



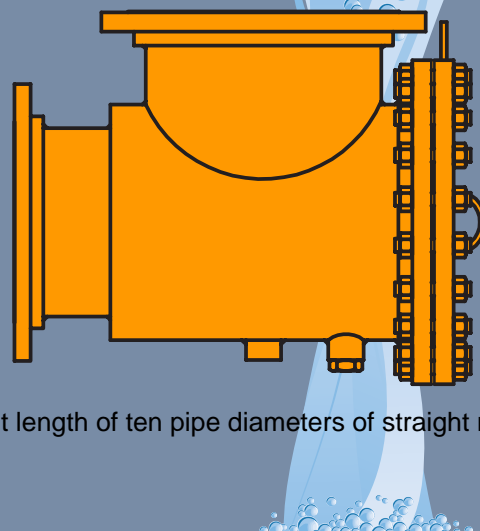
FLOW SOLUTIONS INTERNATIONAL

Your pipeline to the future!

SD SERIES SUCTION DIFFUSERS

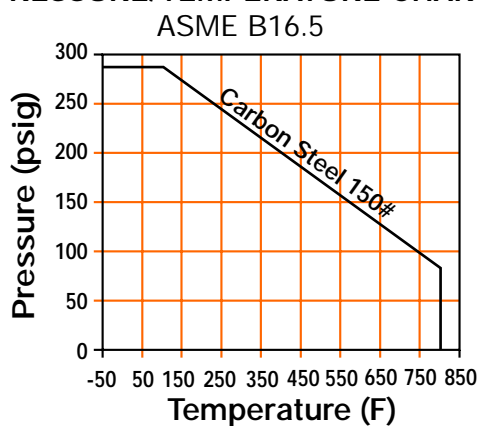
FSI SD Series suction diffusers increase the flow-straightening capabilities and provide optimum flow condition at the pump inlets while reducing the space and fitting requirements.

It also eliminates the need for an equivalent length of ten pipe diameters of straight run ...



Save money and extend the life of system pumps, piping and components with FSI SD Series suction diffusers. The FSI SD Series suction diffuser is designed and fabricated to the ASME Boiler & Pressure Vessel Code, Section VIII, Division I.

PRESSURE/TEMPERATURE CHART



Contact Factory for higher ratings.

MODELS AVAILABLE

- Type 1 - One pipe diameter of flow straightening
- Type 2 - Three pipe diameters of flow straightening
- Type 3 - Five pipe diameters of flow straightening

OPTIONS

- Customer specified materials, sizes and designs
- Other flow straightening quality designs
- Hinged or quick opening/operator assisted covers
- Vent and/or differential pressure connections
- ASME "U" stamped vessels on request
- Other perforated screen and mesh liner baskets
- Data Packages and MTR's available on request

APPLICATION

- Hydronic Cooling & Heating and Industrial Pumping

APPLICABLE CODES

- Designed and manufactured in accordance with ASME B31.1, ASME B31.3 and/or ASME Section VIII, Div. 1
- CRN available in all Provinces
- Welders certified to ASME Section IX

FEATURES

- Strainer, flow straightener, elbow and pipe reducer for pump applications
- Standard and custom engineered designs
- Integral straightening vanes reduce turbulence to improve pump efficiency
- One, three or five pipe diameters of flow straightening (Type 1, 2 or 3)
- Standard, undersized or oversized outlet connections
- Direct mount to the suction side of a pump in either horizontal or vertical position
- Supporting pads for easy mounting of standard I.D. support foot
- Drain connection with plug furnished as standard

> 5850 DON MURIE STREET, NIAGARA FALLS, ONTARIO L2E6X8, CANADA
> TOLLFREE: 1-855-788-2468, INT'L: +905-330-3490, FAX: +1-905-248-3177

> 3725 WALDEN AVE, SUITE 18, LANCASTER, NEW YORK 14086, USA. TEL: +1-716-989-0076, 1-716-343-3423

ORDERING CODE

Model	Material	Inlet Size	Class	Con- nections	Dash	Cover	Perf.	Mesh
S D 1 C H 1 R - Q 4 2								
1 2 3 4 5			6	7	8	9	10	11

Model - Position 1 - 3

SD1 - Type 1 - Standard Outlet
SD2 - Type 1 - Undersized Outlet
SD3 - Type 1 - Oversized Outlet
SD4 - Type 2 - Standard Outlet
SD5 - Type 2 - Undersized Outlet
SD6 - Type 2 - Oversized Outlet
SD7 - Type 3 - Standard Outlet
SD8 - Type 3 - Undersized Outlet
SD9 - Type 3 - Oversized Outlet
SDX - Custom Configuration

Standard Outlet is one size smaller than the inlet.

Undersized Outlet is two sizes smaller than the inlet.

Oversized Outlet is the same size as the inlet.

Material - Position 4

C - Carbon Steel
L - Low Temp CS
V - 304 SS
T - 316 SS
M - Monel
X - Other

Inlet Size - Position 5

B - 10 L - 36
C - 12 M - 40
D - 14 N - 42
E - 16 X - OTHER
F - 18
G - 20
H - 24
J - 28
K - 30

Class - Position 6

1 - 150
3 - 300
6 - 600
X - Other

Connection - Inlet Position 7

F - Flat Face Flange
J - Ring Joint
R - Raised Face Flange
X - Other

Dash - Position 8

Cover - Position 9

B - Bolted & Hinged
C - Bolted & Davit
D - Q.Open/Davit
Q - Q.Open/Hinged
X - Other

Perf. - Position 10

304SS Material

A - None 5 - 5/32"
B - 3/64" 6 - 3/16"
1 - 1/32" 7 - 7/32"
2 - 1/16" 8 - 1/4"
3 - 3/32" 9 - 3/8"
4 - 1/8" X - Other

Mesh - Position 11

A - None 6 - 60
1 - 10 7 - 80
2 - 20 8 - 100
3 - 30 9 - 120
4 - 40 X - Other
5 - 50

PARTS LIST AND STANDARD MATERIALS

DESCRIPTION	SPECIFICATIONS	
	CARBON STEEL	STAINLESS STEEL
SHELL	A53 E/B/A106-B	A312
NOZZLES	A53 E/B/A106-B	A312
FLANGES	A105	A182
HEADS	A516-70	A240
COUPLING	A105	A182
PLUG	A105	A182
BASKET	304 SS	304 SS
GASKET	304 SS SPIRAL WOUND	304 SS SPIRAL WOUND
STUD	A193-B7	A193-B8-1
NUT	A194-2H	A194-8

Connections:

10" x 6" - 24" x 24" RF Inlet x FF Outlet

SCREEN OPENINGS

SIZE	STANDARD SCREEN	MATERIALS
All	1/8" Perf.	304 SS

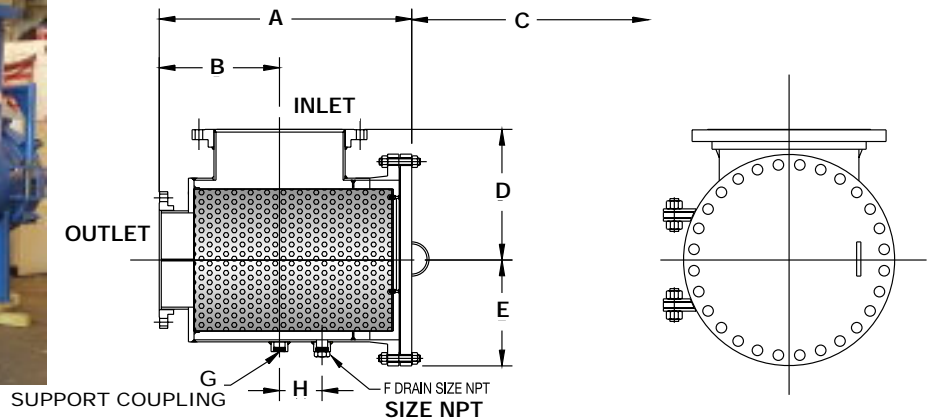
OPEN AREA RATIOS (TYPE 1) with Standard Perforated Screen

Opening 40%, 1/8" Diameter

Size Inlet X Outlet	Nominal Outlet Area (in ²)	Gross Screen Area (in ²)	Free Screen Area (in ²)	Open Area Ratio (OAR)
10 x 6	28.89	455	182	6.3
10 x 8	50.03	455	182	3.6
10 x 10	78.85	700	280	3.6
12 x 8	50.03	524	210	4.2
12 x 10	78.85	700	280	3.6
12 x 12	113.10	811	324	2.9
14 x 10	78.85	700	280	3.6
14 x 12	113.10	811	324	2.9
14 x 14	137.89	1162	465	3.4
16 x 12	113.10	811	324	2.9
16 x 14	137.89	1162	465	3.4
16 x 16	182.65	1275	510	2.8
18 x 14	137.89	1162	465	3.4
18 x 16	182.65	1275	510	2.8
18 x 18	233.71	1470	588	2.5
20 x 16	182.65	1275	510	2.8
20 x 18	233.71	1470	588	2.5
20 x 20	291.04	2454	982	3.4
24 x 18	233.71	1470	588	2.5
24 x 20	291.04	2454	982	3.4
24 x 24	424.56	2454	982	2.3

OAR = Free Screen Area divided by Nominal Outlet Area.
Free Screen Area = Opening % times Gross Screen Area.
Values shown are approximate. Contact factory for exact ratios.

FSI - SD SERIES SUCTION DIFFUSER > Dimensional Data



DIMENSIONS* inches (mm) **AND WEIGHTS** pounds (kg)

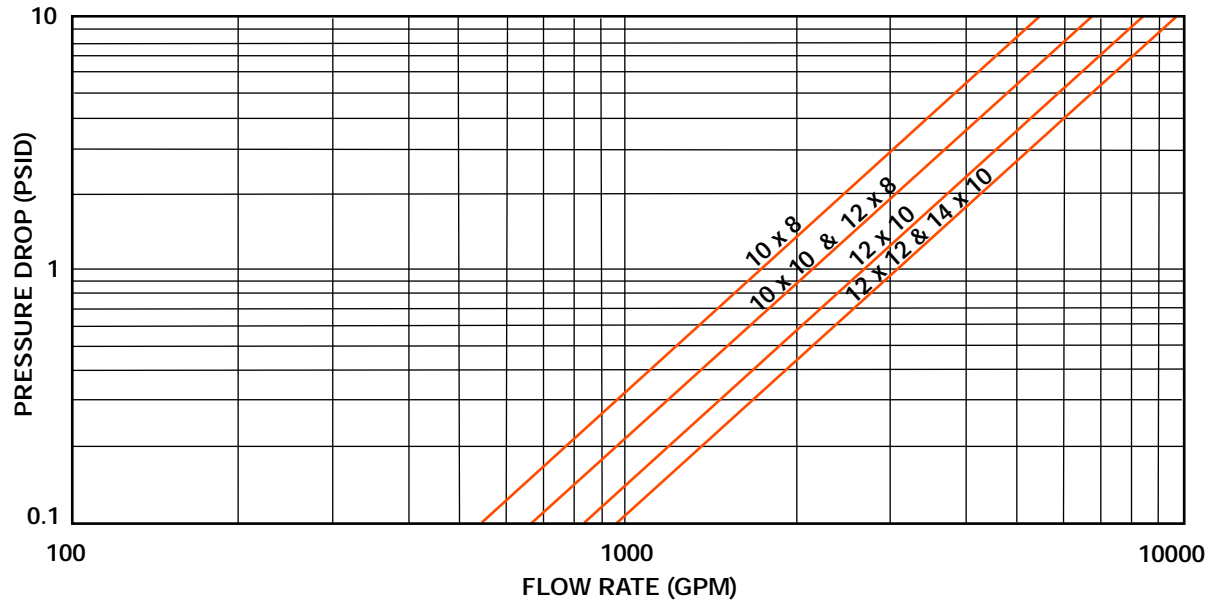
Inlet	Outlet	A			B			C	D	E	F	G	H	Weight ²
		TYPE1	TYPE2	TYPE3	TYPE1	TYPE2	TYPE3							
STANDARD OUTLET MODEL														
10 (250)	8 (200)	22 ¹ / ₈ (575)	26 ¹ / ₈ (676)	30 ¹ / ₈ (778)	11 ¹ / ₈ (283)	15 ¹ / ₈ (384)	19 ¹ / ₈ (486)	17 ¹ / ₈ (441)	12 ¹ / ₈ (321)	8 (203)	1 (40)	1 (40)	4 ¹ / ₈ (105)	339 (154)
12 (300)	10 (250)	25 ¹ / ₈ (656)	30 ¹ / ₈ (783)	35 ¹ / ₈ (910)	13 ¹ / ₈ (333)	18 ¹ / ₈ (460)	23 ¹ / ₈ (587)	18 ¹ / ₈ (478)	12 ¹ / ₈ (327)	10 ¹ / ₈ (267)	1 ¹ / ₂ (40)	1 ¹ / ₂ (40)	4 ¹ / ₈ (121)	530 (240)
14 (350)	12 (300)	26 ¹ / ₈ (670)	32 ¹ / ₈ (822)	38 ¹ / ₈ (975)	13 ¹ / ₈ (346)	19 ¹ / ₈ (499)	25 ¹ / ₈ (651)	21 ¹ / ₈ (546)	15 ¹ / ₈ (387)	11 ¹ / ₈ (298)	1 ¹ / ₂ (40)	1 ¹ / ₂ (40)	5 ¹ / ₈ (133)	808 (366)
16 (400)	14 (350)	32 ¹ / ₈ (821)	39 ¹ / ₈ (998)	46 ¹ / ₈ (1,176)	16 ¹ / ₈ (425)	23 ¹ / ₈ (603)	30 ¹ / ₈ (781)	26 ¹ / ₈ (679)	16 ¹ / ₈ (413)	12 ¹ / ₈ (318)	2 (50)	2 (50)	5 ¹ / ₈ (140)	1086 (493)
18 (450)	16 (400)	32 ¹ / ₈ (827)	40 ¹ / ₈ (1,030)	48 ¹ / ₈ (1,233)	10 ¹ / ₈ (270)	18 ¹ / ₈ (473)	26 ¹ / ₈ (676)	26 ¹ / ₈ (676)	17 ¹ / ₈ (448)	13 ¹ / ₈ (349)	2 (50)	3 (50)	6 ¹ / ₈ (165)	1256 (570)
20 (500)	18 (450)	32 ¹ / ₈ (816)	41 ¹ / ₈ (1,045)	50 ¹ / ₈ (1,273)	23 ¹ / ₈ (588)	32 ¹ / ₈ (816)	41 ¹ / ₈ (1,045)	25 ¹ / ₈ (641)	20 ¹ / ₈ (511)	16 (406)	2 (50)	2 (50)	2 ¹ / ₈ (73)	1793 (813)
24 (600)	20 (500)	40 (1,016)	50 (1,270)	60 (1,524)	21 ¹ / ₈ (537)	31 ¹ / ₈ (791)	41 ¹ / ₈ (1,045)	32 ¹ / ₈ (826)	22 (559)	17 ¹ / ₈ (444)	2 (50)	2 (50)	9 (227)	3545 (1,608)
UNDERSIZED OUTLET MODEL														
10 (250)	6 (150)	21 ¹ / ₈ (556)	24 ¹ / ₈ (632)	27 ¹ / ₈ (708)	11 ¹ / ₈ (298)	14 ¹ / ₈ (375)	17 ¹ / ₈ (451)	17 ¹ / ₈ (440)	11 ¹ / ₈ (283)	8 (203)	1 (25)	1 (25)	4 (102)	261 (118)
12 (300)	8 (200)	22 ¹ / ₈ (572)	26 ¹ / ₈ (673)	30 ¹ / ₈ (775)	11 ¹ / ₈ (286)	15 ¹ / ₈ (387)	19 ¹ / ₈ (489)	18 ¹ / ₈ (478)	12 ¹ / ₈ (327)	9 ¹ / ₈ (241)	1 ¹ / ₂ (40)	1 ¹ / ₂ (40)	4 ¹ / ₈ (118)	437 (198)
14 (350)	10 (250)	25 ¹ / ₈ (657)	30 ¹ / ₈ (784)	35 ¹ / ₈ (911)	13 ¹ / ₈ (333)	18 ¹ / ₈ (460)	23 ¹ / ₈ (587)	18 ¹ / ₈ (480)	14 (356)	10 ¹ / ₈ (267)	1 ¹ / ₂ (40)	1 ¹ / ₂ (40)	5 ¹ / ₈ (133)	670 (304)
16 (400)	12 (300)	26 ¹ / ₈ (667)	32 ¹ / ₈ (819)	38 ¹ / ₈ (972)	13.63 (346)	19 ¹ / ₈ (499)	25 ¹ / ₈ (651)	21 ¹ / ₈ (546)	15 ¹ / ₈ (394)	11 ¹ / ₈ (298)	2 (50)	2 (50)	5 ¹ / ₈ (129)	913 (414)
18 (450)	14 (350)	29 ¹ / ₈ (744)	36 ¹ / ₈ (922)	43 ¹ / ₈ (1,100)	16 ¹ / ₈ (425)	23 ¹ / ₈ (603)	30 ¹ / ₈ (781)	26 ¹ / ₈ (679)	16 ¹ / ₈ (416)	12 ¹ / ₈ (318)	2 (50)	2 (50)	5 ¹ / ₈ (149)	1058 (480)
20 (500)	16 (400)	32 ¹ / ₈ (827)	40 ¹ / ₈ (1,030)	48 ¹ / ₈ (1,233)	17 ¹ / ₈ (437)	25 ¹ / ₈ (640)	33 ¹ / ₈ (843)	26 ¹ / ₈ (676)	17 ¹ / ₈ (454)	13 ¹ / ₈ (349)	2 (50)	2 (50)	6 ¹ / ₈ (168)	1452 (659)
24 (600)	18 (450)	32 ¹ / ₈ (816)	41 ¹ / ₈ (1,045)	50 ¹ / ₈ (1,273)	17 (432)	26 (660)	35 (889)	25 ¹ / ₈ (651)	23 ¹ / ₈ (607)	16 (406)	2 (50)	2 (50)	7 ¹ / ₈ (198)	2382 (1,080)
OVERSIZED OUTLET MODEL														
10 (250)	10 (250)	25 ¹ / ₈ (656)	30 ¹ / ₈ (783)	35 ¹ / ₈ (910)	13 ¹ / ₈ (333)	18 ¹ / ₈ (460)	23 ¹ / ₈ (587)	18 ¹ / ₈ (478)	13 ¹ / ₈ (346)	10 ¹ / ₈ (267)	1 (25)	1 (25)	5 ¹ / ₈ (135)	420 (190)
12 (300)	12 (300)	26 ¹ / ₈ (670)	32 ¹ / ₈ (822)	38 ¹ / ₈ (975)	13 ¹ / ₈ (346)	19 ¹ / ₈ (499)	25 ¹ / ₈ (651)	21 ¹ / ₈ (546)	15 ¹ / ₈ (384)	11 ¹ / ₈ (298)	1 ¹ / ₂ (40)	1 ¹ / ₂ (40)	4 ¹ / ₈ (119)	650 (295)
14 (350)	14 (350)	32 ¹ / ₈ (816)	39 ¹ / ₈ (994)	46 ¹ / ₈ (1,172)	16 ¹ / ₈ (425)	23 ¹ / ₈ (603)	30 ¹ / ₈ (781)	26 ¹ / ₈ (679)	16 (406)	12 ¹ / ₈ (318)	1 ¹ / ₂ (40)	1 ¹ / ₂ (40)	5 (127)	964 (437)
16 (400)	16 (400)	32 ¹ / ₈ (827)	40 ¹ / ₈ (1,030)	48 ¹ / ₈ (1,233)	17 ¹ / ₈ (437)	25 ¹ / ₈ (640)	33 ¹ / ₈ (843)	26 ¹ / ₈ (676)	17 ¹ / ₈ (445)	13 ¹ / ₈ (349)	2 (50)	2 (50)	8 ¹ / ₈ (205)	1280 (580)
18 (450)	18 (450)	32 ¹ / ₈ (816)	41 ¹ / ₈ (1,045)	50 ¹ / ₈ (1,273)	17 (432)	26 (660)	35 (889)	25 ¹ / ₈ (641)	19 ¹ / ₈ (505)	16 (406)	2 (50)	2 (50)	5 ¹ / ₈ (151)	1572 (713)
20 (500)	20 (500)	40 (1,016)	50 (1,270)	60 (1,524)	21 ¹ / ₈ (537)	31 ¹ / ₈ (791)	41 ¹ / ₈ (1,045)	32 ¹ / ₈ (826)	21 ¹ / ₈ (549)	17 ¹ / ₈ (444)	2 (50)	2 (50)	8 (203)	2560 (1,161)
24 (600)	24 (600)	41 ¹ / ₈ (1,051)	53 ¹ / ₈ (1,356)	65 ¹ / ₈ (1,661)	22 ¹ / ₈ (562)	34 ¹ / ₈ (867)	46 ¹ / ₈ (1,172)	34 ¹ / ₈ (886)	23 ¹ / ₈ (606)	17 ¹ / ₈ (444)	2 (50)	2 (50)	7 ¹ / ₈ (198)	3600 (1,633)



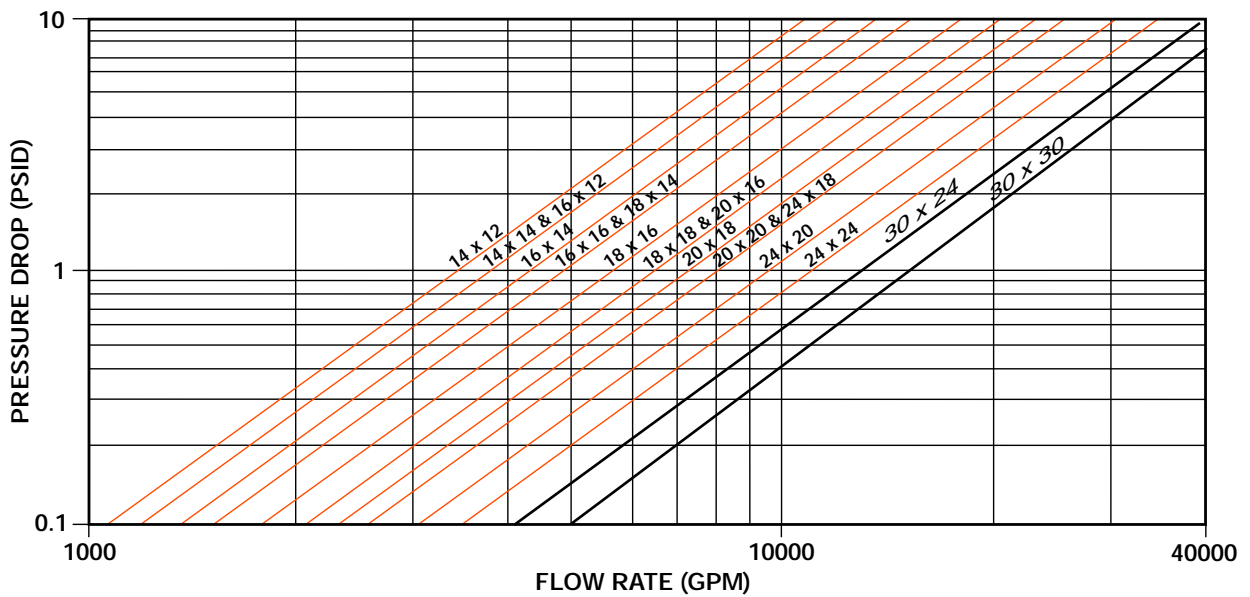
FLOW SOLUTIONS INTERNATIONAL

Water Service, Clean Basket, 1/32" - 1/4" Perforated Screen*

(Sizes 10"x 8" - 12"x 12")



(Sizes 14"x 12" - 24"x 24")





ENGINEERING DATA

SCREEN OPENING DETAIL

Factors To Consider

Purpose

If the basket strainer is being used for protection rather than direct filtration, FSI's standard screens will suffice in most applications.

Service

With services that require extremely sturdy screens, such as high pressure/ temperature applications or services with high viscosities, FSI recommends that perforated screens without mesh liners be used. If mesh is required to obtain a certain level of filtration, then FSI recommends a trapped perf./ mesh/perf. combination.

Filtration Level

When choosing a perf. or a mesh/perf. combination attention should be given to ensure overstraining does not occur. As a general rule the specified level of filtration should be no smaller than half the size of the particle to be removed. If too fine a filtration is specified the pressure drop through the strainer will increase very rapidly, possibly causing damage to the basket.

Screen Types/Dimensions

1/4" Dia. - 40% O.A.	3/16" Dia. - 50% O.A.	5/32" Dia. - 58% O.A.	1/8" Dia. - 40% O.A.	3/32" Dia. - 39% O.A.	1/16" Dia. - 37% O.A.	3/64" Dia. - 36% O.A.	1/32" Dia. - 40% O.A.	0.027" Dia. - 23% O.A.	20 Mesh - 49% O.A. 0.035" Openings	30 Mesh - 45% O.A. 0.022" Openings	40 Mesh - 41% O.A. 0.016" Openings	60 Mesh - 38% O.A. 0.010" Openings	80 Mesh - 36% O.A. 0.008" Openings	100 Mesh - 30% O.A. 0.006" Openings

- Notes:**
1. Screen openings other than those shown above are readily available. FSI inventories various mesh sizes as fine as 5 micron and perforated plate as coarse as 1/2" Dia.
 2. Screens are available in a wide range of materials. FSI inventories various screen material in Carbon Steel, Stainless Steel (304, 316), Alloy 20, Monel 400, Hastalloy C and Titanium Grade 2.
 3. Custom manufactured screens are available upon request. Please consult factory.

Strainer Installation Instructions

- Ensure all machined surfaces are free of defects and that the inside of the strainer is free of foreign objects.
- For horizontal pipelines, the strainer should be installed such that the blow-down connection is pointed downwards.
- For flanged end strainers, the flange bolting should be tightened gradually in a back and forth clockwise pattern. Threaded end strainers should use an appropriate sealant.
- Once installed, increase line pressure gradually and check for leakage around joints.
- If the strainer is supplied with a start-up screen, monitor pressure drop carefully.

Strainer Removal Instructions

- Drain piping
- Vent line to relieve pressure.
- Loosen cover and open to access screen. Remove, clean and replace screen in original position (Note: In some instances, a high pressure water jet or steam may be required for effective cleaning).
- Inspect cover gasket for damage. If necessary, replace. (Note: If spiral wound gaskets have been used, they must be replaced and cannot be used again).
- Tighten cover. The strainer is ready for line start-up

CAUTION SHOULD BE TAKEN DUE TO POSSIBLE EMISSION OF PROCESS MATERIAL FROM PIPING. ALWAYS ENSURE NO LINE PRESSURE EXISTS WHEN OPENING COVER.

Maintenance Instructions

For maximum efficiency, determine the length of time it takes for the pressure drop to double that in the clean condition. Once the pressure drop reaches an unacceptable value, shut down line and follow the "Basket Removal Instructions" above.

A pressure gauge installed before and after the strainer inline will indicate pressure loss due to clogging and may be used to determine when cleaning is required.

Trouble Shooting Guides and Diagnostic Techniques

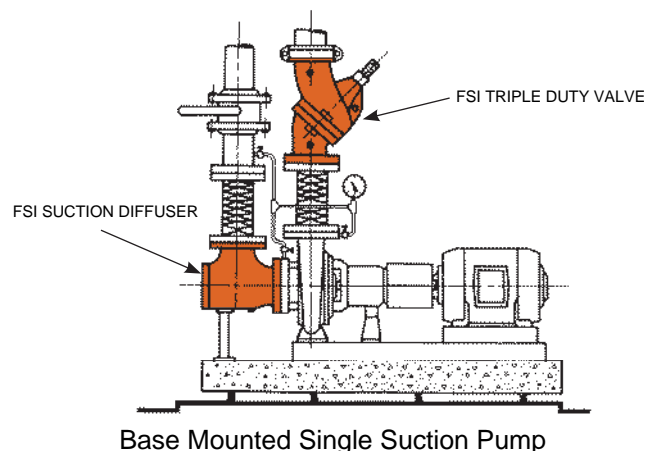
- After pressurizing, inspect cover and other joints for leakage. Gasket replacement or cover tightening is necessary if leakage occurs.
- If the required filtration is not taking place, ensure the screen is installed in the correct position, that being flush to the upper and lower screen seating surfaces.

Limited Warranty

All products are warranted to be free of defects in material and workmanship for a period of one year from the date of shipment, subject to the limitations below: If the purchaser believes a product defective, the purchaser shall:

- (a) Notify the manufacturer, state the alleged defect and request permission to return the product.
- (b) If permission is given, return the product with transportation prepaid. If the product is accepted for return and found to be defective, the manufacturer will, at its discretion, either repair or replace the product, f.o.b. factory, within 60 days of receipt, or refund the purchase price.

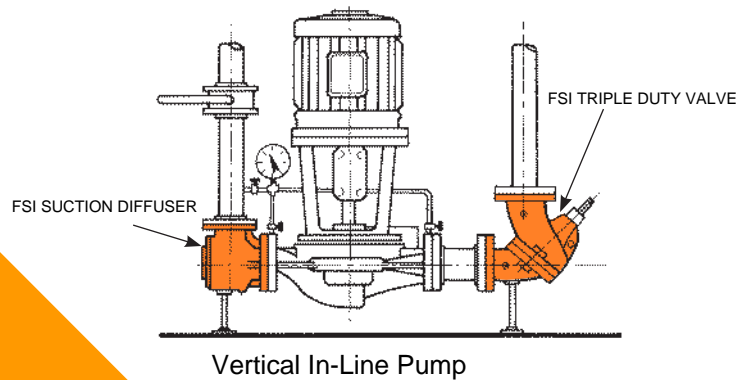
Other than to repair, replace or refund described above, the purchaser agrees that the manufacturer shall not be liable for any losses, costs, expenses or damages of any kind arising out of the product, its use, installation or replacement, labeling, instructions, information or technical data of any kind, description of product use, sample or model, warnings or lack of foregoing. No other warranties, written or oral, expressed or implied, including the warranties of fitness for a particular purpose and merchantability, are made or authorized. No affirmation of fact, promise, description of product use or sample or model shall create any warranty from the manufacturer, unless signed by the president or vice-president. These products are not manufactured, sold or intended for personal, family or household purposes.



FSI SUCTION DIFFUSER FEATURES

SUCTION DIFFUSERS, COMBINATION AND TRIPLE DUTY VALVES

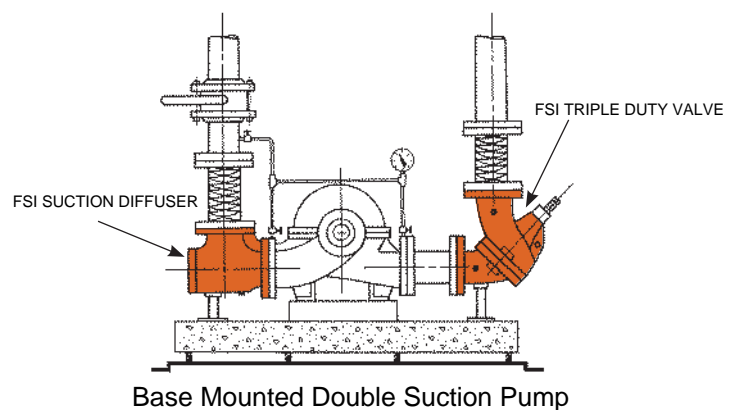
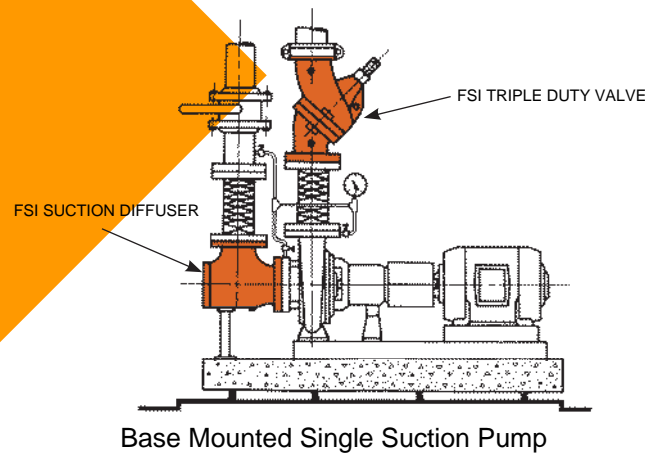
FSI Method



- Fewer components required as redundant fittings are eliminated.
- Fewer connections required with FSI suction diffusers and triple duty valves
- Less installation time required by reducing the number of fittings.
- Less installation space required as pump inlet spool piece is eliminated.

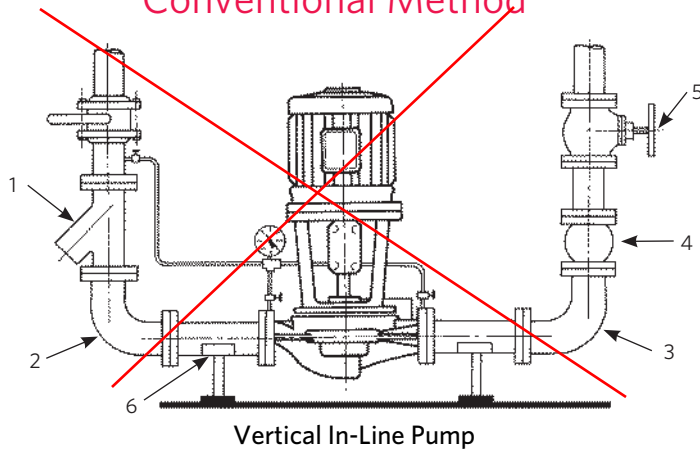
Reduce Field Installation and Materials Costs:

Many Components eliminated using FSI Triple Duty valves and Suction Diffusers strainer for base mounted single and double suction pump installations and vertical in-line installations:



Reduce Field Installation and Materials Costs

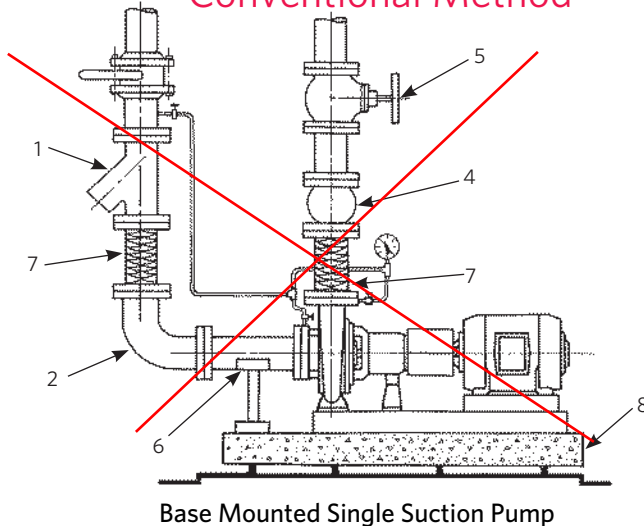
Conventional Method



Components eliminated using FSI Suction diffusers and triple duty valves for base mounted single and double suction pump installations and Vertical In-Line installations:

1. "Y" Type Strainer
2. Suction long radius elbow
3. Discharge long radius elbow
4. Discharge check valve
5. Discharge globe valve
6. Suction spool piece

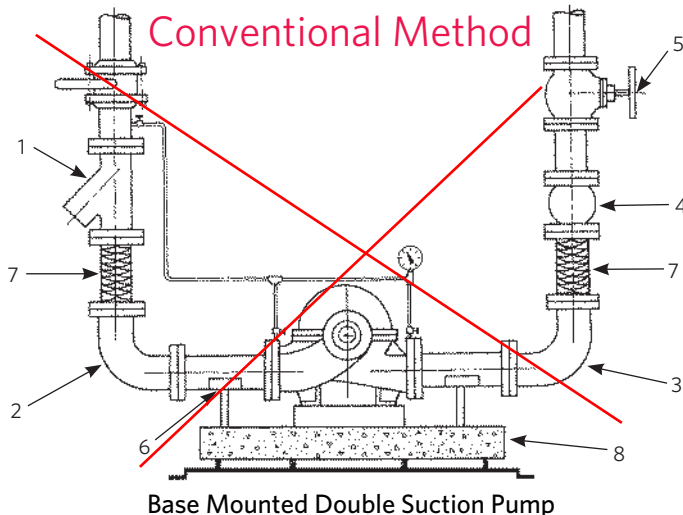
Conventional Method



Additional components eliminated using Vertical In-Line pumps with FSI Suction Diffusers and Triple Duty Valves in place of base mounted applications:

7. Flexible connectors
8. Inertia base isolation
9. Field shaft alignment (not shown)

Conventional Method



Confusion on Diffusion

Controversial opinions can be found on the subject which has become known as *suction diffusion*. Actually, diffusion means *to disperse or spread out*. A suction diffuser is a special pipe fitting, sometimes in the configuration of a tee or sharp elbow, which is installed directly on the pump's suction connection which contains, depending on the make, various configurations of *flow straightening* elements. Often these special fittings may also incorporate some type of straining feature. **Figure 1** shows a cut-away view of a typical diffuser attached directly to a pump suction. Manufacturers of suction diffusers state that they can be utilized to smooth, balance, and otherwise streamline liquid flow to the impeller eye when physical space is not available to accommodate the recommended **5D** to **10D** full-size straight pipe provision.

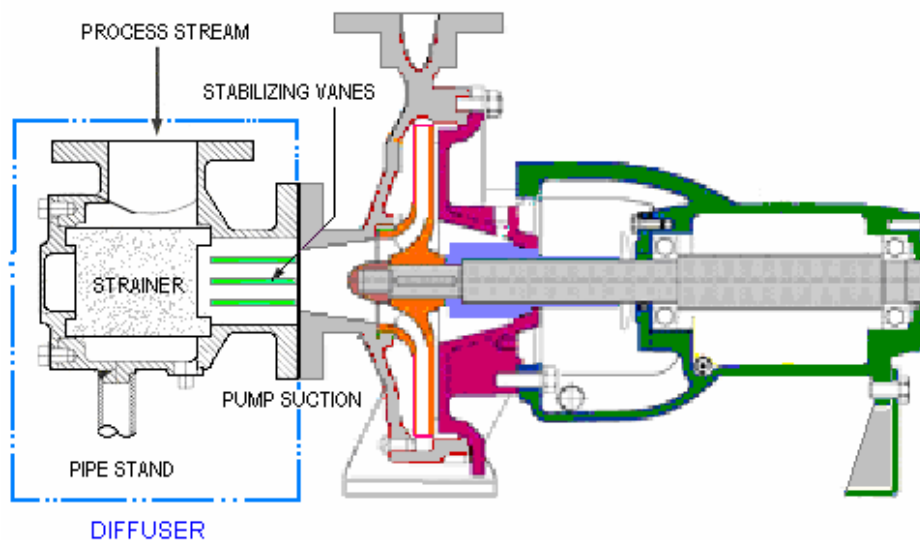


Figure 1 – Suction diffuser

The attribute of spatial compensation is somewhat debatable. A comparative examination of a number of commercially available diffuser models indicated that the average physical *take-out*, or length, plus the required space for the removal of the screen, was equivalent to **5D**. This is identical to the recommended absolute minimum of **5D** normally sought. Even assuming that the diffuser has a space accommodating feature and that its use may produce the desired result, it introduces additional frictional resistance which may be problematic with limited NPSH. If a straining element is present in the diffuser, then routine observation and maintenance will always be in order. Suction diffusers with straining elements should be treated with the same careful consideration, that will be discussed shortly, given a suction strainer when deciding to install this type of device on the pump suction. With respect to diffusers, use them only when the recommended minimum full-size straight pipe lengths can not be provided immediately upstream of the pump inlet port and certainly only after complete evaluation of the resultant flow characteristics.