

SolBank3.0 Noise test and analysis Report



CSI Energy Storage Co., Ltd.No.348
Lushan Road, SND, Suzhou, Jiangsu,
China

This report is only applicable to the SolBank 3.0 product that is equipped with the chiller brand/model **Envicool - EMW250FCNS2A/EMW600FCNS2F** . For specific parameters, please refer to the chapter 2. For more information about other model, please contact e-Storage.

This report shows SolBank product data measured under specific conditions, e-Storage has the final right to interpret the content.

Unauthorized individuals or organizations may not copy or redistribute any of the contents and results of this report.

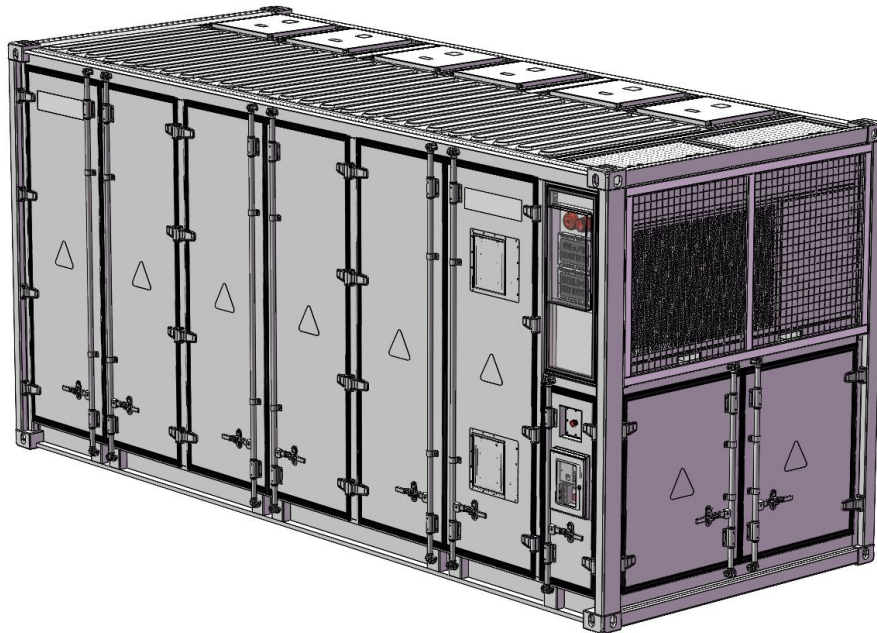
Version	Date	Content Revision	Drafted/Revised by	Reviewed by	Approved by
A0	2025.7.29	Initial	Zhangcheng Cao		
A1	2025.8.5	Add 0.25P chiller test data and results	Zhangcheng Cao		

Table of contents

1 Scope	3
2 Test Preview	4
2.1 Technical characteristics	4
2.2 Test bench	5
2.3 Measurement points	6
3 Noise Test Result	7
3.1 Noise Correction	7
3.1.1 Correction of background noise	7
3.1.2 Determination of environmental correction	8
3.2 Testing Result and analysis	8
3.2.1 Comparison of SPL at different fan load	9
3.2.1 Comparison of SPL at 1m and SWL	10
3.2.3 1/3 octave spectrum analysis data	10
4 Equipment	17

1 Scope

This report refers to the test methods and requirements of ISO 3746:2010 to assess the noise levels of components in operating of SolBank product.



Please note that considering that the main source of noise in SolBank operation is the chiller, the SolBank model and configuration may be different, and the chiller supplier or model used may be different. This report is applicable to **CSI-SolBank-S-5016-4h** and **CSI-SolBank-S-5016-2h** products with **EMW250FCNS2A** and **EMW600FCNS2F**, focus on the noise performance of chiller at 3 fan speeds load (100% 80% 60%) for the container level.

Normally this report applies to all models of e-Storage SolBank3.0 products, if other models or more accurate results are required, please contact e-Storage.

2 Test Preview

2.1 Technical characteristics

SolBank3.0

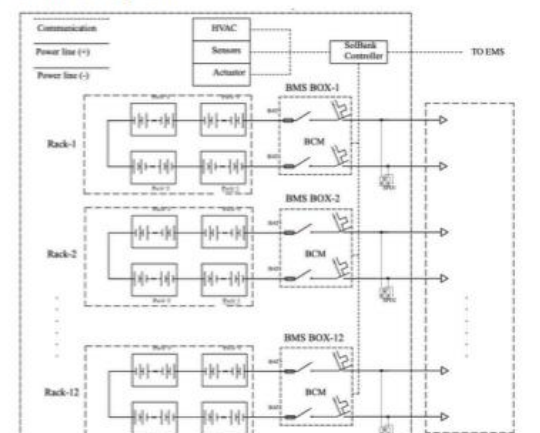
General		
Product Model	CSI-SolBank-S-5016-2h-NA	
	CSI-SolBank-S-5016-4h-NA	
Battery Chemistry	Lithium Iron Phosphate (LFP)	
Pack Configuration	1P104S (104 Cells)	
Rack Configuration	1P416S (4 Packs)	
System Configuration	12P416S (12 Racks)	
Nominal DC Voltage	1331.2 V	
Operation DC Voltage Range	1164.8 V ~ 1497.6 V	
Performance		
Charging/Discharging Mode	0.5 P / 0.5 P	0.25 P / 0.25 P
Rated DC Power	2350 kW	1200 kW
Initial Storage Capacity	4700 kWh	4800 kWh
Duration @Rated DC Power	2hrs	4hrs
Round Trip Efficiency (RTE)	93%	94%
Auxiliary Load (Standby/Peak)	1.5 kVA / 50 kVA	1.5 kVA / 22 kVA
Max. Short Circuit Current	10 kA*12	10 kA*12
Operating Temperature (Ambient)	-30 °C to 55 °C (derating from 45°C to 55°C)	
Relative Humidity	≤95% (non-condensing)	
Altitude	≤4000 m (derating from 2000 m to 4000 m)	
Noise Sound Pressure Level (LPA) at 1 meter distance	≤75 dB(A)	
Auxiliary Systems		
Auxiliary Power Interface	AC480 V / 60 Hz, 3P5W	
Thermal Management System	Smart liquid cooling/heating	
External Communication Interface	Ethernet connection, Modbus TCP/IP protocol	

Mechanical	
Enclosure	20ft. high-cube container
Dimensions (L*W*H)	6058*2438*2896 mm (238.50*95.98*114.02 in)
Weight (Battery Included)	43,000 kg (94,800 lbs)
Enclosure Ingress Rating	IP55 / NEMA 3R
Painting/Coating	RAL9003 / C4 Coating
Seismic Parameter	Zone 4

Safety	
Fire Detection and Alarm	Fire alarm panel, heat and smoke detection, alarm bell and strobe
Explosion Prevention	Combustible gas detector with active ventilation
Uninterrupted Power Reserve	Container level UPS for 2-hr control system backup; dedicated fire safety UPS for 24-hr fire alarm backup
Emergency Stop/Automatic Shut-off	Local and Remote
Fire Suppression Options	Aerosol-based suppression system. Dry pipe sprinkler system.

SolBank 3.0

Circuit Diagram



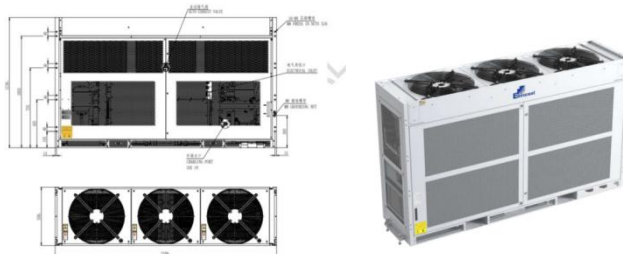
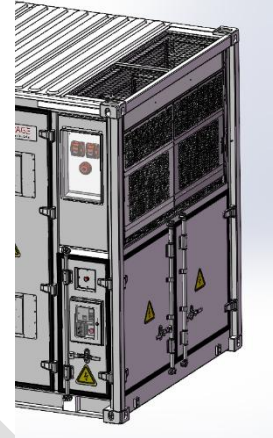
Chiller

Envicool

EMW600FCNS2F (For 0.5P)

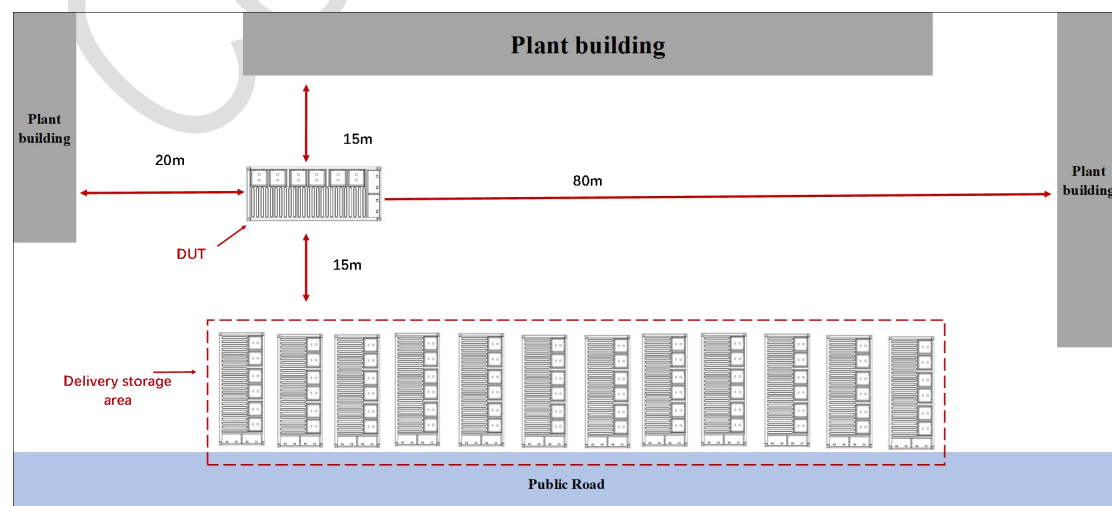
EMW250FCNS2A (For 0.25P)

Description: The fan of this chiller model is mounted on the top of the machine and dissipates heat by exhausting air to the top of the machine, where the air enters from the side through negative pressure.



2.2 Test bench

To avoid the environment influence in the noise measurements, the DUT had been placed at the outside of the plant, at the outside concrete esplanade without any object at least at 10m of distance. Also, the measurements was performed in the moment of the day in which there is less noise at the outside environment (production and traffic noise). The chiller was guaranteed to run normally by the aux power, and manually adjust the fan speed through software.



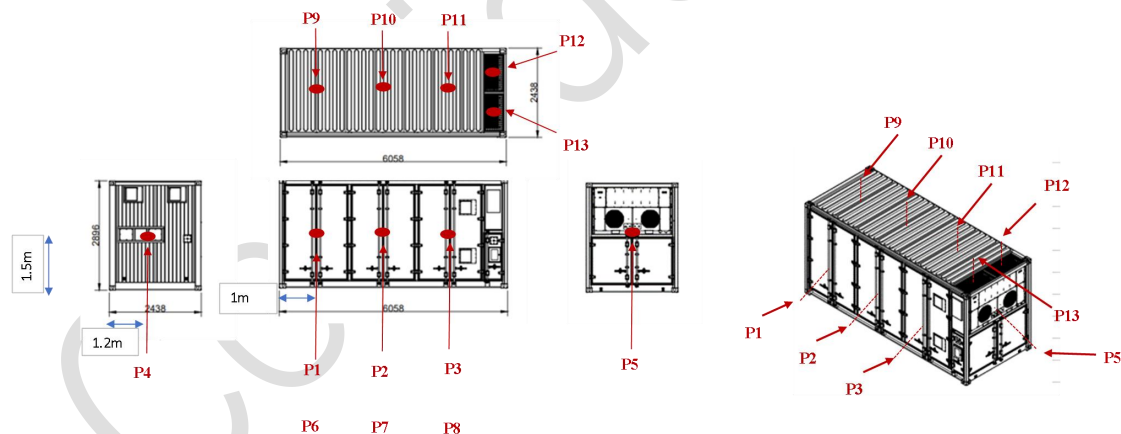


Test location

Meteorological conditions:

No.	Chiller	Date	Temperature/°C	Wind speed/km·h ⁻¹	Humidity/%
1	Envicool / EMW600FCNS2F	2025.4.27	23.9	1	46
2	Envicool / EMW250FCNS2A	2025.8.1	29	5	78

2.3 Measurement points



Note:

P6, P7, P8 for the back of the container points, same as P1, P2, P3 to the front of the container position.

All points are 1m distance from the DUT surface.

Measurement results of P1~P11 are used as a source of data for calculation of surface-averaged sound pressure level (SPL) and sound power level (SWL), and P12 and P13 are used as typical measurement points of product noise (Right above the air outlet, maximum values in specific cases).

3 Noise Test Result

3.1 Noise Correction

Due to the impact of the measurement environment and background noise, all the sound pressure level measurement results had been corrected.

3.1.1 Correction of background noise

The background noise corrections, K_{1A} , shall be calculated using Equation:

$$K_{1A} = -10 \lg \left(1 - 10^{-0.1 \Delta L_{pA}} \right) \text{ dB}$$

where

$$\Delta L_{pA} = \overline{L'_{pA(ST)}} - \overline{L_{pA(B)}}$$

in which

$\overline{L'_{pA(ST)}}$ is the A-weighted time-averaged sound pressure level from the array of microphone positions over the measurement surface, with the noise source under test in operation, in decibels,

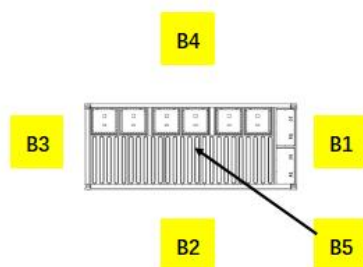
$\overline{L_{pA(B)}}$ is the mean A-weighted time-averaged sound pressure level of the background noise from the array of microphone positions over the measurement surface, in decibels.

If $\Delta L_{pA} > 10 \text{ dB}$, K_{1A} is assumed equal to zero.

For $3 \text{ dB} \leq \Delta L_{pA} \leq 10 \text{ dB}$, corrections shall be calculated in accordance with Equation

The accuracy of the result(s) is reduced and the value of K_{1A} to be applied in this case is 3 dB (the value for $\Delta L_{pA} = 3 \text{ dB}$). In this case, the data from the test represent an upper boundary to the sound power level of the noise source under test.

Background noise measurement points and results as below



Note:

B5 represents the center of the top of the container.

Rev A1

All points are 1m distance from the DUT surface.

Average background noise level for Envicool / EMW600FCNS2F is 48.6 dB.

	B1	B2	B3	B4	B5
LPA	47	49.9	48.7	48.6	48.5
∑LPA	48.6				

Average background noise level for Envicool /EMW250FCNS2A is 45.5 dB.

	B1	B2	B3	B4	B5
LPA	43.5	44.1	46.7	46.7	45.6
∑LPA	45.5				

Note: When the measured value is close to the background noise, the accuracy of the measurement result is inevitably reduced, at this time the measurement result is the upper limit of the sound pressure level or sound power level of the measured sound source, and the result is used as a reference.

3.1.2 Determination of environmental correction

The test environment conditions correction is not necessary in this test case due to the test was performed at the outside of the installations, so, the correction factor K_{2A} is equal to 0.

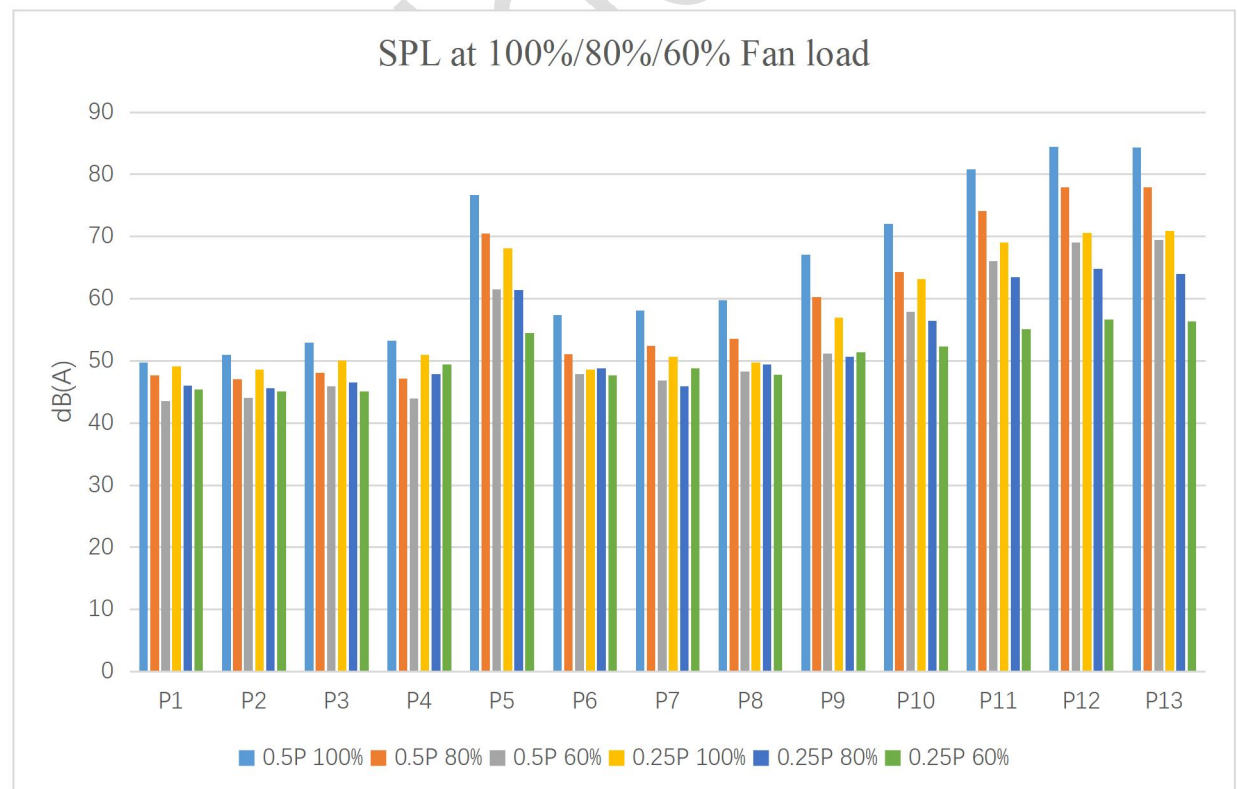
3.2 Testing Result and analysis

The following measurements were corrected by background noise. The smaller the number, the lower the noise level.

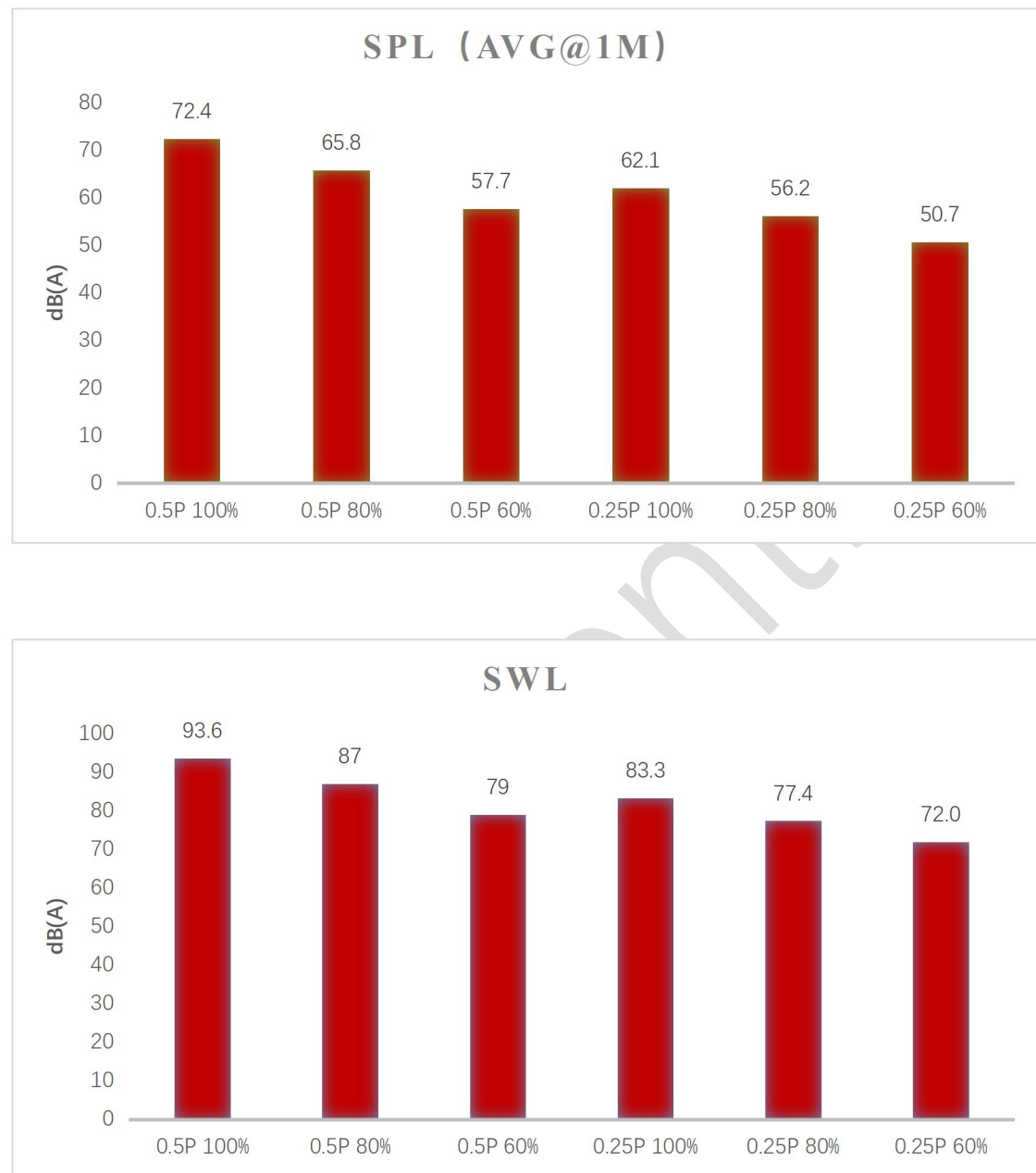
Unit: dB(A)

Model & Load	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	SPL (avg@1 m)	SWL	MAX
0.5P 100%	49.7	51	52.9	53.2	76.7	57.4	58.1	59.8	67.1	72	80.8	84.4	84.3	72.4	93.6	84.4
0.5P 80%	47.7	47.1	48.1	47.2	70.5	51.1	52.4	53.6	60.3	64.3	74.1	77.9	77.9	65.8	87	77.9
0.5P 60%	43.5	44.1	45.9	44	61.5	47.9	46.8	48.3	51.2	57.9	66.1	69.1	69.5	57.7	79	69.5
0.25P 100%	49.1	48.6	50	51	68.1	48.6	50.7	49.7	57	63.2	69	70.6	70.9	62.1	83.3	70.90
0.25P 80%	46	45.6	46.5	47.9	61.4	48.8	45.9	49.4	50.7	56.5	63.5	64.8	64	56.2	77.4	64.80
0.25P 60%	45.4	45.1	45.1	49.4	54.5	47.7	48.8	47.8	51.4	52.3	55.1	56.7	56.3	50.7	72.0	56.70

3.2.1 Comparison of SPL at different fan load



3.2.2 Comparison of SPL at 1m and SWL



3.2.3 1/3 octave spectrum analysis data

0.5P 100% Speed													
Frequency	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
5	-52.1	-49.8	-52.4	-51.2	-47.0	-53.4	-51.8	-50.7	-45.1	-48.5	-34.8	-31.5	-43.7
6.3	-40.7	-37.5	-39.1	-40.3	-38.3	-40.1	-40.1	-37.5	-39.5	-38.0	-28.0	-22.6	-34.3
8	-31.3	-27.9	-27.9	-30.0	-29.3	-30.4	-28.5	-26.7	-27.5	-31.2	-20.6	-14.2	-28.6
10	-23.3	-24.3	-20.9	-23.0	-22.8	-24.7	-21.5	-20.0	-23.4	-25.4	-15.8	-6.9	-21.2
12.5	-23.5	-20.2	-20.0	-20.2	-20.5	-21.4	-18.9	-16.4	-18.6	-19.7	-9.4	0.1	-15.3
16	-17.1	-15.7	-15.3	-15.5	-13.4	-16.8	-16.7	-17.8	-13.6	-13.2	-0.5	7.6	-8.7
20	-13.3	-12.8	-12.9	-10.6	-10.9	-11.4	-12.9	-13.2	-11.5	-11.2	4.9	14.3	-3.0
25	-12.1	-10.7	-10.9	-12.3	-10.0	-11.5	-11.7	-11.0	-9.7	-11.0	6.7	17.7	-1.2
31.5	-9.6	-7.4	-7.9	-9.0	-6.4	-9.2	-8.3	-6.3	-7.0	-9.0	8.4	21.6	1.8
40	-8.3	-5.9	-7.3	-7.8	-5.7	-8.1	-6.0	-5.6	-4.7	-6.6	9.5	24.8	3.6
50	-4.9	-4.4	-4.9	-3.6	-1.4	-6.5	-4.5	-2.5	0.4	-3.4	11.6	26.2	8.4
63	-0.3	-0.0	-0.3	-0.1	5.3	-0.3	0.1	2.3	6.9	2.6	13.6	28.3	12.3
80	9.8	9.2	9.6	10.3	16.8	9.4	11.1	13.4	15.1	12.1	20.5	34.5	20.3
100	10.1	9.8	9.8	11.2	18.2	10.1	12.7	14.3	15.9	16.3	24.2	35.9	25.1
125	8.1	8.9	9.1	9.7	20.0	10.0	11.1	13.0	16.7	20.1	26.6	30.2	28.7
160	9.4	11.2	14.1	11.2	23.6	11.8	17.0	16.8	22.8	25.9	32.3	34.2	34.5
200	13.4	15.4	15.9	14.4	27.2	16.7	19.7	19.3	26.3	29.8	36.7	38.3	39.6
250	21.0	20.8	22.3	20.3	29.5	24.9	26.7	26.3	30.6	33.9	41.0	43.0	44.4
315	24.0	22.1	27.9	23.2	37.8	26.8	24.7	29.0	34.9	38.9	45.1	48.0	49.2
400	24.0	26.2	28.9	24.5	40.0	28.4	29.3	31.2	36.6	40.1	45.6	47.9	49.7
500	26.9	27.7	30.4	25.2	42.8	29.6	29.1	32.4	37.3	40.6	46.2	47.4	49.0
630	29.3	31.1	31.5	28.6	46.4	31.6	33.1	36.0	38.0	40.6	48.4	50.6	51.8
800	34.2	34.7	37.2	33.1	50.6	35.1	35.7	38.5	40.4	45.0	52.6	56.2	56.6
1000	40.0	40.2	40.5	37.8	54.0	39.6	40.1	42.1	46.3	50.0	57.9	61.2	61.5
1250	42.7	42.9	43.1	41.3	57.3	43.7	43.2	45.4	48.5	52.7	61.1	65.0	66.0
1600	46.1	46.0	45.9	45.4	62.2	47.4	47.1	48.7	51.8	55.6	65.1	68.5	68.7
2000	48.8	49.0	48.2	48.0	65.5	50.1	50.7	50.9	56.1	60.3	68.4	72.4	73.2
2500	47.5	47.7	47.6	47.2	67.4	49.8	50.5	51.4	55.7	60.6	69.4	73.3	73.8
3150	31.6	32.8	33.9	32.7	53.0	36.6	37.8	37.9	42.5	47.8	55.9	59.7	60.2
4000	29.1	31.2	35.0	31.8	53.6	36.7	37.1	37.5	40.0	45.5	55.6	61.0	61.1
5000	27.5	29.4	32.9	29.8	52.9	34.6	35.8	35.7	40.1	45.4	55.4	60.0	60.4
6300	22.7	24.1	27.9	25.0	49.2	30.8	31.8	32.4	36.6	42.2	51.9	56.5	56.9
8000	21.2	25.3	27.9	27.7	54.6	32.3	33.1	34.0	40.5	45.7	55.9	61.4	61.9
10000	10.8	14.8	16.5	15.2	43.1	20.2	21.5	22.0	29.5	34.5	44.2	49.1	49.4
12500	6.0	8.7	13.1	16.0	44.7	20.3	21.2	21.0	33.4	39.2	48.7	50.5	52.9
16000	-0.9	-0.5	-0.1	0.3	25.3	2.0	2.6	2.6	15.3	19.8	28.0	30.8	32.0

Rev A1

20000	-2.5	-2.4	0.0	-2.5	17.7	-2.3	-2.1	-1.7	1.8	6.1	17.2	19.1	20.0
--------------	------	------	-----	------	------	------	------	------	-----	-----	------	------	------

0.5P 80% Speed													
Frequency	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
5	-55.4	-55.7	-50.6	-50.1	-50.0	-51.3	-46.0	-52.2	-50.9	-47.4	-30.5	-32.2	-30.7
6.3	-46.7	-44.1	-43.4	-42.3	-42.9	-42.9	-37.6	-45.0	-39.8	-42.0	-25.0	-20.5	-25.8
8	-36.2	-37.7	-33.4	-35.0	-34.9	-34.2	-32.5	-33.5	-32.1	-31.8	-18.3	-12.9	-16.2
10	-31.9	-31.2	-29.8	-24.5	-26.8	-27.8	-26.0	-29.9	-26.5	-30.4	-10.7	-5.7	-9.0
12.5	-27.9	-24.8	-25.3	-20.5	-23.3	-24.3	-21.0	-25.2	-23.9	-25.0	-3.7	0.8	-4.9
16	-22.3	-22.0	-19.7	-19.0	-19.6	-19.3	-16.6	-19.7	-18.5	-18.1	0.8	4.5	2.7
20	-19.4	-17.1	-16.8	-16.0	-15.7	-15.3	-14.1	-18.0	-14.7	-15.3	4.1	11.0	5.4
25	-16.2	-14.7	-14.0	-13.2	-15.4	-16.1	-12.7	-17.2	-15.7	-13.0	6.7	14.6	9.5
31.5	-11.2	-10.4	-10.2	-8.6	-11.1	-12.7	-9.7	-13.4	-11.7	-11.4	10.9	13.9	12.7
40	-8.8	-7.1	-10.7	-8.2	-10.8	-10.4	-6.2	-11.9	-10.6	-8.2	12.7	16.9	15.1
50	-7.3	-3.9	-7.5	-6.8	-10.2	-8.9	-3.0	-10.6	-7.1	-2.3	14.6	18.8	16.3
63	-5.3	-2.2	-4.8	-4.3	-7.6	-5.6	0.3	-6.2	-0.7	1.4	14.7	18.6	17.5
80	-1.0	0.6	-0.1	1.0	-0.2	0.1	10.5	-0.4	4.0	8.5	15.6	19.0	17.1
100	7.7	11.4	10.5	9.5	10.3	9.4	18.9	7.8	12.7	16.9	21.9	22.9	22.8
125	7.5	11.3	10.1	9.6	14.8	11.2	15.7	9.9	14.6	19.2	24.5	24.1	25.8
160	6.1	9.9	11.2	9.4	17.1	10.4	15.4	8.8	15.5	20.2	25.1	25.7	25.9
200	11.6	13.4	14.0	10.9	22.6	13.4	16.6	15.3	22.2	27.2	33.6	34.9	35.8
250	16.4	16.6	17.2	15.3	22.0	18.4	20.6	20.3	23.9	28.9	35.6	37.3	38.2
315	16.6	16.1	21.0	17.3	29.3	20.1	18.2	21.6	26.8	31.5	38.5	40.3	41.3
400	17.2	19.5	21.9	19.3	30.8	22.0	21.5	23.5	28.4	32.7	38.3	39.5	41.0
500	21.6	23.0	24.7	20.6	36.3	25.6	24.8	25.7	30.0	33.9	39.4	40.0	41.0
630	24.8	26.2	28.8	25.3	39.5	27.6	27.7	29.7	32.1	35.5	42.4	44.4	45.6
800	30.1	30.6	33.1	30.3	44.3	33.0	32.7	34.1	36.1	39.7	47.4	50.4	50.2
1000	34.4	35.6	37.3	34.7	47.6	37.1	37.2	37.2	40.8	44.5	51.4	54.2	54.8
1250	37.7	38.5	40.1	38.7	51.2	40.8	40.7	40.5	43.8	47.3	55.5	58.1	58.7
1600	41.3	41.7	42.8	42.2	55.4	45.5	44.6	43.8	47.4	50.1	59.5	61.7	62.0
2000	44.1	44.6	45.4	44.3	58.7	49.2	47.1	46.3	50.6	54.2	62.4	65.8	66.0
2500	43.3	43.1	46.1	43.9	61.4	49.5	47.2	47.9	51.1	56.0	63.5	66.7	67.3
3150	28.5	29.5	34.0	29.8	47.1	36.2	34.8	34.3	37.2	42.3	50.7	53.0	53.6
4000	24.8	27.5	31.6	26.6	47.7	32.6	32.8	33.2	34.8	40.4	50.4	54.5	54.5
5000	23.3	25.3	28.7	23.9	45.0	31.8	30.8	30.5	31.8	36.8	46.8	50.5	50.8
6300	21.3	22.8	26.7	21.2	44.5	28.9	29.2	28.6	30.2	35.8	45.3	49.2	49.7
8000	21.7	22.2	29.0	28.6	53.7	33.4	33.9	34.2	40.5	47.3	57.0	61.7	63.0
10000	10.8	10.1	15.5	12.2	39.2	17.8	18.9	18.6	25.1	31.4	41.0	44.8	45.5
12500	5.5	7.3	13.6	15.8	42.4	19.4	20.6	20.7	33.0	40.0	49.0	52.1	52.6
16000	-0.8	-1.0	-0.5	-0.1	22.2	1.1	2.6	1.7	12.8	19.4	27.7	30.4	31.0
20000	-2.4	-2.6	0.4	-2.6	17.6	-2.4	-1.3	-2.2	-1.7	2.1	10.9	14.0	14.4

0.5P 60% Speed													
Frequency	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
5	-43.0	-51.0	-49.5	-48.5	-45.8	-49.0	-46.1	-46.8	-47.3	-46.1	-41.1	-32.4	-35.9
6.3	-39.1	-44.0	-41.3	-40.8	-37.9	-42.7	-40.9	-39.3	-37.7	-38.8	-33.7	-24.7	-29.6
8	-31.9	-38.2	-35.0	-37.4	-32.2	-34.2	-36.5	-33.6	-31.9	-32.3	-28.5	-17.1	-24.8
10	-28.4	-31.8	-29.9	-30.8	-26.8	-32.1	-30.5	-28.4	-26.2	-28.9	-22.7	-10.8	-17.9
12.5	-21.3	-24.9	-25.0	-25.6	-22.1	-25.7	-24.3	-22.1	-21.6	-22.5	-15.7	-6.0	-12.0
16	-18.2	-20.4	-18.6	-20.8	-17.3	-21.5	-19.6	-18.8	-17.0	-19.1	-10.1	0.5	-7.1
20	-16.6	-18.8	-16.4	-16.6	-15.9	-16.3	-19.2	-15.7	-13.2	-15.3	-9.2	3.6	-2.8
25	-13.4	-16.0	-16.6	-15.6	-13.3	-17.6	-15.1	-13.9	-10.9	-16.3	-5.1	7.5	0.5
31.5	-11.2	-10.8	-11.6	-11.6	-10.1	-13.9	-11.7	-11.5	-9.6	-14.5	-2.5	9.5	1.9
40	-7.5	-8.7	-7.1	-8.1	-7.3	-7.6	-9.0	-7.8	-9.9	-9.9	-4.3	10.2	2.2
50	-4.4	-4.5	-2.4	-6.6	-3.0	-4.1	-4.8	-4.5	-6.6	-6.8	-2.7	8.8	3.4
63	0.3	0.4	2.2	-1.1	1.8	0.2	0.1	-0.1	-3.2	-1.8	2.2	10.2	4.5
80	5.6	3.9	7.7	2.7	7.8	5.9	4.6	4.6	1.4	5.0	10.4	11.4	10.2
100	15.0	13.5	16.7	9.4	16.3	17.3	13.7	13.7	9.2	13.7	16.6	12.5	15.7
125	15.7	13.7	18.7	14.4	16.6	15.8	14.3	15.0	9.1	14.7	17.5	14.1	17.1
160	15.1	14.5	19.9	11.8	16.7	16.8	14.2	15.1	12.4	16.2	20.4	19.4	21.4
200	7.3	8.2	11.0	8.4	14.4	9.6	10.6	9.3	13.8	16.2	23.8	25.0	25.3
250	11.1	12.5	14.5	12.5	15.0	13.7	14.9	14.5	15.2	17.7	25.1	26.7	27.7
315	14.3	15.9	16.7	15.2	20.4	15.9	16.1	16.6	17.9	20.3	27.5	30.0	30.2
400	17.9	19.9	18.4	18.5	24.7	20.0	18.5	19.8	20.8	23.3	29.7	31.0	31.8
500	20.2	21.4	22.1	21.1	29.4	23.8	24.1	22.5	24.6	26.2	31.7	33.0	33.9
630	25.6	26.1	27.8	27.5	33.4	28.3	28.2	28.1	29.6	29.4	34.3	36.2	37.2
800	31.8	31.9	33.3	33.2	38.0	35.7	34.2	32.5	35.2	35.7	39.0	40.9	41.2
1000	37.8	38.2	38.7	38.9	45.2	41.5	39.6	38.6	40.0	40.4	44.9	47.4	47.8
1250	40.8	41.7	41.9	42.4	47.9	44.2	43.0	41.5	43.5	43.4	48.4	51.1	51.0
1600	45.1	45.5	45.3	46.4	50.6	48.1	47.4	45.6	46.8	46.7	52.3	53.4	54.0
2000	48.2	48.6	48.9	49.2	53.6	50.8	49.6	48.0	49.8	49.9	55.3	57.7	58.2
2500	46.9	47.2	47.6	47.2	55.2	49.2	48.0	47.5	48.6	49.5	55.7	58.4	58.9
3150	31.8	31.8	33.5	32.0	41.2	35.0	34.1	34.0	34.3	35.0	42.5	44.3	44.9
4000	24.9	26.4	29.6	25.9	41.5	29.7	29.8	30.6	30.3	32.1	41.5	45.8	46.4
5000	23.9	26.3	28.4	23.9	41.2	30.3	29.3	30.2	28.9	29.7	38.7	42.6	43.0
6300	21.8	23.6	25.7	22.3	42.0	27.6	27.6	29.6	28.0	29.4	39.0	42.3	43.8
8000	20.1	21.2	24.9	27.5	51.0	31.8	32.7	33.4	38.8	44.9	56.1	60.9	60.9
10000	10.6	11.0	15.5	15.2	35.9	15.8	16.8	18.3	21.2	25.7	36.2	40.6	40.9
12500	3.8	3.9	6.9	11.2	38.3	16.2	17.2	17.6	26.0	32.5	44.6	48.8	48.2
16000	-0.6	-0.8	0.2	0.6	18.8	0.1	0.5	1.0	6.3	11.8	23.2	25.5	26.2
20000	-2.5	-2.5	-1.0	-2.5	14.2	-2.3	-2.1	-1.7	0.2	3.5	13.9	16.1	17.8

0.25P 100% Speed													
Frequency	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
5	-56.4	-54.9	-54.8	-56.4	-61.1	-58.5	-57.6	-57.2	-52.8	-53.1	-33.5	-44.7	-31.5
6.3	-47.4	-49.0	-49.8	-49.9	-51.4	-52.0	-50.2	-48.2	-43.1	-40.4	-25.2	-41.5	-24.1
8	-37.0	-37.5	-38.6	-35.2	-37.4	-35.0	-37.0	-37.2	-38.9	-33.7	-17.9	-32.9	-16.1
10	-33.0	-29.8	-32.3	-35.6	-30.9	-33.0	-33.1	-33.5	-36.6	-33.5	-11.4	-23.4	-10.0
12.5	-28.4	-30.0	-28.5	-31.6	-26.0	-32.5	-30.1	-27.6	-33.4	-27.0	-5.8	-17.0	-4.2
16	-24.0	-25.0	-23.2	-26.7	-21.0	-27.2	-25.3	-24.1	-28.2	-17.0	2.3	-12.5	2.0
20	-24.3	-23.1	-23.2	-26.9	-19.8	-28.4	-27.1	-22.6	-12.5	-0.8	8.7	-6.8	5.8
25	-23.0	-17.6	-21.8	-23.2	-18.3	-24.0	-22.2	-17.4	-15.9	1.3	7.9	-2.1	8.9
31.5	-18.8	-14.1	-17.7	-17.3	-13.7	-17.7	-16.9	-13.2	-17.9	1.1	12.6	-0.3	9.4
40	-14.3	-13.1	-12.6	-14.1	-7.8	-13.8	-12.9	-6.8	-7.0	4.0	13.2	0.5	11.6
50	-11.5	-11.4	-9.0	-12.3	-2.9	-11.0	-10.0	-7.0	-5.7	6.5	7.8	2.2	12.7
63	-10.2	-7.8	-8.3	-10.4	-0.2	-9.9	-8.6	-4.8	7.0	15.0	9.6	7.8	13.5
80	-5.9	-3.2	-5.9	-6.1	7.6	-5.2	-3.8	-0.1	9.2	24.8	14.8	15.3	13.2
100	2.1	6.4	5.9	0.8	17.9	3.2	5.5	10.3	14.7	24.0	22.9	21.6	20.8
125	3.5	8.4	11.4	3.8	24.0	8.0	9.4	14.8	20.7	29.3	28.5	24.8	26.3
160	5.1	8.0	7.8	4.1	19.4	6.2	8.9	11.1	17.2	24.8	22.4	23.1	23.9
200	12.8	13.1	13.7	9.0	21.9	15.5	16.0	15.4	17.7	24.1	27.0	32.2	33.8
250	15.5	15.1	19.5	13.2	26.2	18.3	16.4	18.3	20.9	27.2	31.6	36.3	38.1
315	17.0	17.3	17.4	15.0	31.0	17.4	23.4	21.8	20.8	27.9	32.5	39.5	39.0
400	17.4	17.5	21.1	15.9	37.2	20.5	21.7	22.7	26.9	32.6	36.5	40.9	39.8
500	20.3	21.1	23.9	20.7	40.5	22.7	25.3	27.1	30.8	36.9	40.7	44.6	43.2
630	27.8	29.1	29.5	24.5	43.9	28.4	29.8	30.4	32.8	38.7	43.8	48.4	47.7
800	30.2	32.2	32.4	26.4	50.7	30.7	32.0	31.4	37.1	43.6	48.8	53.5	52.7
1000	32.7	33.4	35.9	29.4	51.2	32.6	33.3	34.5	40.9	47.1	52.8	55.4	55.9
1250	34.0	35.9	38.1	32.0	55.7	33.7	36.4	37.2	42.5	48.9	56.1	58.8	59.3
1600	39.4	38.8	41.4	40.9	58.4	37.2	38.7	40.0	47.8	54.1	61.1	61.6	62.3
2000	46.4	45.3	46.4	49.0	63.2	43.0	44.0	44.5	53.8	59.2	64.8	65.5	65.8
2500	42.9	42.5	44.4	44.6	64.6	45.9	48.7	46.2	51.9	59.1	64.5	66.8	67.0
3150	31.5	30.0	32.0	32.4	50.6	33.3	35.2	34.3	39.9	46.8	51.8	54.2	54.4
4000	28.7	25.8	26.7	24.5	43.1	24.2	24.1	24.0	33.9	40.0	45.7	46.0	46.6
5000	32.1	35.0	33.6	32.0	44.8	24.3	24.3	25.3	36.1	42.0	47.3	48.0	48.7
6300	25.0	26.0	26.1	23.9	44.7	21.5	22.3	23.0	32.1	41.7	47.2	48.6	48.8
8000	18.1	19.2	19.9	17.8	44.5	16.4	17.0	17.6	30.7	40.9	45.4	46.0	46.2
10000	19.3	22.4	20.3	19.9	37.0	16.4	15.8	15.9	25.5	34.6	39.0	40.5	40.6
12500	4.9	7.6	7.0	5.0	23.8	2.0	2.2	2.3	12.3	23.1	28.2	28.2	28.4
16000	-0.8	0.5	-0.4	-0.8	19.3	-1.2	-1.1	-1.0	5.7	18.5	24.0	22.8	23.6
20000	-2.5	-2.1	-2.4	-2.4	10.6	-2.5	-2.3	0.9	-1.1	10.9	12.1	12.9	10.7

0.25P 80% Speed													
Frequency	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
5	-52.8	-53.1	-51.6	-54.7	-54.4	-54.6	-58.0	-55.2	-44.1	-48.2	-30.2	-32.2	-46.7
6.3	-46.5	-49.9	-46.9	-48.5	-47.2	-51.2	-49.1	-48.7	-39.4	-36.7	-26.2	-24.1	-39.3
8	-36.4	-35.7	-36.1	-32.9	-33.8	-37.6	-38.2	-34.9	-30.4	-30.5	-18.6	-19.9	-31.7
10	-30.7	-33.9	-29.5	-30.7	-31.4	-33.9	-32.5	-32.5	-25.3	-28.9	-11.0	-15.3	-28.2
12.5	-26.7	-28.8	-25.7	-28.2	-25.8	-28.7	-29.8	-29.9	-20.5	-22.8	-5.7	-7.8	-24.7
16	-26.2	-26.9	-23.5	-23.9	-24.4	-26.0	-26.6	-26.7	-19.5	-15.5	2.0	-5.3	-20.2
20	-23.5	-26.2	-23.0	-25.9	-23.9	-27.1	-26.9	-27.5	-9.4	-8.6	3.4	2.8	-9.5
25	-20.2	-23.0	-20.7	-24.4	-23.3	-23.9	-22.9	-23.5	-9.4	-9.8	5.7	1.9	-8.8
31.5	-15.2	-17.7	-18.0	-19.0	-17.0	-18.3	-17.4	-18.4	-11.7	-6.7	9.2	5.4	-4.4
40	-12.3	-13.3	-12.0	-12.9	-11.6	-13.7	-14.1	-13.0	-5.6	-3.4	10.0	7.5	-3.1
50	-10.2	-11.6	-8.8	-11.5	-9.5	-10.3	-10.4	-10.4	0.8	-5.0	8.6	8.4	-1.7
63	-8.5	-10.5	-5.3	-11.1	-8.8	-9.6	-9.5	-8.7	2.5	-0.9	9.4	9.3	3.2
80	-2.3	-4.3	0.1	-6.3	7.9	-4.2	-4.0	-3.9	11.4	11.6	14.1	15.0	14.9
100	8.6	5.4	8.4	-1.3	17.6	2.4	3.5	3.9	14.7	18.8	19.5	23.4	22.8
125	8.5	4.9	7.5	-0.6	8.9	-0.7	1.3	4.8	19.8	13.9	17.8	14.7	13.4
160	10.7	6.3	7.8	3.8	17.6	5.3	8.3	9.8	28.5	19.9	25.0	23.0	23.3
200	10.1	11.0	11.5	6.5	26.5	10.5	13.8	16.0	24.2	17.6	25.3	27.8	27.1
250	10.4	9.7	14.5	9.3	21.6	10.7	10.3	16.0	13.9	18.7	26.8	30.8	30.1
315	13.2	12.8	14.3	11.5	24.9	14.0	15.4	16.4	15.2	19.5	28.3	32.6	31.5
400	14.6	14.7	16.9	13.4	29.9	16.6	16.4	18.4	19.3	25.1	32.8	35.6	34.2
500	17.9	18.2	19.1	17.6	34.7	19.0	19.5	21.4	24.6	29.0	36.7	39.2	37.7
630	24.3	26.2	26.1	22.4	39.1	24.2	25.3	25.7	26.7	31.6	39.5	43.0	41.9
800	27.6	28.3	29.2	25.4	44.1	26.4	27.2	26.9	31.7	36.9	44.3	48.1	46.4
1000	30.6	30.9	32.0	27.8	46.6	27.3	28.3	29.5	33.7	39.4	47.4	49.8	49.3
1250	30.8	32.4	33.0	29.6	49.2	30.4	31.2	31.7	35.4	41.6	50.0	52.7	52.3
1600	34.3	35.3	36.6	33.3	52.6	35.1	35.3	36.4	40.3	48.1	55.9	55.6	55.4
2000	41.6	40.7	41.5	42.1	56.6	40.9	41.2	42.2	45.4	52.6	59.2	60.0	59.0
2500	41.7	41.2	41.9	45.8	57.5	47.4	42.6	47.8	47.7	52.0	58.7	60.9	60.1
3150	31.4	30.3	31.6	33.2	44.2	34.3	31.8	34.8	34.8	39.9	46.5	48.1	47.5
4000	25.6	26.0	25.5	24.9	36.8	22.3	23.1	22.5	28.3	33.3	39.4	39.9	39.6
5000	34.8	33.9	36.4	31.3	38.7	25.4	24.8	24.6	33.4	36.9	41.9	42.0	42.0
6300	25.1	24.1	24.6	22.0	37.9	21.1	21.3	22.0	25.7	33.2	41.6	41.8	41.3
8000	18.0	16.7	17.3	16.2	39.7	16.4	15.8	16.3	24.6	34.1	42.0	40.7	39.8
10000	21.4	19.9	19.4	19.2	30.6	16.0	17.3	16.7	20.1	26.4	34.2	33.8	33.4
12500	5.6	4.8	4.5	3.9	17.3	1.8	2.4	2.3	6.0	14.1	22.8	22.0	20.7
16000	-0.6	-0.8	-0.8	-1.0	18.2	-1.2	-1.1	4.2	3.6	15.1	26.1	22.2	22.9
20000	-2.4	-2.4	-2.5	-1.5	5.4	-2.5	-2.5	-2.4	1.7	1.5	8.9	6.1	5.3

0.25P 60% Speed													
Frequency	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
5	-49.2	-48.5	-50.9	-52.1	-51.9	-52.6	-52.7	-52.9	-55.8	-44.8	-43.2	-38.6	-42.3
6.3	-44.0	-43.4	-45.1	-46.0	-46.3	-47.3	-47.4	-45.3	-42.5	-37.0	-38.5	-31.7	-32.5
8	-33.6	-30.1	-30.2	-28.7	-29.7	-33.5	-34.4	-35.0	-33.9	-28.8	-32.2	-25.8	-27.2
10	-29.7	-28.5	-31.0	-28.2	-27.8	-29.1	-30.4	-31.9	-30.0	-28.2	-25.3	-20.5	-22.0
12.5	-28.9	-25.9	-27.2	-25.9	-24.4	-31.8	-29.7	-31.2	-23.1	-22.7	-19.7	-13.5	-16.8
16	-26.0	-22.9	-25.1	-22.8	-22.4	-28.8	-26.5	-27.5	-20.1	-18.5	-13.0	-9.5	-12.1
20	-24.4	-23.0	-25.3	-21.9	-21.1	-26.6	-24.7	-25.0	-8.6	-8.5	-5.9	-3.4	-7.5
25	-20.6	-18.9	-22.4	-19.4	-19.3	-22.9	-23.2	-21.3	-11.0	-11.3	-5.3	-0.6	-4.4
31.5	-15.2	-14.8	-16.8	-15.5	-13.0	-16.2	-16.8	-14.6	-9.9	-8.4	-3.1	0.8	-0.8
40	-10.9	-10.2	-11.6	-9.3	-7.6	-11.9	-12.6	-10.8	-4.2	-3.7	-2.2	4.0	0.4
50	-8.9	-9.2	-10.4	-8.3	-8.4	-9.5	-10.2	-10.2	-8.8	-5.2	-1.7	8.3	4.8
63	-7.3	-8.4	-10.6	-7.2	-3.5	-6.2	-7.3	-7.2	19.2	11.4	4.0	11.8	12.5
80	-3.3	-5.9	-6.1	-3.5	-1.2	-3.9	-4.9	-4.0	15.5	10.6	9.5	23.2	18.6
100	9.3	0.3	3.1	7.8	9.4	4.0	3.3	2.4	8.8	8.1	14.1	28.3	27.1
125	11.1	2.5	5.3	10.3	12.6	5.8	5.2	5.5	10.5	16.4	11.3	28.0	25.3
160	9.1	3.3	4.9	8.4	10.3	5.6	5.9	5.1	20.5	19.3	14.3	33.2	31.9
200	9.5	6.7	7.5	9.6	13.9	8.3	8.2	8.3	20.4	17.2	14.9	31.1	29.9
250	9.0	8.0	10.2	7.8	14.5	8.6	8.5	9.5	9.9	10.7	16.3	23.2	22.5
315	11.3	10.3	11.0	10.1	18.1	12.4	12.7	12.1	11.8	13.6	19.5	24.8	23.9
400	14.2	14.6	14.7	13.2	22.6	13.8	13.7	14.1	15.7	18.3	23.5	28.2	26.4
500	16.3	19.5	16.5	16.4	28.4	16.4	17.2	17.2	19.7	21.8	27.5	31.5	30.4
630	23.2	25.3	24.3	21.7	33.3	22.8	23.3	22.9	22.7	25.6	31.1	34.9	33.9
800	26.1	27.0	27.7	24.0	39.5	24.7	24.1	24.8	26.7	29.5	35.2	39.8	38.0
1000	29.4	29.0	31.2	27.6	39.3	26.9	24.8	25.5	28.7	32.2	37.7	41.1	40.6
1250	29.3	31.2	31.9	29.2	41.3	29.4	29.2	28.7	31.6	34.2	40.6	43.8	43.7
1600	33.0	32.8	34.0	32.4	45.0	34.0	33.7	33.8	42.3	44.5	46.8	47.8	47.7
2000	39.9	38.6	39.1	40.1	49.3	42.0	42.1	41.7	49.0	49.5	51.4	52.6	51.6
2500	41.9	41.6	41.0	48.4	50.8	45.6	47.2	45.8	45.6	46.3	50.0	51.9	52.0
3150	31.1	29.7	30.7	34.0	37.7	33.5	34.6	33.3	32.6	34.7	37.5	39.6	39.5
4000	24.4	24.7	23.9	23.1	29.5	23.2	22.9	22.5	26.1	26.8	30.3	30.9	30.7
5000	35.6	36.5	35.9	31.6	33.4	23.7	24.2	24.6	33.5	34.0	35.8	36.0	36.7
6300	24.5	25.5	24.8	22.4	29.9	20.8	20.9	21.1	24.6	25.6	30.2	31.6	31.7
8000	18.5	19.1	18.1	19.2	40.0	25.5	26.6	28.7	29.4	32.9	39.7	40.2	40.1
10000	21.3	20.9	19.9	18.7	23.6	16.2	17.3	16.9	21.4	21.7	25.3	25.9	25.9
12500	7.8	6.5	6.2	4.5	9.3	1.8	2.3	1.8	4.6	5.8	10.1	10.9	10.5
16000	0.8	-0.5	-0.0	-0.8	16.7	-1.1	-1.1	-1.0	2.1	11.7	22.4	20.4	21.5
20000	-2.3	-2.4	-2.3	-2.2	3.6	-2.5	-2.5	-2.5	-2.4	-1.4	4.1	3.2	1.9

4 Equipment

The measurements will be taken with the AWA6292 spectrum analyzer. This device allows to get the 1/3 octave attenuation measurements with different ponderation curves to the frequency measurement. According to the ISO 3746 the measurements will be taken with the ponderation curve A. The peak values of the attenuation (dB) will be recorded.

- Measurement bandwidth : 10 Hz - 23.0 kHz
- Level resolution: 0.1 dB
- Accuracy (RMS calculation): Level 1
- Range: 20-143 dB(A)
- Type Curve: A
- Measurement speed: Low

More about instruments: https://www.hzaihua.com/products_cont.html?id=115#d3



----- **The end** -----