



EXHAUST SILENCERS

PENN SEPARATOR CORP
BROOKVILLE, PA 15825

BULLETIN ES1295
E1

THE SP SILENCER

For Maximum Noise Reduction

The SP Exhaust Silencer is a single pass silencer designed to give maximum attenuation of both low and high frequency noise for air, steam, or gas exhausting to atmosphere.

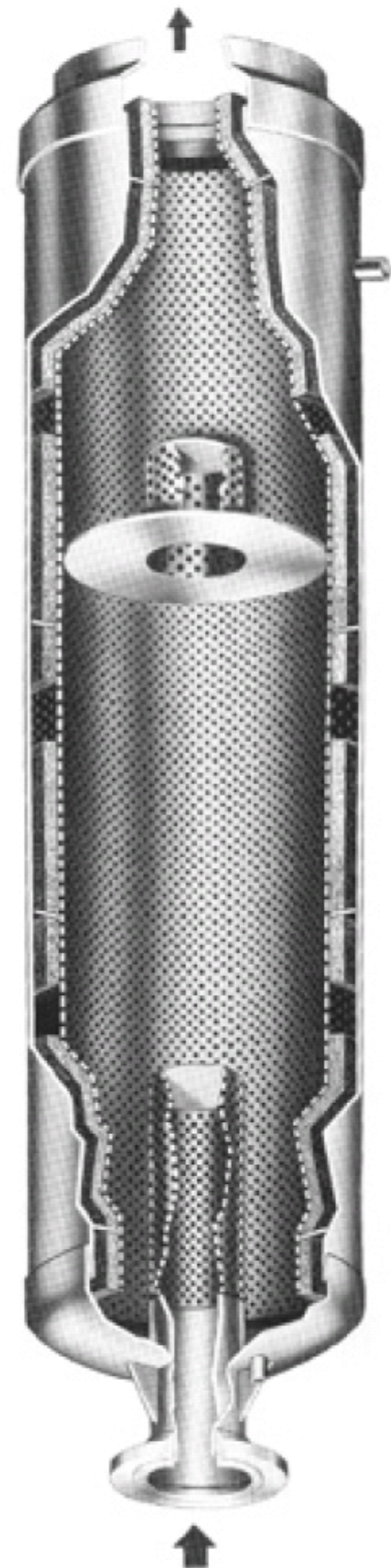
The gas enters the inlet of the silencer where the flow is disbursed through the inlet diffuser tube into hundreds of small jet flows. This provides for quite flow of the gas into the silencer and the first stage silencing chamber. The diffuser also directs the flow toward the outer walls of the silencer body. The gas then repeats the same process contracting and expanding into the second storage chamber. The second chamber reacts with the noise the same way as the first chamber dissipating and absorbing the noise that is left over. The second chamber also has an important function as a reflow area. It allows for an even flow of gas to the outlet. This assures the quiet release of gases to the atmosphere through an adequately sized outlet.

The first and second absorption chambers are lined with 1/2" Dalcon Acoustical Material protected by perforated plate. The perforated plate creates a dimple effect on the acoustical material. This feature is similar to dimpled acoustical tile. It is this design that is very efficient in absorbing medium and high frequency noise. Besides the absorption material please note the strategically placed dissipative chamber openings on the perforated plate where there is no acoustical material. These areas are specifically designed to absorb low frequency noise. This means the silencer will work for both low and high frequency noise.

Each silencer reduces noises differently. The larger the size, the higher the reduction. These reductions range from 34.9 to 48.4dB. The following page gives these combined reductions as well as reductions at various frequencies.

Both the SP and SP-S Silencer are designed to take high inlet velocities of 900 fps. So they make excellent exhaust Silencers. The acoustical material "Dalcon" is rated for 1250 deg. F so that this silencer works well on steam conditions. The SP and SP-S Exhaust Silencers have the same quality of workmanship that has gone into all Penn Products for so many years and is guaranteed for a year against defects in materials or workmanship.

For maximum noise reduction choose Penn's SP Exhaust Silencer.



SP SILENCER — ATTENUATION LEVELS ON STEAM

Frequency	31.5	63	125	250	500	1K	2K	4K	8K	16K	Combined
SP 2-14	1.6	1.4	6.9	11.0	22.8	32.0	37.9	40.6	36.8	26.9	34.9
SP 2.5-14	2.9	3.3	5.6	10.5	22.0	30.9	38.0	41.3	39.5	27.6	36.5
SP 3-18	3.5	4.0	4.9	11.5	21.8	34.0	39.0	43.5	40.0	28.0	36.8
SP 4-20	4.3	4.6	4.7	14.5	22.4	31.6	40.4	41.5	37.9	30.0	38.2
SP 5-24	5.0	4.9	5.0	15.5	25.4	35.1	42.2	43.4	40.4	28.1	38.4
SP 6-24	6.1	4.8	5.5	17.1	25.4	32.8	40.6	45.0	42.6	31.8	39.9
SP 8-30	8.8	3.7	6.4	15.4	28.0	36.2	42.4	44.5	42.1	32.9	41.8
SP 10-36	9.2	3.6	7.6	15.2	28.0	34.8	42.2	46.2	43.1	31.3	42.0
SP 12-42	10.4	4.2	11.4	19.3	27.4	36.6	42.8	48.5	42.9	34.2	43.7
SP 14-48	11.1	5.3	12.9	21.7	28.3	38.5	45.0	47.0	43.9	35.5	45.2
SP 16-48	11.2	5.8	15.1	19.4	29.6	39.0	44.4	50.2	44.7	34.3	46.5
SP 18-48	11.2	5.9	15.3	19.4	32.2	39.9	45.7	49.0	48.6	37.7	47.0
SP 20-54	11.3	5.9	15.3	19.0	32.1	40.6	48.7	50.7	45.3	36.8	48.4
SP 24-54	11.3	5.9	15.3	19.0	32.1	40.6	48.7	50.7	45.3	36.8	48.4

SP SILENCER — ATTENUATION LEVELS ON AIR

Frequency	31.5	63	125	250	500	1K	2K	4K	8K	16K	Combined
SP 2-14	1.9	2.2	5.1	9.8	22.3	29.3	37.4	41.7	38.5	27.3	34.9
SP 2.5-14	3.6	3.6	3.7	14.2	24.1	33.5	39.8	43.7	40.4	29.3	36.4
SP 3-18	4.3	3.5	4.0	14.9	25.2	30.6	40.9	44.3	40.3	27.2	36.8
SP 4-20	5.3	3.0	3.7	16.1	22.1	34.4	40.0	41.3	39.4	30.0	38.1
SP 5-24	6.0	2.4	3.4	13.5	23.0	32.2	39.6	44.2	41.2	30.3	38.3
SP 6-24	7.1	1.6	5.3	13.3	26.4	31.9	42.5	42.7	41.3	28.2	39.7
SP 8-30	8.4	2.6	10.3	19.1	25.1	36.2	43.9	47.2	44.4	33.4	41.7
SP 10-36	8.3	2.8	11.2	18.5	25.4	36.0	42.8	45.0	43.0	31.4	41.5
SP 12-42	7.9	2.6	11.0	16.3	27.5	37.9	44.5	45.9	43.3	35.0	43.6
SP 14-48	7.3	3.7	9.8	21.1	30.2	37.3	47.0	50.2	46.7	33.4	45.1
SP 16-48	7.3	6.7	9.8	19.9	29.4	37.6	44.6	51.1	47.4	34.0	46.5
SP 18-48	7.5	8.6	10.7	19.3	31.8	38.3	49.0	51.2	47.9	34.0	46.8
SP 20-54	7.4	7.5	9.8	18.8	31.8	41.1	48.4	50.2	44.9	35.0	46.7
SP 24-54	7.4	7.5	9.8	18.8	31.8	41.1	48.4	50.2	44.9	35.0	46.7

THE SP-S SILENCER

For Good Noise Reduction

The SP-S Exhaust Silencer is also a single pass silencer designed to give good attenuation of both low and high frequency noise for air, steam, or gas exhausting to atmosphere.

The SP-S Silencer is an economical approach to silencing where the noise level reduction does not have to be as great as the SP model. The SP-S Silencer has the same physical configurations as the SP Silencer except that it is two-thirds the length of an SP Silencer.

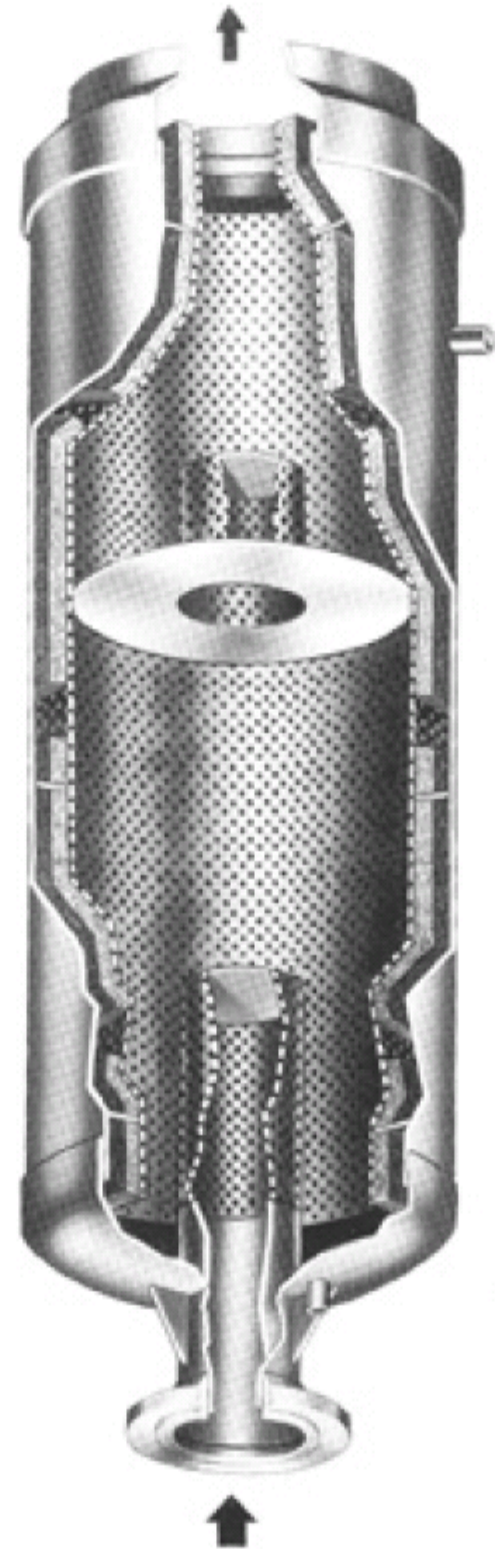
The gas enters the inlet of the silencer where the flow is disbursed through the inlet diffuser tube into hundreds of small jet flows. This provides for a quiet flow of the gas into the silencer and the first stage silencing chamber. The diffuser also directs the flow toward the outer walls of the silencer body. The gas then repeats the same process contracting and expanding into the second stage chamber. The second chamber reacts with the noise the same way as the first chamber dissipating and absorbing the noise that is left over. The second chamber also has an important function as a reflow area. It allows for an even flow of gas to the outlet. This assures the quiet release of gases to the atmosphere through an adequately sized outlet.

The first and second absorption chambers are lined with 1/2" Dalcon Acoustical Material protected by perforated plate. The perforated plate creates a dimple effect on the acoustical material. This feature is similar to dimpled acoustical tile. It is this design that is very efficient in absorbing medium and high frequency noise. Besides the absorption material please note the strategically placed dissipative chamber openings on the perforated plate where there is no acoustical material. These areas are specifically designed to absorb low frequency noise. This means the silencer will work for both low and high frequency noise.

Each silencer reduces noise differently. The larger the size, the higher the reduction. These reductions range from 24.4 to 29.7 dB. The following page gives these combined reductions as well as reductions at various frequencies.

Both the SP and SP-S Silencer are designed to take high inlet velocities of 900 fps. so they make excellent exhaust Silencers. The acoustical material "Dalcon" is rated for 1250 deg. F so that this silencer works well on steam conditions. The SP and SP-S Exhaust Silencers have the same quality of workmanship that has gone into all Penn Products for so many years and is guaranteed for a year against defects in materials or workmanship.

For good noise reduction choose Penn's SP-S Exhaust Silencer.



SP-S SILENCER — ATTENUATION LEVELS ON STEAM

Frequency	31.5	63	125	250	500	1K	2K	4K	8K	16K	Combined
SP 2-14-S	0.4	-0.1	3.5	8.7	13.1	21.2	25.1	25.9	24.3	17.8	24.4
SP 2.5-14-S	1.0	0.9	4.5	7.3	15.0	21.0	24.7	26.7	24.0	19.0	24.7
SP 3-18-S	1.6	1.7	4.2	7.3	16.3	20.0	26.6	28.1	26.7	18.8	25.9
SP 4-20-S	1.4	1.5	4.4	7.4	15.9	21.3	24.8	27.2	26.0	19.1	25.8
SP 5-24-S	1.9	2.1	3.8	6.9	14.9	20.0	24.5	29.0	25.3	18.9	26.0
SP 6-24-S	2.6	2.8	3.1	8.6	14.0	21.1	26.0	27.5	25.4	18.7	25.7
SP 8-30-S	3.2	3.2	3.3	10.3	16.8	23.2	28.0	29.3	26.3	19.3	27.0
SP 10-36-S	3.3	3.2	3.3	10.3	16.8	23.2	27.9	28.7	26.8	18.6	26.5
SP 12-42-S	4.0	3.2	3.6	11.3	16.8	21.7	26.9	29.8	28.2	21.0	27.3
SP 14-48-S	4.4	3.1	3.6	11.8	15.5	24.1	28.8	29.6	26.2	20.5	27.7
SP 16-48-S	5.7	2.5	3.9	10.1	18.4	24.2	27.6	31.0	28.9	20.5	28.6
SP 18-48-S	6.4	2.5	6.2	10.1	16.8	25.7	30.0	29.7	29.5	22.4	29.2
SP 20-54-S	6.3	2.4	5.6	9.9	17.3	23.7	27.9	29.9	28.4	20.7	29.6
SP 24-54-S	6.3	2.4	5.6	9.9	17.3	23.7	27.9	29.9	28.4	20.7	29.6

SP-S SILENCER — ATTENUATION LEVELS ON AIR

Frequency	31.5	63	125	250	500	1K	2K	4K	8K	16K	Combined
SP 2-14-S	0.5	0.2	4.0	7.1	13.0	19.0	25.7	25.4	25.4	16.5	24.7
SP 2.5-14-S	1.2	1.4	3.4	6.5	14.9	19.5	25.2	27.4	24.5	16.8	25.6
SP 3-18-S	1.9	2.2	2.4	8.1	13.3	19.9	26.4	28.4	26.5	18.5	25.9
SP 4-20-S	1.7	2.0	2.5	7.3	13.6	21.9	24.2	28.4	24.6	18.4	25.7
SP 5-24-S	2.3	2.4	2.4	9.3	15.7	21.2	25.6	27.0	25.5	18.9	25.1
SP 6-24-S	3.2	2.2	2.7	10.6	15.3	20.7	24.8	28.4	25.6	18.4	26.6
SP 8-30-S	3.9	1.6	2.2	9.1	14.8	20.9	27.0	27.4	26.1	19.3	27.0
SP 10-36-S	4.0	1.6	2.2	9.0	15.2	21.3	26.2	29.3	27.3	20.1	26.6
SP 12-42-S	4.7	1.1	3.5	8.8	17.5	21.1	28.1	28.3	27.4	18.7	27.2
SP 14-48-S	5.0	1.0	4.7	8.6	15.3	24.2	28.4	29.2	27.9	20.2	27.5
SP 16-48-S	5.5	1.6	6.6	12.2	18.0	22.8	27.1	31.0	29.1	19.7	28.6
SP 18-48-S	5.4	1.9	8.1	10.6	18.8	24.5	29.0	31.1	29.5	22.1	29.1
SP 20-54-S	5.5	1.9	7.8	11.3	16.9	22.5	28.9	30.0	28.1	22.3	29.7
SP 24-54-S	5.5	1.9	7.8	11.3	16.9	22.5	28.9	30.0	28.1	22.3	29.7

CHART 1

HOW TO USE THE SELECTOR CHART

Go across the bottom of the Chart to the flow that you have for steam in lbs./Hr. for Air in SCFM. Then go up the chart to the maximum inlet flow fo 900fps. Read directly off of the chart the Silnecor inlet size. If the intersection falls on the line go to the larger size. Go from the intersection to the left of chart to read pressure drop. If pressure drop is too high go down to pressure drop desired, go right of chart until it intersects with flow line. This is the Silencer required for that pressure drop.

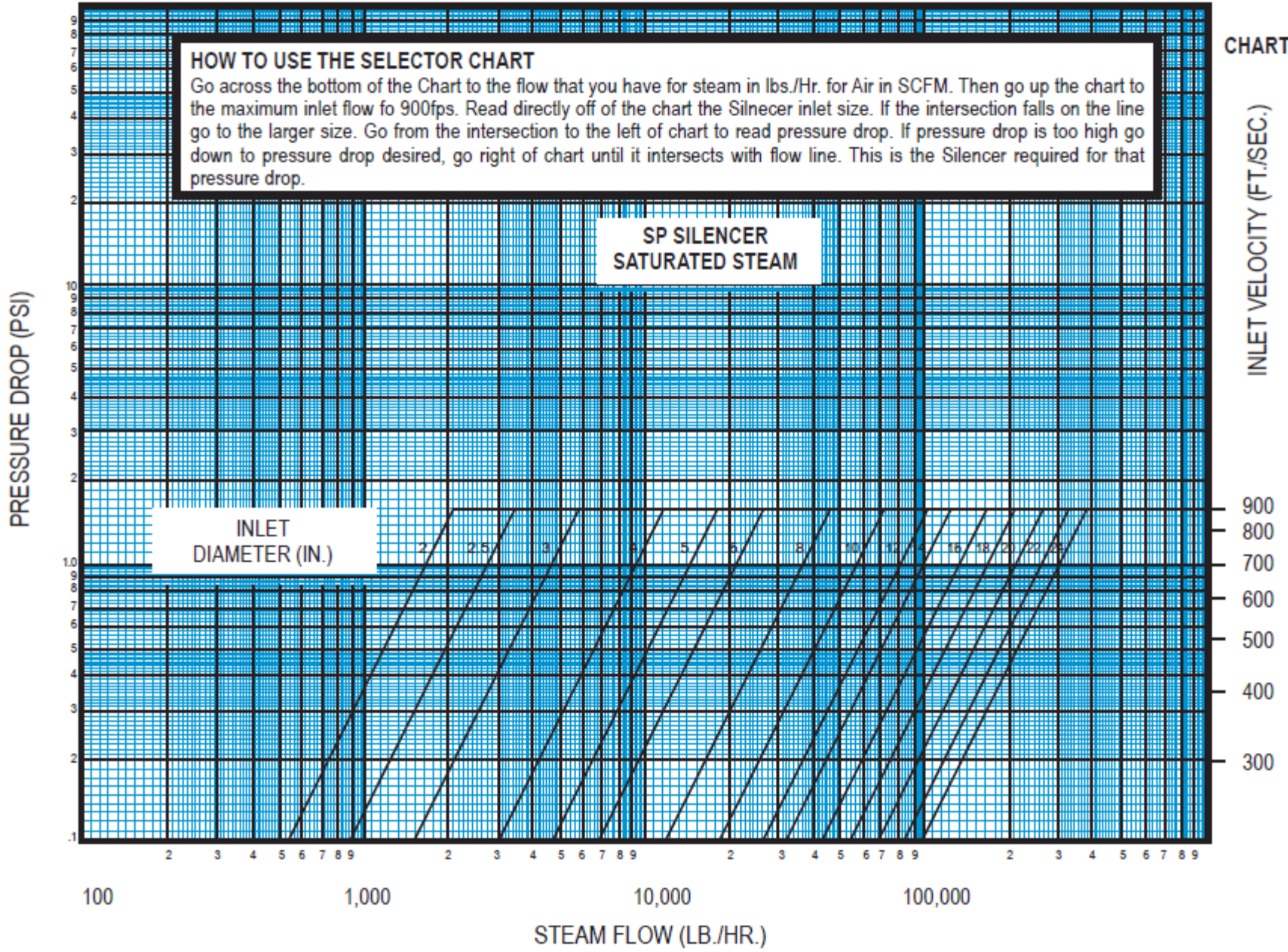


CHART 2

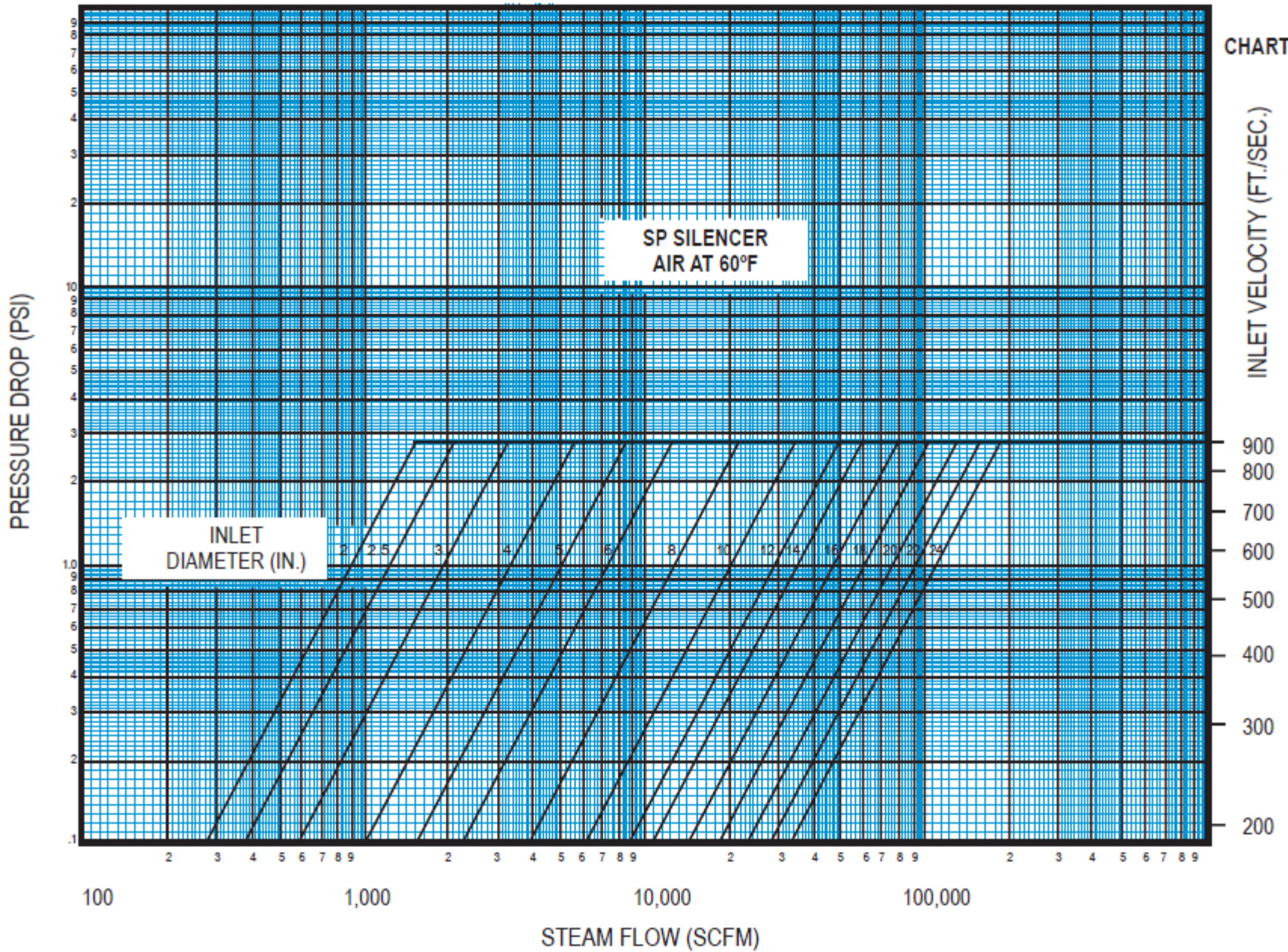


CHART 3

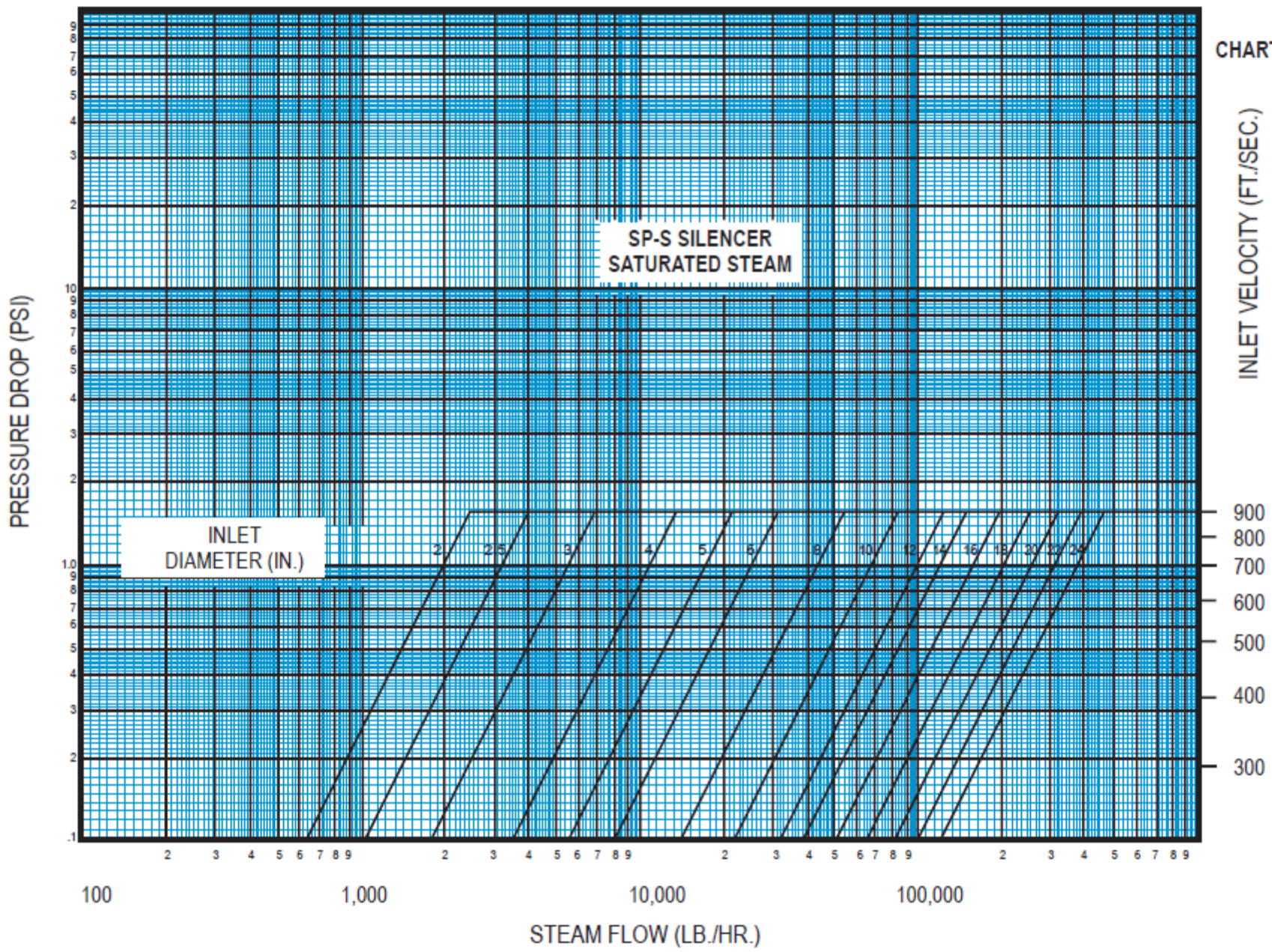
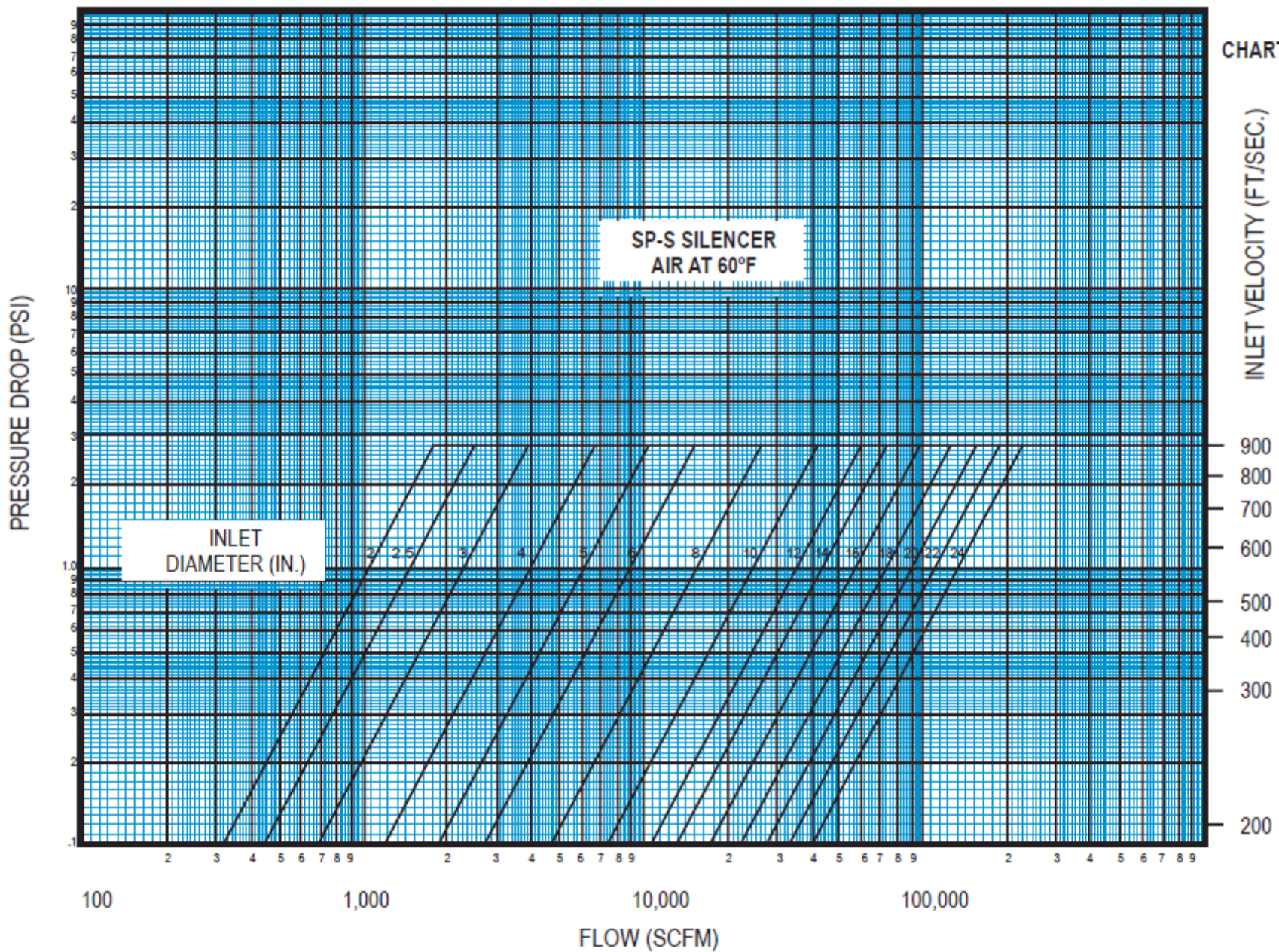
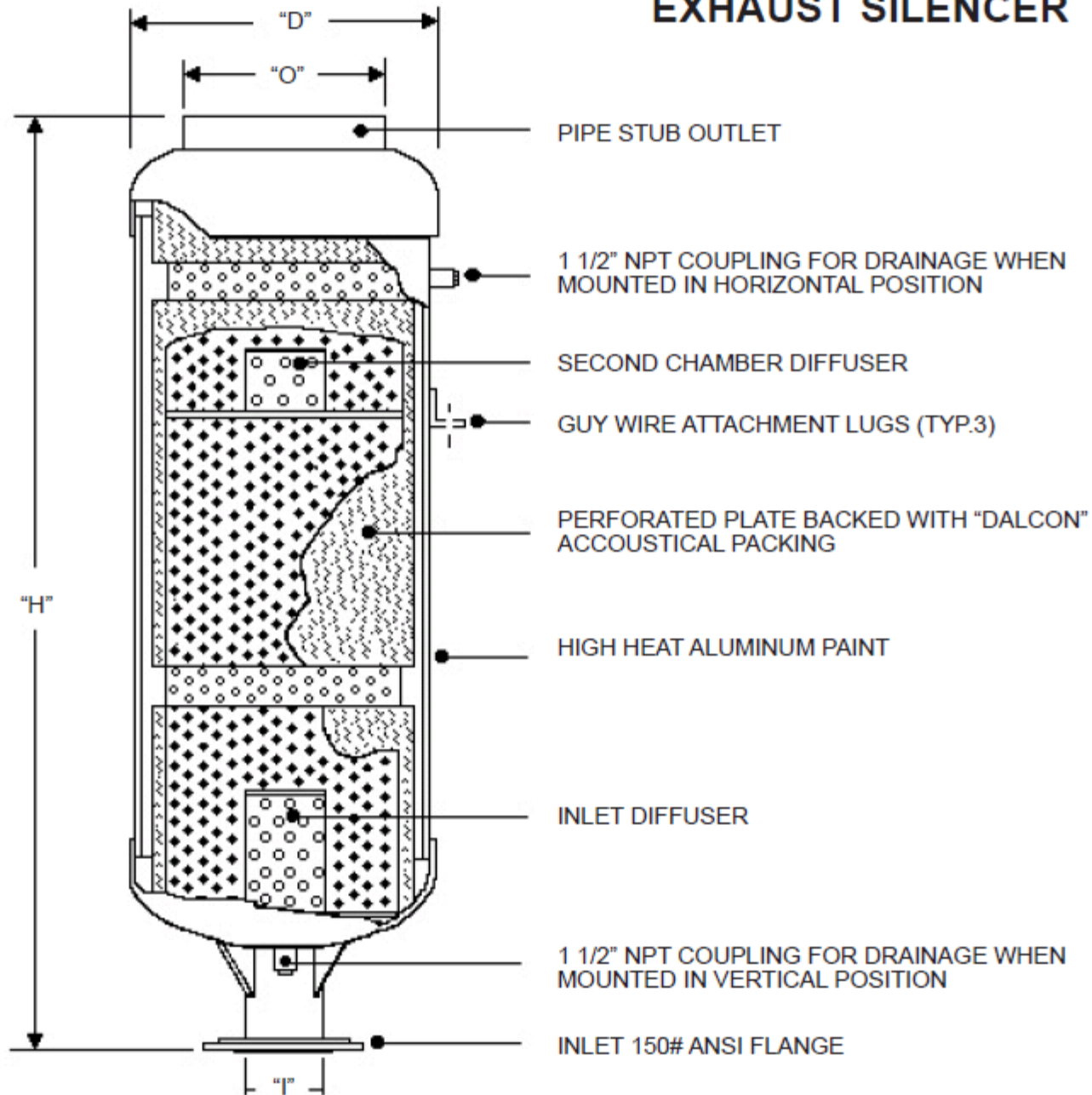


CHART 4



DIMENSIONS — SP AND SP-S SILENCER

SPECIFICATION PRINT EXHAUST SILENCER



SP SILENCER

DIMENSIONS					
MODEL	I	D	O	H	PL Min.
SP 2-14	2	14	5	60	7 Ga.
SP 2.5-14	2 1/2	14	6	84	7 Ga.
SP 3-18	3	18	8	96	7 Ga.
SP 4-20	4	20	10	108	7 Ga.
SP 5-24	5	24	12	120	7 Ga.
SP 6-24	6	24	14	135	7 Ga.
SP 8-30	8	30	18	180	7 Ga.
SP 10-36	10	36	24	195	7 Ga.
SP 12-42	12	42	30	216	1/4"
SP 14-48	14	48	30	252	1/4"
SP 16-48	16	48	36	276	1/4"
SP 18-48	18	48	42	288	1/4"
SP 20-54	20	54	48	288	1/4"
SP 24-54	24	54	48	288	1/4"

SP-S SILENCER

DIMENSIONS					
MODEL	I	D	O	H	PL Min.
SP 2-14-S	2	14	5	40	7 Ga.
SP 2.5-14-S	2 1/2	14	6	56	7 Ga.
SP 3-18-S	3	18	8	64	7 Ga.
SP 4-20-S	4	20	10	72	7 Ga.
SP 5-24-S	5	24	12	80	7 Ga.
SP 6-24-S	6	24	14	90	7 Ga.
SP 8-30-S	8	30	18	120	7 Ga.
SP 10-36-S	10	36	24	130	7 Ga.
SP 12-42-S	12	42	30	144	1/4"
SP 14-48-S	14	48	30	168	1/4"
SP 16-48-S	16	48	36	184	1/4"
SP 18-48-S	18	48	42	192	1/4"
SP 20-54-S	20	54	48	192	1/4"
SP 24-54-S	24	54	48	192	1/4"

“DALCON” — AN EFFECTIVE ACOUSTICAL MATERIAL

An acoustical material which absorbs 90% of the sound energy has an absorption coefficient of .9. We tested “DalCon” under different conditions — up to 50% saturated with moisture. This is important because in operation a Silencer can get wet. Under these wet conditions acoustical material can lose its sound absorbing qualities. “DalCon” has an absorption coefficient of .9 on noise with a frequency above 1400Hz. It will absorb 50% of the noise down to 800Hz. This is important because a predominate amount of the noise on exhaust conditions is medium and high frequency noise. We protect the acoustical material with perforated plate with 1/8” dia. Holes. This serves two purposes: prevents the erosion of the acoustical material by the gases flowing through the Silencer and helps reduce the noise level by providing a dimple effect that one finds on acoustical ceiling tile. “DalCon” also has a good temperature rating, 1250°F, which makes it ideal for Steam Silencers.

HOW TO DETERMINE YOUR NOISE LEVEL REDUCTION

We know that for each model Exhaust Silencer a level of reduction is produced. These reductions are stated on the previous pages. The Silencers will reduce the initial noise by the rated reductions listed for each model. The best way to get initial noise levels is by taking actual levels. This level less the silencers rated reduction will equal the final noise level. The initial noise level for this method can be taken at any location. The final level would be the level at this same location. Once a noise level is known for one location other locations can be calculated. It is a rule in acoustics that for every doubling of distance away from the noise source the noise can be reduced by another 3dB (in a semi-reverberant field-buildings near by) and 6 dB in a free field (unobstructed). So by doubling the distance that levels are made estimates of final levels at other locations can be established. Estimates of noise levels can be made when actual noise levels cannot be taken. Information about these calculations is contained in our engineering brochure E-2 Exhaust Noise and Penn Silencers. These estimated levels along with the silencers rated reduction will give estimated final noise levels. Using a Penn Silencer will bring noise on most applications to within required levels.

SOME SATISFIED PENN SILENCER CUSTOMERS

Gulf Oil Refinery, Philadelphia, Pa.
G.E., Mt. Vernon, Ind.
Community College, Memphis, Tenn.
Marchel Paper Co., E. Patterson, N.J.
Naval Amm. Dept., Hawthorne, Nev.
Tougher Ind., Albany, N.Y.
Cam. Ind., Kent, Wash.
Dixie Furniture, Lexington, N.C.

Youngstown Sheet & Tube, Youngstown, Ohio
Allied Chemical, Moncure, N.C.
Merk & Co., Rahway, N.J.
Merch Sharp & Dome, Ireland
Dow Chemical, Freeport, Tx.
Gulf & Western Food, S. Bay, Fla.
Great Lakes Cemical Co., Eldora, Co.
Gen. Motors Assembly Div., Willow Run, Mich.

Your de  enn dable boiler accessories...