SELECTION OF A COOLING FAN

The following points should be considered when selecting a cooling fan:

1. Determine the amount of heat generated inside the equipment.
2. From the equipment maker's data, find the maximum permissible equipment temperature.
3. Calculate the air volume necessary from the equation.
4. Select the fan from the performance curves shown in the specification sheets.

The volume of airflow required to cool the equipment can be determined if the internal heat dissipation and the total allowable temperature rise are known.
The basic heat transfer equation is:

$Q = Cp \times W \times \Delta T$

Where:

Q = Amount of heat transferred
Cp = Specific heat of air
ΔT = Temperature rise within the cabinet
W = Mass flow = CFM x D
Where: D= Air Density
and CFM is cubic feet / min

By substitution, we obtain:

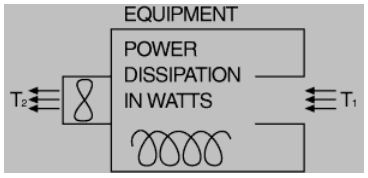
$$\text{Air Flow in CFM} = \frac{Q}{Cp \times D \times \Delta T}$$

Then we get the following equations:

$$\text{Air Flow in CFM} = \frac{3.16 \times P}{\Delta Tf} = \frac{1.76 \times P}{\Delta Tc}$$

$$\text{Air Flow in m}^3\text{/min} = \frac{0.09 \times P}{\Delta Tf} = \frac{0.05 \times P}{\Delta Tc}$$

P: Internal power dissipation in watts
ΔTf : Allowable temperature rise in °F
ΔTc: Allowable temperature rise in °C
ΔT: T2 –T1 (T1: Incoming airflow temperature, T2: Outgoing airflow temperature)
1 m^3 / min = 35.315 CFM (Cubic Feet / min)



COOLING OF HEAT GENERATING EQUIPMENT

Example 1: If internal power dissipation is 1500 Watts and ΔT is 50 °F

$$\text{Air Flow in CFM} = \frac{3.16 \times 1500}{50}$$

= 94.8 CFM or 2.68 m^3 / min

Example 2: If internal power dissipation is 1000 Watts and ΔT is 20 °C

$$\text{Air Flow in m}^3\text{/min} = \frac{0.05 \times 1000}{20}$$

= 2.5 m^3 / min (or 88.3 CFM)

(See also HOW TO MEASURE THE IMPEDANCE OF YOUR SYSTEM)

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