{\circ} = ^{\circ}C \times 1.8 + 32^{\circ}F$

C	10	15	20	25	30	35	40	45	50	60	70	75
F	50	68	77	86	95	104	113	122	140	149	158	167

Air Measurement

Conversion chart



Determination of the air performance curves is obtained by using the double chamber method based on AMCA standard. The difference between the pressures before and after the nozzle (differential pressure P_n) is measured so as to obtain the air flow at the nozzle and the different pressure between those in the two chambers (static pressure P_s). The air flow is calculated from the differential pressure by using equation (A). The auxiliary blower enables to cancel out the aerodynamic resistance.

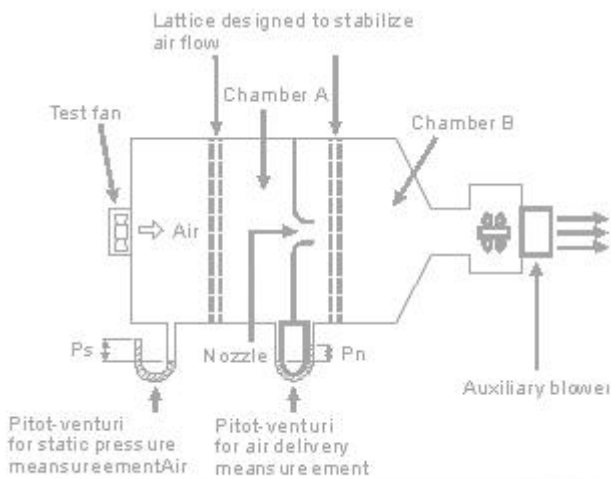
$$Q = 60 AV \dots (A)$$

where

Q: Air flow rate (m³/ min)

A: Nozzle sectional area = $\pi D^2 / 4$

V: Average flow velocity from nozzle



r: Specific gravity (kg / m³) of air (r = 1.2 kg / m³ at 20°C, 1atm)

g: Gravitational acceleration = 9.8 m/s²

P_n: Differential pressure mm H₂O)

P_s: Static pressure (mm H₂O)

Table of Temperature Vs. Air Flow

P(KW)		0.1	0.25	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0
ATc°C	ATT°F										
50	122	3.5	9	18	35	53	70	88	105	141	176
45	113	4	10	20	39	59	78	98	117	156	195
40	104	6.6	11	22	44	66	88	110	132	176	220
35	95	7.5	12.5	25	50	75	100	125	151	201	251
30	86	9	15	29	59	88	117	146	176	234	293
25	77	11	18	35	75	105	141	176	211	281	351
20	68	13	22	44	88	132	176	220	264	351	439
15	59	18	29	59	117	176	234	293	351	469	586
10	50	26	44	88	176	264	351	439	527	704	879
5	41	53	88	176	351	527	704	879	1055	1406	1758