Properly Sizing a Blower
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A fume hood works only as well as the blower used with it.

Blower must be properly selected for each installation:
- Chemical resistance
- Airflow
- Static pressure

Important Note:
Built-in Blower Configuration

- Simple, economical installation
- Ideal for short, straight duct runs and low toxicity applications
- Generally noisier than remote installations
- Ductwork under positive pressure

Hoods with Integral Blowers:
- Protector® Premier Hoods
- Basic 47 and 70 Hoods
- Protector® Fiberglass 30 Hoods
Remote Blower Configuration

- Most common type of installation
- Quieter than built-in blower
- Can be sized for length of duct run
- Duct under negative pressure, safest operation
- 10' Stack height, per NFPA 45
- Horizontal runs taper back to hood
- 3-5 duct diameters between elbow and blower
- Blower mounted on bushings
- Challenge blower with a damper

- Zero Pressure Weathercap
- Blower Transition Adapter
- 90º Elbow
- Damper
- Flexible Duct Coupling
- Ductwork
Blower Applications

Remote Blowers:

- **Coated Steel**
  - For low to moderately corrosive environments
  - Impeller and housing phenolic coated for corrosion resistance
  - Organics, mild acids

- **Fiberglass**
  - For moderately corrosive environments
  - Molded polypropylene impeller resists corrosives
  - Acids/corrosive applications

- **PVC**
  - For highly corrosive environments
  - Approved for use with perchloric acid
  - PVDF impeller tolerates highly corrosive atmospheres
  - Includes drain port connection for wash down system
  - Acid Digestions, Perchloric, HF
Budgetary Blowers

- Refer to pages 2 and 3 of the Labconco Blower Catalog
- Locate width and type of fume hood
- Select blower based on any known information
  - Sash opening information
  - Face Velocity
  - Length of duct run
  - Blower Type

<table>
<thead>
<tr>
<th>Hood</th>
<th>Sash Open</th>
<th>Face Velocity [fpm]</th>
<th>Airflow [CFM]</th>
<th>Duct Run Dia. [in]</th>
<th>Steel 25'</th>
<th>Fiberglass 25'</th>
<th>Steel 50'</th>
<th>Fiberglass 50'</th>
<th>Steel 75'</th>
</tr>
</thead>
<tbody>
<tr>
<td>4' Protector Laboratory Hood</td>
<td>100%</td>
<td>100</td>
<td>730</td>
<td>12</td>
<td>706800</td>
<td>718100</td>
<td>706800</td>
<td>718100</td>
<td>706800</td>
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<tr>
<td>4' Protector XStream Hood</td>
<td>100%</td>
<td>60</td>
<td>440</td>
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<td>706800</td>
<td>718000</td>
<td>706800</td>
<td>718000</td>
<td>706800</td>
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</tbody>
</table>
**Damper Selection**

- Determine nominal fume hood duct collar diameter, from Labconco fume hood catalog Dimension Data

- Locate correlating damper part number from page 14 of the Labconco Blower Catalog

- A damper should always be included when selecting a blower.
Blower Sizing…

1. Finding Fume hood data/ design requirements
2. Detail the Duct Run
3. Defining the “System”
4. Determine equivalent duct run length
5. Find SP loss through duct
6. Determine Total SP loss
7. Correction Factors
8. Select blower

…one step at a time
Fume Hood Data

- Determine the fume hood model number
  - Go to the corresponding Labconco fume hood catalog pages
- Find the exhaust tables
- Determine total CFM and Static Pressure (SP) through the hood based on:
  - Desired sash position
  - Desired face velocity
  - Nominal hood width

<table>
<thead>
<tr>
<th>With Sash Full Open (28°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Width</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>4 Foot</td>
</tr>
<tr>
<td>5 Foot</td>
</tr>
<tr>
<td>6 Foot</td>
</tr>
<tr>
<td>8 Foot</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>With Sash 60% Open (18°)**</th>
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</thead>
<tbody>
<tr>
<td>Nominal Width</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>4 Foot</td>
</tr>
<tr>
<td>5 Foot</td>
</tr>
<tr>
<td>6 Foot</td>
</tr>
<tr>
<td>8 Foot</td>
</tr>
</tbody>
</table>
Detail the Duct Run

- Consider These Questions
  - How many hoods?
  - How many elbows (90, 45 degree, etc)?
  - How many feet of straight duct?
  - How tall will the stack be?
  - What is the duct diameter?

- Draw a picture!!
Define the System

- What is a “System”?
  A continuous section of ducting where the air has the same volumetric rate and velocity

- Three System Example:
  - System #1 (leg)
  - System #2 (leg)
  - System #3 (main body)

- Each System must be addressed separately.
Calculating Duct Run Equivalent Length

- Add up all the straight section lengths
- Add equivalent lengths for elbows
  - See page 13 of Labconco Blower Catalog for equivalencies
Determining Static Pressure (SP)

- Collect your information from previous steps
  - Diameter of duct (inches)
  - Volumetric rate of air (CFM)
  - SP through the hood
  - Duct run equivalent Length (ft)
    - For each system if applicable
- Go to table on back cover of Blower Catalog
- Locate Static Pressure/10ft from table based on
  - duct diameter/inches
  - Airflow/CFM
- Calculate Static Pressure through ducting
  - \((\text{Number from table}) / (10) \times (\text{Equivalent Length})\)
- Calculate total Static Pressure
  - Static Pressure through duct + Static Pressure through hood
  - If your duct run had multiple “systems”, the “main body system” Static Pressure is added to the Static Pressure from the “leg system” with the highest static pressure.
Correction Factors

- There is no correction for CFM, we only adjust Static Pressure

- Calculate Correction Factor
  - Multiply Temperature Factor by Altitude Factor

- Calculate Static Pressure
  - Multiply total SP (from previous slide) by Correction Factor

<table>
<thead>
<tr>
<th>Temp, °F</th>
<th>Factor</th>
<th>Feet, ASL</th>
<th>Factor</th>
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<td>0</td>
<td>1.00</td>
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<td>40</td>
<td>0.94</td>
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<tr>
<td>70</td>
<td>1.00</td>
<td>1000</td>
<td>1.04</td>
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<td>1.06</td>
<td>1500</td>
<td>1.06</td>
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<td>2000</td>
<td>1.08</td>
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<td>180</td>
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<td>6000</td>
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<tr>
<td>350</td>
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<td>7000</td>
<td>1.30</td>
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</table>
Blower Selection

- Collect the following information
  - Volumetric Rate (CFM)
  - Static Pressure (Corrected)
  - Blower Type (Coated Steel, Fiberglass, PVC)

Select Blower from Blower Catalog

- Locate type of blower type in catalog
- Find Total Static Pressure at the top of the page
- Move down the column to the correct CFM range
- Blower model number is at the left

- Remember, a damper is needed to properly “challenge” the blower
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