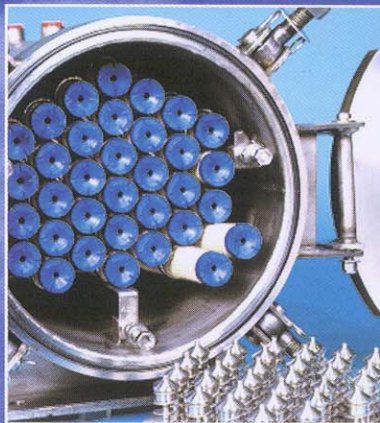


Products for Fuel Handling



DEPARTING TO	GATE	SCHED	REMARKS
DENVER	11	7:00P	ON TIME
SALT LAKE CITY	4	7:10P	ON TIME
ALBUQUERQUE	TKT	7:15P	ON TIME
LAS VEGAS	6A	7:20P	ON TIME
LOS ANGELES			
PHOENIX	3	7:46P	ON TIME
DENVER	12	7:55P	ON TIME
* TOMORROW'S FLIGHTS **			
ALBUQUERQUE	TKT	6:00A	ON TIME
	TKT	6:00A	ON TIME
DENVER	5A	6:10A	ON TIME

AIRPORTS • TERMINALS • PIPELINES • REFINERIES

Velcon®



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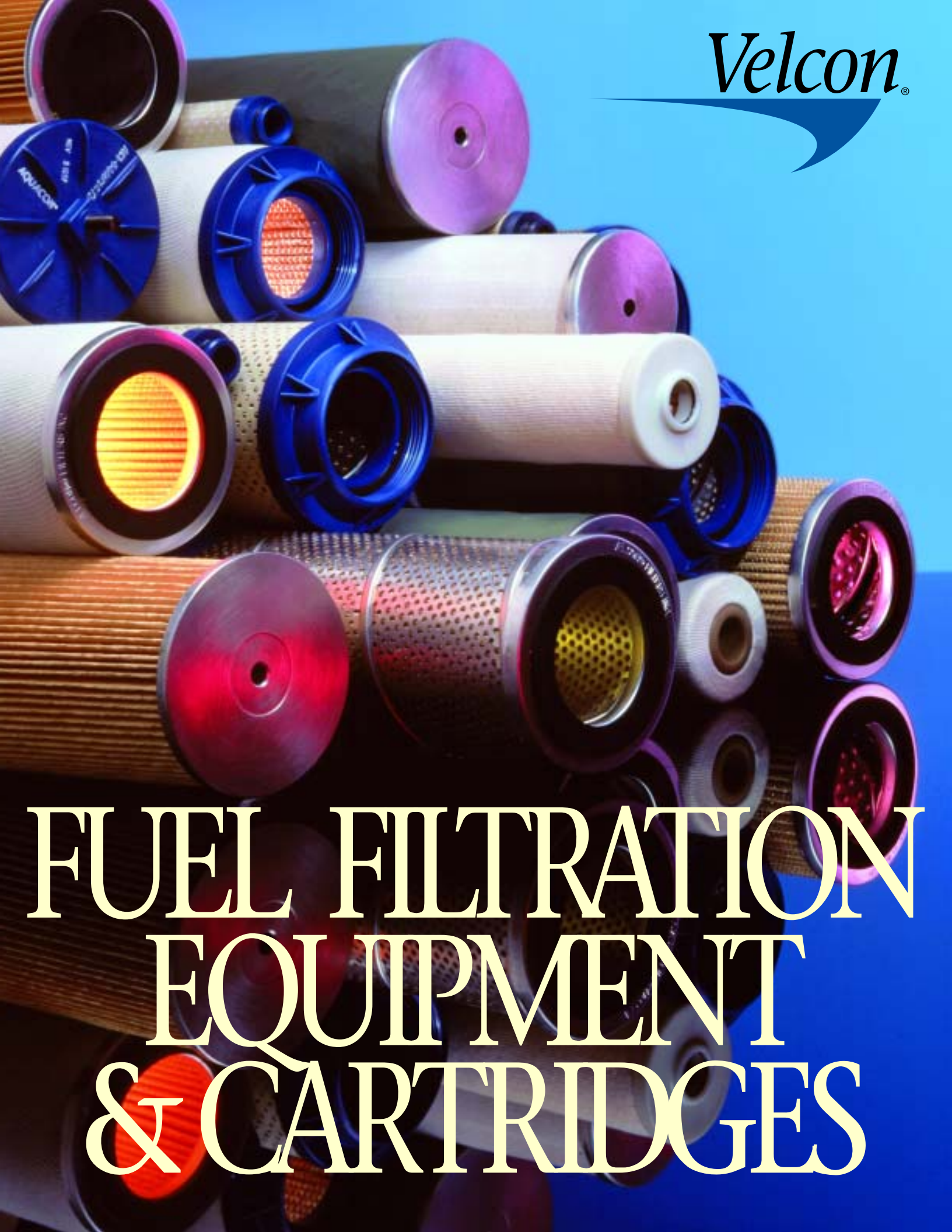
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Velcon®

FUEL FILTRATION EQUIPMENT & CARTRIDGES

INDUSTRY QUALIFIED



Velcon Filters manufactures hundreds of different filter cartridges, with a range of filtration efficiencies in a variety of configurations, to meet specific industry filtration requirements. Cartridges qualified to military specifications are also offered.

Included is the industry's most complete line of cartridge sets qualified by test to the latest edition of API/IP 1581 for use in Filter/Separators. CDF[®] K Series cartridges are qualified to the latest API/IP 1583 monitor specifications.

Super-absorbent **Aquacon[®]** cartridges offer remarkable water removing and holding capability in addition to 1/2 micron particulate removal. They are qualified to the latest API/IP 1583 specifications.

Other cartridges are offered for the removal of granular and colloidal contaminants as well as surfactants.

This family of cartridges provides optimum filtration performance when used in either Velcon filter vessels or in housings made by Quantek/Facet, Fram, Bendix, Bowser/Keene/Kaydon, Purolator, and numerous others.

Contact your local Velcon Representative for a discussion of your specific requirements.

Filter/Separators

Filter/Separators are two-stage vessels designed to remove dirt and separate water from fuel at refineries, product terminals, fuel farms, and on refueling vehicles. They continuously coalesce and separate water, which collects in the vessel sump where it can be drained. Velcon Filter/Separators have passed numerous tests qualifying them to the latest API/IP 1581 edition. Construction is to ASME Code. Units qualified to military specifications are also available.

Equipment

Fixed Installations

- VV Series Vertical Vessels
- HV Series Horizontal Vessels
- V Series Vertical Vessels

Mobile Fueling Units

- HV Series Horizontal Vessels
- HVS Series Horizontal Vessels



Coalescer Cartridges

Used as a first-stage cartridge in Filter/Separators. Remove particulates and coalesce water into large water drops. Also available in screw base design.

Separator Cartridges

Second stage cartridges in Filter/Separators repel coalesced water drops which then collect in the sump for easy removal. Available in Teflon[®] Coated Screen, Synthetic Media or Pleated Paper Media.



& TESTED ... VELCON FILTERS

Positive Water Protection Filters

Positive Water Protection Filters are single-stage filter vessel systems which remove water and dirt from Avgas and Jet Fuel and provide positive protection from water at the point of final fuel filtration.

When a monitor system's water holding capacity is reached, the flow of fuel is stopped. Contaminated fuel can not pass downstream. Units meet all API/IP Specifications.

Construction is to ASME Code Section VIII.

Equipment

Fixed or Mobile Units

- AHM or HM Series Horizontal Monitor Vessels
- AVM or VM Series Vertical Monitor Vessels

High Capacity Units

- HF Series Horizontal **Aquacon**® Vessels
- VF, VFA Series Vertical **Aquacon**® Vessels

CDF® Cartridges

Absorb water and filter solids from Avgas and Jet Fuel. Provide positive protection against water slug transmission.

Performance is not affected by surfactants.

Micronic and Clay Vessels

Micronic and Clay Vessels remove dirt and surfactants. Micronic vessels offer economical particulate prefiltration upstream of clay units or Filter/Separators. Clay elements remove surfactants. Construction is to ASME Code Section VIII.

Equipment

Fixed Installations

- VF, VFA Series Vertical **Aquacon**® Filter Vessels
- VC Series Clay Element Vessels

Pleated Paper Cartridges

Corrugated pleated media with large surface area for filtration of granular contaminants. Also available in screw base design.

Fiberglass Filter Cartridges

Progressively finer layers of fiberglass filter colloidal or slimy contaminants.

Clay Canister Cartridges

Attapulugus clay canisters for removal of surfactants from jet fuel and other petroleum products.

Commissioning Cartridges

Commissioning Cartridges (our FI-xxx series) are now available. They can be used in place of coalescers to remove heavy solid contaminants during start up. Our FO-754PL05 and other shorter length filter elements can be used in place of clay canisters for initial system flush.

Aquacon® Cartridges

Filter particulate matter and absorb water with great efficiency. Water capacity is approximately 40 times greater than 2" diameter monitor cartridges. Also provide positive, surfactant-proof protection against water slugs.

Proven Performance: Velcon Filters

Velcon Filters, Inc. serves a variety of markets throughout the world with a broad range of fluid clarification products. The largest single segment of our business involves providing the jet fuel industry with products that filter, purify and remove water from jet fuel from the refinery to the aircraft refueler.

Major customers served by Velcon include:

- Airlines
- Airport Refuelers, both Military and Commercial
- Petroleum Products Distribution
- Refineries
- Industrial Plants: Petrochem, Pulp & Paper, Plastics Injection Molders & many others.
- Original Equipment Manufacturers

A History of Innovation

Velcon Filters was founded as Enfab, Inc. in 1953 by Harold Higbee, a Tooling Engineer, and L.W. (Lu) Taylor, an Industrial Engineer. Both had extensive experience in the fiberglass industry. The first products were fabricated fiberglass components for the 2.75 Rocket sold to the United States government.

Imaginative R&D led to the creation of a proprietary fiberglass filter coalescer in 1957. This revolutionary product was initially introduced to both Military and Commercial Aviation Fuel markets and subsequently to pipelines and refineries. Velcon now supplies more replacement cartridges to purify jet fuel than any other company in the world.



Velcon products are sold and serviced by a world-wide representative network. To order, contact Headquarters or your LOCAL REPRESENTATIVE:

Energy and environmental problems in the 1970's created new opportunities.

In 1979, Velcon introduced **Aquacon**® water-absorbing cartridges which remove water and dirt from industrial oils and fuels, restoring the oil or fuel to a clean, usable condition. The outer layers of filter media remove particulate contaminants, while the inner layers chemically retain water within the super-absorbent media. As the cartridge reaches its absorption capacity, the media expands rapidly to restrict the flow of unfiltered oil or fuel, signaling the operator to replace the cartridge.

Velcon Today

In 1991, Lu Taylor became Chairman of the Board and his son David C. Taylor assumed the position of President. Dave Taylor brought with him a broad range of technical and management experience.

Velcon's commitment to quality has been recognized through its achievement of the ISO 9001 Certification of Registration in 2000. Most recently Velcon has requalified for ISO 9001, proving its continuing achievement of quality standards. Velcon is also the first filter manufacturer to receive qualifications for all three categories of the API/IP 1581 5th Edition Specification.

3 Manufacturing Locations:

Colorado Springs, CO - Corporate headquarters, inside sales, R&D, and engineering and marketing facilities are based here. Our lab, the largest indoor jet fuel testing lab in the world, is responsible for product development and analysis of customer fluid samples to determine optimum clarification methods. Oily water separators and oil filter systems are manufactured here.

Harlingen, TX - ASME code certified steel and aluminum filter housings as well as portable filter systems.

Sylacauga, AL - Fiberglass coalescers, pleated paper fiberglass coalescers, fiberglass filters, clay elements, TCS and pleated paper separators and **Aquacon**® elements.

Close the Loop with FILCare®

Velcon Filters' United States FILCare® Cartridge Recycling service provides you with a convenient, legal, cost effective, and environmentally responsible method for disposing of your used jet and diesel fuel filter cartridges. Contact your local Velcon Distributor for a discussion of how closing the loop with FILCare® can be of service to you.

Customer Service Commitment

Velcon Filters, Inc. and its worldwide network of Authorized Distributors, Affiliates, Representatives, and Licensees, are committed to going above and beyond to offer unequalled customer service by providing support 24 hours a day, 365 days a year. Velcon's customer service includes technical support, training seminars and materials, industry newsletters, and same-day shipment, when ordered before noon, of most in-stock items. For a discussion of your specific requirements, contact your local Velcon Representative, call Velcon toll free at 800.531.0180, or email us at vfsales@velcon.com.



MANUFACTURING PLANTS LOCATED AT:

Sylacauga, Alabama
Colorado Springs, Colorado
Harlingen, Texas

AFFILIATES:

Canada, Germany & Singapore

COMPANY HEADQUARTERS:

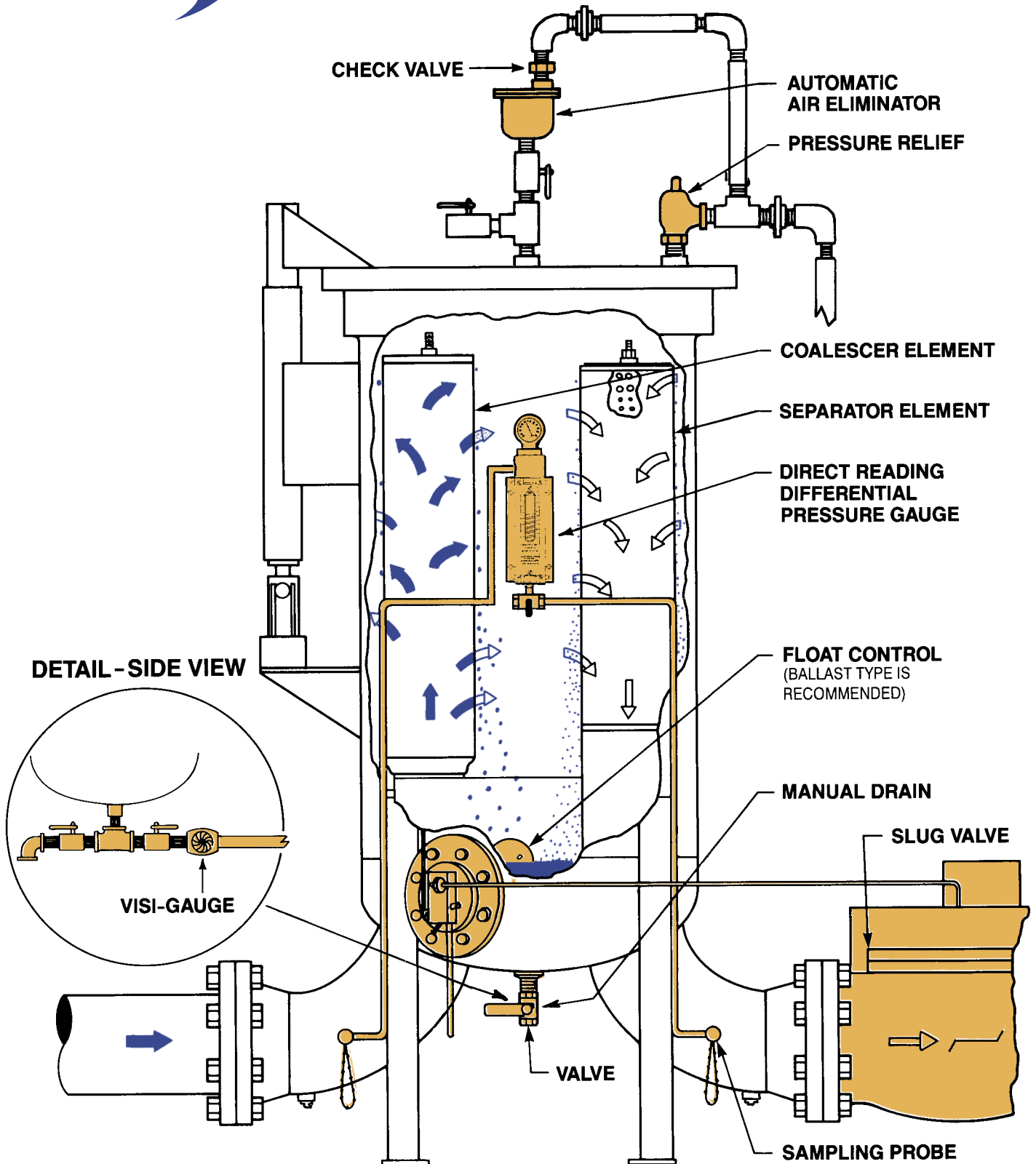
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Velcon®

Section 1

Filter Separator

Vessels



CUTAWAY—TYPICAL FILTER/SEPARATOR

FUNCTION OF FILTER/SEPARATOR ACCESSORIES

Air Eliminator – Provides air vent to permit escape of trapped air during filling of vessel. When unit is completely filled with fuel, air eliminator automatically closes.

Check Valve – Prevents air from siphoning into the vessel through the air eliminator.

Pressure Relief Valve – This valve can be set to open at a desired pressure to exhaust excess pressure built up in the system, due to thermal expansion in a non-flow condition.

Coalescer Element – Designed to remove solid contaminants, to break the emulsion of water in the product into droplets, and to enlarge these droplets so that they will drop out of the product. The flow is from the inside to the outside of the coalescer.

Separator Element – Repels coalesced water droplets and prevents them from going downstream. The flow is from the outside to the inside.

Pressure Gauge – The direct reading differential pressure gauge is used to measure the pressure difference between the inlet and outlet of a filter/separator, thus providing an indication of element condition.

Float Control – Rides the interface between fuel and water, and by its up and down movement, opens and closes ports to generate hydraulic signals to automatic valves. Velcon recommends the “ballast” type float control for easier checking of the integrity of the float ball.

Slug Valve – In the event of excessive water build-up, the slug valve, on signal from the float control, will shut down all flow through the system until excess water can be drained off. The slug valve can be provided with a rate-of-flow control which will prevent excessive flow rates through the filter/separator.

Sampling Probe – The purpose of the probe is to insure that fuel samples are representative of the fuel in the pipe. The probe penetrates through the pipe coupling that is welded to the pipe. There is no possibility of rust and dirt that usually collects in stagnant pockets reaching the filter membrane test capsule.

Manual Drain – Opened daily to remove any accumulated water and to sample the fuel in the sump. This also helps to evaluate the condition of the coalescer. It is also opened to completely drain the vessel when changing elements.



Velcon products are sold and serviced by a world-wide representative network. To order, contact Headquarters or your **LOCAL REPRESENTATIVE**:

COMPANY HEADQUARTERS:

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1210 Garden of the Gods Road
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Fax: 719.531.5690
e-mail: vfsales@velcon.com
www.velcon.com

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Sylacauga, Alabama

OVERSEAS AFFILIATES:

Frankfurt/M., Germany & Singapore

***Liquid Filtration
and Separation
Specialists***



Vertical Filter/Separators

V and VV-Series

Compact Filter/Separator Vessels for Fixed Installations



FEATURES

- **Compact Design**
- **Code Qualification**
- **Simplified Maintenance**
- **Field Proven Performance**

DESCRIPTION

Units are designed for ease of maintenance with one piece threaded base coalescers and reusable one-piece Teflon® coated screen separators. The 85 Series Coalescer Elements used in most of these vessels have been field proven to give exceptionally long service life.

SPECIFICATIONS

- 150 psi ASME Code Construction
- RF Flanged Connections
- Swing Bolted Closure
- Buna-N O-Ring Cover Seal
- Mil-C-4556 Epoxy Coated Interior, Primed Exterior

RECOMMENDED ACCESSORIES

The following accessories are recommended for safe, effective operation at all installations.

- Automatic Air Vent
- Pressure Relief Valve
- Differential Pressure Gauge
- Sampling Probes
- Interface Control
- ASME Code Stamp
- Water Slug Control Valve
- Manual Drain Valve

OTHER ACCESSORIES AVAILABLE

- Sump Heater
- Sight Glass

NOTE: These vessels were previously qualified to API 1581 3rd Edition, which has been superseded by API/IP 1581 5th Edition. For vessels qualified to this latest edition, please refer to data sheet #1947.

® Teflon is a registered trademark of E.I. du Pont de Nemours & Co., Inc.

CARTRIDGE SELECTION

Velcon Vessel Model Number	Flow Rates – USGPM ¹		Coalescer Elements			Separator Elements	
	Kerosene API Group II Class B	Gasoline	Qty	83 Series Options ²	85/87 Series Options ³	Qty	Model Number
V-1222	50	70	1	I-62283TB	I-62287TB	1	SO-318C
V-1622	100	140	2	I-62283TB	I-62287TB	1	SO-623C
V-1633	155	215	2	I-63383TB	I-63387TB	1	SO-629C
VV-1633	200	260	3	I-63383TB	I-63387TB	1	SO-436V
VV-1833	220	305	3	I-63383TB	I-63385TB	1	SO-633VA
VV-1838	270	380	3	I-63883TB	I-63885TB	1	SO-640V
VV-2044	300	445	3	I-64483TB	I-64485TB	1	SO-644V
VV-2328	335	450	5	I-62883TB	I-62885TB	2	SO-630PV
VV-2333	400	540	5	I-63383TB	I-63385TB	2	SO-630PV
VV-2338	465	630	5	I-63883TB	I-63885TB	2	SO-636PV
VV-2344	540	740	5	I-64483TB	I-64485TB	2	SO-640PV
VV-2833	560	760	7	I-63383TB	I-63385TB	3	SO-630PV
VV-2838	605	880	7	I-63883TB	I-63885TB	3	SO-630PV
VV-2844	765	1035	7	I-64483TB	I-64485TB	3	SO-640PV
VV-2856	900	1340	7	I-65683TB	I-65685TB	3	SO-644PV
VV-3638	1030	1390	11	I-63883TB	I-63885TB	5	SO-636PV
VV-3644	1205	1630	11	I-64483TB	I-64485TB	5	SO-636PV
VV-3656	1800	2340	12	I-65683	I-65685	6	SO-644V
VV-4856	3000	3900	20	I-65683	I-65685	10	SO-644PV

1. Based on fuel with minimum interfacial tension of 36 dynes per centimeter over water.
2. For gasoline and API 1581, Group I Class B.
3. For API 1581 Second and Third Editions, Group II Class B. All "85" Series Coalescers are also available as "87" Series. "87" Series Coalescers are also qualified to API 1581 Third Edition, Group II Class B.

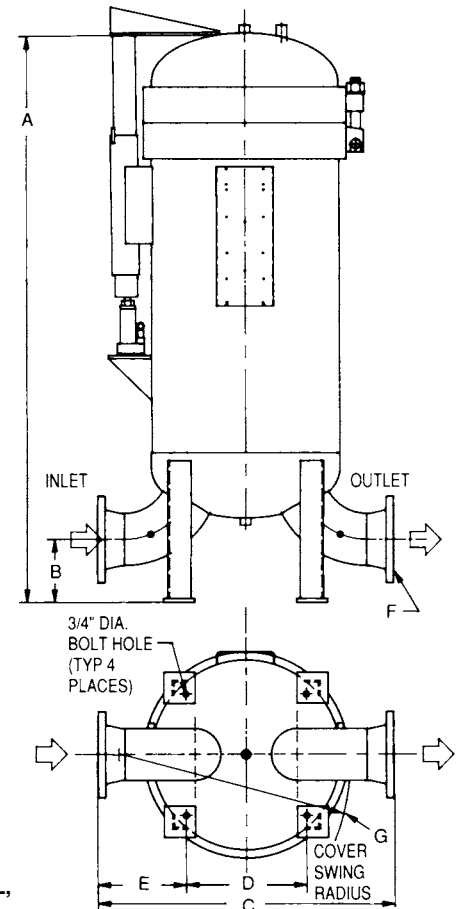
DIMENSIONAL DATA

Velcon Vessel Model No.	Dimensions in Inches ¹							Weight With Skid Volume	
	A	B	C	D	E	F	G	(lbs)	(US gal)
V-1222	39 ¹ / ₄	6	17 ¹ / ₈	8	4 ⁹ / ₁₆	1 ¹ / ₂	No Lift	360	14
V-1622	46 ¹ / ₈	6	23	9	7 ⁹ / ₈	2 ¹ / ₂	17 ⁵ / ₈	500	28
V-1633	56 ⁵ / ₈	6	23	9	7 ³ / ₈	2 ¹ / ₂	17 ⁵ / ₈	600	37
VV-1633	62	6	28 ¹ / ₄	9	9 ⁹ / ₈	4	17 ¹ / ₂	620	39
VV-1833	63 ¹ / ₂	6	29 ⁹ / ₈	10 ¹ / ₂	9 ¹³ / ₁₆	4	22 ⁵ / ₈	700	49
VV-1838	68 ¹ / ₂	6	29 ⁹ / ₈	10 ¹ / ₂	9 ¹³ / ₁₆	4	22 ⁵ / ₈	950	54
VV-2044	75 ⁵ / ₈	6	29 ⁹ / ₈	13	8 ⁵ / ₁₆	4	26 ⁵ / ₈	1075	75
VV-2328	67 ¹ / ₂	6	31 ¹ / ₄	15 ¹ / ₂	7 ⁷ / ₈	4	30 ⁵ / ₁₆	1170	85
VV-2333	67 ¹ / ₂	8	35 ¹³ / ₁₆	15 ¹ / ₂	8 ¹⁵ / ₁₆	6	30 ⁵ / ₁₆	1170	85
VV-2338	73 ¹ / ₂	8	35 ¹³ / ₁₆	15 ¹ / ₂	8 ¹⁵ / ₁₆	6	30 ⁵ / ₁₆	1200	95
VV-2344	78	8	35 ¹³ / ₁₆	15 ¹ / ₂	8 ¹⁵ / ₁₆	6	30 ⁵ / ₁₆	1225	100
VV-2833	81 ¹ / ₄	8	37 ¹ / ₈	18	9 ⁹ / ₈	6	34	1600	155
VV-2838	81 ¹ / ₄	8	37 ¹ / ₈	18	9 ⁹ / ₈	6	34	1600	155
VV-2844	87 ¹ / ₄	8	37 ¹ / ₈	18	9 ⁵ / ₈	6 ²	34	1650	170
VV-2856	100	8	37 ¹ / ₈	18	9 ⁵ / ₈	6	34	1750	200
VV-3638	96	9	53	24	13	8	43 ³ / ₈	2140	300
VV-3644	97	9	53	24	13	8	43 ³ / ₈	2150	305
VV-3656	109	9	53	24	13	8	43 ³ / ₈	2300	355
VV-4856	112 ³ / ₄	9	56 ¹ / ₂	32	12 ¹ / ₄	10	56 ¹ / ₈	3600	656

- V-12, V-16, VV-18, -20, and -23 Series Filter/Separators have Flat covers. All other models have domes.
- V-12 Series Filter/Separators have no jack. V-16 Series Filter/Separators have screw-type jacks. All other models have hydraulic-type jacks.
- VV-1633 vessels are built with the float chamber as a standard accessory.

1. **DIMENSIONS SHOWN ARE FOR ESTIMATING PURPOSES ONLY. FOR EXACT DIMENSIONAL DETAIL, OBTAIN CERTIFIED COPY OF VESSEL DRAWING.**

2. If 8" Flanges are desired, specify P/N 180-RED1. **Note: With 8" Flanges "E" and "C" dimensions will change.**





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**Liquid Filtration
and Separation
Specialists**

Compact Filter/Separator Vessels for Fixed Installations



FEATURES

- **Compact Design**
- **Code Qualification**
- **Simplified Maintenance**
- **Field Proven Performance**

DESCRIPTION

Compact V and VV Series Filter/Separators comply fully with API/IP 1581, Fifth Edition, requirements for Category C equipment. Units are designed for ease of maintenance with one piece threaded base "C5" Series Coalescer Elements and reusable one-piece Teflon® coated screen "5" Series Separator Elements (see Velcon Form 1923).

SPECIFICATIONS

- 150 PSI ASME Code Construction
- RF Flanged Connections
- Swing Bolted Closure
- Buna-N O-ring Cover Seal
- Mil-C-4556 Epoxy Coated Interior, Primer Exterior

RECOMMENDED ACCESSORIES

The following accessories are recommended for safe, effective operation at all installations.

- Automatic Air Vent
- Pressure Relief Valve
- Differential Pressure Gauge
- Sampling Probes
- Interface Control
- ASME Code Stamp
- Water Slug Control Valve
- Manual Drain Valve

OTHER ACCESSORIES AVAILABLE

- Sump Heater
- Sight Glass

CARTRIDGE SELECTION

Velcon Vessel Model Number	Flow Rates - US GPM ¹	Coalescer Elements		Separator Elements	
		Qty	Model Number	Qty	Model Number
V-1622	100	2	I-622C5TB	1	SO-623VA5
VV-2028	200	3	I-628C5TB	1	SO-630V5
VV-2328	340	5	I-628C5TB	2	SO-630PV5
VV-2333	400	5	I-633C5TB	2	SO-630PV5
VV-2828	475	7	I-628C5TB	3	SO-630PV5
VV-2838	605	7	I-638C5TB	3	SO-630PV5
VV-2844	780	7	I-644C5TB	3	SO-640PV5
VV-2856	900	7	I-656C5TB	3	SO-644PV5
VV-3638	1045	11	I-638C5TB	5	SO-636PV5
VV-3644	1220	11	I-644C5TB	5	SO-636PV5
VV-3656	1500	11	I-656C5TB	5	SO-644PV5
VV-3756	1725	12	I-656C5TB	6	SO-644V5
VV-4244	2000	18	I-644C5TB	7	SO-644V5
VV-4256	2300	16	I-656C5TB	8	SO-644V5
VV-4456	2500	18	I-656C5TB	8	SO-646V5

1. Based on fuel with minimum interfacial tension of 36 dynes per centimeter over water.

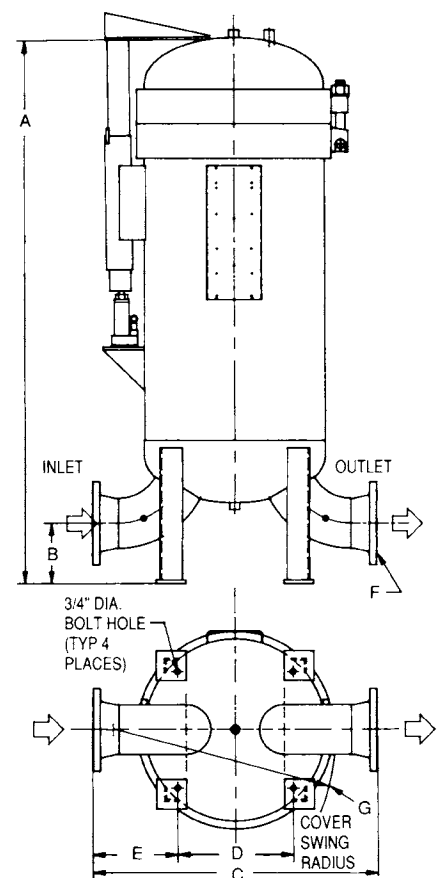
OTHER MODELS AVAILABLE UPON REQUEST

DIMENSIONAL DATA

Velcon Vessel Model No.	Dimensions in Inches ¹							Weight With Skid Volume (lbs) (US gal)	
	A	B	C	D	E	F	G		
V-1622	46 ¹ / ₈	6	23	9	7 ³ / ₈	2 ¹ / ₂	17 ⁵ / ₈	500	28
VV-2028	59 ³ / ₈	6	29 ⁵ / ₈	13	8 ⁵ / ₁₆	4	26 ³ / ₈	825	63
VV-2328	67 ¹ / ₂	6	31 ¹ / ₄	15 ¹ / ₂	7 ⁷ / ₈	4	30 ⁵ / ₁₆	1170	85
VV-2333	67 ¹ / ₂	8	35 ¹⁵ / ₁₆	15 ¹ / ₂	8 ¹⁵ / ₁₆	6	30 ⁵ / ₁₆	1170	85
VV-2828	71 ¹ / ₄	8	37 ¹ / ₈	18	9 ⁵ / ₈	6	34	1525	137
VV-2838	81 ¹ / ₄	8	37 ¹ / ₈	18	9 ⁵ / ₈	6	34	1600	155
VV-2844	87 ¹ / ₄	8	37 ¹ / ₈	18	9 ⁵ / ₈	6	34	1650	170
VV-2856	100	8	37 ¹ / ₈	18	9 ⁵ / ₈	6	34	1750	200
VV-3638	96	9	53	24	13	8	43 ³ / ₈	2140	300
VV-3644	97	9	53	24	13	8	43 ³ / ₈	2150	305
VV-3656	109	9	53	24	13	8	43 ³ / ₈	2300	355
VV-3756	109	9	53	24	13	8	43 ³ / ₈	2300	355
VV-4244	99	9	62	27	17 ¹ / ₂	10	50 ³ / ₄	3500	500
VV-4256	109 ¹ / ₂	8 ⁷ / ₈	62	27	17 ¹ / ₂	10	50 ³ / ₄	3575	536
VV-4456	109	9	62	30	18	10	52 ¹ / ₄	3800	595

- V-16, VV-20, and VV-23 Series Filter/Separators have Flat covers. All other models have domes.
- V-16 Series Filter/Separators have screw-type jacks. All other models have hydraulic-type jacks.

1. DIMENSIONS SHOWN ARE FOR ESTIMATING PURPOSES ONLY.
FOR EXACT DIMENSIONAL DETAIL, OBTAIN CERTIFIED COPY OF VESSEL DRAWING.





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Horizontal Filter/Separators

HV Series

Compact Horizontal Filter/Separator Vessels for Fixed Installations Offers Significant Operating Advantages Over Vertical Designs

EASIER CARTRIDGE CHANGE

The horizontal filter/separator design provides more convenient access to the cartridges than the vertical design.

EFFLUENT CLEANLINESS

A horizontal filter/separator must be drained to change the elements. This prevents the possibility of getting dirt in the effluent that can occur if the operator does not fully drain a vertical vessel when changing elements. The separator mounting holes on a horizontal vessel are in a vertical plane at the top of the vessel so it is nearly impossible to get dirt in the effluent when cartridges are being changed.

LOWER COST

A horizontal filter/separator will often cost less than a vertical filter/separator of the same rated flow, for the same specifications.

INDUSTRY QUALIFIED

Velcon HV Series Horizontal Filter/Separators are fully qualified to API Publication 1581, Third Edition, Group II, Class B (fixed installations). These units incorporate one piece threaded base coalescer elements for easy, reliable installation and reusable one piece Teflon[®] coated screen separators.

SPECIFICATIONS

- 150 psi ASME Code Construction
- RF Flanged Connections
- Swing Bolted Closure
- Buna-N O-ring Cover Seal
- MIL-PRF-4556 Epoxy Coated Interior, Primed Exterior



RECOMMENDED ACCESSORIES

The following accessories are recommended for safe effective operation at all installations:

- Automatic Air Vent
- Pressure Relief Valve
- Differential Pressure Gauge
- Sampling Probes
- Interface Control (ballast type float recommended)
- Water Slug Control Valve
- Manual Drain Valve
- ASME Code Stamp
- API Nameplate

OTHER ACCESSORIES AVAILABLE

- Sump Heater
- Sight Glass

[®] Teflon is a registered trademark of E.I. du Pont de Nemours & Co., Inc.

Compact Horizontal Filter/Separator Vessels for Fixed Installations

CARTRIDGE SELECTION

	Flow Rates - USGPM ⁽¹⁾		Coalescer Elements			Separator Elements	
Vessel Model No.	Kerosene API Group II Class B	Gasoline	Qty	83 Series Options ⁽²⁾	85 Series Options ⁽³⁾	Qty	Model Number
HV-1422	100	150	2	I-62283TB	I-62285TB	1	SO-323C
HV-1622	150	230	3	I-62283TB	I-62285TB	1	SO-424C
HV-1633	240	350	3	I-63383TB	I-63385TB	1	SO-436C
HV-2233	320	475	4	I-63383TB	I-63385TB	2	SO-430C
HV-2244	435	650	4	I-64483TB	I-64485TB	2	SO-436C
HV-2838	655	950	7	I-63883TB	I-63885TB	2	SO-636CM
HV-2844	765	1100	7	I-64483TB	I-64485TB	2	SO-640CM
HV-2856	990	1400	7	I-65683TB	I-65685TB	2	SO-648CM
HV-3456	1400	1900	10	I-65683TB	I-65685TB	3	SO-648CM

Notes: 1. Based on fuel with minimum interfacial tension of 36 dynes per centimeter over water.

2. For gasoline and API 1581, Group I Class B.

3. For API 1581 Third Edition, Group II Class B. (Also qualified with 87 Series Coalescers.)

DIMENSIONAL DATA

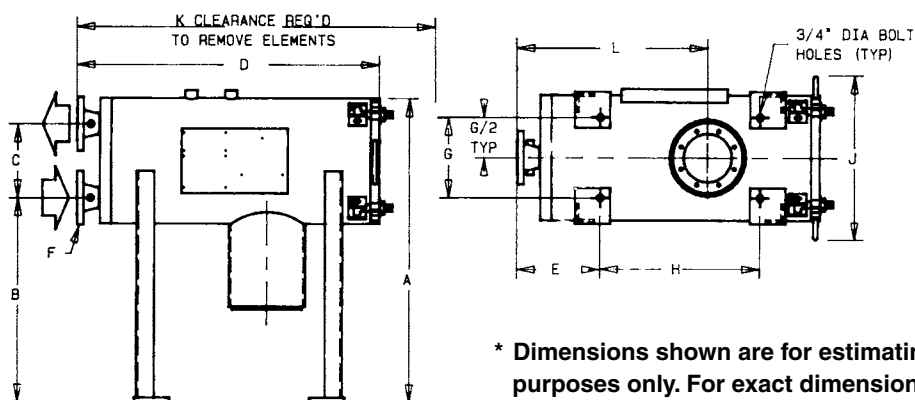
Vessel Model No.	Dimensions (inches)*										
	A	B	C	D	E	F	G	H	J	K	L
HV-1422	35 ³ / ₄	25 ¹ / ₈	8 ¹ / ₈	35 ¹¹ / ₁₆	9 ³ / ₈	2	9	18	18 ¹ / ₂	56	21 ¹ / ₂
HV-1622	36 ³ / ₈	23 ³ / ₈	10	35 ¹ / ₁₆	9 ³ / ₈	4	13	16	20 ⁵ / ₈	58	17 ¹ / ₂
HV-1633	36 ³ / ₈	23 ³ / ₈	10	45 ⁹ / ₁₆	9 ³ / ₈	4	13	27	20 ⁵ / ₈	80	28 ⁵ / ₈
HV-2233	53	38 ¹ / ₂	10	50 ³ / ₄	14 ⁷ / ₁₆	4	16	23 ¹ / ₂	27 ¹ / ₁₆	83	29
HV-2244	53	38 ¹ / ₂	10	62 ¹ / ₄	14 ⁷ / ₁₆	4	16	29 ¹ / ₂	27 ¹ / ₁₆	105	29 ⁵ / ₁₆
HV-2838	55 ³ / ₄	34 ¹ / ₄	16 ³ / ₄	57	15	6	22	22	34 ¹ / ₂	83	27
HV-2844	55 ³ / ₄	34 ¹ / ₄	16 ³ / ₄	61	16	6	22	22 ¹ / ₂	34 ¹ / ₂	93	33
HV-2856	55 ³ / ₄	34 ¹ / ₄	16 ³ / ₄	67 ³ / ₄	15	6	22	42	34 ¹ / ₂	122	45
HV-3456	65 ³ / ₈	38 ³ / ₈	20	82 ¹ / ₂	18 ⁷ / ₁₆	6**	28	38 ¹ / ₄	39 ³ / ₄	124	37 ¹ / ₂

Notes: HV-14, -16 and -22 series filter/separators have flat covers while the HV-28, and -34 series have domed covers.

** If 8" Flanges are desired, specify P/N 180-CC.

WEIGHTS AND VOLUMES

Vessel Model No.	Weight With Skid (lbs)	Volume (US gal)
HV-1422	390	20
HV-1622	435	28
HV-1633	475	37
HV-2233	800	73
HV-2244	860	90
HV-2838	1050	130
HV-2844	1100	145
HV-2856	1200	176
HV-3456	1800	290



* Dimensions shown are for estimating purposes only. For exact dimensional detail, obtain copy of vessel drawing.



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Horizontal Filter/Separators

HV-xxxx225 Series

Horizontal Filter/Separator Vessels for Fixed Installations at Military Facilities

meeting

**USAF Filter/Separator Specifications
Section 15880**

EASIER CARTRIDGE CHANGE

The horizontal filter/separator design provides more convenient access to the cartridges than the vertical design.

EFFLUENT CLEANLINESS

A horizontal filter/separator must be drained to change the elements. This prevents the possibility of getting dirt in the effluent that can occur if the operator does not fully drain a vertical vessel when changing elements. The separator mounting holes on a horizontal vessel are in a vertical plane at the top of the vessel so it is nearly impossible to get dirt in the effluent when cartridges are being changed.

TESTED AND APPROVED* VESSELS

Velcon HV-xxxx225 Series Horizontal Filter/Separators are qualified to USAF Specification 15880. This specification is similar to API/IP 1581, Fifth Edition, Category M. These vessels incorporate one piece threaded base coalescer elements for easy, reliable installation and reusable one piece Teflon® coated screen separators.

SPECIFICATIONS

- 225 psi ASME Code Construction
- RF Flanged Connections
- Swing Bolted Closure
- Buna-N O-Ring Cover Seal
- Mil-PRF-4556 Epoxy Coated Interior, Primed Exterior

* Approval letters are available upon request.

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STANDARD ACCESSORIES

In compliance with USAF Specification 15880, the following accessories are included for safe, effective operation:

- Automatic Air Vent with Check Valve
- Pressure Relief Valve**
- Direct Reading Differential Pressure Gauge
- Sampling Probes with Ball Valves
- Stainless Steel Ball Valve Manual Drain
- Sight Gauge with Ball Checks and Colored Density Sensitive Ball
- ASME Code Stamp
- API Nameplate

** Does not meet Mil-V-11201

OPTIONAL ACCESSORIES

- Interface Control
- Water Slug Control Valve

These optional accessories may be supplied directly by the control valve manufacturer, depending on purchase specifications.

Horizontal Filter/Separator Vessels for Fixed Installations at Military Facilities

FLOW RATES AND CARTRIDGES

Vessel Model No.	Flow Rates ⁽¹⁾ USGPM	Coalescer Quantity	Cartridge Model No.	Separator Quantity	Cartridge Model No.	Weight with Skid (lbs)	Volume (US gal)
HV-2238225	300	4	I-638MMTB	2	SO-430V	1000	85
HV-2838225	600	7	I-638MMTB	2	SO-636V	1175	140
HV-3456225	1200	10	I-656MMTB	3	SO-648V	2100	335

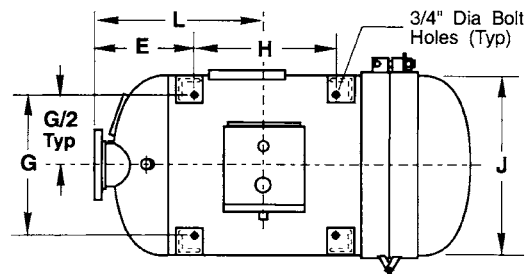
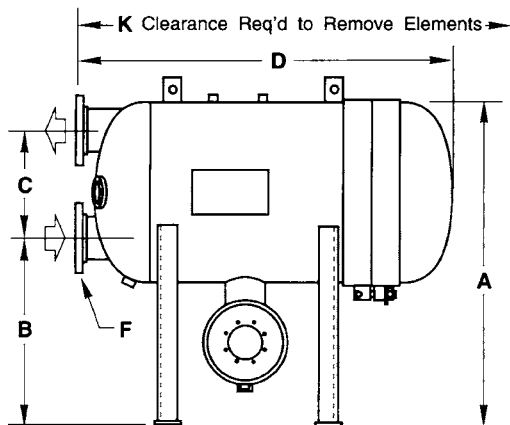
Note: ⁽¹⁾ For Jet A, Jet A-1, Jet B, JP-4, JP-5, JP-8

DIMENSIONAL DATA

Vessel Model No.	Dimensions (inches)*										
	A	B	C	D	E	F ⁽³⁾	G	H	J	K	L
HV-2238225	53	38½	10	59⅞	14½	4	16	30	22	93½	29
HV-2838225	55¾	34¼	16¾	62½	15	6	22	22	28	85	27
HV-3456225	65⅞	37⅞	22	83½	19⅞	8	28	38¼	34	94½	38½

Notes ⁽²⁾ HV-2238225 has a flat cover, while the HV-2838225 and HV-3456225 have domed covers.

⁽³⁾ Flanges are raised face flanges complying with ANSI B16-5, Class 150.



* Dimensions shown are for estimating purposes only. For exact dimensional detail, obtain copy of vessel drawing.



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Horizontal Filter/Separators

HV and HVS Series

Compact Side and End Opening Horizontal Filter/Separator Vessels for Mobile Fueling Equipment

**Designed Specifically for
Hydrant Carts and Refuelers**

FEATURES

- **Reduced Weight** is vital in the manufacture of refuelers and hydrant carts. Velcon Filter/Separators drastically reduce the weight of the vessel.
- **Reduced Size** is another important factor in designing refuelers and hydrant carts. Velcon Filter/Separators reduce the size of the vessel by up to 50%.
- **Easier Maintenance.** One piece cartridge design provides faster changeout and fewer potential gasket leaks than stacked cartridges.
- **Industry Qualified.** Velcon HV and HVS Series Horizontal Filters/Separators are fully qualified to API Publication 1581, Third Edition, Groups I and II, Class C (mobile installations). These units incorporate one piece threaded base coalescer elements for easy, reliable installation and reusable one piece Teflon® coated screen separators.

SPECIFICATIONS

- 150 psi ASME Code Construction
- Victaulic Connections (Flanges Optional)
- Swing Bolted Closure
- Buna-N O-Ring Cover Seal
- Spider Assembly to stabilize cartridges
- Mil-C-4556 Epoxy Coated Interior, Primed Exterior
- Fittings for Pressure Relief Valve, Air Vent, and Pressure Gauge
- Sump is covered with plywood when shipped. Bolted steel cover is available as an option



Model No. HVS-2228M

**A fully-qualified 600 US GPM Filter/Separator.
Side Opening unit is only 22 inches in diameter
and 65 inches long.**



Model No. HV-1633M

**A fully-qualified 310 US GPM Filter/Separator.
End Opening unit is only 16 inches in diameter
and 45½ inches long.**

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Horizontal Filter/Separators for Mobile Fueling

HV Series End Opening Vessels



END OPENING VESSELS CARTRIDGE SELECTION

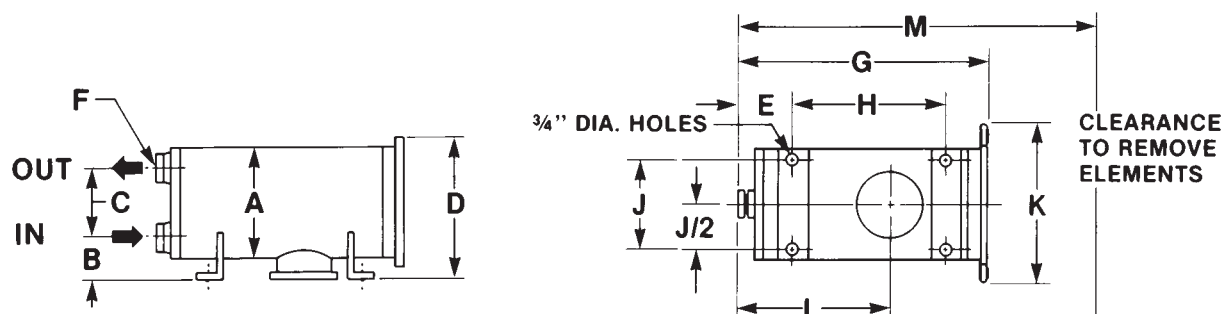
Vessel Model	Flow-US GPM Kerosene	Cover Style	Coalescer Elements			Separator Elements	
			Qty	83 Series ⁽¹⁾	87 Series ⁽²⁾	Qty	Model
HV-1416M	100	Flat	2	I-61683TB	I-61687TB	1	SO-318V
HV-1622M	200	Flat	3	I-62283TB	I-62287TB	1	SO-424V
HV-1633M	310	Flat	3	I-63383TB	I-63387TB	1	SO-436V
HV-2233M	430	Flat	4	I-63383TB	I-63387TB	2	SO-424V
HV-2238M	500	Flat	4	I-63883TB	I-63887TB	2	SO-430V
HV-2244M	585	Flat	4	I-64483TB	I-64487TB	2	SO-436V
HV-2456M	760	Flat	4	I-65683TB	I-65687TB	2	SO-636V
HV-2828M*	625	Dome	7	I-62883TB	I-62887TB	2	SO-624V
HV-2833M*	755	Dome	7	I-63383TB	I-63387TB	2	SO-636V
HV-2838M*	880	Dome	7	I-63883TB	I-63887TB	2	SO-636V
HV-2844M*	1030	Dome	7	I-64483TB	I-64487TB	2	SO-640V
HV-2856M*	1310	Dome	7	I-65683TB	I-65687TB	2	SO-648V

NOTES

⁽¹⁾ Specify "83 Series" for A.P.I. Group I, Mil-F-8901, or Gasoline service.

⁽²⁾ Specify "87 Series" for A.P.I. Group II service or for applications where both A.P.I. Group II and Mil-F-8901 performance are required.

* Inlet/Outlet flanges on HV-28xxM vessels are 150 lb. raised face.



END OPENING VESSELS DIMENSIONS**

Vessel Model	Dimensions are in inches												Wt Lbs w/Skid	Vol US Gal
	A	B	C	D	E	F	G	H	J	K	L	M		
HV-1416M	14	6 $\frac{3}{4}$	8 $\frac{3}{4}$	19	4 $\frac{7}{8}$	2	30	20 $\frac{1}{4}$	10 $\frac{3}{4}$	18 $\frac{3}{4}$	15 $\frac{3}{4}$	45	400	18
HV-1622M	16	6	10	21	9 $\frac{3}{8}$	4	34 $\frac{3}{8}$	16	10 $\frac{3}{4}$	20 $\frac{3}{8}$	17 $\frac{3}{4}$	66	440	32
HV-1633M	16	6	10	21	9 $\frac{3}{8}$	4	45 $\frac{1}{2}$	27	10 $\frac{3}{4}$	20 $\frac{3}{8}$	28 $\frac{1}{2}$	79	450	42
HV-2233M	22	10 $\frac{1}{2}$	10	29	11 $\frac{1}{2}$	4	48	29	16	30	32 $\frac{3}{4}$	82	800	69
HV-2238M	22	10 $\frac{1}{2}$	10	29	11 $\frac{1}{2}$	4	53	34	16	30	37 $\frac{3}{4}$	89	835	77
HV-2244M	24	12	11 $\frac{1}{2}$	33	15	6	62 $\frac{1}{2}$	31 $\frac{1}{2}$	18	34	36	88	870	87
HV-2456M	24	10 $\frac{1}{2}$	12	29 $\frac{1}{2}$	12	6	68 $\frac{1}{2}$	43	18	34	46	96 $\frac{1}{2}$	1255	124
HV-2828M	28	10 $\frac{1}{2}$	16 $\frac{3}{4}$	35 $\frac{1}{2}$	12	6*	56	22 $\frac{1}{2}$	21	36	23 $\frac{3}{4}$	69	1210	120
HV-2833M	28	10 $\frac{1}{2}$	16 $\frac{3}{4}$	35 $\frac{1}{2}$	12	6*	61	28	21	36	23 $\frac{3}{4}$	83	1255	135
HV-2838M	28	10 $\frac{1}{2}$	16 $\frac{3}{4}$	35 $\frac{1}{2}$	12	6*	61	28	21	36	23 $\frac{3}{4}$	85	1300	150
HV-2844M	28	10 $\frac{1}{2}$	16 $\frac{3}{4}$	35 $\frac{1}{2}$	12	6*	63	29	21	36	23 $\frac{3}{4}$	92	1350	166
HV-2856M	28	10 $\frac{1}{2}$	16 $\frac{3}{4}$	35 $\frac{1}{2}$	12	6*	73	41	21	36	23 $\frac{3}{4}$	116	1460	198

**Dimensions shown are for estimating purposes only. For exact dimensional detail, obtain a certified copy of specific vessel drawing.

HV Series

Side Opening Vessels



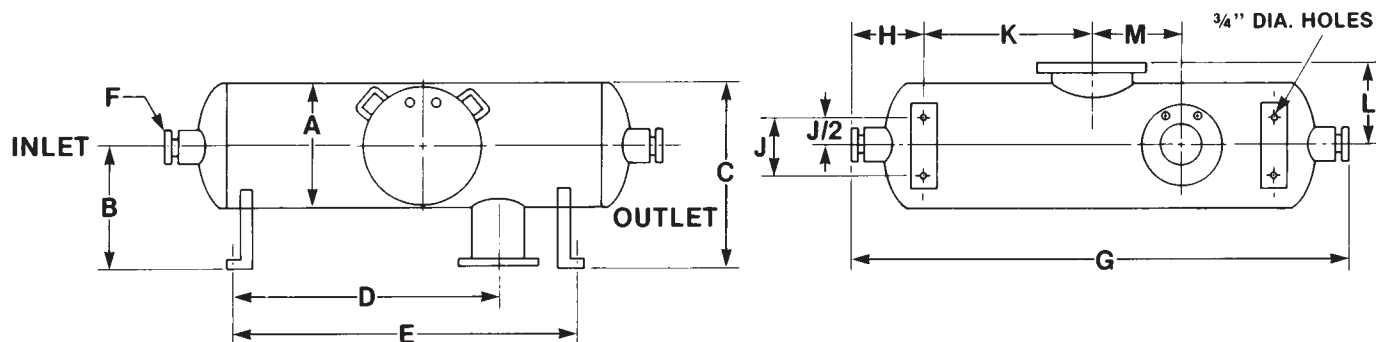
SIDE OPENING VESSELS CARTRIDGE SELECTION

Vessel Model	Flow-US GPM Kerosene	Qty	Coalescer Elements		Separator Elements	
			83 Series ⁽¹⁾	87 Series ⁽²⁾	Qty	Model
HVS-2222M	450	7	I-62283TB	I-62287TB	3	SO-609V
HVS-2228M	600	7	I-62883TB	I-62887TB	4	SO-609V
HVS-2628M	755	9	I-62883TB	I-62887TB	5	SO-609V
HVS-2828M	885	10	I-62883TB	I-62887TB	6	SO-609V
HVS-3133M	1205	12	I-63383TB	I-63387TB	8	SO-609V

NOTES

⁽¹⁾ Specify "83 Series" for A.P.I. Group I, Mil-F-8901, or Gasoline service.

⁽²⁾ Specify "87 Series" for A.P.I. Group II service or for applications where both A.P.I. Group II and Mil-F-8901 performance are required.



SIDE OPENING VESSELS DIMENSIONS**

Vessel Model	Dimensions are in inches												Wt Lbs w/Skid	Vol US Gal
	A	B	C	D	E	F	G	H	J	K	L	M		
HVS-2222M	22	14	29	30½	41	4	60	9½	16	30½	16½	0	1070	85
HVS-2228M	22	14	29	35½	46	4	65	9½	16	35½	15½	0	1100	95
HVS-2628M	26	16	32	36	45	6	71	13	21	30	19½	6	1340	132
HVS-2828M	28	18	33	36	45	6	71	15	21	30	19¼	6	1580	150
HVS-3133M	31	19	35	36	49	6	77	14	22	36	20¾	0	2000	195

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***Fluid
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V Series Filter/Separators

APPLICATIONS

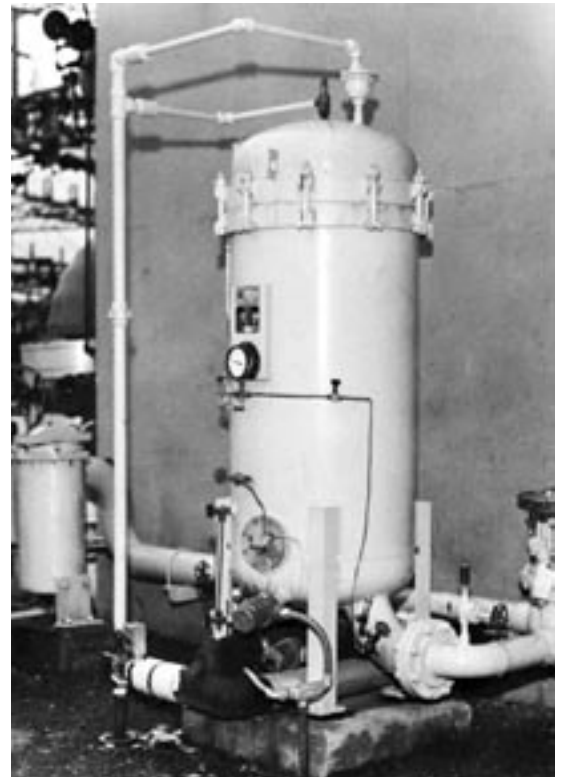
- Diesel Fuels
- Kerosene
- Gasoline

INSTALLATIONS

- Airports
- Loading Racks
- Refineries
- Gas Turbines
- Terminals

STANDARD DESIGN FEATURES

- Threaded Base Coalescer Elements
- Pleated Paper Separator Elements
- 150 psi ASME Code Construction
- RF Flanged Connections
- Swing Bolt Closure with O-ring Seal
- Epoxy-Coated Interior, Primed Exterior



Pleated paper second stage cartridges are standard in V series Filter/Separators for Diesel Grade Fuels and also for Jet Fuel installations where this type of cartridge is specified.

OPTIONAL ACCESSORIES

The accessory items marked with an (R) are recommended for safe, effective operation of all installations.

Automatic Air Vent (R)

Pressure Relief Valve (R)

Differential Pressure Gauge (R)

Manual Drain Valve (R)

Water Slug Valve (R)

Water Interface Control (R)

Sampling Probes (R)

Sump Heater

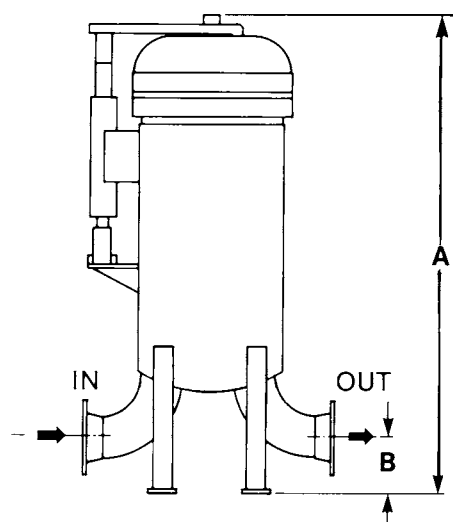
Sight Glass

FLOW SIZING

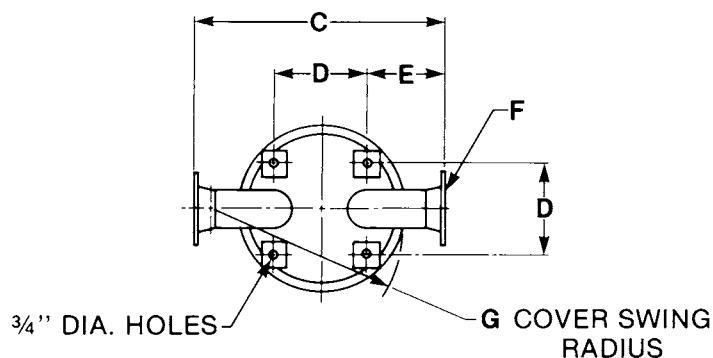
Vessel Model No.	Flow Rates (USGPM) ⁽¹⁾			Coalescer Element Option			Separator Element	
	Diesel	Kerosene	Gasoline	Qty.	Diesel	"83" Series ⁽²⁾	Qty.	Model No.
V-2222	135	200	260	4	I-6224TB	I-62283TB	6	SO-611PLF3
V-2233	200	300	390	4	I-6334TB	I-63383TB	3	SO-629PLF3
V-2833	300	450	520	6	I-6334TB	I-63383TB	5	SO-629PLF3
V-2844	400	600	780	6	I-6444TB	I-64483TB	5	SO-633PLBZ
V-3638	600	950	1230	11	I-6384TB	I-63883TB	9	SO-629PLF3
V-3644	720	1100	1430	11	I-6444TB	I-64483TB	9	SO-633PLBZ
V-3656	900	1400	1820	11	I-6564TB	I-65683TB	9	SO-644PLBZ
V-4244	1000	1500	1939	15	I-6444TB	I-64483TB	12	SO-633PLBZ
V-4256	1250	1900	2470	15	I-6564TB	I-65683TB	12	SO-644PLBZ

NOTES: (1) Based on minimum Interfacial Tension of 36 dynes per centimeter

(2) Recommended for kerosene and gasoline service



DIMENSIONS



Obtain Certified Hole Pattern before Pouring Slabs.

Vessel Model No.	Cover Style	Dimensions (Inches)*							Weight w/ Skid lbs.	Volume U.S. Gal.
		A	B	C	D	E	F	G		
V-2222	Flat	62	8	27 ¹ / ₈	15 ¹ / ₂	6 ¹ / ₄	4	30	1110	64
V-2233	Flat	68	8	27 ¹ / ₈	15 ¹ / ₂	6 ¹ / ₄	4	30	1130	72
V-2833	Dome	84	8	40	18	11	6	36	1650	170
V-2844	Dome	89 ³ / ₈	8	40	18	12 ⁵ / ₈	6	36	1690	185
V-3638	Dome	91 ¹ / ₂	8	63 ¹ / ₄	23 ¹ / ₂	19 ⁷ / ₈	6	44	2080	280
V-3644	Dome	93 ³ / ₄	9	52 ¹ / ₈	23 ¹ / ₂	14 ⁵ / ₁₆	8	44	2150	305
V-3656	Dome	105	9	52 ¹ / ₈	23 ¹ / ₂	14 ⁵ / ₁₆	8	44	2300	355
V-4244	Dome	101 ³ / ₈	9	55 ¹ / ₈	28	13 ¹ / ₂	8	50	3350	450
V-4256	Dome	113 ³ / ₈	9	55 ¹ / ₈	28	15	8	50	3500	520

*Dimensions are shown for estimation purposes. For exact dimension detail, obtain certified copy of Vessel Drawing.



Velcon products are sold and serviced by a world-wide representative network. To order, contact Headquarters or your **LOCAL REPRESENTATIVE**:

COMPANY HEADQUARTERS:
 Velcon Filters, Inc.
 1210 Garden of the Gods Road
 Colorado Springs, CO 80907-3410
 Phone: 1.800.531.0180 / 1.719.531.5855
 Fax: 719.531.5690
 e-mail: vfsales@velcon.com
 www.velcon.com

MANUFACTURING PLANTS LOCATED AT:
 Colorado Springs, Colorado
 Sylacauga, Alabama

OVERSEAS AFFILIATES:
 Frankfurt/M., Germany & Singapore

**Liquid Filtration
and Separation
Specialists**



V818 Filter/Separator

Low cost protection against dirt and water contamination of jet, gasoline, and diesel fuels.

STANDARD DESIGN FEATURES

- Air Vent and Drain Valves
- Epoxy Coated Interior, Primed Exterior
- Threaded Base Coalescer Cartridge
- 100 PSI Design Pressure
- Choice of Three Second Stage Cartridge Options
- Differential Pressure Gauge
- Leg Assembly

OPTIONAL FEATURES

- Male and Female Pipe Union
- Velcon CDF® Series Elements

The Velcon V818 series is designed for assuring CLEAN and DRY FUEL delivery at smaller installations. This compact unit will meet the effluent clarity requirement of MIL-F-8901 when operated and drained properly. Positive protection against water transmission when the filter/separator is overloaded can be achieved by use of the Velcon CDF® Series elements option inside a Teflon® coated screen second stage. This option provides in a single vessel the performance which normally requires both a filter/separator vessel and a monitor vessel, and effluent clarity will meet API/IP-1583 Monitor Specs.

Installation is easy using standard pipe couplings. Male and female pipe union is available as an accessory for connection to the outlet to facilitate the installation and provide for quick cartridge changeout.



**Threaded Base
Coalescer**

**Teflon® Coated
Screen Separator
With CDF® Elements**

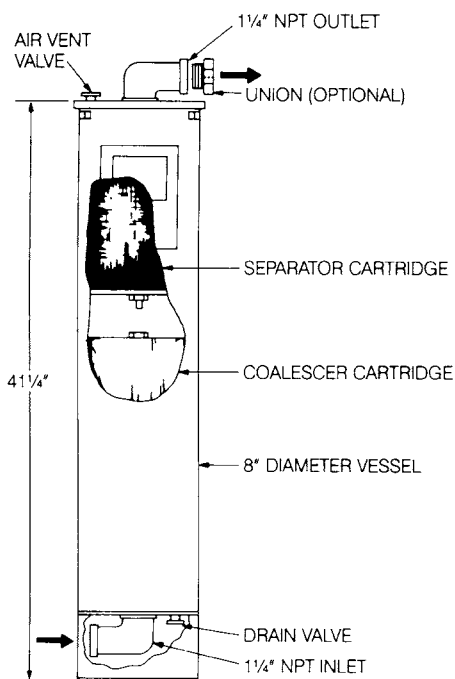


**Pleated Paper
Separator**

**Teflon Coated
Screen Separator**

® Teflon is a registered trademark of E.I. du Pont de Nemours & Co., Inc.

® CDF is a registered trademark of Velcon Filters, Inc.



Model V818 Used With:	Flow Rates (USGPM)
Kerosene	
With CDF® Elements	50
Without CDF® Elements	40
Gasoline	60
Diesel Fuel	23

Options for Cartridges and Accessories	Part Number for Model V818002	Part Number for Model V818001 (inc CDF Hardware)
Coalescer Cartridge (1 required per vessel) For use with jet fuel, gasoline For use with diesel fuel	I-6186T I-6184T	I-6186T N/A
CDF Elements (5 required per vessel)	N/A	CDF-210K
Separator Cartridge (1 required per vessel) Teflon coated screen Teflon coated screen (no provision for CDF elements) Pleated paper (no provision for CDF elements)	N/A SO-611C SO-611PLF3	SO-613GS N/A N/A
Accessories 1 1/4" male & female pipe union Spare CDF elements (5 per set required)	71607 N/A	71607 CDF-210K

PLEASE NOTE THAT YOU MUST SPECIFY ALL COMPONENTS REQUIRED

Sample specification: For a 50 gpm Jet Fuel filter/separator with CDF Series elements, differential pressure gauge, pipe union, one spare coalescer cartridge and a spare set of CDF elements, specify the following:

Quantity	Part #	Description
1	V818001	Filter/Separator Vessel-50 gpm Jet Fuel
2	I-6186T	Coalescer Element (one spare)
1	SO-613GS	Separator Cartridge
1	71607	Pipe Union
10	CDF-210K	CDF Series Elements (original plus spare set)
1	G-1045	Lid Gasket



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e-mail: vfsales@velcon.com
www.velcon.com

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**Liquid Filtration
and Separation
Specialists**

Section 2

Filter/Separator

Conversion



Aviation Fuel Filter/Separator Cartridges

Velcon Fast FAX Upgrade Form

Fax No.: 719-531-5690

To: Velcon Filters, Inc.

1210 Garden of the Gods Road

Colorado Springs, CO 80907-3410

Attn: Aviation Product Manager

From: _____

Company: _____

Address: _____

Phone: _____

Fax No.: _____

Please recommend coalescer cartridges, separators, monitor cartridges and conversion hardware, if any, for the vessels listed below to qualify them to API/IP 1581 3rd Edition, Group II or 5th Edition, or IP Certificate as appropriate, to satisfy requirements of ATA 103 and JIG.

1 Vessel Model No. _____ Max Flow Rate _____ USGPM
Serial No. _____ Unit No. _____ Cover Gasket No. _____
Presently Installed Qty _____ Model No. _____ Coalescer Elements
Qty _____ Model No. _____ Separator Elements
Qty _____ Model No. _____ Monitor Elements
API/IP – 1581 3rd Edition: Fixed () Mobile ()
API/IP – 1581 5th Edition: Category C () Category M () Category M100 ()
IP Certificate ()

2 Vessel Model No. _____ Max Flow Rate _____ USGPM
Serial No. _____ Unit No. _____ Cover Gasket No. _____
Presently Installed Qty _____ Model No. _____ Coalescer Elements
Qty _____ Model No. _____ Separator Elements
Qty _____ Model No. _____ Monitor Elements
API/IP – 1581 3rd Edition: Fixed () Mobile ()
API/IP – 1581 5th Edition: Category C () Category M () Category M100 ()
IP Certificate ()

3 Vessel Model No. _____ Max Flow Rate _____ USGPM
Serial No. _____ Unit No. _____ Cover Gasket No. _____
Presently Installed Qty _____ Model No. _____ Coalescer Elements
Qty _____ Model No. _____ Separator Elements
Qty _____ Model No. _____ Monitor Elements
API/IP – 1581 3rd Edition: Fixed () Mobile ()
API/IP – 1581 5th Edition: Category C () Category M () Category M100 ()
IP Certificate ()

EXAMPLE (For API/IP 1581 5th Edition Conversion)

Vessel Model No. HV-2833M150 Max Flow Rate 755 USGPM
Serial No. SO54321 Unit No. Truck # 127 Cover Gasket No. G-0769
Presently Installed Qty 7 Model No. I-633C5TB Coalescer Elements
Qty 2 Model No. SO-636V Separator Elements
Qty _____ Model No. _____ Monitor Elements
API/IP – 1581 3rd Edition: Fixed () Mobile ()
API/IP – 1581 5th Edition: Category C (**X**) Category M () Category M100 ()
IP Certificate ()



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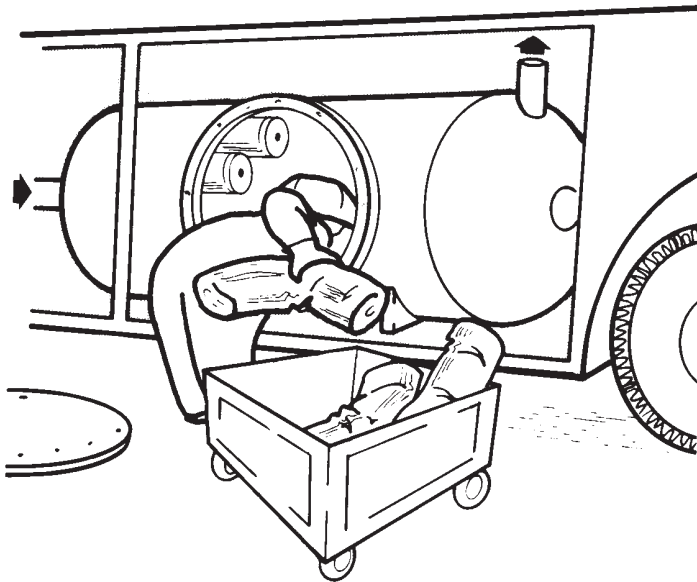
***Liquid Filtration
and Separation
Specialists***

Due to Velcon Filters' continuing product improvement, drawings, specifications and pictures are subject to change without notice.

Here's how to install Velcon Filters Inc. "T" series elements and Teflon®* coated screen separators – SO Series – into horizontal FRAM FCS filter separators:

1

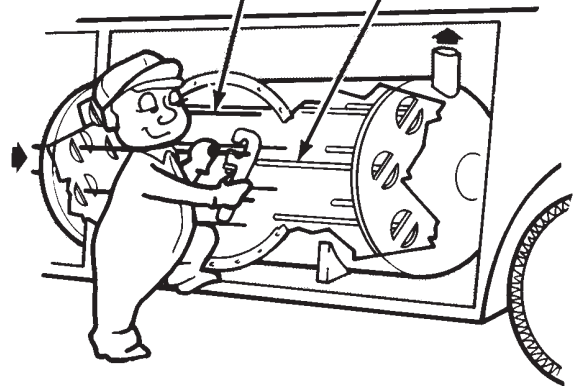
Remove all old elements



2

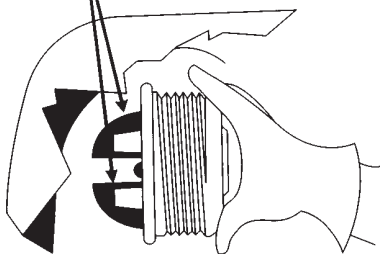
Take these rods out

Leave these rods in



3

6000T Adapter
"Anti-Rotation" Lugs

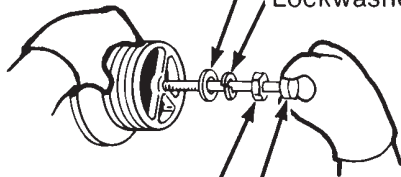


Fit adapter against inlet bulk-head. Position adapter so that the "anti-rotation" lugs are straddling the mounting cross bar or "tongue".

4

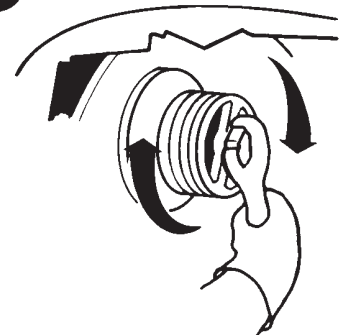
Flat washer
Lockwasher

Locknut
Bolt



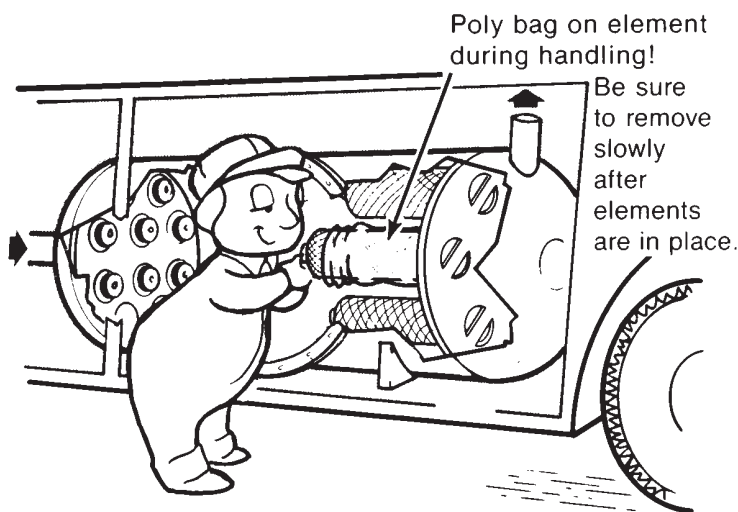
Insert threaded bolt thru adapter into tank inlet bulkhead a minimum of 8 full turns. If 8 turns are impossible with locknut in place, remove and discard locknut; then reassemble.

5



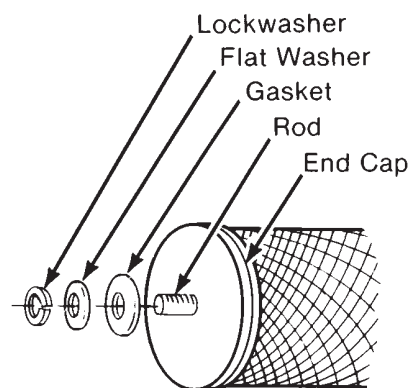
Tighten locknut (or bolt if locknut has been removed) to 15 ft-lb of torque.

6



Gently place the second stage separators over outlet rods. Do not handle Teflon® screen with bare hands. Velcon recommends the use of clean work gloves.

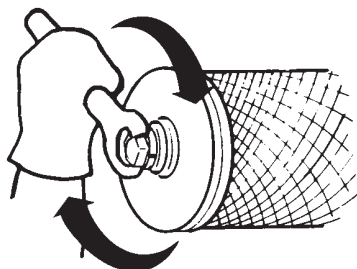
7



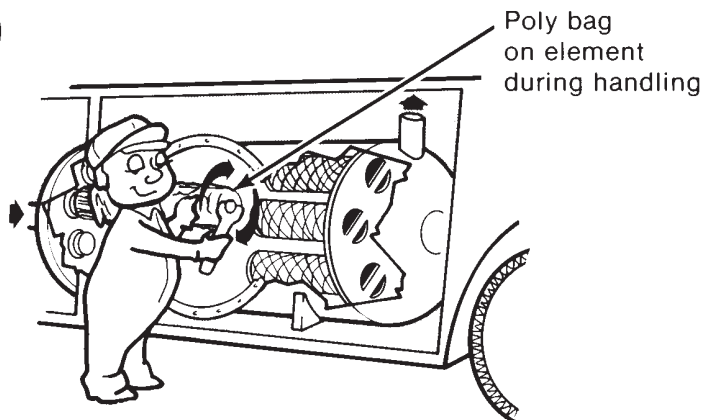
Fit end cap, gasket, flat washer and lockwasher on rod.

8

Apply nut to rod and tighten until lockwasher is flat 3-5 ft-lb torque).



9



Break the polyethylene bag at the element's threaded end and slide it back a few inches. Leaving the bags on the elements during installation, screw elements onto adapters & tighten hand tight. Slowly remove polyethylene bag! Use a wrench with Gammon P/N GTP-1224 adapter on the square base of the element to tighten an additional ¼ turn (about 30 ft-lb torque).

10

The threaded stud on the end of the coalescer cartridge is designed for use with a retaining spider which stabilizes the ends of the coalescers. If the Filter/Separator is equipped with a spider, place it over the threaded studs of the installed coalescer elements. Then place a flat washer, split lock washer, and nut on each stud.

Tighten the nuts until the split washer flattens and then tighten one half turn more to about 5 ft-lbs.

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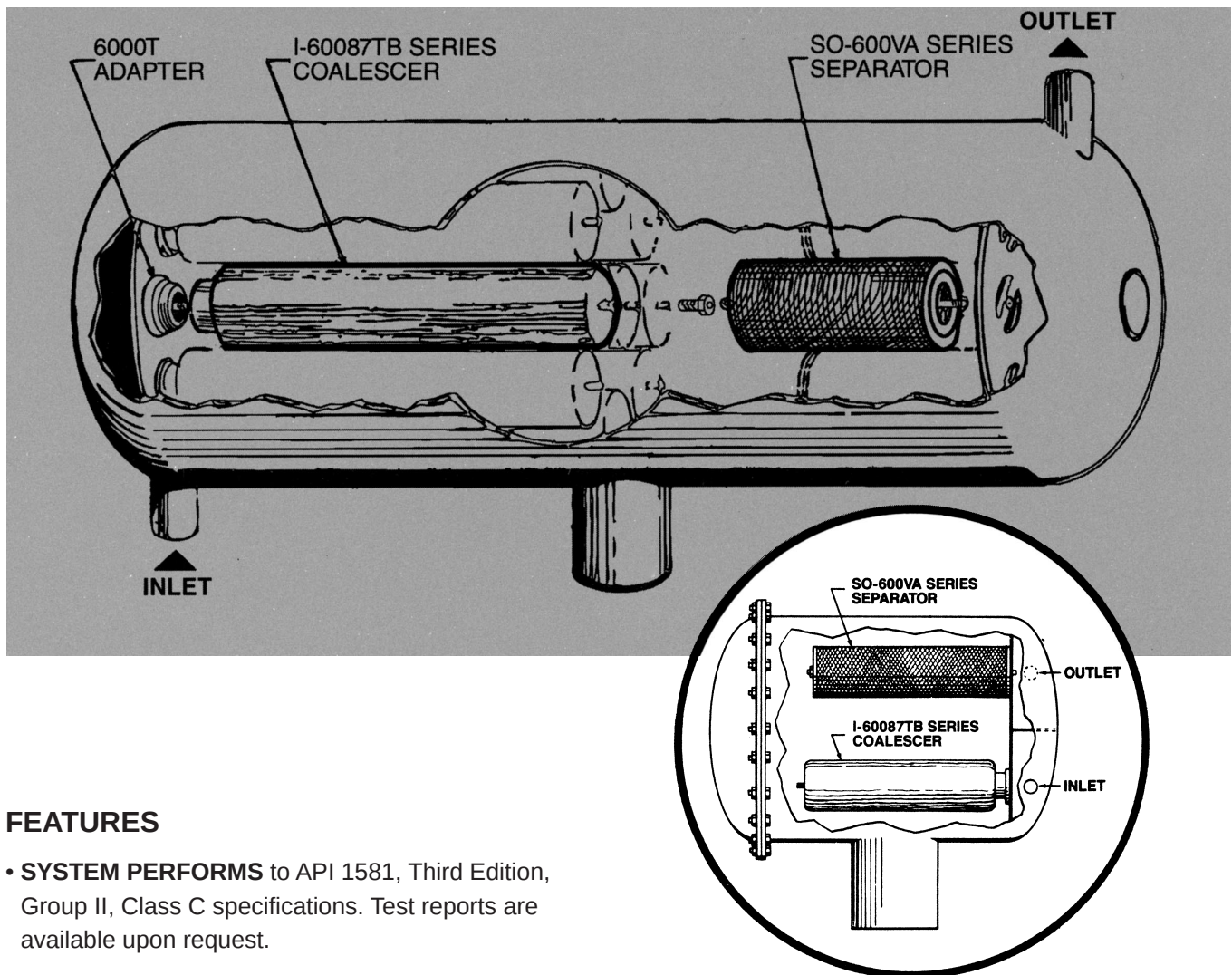
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Filter/Separator Conversion of Facet/Fram FCS Series

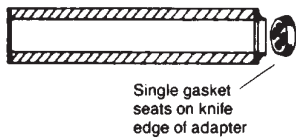
Adapt Facet/Fram Filter/Separator Vessels to API Bulletin 1581, Third Edition, Group II, Class C (Mobile Fueling Equipment) Specifications with the Velcon System of Element Installation



FEATURES

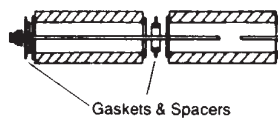
- **SYSTEM PERFORMS** to API 1581, Third Edition, Group II, Class C specifications. Test reports are available upon request.
- **ONE-PIECE ELEMENTS** are used. This eliminates as many as 40 potential gasket seal leaks per filter/separator.
- **KNIFE-EDGE SEALING GASKETS** are used to eliminate by-passing.
- **HIGH PERFORMANCE COALESCER ELEMENTS** exceed 100 psi bursting strength.
- **SIMPLE, FAST** element installation. 6000T screw base adapters are furnished at no charge on initial installations.
- **CLEANABLE, REUSABLE SEPARATORS** make the system economical and efficient.

Comparison of Old Short Filter Cartridges and New Single Element Replacement



VELCON

VELCON "T" Series (simple adapter bolts to bulkhead — use 15 ft lbs of torque on adapter mounting bolt)



FRAM

Battery of short elements and gaskets. This is eliminated with improved VELCON system

ELEMENT CONVERSION TABLE (Side-By-Side Element Vessels)

FACET/FRAM MODEL NO.	*FLOW RATE USGPM	COALESCERS QTY	MODEL NO.	SEPARATORS QTY	MODEL NO.	CONVERSION KIT NO.	REQUIRED NO. OF 6000T SCREW BASE ADAPTERS
FCS-262-3N11	90	3	I-61487TB	1	SO-609VA	CK-1216	3
FCS-462-4N11	175	2	I-62887TB	1	SO-430V	(1 Blind)	2
FCS-663-4K21 FCS-663-8K11	185	3	I-62287TB	2	SO-609VA	CK-1217	3
FCS-458-3K21	200	3	I-62287TB	2	SO-417V	CK-1277	3
FCS-462-3N21 FCS-462-6N11	265	3	I-62887TB	2	SO-417V	CK-1277	3
FCS-662-4N21 FCS-658-4A2	260	3	I-62887TB	2	SO-612VA	CK-1219	3
FCS-863-6K21 FCS-862-12K11 FCS-863-12K11	280	5	I-62287TB	3	SO-609VA	CK-1208	5
FCS-1063-8K21 FCS-1063-16K11	405	6	I-62287TB	2	SO-618VA	CK-1223	6
FCS-1562-21N11	620	5	I-64487TB	2	SO-630VA	CK-1473	5

ELEMENT CONVERSION TABLE (End-Opposing Element Vessels)

FACET/FRAM MODEL NO.	*FLOW RATE USGPM	COALESCERS QTY	MODEL NO.	SEPARATORS QTY	MODEL NO.	CONVERSION KIT NO.	REQUIRED NO. OF 6000T SCREW BASE ADAPTERS
FCS-558-7N11	195	5	I-61487TB	2	SO-609VA	CK-1205	5
FCS-762-10N11 FCS-761-10N11 FCS-661F-10N14	300	4	I-62887TB	2	SO-609VA	CK-1201	4
FCS-962-16N11	530	6	I-62887TB	4	SO-609VA	CK-1202	6
FCS-1062-13N11	515	13	I-61487TB	4	SO-609VA	CK-1271	13
FCS-1264-20N11 FCS-1261-20N11 FCS-961F-10N27	600	7	I-62887TB	4	SO-609VA	CK-1200	7
FCS-862T2-16N15	600	7	I-62887TB	4	SO-609VA	CK-1207	7
FCS-11358-20N11 FCS-1358F-20N17 FCS-1362-10N21 FCS-1362F-20N11	600	7	I-62887TB	4	SO-609VA	CK-1203	7
FCS-1862-26N11	600	7	I-62887TB	4	SO-609VA	CK-1233	7
FCS-1361-22N11	905	11	I-62887TB	6	SO-609VA	CK-1238	11
FCS-1261F-24N17	1055	12	I-62887TB	7	SO-609VA	CK-1209	12
FCS-1562-24N1	1055	12	I-62887TB	7	SO-609VA	CK-1297	12
FCS-3263-36N11	1205	14	I-62887TB	8	SO-609VA	CK-1235	14

On first installation order the applicable conversion kit, and the correct amount of 6000T screw base adapters.

CAUTION: The vessel model number for Facet/Fram horizontal vessels is not a reliable guide to the correct gasket.

Always check the nameplate for the gasket number.

*Higher flow rates are available. Check with your Velcon Representative for applicable Conversion Kit and element information.



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e-mail: vfsales@velcon.com
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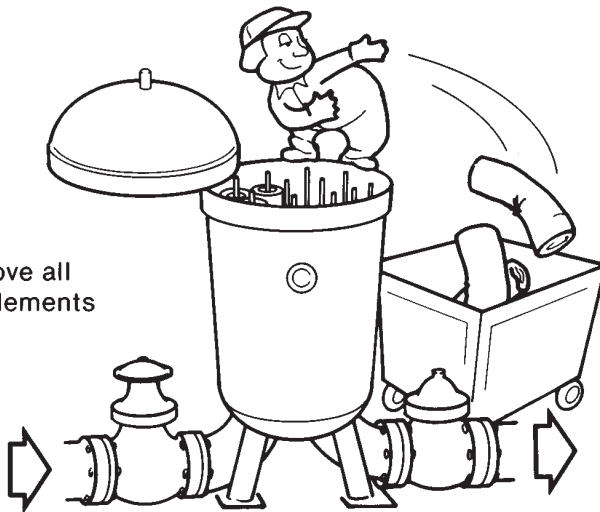
Filter/Separator Conversion Vertical Vessels

Here's How

TO INSTALL VELCON FILTERS INC. "T" SERIES ELEMENTS AND TEFLON® COATED SCREEN SEPARATORS – SO SERIES – INTO VERTICAL FRAM VFCS FILTER SEPARATORS

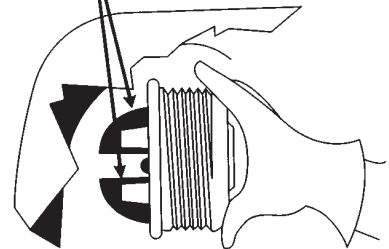
1

Remove all
old elements



3

6000T Adapter
"Anti-Rotation" Lugs

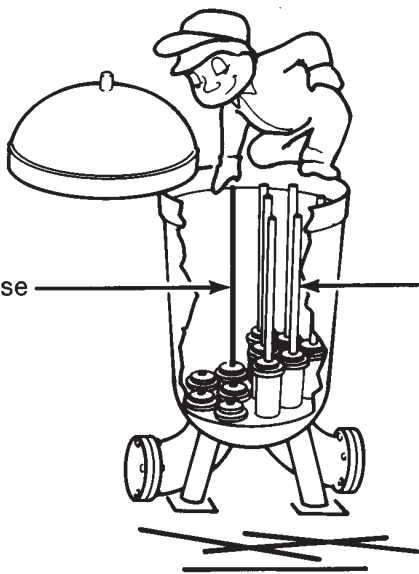


Fit adapter against element
stub. Position adapter so that
the "anti-rotation" lugs are
straddling the mounting cross
bar or "tongue".

2

Take these
rods out

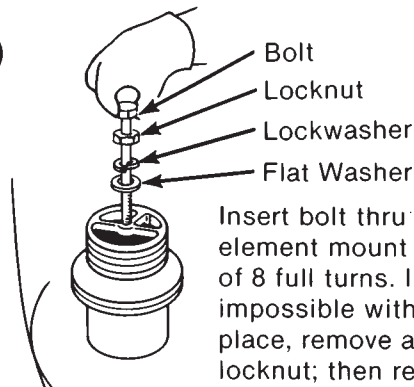
Leave these
rods in



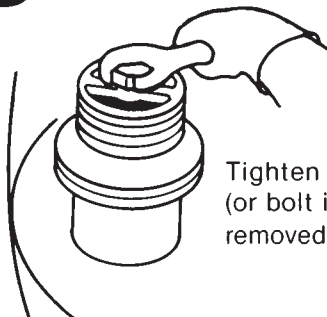
4

NOTE: Wear clean gloves when
handling new elements. Keep
poly-bags on elements until
properly secured in the vessel.



5

Insert bolt thru adapter into element mount a minimum of 8 full turns. If 8 turns are impossible with locknut in place, remove and discard locknut; then reassemble.

6

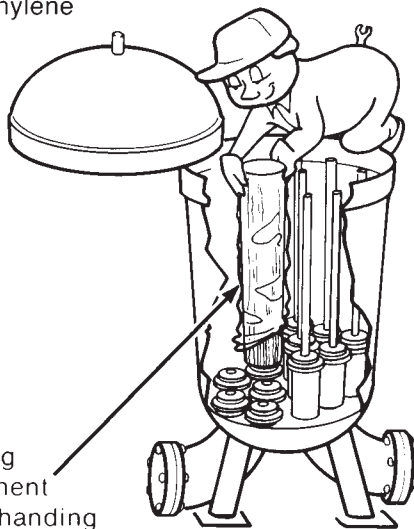
Tighten locknut (or bolt if locknut has been removed) to 15 ft-lb of torque.

7

Break the polyethylene bag at the element's threaded end and slide it back a few inches. Leaving the bag on the element during installation, screw elements onto adapters & tighten hand tight. Remove polyethylene bag slowly!

Use a wrench with Gammon P/N GTP-1224 adapter on the square base of the element to tighten an additional 1/4 turn (about 30 ft-lb torque).

Poly-bag on element during handing

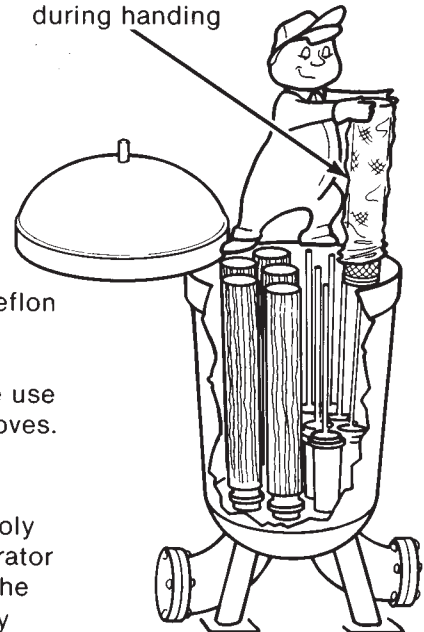
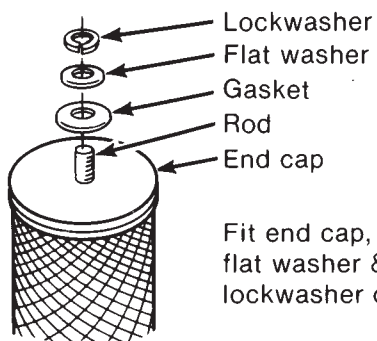
**8**

Poly-bag on element during handing

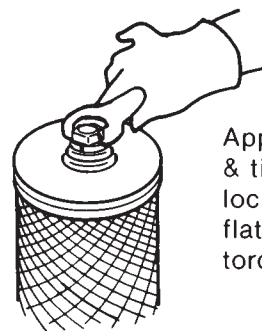
Gently place the second stage separators on element stubs.

Do not handle Teflon screen with bare hands. Velcon recommends the use of clean work gloves.

Also, keep the poly bag on the separator until placed on the stub. Then, slowly remove the poly bag.

**9**

Fit end cap, gasket, flat washer & lockwasher on rod

10

Apply nut to rod & tighten until lockwasher is flat (3-5 ft-lb torque).

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**Liquid Filtration
and Separation
Specialists**

Section 3

Filter Vessels



Vel-Max Filter Vessel

- **Compact**
- **Flexible Filtration**
- **Multipurpose Design**
- **Simplified Maintenance**

DESCRIPTION

The compact Vel-Max Filter Vessel is suitable for flowrates up to 204 USGPM with micronic cartridges, up to 198 USGPM as a filter/separator, and up to 150 USGPM with CDF[®] monitor cartridges. The Vel-Max can be used on mobile refueling equipment, fueling cabinets and for fixed fueling installations. Vel-Max is designed for easy maintenance and easy conversion to a prefilter, filter/separator, or monitor.

APPLICATIONS

- Jet Fuel
- Avgas
- Motor Gasoline
- Diesel Fuel
- Kerosene

STANDARD FEATURES

- Carbon steel construction
- 250 psi design pressure
- Epoxy coated interior, primed exterior
- 2" NPT female inlet/outlet
- 1/2" NPT drain connection
- 3/4" NPT vent and relief connection
- 1/2" NPT sight glass connections
- 1" NPT water probe connection
- 1/8" NPT differential pressure gauge connections
- Lid Gasket: G-2052 (Buna N)



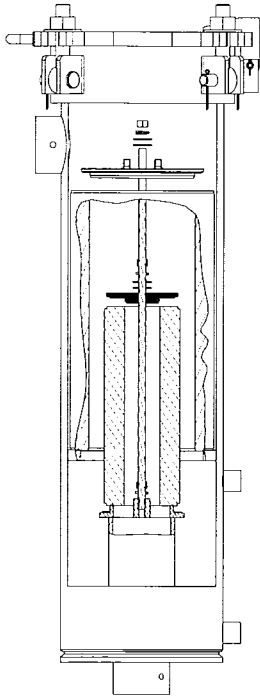
Vel-Max Filter Vessel, VX-2, showing optional leg assembly, differential pressure gauge, sight glass assembly, and air eliminator.

OPTIONAL FEATURES

- Air eliminator
- Drain valve
- Pressure relief valve
- Water probe
- Sight gauge
- Leg assembly with adjustable height
- ASME Code stamp
- Differential pressure gauge assembly
- Lid Gasket: G-2052V (Viton)

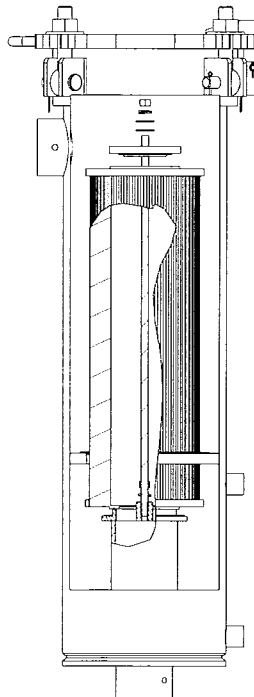
Vel-Max Filter Vessel Configurations/Applications

Filter/Separator Configuration



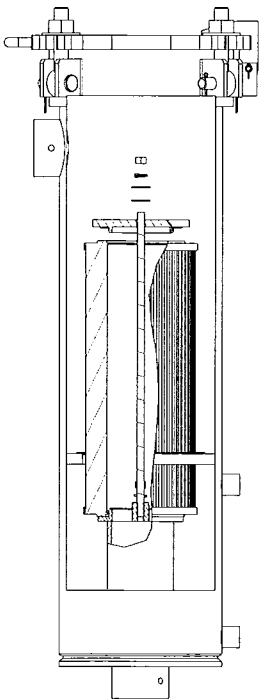
Vel-Max Series for liquid/liquid separation uses a 2-stage coalescer separator cartridge combination to remove free and emulsified water from a liquid product stream. The first stage coalescing cartridge provides filtration as well as coalescing of free and emulsified water. The second stage separator is a hydrophobic barrier designed to repel the coalesced water droplets. The water droplets will fall and collect in the sump for removal through the manual drain.

6" or 6.25" OD x 2.625" ID Configuration



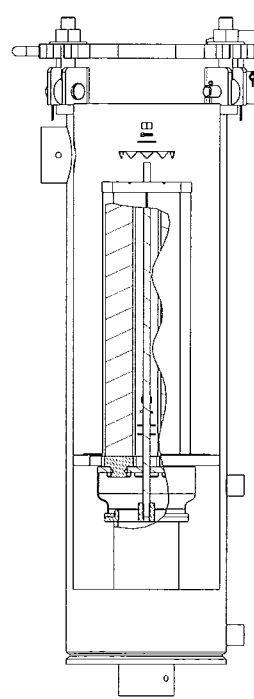
Vel-Max Series for 6" or 6.25" OD x 2.625" ID cartridges can be used in several ways. To remove solid contaminants from a flow stream, use the vessel with a pleated media filter. When used with Aquacon® cartridges the Vel-Max will remove solids and free water by absorption from a fuel or industrial oil flow stream. Using Vel-Max with clay cartridges will remove surfactants, color and other impurities by adsorption from a fuel or industrial oil system.

6" OD x 3.5" ID Configuration



Vel-Max Series with 6" OD x 3.5" ID cartridges can be used in two ways. To remove solid contaminants from a flow stream, use the vessel with a pleated media filter. When used with Aquacon® cartridges* the Vel-Max will remove solid contaminants and free water by absorption from a jet fuel or aviation gasoline flow stream.

CDF® Monitor Configuration



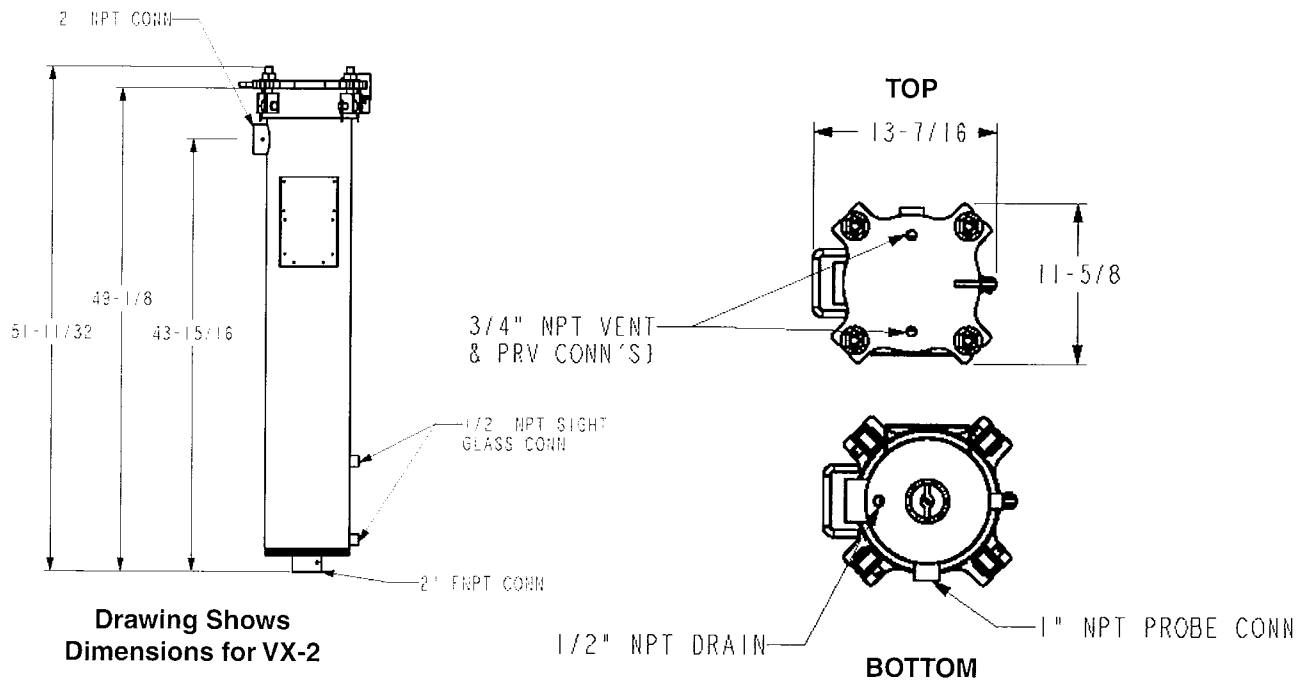
Vel-Max Series can be adapted to use 2" diameter CDF® type monitor cartridges* for removing solid contaminants and free water by absorption from jet fuel or aviation gasoline flow streams.

***CAUTION: DO NOT USE AQUACON OR CDF MONITOR CARTRIDGES IN PRE-MIXED JET FUEL CONTAINING ANTI-ICING ADDITIVES**

Vel-Max Filter Vessel

DIMENSIONS

Model	Height		Cover Width		Cover Length		Dry Weight	
	inches	mm	inches	mm	inches	mm	lbs	kgs
VX-1	36	914	13 7/16	341	11 5/8	295	110	50
VX-2	51	1295	13 7/16	341	11 5/8	295	125	57
VX-3	66	1676	13 7/16	341	11 5/8	295	150	68



Dimensions shown are for estimating purposes only.
For exact dimensional detail, obtain certified copy of vessel drawing.

FLOW RATES

CONFIGURATION	PRODUCT	VX-1	VX-2	VX-3
FILTER / SEPARATOR	TURBINE LUBE OIL (ISO 32, 100° F)	3.5 USGPM	7.5 USGPM	11.5 USGPM
	INSULATING OIL (80° F)	6.1 USGPM	13.5 USGPM	20.0 USGPM
	DIESEL FUEL	27 USGPM	50 USGPM	75 USGPM
	GASOLINE / AVIATION GASOLINE	66 USGPM	132 USGPM	198 USGPM
	JET FUEL / KEROSENE	50 USGPM	100 USGPM	150 USGPM
MICRONIC CARTRIDGES 6" OD x 3.5" ID	OILS	CONTACT FACTORY		
	DIESEL FUEL	50 USGPM	100 USGPM	150 USGPM
	GASOLINE / AVIATION GASOLINE	68 USGPM	136 USGPM	204 USGPM
	JET FUEL / KEROSENE	66 USGPM	132 USGPM	198 USGPM
AVIATION Aquacon ® CARTRIDGES 6" OD x 3.5" ID	JET FUEL / KEROSENE	58 USGPM	115 USGPM	176 USGPM
INDUSTRIAL MICRONIC & Aquacon ® CARTRIDGES 6" or 6.25" OD x 2.625" ID	OILS	CONTACT FACTORY		
	DIESEL / GASOLINE / AV GAS / JET FUEL / KEROSENE	50 USGPM	100 USGPM	150 USGPM
CLAY CARTRIDGES (LA-61801B)	INSULATING OIL	1 USGPM	N/A	2 USGPM
	JET FUEL / KEROSENE / GASOLINE	7.5 USGPM		15 USGPM
CDF® MONITOR CARTRIDGES		75 USGPM	150 USGPM	N/A

VEL-MAX CARTRIDGE SELECTION TABLE

CARTRIDGES

FILTER/SEPARATOR CONFIGURATION				
FIRST STAGE COALESCERS FOR:	MICRON RATING	VX-1	VX-2	VX-3
DIESEL FUEL	25	O-8150	O-8300	O-8440
	3	O-8154	O-8304	O-8440
DIESEL FUEL / GASOLINE	2	O-8156	O-8306	O-8446
JET FUEL / KEROSENE / DIESEL FUEL / GASOLINE / INSULATING OIL / TURBINE LUBE OIL	0.5	O-81588	O-83088	O-84488
SECOND STAGE SEPARATORS FOR:		VX-1	VX-2	VX-3
DIESEL	PAPER	SO-415PL	SO-430PL	SO-444PL
JET / KERO / GAS / OILS	TCS	SO-415V5	SO-430V5	SO-444V5

6" OD X 3.5" ID CONFIGURATION		VX-1	VX-2	VX-3
MICRONIC CARTRIDGES	PLEATED PAPER	FO-614PLFXX	FO-614PLFXX (STACK OF 2)	FO-614PLFXX (STACK OF 3)
			FO-629PLFXX	FO-644PLFXX
	FIBERGLASS DEPTH	FO-614FGXX	FO-614FGXX (STACK OF 2)	FO-614FGXX (STACK OF 3)
			FO-629FGXX	FO-644FGXX
AVIATION <i>Aquacon</i> ® CARTRIDGES*		ACO-61401L	ACO-61401L (STACK OF 2)	ACO-61405 (STACK OF 3)
			ACO-62901L	ACO-64401L
INDUSTRIAL <i>Aquacon</i> ® CARTRIDGES		AC-61405	A(C/D)-614XX	A(C/D)-614XX
		AD-61410	(STACK OF 2)	(STACK OF 3)
		AD-61425	AC-62905	AC-64405

6" OR 6.25" OD X 2.625" ID CONFIGURATION		VX-1	VX-2	VX-3	
MICRONIC CARTRIDGES	PLEATED PAPER (FO) & PLEATED SYNTHETIC (FOS)	FO-718PLXX	N/A	(FO/FOS)-718XX (STACK OF 2)	
		FOS-618PLXX		FO-736PLXX	
		FOS-718PLXX		FOS-636PLXX	
	FIBERGLASS DEPTH	FO-618FGAXX		FO-618FGAXX (STACK OF 2)	
		FO-636FGAXX AC-718XX (STACK OF 2)			
INDUSTRIAL <i>Aquacon</i> ® CARTRIDGES		AC-718XX			AC-736XX
CLAY (FULLER'S EARTH) CARTRIDGES		LA-61801B			LA-61801B (STACK OF 2)

CDF® MONITOR CONFIGURATION	VX-1	VX-2	VX-3
CDF® CARTRIDGES*	CDF-215K or N (5 EA)	CDF-230K or N (5 EA)	N/A

Contact Velcon Filters, Inc. for available micron ratings.

HARDWARE KITS

CONFIGURATION	VX-1	VX-2	VX-3
FILTER / SEPARATOR (COALESCER + SEPARATOR)	VX1-FSKIT	VX2-FSKIT	VX3-FSKIT
6" OD X 3.5" ID CARTRIDGE(S)	VX1-AVKIT	VX2-AVKIT	VX3-AVKIT
6" OR 6.25" OD X 2.625" ID CARTRIDGE(S)	VX1-INKIT	N/A	VX3-INKIT
CDF® MONITOR CARTRIDGES	VX1-CDKIT	VX2-CDKIT	N/A

***CAUTION: DO NOT USE AQUACON OR CDF MONITOR CARTRIDGES IN PRE-MIXED JET FUEL CONTAINING ANTI-ICING ADDITIVES**



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Horizontal **Aquacon**® Vessels

API/IP 1583 4th Edition Monitor Specification Qualified HA Series

Horizontal **Aquacon**® for Aircraft Fueling Trucks, Hydrant Carts, and Cabinets

FEATURES

- Positive Protection Against Water and Dirt
- Compact Design
- ASME Code Qualification
- Field Proven Performance

DESCRIPTION

Compact HA Series **Aquacon**® Vessels comply fully with API/IP Specification 1583 4th Edition for Aviation Fuel Filter Monitors with Absorbent Type Elements. Units are designed to accept the latest "L" series cartridges.



SPECIFICATIONS

- 150 PSI ASME Code Construction
- 220 psid (15 bar) Hydrotest Pressure for Deckplate
- Carbon Steel Construction
- RF Flanged or Victaulic Connections
- Swing Bolted Closure
- Buna-N O-Ring Cover Seal
- Mil-C-4556 Epoxy Coated Interior, Primed Exterior

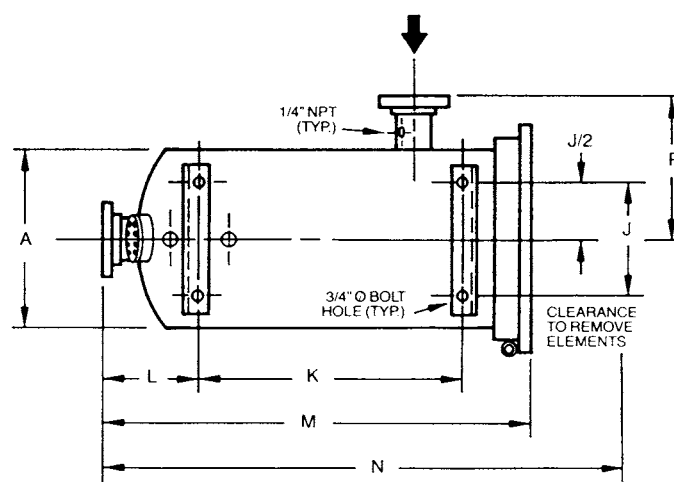
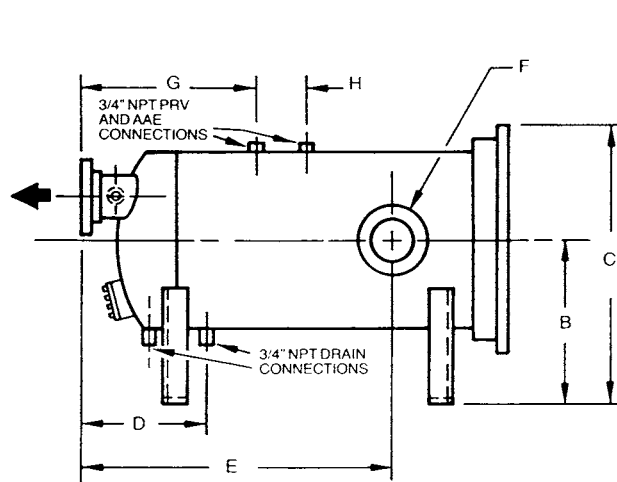
RECOMMENDED ACCESSORIES

- Automatic Air Eliminator
- Pressure Relief Valve
- Manual Drain Valve(s)
- Differential Pressure Gauge
- Sampling Probes
- ASME Code Stamp

*****CAUTION*****

In fuels containing anti-icing additive (Di-EGME, FSII, Prist®), stagnant water bottoms can absorb large amounts of the anti-icing additive. This water/FSII solution can disarm water absorbing cartridges allowing water to pass downstream. Daily draining of the **Aquacon**® vessel and of water bottoms upstream of the cartridges is IMPERATIVE. Also, change-out cartridges when differential pressure reaches 15 psid.

VESSEL MODEL NUMBER	FLOW RATE		CARTRIDGES		WEIGHT W/SKID (LBS)	VOLUME U.S. GALS
	U.S. GPM	L/M	MODEL NO.	QTY		
HA-829M	115	435	ACO-62901L	1	265	8
HA-844M	173	654	ACO-64401L	1	300	12
HA-1814M	232	878	ACO-61401L	4	550	29
HA-1829M	460	1,741	ACO-62901L	4	600	44
HA-2229M	805	2,611	ACO-62901L	7	720	56
HA-2244M	1,211	3,928	ACO-64401L	7	800	75



VESSEL MODEL NUMBER	DIMENSIONS IN INCHES													
	A	B	C	D	E	F	G	H	J	K	L	M	N	P
HA-829M	8 ⁵ / ₈	8	13 ⁷ / ₁₆	11	38	2	7 ⁹ / ₁₆	9 ¹⁵ / ₁₆	5 ¹ / ₂	30	8	43	74	9
HA-844M	8 ⁵ / ₈	8	13 ⁷ / ₁₆	11	56 ⁵ / ₈	2	7 ⁹ / ₁₆	9 ¹⁵ / ₁₆	5 ¹ / ₂	48	8	62	108	9
HA-1814M	18	12	25	19	19 ¹³ / ₁₆	4	19	10	10 ³ / ₄	9	12 ¹ / ₂	31 ¹ / ₂	43	15
HA-1829M	18	12	25	19	33 ¹³ / ₁₆	4	19	10	10 ³ / ₄	23	12 ¹ / ₂	45 ¹ / ₂	73	15
HA-2229M	22	14	28 ¹ / ₄	20	32 ³ / ₄	6	20	10	10 ³ / ₄	22	14	46 ³ / ₈	74	17
HA-2244M	22	14	28 ¹ / ₄	20	48 ³ / ₄	6	20	10	10 ³ / ₄	35	14	60 ³ / ₈	103	17



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Filter Housing VF-31E

Clean Dry • Fuels • Oils • Gasses with High Performance *Aquacon*® Filter Cartridges

FEATURING

- Free and emulsified water to less than 5 ppm
- 1/2 micrometer particulate removal
- Provides protection against “slugs” of water
- Pressure increase signals cartridge change
- Use with existing filter housings

DESCRIPTION

The VF-31E is a versatile filter housing designed for use with several different high performance *Aquacon* filter cartridges. Cartridges are offered for the optimum filtration of aviation fuel (see caution on reverse side), gasoline, diesel fuel, oils, compressed air, and other gasses. Refer to the Cartridge Selection Table on the reverse side of this sheet for details.

Aquacon filters eliminate water contamination problems by removing water from fuels, oils, and gasses. Filtered water is chemically locked into the cartridge’s inner super-absorbent media.

As a cartridge reaches its water holding limit, the media expands very rapidly and restricts the flow of unfiltered material. This causes an increase in the differential pressure which signals the operator to replace the cartridge. When filtering fuels or compressed air, a saturated *Aquacon* cartridge will completely block the flow until it is replaced.

Aquacon Cartridges are also excellent dirt filters. Silt, rust, and other particulates are removed by the cartridge’s outer filter media. 5 and 25 micron rated cartridges are available for use with fuels and oils. The ACA-210 cartridge, for use with compressed air and other gasses, has a 1 micron rating.



VF-31E
Filter
Housing



AC-21005
Filter
Cartridge



ACA-210
Filter
Cartridge

APPLICATIONS

Fuels:	Oils:
Kerosene	Insulating
Diesel	Hydraulic
Gasoline	Lubricating

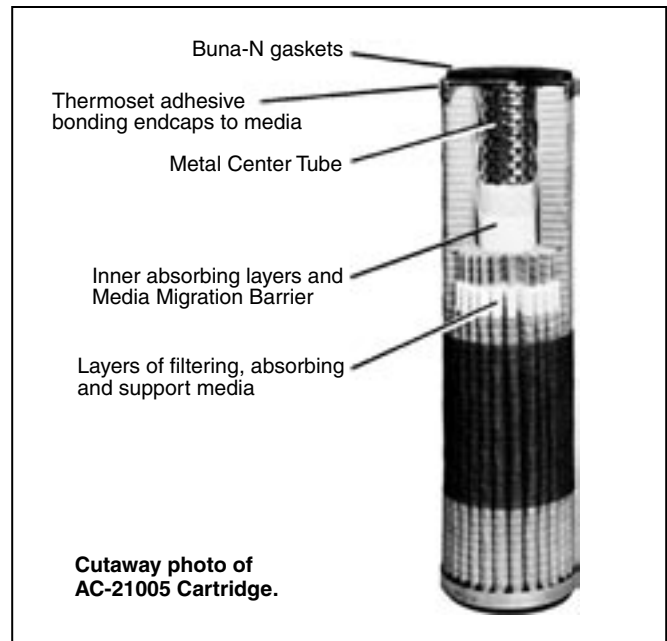
Compressed Air and Other Gasses

WARNING: Absorbent-type monitor cartridges will not remove water from fuel containing alcohol-blending agents (commonly called gasohol). For removal of solids, please use Velcon particle removal filters specifically made for gasohol. Consult your Velcon representative.

SPECIFICATIONS

Filter Housing VF-31E

- Recommended maximum flow rate: see table below
- Maximum operating pressure: 150 psi
- Material: cast aluminum head, carbon steel bowl with epoxy painted interior and exterior
- Inlet/Outlet Connection: 1" NPT
- Inlet/Outlet face-to-face: 4"
- Mounting holes in head: four 1/4-20 NC
- Seal: Buna-N gasket
- Height: 13.50" without Petcock, 14.50" with Petcock
- Weight: 3 lbs., 15 oz.
- Shipping Weight: 4 lbs., 15 oz.
- Hardware included: 1 ea. Buna-N Lid Gasket, Mounting Brackets, 1 ea. Plug (for fuel and oil applications), and 1 ea. 1/8" Petcock Drain (for air, gas and aviation fuel applications).



Aquacon FILTER CARTRIDGE SELECTION TABLE

Application	Cartridge	Flow Rate	Micron Rating
Jet Fuel Avgas*	ACO-21001L	1 - 15 GPM	1/2
Motor Gasoline	AC-21005	1 - 15 GPM	5
Diesel Fuel*	AD-21025	1 - 15 GPM	25
Oils	AC-21005 or AD-21025	Varies with Oil Viscosity	5 or 25
Compressed Air & Other Gasses	ACA-210	100 SCFM at 100 psig	1

*For Aviation and Diesel Fuel Systems, if system pressure can exceed 25 psi, **always** install pressure gauge or other means of determining differential pressure.

Cartridge Pressure Ratings

Collapse strength of the ACO-21001L, AC-21005 and AD-21025 is 60 psid.

Collapse strength of the ACA-210 is 150 psid.

*****CAUTION*****

DO NOT USE WITH PRE-MIXED FUELS CONTAINING ANTI-ICING ADDITIVES.

ORDERING INFORMATION (Specify)

• Model VF-31E Filter Housing

Supplied without cartridge

Supplied with 1 ea. Model G-0995

Buna-N Lid Gasket, Mounting Brackets,

1 ea. Plug, and 1 ea. 1/8" Drain Petcock

RECOMMENDED SPARES

- 1 ea. Model G-0995 Buna-N Lid Gasket
- 4 ea. Aquacon filter cartridges (Specify from table.)



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Filter Housing VF-61

Clean Dry Fuels and Oils with High Performance *Aquacon*® Filter Cartridges

FEATURES

- Free and emulsified water to less than 5 ppm
- 1/2 micrometer particulate removal
- Provides protection against “slugs” of water
- Pressure increase signals cartridge change
- Use with existing filter housings

DESCRIPTION

The VF-61 is a versatile filter housing designed for use with several different high performance *Aquacon* filter cartridges. Refer to the cartridge selection table on the reverse side.

Aquacon cartridges filter out water by chemically locking it into layers of super-absorbent media. Water removal efficiency is not affected by common surfactants or additives. Water capacity is as much as 1½ quarts, depending on the flow rate. These cartridges also effectively filter out dirt, rust and other particulates. (See caution below, right.)

As a cartridge reaches its water-holding limit, the media expands very rapidly and restricts the flow. For oils and other high viscosity liquids, the pressure drop will rapidly increase, signaling the need to change cartridges.

The VF-61, with ACO series cartridges installed, has become the standard for low flow rate full flow aviation fuel monitor applications.

APPLICATIONS

Jet Fuel	Insulating Oil
Avgas	Hydraulic Oil
Motor Gasoline	Lubricating Oil
Diesel Fuel	Selected Solvents



VF-61 shown with standard accessories
and (inset) with optional quick release hand bolts.

*****CAUTION*****

DO NOT USE WITH PRE-MIXED FUELS CONTAINING
ANTI-ICING ADDITIVES.

WARNING: Absorbent-type monitor cartridges will not remove water from fuel containing alcohol-blending agents (commonly called gasohol). For removal of solids, please use Velcon particle removal filters specifically made for gasohol. Consult your Velcon representative.

SPECIFICATIONS

Filter Housing VF-61

- Maximum Operating Pressure: 150 psi
- Material: die cast aluminum head and closure clamp assembly; carbon steel shell with epoxy coated exterior and interior.
- Inlet/Outlet Connection: 1 1/2" NPT
- Closure Seal: Buna-N O-Ring (P/N G-0986)
- Weight: 8 lbs., Shipping Weight: 10 lbs.
- 1/8" brass petcock vent valve and 1/2" drain valve

Cartridges

- Maximum Operating Temperature: 200°F
- Collapse Strength: 75 psi (5 bar)
- pH Range: 5 - 9
- Nominal Filtration Efficiency: 98%

Over Pressure Protection

- When exposed to a high concentration of water, the differential pressure across an **Aquacon**® cartridge will immediately increase. Pressure bypasses or other means to limit the inlet pressure to 75 psi (5 bar) should be installed to prevent the cartridge from collapsing.

FILTER CARTRIDGE SELECTION TABLE

Application	Cartridge	Rating	Typical Free Water in Effluent (Maximum)	Recommended Flow Rates
Jet Fuel ⁽¹⁾ Avgas ⁽¹⁾	ACO-51201L	1/2	2 ppm	5 - 50 USGPM ⁽²⁾
Motor Gasoline	AC-51205	5	5 ppm	5 - 50 USGPM
Diesel Fuel	AD-51225	25	50 ppm	15 - 50 USGPM
Oils	AC-51205 AD-51225	5 25	See Note (3)	Varies with viscosity. See Form #1709.
Solvents	ASL-51201	1	5 ppm	5 - 50 USGPM
Dirt Removal Only	FO-512PL05 FO-512PL1/2 FO-512PL25	5 1/2 25	N/A	1 - 50 USGPM

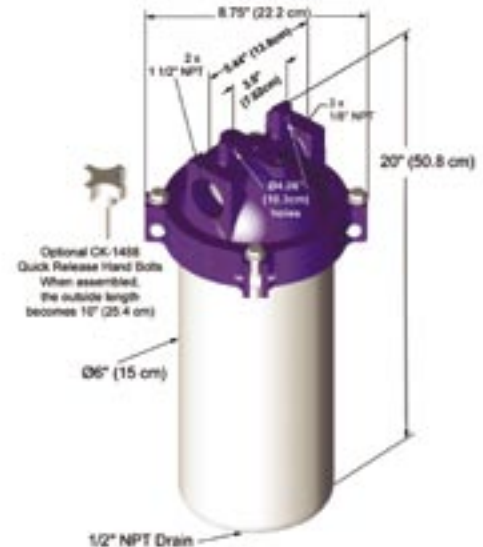
NOTES:

- (1) For Aviation Fuels, if system pressure can exceed 25 psi, and for Diesel Fuel Systems, always install pressure gauge or other means of determining differential pressure.
- (2) For Full Flow Fuel Monitor applications, the flow rate can be increased to 75 USGPM. This will result in a somewhat reduced cartridge life and higher initial pressure drop. In jet fuel with an ACO-51201L installed, the initial pressure drop is 6 psi at 50 USGPM, 10 psi at 75 USGPM.
- (3) For oils and other liquids with viscosity above 100 SUS, more than one pass is typically required through the cartridge. After several passes, water levels of 5 ppm can be achieved.

ORDERING INFORMATION

- Specify Model VF-61 Filter Housing
- Unit is supplied with G-0986 Buna-N O-Ring and 1/8" valve and 1/2" drain plug installed. 1/2" petcock drain valve is shipped loose.
- Cartridges are not supplied and must be ordered separately.
- Viton O-Rings (P/N G-0986A) are available but must be ordered separately. They are recommended for gasoline and solvent applications.
- Optional Differential Pressure Gauge Assembly is Part Number 10678 (See Form #1959)

VESSEL DIMENSIONS



RECOMMENDED SPARES

- 1 each G-0986 Buna-N O-Ring
- 6 each Cartridges
- If Viton O-Rings are desired, 2 each G-0986A

OPTIONS

- Part Number 554Y020 is a Carbon Steel 1/2" NPT Ball Valve, with Mounting Nipple
- Part Number CK-1488 quick release hand bolts (set of 4) to replace closure bolts (shown on page 1 inset photo)



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VF-61

Differential Pressure Gauge

Assembly Part Number 10678



Differential Pressure Gauge Kit for use with the VF-61 Housing

This unit measures pressure difference between two points. The gauge allows for a simple reading on an easy-to-read scale. A red/green dial with a breakpoint located at 15 psid alerts the user of the condition of the process.

This kit consists of the following components:

- Differential Pressure Gauge: aluminum body, 1/8" NPT bottom, 1" molded lens & 0-20 psid scale,
- Compression Fittings: 1 straight, 1 90° elbow
- 1/4 O.D. Copper Tubing

Operation

When the needle is in the green zone of the gauge during normal flow, the differential pressure is less than 15 psid across the installed element, and the element does not need to be changed out.

When the needle is in the red zone, the differential pressure is more than 15 psid and the element should be changed out. It has reached its recommended maximum pressure differential.

CAUTION:

Do not mount the P/N 10678 differential pressure gauge assembly any closer than 2" from a steel bracket or pipe. The gauge has a magnetic piston, and mounting too close to steel may affect the accuracy.



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Specialists***



Filter Housing

VF-609

Clean Dry Fuel with High Performance *Aquacon*® Filter Cartridges for Helicopter Refueling and Dispensing Pumps

FEATURES

- **Positive Water Removal** – *Aquacon* cartridges remove free and emulsified water from fuels
- **Positive Water Holding** – filtered water is chemically locked in and can't be squeezed out
- **Pressure Increase** signals cartridge change
- **Effective Dirt Removal** – 98% + efficiency for 1/2, 5, or 25 micrometer particles

DESCRIPTION

The VF-609 is a versatile filter housing with bolted cover, designed for use with several different high performance *Aquacon* filter cartridges. Refer to the cartridge selection table on the reverse side.

Aquacon cartridges filter out water by chemically locking it into layers of super-absorbent media. Water removal efficiency is not affected by surfactants or additives, and once captured, the water cannot be squeezed out. Water capacity is as much as 1½ quarts, depending on the flow rate. These cartridges also effectively filter out dirt, rust and other particulates.

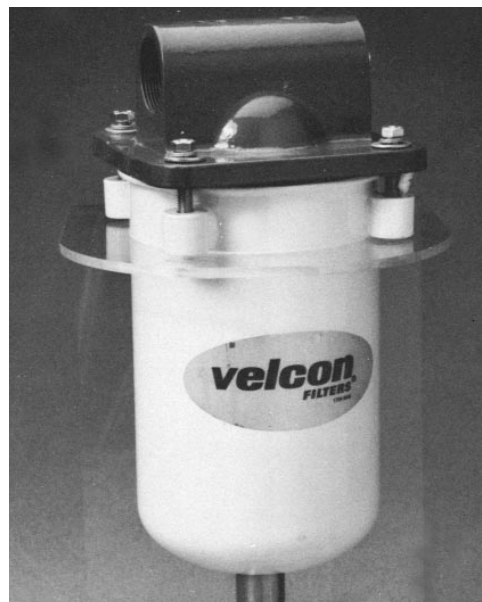
As a cartridge reaches its water-holding limit, the media expands very rapidly and restricts the flow. For fuels, the flow will completely stop, giving positive shut-off and guaranteeing water will not get downstream. For oils and other high viscosity liquids, the pressure drop will rapidly increase, signaling the need to change cartridges.

APPLICATIONS

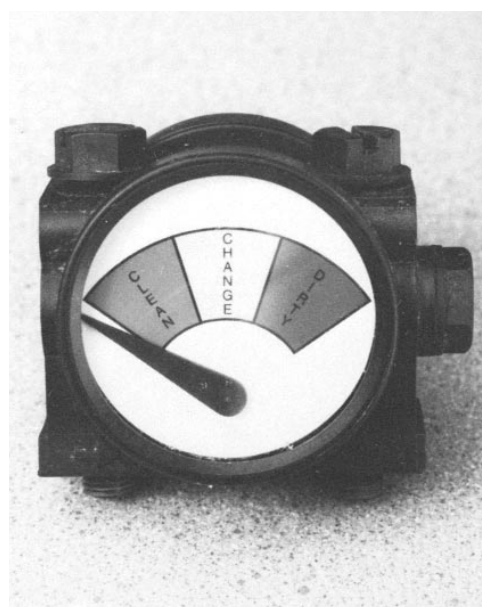
- Jet Fuel
- Avgas
- Motor Gasoline
- Diesel Fuel
- Selected Solvents

*******CAUTION*******

In fuels containing anti-icing additive (Di-EGME, FSII, Prist®), stagnant water bottoms can absorb large amounts of the anti-icing additive. This water/FSII solution can disarm water absorbing elements allowing water to pass downstream. Daily draining of the monitor vessel and of water bottoms upstream of the elements is **IMPERATIVE**. Also, changeout @ **15 psid**.



The VF-609 uses high performance *Aquacon* filter cartridges. Model above is shown without optional gauge.



The VF-609 gauge is an easy to install optional accessory.

SPECIFICATIONS

Filter Housing VF-609

- Maximum Operating Pressure: 150 psi
- Material: Cast aluminum head; carbon steel shell with epoxy coated exterior and interior; four bolt head
- Inlet/Outlet Connections: 1½" NPT
- Closure Seal: Buna-N O-Ring – P/N G-0565
- Weight: 8 lbs.
- Shipping Weight: 10 lbs
- ¼" brass petcock vent valve and ½" drain valve
- Bolted cover

Cartridges

- Maximum Operating Temperature: 250°F (121°C)
- Collapse Strength: 75 psi (5bar)
- pH Range: 5 - 9
- Nominal Filtration Efficiency: 98%

Optional Pressure Gauge (P/N 07-224)

- Two-faced for universal installation
- Mounts directly to filter head with two slotted bolts
- Magnetic actuation
- Safe – no pressure behind lens
- 2" dial face
- 3" color dial (green – yellow – red) meets international standards

Pressure Gauge Function:

Color	Indicates	Pressure Drop
Green	Clean	0 - 15 psi
Yellow	Change	16 - 25 psi
Red	Dirty	26+ psi

OVER PRESSURE PROTECTION

When exposed to a high concentration of water, the differential pressure across an **Aquacon** cartridge will immediately increase. Pressure bypasses or other means to limit the inlet pressure to 75 psi (5 bar) should be installed to prevent the cartridge from collapsing.

FILTER CARTRIDGE SELECTION TABLE

Cartridge	Micron Rating	Typical Free Water in Effluent (Maximum)	Application	Recommended Flow-Rates
ACO-60901L	½	2 ppm	Jet Fuel/Avgas	15 - 36 GPM
ACO-609P3L (min qty 12)	.3	2 ppm	Jet Fuel/Avgas	15 - 36 GPM
AD-60925	25	50 ppm	Diesel Fuel	15 - 30 GPM

ORDERING INFORMATION

- Specify model VF-609 Filter Housing
- Unit is supplied with G-0565 Buna-N O-Ring and ¼" vent valve and ½" drain valve.
- Cartridges are **not** supplied and must be ordered separately.
- Viton O-Rings (P/N G-0565A) are available but must be ordered separately. They are recommended for gasoline and solvent applications.
- Optional Differential Pressure Gauge Assembly is P/N 07-224

RECOMMENDED SPARES

- 1 each G-0565 Buna-N O-Ring
- 6 each cartridges
- If Viton O-Rings are desired, 2 each G-0565A

OPTIONAL DRAIN VALVE

- Part Number 554Y020 is a Carbon Steel ½" NPT Ball Valve, with Mounting Nipple

*****CAUTION !*****

To protect the fuel system, including the VF-609 and other components, be sure to install pressure relief valve(s).



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CDF® Monitor Vessels

Compact Monitor Vessels Assure Clean, Dry Fuel Delivery

FEATURES

- **Lightweight** aluminum construction. Also available in less expensive carbon steel housings with aluminum deckplates.
- **Compact** size minimizes space requirements on mobile refueling equipment, in cabinets, and at loading racks.
- **Field Proven CDF** Series Monitor Cartridges are provided with the vessel.
- **Qualified** to the Institute of Petroleum's specification for fuel monitors when fitted with CDF-K Series Cartridges.
- **Positive Water Protection** means that additional water defense equipment, such as an electronic water detecting probe or a float control and slug valve, is not needed.
- **Rugged Construction** allows the vessel deckplate to exceed the 220 psid hydrostatic test requirement. CDF-K Series elements exceed 175 psid.

DESCRIPTION

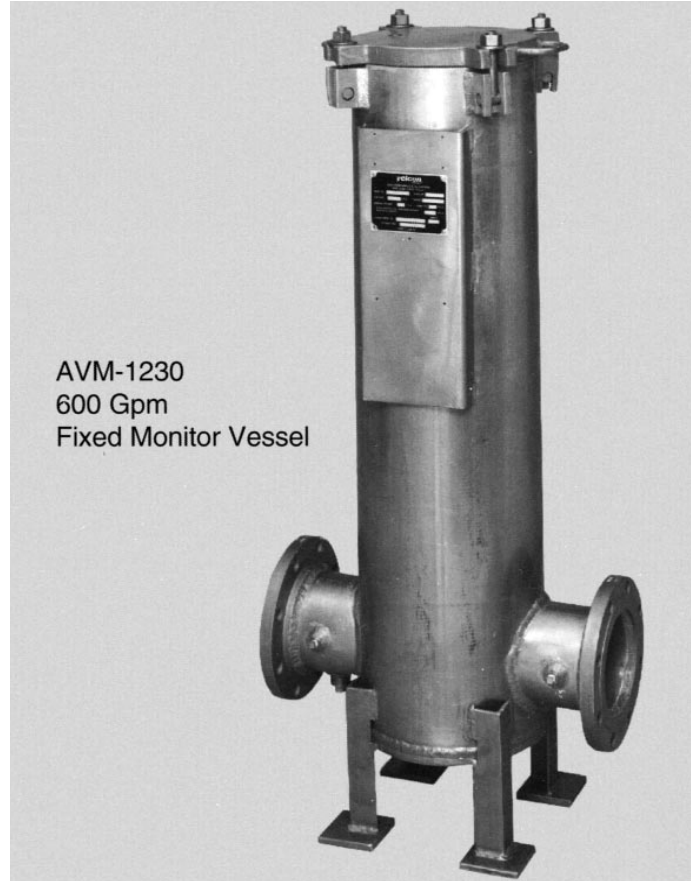
The Velcon CDF Monitor Vessels, equipped with the CDF-K Series Cartridges, provide superior performance and reliability for assuring clean, dry fuel. These vessels are for use downstream of filter/separators or on refueler trucks. The presence of water and/or dirt in the influent fuel is indicated by an increase in the pressure differential (or a decrease in flow rate if the monitor housing is not equipped with a differential pressure gauge). These changes are the result of flow restriction caused by dirt filtration or water absorption in the media. The rapidity of these changes will depend on the quantity of water or contaminant present.

SPECIFICATIONS

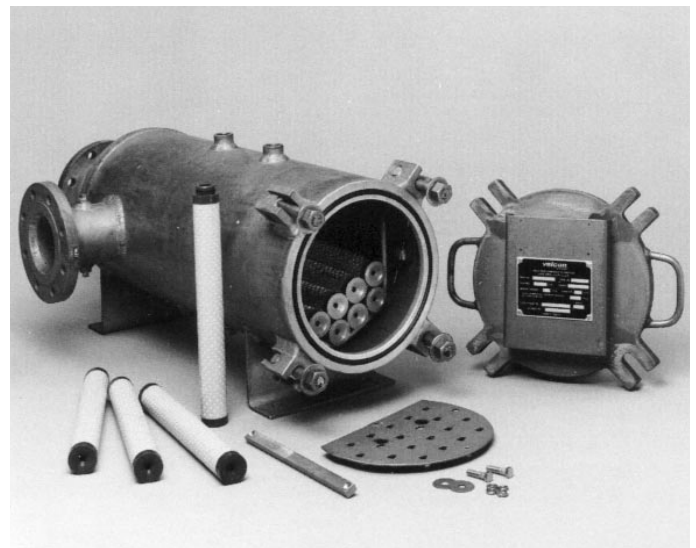
- 150 psi ASME Code Construction (higher pressures optional)
- 220 psid hydrotest pressure for deckplate
- Aluminum or Carbon Steel Construction
- Buna-N O-Ring cover seal
- Victaulic or flanged connections (specify one)
- Spider assembly for stabilizing cartridges
- Optional "check valve" spider available

Standard fittings for:

- Automatic Air Eliminator
- Pressure Relief Valve
- Manual Drain Valve(s)
- Differential Pressure Gauge
- Sampling Connections

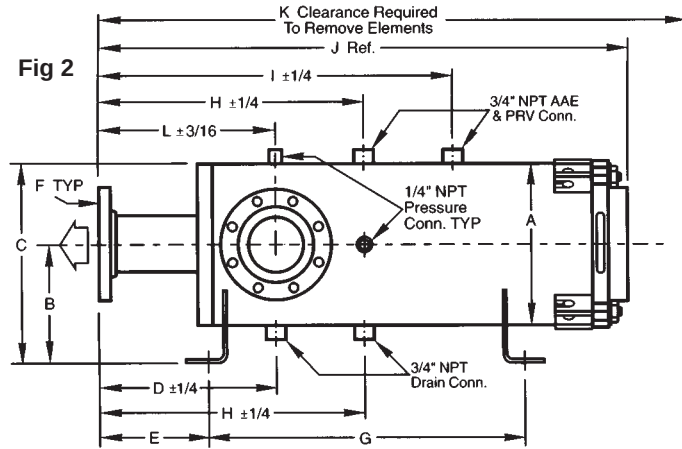
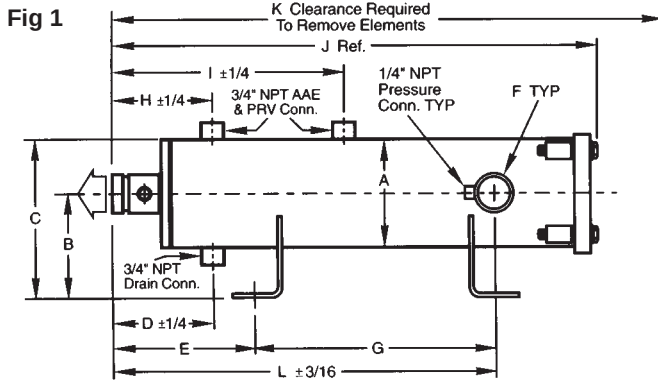


AVM-1230
600 Gpm
Fixed Monitor Vessel



AHM-1215M 300 GPM Mobile Monitor Vessel

CDF Monitor Vessels



HORIZONTAL (MOBILE) CDF MONITOR VESSELS FIGURES 1 AND 2 (SEE NOTE A)

Vessel Model Number	Flow Rate US		Elements		Fig	Dimensions are in Inches																Wt. Volume	
	GPM	L/M	Model	Qty		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Lbs	U.S. Gallons
AHM-0610M	50	185	CDF-210K	5	1	6 ⁵ / ₈	6 ⁵ / ₁₆	9 ⁵ / ₈	6 ⁷ / ₈	8 ⁷ / ₈	2	6 ⁷ / ₈	6	14 ⁷ / ₈	18 ³ / ₄	29	14					40	2 ¹ / ₂
AHM-0620M	100	375	CDF-220K	5	1	6 ⁵ / ₈	6 ⁵ / ₁₆	9 ⁵ / ₈	6	8	2	15	6	14	29 ⁷ / ₈	48	23 ³ / ₄					45	3 ³ / ₄
AHM-0630M	150	565	CDF-230K	5	1	6 ⁵ / ₈	6 ⁵ / ₁₆	9 ⁵ / ₈	6	8	2	25	6	14	40 ¹ / ₂	68	33 ³ / ₈					50	5
AHM-1210M	200	755	CDF-210K	20	2	12 ³ / ₄	9 ³ / ₈	15 ³ / ₄	14	8 ¹ / ₂	4	20	25	31	38 ¹ / ₄	45	28 ¹ / ₂					110	12 ¹ / ₂
AHM-1020M	200	755	CDF-220K	10	2	10 ³ / ₄	9 ³ / ₈	14 ³ / ₄	10	5 ¹ / ₂	4	25	18	25	41	61	10					155	11
AHM-1215M	300	1135	CDF-215K	20	2	12 ³ / ₄	9 ³ / ₈	15 ³ / ₄	14	8 ¹ / ₂	4	25	25	31	43 ³ / ₄	55	14					130	15
AHM-1030M	300	1135	CDF-230K	10	2	10 ³ / ₄	9 ³ / ₈	14 ³ / ₄	10	5 ¹ / ₂	4	30	18	25	51	80	10					165	15
AHM-1220M	400	1510	CDF-220K	20	2	12 ³ / ₄	9 ³ / ₈	15 ³ / ₄	14	8 ¹ / ₂	4	30	25	31	48 ¹ / ₄	65	14					155	17 ¹ / ₂
AHM-1225M	500	1890	CDF-225K	20	2	12 ³ / ₄	9 ³ / ₈	15 ³ / ₄	14	8 ¹ / ₂	6	35	22	29	53 ³ / ₄	75	14					175	20
AHM-1230M	600	2270	CDF-230K	20	2	12 ³ / ₄	9 ³ / ₈	15 ³ / ₄	14	8 ¹ / ₂	6	40	22	29	58 ¹ / ₄	84	14					200	22 ¹ / ₂
AHM-1430M	800	3025	CDF-230K	27	2	14	10 ¹ / ₂	17 ¹ / ₂	9 ³ / ₈	7	6	35	20	30	51 ¹ / ₁₆	79	25					170	26
AHM-1630M	1000	3785	CDF-230K	34	2	16	11 ¹ / ₂	19 ¹ / ₂	9 ³ / ₈	6	6	40	20*	30	57 ¹ / ₄	85	25					200	41
AHM-1830M	1200	4540	CDF-230K	40	2	18 ¹ / ₄	15 ¹ / ₈	24 ¹ / ₄	8 ³ / ₈	15 ⁷ / ₈	6	21 ¹ / ₂	17 ¹ / ₈	32	49 ¹ / ₂	76	25 ¹ / ₈					290	39

Note: On this vessel "H" has two different dimensions.

The AAE dimension (shown) is 20", while the lower "H" dimension is 13¹/₄"

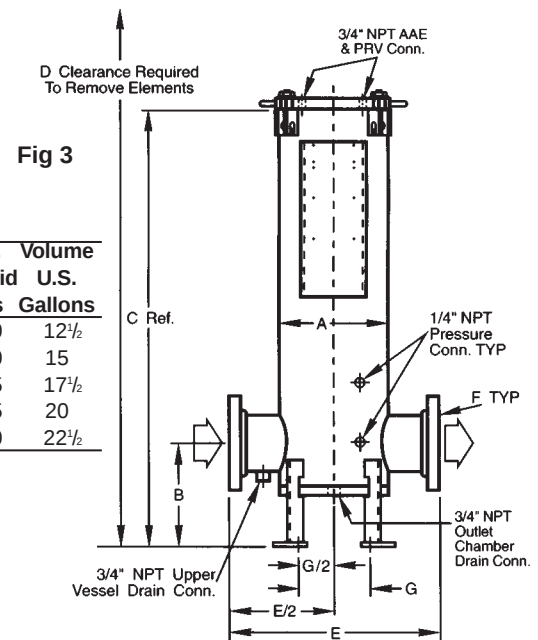
VERTICAL (FIXED) CDF MONITOR VESSELS FIGURE 3 (SEE NOTE A)

Vessel Model Number	Flow Rate US		Elements		Dimensions are in Inches										Wt. Volume	
	GPM	L/M	Model	Qty	A	B	C	D	E	F	G	H	I	J	Lbs	U.S. Gallons
AVM-1210	200	755	CDF-210K	20	12 ³ / ₄	12	33	42	24	4	8 ¹ / ₂				110	12 ¹ / ₂
AVM-1215	300	1135	CDF-215K	20	12 ³ / ₄	12	38	52	24	4	8 ¹ / ₂				130	15
AVM-1220	400	1510	CDF-220K	20	12 ³ / ₄	12	43	62	24	4	8 ¹ / ₂				155	17 ¹ / ₂
AVM-1225	500	1890	CDF-225K	20	12 ³ / ₄	12	47	71	24	6	8 ¹ / ₂				175	20
AVM-1230	600	2270	CDF-230K	20	12 ³ / ₄	12	53	82	24	6	8 ¹ / ₂				200	22 ¹ / ₂

Note A: Dimensions shown are for vessels made of aluminum.

Dimensions may be slightly different for carbon steel vessels.

Carbon steel vessels have epoxied interiors with aluminum deckplates.



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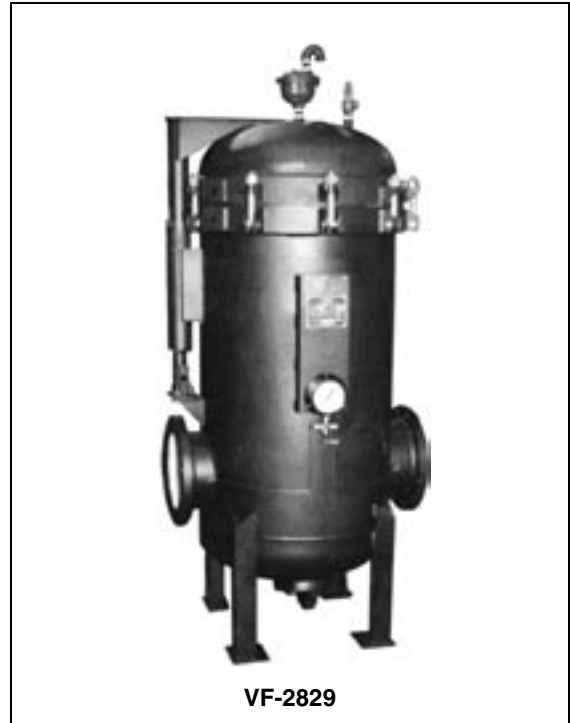
VF Series Filter Vessels

STANDARD DESIGN FEATURES

- 150 psi welded steel ASME Code construction.
- Choice of filter efficiency from 0.5 to 75 microns.
- Choice of pleated or depth type media.
- Epoxy coated interior, primed exterior.
- Buna-N O-ring cover seals.

RECOMMENDED OPTIONAL ACCESSORIES

- Automatic Air Eliminator
- Pressure Relief Valve
- Differential Pressure Gauge
- Drain Valve(s)
- Sampling Probes
- ASME Code Stamp



VF-1614 and larger vessels are provided with swing bolt closure, RF flange connections and fittings for pressure gauge, air eliminator, pressure relief valve and drain valve.

VF-814-844 Filters have through bolt covers, NPT connections, and include fittings for drain, pressure gauge and air vent.

TYPICAL APPLICATIONS

Jet Fuels Diesel Fuels Gasoline

Consult our cartridge data sheets to select the efficiency and type of cartridge that is right for your application – PLF Series (pleated surface type filtration), FG Series (fiberglass depth type filtration), or **Aquacon®** Series (dehydration and filtration).

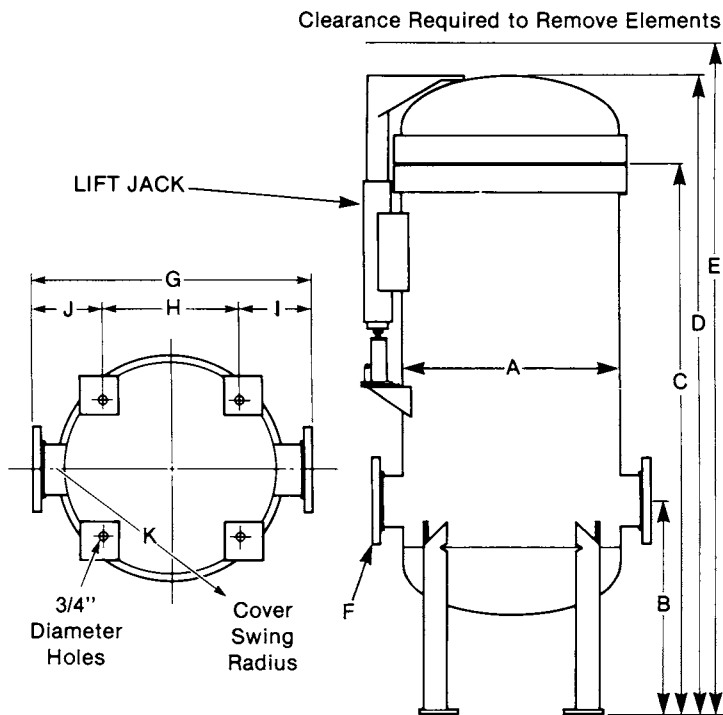


Figure 1

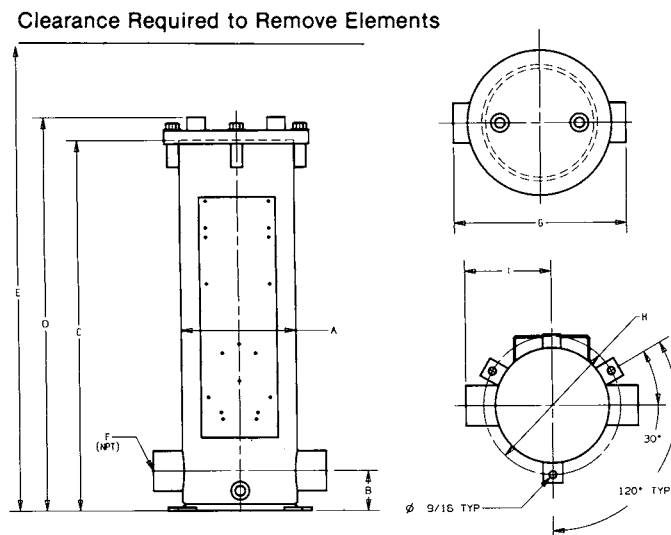


Figure 2

Vessel Model Number	Rated Flow USGPM ¹	614 Series ² Elements		Fig. No.	Dimensions in Inches ³											Weight with Skid, lbs.	Volume U.S. Gallons
		Total Qty.	No. of Stacks		A	B	C	D	E	F	G	H	I	J	K		
VF-814	50	1	1	2	8 ⁵ / ₈	3	27 ³ / ₄	29 ¹ / ₂	43	2	13	10 ³ / ₈	6 ¹ / ₂	—	—	225	5
VF-829	100	2	1	2	8 ⁵ / ₈	3	41 ³ / ₄	43 ¹ / ₂	58	2	13	10 ³ / ₈	6 ¹ / ₂	—	—	265	8
VF-844	150	3	1	2	8 ⁵ / ₈	3	55 ³ / ₄	57 ¹ / ₂	72	2	13	10 ³ / ₈	6 ¹ / ₂	—	—	305	11
VF-1614	200	4	4	1 ⁴	16	15	37 ³ / ₈	40 ³ / ₈	67	4	24 ¹ / ₄	9	7 ⁵ / ₈	—	—	500	22
VF-1629	400	8	4	1 ⁴	16	15	52 ¹ / ₈	55 ⁵ / ₈	82	4	24 ¹ / ₄	9	7 ⁵ / ₈	—	—	560	35
VF-2029	600	12	6	1 ⁴	20	19 ¹ / ₂	56 ¹ / ₂	62	86	6	28	13	7 ¹ / ₂	7 ¹ / ₂	26	1000	67
VF-2044	900	18	6	1 ⁴	20	19 ¹ / ₂	71	76 ³ / ₈	113	6	28	13	7 ¹ / ₂	7 ¹ / ₂	26	1100	88
VF-2829	1200	24	12	1	28	24	48 ¹ / ₂	64 ³ / ₄	73	8	36	18	9	9	35	1500	125
VF-2844	1800	36	12	1	28	24	63 ¹ / ₂	79 ³ / ₄	87 ¹ / ₂	8	36	18	9	9	35	1600	165
VF-3644	2700	54	18	1	36	26	63 ³ / ₈	77	107	10	48	23	12 ¹ / ₂	12 ¹ / ₂	43	2250	288
VF-4244	4050	81	27	1	42	28	66	86 ⁵ / ₈	112	12	54	28	13	13	50	3800	400

- Flow rate is based on FO-614PLF5 (5-micron pleated paper) elements for fluids with a viscosity of up to a maximum of 120 SSU and a clean pressure drop of 2 psi maximum. For other elements and/or higher viscosities, consult our element data sheets or your Velcon Representative.
- VF Series Filters are designed to accommodate our standard 6 in. O.D., 3¹/₂ in. I.D., 14¹/₂ in. long elements that are stacked one, two, or three high. Many elements are available in longer lengths that eliminate stacking. For example, a 44 inch long FO-644PLF1M could be used in place of three 14¹/₂ inch long elements. This makes for easier and less expensive changeouts.
- A number of threaded base filter elements (e.g. FO-644PLF5TB) are available, which allow for easier element changeout and removal of particulate matter from the deckplates. See data sheet # 1549. The threaded base elements mount on the 6000T Adapters.
- Dimensions shown are for estimating purposes only. For exact dimensions, obtain certified drawing.
- VF-16 and VF-20 Series vessels have flat covers. VF-16 Series vessels do not have hydraulic lift jacks.
- Available **Aquacon** Cartridges are the ACO-61401L, ACO-62901L and ACO-64401L.

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VC Series Clay Element Vessels

VC Series are for use with Velcon clay elements in applications such as removing surfactants from jet fuel and acids or products of oxidation from lube and hydraulic oils. The standard design is fitted for canister type cartridges with knife seal mounting hardware. Velcon recommends our standard canister design because it offers you the following advantages over the bag type:

- 1. Positive Cartridge End Seal**
 - prevents contaminated liquid bypass
- 2. Lower Purchase Price**
 - the canister design eliminates the need for costly element standpipes
- 3. Easier, Faster Element Changes**
 - with simple hand tools

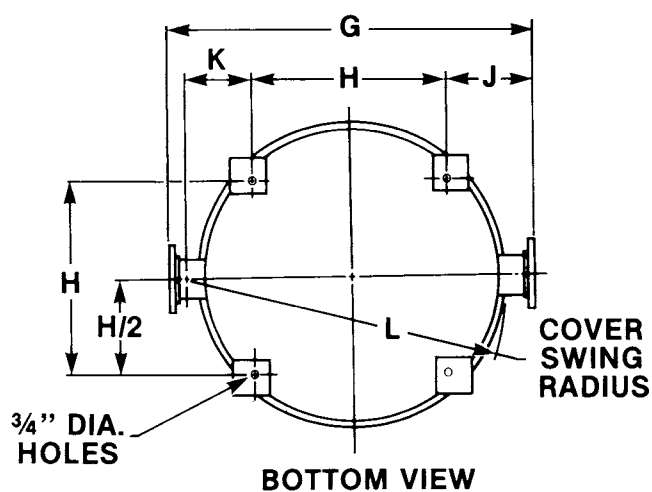
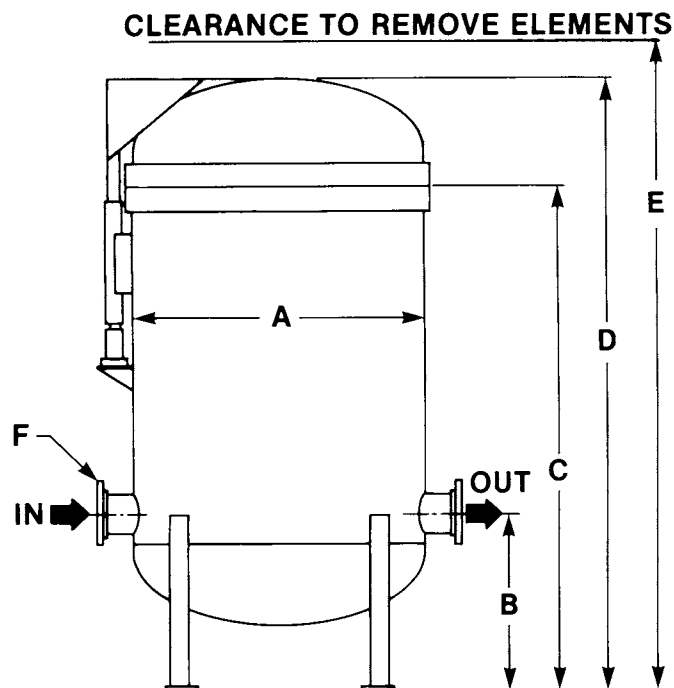
OTHER STANDARD DESIGN FEATURES

- 150 psi ASME Code construction
- RF flanged connections
- Swing bolt closure with Buna-N O-ring cover seal
- Hydraulic jack cover lift
- Inlet baffle to protect elements
- MIL-C-4556 epoxy coated interior, primed exterior.

OPTIONAL ACCESSORIES

Velcon recommends automatic air vent, pressure relief valve, differential pressure gauge, and drain valves (2 per vessel). Also available are work platforms, rate of flow controls, sampling probes and ASME Code Certification.





Obtain Certified Hole Pattern Before
Pouring Slabs

CLAY VESSELS

Vessel Model No.	Flow Rate (Kerosene) USGPM	Cartridges		Dimensions (inches)*											Weight (W/skid) lbs.	Vol. U.S. Gals.
		Model No.	Qty.	A	B	C	D	E	F	G	H	J	K	L		
VC-3636	230	CO-718CE	34	36	25	58	70	82	4	48	23	12 ¹ / ₂	9 ¹ / ₂	43	2125	251
VC-3654	340	CO-718CE	51	36 ⁵ / ₈	25	74 ³ / ₈	91 ¹ / ₄	95	4	48	23	12 ¹ / ₂	9	43	2375	331
VC-4254	465	CO-718CE	72	42	26 ¹ / ₂	77 ¹ / ₂	91	101 ¹ / ₂	6	54	28	13	11	49	3000	468
VC-4854	600	CO-718CE	93	48	28	79 ¹ / ₄	104 ³ / ₈	100	6	60	32	14	10 ¹ / ₂	56	3500	626
VC-5454	800	CO-718CE	120	54	29	80	97	104	6	66	36 ¹ / ₂	14 ³ / ₄	12 ³ / ₄	61	4100	813
VC-6054	1050	CO-718CE	150	61	31	82	104 ⁷ / ₁₆	102	8	72	41	15 ¹ / ₂	11 ⁷ / ₈	68	4750	1028
VC-6654	1200	CO-718CE	183	67	36	87 ¹ / ₈	118 ⁷ / ₈	108	8	78	45 ¹ / ₂	16 ¹ / ₄	12 ⁵ / ₈	75	6500	1275

*Dimensions are shown for estimating purposes. For exact dimensional detail, obtain certified copy of Vessel Drawing.

Note: For tight spaces, clearance to remove clay cartridge is only 2 feet above flange break.



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Section 4

Cartridges



Coalescer Cartridges for Aviation Fuel and Industrial Use

FEATURES

- Cost effective particle and emulsified water removal from hydrocarbon fluids
- Easy installation and replacement with one-piece design
- Choice of Threaded Base or Open End cartridges
- Choice of All-Fiberglass Media or Combination Fiberglass and Pleated Media
- Field proven performance
- Ongoing qualification testing to meet changing commercial and military requirements

GENERAL

Coalescer cartridges are employed as the first stage in filter/separator vessels for hydrocarbon fluids. They perform two functions: (1) coalesce (combine) highly dispersed, emulsified water particles into larger water drops and (2) filter-out particulate contaminants.

HOW COALESCER CARTRIDGES WORK

The top photo shows a highly magnified view of the coalescing process. Tiny droplets of water contact and adhere to strands of fiberglass. Flow pushes the droplets along the strand until they reach an intersection of strands where they combine with other droplets (coalesce) into large drops.

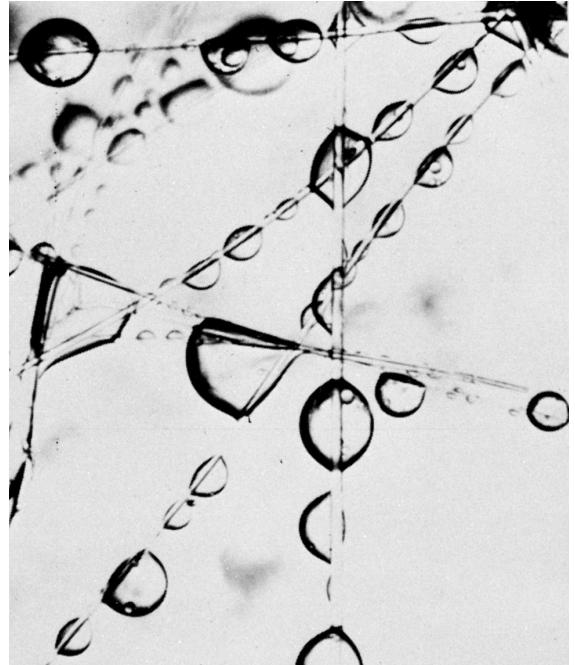
These large drops are then carried to the outside surface of the cartridge. Having a higher specific gravity than the hydrocarbon fluid, they release and settle to the bottom of the vessel. The larger the drops, the faster and more efficiently they fall out. (See bottom photo.) In general, particle removal efficiency increases with coalescing efficiency. This is accomplished by employing a tighter, finer filtration media.

Flow direction is from inside to outside of the cartridge. This minimizes surface velocity and helps prevent the water drops from breaking up and being carried downstream.

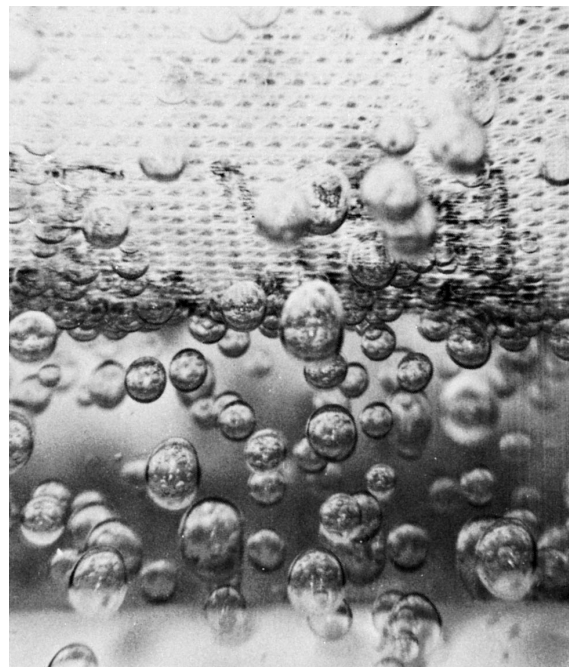
APPLICATIONS

Coalescer cartridges are used primarily to coalesce emulsified water and remove particles from hydrocarbon fluids. The largest single application is the filtration of aviation jet fuel. They are also used with other types of fuels, process streams in refineries and petrochemical plants, and condensate streams where natural gas is produced.

Other liquids can be separated if they are immiscible, the specific gravities differ, and high concentrations of surface active agents are not present. As a rule of thumb, if a sample of the mixture readily separates in an hour or two, a coalescer can probably be used. If the mixture hasn't separated after 24 hours, coalescing probably won't work.



Photomicrograph of coalescing process
inside fiberglass media.



Coalesced water drops releasing
from the knitted sock at the outside surface
of the cartridge.

Coalescer Cartridges

CONSTRUCTION

Velcon single-unit coalescer elements are offered with Threaded Base or Open Ends and with Fiberglass Media or Fiberglass and Pleated Media combinations.

Threaded Base Coalescers are recommended for use in most applications. They simplify installation and replacement by eliminating the need for cover plates, center plates, nuts, washers, and gaskets. They are for use in Velcon and other make filter/separators. Threaded base adapters are available to convert vessels presently using open end elements.

Open End Coalescers are offered with single unit construction which reduces the number of gasket seals and improves overall reliability.

All-fiberglass Media Coalescers combine depth particulate filtration with a deep coalescing structure. All-fiberglass designs have successively finer media layers to achieve depth-type filtration of particles.

Combination Fiberglass and Pleated Media Coalescers remove particles primarily in the high surface area pleated core. They have one or more layers of pleated media inside a cylinder of molded fiberglass laminations to provide an extended surface area for particulate filtration. Pleat corrugation and separation materials are used to keep pleats open for full utilization.

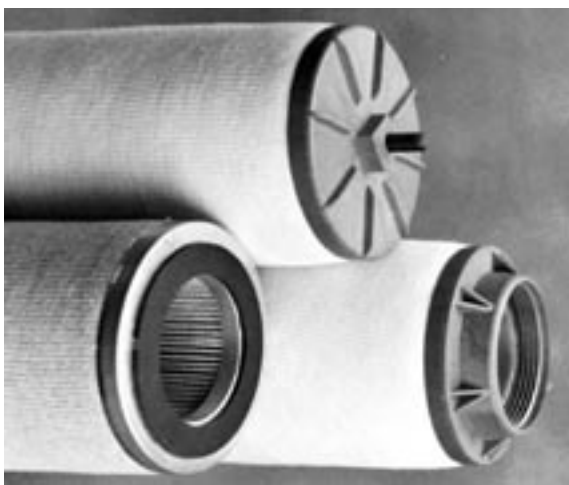
Coalescing and filtration performance depends largely on the fiber diameter and bulk density of the fiberglass media. Both the All-Fiberglass and the Combination coalescer cartridge designs incorporate phenolic resin impregnated fiberglass media. Several grades with fiber diameters ranging from 1 to 10 micrometers are used in various combinations to achieve desired results. Velcon's latest coalescer designs (85, 87 and C5 series cartridges) achieve even higher filtration and coalescing efficiency by incorporating pure micro-glass fibers with diameters of less than 1 micrometer in the pleated media.



All-Fiberglass "6" Series Coalescer



**Fiberglass and Pleated Media
"87" Series Coalescer**



**6" Diameter
Threaded Base
and Open End
Coalescer
End Caps**



6000T Threaded Base Adapter

COALESCER CARTRIDGE SERIES DESCRIPTION

Model Number System. Refer to the box at right. The one or two digit Series Designator relates to the approximate micron rating of each model coalescer cartridge. Note that this is a nominal rating and should be used for reference only.

The “0”, “2”, and “4” Series all-fiberglass cartridges are rated at 25, 5, and 3 microns respectively. The “2” and “4” Series are commonly used with diesel and other fuel oils, and are a compromise between filtration efficiency (cartridge life) and water removing capability. They coalesce gross water, but normally do not remove fine water haze.

The all-fiberglass “6” Series was originally developed for jet fuel service (the original MIL-F-8901 specification). It has a 2-micron rating and met the First Edition API 1581, Group I (non-additive) requirements. It has proven to be the most cost effective design in some jet fuel applications. “6” Series cartridges are also used in gasoline filtration service. However, it should be noted that the powerful detergent additives in most automotive gasolines reduce the coalescing capability of this and other cartridge designs.

“83” Series Cartridges. The 1-micron rated “83” Series is a pleated media/fiberglass cartridge originally designed to meet the requirements of First Edition API 1581, Group II (jet fuel with additives). Over the years the very practical “83” Series cartridges have become the most widely used design in applications including gasoline, condensate, and insulating oil filtration.

“85” and “87” Series Cartridges meet the requirements of the Third Edition. The “85” Series is rated at 0.5-micron while the “87” Series is rated at 0.3 micron. Both incorporate multi-layered pleated media. The “85” Series is used in Class A and Class B (fixed) installations and has consistently shown superior dirt holding capacity in the field. The “87” Series is qualified for both Class B (fixed) and Class C (mobile) applications.

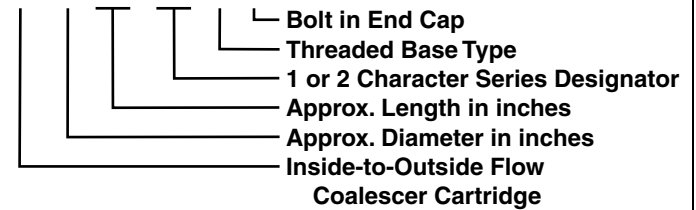
Fifth Edition Cartridges. I-6xxC5 (TB), I-6xxMM, and I-6xxA4 Series of coalescers incorporate a multi-layered pleated media designed to provide superior dirt holding capacity in the field, combined with 0.4 micron efficiency. The I-6xxC5 (TB) will replace both the I-6xx85 (TB) and I-6xx87 (TB) cartridges. These cartridges are available in either threaded base or open-end configuration. See data sheets 1923 and 1934 for more specific information on API/IP 1581 Fifth Edition.

Cartridge Dimensions. 6” diameter cartridges are the current industry standard. They are offered in lengths of 11”, 14”, 22”, 28”, 33”, 38”, 44”, and 56”. However, not all series are available in all lengths or in both end cap designs. Contact your Velcon Distributor for details.

4” diameter cartridges are also offered for use with older equipment. They are available in a variety of lengths ranging from 8 to 40 inches.

Velcon Model Numbers include significant product information. **Example:**

I - 6 2 8 C 5 T B



Note that **I-628C5** would designate the open end version of this cartridge.



GENERAL SPECIFICATIONS

- 75 psi maximum pressure differential rating
- 5 to 9 pH range
- 150°–160°F maximum operating temperature
- Aluminum center tube
- Buna-N gaskets
- Injection molded end caps are standard on 6” diameter threaded base coalescers;
- Aluminum end caps are standard on 6” diameter open end cartridges
- All 6” diameter cartridge end caps are bonded directly to the media with high strength epoxy
- 4” diameter cartridge end caps are molded polyester resin or injection molded

Coalescer Cartridge and Filter/Separator Vessel Selection Guidelines

Aviation Fuel Filtration in commercial applications is governed by the complex, stringent requirements of API/IP Publication 1581, Fifth Edition. Refer to the appropriate Velcon literature or contact your Velcon Representative for assistance. For non-aviation applications the following guidelines have proven to be useful. Note, however, that these guidelines are general in nature and should be used for guidance only.

1 Determine total length (inches) of 6" diameter cartridge required:

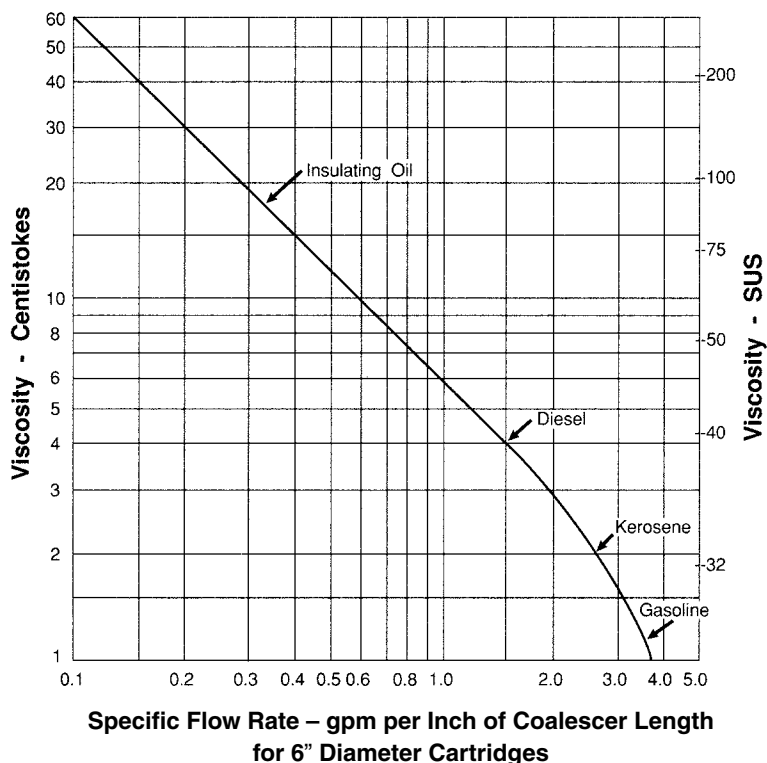
- Find the approximate viscosity of your hydrocarbon fluid on the Chart Y-axis.
- Find the corresponding Specific Flow Rate (gpm/inch) on the X-axis.
- Divide Total Flow Rate (gpm) of your application by this Specific Flow Rate to calculate total inches of coalescer required.

2 Select cartridge model and calculate quantity required:

- Choose model (type and length) cartridge to use. **83 Series Coalescers** are recommended for most applications. Other types and sizes are offered for special applications.
- Calculate minimum number of cartridges required by dividing total inches (from Step 1) by length of cartridge selected.

3 Select the Filter/Separator Vessel for your application:

- Refer to the Velcon literature for **HV** (horizontal) or **VV** (vertical) Filter/Separators.
- Find the appropriate vessel for the model and quantity Coalescer Cartridge selected in Step 2.



NOTES

- These guidelines assume a specific gravity of 0.92 or less, and an influent water concentration of 3% or less. In general, if the Interfacial Tension (IFT) of the hydrocarbon over water is 36 dynes per centimeter or greater, effluent water levels of 15 ppm or less can be achieved.
- Surfactants will significantly lower IFT with a corresponding decrease in coalescing performance. Surfactants can occur naturally (diesel fuel) or they can be intentionally added as corrosion inhibitors (pipelines, lube and hydraulic oils) and detergent dispersants (automotive gasoline).
- As previously discussed, diesel and fuel oils are a special category. **2 or 4 Series Coalescer Cartridges** are commonly used. Pleated paper separator cartridges are typically specified since diesel often contains materials that adhere to TCS separators and cannot be cleaned off – nullifying their cost effectiveness. Refer to Velcon **V Series Filter/Separator Vessels** literature.
- Oversizing filtration equipment improves performance and extends cartridge life.
- Strong bases (high pH fluids) attack glass microfibers and break down the coalescing media. Caustic washing or applications with high concentrations of MEA or DEA should be avoided.
- Initial differential pressure (with clean coalescer cartridges) will be less than 5 psi. Cartridges should be changed when the differential pressure reaches 15 psi or after one year – whichever occurs first.



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Separator Cartridges

Filter/Separator 2nd Stage Elements

Features

- Optimum 2nd stage water removal
- Choice of Teflon® Coated Screen, Synthetic or Pleated Paper Media
- Field proven performance
- Largest selection of replacement elements

General

Separator Cartridges are employed as the second stage in filter/separator vessels. Their sole function is to repel coalesced water drops produced by the first stage cartridges while allowing hydrocarbon fluids to pass through. Water drops settle into the filter/separator sump and are not carried downstream. All particle filtering is done by the first stage coalescer cartridge.

How Separator Cartridges Work

Flow direction is from outside-to-inside. The top photo insert shows water being repelled by the hydrophobic separator medium on the cartridge's outside surface. Hydrocarbon fluids, on the other hand, easily pass through and exit the separator cartridge. Cartridges with three different types of repelling media are offered:

TCS Teflon Coated Screen Cartridges are, by far, the most popular type of separator cartridge. With proper cleaning and inspection (see Velcon Form #1242), cost effective TCS elements can be **reused** over many coalescer cartridge changeout cycles. And, TCS cartridges generate considerably less static charge than pleated paper cartridges. These features have made them the preferred choice for aircraft fueling applications.

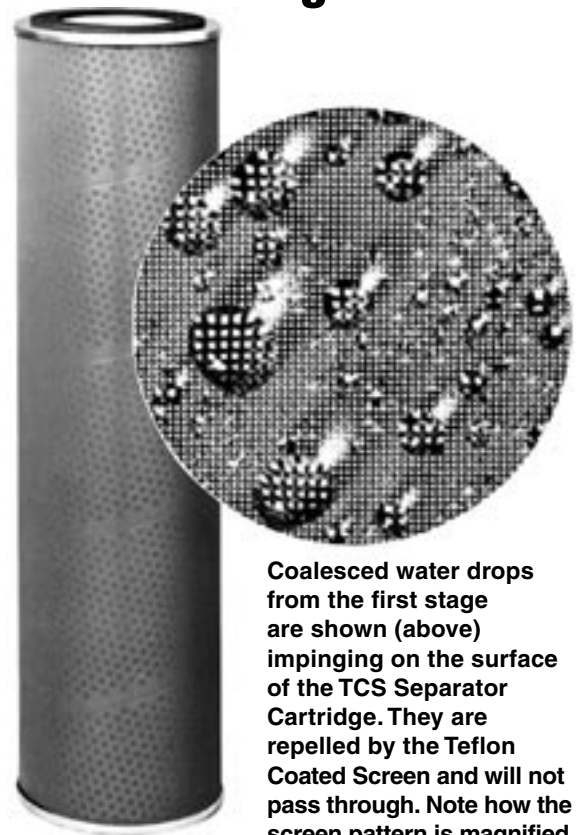
Pleated Paper Cartridges cannot be reused and are replaced at every coalescer cartridge changeout. They are often used with diesel and other fuel oils which may contain materials that adhere to TCS cartridges and cannot be cleaned off.

Synthetic Media Cartridges can be cleaned a maximum of two times. They are lower in price than TCS cartridges and are intended for customers who do not want to take the time to clean separators (see Form #1806).

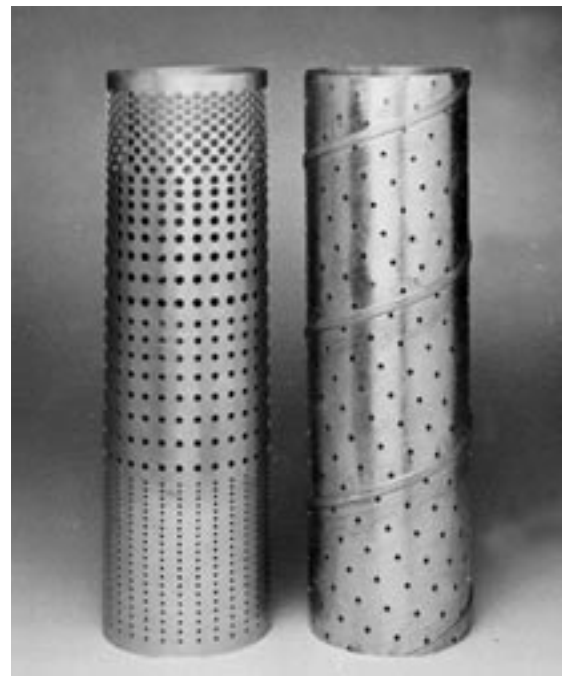
Separator Cartridge Performance

Maintaining a uniform flow along the length of the cartridge optimizes performance and reduces the number of cartridges required. Flow is controlled by a tube, inside each cartridge, through which the hydrocarbon fluid exits the cartridge and the filter/separator vessel. Two styles of inner tube are offered. See bottom photo.

Cartridges with uniform hole pattern inner tubes are adequate for many applications. However, where optimum flow distribution is required, cartridges with variable hole pattern inner tubes are recommended. When converting older equipment, a lesser number of variable hole pattern cartridges is usually required. Operating costs will be reduced.



Coalesced water drops from the first stage are shown (above) impinging on the surface of the TCS Separator Cartridge. They are repelled by the Teflon Coated Screen and will not pass through. Note how the screen pattern is magnified by the drops.



Variable Hole Pattern
Inner Tube

Uniform Hole Pattern
Inner Tube

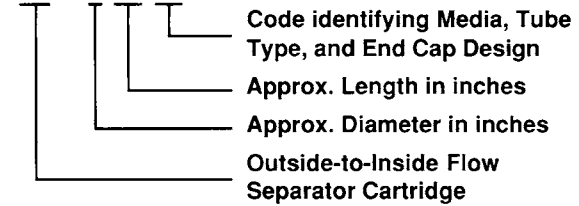
®Teflon is a registered trademark of E.I. du Pont de Nemours & Co., Inc.

Separator Cartridges

Model number system. Refer to box at right and table below. Note that "C" in the code always means a Uniform hole pattern inner tube with TCS media, and "V" means Variable hole pattern with TCS media. Blind caps have a hole for the tie rod.

Velcon Model Numbers include significant product information. **Example:**

S O - 6 3 6 P V



Cartridge Code Identification Table

Model Number	Flow Control Hole Pattern	OD	Mounting End ID	Opposite End ID	Media
SO-3xxC	Uniform	3 ¹ / ₁₆ "	1 ¹⁵ / ₁₆ "	Blind	TCS
SO-3xxV	Variable	3 ¹ / ₁₆ "	1 ¹⁵ / ₁₆ "	Blind	TCS
SO-4xxC	Uniform	4 ⁹ / ₁₆ "	3 ¹ / ₂ "	Blind	TCS
SO-4xxV	Variable	4 ⁹ / ₁₆ "	3 ¹ / ₂ "	Blind	TCS
SO-6xxC	Uniform	6"	3 ¹ / ₂ "	3 ¹ / ₂ "	TCS
SO-6xxCM	Uniform	6"	4 ¹ / ₂ "	Blind	TCS
SO-6xxVA (5)	Variable	6"	3 ¹ / ₂ "	Blind	TCS
SO-6xxV (5)	Variable	6"	4 ¹ / ₂ "	Blind	TCS
SO-6xxPV (5)	Variable	6"	4 ¹ / ₈ "	Blind	TCS
SO-6xxPLF3 ⁽ⁿ⁾	Uniform	6"	3 ¹ / ₂ "	3 ¹ / ₂ "	Pleated Paper
SO-6xxPLBZ ⁽ⁿ⁾	Uniform	6"	3 ¹ / ₂ "	Blind	Pleated Paper
SO-6xxCSN*	Uniform	6"	3 ¹ / ₂ "	3 ¹ / ₂ "	Synthetic
SO-6xxCMSN*	Uniform	6"	4 ¹ / ₂ "	Blind	Synthetic
SO-6xxCPSN*	Uniform	6"	4 ¹ / ₈ "	Blind	Synthetic

1. Please note: The shelf life for pleated paper separators (for example, SO-XXXPLF3 and SO-6XXPLBZ) is one year.

* U.S. Patent No. 6,068,723 and 6,415,930

General Specifications

- TCS medium is 200 mesh stainless steel screen coated on both sides with green Teflon. The screen is lockseam folded and fastened with an internal aluminum clip.
- End caps and tubes are aluminum.
- Gaskets are Buna-N.
- Pleated medium is silicone treated resin impregnated paper with a protective outer aluminum screen jacket.
- pH range is 5 to 9.
- Maximum operating temperature is 200°F.



Table Notes

SO Series Cartridge listed in Code Identification Table at left are the most commonly used types. A variety of other styles are available for special applications. Contact your Velcon distributor for details.

SO-6xxPLF3 Pleated Separators come in lengths of 11.25, 14.5, 16.25, 29.0, and 33.12 inches. Frequently, they are installed in stacks of two or three cartridges. SO-6xxC cartridges are available in these same stackable lengths plus longer lengths. However, single-unit designs are recommended for installation ease and lower cost. Other styles listed in Table are not intended to be stacked.

Velcon variable size hole pattern cartridges should not be replaced with uniform hole pattern cartridges unless appropriate full-scale test data can be supplied showing equivalent performance.

For more information about API/IP 1581 5th Ed qualified separators, please see data sheet 1923.

SO-6xxCSN/CMSN/CPSN separators are intended for customers who want a lower cost separator for disposal rather than clean and re-use (can be cleaned a maximum of two times).

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Coalescer/Separator Cartridges

for Aviation Fuel

Qualified to API/IP 1581 5th Edition

**The following products
have been fully qualified
to the specification:
API/IP 1581 5th Edition.**

COALESCERS

The **I-6xxC5 (TB)**, **I-6xxMM**, and **I-6xxA4 Series** of coalescers incorporate a multi-layered pleated media designed to provide superior dirt holding capacity in the field, combined with 0.4 micron efficiency. The **I-6xxC5 (TB)** will replace both Velcon's **I-6xx85 (TB)** and **I-6xx87 (TB)** cartridges. These cartridges are available in either threaded base or open-end configuration. For more information concerning dimensions and general specifications please refer to our data sheet #1732.

SEPARATORS

The **SO-6xxV5**, **SO-6xxPV5**, and **SO-6xxVA5** are Teflon[®] coated screen cartridges. To achieve optimum flow distribution these cartridges incorporate a variable hole pattern inner tube combined with a uniform hole pattern outer tube specifically designed for installation in vertical filter/separators. For horizontal vessels our previously qualified Teflon Separator Cartridges **SO-6xxV**, **SO-6xxC**, and **SO-6xxVA** would be used. Please refer to our data sheet #1521 for overall dimensions and general specifications.



I-614C5TB



**Teflon Coated
Separators**



**Close-up of water being
repelled by separator**

Velcon Filters, Inc. has tested and qualified a comprehensive range of products to meet the latest API/IP-1581 5th Edition Specification. The new categories for the new specification are:

CATEGORY C

This category replaces the previous class A, B, & C of API/IP-1581 Third Edition. Velcon's new coalescer cartridges that meet Category C requirements are our **I-6xxC5 Series** (the xx denotes nominal cartridge length). These new cartridges have been developed to provide better water removal performance of surfactant-laden fuels, and improved filtration efficiency combined with longer life. Category 'C' cartridges can be used at any point in the fuel distribution system – from refineries to into-plane fueling.

Velcon's Teflon Separator Cartridges for Category C are **SO-6xxV5**, **SO-6xxPV5**, and **SO-6xxVA5**.

CATEGORY M

This is a brand new specification for military fuels, like JP8 (similar to Jet A but containing anti-icing and other additives). Velcon's coalescer products for this series are our **I-6xxMM** cartridges. The separators for this category are currently our **SO-6xxC**.

CATEGORY M100

This specification is for military fuels like JP8, but it also includes a surfactant additive called +100. The '+100' allows fuels to run at higher operating temperatures and reduces maintenance for high performance military jet engines. Velcon's coalescer cartridges for the M100 Category are our **I-6xxA4 Series**. The Teflon Separators for M100 are currently our **SO-6xxCM** and **SO-6xxGS** (three-stage).



New to the 5th Edition is a specification that allows operators to incorporate a third stage water absorbing cartridge with each category. Velcon has currently qualified our CDF®-2xxK Series monitor cartridges for Category M100.

Also new is the description of filter/separators as "Type S" & "Type S-LD." (S= Significant levels of water & dirt, LD for low dirt.) All of Velcon's qualified products are Type S, which also qualifies them to Type S-LD, as specified in API/IP 1581 5th Edition Paragraph 2.4.2. See also Paragraphs 2.3.1 - 2.3.3.



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Coalescer I-4xxMM Family

Fully Qualified to API/IP 1581 5th Edition, Category M

DESCRIPTION

The **I-4xxMM** filter/coalescer cartridge has an internal multi-layer pleat block with a large surface area for greater dirt holding capacity. A fine fiber micro-glass shell provides optimum water removal characteristics. The advanced composition of our “MM” series media allows most vessel configurations to meet API/ IP-1581 5th Edition, Category M, performance requirements.



Top - Blind cap



Bottom - Mounting end
with o-ring seal

APPLICATION

These cartridges are designed to fit in DOD military vessels such as those originally made to the MIL-F-27629 and 27630 specifications.

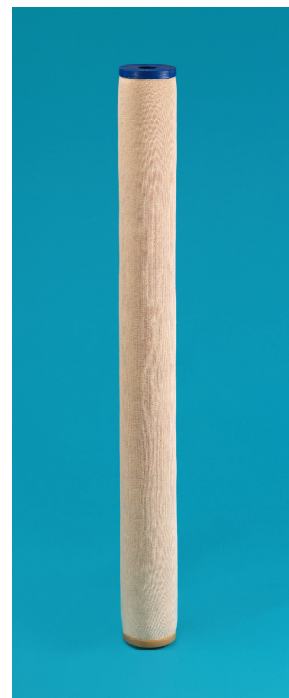
I-440MM filter/coalescer (NSN 4330-01-511-8268) has been specifically designed to replace a stack of two standard DOD filter/coalescers (NSN 4330-00-983-0998). The I-440MM is a **direct** replacement for the previous 3rd Edition model, I-44087 (NSN 4330-01-407-3548).



GTP-5935-M
Alignment Pin

An objective of the 40" cartridge is to eliminate three potential leakage points (there are two o-rings at each end of a 20" cartridge). The I-440MM has a top blind end and only one o-ring at the lower end. Use one Gammon GTP-5935-M alignment pin in the top blind cap to provide a locator for spider plate alignment.

I-440MM has an o-ring at each end to accommodate a few existing filter/separator vessels that use tie rods instead of spider plates to hold the cartridges. I-420MM (NSN 4330-01-511-8209), the 20-inch coalescer, also has an o-ring at each end and is a direct replacement for the 20-inch DOD cartridge. No alignment pin is required for either of these models.



I-440MM*

* I-440MM: Alternative version with O-Ring seals on **both** ends

SPECIFICATIONS

	I-440MM	I-420MM
NSN #	4330-01-511-8268	4330-01-511-8209
OAL	39.875"	20"
OD	3.625"	3.625"
Endcaps	Injection molded glass filled nylon	
Seal: Internal O-ring (AS 568A-123)	Mounting end	Both ends
Blind cap	Opposite end*	N/A
Changeout Differential Pressure	15 psid	15 psid
Maximum Pressure Rating	75 psid	75 psid
Maximum Rated Flow	40 USGPM (jet fuel)	20 USGPM (jet fuel)
Maximum Operating Temperature	225°F	225°F
Micron Rating (Nominal)	0.4	0.4

*I-440AMM has O-rings on both ends.



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Separator SI-xxx Series

Fully Qualified to API/IP 1581 5th Edition, Category M

DESCRIPTION

The SI-xxx Series Separator Shroud is composed of an inner Teflon®-coated 200 mesh screen. The open endcap on the five inch canister has a locking bayonet with wavy spring. The blind end has a nozzle for a DOD coalescer o-ring endcap. These separators are qualified to Category M (Military) of the API/IP 1581 5th Edition Specification.

APPLICATION

The SI-xxx Series Separator Shrouds are made to fit over first stage coalescers in DOD military vessels such as those originally made to the MIL-F-27629 and 27630 specifications.

The inner Teflon coating repels water droplets as they exit the coalescers, adding another layer of protection to the fueling system. The water droplets in the annular gap between the outside diameter of the coalescer and the inside diameter of the separator shroud fall to the sump area at the bottom of the filter vessel.

SPECIFICATIONS

Velcon Model #	NSN #	OAL	OD	ID	Micron Rating
SI-422A	4330-01-152-2376	21.56	4.46	4	140
SI-522	4330-01-511-8316	22.44	5.23	4	140
SI-542	4330-01-511-8274	42.5	5.23	4	140



Open endcap with bayonet



SI-542 Separator



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High Efficiency, Long Life Cartridges for Industrial Fluids



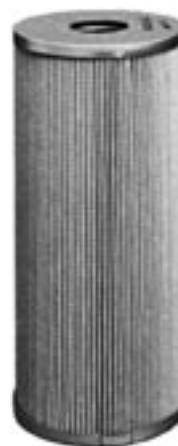
FO-424PL5



FO-718PL



FO-614PLF



FO-512PL05



FO-656PLF1/2

- **Large Surface Area** – Allows high flow rate with low initial pressure drop and maximum contaminant holding capacity.
- **Resin Impregnated Media** – Maintains strength, resists effects of water and heat.
- **75 psi Collapse Strength** – Heavy gauge carbon steel endcaps and center tube give safety margin against pressure surges.
- **Coated Steel Components** – Resist corrosion from most industrial fluids.
- **Corrugated Media** – Prevents pleat pinch-off, assuring all filtration media is utilized.
- **Buna-N Gaskets** – The best general gasket material available assures positive seal in most fluids.
- **Thermoset Bonding Material** – Durable endcap-to-media bond prevents internal bypassing.
- **98%+ Filtration Efficiency** – Micron Ratings from 1/2 to 75 available.
- **Threaded base filter elements** – Available for easier installation.

APPLICATIONS

Velcon Pleated Media Cartridges are suitable for a broad range of polar and non-polar fluids. Recommendations where the contaminant is granular (non-colloidal), allowing maximum utilization of the high surface area.

Suitable for:

All Hydrocarbon Fuels
Water Emulsion Coolants
Insulating Oils

Cutting Oils
Naphtha
Toluol

Glycols
Lube Oils
Synthetic Oils

Degreasing Fluids
Ethyl Alcohol
Hydraulic Oils

SPECIFICATIONS

75 psi Collapse strength
98%+ Nominal filtration efficiency
5 - 9 Operating pH range
250°F Maximum operating temperature

Recommended changeout differential pressure - 25 psid
Micron ratings from 1/2 to 75
For information about Flow Ratings with various viscosity fluids,
refer to Form #1532
Multi-pass (Beta Ratio) data available on request

CARTRIDGE INFORMATION

The following table lists a few of the broad range of available Velcon cartridges and some of their common interchanges. Your local Velcon Representative can provide more complete information.

Dimensions	Model	Nominal Micron Rating	Perforated Outer Wrap	Replaces Facet/Fram Quantek	Replaces Bowser/Keene Kaydon
6" x 14 1/2" x 3 1/2" ID	FO-614PLF1/2	1/2	No	C-614-0.5PL	BP-614-3
	FO-614PLF1	1	No	C-701-1	
	FO-614PLF1M	1	Yes	MP1L	
	FO-614PLF2	2	No	C-701, C-763-1, MP2L	
	FO-614PLF5	5	No	CH-57PL, MP5L	BP-614-1
	FO-614PLF5M	5	Yes	CH-57PLO	
	FO-614PLF10	10	No	C-729, MP102	BP-614-W
	FO-614PLF15	15	No	C-744-15, MP15L	
	FO-614PLF15M	15	Yes	C-744-15-0	BP-614-5
	FO-614PLF25	25	No	C-702, C-708, MP25L	BP-614
	FO-614PLF75	75	No	C-736	
6" x 29" x 3 1/2" ID	FO-629PLF1/2	1/2	No	MP0.5LX2	
	FO-629PLF1	1	No	CF-629-1PL, MP1LX2	
	FO-629PLF2	2	No	MP2LX2	
	FO-629PLF2TB	2	No	Threaded Base	
	FO-629PLF5	5	No	CH-57PL-2, CF-629-5PL, MP5LX2	
	FO-629PLF5TB	5	No	Threaded Base	
	FO-629PLF10	10	No	MP10LX2	
6" x 44" x 3 1/2" ID	FO-644PLF1/2	1/2	Yes	CF-644-0.5PLO, MP0.5LX3	
	FO-644PLF1/2TB	1/2	Yes	Threaded Base	
	FO-644PLF1M	1	Yes	CF-644-1PLO	
	FO-644PLF1TB	1	Yes	Threaded Base	
	FO-644PLF2M	2	Yes	CF-644-2PLO, C-763-3-O, C-702	
	FO-644PLF2TB	2	Yes	Threaded Base	
	FO-644PLF5M	5	Yes	CF-644-5PLO, C-744-3	
	FO-644PLF5TB	5	Yes	Threaded Base	
	FO-644PLF10M	10	Yes		
	FO-644PLF25M	25	Yes	CF-644-25PLO, C-702-3	
6" x 56" x 3 1/2" ID	FO-656PLP3TB	0.3	Yes	Threaded Base	
	FO-656PLF1/2	1/2	Yes		
	FO-656PLF1/2TB	1/2	Yes	Threaded Base	
	FO-656PLF1M	1	Yes		
	FO-656PLF1TB	1	Yes	Threaded Base	
	FO-656PLF2M	2	Yes		
	FO-656PLF2TB	2	Yes	Threaded Base	
	FO-656PLF5TB	5	Yes	Threaded Base	
6 1/4" x 18" x 2 9/16" ID	FO-718PLP3	0.3	No		BP-718-3
	FO-718PL1/2	1/2	No		
	FO-718PL01	1	Yes		
	FO-718PL02	2	Yes		
	FO-718PL05	5	Yes		
	FO-718PL15	15	Yes		
	FO-718PL50	50	Yes		
6 1/4" x 36" x 2 9/16" ID	FO-736PL1/2	1/2	Yes		
	FO-736PL15	15	Yes		
For VF-61 Housing	FO-512PL1/2	1/2	No		
	FO-512PL05	5	No		
4" x 12 1/4" x 1 3/4" ID	FO-412PL2	2	No	C-707	BP-412
	FO-412PL5	5	No		
4" x 18" x 1 3/4" ID	FO-418PL5	5	No	C-706	BP-518-1
4" x 24 1/8" x 1 3/4" ID	FO-424PL1	1	No	C-704	
	FO-424PL5	5	No		
	FO-424PL25	25	No		



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FI Series

Inside-to-Out Flow Filter Cartridges

Specialized Filters for Use in Filter/Separator Vessels

The FI Series of Inside-to-Out flow filter cartridges are specially designed to replace the coalescer elements in filter-separator vessels. The FI filter cartridges are excellent choices to reduce filtration costs when flushing new systems, or when a filter/separator vessel is used to remove particulate matter only and not water. (Many surplus F/S vessels in the field have been used as pre-filter/micronic vessels.)

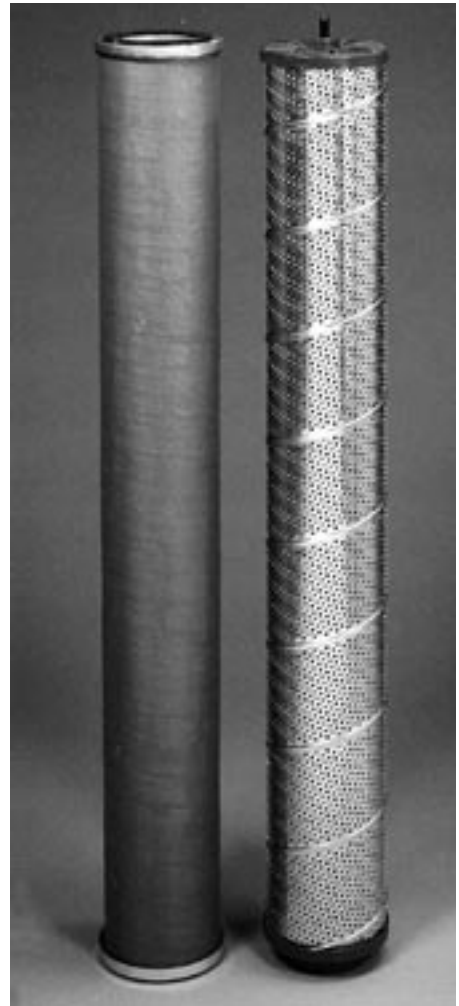
The FG suffix, all fiberglass filter elements (e.g., FI-644FG5), are intended for colloidal or slimy type matter; whereas the PL suffix, pleated paper filter elements (e.g., FI-644PLF5), are intended for normal particulate matter.

- **98% filtration efficiency** with micron ratings from $\frac{1}{2}$ and higher
- **Thermoset Adhesive Material** – Durable endcap-to-media bond prevents internal bypassing
- **Buna-N Gaskets** – The best general gasket material available, assures positive seals
- **Coated Steel Components** – Resist corrosion from most industrial fluids
- **75 psi Burst Strength** – Heavy gauge carbon steel endcaps and outer reinforcing give safety margin against pressure surges

APPLICATIONS

All Hydrocarbon Fuels
Water Emulsion Coolants
Insulating Oils
Cutting Oils
Naphtha
Lube Oils

Glycols
Toluol
Synthetic Oils
Degreasing Fluids
Ethyl Alcohol
Hydraulic Oils



CARTRIDGE INFORMATION

The following table lists the sizes and features of the available FI Series cartridges. More will be added. Your local Velcon Representative can provide more complete information.

Model	Dimensions	Nominal Micron Rating	Type of Filter Material	Features
FI-431FG10T	3.75" OD x 31.63" OAL	10	Fiberglass	Threaded Base
FI-431FG5T	3.75" OD x 31.63" OAL	5	Fiberglass	Threaded Base
FI-633FG10TB	6.0" x 33.0" OAL	10	Fiberglass	Threaded Base
FI-638FG10TB	6.0" x 38.0" OAL	10	Fiberglass	Threaded Base
FI-638PL5TB	6.0" x 38.0" OAL	5	Pleated Paper	Threaded Base
FI-644FG10	6.0" x 3.5" ID x 44.0" OAL	10	Fiberglass	Open Ends
FI-644FG10TB	6.0" x 44.0" OAL	10	Fiberglass	Threaded Base
FI-644FG5	6.0" x 3.5" ID x 44.0" OAL	5	Fiberglass	Open Ends
FI-644PL1/2TB	6.0" x 44.0" OAL	0.5	Pleated Paper	Threaded Base
FI-644PLF5	6.0" x 3.5" ID x 44.0" OAL	5	Pleated Paper	Open Ends
FI-644PL25TB	6.0" x 3.5" ID x 44.0" OAL	25	Pleated Paper	Threaded Base
FI-656PLF1	6.0" x 3.5" ID x 57.0" OAL	1	Pleated Paper	Open Ends
FI-656PL1/2TB	6.0" x 56.0" OAL	0.5	Pleated Paper	Threaded Base
FI-656PLF1TB	6.0" x 56.0" OAL	1	Pleated Paper	Threaded Base
FI-656PLF2	6.0" x 3.5" ID x 57.0" OAL	2	Pleated Paper	Open Ends
FI-656PLF2TB	6.0" x 56.0" OAL	2	Pleated Paper	Threaded Base

SPECIFICATIONS

75 psi Burst Strength

98% Nominal Filtration Efficiency

5 - 9 Operating pH range

160°F Maximum operating temperature

Micron Ratings from 0.5

Inside-to-Out Flow

Change out at 15 psid



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Disposable Cartridges

DC Series

High Efficiency, Long Life Cartridges for Fuels, Fluids and Oils

BENEFITS

- Disposable, Crushable and Incinerable – Reduces your costs associated with shipping and containers when using *FILCare* Filter Cartridge Recycling Service.
- Provides a convenient, cost-efficient method to recycle.
- Lightweight, easy handling during installation and change-outs.
- No More Land Fill – Velcon Disposable Cartridges offer a convenient, legal, cost-effective and environmentally responsible method for disposing of your used filter cartridges.

CLOSE THE LOOP WITH *FILCare* (United States Filter Cartridge Recycling)

***FILCare* SERVICE**

FILCare Service provides you with a convenient, legal, cost effective and environmentally responsible method for disposing of your used jet and diesel or oil filter cartridges. *FILCare* Service supplies you with everything required to ship your used cartridges for disposal. Complete recycling packages include step-by-step instructions for draining, boxing, labeling and packing the cartridges for transport.

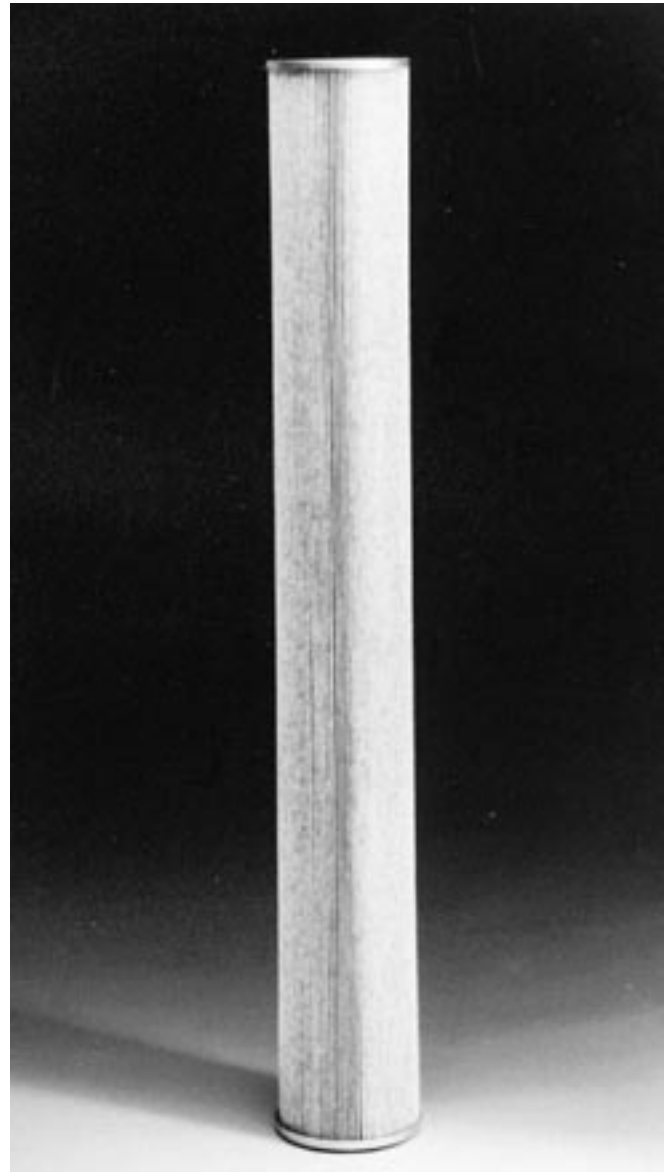
COMPLIANCE

When packaged and shipped according to *FILCare* instructions, used filters can be transported as non-hazardous material in compliance with Title 22 of the Environmental Health and Safety Code for the "Management of Drained Used Oil Filters." Upon receipt of the used cartridges by *FILCare*, the customer will receive a certificate of recycling. This certificate and the bill of lading will serve as proof of compliance with local, state and federal environmental regulations.

LOWER COSTS

FILCare's cartridge disposal/recycling service lowers your operating costs. Savings are realized by reducing the volume of material you send to hazardous waste disposal facilities and by minimizing the time you spend on regulatory compliance record keeping, reporting and tracking.

Contact your Authorized Velcon Distributor for a discussion of how closing the loop with *FILCare* can be of service to you.



FEATURES

- Large Surface Area – allows high flow rate with low initial pressure drop and maximum contaminant holding capacity
- Resin Impregnated Media – maintains strength, resists effects of water and heat
- Aluminum Components – resists corrosion from most fluids
- Corrugated Media – prevents pleat pinch-off, assuring all filtration media is utilized
- Buna-N Gaskets – the best general gasket material available assures positive seal in most fluids
- Thermoset Adhesive Bonding Material – durable endcap-to-media bond prevents internal bypassing
- 98% Filtration Efficiency with Micron Ratings 1 - 5

APPLICATIONS

Velcon pleated paper media cartridges are suitable for a broad range of polar and non-polar fluids. Recommended for applications where the contaminant is granular (non-colloidal), allowing maximum utilization of the high surface area.

Suitable for:

All hydro-carbon fuels

Cutting oils

Glycols

Degreasing fluids

Insulating oils

Water emulsion coolants

Toluol

Lube oils

Synthetic oils

Ethyl alcohol

Hydraulic oils

Naptha

CARTRIDGES

All cartridges are 6" outside diameter and are offered in four lengths: 14", 29", 44" and 58".

SPECIFICATIONS

- Micron Ratings from 1 - 5
- 98% + Nominal Filtration Efficiency
- 5 - 9 Operating pH range
- 200° F Maximum Operating Temp

Interchangeable with Facet – to use the Velcon Disposable Cartridges, DC-Series, you must first have an Installation Kit installed.

FILTER CROSS-REFERENCE TABLE

Velcon P/N	Facet P/N	Length	Micron Rating
DC-614PLF1	CIF 1	14	1
DC-629PLF1	CIF 1 x 2	29	1
DC-644PLF1	CIF 1 x 3	44	1
DC-658PLF1	CIF 1 x 4	58	1
DC-614PLF5	CIF 5	14	5
DC-629PLF5	CIF 5 x 2	29	5
DC-644PLF5	CIF 5 x 3	44	5
DC-658PLF5	CIF 5 x 4	58	5

CONVERSIONS

Refer to Velcon data sheet #1862 for information on the Permanent Filter Core Kits for easy conversion of filter vessels to the DC series disposable elements.



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Permanent Filter Core Kits

**CK-1479, CK-1480
CK-1481, CK-1482**

Velcon's new permanent filter core kits mount easily into filter vessels to provide support for DC series disposable elements. The core is a simple one-piece design that can be installed directly into the vessel, unlike the complicated multi-piece plastic designs. Velcon's permanent cores have high quality, all aluminum construction and achieve 175 psi collapse strength. The one-piece design and smooth outer surface allow for easy installation and removal of the DC series elements. Kits are available in 14", 29", 44" and 58" lengths.

Each kit includes the tube assembly, nuts and washers. Filters and additional hardware should be ordered separately.

Refer to data sheet 1842 for detailed information on the DC Series disposable cartridges.

NOTE: The Velcon Permanent Support Tube Kits are designed for use only with standard 3½" filter mounting adapters and appropriate length tie rods. The kit will not work with threaded base adapters.

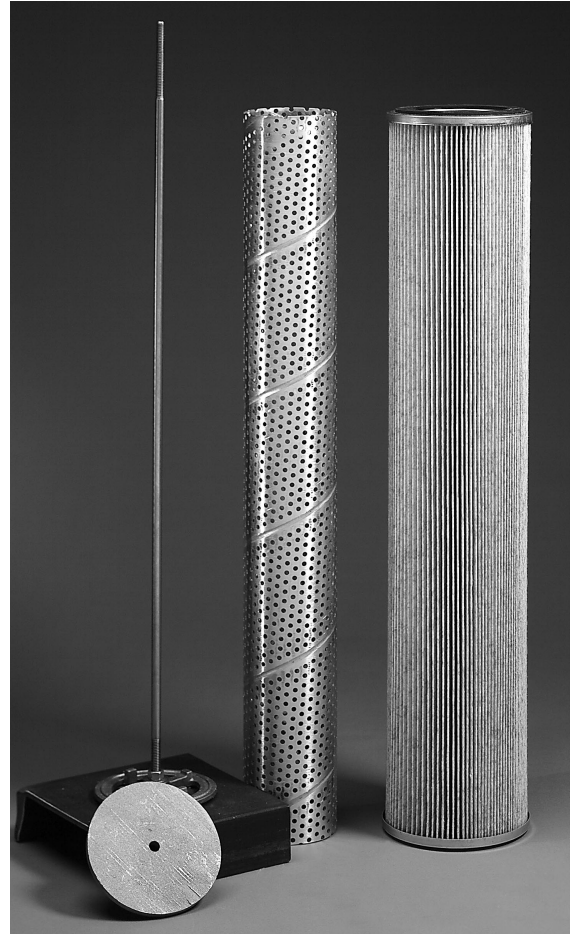
The Velcon Permanent Support Tube Kits are designed for use with either the Velcon "DC" disposable cartridges or Facet CIF Series cartridges of appropriate length.

The Velcon Permanent Support Tube Kits are designed to replace the Facet CIF Series Center Tube Kits.

Velcon Kit	replaces Facet Kit
CK-1479	CIF1KIT (14" KIT)
CK-1480	CIF2KIT (29" KIT)
CK-1481	CIF3KIT (44" KIT)
CK-1482	CIF4KIT (58" KIT)

INSTALLATION INSTRUCTIONS

1. Remove existing elements and/or previously installed support tubes.
2. If required, install 3½" adapters and appropriate length tie rods. Consult Velcon technical support for tie rod information if needed.
3. Adjust tie rod length from deck plate as shown below:
CK-1479 = 16" (top of tie rod to deck plate)
CK-1480 = 31" (top of tie rod to deck plate)
CK-1481 = 46" (top of tie rod to deck plate)
CK-1482 = 60" (top of tie rod to deck plate)



CK-1480 with DC Series cartridge and cover plate

4. Install the tube assembly on to the tie rod with the closed end (disk) facing the lid of the vessel. Make sure that there is a minimum of 2½" of threaded tie rod above the surface of the disk.
5. Center the base of the tube assembly on the 3½" adapter so that the sealing knife-edge of the adapter is visible completely around the tube. Install the correct hardware (¾" or ½") on the tie rod and tighten to 10 ft-lbs. to affix the tube assembly in the vessel.

CAUTION

Use care in handling the tube assembly! If the tube is bent or dented, the elements will be difficult or impossible to install.



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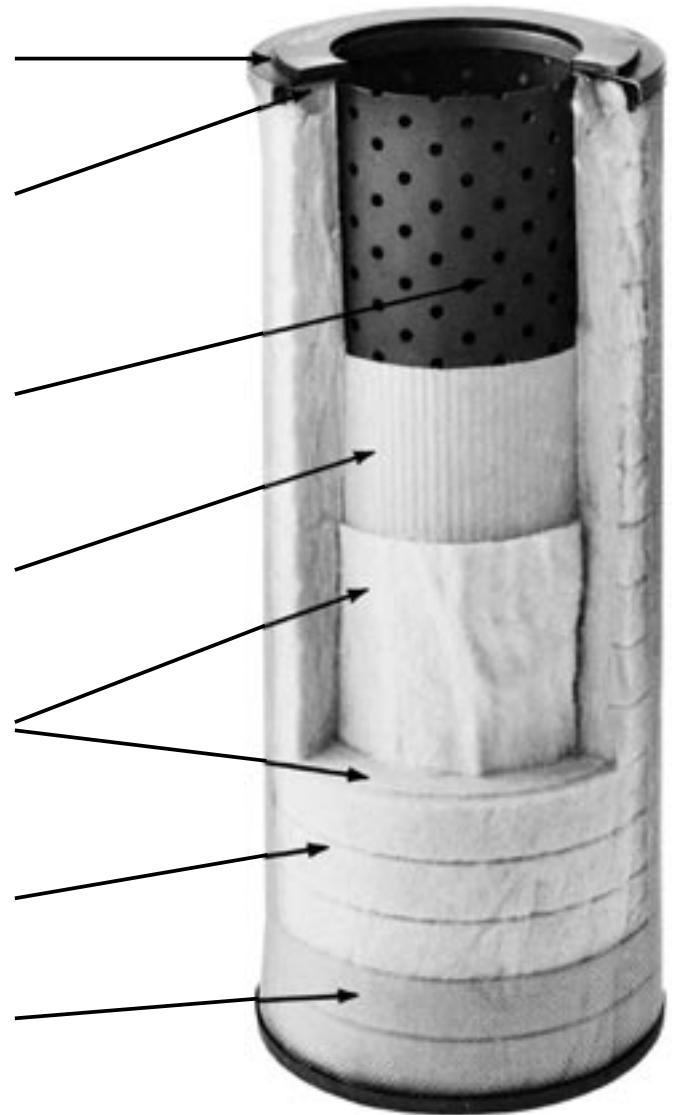
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Fiberglass Filter Cartridges

High Efficiency, Long Life Cartridges for Oils and Fuels

- Buna-N gaskets bonded to endcaps form a positive, durable seal.
- Specially formulated thermoset resin bonds endcaps to centertube and media, preventing fluid bypass.
- Aluminized heavy-gauge steel centertube and endcaps resist corrosion and insure 100 psi collapse strength.
- Migration barrier guarantees that no fibers will pass downstream.
- Resin-impregnated fiberglass media, arranged in progressively finer layers, provides superior depth filtration with no channeling.
- Surface grooves increase dirt holding capacity.
- Screen outerwrap prevents handling damage.



FO-614FG Cutaway

Velcon Fiberglass Depth Cartridges have proven superior in filtering colloidal or slimy contaminants. Lube oil and EDM coolant filtration are this type of application where fiberglass elements consistently filter better with dramatically longer life than other types of media.

APPLICATIONS

Hydraulic Oils
Water Emulsion Coolants
Boiler Feed Water

Cutting Oils
Naphtha
Fuels

Glycols
Lube Oils
Synthetic Oils

Degreasing Fluids
Ethyl Alcohol

CARTRIDGE INFORMATION

FG SERIES

Velcon Model Number	O.D.	I.D.	Length	Micron Rating
FO-336FG10	3 ¹ / ₁₆ "	1 ⁵ / ₁₆ "	36 ¹ / ₁₆ "	10
FO-614FG10	6"	3 ¹ / ₂ "	14 ¹ / ₂ "	10
FO-614FG25	6"	3 ¹ / ₂ "	14 ¹ / ₂ "	25
FO-618FG10P	6"	3 ¹ / ₂ "	18"	10
FO-618FG25	6"	3 ¹ / ₂ "	18"	25
FO-622FG10	6"	3 ¹ / ₂ "	22"	10
FO-622FG25	6"	3 ¹ / ₂ "	22"	25
FO-629FG2	6"	3 ¹ / ₂ "	29 ¹ / ₂ "	2
FO-629FG10	6"	3 ¹ / ₂ "	29 ¹ / ₂ "	10
FO-629FG25	6"	3 ¹ / ₂ "	29 ¹ / ₂ "	25
FO-636FG5	6"	3 ¹ / ₂ "	35 ⁷ / ₈ "	5
FO-636FG10	6"	3 ¹ / ₂ "	35 ⁷ / ₈ "	10
FO-636FG25	6"	3 ¹ / ₂ "	35 ⁷ / ₈ "	25
FO-644FG2	6"	3 ¹ / ₂ "	44"	2
FO-644FG5	6"	3 ¹ / ₂ "	44"	5
FO-644FG25	6"	3 ¹ / ₂ "	44"	25
FO-644FG40P	6"	3 ¹ / ₂ "	44"	40

FGA SERIES

FO-618FGA5	6"	2 ⁹ / ₁₆ "	18"	5
FO-618FGA10	6"	2 ⁹ / ₁₆ "	18"	10
FO-618FGA25	6"	2 ⁹ / ₁₆ "	18"	25
FO-629FGA10	6"	2 ⁹ / ₁₆ "	29 ¹ / ₂ "	10
FO-632FGA10	6"	2 ⁹ / ₁₆ "	32"	10
FO-636FGA5	6"	2 ⁹ / ₁₆ "	35 ⁷ / ₈ "	5
FO-636FGA10	6"	2 ⁹ / ₁₆ "	35 ⁷ / ₈ "	10

SPECIFICATIONS

100 psi collapse strength
98% + filtration efficiency

5 - 9 operating pH range
250°F maximum operating temperature



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Natural Gas Filter Cartridges

Improved Natural Gas Filter/Separator Performance

Velcon Model FO-436G and FO-472G gas filter elements have been designed to remove particulate and liquid contaminant from natural gas. Both sizes offer:

- **Finer Filtration**
- **More Complete Liquid Removal**
- **Proven Performance**

The FO-436G and FO-472G have been designed for installations where superior performance features are desired over those offered by standard cartridges.

- **High Collapse Strength** – In lab tests, the FO-472G averaged > 100 psid collapse strength vs. 34 psid for a leading competitive element.
- **Improved Filtration/Separation Efficiency** – Multiple layers of fiberglass in graduated fiber diameters assure maximum efficiency by distributing collected particles evenly throughout the filter body. The fine fiberglass inner wrap assures finer moisture separation compared to standard models.
- **Positive Media Migration Barrier** – An inner wrap of cellulose filtration material provides a positive media migration barrier.
- **Improved Handling Characteristics** – An outer wrap of resin coated fiberglass screen retains element shape and density through its useful life, protects against handling damage, and reduces the exterior dirt accumulation typical of fuzzy cotton or dacron stockinette coverings.
- **Steel End Caps** – Aluminized steel provides corrosion resistance while plastisol adhesive assures complete bonding of filter media to end caps.
- **Buna Gaskets** – Seal tightly to mounting stool and top seal plate.

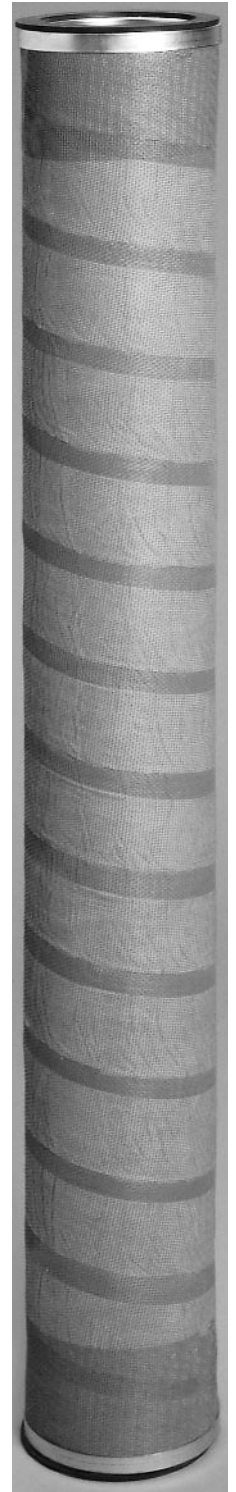
Both the 36" FO-436G and the 72" FO-472G elements are dimensionally interchangeable with many elements in field use. They include:

Peco Model FG-372

KingTool Model KTVSWN

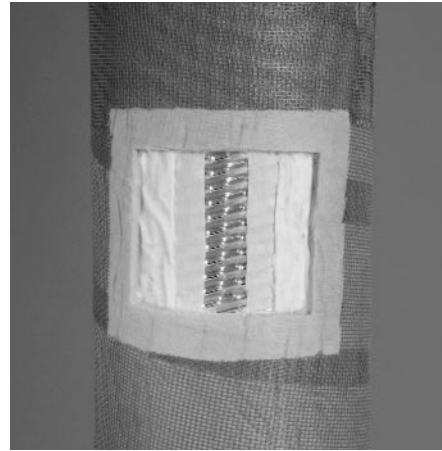
Filter Shield Model FS-FG-472-6

Flo-Line Model Q-FG-372



SPECIFICATIONS

- Heavy gauge aluminized steel center tube resists corrosion and gives 100 psi collapse strength. Louvered openings provide maximum flow distribution.
- Resin-impregnated cellulose barrier to stop fibers from migrating downstream.
- Resin-impregnated fiberglass media, arranged in progressively finer layers, to provide efficient, no channeling depth filtration.
- 200° maximum operating temperature.

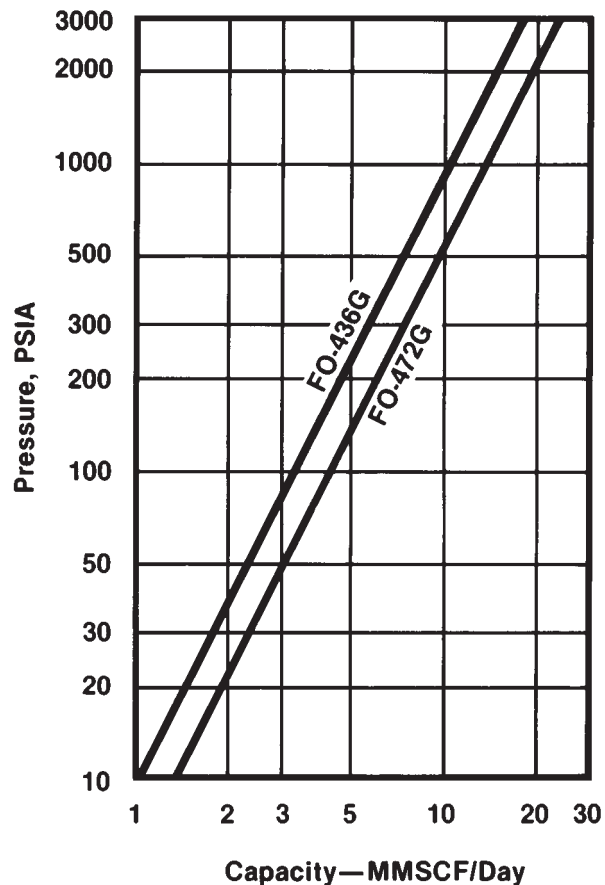


MODELS AVAILABLE:

Model	OAL	Rating @ 99% Gravimetric Efficiency
FO-436G	35.75	1/2 micron
FO-436G5	35.75	1 micron
FO-436GA	35.75	2 micron
FO-436GC	35.75	5 micron
FO-472G	71.875	1/2 micron
FO-472GC	71.875	5 micron

CAPACITY VS. OPERATING PRESSURE

- Sized for 1 psi Differential Pressure across filter and centerpipe
- Specific gravity = 0.65
- Temperature = 60°F



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CO-718 Series Cartridges for Fuel and Oil Treatment

The Velcon CO-718 Series elements are intended for use in all clay treatment vessels designed for nominal 7" x 18" cartridges. The treatment/purification medium is a special blend of low volatile materials (LVM) fuller's earth compounded to provide the optimum balance between adsorptive capacity and water resistance. With their ability to prevent channeling and their high particle structure stability, the elements assure reliable performance and long life in the most exacting process applications.

Jet Fuel Treatment – One of the most common uses for clay elements is to remove surfactants from jet fuels. Surfactants can carry over from the refinery process or be picked up when the jet fuel travels through multi-product pipelines (corrosion inhibitors, gasoline additives, etc.). Surfactants will eventually disarm filter/separators, which are primarily designed to remove water from the jet fuel. By removing surfactants from the fuel, the clay elements protect the downstream filter/separators. Since clay removes the surfactants by an adsorbent (adhering) action, the fuel residence time, or time in contact with the clay, is very important for proper fuel treatment. Normally, a flow rate of about 6.5 gpm per 7" x 18" element is ideal for jet fuel.

NOTE: For further information on clay, see data sheet #1223 in the Technical Information Section of the Velcon catalog. See data sheet #1759, *SWIFTKit*®, for information on how to determine when the clay elements should be changed.



CO-718CE Canister

CONSTRUCTION

CO-718CE is a rugged canister element featuring aluminized steel endcaps and center-tube, polyester felt outerwrap and both interior and exterior media migration barriers. A wire bail provides for easy installation and removal. Buna-N gaskets at each end assure tight sealing. The improved construction offers high resistance to transit or handling damage and to differential pressures up to 100 psi.

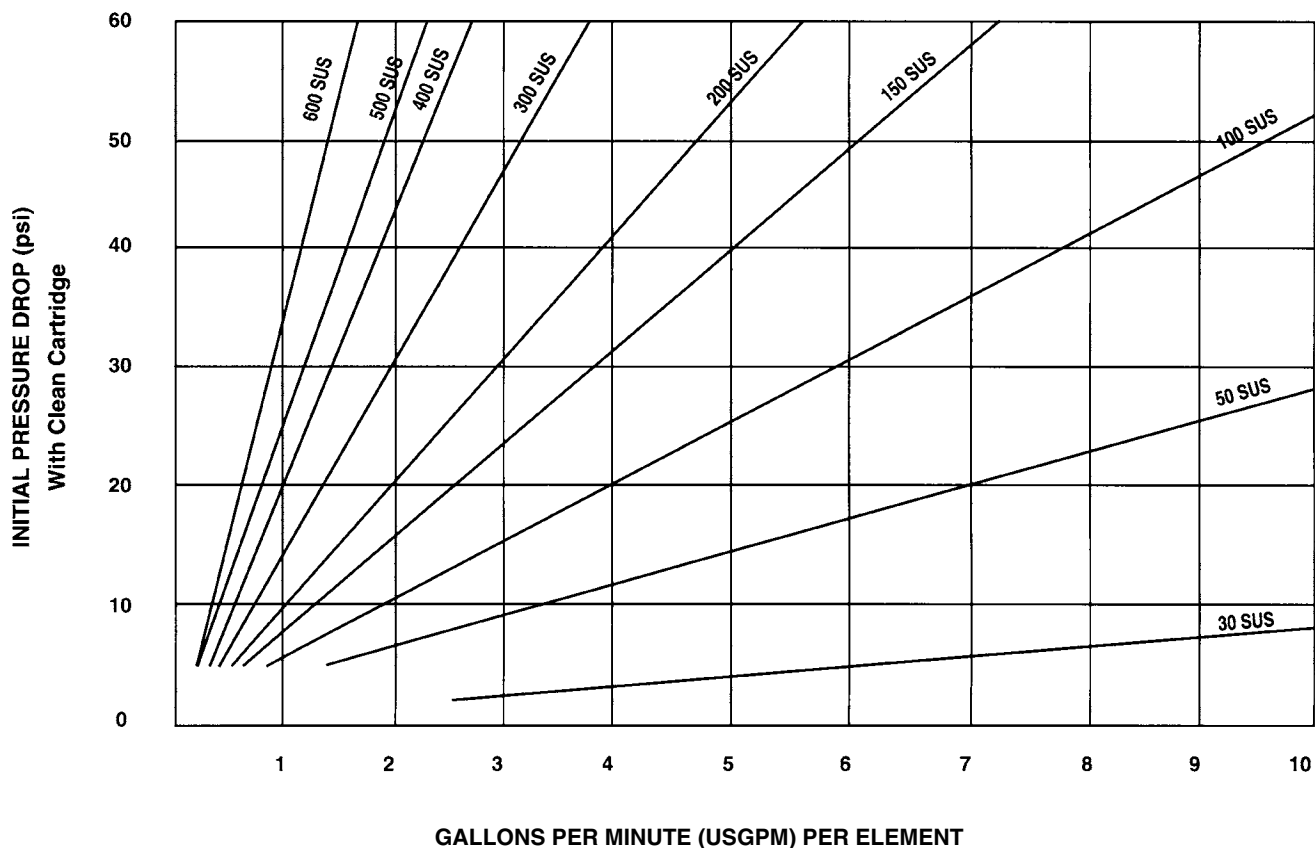
SPECIFICATIONS

Length 18"
 Outer Diameter 7"
 Center Diameter 2 1/4"
 Collapse Strength 100 psi
 Interchange:
 Facet/Fram C-766-3
 Keene-LE-718

APPLICATIONS

Lubricating Oils
 Vacuum Pump Oils
 Jet Fuels
 Aluminum and Stainless Steel Rolling Oils
 Quench Oils
 Hydraulic Fluids
 Insulation Oils

Flow Rate Per Element



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CDF® Fuel Monitor Cartridges K Series

Field Proven: CDF Replacement Cartridges Assure Clean Dry Fuel Delivery

FEATURES

- **CDF-K SERIES** are qualified to IP-1583, Fourth Edition, a specification for Aviation Fuel Filter Monitors.
- **O-RING SEAL** minimizes the possibility of bypassing contaminated fuel at differential pressures up to 175 psi.
- **RUGGED CONSTRUCTION** collapse strength exceeds 175 psi differential pressure.

DESCRIPTION

The Velcon CDF® Series cartridges are designed to provide superior performance and reliability in standard fuel monitor housings through a unique, patented combination of media that absorbs water and filters solids that may be present in the fuel. Full flow through the media is provided by plastic endcaps that are bonded to the media and an O-ring seal on the outlet end. This minimizes the possibilities of bypassing contaminated fuel or transmission of water downstream at low flow rates.

The presence of water and/or dirt in the influent fuel is indicated by an increase in the pressure differential (or a decrease in flow rate if the monitor housing is not equipped with a differential pressure gauge). These changes are the result of flow restriction caused by dirt filtration or water absorption in the media. The rapidity of these changes will depend on the quantity of water or contaminant present.

*******CAUTION*******

DO NOT USE WITH PRE-MIXED FUELS CONTAINING ANTI-ICING ADDITIVES.



The CDF-K Series construction contains an extra layer of fine filter medium required to meet the tighter filtration requirements of the IP-1583 specification.

CARTRIDGE SELECTION TABLE

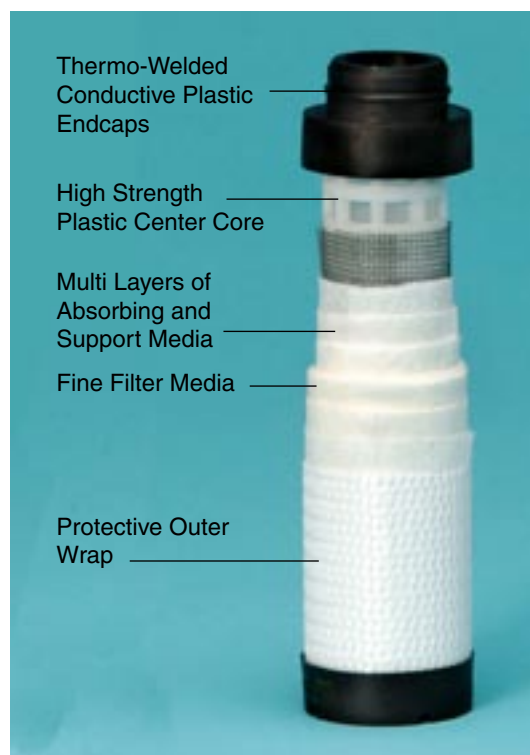
Cartridge Flow Rate GPM	Velcon Model Number	Overall Length	Replacements for:	
			Facet Model Number	Racor Model Number
5	CDF-205K	5 ¹³ / ₁₆ "	FG-205-3	—
10	CDF-210K	10 ¹³ / ₁₆ "	FG-210-3	FMI-10203
15	CDF-215K	15 ¹³ / ₁₆ "	FG-215-3	FMI-15203
20	CDF-220K	20 ¹³ / ₁₆ "	FG-220-3	FMI-20203
25	CDF-225K	25 ¹³ / ₁₆ "	FG-225-3	FMI-25203
30	CDF-230K	30 ¹³ / ₁₆ "	FG-230-3	FMI-30203

SPECIFICATIONS AND TECHNICAL INFORMATION CDF® K SERIES

- 175 psid (12 bar) collapse strength
- 160°F maximum operating temperature
- Recommended changeout differential pressure = 25* psid
- For service life information, please refer to Operating Procedures # 1839 or consult your company fuel handling procedures.

ORDERING INFORMATION

- Specify Velcon Model Number from table above.
- CDF Cartridges are packaged 20 per carton.



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 Specialists***



CDF® Fuel Monitor Cartridges N Series

Field Proven: CDF Replacement Cartridges Assure Clean Dry Fuel Delivery

FEATURES

CDF-N SERIES are qualified to IP 1583, Fourth Edition, a specification for Aviation Fuel Filter Monitors.

IMPROVED SALT WATER PERFORMANCE

CONDUCTIVE END CAPS and adhesive for reduction of static charge within the vessel.

O-RING SEAL minimizes the possibility of bypassing contaminated fuel at differential pressures up to 175 psi.

RUGGED CONSTRUCTION collapse strength exceeds 175 psi differential pressure.

DESCRIPTION

The Velcon CDF® N Series cartridges are designed to provide superior performance and reliability in standard fuel monitor housings through a unique, patented combination of media that absorbs water and filters solids that may be present in the fuel, and provides for reduced static charge. Full flow through the media is provided by plastic endcaps that are bonded to the media and an O-ring seal on the outlet end. This minimizes the possibilities of bypassing contaminated fuel or transmission of water downstream at low flow rates.

The presence of water and/or dirt in the influent fuel is indicated by an increase in the pressure differential (or a decrease in flow rate if the monitor housing is not equipped with a differential pressure gauge). These changes are the result of flow restriction caused by dirt filtration or water absorption in the media. The frequency of these changes will depend on the quantity of water or contaminant present.



The CDF-N Series construction contains an extra layer of fine filter medium required to meet the tighter filtration requirements of the IP 1583 Fourth Edition specification.

*******CAUTION*******

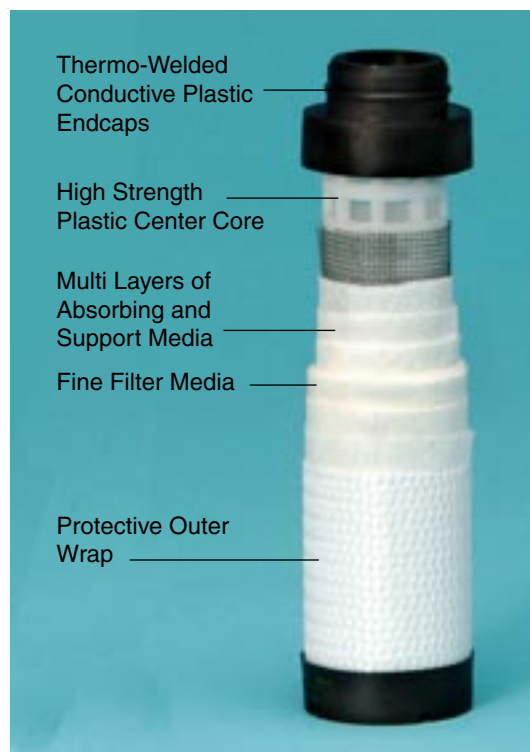
DO NOT USE WITH PRE-MIXED FUELS CONTAINING ANTI-ICING ADDITIVES.

IP Specification 1583 Fourth Edition Information

Our new CDF®-2xxN Series Cartridges incorporate features that result in an increase of electrical conductivity to quickly dissipate electrostatic charge across the cartridge. This is in response to the new requirement in the specification to reduce static charge within the filter monitor.

Another addition to the specification is an optional test to determine the performance of the cartridge in a salt water environment. The CDF® N Series successfully passed the following tests:

1. ¾ % Sodium Chloride full flow slug test
2. ¾ % Sodium Chloride 50 ppm test



CARTRIDGE SELECTION TABLE

Cartridge Flow Rate GPM	Velcon Model Number	Overall Length	Replacements for:	
			Facet Model Number	Racor Model Number
5	CDF-205N	5 ^{13/16} "	FG-205-3	—
10	CDF-210N	10 ^{13/16} "	FG-210-3	FMI-10203
15	CDF-215N	15 ^{13/16} "	FG-215-3	FMI-15203
20	CDF-220N	20 ^{13/16} "	FG-220-3	FMI-20203
25	CDF-225N	25 ^{13/16} "	FG-225-3	FMI-25203
30	CDF-230N	30 ^{13/16} "	FG-230-3	FMI-30203

SPECIFICATIONS AND TECHNICAL INFORMATION CDF® N SERIES

- 175 psid (12 bar) collapse strength
- 160°F maximum operating temperature
- Recommended changeout differential pressure = 25* psid
- For service life information, please refer to Operating Procedures # 1839 or consult your company fuel handling procedures.

ORDERING INFORMATION

- Specify Velcon Model Number from table above.
- CDF Cartridges are packaged 20 per carton.



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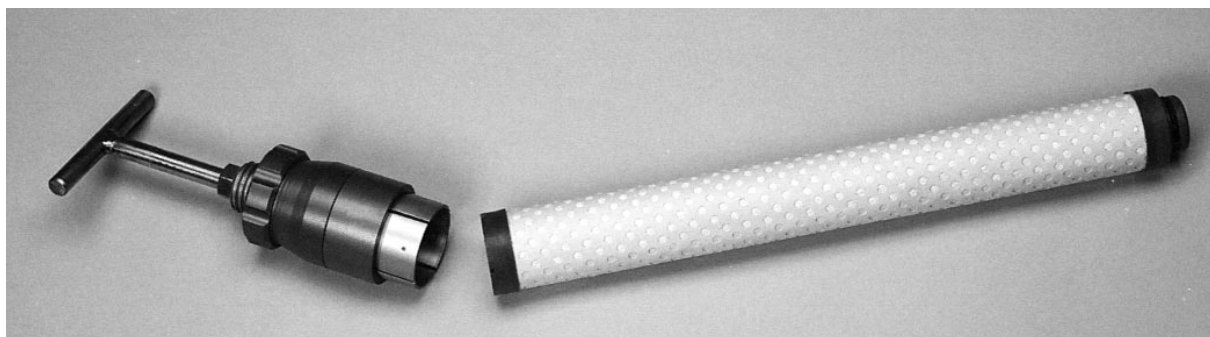
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**Liquid Filtration
and Separation
Specialists**



CDF® Fuel Monitor Cartridge Extracting Tool

A Safe, Easy and Practical Way to Remove and Install CDF Cartridges.



FEATURES

- Helps ensure element seats correctly during installation
- Grips element securely aiding removal
- Sure-fit every time reducing CDF changeout time
- Collet clamping mechanism with a T-Bar extractor
- Quality constructed out of aluminum
- Fits all Velcon CDF cartridges

ORDERING INFORMATION

- Specify Velcon Model Number CDF-2EX



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*Fluid
Decontamination
Specialists*

Due to Velcon Filters' continuing product improvement, drawings, specifications and pictures are subject to change without notice.



ACO Aquacon® Aviation Fuel Filter Cartridges

Remove Water and Dirt from Jet Fuel and Avgas Outside-to-In Flow Cartridges

- Free and emulsified water to less than 5 ppm
- 1/2 micrometer particulate removal
- Provides protection against “slugs” of water
- Pressure increase signals cartridge change
- Use with existing filter housings

DESCRIPTION

Patented* **Aquacon** Filter Cartridges have a unique high-capacity inner filter media which removes all free and emulsified water from hydrocarbon fuels down to less than 5 ppm in the effluent. Absorbed water is chemically locked into this media.

When a cartridge reaches its water holding capacity, its accordion pleats swell and cause an increase in the differential pressure which signals the operator to change the cartridge.

Solid contaminants are removed by the cartridge's two particulate filter media layers. The pleated accordion style design provides a large surface area for maximum dirt holding capacity. Models are offered for particulate filtration down to 1/2 micrometer size with 98% plus efficiency. Performance is not affected by the presence of common surface active agents.

Compact **Aquacon** Cartridges are quick and easy to install. Models are available to fit most existing standard housings. Refer to Cartridge Selection Table on reverse side.

*****CAUTION*****

DO NOT USE WITH PRE-MIXED FUELS CONTAINING ANTI-ICING ADDITIVES.

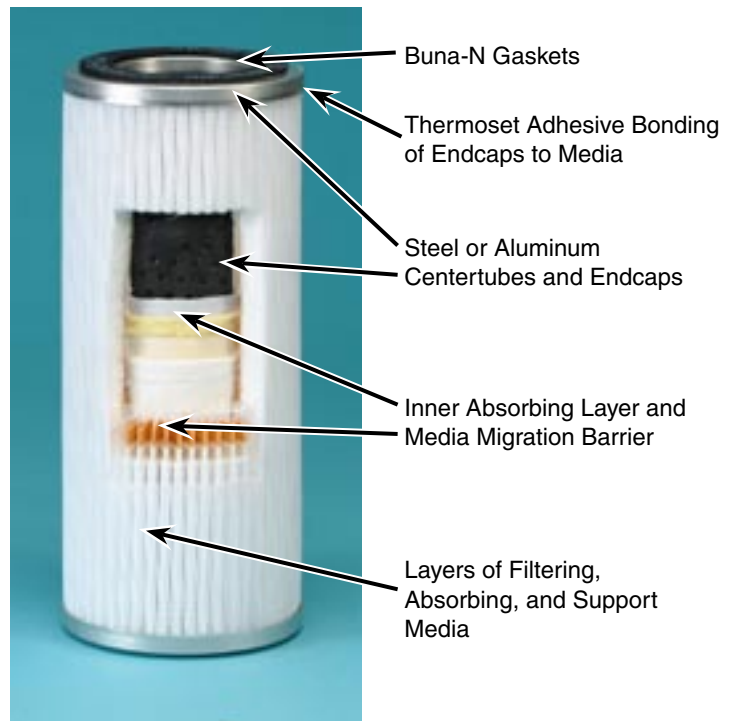
Use form 1846 for cartridge changeout at flowrates less than rated flow.



ACO-60901L



ACO-61401L



Typical Aquacon Cartridge Construction

* U.S. Patent No. 4,242,206.

CARTRIDGE SELECTION TABLE

Model Number	Micron Ratings	Inside Diameter (Inches)	Outside Diameter (Inches)	Length (Inches)	Collapse Pressure (psi)	Maximum Flow Rate (USGPM)	Interchange Information
ACO-21001L	0.5	1 ¹ / ₃₂	2 ⁵ / ₈	9 ³ / ₄	60	15	Fits VF-31E Housing
ACO-31001L	0.5	1 ⁵ / ₁₆	3	9 ³ / ₄	75	20	Fits Purolator Vessel PR-172-3
ACO-40501SPL	0.5	1-12NF	3 ³ / ₄	5 ¹ / ₂	60	10	Use with head SPH-2
ACO-40801L	0.5	1 ³ / ₄	4	8	100	13	Rellumit Replacement
ACO-40901SPL	0.5	1 ³ / ₈ - 12NF	3 ³ / ₄	8 ¹ / ₂	60	15	Use with head SPH-3
ACO-41201L	0.5	1 ³ / ₄	4	12 ¹ / ₄	100	20	Replaces Facet C-707; Purolator Vessel PAG-50
ACO-41601L	0.5	1 ³ / ₄	4	15 ¹³ / ₁₆	100	27	Rellumit Replacement
ACO-41801L	0.5	1 ³ / ₄	4	18	100	30	Replaces Facet C-706 and Keene BP-419, BP-518
ACO-41901L	0.5	1 ³ / ₄	4	19 ⁷ / ₈	175	32	Rellumit Replacement
ACO-51201L	0.5	1 ⁷ / ₈	5 ⁵ / ₈	12 ¹ / ₄	75	50	Fits VF-61 Housing
ACO-512P3L	0.3	1 ⁷ / ₈	5 ⁵ / ₈	12 ¹ / ₄	75	50	Fits VF-61 Housing
ACO-60801L	0.5	3 ¹ / ₂	6	8 ¹ / ₄	100	30	Omeco 6" x 8" Replacement
ACO-60901L	0.5	1 ¹ / ₂	6	9 ¹¹ / ₁₆	100	36	Fits Fram/Facet VFCS-21 (Element CC-21-7); VF-609
ACO-609P3L	0.3	1 ¹ / ₂	6	9 ⁹ / ₁₆	100	36	Fits Fram/Facet VFCS-21 (Element CC-21-7); VF-609
ACO-61201L	0.5	1 ¹ / ₂	6	13 ³ / ₄	100	48	Fits Fram/Facet VFCS-22 (Element CC-22-7)
ACO-61401L	0.5	3 ¹ / ₂	6	14 ¹ / ₂	175	58	Qualified to IP-1583
ACO-62201LTB	0.5	3 ¹ / ₂	6	22	175	88	Qualified to IP-1583
ACO-62901L	0.5	3 ¹ / ₂	6	28 ³ / ₄	175	115	Qualified to IP-1583
ACO-63301L	0.5	3 ¹ / ₂	6	33 ³ / ₄	175	133	Qualified to IP-1583
ACO-64401L	0.5	3 ¹ / ₂	6	43 ³ / ₄	175	173	Qualified to IP-1583
ACO-64401LTB	0.5	3 ¹ / ₂	6	44	175	176	Qualified to IP-1583
ACO-71801L	0.5	2 ¹ / ₂	6 ¹ / ₄	18	75	65	Fits VF-71E Housing

TECHNICAL INFORMATION

1. Maximum operating temperature is 160°F
2. Micron ratings are nominal at 98%+ efficiency
3. **Aquacon** Cartridges can significantly reduce flow when loaded with water or dirt. Appropriate precautions should be taken in applications where fuel flow must be maintained or where surge conditions can occur.

4. Replace the cartridge if the differential pressure exceeds 25 psid. For service life information, please refer to Operating Procedure # 1839 or consult your company fuel handling procedures.

NOTE: 1/2 micron rated **Aquacon** Cartridges are recommended for use with jet fuel and avgas. Effluent quality meets requirements for IP-1583.



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ACI *Aquacon*® Aviation Fuel Filter Cartridges

Used as the “Final Defense” in Refuelers/Serviceers to Insure Water and Dirt are Kept Out of Aircraft

- Qualified to API/IP-1583 Monitor specifications
- 1/2 micrometer particulate removal
- Provide protection against “slugs” of water
- Pressure increase signals cartridge change
- Not affected by surface active agents*
(see caution info below)
- Replace existing coalescers in into-plane filter/separator vessels
- Inside-to-out flow pattern

DESCRIPTION

Patented* *Aquacon* Filter Cartridges have a unique high-capacity inner filter media which removes all free and emulsified water from hydrocarbon fuels down to less than 5 ppm in the effluent. Absorbed water is chemically locked into this media and cannot be squeezed out.

When a cartridge reaches its water holding capacity, its accordion pleats swell, and cause an increase in the differential pressure which signals the operator to change the cartridge.

Solid contaminants are removed by the cartridge’s two particulate filter media layers. The pleated accordion style design provides a large surface area for maximum dirt holding capacity. Performance is not affected by the presence of surface active agents* (see below).

The Velcon ACI open-end and threaded-base *Aquacon* Cartridges have been qualified to API/IP-1583, the “Institute of Petroleum Specifications and Qualification Procedures for Aviation Fuel Filter Monitors with Absorbent Type Elements.”

The ACI-6xx01L open-end and ACI-6xx01LTB threaded base *Aquacon* elements are intended to be installed in the final filter/separator vessel in place of coalescers for more positive protection against dirt and water downstream.

*****CAUTION*****

In fuels containing anti-icing additive (Di-EGME, FSII, Prist®), stagnant water bottoms can absorb large amounts of the anti-icing additive. This water/FSII solution can disarm water-absorbing elements allowing water to pass downstream. Daily draining of the monitor vessel and of water bottoms upstream of the elements is **IMPERATIVE**. Also, changeout @ **15 psid**.

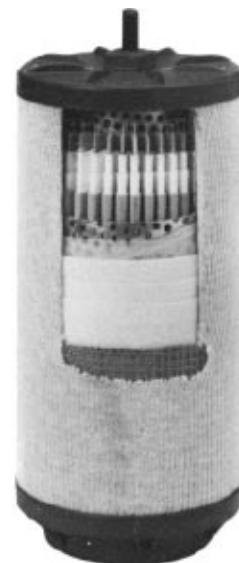


ACI-61401LTB



ACI-61401L

ACI *Aquacon* Cartridge Construction



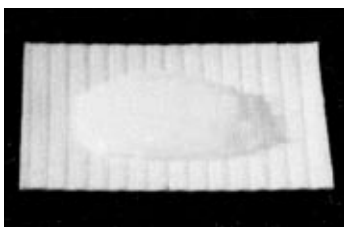
ACI-61401LTB Cutaway

* U.S. Patent No. 4,242,206.

Aquacon absorbs water from aviation fuel and chemically locks it in – you can't squeeze it out!
Prove it with a squeeze test. Media samples available upon request.



1. Pour a small pool of water, about the size of a quarter, onto a smooth surface.



2. Place one of the media samples directly on top of the water. Note how the media swells as it absorbs and "locks in" the water.



3. Next, place the media sample between thumb and forefinger and squeeze – as hard as you wish. No free water is liberated.

CARTRIDGE SELECTION TABLE

Model Number	O. D. Inches	Length Inches ¹	End-Cap Type	Maximum Flow Rate (USGPM)	Interchange Information
ACI-61401L	6	14 ¹ / ₂	3 ¹ / ₂ " ID Open-Ends	58	CC-N18, CA14-3, CA14-9
ACI-61401LTB	6	14	Screw Base/Blind	56	CC-N18SB, CA14-3SB, CA14-9SB
ACI-62201L	6	22 ¹ / ₄	3 ¹ / ₂ " ID Open-Ends	89	CC-K2, CC-K28, CA22-3, CA22-9
ACI-62201LTB	6	22	Screw Base/Blind	88	CC-K28SB, CA22-3SB, CA22-9SB
ACI-62901L	6	28 ³ / ₄	3 ¹ / ₂ " ID Open-Ends	115	CC-N28, CA28-3, CA28-9
ACI-62901LTB	6	27 ⁵ / ₁₆	Screw Base/Blind	111	CC-N28SB, CA28-3SB, CA28-9SB
ACI-63301L	6	33 ¹ / ₄	3 ¹ / ₂ " ID Open-Ends	133	CC-K38, CA33-3, CA33-9
ACI-63301LTB	6	33	Screw Base/Blind	132	CC-K38SB, CA33-3SB, CA33-9SB Has NSN: 4330-01-439-2314
ACI-63301FL	6	33 ³ / ₈	2" ID Open-Ends	133	Faudi F. 1-842 (1.066.020)
ACI-63801L	6	38 ¹ / ₄	3 ¹ / ₂ " ID Open-Ends	153	CC-K38-1, CA38-3, CA38-9
ACI-63801LTB	6	38	Screw Base/Blind	152	CC-K38SB-1, CA38-3SB, CA38-9SB
ACI-64401L	6	43 ¹ / ₄	3 ¹ / ₂ " ID Open-Ends	173	CC-N38, CA43-3 CA43-9
ACI-64401LTB	6	44	Screw Base/Blind	176	CC-N38SB, CA43-3SB, CA43-9SB
ACI-65601L	6	57	3 ¹ / ₂ " ID Open-Ends	228	CC-N48, CA56-3, CA56-9
ACI-65601LTB	6	56 ¹ / ₁₆	Screw Base/Blind	224	CC-N48SB, CA56-3SB, CA56-9SB

Note: Drain vessels equipped with the ACI **Aquacon** Cartridges on a daily basis from an upstream drain to ensure upstream water is removed to prolong element life.

TECHNICAL INFORMATION

- Maximum exposure temperature is 160°F.
- Cartridges are rated at 1/2 micron nominal efficiency.
- Aquacon** Cartridges completely shut off flow when loaded with water or dirt.
- Replace the cartridge if the differential pressure exceeds 25 psid.² For service life information, please refer to Operating Procedure # 1839 or consult your company fuel handling procedures.
- ACI burst strength exceeds 175 psid. If F/S vessel coalescer deckplate or manifold is not certified to 15 bar (220 psi) strength, a differential pressure limiting device, set from 25 - 30 psid, should be installed on the filter/separator vessel.

¹ Overall length does not include the 1" bolt for the ACI-6xx01LTB threaded base ACI's.

² 15 psid is acceptable in fuel with anti-icing additive.



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Specialists**



Aviation Aquacon® Spin-On Filters

ACO-40501SPL
ACO-40901SPL

Remove Dirt and Water from Jet Fuel and Avgas

FEATURES

- Convenient Spin-On Design
- Removes free and emulsified water to less than 5 ppm, typical
- Filters out dirt and other particulates to a ½ micron nominal rating
- Choice of four mounting head styles

*****CAUTION*****

In fuels containing anti-icing additive (Di-EGME, FSII, Prist®), stagnant water bottoms can absorb large amounts of the anti-icing additive. This water/FSII solution can disarm water-absorbing elements allowing water to pass downstream. Daily draining of the monitor vessel and of water bottoms upstream of the elements is **IMPERATIVE**. Also, changeout @ 15 psid.



ACO-40501SPL
mounted to
SPH-2 Head



ACO-40901SPL
mounted to
SPH-4 Head



ACO-40901SPL
mounted to
SPH-5 Parallel Flow Head

DESCRIPTION

ACO-40501SPL is the popular 3¾" diameter x 5½" long size. The ACO-40901SPL is 3¾" diameter x 8½" long. Four mounting head styles are offered for use with these two cartridges. Refer to the back side of this sheet for details.

Aquacon cartridges filter out water by chemically locking it into layers of super-absorbent media. Water removal efficiency is not affected by surfactants or additives,

and once captured, the water cannot be squeezed out. These cartridges also effectively filter out dirt, rust, and other particulates. (See caution above.)

As a cartridge reaches its water-holding limit, the media expands very rapidly and restricts the flow. The flow will completely stop, giving positive shut-off and guaranteeing that water will not get downstream.

Aviation *Aquacon*® ACO-40501SPL and ACO-40901SPL Spin-On Filters

CARTRIDGE TECHNICAL INFORMATION

Maximum Operating Pressure: 50 psi
 Maximum Operating Temperature: 200°F
 ½ micron nominal filtration rating at 98+% efficiency.
 Cartridges do not remove soluble (dissolved) water.
 Gaskets are Buna-N.

	ACO-40501SPL	ACO-40901SPL
Diameter:	3¾"	3¾"
Length:	5½"	8½"
Weight:	1¼ lbs.	1½ lbs.
Thread:	1"-12 NF	1¾"-12 NF



**ACO-40501SPL and
ACO-40901SPL**

HEAD STYLES AND FLOW RATES



SPH-2

SPH-3

SPH-4

SPH-5

Head Part Number	Use with <i>Aquacon</i> Cartridge(s)	Inlet/Outlet Size	Inlet/Outlet Face-to-Face	Head Weight, Lbs	Jet Fuel or Avgas Max Flow USGPM
SPH-2	1 ea. ACO-40501SPL	¾" NPT	3¾"	1	10
SPH-3	1 ea. ACO-40901SPL	¾" NPT	3¾"	1	15
SPH-4	1 ea. ACO-40901SPL	½" NPT	2¾"	1	7
SPH-5	2 ea. ACO-40901SPL	½" NPT	7"	1¼	15

NOTES

1. Differential pressure across head and cartridge at recommended maximum flow is 5 psi or less.
2. SPH-2, -3, -4, and -5 are die cast aluminum 380 alloy.
3. SPH-4 and -5 have dual inlets/outlets for plumbing flexibility.
4. SPH-5 allows parallel flow through two cartridges.
5. Heads have no internal bypass. Flow will stop if cartridges plug-up.
6. Mounting holes on SPH-4 and -5 are ⅝".
7. SPH-3, -4, and -5 have steel bushings or nipples for adapting to ACO-40901SPL. They are permanently fastened with Loctite® 271.



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OS Series Coalescer/ Separator Cartridges

Aviation Fuel: OS-60988/OS-61288

Diesel Fuel: OS-60986/OS-61286

Designed for superior performance in Facet VFCS-21 and VFCS-22 Filter/Separator Vessels

FEATURES

- One piece replacement combination coalescer and separator cartridge
- Laboratory tested to 0.2% water in incoming fuel, less than 10 ppm in effluent
- Teflon® Coated Screen Separator
- Reliable radial sump seal design
- Easier installation – no shim gaskets required
- Nominal 1 micron particle efficiency for Jet Fuel and Avgas; 5 micron for Diesel Fuel
- Minimum 75 psid collapse strength
- Flow direction – outside to inside
- Operating temperatures up to 240°F (115°C)
- 5 - 9 operating pH range

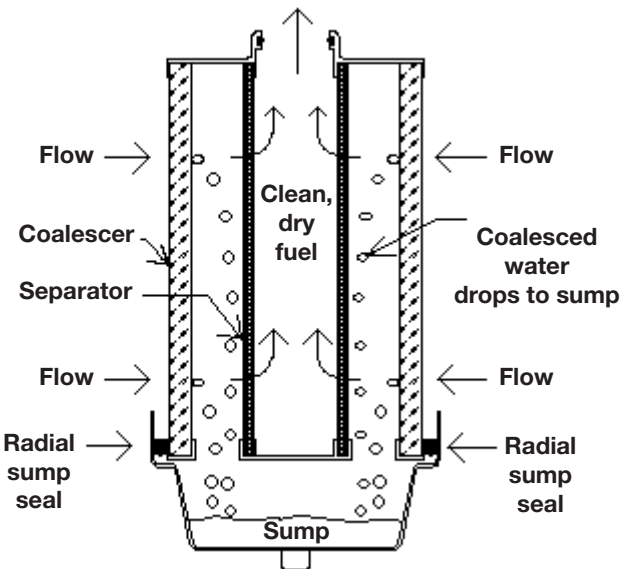
The OS Series combination coalescer/separator cartridges filter dirt and remove water from aviation and diesel fuels. They are designed to fit into the Facet VFCS-21 and VFCS-22 filter/separator housings. Performance is improved due to Teflon Coated Screen Separators and reliable radial sump seals. Since these housings are not equipped with a water defense mechanism in the event of excess water from upstream (water slugs), downstream water slug protection is recommended (housing with CDF®s or **Aquacon®s**).



OS-60988 Cartridge

DESCRIPTION

Flow is from outside to inside through the cartridge.
Coalesced water is repelled by the separator and drops to the sump for daily draining. Clean, dry fuel exits the cartridge through the snout at the top.



MODEL NUMBER	FOR PRODUCT	FLOW RATE USGPM (maximum)	MICRON RATING μ	DIMENSIONS			
				OD		LENGTH	
				inches	mm	inches	mm
OS-60988	Jet Fuel/Avgas	45	1	6	152	9 $\frac{5}{8}$	244
OS-61288	Jet Fuel/Avgas	60	1	6	152	13 $\frac{5}{8}$	346
OS-60986	Diesel Fuel	23	5	6	152	9 $\frac{5}{8}$	244
OS-61286	Diesel Fuel	30	5	6	152	13 $\frac{5}{8}$	346

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Due to Velcon Filters' continuing product improvement, drawings, specifications and pictures are subject to change without notice.



Replacement Elements for Facet Superflex™ Housings

O-8140 Coalescer and SO-410PL Separator Remove Water and Dirt from Diesel Fuel

- Free and emulsified water to less than 50 ppm
- 25 micrometer particulate removal
- Used in place of Diesel **Aquacon**® cartridges for larger amounts of upstream water
- For use in the Facet Superflex housings in diesel fuel service

DESCRIPTION

The Velcon O-8140 Coalescer and SO-410PL Separator are installed together in the Facet Superflex housing to remove water and dirt from diesel fuel. The fuel passes from the outside to the inside through the O-8140 Coalescer. Dirt is filtered out of the fuel and free/emulsified water in the diesel fuel is coalesced. The coalesced water droplets, which form on the inside of the coalescer are repelled from going further downstream by the pleated paper media SO-410PL Separator. The water settles down to the sump where it is manually drained. Daily draining is recommended. Taller Superflex housings can stack the O-8140 and SO-410PL two or three high for larger flowrates. When the differential pressure across the elements reaches 15 psid, the elements should be removed and replaced with new elements.



O-8140 Coalescer and SO-410PL Separator

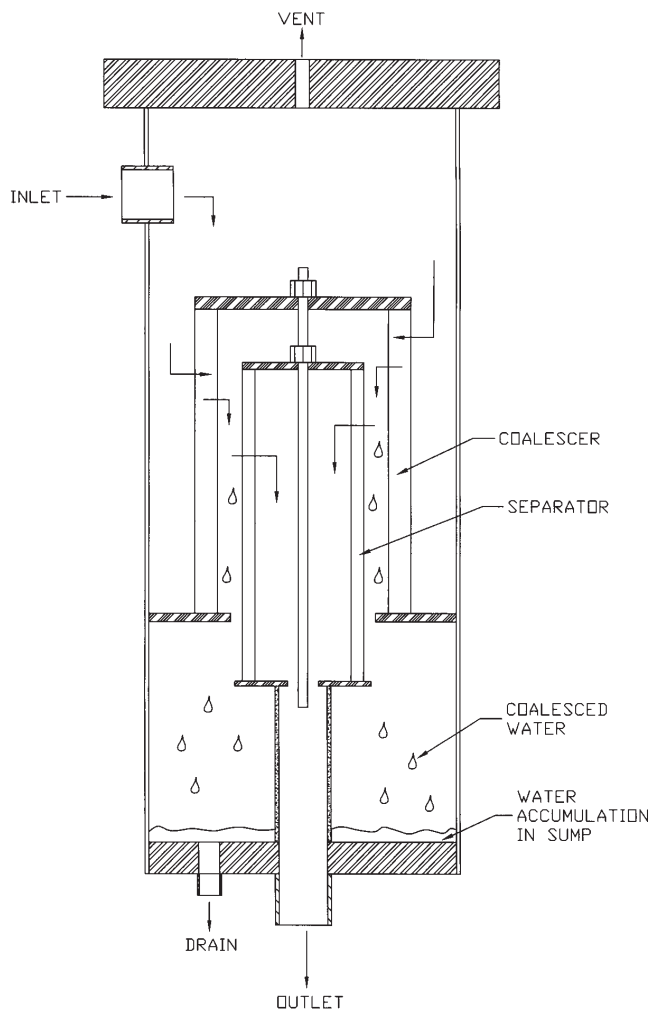
SPECIFICATIONS

- Maximum Operating Temperature is 160°F / 71°C
- Flow direction: outside to inside
- pH range: 5 to 9
- Changeout at 15 psid

FLOW RATES

Initial pressure drop: 2 psig (13.8 kPa)

Housing with Cartridges	Diesel	
	gpm	lpm
1 High	27	102
2 High	48	159
3 High	68	257



Superflex Housing (1-High)



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Section 5

Technical

Information



Fuel & Oil Filtration Laboratory

Laboratory Capabilities

FACILITIES OVERVIEW & MISSION

The Dinius Product Development Laboratory at Velcon Filters is one of the company's most important assets. Numerous state of the art fuel and oil filtration products have been developed and qualified here. They include the widest range of fuel filtration products available to the aviation industry. The lab is located in a 9,000 square foot facility at our headquarters facility in Colorado Springs, Colorado and is the largest indoor jet fuel testing lab in the world.

Its missions include:

- New product development
- Qualification testing to the highly demanding requirements of civil and military aviation fuel filtration specifications
- Quality conformance testing of raw materials and finished products to support our manufacturing operations
- Analysis of customers' fluid samples to determine the best clarification method
- Testing filter cartridges returned from the field

These missions are carried out by a well qualified Technical Services team consisting of two product development engineers and the support of three test technicians. This core group is aided by other engineering and marketing functions throughout the company. Decades of cumulative experience are focused on our missions.

The testing facility consists of three main labs: jet fuel, industrial/utility, and the analytical lab.



JET FUEL FILTER LAB AND AVIATION PRODUCT TESTING

To meet the critical requirements of the aviation industry, two separate computer-instrumented test loops gauge our products' ability to remove water and dirt from jet fuel. One loop is equipped for full-scale tests up to 2,500 gpm. The other loop is suitable for single element tests up to 150 gpm. These loops are designed to comply with the latest editions of jet fuel filtration and separation specifications including:

- API/IP Publication 1581
- API/IP 1583 Specification for Absorbent-Type Elements
- Mil F-8901
- Mil M-81380 (AS) Fuel Monitor Specification

Two sets of clay filters, micron filters, and filter/separators are used, along with a fuel storage capability of 45,000 gallons. Refrigerated heat exchangers, additive blending tanks, large pumps, and a wastewater treatment system are also present. A custom, state of the art data acquisition system is included to handle the data gathering tasks.

In addition to the test loops, a separate open coalescing tank is used for visual examination of coalescing performance, and a burst chamber for determining cartridge burst and collapse strength.



INDUSTRIAL AND UTILITY PRODUCT TESTING

Velcon products are also used in a wide variety of industrial fluid clarification applications. Our industrial product development focuses on problem solving: innovating a cost effective solution to a customer's specific problem and applying it to related industries. The unique **Aquacon**[®] water absorbing filter elements evolved as a result of this approach.

In addition, a line of products is specifically targeted to clarify electrical insulating oil. The focus here is to remove sub-micron carbon particles and water to low ppm levels.

A significant portion of the Velcon test facility is dedicated to industrial and utility product development with the following equipment available on-site:

- **Burst Chamber** for determining cartridge burst and collapse strength
- **MultiPass Filter Test Stand** for precisely evaluating particle removal efficiency and contaminant capacity of industrial filters
- **Insulating Oil Filter Test Stand** to determine water and carbon removal and characteristics of cartridges used in dielectric oil clarification
- **Differential Pressure Test Stand** to study the effects of varying oil viscosities on filters

ANALYTICAL LABORATORY

The Analytical Lab houses a wide range of capabilities to support jet fuel filter testing, in-house quality control, and industrial and utility filter testing. In addition, customers' fluid samples are analyzed to determine the best filtration solution.

Key equipment includes:

- **Micro-Separator**[®] for determining the MSEP (WSIM) of fuel per ASTM D3948
- **Tensiometer** for measuring interfacial tension (IFT) per ASTM D971
- **Analytical Balances** for measuring gravimetric contamination per ASTM 2276
- **Test Cell with Electrometer** for measuring electrical conductivity per ASTM 2624
- **Titration** for determining water content (Karl Fischer method) per ASTM D1744
- **Breakdown Voltage Tester** for measuring insulating oil dielectric strength per ASTM D877 and D1816
- **Particle Counter** to determine particle size distribution in accordance with the multi-pass filter test method, ISO 4572

Other equipment is available to conduct these additional ASTM tests: D974, D1298, D1796, D88.



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Glossary of Terms

TERM

USAGE

Aerosol

Submicron particles suspended in air, gas or vapor. A fog, fume, or smoke.

Bulk Density

Ratio of total mass or weight of the material divided by the volume of the material (includes void volume in the case of solids).

Coalesce

To unite small droplets of one liquid preparatory to its being separated from another liquid. Filter/coalescer cartridges coalesce small water droplets present in water contaminated fuel and certain oils into larger drops which are then separated by gravity.

Continuous Phase

The basic product flowing through a filter or filter/separator which continues on through a system after being subjected to solids and/or water removal.

Delta P

See "Pressure Drop" on reverse.

Discontinuous Phase

The phase dispersed in the continuous phase; water is a discontinuous phase to be separated from a hydrocarbon liquid or from air or gas.

Drop

The quantity of liquid which makes up one spherical mass; a liquid globule.

Droplet

A minute drop which may coalesce to form larger drops.

Effluent

Stream of fluid at the outlet of a filter or filter/separator. Opposite of influent.

Emulsion

A dispersion of fine droplets in the continuous phase.

Entrained Water

Discrete visible water droplets carried by a continuous hydrocarbon phase.

Fiber Migration

Carry-over of fibers from filter or separator media material into the effluent. Fiber migration is a qualitative part of total media migration.

Filtrate

The fluid which has passed through filtering media. Also referred to as effluent from filters.

Gravity Separation

Separation of immiscible phases resulting from a difference in specific gravity (Settling).

Hydrophilic	Water accepting or water wettable. Opposite of hydrophobic.
Hydrophobic	Water repelling. Lacking affinity for water. Opposite of hydrophilic.
Immiscible	Liquids which are mutually insoluble; opposite of miscible.
Influent	Stream of fluid at the inlet of a filter or filter/separator. Opposite of effluent.
Media Migration	Carry-over of fibers and particles from filter or separator media material into the effluent. Includes fiber migration, expressed as milligrams per liter.
Miscible	Liquids which are mutually soluble. Opposite of immiscible.
Pressure Drop (Delta P: ΔP)	The difference in pressure between two points, generally at the inlet and outlet of a filter or a filter/separator. Measured in pounds per square inch, inches of mercury, kilograms per square centimeter, kilopascals (kPa) or bars (1 bar = 14.5 psi). (Also commonly referred to as Delta P or differential pressure.)
Specific Gravity	The ratio of weight of a fluid to the weight of an equal volume of standard substance; i.e. water for solids and liquids, and air or hydrogen for gases.
Static Generation	Unbalanced or net electrical charge produced in a flowing hydrocarbon liquid.
Surfactants	Surface-active agents, which are also called detergents, emulsifiers, or wetting agents. Polar compounds. (Most surfactants in Jet Fuel can be removed by Clay Treatment.)
Three-Stage	A filter/separator vessel containing coalescers, separators and 3rd stage monitor elements (e.g. CDF cartridges)
Two-Stage	A filter/separator containing two kinds or types of elements (coalescers and separators).
Velocity	The time rate of motion or speed in a given direction.
Viscosity	A molecular property of fluids: the friction of molecular motion. A more viscous fluid has a higher pressure drop at a given rate of flow, as compared to a less viscous fluid.



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Frequently Used Conversions

PRESSURE

MULTIPLY THIS	x	BY THIS	=	TO OBTAIN THIS
bar		14.50		psi
psi		0.069		bar
bar		10 ⁵		N/m ² (Pascal)
psi		27.7		in of H ₂ O
in of H ₂ O		0.0361		psi
psi		2.31		ft of H ₂ O
psi		2.036		in of Hg
psi		6.8948		kPa (kilo Pascal)
kPa		0.1450		psi
psi		0.070307		kg/cm ²
kg/cm ²		14.224		psi
ft-lb (Torque)		1.356		N-M (Newton meter)

FLOW RATE

MULTIPLY THIS	x	BY THIS	=	TO OBTAIN THIS
BBL/day		0.029		USGPM
BBL/hr		0.7		USGPM
m ³ /hr		4.4		USGPM
metric ton/hr		4.4		USGPM
gpm		3.785		l/min
l/min		0.2642		USGPM

VOLUME

MULTIPLY THIS	x	BY THIS	=	TO OBTAIN THIS
US gallon		0.8327		British gallons
British gallon		1.2009		US gallons
US gallon		3.785		liters
US gallon		231		in ³
US gallon		0.1337		ft ³
US gallon		0.00379		m ³
BBL (barrel)		42		US gallons
m ³		264.73		US gallons
m ³		6.3031		BBL (barrel)
gram/l		1000		ppm

LINEAR MEASUREMENT

MULTIPLY THIS	x	BY THIS	=	TO OBTAIN THIS
in		2.54		cm
in		25.4		mm
mm		0.03937		in
m		3.2808		ft
micron		0.00003937		in
micron		0.001		mm
mm		1000		microns
in		25,400		microns

MASS

MULTIPLY THIS	x	BY THIS	=	TO OBTAIN THIS
kg		2.2046		lb
lb		0.45359		kg



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Filter Sizing Information

FO Series Filter Cartridges

CARTRIDGE FLOW RATE (US GPM) VS. VISCOSITY DATA FOR 2 PSI AND 5 PSI INITIAL PRESSURE DROPS

CARTRIDGE	33 SUS 2 CS		39 SUS 4 CS		46 SUS 6 CS		59 SUS 10 CS		98 SUS 20 CS		142 SUS 30 CS		187 SUS 40 CS	
	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI
FO-614PLF1/2	68	68	50	66	33	65	20	50	10	25	7	17	5	12
FO-614PLF1	68	68	50	66	33	65	20	50	10	25	7	17	5	12
FO-614PLF2	68	68	66	66	65	65	52	64	26	63	18	44	13	33
FO-614PLF5	68	68	66	66	65	65	64	64	63	63	53	62	40	61
FO-614PLF25	68	68	66	66	65	65	64	64	63	63	62	62	61	61
FO-614PLF75	68	68	66	66	65	65	64	64	63	63	62	62	61	61
FO-718PL1/2	50	50	50	50	38	50	23	50	12	29	8	19	6	15
FO-718PL01	50	50	50	50	38	50	23	50	12	29	8	19	6	15
FO-718PL02	50	50	50	50	50	50	50	50	31	50	21	50	16	39
FO-718PL05	50	50	50	50	50	50	50	50	50	50	50	50	50	50
FO-718PL15	50	50	50	50	50	50	50	50	50	50	50	50	50	50
FO-718PL50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
FO-618FGA5	68	68	66	66	42	65	25	60	13	31	8	21	6	16
FO-618FGA10	68	68	66	66	50	65	30	64	15	38	10	25	8	19
FO-618FGA25	68	68	66	66	50	65	30	64	15	38	10	25	8	19

CARTRIDGE	233 SUS 50 CS		348 SUS 75 CS		463 SUS 100 CS		927 SUS 200 CS		1390 SUS 300 CS		1853 SUS 400 CS		2316 SUS 500 CS	
	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI	2 PSI	5 PSI
FO-614PLF1/2	4	10	3	7	2	5	1	3	1	2	–	1	–	1
FO-614PLF1	4	10	3	7	2	5	1	3	1	2	–	1	–	1
FO-614PLF2	10	26	7	18	5	13	3	7	2	4	1	3	1	3
FO-614PLF5	32	60	22	55	16	40	8	20	5	13	4	10	3	8
FO-614PLF25	60	60	59	59	45	58	22	55	15	50	11	28	9	23
FO-614PLF75	60	60	59	59	58	58	45	57	30	56	22	55	18	45
FO-718PL1/2	5	12	3	8	2	6	1	3	1	2	1	2	–	1
FO-718PL01	5	12	3	8	2	6	1	3	1	2	1	2	–	1
FO-718PL02	12	31	8	21	6	16	3	8	2	5	2	4	1	3
FO-718PL05	41	50	27	50	20	50	10	25	7	17	5	13	4	10
FO-718PL15	50	50	50	50	42	50	21	50	14	35	10	26	8	21
FO-718PL50	50	50	50	50	50	50	30	50	20	50	15	38	12	30
FO-618FGA5	5	13	3	8	2	6	1	3	1	2	1	2	1	1
FO-618FGA10	6	15	4	10	3	8	1	4	1	3	1	2	1	2
FO-618FGA25	6	15	4	10	3	8	1	4	1	3	1	2	1	2

NOTES: 1. Figures in table are flow rates (US GPM) that will cause a pressure drop of 2 or 5 psi across the cartridge.
2. Recommended maximum flow rate for each cartridge is 50 gpm.

Housing Selection Guidelines

FILTER SIZING

1. Select the desired filter cartridge type and micrometer (micron) rating.
2. Determine the viscosity at the operating temperature for the fluid being filtered. See Bulletin 1533.
3. From the cartridge flow rate data estimate the flow rate that will result in a 2 psi differential pressure.
4. Divide the total desired flow rate by the flow rate determined in 3, above. This will give the required number of cartridges.
5. Select a filter housing that will hold the required number of cartridges.

- NOTES:**
- a) Recommended maximum flow rate for each cartridge is 50 gpm. If this rate is to be exceeded please contact Velcon with details of the proposed application.
 - b) For double and triple length cartridges find the flow rate for the equivalent single length cartridge and multiply by 2 or 3, as appropriate. For example, the triple length five micron rated FO-644PLF5M would have 3 times the flow rate of the single length five micron rated FO-614PLF5.
 - c) For recirculating lube and hydraulic oil systems where contaminant generation will be slight, it is common practice to size for a 5 psi initial pressure drop.

CONTAMINANT CAPACITY

Velcon recommends filter cartridges be changed when they reach 15 psi differential in aviation service or a 25 psi differential in industrial applications. The amount of contaminant a cartridge will hold before that point depends on many factors, the key one being the nature of the contaminant itself. A hard, particulate contaminant has very different filtration characteristics than a soft, amorphous one.

Accurately estimating the life of a cartridge in a given application, therefore, is extremely difficult. However, when a cartridge has been sized for an initial pressure drop of 2 psi, the following rule of thumb is often employed for particulate contaminants: A 1 or 2 micrometer cartridge will hold up to 3 pounds of contaminant, and a 5 micrometer or greater cartridge will hold up to 5 pounds.

REDUCED FLOW RATE EFFECTS

The filter sizing above is based on a 2 psi initial pressure differential (or 50 gpm maximum flow) which is a widely accepted industry standard. However, where heavy contaminant loads are anticipated, a substantial savings in operating costs for cartridges and filter change labor can be achieved by over-sizing the filter. **Reducing the flow rate per cartridge in half will increase the contaminant capacity of each cartridge by 30 to 50 percent. This means that doubling the size of the filter will increase the total throughput between cartridge changeouts by as much as three times.**



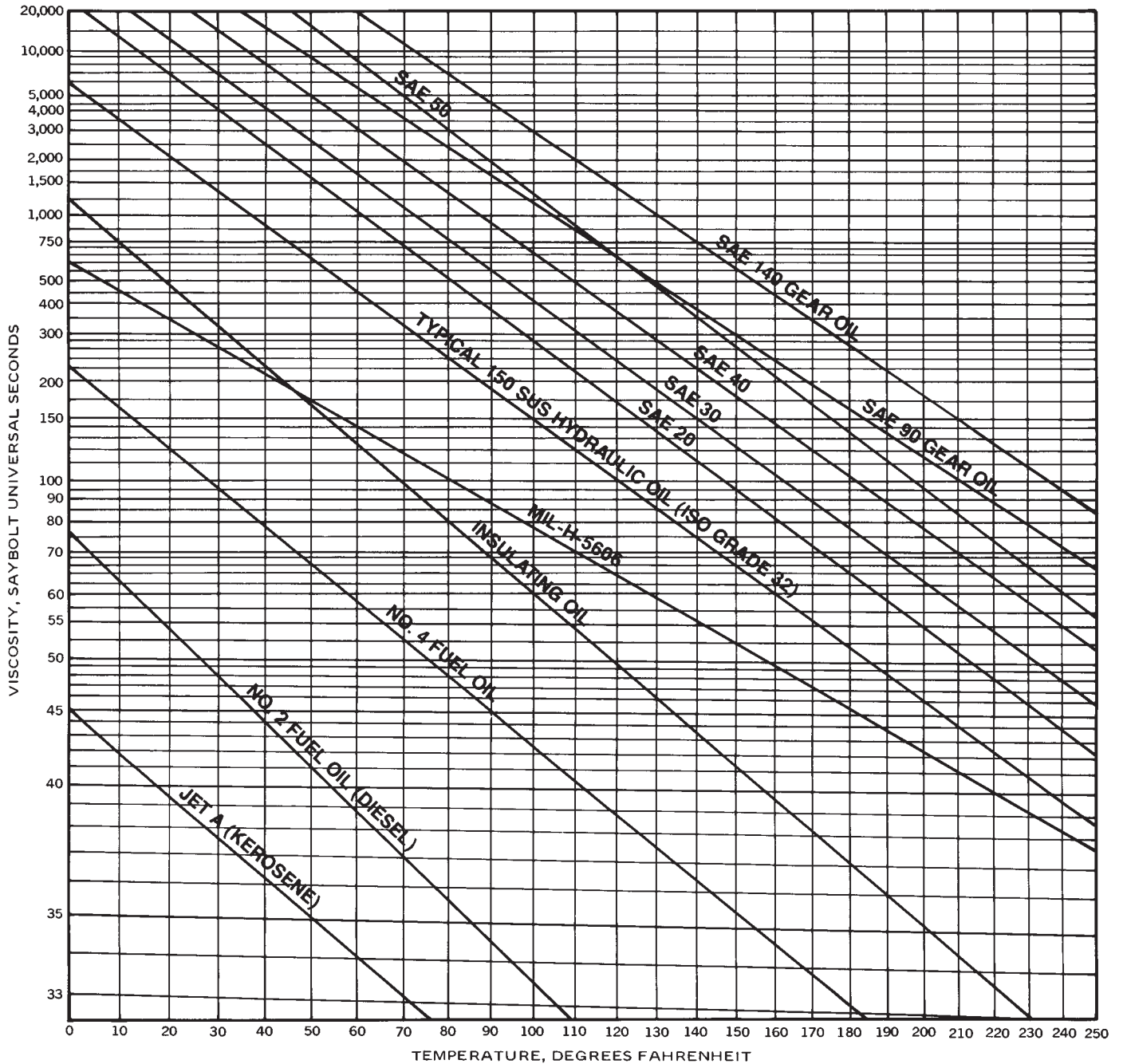
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Centistokes to Saybolt Universal Seconds Conversion

To convert centistokes to Saybolt Universal Seconds, find the centistoke value on the table at left and then read across to find the equivalent value in Saybolt Universal Seconds.

EXAMPLE:

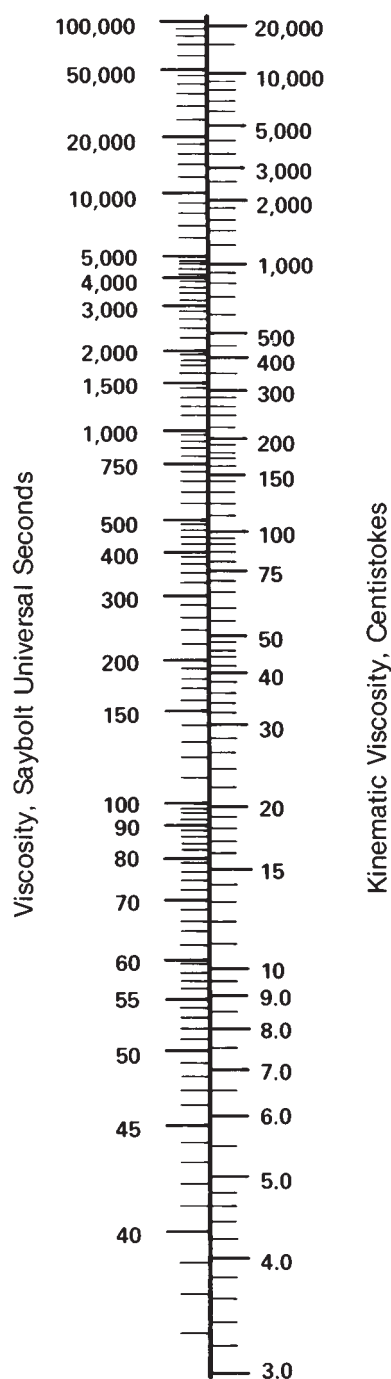
A viscosity of 30 centistokes is equivalent to 140 Saybolt Universal Seconds.

NOTES:

- a) If the viscosity is given in centipoise (cp), it can be readily converted to centistokes (cs) by the formula:

$$\text{centistokes} = \frac{\text{centipoise}}{\text{specific gravity}}$$

- b) Centistokes are often designated by cSt.
c) Saybolt Universal Seconds are designated by either SUS or SSU



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CLAY TREATMENT OF TURBINE FUEL

Surfactant contamination in turbine fuels has been attributed to the following sources:

- 1. Refinery** – Naphthenic and sulfonic acids; also sodium naphthenates and sulfonates formed during acid and caustic treating.
- 2. Pipelines and transport trucks** – Residuals from motor gasolines and heating oils adsorbed on pipe walls – then desorbed into turbine fuel. Also, pipeline additives are surfactants.
- 3. Ships and barges** – Same methods as in (2) above. Also, sea water and acids in the fuel can combine to form sodium naphthenates and sulfonates.
- 4. Maintenance materials** – Soaps, detergents, and steam cleaning residues. Rust preventives and descaling chemicals usually are surfactants or combine to form surfactants.

The problems that are attributed to surfactants are principally related to their tendency to prevent the filter/separator from performing its functions, i.e., removing dirt and water from the fuel. The mechanics of this are a subject for a separate discussion but the

results of such a failure are extensive. Water and dirt in an aircraft fuel system have well recognized dangers, but secondary effects are of equal importance. Bacteria can grow in the aircraft fuel system if water is present and the result can be corrosion of structural members and errors in the signals from fuel quantity gauging probes.

Treatment of fuel to remove surfactants is usually done with attapulgus clay. In the refinery, large towers are built to contain many tons of bulk clay in a percolation column. However, complications of handling bulk clay outside of a refinery have led the industry to use element-type clay vessels when it is necessary to treat the fuel in field installations.

The key to good results in clay treatment is to keep the fuel in contact with the clay for as long a time as possible. We call this "residence" time. If you look at a clay particle, you see what seems to be a grain of fine (60 to 90 mesh) sand. But if you look within the grain with a microscope, you find it is made up of smaller particles that cling together to form a porous mass. If we now examine these smaller particles with an electron microscope, we see that they contain thousands of tiny needle-like attapulgite crystals.



This photograph was taken at 35000X and was reproduced from technical literature of Minerals and Chemicals Philipp Corporation.

Scientists have calculated that one pound of attapulgite has about 13 acres of surface area.

It is clear that residence time, mentioned above, is required because the fuel must have enough time to penetrate the clay particle where the surfactant can be adsorbed onto the surfaces of the crystals. Extremely small dirt particles in the sub-micronic range are also adsorbed. This is why the oil industry and most filter manufacturers keep the flow rate per standard element very low – from 5 to 6 gpm, but never higher than 7 gpm. The industry is well standardized on 18" long elements, 7" diameter.

Referring once again to the construction of a clay particle, it was mentioned that the individual grains are made up of very small particles that cling together. The grains will not break down under normal conditions, but water can cause this to happen. To deter breakdown in the presence of water, Velcon Filters, Inc. uses an oven-treated grade of clay, known as LVM.

The improvement in operating life of coalescer elements when clay is installed is dramatic. At one location, 50,000 gallons were clogging Velcon Filters "9" series elements.

Life jumped to 4 million gallons after clay was installed and the clay elements lasted 8 million gallons. In another installation, regular "6" series elements were lasting only 200,000 gallons. After clay was installed, life went up to 16 million gallons. The improvement in filter membrane color ratings is just as dramatic as the improvement in coalescer life.

Two types of elements are available for clay vessels. One is a bag element which contains a given quantity of clay inside a cloth bag. The second element is a rigid canister, which contains the same clay. Velcon only produces the canister type elements because they provide a more effective sealing mechanism between elements when they are stacked on top of one another in the clay vessels. This cuts down on by-passing caused by folds of the cloth of the bag element. Since the flow rates on clay elements are quite low, it is possible to have a significant amount of by-passing from relatively small apertures between the bag elements. Also, some competitors' bag elements and canisters contain less efficient 30–60 mesh clay. We encourage customers to use Velcon's canister type element (with 60–90 mesh) for the best performance and highest efficiency of clay treatment vessels.



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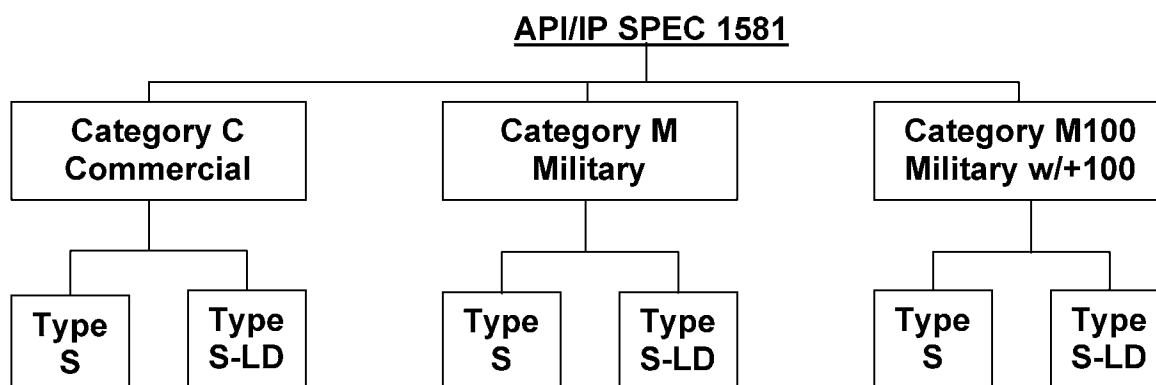
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API/IP 1581 5th Edition Specification* Key Points

1. **Category “C”** filter/separators are for use in commercial Jet-A or Jet-A1 fuel. They are tested in fuel containing anti-static additive Stadis 450 and corrosion inhibitor DCI-4A.
2. **Category “M”** filter/separators are for use in military JP-8 or JP-5 fuel. They are tested in fuel containing Stadis 450, DCI-4A, and anti-icing additive Di-EGME.
3. **Category “M100”** filter/separators are for use in military JP8+100 fuel. They are tested in fuel containing Stadis 450, DCI-4A, Di-EGME, and thermal stability additive Spec Aid 8Q462.
4. **Type “S”** filter/separators are used at filtration points where significant levels of both dirt and water can be expected.
5. **Type “S-LD”** filter/separators are used at filtration points where significant levels of water but minimal amounts of dirt can be expected. (Note: testing to Type “S” qualifies for both Type “S” and Type “S-LD”.)



6. Multi-Stage Systems can be used at all filtration points in addition to filter/separators where additional performance is desired. Multi-stage devices can include upstream pre-filters and downstream water absorbing filters.
7. The API specification procedures qualify the entire filter/separator, not just the elements. Strictly speaking, there is no such thing as an API qualified element. There are only elements that are used in an API qualified filter/separator.
8. A filter/separator of similar geometry to the tested vessel can be qualified by similarity providing that a complex set of criteria are met. This is particularly significant in establishing A.P.I. qualification for existing equipment in the field. API/IP Specification 1582** details the similarity specifications that have to be met in order for a filter/separator to be qualified by similarity.
9. In order for a filter/separator to be accepted as meeting the API specification, it must be tested to the specification with an official witness designated by the API committee present. This witness ensures that all procedures are followed per specification and that all test results meet the specification requirements. An official test report is then issued by the API.

* API/IP Specification 1581, Fifth Edition, “Specifications and Qualification Procedures for Aviation Jet Fuel Filter/Separators”, July 2002

** API/IP Specification 1582, “Specifications for Similarity For API/IP 1581 Aviation Jet Fuel Filter/Separators”, February, 2001

FILTER/SEPARATOR SPECIFICATIONS

MAJOR MECHANICAL, TEST, & PERFORMANCE REQUIREMENTS

CRITERIA		SPECIFICATION REQUIREMENT
TEST FUEL ADDITIVES	CATEGORY C	1.0 MG/L STADIS 450 + 15.0 MG/L DCI-4A
	CATEGORY M	2.0 MG/L STADIS 450 + 15 MG/L DCI-4A + 0.15% DI-EGME
	CATEGORY M100	2.0 MG/L STADIS 450 + 15 MG/L DCI-4A + 0.15% DI-EGME + 256 MG/L SPEC AID 8Q462
TEST SERIES TO BE RUN		SINGLE ELEMENT
		FULL SCALE
FUEL HANDLING	SINGLE ELEMENT	SINGLE PASS FROM 1 TANK TO ANOTHER
	FULL SCALE	RECIRCULATE
FUEL TEMPERATURE	MINIMUM TEMPERATURE	40 DEG F
	MAXIMUM TEMPERATURE	90 DEG F
	DEVIATION FROM TEST START TEMPERATURE	+/- 11 DEG F
MAXIMUM CLEAN INITIAL DIFFERENTIAL PRESSURE		6 PSID ACROSS FILTER/COALESCER STAGE, 10 PSID ACROSS VESSEL
STRUCTURAL STRENGTH OF FILTER/COALESCER ELEMENTS		75 PSID WITH NO RUPTURE, BYPASSING OF SEALS, OR PINHOLE LEAKS
STRUCTURAL INTEGRITY OF FILTER/COALESCER ELEMENTS		NO MEDIA OR STRUCTURAL DETERIORATION SUCH AS LEAKS OR TEARS
MAXIMUM EFFLUENT CONTAMINANT LEVELS DURING TESTS	FIBER CONTENT	10 FIBERS PER LITER
	SOLIDS CONTENT	1.0 MILLIGRAM PER GALLON
	FREE WATER CONTENT	15 PARTS PER MILLION
CONDITIONING RUN TEST	FLOW RATE	3 GPM FOR SINGLE ELEMENT TEST, 10% OF RATED FLOW FOR FULL SCALE TEST
	TEST DURATION	30 MINUTES
WATER COALESCENCE TEST - CLEAN ELEMENT	FLOW RATE	RATED FLOW
	TEST DURATION	30 MINUTES
	WATER INJECTION RATE	0.01% BY VOLUME
SOLIDS HOLDING TEST	FLOW RATE	RATED FLOW
	TEST DURATION - TYPE S	75 MINUTES FOR SINGLE ELEMENT, 45 MIN FOR FULL SCALE
	TEST DURATION - TYPE S-LD	ADD SOLIDS UNTIL PRESSURE REACHES 22.5 PSID, THEN RUN ADDITIONAL 45 MINUTES WITH NO ADDITION
	SOLIDS INJECTION RATE	72 MG/GAL
	MAXIMUM DEPTA P AT 50 MINUTES - TYPE S	15 PSID
	MAXIMUM PRESSURE AT 75 MINUTES - TYPE S	45 PSID
WATER COALESCENCE TEST - DIRTY ELEMENT	FLOW RATE	RATED FLOW
	TEST DURATION-Single Element	1ST PERIOD: 150 MINUTES, 2ND PERIOD: 30 MINUTES
	- Full Scale	1ST PERIOD: 90 MINUTES, 2ND PERIOD: 15 MINUTES
	WATER INJECTION RATE	1ST PERIOD: 0.01%, 2ND PERIOD: 3.0%
VESSEL LENGTH TO DIAMETER RATIO	VESSEL ≤ 24 INCHES	1.75
	VESSEL > 24 INCHES	2.5
MINIMUM SPACING BETWEEN ELEMENTS AND BETWEEN ELEMENTS & VESSEL WALL		0.5 INCHES



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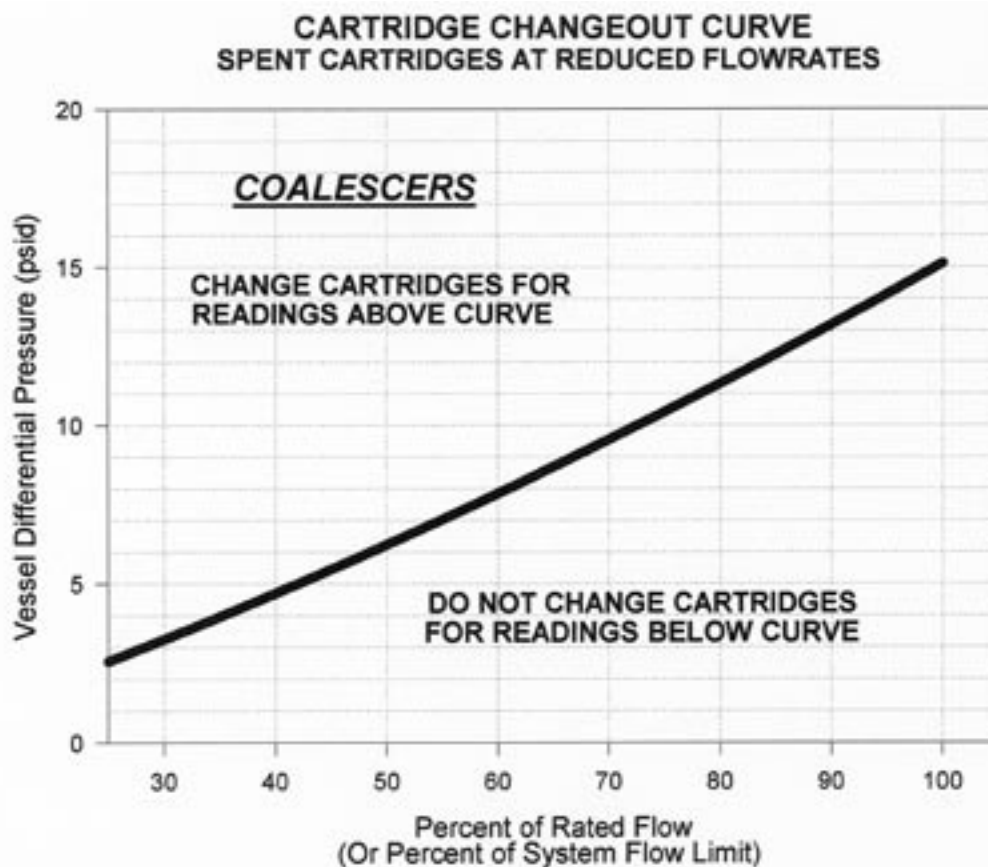
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Pressure Drop Curve With “Spent” Coalescer Cartridges

Velcon recommends changing coalescer cartridges when the pressure differential reaches 15 PSID and the filter/separator is being operated at its rated flow. The system, however, will often be operating at lower flow rates with a corresponding lower differential pressure. If, for example, a 600 GPM filter/separator shows a differential of 12 PSID at 300 GPM and the flow rate was increased to 600 GPM, the differential would be about 20 PSID which is considerably above the recommended pressure drop for changing elements.

It is important, therefore, to know the pressure differential characteristics at lower flow rates for a set of coalescer cartridges which are plugged to the extent that they would show a 15 PSID differential at rated flow. The graph below contains this information for Velcon coalescer cartridges.



Vessel pressure drop characteristics with “spent” cartridges

EXAMPLES: A 1000 GPM filter/separator is operating at 600 GPM (60% of rated flow). If the pressure differential is less than 8 PSID, the cartridges do not require changing. If the pressure differential is 8 PSID or more, however, the elements are due for a changeout.

EXCEPTION: If the system in this example is limited to a maximum flow of 750 GPM by pump capacity or some other factor, then 750 GPM should be considered 100% of rated flow rather than higher rating of the filter/separator. In this case, the 600 GPM flow would be 80% of rated flow and the differential at this rate can be as high as 11½ PSID without changing elements.

NOTE: “Stick-on” labels (Form #1486) of the above graph can be obtained from Velcon Filters, Inc., Colorado Springs. These labels can be affixed to the F/S vessel near the differential pressure gauge.



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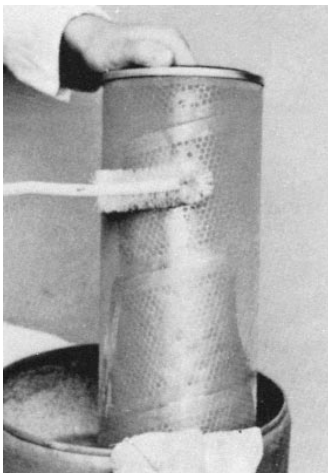
Maintenance Instructions

Teflon® Coated Screen Separator Elements

DO NOT THROW TEFLON COATED SCREEN SEPARATOR ELEMENTS AWAY WHEN CHANGING COALESCERS. These separators are designed to eliminate the costly practice of replacing paper separators. It is recommended, however, that the separators be inspected, tested and cleaned at every coalescer change to assure prolonged, effective separation life. The procedure for this is described below:

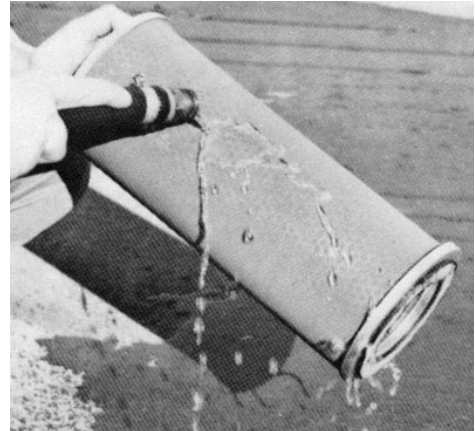


1. Throughout the entire procedure, **AVOID LETTING SCREEN COME IN CONTACT WITH YOUR BARE SKIN**, particularly after the element has been cleaned. Hold the element by the end-caps. If necessary to handle the screen during removal or installation, use a clean, dry, non-abrasive material, such as a poly-bag from one of the coalescers, between your hand and the screen.

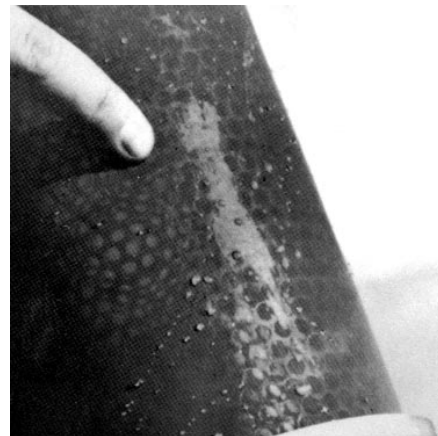


2. After removing the element from the vessel, submerge it in clean fuel and gently scrub the entire screen surface with a soft cloth or soft bristle brush.

3. SURFACE INSPECTION. Holding the element by the endcaps, visually inspect the entire surface of the screen for any nicks or cuts. If there are any visible flaws, they should be patched (see 6).



4. WATER TEST. Be sure that the separator is fuel-wetted before performing this test. Hold the element by the end-cap at an angle, and gradually pour water over the entire screen surface. Do not spray the water and do not let it fall more than a distance of three inches before contacting the screen.



The water will bead and roll off the surface of properly functioning separators (as it would on a freshly-waxed car). If this is the case, the separator has passed the Water Test and can be reused.

If any portion of the Teflon coated screen is wetted by the water (the water will seep into the pores of the screen; this is very obvious to the eye), the element has failed the Water Test. The wetted area must be cleaned again (see 7), and the recleaned element should pass the Water Test before it is reinstalled.

NOTE: The separator in the photo above has been purposely disarmed to show a water-wetted surface.



5. If the separator passes the Surface Inspection and Water Test, rinse it thoroughly in clean fuel to remove traces of water. Let the separators air dry prior to reinstalling.

6. If an element fails the Surface Inspection due to visible nicks, cuts, or other flaws in the screen that can be caused by mishandling, they can be patched if they are smaller than $\frac{1}{8}$ inch (size of dot ●). Use clear fingernail polish or any epoxy base putty of the type used for automobile body repairs.

**ALWAYS REPEAT THE WATER TEST
TO INSURE A GOOD PATCH.**

**BE SURE THAT THE SEPARATOR IS FUEL-WETTED
BEFORE PERFORMING THIS TEST.**

7. If an element fails the Water Test due to visible wetted areas, try washing the element with hot water. Use pressurized hot water from a tap or hose and thoroughly spray the wetted area. Scrubbing with a soft rag or brush will often help on stubborn areas. Allow the element to dry, then perform the Water Test again. If the element continues to fail the Water Test, it must be replaced.

8. If gaskets should become dislodged, thoroughly clean gasket and end-cap surfaces with a solvent such as MEK or Acetone. Apply a super glue cyanoacrylate adhesive, such as Bostik #7432, to end-cap. Place gasket onto end-cap, applying pressure over entire surface of gasket. Let dry approximately 30 seconds.

9. REMINDER. While reinstalling the Teflon coated screen elements, be sure to avoid handling the screen with your bare hands. If you must handle the screen, use a clean, dry, non-abrasive material, such as a poly-bag. Be sure to remove all poly-bags prior to closing vessel.

NOTE: The above cleaning instructions are also applicable to the Velcon synthetic media (Repeller®) separators. These can be cleaned a maximum of two times before they should be replaced.



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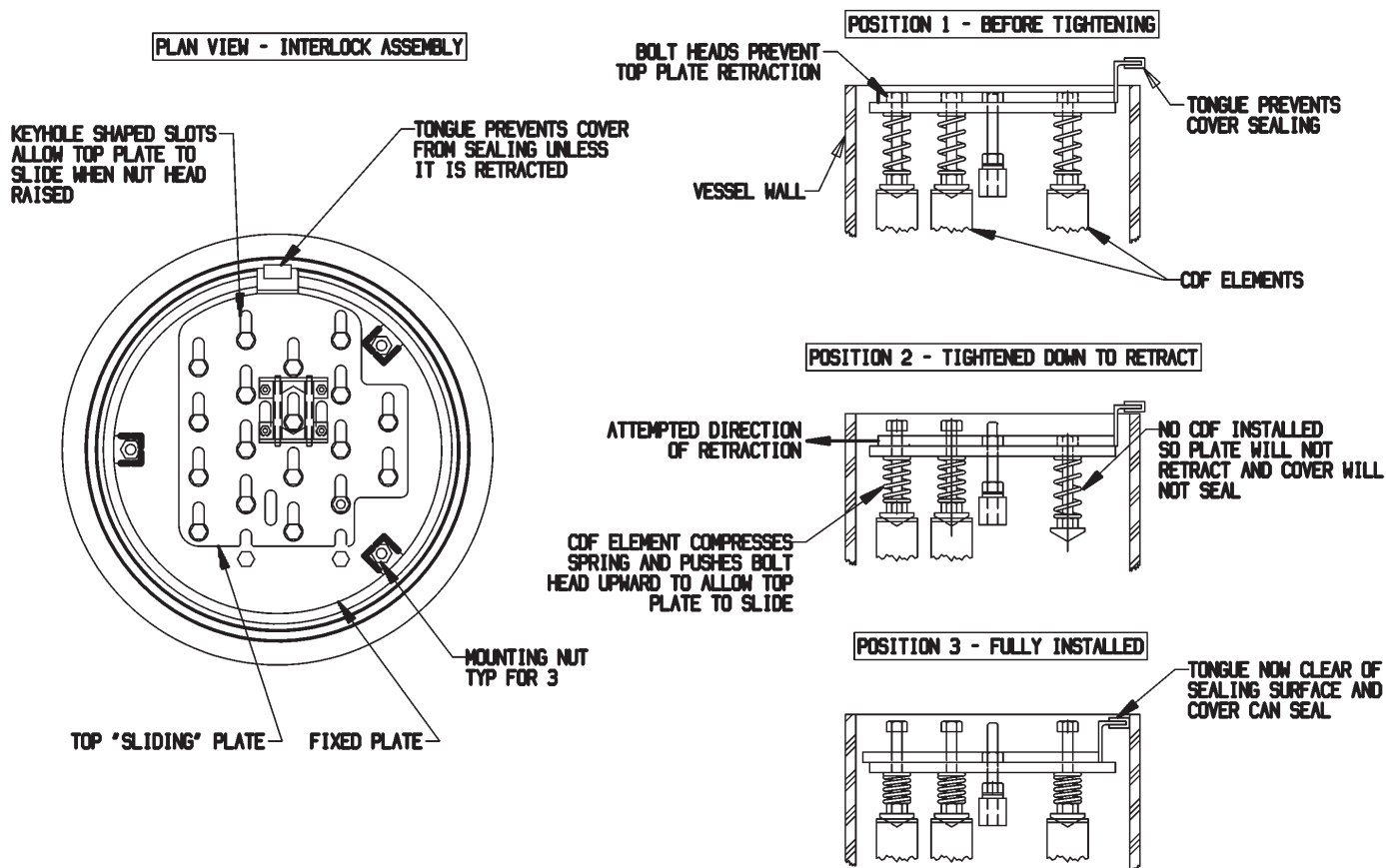
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Monitor Interlock Operating Principle



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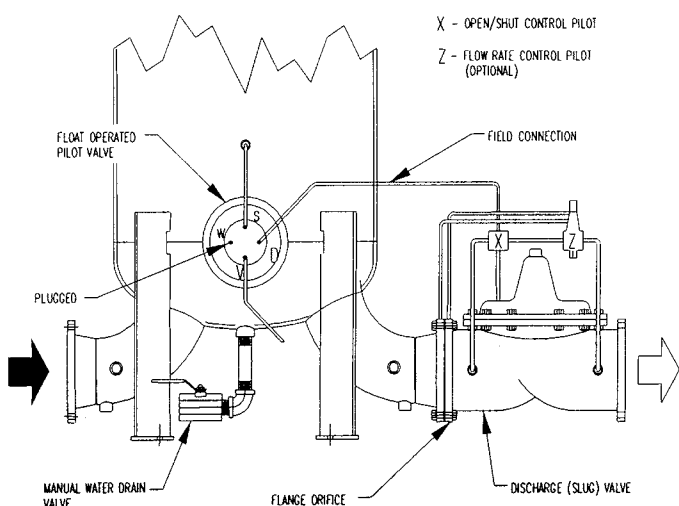
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Typical Float Control & Slug Valve Hook-up

PORT FUNCTION	VENDOR IDENTIFICATION		
	WATTS ACV	CLA-VAL	OCV
S = PRESSURE SUPPLY	P	S	P
W = WATER DRAIN VALVE	DV	W	W
D = DISCHARGE (SLUG) VALVE	SV	F	A
V = VENT	E	D	E



FLOAT FLANGE TORQUE REQUIREMENTS

- Hand tighten all nuts evenly to hold float control in place. (Flat gasket should be dry.)
- Apply 30% of required torque in a cross-torquing process to all nuts.
- Follow above procedure to 60% of required torque and then again to 100%.

Vessel Design	Torque Requirements
150 psi	25 ft/lb
275 psi	40 ft/lb

INSTRUCTIONS

1. Float operated pilot valve is normally installed at the factory. If installed in the field, ensure it is installed right side up.
2. Supply port on the float valve (S) is plumbed to a fitting on the vessel downstream of coalescers to ensure supply line is free of solid contamination.
3. The float valve water drain port (W) is plugged (see Note 2).
4. The float valve discharge (slug) valve port (D) is connected to the open/shut control pilot (X) on the discharge (slug) valve. (If no discharge (slug) valve is installed, the port is plugged.)
5. Rate of flow control, (ROFC) orifice is located on inlet flange of Cla-Val, Watts ACV, & OCV slug valves. The ROFC valve is available with optional check valve feature. The float pilot is available with optional internal ballast to check the integrity of the float ball. We strongly recommend the ballast type float controls!!
6. Remove the plastic cap plug from the vent port (V). (The vent port can be left open or optionally connected to downstream of the manual water drain valve. If connected be sure that there is no line pressure acting against the vent.)

NOTES

1. The Watts ACV and OCV float systems use supply pressure to open the automatic drain valve and to keep the discharge (slug) valve open.

The Cla-Val float system uses supply pressure to keep the automatic water drain valve closed and to close the discharge (slug) valve.
2. VELCON DOES NOT RECOMMEND, WARRANTEE, OR SELL AUTOMATIC DRAIN VALVES. They do not completely drain the water from the sump and they malfunction too often resulting in costly fuel spills and subsequent environmental problems.



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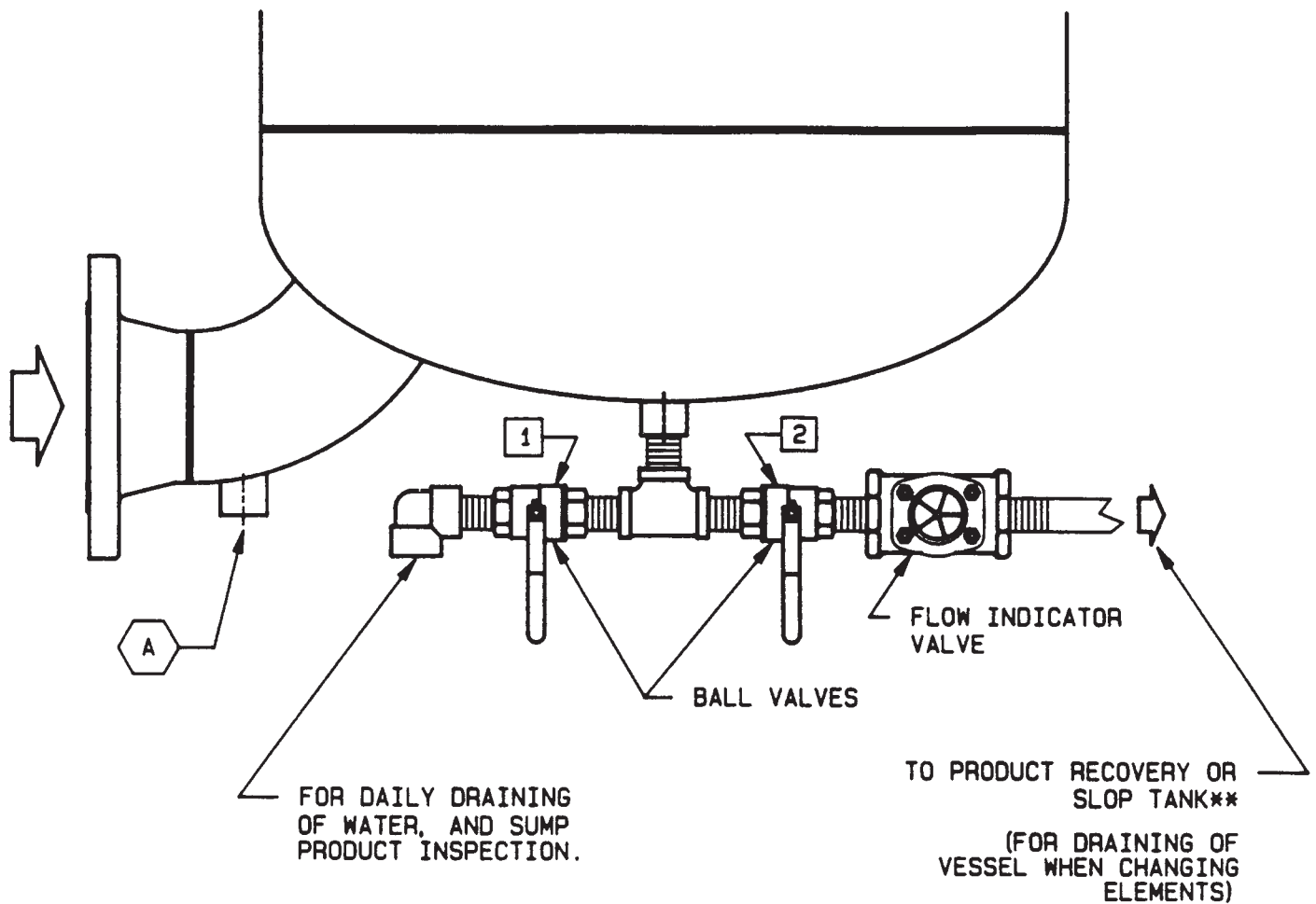
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Recommended Manual Drain Hookup VV23/VV28/VV36 Filter/Separator Vessels



**** WHEN DRAINING VESSEL TO CHANGE ELEMENTS:**

1. Drain completely out of vessel through ball valve #2 above.
2. Drain a few gallons out of manual drain valve "A" (or plug) located at the bottom of the inlet elbow. This insures no fuel remains trapped inside coalescers. (Otherwise unfiltered fuel from inside the coalescers could make clean-up of the sump more tedious.)

NOTE:

A flow indicator valve is recommended so that operator will remember to close valve #2 when filling the vessel. It also shows operator when the vessel is completely drained.



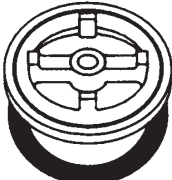
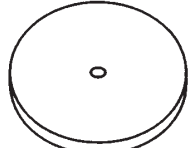
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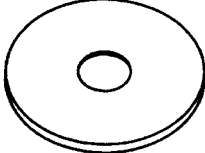
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VELCON OPEN-END ADAPTERS					
ELEMENT ID:	2" ID	2-1/4" ID	2-1/2" ID	3-1/2" ID *	4-1/2" ID
APPLICATION:	SO-300V	CO-718CE LA-71801B	FO-718PL FO-600FGA	I-6000, SO-400V SO-600VA, FO-600PL FO-600FG, SO-600PL	SO-600V
MOUNTING ADAPTER  (INCLUDES GLUED-ON GASKET)	12-02S WITH GASKET G-0131	12-02S WITH GASKET G-0131	12-02G WITH GASKET G-1041	12-02I WITH GASKET G-0126 (12-02W)	12-02U WITH GASKET G-0129A
SPACER (CENTER PLATE) 	N/A	12-02F	12-02A	12-02K (12-02T)	N/A
END CAP 	N/A	12-02M	12-02M	12-02C (12-02X)	N/A
*NOTE: ADAPTER PART NUMBERS SHOWN HAVE HOLES DRILLED FOR 3/8" DIAMETER TIE RODS. PART NUMBERS IN PARENTHESES FOR 3-1/2" ID ELEMENTS HAVE HOLES DRILLED FOR 1/2" DIAMETER TIE RODS (FACET VESSELS) .					





Velcon Nut & Washer Part Numbers

VELCON NUT & WASHER PART NUMBERS			
SIZE:	3/8" (16NC)	1/2" (13NC)	5/8" (11NC)
HEX NUT 	K07 (07-070)	K02 (07-020)	K19 (07-128)
LOCK WASHER 	K05 (07-071)	K54 (07-032)	N/A
FLAT WASHER 	K06 (07-042)	07-035	N/A
TIE ROD GASKET 	G-0305	G-0313	N/A
SPIDER: FLAT WASHER (LARGE OD) 	K87 (07-034)	K08	K18 (07-129)



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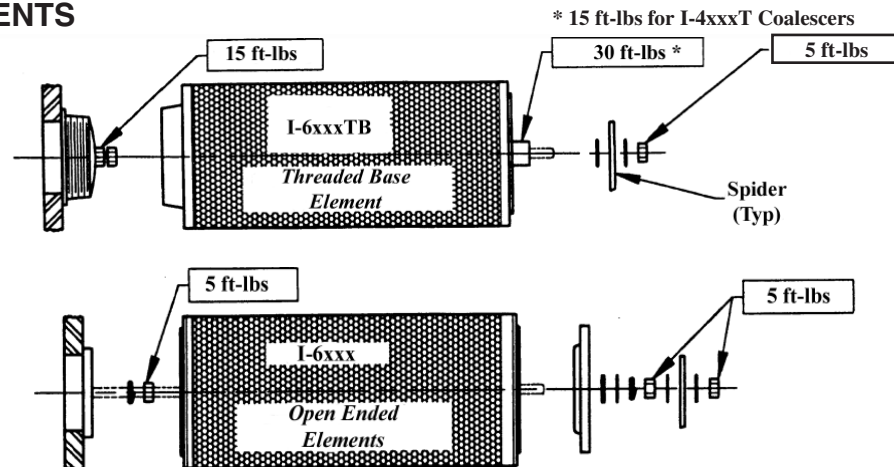
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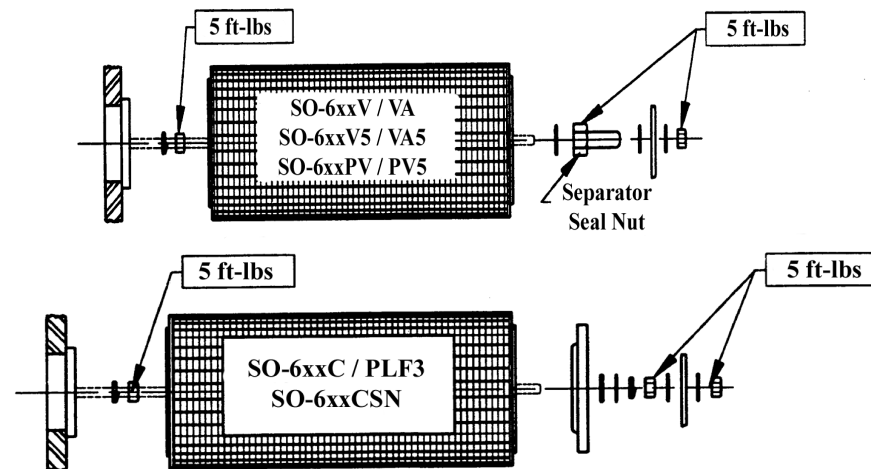
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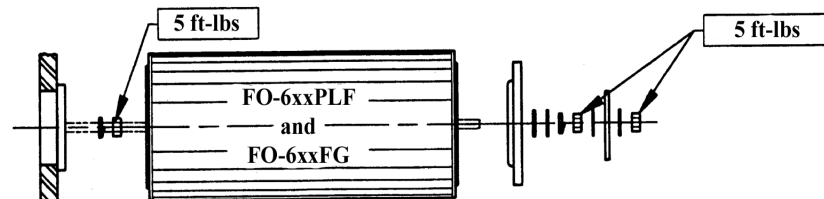
COALESCER ELEMENTS



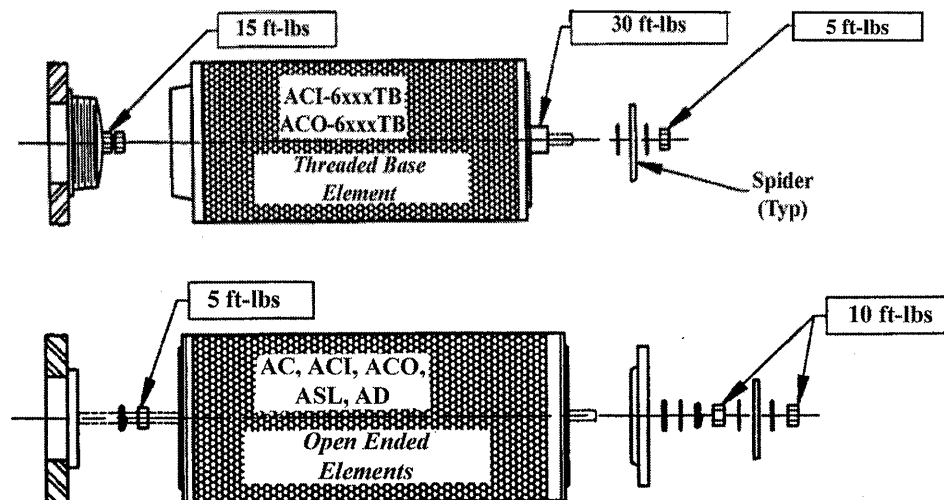
SEPARATOR ELEMENTS



FILTER ELEMENTS



Aquacon® ELEMENTS



TORQUE CONVERSION TABLE

ft-lbs	inch-lbs	kg-m	N-m
5	60	0.69	6.78
10	120	1.38	13.56
15	180	2.07	20.34
20	240	2.77	27.12
30	360	4.15	40.67



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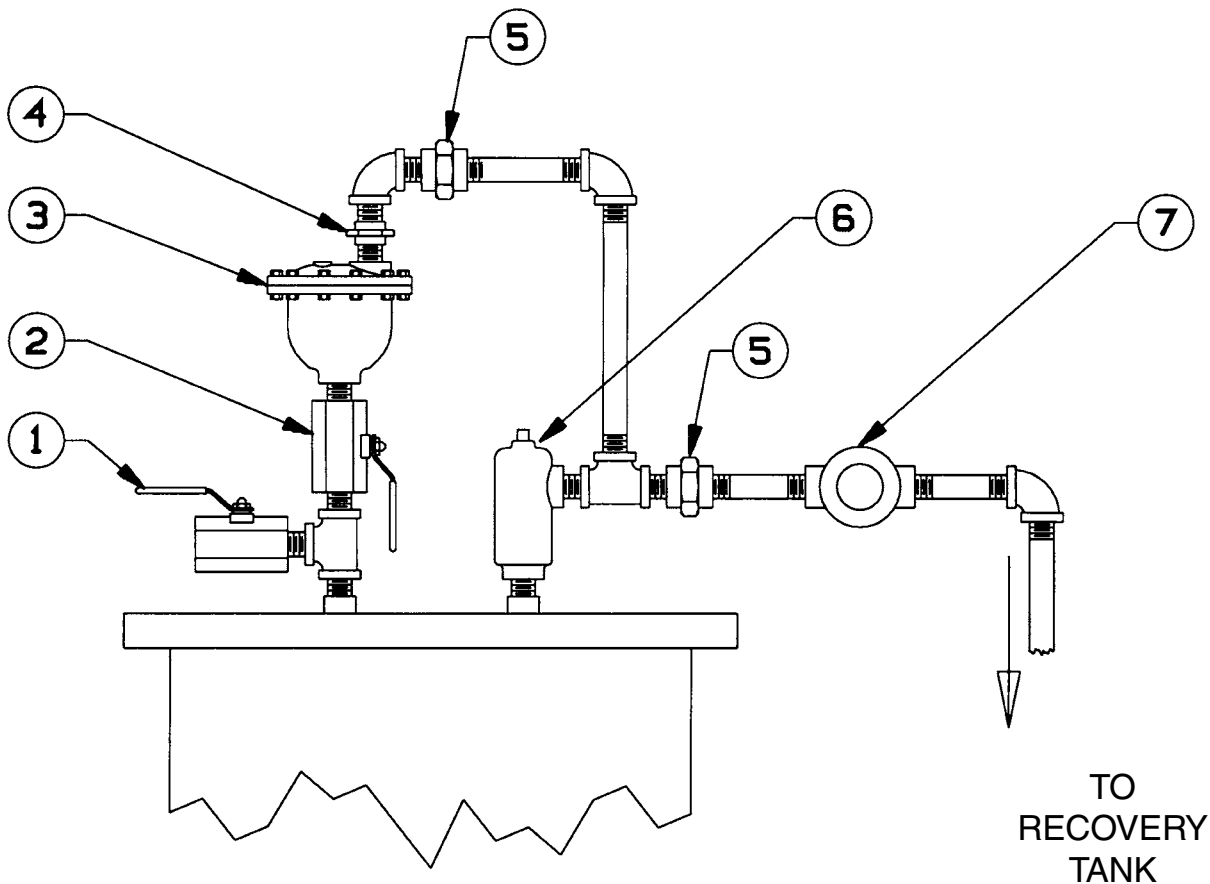
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Auto Air Eliminator & Relief Valve Hook-Up

Typical Arrangement for Filter/Separator



1. Ball Valve – Close for normal operation. Open when filling or draining the vessel.
2. Ball Valve – (Optional) Open for normal operation. Close when air eliminator is to be removed for service.
3. Automatic Air Eliminator
4. Check Valve – Prevents air from siphoning into vessel
5. Pipe Unions
6. Pressure Relief Valve – Set at maximum working pressure (design pressure) of vessel or lower
7. Flow Indicator (Optional)



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Safe & Sound

Velcon Filters Give You More of Both

To keep your system safe, watch for these problems. To keep your system sound, pay attention to these components.

TROUBLESHOOTING COMMON PROBLEMS IN YOUR FUEL FILTRATION EQUIPMENT:

1. The Differential Pressure Gauge keeps track of the pressure difference between your filter/separator vessel's inlet and outlet, telling you when to change filters. Watch for these problems:

A sluggish direct-reading gauge may not show correct differential pressure. In a direct-reading gauge like a Gammon Gauge, install a new filter at the top of the gauge. If this doesn't help, dismantle the gauge and polish the piston and the inside of the glass cylinder with a Scotch Brite® pad. Don't use any other material.

A fluctuating needle on a dial-type gauge is hard to read and may be a precursor to a damaged gauge. Install pressure snubbers on the lines leading to the gauge.

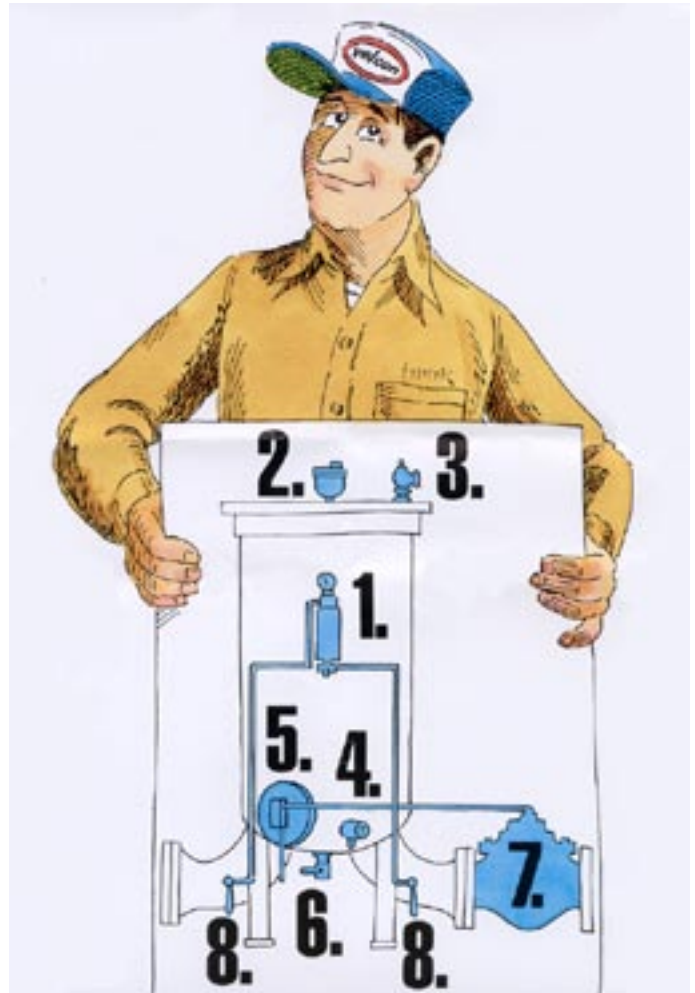
If the needle on your dial gauge has come off or the pointer doesn't return to zero, your gauge has failed and you might have burst or collapsed elements. Replace the gauge and the elements and keep the problem from happening again by putting in adequate-sized surge suppressors.

2. The Automatic Air Eliminator allows trapped air to escape when you're filling the vessel, which prevents interior fires.

If it leaks fuel continuously, the valve pin isn't seating in the seal washer. If the air eliminator has a removable cover, order an overhaul kit.

If it won't release air in cold weather, try tapping it gently on the outside. This should release the internal float, which could be frozen in the closed position.

If it won't release air fast enough, tell your Velcon distributor the actual maximum system operating pressure. You can probably get a seal with a larger opening.



3. The Pressure Relief Valve should be set to keep the system pressure at a safe level.

A continuous fuel leak means the seat seal is damaged. Often it can simply be replaced. Check with the manufacturer. Also, the pressure setting of the valve may not be as high as it should be. Have the valve tested and reset it at the design pressure of the system.

4. The Sump and Drain Heaters keep water from freezing in the system in cold climates.

If the vessel interior is warm when you change filter elements, you forgot to turn off the heater before you drained the vessel. Bad idea!

If the heater doesn't work when the temperature drops to 35°F, try these three things:

- **Reset the internal thermostat, if you have one.**
- **Make sure the heater is hooked up to the right voltage.**
- **Slowly turn the thermostat adjustment through the present ambient temperature to see if it clicks. If it doesn't, it's not working.**

The Sight Glass, we believe, shouldn't be there at all. We recommend you get rid of it. In the first place, it's easily broken, which can lead to big spills. And if the glass gets gummed up, looking at the fuel/water interface becomes difficult, if not impossible.

5. The Float Control sinks in fuel and floats in water. It detects water buildup problems and signals the slug valve to shut down.

When fuel drips continuously from the vent port, check for dirt trapped in the seals. Take the float assembly apart and clean it carefully. Also look for damage to the O-rings and seat. If you find any, order a repair kit.

If you push in on the manual tester and it doesn't show resistance, the float ball is stuck in the top position or is floating in water. Drain all the water in the vessel sump. If the float doesn't return to the down position, remove the float assembly and repair or replace it.

6. The Manual Drain Valve should be opened daily to remove any water and to sample the fuel in the sump.

If water and dirt come out of the sump, check that you opened the right drain valve. Some vessels have two or more drain ports, and one is from the inlet, or dirty compartment, where you expect dirt and water. The other is from the main compartment, where fuel should be clean and coalesced water is accumulated in the sump.

If you can't take samples because the drain line from the clean compartment is solid-plumbed to the slop/recovery tank, your system isn't installed properly. Put in a tee and an additional ball valve.

If a newly-installed vessel shows dirt, pipe scale, or weld slag in the interior, be sure the inlet and outlet drain lines have separate valves and the lines are not interconnected. Otherwise, unfiltered fuel can flow backwards and enter the vessel through the clean-compartment drain valve.

7. The Slug Valve shuts off the system on a signal from the float control when excessive water buildup threatens the system.

If the vessel flow shuts off, check these five things:

- **There might be water in the vessel.**
- **The float might be stuck in the up position.**
- **The float control might be hooked up to the slug valve incorrectly.**
- **The float control vent might be plugged.**
- **The main valve diaphragm might be ruptured.**

8. The Sampling Probes enable you to take representative fuel samples from each side of the vessel.

If it leaks, replace the poppet seal in the quick disconnect. You should install an on/off ball valve between the probe and the quick disconnect so that you can replace the seal without having to drain the system.

The Automatic Drain Valves, like the Sight Glass, we believe, shouldn't be there at all. If you have any, we suggest you take them out and replace them with manual ones. They're neither recommended nor warranted, they don't get rid of all the water, and they frequently malfunction.

Some Sound Information, Useful and Readily Available:

The Manual of Aviation Fuel Quality Control Procedures, ASTM Manual Series MNL5, Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Phone: (610) 832-9585.

Standards for Jet Fuel Quality Control at Airports, ATA Specification No. 103, ATA Distribution Center, PO Box 511, Annapolis Junction, MD 20701 U.S.A., Phone: (800) 497-3326 / (301) 490-7951.



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and Separation
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Pure & Simple

Velcon Filters Give You More of Both

Pure Fuel: How to make sure that's all you ever deliver

EVERY TIME YOU RECEIVE FUEL:

- Before you accept it, take a sample from the lowest point in each compartment into a clean white bucket. If it's clear, bright and free of water, it's okay. If you're not sure about "clear and bright," see the section at the top right.

EVERY DAY:

- Drain the sump of each filter vessel and storage tank into a white bucket. Take filter samples with the pump on. Inspect samples for contamination particles and discolored water. Be sure all accumulated water is drained off.
- Check and record the pressure differential across each filter housing under normal flow conditions.

ONCE A MONTH:

- Do a membrane filter test downstream from each jet fuel filter vessel.
- Check nozzle screens for particles. If you find any, check out the refueling equipment to find out why.

ONCE A YEAR:

- Inspect your storage tanks and clean them if they need it.
- Check the water defense system in the filter/separator. Be sure the float control is buoyant and is still able to shut down the slug valve.
- Change your coalescer elements and any pleated paper separator elements. Your Velcon representative can help you get the right element sets and conversion information to meet API/IP 1581.
- Clean, inspect, and test any Teflon[®] coated screen separators. (See Velcon data sheet 1242)
- Use water-absorbent filter cartridges in your Avgas system. We recommend Velcon's **Aquacon[®]** cartridges, but we're prejudiced.



Five Simple things that tell you what you're looking at:

1. "Clear and bright" doesn't mean the color of jet fuel, which can range from colorless to straw color. It means no free water, no sediment and nothing clouding the fuel or floating in it.
2. If you're not sure whether you're looking at water or colorless jet fuel, pour in some coffee. It separates from the fuel, but it mixes with any water in the jar.
3. For water contamination control, don't ever put your faith in an automatic water drain valve or a sightglass. Automatic drain valves won't get out all the water and bacteria grows where the fuel and water surfaces meet. And sightglasses are useless unless they show you both fuel and water and the line between them. Otherwise, you don't know whether you're looking at pure fuel or pure water.
4. Differential pressure is the difference between the pressure upstream and downstream of a filter/separator. Differential pressure increases when contaminant is filtered by the first-stage cartridges and causes a flow restriction.
5. A sudden decrease in pressure differential across a filter housing may mean trouble. The vessel should be opened immediately and inspected for ruptured elements, seals or mounting hardware. It's also possible to get a decrease in pressure differential without any of these failures. It can happen if cartridges that have been separating water from the fuel now are exposed to dry fuel. The water is slowly pushed out of the coalescer, resulting in decreased differential pressure.

Follow these simple steps and you won't start a fire when you fill a filter vessel:

Fires start from sparks caused by electrostatic buildup. Here's how you can prevent them.

1. Close the outlet valve and the drain valves.
2. Crack open the inlet valve *slightly* so that the vessel will fill *slowly* to prevent charge buildup.
3. Start the pump.
4. If you have a manual air eliminator, open it completely.
5. Allow about 10 minutes to fill the vessel. If it fills faster than that, you're taking a chance.
6. Remember to close the air eliminator when the vessel is full.
7. If the vessel has an automatic air eliminator with a check valve, you had to remove the check valve before you could drain. Remember to put it back.

Some simple ways to stay out of trouble when you change cartridges..

- **Drain the filter housing completely.** Otherwise, the dirt can fall out of the cartridge and contaminate the fuel. If you open the air eliminator, the vessel drains faster. Remove the used cartridges.
- **Don't touch the new coalescer and separator cartridges.** Leave the polybags on the cartridges as you install them. And before you close the vessel, take the bags off *slowly* to avoid building up an electrostatic charge. If you have to handle the cartridges, wear clean cotton or rubber gloves. Don't touch the separator's Teflon[®] screen. Handle it by the endcaps.
- **Always use a torque wrench for installing cartridges.** Read the manufacturer's specified torque value in the installation instructions.
- **When you clean the inside of a filter vessel, use the product being filtered or diluted bleach.** Do not use soap or another type of fuel.
- **Close all the drain valves before you refill.** Obvious, but easy to forget!

Some Sound Information, Useful and Readily Available:

The Manual of Aviation Fuel Quality Control Procedures, ASTM Manual Series MNL5, Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Phone: (610) 832-9585.

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Section 6

Other Products



HYDROKIT®

Detect Free Water in Aviation Fuel

FEATURES

- **Easy to Use** – Automatically controls the sample size. Simple evaluation by color comparison.
- **Shelf Life** – For details on shelf life refer to date on box or contact Velcon at 1-800-531-0180.
- **Responds Consistently** – Responds consistently in a wide variety of aviation jet fuels.
- **Carefully Controlled Quality** – Manufactured by Velcon Filters, Inc. to strict quality control specifications.

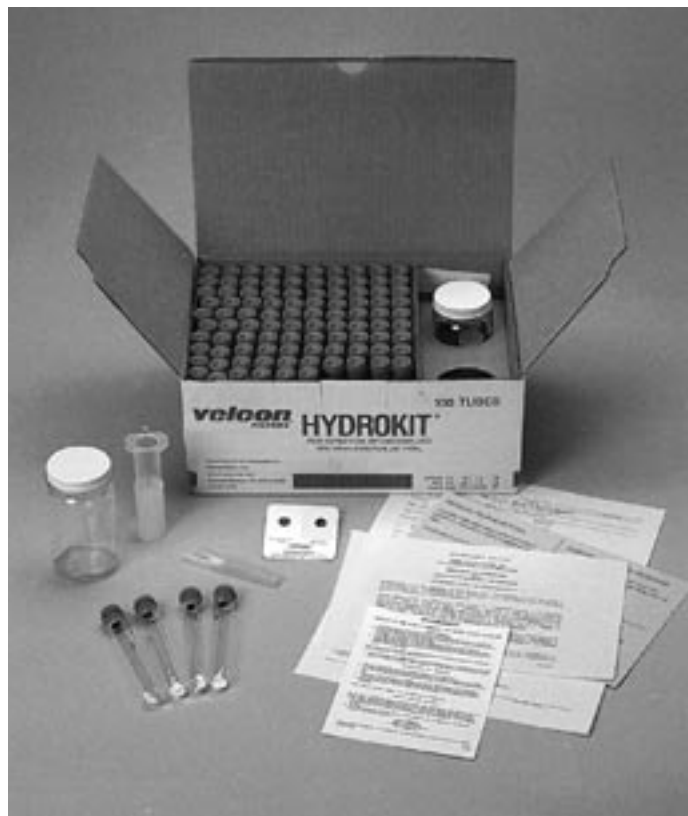
DESCRIPTION

The HYDROKIT is an effective “Go, No-Go” field test designed to periodically check for free water, which is removed to ppm levels by properly operating filter/separators, **Aquacon®**, and monitor vessels. Samples are normally taken downstream of the vessel, but they can also be taken at other points in the fuel distribution system.

The HYDROKIT is designed to indicate free water in excess of 30* ppm by changing the powder contained in the sample tube to a pink color. Thirty ppm is generally accepted as the maximum amount of water permissible when fueling aircraft. The HYDROKIT is designed for “fail-safe” operation, with false negative readings unlikely. Almost any error in performing the test will indicate the presence of wet fuel. If the sample indicates the presence of excessive water, it is always a good practice to repeat the test on a second sample.

APPLICATIONS

- Aviation Jet (Turbine) Fuels
- Diesel Fuel
- Not for use with Avgas



ORDERING INFORMATION

<u>MODEL NO.</u>	<u>QTY OF TEST TUBES</u>	
HK600*	600	(6 ea. HK100)
HK600-15	600	(6 ea. HK100-15 15 ppm sensitivity)
HK100*	100	
HK100-15	100	(15 ppm sensitivity)
HK25	25	
HK25-15	25	(15 ppm sensitivity)
HK3	3	
HK3-15	3	(15 ppm sensitivity)

Each model above comes complete with:
sample tubes
wide mouth glass sample jar(s)
needle holder assembly
instruction card
color indicator comparison card

*in excess of 15 ppm in HKxx-15 tubes. These tubes are used where ATA-103 requirements are specified at 15 ppm of water maximum.

How To Use HYDROKIT®

- 1**
Sample bottle
must be clean.



- 2**
Take sample
downstream of
vessel.



- 3**
Push tube down
into needle holder
in sample.



- 4**
After tube fills,
shake for
15 seconds.
Set upright
to allow powder
to settle.



- 5**
Check powder
color at
two minutes.



- 6**
If color is the
same or darker
than FAIL,
more than
30* ppm
of free water
is present.

*(15 ppm of free water
in HKxxx-15 tubes.)



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HYDROKIT[®] MKII

Two Year Shelf Life

Detect Free Water in Aviation Fuel

FEATURES

- **Easy to Use** – Automatically controls the sample size. Simple evaluation by color comparison.
- **Shelf Life** – Two years. Refer to date on box.
- **Responds Consistently** – Responds consistently in a wide variety of aviation jet fuels.
- **Carefully Controlled Quality** – Manufactured by Velcon Filters, Inc. to strict quality control specifications.

DESCRIPTION

The HydroKit MKII is an effective “Go, No-Go” field test designed to periodically check for free water, which is removed to ppm levels by properly operating filter/separators, **Aquacon**[®], and monitor vessels. Samples are normally taken downstream of the vessel, but they can also be taken at other points in the fuel distribution system.

The HydroKit MKII is designed to indicate free water in excess of 30* ppm by changing the powder contained in the sample tube to a pink color. Thirty ppm is generally accepted as the maximum amount of water permissible when fueling aircraft. The HydroKit MKII is designed for “fail-safe” operation, with false negative readings unlikely. Almost any error in performing the test will indicate the presence of wet fuel. If the sample indicates the presence of excessive water, it is always a good practice to repeat the test on a second sample.

APPLICATIONS

- Jet Fuel
- Diesel Fuel
- Not for use with Avgas



ORDERING INFORMATION

<u>MODEL NO.</u>	<u>QTY OF TEST TUBES</u>	
HK600MKII	600	(6 ea. HK100MKII)
HK600MKII-15	600	(6 ea. HK100MKII-15 15 ppm sensitivity)
HK100MKII	100	
HK100MKII-15	100	(15 ppm sensitivity)

Each model above comes complete with:

sample tubes
wide mouth glass sample jar(s)
needle holder assembly
instruction card
color indicator comparison card

*in excess of 15 ppm in HKxxxMKII-15 tubes. These tubes are used where ATA-103 requirements are specified at 15 ppm of water maximum.

How To Use HYDROKIT®

- 1**
Sample bottle
must be clean.



- 2**
Take sample
downstream of
vessel.



- 3**
Push tube down
into needle holder
in sample.



- 4**
After tube fills,
shake for
15 seconds.
Set upright
to allow powder
to settle.



- 5**
Check powder
color at
two minutes.



- 6**
If color is the
same or darker
than FAIL,
more than
30* ppm
of free water
is present.

*(15 ppm of free water
in HKxxx-15 tubes.)



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SWIFTKit®

Detect Surfactants in Aviation Jet Fuel

FEATURES

- **Easy to Use/Rapid Results**
Test done in the field, no need to wait for lab results.
- **High Degree of Accuracy**
Repeatability to within ± 3 dynes/cm when compared to the ASTM D971 ring method.
- **Economical**
Lowest cost per sample analysis.

DESCRIPTION

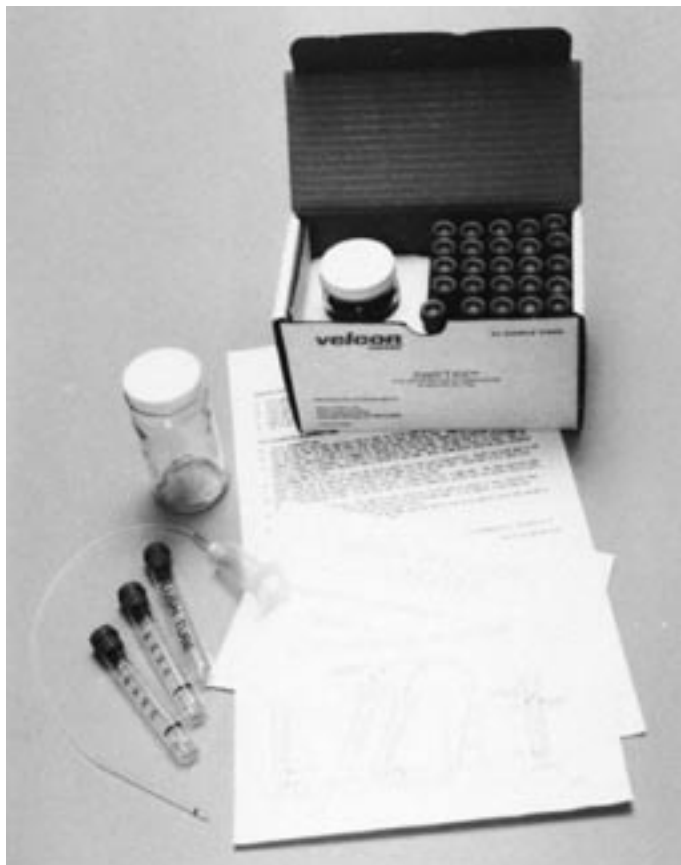
The patented* *SWIFTKit* is the first practical device to determine the Interfacial Tension (IFT) of aviation jet fuel in the field. The IFT value is a general indication of the surfactant (surface active agent) level in fuel; higher IFT values indicate lower surfactant levels. Surfactants can disarm coalescer elements, which could allow excess water downstream and into the aircraft.

APPLICATIONS

The *SWIFTKit* can be used for general quality checks on fuel during transfer and transportation, and particularly for receipts into airport storage. The *SWIFTKit* is especially useful to determine the condition of clay treatment cartridges by comparing the upstream and downstream IFT values. An increase in IFT value shows that the clay is still effectively doing its job of removing surfactants.

ORDERING INFORMATION

- Specify Model SWK1



Each SWK1 *SWIFTKit* box includes:

- 20 sample *SWIFTKit* tubes
- 5 flush tubes
- 1 wide mouth glass sample jar
- 1 needle holder assembly
- 1 procedure sheet
- 1 illustration of procedure sheet
- 1 safety and MSDS sheet

*U.S. Patent No. 5,305,632.

How To Use The *SWIFTKit*®

1

Sample bottle must be clean.



2

Take sample at receipt point; or upstream and downstream of clay vessel.



3

Flush the sampling hose assembly using the flush tube.



4

Draw the fuel sample into the SWIFTKit tube. Insure fuel level is above capillary tube.



5

Examine capillary tube to be sure there are no air bubbles.



6

After 4 minutes, read the IFT value corresponding to the fuel/water interface level in the capillary tube.



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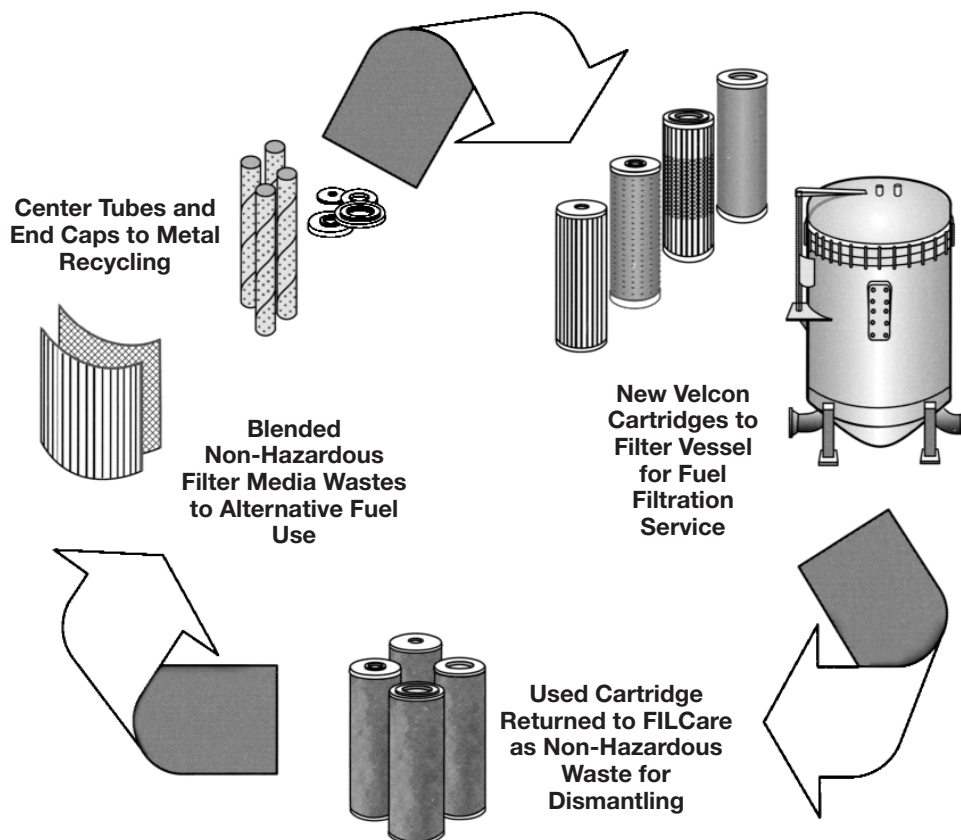
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Jet & Diesel Fuel Filter Cartridge Recycling

Close the Loop with *FILCare*



***FILCare* SERVICE**

Velcon's *FILCare* Service provides you with a convenient, legal, cost effective, and environmentally responsible method for disposing of your used jet and diesel fuel filter cartridges.

CONVENIENCE

FILCare will accept your used Velcon Coalescers and Separators, Pleated Paper Elements, **Aquacon**® Cartridges, Clay Canisters, String Wound Filters, Spin-Ons, and Absorbent Pads for disposal. *FILCare* will also accept similar filter elements produced by other manufacturers. *FILCare* Service supplies you with everything required to ship your used cartridges for disposal. Complete recycling packages include step-by-step instructions for draining, boxing, labeling, and packing the cartridges for transport.

COMPLIANCE

When packaged and shipped according to *FILCare* instructions, used filters can be transported as nonhazardous material in compliance with California Title 22, 49 CFR Subchapter C, 40 CFR Parts 261-268, and 40 CFR, Part 279. Some states may impose other requirements; please comply with local requirements as necessary. Upon receipt of the used cartridges by *FILCare*, the customer will receive a certificate of recycling. This certificate and the bill of lading will serve as proof of compliance with environmental and hazardous materials transportation regulations.

LOWER COSTS

FILCare's cartridge disposal/recycling service lowers your operating costs. Savings are realized by reducing the volume of material you send to hazardous waste disposal facilities and by minimizing the time you spend on regulatory compliance record keeping, reporting, and tracking.

RESPONSIBLE CARTRIDGE DISPOSAL

FILCare helps you deal with the continuing strict regulation of industrial waste material by handling the disposal of your used aviation and diesel fuel filters in a completely responsible manner. The service provides major assistance in the fulfillment of your legal and environmental obligations for the proper disposal of these items.

FILCare is a valuable, ongoing asset for dealing with your cartridge disposal problems. An association with Velcon Filters and its network of Distributors provides you with access to experienced and knowledgeable personnel ready to answer your questions about compliance reporting regulations and to help with other related problems. **Contact Velcon Filters or your Local Velcon Distributor for a discussion of how closing the loop with *FILCare* can be of service to you.** Also, a four-minute video on the subject is available on request.

DISCLAIMER

FILCare **can't accept** cartridges which have been used for **GASOLINE FILTRATION**. Acceptable cartridges will have been used in jet and diesel fuel filtering applications only.



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Coalescing Plate Separator

VPSM Series

FEATURES

- Easy to install
- Minimum maintenance
- Compact
- Oil & solids separation
- Conforms to Waterboard & E.P.A. Guidelines

APPLICATIONS

- Workshop and service stations
- Vehicle washbays
- Coolant "Tramp Oil" removal
- Silt removal
- Rainwater runoff

SPECIFICATIONS

- Molded polyethylene tank

Dimensions:

VPSM5-P50	VPSM20-4P50
5 GPM	20 GPM
16" Wide	30" Wide
45" High	74" High
51" Long	63" Long

Connections:

Outlet:	1.25"	1.5"
Inlet:	1.25"	2.0"

- Vertical polypropylene plate packs with option of 1/4" (P25) and/or 1/2" (P50) spacing

ASSOCIATED EQUIPMENT & OPTIONS

- Positive displacement pump
- Low voltage level control system
- Installation



Model VPSM5-P50



Vertical Plate Pack (P25 or P50)

ADDITIONAL SPECIFICATIONS

	5GPM Flow Rate	20GPM Flow Rate
Voltage	120V	120V
Motor	1/2HP, 1PH	1.5HP, 1PH
Type of Pump	ASM D25 diaphragm (5GPM)	ASM D50 diaphragm (20GPM)
Suction pipe length	0'-16.5' with 1.0" pipe *16.5'-33' with 1.25" pipe	*0'-16.5' with 2.0" pipe 16.5'-33' with 2.5" pipe
Discharge pipe length	*0'-16.5' with 1.25" pipe 16.5'-66' with 1.5" pipe	0'-16.5' with 2.5" pipe 16.5'-66' with 3" pipe
Float type	MAC 3	MAC 3
Float cable length	16.5', 33', or 49'	16.5', 33', or 49'
Weight (including pump)	240 lbs.	620 lbs.

* Pipe diameter installed with system



VPSM20-4P50



VPSM5-P50



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