

DESCRIPTION

The Airfoil Pitot (AF-AFP) is a Parallel Plate Pitot for use under a hood airfoil that can be used to measure hood face velocity. 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-AFP is designed to measure air velocities down to approximately 50 fpm. The pitot must be used with an ultra-low differential pressure transmitter utilizing Slack Membrane™ techniques such as the AF-FVR-1a. This AF-FVR-1a is a true differential pressure transmitter and does not use thermal techniques. It's 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 airflow 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 and is suitable for hoods having compound sash configurations

CALCULATIONS

The Airfoil Coefficient (AFC) is the ratio between the entrance coefficient of the hood and the entrance coefficient of the airfoil. A number less than 1 infers the air flows under the airfoil easier than it flows into the hood. The 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 (on back) is taken from a typical 6 ft (6 m) hood and indicates the sensitivity of the Airfoil Pitot to vertical sash movement.

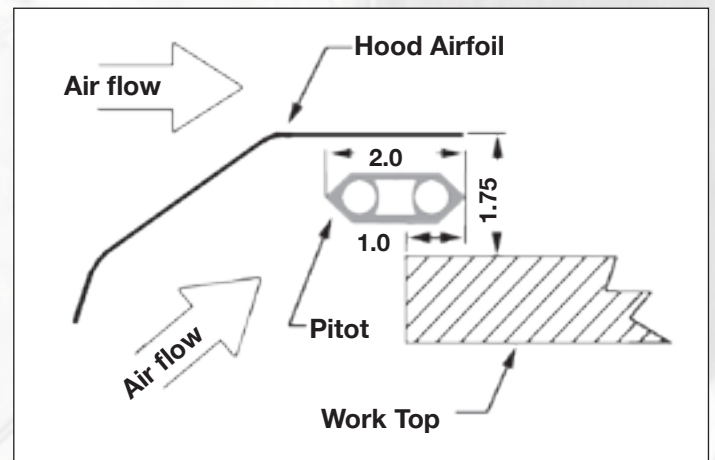
There is minimal sensitivity to horizontal movement. Full open is 28 in. (0.7 m) and the bypass starts to open below 10 in. (0.25 m). Hood baffle adjustment may also effect the AFC by a small amount.

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

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

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

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

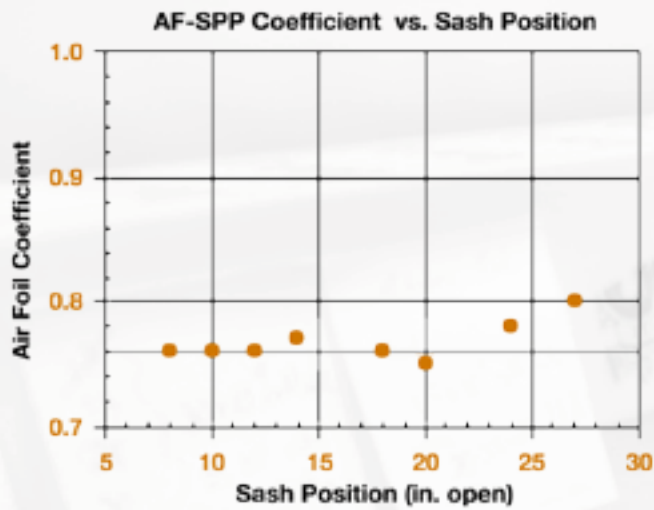


TYPICAL INSTALLATION

Typical installation, as shown in the above figure, gives an AFC (airfoil coefficient - refer to Calculations at left) 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 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%. 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 are joined prior to the transmitter.



Average Deviation = 1.2%
 Maximum Deviation From Average = 4.2%

Standard Deviation = 1.5%
 Average = 0.77

- ▼ Remove the airfoil from the hood
- ▼ Remove standoff from the airfoil
- ▼ Drill holes with the template provided for the total 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 hoods' maximum inside width. Some 6 ft (1.83 m) hoods have an inside width of only 60 in. (1.52 m) while others are as wide as 63 in. (1.60 m). For power cord clearance, the pitot should be a minimum of 2 in. (5 cm) shorter than the inside width of the hood. Table clamp requires 1.25 in. (3.2 cm) work top with a minimum of 1 in. (2.5 cm) overhang. Pitot requires 3/8 in. tubing. The last two digits of the part number are the standard length in inches.

AF-AFP2-36	3 ft (0.9 m) - 4 ft (1.2 m) hood nominal side
AF-AFP2-48	4 ft (1.2 m) - 5 ft (1.5 m) hood nominal side
AF-AFP2-60	5 ft (1.5 m) - 6 ft (1.8 m) hood nominal side
AF-AFP2-85	7 ft (2.1 m) - 8 ft (2.4 m) hood nominal side



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