

Determining Requirements for Sizing Vortex Tubes and CNC Coolers

1. Size the heat load area of the cabinet using the following formula:

$$(2 * W + 2 * D) \text{ Height} = \text{square feet of cabinet}$$

Example: 3' wide, 1' deep, 4' high = 32 square feet

2. Determine inside temperature reading for maximum hotter outside temperatures:

Example: If reading is taken on a 70°F day and the cabinet temperature reads 110°F, add 25°F for maximum outside temperatures. If the electronics will be operating during a summer day add more if it will get hotter.

3. 90°F (32°C) is a safe operating temperature for most electronics to reduce heat stress on the controls and drying of the wafer boards.

4. Subtract the temperature of 90°F as the desired temperature inside the cabinet from the temperature reading in step 2 to determine the temperature difference, or Delta T.

5. Use the square area of your cabinet readings on the left side of the scale and match it with the temperature difference from step 4 on the top of the sizing chart.

6. The intersection of these two numbers will give you the BTUs required to maintain the desired 90°F inside temperature.

Example: Cabinet size is 32 square feet , Maximum heat on a hot day is 135° F, Delta T is 45°F The BTUs required to cool my enclosure is 550. A 10 cfm vortex cooler will work.

Sizing Chart		BTU Requirements for Cooling Inside temperature drop needed to safe 90°F (32°C)				
Delta T		90°F	70°F	50°F	30°F	10°F
Cabinet size in Feet	Sq Ft					
2' H x 2' W x 2' D	16	500	350	150	50	50
3' H x 3' W x 2' D	30	1100	800	450	150	100
4' H x 3' W x 1' D	32	1300	900	550	150	100
5' H x 3' W x 1' D	40	1600	1100	700	150	100
5' H x 4' W x 1' D	50	2200	1400	900	300	150
5' H x 4' W x 2' D	60	2600	1800	1100	500	200
5' H x 5' W x 2' D	70	3000	2100	1300	600	200
6' H x 4' W x 2' D	72	3100	2200	1400	700	200
6' H x 5' W x 2' D	84	3600	2600	1600	750	200
6' H x 6' W x 2' D	96	4200	3000	1900	900	200
7' H x 6' W x 2' D	112	4800	3500	2200	1000	200
7' H x 7' W x 2' D	126	5800	4100	2600	1300	250
8' H x 7' W x 8' D	144	6500	4600	2900	1450	300
8' H x 8' W x 2' D	160	7000	5200	3300	1650	350
8' H x 10' W x 2' D	192	8800	6400	5200	2100	450

Green = 10 cfm Red= 15 cfm Blue= 25 cfm Yellow= 35 cfm Orange= Quantity of (2) 35 cfm units

Delta T	50°C	39°	28°C	17°C	6°C
Square meters					
1.49	126	88	38	13	13
2.79	280	202	113	38	25
2.97	330	227	139	38	25
3.72	405	280	176	38	25
4.65	555	353	227	75	38
5.6	655	454	280	126	50
6.50	756	530	328	151	50
6.69	781	555	353	176	50
7.80	907	655	403	189	50
8.92	1058	756	480	227	50
10.40	1210	882	554	252	50
11.71	1462	1033	655	328	63
13.38	1638	1159	730	365	76
14.86	1764	1310	832	416	88
17.84	2218	1612	1310	530	113