Properly Sizing a Blower

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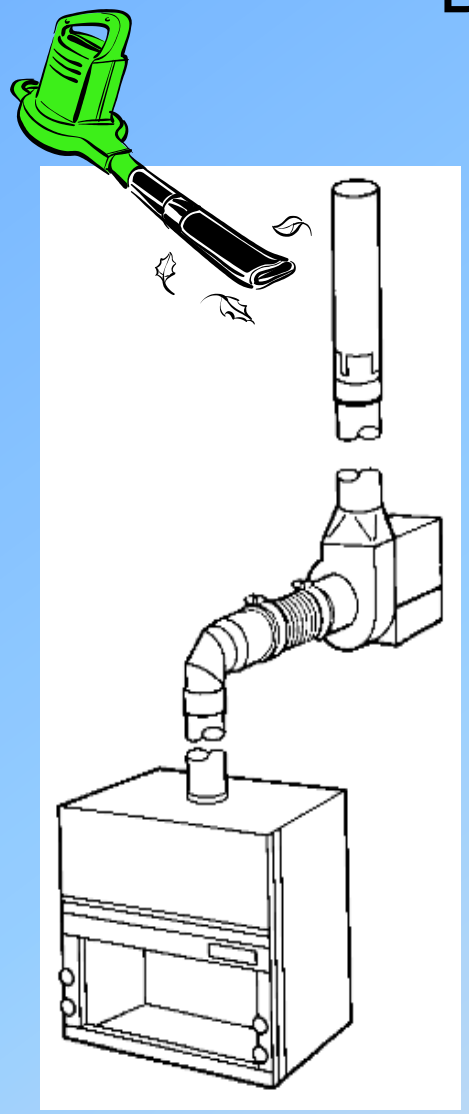
Blower Selection Process



Important Note:

- 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

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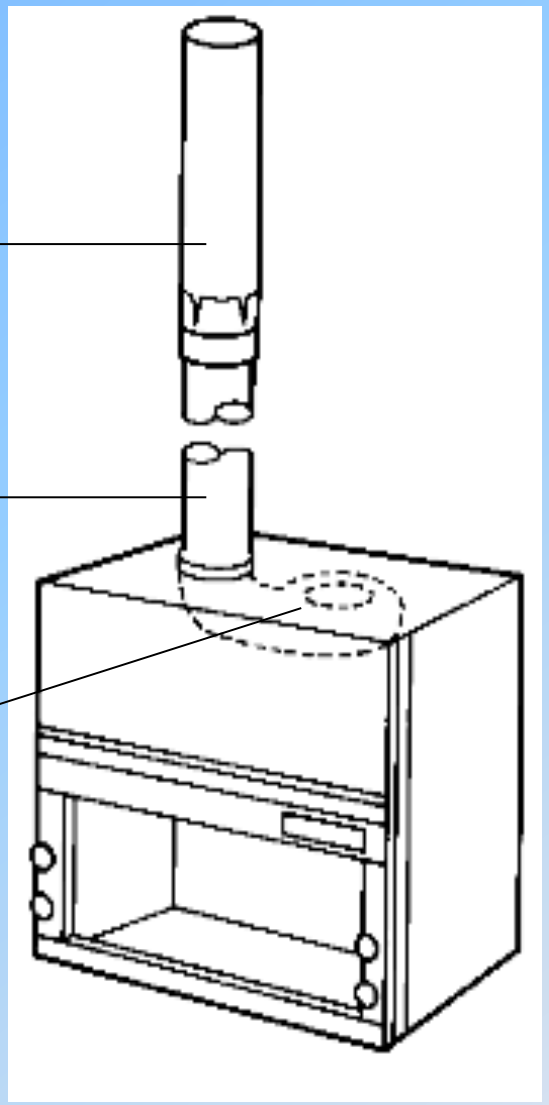
Built-in Blower Configuration



- 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

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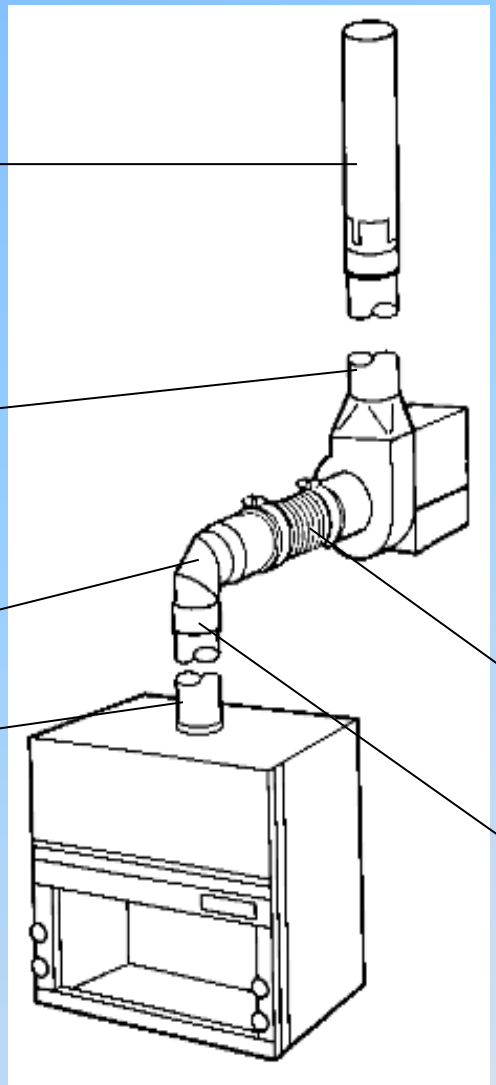
Remote Blower Configuration



- 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

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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

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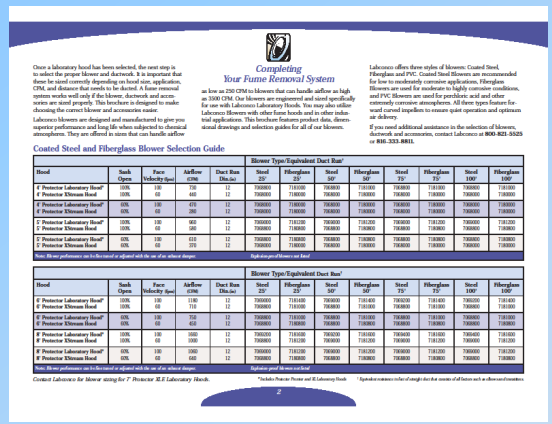
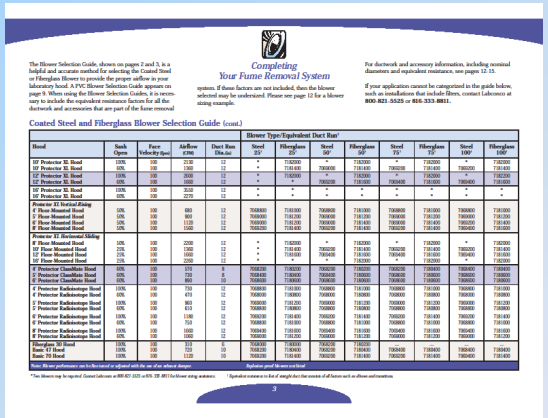
Budgetary Blowers

- 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

					Blower Type/Equivalent Duct Run'				
Hood	Sash Open	Face Velocity (fpm)	Airflow (CFM)	Duct Run Dia.(in)	Steel 25'	Fiberglass 25'	Steel 50'	Fiberglass 50'	Steel 75'
4' Protector Laboratory Hood*	100%	100	730	12	7068800	7181000	7068800	7181000	7068800
4' Protector XStream Hood	100%	60	440	12	7068000	7180000	7068000	7180000	7068000


Completing Your Fume Removal System

Coated Steel and Fiberglass Blower Selection Guide


Completing Your Fume Removal System

Coated Steel and Fiberglass Blower Selection Guide (cont.)

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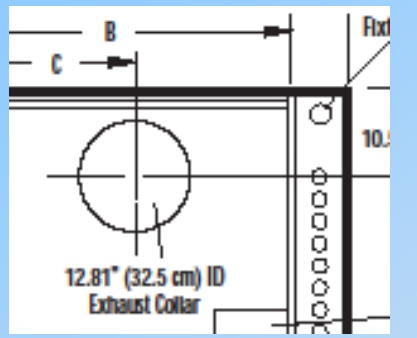
Damper Selection

- 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

Nominal Diameter/Inches	6	8	10	12	16
Catalog Number	4724200	4741300	5983400	5981200	4726400
Shipping Weight lbs./kg	10/5	12/5	15/7	20/9	25/11
Approx. Height/inches	14	19.125	19.5	19.67	24

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

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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

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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

With Sash Full Open (28")

Nominal Width	Total Exhaust CFM and Static Pressure 100 fpm	S.P.	80 fpm	S.P.
4 Foot	730	0.17"	590	0.11"
5 Foot	960	0.24"	770	0.16"
6 Foot	1180	0.31"	940	0.20"
8 Foot	1660	0.22"	1330	0.15"

With Sash 60% Open (18")**

Nominal Width	Total Exhaust CFM and Static Pressure 100 fpm	S.P.	80 fpm	S.P.	60 fpm	S.P.
4 Foot	470	0.07"	380	0.05"	280	0.03"
5 Foot	610	0.11"	490	0.08"	370	0.04"
6 Foot	750	0.14"	600	0.09"	450	0.05"
8 Foot	1060	0.08"	850	0.06"	640	0.03"

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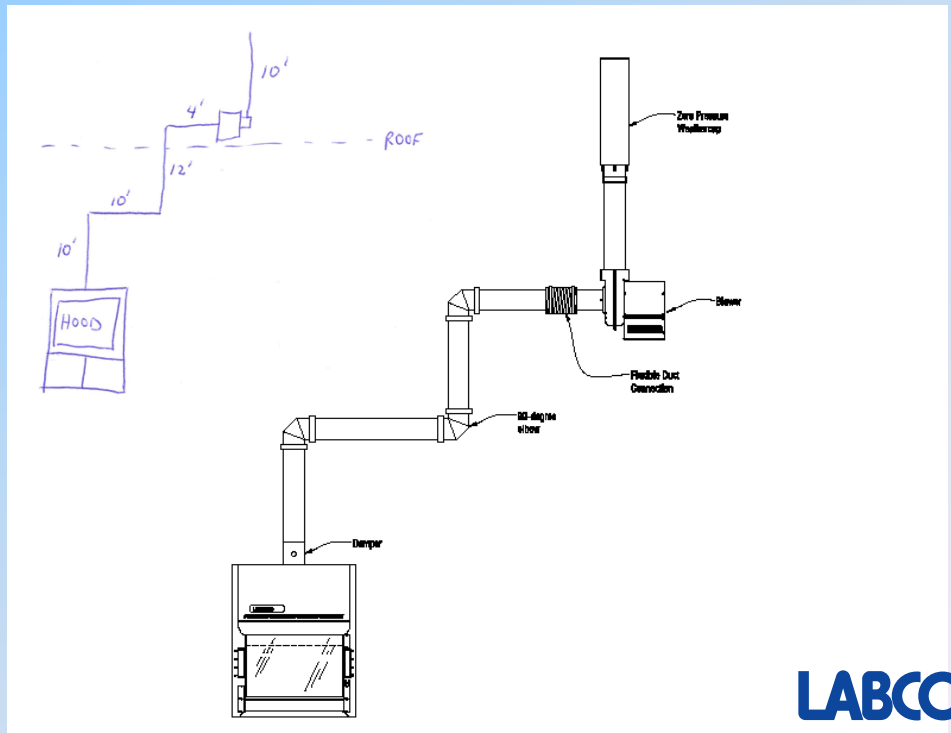
Detail the Duct Run

- 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!!



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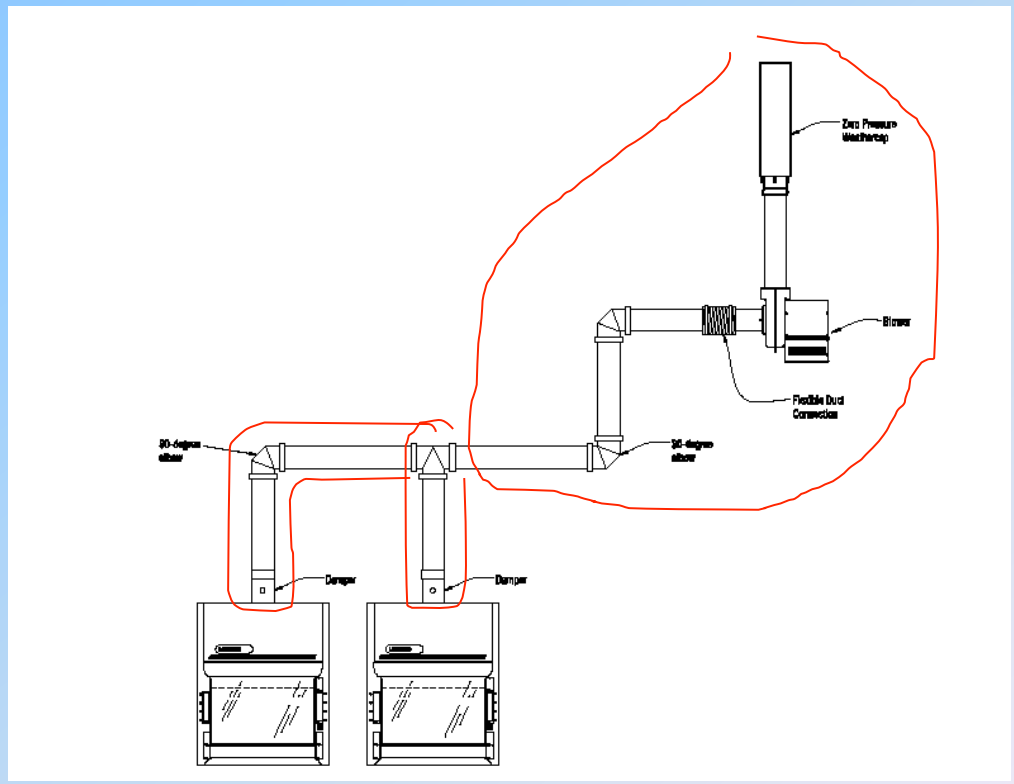
Define the System

- 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.



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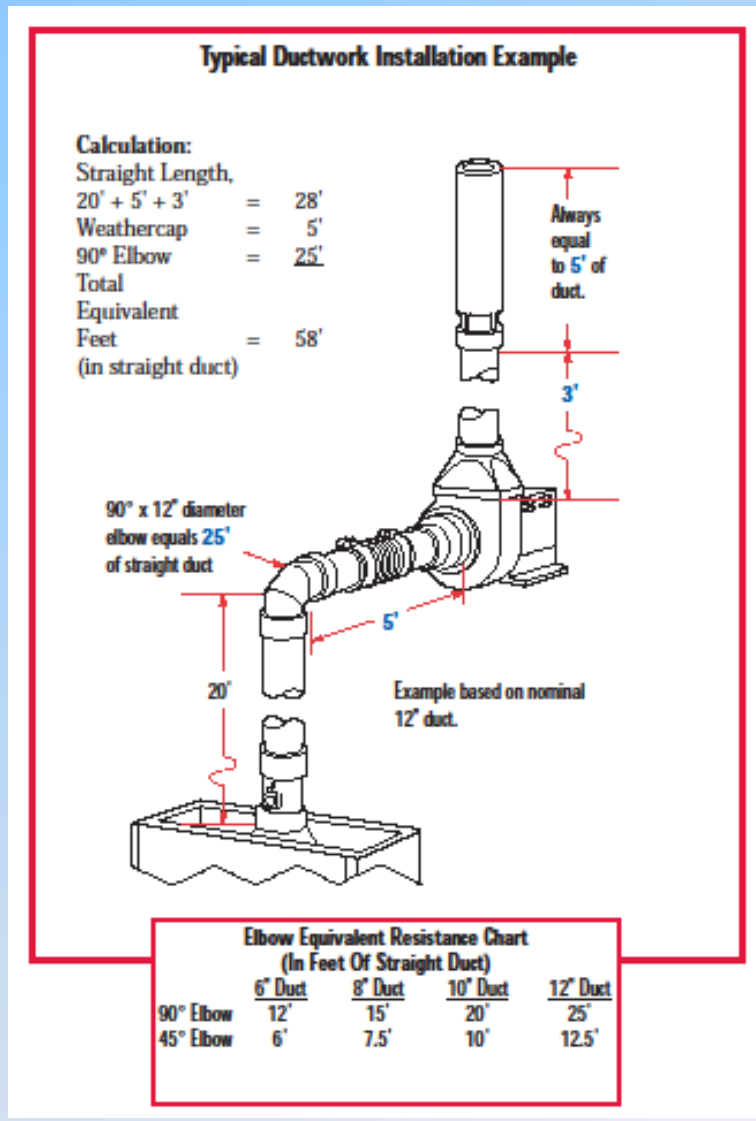
Calculating Duct Run Equivalent Length

- Add up all the straight section lengths
- Add equivalent lengths for elbows
  - ✓ See page 13 of Labconco

    Blower Catalog for equivalencies

	Nominal Diameter/Inches	6	8	10	12	16
90° Elbow	Catalog Number	4708700	4719000	7027300	5802100	5805100
	Approx. Height/Inches	13.625	17.313	20.375	24.188	29.000
	Shipping Weight lbs./kg	8/4	10/5	12/5	14/6	17/8
	Equivalent Resistance in feet of Straight Duct	12	15	20	25	36



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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
  - (Number from table) / (10) x (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.

Nominal Diameter/Inches	6	8	10	12	16
Actual OD/inches	6.625	8.625	10.750	12.750	16.000
Actual ID/inches	6.250	8.250	10.375	12.375	15.625
Catalog Number	4708600	4718900	7027200	5602000	5605000
Shipping Weight lbs./kg	25/11	35/16	50/23	65/29	80/86
Airflow/CFM	Static Pressure Loss/Inches H_2O for Each 10 ft. of Duct Length				
250	.039	.011	.003	.001	–
500	.147	.037	.013	.005	.001
750	.321	.079	.026	.011	.003
1000	.557	.140	.043	.018	.005
1250	.855	.210	.066	.027	.008
1500	–	.300	.095	.039	.012
1750	–	.380	.130	.053	.016
2000	–	.485	.155	.067	.020
2500	–	–	.245	.109	.031
3000	–	–	–	.145	.042
4000	–	–	–	.240	.074
5000	–	–	–	–	.120

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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

Air Density Correction Factors			
Correction Factors for Temperature		Correction Factors for Altitude	
Temp, ℉	Factor	Feet, ASL	Factor
0	0.87	0	1.00
40	0.94	500	1.02
70	1.00	1000	1.04
100	1.06	1500	1.06
140	1.03	2000	1.08
180	1.21	3000	1.12
200	1.25	4000	1.16
250	1.34	5000	1.20
300	1.43	6000	1.25
350	1.53	7000	1.30

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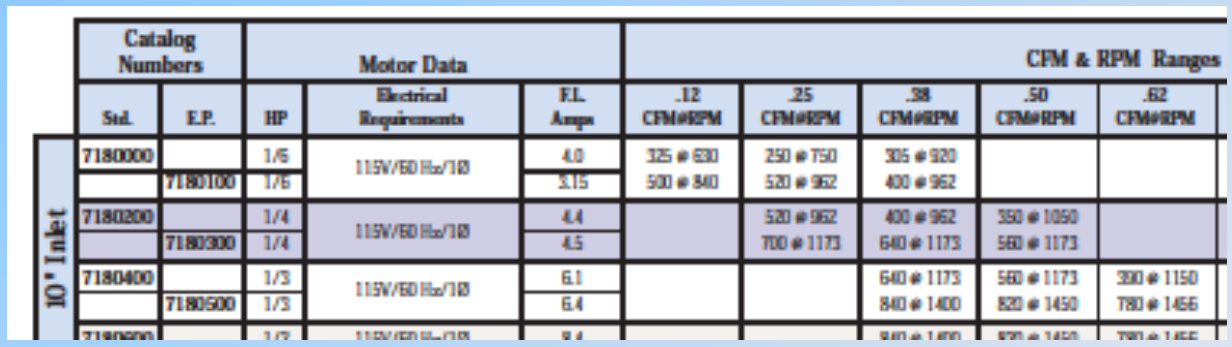
Blower Selection

- 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



	Catalog Numbers		Motor Data			CFM & RPM Ranges				
	Std.	E.P.	HP	Electrical Requirements	F.L. Amps	.12 CFM@RPM	.25 CFM@RPM	.38 CFM@RPM	.50 CFM@RPM	.62 CFM@RPM
10" Inlet	7180000		1/6	115V/60 Hz/1Ø	4.0	325 @ 630 500 @ 840	250 @ 750 520 @ 962	305 @ 920 400 @ 962		
		7180100	1/6		3.15					
	7180200		1/4	115V/60 Hz/1Ø	4.4		520 @ 962 700 @ 1173	400 @ 962 640 @ 1173	350 @ 1050 560 @ 1173	
		7180300	1/4		4.5					
	7180400		1/3	115V/60 Hz/1Ø	6.1			640 @ 1173 840 @ 1400	560 @ 1173 820 @ 1450	390 @ 1150 780 @ 1466
		7180500	1/3		6.4					

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

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