PNEUMATECH®

Oil Mist Eliminators

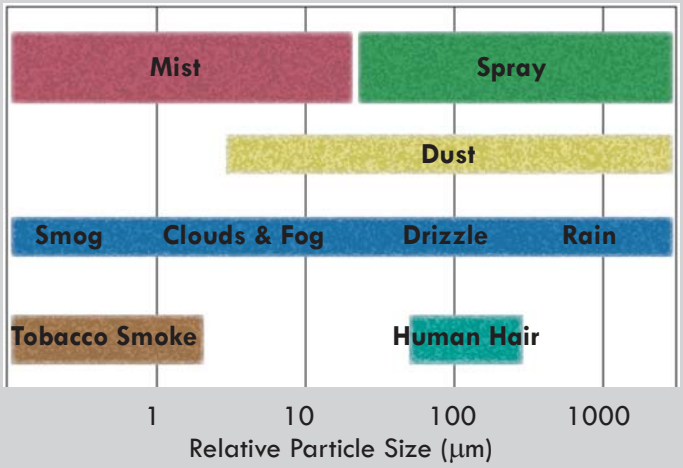
PMR Series

Section 60
Bulletin A-6

Pneumatech's Mist Eliminators combine superior performance in particle elimination with an unmatched service life. Typically used as the pre-filter to a dryer, mist eliminators capture lubricant and condensed moisture carryover, even in the event of a catastrophic compressor separator collapse. Pneumatech PMR Series also have the lowest operating costs of any available technology. With only 1/10th the pressure drop of a regular coalescing filter and an expected service life 20-30 times longer than conventional filters, or competitive mist eliminators, the PMR Series is the ONLY choice for efficient removal of mist sized particles.

The Problem - Compressed Air Contamination

With all lubricated air compressors, submicron oil and water particles are present in the compressed air stream. These mist particles are formed during the compression cycle and after-cooling process. The water, oil and particles combine to form an acidic, corrosive mixture that can damage downstream instruments, tools, airveying membranes and even contaminate final product. If a stand alone desiccant dryer is used, the oil and water particles will overload the desiccant bed and significantly reduce its life.

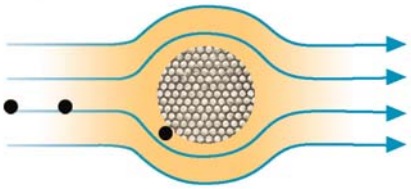


The Efficient Filtration Solution

PMR series Mist Eliminators is more efficient because it does not use pressure differential as the primary means of coalescing. Instead, it utilizes the mechanisms described on the next page along with sufficient bed contact time to remove the particles from the compressed air (gas) stream. By using homogenous-sized fibers packed to a specific density, PMR series Mist Eliminators takes advantage of the properties of gas diffusion and traps contaminants in the interstitial space. By maintaining minimal velocities through the fiber bed, the terminal settling velocity is never exceeded. This allows the coalesced condensate to make its way to the outer layer of the element and ultimately to the bottom of the housing, where it can be drained away.

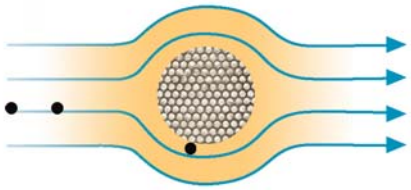
COLLECTION MECHANISMS FOR MIST ELIMINATORS

INERTIAL IMPACT
Particles collide with fiber
(particles >3 microns)



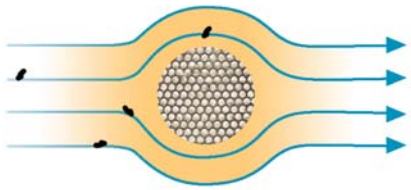
Particles larger than three microns are collected when their momentum prevents them from following gas streamlines around fibers. They leave the streamline, strike a fiber and are collected by the filter.

DIRECT INTERCEPTION
Particles touch fiber
(particles 1-3 mocrons)



Particles between 1.0 and 3.0 microns tend to follow the gas streamlines as they flow relatively close to fibers. A 1.0 micron particle, for example, passing within 0.5 micron of a fiber will be collected by the fiber.

BROWNIAN DIFFUSION
Particles hit fiber as a result of random movement
(particles <1 micron)



Extremely fine particles have random side-to-side movement caused by collisions with gas molecules. A 0.1 micron particle will have about ten times the Brownian movement or random motion of a 1.0 micron particle, greatly increasing the probability of collision with a fiber.

Performance Guaranteed by Particle Size, Not Weight

We guarantee particle removal efficiency of PMR series Mist Eliminators by the percentage of particle sizes collected, not by weight. This is an important distinction because a 0.5 micron particle has just 1/1000th the weight of a 5 micron particle. Collection claims based on weight can be misleading because small particles with greater Brownian movement tend not to be collected and pass downstream in the system. PMR series Mist Eliminators collects smaller, lighter weight particles far more efficiently than conventional filtration media.

Mechanical	**Condensation**	**Chemical Reaction**
Mist mean size is 2.5 microns (0.0025mm)	Mist mean size is 1.0 microns (0.001mm)	Mist mean size is 0.3 microns (0.0003mm)

ADVANTAGES

- Removes 100% of all aerosol mist particles, 1 micron and larger.
- Removes 99.5% of all aerosol sub-micron mist particles. Higher efficiencies are optional.
- The best protection available from air/oil separator collapse or condensate trap failure.
- 10 year element lifetime warranty.
- Low operating and energy cost, with payback often within one year.
- Low pressure differential over element life, equals a lifetime of energy savings.
- Extends the life of desiccant dryer bed, if installed upstream, thereby reducing maintenance cost.
- Consistent performance, guaranteed by Pneumatech.

Infinite Turndown

PMR series Mist Eliminators have an infinite turndown ratio, so peak performance is available even at minimal flows. The efficiency curve actually improves as the flow decreases. This means that mist eliminators can be over-sized for future expansion without compromising current performance. In contrast, filters based on pressure differential decline in performance as flow decreases, and it is not advisable to over size this type of coalescing filter.

BEST PERFORMANCE

Initial cost – approximate cost to purchase a 1000 cfm complete filter

Average pressure drop – over the lifetime of the element

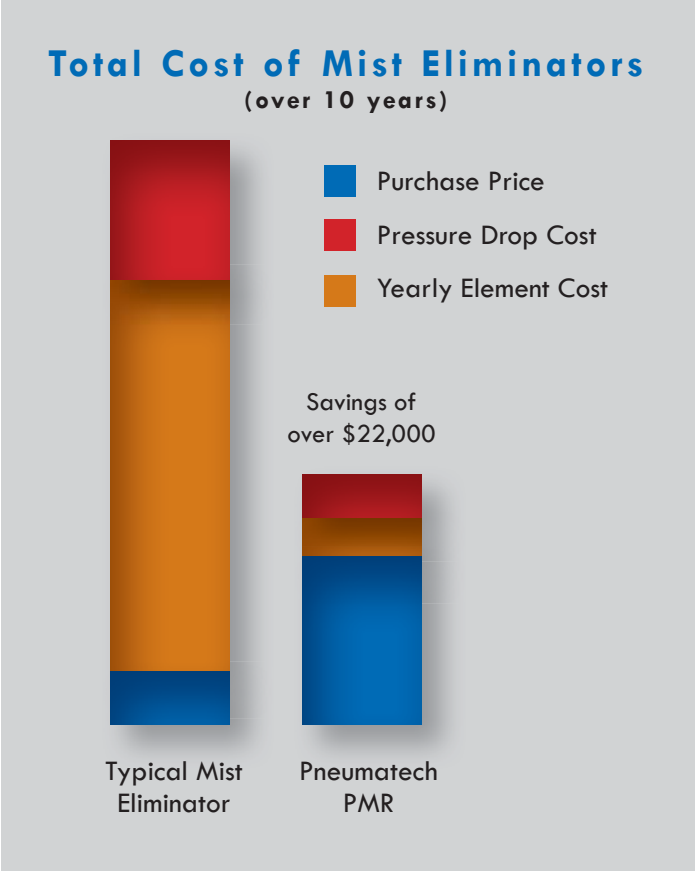
Average cost of pressure drop – assume that each cfm costs 0.19kW and each psi saves 0.5% of this power, price per kwhr = $0.08 and the system runs 8000 hrs per year

Yearly element replacement cost – all element and labor costs for 10 years, evenly spread

	Regular Filter	Mist Eliminator
Initial Cost	$1,200	$6,000
Average Pressure Drop	4 PSI	0.5 PSI
Average Cost of Pressure Drop	$2,432	$304
Yearly Element Replacement Cost	$900	$160
Total Cost Over 10 Years	$34,520	$10,640
PMR Investment Payback		20 months

Note: These figures are for guidance only and do not constitute a quote.

Over a 10-year period, this 1000 cfm system with a standard filter will cost the operator approximately $21,280 more in energy and $7,400 more in element replacements. This means that the extra investment for the Mist Eliminator will be returned in about 20 months. Larger systems will save significantly more energy and as a result will have an even faster payback. This example was used because 1000 cfm is a very popular system size.



DESIGN CONSIDERATIONS

Designing a filtration system that will last reliably for at least 10 years without maintenance is a complicated and technical process. The PMR series Mist Eliminator have been especially designed to deliver market leading performance over the long term, guaranteed. The key design aspects that enable this performance include:

Vessel Design

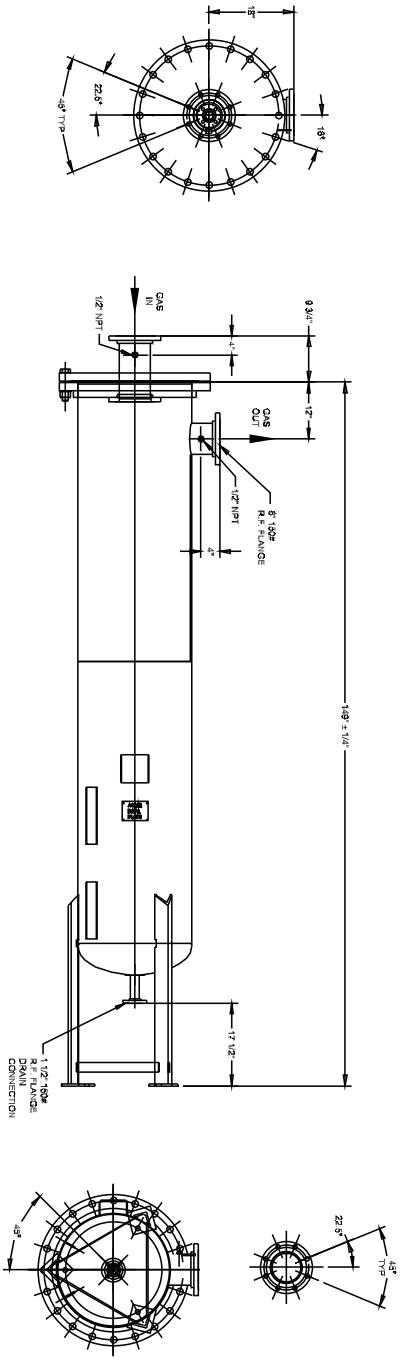
In order for the element to work efficiently, compressed air needs sufficient contact time with the fiber bed. Therefore, proper vessel design is crucial to ensure the performance of the Mist Eliminator. A common mistake is to supply a vessel that is too short, too small in diameter, or both. In such cases, the terminal settling velocity will be exceeded and the condensate will pass straight through the element, usually causing pressure drop.

Fiber Bed

By using homogenous-sized fibers, hand packed to a specific density, these filters takes advantage of the properties of gas diffusion and traps contaminants in the interstitial space. Unlike some designs using filter paper, PMR series Mist Eliminators are able to offer a more reliable performance over the long term, and a guaranteed lifetime of at least 10 years.

Rating

The filter is nominally rated for use in a wet air stream before a dryer. In addition, the filter will withstand liquid slugging and in most cases a catastrophic failure of a compressor air/oil separator element. If the filter is used after a dryer, the inlet air flow can be increased beyond the nominal rating, as detailed in the technical data, without jeopardizing the warranty.



SPECIFICATIONS

Model Number	Nominal Inlet Flow		Connections		Vessel Height	Vessel Diameter
	Upstream of Dryer	Downstream of Refrig Dryer	Inlet/ Outlet	Drain		
PMR-85	85	140	2	1	32"	14"
PMR-180	180	252	2	1	36"	14"
PMR-435	435	587	2.5	1	49"	14"
PMR-780	785	1004	4	1	68"	16"
PMR-1015	1015	1,333	4	1	68"	16"
PMR-1305	1305	1,651	4	1	68"	18"
PMR-1450	1450	1,928	4	1	62"	24"
PMR-2175	2175	2,790	4	1	75"	24"
PMR-2900	2900	3,853	4	1	88"	24"
PMR-4350	4350	5,527	6	1.5	135"	24"
PMR-6160	6160	7,752	8	2	137"	30"
PMR-7250	7250	9,752	8	2	157"	30"
PMR-8700	8700	11,717	10	2	185"	30"
PMR-15000	15,000	16,242	12	2	185"	36"
PMR-17500	17,500	18,267	12	2	209"	36"

Operating Specifications

	Nominal Conditions	Maximum Conditions
Gas	Compressed Air	Compressed Air
Inlet Pressure	100 PSI	150 PSI
Inlet Temperature	100°F	120°F

Filtration performance at nominal conditions:
Inlet submicron mist removal efficiency = 99.5% as standard to a maximum of 99.95% as a special option
Inlet particle removal efficiency, 1 micron and bigger = 100%
Inlet particle removal efficiency, 0.1 - 3.0 micron = 99.98%

Capacity Correction for Different Inlet Pressure

Inlet Pressure (PSIG)	Filter Inlet Capacity Correction Factor
70	0.74
80	0.83
90	0.91
100	1.0
110	1.09
120	1.17
130	1.26
140	1.35
150	1.44

Pneumatech
4909 70th Avenue
Kenosha, Wisconsin U.S.A. 53144
(262) 658-4300 Fax: (262) 658-1945

www.pneumatech.com

Distributed by:

Member of CAGI www.cagi.org

Use of this Motor Challenge logo does not imply DOE endorsement.