3 Roughing Components

Section 3

Foreline Traps

Introduction

The MDC Precision family of roughing line traps

Features

- Molecular sieve trap
- Single piece coaxial trap
- Two piece coaxial trap
- Liquid nitrogen trap

Molecular Sieve Traps

Molecular sieve traps containing type 13X synthetic zeolite effectively prevent oil backstreaming and trap water vapors at room temperature.Type 13X zeolite will adsorb molecules with critical diameters up to 10 angstrom. The sieve charge can be reactivated by baking out in place when a base vacuum cannot be achieved. A valve should be used to isolate the evolved gas from the system during the bakeout cycle. During bakeout a mechanical pump removes the evolved gases from the sieve trapping material. To minimize down-time, bakeouts can be conducted, with the aid of a timer, during system off-hours. Oils trapped by the sieve material will not be evolved by baking. Periodic replacement of the sieve material is required whenever the sieve material exhibits evidence of hydrocarbon saturation as determined by empirical observation. The sieve trapping material is easily replaced through a port fitted to the top of the trap. Molecular sieve traps can be mounted in a vertical or horizontal position. A trap's built-in heater requires customer wiring to a 115VAC wall outlet. Once turned on, the heater reaches and maintains a self-regulated and constant 150°C temperature. Bakeout time depends on the amount of water vapor loading of the zeolite and can range from 4 to 12 hours.

Coaxial Traps

Coaxial foreline traps offer easy maintenance and room temperature operation, they require no bakeout or cooling and are virtually maintenance-free. They are ideally suited for trapping roughing pump hydrocarbons from backstreaming into a vacuum system. Single piece coaxial foreline traps contain absorbent filter cartridges with a bronze wool element. This filter element is permanently sealed inside the trap's body and can't be removed or replaced. These traps are serviced by replacing them with a spare unit while cleaning the contaminated trap. Single piece traps are available in 4" and 6" body diameters.

In contrast to the single piece units, the two piece coaxial foreline traps offer a wider selection of filter element materials. Filter elements for a two piece trap are removable stainless steel screen cartridges filled with copper, stainless steel or bronze wools, activated alumina, activated carbon or dual element absorbent materials. During operation, pump oil coalesces on the element and returns to the pump. Activated alumina effectively adsorbs acids and water vapor while activated carbon adsorbs organics and water vapor. Filter cartridges are quickly and easily replaced by removing the banded clamp that fastens the two-piece body. MDC recommends keeping a spare element on-hand for a quick change to minimize down time. Reusable elements may be cleaned and ready for the next exchange. Note that filter elements are not included with trap assemblies and must be ordered separately. Two piece traps are offered with 2", 4", 6" and 8" body diameters. All coaxial trap bodies are made of type 304 stainless steel and are offered with a choice of hose or flange style connections. Del-Seal™ CF metal seal flange connections have one fixed and one rotatable flange for alignment purposes. Kwik-Flange™ ISO KF and Large-Flange™ ISO LF flanges are clamp-style. Hose connections may also be welded, but permanent installation must be carefully evaluated.

Contaminated traps may be cleaned with a solvent and allowed to dry before replacing into service. MDC recommends having a spare trap or filter element available for rapid replacement to minimize down time during the cleaning process.

All dimensions in this catalog are given in inches unless specified otherwise.

Molecular sieve traps page 246

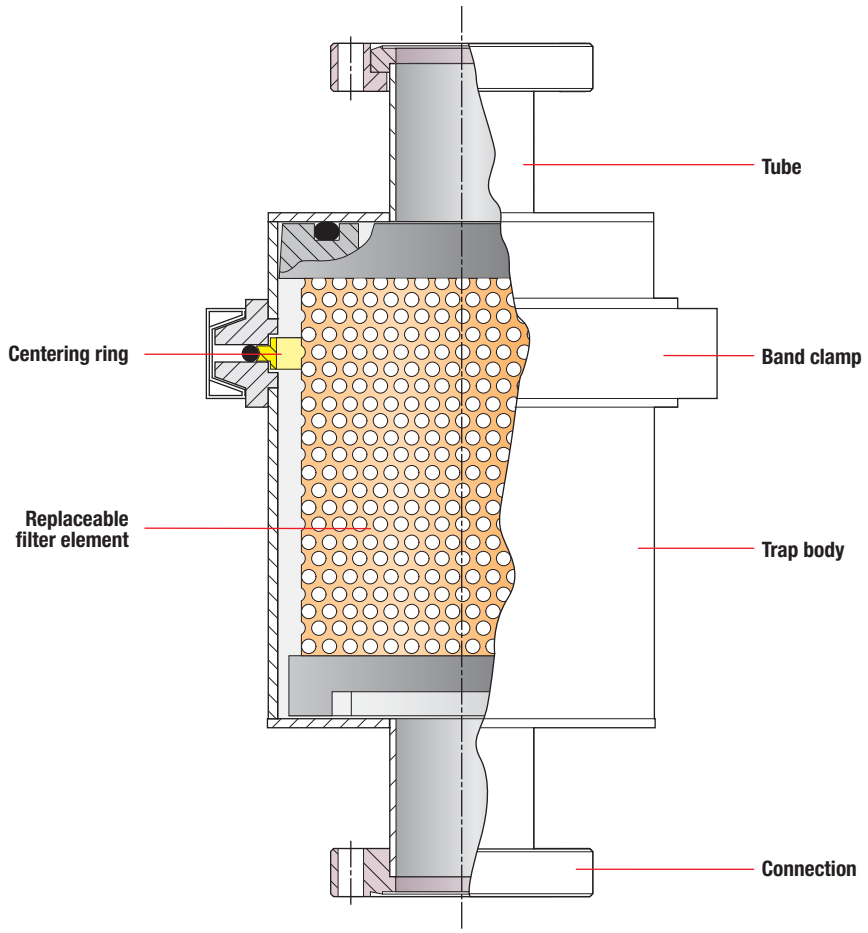
Liquid Nitrogen Traps

Liquid nitrogen traps remove condensables before they enter the pump or backstream from the pump to the vacuum system. Water trapping by the liquid nitrogen cooled surface is complete and permanent.

Liquid nitrogen traps can be fitted with a customer-supplied coolant level controller to automatically replenish consumed liquid nitrogen.

In general, trap performance will vary with the specific application, usage, number of process cycles and relative humidity in the region. One cycle per day in an R&D application could provide approximately six months of maintenance free service. Production type applications will require more stringent preventative maintenance programs tailored to a specific application.

Typical two-piece coaxial trap assembly
Shown with Dual-Element Cartridge



Coaxial, single piece traps page 248

Coaxial, two piece traps page 250

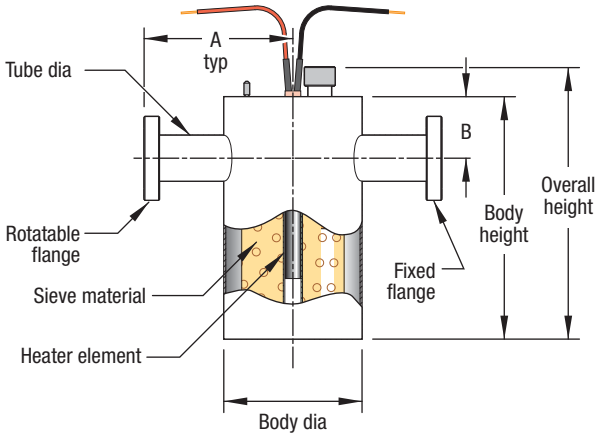
Liquid nitrogen traps page 254

Foreline Traps

Molecular Sieve

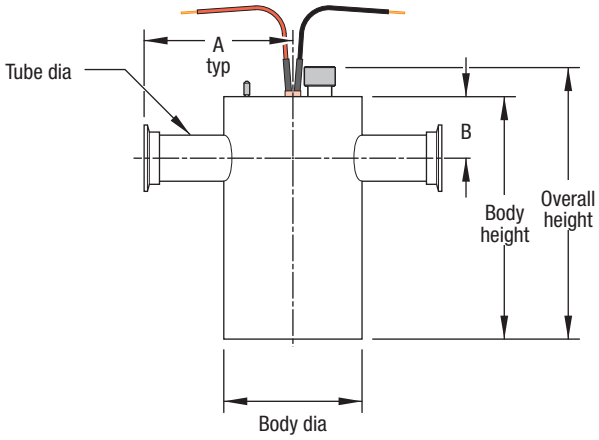
ULTRAHIGH & HIGH VACUUM SERIES

Del-Seal™ CF ports

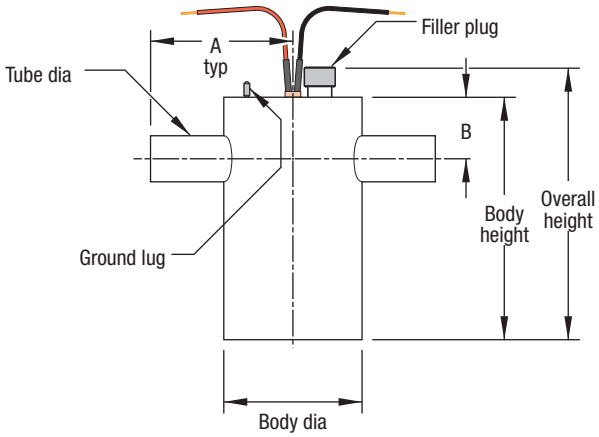


ISO KF and LF ports

3/4" to 2" Tube dia: Kwik-Flange™
3" Tube dia: Large-Flange™



Hose connection



Features

- Effectively blocks backstreaming by absorbing hydrocarbons
- Traps water vapor
- Regeneration using built-in heater
- Type 304 stainless steel trap body
- Available in five connection sizes

Description

Molecular Sieve Traps containing Type 13X synthetic zeolite effec-tively prevent oil backstreaming at room temperature. They also trap water vapor in the sieve charge. The sieve charge can be reactivated by baking out in place when the base vacuum cannot be achieved. A valve should be used to isolate evolved gas from the system during bakeout cycle. During the bakeout the mechan-ical pump removes the evolved gas from the sieve trapping mate-rial. Normal bakeout can be accomplished by use of a timer dur-ing system off-hours.

Any oils trapped by the sieve material cannot be removed by bak-ing. Periodic replacement is required whenever the sieve material exhibits evidence of hydrocarbon loading as determined by empir-ical observation. Sieve trapping material can be replaced through port on top of trap. Traps can be mounted in the standard vertical or horizontal position.

The built-in heater requires wiring to a 115 VAC wall outlet. Once turned on, the heater reaches and maintains a self-regulated con-stant 150°C temperature. Bakeout time depends on the amount of water vapor loading of the zeolite, within the range of 4 to 12 hours.

Foreline Traps

Molecular Sieve

Del-Seal™ CF

TRAP SIZE	DEL-SEAL FLANGE	TUBE DIA.	BODY DIA.	BODY HEIGHT	OVERALL HEIGHT	A	B	WT LB	REFERENCE	PART NUMBER
4	1-1/3	.75	4.50	5.25	6.38	5.00	1.69	4	MST-075-2	431016
4	2-1/8	1.00	4.50	5.25	6.38	4.67	1.69	5	MST-100-2	431003
4	2-3/4	1.50	4.50	7.88	9.00	4.70	2.00	5-1/2	MST-150-2	431006
4	3-3/8	2.00	4.50	7.88	9.00	4.72	2.00	6	MST-200-2	431009
6	4-5/8	3.00	6.00	10.00	11.13	5.87	3.00	7-1/2	MST-300-2	431012

ISO KF and ISO LF

TRAP SIZE	ISO REF.	TUBE DIA.	BODY DIA.	BODY HEIGHT	OVERALL HEIGHT	A	B	WT LB	REFERENCE	PART NUMBER
4	NW16	.75	4.50	5.25	6.38	5.00	1.69	4	KMST-075-2	431029
4	NW25	1.00	4.50	5.25	6.38	4.67	1.69	5	KMST-100-2	431030
4	NW40	1.50	4.50	7.88	9.00	4.71	2.00	5-1/2	KMST-150-2	431031
4	NW50	2.00	4.50	7.88	9.00	4.73	2.00	6	KMST-200-2	431032
6	NW80	3.00	6.00	10.00	11.13	5.75	3.00	7-1/2	LMST-300-2	431033

Hose Connection

TRAP SIZE	TUBE DIA.	TUBE WALL	BODY DIA.	BODY HEIGHT	OVERALL HEIGHT	A	B	WT LB	REFERENCE	PART NUMBER
4	.75	.035	4.50	5.25	6.38	4.50	1.69	4	MST-075	431000
4	1.00	.065	4.50	5.25	6.38	4.50	1.69	5	MST-100	431001
4	1.50	.065	4.50	7.88	9.00	4.50	2.00	5-1/2	MST-150	431004
4	2.00	.065	4.50	7.88	9.00	4.50	2.00	6	MST-200	431007
6	3.00	.065	6.00	10.00	11.13	5.50	3.00	7-1/2	MST-300	431010

Accessories

DESCRIPTION	WT LB	REFERENCE	PART NUMBER
MOLECULAR SIEVE REPLACEMENT CHARGE, TYPE 13X, 1-1/2 LB [1]	1-1/2	MST-C	431013
REPLACEMENT HEATER ASSEMBLY, 115 V, 75 W	1/4	MST-H	431014

Mechanical Pump Size	Recommended Trap Size	Gas Handling Load (50% Rel Humidity)	Capacity lbs	Trap Ref. No.	[1] Number Charges Required
Up to 8 cfm	3/4 & 1	60 cu. ft.	1.1	MST-075 & -100	1
8 to 17 cfm	1-1/2	125 cu. ft.	1.6	MST-150	2
17 to 30 cfm	2	125 cu. ft.	1.6	MST-200	2
Over 30 cfm	3	150 cu. ft.	4.0	MST-300	3

Foreline Traps

Coaxial

ULTRAHIGH & HIGH VACUUM SERIES

Features

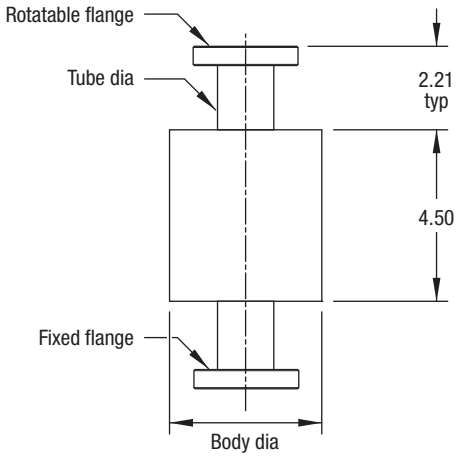
- Significantly reduces oil backstreaming
- Low cost one-piece body design
- Bronze wool element
- Type 304 stainless steel trap body
- Four-inch and six-inch body diameters

Description

Coaxial foreline traps offer easy maintenance and room temperature operation, they require no bakeout or cooling and are virtually maintenance-free. They are ideally suited for trapping roughing pump hydrocarbons and preventing them from backstreaming into a vacuum system. Single piece coaxial foreline traps contain absorbent filter cartridges filled with a bronze wool element. This filter element is permanently sealed inside the trap's body and can't be removed or replaced. These traps are serviced by replacing them with a spare unit while cleaning the contaminated trap. Single piece traps are available in 4" and 6" body diameters.

Trap bodies are manufactured from type 304 stainless steel. Traps are offered with a choice of hose or flange connections in seven sizes. Del-Seal™ CF metal seal flange connections have one fixed and one rotatable flange for alignment purposes. Kwik-Flange™ and Large-Flange™ ISO flanges are clamp-style. Hose connections may also be welded, but permanent installation is not recommended. Used traps may be cleaned with a solvent and allowed to dry before replacing into service. MDC recommends having a spare trap available for rapid replacement to minimize down time. The used unit may be cleaned and stored for re-use as convenient.

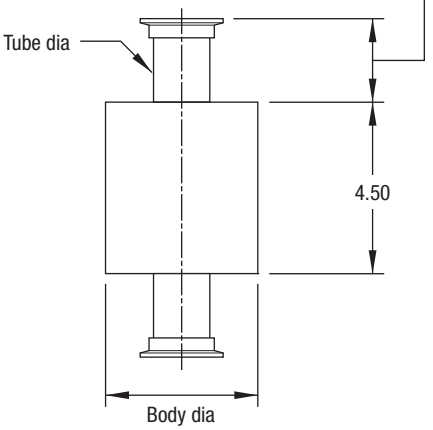
Del-Seal™ CF ports



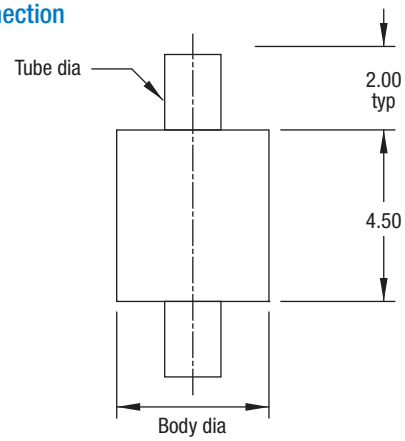
ISO KF and LF ports

3/4" to 2" Tube dia: Kwik-Flange™
2-1/2" to 4" Tube dia: Large-Flange™

Flange	Length
KF	2.21
LF	2.25



Hose connection



Del-Seal™ CF

TRAP SIZE	DEL-SEAL FLANGE	TUBE DIA.	BODY DIA.	WT LB	REFERENCE	PART NUMBER
4	1-1/3	.75	4.00	2-1/2	TX-075-2	430000
4	2-1/8	1.00	4.00	3	TX-100-2	430003
4	2-3/4	1.50	4.00	4-1/2	TX-150-2	430006
4	3-3/8	2.00	4.00	5	TX-200-2	430009
4	4-1/2	2.50	4.00	5	TX-250-2	430012
4	4-5/8	3.00	4.00	5-1/2	TX-300-2	430015
6	6	4.00	6.00	6-1/2	TX-400-2	430018

ISO KF and ISO LF

TRAP SIZE	ISO REF	TUBE DIA.	BODY DIA.	WT LB	REFERENCE	PART NUMBER
4	NW16	.75	4.00	2-1/2	KTX-075-2	430050
4	NW25	1.00	4.00	3	KTX-100-2	430051
4	NW40	1.50	4.00	4-1/2	KTX-150-2	430052
4	NW50	2.00	4.00	5	KTX-200-2	430053
4	NW63	2.50	4.00	5	LTX-250-2	430054
4	NW80	3.00	4.00	5-1/2	LTX-300-2	430062
6	NW100	4.00	6.00	6-1/2	LTX-400-2	430055

Hose Connection

TRAP SIZE	TUBE DIA.	BODY DIA.	WT LB	REFERENCE	PART NUMBER
4	.75	4.00	2-1/2	TX-075	430002
4	1.00	4.00	3	TX-100	430005
4	1.50	4.00	4-1/2	TX-150	430008
4	2.00	4.00	5	TX-200	430011
4	2.50	4.00	5	TX-250	430014
4	3.00	4.00	5-1/2	TX-300	430017
6	4.00	6.00	6-1/2	TX-400	430020

Foreline Traps

Coaxial with Replaceable Filter

ULTRAHIGH & HIGH VACUUM SERIES

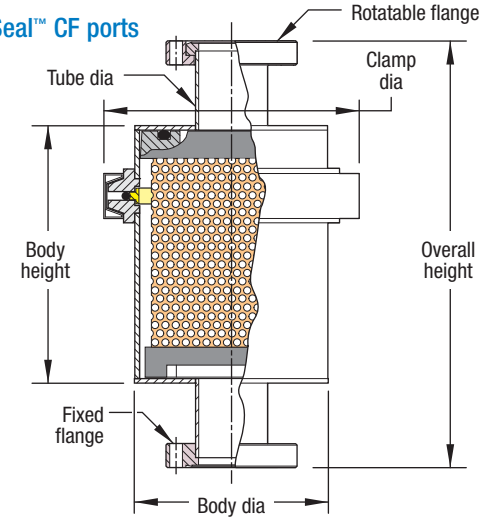
Features

- Significantly reduces oil backstreaming
- Two-piece clamped body design for easy element replacement
- Choice of copper, stainless steel, bronze, activated alumina and activated carbon filter elements
- Two-inch through eight-inch body diameters
- Type 304 stainless steel trap body
- FKM / FPM fluoroelastomer O-ring body seal

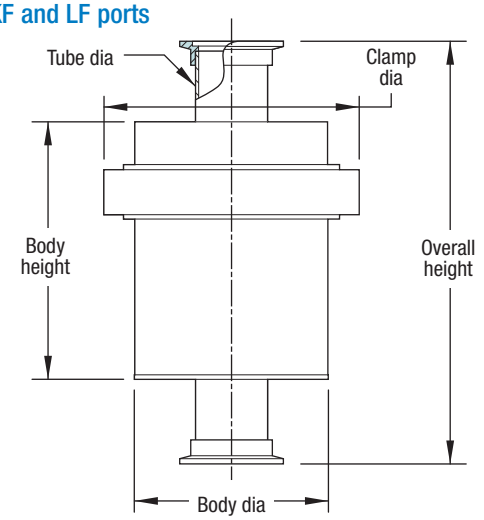
Description

In contrast to the single piece units on the previous two pages, the two-piece coaxial foreline traps offer a wider selection of filter element materials. Filter elements for a two-piece trap are removable stainless steel screen cartridges filled with copper, stainless steel or bronze wools, activated alumina, activated carbon or dual element absorbent material. During operation, pump oil coalesces on the element and returns to the pump. Activated alumina effectively adsorbs acids and water vapor, while activated carbon adsorbs organics and water vapor. Filter cartridges are quickly and easily replaced by removing the banded clamp that fastens the two-piece body. MDC recommends keeping a spare element on-hand for a quick change to minimize down time. Reusable elements may be cleaned and ready for the next exchange. Note that filter elements are not included with trap assemblies and must be ordered separately. Two-piece traps are offered with 2", 4", 6" and 8" body diameters. All coaxial trap bodies are made of type 304 stainless steel and are offered with a choice of hose or flange style connections. Del-Seal™ CF metal seal flange connections have one fixed and one rotatable flange for alignment purposes. Kwik-Flange™ ISO KF and Large-Flange™ ISO LF flanges are clamp-style. Hose connections may also be welded, but permanent installation must be carefully evaluated. Contaminated traps may be cleaned with a solvent and allowed to dry before replacing into service. MDC recommends having a spare trap or filter element available for rapid replacement to minimize down time during the cleaning process. Filter elements are not included with trap assemblies; they must be ordered separately from the tables on page 253.

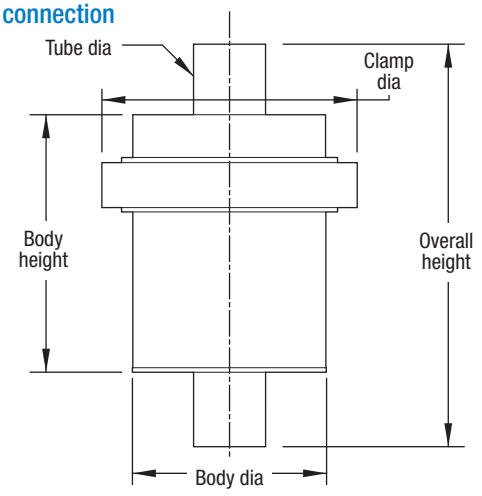
Del-Seal™ CF ports



ISO KF and LF ports



Hose connection



Foreline Traps

Coaxial with Replaceable Filter

Del-Seal™ CF

TRAP SIZE	DEL-SEAL FLANGE	TUBE DIA.	BODY DIA.	BODY HEIGHT	OVERALL HEIGHT	CLAMP O.D.	WT LB	REFERENCE	PART NUMBER
2	1-1/3	.75	2.00	5.32	9.32	4.54	2	DFT-2075-2	433002
2	2-1/8	1.00	2.00	5.32	8.66	4.54	2	DFT-2100-2	433005
4	1-1/3	.75	4.00	5.31	9.31	5.38	5	DFT-4075-2	433008
4	2-1/8	1.00	4.00	5.31	8.65	5.38	5	DFT-4100-2	433011
4	2-3/4	1.50	4.00	5.31	8.73	5.38	5	DFT-4150-2	433014
4	3-3/8	2.00	4.00	5.31	8.76	5.38	5	DFT-4200-2	433017
6	2-3/4	1.50	6.00	7.07	10.49	7.25	15	DFT-6150-2	433020
6	3-3/8	2.00	6.00	7.07	10.52	7.25	15	DFT-6200-2	433023
6	4-1/2	2.50	6.00	7.07	10.82	7.25	15	DFT-6250-2	433026
6	4-5/8	3.00	6.00	7.07	10.82	7.25	15	DFT-6300-2	433029
8	4-1/2	2.50	8.00	10.07	13.82	9.56	25	DFT-8250-2	433032
8	4-5/8	3.00	8.00	10.07	13.82	9.56	25	DFT-8300-2	433035
8	6	4.00	8.00	10.07	13.94	9.56	25	DFT-8400-2	433038
8	8	6.00	8.00	10.07	14.07	9.56	25	DFT-8600-2	433041

ISO KF and ISO LF

TRAP SIZE	ISO REF.	TUBE DIA.	BODY DIA.	BODY HEIGHT	OVERALL HEIGHT	CLAMP O.D.	WT LB	REFERENCE	PART NUMBER
2	NW16	.75	2.00	5.32	9.32	4.54	2	KDFT-2075-2	433003
2	NW25	1.00	2.00	5.32	8.66	4.54	2	KDFT-2100-2	433006
4	NW16	.75	4.00	5.31	9.31	5.38	5	KDFT-4075-2	433009
4	NW25	1.00	4.00	5.31	8.65	5.38	5	KDFT-4100-2	433012
4	NW40	1.50	4.00	5.31	8.73	5.38	5	KDFT-4150-2	433015
4	NW50	2.00	4.00	5.31	8.76	5.38	5	KDFT-4200-2	433018
6	NW40	1.50	6.00	7.07	10.49	7.25	15	KDFT-6150-2	433021
6	NW50	2.00	6.00	7.07	10.52	7.25	15	KDFT-6200-2	433024
6	NW63	2.50	6.00	7.07	10.57	7.25	15	LDFT-6250-2	433027
6	NW80	3.00	6.00	7.07	10.57	7.25	15	LDFT-6300-2	433030
8	NW63	2.50	8.00	10.07	13.57	9.56	25	LDFT-8250-2	433033
8	NW80	3.00	8.00	10.07	13.57	9.56	25	LDFT-8300-2	433036
8	NW100	4.00	8.00	10.07	13.57	9.56	25	LDFT-8400-2	433039
8	NW160	6.00	8.00	10.07	13.57	9.56	25	LDFT-8600-2	433042

Hose Connection

TRAP SIZE	TUBE DIA.	BODY DIA.	BODY HEIGHT	OVERALL HEIGHT	CLAMP O.D.	WT LB	REFERENCE	PART NUMBER
2	.50	2.00	5.32	8.32	4.54	2	DFT-2050	433000
2	.75	2.00	5.32	8.32	4.54	2	DFT-2075	433001
2	1.00	2.00	5.32	8.32	4.54	2	DFT-2100	433004
4	.75	4.00	5.31	8.31	5.38	5	DFT-4075	433007
4	1.00	4.00	5.31	8.31	5.38	5	DFT-4100	433010
4	1.50	4.00	5.31	8.31	5.38	5	DFT-4150	433013
4	2.00	4.00	5.31	8.31	5.38	5	DFT-4200	433016
6	1.50	6.00	7.07	10.07	7.25	15	DFT-6150	433019
6	2.00	6.00	7.07	10.07	7.25	15	DFT-6200	433022
6	2.50	6.00	7.07	10.07	7.25	15	DFT-6250	433025
6	3.00	6.00	7.07	10.07	7.25	15	DFT-6300	433028
8	2.50	8.00	10.07	13.07	9.56	25	DFT-8250	433031
8	3.00	8.00	10.07	13.07	9.56	25	DFT-8300	433034
8	4.00	8.00	10.07	13.07	9.56	25	DFT-8400	433037
8	6.00	8.00	10.07	13.07	9.56	25	DFT-8600	433040

Replaceable Filter Elements, page 252

Foreline Traps

Filter Elements

Filters for two-piece coaxial traps

Features

- Easy exchange of cartridges
- Metal sieve units are reusable
- Use with two-piece coaxial trap bodies detailed on page 251

Description

Two-piece coaxial foreline traps offer a wide selection of replaceable filter element materials. Filter elements for a two-piece trap are removable stainless steel screen cartridges filled with copper, stainless steel or bronze wools, activated alumina, activated carbon or dual element absorbent material.

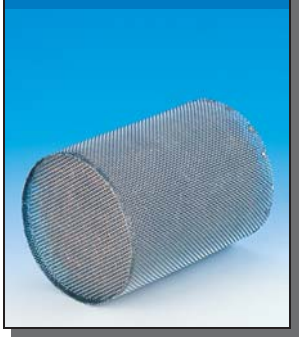
Metal wool filter elements are used primarily for the trapping of pump oil backstreaming through a vacuum system. During pump operation, oil coalesces on the metal wool element and drains back to the vacuum pump. Activated alumina effectively adsorbs both acids and water vapor while activated carbon adsorbs organics and water vapor. The selection chart at the bottom of the facing page will help in choosing a filter element for your specific application.

Filter cartridges are quickly and easily replaced by removing the banded clamp that fastens a two-piece coaxial trap body. To minimize down time, MDC recommends keeping spare filter elements on-hand for quick replacement. Reusable elements may be cleaned and stored for the next exchange. With the exception of the activated carbon and dual element filters, all others are reusable. Filter elements are not included with trap assemblies and must be ordered separately using the part numbers detailed on the next page. Filters for 2", 4", 6" and 8" body diameters are included. Contaminated elements may be cleaned with a solvent and allowed to dry before reusing.

Foreline Traps
Filter Elements

Copper

Stainless Steel



Bronze

Activated Alumina

Activated Carbon

Dual Element

DESCRIPTION	REFERENCE	PART NUMBER
USE WITH 2" BODY TRAPS		
COPPER SIEVE ELEMENT	DFT-2F-CU	433050
STAINLESS STEEL SIEVE ELEMENT	DFT-2F-SS	433051
BRONZE SIEVE ELEMENT	DFT-2F-BR	433052
ACTIVATED ALUMINA CARTRIDGE [2]	DFT-2F-AA	433053
ACTIVATED CARBON CARTRIDGE [2]	DFT-2F-AC	433054
USE WITH 4" BODY TRAPS		
COPPER SIEVE ELEMENT	DFT-4F-CU	433055
STAINLESS STEEL SIEVE ELEMENT	DFT-4F-SS	433056
BRONZE SIEVE ELEMENT	DFT-4F-BR	433057
ACTIVATED ALUMINA CARTRIDGE [2]	DFT-4F-AA	433058
ACTIVATED CARBON CARTRIDGE [2]	DFT-4F-AC	433059
DUAL ELEMENT AC / FG [1,2]	DFT-4F-DE	433060
USE WITH 6" BODY TRAPS		
COPPER SIEVE ELEMENT	DFT-6F-CU	433061
STAINLESS STEEL SIEVE ELEMENT	DFT-6F-SS	433062
BRONZE SIEVE ELEMENT	DFT-6F-BR	433063
ACTIVATED ALUMINA CARTRIDGE [2]	DFT-6F-AA	433064
ACTIVATED CARBON CARTRIDGE [2]	DFT-6F-AC	433065
DUAL ELEMENT AC / FG [1,2]	DFT-6F-DE	433066
USE WITH 8" BODY TRAPS		
COPPER SIEVE ELEMENT	DFT-8F-CU	433067
STAINLESS STEEL SIEVE ELEMENT	DFT-8F-SS	433068
BRONZE SIEVE ELEMENT	DFT-8F-BR	433069
ACTIVATED ALUMINA CARTRIDGE [2]	DFT-8F-AA	433070
ACTIVATED CARBON CARTRIDGE [2]	DFT-8F-AC	433071

[1] Activated Carbon and Fiberglass
[2] Requires initial pump-down

Filter Element Selection Table

	Stainless Steel	Copper	Bronze	Activated Alumina	Activated Carbon	Dual Element
Prevent Oil Back-Streaming	XXX	XXX	XXX	X	X	XXX
Trap Water Vapor				XX	XX	
Trap Organics					XXX	XXX
Trap Acid Vapors				XXX		

Effectiveness Rating:
XXX Very Good
XX Good
X Fair

This table is offered as a general guideline for filter selection. Please contact factory for additional information.

Foreline Traps

Liquid Nitrogen

ULTRAHIGH & HIGH VACUUM SERIES

Features

- Traps all types of condensable vapors
- Two-piece clamped body for easy maintenance
- Type 304 stainless steel trap body
- Aluminum centering ring with FKM / FPM fluoroelastomer O-ring
- Low LN_2 consumption

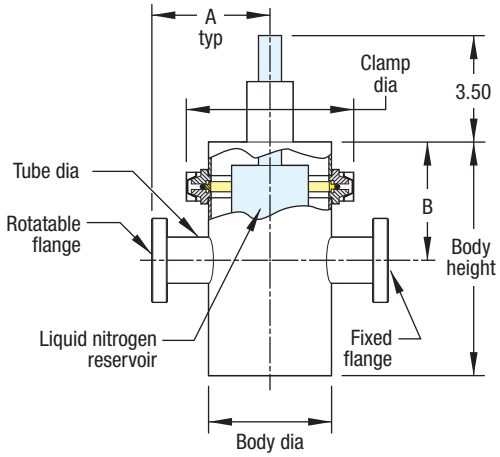
Description

Liquid nitrogen traps remove condensables before they enter the pump or backstream from the pump to the vacuum system. Water trapping by the liquid nitrogen cooled stainless steel surface is complete and permanent.

Liquid nitrogen is added to the reservoir through a fill and vent tube at the top of the trap. A liquid level sensor from a customer-supplied controller can also be inserted through the tube. Reservoir capacities, given in liters, are listed in the product tables.

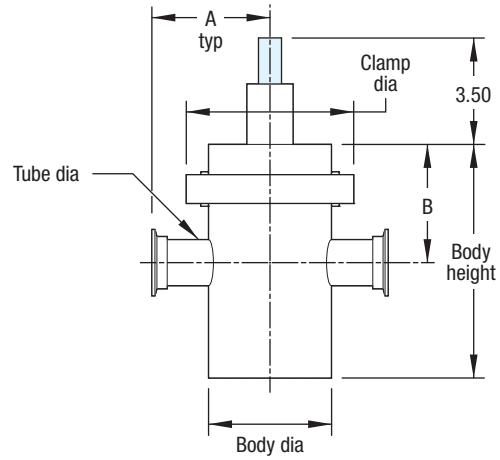
Liquid nitrogen consumption is largely dependent on the level of vacuum maintained in the roughing line. Other factors such as fre-quency of vacuum cycling, ambient relative humidity and gas bleed also affect consumption. Regeneration is achieved by isolating the trap from the vacuum system and removing the band clamp to sep-arate the upper and lower body sections.

Del-Seal™ CF ports

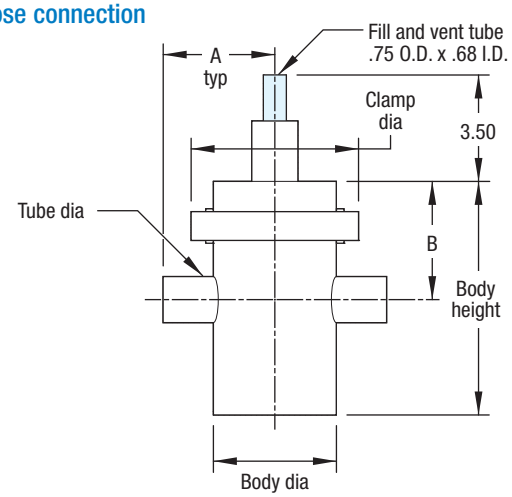


ISO KF and LF ports

3/4" to 2" Tube dia: Kwik-Flange™
2-1/2" to 4" Tube dia: Large-Flange™



Hose connection



Foreline Traps

Liquid Nitrogen

Del-Seal™ CF

TRAP SIZE	NOM. CAP. [1]	DEL-SEAL FLANGE	TUBE DIA.	BODY DIA.	BODY HEIGHT	A	B	CLAMP O.D.	WT LB	REFERENCE	PART NUMBER
4	.45	1-1/3	.75	4.00	7.57	4.00	3.84	5.50	6	DFT-4075-2LN	434001
4	.45	2-1/8	1.00	4.00	7.57	3.67	3.84	5.50	6	DFT-4100-2LN	434004
4	.45	2-3/4	1.50	4.00	7.57	3.70	3.84	5.50	6	DFT-4150-2LN	434007
6	1.59	2-3/4	1.50	6.00	10.26	4.70	5.73	7.50	13	DFT-6150-2LN	434010
6	1.59	3-3/8	2.00	6.00	10.26	4.72	5.73	7.50	13	DFT-6200-2LN	434013
6	1.59	4-1/2	2.50	6.00	10.26	4.87	5.73	7.50	13	DFT-6250-2LN	434016
8	4.13	4-1/2	2.50	8.00	11.26	5.87	6.26	9.62	25	DFT-8250-2LN	434019
8	4.13	4-5/8	3.00	8.00	11.26	5.87	6.26	9.62	25	DFT-8300-2LN	434022
8	4.13	6	4.00	8.00	11.26	5.93	6.26	9.62	25	DFT-8400-2LN	434025

ISO KF and ISO LF

TRAP SIZE	NOM. CAP. [1]	ISO REF.	TUBE DIA.	BODY DIA.	BODY HEIGHT	A	B	CLAMP O.D.	WT LB	REFERENCE	PART NUMBER
4	.45	NW16	.75	4.00	7.57	4.00	3.84	5.50	6	KDFT-4075-2LN	434002
4	.45	NW25	1.00	4.00	7.57	3.67	3.84	5.50	6	KDFT-4100-2LN	434005
4	.45	NW40	1.50	4.00	7.57	3.71	3.84	5.50	6	KDFT-4150-2LN	434008
6	1.59	NW40	1.50	6.00	10.26	4.71	5.73	7.50	13	KDFT-6150-2LN	434011
6	1.59	NW50	2.00	6.00	10.26	4.73	5.73	7.50	13	KDFT-6200-2LN	434014
6	1.59	NW63	2.50	6.00	10.26	4.75	5.73	7.50	13	LDFT-6250-2LN	434017
8	4.13	NW63	2.50	8.00	11.26	5.75	6.26	9.62	25	LDFT-8250-2LN	434020
8	4.13	NW80	3.00	8.00	11.26	5.75	6.26	9.62	25	LDFT-8300-2LN	434023
8	4.13	NW100	4.00	8.00	11.26	5.75	6.26	9.62	25	LDFT-8400-2LN	434026

Hose Connection

TRAP SIZE	NOM. CAP. [1]	TUBE DIA.	TUBE WALL	BODY DIA.	BODY HEIGHT	A	B	CLAMP O.D.	WT LB	REFERENCE	PART NUMBER
4	.45	.75	.035	4.00	7.57	3.50	3.84	5.50	6	DFT-4075-LN	434000
4	.45	1.00	.065	4.00	7.57	3.50	3.84	5.50	6	DFT-4100-LN	434003
4	.45	1.50	.065	4.00	7.57	3.50	3.84	5.50	6	DFT-4150-LN	434006
6	1.59	1.50	.065	6.00	10.26	4.50	5.73	7.50	13	DFT-6150-LN	434009
6	1.59	2.00	.065	6.00	10.26	4.50	5.73	7.50	13	DFT-6200-LN	434012
6	1.59	2.50	.065	6.00	10.26	4.50	5.73	7.50	13	DFT-6250-LN	434015
8	4.13	2.50	.065	8.00	11.26	5.50	6.26	9.62	25	DFT-8250-LN	434018
8	4.13	3.00	.065	8.00	11.26	5.50	6.26	9.62	25	DFT-8300-LN	434021
8	4.13	4.00	.083	8.00	11.26	5.50	6.26	9.62	25	DFT-8400-LN	434024

[1] Nominal capacity in liters

Vacuum Pumps

Cryogenic Sorption

Dual sorption pump assembly page 258

Features

- 1x10^{-3} Torr vacuum level
- Economical roughing source
- No moving parts
- Vibration free operation
- Heat regeneration
- Positive pressure safety vent
- Multiple pump capability
- Clean and noncontaminating operation

All dimensions in this catalog are given in inches unless specified otherwise.

Sorption roughing pumps or sorption pumps are used for pumping systems from atmospheric pressure to a pressure of approximately 10^{-2} Torr. They rely on the dispersion forces existing between a gas and a surface to bind gas molecules on chilled surfaces inside the pump. In other words, they pump by cryosorption.

Sorption pumps typically consist of a cylindrical canister or body that is filled with an adsorbent material. The adsorbent is usually a molecular sieve material, or zeolite, which consists of pellets made of a calcium or a sodium aluminosilicate crystalline matrix. The canister is placed in a dewar cooled by liquid nitrogen. Zeolite is a poor heat conductor, so an array of aluminum fins inside the pump is used to improve thermal contact with the sieve material. The pump body and internal cooling fins are specially designed for maximum heat transfer. The pump neck and flange are made of stainless steel. The pumps are mounted and supported by the flanges and since stainless steel is a poor thermal conductor frosting of adjacent components is minimized. Sorption pumps need liquid nitrogen to operate and, as with any capture pump, they have to be periodically regenerated. Sorption pumps are very clean noncontaminating roughing pumps and are ideal for low throughput applications. They are used in conjunction with getter pumps, ion pumps, or mechanical cryopumps.

In a sorption pump, molecules are held on the zeolite surface by physical adsorption. The number of molecules that can be held on an adsorbent is dependent on the temperature of both gas and surface, the chemical nature of gas and surface, the microscopic roughness of the surface, and the incident flux of molecules. The key is to have equilibrium conditions such that practical amounts of gas can be captured at the desired pressures. It follows that a large surface area at low temperatures will have the capability of adsorbing large volumes of gas. By providing large surface areas, practical amounts of nitrogen can be pumped. The key elements of a sorption pump include an aluminum body, an array of fins that remove heat from the zeolite, and a pressure relief mechanism. All MDC sorption pumps are fitted with an elastomer stopper that automatically releases positive pressure. When a sorption pump is saturated with air and allowed to warm up to room temperature, very high pressures can be generated. The elastomer stopper is a key safety element of MDC sorption pumps and operation of this stopper should never be obstructed or disabled.

The adsorbent used is a Type 5A synthetic zeolite molecular sieve material. Zeolite is a highly porous material with a surface to volume ratio of about 800 square meters per cubic centimeter. It is supplied in pellets of about 1.58mm in diameter with molecular sized cavities that are linked by 5 Angstrom size pores. These pores are large enough to trap nitrogen, oxygen, and argon molecules, the main constituents of air. Zeolite also has a very high affinity for water vapor. Water vapor accumulated through repeated pump cycles of a chamber filled with ambient air will eventually saturate the sieve material, reducing and eventually eliminating its capacity for adsorbing nitrogen and oxygen. To remove the accumulated water and regenerate the adsorbent material, the pump must then be baked to 250°C or higher. Under normal operating conditions, the sieve material can be recycled indefinitely.

Sorption pumps do not include the optional bakeout heater. Heaters must be purchased separately. During pump operation, do not

Dual sorption pump manifold with TC gauge

Optional heater assembly

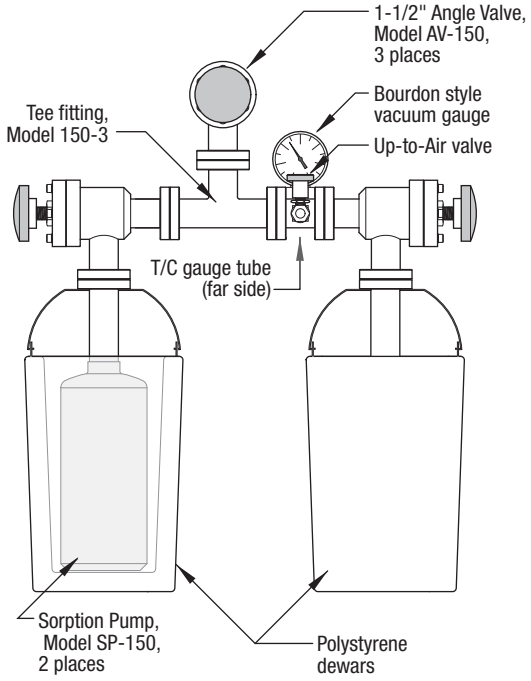
run the heater while it's immersed in liquid nitrogen.

Noble gases such as neon and helium are pumped poorly by sorption pumps. If, for instance, neon is pumped together with air, its capacity will be less because the neon will be replaced by the active air gases, starting at pressures below 7.5 Torr. For this reason, sorption pumps are quite often staged. When two pumps are staged, one pump is used to achieve a pressure of 7.5 Torr and is then valved off. The second pump is then opened and the pressure is further reduced. By this method, 99% of the air is removed with the first pump, and noble gases are also swept into this pump and cannot backstream into the system when pressure is further reduced. Staged or multiple pump assemblies are fitted with both Bourdon and Thermocouple vacuum gauge tubes for monitoring vacuum levels. These manifolds are supplied with three manual UHV angle valves which allow the isolation of each pump and the manifold from the main vacuum system.

Pump operation is simple and fast. To begin pumping, add liquid nitrogen to the dewars. No electrical power is required and there are no moving parts and no vibration. A single sorption pump can evacuate a 100 liter chamber from atmosphere to 10^{-2} Torr in approximately 10 minutes. Each sorption pump has a capacity of 60,000 Torr-liters. Multiple pump systems are commonly used as they are faster and more efficient. Double and triple pump systems are mounted or connected to the chamber via a vacuum manifold. Single pumps, on the other hand, mount directly to a chamber. Pumpdown begins as soon as the adsorbent material in the pump is chilled with liquid nitrogen.

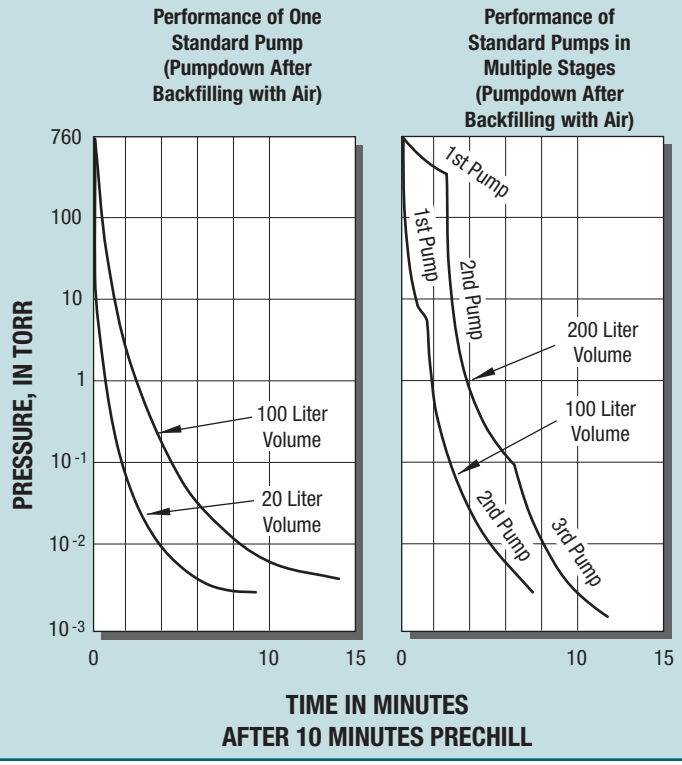
Type 5A Zeolite adsorbent material

Double Sorption Pump System
Model SPS-2-150



- 2-3/4" Del-Seal™ CF flanges are joined using copper gaskets
- Liquid nitrogen supplied by user

Pumpdown Curves



Double Sorption Pump System

Features

- Contamination-free roughing
- Requires only LN_2 for operation
- Fail-safe pressure relief valve
- Aluminum construction for high rate of heat transfer
- No moving parts - no vibration

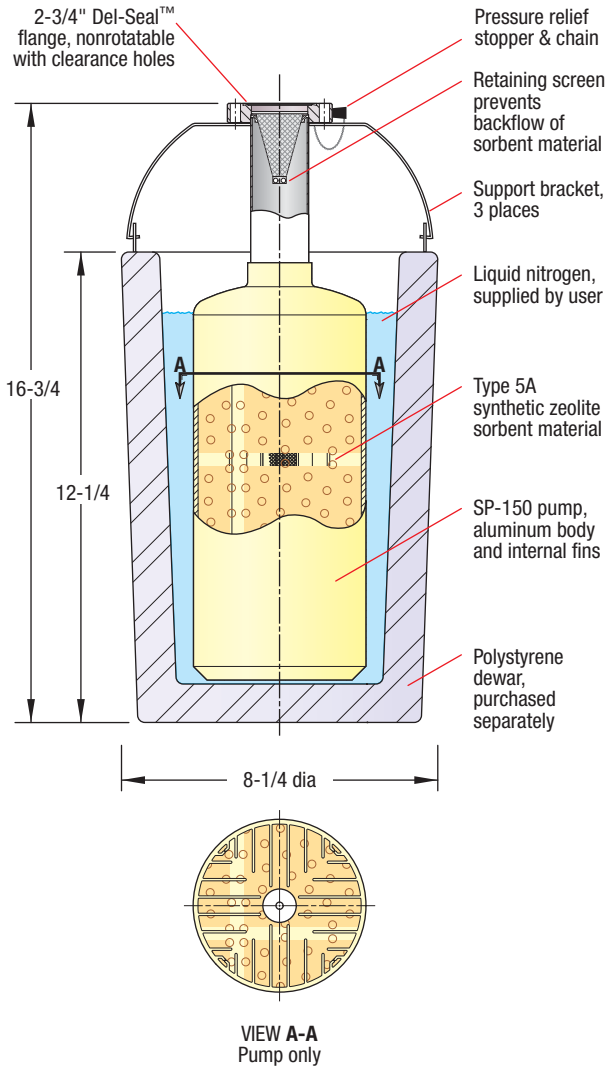
Specifications

Material	
Pump, wall and internal fins	Aluminum
Flanges	304ss
Dewar	High density rigid polystyrene
Fastening	
Bolts, .250-28 UNF	12 lb-ft
Vacuum Range	$5x10^{-3}$ Torr
Temperature Range	Pump: -210ºC to 450ºC
	Dewar: -210ºC to ambient
Weight, without LN_2	
Single pump with dewar added	7 lb
Double pump system	28 lb
Dimensions	See drawings

LOW VACUUM

Sorption Pump
Model SP-150

Shown installed in polystyrene dewar

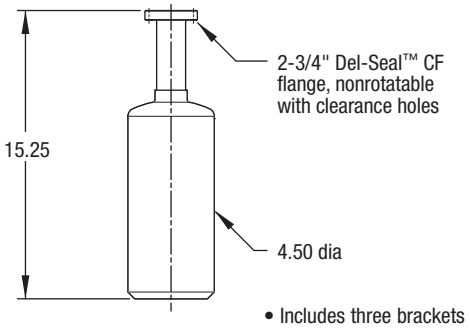


VIEW **A-A**
Pump only

ACCESSORIES

DESCRIPTION	WT LB	REFERENCE	PART NUMBER
DEWAR	1	SPD-150	500001
BAKEOUT HEATER	4	SPH-150	500002
SORBENT MATERIAL	3	SPMS-150	500003
STOPPER	1/8	VSCA-18	950011

Single Pump

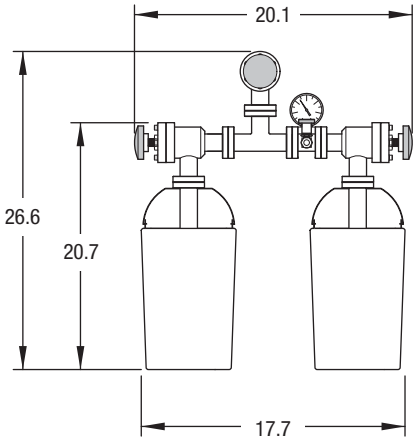


Individual pump includes...

- Aluminum body with stainless steel neck
- 2-3/4" Del-Seal™ CF flange
- Includes initial sorbent material charge, copper gasket and hardware
- 7 pound shipping weight

REFERENCE	PART NUMBER
SP-150	500000

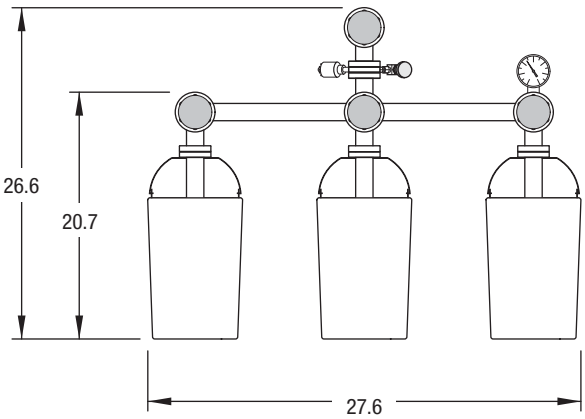
Multiple Pump



Dual system includes...

- 2 each SP-150 pumps with sorbent material
- 2 each SPD-150 dewars
- 3 each AV-150 manual Right-Angle valves
- 1 each 150-3 Tee fitting
- 1 each Gauge nipple Assembly, including thermo-couple gauge tube, Up-to-Air valve and Bourdon vacuum gauge
- 28 pound shipping weight

REFERENCE	PART NUMBER
SPS-2-150	500004



Triple system includes...

- 3 each SP-150 pumps with sorbent material
- 3 each SPD-150 dewars
- 4 each AV-150 manual Right-Angle valves
- 1 each 150-3 Tee fitting
- 1 each Gauge nipple Assembly, including thermo-couple gauge tube, Up-to-Air valve and Bourdon vacuum gauge
- 33 pound shipping weight

REFERENCE	PART NUMBER
SPS-3-150	500005

Accessories shown at right are ordered from the table on the facing page

DEWAR
HIGH DENSITY POLYSTYRENE

PART NUMBER 500001

BAKEOUT HEATER
115 VAC, 50/60 HZ

PART NUMBER 500002

SORBENT MATERIAL
TYPE 5A SYNTHETIC ZEOLITE

PART NUMBER 500003

STOPPER
FKM / FPM FLUOROELASTOMER

PART NUMBER 950011

Vacuum Hose & Accessories

Introduction

Braided and unbraided flexible stainless steel hose, starting on page 263

Features

- Wire reinforced PVC hose
- Stainless steel flexible hose
- Stainless steel braided hose
- PVC tubes and fittings
- Double-sided access flanges
- Up-to-Air valves
- Pressure surge discs
- Leak detector, port reducer kits
- Vacuum greases and lubricants

All dimensions in this catalog are given in inches unless specified otherwise.

Wire Reinforced PVC Hose

MDC wire reinforced PVC hose is a flexible and economical solution for mechanical pump roughing lines. They are suitable for basic vacuum service to levels of $1x10^{-3}$ Torr. The wire reinforced wall prevents tube collapse while under vacuum loads, yet provides adequate flexibility for convoluted line paths. A 20 inch minimum static radius is typical for all hose sizes. Flexible PVC wire reinforced hose is available in sizes from 3/4 to 2 inch diameters, with or without end terminations. In an nonterminated form, hose is sold by the foot to 100 feet maximum lengths. In a terminated form they are available with stainless steel Kwik-Flange™ ISO KF flanges in sizes including NW16, NW25, NW40, and NW50. The PVC hose is secured to the Kwik-Flange™ terminations via stainless steel hose clamps.

Flexible Stainless Steel Hose

MDC flexible stainless steel hose is the perfect solution for applications where standard straight-line vacuum plumbing is not practical or where vibration isolation is required. This type of hose consists of a relatively thin wall formed stainless steel bellows which is available with an optional stainless steel braided sheath. The flexible stainless steel braiding protects the formed bellows from abrasion or impact produced by component movement or vacuum cycling and also protects the hose from excessive bending. Both braided and unbraided configurations are offered with a choice of three end terminations including Del-Seal™ CF metal seal flanges, Kwik-Flange™ ISO KF and Large-Flange™ ISO LF flanges as well as tube end terminations. Limited only by the choice of mount, all stainless steel hoses can be baked to 450°C. Custom sizes, lengths and terminations other than those listed are available on request. Hoses with Del-Seal™ CF metal seal flanges provide a complete metal air-to-vacuum seal required for UHV applications. Note that the large and convoluted internal surface area will require lengthy pumping to achieve UHV pressures. Stainless steel roughing lines are available in a very flexible thin wall configuration and a less flexible medium wall configuration. Care must be taken when installing thin wall hose so as to not exceed the specified bend. MDC recommends that all thin wall hose be used primarily for vibration isolation purposes and installed with minimal bend. Flexible hoses tend to contract when subjected to internal vacuum loads. Components connected to either end of a hose must be securely anchored to prevent movement or possible damage. The total load exerted by atmospheric pressure is substantial and can move roughing pumps and other light, non-secured components. The static bend radius specification for a formed bellows is the minimum radius the bellows can be curved without permanent deformation. The spring rates for stainless steel flexible hose are given for reference only and are typically used as a means to quantify hose flexibility or rigidity. Spring rates are based on the amount of force required to compress one linear inch of a hose that is supported over its entire length. Since unguided hose squirms or deflects laterally, the stated spring rates are of no value unless a hose is supported over its entire length.

Small Diameter Process Lines

MDC Del-Flex™ is the perfect solution for applications where process lines are not straight-line or where vibration isolation is required. The new process lines consist of a relatively thin wall formed 321 stainless steel bellows with 316L tube ends.
Our process lines are fully vacuum annealed to enhance cleanliness. Annealing also

Del-Flex process lines page 271

PVC tubing and components page 278

Manually actuated up-to-air valves page 283

allows the line to be formed with a preset static bend for ease of installation. These convoluted lines are capable of manual compression and extension in length to a maximum of 20% of the nominal convoluted free length. This allows customization at installation without degrading performance integrity. The most severe static bend can be accomplished by bending the line until the convolutions touch at the minimum bend area and then allowing slight spring back to naturally occur, leaving the assembly in the "at rest" condition. Braided lines are available for applications where movement dynamics necessitates part contact. The braided sheath, however, does limit line flexibility.

All welds are accomplished utilizing a state of the art programmable orbital TIG welding process. During welding, argon gas is used as a purge to eliminate oxidation and ensure complete and uniform penetration.

PVC Fittings and Components

Polyvinyl chloride, PVC components offer an economical solution for long vacuum pump exhaust lines and rough vacuum lines. PVC's light weight and flexibility make it simple to assemble in custom configurations right on site. PVC has excellent corrosion resistance and is ideally suited for harsh chemical environments. Kwik-Flange™ ISO KF PVC components can be used in some corrosive environment applications where exposed metal surfaces are subject to chemical attack. Note that many mechanical vacuum pumps are typically supplied with ISO KF inlet and outlet ports. Kwik-Flange™ ISO KF PVC flanges are easily connected to these ports with standard centering rings and hinged clamps. PVC tubing and fittings are assembled, sealed and permanently bonded by using a PVC primer and cement.

Access Flanges

MDC Double-sided access flanges are constructed around the standard double-sided 2-3/4 inch Del-Seal™ CF metal seal flange and provide a convenient method of adding roughing accessories to a vacuum system. These flanges are offered with one or two 1/8"-27 NPT female pipe threads which accept MDC thermocouple gauge tubes and up-to-air valves or other NPT fitted components required by a specific application. These flanges can be installed in an existing vacuum system without the need for additional ports. Simply insert a double-sided flange assembly between two 2-3/4 inch Del-Seal™ CF vacuum flanges and refasten using longer bolts. Bolt kits for fastening double-sided flanges can be found in the flanges and fittings section of this catalog. Double-sided flanges are also offered with no accessory holes. Other configurations are available on request. Note that vacuum and temperature ratings for a finished assembly will be limited by the lowest rated component and by the method used to seal the pipe threads.

Up-to-Air Valves

MDC up-to-air valves are used primarily for the venting or back filling of vacuum vessels. They are vacuum rated to $1x10^{-8}$ Torr. When fitted with Del-Seal™ CF metal seal flanges they can be baked to 300°C. These are manually actuated 1/4 inch diameter valves fitted with a bellows actuator seal.

Pressure Burst Discs

Most vacuum vessels are designed and constructed with internal vacuum joints and welds that are rated for an external load of one atmosphere. They are not pressure vessels and as such should never be subjected to positive pressure loads in excess of one atmosphere. For this purpose fail-safe burst discs have been developed to prevent the accidental pressurizing of a vacuum vessel. MDC burst discs are offered with 1/8 inch male NPT fittings or Del-Seal™ CF metal seal flanges. They can be fitted to most any vacuum system where over pressurization is a possibility. The burst disc is constructed with a thin metal membrane which is capable of sustaining a vacuum load. As pressure begins to build inside a vacuum vessel, the thin metal diaphragm is deformed outwardly until it comes in contact with the sharp edges of the burst disk housing and finally ruptures, relieving the pressure in the system. Once ruptured, the unit is not reusable and must be replaced to make the vessel operational. The disc is designed to burst at a positive pressure anywhere in the range from atmosphere to 25 psig, with rupture certain to occur before 25 psig.

Leak Detector, Port Reducer Kits

MDC Test Port Reducer Kits offer a set of ten different size aluminum reducing adapters for either 1-1/8 or 2 inch leak detector inlet or test ports. They can be used with leak detectors and other devices using an internal elastomer seal. The kits provide a quick, simple, and inexpensive method for reducing standard inlets to 1, 7/8, 3/4, 5/8, 1/2, 3/8, 5/16, 1/4, 3/16 and 1/8 inch tube diameters. In the 2 inch kit, the small test ports fit inside the large adapter. Note that the 1-1/8 inch kit does not include the 2 inch adapter. Each set is supplied in a durable carrying and storage case.

Vacuum Greases and Lubricants

MDC offers a wide selection of vacuum compatible greases and lubricants ideally suited for lubricating static and dynamic elastomer seals or mechanisms in most high vacuum environments.

Leak detector port reducer kits page 284

Pressure burst discs page 284

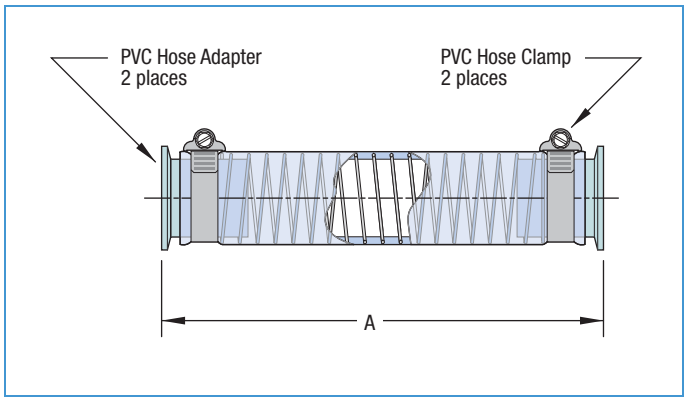
Vacuum lubricants, greases and sealer page 285

Vacuum Roughing Hose

PVC Wire Reinforced Hose

Kwik-Flange™

- Complete assembly includes one Kwik-Flange™ PVC Hose Adapter and Hose Clamp on each end
- Additional hardware available below



- Mates with standard ISO Kwik-Flange™ fittings
- Roughing applications to 10^{-3} Torr
- 35°C (95°F) maximum temperature
- 2-foot or 6-foot lengths
- Non-standard lengths available to 100-ft max
- Does not require cementing

HOSE SIZE	FLANGE SIZE	FLANGE O.D.	ISO REF	STATIC BEND RADIUS	A INCH	WT LB	REFERENCE	PART NUMBER
3/4	K-075	1.18	NW16	19.69	24	1	K075-PVC-24	728000
3/4	K-075	1.18	NW16	19.69	72	2	K075-PVC-72	728047
1	K-100	1.57	NW25	19.69	24	1	K100-PVC-24	728001
1	K-100	1.57	NW25	19.69	72	6	K100-PVC-72	728048
1-1/2	K-150	2.16	NW40	19.69	24	1-1/2	K150-PVC-24	728002
1-1/2	K-150	2.16	NW40	19.69	72	6-1/2	K150-PVC-72	728049
2	K-200	2.95	NW50	19.69	24	1-1/2	K200-PVC-24	728003
2	K-200	2.95	NW50	19.69	72	7-1/2	K200-PVC-72	728050

Coiled Hose

- Bulk hose available to 100-foot maximum length

HOSE SIZE	HOSE I.D.	HOSE WALL	HOSE O.D.	STATIC BEND RADIUS	WT / FOOT LB	REFERENCE	PART NUMBER
1/2	.50	.124	.748	19.69	1/4	PVC-050	728034
3/4	.75	.137	1.024	19.69	1/4	PVC-075	728035
1	1.00	.160	1.319	19.69	1-1/4	PVC-100	728036
1-1/2	1.50	.205	1.909	19.69	1-1/4	PVC-150	728037
2	2.00	.191	2.382	19.69	1-1/2	PVC-200	728038

Hardware

- Hose adapters are stainless steel construction

HOSE SIZE	FLANGE SIZE	ISO REF	QTY	HOSE CLAMP SIZE	WT LB	REFERENCE	PART NUMBER
PVC HOSE ADAPTER							
1/2	K-050	NW16	1	-	1/4	K050-HPV	736000
3/4	K-075	NW16	1	-	1/4	K075-HPV	736001
1	K-100	NW25	1	-	1/4	K100-HPV	736002
1-1/2	K-150	NW40	1	-	1/4	K150-HPV	736003
2	K-200	NW50	1	-	1/4	K200-HPV	736004
PVC HOSE CLAMP							
1/2 AND 3/4	-	-	1	1/2 to 1-1/8	1/8	-	072810
1	-	-	1	3/4 to 1-1/2	1/8	-	072811
1-1/2	-	-	1	1-1/8 to 2	1/8	-	072812
2	-	-	1	1-3/4 to 2-5/8	1/8	-	072813

Vacuum Roughing Hose

Flexible Stainless Steel Hose

ULTRAHIGH & HIGH VACUUM SERIES

Features

- Type 304 stainless steel
- Unbraided or braided configurations
- Medium wall or thin wall configurations
- Highly flexible
- Allows misalignment of pump and chamber
- Provides vibration isolation from mechanical pumps
- All-metal flange hose bakeable to 450°C

Specifications

Material			
Hose			304ss
Flanges			304ss
Gaskets			OFE copper or FKM / FPM fluoroelastomer elastomer
O-rings			FKM / FPM fluoroelastomer, Buna-N® or Silicone elastomer
Clamps, hinged & bulkhead			Aluminum
Fastening			
Bolt, Clamp, Bulkhead			Refer to individual flange
Vacuum Range			
Del-Seal™ CF and Weldable Nipple			$1x10^{-10}$ Torr
Kwik-Flange™ and Large-Flange™			$1x10^{-8}$ Torr
Temperature Range	Minimum	Intermittent	Sustained
Copper gasket	-200°C	450°C	400°C
FKM / FPM fluoroelastomer	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C
Silicone	-20°C	200°C	150°C
Bellows Thickness	**Medium Wall**		**Thin Wall**
3/4" O.D. nominal	.008		.005
1" O.D. nominal	.009		.005
1-1/2" O.D. nominal	.011		.006
2" O.D. nominal	.012		.006
2-1/2" O.D. nominal	.012		-
3" O.D. nominal	.014		-
4" O.D. nominal	.014		-
Static Bend Radius			See hose size, given in inches
Spring Rate			See table, given in pounds per inch
Weight & Additional Dimensions			See table

Description

MDC flexible stainless steel hose is useful in situations where stan-dard straight-line plumbing is impractical or where vibration isola-tion is necessary. The hose consists of stainless steel formed bellows covered with an optional tough metal braid of the same material. The flexible braid protects the bellows from abrasion or impact and pro-vides external support to a component that tends to move under vac-uum. Both unbraided and braided configurations are offered with a choice of flanges and connectors. The hose provides great flexibility, strength and durability, and is bakeable. The sizes and lengths shown are standard items. Other lengths and connector combina-tions are available on request.

Hoses with Del-Seal™ CF flanges provide a complete metal air-to-vacuum seal required for UHV applications. Note that the large inter-nal surface area requires lengthy pumping to achieve UHV pressures.

Stainless steel hoses are available in a highly flexible thin wall con-figuration and a more rigid medium wall configuration. Care must be taken when installing the thin wall versions to not exceed the spec-ified bend radius. MDC recommends that thin wall hoses be used for vibration isolation purposes and installed with minimal curvature.

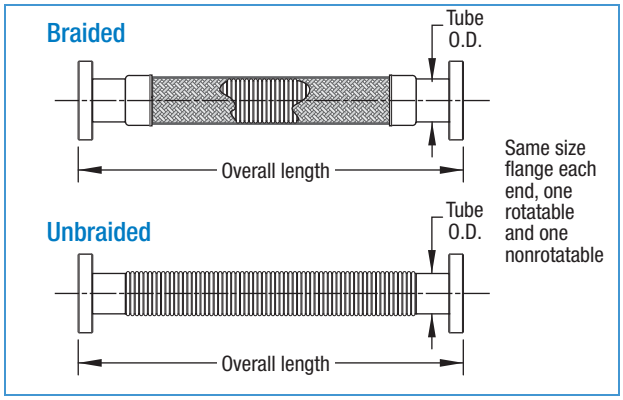
Because all flex hoses compress when subjected to internal vacuum pressures, equipment connected to either end of a flex hose must be securely anchored. Atmospheric pressure exerts a substantial force and can move roughing pumps or other light, non-secured compo-nents.

The static bend radius of a flex hose is the minimum radius a hose can be curved without encountering permanent deformation. The spring rate of a flex hose is the amount of force required to compress a hose one linear inch, with the hose guided over its entire length. Unguided hose will squirm or deflect sideways and stated spring rates no longer apply. Nominal values given in the tables are for reference only.

Vacuum Roughing Hose

Del-Seal™ CF

Medium Wall



- Del-Seal™ CF flanges
- Medium wall braided and unbraided
- Thin wall unbraided
- Other flanges, connectors and custom lengths available upon request

NOMINAL TUBE O.D.	FLANGE NOM.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	SPRING RATE	WT LB	REFERENCE	PART NUMBER
BRAIDED								
3/4	1-1/3	18	.008	3	25	3	FRL-075-18F2	440002
3/4	1-1/3	24	.008	3	19	3	FRL-075-24F2	440006
3/4	1-1/3	36	.008	3	13	4	FRL-075-36F2	440010
3/4	1-1/3	48	.008	3	11.5	5	FRL-075-48F2	440014
1	2-1/8	18	.009	4.25	38	4	FRL-100-18F2	440070
1	2-1/8	24	.009	4.25	28	4	FRL-100-24F2	440076
1	2-1/8	36	.009	4.25	18	5	FRL-100-36F2	440082
1	2-1/8	48	.009	4.25	16.5	6	FRL-100-48F2	440088
1-1/2	2-3/4	18	.011	6.5	56	6	FRL-150-18F2	440018
1-1/2	2-3/4	24	.011	6.5	40	7	FRL-150-24F2	440024
1-1/2	2-3/4	36	.011	6.5	27	9	FRL-150-36F2	440030
1-1/2	2-3/4	48	.011	6.5	25	10	FRL-150-48F2	440036
2	3-3/8	18	.012	9	85	8	FRL-200-18F2	440042
2	3-3/8	24	.012	9	63	11	FRL-200-24F2	440046
2	3-3/8	36	.012	9	40	15	FRL-200-36F2	440050
2	3-3/8	48	.012	9	34	17	FRL-200-48F2	440054
2-1/2	4-1/2	18	.012	10	120	10	FRL-250-18F2	440152
2-1/2	4-1/2	24	.012	10	82	13	FRL-250-24F2	440153
2-1/2	4-1/2	36	.012	10	67	18	FRL-250-36F2	440154
2-1/2	4-1/2	48	.012	10	58	22	FRL-250-48F2	440155
3	4-5/8	18	.014	11	196	15	FRL-300-18F2	440058
3	4-5/8	24	.014	11	150	19	FRL-300-24F2	440061
3	4-5/8	36	.014	11	108	23	FRL-300-36F2	440064
3	4-5/8	48	.014	11	88	27	FRL-300-48F2	440067
4	6	18	.014	13	142	21	FRL-400-18F2	440093
4	6	24	.014	13	108	25	FRL-400-24F2	440095
4	6	36	.014	13	73	27	FRL-400-36F2	440097
4	6	48	.014	13	80	31	FRL-400-48F2	440099

Spring rates are in pounds per inch, axial

Vacuum Roughing Hose

Del-Seal™ CF

Medium Wall

NOMINAL TUBE O.D.	FLANGE NOM.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	SPRING RATE	WT LB	REFERENCE	PART NUMBER
UNBRAIDED								
3/4	1-1/3	18	.008	2	23	3	UB-FRL-075-18F2	441002
3/4	1-1/3	24	.008	2	17	3	UB-FRL-075-24F2	441006
3/4	1-1/3	36	.008	2	11	4	UB-FRL-075-36F2	441010
3/4	1-1/3	48	.008	2	10	5	UB-FRL-075-48F2	441014
1	2-1/8	18	.009	4	34	4	UB-FRL-100-18F2	441070
1	2-1/8	24	.009	4	25	4	UB-FRL-100-24F2	441076
1	2-1/8	36	.009	4	16	5	UB-FRL-100-36F2	441082
1	2-1/8	48	.009	4	15	6	UB-FRL-100-48F2	441088
1-1/2	2-3/4	18	.011	5	51	6	UB-FRL-150-18F2	441018
1-1/2	2-3/4	24	.011	5	37	7	UB-FRL-150-24F2	441024
1-1/2	2-3/4	36	.011	5	24	8	UB-FRL-150-36F2	441030
1-1/2	2-3/4	48	.011	5	22	10	UB-FRL-150-48F2	441036
2	3-3/8	18	.012	7.75	78	6	UB-FRL-200-18F2	441042
2	3-3/8	24	.012	7.75	57	7	UB-FRL-200-24F2	441046
2	3-3/8	36	.012	7.75	37	9	UB-FRL-200-36F2	441050
2	3-3/8	48	.012	7.75	33	11	UB-FRL-200-48F2	441054
2-1/2	4-1/2	18	.012	8.25	109	7	UB-FRL-250-18F2	441152
2-1/2	4-1/2	24	.012	8.25	75	8	UB-FRL-250-24F2	441153
2-1/2	4-1/2	36	.012	8.25	61	12	UB-FRL-250-36F2	441154
2-1/2	4-/12	48	.012	8.25	53	14	UB-FRL-250-48F2	441155
3	4-5/8	18	.014	9	186	9	UB-FRL-300-18F2	441058
3	4-5/8	24	.014	9	112	10	UB-FRL-300-24F2	441061
3	4-5/8	36	.014	9	93	13	UB-FRL-300-36F2	441064
3	4-5/8	48	.014	9	80	15	UB-FRL-300-48F2	441067
4	6	18	.014	11	131	13	UB-FRL-400-18F2	441093
4	6	24	.014	11	97	15	UB-FRL-400-24F2	441095
4	6	36	.014	11	65	19	UB-FRL-400-36F2	441097
4	6	48	.014	11	71	23	UB-FRL-400-48F2	441099

Spring rates are in pounds per inch, axial

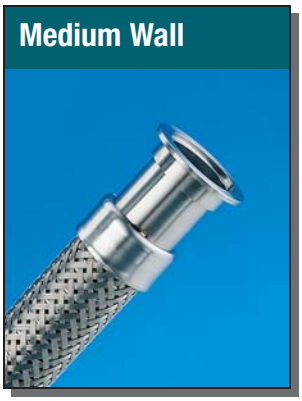
Thin Wall

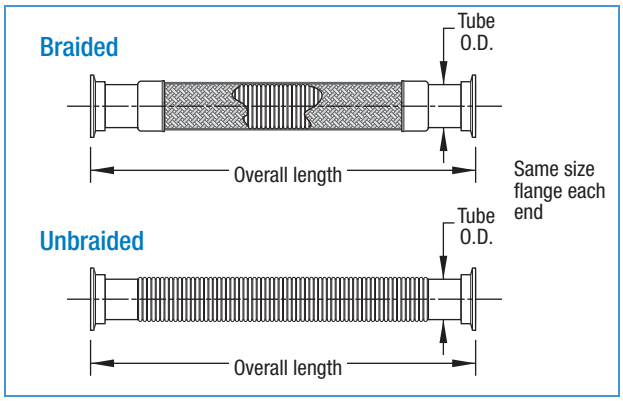
NOMINAL TUBE O.D.	FLANGE NOM.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	SPRING RATE	WT LB	REFERENCE	PART NUMBER
UNBRAIDED								
3/4	1-1/3	18	.005	1	7	3	UB-FRLT-075-18F2	441500
3/4	1-1/3	24	.005	1	5	3	UB-FRLT-075-24F2	441501
3/4	1-1/3	36	.005	1	3	4	UB-FRLT-075-36F2	441502
1	2-1/8	18	.005	1.4	5	4	UB-FRLT-100-18F2	441504
1	2-1/8	24	.005	1.4	3	4	UB-FRLT-100-24F2	441505
1	2-1/8	36	.005	1.4	2	5	UB-FRLT-100-36F2	441506
1	2-1/8	48	.005	1.4	2	6	UB-FRLT-100-48F2	441507
1-1/2	2-3/4	18	.006	2.36	8	6	UB-FRLT-150-18F2	441508
1-1/2	2-3/4	24	.006	2.36	6	7	UB-FRLT-150-24F2	441509
1-1/2	2-3/4	36	.006	2.36	4	8	UB-FRLT-150-36F2	441510
1-1/2	2-3/4	48	.006	2.36	4	10	UB-FRLT-150-48F2	441511
2	3-3/8	18	.006	2.5	9	6	UB-FRLT-200-18F2	441512
2	3-3/8	24	.006	2.5	6	9	UB-FRLT-200-24F2	441513
2	3-3/8	36	.006	2.5	4	13	UB-FRLT-200-36F2	441514
2	3-3/8	48	.006	2.5	4	15	UB-FRLT-200-48F2	441515

Spring rates are in pounds per inch, axial

Vacuum Roughing Hose

ISO KF and LF





- Kwik-Flange™ and Large-Flange™
- Medium wall braided and unbraided
- Thin wall unbraided
- Other flanges, connectors and custom lengths available upon request

NOMINAL TUBE O.D.	ISO REF.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	SPRING RATE	WT LB	REFERENCE	PART NUMBER
BRAIDED								
3/4	NW16	18	.008	3	25	3	KFRL-075-18F2	440101
3/4	NW16	24	.008	3	19	3	KFRL-075-24F2	440103
3/4	NW16	36	.008	3	13	4	KFRL-075-36F2	440105
3/4	NW16	48	.008	3	11.5	5	KFRL-075-48F2	440107
1	NW25	18	.009	4.25	38	4	KFRL-100-18F2	440109
1	NW25	24	.009	4.25	28	4	KFRL-100-24F2	440111
1	NW25	36	.009	4.25	18	5	KFRL-100-36F2	440113
1	NW25	48	.009	4.25	16.5	6	KFRL-100-48F2	440115
1-1/2	NW40	18	.011	6.5	56	5	KFRL-150-18F2	440117
1-1/2	NW40	24	.011	6.5	40	6	KFRL-150-24F2	440121
1-1/2	NW40	36	.011	6.5	27	8	KFRL-150-36F2	440125
1-1/2	NW40	48	.011	6.5	25	9	KFRL-150-48F2	440129
2	NW50	18	.012	9	85	6	KFRL-200-18F2	440133
2	NW50	24	.012	9	63	9	KFRL-200-24F2	440135
2	NW50	36	.012	9	40	13	KFRL-200-36F2	440137
2	NW50	48	.012	9	34	15	KFRL-200-48F2	440139
2-1/2	NW63	18	.012	10	120	7	LFRL-250-18F2	440156
2-1/2	NW63	24	.012	10	82	10	LFRL-250-24F2	440157
2-1/2	NW63	36	.012	10	67	16	LFRL-250-36F2	440158
2-1/2	NW63	48	.012	10	58	19	LFRL-250-48F2	440159
3	NW80	18	.014	11	196	13	LFRL-300-18F2	440200
3	NW80	24	.014	11	150	17	LFRL-300-24F2	440201
3	NW80	36	.014	11	108	21	LFRL-300-36F2	440202
3	NW80	48	.014	11	88	25	LFRL-300-48F2	440203
4	NW100	18	.014	13	142	18	LFRL-400-18F2	440204
4	NW100	24	.014	13	108	22	LFRL-400-24F2	440205
4	NW100	36	.014	13	73	24	LFRL-400-36F2	440206
4	NW100	48	.014	13	80	28	LFRL-400-48F2	440207

Spring rates are in pounds per inch, axial

Vacuum Roughing Hose
ISO KF and LF

Medium Wall

NOMINAL TUBE O.D.	ISO REF.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	SPRING RATE	WT LB	REFERENCE	PART NUMBER
UNBRAIDED								
3/4	NW16	18	.008	2	23	3	UB-KFRL-075-18F2	441101
3/4	NW16	24	.008	2	17	3	UB-KFRL-075-24F2	441103
3/4	NW16	36	.008	2	11	4	UB-KFRL-075-36F2	441105
3/4	NW16	48	.008	2	10	4	UB-KFRL-075-48F2	441107
1	NW25	18	.009	4	34	4	UB-KFRL-100-18F2	441109
1	NW25	24	.009	4	25	4	UB-KFRL-100-24F2	441111
1	NW25	36	.009	4	16	5	UB-KFRL-100-36F2	441113
1	NW25	48	.009	4	15	6	UB-KFRL-100-48F2	441115
1-1/2	NW40	18	.011	5	51	5	UB-KFRL-150-18F2	441117
1-1/2	NW40	24	.011	5	37	6	UB-KFRL-150-24F2	441121
1-1/2	NW40	36	.011	5	24	8	UB-KFRL-150-36F2	441125
1-1/2	NW40	48	.011	5	22	9	UB-KFRL-150-48F2	441129
2	NW50	18	.012	7.75	78	6	UB-KFRL-200-18F2	441133
2	NW50	24	.012	7.75	57	9	UB-KFRL-200-24F2	441135
2	NW50	36	.012	7.75	37	13	UB-KFRL-200-36F2	441137
2	NW50	48	.012	7.75	33	15	UB-KFRL-200-48F2	441139
2-1/2	NW63	18	.012	8.25	109	7	UB-LFRL-250-18F2	441156
2-1/2	NW63	24	.012	8.25	75	10	UB-LFRL-250-24F2	441157
2-1/2	NW63	36	.012	8.25	61	16	UB-LFRL-250-36F2	441158
2-1/2	NW63	48	.012	8.25	53	19	UB-LFRL-250-48F2	441159
3	NW80	18	.014	9	186	12	UB-LFRL-300-18F2	441200
3	NW80	24	.014	9	112	16	UB-LFRL-300-24F2	441201
3	NW80	36	.014	9	93	20	UB-LFRL-300-36F2	441202
3	NW80	48	.014	9	80	24	UB-LFRL-300-48F2	441203
4	NW100	18	.014	11	131	15	UB-LFRL-400-18F2	441204
4	NW100	24	.014	11	97	19	UB-LFRL-400-24F2	441205
4	NW100	36	.014	11	65	21	UB-LFRL-400-36F2	441206
4	NW100	48	.014	11	71	25	UB-LFRL-400-48F2	441207

Spring rates are in pounds per inch, axial

Thin Wall

NOMINAL TUBE O.D.	ISO REF.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	SPRING RATE	WT LB	REFERENCE	PART NUMBER
UNBRAIDED								
3/4	NW16	18	.005	1	7	3	UB-KFRLT-075-18F2	441516
3/4	NW16	24	.005	1	5	3	UB-KFRLT-075-24F2	441517
3/4	NW16	36	.005	1	3	4	UB-KFRLT-075-36F2	441518
1	NW25	18	.005	1.4	5	4	UB-KFRLT-100-18F2	441520
1	NW25	24	.005	1.4	3	4	UB-KFRLT-100-24F2	441521
1	NW25	36	.005	1.4	2	5	UB-KFRLT-100-36F2	441522
1	NW25	48	.005	1.4	2	6	UB-KFRLT-100-48F2	441523
1-1/2	NW40	18	.006	2.36	8	5	UB-KFRLT-150-18F2	441524
1-1/2	NW40	24	.006	2.36	6	6	UB-KFRLT-150-24F2	441525
1-1/2	NW40	36	.006	2.36	4	8	UB-KFRLT-150-36F2	441526
1-1/2	NW40	48	.006	2.36	4	9	UB-KFRLT-150-48F2	441527
2	NW50	18	.006	2.5	9	6	UB-KFRLT-200-18F2	441528
2	NW50	24	.006	2.5	6	7	UB-KFRLT-200-24F2	441529
2	NW50	36	.006	2.5	4	9	UB-KFRLT-200-36F2	441530
2	NW50	48	.006	2.5	4	11	UB-KFRLT-200-48F2	441531

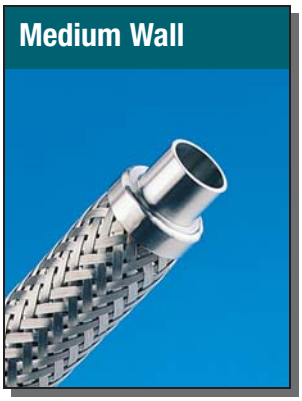
Spring rates are in pounds per inch, axial

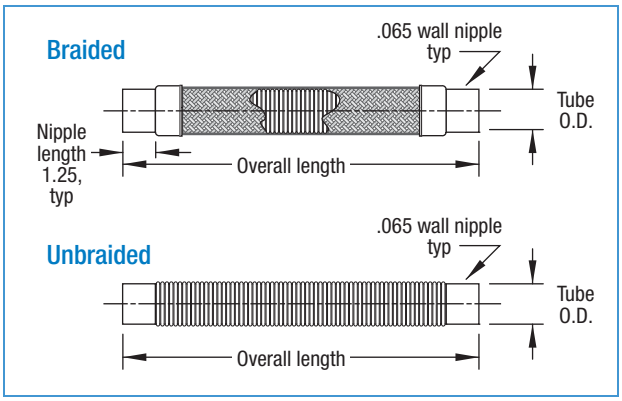
Vacuum Roughing Hose

Weldable Hose Ends

MDC PRECISION
Enabling Science to Change the World

Medium Wall





- Weldable or hose connection
- Medium wall braided and unbraided
- Thin wall unbraided
- Other flanges, connectors and custom lengths available upon request

NOMINAL TUBE O.D.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	SPRING RATE	WT LB	REFERENCE	PART NUMBER
BRAIDED							
3/4	18	.008	3	25	2	FRL-075-18	440000
3/4	24	.008	3	19	2	FRL-075-24	440004
3/4	36	.008	3	13	3	FRL-075-36	440008
3/4	48	.008	3	11.5	4	FRL-075-48	440012
1	18	.009	4.25	38	3	FRL-100-18	440068
1	24	.009	4.25	28	3	FRL-100-24	440074
1	36	.009	4.25	18	4	FRL-100-36	440080
1	48	.009	4.25	16.5	5	FRL-100-48	440086
1-1/2	18	.011	6.5	56	4	FRL-150-18	440016
1-1/2	24	.011	6.5	40	5	FRL-150-24	440022
1-1/2	36	.011	6.5	27	7	FRL-150-36	440028
1-1/2	48	.011	6.5	25	8	FRL-150-48	440034
2	18	.012	9	85	5	FRL-200-18	440040
2	24	.012	9	63	8	FRL-200-24	440044
2	36	.012	9	40	12	FRL-200-36	440048
2	48	.012	9	34	14	FRL-200-48	440052
2-1/2	18	.012	10	120	6	FRL-250-18	440160
2-1/2	24	.012	10	82	9	FRL-250-24	440161
2-1/2	36	.012	10	67	14	FRL-250-36	440162
2-1/2	48	.012	10	58	16	FRL-250-48	440163
3	18	.014	11	196	10	FRL-300-18	440056
3	24	.014	11	150	14	FRL-300-24	440059
3	36	.014	11	108	18	FRL-300-36	440062
3	48	.014	11	88	22	FRL-300-48	440065
4	18	.014	13	142	14	FRL-400-18	440092
4	24	.014	13	108	18	FRL-400-24	440094
4	36	.014	13	73	20	FRL-400-36	440096
4	48	.014	13	80	24	FRL-400-48	440098

Spring rates are in pounds per inch, axial

Vacuum Roughing Hose

Weldable Hose Ends

Medium Wall

NOMINAL TUBE O.D.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	SPRING RATE	WT LB	REFERENCE	PART NUMBER
UNBRAIDED							
3/4	18	.008	2	23	2	UB-FRL-075-18	441000
3/4	24	.008	2	17	2	UB-FRL-075-24	441004
3/4	36	.008	2	11	3	UB-FRL-075-36	441008
3/4	48	.008	2	10	4	UB-FRL-075-48	441012
1	18	.009	4	34	3	UB-FRL-100-18	441068
1	24	.009	4	25	3	UB-FRL-100-24	441074
1	36	.009	4	16	4	UB-FRL-100-36	441080
1	48	.009	4	15	5	UB-FRL-100-48	441086
1-1/2	18	.011	5	51	4	UB-FRL-150-18	441016
1-1/2	24	.011	5	37	5	UB-FRL-150-24	441022
1-1/2	36	.011	5	24	6	UB-FRL-150-36	441028
1-1/2	48	.011	5	22	8	UB-FRL-150-48	441034
2	18	.012	7.75	78	3	UB-FRL-200-18	441040
2	24	.012	7.75	57	4	UB-FRL-200-24	441044
2	36	.012	7.75	37	8	UB-FRL-200-36	441048
2	48	.012	7.75	33	9	UB-FRL-200-48	441052
2-1/2	18	.012	8.25	109	4	UB-FRL-250-18	441160
2-1/2	24	.012	8.25	75	5	UB-FRL-250-24	441161
2-1/2	36	.012	8.25	61	7	UB-FRL-250-36	441162
2-1/2	48	.012	8.25	53	9	UB-FRL-250-48	441163
3	18	.014	9	186	4	UB-FRL-300-18	441056
3	24	.014	9	112	5	UB-FRL-300-24	441059
3	36	.014	9	93	8	UB-FRL-300-36	441062
3	48	.014	9	80	10	UB-FRL-300-48	441065
4	18	.014	11	131	6	UB-FRL-400-18	441092
4	24	.014	11	97	8	UB-FRL-400-24	441094
4	36	.014	11	65	12	UB-FRL-400-36	441096
4	48	.014	11	71	16	UB-FRL-400-48	441098

Spring rates are in pounds per inch, axial

Thin Wall

NOMINAL TUBE O.D.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	SPRING RATE	WT LB	REFERENCE	PART NUMBER
UNBRAIDED							
3/4	18	.005	1	7	3	UB-FRLT-075-18	441532
3/4	24	.005	1	5	3	UB-FRLT-075-24	441533
3/4	36	.005	1	3	4	UB-FRLT-075-36	441534
1	18	.005	1.4	5	4	UB-FRLT-100-18	441536
1	24	.005	1.4	3	4	UB-FRLT-100-24	441537
1	36	.005	1.4	2	5	UB-FRLT-100-36	441538
1	48	.005	1.4	2	6	UB-FRLT-100-48	441539
1-1/2	18	.006	2.36	8	6	UB-FRLT-150-18	441540
1-1/2	24	.006	2.36	6	7	UB-FRLT-150-24	441541
1-1/2	36	.006	2.36	4	8	UB-FRLT-150-36	441542
1-1/2	48	.006	2.36	4	10	UB-FRLT-150-48	441543
2	18	.006	2.5	9	6	UB-FRLT-200-18	441544
2	24	.006	2.5	6	7	UB-FRLT-200-24	441545
2	36	.006	2.5	4	9	UB-FRLT-200-36	441546
2	48	.006	2.5	4	11	UB-FRLT-200-48	441547

Spring rates are in pounds per inch, axial

Del-Flex™ Process Lines

Flexible Stainless Steel Hose

Del-Flex™ Process Lines

Flexible Stainless Steel Hose

ULTRAHIGH & HIGH VACUUM SERIES

Features

- Type 321 stainless steel
- Unbraided or braided configurations
- Thin wall configuration
- Highly flexible
- Provides easy installation of process lines
- All-metal flange hose bakeable to 450°C

Description

MDC Del-Flex™ is the perfect solution for applications where process lines are not straight-line or where vibration isolation is required. The new process lines consist of a relatively thin wall formed 321 stainless steel bellows with 316L tube ends.

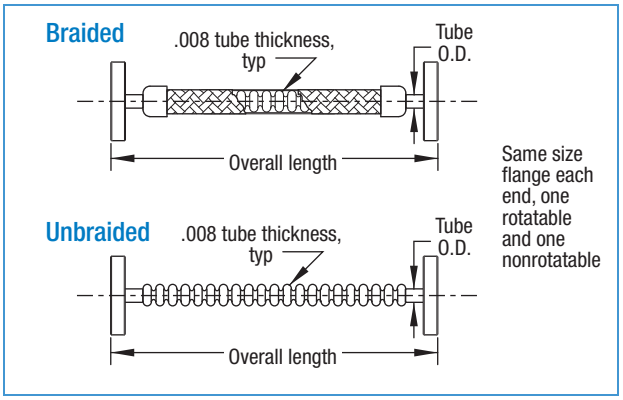
Our process lines are fully vacuum annealed to enhance cleanliness. Annealing also allows the line to be formed with a preset static bend for ease of installation. These convoluted lines are capable of manual compression and extension in length to a maximum of 20% of the nominal convoluted free length. This allows customization at installation without degrading performance integrity. The most severe static bend can be accomplished by bending the line until the convolutions touch at the minimum bend area and then allowing slight spring back to naturally occur, leaving the assembly in the "at rest" condition. Braided lines are available for applications where movement dynamics necessitates part contact. The braided sheath, however, does limit line flexibility.

All welds are accomplished utilizing a state of the art programmable orbital TIG welding process. During welding, argon gas is used as a purge to eliminate oxidation and ensure complete and uniform penetration.

Specifications

Material			
Hose			321ss
Flanges			304ss
Gaskets			OFE copper or FKM / FPM fluoroelastomer elastomer
O-rings			FKM / FPM fluoroelastomer, Buna-N® or Silicone elastomer
Clamps, hinged & bulkhead			Aluminum
Fastening			
Bolt, Clamp, Bulkhead			Refer to individual flange
Vacuum Range			
Del-Seal™ CF and Weldable Nipple			$1x10^{-10}$ Torr
Kwik-Flange™ and Large-Flange™			$1x10^{-8}$ Torr
Temperature Range	Minimum	Intermittent	Sustained
Copper gasket	-200°C	450°C	400°C
FKM / FPM fluoroelastomer	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C
Silicone	-20°C	200°C	150°C
Bellows Thickness			
.25" and .38" O.D. nominal			.008
Bend Radius			See table, given in inches
Weight & Additional Dimensions			See table

Braided



- 1.33 Mini Del-Seal™ CF flanges
- Thin wall braided and unbraided
- 321 stainless steel bellows
- Bakeable to 450°C
- Other flanges, connectors and custom lengths available upon request

Centerline Bend Radii

.25 Tube O.D.

Braided, static	1.75
Braided, dynamic	5.00
Unbraided, static	1.13

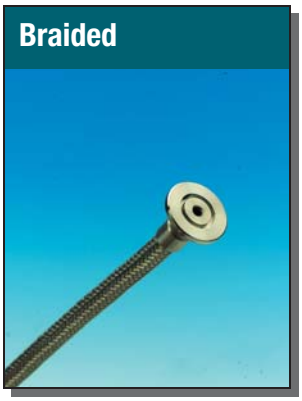
.38 Tube O.D.

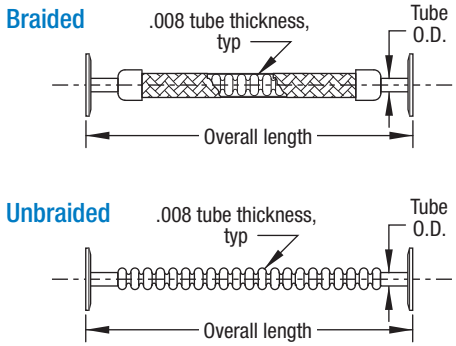
Braided, static	3.00
Braided, dynamic	8.00
Unbraided, static	1.88

NOMINAL TUBE O.D.	FLANGE NOM.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
BRAIDED							
1/4	1-1/3	4	.008	1.75	1/4	FRL-075-025-4F2	440313
1/4	1-1/3	8	.008	1.75	1/4	FRL-075-025-8F2	440314
1/4	1-1/3	12	.008	1.75	1/2	FRL-075-025-12F2	440315
1/4	1-1/3	18	.008	1.75	1/2	FRL-075-025-18F2	440316
1/4	1-1/3	24	.008	1.75	3/4	FRL-075-025-24F2	440317
1/4	1-1/3	36	.008	1.75	1	FRL-075-025-36F2	440318
3/8	1-1/3	4	.008	3.00	1/4	FRL-075-038-4F2	440363
3/8	1-1/3	8	.008	3.00	1/4	FRL-075-038-8F2	440364
3/8	1-1/3	12	.008	3.00	1/2	FRL-075-038-12F2	440365
3/8	1-1/3	18	.008	3.00	1/2	FRL-075-038-18F2	440366
3/8	1-1/3	24	.008	3.00	3/4	FRL-075-038-24F2	440367
3/8	1-1/3	36	.008	3.00	1	FRL-075-038-36F2	440368

Unbraided

NOMINAL TUBE O.D.	FLANGE NOM.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
UNBRAIDED							
1/4	1-1/3	4	.008	1.13	1/4	UB-FRL-075-025-4F2	441313
1/4	1-1/3	8	.008	1.13	1/4	UB-FRL-075-025-8F2	441314
1/4	1-1/3	12	.008	1.13	1/2	UB-FRL-075-025-12F2	441315
1/4	1-1/3	18	.008	1.13	1/2	UB-FRL-075-025-18F2	441316
1/4	1-1/3	24	.008	1.13	3/4	UB-FRL-075-025-24F2	441317
1/4	1-1/3	36	.008	1.13	1	UB-FRL-075-025-36F2	441318
3/8	1-1/3	4	.008	1.88	1/4	UB-FRL-075-038-4F2	441363
3/8	1-1/3	8	.008	1.88	1/4	UB-FRL-075-038-8F2	441364
3/8	1-1/3	12	.008	1.88	1/2	UB-FRL-075-038-12F2	441365
3/8	1-1/3	18	.008	1.88	1/2	UB-FRL-075-038-18F2	441366
3/8	1-1/3	24	.008	1.88	3/4	UB-FRL-075-038-24F2	441367
3/8	1-1/3	36	.008	1.88	1	UB-FRL-075-038-36F2	441368





- Kwik-Flange™
- Thin wall braided and unbraided
- 321 stainless steel bellows
- Bakeable to 150°C sustained, 200°C intermittent
- Other flanges, connectors and custom lengths available upon request

Centerline Bend Radii

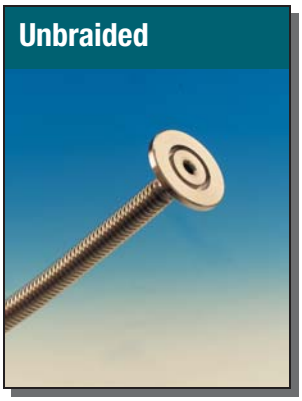
.25 Tube O.D.

Braided, static	1.75
Braided, dynamic	5.00
Unbraided, static	1.13

.38 Tube O.D.

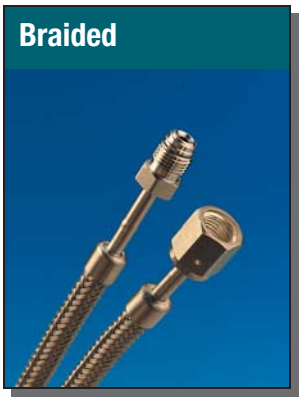
Braided, static	3.00
Braided, dynamic	8.00
Unbraided, static	1.88

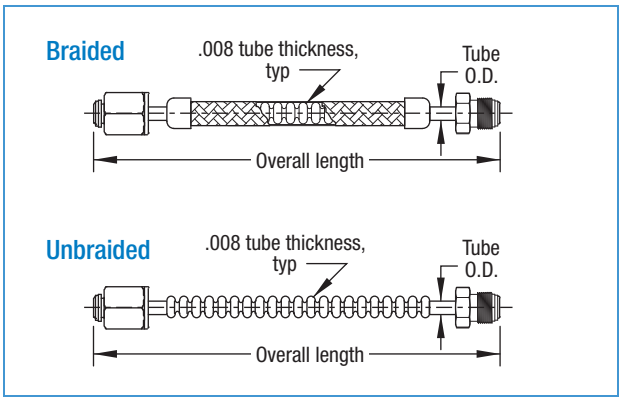
NOMINAL TUBE O.D.	ISO REF.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
BRAIDED							
1/4	NW16	4	.008	1.75	1/4	KFRL-075-025-4F2	440307
1/4	NW16	8	.008	1.75	1/4	KFRL-075-025-8F2	440308
1/4	NW16	12	.008	1.75	1/2	KFRL-075-025-12F2	440309
1/4	NW16	18	.008	1.75	1/2	KFRL-075-025-18F2	440310
1/4	NW16	24	.008	1.75	3/4	KFRL-075-025-24F2	440311
1/4	NW16	36	.008	1.75	1	KFRL-075-025-36F2	440312
3/8	NW16	4	.008	3.00	1/4	KFRL-075-038-4F2	440357
3/8	NW16	8	.008	3.00	1/4	KFRL-075-038-8F2	440358
3/8	NW16	12	.008	3.00	1/2	KFRL-075-038-12F2	440359
3/8	NW16	18	.008	3.00	1/2	KFRL-075-038-18F2	440360
3/8	NW16	24	.008	3.00	3/4	KFRL-075-038-24F2	440361
3/8	NW16	36	.008	3.00	1	KFRL-075-038-36F2	440362



NOMINAL TUBE O.D.	ISO REF.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
UNBRAIDED							
1/4	NW16	4	.008	1.13	1/4	UB-KFRL-075-025-4F2	441307
1/4	NW16	8	.008	1.13	1/4	UB-KFRL-075-025-8F2	441308
1/4	NW16	12	.008	1.13	1/2	UB-KFRL-075-025-12F2	441309
1/4	NW16	18	.008	1.13	1/2	UB-KFRL-075-025-18F2	441310
1/4	NW16	24	.008	1.13	3/4	UB-KFRL-075-025-24F2	441311
1/4	NW16	36	.008	1.13	1	UB-KFRL-075-025-36F2	441312
3/8	NW16	4	.008	1.88	1/4	UB-KFRL-075-038-4F2	441357
3/8	NW16	8	.008	1.88	1/4	UB-KFRL-075-038-8F2	441358
3/8	NW16	12	.008	1.88	1/2	UB-KFRL-075-038-12F2	441359
3/8	NW16	18	.008	1.88	1/2	UB-KFRL-075-038-18F2	441360
3/8	NW16	24	.008	1.88	3/4	UB-KFRL-075-038-24F2	441361
3/8	NW16	36	.008	1.88	1	UB-KFRL-075-038-36F2	441362

Del-Flex™ Process Lines
VCR™





- VCR™ connection
- Thin wall braided and unbraided
- 321 stainless steel bellows
- Bakeable to 450°C
- Other flanges, connectors and custom lengths available upon request

Centerline Bend Radii

.25 Tube O.D.

Braided, static	1.75
Braided, dynamic	5.00

.38 Tube O.D.

Braided, static	3.00
Braided, dynamic	8.00

NOMINAL TUBE O.D.	CONNECTOR TYPE	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
BRAIDED							
MALE TO FEMALE							
1/4	1/4 VCR	8	.008	1.75	1/4	FRL-1/4VCR-8M/F	440319
1/4	1/4 VCR	12	.008	1.75	1/2	FRL-1/4VCR-12M/F	440320
1/4	1/4 VCR	18	.008	1.75	1/2	FRL-1/4VCR-18M/F	440321
1/4	1/4 VCR	24	.008	1.75	3/4	FRL-1/4VCR-24M/F	440322
1/4	1/4 VCR	36	.008	1.75	1	FRL-1/4VCR-36M/F	440323
MALE TO MALE							
1/4	1/4 VCR	8	.008	1.75	1/4	FRL-1/4MVCR-8F2	440324
1/4	1/4 VCR	12	.008	1.75	1/2	FRL-1/4MVCR-12F2	440325
1/4	1/4 VCR	18	.008	1.75	1/2	FRL-1/4MVCR-18F2	440326
1/4	1/4 VCR	24	.008	1.75	3/4	FRL-1/4MVCR-24F2	440327
1/4	1/4 VCR	36	.008	1.75	1	FRL-1/4MVCR-36F2	440328
FEMALE TO FEMALE							
1/4	1/4 VCR	8	.008	1.75	1/4	FRL-1/4FVCR-8F2	440329
1/4	1/4 VCR	12	.008	1.75	1/2	FRL-1/4FVCR-12F2	440330
1/4	1/4 VCR	18	.008	1.75	1/2	FRL-1/4FVCR-18F2	440331
1/4	1/4 VCR	24	.008	1.75	3/4	FRL-1/4FVCR-24F2	440332
1/4	1/4 VCR	36	.008	1.75	1	FRL-1/4FVCR-36F2	440333
BRAIDED							
MALE TO FEMALE							
3/8	3/8 VCR	8	.008	3.00	1/4	FRL-3/8VCR-8M/F	440369
3/8	3/8 VCR	12	.008	3.00	1/2	FRL-3/8VCR-12M/F	440370
3/8	3/8 VCR	18	.008	3.00	1/2	FRL-3/8VCR-18M/F	440371
3/8	3/8 VCR	24	.008	3.00	3/4	FRL-3/8VCR-24M/F	440372
3/8	3/8 VCR	36	.008	3.00	1	FRL-3/8VCR-36M/F	440373
MALE TO MALE							
3/8	3/8 VCR	8	.008	3.00	1/4	FRL-3/8MVCR-8F2	440374
3/8	3/8 VCR	12	.008	3.00	1/2	FRL-3/8MVCR-12F2	440375
3/8	3/8 VCR	18	.008	3.00	1/2	FRL-3/8MVCR-18F2	440376
3/8	3/8 VCR	24	.008	3.00	3/4	FRL-3/8MVCR-24F2	440377
3/8	3/8 VCR	36	.008	3.00	1	FRL-3/8MVCR-36F2	440378
FEMALE TO FEMALE							
3/8	3/8 VCR	8	.008	3.00	1/4	FRL-3/8FVCR-8F2	440379
3/8	3/8 VCR	12	.008	3.00	1/2	FRL-3/8FVCR-12F2	440380
3/8	3/8 VCR	18	.008	3.00	1/2	FRL-3/8FVCR-18F2	440381
3/8	3/8 VCR	24	.008	3.00	3/4	FRL-3/8FVCR-24F2	440382
3/8	3/8 VCR	36	.008	3.00	1	FRL-3/8FVCR-36F2	440383

Unbraided

Centerline Bend Radii

.25 Tube O.D.

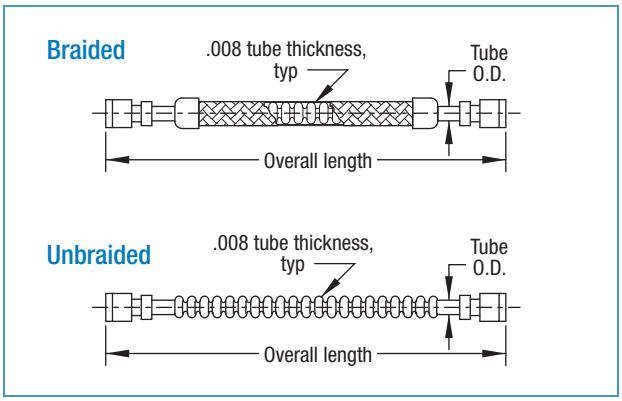
Unbraided, static	1.13

.38 Tube O.D.

Unbraided, static	1.88

NOMINAL TUBE O.D.	CONNECTOR TYPE	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
UNBRAIDED							
MALE TO FEMALE							
1/4	1/4 VCR	4	.008	1.13	1/4	UB-FRL-1/4VCR-4M/F	441319
1/4	1/4 VCR	8	.008	1.13	1/4	UB-FRL-1/4VCR-8M/F	441320
1/4	1/4 VCR	12	.008	1.13	1/2	UB-FRL-1/4VCR-12M/F	441321
1/4	1/4 VCR	18	.008	1.13	1/2	UB-FRL-1/4VCR-18M/F	441322
1/4	1/4 VCR	24	.008	1.13	3/4	UB-FRL-1/4VCR-24M/F	441323
1/4	1/4 VCR	36	.008	1.13	1	UB-FRL-1/4VCR-36M/F	441324
MALE TO MALE							
1/4	1/4 VCR	4	.008	1.13	1/4	UB-FRL-1/4MVCR-4F2	441325
1/4	1/4 VCR	8	.008	1.13	1/4	UB-FRL-1/4MVCR-8F2	441326
1/4	1/4 VCR	12	.008	1.13	1/2	UB-FRL-1/4MVCR-12F2	441327
1/4	1/4 VCR	18	.008	1.13	1/2	UB-FRL-1/4MVCR-18F2	441328
1/4	1/4 VCR	24	.008	1.13	3/4	UB-FRL-1/4MVCR-24F2	441329
1/4	1/4 VCR	36	.008	1.13	1	UB-FRL-1/4MVCR-36F2	441330
FEMALE TO FEMALE							
1/4	1/4 VCR	4	.008	1.13	1/4	UB-FRL-1/4FVCR-4F2	441331
1/4	1/4 VCR	8	.008	1.13	1/4	UB-FRL-1/4FVCR-8F2	441332
1/4	1/4 VCR	12	.008	1.13	1/2	UB-FRL-1/4FVCR-12F2	441333
1/4	1/4 VCR	18	.008	1.13	1/2	UB-FRL-1/4FVCR-18F2	441334
1/4	1/4 VCR	24	.008	1.13	3/4	UB-FRL-1/4FVCR-24F2	441335
1/4	1/4 VCR	36	.008	1.13	1	UB-FRL-1/4FVCR-36F2	441336
UNBRAIDED							
MALE TO FEMALE							
3/8	3/8 VCR	4	.008	1.88	1/4	UB-FRL-3/8VCR-4M/F	441369
3/8	3/8 VCR	8	.008	1.88	1/4	UB-FRL-3/8VCR-8M/F	441370
3/8	3/8 VCR	12	.008	1.88	1/2	UB-FRL-3/8VCR-12M/F	441371
3/8	3/8 VCR	18	.008	1.88	1/2	UB-FRL-3/8VCR-18M/F	441372
3/8	3/8 VCR	24	.008	1.88	3/4	UB-FRL-3/8VCR-24M/F	441373
3/8	3/8 VCR	36	.008	1.88	1	UB-FRL-3/8VCR-36M/F	441374
MALE TO MALE							
3/8	3/8 VCR	4	.008	1.88	1/4	UB-FRL-3/8MVCR-4F2	441375
3/8	3/8 VCR	8	.008	1.88	1/4	UB-FRL-3/8MVCR-8F2	441376
3/8	3/8 VCR	12	.008	1.88	1/2	UB-FRL-3/8MVCR-12F2	441377
3/8	3/8 VCR	18	.008	1.88	1/2	UB-FRL-3/8MVCR-18F2	441378
3/8	3/8 VCR	24	.008	1.88	3/4	UB-FRL-3/8MVCR-24F2	441379
3/8	3/8 VCR	36	.008	1.88	1	UB-FRL-3/8MVCR-36F2	441380
FEMALE TO FEMALE							
3/8	3/8 VCR	4	.008	1.88	1/4	UB-FRL-3/8FVCR-4F2	441381
3/8	3/8 VCR	8	.008	1.88	1/4	UB-FRL-3/8FVCR-8F2	441382
3/8	3/8 VCR	12	.008	1.88	1/2	UB-FRL-3/8FVCR-12F2	441383
3/8	3/8 VCR	18	.008	1.88	1/2	UB-FRL-3/8FVCR-18F2	441384
3/8	3/8 VCR	24	.008	1.88	3/4	UB-FRL-3/8FVCR-24F2	441385
3/8	3/8 VCR	36	.008	1.88	1	UB-FRL-3/8FVCR-36F2	441386

Braided



- Swagelok™ connection
- Thin wall braided and unbraided
- 321 stainless steel bellows
- Bakeable to 450°C
- Other flanges, connectors and custom lengths available upon request

Centerline Bend Radii

.25 Tube O.D.

Braided, static	1.75
Braided, dynamic	5.00
Unbraided, static	1.13

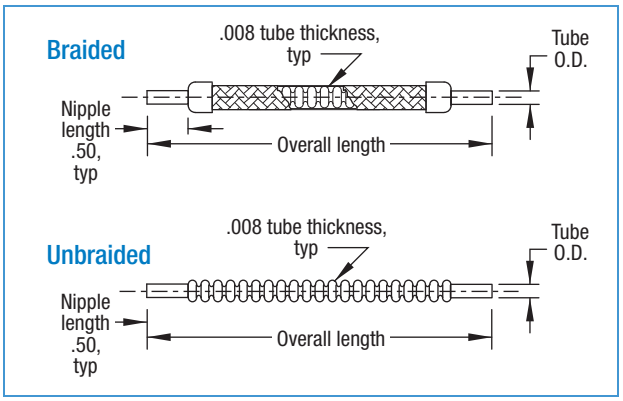
.38 Tube O.D.

Braided, static	3.00
Braided, dynamic	8.00
Unbraided, static	1.88

NOMINAL TUBE O.D.	CONNECTOR TYPE	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
BRAIDED							
1/4	1/4 SWG	8	.008	1.75	1/4	FRL-1/4SWG-8F2	440334
1/4	1/4 SWG	12	.008	1.75	1/2	FRL-1/4SWG-12F2	440335
1/4	1/4 SWG	18	.008	1.75	1/2	FRL-1/4SWG-18F2	440336
1/4	1/4 SWG	24	.008	1.75	3/4	FRL-1/4SWG-24F2	440337
1/4	1/4 SWG	36	.008	1.75	1	FRL-1/4SWG-36F2	440338
3/8	3/8 SWG	8	.008	3.00	1/4	FRL-3/8SWG-8F2	440384
3/8	3/8 SWG	12	.008	3.00	1/2	FRL-3/8SWG-12F2	440385
3/8	3/8 SWG	18	.008	3.00	1/2	FRL-3/8SWG-18F2	440386
3/8	3/8 SWG	24	.008	3.00	3/4	FRL-3/8SWG-24F2	440387
3/8	3/8 SWG	36	.008	3.00	1	FRL-3/8SWG-36F2	440388

Unbraided

NOMINAL TUBE O.D.	CONNECTOR TYPE	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
UNBRAIDED							
1/4	1/4 SWG	4	.008	1.13	1/4	UB-FRL-1/4SWG-4F2	441337
1/4	1/4 SWG	8	.008	1.13	1/4	UB-FRL-1/4SWG-8F2	441338
1/4	1/4 SWG	12	.008	1.13	1/2	UB-FRL-1/4SWG-12F2	441339
1/4	1/4 SWG	18	.008	1.13	1/2	UB-FRL-1/4SWG-18F2	441340
1/4	1/4 SWG	24	.008	1.13	3/4	UB-FRL-1/4SWG-24F2	441341
1/4	1/4 SWG	36	.008	1.13	1	UB-FRL-1/4SWG-36F2	441342
3/8	3/8 SWG	4	.008	1.88	1/4	UB-FRL-3/8SWG-4F2	441387
3/8	3/8 SWG	8	.008	1.88	1/4	UB-FRL-3/8SWG-8F2	441388
3/8	3/8 SWG	12	.008	1.88	1/2	UB-FRL-3/8SWG-12F2	441389
3/8	3/8 SWG	18	.008	1.88	1/2	UB-FRL-3/8SWG-18F2	441390
3/8	3/8 SWG	24	.008	1.88	3/4	UB-FRL-3/8SWG-24F2	441391
3/8	3/8 SWG	36	.008	1.88	1	UB-FRL-3/8SWG-36F2	441392



- Weldable or hose connection
- Thin wall braided and unbraided
- 321 stainless steel bellows and 316L tube ends
- Bakeable to 450°C
- Other flanges, connectors and custom lengths available upon request

Centerline Bend Radii

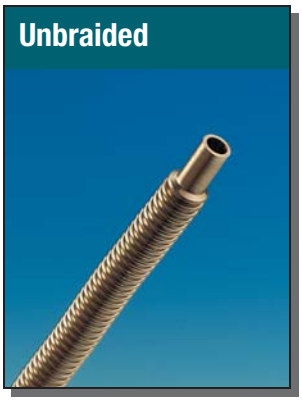
.25 Tube O.D.

Braided, static	1.75
Braided, dynamic	5.00
Unbraided, static	1.13

.38 Tube O.D.

Braided, static	3.00
Braided, dynamic	8.00
Unbraided, static	1.88

NOMINAL TUBE O.D.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
BRAIDED						
1/4	4	.008	1.75	1/4	FRL-025-4	440301
1/4	8	.008	1.75	1/4	FRL-025-8	440302
1/4	12	.008	1.75	1/2	FRL-025-12	440303
1/4	18	.008	1.75	1/2	FRL-025-18	440304
1/4	24	.008	1.75	3/4	FRL-025-24	440305
1/4	36	.008	1.75	1	FRL-025-36	440306
3/8	4	.008	3.00	1/4	FRL-038-4	440351
3/8	8	.008	3.00	1/4	FRL-038-8	440352
3/8	12	.008	3.00	1/2	FRL-038-12	440353
3/8	18	.008	3.00	1/2	FRL-038-18	440354
3/8	24	.008	3.00	3/4	FRL-038-24	440355
3/8	36	.008	3.00	1	FRL-038-36	440356



NOMINAL TUBE O.D.	OVERALL LENGTH	WALL THK.	STATIC BEND RAD.	WT LB	REFERENCE	PART NUMBER
UNBRAIDED						
1/4	4	.008	1.13	1/4	UB-FRL-025-4	441301
1/4	8	.008	1.13	1/4	UB-FRL-025-8	441302
1/4	12	.008	1.13	1/2	UB-FRL-025-12	441303
1/4	18	.008	1.13	1/2	UB-FRL-025-18	441304
1/4	24	.008	1.13	3/4	UB-FRL-025-24	441305
1/4	36	.008	1.13	1	UB-FRL-025-36	441306
3/8	4	.008	1.88	1/4	UB-FRL-038-4	441351
3/8	8	.008	1.88	1/4	UB-FRL-038-8	441352
3/8	12	.008	1.88	1/2	UB-FRL-038-12	441353
3/8	18	.008	1.88	1/2	UB-FRL-038-18	441354
3/8	24	.008	1.88	3/4	UB-FRL-038-24	441355
3/8	36	.008	1.88	1	UB-FRL-038-36	441356

PVC Kwik-Flange™ ISO KF

Low Vacuum

Features

- Low vacuum rated to $5x10^{-3}$ Torr
- Temperature rated to 60°C maximum
- ISO compatible design
- Corrosion resistant material
- Applications include extended length roughing lines and mechanical pump venting

Description

Polyvinyl chloride (PVC) components offer an economical solution to lengthy vacuum pump exhaust lines and rough vacuum lines. The light weight and flexibility of PVC makes it easy to cut and assemble custom configurations on-site.

Another major advantage of PVC is its resistance to most wet, corrosive environments. Kwik-Flange™ PVC components are preferred for use in corrosive environment applications where exposed metal surfaces are subject to deterioration.

Note that many mechanical vacuum pumps are supplied with integral ISO type fittings on both inlet and outlet ports. Kwik-Flange™ PVC components can be quickly and easily connected to these ports with standard ISO centering rings and hinged clamps.

PVC tubing and fittings are assembled by using a primer and cement. Follow all instructions on containers for leak tight joints.

Specifications

Material	
Flanges	PVC
Tubing	Type 1 Grade PVC, ASTM D-1785, Sched 80
O-rings	FKM / FPM fluoroelastomer, Buna-N®
Centering rings	Stainless steel
Clamps	Aluminum
Fastening	
Clamps	Hinged
Thread Size	10-32 UNC
Torque	Finger-tight
Vacuum Range	$5x10^{-3}$ Torr
Temperature Range	Ambient to 60°C maximum
Weight and Dimensions	See table

Inch-Metric Comparison

MDC	O.D. Inches	ISO	I.D. mm	I.D. Inches
K075	.75	NW16	16	.63
K100	1.00	NW25	25	.98
K150	1.50	NW40	40	1.57
K200	2.00	NW50	50	1.97

Primer & Cement

DESCRIPTION	REFERENCE	PART NUMBER
PVC PRIMER 1000	PVCP-1000	728032
PVC CEMENT 1000	PVCC-1000	728033

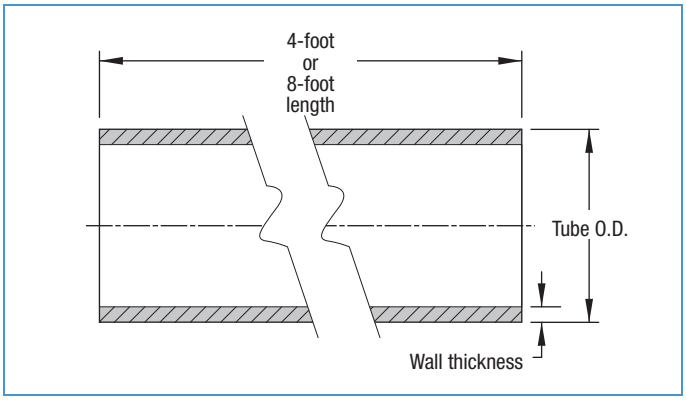
PVC Primer 1000

- Fast acting clear primer
- Softens and prepares PVC tube and flange
- To be used with PVC Cement 1000

PVC CEMENT 1000

- For all sizes and types of PVC
- Sets up rapidly and provides strong leak-tight weld
- Hundreds of PVC welds in each can

Tube



- Conforms to ASTM D–1785, Type 1
- Refer to table for exact dimensions
- High chemical resistance
- 60°C (140°F) maximum working temperature
- 4-ft and 8-ft standard lengths

PVC NOM.	LENGTH	USE WITH REF. ISO	TUBE O.D.	WALL THICKNESS	WT LB	REFERENCE	PART NUMBER
1	4	NW25	1.05	.18	2	PVCT-100-4	728041
1	8	NW25	1.05	.18	4	PVCT-100-8	728042
1-1/2	4	NW40	1.31	.20	2-1/2	PVCT-150-4	728043
1-1/2	8	NW40	1.31	.20	5	PVCT-150-8	728044
2	4	NW50	1.90	.22	4	PVCT-200-4	728045
2	8	NW50	1.90	.22	8	PVCT-200-8	728046

Weld Flange

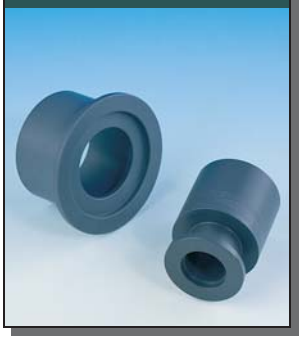


Figure 1

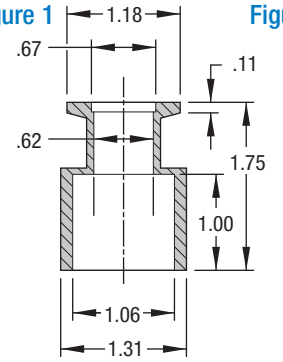
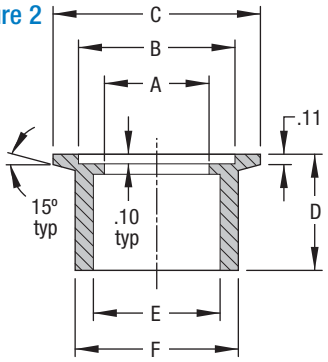


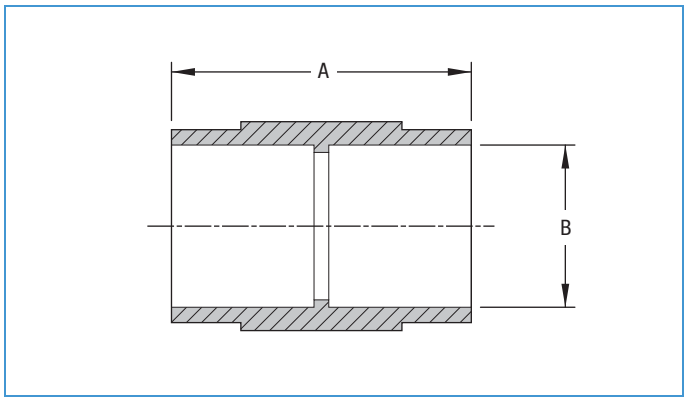
Figure 2



- Mates with standard Kwik-Flange™ ISO KF hardware
- Use with PVC tubing
- Requires cementing

PVC NOM.	FIG.	ISO NOM.	A	B	C	D	E	F	WT LB	REFERENCE	PART NUMBER
1	1	NW16	-	-	See Dimensions on Figure 1			-	1/4	PVC-K075-W	728004
1	2	NW25	.80	1.03	1.57	1.17	1.06	1.20	1/4	PVC-K100-W	728005
1-1/2	2	NW40	1.09	1.62	2.16	1.21	1.32	1.70	1/4	PVC-K150-W	728006
2	2	NW50	1.62	2.06	2.95	1.23	1.91	2.20	1/4	PVC-K200-W	728007

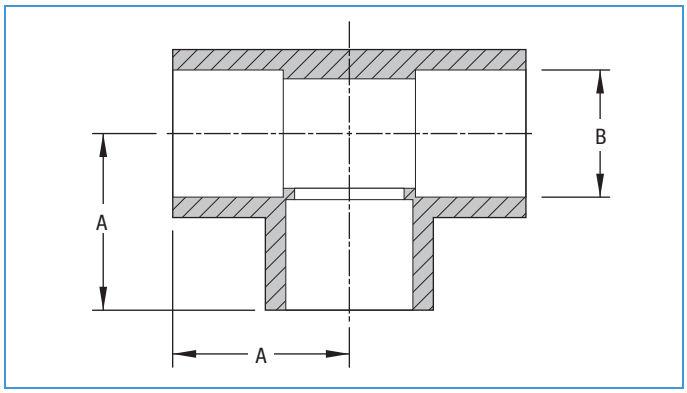
Coupling



- Use with PVC tubing
- Requires cementing

FLANGE REF. ISO	FLANGE O.D.	PVC NOM. SIZE	COUPLING O.D.	A	B	WT LB	REFERENCE	PART NUMBER
NW25	1.57	1	1.50	2.18	1.06	1/2	PVC-K100-C	728008
NW40	2.16	1-1/2	1.82	2.44	1.32	1/2	PVC-K150-C	728009
NW50	2.95	2	2.52	2.98	1.91	1/2	PVC-K200-C	728010

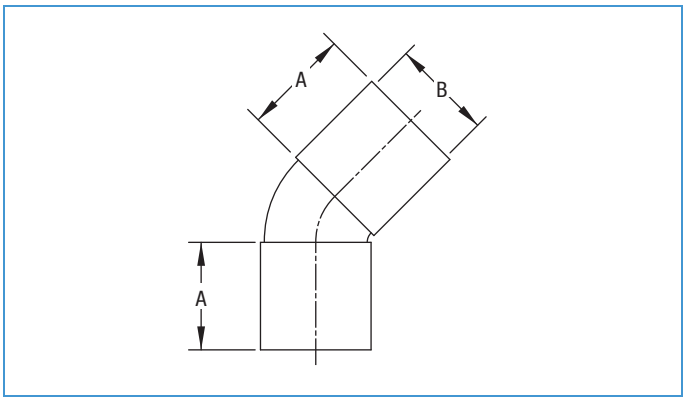
Tee



- Use with PVC tubing
- Requires cementing

FLANGE REF. ISO	FLANGE O.D.	PVC NOM. SIZE	TEE O.D.	A	B	WT LB	REFERENCE	PART NUMBER
NW25	1.57	1	1.50	1.60	1.06	3/4	PVC-K100-3	728017
NW40	2.16	1-1/2	1.82	2.10	1.32	1-1/2	PVC-K150-3	728018
NW50	2.95	2	2.52	2.40	1.91	1-1/2	PVC-K200-3	728019

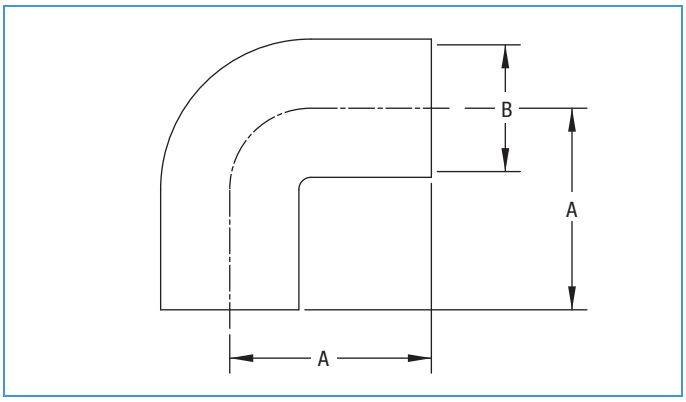
45° Elbow



- Use with PVC tubing
- Requires cementing

FLANGE REF. ISO	FLANGE O.D.	PVC NOM. SIZE	ELBOW O.D.	A	B	WT LB	REFERENCE	PART NUMBER
NW25	1.57	1	1.50	1.50	1.06	1/2	PVC-K100-45L	728011
NW40	2.16	1-1/2	1.82	1.75	1.32	3/4	PVC-K150-45L	728012
NW50	2.95	2	2.52	2.15	1.91	3/4	PVC-K200-45L	728013

90° Elbow



- Use with PVC tubing
- Requires cementing

FLANGE REF. ISO	FLANGE O.D.	PVC NOM. SIZE	ELBOW O.D.	A	B	WT LB	REFERENCE	PART NUMBER
NW25	1.57	1	1.50	1.60	1.06	1/2	PVC-K100-90L	728014
NW40	2.16	1-1/2	1.82	1.65	1.32	3/4	PVC-K150-90L	728015
NW50	2.95	2	2.52	2.35	1.91	3/4	PVC-K200-90L	728016

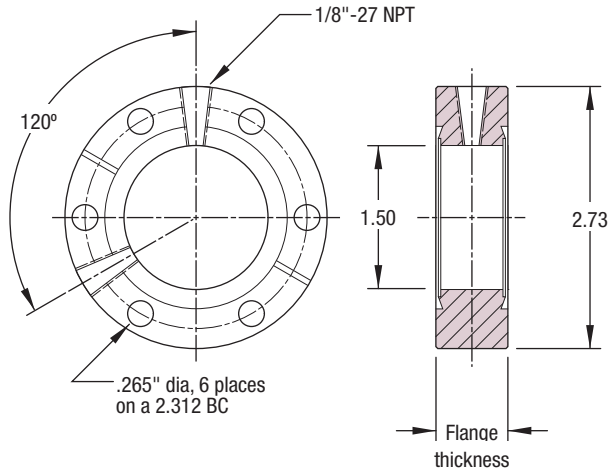
Accessories

Double Sided Access Flange

HIGH VACUUM SERIES

Description

Del-Seal™ CF 2-3/4 inch Double Sided Flanges are supplied with no accessory holes or with one or two radial 1/8"-27 NPT tapped holes. These holes can accommodate thermocouple gauge tubes, Up-to-Air valves, or a combination of a tube and a valve. Custom configurations are available on request.
Note that vacuum ratings and temperature maximums are limited by the method used to seal the pipe threads.



FD-275150-2H

Features

- Allows access to vacuum chambers by adding a minimum thickness to an existing port
- High vacuum rated to 10^{-8} Torr
- Temperature rated to 150°C maximum
- Useable with any combination of valves and gauge tubes

DOUBLE SIDED FLANGE
2 NPT TAPPED HOLES

PART NUMBER 420002

T/C GAUGE TUBE
SINGLE NPT TAPPED HOLE

PART NUMBER 420003

UP-TO-AIR VALVE
SINGLE NPT TAPPED HOLE

PART NUMBER 420004

TUBE & VALVE
WITH CENTER BAFFLE

PART NUMBER 420005

PLUGS
STAINLESS STEEL 1/8"-27 NPT

PART NUMBER 420008

DOUBLE-SIDED	FLANGE THICKNESS	NO. OF HOLES 1/8"-27 NPT	ATTACHMENT #1	ATTACHMENT #2	WT LB	REFERENCE	PART NUMBER
2-3/4	0.75	0	-	-	3/4	FD-275150	140013
2-3/4	0.75	1	-	-	3/4	FD-275150-1H	420001
2-3/4	0.75	2	-	-	3/4	FD-275150-2H	420002
2-3/4	0.75	1	ELASTOMER STOPPER	-	3/4	FD-275150-GV	420015
2-3/4	0.75	1	1518 T/C GAUGE TUBE	-	1	FD-275150-TC	420003
2-3/4	0.75	1	1/4" UP-TO-AIR VALVE	-	1-1/2	FD-275150-V	420004
2-3/4	0.75	2	1/4" UP-TO-AIR VALVE	1518 T/C GAUGE TUBE	1-1/2	FD-275150-VTC	420005
2-3/4	1.00	0	-	-	1	FD-275150-1	140014
2-3/4	-	-	1/8"-27 NPT STAINLESS STEEL PLUGS, SET OF 2		1/8	PLG-112	420008

ULTRAHIGH & HIGH VACUUM SERIES

Description

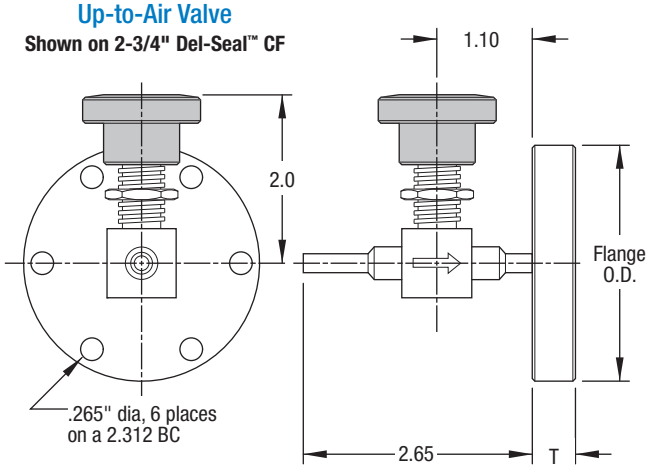
MDC Up-to-Air Valves are welded directly to a flange. The valves are 1/4 inch, bellows sealed, manually activated, and have a 1/4-inch O.D. tube termination. They are designed for use on any type of vacuum system for venting and back fill.

Temperature range:
Del-Seal™ CF configuration: -60° to 315°C (-80° to 600°F)
Kwik-Flange™ ISO KF configuration: -20° to 150°C (-5° to 300°F)

Features

- Allows venting or back fill of vacuum chambers
- High vacuum rated to 10^{-8} Torr
- Temperature rated to 315°C maximum with Del-Seal™ CF configuration
- Standard 1/4" tube end

Up-to-Air Valve
Shown on 2-3/4" Del-Seal™ CF



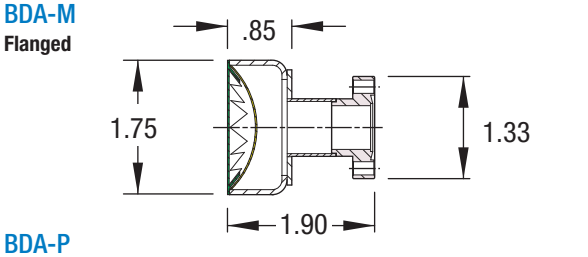
Approximate dimensions for reference only

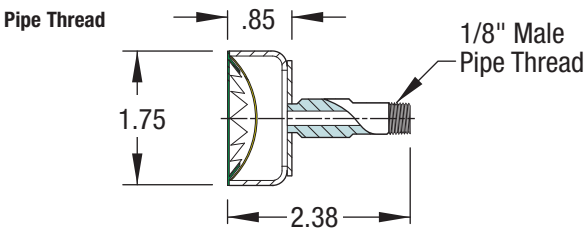
NOMINAL FLANGE	FLANGE REF.	FLANGE O.D.	T	DESCRIPTION	WT LB	REFERENCE	PART NUMBER
1-1/3	F133000	1.33	.285	DEL-SEAL FLANGE WITH 1/4" UP-TO-AIR VALVE	3/4	F133000-V	420009
2-1/8	F218000	2.12	.470	DEL-SEAL FLANGE WITH 1/4" UP-TO-AIR VALVE	1	F218000-V	420011
2-3/4	F275000	2.73	.500	DEL-SEAL FLANGE WITH 1/4" UP-TO-AIR VALVE	1-1/2	F275000-V	420006

NOMINAL FLANGE	FLANGE REF.	FLANGE O.D.	T	DESCRIPTION	WT LB	REFERENCE	PART NUMBER
NW16	K075	1.18	.200	KWIK-FLANGE WITH 1/4" UP-TO-AIR VALVE	3/4	K075-V	420010
NW25	K100	1.57	.200	KWIK-FLANGE WITH 1/4" UP-TO-AIR VALVE	3/4	K100-V	420012
NW40	K150	2.16	.200	KWIK-FLANGE WITH 1/4" UP-TO-AIR VALVE	1	K150-V	420013
NW50	K200	2.95	.200	KWIK-FLANGE WITH 1/4" UP-TO-AIR VALVE	1-1/2	K200-V	420014

Pressure Burst Disc

- Positive pressure relief
- Leak tight to 2×10^{-10} std. cc/sec of Helium
- Stainless steel body Compact design with no moving parts





Description

MDC Burst Discs have been developed as a safety device to protect vacuum systems against back fill over-pressure. They can be used on any type of system where over-pressurization is undesirable.

When over-pressure occurs, the thin diaphragm comes in contact with the sharp edges of the housing and ruptures, relieving the pressure in the system. Once ruptured, the unit must be discarded and replaced.

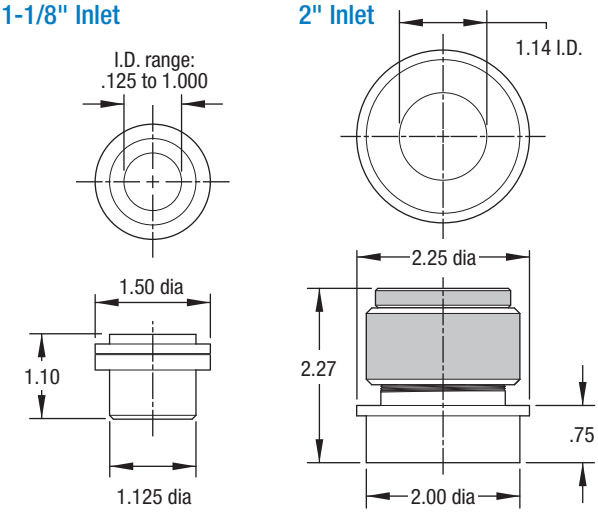
The disc is designed to burst at a positive pressure anywhere in the range from over atmosphere to 25 psig, with rupture certain to occur before 25 psig.

DESCRIPTION	WT LB	REFERENCE	PART NUMBER
1-1/3" DEL-SEAL FLANGE WITH PRESSURE BURST DISC	3/4	BDA-M	420030

DESCRIPTION	WT LB	REFERENCE	PART NUMBER
1/8"-27 MALE PIPE THREAD WITH PRESSURE BURST DISC	1/4	BDA-P	420031

Test Port Kit

- Lightweight all-aluminum construction
- Choice of 1-1/8" and 2" inlet kits
- Ten different sizes, 1/8" through 1"
- Sturdy complete-set carrying case for convenience and safety



Description

MDC Test Port Reducer Kits offer a set of ten different size aluminum reducing adapters for either 1-1/8 or 2 inch inlets. They can be used with leak detectors and other devices with an internal O-ring seal. The kits provide a quick, simple, and inexpensive method for reducing the two standard inlets to tube sizes 1, 7/8, 3/4, 5/8, 1/2, 3/8, 5/16, 1/4, 3/16 and 1/8 inch O.D.

In the 2 inch kit, the small test ports fit inside the large adapter. Note that the 1-1/8 inch kit does not include the 2-inch adapter.

Each set is supplied in a durable carrying and storage case.

DESCRIPTION	WT LB	REFERENCE	PART NUMBER
1-1/8" TEST PORT REDUCER KIT	3	TPR-112	651000
2" TEST PORT REDUCER KIT	3-1/2	TPR-200	651001

Lubricant, Thread

DESCRIPTION	WT OZ	REFERENCE	PART NUMBER
FEL-PRO® C-102	1	FEL-PRO C-102	432030

- Anti-galling lubricant for threads
- High temperature lubricant
- Temperature range to 1315°C
- Lead-free petroleum distillate
- Contains calcium fluoride and graphite
- 1 oz. tube

Lubricant, Vacuum

DESCRIPTION	WT OZ	REFERENCE	PART NUMBER
DOW CORNING VACUUM GREASE DC-150	5.3	DOW DC-150	432031

- Elastomer gasket sealant
- Gear and bearing lubricant
- Heat stable
- Temperature range -40°C to +260°C
- Low vapor pressure
- Inert, resists most chemicals
- 5.3 oz. tube

Lubricant, Vacuum

DESCRIPTION	WT OZ	REFERENCE	PART NUMBER
APIEZON® VACUUM GREASE TYPE L	.9	TYPE L	432032
APIEZON® VACUUM GREASE TYPE M	.9	TYPE M	432033

- Elastomer gasket sealant
- Gear and bearing lubricant
- Approximate melting point Type L 47°C Type M 44°C
- Vapor pressure, Torr at 20°C Type L $8x10^{-11}$ Type M $2x10^{-9}$
- Hydrocarbon base allows easy clean-up with common solvents
- 0.9 oz. tube (25g)

Lubricant, Vacuum

DESCRIPTION	WT OZ	REFERENCE	PART NUMBER
KRYTOX® LVP	2	KRYTOX LVP	432035

- Elastomer gasket sealant
- Gear and bearing lubricant
- High vacuum grease
- Temperature range -20°C to +300°C
- Vapor pressure, Torr at 20°C $< 10^{-13}$
- Fluorinated oil with fluorocarbon thickener
- 2 oz. tube

Sealant

DESCRIPTION	WT OZ	REFERENCE	PART NUMBER
EPOXY PATCH	4	EP-1	432037

- Low vapor pressure resin sealant
- Seals without solvent evaporation
- Temperature range -45°C to +125°C
- Vacuum range 10^{-8} Torr
- Epoxy cement in two tubes:
  - a. Resin 2.8 oz.
  - b. Hardener 1.2 oz.