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ENGINEERING SUPPLEMENT
ES-673
July 2018

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 centerbody which matches the hub/motor diameter. The pressure loss (or regain) is calculated by multi-plying 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 CFM/2.46 $ft.^2$ = 1624 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 X 0.05 = .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

The insertion loss will vary slightly with various flow velocities and with the noise traveling with or against the airflow.

Chart I – Sound Attenuation

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

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

Chart II

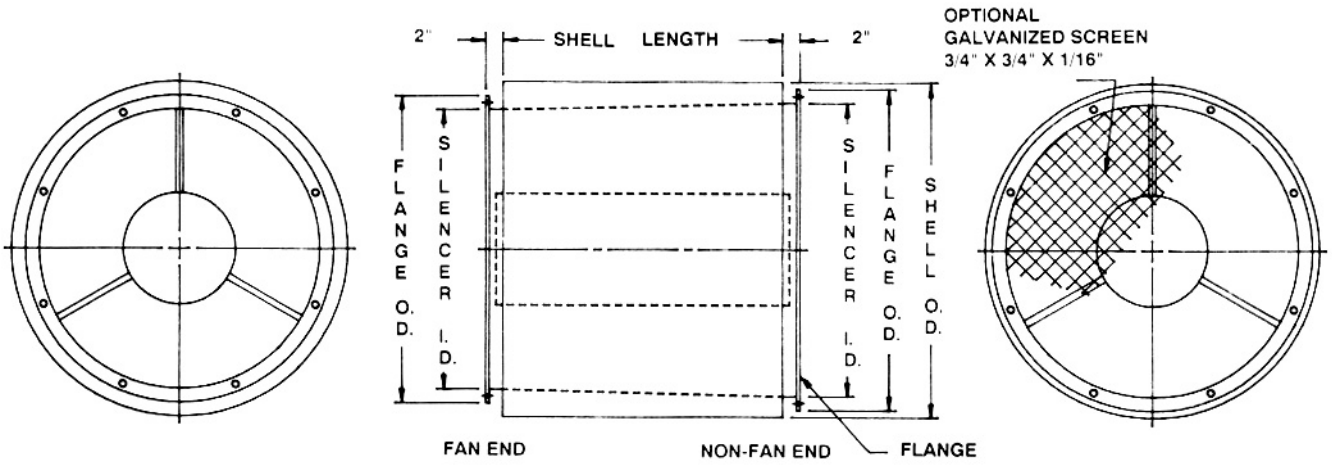
Velocity Pressure	
Velocity (FPM)	Velocity Pressure (in W.G.)
1000	0.062
1250	0.097
1500	0.140
1750	0.191
2000	0.249
2250	0.316
2500	0.390
2750	0.471
3000	0.561
3250	0.659
3500	0.764
3750	0.877
4000	0.998
4500	1.262
5000	1.559
5500	1.886
6000	2.244
6500	2.634

Velocity Pressure= $(\text{Velocity}/4005)^2$

Chart III

Loss Coefficients					
Size	Type A Silencers		Size	Type B Silencers	
	Fan Inlet	Fan Outlet		Fan Inlet	Fan Outlet
12	+0.22	-0.02	12	+0.38	+0.12
14	+0.15	-0.11	14	+0.26	-0.02
16	+0.19	-0.02	16	+0.31	+0.08
18	+0.15	-0.09	18	+0.24	-0.01
21	+0.14	-0.11	21	+0.20	-0.03
24	+0.16	-0.02	24	+0.24	+0.11
27	+0.14	-0.08	27	+0.19	+0.03
29	+0.13	-0.09	29	+0.18	+0.01
32	+0.15	-0.02	32	+0.21	+0.11
36	+0.13	-0.07	36	+0.17	+0.04
38	+0.12	-0.10	38	+0.16	+0.01
42	+0.13	-0.06	42	+0.17	+0.06
48	+0.12	-0.09	48	+0.15	+0.01
54	+0.14	+0.07	54	+0.20	+0.27
60	+0.12	+0.01	60	+0.16	+0.15

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

Chart IV
Specifications

Size	Silencer Dimensions					Fan End Flange				Non-Fan End Flange				Weight	
	Fan End Diameter	Non-Fan End Dia.	Shell O.D.	Shell Length Type A	Shell Length Type B	Flange O.D.	Bolt Circle	Hole Dia.	# of Holes	Flange O.D.	Bolt Circle	Hole Dia.	# of Holes	Type A	Type B
12	12 1/4	15	21	12	36	14 3/4	14	1/2	8	18	16 3/4	1/2	8	65	135
14	14 1/4	18	24	14	38	16 3/4	16	1/2	8	21	19 3/4	1/2	8	80	160
16	16 1/4	20	26	16	40	18 3/4	18	1/2	8	23	21 3/4	1/2	8	100	190
18	18 1/4	23	29	18	42	21 1/4	20	1/2	8	26	24 3/4	1/2	8	120	220
21	21 1/4	26	32	21	45	24 1/4	23	1/2	8	29	27 3/4	1/2	16	145	260
24	24 3/8	30	36	24	48	27 3/8	26 1/8	1/2	8	33	31 3/4	1/2	16	195	325
27	27 3/8	34	40	27	51	30 3/8	29 1/8	1/2	8	37	35 1/4	1/2	16	230	380
29	29 1/4	36	43	29	53	32 1/4	31	1/2	16	39	37 1/4	5/8	16	290	440
32	32 1/2	40	46	32	56	35 1/2	34 1/4	1/2	16	44	42 1/4	5/8	16	320	500
36	36 1/2	45	51	36	60	40 1/2	38 3/8	1/2	16	49	47 1/4	5/8	16	385	585
38	38	48	54	38	62	42 1/2	40 1/4	5/8	16	52	50 1/4	5/8	16	455	660
42	42 3/4	53	59	42	78	47 1/8	45	5/8	16	57	55 1/4	5/8	24	680	1115
48	48 3/4	60	66	48	84	53 1/8	51	5/8	16	64	62 1/4	5/8	24	835	1320
54	55	68	74	55	91	59 1/2	57 3/8	5/8	16	72	70 1/4	5/8	24	1170	1770
60	61	76	82	60	96	65 1/2	63 3/8	5/8	16	80	78 1/4	5/8	24	1385	2045

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.

Form JLK 0718