

# LOADED SOUND TEST SUMMARY SHEET

NAME OF DEVICE UNDER TEST (DUT)  
TOOL OPERATOR  
COMPUTER OPERATOR  
TEST DATE

Reciprocating Saw  
Manual Mode, Brian Kim  
Edward Zechmann  
5/11/2009

TEST DESCRIPTION  
TEST LOCATION  
MANUFACTURER  
MODEL  
SERIAL NUMBER  
MODE OF OPERATION  
RUN NUMBER  
YEAR MADE

Sound Power Level Measurement  
UC anechoic lab  
Milwaukee  
6520-21  
B02B608250660  
FULL SPEED, LOADED, WITH OPERATOR  
1  
2008

DIMENSIONS (inches)  
WEIGHT (lbs.)  
TECHNICAL SPECIFICATIONS  
MOUNTING CONDITIONS  
LOADING CONDITIONS  
K1 (dBA)  
K2 (dBA)  
TEMPERATURE (CELSIUS)  
HUMIDITY %  
BAROMETRIC PRESSURE ("Hg)

Length 19.0", Width 4.0", Height 6.5"  
8.8  
1 1/8 inch stroke length  
1 inch thick oak board mounted on test jig  
FULL SPEED, LOADED 1" OAK, WITH OPERATOR  
0  
0.38  
24  
36  
30.14

TEST ENVIRONMENT  
TOOL TESTING STANDARD  
MEASUREMENT STANDARD  
MICROPHONE SET-UP  
SURFACE RADIUS

SEMI ANECHOIC, SEMI HEMISPHERICAL  
ANSI S12.15-1992  
ISO 3744:1994-05-01  
10-MICROPHONES  
2.00 meters

RATED POWER (WATTS)  
ACTUAL INPUT POWER (WATTS)  
VOLTAGE (VOLTS)  
CURRENT (AMPS)  
RATED SPM  
ACTUAL SPM

1440  
516  
115  
8.2  
2800  
-

SOUND POWER LEVEL (dBA)  
SOUND POWER (WATTS) A-weighted  
SWLA - k2 (dBA)  
SWLA - k2 (WATTS) A-weighted  
SOUND PRESSURE LEVEL (dBA) @ 2 meters

106.2  
0.04210  
105.9  
0.03855  
92.2

AT THE NOMINAL HEARING ZONE OF OPERATOR  
SOUND PRESSURE LEVEL (dBA)

94.9

# Average Directivity Study

TEST DATE 5/11/2009  
DUT Reciprocating Saw  
Manufacturer Milwaukee  
Model Number 6520-21  
Serial Number B02B608250660  
Mode FULL SPEED, LOADED, WITH OPERATOR  
Run Number 1

## A-weighted Sound Pressure Level

	Position1	Position2
Mic #	dBA	dBA
0	90.7	90.8
1	86.3	86.5
2	92.9	89.5
3	93.5	90.1
4	92.4	93.8
5	94.1	93.0
6	88.7	86.4
7	95.9	91.6
8	89.5	91.1
9	97.4	91.3
10	94.5	94.9
dB difference	11.1	7.3

## A-weighted Directivity Index

Mic #	dBA	dBA
0	-1.4	0.4
1	-5.9	-3.9
2	0.8	-0.9
3	1.4	-0.3
4	0.3	3.4
5	2.0	2.6
6	-3.5	-4.0
7	3.8	1.2
8	-2.7	0.7
9	5.3	0.9

# SOUND DATA SHEET

## PRODUCT INFORMATION

## TEST CONDITIONS

TEST DATE	5/11/2009		
DUT	Reciprocating Saw	Actual Power (watt)	516
Manufacturer	Milwaukee	Voltage (Volts)	115
Model Number	6520-21	Current (Amps)	8.2
Serial Number	B02B608250660	Actual RPM	-
Mode of Operation	FULL SPEED, LOADED, WITH OP	Temperature (Deg. F)	24
Run Number	1	Humidity (%)	36

### Measurement Data

Baro. Press. (inch of Hg) 30.14

#### Linear (unweighted) Position 1

Sound Power (dB)	110.42	108.66	110.63	107.72	108.10	109.30	106.45	105.00	107.03	106.66
Sound Power (Watts)	0.11023	0.07350	0.11549	0.05916	0.06462	0.08514	0.04415	0.03160	0.05049	0.04631
Sound Pressure (dB)	96.42	94.66	96.62	93.72	94.10	95.30	92.45	90.99	93.03	92.65

#### Linear (unweighted) Position 2

Sound Power (dB)	107.48	105.04	104.64	105.78	106.38	106.69	105.31	104.05	103.91	103.86
Sound Power (Watts)	0.05594	0.03193	0.02909	0.03786	0.04342	0.04671	0.03398	0.02539	0.02458	0.02434
Sound Pressure (dB)	93.47	91.04	90.64	91.78	92.37	92.69	91.31	90.04	89.90	89.86

#### A-weighted Position 1

Sound Power (dBA)	109.36	107.52	109.27	106.65	106.94	108.39	105.22	104.23	106.02	105.82
Sound Power (Watts)	0.08631	0.05652	0.08446	0.04626	0.04939	0.06906	0.03325	0.02649	0.04004	0.03822
Sound Pressure (dBA)	95.36	93.52	95.26	92.65	92.93	94.39	91.22	90.23	92.02	91.82

#### A-weighted Position 2

Sound Power (dBA)	106.67	104.71	104.08	105.34	105.85	106.20	104.93	103.38	103.43	103.27
Sound Power (Watts)	0.04644	0.02957	0.02557	0.03420	0.03842	0.04168	0.03112	0.02176	0.02202	0.02125
Sound Pressure (dBA)	92.67	90.71	90.08	91.34	91.84	92.20	90.93	89.37	89.43	89.27

### Calculations

#### Average A-weighted Sound Data

Sound Power (dBA)	106.24
Sound Power (Watts)	0.0421
Sound Pressure (dBA)	92.24

Std. Deviation SWLA	1.8223
95 % Confidence Level	0.8529

## LOADED VIBRATIONS TEST SUMMARY SHEET

NAME OF DEVICE UNDER TEST (DUT)	Reciprocating Saw
TOOL OPERATOR (SUBJECT OF TEST)	Manual Mode, Brian Kim
COMPUTER OPERATOR	Edward Zechmann
TEST DATE	5/11/2009
TEST DESCRIPTION	Human Exposure to Vibrations
TEST LOCATION	UC ANECHOIC LAB
MANUFACTURER	Milwaukee
MODEL	6520-21
SERIAL NUMBER	B02B608250660
MODE OF OPERATION	FULL SPEED, LOADED, WITH OPERATOR
RUN NUMBER	1
YEAR MADE	2008
DIMENSIONS (inches)	Length 19.0", Width 4.0", Height 6.5"
WEIGHT (lbs.)	8.8
TECHNICAL SPECIFICATIONS	1 1/8 inch stroke length
MOUNTING CONDITIONS	1 inch thick oak board mounted on test jig
LOADING CONDITIONS	FULL SPEED, LOADED 1" OAK, WITH OPERATOR
TEMPERATURE (CELSIUS)	24
HUMIDITY %	36
BAROMETRIC PRESSURE ("Hg)	30.14
TEST ENVIRONMENT	SEMI ANECHOIC, SEMI HEMISPHERICAL
MEASUREMENT STANDARD	ISO 5349-1 and ISO 5349-2
ACCELEROMETER SETUP	2 - ACCELEROMETERS
SETUP DIAGRAM	reciprocating_saw_8_accel_setup.doc
LOCATION ACCEL 1	right hand, right handle, on top of tool, near trigger
ORIENTATION ACCEL 1	X toward left side of tool, Y away from saw blade, Z toward top of tool
LOCATION ACCEL 2	left hand, on top of tool, behind saw blade
ORIENTATION ACCEL 2	X toward left side of tool, Y away from saw blade, Z toward top of tool
ADAPTER TYPE	Accel 1-side adapter, Accel 2-side adapter
OPERATOR POSTURE	Standing over tool, both hands gripping and sliding tool through wood
HAND GRIP FORCE	Band clamp over rubber mechanical low-pass filter
RATED POWER (WATTS)	1440
ACTUAL INPUT POWER (WATTS)	516
VOLTAGE (VOLTS)	115
CURRENT (AMPS)	8.2
RATED RPM	2800
ACTUAL RPM	-
Vibrations	
Accelerometer 1	
X, Y, Z arms m/s <sup>2</sup> weighted	6.5, 24.2, 10.7
X, Y, Z arms m/s <sup>2</sup> linear	85, 135.6, 103.2
Total arms m/s <sup>2</sup> (weighted, linear)	27.3, 190.6
Accelerometer 2	
X, Y, Z arms m/s <sup>2</sup> weighted	7.8, 26.6, 7.2
X, Y, Z arms m/s <sup>2</sup> linear	113.2, 180.6, 155.7
Total arms m/s <sup>2</sup> (weighted, linear)	28.8, 264.5

# VIBRATIONS DATA SHEET

TEST DATE	5/11/2009			
DUT	Reciprocating Saw	Actual Power (watt)	516	
Manufacturer	Milwaukee	Voltage (Volts)	115	
Model Number	6520-21	Current (Amps)	8.2	
Serial Number	B02B608250660	Actual RPM	-	
Mode of Operation	FULL SPEED, LOADED, WITH C		Temperature	24
Run Number	1	Humidity (%)	36	

Accelerometer 1	arms weighted m/s <sup>2</sup>																
Axis	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
X	4.9	5.6	4.8	4.6	7.1	7.4	3.9	5.7	7.8	7.0	4.1	8.3	7.7	8.2	7.9	5.8	6.2
Y	28.7	20.6	20.9	23.7	24.1	23.8	20.0	23.0	24.5	24.7	23.9	25.0	24.4	25.1	25.5	24.9	25.5
Z	6.4	6.7	6.2	11.2	11.5	10.6	6.2	9.2	12.7	12.7	9.3	13.1	12.1	12.7	11.8	10.7	13.3
Total arms	29.8	22.4	22.3	26.7	27.6	27.1	21.3	25.4	28.7	28.6	26.0	29.4	28.3	29.3	29.2	27.7	29.4

Accelerometer 1	arms linear m/s <sup>2</sup>																
X	80.0	75.8	73.0	85.0	92.3	88.3	75.6	88.0	85.0	81.7	85.8	89.4	88.6	86.8	87.5	85.6	89.4
Y	171.3	123.2	152.8	136.3	146.6	154.5	123.5	129.7	135.3	128.2	132.3	132.8	127.1	136.4	129.0	132.1	134.6
Z	120.8	93.0	109.9	110.2	113.6	108.7	102.7	99.8	107.7	102.3	102.9	103.7	100.4	106.7	96.5	94.3	101.2
Total arms	224.3	172.0	201.8	194.8	207.2	208.6	177.5	185.8	192.7	183.3	188.3	190.7	184.6	193.7	183.3	183.5	190.6

Accelerometer 2	arms weighted m/s <sup>2</sup>																
Axis	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
X	19.3	8.0	8.0	5.7	7.9	6.9	9.1	7.7	6.8	6.2	9.2	7.1	6.5	5.7	7.6	7.0	5.3
Y	29.0	21.5	20.8	25.8	26.6	25.6	20.2	26.5	27.5	27.9	26.7	28.0	27.3	27.9	28.5	27.8	28.4
Z	6.8	5.6	5.7	8.1	8.2	7.2	5.4	6.9	8.1	8.0	7.2	7.5	7.5	7.9	7.1	6.5	8.2
Total arms	35.4	23.6	23.0	27.6	28.9	27.5	22.8	28.4	29.5	29.7	29.2	29.8	29.1	29.6	30.3	29.4	30.0

Accelerometer 2	arms linear m/s <sup>2</sup>																
X	137.7	101.6	118.8	107.2	113.1	113.5	102.1	110.2	109.9	104.9	115.8	111.1	111.2	117.7	115.3	109.0	118.1
Y	167.9	161.1	156.1	167.4	167.8	173.8	140.0	168.4	171.1	168.1	166.1	196.0	191.5	219.4	187.0	182.8	206.4
Z	181.9	144.6	166.8	151.7	156.1	153.3	154.3	153.9	157.4	151.2	149.1	154.4	152.2	163.2	154.6	147.6	164.8
Total arms	283.2	239.1	257.5	250.1	255.6	258.0	232.1	253.3	257.2	249.3	251.4	273.2	268.7	297.7	268.6	259.0	289.3

Average arms																	
Weighted m/s <sup>2</sup>	Accel 1	Accel 2	Linear		Accel 1	Accel 2											
X	6.5	7.8	X	85.0	113.2												
Y	24.2	26.6	Y	135.6	180.6												
Z	10.7	7.2	Z	103.2	155.7												
Total arms m/s <sup>2</sup>	27.3	28.8	190.6		264.5												
Std. Deviation	2.6	2.9	12.2		18.4												
95 % Confidence Level	1.2	1.4	5.7		8.6												

18	19	20
7.2	7.7	8.3
25.0	24.7	25.8
11.5	12.5	13.5
28.4	28.7	30.3

87.8	86.1	87.9
127.6	125.4	132.7
92.2	97.8	100.0
180.3	180.8	188.0

18	19	20
7.9	7.2	6.0
28.6	28.9	29.5
7.0	7.9	8.2
30.5	30.8	31.2

110.7	114.5	122.2
184.3	209.9	226.4
151.7	150.7	154.6
263.1	282.6	300.1