

PACKAGED ROOFTOP UNITS



LCH / LGH
ENERGENCE™ ROOFTOP UNITS - 60HZ
Sound Data

ENGINEERING DATA

Bulletin No. 210562
 November 2009

LCH/LGH (35 - 50 TON) OUTDOOR SOUND DATA (LESS POWER EXHAUST)

	Octave Band Sound Power Levels dBA, re 10-12 Watts Center Frequency - HZ							Sound Rating Number (dB)
	125	250	500	1000	2000	4000	8000	
Two Compressors Operating	87	88	85	84	80	76	69	88
All Compressors Operating	90	92	87	86	83	79	72	91

Tested according to AHRI Standard 270 and ANSI Standard S12.32.

LCH/LGH (35 - 50 TON) LESS POWER EXHAUST

SUPPLY AIR BLOWER

cfm	Total Static Pressure in. w.g.	Blower RPM	Supply - Sound Power Level (Lw) dB								Return - Sound Power Level (Lw) dB							
			Octave Band Sound Power Levels dBA re 10 ⁻¹² Watts - Center Frequency - HZ								Octave Band Sound Power Levels dBA re 10 ⁻¹² Watts - Center Frequency - HZ							
			63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
8000	0.4	425	78	67	68	72	66	64	59	51	72	62	60	62	55	49	48	43
	0.6	485	80	68	69	73	67	65	61	53	75	63	62	63	57	51	49	43
	0.8	540	82	70	70	74	69	67	62	55	76	65	62	65	59	52	50	44
	1.0	590	84	71	71	75	70	68	64	56	77	66	62	66	60	54	51	44
10500	0.5	520	83	73	74	77	72	70	66	58	77	67	63	66	60	54	50	44
	1.0	620	86	75	76	80	75	73	69	62	80	70	65	70	64	58	54	47
	1.5	735	89	77	78	81	77	75	71	65	82	71	67	71	68	61	58	54
	2.0	820	91	80	81	85	82	80	76	70	86	74	70	73	69	64	60	55
13,000	1.0	675	88	78	79	83	80	78	74	67	82	72	68	71	65	60	55	49
	1.5	765	90	80	80	84	81	79	75	69	84	73	69	72	68	63	59	54
	2.0	860	95	82	82	85	82	80	76	71	86	75	71	73	70	65	61	57
	3.0	1010	93	85	85	89	87	85	81	76	88	78	74	76	73	69	65	60
15,000	1.0	735	90	81	81	85	82	80	76	69	85	74	70	72	67	62	57	51
	1.5	800	91	82	83	86	83	81	77	71	87	75	71	73	69	64	60	54
	2.0	880	99	83	84	87	84	83	79	73	87	76	72	75	71	66	62	57
	3.0	1040	97	86	87	90	88	86	82	77	90	79	75	77	74	70	66	61
	4.0	1165	100	89	89	92	90	89	85	79	92	81	78	80	76	73	68	63
17,000	1.0	805	95	84	84	88	86	84	80	74	88	76	73	74	70	65	60	53
	1.5	875	97	85	85	89	87	85	81	75	88	77	74	75	72	67	62	55
	2.0	915	94	86	86	89	87	86	82	76	89	78	75	76	73	69	63	57
	3.0	1065	96	87	87	91	89	87	84	78	89	79	76	78	75	71	66	61
	4.0	1195	99	90	90	93	91	90	86	80	92	82	78	80	77	74	69	64
19,000	1.0	880	96	87	86	90	88	87	83	77	89	78	75	75	72	68	62	55
	1.5	920	96	87	87	91	89	87	83	78	89	79	76	77	73	69	64	57
	2.0	965	96	88	88	91	90	88	84	79	91	80	78	78	74	70	65	58
	3.0	1090	97	88	89	92	90	89	85	80	90	81	78	79	76	72	67	61
	4.0	1220	99	91	91	95	93	92	88	82	92	83	80	81	78	75	70	64
21,000	1.0	960	100	91	89	93	92	90	86	81	93	80	78	77	75	71	65	57
	1.5	990	99	90	89	93	92	91	87	81	91	81	79	78	75	72	66	58
	2.0	1030	95	89	90	93	92	91	87	81	92	81	80	79	76	72	66	59
	3.0	1125	98	89	89	93	92	90	86	81	90	81	79	80	76	73	68	62
	4.0	1245	101	92	92	96	94	93	89	83	93	84	81	82	79	76	71	64

Tested according to AHRI Standard 260 and ANSI Standard S12.32.

LCH/LGH (35 - 50 TON) POWER EXHAUST FANS

POWER EXHAUST FANS - 50% HIGH STATIC OPERATION, NO ENERGY RECOVERY WHEEL

cfm	Return Static Pressure in. w.g.	Blower RPM	Outdoor - Sound Power Level (Lw) dB								Return - Sound Power Level (Lw) dB							
			Frequency - HZ								Frequency - HZ							
			63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
4000	0.20	520	82	73	70	71	66	64	58	55	78	66	62	67	62	58	56	64
	0.50	685	85	78	76	77	74	72	67	61	82	72	69	71	68	66	63	64
	1.00	930	92	86	85	86	85	82	78	73	89	80	76	79	77	75	73	69
5000	0.20	600	84	76	75	75	72	69	64	59	82	70	66	69	66	63	61	64
	0.50	735	88	81	79	80	77	75	71	64	85	74	70	73	70	68	66	65
	1.00	950	93	87	86	87	86	83	80	74	90	80	77	79	77	76	74	69
6000	0.20	685	88	81	79	81	78	75	71	65	85	74	70	74	70	68	66	65
	0.50	800	90	84	82	84	81	79	75	69	87	77	73	76	74	72	70	66
	1.00	980	93	88	87	88	87	85	81	76	90	81	77	80	78	77	75	71
7000	0.20	780	92	85	84	85	83	81	77	72	89	78	74	78	75	73	72	68
	0.50	875	93	87	86	87	85	83	79	74	89	80	76	79	77	75	74	69
	1.00	1030	94	89	88	88	88	86	82	77	90	82	78	80	79	78	76	71

Tested according to AHRI Standard 260 and ANSI Standard S12.32.

50% HIGH STATIC OPERATION WITH ENERGY RECOVERY WHEEL (BY-PASS DAMPERS CLOSED)

cfm	Return Static Pressure in. w.g.	Blower RPM	Outdoor - Sound Power Level (Lw) dB								Return - Sound Power Level (Lw) dB							
			Frequency - HZ								Frequency - HZ							
			63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
3000	0.20	585	83	74	70	69	68	65	59	55	80	64	62	65	60	56	53	58
	0.50	760	87	81	77	77	75	73	67	61	84	71	67	70	66	63	59	58
	1.00	1040	92	87	85	84	83	81	77	71	88	76	74	76	72	70	68	62
4000	0.20	710	86	79	75	75	73	71	66	59	83	69	66	68	63	61	57	59
	0.50	840	90	83	80	80	77	76	71	64	86	72	69	71	68	65	62	59
	1.00	1060	93	86	84	83	82	80	76	70	88	75	73	74	71	69	67	61
5000	0.20	850	90	83	81	81	79	77	73	66	87	73	69	72	68	66	63	59
	0.50	955	92	86	84	84	82	81	76	70	87	75	72	74	70	69	66	61
	1.00	1130	94	86	83	83	82	80	76	69	88	75	72	74	70	69	66	61
6000	0.20	990	94	87	86	86	85	83	79	73	88	76	73	75	72	71	69	62
	0.50	1080	94	87	86	86	84	82	79	72	89	76	73	74	71	70	68	61
	1.00	1225	94	85	83	83	81	79	75	69	88	75	71	73	70	68	66	60

Tested according to AHRI Standard 260 and ANSI Standard S12.32.

50% HIGH STATIC OPERATION WITH ENERGY RECOVERY WHEEL IN ECONOMIZER MODE (BY-PASS DAMPERS OPEN)

cfm	Return Static Pressure in. w.g.	Blower RPM	Outdoor - Sound Power Level (Lw) dB								Return - Sound Power Level (Lw) dB							
			Frequency - HZ								Frequency - HZ							
			63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
3500	0.20	495	81	71	68	68	64	61	55	53	77	65	61	64	60	56	51	58
	0.50	675	85	78	75	76	72	71	65	58	82	71	68	70	66	64	60	59
	1.00	935	93	86	85	85	84	82	78	71	90	79	76	78	76	73	71	65
5000	0.20	820	85	77	75	76	72	70	65	58	82	70	67	70	66	63	59	59
	0.50	745	89	81	79	80	76	75	71	63	85	73	69	73	70	67	64	60
	1.00	950	94	87	86	86	85	83	79	73	90	79	76	78	77	74	73	66
6500	0.20	765	92	84	82	83	80	79	75	69	88	76	72	76	73	71	69	63
	0.50	860	93	86	84	85	83	82	78	72	89	79	74	78	75	73	71	66
	1.00	1020	95	88	88	88	88	85	82	76	91	81	78	80	78	76	75	69
8000	0.20	915	95	89	88	88	88	86	83	77	91	81	77	81	80	77	75	70
	0.50	990	96	90	89	90	89	87	84	80	92	82	79	82	82	78	76	72
	1.00	1120	97	90	90	91	91	89	86	81	93	84	80	83	83	79	78	74

Tested according to AHRI Standard 260 and ANSI Standard S12.32.

LCH/LGH (35 - 50 TON) POWER EXHAUST FANS

POWER EXHAUST FANS - 100% HIGH STATIC OPERATION, NO ENERGY RECOVERY WHEEL

cfm	Return Static Pressure in. w.g.	Blower RPM	Outdoor - Sound Power Level (Lw) dB								Return - Sound Power Level (Lw) dB							
			Frequency - HZ								Frequency - HZ							
			63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
8000	0.20	495	85	75	71	71	68	65	60	58	81	68	65	67	64	60	59	66
	0.50	625	87	79	76	76	73	71	66	61	85	71	69	72	69	66	64	66
	1.00	835	92	86	84	84	82	80	76	69	89	78	76	78	75	73	72	68
11,000	0.20	625	88	81	79	80	76	74	69	64	86	73	70	73	70	68	65	67
	0.50	720	90	84	82	82	79	77	73	66	88	75	73	75	73	71	68	67
	1.00	875	94	87	86	86	84	82	78	72	91	79	76	79	77	75	73	69
14,000	0.20	765	93	87	86	87	84	82	78	72	91	78	75	79	76	74	72	69
	0.50	835	95	89	88	89	86	84	80	75	93	80	77	80	78	76	75	70
	1.00	960	97	90	90	90	89	87	83	77	94	82	79	82	80	79	77	72
17,000	0.20	905	97	92	91	93	90	89	85	77	95	82	79	83	80	80	77	71
	0.50	970	97	92	92	93	91	89	86	79	95	83	79	83	81	80	79	72
	1.00	1070	98	93	92	94	91	90	87	80	95	84	80	83	82	80	79	74

Tested according to AHRI Standard 260 and ANSI Standard S12.32.

100% HIGH STATIC OPERATION WITH ENERGY RECOVERY WHEEL (BY-PASS DAMPERS CLOSED)

cfm	Return Static Pressure in. w.g.	Blower RPM	Outdoor - Sound Power Level (Lw) dB								Return - Sound Power Level (Lw) dB							
			Frequency - HZ								Frequency - HZ							
			63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
5000	0.20	565	86	75	72	70	69	65	60	58	84	65	64	67	63	58	56	61
	0.50	740	91	81	78	77	75	73	67	62	88	71	70	72	69	64	61	61
	1.00	1015	97	90	86	85	83	82	78	72	94	79	75	78	74	72	69	64
6000	0.20	635	88	78	75	74	72	69	63	59	85	68	66	69	66	61	57	61
	0.50	780	92	83	80	79	77	75	70	64	89	72	70	73	69	66	62	61
	1.00	1020	97	90	86	86	84	82	78	72	93	79	76	78	74	72	70	64
7500	0.20	750	91	83	79	79	76	74	69	63	88	72	70	72	69	65	61	61
	0.50	865	94	86	82	82	79	78	73	67	91	75	72	75	71	68	65	61
	1.00	1060	97	90	86	86	84	82	78	72	93	79	76	78	74	72	70	64
9000	0.20	870	94	87	83	83	80	79	74	68	91	76	72	75	71	69	66	61
	0.50	970	96	89	85	85	83	81	77	71	93	78	74	77	73	71	68	63
	1.00	1130	97	90	86	86	84	82	78	73	94	79	76	79	74	72	70	65

Tested according to AHRI Standard 260 and ANSI Standard S12.32.

100% HIGH STATIC OPERATION WITH ENERGY RECOVERY WHEEL IN ECONOMIZER MODE (BY-PASS DAMPERS OPEN)

cfm	Return Static Pressure in. w.g.	Blower RPM	Outdoor - Sound Power Level (Lw) dB								Return - Sound Power Level (Lw) dB							
			Frequency - HZ								Frequency - HZ							
			63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
7000	0.20	520	85	75	71	72	68	65	60	58	82	67	64	68	63	59	57	61
	0.50	675	89	81	78	78	74	72	67	62	87	72	70	72	69	65	62	62
	1.00	915	94	88	86	85	83	81	77	71	91	79	76	78	75	73	70	65
10,000	0.20	665	91	83	79	79	76	74	69	64	89	74	70	73	70	67	64	62
	0.50	775	92	86	83	83	80	78	74	67	90	76	73	76	73	70	68	64
	1.00	955	96	90	87	87	86	84	80	74	92	81	78	80	77	75	73	67
13,000	0.20	825	94	88	86	86	83	82	78	72	91	79	75	78	76	74	71	66
	0.50	910	96	90	88	88	87	85	81	75	93	81	78	80	78	76	74	68
	1.00	1050	96	91	89	89	88	86	82	76	93	81	79	81	79	77	75	69
16,000	0.10	970	97	90	89	90	87	86	83	74	94	82	79	81	78	77	74	68
	0.20	995	99	94	94	93	92	92	89	82	95	86	82	83	84	82	81	70
	1.00	1175	97	92	90	89	90	86	83	79	94	81	79	82	82	77	76	71

Tested according to AHRI Standard 260 and ANSI Standard S12.32.

SOUND DATA CALCULATIONS

In order to obtain the total sound level at the return duct, the supply fan sound level and the exhaust fan sound levels must be added. Decibels can not simply be added together to get a total sound level, they are a logarithmic addition. The following are two methods to add decibels.

Method One

The addition of decibels is done with the following mathematical formula. The final answer should be rounded to the nearest whole number.

$$L_w = 10 \log \left[10^{\left(\frac{L_1}{10}\right)} + 10^{\left(\frac{L_2}{10}\right)} \right]$$

WHERE:

L_w = total sound
 L_1 = first sound level
 L_2 = second sound level

Method Two

Another way to add decibels can be done by using a simple table.

Figure the difference in the two sound levels.

Using the following table, add the value from line 2 to the higher of the sound levels.

The final answer should be rounded to the nearest whole number.

Adding Decibels

Line 1	Difference Between Two Levels ($L_2 - L_1$)	0	1	2	3	4	5	6	7	8	9	10
Line 2	Value added to the Higher Sound Level (L_2)	3	2.5	2.1	1.8	1.5	1.2	1.0	0.8	0.6	0.5	0.4

An example of this method:

Using a 40 ton rooftop unit with the following values:

Supply blower:

15,000 cfm

2.0 in. w.g. total static pressure

880 RPM

100% High Static Power Exhaust Fan With Energy Recovery Wheel In Economizer Mode (By-pass Dampers Open)

13,000 cfm

0.5 in. w.g. static pressure

910 RPM

		Frequency - HZ							
		63	125	250	500	1000	2000	4000	8000
Line A:	Supply Blower Sound Level	99	83	84	87	84	83	79	73
Line B:	Power Exhaust Sound Level	93	81	78	80	78	76	74	68
Line C:	Difference (Line A - Line B)	6	2	6	7	6	7	5	5
Line D:	Using table above, adder for difference from Line 2	1.0	2.1	1.0	0.8	1.0	1.0	1.2	1.2
Total	Highest sound level plus Line D (rounded to nearest whole number)	100	85	85	88	85	84	80	74



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