

AIRFOIL PITOT™

Improves Fume Hood Containment:

- ▼ Maintains constant face velocity over a range of sash positions, whether the movement is horizontal or vertical
- ▼ Isolates hood from room pressure variations
- ▼ Isolates hood from exhaust duct static pressure variations
- ▼ Detects and corrects for high molecular weight gasses in hood
- ▼ Minimizes the effect of external disturbances

Saves Energy:

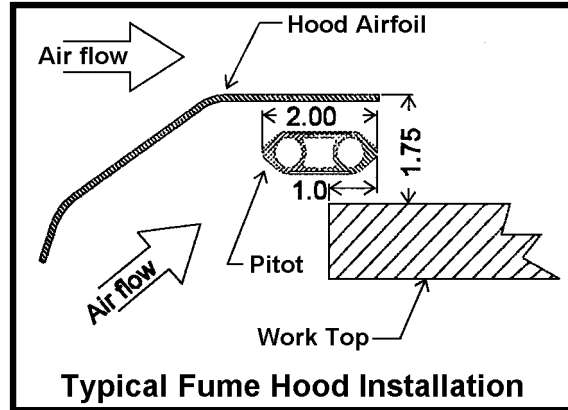
- ▼ Allows operation at minimum safe face velocity

The Airfoil Pitot™ (AF-AFP) is a combination of a Parallel Plate Pitot (AF-PPP) and a hood airfoil that can be used to measure hood face velocity. (Please refer to the AF-PPP datasheet for details.) For installation, approximately 0.5 in. (13 mm) clearance is required between the table top and pitot and between the pitot and the bottom of the airfoil. This normally requires raising the airfoil by about 0.75 in (19 mm). The resulting installation is simple, transparent to the user, and does not interfere with hood operation.

The AF-PPP is designed to measure air velocities down to approximately 30 fpm (0.15 m/s). The pitot must be used with an ultra-low differential pressure transmitter utilizing Slack Membrane™ techniques such as the FVR-1a. This FVR-1a is a true differential pressure transmitter and does not use thermal techniques. Its most common setting of 1.5 in-mil wc (0.375 Pa) full-scale corresponds to a control range for 65 to 115 fpm (0.33 to 0.58 m/s), between 25 and 75% full-scale.

The AF-AFP samples the air-flow into the hood at approximately 10 in. (2.54 cm) intervals across the face of the hood on a 60 in. (1.52 m) opening. All openings, whether on the left, middle, or right side of the hood are given the same weight in flow sensing. Fume hoods with up to 12 ft. (3.66 m) openings can be accommodated by this method.

Typical installation, as shown in the above figure, gives an AFC (airfoil coefficient - refer to Calculations) of approximately 0.88 in still air on a 6 ft. (1.83 m) fume hood with a 2 ft. (0.61 m) opening when compared to exhaust duct volume. (This ratio may change by as much as 30% in



turbulent air.) The AFC is somewhat dependent on sash opening due to changes in the hood entrance coefficient; however, the typical average deviation is less than 2% (refer to Airfoil Coefficient vs. Sash Position). Installation, airfoil, and hood design can cause this number to vary between 0.75 and 1.1. These values are somewhat hood dependent; they should always be confirmed on a particular hood. Pitots over 72 in. (1.8 m) require tubing connections on both ends that joined prior to the transmitter.

CALCULATIONS

The AFC is the ratio between the entrance coefficient of the hood and the entrance coefficient of the airfoil. A number less than 1 infers that the air flows under the airfoil easier than it flows into the hood. AFC is hood and installation dependent. The pitot should be completely installed and firmly fixed in place before any calibration is attempted. The graph Airfoil Coefficient vs. Sash Position is taken from a typical 6 ft. (6 m) hood and indicates the sensitivity of the Airfoil Pitot™ to vertical sash movement. There is minimal sensitivity to horizontal movement. Full open is 28 in. (0.7 m) and the bypass starts to open below 10 in. (0.25 m). Hood baffle adjustment may also affect the AFC by a small amount.

The equation for face velocity (fpm) and pressure (in. wc) at standard conditions is:

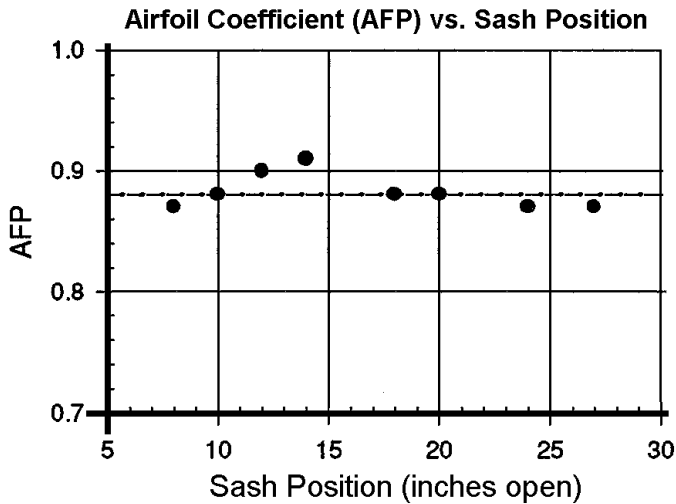
$$V_{FACE} = AFC \times 4005 \sqrt{\Delta\rho}$$

For a face velocity of 100 fpm, using an AFC of 0.88:

$$\Delta\rho = \left(\frac{V_{FACE}}{AFC \times 4005} \right)^2 = \left(\frac{100}{0.88 \times 4005} \right)^2 = 0.81 \text{ in - mil wc}$$

AF-AFP

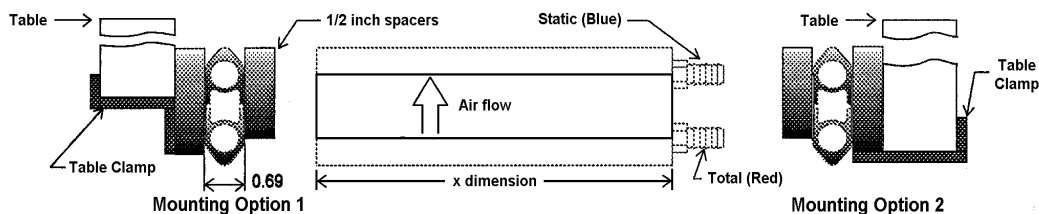
SAMPLE SIX-FOOT FUME HOOD



Average Deviation = 1.1%
Standard Deviation = 1.4%
Average = 0.88
Maximum Deviation from Average = 3.1%

INSTALLATION

- ▼ Remove the airfoil from the hood.
- ▼ Remove stand off from the airfoil.
- ▼ Drill holes with the template provided for the total and static ports.
- ▼ Clamp pitot to work table.
- ▼ Install airfoil by laying it on top of the pitot and drilling new mounting holes in the new raised location. Some hoods require the fascia to be cut if the airfoil is located beneath - please refer to the hood's specific installation instructions.



ORDERING INFORMATION

The AF-AFP is ordered by the hood's approximate inside width. Some 6 ft. (1.8 m) hoods have inside widths of only 60 in. (1.5 m) while others have as much as 63 in. (1.6 m). For power cord clearance, the pitot should be a minimum of 2 in. (5 cm) shorter than hood inside width. Table clamp requires 1.25 in. (3.2 cm) work top with a minimum 1 in. (2.5 cm) overhang. Pitot requires 3/8 in. ID tubing. The last two digits of the part number are the standard length in inches. The unit may be field-trimmed to desired length.

STANDARD SIZES

- ▼ AF-AFP2-84: 8 ft. (2.4 m) hood, 7 ft. (2.1 m) nominal inside
- ▼ AF-AFP2-60: 6 ft. (1.8 m) hood, 5 ft. (1.5 m) nominal inside
- ▼ AF-AFP2-48: 5 ft. (1.5 m) hood, 4 ft. (1.2 m) nominal inside
- ▼ AF-AFP2-36: 4 ft. (1.2 m) hood, 3 ft. (0.9 m) nominal inside

WORLD HEADQUARTERS

American Auto-Matrix
One Technology Lane
Export, Pennsylvania 15632-8903 USA
Tel (1) 724-733-2000
Fax (1) 724-327-6124
Email aam@aamatrix.com
www.aamatrix.com



AMERICAN AUTO-MATRIX®

part no. 1E-05-00-0060