

AEROVENT

SOUND POWER LEVELS

BIUB – Backward Inclined Utility Blowers

BIUBU5 – Backward Inclined Utility Blowers, UL 705 Listed

BIUBU2 – Backward Inclined Utility Blowers, UL 762 Listed

BIUBSH – Backward Inclined Utility Blowers, UL Smoke & Heat



Aerovent, a Twin City Fan Company, certifies that the fans shown herein are licensed to bear the AMCA Seal for Air and Sound. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

The calculated sound power levels from these ratings are in decibels, referenced to 10–12 watts. Calculated per AMCA Standard 301.

For Air Performance refer to Catalog 760.



Sound Calculations

The sound power levels published in this have been determined by laboratory tests in accordance with AMCA Standard 300-96 and carry the AMCA Seal for BIUB, BIUBU5, BIUBU2 and BIUBSH fans. The sound power levels shown are decibel (dB) levels referred to 10^{-12} watts. We have listed sound power levels for the eight octave bands with frequency range as shown below.

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY CENTER	45 to 90	90 to 180	180 to 355	355 to 710	710 to 1400	1400 to 2800	2800 to 5600	5600 to 11200
CENTER FREQUENCY	63	125	250	500	1000	2000	4000	8000

Sound power levels (SPL) for the fans can be easily obtained using Aerovent Fan Selector® software program. The SPL can also be obtained using specific sound power level method described below:

**Sound Power Level of a fan =
Specific Sound Power Level (L_{WK}) + Capacity Fraction (M)**

Use of this method will be illustrated by the following example:

Calculate sound power levels for:

Size 36 BIUB	Elevation 3000 ft.
CFM. 15500	RPM. 893
SP. 2.5" w.g.	OV. 2024
Temp. 300°F	

1. How to determine L_{WK}

We have published values for L_{WK} at various speeds and operating points on pages 3 through 5.

The operating point is a ratio of design CFM to the wide open volume (WOV). The WOVS equals to CFM for a given RPM at zero static pressure. WOVS can be calculated by multiplying fan RPM by the factors (Rf) shown in the table. Thus, WOVS volume for 893 RPM = 29.05 x 893 = 25,942 CFM.

Therefore, operating point falls at 60% ($15500 \div 25942$) of the WOVS. Referring to the L_{WK} table for Size 36 BIUB, the specific sound power levels can be read as follows:

L_{WK} = 38 37 35 29 26 22 17 12

SIZE	Rf Factor
12	1.090
13	1.459
15	2.001
16	2.664
18	3.580
20	4.712
22	6.488
24	8.661
27	11.64
30	15.96
33	21.25
36	29.05

2. How to determine M

The value of M can be taken from the tables on page 6 once Total Pressure (TP) is calculated.

Total Pressure (TP) = Static Pressure (SP) + Velocity Pressure (VP) (All pressure at operating density.)

VP = (Outlet Velocity \div 4005)² x density factor.

In our example VP = $(2024 \div 4005)^2 \times 0.625 = 0.16$.

Therefore, TP = 2.5 + 0.16 = 2.66.

Thus, for 15500 CFM and 2.66" TP, M works out to be 51.

M can also be calculated using the formula, $M = 10 \log \text{CFM} + 20 \log \text{TP}$.

3. Combining L_{WK} and M gives sound power levels.

Thus,	Octave Band	1	2	3	4	5	6	7	8
	SPL =	38	37	35	29	26	22	17	12
		51	51	51	51	51	51	51	51
		89	88	86	80	77	73	68	63

LWK Values for BIUB, BIUBU5, BIUBU2 and BIUBSH

Size 36

RPM	% WOV	OCTAVE BAND							
		1	2	3	4	5	6	7	8
2100	90	45	44	42	46	41	39	34	28
	80	40	39	37	41	36	33	29	22
	70	39	38	35	40	35	32	27	21
	60	38	36	32	36	31	28	23	18
	50	38	36	32	36	31	28	23	18
1800	90	45	43	43	46	40	38	33	26
	80	40	37	38	41	35	33	27	21
	70	39	37	37	40	33	31	26	20
	60	38	35	34	36	29	27	22	17
	50	38	35	34	36	29	27	22	17
1500	90	45	41	45	45	39	37	31	24
	80	39	36	41	41	34	31	26	19
	70	39	35	39	39	33	30	24	18
	60	38	32	36	36	29	26	20	15
	50	38	32	36	36	29	26	20	15
1200	90	45	41	46	43	39	35	29	21
	80	39	36	41	38	34	30	24	17
	70	39	35	40	37	32	28	22	16
	60	37	31	36	33	28	24	19	14
	50	37	31	36	33	28	24	19	14
900	90	46	46	45	39	37	32	26	18
	80	41	41	41	34	31	27	20	14
	70	40	40	40	33	30	26	20	13
	60	38	37	35	29	26	22	17	12
	50	38	37	35	29	26	22	17	12
600	90	48	47	42	37	34	28	21	14
	80	44	42	37	32	29	23	17	10
	70	43	41	36	30	28	22	16	10
	60	40	37	31	27	25	20	14	9
	50	40	37	31	27	25	20	14	9
300	90	47	41	37	34	28	21	15	8
	80	42	37	31	29	23	17	11	4
	70	41	35	30	28	22	16	10	4
	60	37	31	27	25	20	14	9	4
	50	37	31	27	25	20	14	9	4
100	90	38	35	31	24	17	11	4	-3
	80	33	29	25	19	13	7	0	-6
	70	32	28	24	19	13	6	0	-6
	60	28	25	22	17	12	6	1	-4
	50	28	25	22	17	12	6	1	-4

Values shown are for inlet LWK_i specific sound power levels for: Installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

M Capacity Fraction

CFM	TOTAL PRESSURE AT DENSITY																			
	1/4	3/8	1/2	5/8	3/4	7/8	1	1¼	1½	2	2½	3	3½	4	4½	5	5½	6	6½	
100	8	11	14	16	18	19	20	22	24	26	28	30	31	32	33	34	35	36	36	
150	10	13	16	18	19	21	22	24	25	28	30	31	33	34	35	36	37	37	38	
200	11	14	17	19	21	22	23	25	27	29	31	33	34	35	36	37	38	39	39	
300	13	16	19	21	22	24	25	27	28	31	33	34	36	37	38	39	40	40	41	
500	15	18	21	23	24	26	27	29	31	33	35	37	38	39	40	41	42	43	43	
750	17	20	23	25	26	28	29	31	32	35	37	38	40	41	42	43	44	44	45	
1000	18	21	24	26	28	29	30	32	34	36	38	40	41	42	43	44	45	46	46	
1500	20	23	26	28	29	31	32	34	35	38	40	41	43	44	45	46	47	47	48	
2000	21	24	27	29	31	32	33	35	37	39	41	43	44	45	46	47	48	49	49	
3000	23	26	29	31	32	34	35	37	38	41	43	44	46	47	48	49	50	50	51	
5000	25	28	31	33	34	36	37	39	41	43	45	47	48	49	50	51	52	53	53	
7500	27	30	33	35	36	38	39	41	42	45	47	48	50	51	52	53	54	54	55	
10000	28	31	34	36	38	39	40	42	44	46	48	50	51	52	53	54	55	56	56	
15000	30	33	36	38	39	41	42	44	45	48	50	51	53	54	55	56	57	57	58	
20000	31	34	37	39	41	42	43	45	47	49	51	53	54	55	56	57	58	59	59	
30000	33	36	39	41	42	44	45	47	48	51	53	54	56	57	58	59	60	60	61	
50000	35	38	41	43	44	46	47	49	51	53	55	57	58	59	60	61	62	63	63	
75000	37	40	43	45	46	48	49	51	52	55	57	58	60	61	62	63	64	64	65	
100000	38	41	44	46	48	49	50	52	54	56	58	60	61	62	63	64	65	66	66	
150000	40	43	46	48	49	51	52	54	55	58	60	61	63	64	65	66	67	67	68	
200000	41	44	47	49	51	52	53	55	57	59	61	63	64	65	66	67	68	69	69	

CFM	TOTAL PRESSURE AT DENSITY																		
	7	8	9	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
100	37	38	39	40	42	43	44	45	46	47	48	48	49	50	50	51	51	52	52
150	39	40	41	42	43	45	46	47	48	49	49	50	51	51	52	52	53	53	54
200	40	41	42	43	45	46	47	48	49	50	51	51	52	53	53	54	54	55	55
300	42	43	44	45	46	48	49	50	51	52	52	53	54	54	55	55	56	56	57
500	44	45	46	47	49	50	51	52	53	54	55	55	56	57	57	58	58	59	59
750	46	47	48	49	50	52	53	54	55	56	56	57	58	58	59	59	60	60	61
1000	47	48	49	50	52	53	54	55	56	57	58	58	59	60	60	61	61	62	62
1500	49	50	51	52	53	55	56	57	58	59	59	60	61	61	62	62	63	63	64
2000	50	51	52	53	55	56	57	58	59	60	61	61	62	63	63	64	64	65	65
3000	52	53	54	55	56	58	59	60	61	62	62	63	64	64	65	65	66	66	67
5000	54	55	56	57	59	60	61	62	63	64	65	65	66	67	67	68	68	69	69
7500	56	57	58	59	60	62	63	64	65	66	66	67	68	68	69	69	70	70	71
10000	57	58	59	60	62	63	64	65	66	67	68	68	69	70	70	71	71	72	72
15000	59	60	61	62	63	65	66	67	68	69	69	70	71	71	72	72	73	73	74
20000	60	61	62	63	65	66	67	68	69	70	71	71	72	73	73	74	74	75	75
30000	62	63	64	65	66	68	69	70	71	72	72	73	74	74	75	75	76	76	77
50000	64	65	66	67	69	70	71	72	73	74	75	75	76	77	77	78	78	79	79
75000	66	67	68	69	70	72	73	74	75	76	76	77	78	78	79	79	80	80	81
100000	67	68	69	70	72	73	74	75	76	77	78	78	79	80	80	81	81	82	82
150000	69	70	71	72	73	75	76	77	78	79	79	80	81	81	82	82	83	83	84
200000	70	71	72	73	75	76	77	78	79	80	81	81	82	83	83	84	84	85	85



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