



Air Components, Inc.

M & P Air Components, Inc. provides Components, Technologies, Guidelines, Sales and Technical Services for Industrial Air and Dry Solids Processes.

Our Goal is to provide Clients with the correct components selection and system design to achieve the best Utilization, Reliability, Safety and Economy for their plant processes.

Dale Price

P.O. Box 1260  
260 El Dorado Drive  
Lake Arrowhead, CA 92352

Tel 909.336.0420 Fax 909.336.0430  
sales @mpair.com www.mpair.com

# Technical Bulletin

## Industrial Ventilation – Hood Design

TB.100.0.04

A Hood is a shaped inlet designed to capture contaminated air at its source and conduct it into the duct system while keeping the breathing zone safe. The Hood shape determines the airflow and hood static pressure requirement.

Airflow toward the hood opening must be high enough to maintain control of the contaminant until it is safely inside the hood.

The Hood should be placed as close as possible to the source, drawing the contaminant away from the breathing zone, and positioned in the path of contaminant travel.

Sources of disturbances include thermal air currents, machinery motion, movement of materials, operator movement, room air currents, spot area ventilation, and physical obstructions.

### Hood Flowrate Formulae:

Q = Hood Flowrate, cfm  
V<sub>c</sub> = Capture Velocity, fpm  
A = Hood Area, Ft<sup>2</sup>  
L or W = Length or Height of Hood Opening, Ft  
X = Contaminant Distance Away From Hood and where X is within 1.5D, Ft  
D = Dia of round hood or side of square hood, Ft

Slotted Hood, No Flange: Q = 3.7(LV<sub>c</sub>X)

Slotted Hood, Flanged: Q = 2.6(LV<sub>c</sub>X)

Rectangular Taper, No Flange: Q = V<sub>c</sub>(10X<sup>2</sup> + A)

Rectangular Taper, Flanged: Q = 0.75V<sub>c</sub>(10X<sup>2</sup> + A)

Slots have an opening aspect ratio (W/L) of 0.2 or less and are only used to provide uniform air distribution across the face of a hood. Typical slot velocities are from 1500 to 2000 fpm, with the slot velocity approximately 2 times the plenum velocity.

Hood Entry Loss (h<sub>e</sub>). As air enters an opening it contracts, which results in a small energy loss. As it continues it expands and this slowing of the air results in

the major portion of the hood entry loss. The more pronounced the contraction, the greater will be the energy loss and the corresponding hood static pressure.

The Hood Entry Loss represents a loss coefficient multiplied by the (duct) velocity pressure. This coefficient is specific to the hood design and represents the energy loss as the air moves through the hood opening. Hood Entry Losses for typical hoods are:

Plain Duct: h<sub>e</sub> = 0.93 VP<sub>d</sub>

Flanged Duct: h<sub>e</sub> = 0.49 VP<sub>d</sub>

(The flange width should be equal to the square root of the hood area)

Bell Entry: h<sub>e</sub> = 0.04 VP<sub>d</sub>

Sharp Edge Orifice: h<sub>e</sub> = 1.78 VP<sub>o</sub>

Taper Entry: h<sub>e</sub> = Varies with the included taper angle.

Simple Hoods will have one entry loss, while Compound Hoods will have two or more.

Acceleration Loss (VP<sub>d</sub>). As the air enters the hood, it is accelerated from its natural state outside the hood to the duct velocity. This represents a change in velocity pressure and must be accounted for in the Hood Loss.

For Simple Hoods, the Acceleration Loss is equal to one (1) duct velocity pressure, VP<sub>d</sub>

For Compound Hoods, the Acceleration Loss is equal to either one (1) slot or one (1) duct velocity pressure, whichever is greater (VP<sub>s</sub> or VP<sub>d</sub>).

Hood Static Pressure (SP<sub>h</sub>) is the sum of the Hood Entry Loss and the Acceleration Loss for each specific hood type as follows:

For Simple Hoods, SP<sub>h</sub> = h<sub>e</sub> + VP<sub>d</sub>

For Compound Hoods, SP<sub>h</sub> = h<sub>es</sub> + h<sub>ed</sub> + VP<sub>d</sub> or VP<sub>s</sub> whichever is greater.

sales@mpair.com  
www.mpair.com

# M&P

Air Components, Inc.

(909) 336-0420  
P.O. Box 1260  
260 El Dorado Drive  
Lake Arrowhead, CA 92652  
Fax (909) 336-0430

## Air Pollution Control

- Dust, Smoke & Fume Collection
- Liquid Mist Collection
- Gas & Particulate Scrubbers
- Hood Design & Upgrades
- Static Gas Blending & Mixing

## Technical Services

- Fan Inspection & Troubleshooting
- Fan Balancing & Vibration Control
- Acceptance Testing
- Millwright Services
- Technical Training Seminars

## Fans, Blowers & Exhausters

- Plant Ventilation & Process Control
- Odor & Fume Exhausters
- High Capacity & Temperature
- Acoustical & Thermal Blankets
- Silencers & Noise Enclosures
- Air Knife Systems



## Dry Solids Processing

- Dilute & Dense Phase Conveying
- Pressure & Vacuum Systems
- Pneumatic Blending
- Weighing & Batching
- Process Automation



Blender Products, Inc.



**nyb** | The New York Blower Company®

