



# FY SERIES FABRICATED Y STRAINERS

PRESSURES TO 6170 PSIG (425 BARG)  
TEMPERATURES TO 800°F (427°C)

- Custom engineered and fabricated Y strainers
- NPT, RF or RTJ, Socketweld and Buttweld connections designed in accordance with ASME B16.34 and B16.5
- Standard thru bolt or grooved cover design.
- Installation in horizontal or vertical pipelines.
- Stainless steel perforated screens are standard
- Drain/Blow-off connection furnished with plug

## APPLICATIONS

- Steam, liquid, gas and oil service
- Power industry
- Pulp and paper
- Chemical industry
- Process Equipment
- Metal & Mining
- Water & Waste

## APPLICABLE CODES

- Designed/Manufactured to meet ASME B31.1, B31.3 or B31.4 and/or ASME Section VIII, Div. 1.
- Canadian Registration Numbers (CRN) available
- Welders certified to ASME Section IX

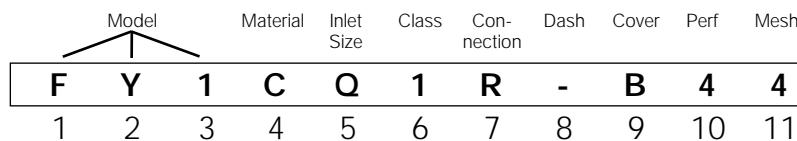
## MODELS

- FY1 – Standard
- FYZ – Custom Configuration

## OPTIONS

- Other materials, sizes and/or configurations
- Quick Opening covers – See Page 92
- Other screen, mesh or wedgewire – See Page 90
- Vent and/or differential pressure connections
- "U" stamped vessels
- NACE MRO10-75 Certification
- External/Internal coatings
- 600# flange rating and higher
- Gooved end connections
- Oxygen cleaning
- Contact Factory for other Options

## FY Series Ordering Code



**Model** - Position 1-3  
FY1 - Standard  
FYZ - Custom Configuration

**Material** - Position 4  
C - Carbon Steel  
L - Low Temp CS  
V - 304 SS  
T - 316 SS  
T - 316 SS  
M - Monel  
H - Hastelloy  
Z - Other

**Inlet Size** - Position 5  
H - 2"  
J - 2-1/2"  
K - 3"  
M - 4"  
N - 5"  
P - 6"  
Q - 8"  
R - 10"  
S - 12"  
T - 14"  
U - 16"  
V - 18"  
W - 20"  
X - 22"  
Y - 24"  
1 - 28"  
2 - 30"  
3 - 36"  
4 - 40"  
Z - Other

**Class** - Position 6  
1 - 150  
3 - 300  
4 - 600  
5 - 900  
6 - 1500  
7 - 2500  
Z - Other

**Connection** - Position 7  
B - Buttweld<sup>1</sup>  
F - Flat Face Flange  
G - Grooved  
N - NPT  
J - Ring Joint Flange  
R - Raised Face Flange  
K - Socket Weld  
Z - Other

1. For Buttweld connection please specify mating pipe schedule.

**Dash** - Position 8  
**Cover** - Position 9  
B - Bolted  
C - Bolted w/C-Clamp  
D - Bolted w/Davit  
J - Bolted w/Hinge  
G - Grooved  
H - T - Bolt Hinged  
T - Threaded Hinged  
Y - Yoke Hinged  
Z - Other

**Perf** - Position 10  
**304SS Material Standard<sup>2</sup>**  
A - None  
B - 3/64"  
1 - 1/32"  
2 - 1/16"  
3 - 3/32"  
4 - 1/8"  
5 - 5/32"  
6 - 3/16"  
7 - 7/32"  
8 - 1/4"  
9 - 3/8"  
Z - Other

2. For other screen materials, contact factory.

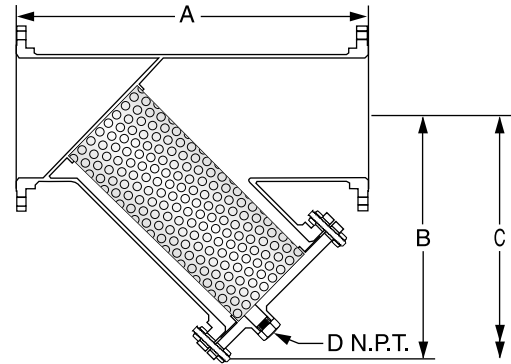
**Mesh<sup>2</sup>** - Position 11  
A - None  
1 - 10  
2 - 20  
3 - 30  
4 - 40  
5 - 50  
6 - 60  
7 - 80  
8 - 100  
9 - 120  
Z - Other

For any variations, use the part Numbering system above but clearly indicate the additional requirements.

# FY SERIES FABRICATED Y STRAINERS

## SPECIFICATION

Y Strainer shall be designed and manufactured to meet ASME B31.1, ASME B31.3 or ASME B31.4 and/or ASME Section VIII Div. 1. The Strainer body shall be fabricated steel or other specified material. The screen shall be size \_\_\_\_\_ perf Stainless Steel. The strainer shall have a bolted cover furnished with a drain connection and plug as standard. The strainer shall have an inlet size of \_\_\_\_\_ and Open Area Ratio of \_\_\_\_\_. The Y Strainer shall be SSI FY\_\_ Series.



Shown with Bolted Cover

## MATERIALS OF CONSTRUCTION (Carbon Steel shown\*)

Shell & Nozzles .....	SA53S/B / A106-B
Flanges .....	SA105
Coupling/threadolets .....	SA105
Plug .....	SA105
Screen Retainer Ring .....	A36
Screen <sup>1</sup> .....	304 SS
Gasket <sup>1</sup> .....	304 SS Spiral Wound
Stud .....	SA193-B7
Nut .....	SA194-2H

\* Other Materials Available. Consult Factory

1. Recommended Spare Parts

Materials specification will change when NACE MR01-75 is specified.

Connections\*:  
2-24" NPT, Socketweld,  
RF, FF, RTJ or Buttweld

\* For additional sizes consult factory.

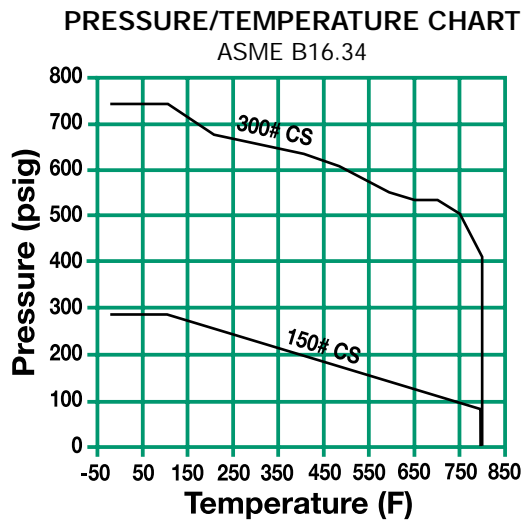
## SCREEN OPENINGS

SIZE	STANDARD SCREEN	MATERIALS
2"-12"	1/8" Perf	304 SS
14"-24"	3/16" Perf	304 SS

## DIMENSIONS inches (mm)

## AND WEIGHTS pounds (kg)

150# Shown - Consult Factory for other ratings



For Quick Opening Covers Ratings see page 92  
For higher pressure classes and other materials, consult factory.

SIZE	A	B	C	D	WEIGHT	
					Cover	Unit
2 (50)	10 <sup>13</sup> / <sub>16</sub> (275)	8 <sup>1</sup> / <sub>4</sub> (210)	13 <sup>1</sup> / <sub>4</sub> (337)	1/2 (15)	5 (2)	28 (13)
2 1/2 (65)	13 <sup>3</sup> / <sub>8</sub> (340)	10 <sup>1</sup> / <sub>4</sub> (260)	16 <sup>7</sup> / <sub>16</sub> (418)	1 (25)	9 (4)	81 (37)
3 (80)	13 <sup>3</sup> / <sub>8</sub> (340)	10 <sup>1</sup> / <sub>4</sub> (260)	16 <sup>7</sup> / <sub>16</sub> (418)	1 (25)	9 (4)	81 (37)
4 (100)	14 <sup>3</sup> / <sub>4</sub> (375)	10 <sup>1</sup> / <sub>2</sub> (267)	16 <sup>3</sup> / <sub>4</sub> (425)	1 1/2 (4)	17 (8)	85 (39)
5 (125)	17 <sup>1</sup> / <sub>4</sub> (438)	12 <sup>1</sup> / <sub>2</sub> (318)	20 (508)	1 1/2 (40)	20 (9)	110 (50)
6 (150)	22 (559)	14 (356)	22 <sup>7</sup> / <sub>16</sub> (570)	2 (50)	26 (12)	145 (66)
8 (200)	24 (610)	17 <sup>3</sup> / <sub>4</sub> (451)	28 <sup>7</sup> / <sub>16</sub> (722)	2 (50)	45 (20)	256 (116)
10 (250)	31 <sup>1</sup> / <sub>2</sub> (800)	22 (559)	35 <sup>1</sup> / <sub>4</sub> (895)	2 (50)	70 (32)	380 (172)
12 (300)	32 <sup>3</sup> / <sub>4</sub> (832)	25 (635)	40 (1016)	2 (50)	110 (50)	700 (317)
14 (350)	39 <sup>3</sup> / <sub>4</sub> (1010)	27 (686)	43 <sup>1</sup> / <sub>4</sub> (1099)	2 (50)	140 (63)	750 (340)
16 (400)	45 <sup>1</sup> / <sub>4</sub> (1149)	30 <sup>7</sup> / <sub>8</sub> (784)	49 <sup>1</sup> / <sub>2</sub> (1257)	2 (50)	180 (82)	905 (410)
18 (450)	48 <sup>1</sup> / <sub>2</sub> (1232)	33 <sup>7</sup> / <sub>8</sub> (861)	54 <sup>1</sup> / <sub>4</sub> (1378)	2 (50)	220 (100)	1125 (510)
20 (500)	53 <sup>3</sup> / <sub>4</sub> (1365)	39 (991)	62 <sup>1</sup> / <sub>2</sub> (1588)	2 (50)	285 (129)	1415 (641)
24 (600)	64 (1626)	44 (1118)	70 <sup>1</sup> / <sub>2</sub> (1791)	2 (50)	430 (195)	1825 (827)

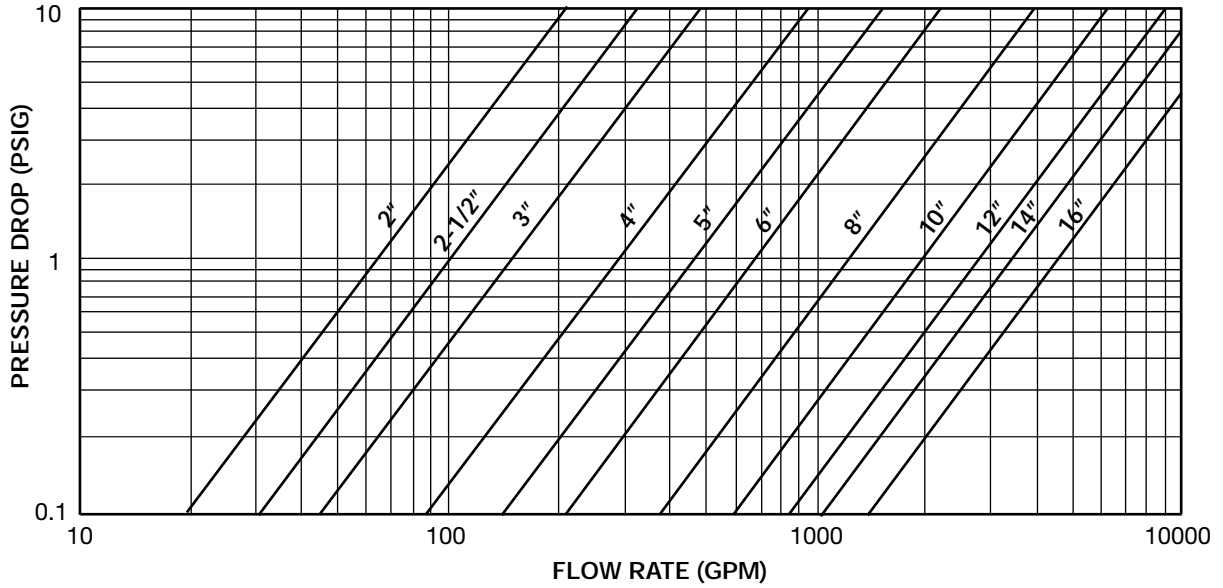
Dimensions shown are subject to change.  
Consult factory for certified drawings when required.



# FY SERIES FABRICATED Y STRAINERS PRESSURE DROP VS FLOW RATE

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

(Sizes 2" - 16")



\* For Gas, Steam or Air service, consult factory.



# FY SERIES

## FABRICATED Y STRAINERS

### OPEN AREA RATIOS

with Standard Perforated Screen

Size	Perf. Diameter (inches)	Opening %	Std Pipe Nominal Area (in <sup>2</sup> )	Gross Screen Area (in <sup>2</sup> )	Free Screen Area (in <sup>2</sup> )	Open Area Ratio (OAR)
2	1/8	40	3.4	39	16	4.6
3	1/8	40	7.4	77	31	4.2
4	1/8	40	12.7	135	54	4.2
5	1/8	40	20.0	160	64	3.2
6	1/8	40	28.9	215	86	3.0
8	1/8	40	50.0	375	150	3.0
10	1/8	40	78.9	545	218	2.8
12	1/8	40	113.1	785	314	2.8
14	3/16	50	140.5	900	360	2.6
16	3/16	50	185.7	1210	484	2.6
18	3/16	50	237.1	1560	624	2.6
20	3/16	50	294.8	1950	780	2.6
24	3/16	50	429.1	2765	1106	2.6

OAR = Free Screen Area / Inlet Area

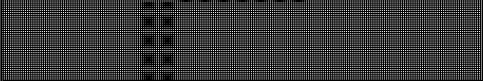
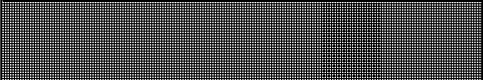
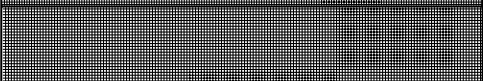
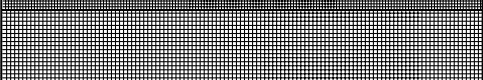
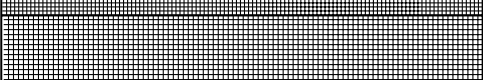
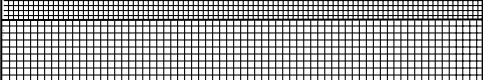
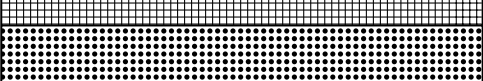
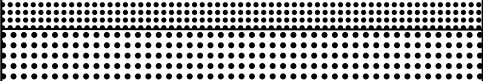
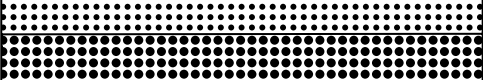
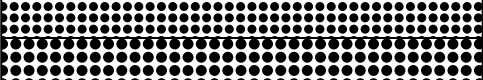





Free Screen Area = Opening % x Gross Screen Area

Values shown are approximate. Consult factory for exact ratios.

NOTES:

# Y-STRAINER TECHNICAL INFORMATION

# SCREEN OPENINGS

	100 Mesh - 30% O.A. 0.006" Openings
	80 Mesh - 36% O.A. 0.008" Openings
	60 Mesh - 38% O.A. 0.010" Openings
	40 Mesh - 41% O.A. 0.016" Openings
	30 Mesh - 45% O.A. 0.022" Openings
	20 Mesh - 49% O.A. 0.035" Openings
	0.027" Dia. - 23% O.A.
	0.033" Dia. - 28% O.A.
	3/64" Dia. - 36% O.A.
	1/16" Dia. - 37% O.A.
	3/32" Dia. - 39% O.A.
	1/8" Dia. - 40% O.A.
	5/32" Dia. - 58% O.A.
	3/16" Dia. - 50% O.A.
	1/4" Dia. - 40% O.A.

## FACTORS TO CONSIDER

### 1 Purpose

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

### 2 Service

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

### 3 Filtration Level

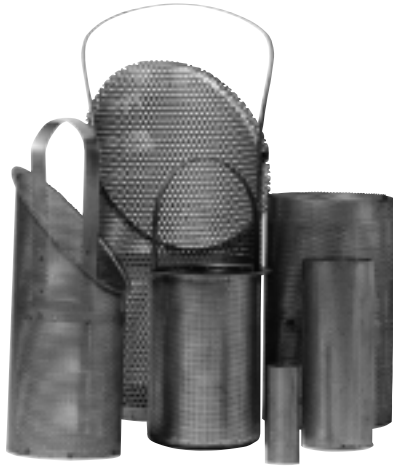
When choosing a perf. or a mesh/perf. combination, attention should be given to ensure overstraining does not occur. As a general rule, the specified level of filtration should be no smaller than half the size of the particle to be removed. If too fine a filtration is specified, the pressure drop through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

Screen openings other than those shown above are readily available. Various mesh sizes as fine as 5 micron and perforated plate as coarse as 1/2" Dia. are in inventory.

Screens are available in a wide range of materials. Screens of carbon steel, stainless steel (304, 316), alloy 20, monel 400, hastelloy C and titanium grade 2 are in inventory.

Custom manufactured screens are available upon request. Please consult factory.

# Y STRAINER REPLACEMENT CYLINDRICAL SCREENS



Spence has screens and baskets for all makes of Y, basket and duplex strainers. The range of materials and size of units is unlimited. Spence provides baskets manufactured from:

- Perforated Plate
- Mesh or Mesh/Perf. combination
- Wedge Wire
- Electron Beam Small Hole Perforated Plate

Using the above processes or combination thereof, Spence can provide screens and baskets suitable for a wide range of applications.

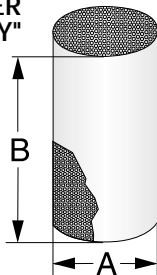
## SCREEN/BASKET CHECKLIST

Kindly photocopy this page and fill out the pertinent information.

### Performance Requirements

Description	Customers Requirement
Required Level of Filtration =	
Material of Construction =	
Minimum Specified Burst Pressure =	
Flow Direction =	
Other =	

CYLINDRICAL STRAINER STYLE "Y"



### Dimensional Requirements

Description		Customers Requirement
Style	Y	
Screen Outer Diameter	A =	
Screen Height	B =	

# Y STRAINER

## PRESSURE DROP CORRECTION FACTORS

### Mesh Lined Baskets and/or Fluids with a Viscosity other than Water

Centistokes	SSU	Unlined Perforated Basket	20 Mesh Lined Basket	40 Mesh Lined Basket	60 Mesh Lined Basket	80 Mesh Lined Basket	100 Mesh Lined Basket	200 Mesh Lined Basket
2	30 (water)	1	1.05	1.2	1.4	1.6	1.7	2
100	500	1.6	1.7	1.9	2.1	2.4	2.6	3.1
216	1000	1.7	2	2.2	2.4	2.6	2.8	3.3
433	2000	1.9	2.2	2.4	2.7	2.9	3.2	3.8
650	3000	2	2.3	2.6	2.9	3.2	3.5	4.1
1083	5000	2.2	2.6	3	3.5	4	4.5	5.3
2200	10000	2.5	3	3.5	4.2	5	6	7.1

- 1) Obtain water pressure drop from graphs on appropriate product page.
- 2) Multiply the pressure drop obtained from (1) by the specific gravity of the liquid.
- 3) Multiply the pressure drop from (2) by the appropriate correction factor for the mesh liner and/or viscosity.

#### Example

**Model:** 150Y2  
**Size:** 4"  
**Body:** Carbon Steel  
**Filtration:** 1/8" perforated screen 40 Mesh lines  
**Flow rate:** 200 GPM  
**Fluid:** Water  
**SG:** 1  
**Viscosity:** 30 SSI

#### Answer

- A) From Pressure Drop Chart *on page 17* pressure drop of water is .48 psid
- B) Multiply by specific gravity;  $.48 \times 1 = .48$  psid
- C) From chart above, multiply answer from B) by correction factor  $.48 \times 1.2$  (correction factor) = .576 psid

## CORRECTION FACTORS FOR CLOGGED SCREENS

% Clogged	Ratio of Free Screen Area to Pipe Area						
	10:1	8:1	6:1	4:1	3:1	2:1	1:1
10							3.15
20						1.15	3.9
30						1.4	5
40						1.8	6.65
50					1.25	2.5	9.45
60				1.15	1.8	3.7	14.5
70				1.75	2.95	6.4	26
80		1.1	1.75	3.6	6.25	14	58
90	2.3	3.45	6	13.5	24	55	

\* Multiply values obtained from Pressure Drop Charts by the appropriate values shown below.

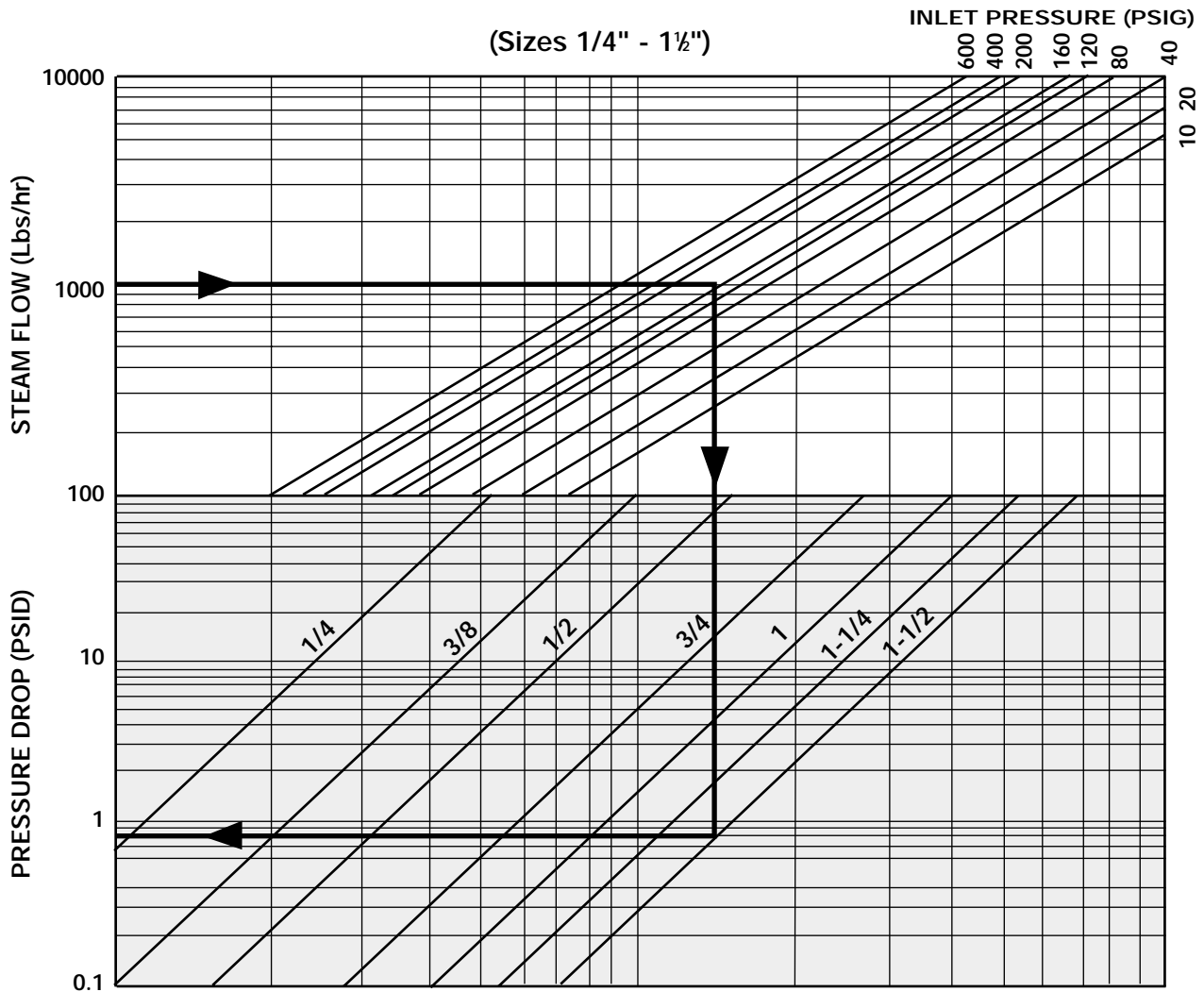
#### Example

**Strainer Size:** 6"  
**Model:** 150Y2  
**Body:** Carbon Steel  
**Filtration:** 1/8" Perf.  
**Flow rate:** 1000 GPM  
**Service:** Water  
**% Clogged:** 60%

#### Answer

- A) The Pressure Drop Chart *on page 17* indicates a drop of 2.2 psid with standard screen.
- B) The Effective Area Chart indicates a ratio of 3.0 free area to pipe area.
- C) Using Chart above we read the correction factor of 3:1 to be 1.8 at 60% clogged.
- D) Total pressure drop equals  $2.2 \times 1.8 = 3.96$  psid.

# Y STRAINER PRESSURE DROP SATURATED STEAM



- Notes:** 1. Pressure drop curve is based on saturated steam flow with standard screens.  
 See page 56 for correction factors to be used with other fluids and/or screen openings.  
 2. Chart can be used for air and gas by using the following formula:

$$Q_s = 0.138 Q_g \sqrt{(460+t) \text{ s.g.}} \left\{ \frac{DP}{P_2} < 1.0 \right\}$$

FOR NON-CRITICAL FLOW

where;

- Q<sub>s</sub> = Equivalent Steam Flow, lbs./hr.
- Q<sub>g</sub> = Air or gas flow, SCFM.
- t = Temperature, °F.
- s.g. = Specific gravity (s.g. = 1 for air.)
- DP = Pressure Drop, psid
- P<sub>2</sub> = Outlet Pressure

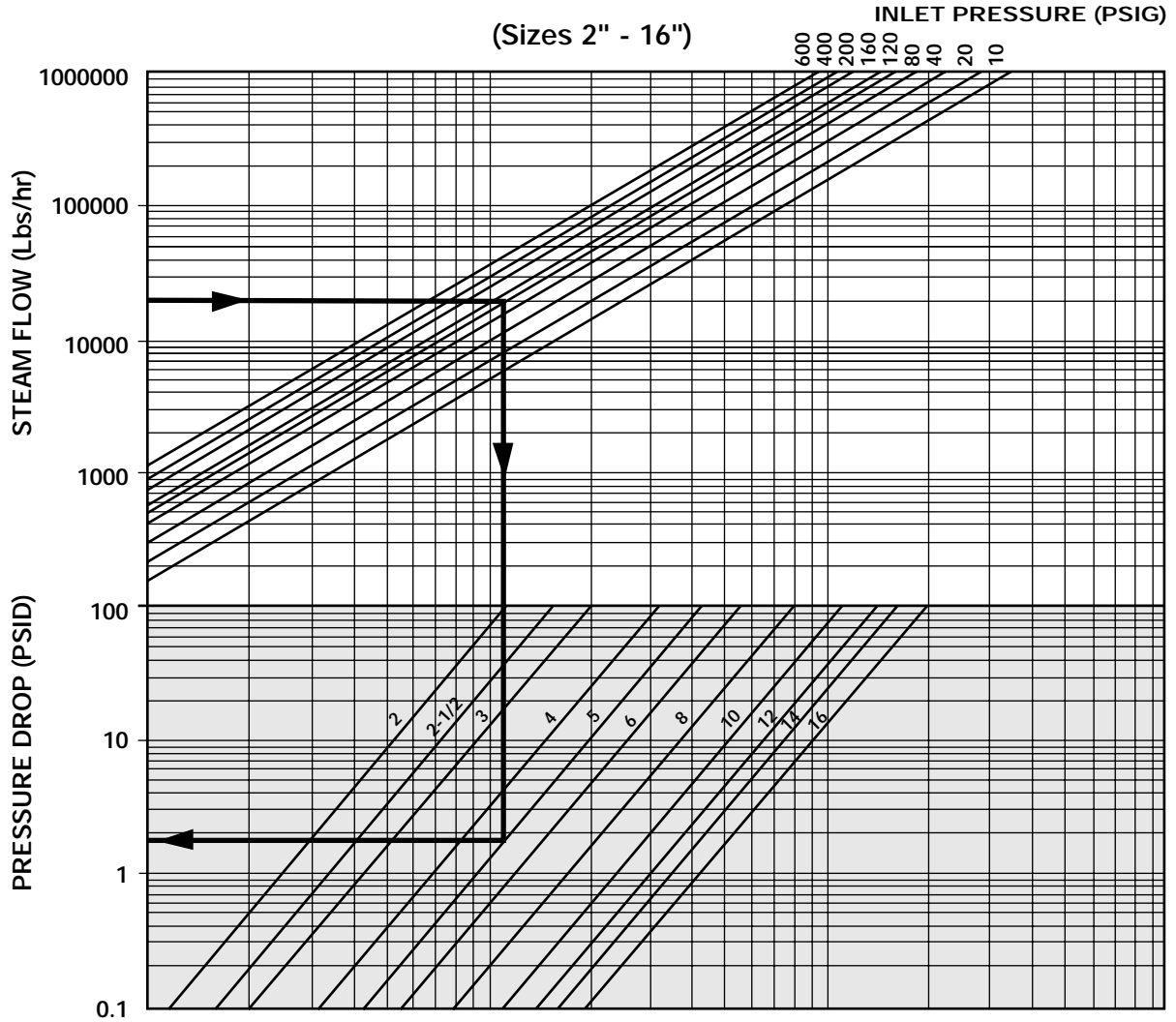
**Example:**

Service: Saturated Steam Flow  
 Pressure: 160 psig  
 Steam Flow: 1000 Lbs/hr  
 Size: 1-1/2"

- Locate steam flow
- Follow horizontal line to required pressure.
- Follow vertical line downwards to required strainer size.
- Follow horizontal line to read pressure drop.
- Pressure drop equals 0.8 psid.

# Y STRAINER

## PRESSURE DROP SATURATED STEAM



- Notes:**
1. Pressure drop curve is based on saturated steam flow with standard screens. See page 56 for correction factors to be used with other screen openings.
  2. Chart can be used for air and gas by using the following formula:

$$Q_s = 0.138 Q_g \sqrt{(460+t) \text{ s.g.}} \left\{ \frac{DP}{P_2} < 1.0 \right\}$$

FOR NON-CRITICAL FLOW

where;

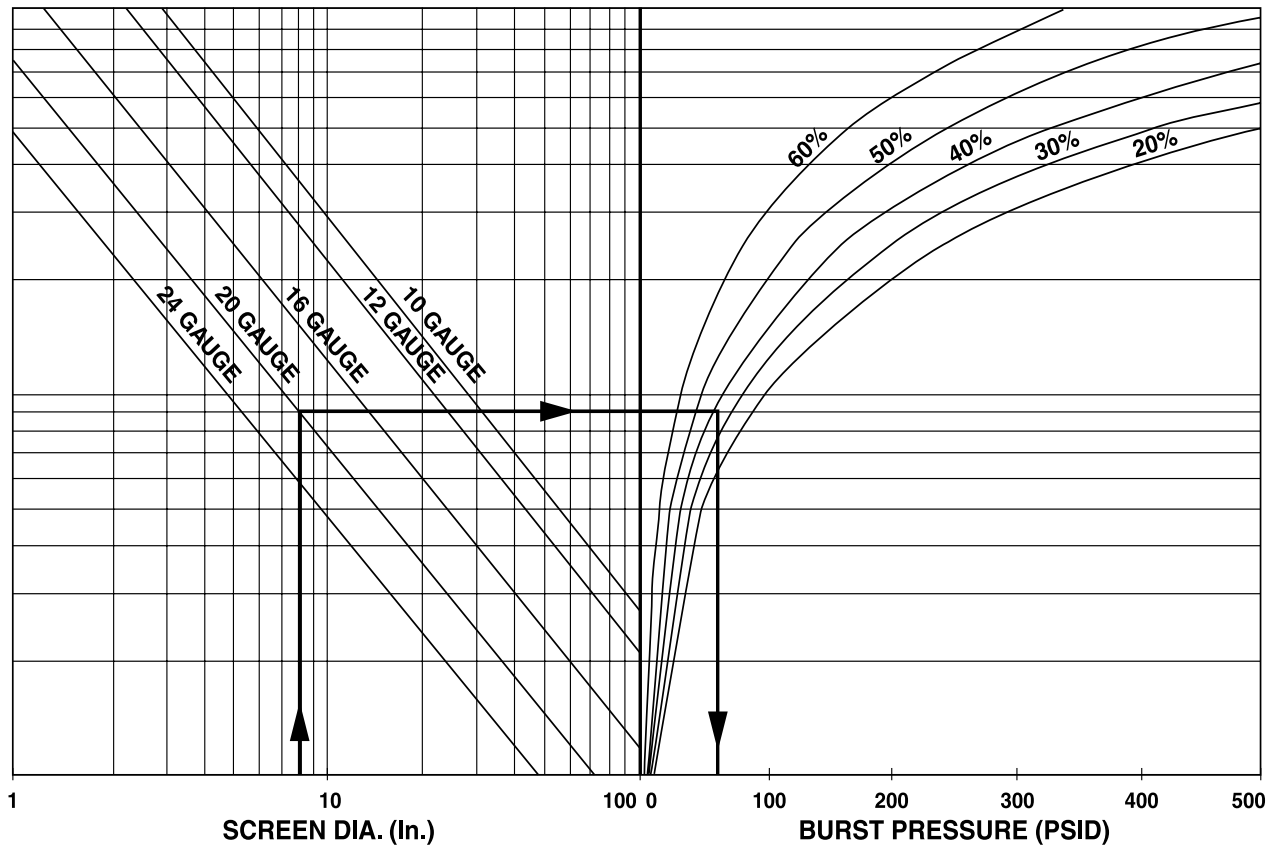
- Q<sub>s</sub> = Equivalent Steam Flow, lbs./hr.
- Q<sub>g</sub> = Air or gas flow, SCFM.
- t = Temperature, °F.
- s.g. = Specific gravity (s.g. = 1 for air.)
- DP = Pressure Drop, psid
- P<sub>2</sub> = Outlet Pressure

**Example:**

Service: Saturated Steam Flow  
 Pressure: 120 psig  
 Steam Flow: 20,000 Lbs/hr  
 Size: 5"

- Locate steam flow
- Follow horizontal line to required pressure.
- Follow vertical line downwards to required strainer size.
- Follow horizontal line to read pressure drop.
- Pressure drop equals 1.8 psid.

# Y STRAINER SCREEN BURST PRESSURE



**Notes:**

1. The above chart is for use with perforated plate and based on the formula:

$$P = \frac{St}{R - 0.4t}$$

SOURCE: ASME Section VIII, Div. 1, Appendix 1.

- P = Burst pressure, psid
- S = Reduced allowable stress, psi
- t = Thickness of perforated plate, in.
- R = Outside radius of screen, in.

2. The above chart is based on a screen material of stainless steel and is valid for operating temperatures up to 100°F. The chart may be used for higher temperatures however it will result in a safety factor reduction. (At 100°F the chart's safety factor is approximately four (4), at 1000°F the chart's safety factor is reduced to approximately two (2)). It is the responsibility of the user to determine an acceptable safety factor.
3. The chart may be used for carbon steel at an approximate 25% reduction in safety factor.
4. See Screen Openings Chart for % Open Area's of inventoried perforated plate.

**Example:**

Strainer Size: 8"  
 Screen Thickness: 20 Gauge  
 Screen Perforations: 0.125" (40% O.A.)

- A) Locate screen diameter (assume a 8" diameter screen)
- B) Follow vertical line to gauge thickness.
- C) Follow horizontal line to required perforation open area.
- D) Follow vertical line downward to read burst pressure.
- E) Burst pressure equals 60 psid approx.

# Y STRAINER

## STRAINER CHECKLIST

Please take the factors listed below into account when selecting a strainer. Kindly photocopy this page and fill out the pertinent information, to your best ability, so that we can recommend a Strainer to suit your specific requirements.

- |  |   |
|--|---|
| <p>1. Fluid to be strained _____</p> <p>2. Flow rate _____</p> <p>3. Density of fluid _____</p> <p>4. Viscosity of fluid _____</p> <p>5. Fluid working pressure _____</p> <p style="padding-left: 20px;">Maximum pressure _____</p> <p>6. Fluid Working Temp. _____</p> <p style="padding-left: 20px;">Maximum Temp. _____</p> <p>7. Preferred material of strainer construction _____</p> <p>8. Present Pipeline size &amp; material _____</p> <p>9. Nature of solids to be strained out _____</p> <p>10. Size of solids to be strained out _____</p> <p style="padding-left: 20px;">Size of mesh or Perf. Req. _____</p> | <p>11. Clearance Limitation Above _____ Below _____</p> <p style="padding-left: 20px;">Left side facing inlet _____ Right side facing inlet _____</p> <p>12. Maximum pressure drop with clean screen _____</p> <p>13. Expected cleaning frequency _____</p> <p>14. Any other information deemed relevant _____</p> <p>_____</p> <p>_____</p> <p>Name _____</p> <p>Company _____</p> <p>Address _____</p> <p>City/Town _____</p> <p>State _____ Zip Code _____</p> <p>Telephone ( _____ ) _____</p> <p>Fax ( _____ ) _____</p> |
|--|---|



# Y STRAINER

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 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 and vertical pipelines, the strainer should be installed so that the blow-down drain connection is pointed downward.
- For flanged end strainers, the flange bolting should be tightened gradually in a back and forth clockwise motion. 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.

### SCREEN 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 can not 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 "Screen Removal Instructions" above. A

pressure gauge installed before and after the strainer in-line 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 screen seating surfaces.

**WARNING:** *This product operates in pipelines or with equipment that carries fluids and/or gasses at elevated temperatures and pressures. Caution should be taken to make sure that this equipment is installed correctly and inspected regularly. Caution should also be taken to protect personnel from fluid or gas leakage.*

NOTES: