

MAC ULTRA WASH

Acoustic Test Report



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Title

MAC ULTRA WASH Acoustic Test Report

Test conditions

Test carried out according to ISO 3744:2010(E)

Device tested

Make: HARMAN Professional Denmark ApS

Model: MAC ULTRA WASH

Serial no: 15063461652

Software version: V1.0.0

Results

An image of the test setup can be found on Page 3. Test results are listed in Table 1 on Page 5. Figures of measurement results are shown in Appendix A on Page 7.

HARMAN Professional Denmark ApS, R&D QA are responsible for the test results given in this report.

Environment

Temperature: 27.2°C Ta

Humidity: 71 %RH

AC mains power: 230 V, 50 Hz

Background noise level: 16.4 dBA

Warm-up time: 30 minutes at each test scenario

Fixture placement: Fixture was placed at least one meter from walls and ceiling, as described in the Standard ISO 3744:2010(E)

Remarks

Test results apply only to the tested specimen.

| Rev: | Made by: | Description: | Approved by: | Date approved: |
|------|-----------|--|--------------------|----------------|
| A | Kevin Guo | MAC ULTRA WASH noise level Measurement | Bo Horsted Poulsen | 2021-05-24 |
| | | | | |

Setup

The product was placed indoors in a semi-anechoic room in the internal Lab of Harman Technology in Shenzhen, China (See Figure 1). The ceiling and walls were all acoustically absorbent and the floor was reflective. The main dimensions of the room were 5.9m * 4.9m * 3.3m (length * width * height).



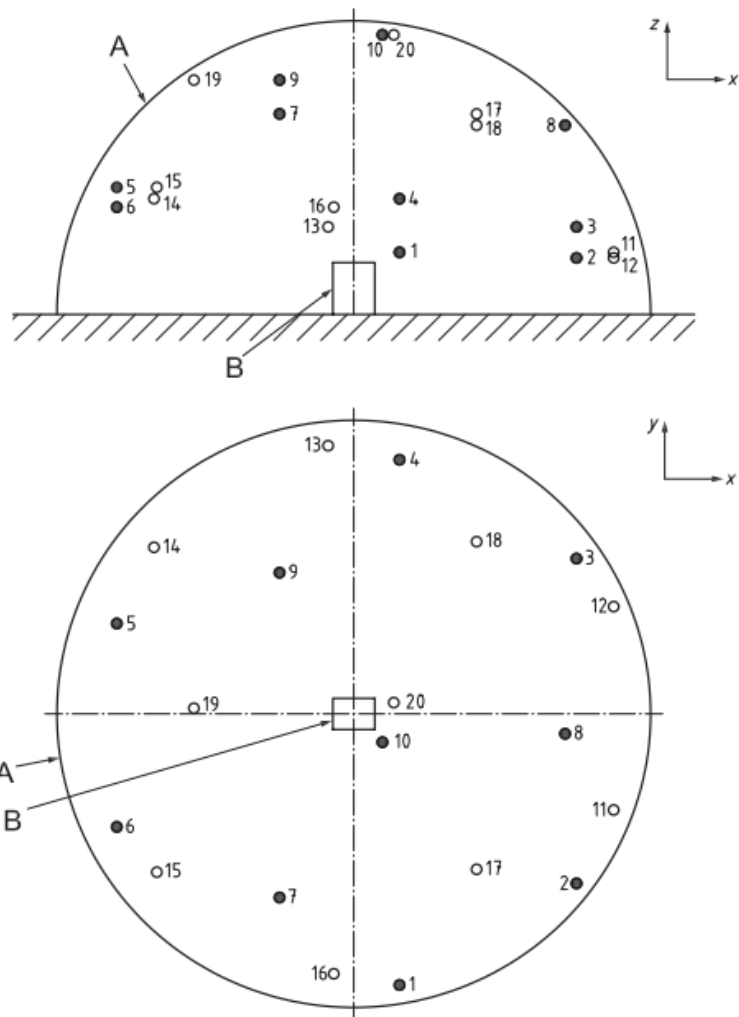
Figure 1: Test setup

The product was allowed a minimum 30 minutes of warm-up time before measurements were performed.

Measurement method

Measurements were carried out using a setup with 1 microphone. The microphone was in turn moved to the measurement positions described below.

Measurement setup at hemispherical measurement model, as figure 2



- Key**
- key microphone positions (1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
 - additional microphone positions (11, 12, 13, 14, 15, 16, 17, 18, 19, 20)
 - A measurement surface
 - B reference box

Figure 2: Microphone Positions

Note:

1. $R=1.5\text{m}$.
2. $S=2\pi R^2$, Measurement surface area: 14.14 m^2 .
3. 10 key microphones were taken measurement, as the range of A-weighted sound pressure levels measured at position 1 to 10 does not exceed 10 dB, additional 11 to 20 can be not considered.
4. The dimensions of the reference box: 47.0 cm x 62.6 cm x 63.0 cm.

Instrumentation

Please refer to Page 6 for instrumentation list.

Results

The MAC ULTRA WASH was measured in 5 different scenarios:

1. All effects static, Light source ON, 100% output white light - Regulated Fan Mode
2. All effects static, Light source ON, 100% output white light - Constant Fan Mode Full
3. All effects static, Light source ON, 100% output white light - Constant Fan Mode Medium
4. All effects static, Light source ON, 100% output white light - Constant Fan Mode Low
5. All effects static, Light source ON, 100% output white light - Constant Fan Mode Ultra-Low

Test positions and sound pressure levels are shown in Table 1.

| Distance from fixture | Regulated Fan [dB(A)] | CFF [dB(A)] | CFM [dB(A)] | CFL [dB(A)] | CFUL [dB(A)] |
|-----------------------|-------------------------|---------------|---------------|---------------|---------------|
| LpA at 0m | 45.6 | 62.9 | 57.1 | 49.9 | 42.5 |
| LpA at 1m | 37.6 | 54.9 | 49.1 | 41.9 | 34.5 |
| LpA at 4m | 25.6 | 42.9 | 37.1 | 29.9 | 22.5 |
| LpA at 7m | 20.7 | 38.0 | 32.2 | 25.0 | 17.6 |

The duration of the acoustical measurement for each position is 30s.

After calculated the time-averaged sound pressure levels of all positions and background noise, the difference between the two values is more than 15dB, therefore no correction for background noise shall be applied.

Table 1: Sound Pressure Levels

Sound Pressure Levels have been converted from Sound Power Levels using the formula: $LpA = (LwA - \text{reduction}_{\text{distance}})$

Reductions used: 8dB(A)@1m, 20dB(A)@4m, 24.9dB(A)@7m

Noise level details

Test equipment:

Instrumentation

| Equipment | Maker | Type |
|-----------|-----------|--|
| Harman | NTi Audio | NTi XL2 A2A-14709-E0 |
| Harman | NTi Audio | MIC MA220 No.7587 |
| Harman | | Semi-anechoic room |
| Harman | | Digital Barometer |
| Harman | | Data logger for atmosphere & environment |
| | | |

Table 2: Instruments Used