Find the airflow in FPM if 1,000 CFM is passing through an 18 inch by 18 inch duct.

Step 1: Find duct area in square feet: 18 × 18 = 324 in2; 324 ÷ 144 = 2.25 ft2

Step 2: 1,000 CFM ÷ 2.25 ft2 = 444.44 FPM

Find the airflow in FPM if 1,000 CFM is passing through a round duct with an 18 inch diameter.

Step 1: Find duct area in square feet: πr2 = π × 92 in2; 254.34 ÷ 144 = 1.766 ft2

Step 2: 1,000 CFM ÷ 1.766 ft2 = 566.25 FPM

If you have a velocity of 444 FPM through a 18” square duct at sea level, find the velocity pressure.

VP = (FPM ÷ 4,005 × ACF)2

VP = 444 ÷ 4,005 × 1)2 = 0.0123 (rounded off)

If you have a velocity of 566 FPM through a 18” diameter round duct at sea level, find the velocity pressure.

VP = (FPM ÷ 4,005 × ACF)2

VP = 566 ÷ 4,005 × 1)2 = 0.02 (rounded off)

The loss coefficient for a fitting was calculated at 1.3 and the velocity pressure is 0.02. What is the loss item or total pressure drop across the fitting?

Loss item = VP × loss Coefficient

Loss item = 0.02 × 1.3 = 0.26

The loss coefficient for a fitting was calculated at 0.001 and the velocity pressure is 0.0123. What is the loss item or total pressure drop across the fitting?

Loss item = VP × loss Coefficient

Loss item = 0.001 × 0.0123 = 0.0000123

What is the loss item or total pressure drop across a 10 foot long duct with a friction rate per 100ft of 0.045?

Loss item = Duct Length × f/100 ÷ 100

Loss item = 10 × 0.045 ÷ 100 = 0.0045

What is the loss item or total pressure drop across a 200 foot long duct with a friction rate per 100ft of 0.03?

Loss item = Duct Length × f/100 ÷ 100

Loss item = 200 × 0.03 ÷ 100 = 0.06

Field Notes:

Technicians should be able to identify imbalances in exhaust and makeup air by simply verifying airflow directions. Technicians can use a piece of tissue or a smoke pencil to identify airflow paths and the relative building pressures they indicate. Most commercial buildings have an airflow related problem somewhere within their walls. Understanding how the systems work together is very important before making an adjustment to any of the components.