

LOADED SOUND TEST SUMMARY SHEET

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

Hammer Drill
Manual Mode, Brian Kim
Edward Zechmann
6/10/2009

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

Sound Power Level Measurement
UC anechoic lab
Hitachi
FDV16VB2
J545244
FULL SPEED, LOADED, WITH OPERATOR
2
2008

DIMENSIONS (inches)
WEIGHT (lbs.)
TECHNICAL SPECIFICATIONS
MOUNTING CONDITIONS
LOADING CONDITIONS

11.3" length, 3.5" width, 9.0" height
3.5
5/8" chuck
Hammer Drill pushed into concrete block in sand in a cardboard box
FULL SPEED, LOADED WITH CONCRETE BLOCK

K1 (dBA)
K2 (dBA)
TEMPERATURE (CELSIUS)
HUMIDITY %
BAROMETRIC PRESSURE ("Hg)

0
0.08
24
42
29.92

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 RPM
ACTUAL RPM

600
-
-
-
2900
-

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

106.4
0.04325
106.3
0.04246
92.4

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

105.9

Average Directivity Study

TEST DATE	6/10/2009
DUT	Hammer Drill
Manufacturer	Hitachi
Model Number	FDV16VB2
Serial Number	J545244
Mode	FULL SPEED, LOADED, WITH OPERATOR
Run Number	2

A-weighted Sound Pressure Level

	Position1	Position2
Mic #	dBA	dBA
0	92.4	92.9
1	92.8	90.9
2	92.9	92.8
3	89.1	93.2
4	92.2	92.0
5	91.8	89.7
6	90.7	92.7
7	87.6	94.3
8	93.3	94.1
9	93.9	92.2
10	105.9	105.9
dB difference	6.4	4.6

A-weighted Directivity Index

Mic #	dBA	dBA
0	0.8	0.5
1	1.1	-1.5
2	1.3	0.3
3	-2.6	0.7
4	0.6	-0.5
5	0.1	-2.8
6	-1.0	0.3
7	-4.1	1.8
8	1.6	1.6
9	2.3	-0.3

SOUND DATA SHEET

PRODUCT INFORMATION

TEST DATE 6/10/2009
DUT Hammer Drill
Manufacturer Hitachi
Model Number FDV16VB2
Serial Number J545244
Mode of Operation FULL SPEED, LOADED, WITH OP
Run Number 2

TEST CONDITIONS

Actual Power (watt) -
Voltage (Volts) -
Current (Amps) -
Actual RPM -
Temperature (Deg. F) 24
Humidity (%) 42
Baro. Press. (inch of Hg) 29.92

Measurement Data

Linear (unweighted) Position 1

Sound Power (dB)	105.49	106.19	105.94	105.86	105.29
Sound Power (Watts)	0.03542	0.04160	0.03929	0.03855	0.03381
Sound Pressure (dB)	91.49	92.19	91.94	91.86	91.29

Linear (unweighted) Position 2

Sound Power (dB)	106.95	105.75	106.89	105.80	106.24
Sound Power (Watts)	0.04960	0.03758	0.04884	0.03798	0.04208
Sound Pressure (dB)	92.95	91.75	92.88	91.79	92.24

A-weighted Position 1

Sound Power (dBA)	105.72	106.43	106.21	106.16	105.58
Sound Power (Watts)	0.03736	0.04401	0.04182	0.04128	0.03614
Sound Pressure (dBA)	91.72	92.43	92.21	92.16	91.58

A-weighted Position 2

Sound Power (dBA)	107.34	105.99	107.08	106.13	106.62
Sound Power (Watts)	0.05417	0.03976	0.05102	0.04100	0.04593
Sound Pressure (dBA)	93.34	91.99	93.08	92.13	92.62

Calculations

Average A-weighted Sound Data

Sound Power (dBA)	106.36
Sound Power (Watts)	0.0432
Sound Pressure (dBA)	92.36

Std. Deviation SWLA	0.5573
95 % Confidence Level	0.3987
Mean SPLA-k2	92.28

LOADED VIBRATIONS TEST SUMMARY SHEET

NAME OF DEVICE UNDER TEST (DUT)	Hammer Drill
TOOL OPERATOR (SUBJECT OF TEST)	Manual Mode, Brian Kim
COMPUTER OPERATOR	Edward Zechmann
TEST DATE	6/10/2009
TEST DESCRIPTION	Human Exposure to Vibrations
TEST LOCATION	UC ANECHOIC LAB
MANUFACTURER	Hitachi
MODEL	FDV16VB2
SERIAL NUMBER	J545244
MODE OF OPERATION	FULL SPEED, LOADED, WITH OPERATOR
RUN NUMBER	2
YEAR MADE	2008
DIMENSIONS (inches)	11.3" length, 3.5" width, 9.0" height
WEIGHT (lbs.)	3.5
TECHNICAL SPECIFICATIONS	5/8" chuck
MOUNTING CONDITIONS	Hammer Drill pushed into concrete block in sand in a cardboard box
LOADING CONDITIONS	FULL SPEED, LOADED WITH CONCRETE BLOCK
TEMPERATURE (CELSIUS)	24
HUMIDITY %	42
BAROMETRIC PRESSURE ("Hg)	29.92
TEST ENVIRONMENT	SEMI ANECHOIC, SEMI HEMISPHERICAL
MEASUREMENT STANDARD	ISO 5349-1 and ISO 5349-2
ACCELEROMETER SETUP	2 - ACCELEROMETERS
SETUP DIAGRAM	Hammer_drill_3_sv_accel_setup.doc
LOCATION ACCEL 1	right hand, on left side of tool, near back of tool, near trigger
ORIENTATION ACCEL 1	X away from drill bit, Y toward top of tool, Z toward left side of tool
LOCATION ACCEL 2	left hand, left grip, on top of side handle
ORIENTATION ACCEL 2	X toward drill bit, Y toward left side of tool, Z toward top of tool
ADAPTER TYPE	Accel 1-side adapter, Accel 2-tall two stem adapter
OPERATOR POSTURE	Bending over the tool, both hands gripping and pressing tool to concrete
HAND GRIP FORCE	Hands gripping tightly to control tool and pressing electrical switch
RATED POWER (WATTS)	600
ACTUAL INPUT POWER (WATTS)	-
VOLTAGE (VOLTS)	-
CURRENT (AMPS)	-
RATED RPM	2900
ACTUAL RPM	-
Vibrations	
Accelerometer 1	
X, Y, Z arms m/s ² weighted	30.2, 13.3, 17.2
X, Y, Z arms m/s ² linear	279.3, 234.9, 167.1
Total arms m/s ² (weighted, linear)	37.4, 404.1
Accelerometer 2	
X, Y, Z arms m/s ² weighted	15.9, 10.8, 13
X, Y, Z arms m/s ² linear	286, 365.7, 375.7
Total arms m/s ² (weighted, linear)	23.3, 598.1

VIBRATIONS DATA SHEET

TEST DATE	6/10/2009		
DUT	Hammer Drill	Actual Power (watt)	-
Manufacturer	Hitachi	Voltage (Volts)	-
Model Number	FDV16VB2	Current (Amps)	-
Serial Number	J545244	Actual RPM	-
Mode of Operation	FULL SPEED, LOADED, WITH C	Temperature	24
Run Number	2	Humidity (%)	42

Accelerometer 1	arms weighted m/s ²									
Axis	1	2	3	4	5	6	7	8	9	10
X	37.9	22.2	22.7	36.9	28.0	29.0	25.9	34.4	25.8	38.7
Y	12.6	12.9	10.9	8.9	12.7	13.0	11.4	21.4	11.3	17.7
Z	25.7	13.4	12.1	13.1	18.1	18.2	11.4	22.7	17.9	19.3
Total arms	47.5	29.0	27.9	40.2	35.7	36.6	30.5	46.4	33.4	46.8

Accelerometer 1	arms linear m/s ²									
X	333.6	198.4	211.3	370.9	212.6	288.5	251.4	284.4	256.6	384.9
Y	243.5	217.8	210.2	194.1	227.1	252.5	249.8	258.5	223.7	271.6
Z	186.9	132.5	130.9	148.0	218.4	186.8	146.8	167.5	159.9	193.6
Total arms	453.3	323.0	325.5	444.0	380.1	426.5	383.6	419.2	376.1	509.3

Accelerometer 2	arms weighted m/s ²									
Axis	1	2	3	4	5	6	7	8	9	10
X	14.7	17.4	11.8	18.8	15.3	19.9	10.3	20.8	14.0	15.5
Y	11.1	8.9	8.0	10.0	12.2	11.6	10.8	11.7	10.4	13.3
Z	14.5	11.4	10.6	16.8	13.5	15.4	10.2	13.8	11.4	12.0
Total arms	23.4	22.6	17.7	27.1	23.8	27.7	18.1	27.6	20.9	23.7

Accelerometer 2	arms linear m/s ²									
X	303.8	346.0	271.2	248.3	233.8	277.9	284.7	347.9	258.5	288.0
Y	370.9	333.4	322.3	349.7	345.9	342.1	391.2	443.3	338.0	419.8
Z	393.9	412.6	380.4	351.9	324.7	366.5	371.0	462.8	327.6	365.4
Total arms	620.5	633.4	567.6	554.8	528.9	573.2	609.7	729.2	537.0	626.6

Average arms										
Weighted m/s ²	Accel 1	Accel 2	Linear	Accel 1	Accel 2					
X	30.2	15.9	X	279.3	286.0					
Y	13.3	10.8	Y	234.9	365.7					
Z	17.2	13.0	Z	167.1	375.7					
Total arms m/s ²	37.4	23.3		404.1	598.1					
Std. Deviation	7.5	3.6		58.1	59.5					
95 % Confidence Level	5.4	2.6		41.5	42.5					