Air/Oil Separators



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Technical Data Oil Mist Discharge Filters



General

Recent developments in product design allow for the possible selection of oil mist discharge filters based on the type of equipment being used. It is, for the first time, possible to identify the appropriate grade of aerosol discharge filter because of the extensive research completed by the Solberg R&D department. Please follow the rules below to correctly size your oil mist discharge filter. If further consultation is required, please contact Solberg or your Solberg sales representative in your area.

Filter Selection Guidelines

#1:

Forget all that you know about air/oil separators for Compressed Air Systems, as such systems repeatedly fail in a vacuum pump application. The first consideration is to determine the type of Vacuum Pump being used. The particle size distribution and mass of oil aerosol discharging from a vacuum pump is as varied as the number of separator tank designs utilized by the industry. The main pump types are Rotary Vane, Rotary Screw, Rotary Piston, Liquid Ring, and Reciprocating Vacuum Pumps. Each type of pump produces its own specific oil discharge characteristics and requires the appropriate media make-up to effectively capture and drain oil aerosols.

#2:

Determine the type of oil being used in the vacuum pump. Trade names, viscosity/grade of oil, and the lubricant base (mineral, synthetic, etc.) are all useful in determining the discharge aerosol characteristics.

#3:

Determine how much oil the pump consumes under normal operating conditions. Typical consumption rates are gallons or liters per hour. The amount of oil consumed is typically the amount of oil being discharged.

#4:

Pump operating cycles including vacuum range, temperature fluctuations, contaminant gases or vapors, and hours of operation per day/week. Also, determine the maximum pressure drop or filter restriction the system will allow.

#5:

Determine the operating temperature at the discharge connection. If it is above +104 ° C, methods of cooling the aerosol should be considered.

#6:

Note the Horsepower of the pump, the outlet connection, and the air flow.

#7: When an external unit is to be used as the primary or sole air/oil separator in a system, a multi-stage Severe Duty system is required.

#8: In the case where an existing air/oil separator (internal or external) is already used, it is important to specify the desired goal for a second filter. Is it planned to have a multi-staged system for severe or extreme duty applications, or is there a requirement for exceptionally clean discharge air? If a multiple stage system is needed, try to identify the primary stage unit and the purpose for the second stage. **#9:** Consider where to install the Filter. Where possible it is best to install in moderate temperature (+2° to +38°C) environments and avoid freezing conditions to ensure the oil drains freely without causing undue back pressure to the Vacuum Pump.

Once as much information as possible is obtained, send the data to Solberg for review and/or review our data sheets in the catalog or on our web page www.solbergmfg.com.



Technical DataOil Mist Discharge Filters

Applications & Equipment

- Vacuum Pumps & Systems
- Vacuum Furnaces & Ovens
- · Vacuum Freeze Drying & Outgassing
- Vacuum Metallizing
- Vacuum Drying
- Vacuum Coating
- Custom Vacuum Pumping Systems
- Food Processing & Packaging
- Industrial Vacuum Processes
- Pressure Unloading Vents on Piston Compres-

sors

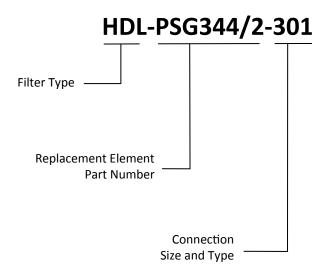
- Reciprocating Engines
- Crankcase
- Medical Work Areas
- Industrial Aerosol Scrubbing
- Heat Treating Equipment/Vacuum Hold Down
- Routing Equipment
- Laboratory Industry
- Leak Detectors
- Autoclaving, Sterilization

Identification

All Solberg products should have an identification label/nameplate that gives the following information:

Assembly Model # Replacement Element

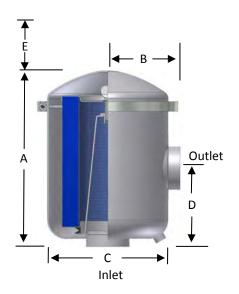
The part number designates the filter type, the element configuration and housing connection size. For example, the following part number identifies the filter as being a "HDL" design filter with a "PSG344/2" coalescing element, and 3" BSPT connection size.



Oil Mist Discharge Filters **HDL Series 1" - 2 1/2" BSPP**







Features

- Captures oil fog, mist or smoke from exhaust of oil flooded
 Large oil holding capacity and easy field maintenance vacuum pumps
- Seamless drawn housings-no welds to rust or vibrate apart
- Positive engagement O-ring seal system
- Rugged all steel construction with baked white enamel finish
- 1/4" drain tap

Benefits

- Pleated filter element provides increased surface area for low back pressure separation of ultra-fine oil mists

Technical Specifications

- 0.3 micron media; 99.97% efficiency
- Continuous operating temp: 20°C (68°F) 80°C (180°F)

Options

- Application specific filter media and gaskets/seals
- Custom connections
- Epoxy or PTFE coated finishes
- Stainless steel housings

BSPP Connections

BSPP Inlet &	Assembly m ³ /h	Assembly Part Number	Dimensions - mm A B C D E					Approx. Weight	Replacement Element	Element m³/h
Outlet	Rating							kg	Part No.	Rating
1"	68	HDL-PSG848-101HC	171	105	186	117	133	2	PSG848	85
1 1/4"	85	HDL-PSG848-126HC	171	105	186	117	133	2	PSG848	85
1 1/2"	85	HDL-PSG848-151HC	171	105	186	117	133	2	PSG848	85
2"	213	HDL-PSG850/1-201HC	286	117	222	127	235	7	PSG850/1	213
2"	298	HDL-PSG860/1-201HC	445	117	222	127	368	14	PSG860/1	340
2 1/2"	425	HDL-PSG244/2-251HC	358	185	305	182	254	16	PSG244/2	510

See Discharge Filter Technical Data section for sizing guidelines.

Dimension tolerance + 6 mm



Oil Mist Discharge Filters HDL Series 3"BSPT - DN200 Flange



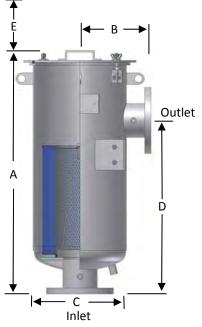
Features

- Captures oil fog, mist or smoke from exhaust of oil flooded vacuum pumps
- Positive engagement O-ring seal system
- Rugged all steel construction with baked white enamel finish
- 1/4" drain tap
- Nameplate bracket
- Lifting lugs

Technical Specifications

- Continuous operating temp: 20°C (68°F) 80°C (180°F)
- 0.3 micron media; 99.97% efficiency
- Housing pressure rating: 14.5 PSI

BSPT & DN Flange Connections



Benefits

- Large oil holding capacity and easy field maintenance
- Pleated filter element provides increased surface area for low back pressure separation of ultra-
- · Multiple separation stages in single element design

Options

- Application specific filter media and gaskets/seals
- Custom connections
- Epoxy or PTFE coated finishes
- Stainless steel housings

Inlet &	Assembly m³/h	Assembly Part Number	DIMENSIONS - mm					Approx.	Replacement Element	Element m³/h
Outlet	Rating		Α	A B C D E					Part No.	Rating
3"	510	HDL-PSG344/2-301	791	229	356	572	381	34	PSG344/2	850
4"	850	HDL-PSG344/2-401	791	229	356	572	381	35	PSG344/2	850
5"	1360	HDL-PSG474/2-501	968	279	470	749	559	72	PSG474/2	1870
6"	1870	HDL-PSG474/2-601	994	305	470	775	559	72	PSG474/2	1870
DN200	3060	HDL-PSG476-DN200	986	356	533	648	559	81	PSG476/2	3060
See Disch	arge Filter T	echnical Data section for sizin	g guideline:	S.				Dim	nension tolerand	ce <u>+</u> 6 mm

PN10	Di	mensions - m	ım	No. of	Thickness
Pattern Flange	O.D.	B.C.	B.H.	Holes	Flg mm
DN200	340	295	22	8	24

O.D.: Outside Dimension B.C.: Bolt Circle B.H.: Bolt Hole B.H.

All flanges are orientated "split center".

Compact Closed Oil Mist Filters EE/SV Series 3/8" - 1"BSPP, ISO Flg







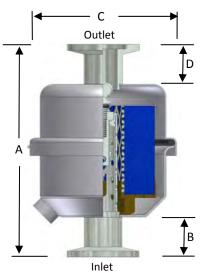
- Captures oil fog, mist or smoke from exhaust of oil flooded vacuum pumps
- Seamless drawn housings no welds to rust or vibrate apart
- Rugged all steel construction

Technical Specifications

- 0.3 micron media; 99.97% efficiency
- Continuous operating temp: 20°C (68°F) 80°C (180°F)

EE Series Specifications

- Back pressure valve designed to release element at 0.5 bar (7.35 PSI) differential for pump safety
- 1/8" oil drain



EE Series Configuration

Benefits

- Compact low profile design
- · Easy field maintenance

Options

- Additional ISO flange connections
- Additional coating options available
- Side outlet configuration
- Drain

								Replacement	Element
Inlet	Outlet	Assembly	Assembly		Dimensions - mm				m³/h
Туре	Туре	m ³ /h Rating	Part Number	Α	В	С	D	Part No.	Rating
3/4"-MPT	1/2"-BSPP	14	EE-GL915-075	119	32	83	13	GL915	14
16mm ISO Flg	16mm ISO Flg	14	EE-GL915-QF16	119	22	83	22	GL915	14
25mm ISO Flg	25mm ISO Flg	14	EE-GL915-QF2516	119	22	83	22	GL915	14
25mm ISO Flg	25mm ISO Flg	34	EE-PSG925-QF25	197	22	133	22	PSG925	34

See Oil Mist Discharge Filter Technical Data section for sizing instructions.

Dimension tolerance ± 6 mm

SV Series Specifications

• Configured without valve or external drain

								Replacement	Element
Inlet	Outlet	Assembly	Assembly		Dimensi	ons - mm		Element	m³/h
Туре	Туре	m ³ /h Rating	Part Number	Α	В	С	D	Part No.	Rating
3/8" BSPT	5/8" Tube	7	SV-GL910-039	89	22	64	13	GL910	7
1/2" MPT	5/8" Tube	7	SV-GL910-050	89	22	64	13	GL910	7
3/8" BSPT	3/8" MPT	14	SV-GL915-039	119	32	83	13	GL915	14
3/4" BSPT	1/2" FPT	14	SV-GL915-075	119	32	83	13	GL915	14
16mm ISO Flg	16mm ISO Flg	14	SV-GL915-QF16	119	22	83	22	GL915	14
25mm ISO Flg	25mm ISO Flg	14	SV-GL915-QF2516	119	22	83	22	GL915	14
25mm ISO Flg	25mm ISO Flg	34	SV-PSG925-QF25	197	22	133	22	PSG925	34

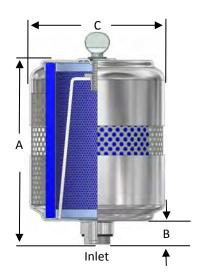
See Oil Mist Discharge Filter Technical Data section for sizing guidelines.

Dimension tolerance <u>+</u> 6 mm



Compact Oil Mist Filters EF Series 1/2" - 1 3/4", ISO Flanges





Features

- Captures oil fog, mist or smoke from discharge of oil flooded vacuum pumps
- Steel construction with nickel plated finish

Benefits

- Easy thumb screw access for element maintenance
- Seamless drawn housings no welds to rust or vibrate apart

Technical Specifications

- 0.3 micron media; 99.97% efficiency
- Continuous operating temp: 20°C (68°F) 80°C (180°F)

Options

- Additional ISO flange connections
- Special connections

Connection Sizes & Styles

C	Connection	Assembly	Assembly	DII	MENSIONS - n	nm	Replacement	Approx.
Size	Style	m ³ /h Rating	Part Number	Α	В	С	Element Part No.	Wt. Kg
1/2"	MPT	8	EF-FG5-050	114	25	64	FG5	0.3
1/2"	MPT	12	EF-FG7-050	140	25	64	FG7	8.0
3/4"	20 Fine Thread	7	EF-FG3-077	83	25	64	FG3	0.5
3/4"	MPT	8	EF-FG5-075	127	38	64	FG5	0.4
3/4"	MPT	12	EF-FG7-075	152	38	64	FG7	0.8
1"	20 Fine Thread	8	EF-FG5-103	99	22	64	FG5	0.3
1"	20 Fine Thread	12	EF-FG7-103	127	22	64	FG7	0.4
1"	20 Fine Thread	27	EF-FG9-103	130	22	130	FG9	0.8
1"	20 Fine Thread	41	EF-FG10-103	184	22	130	FG10	3.2
1 3/4"	20 Fine Thread	41	EF-FG10-177	206	44	130	FG10	1.6
16mm	ISO Flange	8	EF-FG5-NW16	114	22	64	FG5	0.3
25mm	ISO Flange	8	EF-FG5-NW2516	114	22	64	FG5	0.6
25mm	ISO Flange	41	EF-FG10-KF25	235	54	130	FG10	1.6
40mm	ISO Flange	75	EF-FG20-KF40	191	54	260	FG20	3.2
40mm	ISO Flange	94	EF-FG24-KF40	235	54	260	FG24	4.1

See Oil Mist Discharge Filter Technical Data section for sizing guidelines.

Dimension tolerance + 6 mm

Oil Mist Filters w/Drain Back EFDB Series





Auto Drain Back Inlet

Features

- Captures oil fog, mist or smoke from exhaust of oil flooded vacuum pumps
- Auto drain back design to recycle oil mist:
 - Internal drain returns oil back into pump
 - Prevents oil blow back with auto sealing
 - Enclosed housing allows clean environment

Benefits

- Easy thumb screw access for element maintenance
- Compact design
- Seamless drawn housings no welds to rust or vibrate apart

Technical Specifications

- 0.3 micron media; 99.97% efficiency
- Continuous operating temp: 20°C (68°F) 80°C (180°F)

Options

- Additional ISO flange connections
- Special connections

Connection Styles & Sizes - EFDB Series

Connection	Assembly	Assembly	Dimensions - mm			Approx.	Replacement
Size & Style	m ³ /h Rating	Part Number	Α	В	С	Wt. Kg	Element
KF25 ISO Flange	27	EFDB-FG9-KF25	213	54	130	1.1	FG9
1"-20 Fine	27	EFDB-FG9-103	181	22	130	1	FG9
1 3/4"-20 Fine	41	EFDB-FG11-177	245	51	159	1.1	FG11

See Oil Mist Discharge Filter Technical Data section for sizing instructions.

Dimension tolerance ± 6 mm



Air/Oil Sump & Separator Tank For Vacuum Pumps, ATS Series



Oil Fill Port A Inlet D Pump Return Float Level Ports

Features

- Complete separator package for vacuum pumps
- Captures oil fog, mist or smoke from exhaust of oil flooded vacuum pumps
- Multiple separation stages
- Separator baffle system for larger particles
- Rugged carbon steel construction
- 2" NPT oil fill port
- 1" NPT sump drain
- 1" NPT pump return port
- 1/4" tap hole standard: 3" housing

Benefits

- Low profile design
- Connects directly to discharge; no hardware needed
- Simplifies system packaging by integrating sump tank with separator
- Pleated separator element provides increased sur face area for low back pressure separation of ultrafine oil mists

Technical Specifications

- 0.3 micron media; 99.97% efficiency
- Continuous operating temp: 20°C (68°F) 80°C (180°F)

Options

- · Specialty media configuration
- · Housing material
- Special connections

Connection Styles & Sizes

BSPT	BSPT	Assembly m³/h	Assembly Part Number		DIMENSIONS - mm					
Inlet	Outlet	Rating		Α	В	С	D	E	F	Liters
1 1/2"	2"	170	ATS-PSG850/1-151HC	749	575	302	203	219	356	15
2"	2"	340	ATS-PSG860/1-201HC	918	587	406	305	275	410	30
3"	3"	680	ATS-PSG344/2-301C	1214	821	508	381	508	705	65

See Oil Mist Discharge Filter Technical Data section for sizing instructions.

Dimension tolerance + 6 mm"

Vacuum Assisted Oil Mist Eliminators Reciprocating Engines & Turbines



Our Vacuum Assisted Oil Mist Eliminators are designed for field upgrades and new reciprocating engines and turbine installations around the world. Our high efficiency filtration systems eliminate vented oil mist emissions while controlling engine pressure in crankcases and turbine lube oil reservoirs. We offer either vapor extractor and static options based on application requirements.

Series Specific Applications



Reciprocating Engines: Stationary

- Crankcase ventilation systems ensure environmental compliance and protect surrounding workplace from harmful oil mist emissions
- Open and closed system designs
- Prevents engine intake system contamination & seal leakage
- Improves engine performance
- Controls crankcase pressure
- Applications: landfill gas to energy, standby power, prime power and mechanical drive

Gas & Steam Turbines

- Retrofits and upgrades to replace outdated and inefficient vapor extractors for lube oil systems
- Typical systems include: high efficiency coalescing element, vacuum / pressure controls and integrated bypass device to simply maintenance and reduce operating costs
- Applications: peaking, nuclear, and base load power plants





Reciprocating Engines: Marine

- Crankcase ventilation systems ensure safety and reliability
- Unique piping configuration for easy installation, self regulation and seal leak prevention
- Captures vented oil mist emissions and reduces breathing and slipping hazards
- Applications: passenger ships, workboats, military vessels

SOLBERG® Vacuum Assisted Oil Mist Eliminators

1 - 2550 m³/h



Features

- Eliminates visible oil mist emissions
- High efficiency and long lasting replaceable coalescing
- Rugged carbon steel construction
- Industrial grade powder coat finish
- Drain ports for oil recovery
- Control valves for precise pressure regulation
- Large assortment of motor options (Explosion proof, ATEX, etc.)
- Integrated vacuum relief for motor protection
- Contact factory for specific flow ratings and sizes.

Technical Specifications

- 0.3 micron media; 99.97% efficiency
- Flow range: 1-2550 m³/h (1-1,500 ft³/m) std, higher flows are available on request
- Pressure Rating: 1 bar full vacuum (most models)

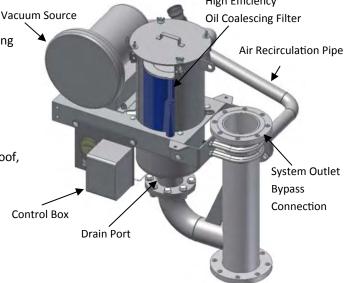
Environmental Compliance

Based on the U.S. RICE NESHAP* ruling, stationary engines over 300HP must be equipped with a crankcase ventilation system by 2013. The objective is to reduce the harmful crankcase emissions emitted into the environment.

Solberg is committed to partnering with plant operators around the world to update their equipment and lessen their environmental impact.

* Reciprocating Internal Combustion Engines National Emissions Standards for Hazardous Air Pollutants





Recirculation System Configuration Example

Options

- Redundant equipment to ensure continuous operation
- Full automation: PLC and DCS compatible
- Stainless steel construction for harsh environments
- · Custom coating and colors
- ASME Section VIII or PED pressure certifications
- Explosive environ. options: ATEX, Class I Div. 1, etc.
- Motor listings: UL, CE, IEC, CSA, IEEE, KOSHA, etc.
- Motor accessories: Heaters, starters, switches, VFD,
- Skid mounted units for ease of transport & installation
- Service and maintenance platforms
- GOST certification

Static Oil Mist Eliminators Capture Vented Crankcase Emissions



CCV Series

Solberg designs and manufactures high efficiency Closed Crankcase Ventilation Systems to capture oil mist and particulate emissions (blow-by) from the crankcases of a reciprocating engine.

Solberg's closed systems protect an engine's turbo, intercoolers and exhaust catalysts from oil mist and particulate contamination. The results are optimized engine performance and a reduction in costly repairs and maintenance.

Solutions Designed For

- Caterpillar
- Jenbacher
- Waukesha
- MTU

- Guascor
- Wartsila
- Cummins
- Fairbanks Morse



Closed Crankcase Ventilation System
Guascor Engine Installation

Typical Applications

- Electric Power Generation
- Marine Power Generation
- Marine Propulsion
- Gas Compression

Benefits & Purpose

- Captures the hazardous oil mist and particulate emissions "blow-by" vented from the crankcase.
- Achieves 99.97% efficiency for 0.3 micron oil mist and particulate
- Protects the turbocharger, intercoolers and exhaust catalysts from contamination and damage.
- Prevents potential health hazards from entering the surrounding environment and workplace
- Maintains required crankcase vacuum via integrated self-regulating valve
- Recovers expensive lube oil lost during the venting process, which allows for efficient operation and lower maintenance costs



Solberg Closed Crankcase Ventilation System With Integrated Vacuum Control Valve

CLV Package



Static Oil Mist Eliminators CV, CVH Series

Series Specific Applications

- Vents for Oil Reservoirs, Crankcases, Bearings, Coupling Guards
- Compressor, Turbine, Gearbox, Engine Applications

Features

- Eliminates visible vented oil mist emissions
- High efficiency fiberglass filter elements: 99.97% removal efficiency for 0.3 μm oil mist
- Carbon steel construction with durable powder coat finish
- Low back pressure filter element design: Pleated and wrapped fiberglass options
- Extensive flow range
- Continuous operating temp: 20°C (68°F) 80°C (180°F)
- Contact factory for specific flows and sizes.

Options

- Stainless steel construction
- Special coatings and finishes
- Internal drain-back mechanism
- Alternative filtration media (wire mesh demister, vane separator)
- Multiple configurations
- Vacuum assisted oil mist eliminators (See page 5-10 to 5-11



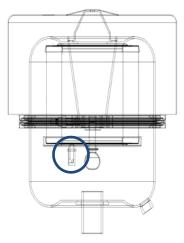
Gearbox Application



CVH Series



CV Series

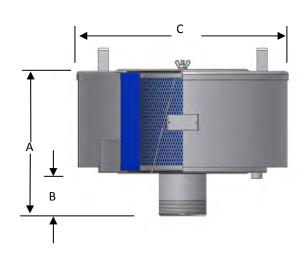


Static Vent Oil Mist Eliminators w/Internal Drain-Back Mechanism

Static Vent Oil Mist Eliminators CVB Series







Features

- Eliminates visible vented oil mist emissions
- Carbon steel construction with powder coat finish
- Low back pressure filter element design: Pleated and wrapped media options
- External drain-back mechanism
- Extensive flow range available upon request

Series Specific Applications

- Air/Oil Separation Vents for oil reservoirs, crankcases, bearings, coupling guards
- Compressors, turbines, gearboxes, engines and more

Technical Specifications

- 0.3 micron media; 99.97% efficiency; Typically 5 PPM or less*
- Continuous operating temp: 20°C (68°F) 80°C (180°F)
- * 150 PPM challenge or less

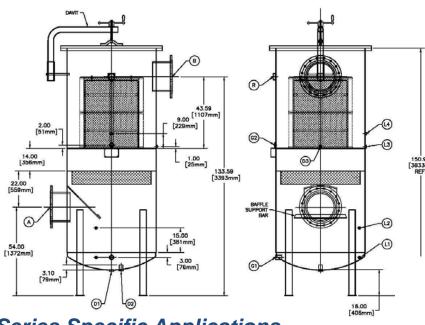
Options

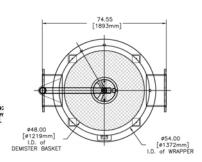
- Stainless steel construction and resistance coatings
- Alternative filtration media (Wire mesh demister, vane separator)
- Vacuum assisted style available: BAE Series

	Outlet Assembly		5.			_	Replacement
Ou	tiet	Assembly	Dime	ensions -	mm	Approx.	Element
Size	Type	Part Number	Α	В	С	Wt. kg	Part No.
1"	MPT	CVB-WP848-100	189	51	156	1.4	WP848
1 1/4"	BSPT	CVB-WP848-126	189	51	156	1.4	WP848
1 1/2"	BSPT	CVB-WP848-151	189	51	156	1.4	WP848
2"	BSPT	CVB-WP850-201	302	64	260	2.5	WP850
2 1/2"	BSPT	CVB-WP850-251	302	64	260	2.5	WP850
3"	BSPT	CVB-WP274-301	375	76	508	6.8	WP274
4"	BSPT	CVB-WP274-401	400	102	508	6.8	WP274
DN100	FLG	CVB-WP274-DN100	400	102	508	9	WP274
DN125	FLG	CVB-WP374-DN125	508	102	508	17	WP374
DN150	FLG	CVB-WP374-DN150	533	127	508	18	WP374



Natural Gas Filtration **Oil Separators**





Note: Drawings are shown with sample dimensions only.

Series Specific Applications

- Landfill and Bio-Gas recovery
- Fuel for reciprocating engines and gas turbines
- Gas compression
- Compressor packages
 - Rotary Screw
 - Centrifugal
 - Reciprocating
 - Vane

Features

- Protects equipment from condensate, oil, and particulate entrained in the gas stream
- Multi-stage separation
 - 316 SS vane pack or demister pad for heavy condensate and oil removal
 - High efficiency 99+% final filter elements
- Rugged carbon steel construction
- · Contact factory for model offering and availability



Options

- Special standards: PED, CRN, ATEX, ASME Vessel code sec. VIII division I
- Stainless steel construction
- Special coatings or finishes
- Replaceable filter elements in various efficiencies for particulate removal
- · Gauge ports, float switches
- Custom leg supports
- Flush port for vessel cleaning
- Removable vessel lid for element service
- Davit arm for vessel lid removal

