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ENGINEERING SUPPLEMENT
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SILENCERS FOR AXIAL FANS

The Axial Silencers presented in this Engineering Supplement have been rated for acoustical attenuation with air flowing through them. The term "Dynamic Insertion Loss" is used to express attenuation when silencers are rated by this method, which is recognized as the most accurate method of rating equipment that must handle air, as well as attenuate sound.

New York Blower Axial Silencers have been designed to minimize the pressure loss through them by using an internal tapered body. The pressure loss (or regain) of the silencer is the result of the aerodynamic design of the silencer which includes the internal tapered body and the center body which matches the hub/motor diameter. The pressure loss (or regain) is calculated by multiplying the velocity pressure for the velocity of the application from Chart II times the loss coefficient from Chart III for the size and type of silencer selected.

DETERMINING SOUND POWER LEVEL RATINGS

Procedure	Steps	Example: Determine the Sound Power Level at the open downstream end of the outlet duct of a combination Type B outlet silencer and a Size 21 Duct Fan delivering 4000 CFM at 1" SP, 2115 RPM, and 1626 FPM outlet velocity.
Determine the fan Outlet Sound Power Level from the sound power ratings shown in Fan-to-Size.	1	From Fan-To-Size, list the Outlet Sound Power Level for Size 21 Duct Fan running at 2115 RPM. See Line 1 below.
Determine the dynamic insertion loss for a Type B silencer.	2	From Chart I for a Type B Silencer, Size 21, list the dynamic insertion loss. See Line 2 below.
To determine the Sound Power Level of the combined silencer and fan, subtract the Dynamic Insertion losses from the fan's outlet sound power levels.	3	Deduct the value for the silencer insertion loss from the Size 21 Duct Fan's Outlet Sound Power Levels, See Line 3 below.
Calculate the pressure loss (or regain) attributable to the silencer.	4	Calculate the silencer face velocity by dividing the fan end silencer area into the system CFM: $4000 \text{ CFM} / 2.46 \text{ ft}^2 = 1624 \text{ FPM}$. From Chart II interpolate to find velocity pressure of 0.165. For a Size 21 Type B outlet silencer the loss coefficient from Chart III is -0.05. The resulting effect on static pressure is a system gain of $0.165 \times 0.05 = 0.008$ inches W.G.

Line	Octave Band Number	1	2	3	4	5	6	7	8
	Center Frequency in Hz	63	125	250	500	1000	2000	4000	8000
1	Outlet Sound Power Level	104	101	93	90	88	84	79	79
2	Dynamic Insertion Loss	2	7	16	31	27	18	13	10
3	Net Duct Fan and Type B Silencer Combination Sound Power Level	102	94	77	59	61	66	66	69

Axial Silencers for Duct, Tubeaxial, Vaneaxial, Vaneaxial Fixed Pitch (VXFP) Fans

Chart I - Sound Attenuation

Size	Type A Silencer							
	Octave Bands							
	1	2	3	4	5	6	7	8
12	-	2	4	9	13	12	8	6
14	-	2	5	9	14	11	8	6
16	1	3	5	12	17	12	9	7
18	1	3	5	14	16	11	8	6
21	1	3	5	14	14	9	7	5
24	1	3	6	15	16	10	8	8
27	1	3	9	16	14	9	8	7
29	1	5	13	14	13	9	8	6
32	1	5	12	15	15	11	10	8
36	1	5	10	14	12	10	8	7
38	2	5	9	13	11	9	8	7
42	2	6	11	14	12	10	9	9
48	2	6	10	13	11	10	9	8
54	4	8	13	18	17	16	15	14
60	4	8	13	16	15	15	14	14

The difference in the insertion loss varies less than ± 2 dB.

Chart I (cont.)- Sound Attenuation

Size	Type B Silencer							
	Octave Bands							
	1	2	3	4	5	6	7	8
12	1	6	16	28	36	31	22	14
14	1	6	16	27	34	26	18	12
16	1	7	17	30	37	27	20	13
18	1	8	17	33	34	24	17	11
21	2	7	16	31	27	18	13	10
24	2	7	19	33	31	20	14	13
27	2	7	20	29	26	17	14	11
29	2	11	24	25	23	16	14	10
32	2	10	23	27	26	19	16	12
36	2	9	18	24	21	16	13	11
38	3	9	17	22	18	14	12	10
42	3	9	17	23	20	16	14	12
48	3	8	15	19	16	14	13	12
54	6	12	20	26	25	22	21	20
60	6	11	18	23	21	20	19	18

The difference in the insertion loss varies less than ± 2 dB.

Axial Silencers for Vaneaxial Adjustable Pitch (VXAP) Fans

Chart I (cont.)- Sound Attenuation

Size	Type C Silencer							
	Octave Bands							
	1	2	3	4	5	6	7	8
21	1	3	6	12	21	15	11	8
24	1	2	5	11	22	14	10	8
27	1	2	7	15	19	15	10	10
29	1	3	11	17	17	15	10	9
32	1	3	11	16	18	14	11	9
36	1	4	10	15	18	13	11	9
38	1	4	9	15	18	14	11	10
42	2	5	10	15	18	14	12	11
48	2	6	10	16	17	14	13	13
54	3	6	11	16	18	16	15	15
60	3	7	12	17	18	17	17	17

The difference in the insertion loss varies less than ± 2 dB.

Chart I (cont.)- Sound Attenuation

Size	Type D Silencer							
	Octave Bands							
	1	2	3	4	5	6	7	8
21	2	7	17	31	39	30	21	15
24	2	5	15	30	39	27	19	14
27	1	6	18	31	35	27	19	15
29	1	7	21	30	31	25	18	15
32	1	7	20	28	31	24	18	14
36	2	7	18	26	29	22	17	14
38	2	8	17	26	29	23	17	15
42	3	9	18	27	30	23	19	17
48	4	10	18	26	29	23	20	19
54	5	11	18	26	29	24	22	21
60	5	11	18	26	29	26	24	23

The difference in the insertion loss varies less than ± 2 dB.

Chart II

Velocity Pressure			
Velocity	Velocity	Velocity	Velocity
(FPM)	Pressure (in W.G.)	(FPM)	Pressure (in W.G.)
1000	0.062	6000	2.244
1250	0.097	6500	2.634
1500	0.14	7000	3.055
1750	0.191	7500	3.507
2000	0.249	8000	3.990
2250	0.316	8500	4.504
2500	0.39	9000	5.050
2750	0.471	9500	5.627
3000	0.561	10000	6.234
3250	0.659	10500	6.873
3500	0.764	11000	7.544
3750	0.877	11500	8.245
4000	0.998	12000	8.978
4500	1.262	12500	9.741
5000	1.559	13000	10.536
5500	1.886		

Velocity Pressure = (Velocity/4005)²

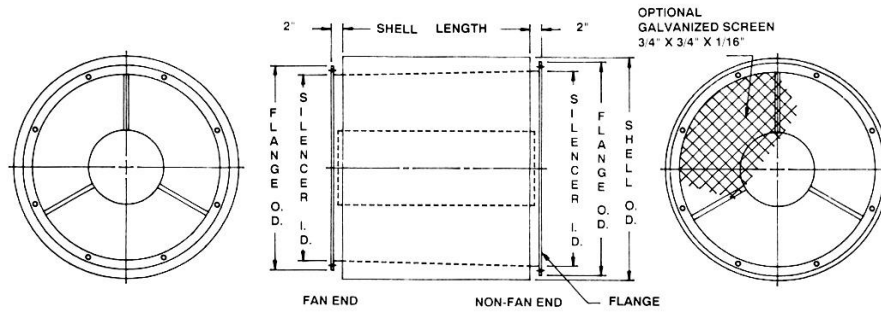
Chart III

Loss Coefficients											
Size	Type A Silencers		Size	Type B Silencers		Size	Type C Silencers		Size	Type D Silencers	
	Fan Inlet	Fan Outlet		Fan Inlet	Fan Outlet		Fan Inlet	Fan Outlet		Fan Inlet	Fan Outlet
	12	0.22		-0.02	12		0.38	0.12		12	NA
14	0.15	-0.11	14	0.26	-0.02	14	NA	NA	14	NA	NA
16	0.19	-0.02	16	0.31	0.08	16	NA	NA	16	NA	NA
18	0.15	-0.09	18	0.24	-0.01	18	NA	NA	18	NA	NA
21	0.14	-0.11	21	0.2	-0.03	21	3.19	0.99	21	4.48	4.43
24	0.16	-0.02	24	0.24	0.11	24	3.08	0.97	24	4.29	4.54
27	0.14	-0.08	27	0.19	0.03	27	2.97	0.94	27	4.11	4.64
29	0.13	-0.09	29	0.18	0.01	29	2.51	0.61	29	3.35	3.42
32	0.15	-0.02	32	0.21	0.11	32	2.44	0.62	32	3.24	3.57
36	0.13	-0.07	36	0.17	0.04	36	2.26	0.52	36	2.96	3.32
38	0.12	-0.1	38	0.16	0.01	38	2.31	0.65	38	3.07	3.94
42	0.13	-0.06	42	0.17	0.06	42	2.08	0.54	42	3.16	3.78
48	0.12	-0.09	48	0.15	0.01	48	2.04	0.84	48	3.05	4.32
54	0.14	0.07	54	0.2	0.27	54	1.93	0.81	54	2.88	4.5
60	0.12	0.01	60	0.16	0.15	60	1.94	1.02	60	2.84	4.89

The system loss is defined as the pressure change of the fan system due to the silencer installation.

Type C and Type D silencer loss coefficients are measured at 10,700 FPM.

A (+) coefficient represents a system loss or pressure drop, while a (-) coefficient represents a system static pressure regain.



* Silencers with screened inlets/outlets do not utilize 2" extended collar on non-fan end. Screen mounts flush to silencer body.

Size	Silencer Dimensions					Fan End Flange			
	Fan End Diameter	Non-Fan End Dia.	Shell O.D.	Shell Length		Flange O.D.	Bolt Circle	Hole Dia.	# of Holes
				Types A & C	Types B & D				
12	12 1/4	15	21	12	36	14 3/4	14	1/2	8
14	14 1/4	18	24	14	38	16 3/4	16	1/2	8
16	16 1/4	20	26	16	40	18 3/4	18	1/2	8
18	18 1/4	23	29	18	42	21 1/4	20	1/2	8
21	21 1/4	26	32	21	45	24 1/4	23	1/2	8
24	24 3/8	30	36	24	48	27 3/8	26 1/8	1/2	8
27	27 3/8	34	40	27	51	30 3/8	29 1/8	1/2	8
29	29 1/4	36	43	29	53	32 1/4	31	1/2	16
32	32 1/2	40	46	32	56	35 1/2	34 1/4	1/2	16
36	36 1/2	45	51	36	60	40 1/2	38 3/8	1/2	16
38	38	48	54	38	62	42 1/4	40 1/4	5/8	16
42	42 3/4	53	59	42	78	47 1/8	45	5/8	16
48	48 3/4	60	66	48	84	53 1/8	51	5/8	16
54	55	68	74	55	91	59 1/2	57 3/8	5/8	16
60	61	76	82	60	96	65 1/2	63 3/8	5/8	16

Dimensions in inches

Weight in pounds

Tolerances: ± 1/8"

Size	Non-Fan End Flange				Weight			
	Flange O.D.	Bolt Circle	Hole Diameter	# of Holes	Duct, Tubeaxial, Vaneaxial, VXFP		VXAP	
					Type A	Type B	Type C	Type D
12	18	16 3/4	1/2	8	65	135	NA	NA
14	21	19 3/4	1/2	8	80	160	NA	NA
16	23	21 3/4	1/2	8	100	190	NA	NA
18	26	24 3/4	1/2	8	120	220	NA	NA
21	29	27 3/4	1/2	16	145	260	271	429
24	33	31 3/4	1/2	16	195	325	343	526
27	37	35 1/4	1/2	16	230	380	429	639
29	39	37 1/4	5/8	16	290	440	486	712
32	44	42 1/4	5/8	16	320	500	774	1099
36	49	47 1/4	5/8	16	385	585	955	1323
38	52	50 1/4	5/8	16	455	660	1074	1472
42	57	55 1/4	5/8	24	680	1115	1289	1953
48	64	62 1/4	5/8	24	835	1320	1649	2414
54	72	70 1/4	5/8	24	1170	1770	2116	2997
60	80	78 1/4	5/8	24	1385	2045	2607	3620

Dimensions in inches

Weight in pounds

Tolerances: ± 1/8"

All silencers are fabricated with galvanized internals and mild carbon steel externals with the external surfaces painted **nyb** green. Silencers are provided with flanged inlets and outlets as standard. Also available with screen or slip connection on end opposite fan upon request. Silencers are to be independently supported. Fans are not designed to support silencers.