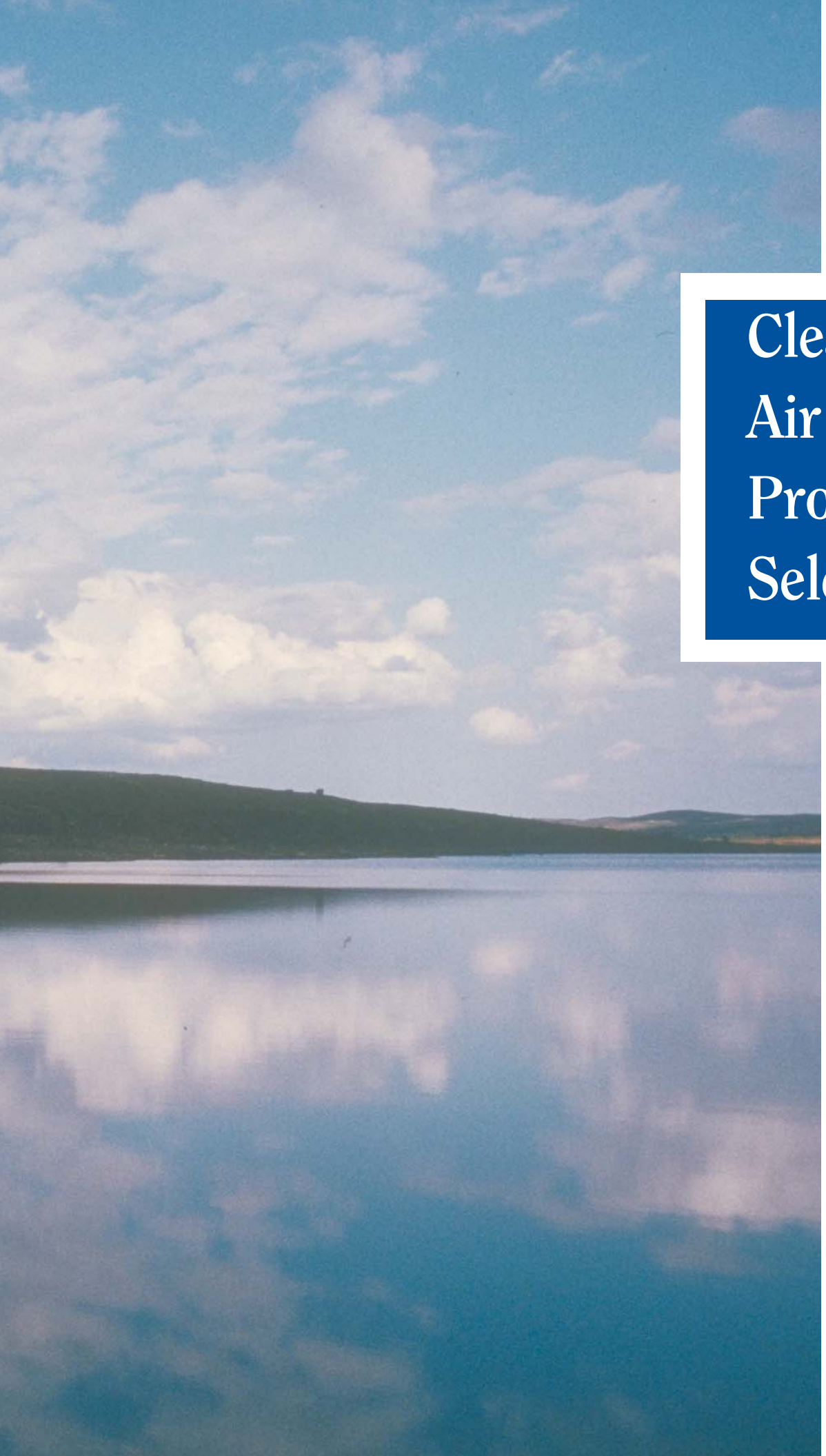
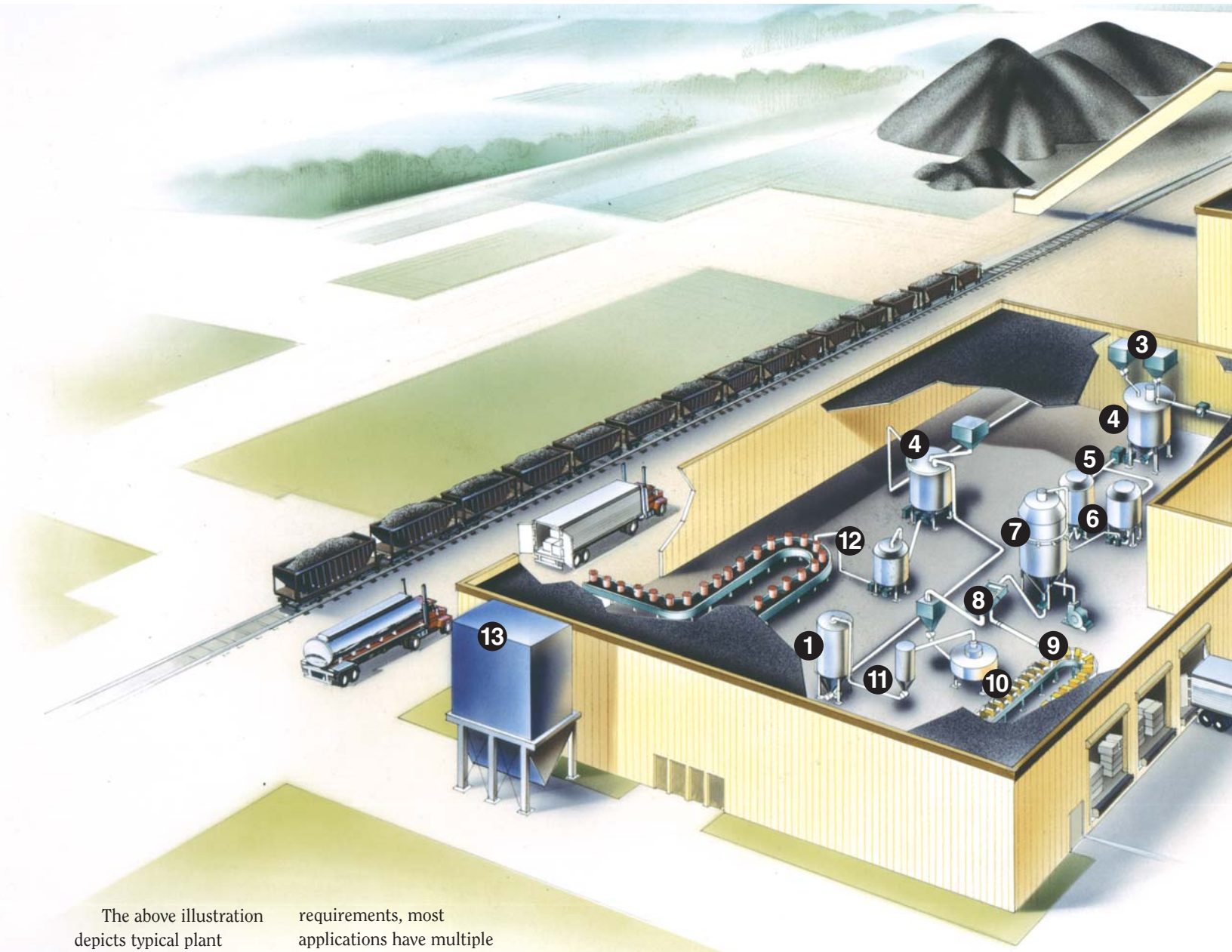


Clean Air Product Selector

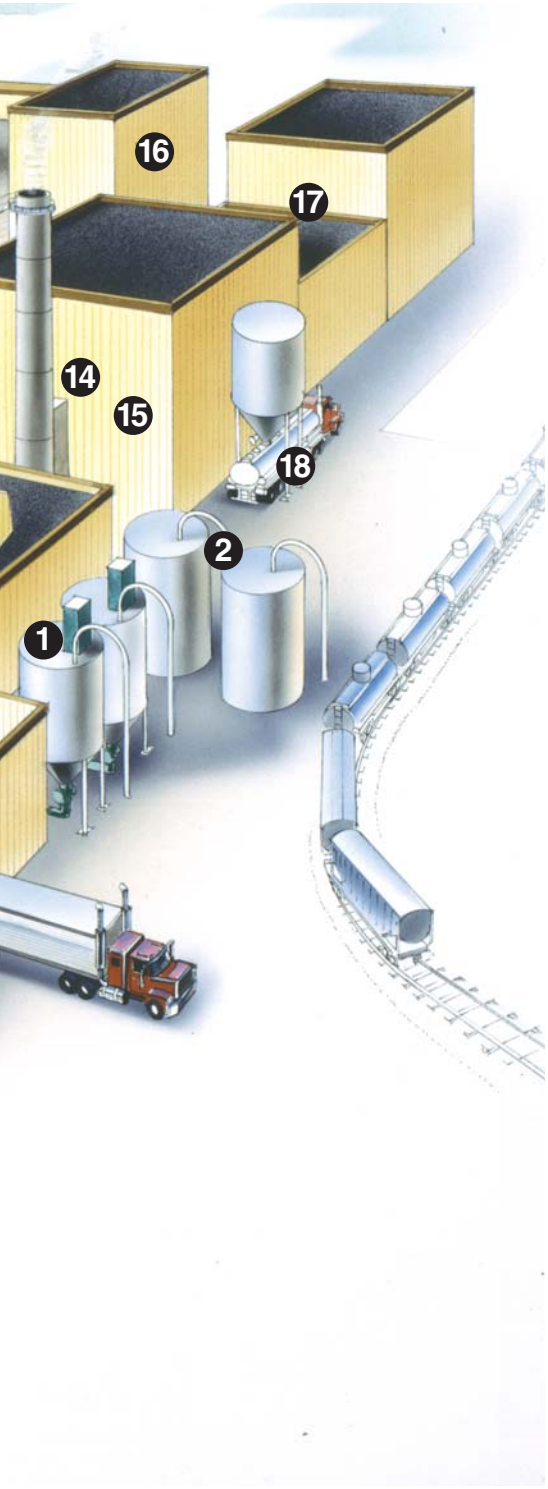
SLY INC

TECHNOLOGY FOR A CLEAN ENVIRONMENT

Potential Applications of Sly Products



The above illustration depicts typical plant emission sources. For equipment selection, identify the process which is most similar to yours. Once the process is identified, match the colors to the icons at right for preliminary equipment selection. Depending on conditions and collection requirements, most applications have multiple potential solutions. Therefore, a variety of potential products are shown. Your Sly representative can offer expert selection assistance to determine the best air pollution control products to meet your specific needs.



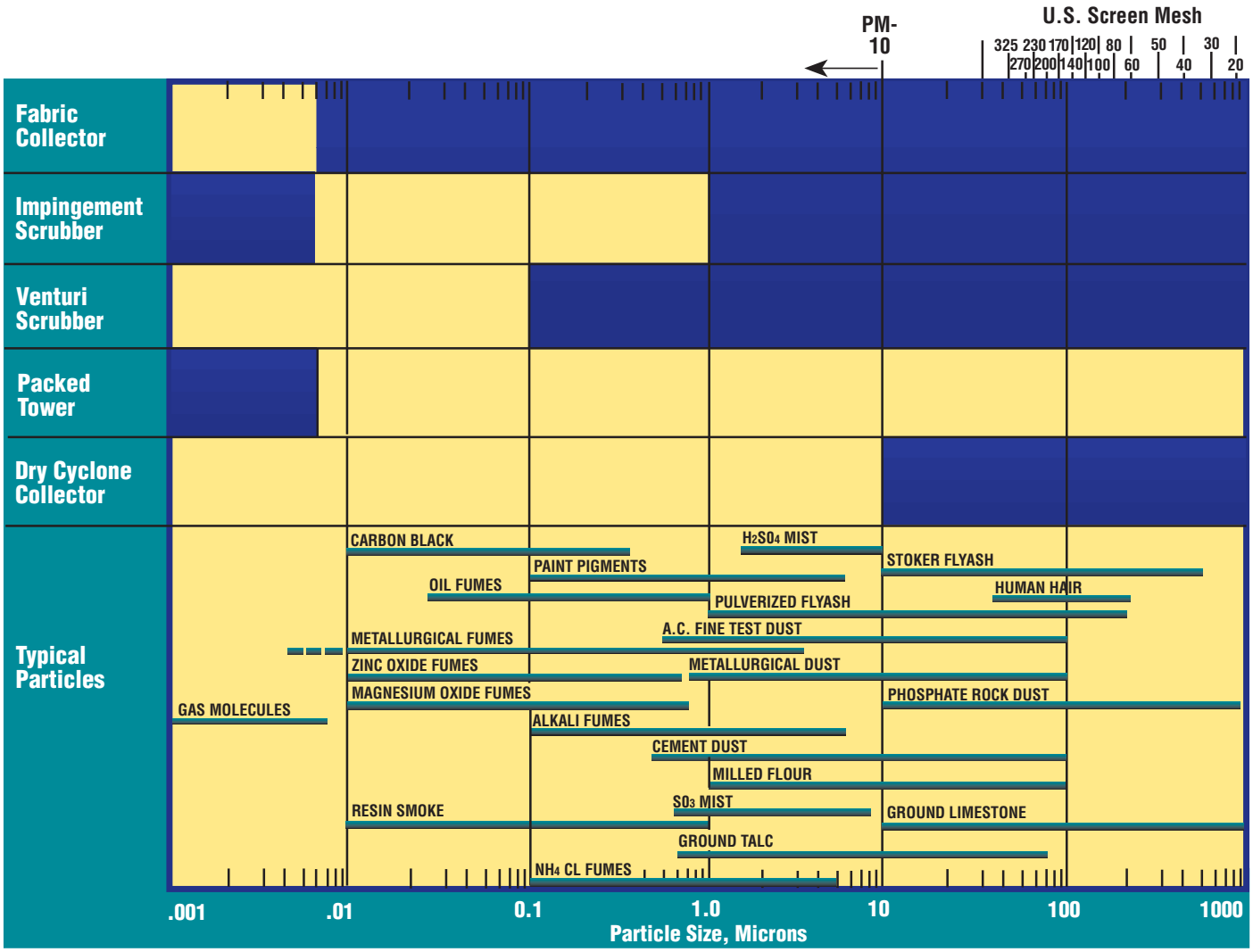
Plant Processes

1. Dry bulk storage
2. Liquid bulk storage
3. Weigh bins
4. Mixer/reactor
5. Vibratory feeder
6. Reactor/slurry tanks
7. Combo — Dryers
8. Screener
9. Packaging operations
10. Size reduction equipment
11. Filter receiver
12. Filling operations
13. Centralized dust/fume/odor/vapor collection system
14. Combo Combo — Cogeneration plant
15. Combo — Incineration plant
16. Combo — Coal or oil-burning power generation plant
17. Solid or liquid waste handling
18. Loading spouts

Product Icons

- Impinjet® Wet Scrubber
- Venturi Wet Scrubber
- Eductor Venturi Scrubber
- Venturi/Impinjet® Wet Scrubber Combination
- TubeJet®/Impinjet® Wet Scrubber Combination
- Pactecon® Collector
- Reverse Air Collector
- Shaker Collector
- TubeJet® Collector
- PleatJet™ Collector

Information to Assist You in Understanding Your Problem



Blue areas indicate the most appropriate range for the various collection technologies shown in left column.

This chart provides relative sizes of commonly encountered airborne materials. This information is to be used in conjunction with the selection and sizing guidelines presented in this brochure.

For assistance in understanding how Sly can solve your problem, call your local representative or Sly at 1-800-334-2957.

● *Appropriate for most applications* ◒ *Appropriate for some applications* ○ *Generally not appropriate*

	Dry Filter Selection			*Wet Scrubber Selection*		
	Cartridge Filter	*Envelope Filter*	*Tube Filter*	*Impingement Baffle Plate*	*Venturi*	*Eductor*
Particle Size: > 10 µ						
Inlet loading:						
Light - <1 gr/cf	●	●	●	●	●	●
Medium - 1-4 gr/cf	●	●	●	●	●	●
Heavy - 5-10 gr/cf	○	◒	●	●	●	●
Very Heavy - >10 gr/cf	○	○	●	●	●	●
Particle Size: < 10 µ-PM 10						
Inlet loading:						
Light - <1 gr/cf	●	●	●	●	●	●
Medium - 1-4 gr/cf	●	●	●	●	●	●
Heavy - 5-10 gr/cf	○	◒	●	●	●	●
Very Heavy - >10 gr/cf	○	○	●	●	●	●
Particle Size: < 1 µ-Sub Micron						
Inlet loading:						
Light - <1 gr/cf	◒	●	●	○	●	○
Medium - 1-4 gr/cf	◒	◒	●	○	●	○
Heavy - 5-10 gr/cf	○	◒	●	○	●	○
Very Heavy - >10 gr/cf	○	○	●	○	●	○
Temperature: <275°F	●	●	●	●	●	●
<375°F	◒	●	●	●	●	●
>375°F	○	◒	●	●	●	●
Dewpoint: Ambient	●	●	●	●	●	●
Process Moisture Added	○	◒	●	●	●	●
Saturated	○	○	◒	●	●	●
Hygroscopic	○	◒	●	●	●	●
Granular	●	●	●	●	●	●
Fluffy/Fibrous	○	●	●	○	●	●
Sticky	○	◒	●	◒	●	●
Abrasive	◒	●	●	●	●	●
Corrosive	◒	●	●	●	●	●
Vapor	○	○	◒	●	○	●
Mists	○	○	○	●	●	●
Condensing/Cooling	○	○	○	◒	○	◒

Sly Inc. sells three basic styles of dry collectors: cartridge, envelope and tubular bag filters.

Sly Inc. sells three basic styles of wet scrubbers: the Impinjet® impingement baffle plate; Venturi and Eductor.

Guidelines for Calculating Air-to-Cloth Ratios

Operating experience is unquestionably the best reference for determining air-to-cloth ratios (A.C.R.). However, the information below may be used as guidelines:

A.C.R. = Material
x Process
x Particle Size/Temperature

Step 1

To determine the Material Factor, find your material and select the appropriate value from the Material Factor Table. (Table A, top right.)

Step 2

Material Loading is expressed in grains per cubic foot.

The Process Factor is a function of the inlet grain loading and type of process. First determine the material loading which is expressed in grains per cubic foot (gr/cf).

To calculate gr/cf from lbs/min,
Multiply: $\frac{7{,}000 \text{ gr/lb} \times \text{lb/min}}{\text{CFM}} = \text{gr/cf}$

Next, establish the process curve which most closely defines your application. The following applications are listed as guidelines.

The applications are defined by:
- Process Gas Filtration: Dryers, Kilns, Reactors
- Product Collection: Air Conveying, Size Reduction, Classifying
- Nuisance Venting: Bulk Material Handling

To determine the Process Factor, use **either:**
- Graph B1, if your grain loading is ≥ 10 gr/cf
- Graph B2, if your grain loading is < 10 gr cf

On the graph, find your grain loading and move horizontally to the appropriate application curve. Move vertically to the bottom of the graph to obtain Process Factor.

Step 3

The air-to-cloth ratio is also affected by temperature and particle size. Graph C is used to determine your Particle Size/Temperature Factor. Locate the temperature of your application and move horizontally to the appropriate particle size curve. Then move vertically to the bottom of the graph to obtain the Particle Size/Temperature Factor.

Step 4

Calculate the air-to-cloth ratio: **A.C.R. = A x B x C**

Example:

Ventilating a belt conveyor bucket elevator and screen handling, silica sand at ambient temperature with an estimated inlet loading of 2 lb/min. Air volume is 5,000 CFM. Average particle size is greater than 10 microns.

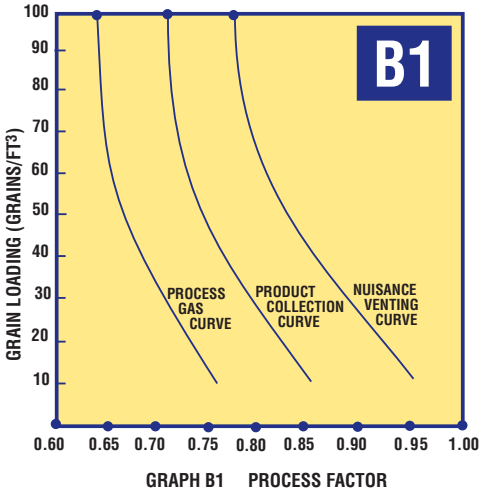
A.C.R. = 8 x 1.1 x 1.0
= 8.8 : 1

A filter's design and cleaning mechanisms affect the final filter ratio. This additional equipment factor must be considered and is noted on the specific Technical Data Sheet of the dust collector being considered. Consult your Sly representative or Sly at 1-800-334-2957.

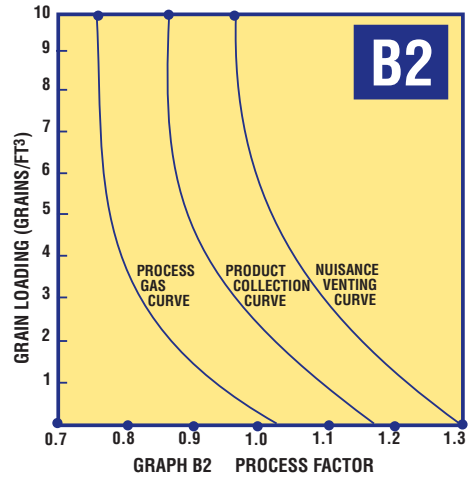
TABLE A MATERIAL FACTOR TABLE

MATERIAL FACTOR	9	8	7	6	5
MATERIAL	GRAIN PAPER SAWDUST TOBACCO	KAOLIN SAND GYPSUM LIME SALT SODA ASH TALC ABRASIVES	ALUMINA METALLIC ORE CEMENT COAL FLOUR FERTILIZER LIMESTONE	COKE PIGMENTS FLYASH DETERGENTS LEAD OXIDE SUGAR	ACTIVATED CARBON CALCIUM CARBON BLACK GRAPHITE CHARCOAL METALLURGICAL FUME ZINC OXIDE

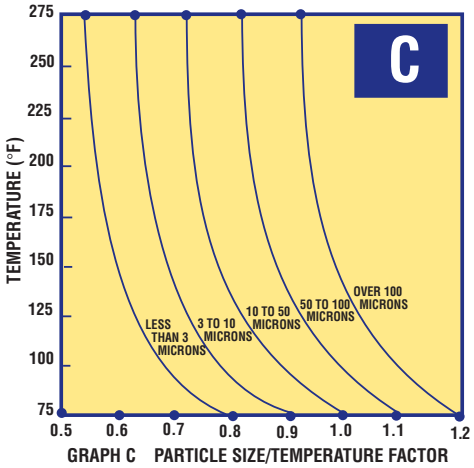
A



GRAPH B1 PROCESS FACTOR



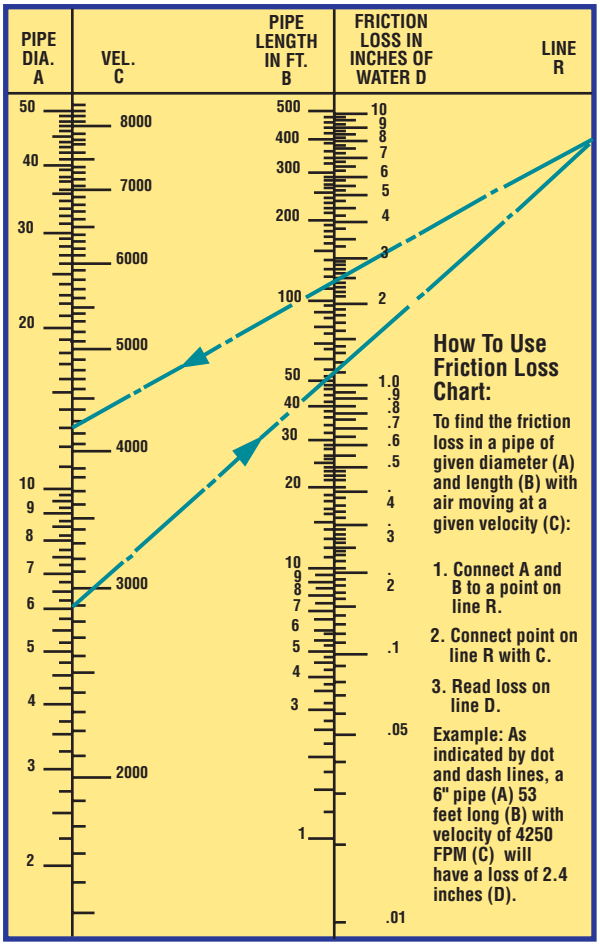
GRAPH B2 PROCESS FACTOR



GRAPH C PARTICLE SIZE/TEMPERATURE FACTOR

Duct Sizing & Static Pressure Loss

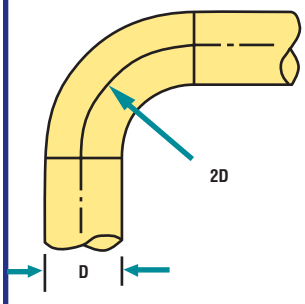
Friction Loss Chart



Air Volumes in Pipe Lines at Various Velocities and Corresponding Velocity Heads in Inches of Water

PIPE DIAMETER (INCHES)	PIPE AREA (SQ. FT.)	VELOCITY FPM (FEET PER MINUTE)				
		3000 FT.	3500 FT.	4000 FT.	4500 FT.	5000 FT.
		VELOCITY PRESSURE, INCHES W.G.				
		.561 IN.	.764 IN.	.998 IN.	1.262 IN.	1.558 IN.
3	.049	147	171	196	220	245
4	.087	262	306	349	393	436
5	.136	409	478	546	614	682
6	.196	589	687	786	884	982
7	.267	802	936	1,069	1,202	1,337
8	.349	1,047	1,222	1,396	1,570	1,746
9	.442	1,325	1,546	1,767	1,988	2,209
10	.545	1,636	1,909	2,182	2,454	2,727
11	.660	1,980	2,310	2,640	2,970	3,300
12	.785	2,356	2,749	3,142	3,534	3,927
13	.922	2,765	3,226	3,687	4,148	4,609
14	1.069	3,207	3,742	4,276	4,811	5,345
15	1.227	3,682	4,295	4,909	5,522	6,136
16	1.396	4,189	4,887	5,585	6,283	6,982
17	1.576	4,729	5,517	6,305	7,093	7,882
18	1.767	5,301	6,185	7,068	7,952	8,836
19	1.969	5,907	6,892	7,876	8,861	9,845
20	2.182	6,545	7,636	8,727	9,818	10,908
21	2.405	7,216	8,419	9,621	10,824	12,027
22	2.640	7,919	9,239	10,559	11,879	13,199
23	2.885	8,656	10,098	11,541	12,983	14,426
24	3.142	9,425	10,996	12,566	14,137	15,708
25	3.409	10,226	11,931	13,635	15,340	17,044
26	3.687	11,061	12,905	14,748	16,592	18,435
27	3.976	11,928	13,916	15,904	17,892	19,880
28	4.276	12,828	14,966	17,104	19,242	21,381
29	4.587	13,761	16,054	18,348	20,641	22,935
30	4.909	14,726	17,180	19,635	22,089	24,544
31	5.241	15,724	18,345	20,966	23,486	26,207
32	5.585	16,655	19,548	22,340	25,133	27,925
33	5.940	17,819	20,787	23,758	26,728	29,698
34	6.305	18,915	22,068	25,220	28,373	31,525
35	6.681	20,044	23,385	26,727	30,066	33,407
36	7.069	21,206	24,740	28,274	31,809	35,343
37	7.467	22,400	26,133	29,867	33,600	37,434
38	7.876	23,627	27,565	31,503	35,441	39,379
39	8.296	24,887	29,035	33,183	37,331	41,479
40	8.727	26,180	30,543	34,906	39,270	43,633
42	9.621	28,863	33,674	38,484	43,295	48,106
44	10.56	31,676	36,955	42,234	47,513	52,793
46	11.54	34,623	40,394	46,164	51,935	57,705
48	12.57	37,699	43,982	50,266	56,549	62,850

Equivalent Resistance In Feet of Straight Pipe



DIA. OF PIPE	90° ELBOW*
3"	3 FT.
4"	4 FT.
5"	6 FT.
6"	7 FT.
7"	9 FT.
8"	10 FT.
10"	14 FT.
12"	17 FT.
14"	21 FT.
16"	24 FT.
18"	28 FT.
20"	32 FT.
24"	40 FT.
30"	51 FT.
36"	64 FT.
40"	72 FT.
48"	89 FT.

* For 60° elbow, multiply by 0.67. For 45° elbow, multiply by 0.50.

Inlet Losses

Estimated inlet losses for standard conditions may be calculated by the following formula:

$$\left[\frac{\left(\frac{\text{Velocity}}{.75}\right)}{4005}\right]^2 = \text{Inlet Loss}$$

Typical Inlet Losses

(To maintain suction at ventilation point)

3000 FPM .....1.00 in.
3500 FPM .....1.36 in.
4000 FPM .....1.77 in.
4500 FPM .....2.24 in.
5000 FPM .....2.77 in.

$$\left[\frac{\frac{4000}{.75}}{4005}\right]^2 = 1.77"$$

Fan Static Pressure

Total fan static pressure = Inlet loss + Friction loss in piping + Loss through filter equipment + Loss through fan exhaust stack or weather cap

Sly's Approach to Air Pollution Control:

- conservative design
- flexible engineering
- controlled manufacturing
- comprehensive field services

Many companies make air pollution control equipment, but none have been doing it as long as Sly.

Nearly a century has passed since our original patent for cloth dust filters. Over the years, we've learned plenty about the application and fabrication of dust collectors and scrubbers. Here are the main points:

"In the pollution control business, conservative application of technology is best."

Equipment misapplication has no place in the pollution control business. Not only is improper equipment apt to fall short of collection requirements, it is oftentimes more expensive to operate than the proper machinery. For example, incorrect sizing and improper media choice can easily lead to excessive maintenance and costly downtime. When you deal with Sly, we have your best long term interests in mind.

"We believe in fitting the equipment to the customer's needs, not the customer to the equipment's capabilities."

Unlike many equipment suppliers, we refuse to mass-produce product and then hope for a good fit. We have maintained flexibility in our engineering techniques which permit us to manufacture each order to fit the task at hand, while maintaining a price to you that is comparable to mass-produced equipment.

In many cases it costs no more to get the very best equipment for the job.

This approach earns us the respect and repeat business of many sophisticated buyers of pollution control equipment. These people, many of whom buy dozens of collectors or scrubbers every few years, have always represented a large portion of our customer base.

"We build our own equipment...for some very good reasons."

Part of the reason Sly can custom-make a collector for you while keeping a competitive price is just that: we **are** the manufacturer. Unlike the majority of our competitors, we **don't** job out our production. We do our own engineering, sewing, metal fabrication, painting, assembly, quality control, and laboratory R&D. This way we control every step of the process, allowing us great flexibility to build the best collector or scrubber for your individual needs. We have a strong commitment to shipping dates and routinely guarantee ship dates when requested.

"Our obligation to the customer doesn't end when the equipment is shipped."

Sly's staff engineers can promptly assist you in troubleshooting or with other field service problems should they arise at your facility. This commitment to total customer support helps guarantee superior value for your investment.

"We're a private company, and intend to stay that way."

The corporate restructurings and short term goals of today's business scene aren't for us. Sly is owned and operated by descendants of the founding family. We are in the business for the long run, and will maintain the professionalism and continuity required to contribute to the long term success of your business.

Founded in 1874, Sly has been providing solutions to environmental problems since the turn of the century. From the beginning, we have done all our engineering and manufacturing in-house.

Dust, fumes or vapors can occur singularly or in many combinations. Only a company with Sly's level of experience is capable of tailoring the correct air pollution control equipment to your specific application.

All assembly and testing is performed in our own plant. We control the quality and delivery schedule to an extent not possible from other suppliers, most of whom sub-contract much of their work.

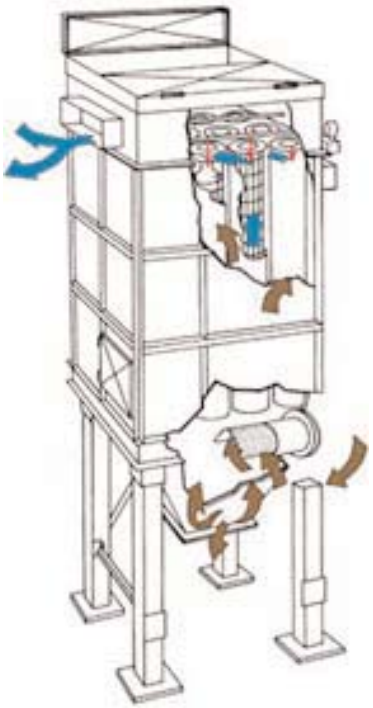
All our collectors are made under our roof...from cutting fabric for filter bags to painting.

Sly employs the most modern automated engineering techniques, allowing us to respond quickly with custom-tailored designs to fit your needs. Options and specials are no problem for us.

Pulse Jet Collectors

Sly TubeJet® dust collectors offer on-line cleaning with a steady pressure drop. Bag changes are exceptionally easy with our "no tools required" design. Capacities to 200,000+ CFM.

Ask for our TubeJet Catalog.



Snap ring filter bags, cages and pulse pipes are removed and installed quickly without tools.

The Sly TubeJet collector offers low cost installation and easy maintenance. It arrives factory-wired, factory-painted (primed inside and out, with an enamel finish on external surfaces), and ready for installation.

Conservative application of equipment and filter media results in high collection efficiencies. Continuous on-line cleaning is accomplished with low consumption of compressed air.

Rugged construction is standard for Sly TubeJet collectors which feature 12 gauge design for operation to ±20" W.G.

Cylindrical TubeJet collectors are for high pressure/high vacuum applications. All-welded construction permits ranges of ±20" W.G., ±100" W.G., and ±17" Hg. Top or side bag removal styles available.

Pulse-Cleaned Envelope Bag Collectors

Sly Pactecon® collectors offer advantages only available with envelope bags: low headroom, outside bag removal and compact overall size. Additional advantages are continuous operation with off-line cleaning, and downflow design which leads to long bag life. Easy installation; bags shipped installed. Capacities to 100,000+ CFM.

Collectors are cleaned off-line, cell-by-cell...contributing to long bag life and low compressed air consumption. Filter bags and bag cleaning system are completely factory-installed.

Ask for our Pactecon Catalog.

Standard modules can be easily configured to handle large air volumes.

Rectangular envelope bags provide several unique advantages: maximum filter area in a minimum filter housing size, low headroom design, and safe side bag removal from outside the collector.

Unlike most pulse-cleaned collectors, we use a downflow design which enhances particulate separation. Bag life is extended by minimizing cleaning cycles.

Shaker-Cleaned Envelope Bag Collectors

If your application permits intermittent operation, consider a Sly Shaker collector, which is simple to operate and maintain. Filtering velocities are low, which provides uniform dust distribution and long bag life. Accumulated dust is intermittently shaken off filters while air flow is temporarily interrupted.

Ask for our Shaker Catalog.

Long, trouble-free service for non-continuous applications. Ideal for bin vents where no compressed air is available.

Vertical Cartridge Collectors

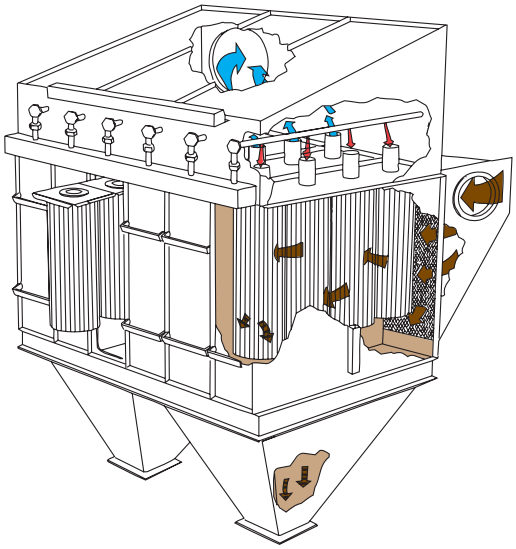
The Sly PleatJet™ Cartridge collector offers the fastest filter changes anywhere!

Maximum capacities are realized by dual stage separation system consisting of a classifier inlet and internal baffling system. Capacities to 50,000+ CFM.

Ask for our PleatJet Catalog.

The Sly PleatJet collector offers low initial cost, low headroom requirements, and virtually eliminates dust reentrainment. Pleat-lock design maintains maximum filter surface area.

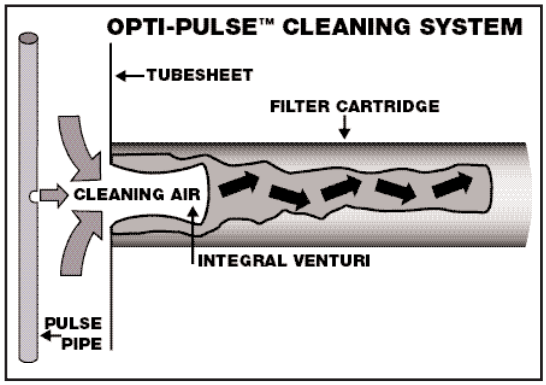
Avoid dust during cartridge changes– Sly's linked cartridges are easily removed at waist level



PleatJet II™ Horizontal Dust Collectors

Specially engineered Opti-Pulse™ venturi pulse system maximizes energy release … provides more uniform dust release. Cleans <u>all</u> of the cartridge, including the hard-to-clean cartridge tops which are not cleaned by conventional pulse systems.

Plus, the PleatJet II is loaded with standard features that you probably would pay extra for with other collectors.



Optimized Opti-Pulse™ Cartridge Cleaning System Delivers Optimal Collector Performance.

You get this…	…because we do this!
• Optimal cartridge cleaning	√ Opti-Pulse venturi cleaning system √ MP-404™ timer with "Clean-On-Demand" module
• Long service life	√ All welded (one piece) construction √ Heavy duty cartridge support (not cantilevered)
• An exact fit to your needs	√ Modular design offers a multitude of configurations √ Multiple inlet and outlet locations √ Accommodates low head room
• Easy maintenance	√ No-tools quick release doors √ Uses industry standard cartridges √ Cleaning system accessible from grade

Basic Criteria for Sizing A Wet Scrubber

The first step is to determine which type of Sly scrubber to select. The nature of the pollutant or contaminant will determine if the Venturi, Impinjet, Packed Tower or combination scrubber system is best suited for your application. (See pages 2 & 3.)

Sizing the scrubber is the next step. The factors affecting sizing are gas flow rate, temperature, pressure, gas composition, humidity, contaminant loading and desired outlet requirements. Also, the availability of an appropriate scrubbing liquid is an important consideration.

Gas streams entering a wet scrubber may or may not be fully saturated, however they will exit the scrubber fully saturated. This process of saturation results in a change in volume, temperature and density.

The overall scrubber size (diameter) is a function of velocity of saturated gas through the scrubber shell. Knowing the moisture content of a gas stream (generally expressed as pounds of water per pound of dry gas) and the inlet temperature, the saturation temperature and saturated volume content can be calculated. The volume correction chart at the right can be used for a close approximation of the change in gas volume.

Example:
10,000 ACFM @ 450°F containing 0.15# H_2O/# dry air

The chart shows a correction factor of 0.75. Inlet volume x correction factor = outlet volume or 10,000 x 0.75 = 7500 ACFM. The scrubber would be sized for this saturated outlet volume.

For Impinjet scrubbers the maximum capacity is based on shell velocity of 500 feet per minute. Dividing the corrected or saturated volume by 500 yields the overall tower cross-sectional area from which the diameter can be determined.

Example (continued):

$$\frac{7500\ ft^3/min}{500\ ft/min} = 15\ ft^2$$

$$\text{Area} = 15\ ft^2 = \frac{\pi D^2}{4}$$

D=diameter
Diameter = 4.37 ft

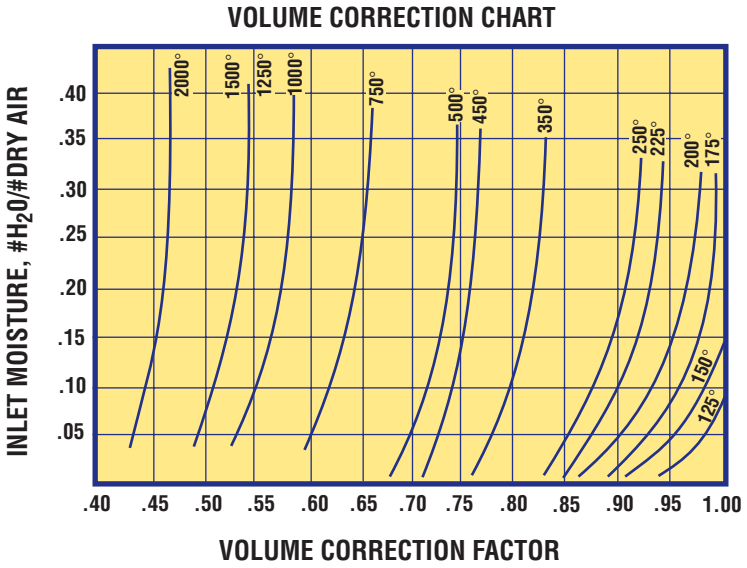
The calculated diameter becomes the reference point for equipment selection. (Refer to specific product catalog.)

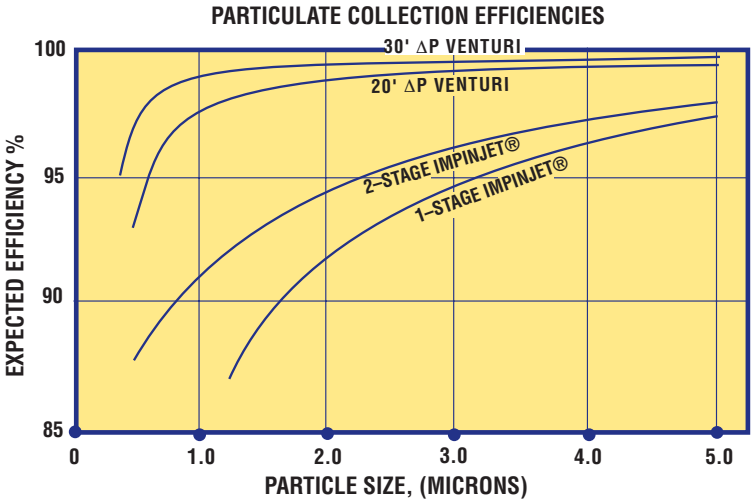
The approximate particulate and/or mist efficiencies for Venturis and Impinjet scrubbers can be determined by the efficiency chart on the right.

To determine the number of Impinjet stages required for the absorption of gases such as acids requires a complex calculation with too many variables to use a simple chart. However the following information is important:

- gas volume
- process description
- temperature
- particle size
- moisture content
- type of contaminant

For assistance in understanding your problem, call your local representative or Sly at 1-800-334-2957.

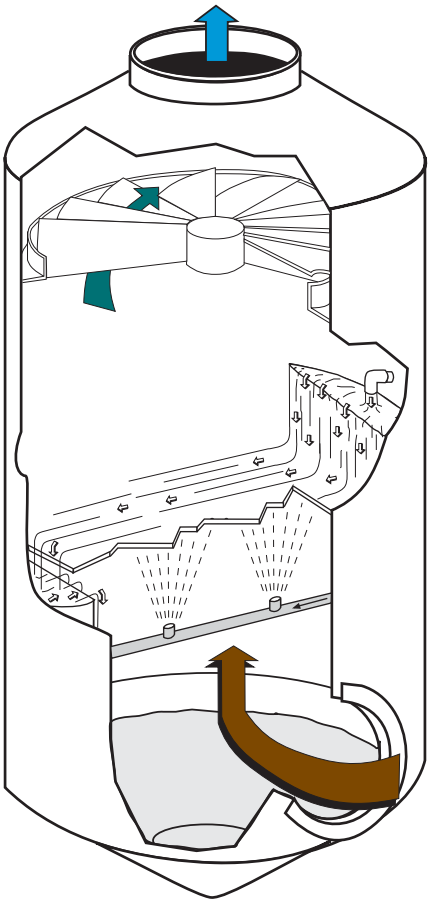




Impinjet® Scrubbers

Sly Impinjet scrubbers clean, cool and absorb gases and collect particulates. High collection efficiencies (98+% @5 microns) are achieved with low water consumption and minimum pressure drop. Capacities to 200,000+ CFM.

Ask for our Scrubber Catalog.



Constructed in either metal or plastic, each stage acts as a discreet fractional collector. Multiple stage designs are available to maximize efficiencies.

Highly resistant to fouling, the Impinjet collector is the ideal scrubber for applications requiring both absorption and particulate removal. Complete package systems are available.

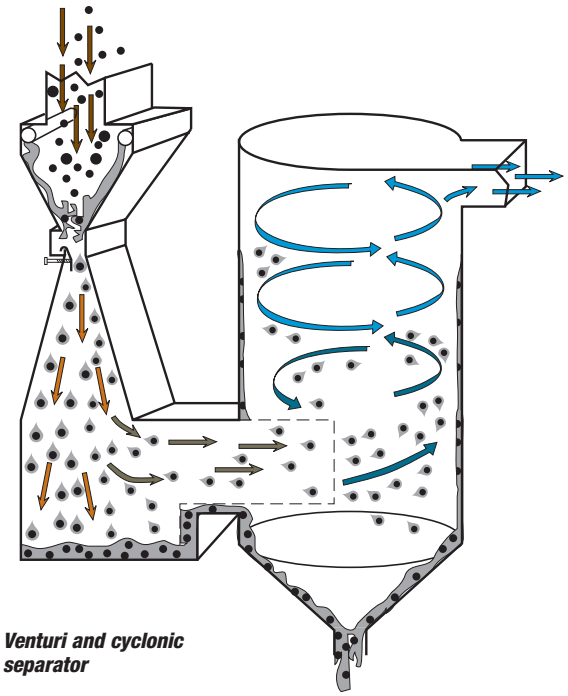
Venturi Wet Scrubbers

The Sly Venturi scrubber efficiently collects fine particulate and mists. Scrubbing liquid is atomized into fine droplets which entrap particles. Adjustable throats for performance optimization are standard. Capacities to 100,000+ CFM.

Designs are available for high temperature, highly corrosive applications. Venturis can be coupled with Impinjet scrubbers or Packed Towers to achieve maximum efficiencies.

Ask for our Scrubber Catalog.

Packaged, shop assembled systems complete with instruments and controls are available. The standard manually adjustable throat can be automated for remote operation.



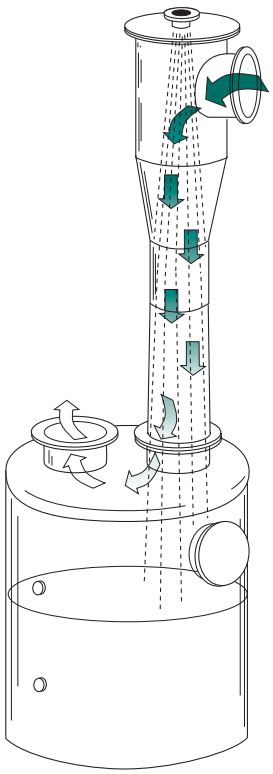
Venturi and cyclonic separator

Eductor Scrubbers

Eductor scrubbers are designed to remove soluble gases and particulate by inducing a gas flow using high pressure liquid focused into a venturi throat. Additionally, eductor scrubbers can be used for direct-contact condensation.

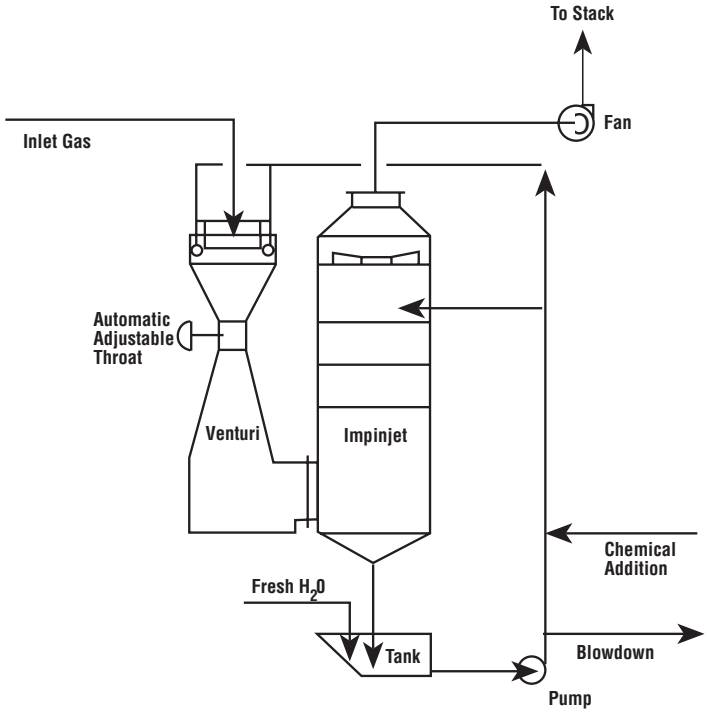
A high liquid flow rate makes the Sly eductor particularly appropriate for collection of sticky and/or gummy particulate, as well as gases which decompose upon contact with water, such as $SiCl_4$ and H_2SiF_6.

Ask for our Scrubber Catalog.



Combination Scrubber Systems

If ultrafine particulate and noxious gases are present in the same gas stream, special combinations of scrubbers are appropriate. A typical example is incineration, which calls first for a Venturi to remove fine particulate and then an Impinjet scrubber to absorb the gases. Complete package systems, including instrumentation and controls, are available.



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