CALCULATE AIR LEAKAGE RATES

The air leakage in a vacuum system should be determined when sizing the vacuum pump by using the following method:

1. Install an accurate absolute pressure vacuum gauge, measuring in Torr (mm Hg absolute).
2. Calculate the total volume of the vacuum system in cubic feet.
3. Pump down the system below the minimum required operating pressure.
4. While the vacuum pump is running, close the inlet valve.
5. Stop the vacuum pump.
6. Note the rate of pressure rise on the absolute vacuum gauge over a period of 30 minutes. The following equation can be used to calculate the pump capacity required to handle the leakage rate:

$Q = (Pr \times V) / (T \times Po)$ in which

Q = Pump capacity at operating pressure (ACFM)
Pr = Pressure rise (Torr)
V = Total system volume (ft^3)
T = Time (minutes)
Po = System operating pressure

Example:
A system with a volume of 1,000 ft^3 has a pressure rise from 25 - 75 Torr in 30 minutes. The system design operating pressure is 60 Torr.

$$Q = ((75 - 25)1,000) / (30 \times 60) = 27.7 \text{ ACFM}$$

A capacity of 27.7 ACFM at 60 Torr is required to overcome just the air leakage in the system. This capacity must be added to the capacity required to handle the process.

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