Test Report issued under the responsibility of:

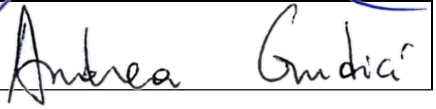
# EN 54-24
# Fire detection and fire alarm systems
# Part 24: Components of voice alarm systems - Loudspeakers

| | |
|---|---|
| **Report Reference No. ..... :** | ELE-25-0243-04-00 |
| **Date of issue ..... :** | 2025-08-28 |
| **Total number of pages ..... :** | 43 + Attachments |
| **Applicant's name ..... :** | Guangzhou DSPPA Audio Co. ,L t d . |
| **Address ..... :** | Add.: No.1 Xiahe Rd, Jianggao Town, Baiyun District, Guangzhou, China Post Code: 510450 |
| **Test item description ..... :** | Surface Mount Fireproof Ceiling Speaker |
| **Trademark ..... :** | DSPPA |
| **Manufacturer ..... :** | DSPPA Audio Co. ,L t d . |
| **Model/Type reference ..... :** | **DSP207EN** |
| **Ratings ..... :** | See below |
| **Standard ..... :** | EN 54-24:2008 |
| **Test procedure ..... :** | / |
| **Non-standard test method ..... :** | / |
| **Test Report Form No. ..... :** | F-TL-ELE-10-20 en Rev. 0.7 |
| **Test Report Form Originator ..... :** | MTIC Intercert S.r.l. |
| **Master TRF ..... :** | Dated 2025-09-02 |

**General disclaimer:** The test results presented in this report relate only to the object tested, as received.

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Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

| | | |
|---|---|---|
| **Test Laboratory ..... :** | MTIC Intercert S.r.l. | |
| **Testing location/address ..... :** | Via Moscova 11 – 20017 Rho (MI) - ITALY | |
| **Tested by (name, signature) ..... :** | Barcella Andrea |  |
| **Approved by (name, signature) ..... :** | Giudici Andrea |  |




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| Release Control Record | | |
|---|---|---|
| **Test report Number** | **Reason of change** | **Date of Issue** |
| ELE-25-0243-04-00 | Original release | 2025-08-28 |
| --- | --- | --- |
| --- | --- | --- |

This document is valid in last revision that deletes and replaces the previous one.

**Summary of testing**

| **Tests performed (name of test and test clause):** | **Testing location:** |
|---|---|
| All clauses. | MTIC Intercert S.r.l. |
| Note: | Via Moscova 11 – 20017 Rho (MI) - ITALY |

Summary of compliance with National Differences (List of countries addressed):

None

☒ The product fulfils the requirements of 54-24:2008

**Other Test Laboratory's Attachments:**

Attachment #L1: None

**List of Attachments:**

Attachment #1: DSP207EN-SPECIFICATION

Attachment #2: CURVE CLIENTE (Frequency response)

Attachment #3: 765A UL637578157494926403jqy4akjs.z0k (Material technical datasheet)

**Factory(ies) identification**

| | |
|---|---|
| **Name and address of factory(ies)...:** | **Guangzhou DSPPA Audio Co. ,Ltd .**<br>Add.: No.1 Xiahe Rd, Jianggao Town, Baiyun District, Guangzhou, China Post Code: 510450 |

**General product information:**

On wall or shelf projector 100V speaker, 12W – 6W – 3W, power taps, EN54-24:2008 standard certified.

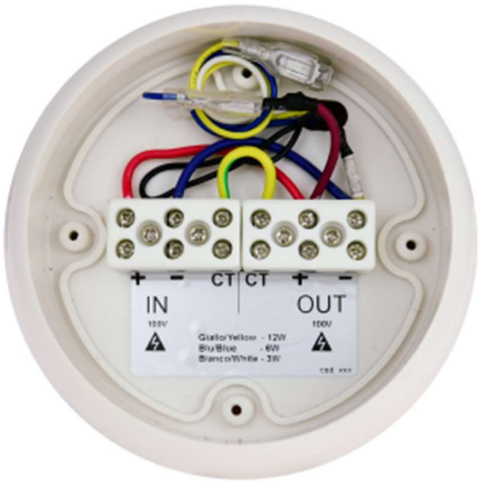
Plastic body made in ABS V0 type, Protection grid in aluminium. Suitable for indoor installation, IP rate protection: IP54.

Wide band bi-cone 5" speaker, audio transformer for connection to 100V or 70V lines, thermal fuse for protection of the speaker line in case of overheating, dual IN-OUT ceramic connector.

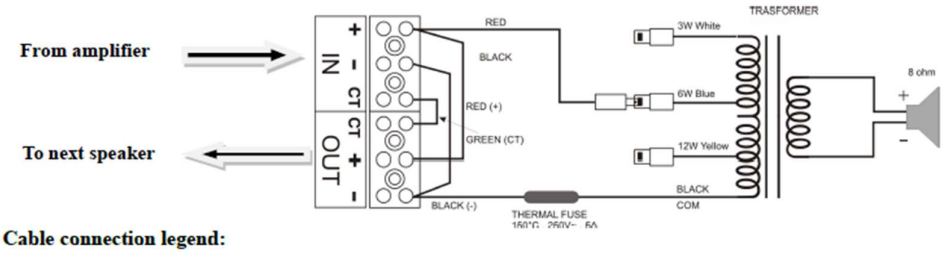
Including aluminium fixing bracket, waterproof cover and IN-OUT cable glands for easy daisy-chain speakers' connection.



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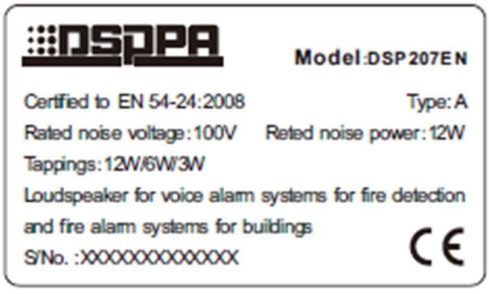

**CONNECTION DIAGRAM:**




**Cable connection legend:**

\+ = 100V
\- = 0V, COM

## Copy of marking plate




***Note:*** *The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective test laboratories that own these marks.*



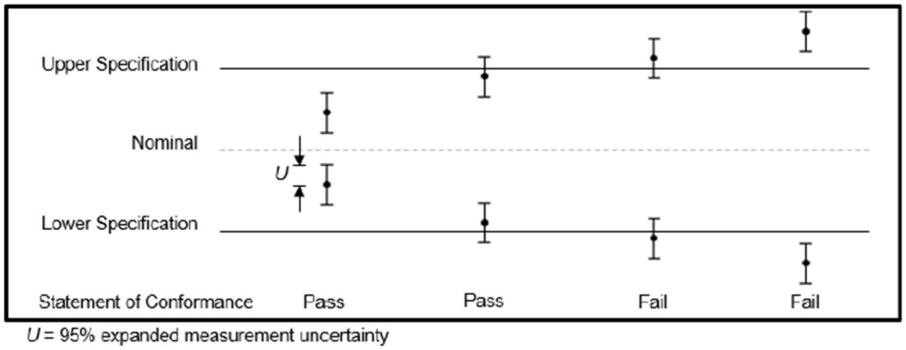
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| **GENERAL INFORMATION** | |
|---|---|
| **Environmental conditions[1]:** | |
| Ambient temperature……: | 15 - 35°C |
| Ambient humidity……..……...: | 25 - 75 %rH |
| Pressure……..: | 75 - 106kPa (750mbar - 1060mbar) |
| **Test item particulars:** | |
| Classification of installation and use……..: | Type A (IP21C – Indoor) |
| Device type (component/sub-assembly/equipment/system)……..: | Loudspeaker |
| Intended use) ……: | Components of voice alarm systems |
| Mode of operation……: | Continuous |
| Supply connection……: | Cable to VACIE |
| Accessories and detachable parts included……....: | Not applicable |
| Other options include……: | Not applicable |
| **Testing:** | |
| Date of receipt of test item(s)……..: | 2025-06-23 |
| Dates tests performed……..: | From 2025-07-07 to 2025-08-27 |
| **Sampling:** | |
| Sampling performed by……..: | Manufacturer |
| **Possible test case verdicts:** | |
| - test case does not apply to the test object ……: | Not Applicable (**N/A**) |
| - test object does meet the requirement……: | Pass (**P**) |
| - test object was not evaluated for the requirement..: | Not Evaluated (**N/E**) |
| - test object does not meet the requirement……: | Fail (**F**) |

**Decision Rule:**

The laboratory defines that the following decision rule of acceptability of the result is: "**Binary decision (with safety band w=0)**" (ref. document ILAC-G8:09/2019).




*U* = 95% expanded measurement uncertainty





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Where:

- Pass: the measured value is below the acceptability limit. Acceptability limit (AL) = Specification limit (TL)
- Fail: the measured value is above the acceptability limit. Acceptability limit (AL) = Specification limit (TL)

Assuming the following definitions

- Guard band (w): Interval between specification limit and acceptability limit, where the bandwidth is defined as w=|TL-AL|
- Specification Limit (TL): Specified upper or lower limit of permitted measured values defined by standards
- Acceptability Limit (AL): Specified upper or lower limit of permitted measured values defined by the Laboratory.

As stated in ILAC-G8-09:2019, for the simple binary method (w=0), the associated specific risk is quantified as follows:

- In < 50% PFA (Probability of False Positive) for cases where the measurement is below the limits of acceptability but considering the uncertainty U may exceed these limits.
- In <50% PFR (Probability of False Negative) for cases where the measurement is above the limits of acceptability but considering the uncertainty U could be within those limits.

**Standard cover by ISO/IEC 17025 scope:**

☒ EN 54-24

**General remarks:**

"(See Attachment #)" refers to additional information appended to the report.
"(See Appended table)" refers to a table appended to the report.
The tests results presented in this report relate only to the object tested.
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List of test equipment must be kept on file and available for review.
Additional test data and/or information provided in the attachments to this report.
Throughout this report a ☐ comma / ☒ point is used as the decimal separator.
When differences exist, they shall be identified in the General product information section.

**Note:**

[1]Datalogs, Environmental conditions, available at the laboratory.


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| Clause | Description | Type A | Type B |
|---|---|---|---|
| 5.2 | Reproducibility | All | / |
| 5.3 | Rated Impedance | 1 | / |
| 5.4 | Horizontal and Vertical coverage angles | 1 | / |
| 5.5 | Maximum sound pressure level | 1 | / |
| 5.6 | Rated noise power (durability) | 2 | / |
| 5.7 | Dry heat (operational) | 3 | / |
| 5.8 | Dry heat (endurance) | / | / |
| 5.9 | Cold (operational) | 3 | / |
| 5.10 | Damp heat, cyclic (operational) | 3 | / |
| 5.11 | Damp heat, steady state (endurance) | 3 | / |
| 5.12 | Damp heat, cyclic (endurance) | / | / |
| 5.13 | SO2 corrosion (endurance) | 4 | / |
| 5.14 | Shock (operational) | 6 | / |
| 5.15 | Impact (operational) | 5 | / |
| 5.16 | Vibration, sinusoidal (operational) | 7 | / |
| 5.17 | Vibration, sinusoidal (endurance) | 7 | / |
| 5.18 | Enclosure protection (IP33C) | 1-2 | / |


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| EN 54-24 | | | |
|---|---|---|---|
| Clause | Requirement | Remark | Verdict |
| **4** | **General requirements** | | |
| 4.1 | **Compliance**<br>In order to conform to this European Standard, voice alarm loudspeakers shall meet the requirements of this clause, which shall be verified by visual inspection or engineering assessment, shall be tested as described in Clause 5 and shall meet the requirements of the tests. | | P |
| 4.2 | **Frequency response limits**<br>The loudspeaker frequency response shall fit within the un-shaded area shown in Figure 1. | See §5.2 | P |
| 4.3 | **Durability**<br>The voice alarm loudspeaker shall be rated for at least 100 h operation at the rated noise power specified by the manufacturer (refer to the test procedure described in 5.6). | See §5.6 | P |
| 4.4 | **Construction** | | – |
| 4.4.1 | **Provision for external conductors**<br>The loudspeaker shall provide space within its enclosure for external conductors to be brought in and terminated. Entry holes for conductors or cables shall be provided or the location where such holes are to be made shall be indicated, by providing a template or some other suitable means.<br>Terminals for connecting external conductors shall be designed so that they are clamped between metal surfaces without being damaged. Each terminal shall enable the connection of any conductor having a cross sectional area between 0,8 $mm^2$ and 2,5 $mm^2$. | Each terminal accepts conductor having a cross sectional area between 0,8 $mm^2$ and 2,5 $mm^2$. | P |
| 4.4.2 | **Materials**<br>The loudspeaker shall be constructed of material(s) capable of withstanding the tests specified in Clause 5. In addition, the material(s) of plastic enclosures shall conform to the following flammability requirements:<br>a) EN 60695-11-10:1999 as amended by EN 60695-11-10:1999/A1:2003 Class V-2 or HB75 for devices operating from a voltage source less than or equal to 30 V RMS or 42,4 V DC and consuming less than 15 W of power;<br>b) EN 60695-11-20:1999 as amended by EN 60695-11-20:1999/A1:2003 Class 5VB for devices operating from a voltage source greater than 30 V RMS or 42,4 V DC and consuming more than 15 W of power. | Enclosure: ABS V0 type – painted grid in aluminium<br>Connections: Ceramic connectors and thermal fuse<br>See Attachment #3 | P |
| 4.4.3 | **Enclosure protection**<br>The degree of protection provided by the enclosure of fire alarm loudspeakers shall conform to the following requirements: | Type A (IP21C) | P |


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| EN 54-24 | | | |
|---|---|---|---|
| Clause | Requirement | Remark | Verdict |
| | - for type A, indoor applications: Code IP21C<br>- for type B, outdoor applications: Code IP33C<br>of EN 60529:1991 as amended by EN 60529:1991/A1:2000. | | |
| 4.4.4 | **Access**<br>Means shall be provided to limit access for removal of parts of or the whole device and to make adjustment to the mode of operation, e.g. special tool, codes, hidden screws, seals. | | P |
| 4.5 | **Marking and data** | | – |
| 4.5.1 | **Marking**<br>Each voice alarm loudspeaker shall be clearly marked with the following information: | | P |
| | a) number of this European Standard (i.e. EN 54-24); | EN 54-24:2008 | P |
| | b) environmental type, i.e. type A or type B; | Type A | P |
| | c) name or trademark of the manufacturer or supplier; | DSPPA | P |
| | d) manufacturer or supplier model designation (type or number); | DSP207EN | P |
| | e) terminal designations; | | N/A |
| | f) rated noise voltage for transformer-coupled loudspeakers; | 100V | P |
| | g) rated impedance for direct-coupled loudspeakers; | Transformer-coupled loudspeakers | P |
| | h) rated noise power (at the highest power setting); | 12W | P |
| | i) power settings (e.g. transformer tapping options for transformer-coupled loudspeakers); | 12W, 6W and 3W<br>Internal wirings connections, see diagram connection on “General product information”. | P |
| | j) mark(s) or code(s) (for example, a serial number or batch code), by which the manufacturer can identify, at least, the date or batch and place of manufacture. | | P |
| | Where any marking on the device uses symbols or abbreviations not in common use then these shall be explained in the data supplied with the device | | P |
| | The marking need not be discernible when the device is installed and ready for use but shall be visible during installation and shall be accessible during maintenance. The markings shall not be placed on screws or other easily removable parts | | P |
| 4.5.2 | **Information in the product data sheet** | | |
| | The information required in 4.5.1 together with the following shall be supplied with the device, or shall be given in a data sheet or technical manual identified on, or with each device: | | P |
| | a) frequency response for each stated reference axis; | 110Hz – 18000Hz | P |


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| EN 54-24 | | | |
|---|---|---|---|
| Clause | Requirement | Remark | Verdict |
| | b) sensitivity for the stated reference axis (see 5.1.5); | 86.3dB (1W/1m)<br>74.3dB (1W/4m) | P |
| | c) horizontal and vertical coverage angles at 500 Hz, 1 kHz, 2 kHz, 4 kHz for each stated reference plane, measured as described in 5.4.2; | 360° H/V (500 Hz)<br>254° H/V (1 kHz)<br>126° H/V (2 kHz)<br>87° H/V (4 kHz) | P |
| | d) maximum sound pressure level (at highest power setting) for each stated reference plane, measured as described in 5.5.2; | 97,2dB Max SPL (1W/1m)<br>85,2dB Max SPL (1W/4m) | P |
| | e) terminal designations; | | P |
| | f) rated noise power, measured as described in 5.6.2; | See table 5.6.2 | P |
| | g) rated impedance for each tapping, measured as described in 5.3.2; | 833,3Ω (12W),<br>1,66kΩ (6W),<br>3,33kΩ (3W) | |
| | h) 1/3 octave band frequency response of any dedicated active equalization which may be required; | No active equalization required | N/A |
| | i) any other information necessary to enable correct installation, operation and maintenance of the device; | See Attachment #1 | P |
| | j) acoustical measurement environment used for the specifications listed in this data sheet, e.g. free-field, half-space free-field, standard baffle. | Free Field | P |
| | If different settings, except power settings, are available on the loudspeaker, such as tone control or adjustable parts, the manufacturer shall specify, for each of the above, the applicable configuration(s). | No different settings are available on the loudspeaker | N/A |

| **5** | **Tests** | | |
|---|---|---|---|
| 5.1.1 | Unless otherwise stated in a test procedure, the testing shall be carried out after the test specimen has been allowed to stabilize in the standard atmospheric conditions for testing described in EN 60068-1, as follows:<br>- temperature: 15 ºC to 35 ºC;<br>- relative humidity: 25 % to 75 %;<br>- air pressure: 86 kPa to 106 kPa.<br>The temperature and humidity shall be substantially constant for each test where these standard atmospheric conditions are applied. | | P |
| 5.1.2 | Unless otherwise stated in a test procedure the test specimen shall be:<br>a) set at its highest power setting;<br>b) preconditioned in accordance with Annex A;<br>c) mounted in the acoustical environment as described in Annex A and as specified by the manufacturer (see 4.5.2 j)). | | P |


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| EN 54-24 | | | |
|---|---|---|---|
| Clause | Requirement | Remark | Verdict |
| | If different settings, except power settings, are available on the loudspeaker, such as tone control or adjustable parts (excluding external mounting bracket), the manufacturer shall specify the configuration(s) to be tested. | | P |
| 5.1.3 | For environmental conditioning tests, unless otherwise specified, the specimen shall be mounted by its normal means of attachment in accordance with the manufacturer's instructions. If these instructions describe more than one method of mounting then the method considered to be most unfavourable shall be chosen for each test. | | P |
| | For some loudspeakers, due to their size, it might not be practical to conduct all of the environmental tests. In such cases, testing may be carried out on a smaller representative specimen, where this is deemed to produce a valid result for a given test | | P |
| 5.1.4 | The tolerances for the environmental test parameters shall be as given in the basic reference standards for the test (e.g. the relevant part of EN 60068).<br>If a specific tolerance or deviation limit is not specified in a requirement or test procedure, then a deviation limit of ± 5 % shall be applied. | | P |
| 5.1.5 | The sound pressure level Lm,i shall be measured in the 1/3 octave bands from 100 Hz to 10 kHz, at the measuring distance, on the reference axis, when the loudspeaker is supplied with a band-filtered noise signal of constant voltage.<br>These levels Lm,i shall be the average true RMS values over a period of at least:<br>- 10 s for 1/3 octave bands from 100 Hz to 400 Hz,<br>- 3 s for 1/3 octave bands from 500 Hz to 1,6 kHz,<br>- 1 s for 1/3 octave bands from 2 kHz to 10 kHz.<br>The measurement shall be performed either: | | P |
| | a) by supplying the loudspeaker sequentially with a 1/3 octave band filtered pink noise signal such that the square of the RMS voltage divided by the rated impedance equals 1 W. In this case the measured sound pressure levels in each 1/3 octave band (Lm,i) shall be corrected (Lc,i) as follows:<br>Lc,i = Lm,i −10×log10 (21) | | N/A |
| | b) by supplying the loudspeaker with a pink noise signal such that the square of the RMS voltage divided by the rated impedance equals 1 W spread over the full range of frequencies (from 100 Hz to 10 kHz, 1/3 octave bands) and analysing the microphone output signal by means of 1/3 octave filters. In that case:<br>Lc,i = Lm,i | | P |


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| EN 54-24 | | | |
|---|---|---|---|
| Clause | Requirement | Remark | Verdict |
| 5.1.6 | The sensitivity $S$ shall be given by the following equation:<br>$S = 10 \times \log_{10}\left[\sum_{i=1}^{i=21} 10^{\left(\frac{L_{c,i}}{10}\right)}\right]$ dB<br>where $L_{c,1}$ to $L_{c,21}$ are the 1/3 octave sound pressure levels from 100 Hz to 10 kHz from the frequency response curve. | | P |
| 5.2 | Reproducibility | | — |
| | a) the frequency response curve fits within the limits shown in 4.2, | See Table 5.2a | P |
| | b) the sound pressure levels in the 1/3 octave bands with centre frequencies from 500 Hz to 4 kHz are within ± 4 dB of the manufacturer's specified curve and | See Table 5.2b<br>See Attachment #2 | P |
| | c) the sensitivity S is greater than or equal to the values specified by the manufacturer | See Table 5.2c | P |
| 5.3 | Rated impedance | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if either 1,min Z or 2,min Z is not lower than 80 % of the rated impedance specified by the manufacturer for each tap setting. | See Table 5.3 | P |
| 5.4 | Horizontal and vertical coverage angles | | — |
| | The loudspeaker shall be deemed to conform to the coverage angles test if the measured horizontal and vertical coverage angles are equal to the values specified by the manufacturer within ± 5°.. | See Table 5.4a and See Table 5.4b | P |
| 5.5 | Maximum sound pressure level | | — |
| | The loudspeaker shall be deemed to conform to the rated sound pressure test if Lmax is greater or equal to the value specified by the manufacturer. | See Table 5.5 | P |
| 5.6 | Rated noise power (durability) | | — |
| | The loudspeaker shall be deemed to conform to the requirement of this test if: | | P |
| | a)the RMS current consumption of the specimen that incorporates protective devices has not reduced by more than 25 % at any time during the conditioning and | | P |


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| EN 54-24 | | | |
|---|---|---|---|
| Clause | Requirement | Remark | Verdict |
| | b) at the end of the recovery period:<br>1) the frequency response curve obtained does not deviate from the one measured before the test by more than ± 3 dB, between and including 500 Hz and 8 kHz and<br>2) the frequency response curve obtained complies with the frequency response performance requirement in 4.2 | See Table 5.6 | P |
| | c) the lowest impedance modulus is not lower than 80 % of the rated impedance specified by the manufacturer. | | P |
| 5.7 | Dry heat (operational) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.7 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.8 | Dry heat (endurance) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.8 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.9 | Cold (operational) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.9 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.10 | Damp heat, cyclic (operational) | | — |


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| EN 54-24 | | | |
|---|---|---|---|
| Clause | Requirement | Remark | Verdict |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.10 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.11 | Damp heat, cyclic (operational) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.11 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.12 | Damp heat, cyclic (endurance) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.12 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.13 | Sulphur dioxide (SO2) corrosion (endurance) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.13 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.14 | Shock (operational) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |


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| EN 54-24 | | | |
|---|---|---|---|
| Clause | Requirement | Remark | Verdict |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.14 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.15 | Impact (operational) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.15 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.16 | Vibration, sinusoidal (operational) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.16 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.17 | Vibration, sinusoidal (endurance) | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |
| | a) the specimen operates continuously during the last hour of conditioning and | | P |
| | b) the frequency response curve fits within the limits specified in 4.2 and | See Table 5.17 | P |
| | c) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test. | | P |
| 5.18 | Enclosure protection | | — |
| | The loudspeaker shall be deemed to conform to the requirements of this sub-clause if: | | P |


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| EN 54-24 | | | |
|---|---|---|---|
| Clause | Requirement | Remark | Verdict |
| | a) the specimen tested conforms with the acceptance conditions for the test for protection against solid foreign objects of EN 60529:1991, 13.3 and | | P |
| | b) the specimen tested conforms with the acceptance conditions for the test against protection against access to hazardous parts EN 60529:1991 as amended by EN 60529:1991/A1:2000, 15.3 and | See Table 5.17 | P |
| | c) after the conditioning period for the test for protection against water:<br>1) the frequency response curve fits within the limits specified in 4.2 and<br>2) the frequency response curve between and including 500 Hz and 8 kHz does not deviate by more than ± 3 dB from that measured during the reproducibility test<br>3) no water has penetrated the enclosure or, if water has penetrated the enclosure, the device incorporates adequate provision for drainage. | | P |

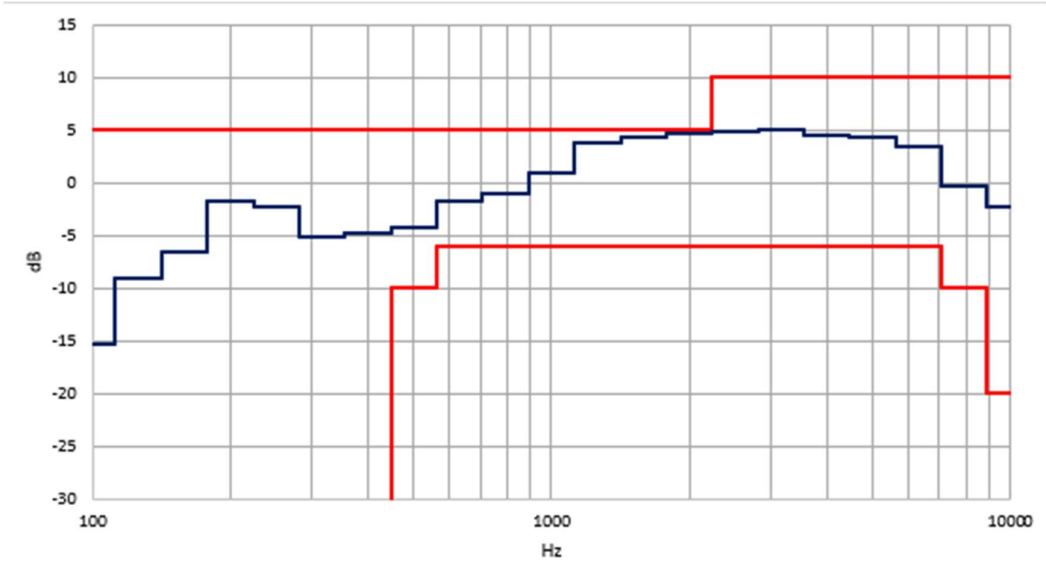

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## 5.2 Reproducibility

| **Table 5.2a** | | **Frequency response (curve fits)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Specimen n°/ Model | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| DSP207EN | P | P | P | P | P | P | P | / | / | |
| **Table 5.2b** | | **Frequency response (± 4 dB of the manufacturer's curve)** | | | | | | | | |
| Specimen n°/ Model | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| DSP207EN | P | P | P | P | P | P | P | / | / | |
| **Table 5.2c** | | **Sensitivity ($S_x$≥ Nominal) [dB]** | | | | | | | | |
| Specimen n°/ Model | Nominal (1W/4m) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Result |
| DSP207EN | 74 | 76 | 76 | 76 | 76 | 76 | 77 | 76 | / | / | P |


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**Sample n.1**



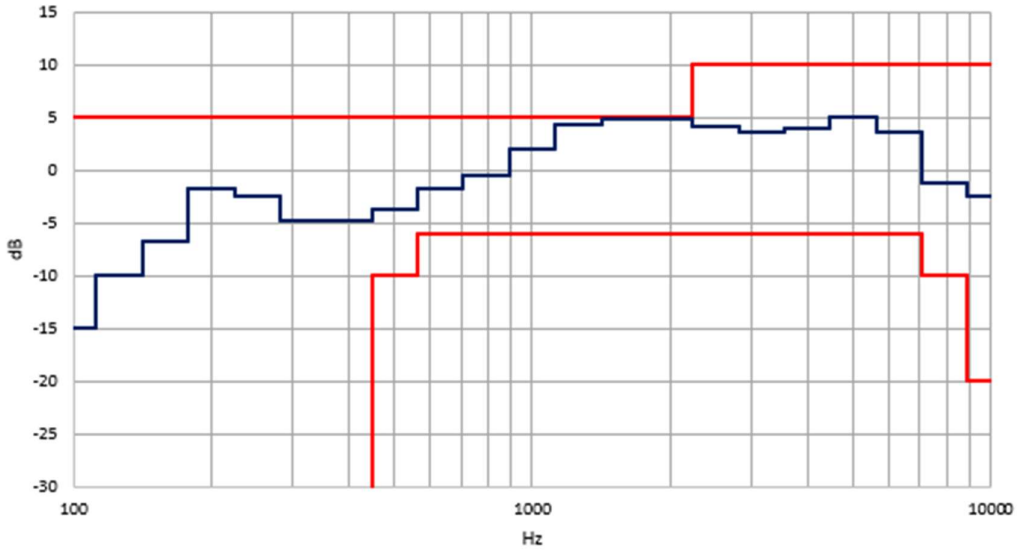

| Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2a | 46,7 | 53,0 | 55,5 | 60,2 | 59,7 | 57,0 | 57,3 | 57,8 | 60,4 | 61,0 | 63,0 | 65,9 | 66,3 | 66,7 | 66,8 | 67,0 | 66,6 | 66,3 | 65,5 | 61,7 | 59,7 |
| 5.2b | --- | --- | --- | --- | --- | --- | --- | -3,4 | -3,3 | -2,9 | -2,3 | 0,1 | -2,6 | -2,8 | -1,8 | -0,7 | -2,3 | --- | --- | --- | --- |
| Manufacturer curve | 49,5 | 58,1 | 64,3 | 65,4 | 64,2 | 62,5 | 61,7 | 61,3 | 63,7 | 63,9 | 65,3 | 65,8 | 68,9 | 69,5 | 68,7 | 67,8 | 68,9 | 69,5 | 68,3 | 63,7 | 65,5 |



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**Sample n.2**



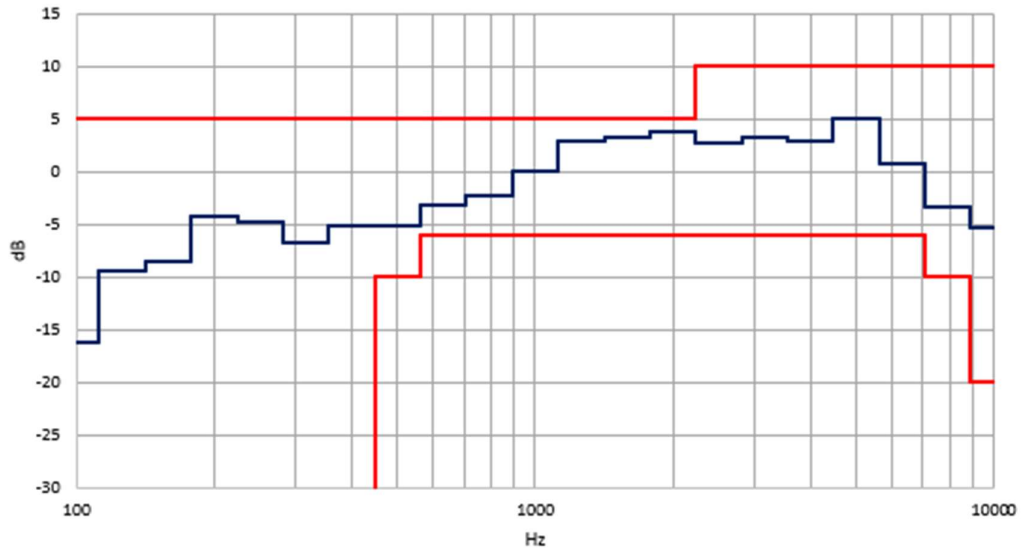

| Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2a | 46,7 | 51,8 | 54,9 | 60,0 | 59,3 | 57,0 | 56,9 | 58,0 | 59,9 | 61,2 | 63,7 | 66,1 | 66,5 | 66,6 | 65,8 | 65,4 | 65,7 | 66,7 | 65,3 | 60,5 | 59,3 |
| 5.2b | --- | --- | --- | --- | --- | --- | --- | -3,3 | -3,8 | -2,7 | -1,6 | 0,2 | -2,4 | -2,9 | -2,8 | -2,4 | -3,2 | --- | --- | --- | --- |
| Manufacturer curve | 49,5 | 58,1 | 64,3 | 65,4 | 64,2 | 62,5 | 61,7 | 61,3 | 63,7 | 63,9 | 65,3 | 65,8 | 68,9 | 69,5 | 68,7 | 67,8 | 68,9 | 69,5 | 68,3 | 63,7 | 65,5 |



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**Sample n.3**



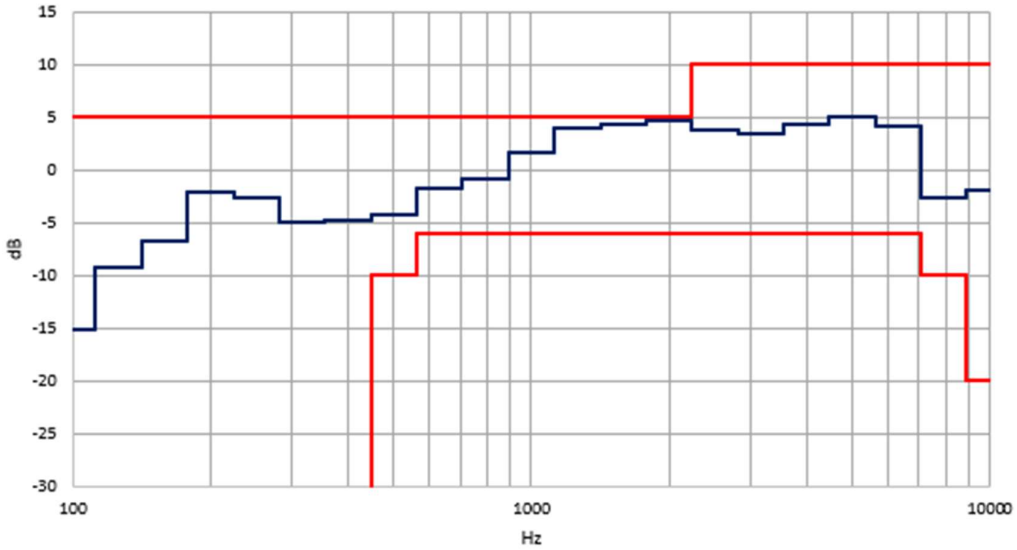

| Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2a | 47,0 | 53,8 | 54,8 | 59,0 | 58,6 | 56,6 | 58,2 | 58,1 | 60,1 | 61,0 | 63,4 | 66,2 | 66,5 | 67,1 | 66,0 | 66,6 | 66,3 | 68,3 | 64,1 | 59,9 | 58,0 |
| 5.2b | --- | --- | --- | --- | --- | --- | --- | -3,1 | -3,6 | -2,9 | -1,9 | 0,4 | -2,4 | -2,4 | -2,7 | -1,1 | -2,7 | --- | --- | --- | --- |
| Manufacturer curve | 49,5 | 58,1 | 64,3 | 65,4 | 64,2 | 62,5 | 61,7 | 61,3 | 63,7 | 63,9 | 65,3 | 65,8 | 68,9 | 69,5 | 68,7 | 67,8 | 68,9 | 69,5 | 68,3 | 63,7 | 65,5 |



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**Sample n.4**



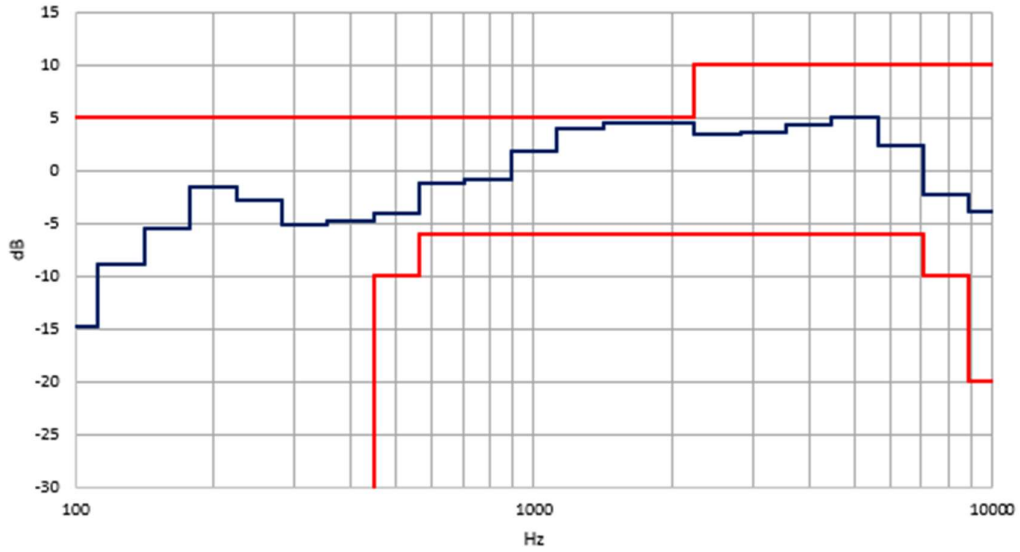

| Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2a | 46,7 | 52,5 | 55,2 | 59,7 | 59,1 | 56,8 | 57,0 | 57,7 | 60,1 | 61,0 | 63,5 | 65,7 | 66,1 | 66,6 | 65,7 | 65,2 | 66,2 | 66,8 | 65,9 | 59,1 | 59,9 |
| 5.2b | --- | --- | --- | --- | --- | --- | --- | -3,6 | -3,6 | -2,9 | -1,8 | -0,1 | -2,8 | -2,9 | -3,0 | -2,5 | -2,8 | --- | --- | --- | --- |
| Manufacturer curve | 49,5 | 58,1 | 64,3 | 65,4 | 64,2 | 62,5 | 61,7 | 61,3 | 63,7 | 63,9 | 65,3 | 65,8 | 68,9 | 69,5 | 68,7 | 67,8 | 68,9 | 69,5 | 68,3 | 63,7 | 65,5 |



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**Sample n.5**



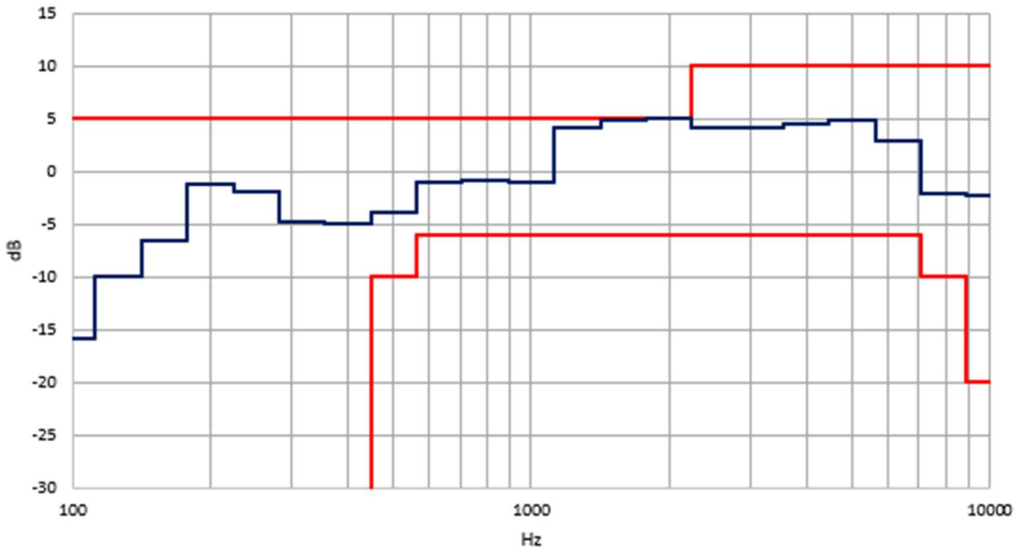

| Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2a | 47,0 | 52,9 | 56,1 | 60,1 | 58,9 | 56,5 | 57,0 | 57,7 | 60,5 | 60,8 | 63,5 | 65,7 | 66,2 | 66,3 | 65,2 | 65,3 | 66,1 | 66,7 | 64,0 | 59,5 | 57,8 |
| 5.2b | --- | --- | --- | --- | --- | --- | --- | -3,6 | -3,2 | -3,1 | -1,8 | -0,1 | -2,7 | -3,2 | -3,5 | -2,5 | -2,9 | --- | --- | --- | --- |
| Manufacturer curve | 49,5 | 58,1 | 64,3 | 65,4 | 64,2 | 62,5 | 61,7 | 61,3 | 63,7 | 63,9 | 65,3 | 65,8 | 68,9 | 69,5 | 68,7 | 67,8 | 68,9 | 69,5 | 68,3 | 63,7 | 65,5 |



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**Sample n.6**



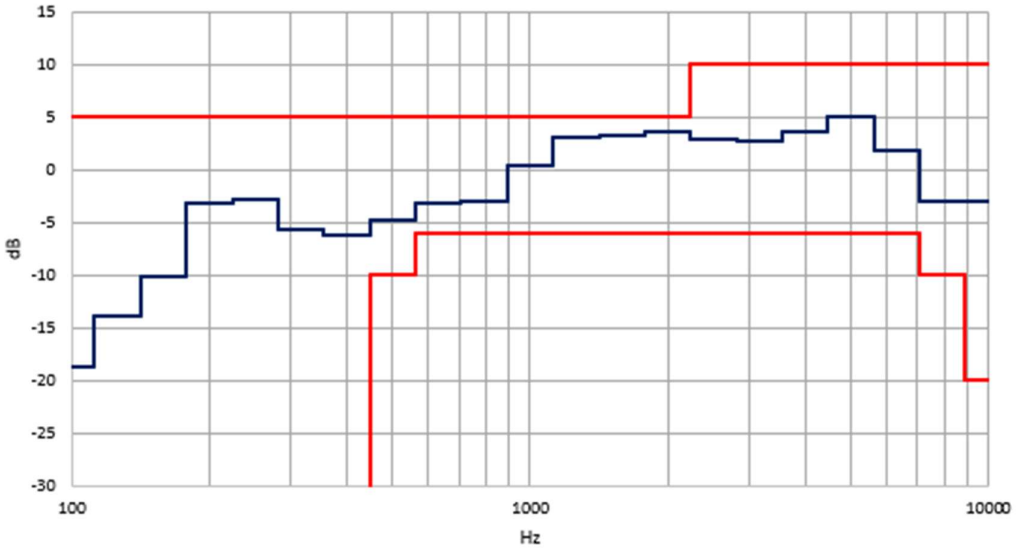

| Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2a | 46,8 | 52,6 | 56,0 | 61,4 | 60,6 | 57,8 | 57,7 | 58,7 | 61,4 | 61,7 | 61,5 | 66,8 | 67,4 | 67,6 | 66,6 | 66,7 | 67,1 | 67,4 | 65,5 | 60,5 | 60,2 |
| 5.2b | --- | --- | --- | --- | --- | --- | --- | -2,5 | -2,3 | -2,2 | -3,8 | 1,0 | -1,5 | -2,0 | -2,1 | -1,0 | -1,8 | --- | --- | --- | --- |
| Manufacturer curve | 49,5 | 58,1 | 64,3 | 65,4 | 64,2 | 62,5 | 61,7 | 61,3 | 63,7 | 63,9 | 65,3 | 65,8 | 68,9 | 69,5 | 68,7 | 67,8 | 68,9 | 69,5 | 68,3 | 63,7 | 65,5 |



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**Sample n.7**




| Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2a | 44,5 | 49,4 | 53,1 | 60,1 | 60,4 | 57,6 | 57,0 | 58,4 | 60,0 | 60,3 | 63,7 | 66,3 | 66,6 | 66,9 | 66,1 | 66,0 | 66,9 | 68,2 | 65,0 | 60,2 | 60,2 |
| 5.2b | --- | --- | --- | --- | --- | --- | --- | -2,9 | -3,7 | -3,6 | -1,7 | 0,5 | -2,3 | -2,6 | -2,6 | -1,7 | -2,1 | --- | --- | --- | --- |
| Manufacturer curve | 49,5 | 58,1 | 64,3 | 65,4 | 64,2 | 62,5 | 61,7 | 61,3 | 63,7 | 63,9 | 65,3 | 65,8 | 68,9 | 69,5 | 68,7 | 67,8 | 68,9 | 69,5 | 68,3 | 63,7 | 65,5 |



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**Sample n.8**

***N/A***

| Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2a | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / |
| 5.2b | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / |
| Manufacturer curve | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / |

**Sample n.9**

***N/A***

| Hz | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2a | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / |
| 5.2b | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / |
| Manufacturer curve | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / |



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| **Table 5.3** | **Rated impedance** | | |
|---|---|---|---|
| Model | Nominal [Ω] | Obtained [Ω] | Result |
| DSP207EN | 833 (12W) | 955 (12W) | P |
| | 1666 (6W) | 1889 (6W) | P |
| | 3333 (3W) | 3688 (3W) | P |

| **Table 5.4a** | **Horizontal coverage angles** | | |
|---|---|---|---|
| Frequency | Nominal [°] | Obtained [°] | Result |
| 500 Hz | 360 | 360 | P |
| 1 kHz | 254 | 255 | P |
| 2 kHz | 126 | 122 | P |
| 4 kHz | 87 | 85 | P |

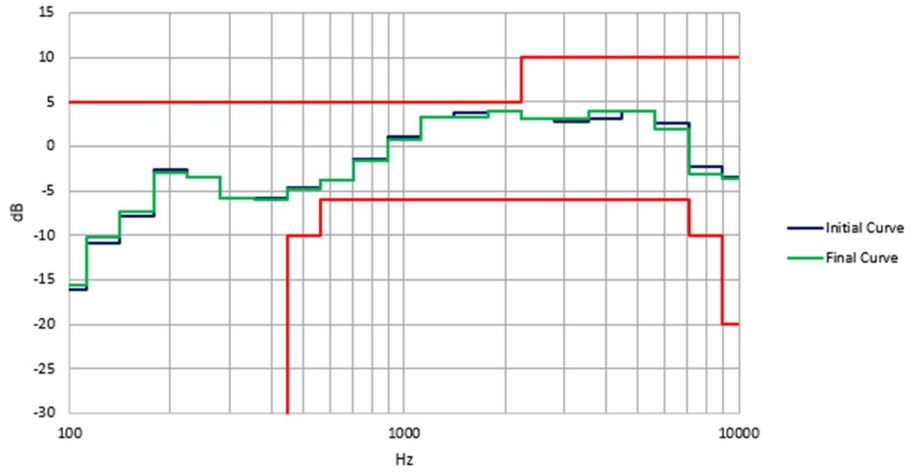
| **Table 5.4b** | **Vertical coverage angles** | | |
|---|---|---|---|
| Frequency | Nominal [°] | Obtained [°] | Result |
| 500 Hz | 360 | 360 | P |
| 1 kHz | 254 | 255 | P |
| 2 kHz | 126 | 122 | P |
| 4 kHz | 87 | 85 | P |

| **Table 5.5** | **Maximum sound pressure level** | | |
|---|---|---|---|
| Model | Nominal [dB (@4m)] | Measured [dB (@4m)] | Result |
| DSP207EN | 85 | 87 | P |


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| Table 5.6 | Rated noise power (durability) | | |
|---|---|---|---|
| **Clause** | **Requirement – Test** | **Results – Remarks** | **Verdict** |
| 5.6.2.1 | The rated noise power shall be measured as described in Annex B. | | – |
| 5.6.2.2 | The loudspeaker shall be placed in the test room in which the atmospheric conditions, as specified in 5.1.1, are maintained. The specimen under test shall be sounding for a continuous period of 100 h at the rated noise voltage as specified by the manufacturer.<br>After the test, the loudspeaker shall be stored under atmospheric conditions specified in 5.1.1 for 24 h. | | – |
| 5.6.2.3 | The RMS current consumption of a loudspeaker that incorporates protective devices shall be continuously monitored throughout the duration of the test. An integration time between 3 s and 10 s shall be used for the measurement. | | P |
| 5.6.2.4 | The frequency response shall be measured in accordance with 5.1.5 or, if applicable, 5.1.6. | | P |
| | The rated impedance shall be measured in accordance with 5.3. | | P |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 46,7 | 51,8 | 54,9 | 60,0 | 59,3 | 57,0 | 56,9 | 58,0 | 59,9 | 61,2 | 63,7 | 66,1 | 66,5 | 66,6 | 65,8 | 65,4 | 65,7 | 66,7 | 65,3 | 60,5 | 59,3 |
| **b) Frequency response (dB)** | 47,1 | 52,5 | 55,3 | 59,7 | 59,3 | 56,9 | 56,7 | 57,8 | 59,9 | 61,0 | 63,4 | 66,0 | 66,0 | 66,6 | 65,8 | 65,8 | 66,6 | 66,7 | 64,6 | 59,6 | 59,0 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | 0,1 | 0,1 | 0,2 | 0,3 | 0,0 | 0,5 | 0,1 | 0,0 | -0,4 | -0,9 | 0,0 | 0,7 | 0,8 | --- |



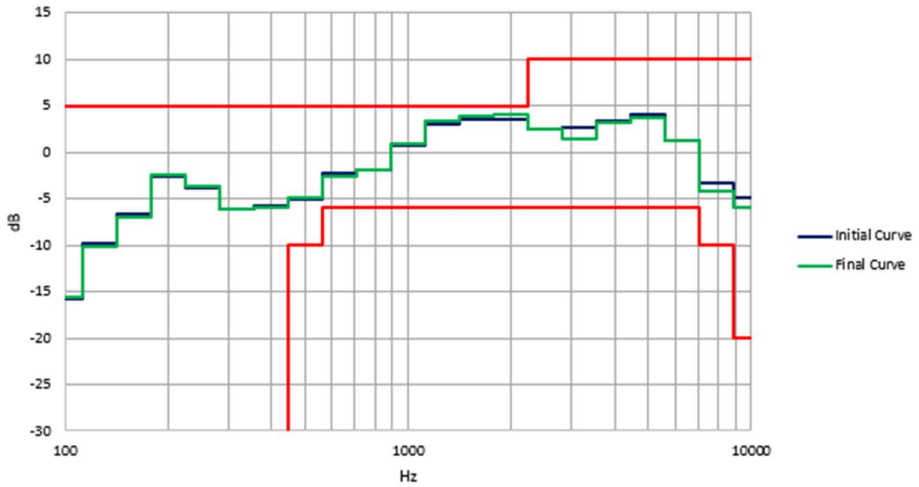



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| Table 5.7 | Dry heat (operational) | | | |
|---|---|---|---|---|
| **Clause** | **Requirement – Test** | | | **Results – Remarks** | **Verdict** |
| 5.7.2.1 | The test apparatus and procedure shall be as described in test Bb of EN 60068-2-2:1993. | | | | — |
| 5.7.2.2 | The specimen shall be maintained in the quiescent state during the conditioning (see 5.7.2.3) except during the last hour when it shall be driven by a simulated programme signal at half the rated noise voltage. | | | | — |
| 5.7.2.3 | Environmental<br>A<br>B | Temperature<br>55 ± 2°C<br>70 ± 2°C | Duration<br>16 h<br>16 h | Type A | — |
| 5.7.2.4 | The specimen shall be checked for audible output during the final hour of the high temperature phase in the last cycle. | | | | P |
| 5.7.2.5 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the recovery period specified in EN 60068-2-2:1993 | | | | P |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 47,0 | 52,9 | 56,1 | 60,1 | 58,9 | 56,5 | 57,0 | 57,7 | 60,5 | 60,8 | 63,5 | 65,7 | 66,2 | 66,3 | 65,2 | 65,3 | 66,1 | 66,7 | 64,0 | 59,5 | 57,8 |
| **b) Frequency response (dB)** | 47,2 | 52,5 | 55,6 | 60,2 | 59,1 | 56,6 | 56,7 | 57,8 | 60,1 | 60,8 | 63,6 | 66,0 | 66,6 | 66,7 | 65,1 | 64,2 | 65,8 | 66,5 | 63,9 | 58,5 | 56,8 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | -0,1 | 0,4 | 0,0 | -0,1 | -0,3 | -0,4 | -0,4 | 0,0 | 1,1 | 0,3 | 0,3 | 0,1 | 1,0 | --- |








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| Table 5.8 | Dry heat (endurance) | | | | |
|---|---|---|---|---|---|
| **Clause** | **Requirement – Test** | | | **Results – Remarks** | **Verdict** |
| 5.8.2 | The test apparatus and procedure shall be as described in test Ba or Bb of EN 60068-2-2:1993 as amended by EN 60068-2-2:1993/A1:1993 and EN 60068-2-2:1993/A2:1994. | | | | — |
| 5.8.2.3 | Environmental<br>A<br>B | Temperature<br>no test<br>70 ± 2°C | Duration<br>no test<br>21 days | (Type A) | N/A |
| 5.8.2.4 | No measurements are required during the conditioning. | | | | — |
| 5.8.2.5 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the recovery period specified in EN 60068-2-2. | | | | N/A |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **b) Frequency response (dB)** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

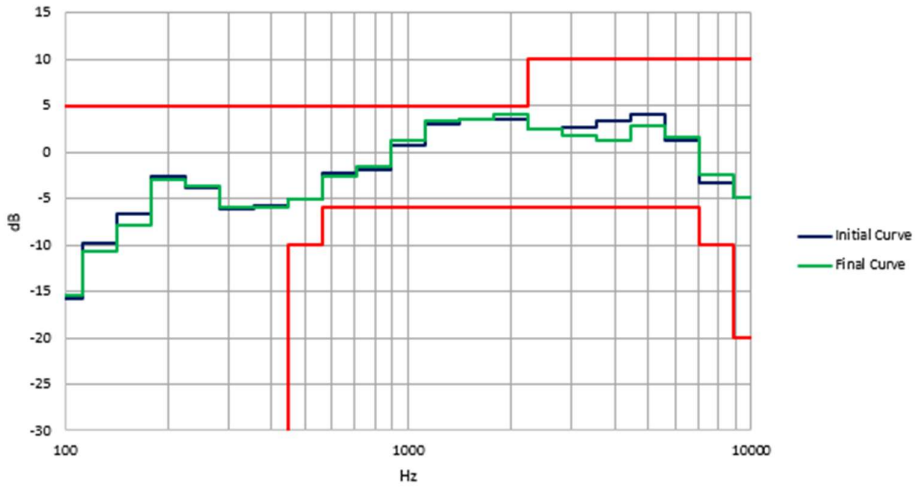


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| Table 5.9 | Cold (operational) | | |
|---|---|---|---|
| **Clause** | **Requirement – Test** | **Results – Remarks** | **Verdict** |
| 5.9.2.1 | The test procedure shall be as described in test Ab for non-dissipating specimens or test Ad for heat dissipating specimens of EN 60068-2-1:2007. | | – |
| 5.9.2.2 | The specimen shall be maintained in the quiescent state during the conditioning (see 5.9.2.3) except during the last hour when it shall be driven by a simulated programme signal at half the rated noise voltage. | | – |
| 5.9.2.3 | Environmental / Temperature / Duration<br>A / -10 ± 3°C / 16 h<br>B / -25 ± 3°C / 16 h | Type A | – |
| 5.9.2.4 | The specimen shall be checked for audible output during the final half hour of conditioning. | | P |
| 5.9.2.5 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the recovery period specified in EN 60068-2-1. | | P |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 47,0 | 52,9 | 56,1 | 60,1 | 58,9 | 56,5 | 57,0 | 57,7 | 60,5 | 60,8 | 63,5 | 65,7 | 66,2 | 66,3 | 65,2 | 65,3 | 66,1 | 66,7 | 64,0 | 59,5 | 57,8 |
| **b) Frequency response (dB)** | 47,9 | 52,5 | 55,3 | 60,3 | 59,6 | 57,4 | 57,3 | 58,2 | 60,7 | 61,7 | 64,5 | 66,7 | 66,9 | 67,3 | 65,8 | 65,1 | 64,5 | 66,1 | 64,9 | 60,9 | 58,3 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | -0,5 | -0,2 | -0,9 | -1,0 | -1,0 | -0,7 | -1,0 | -0,6 | 0,2 | 1,6 | 0,6 | -0,9 | -1,4 | --- |



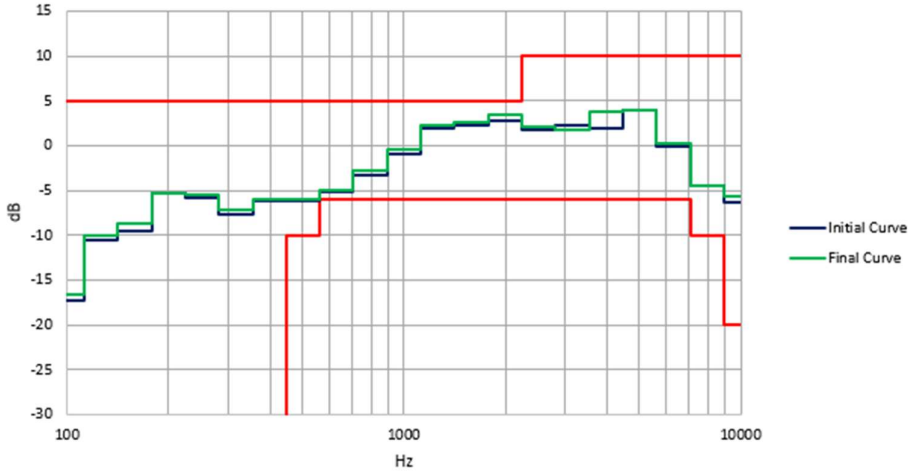





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| Table 5.10 | Damp heat, cyclic (operational) | | |
|---|---|---|---|
| **Clause** | **Requirement – Test** | **Results – Remarks** | **Verdict** |
| 5.10.2.1 | The test apparatus and procedure shall be as described in EN 60068-2-30:2005, using the Variant 1 test cycle and controlled recovery conditions. | | — |
| 5.10.2.2 | The specimen shall be maintained in the quiescent state during the conditioning (see 5.10.2.3) except during the last half hour of the high temperature phase (see Table 5) of the last cycle when it shall be driven by a simulated programme signal at half the rated noise voltage. | | — |
| 5.10.2.3 | Environmental / Lower Temperature / Upper Temperature / Number of cycles<br>A: 25±3°C - UR≥95% / 40±2°C - UR 93±3% / 2<br>B: 25±3°C - UR≥95% / 55±2°C - UR 93±3% / 2 | Type A | — |
| 5.10.2.4 | The specimen shall be checked for audible output during the final half hour of the high temperature phase in the last cycle. | | P |
| 5.10.2.5 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the recovery period specified in EN 60068-2-30. | | P |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 47,0 | 53,8 | 54,8 | 59,0 | 58,6 | 56,6 | 58,2 | 58,1 | 60,1 | 61,0 | 63,4 | 66,2 | 66,5 | 67,1 | 66,0 | 66,6 | 66,3 | 68,3 | 64,1 | 59,9 | 58,0 |
| **b) Frequency response (dB)** | 47,3 | 54,0 | 55,2 | 58,6 | 58,6 | 56,8 | 58,0 | 57,9 | 60,0 | 61,1 | 63,6 | 66,3 | 66,6 | 67,4 | 66,1 | 65,7 | 67,8 | 68,0 | 64,1 | 59,4 | 58,3 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | 0,2 | 0,1 | -0,1 | -0,2 | -0,1 | -0,1 | -0,3 | -0,1 | 0,9 | -1,5 | 0,3 | 0,0 | 0,4 | --- |



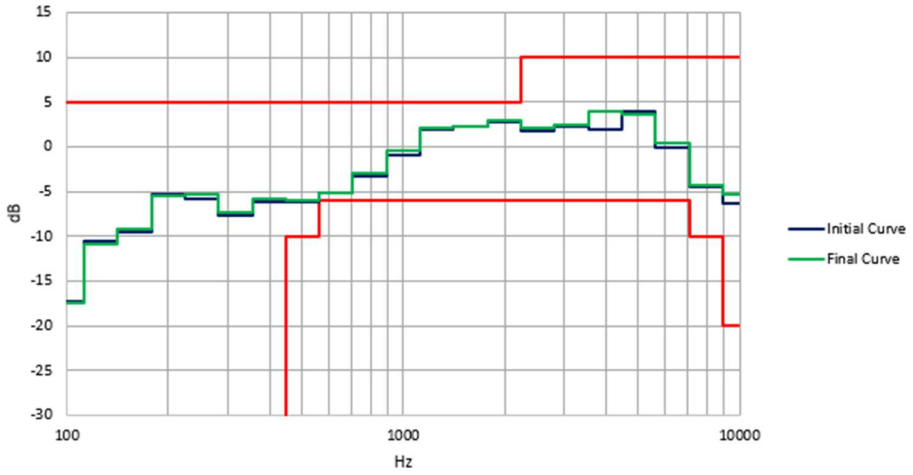



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| Table 5.11 | Damp heat, steady state (endurance) | | | | |
|---|---|---|---|---|---|
| **Clause** | **Requirement – Test** | | | **Results – Remarks** | **Verdict** |
| 5.11.2.1 | The test apparatus and procedure shall be as described in EN 60068-2-78:2001, Test Cab. | | | | – |
| 5.11.2.2 | The specimen shall not be supplied with power during the conditioning (see 5.11.2.3). | | | | – |
| 5.11.2.3 | Environmental | Temperature | Duration | Type A | – |
| | A | 40±2°C - UR 93±3% | 21 days | | |
| | B | 40±2°C - UR 93±3% | 21 days | | |
| 5.11.2.4 | No measurements are required during the conditioning. | | | | – |
| 5.11.2.5 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the recovery period specified in EN 60068-2-78:2001, Test Cab. | | | | P |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 47,0 | 53,8 | 54,8 | 59,0 | 58,6 | 56,6 | 58,2 | 58,1 | 60,1 | 61,0 | 63,4 | 66,2 | 66,5 | 67,1 | 66,0 | 66,6 | 66,3 | 68,3 | 64,1 | 59,9 | 58,0 |
| **b) Frequency response (dB)** | 46,9 | 53,4 | 55,2 | 58,8 | 58,9 | 57,0 | 58,5 | 58,2 | 60,2 | 61,4 | 63,9 | 66,3 | 66,6 | 67,3 | 66,4 | 66,8 | 68,3 | 67,9 | 64,7 | 60,0 | 58,9 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | -0,1 | -0,1 | -0,4 | -0,5 | -0,1 | -0,1 | -0,2 | -0,4 | -0,1 | -2,0 | 0,4 | -0,6 | -0,1 | --- |





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| Table 5.12 | Damp heat, cyclic (endurance) | | | | | |
|---|---|---|---|---|---|---|
| **Clause** | **Requirement – Test** | | | | **Results – Remarks** | **Verdict** |
| 5.11.2.1 | The test apparatus and procedure shall be as described in EN 60068-2-30:2005, using the Variant 1 test cycle and controlled recovery conditions. | | | | | — |
| 5.11.2.2 | The specimen shall not be supplied with power during the conditioning (see 5.12.2.3). | | | | | — |
| 5.11.2.3 | Environmental | Lower Temperature | Upper Temperature | Number of cycles | Type A | — |
| | A | No test | No test | No test | | |
| | B | 25±2°C - UR≥95% | 55±2°C - UR 93±3% | 6 | | |
| 5.11.2.4 | No measurements are required during the conditioning. | | | | | — |
| 5.11.2.5 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the recovery period specified in EN 60068-2-30. | | | | | N/A |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **b) Frequency response (dB)** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

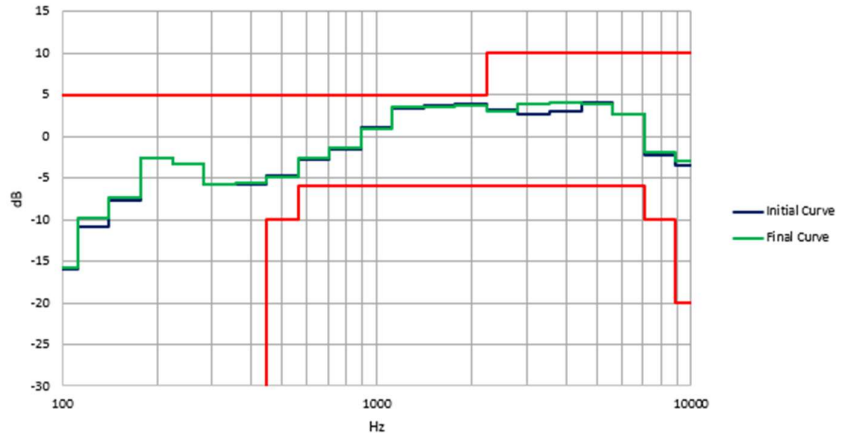


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| Table 5.13 | Sulphur dioxide (SO2) corrosion (endurance) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Clause** | **Requirement – Test** | | | | | **Results – Remarks** | **Verdict** |
| 5.13.2.1 | The test apparatus and procedure shall be as described in EN 60068-2-42:2003, Test Kc, except for the relative humidity of the test atmosphere, which shall be maintained at (93 ± 3) % instead of (75 ± 5) %. | | | | | | – |
| 5.13.2.2 | The specimen shall have un-tinned copper wires, of appropriate diameter, connected to sufficient terminals to allow the functional test to be made after conditioning, without making further connections to the specimen. The specimen shall not be supplied with power during the conditioning (see 5.13.2.3). | | | | | | – |
| 5.13.2.3 | Environmental | Sulphur dioxide content | Temperature | Relative humidity | Duration | | – |
| | A and B | 25 ± 5 µl/l | 25±2°C | 93±3% | 21 days | | |
| 5.13.2.4 | No measurements are required during the conditioning | | | | | | – |
| 5.13.2.5 | Immediately after the conditioning the specimen shall be subjected to a drying period of 16 h at (40 ± 2) °C, ≤ 50 % RH, followed by a recovery period of 1 h to 2 h at the standard atmospheric conditions (see 5.1.1). The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the recovery period. | | | | | | P |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 46,7 | 51,8 | 54,9 | 60,0 | 59,3 | 57,0 | 56,9 | 58,0 | 59,9 | 61,2 | 63,7 | 66,1 | 66,5 | 66,6 | 65,8 | 65,4 | 65,7 | 66,7 | 65,3 | 60,5 | 59,3 |
| **b) Frequency response (dB)** | 44,7 | 50,6 | 53,2 | 57,9 | 57,2 | 54,7 | 54,9 | 55,6 | 57,8 | 59,0 | 61,4 | 63,9 | 64,0 | 64,1 | 63,5 | 64,3 | 64,4 | 64,4 | 63,1 | 58,6 | 57,5 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | 2,4 | 2,1 | 2,2 | 2,3 | 2,1 | 2,5 | 2,5 | 2,4 | 1,1 | 1,3 | 2,3 | 2,2 | 1,9 | --- |



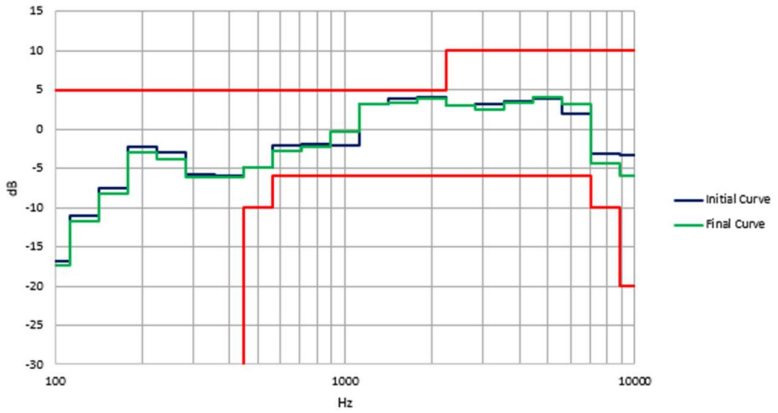



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| Table 5.14 | Shock (operational) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Clause** | **Requirement – Test** | | | | | | **Results – Remarks** | **Verdict** |
| 5.14.2.1 | The test apparatus and procedure shall be as described in EN 60068-2-27:1993, Test Ea, for a half sine wave pulse, but with the peak acceleration related to specimen mass as indicated below. Three shocks shall be applied in each direction of three mutually perpendicular axis (i.e. a total of 18 shocks). One of the three axes shall be perpendicular to the normal mounting plane of the equipment. | | | | | | | — |
| 5.14.2.2 | The specimen shall be mounted on a rigid fixture and shall be maintained in the quiescent state during the conditioning period (see 5.14.2.3). | | | | | | | — |
| 5.14.2.3 | Environmental type | Pulse type | Pulse duration | Maximum acceleration related to specimen mass M in kg: M ≤4,75 kg | Maximum acceleration related to specimen mass M in kg: M > 4,75 kg | No. of shock per direction | No. of pulses per direction | P |
| | A and B | Half sine | 6 ms | 10 x (100 - 20M) m s-2 | No test | 6 | 3 | |
| 5.14.2.4 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the conditioning. | | | | | | | P |

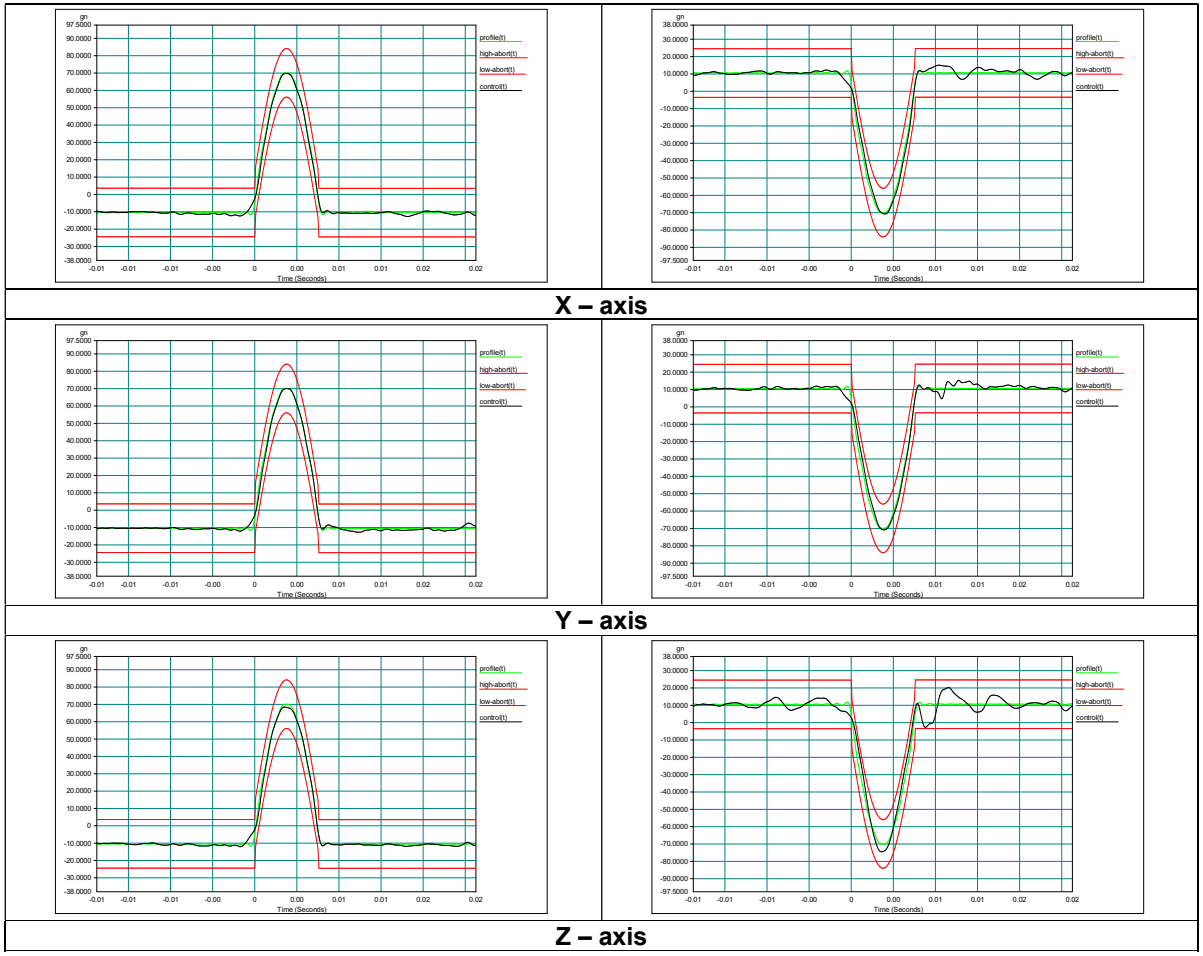
| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 46,8 | 52,6 | 56,0 | 61,4 | 60,6 | 57,8 | 57,7 | 58,7 | 61,4 | 61,7 | 61,5 | 66,8 | 67,4 | 67,6 | 66,6 | 66,7 | 67,1 | 67,4 | 65,5 | 60,5 | 60,2 |
| **b) Frequency response (dB)** | 46,6 | 52,3 | 55,8 | 61,1 | 60,3 | 57,9 | 57,8 | 59,1 | 61,3 | 61,9 | 63,8 | 67,3 | 67,4 | 68,0 | 67,1 | 66,5 | 67,4 | 68,0 | 67,2 | 59,7 | 58,1 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | -0,3 | 0,1 | -0,2 | -2,3 | -0,5 | 0,0 | -0,5 | -0,5 | 0,2 | -0,3 | -0,6 | -1,7 | 0,8 | --- |






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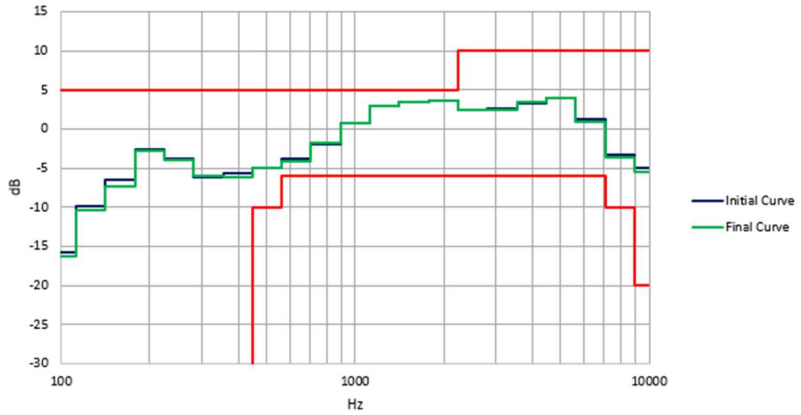





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| Table 5.15 | Impact (operational) | | | |
|---|---|---|---|---|
| **Clause** | **Requirement – Test** | | **Results – Remarks** | **Verdict** |
| 5.15.2.1 | The test apparatus and procedure shall be as described in EN 60068-2-75:1997, Test Eh for test Ehb. Impacts shall be applied to all accessible surfaces of the specimen. For all such surfaces three blows shall be applied to any point(s) considered likely to cause damage to or impair the operation of the specimen. Care shall be taken to ensure that the results from one series of three blows do not influence subsequent series. In case of doubt with regard to the influence of preceding blows, the defect shall be disregarded and a further three blows shall be applied to the same position on a new specimen. | | | — |
| 5.15.2.2 | The specimen shall be maintained in the quiescent state during the conditioning period (see 5.15.2.3). | | | — |
| 5.15.2.3 | Environmental | Impact energy | Number of impact per accessible point | — |
| | A and B | 0,5 ± 0,04 J | 3 | |
| 5.15.2.4 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the conditioning. | | | P |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 47,0 | 52,9 | 56,1 | 60,1 | 58,9 | 56,5 | 57,0 | 57,7 | 60,5 | 60,8 | 63,5 | 65,7 | 66,2 | 66,3 | 65,2 | 65,3 | 66,1 | 66,7 | 64,0 | 59,5 | 57,8 |
| **b) Frequency response (dB)** | 46,3 | 52,4 | 55,4 | 60,0 | 58,7 | 56,7 | 56,5 | 57,7 | 60,1 | 61,0 | 63,4 | 65,6 | 66,2 | 66,2 | 65,1 | 65,2 | 66,1 | 66,7 | 63,6 | 59,0 | 57,3 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | 0,0 | 0,3 | -0,1 | 0,1 | 0,1 | 0,0 | 0,0 | 0,1 | 0,1 | 0,0 | 0,0 | 0,4 | 0,5 | --- |





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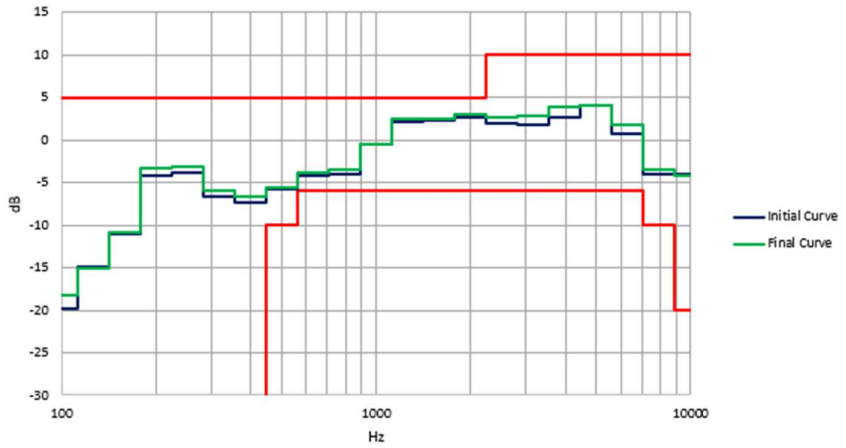
| Table 5.16 | Vibration, sinusoidal (operational) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Clause** | **Requirement – Test** | | | | | | **Results – Remarks** | **Verdict** |
| 5.16.2.1 | The test apparatus and procedure shall be as described in EN 60068-2-6:1995, Test Fc. The vibration shall be applied in each of three mutually perpendicular axes, in turn. One of the three axes shall be perpendicular to the normal mounting plane of the equipment. One sweep cycle (i.e. a sweep of the frequency range from min. to max. to min.) shall be applied for each of the specified functional modes. | | | | | | | — |
| 5.16.2.2 | The specimen shall be mounted on a rigid structure and the vibration shall be applied in each of three mutually perpendicular axes, in turn. The specimen shall be mounted so that one of the three axes is perpendicular to its normal mounting plane. The specimen shall be driven by a simulated programme signal at half rated noise voltage during the conditioning period (see 5.16.2.3). | | | | | | | — |
| 5.16.2.3 | Environmental | Frequency range | Acceleration amplitude | Number of axis | Sweep rate | Sweep cycles per axis x funct. Cond. | | — |
| | A and B | 10 to 150 Hz | 5 m s-2 - 0,5 gn | 3 | 1 oct/min | 1 | | |
| 5.16.2.4 | The specimen shall be checked for audible output during the conditioning period. | | | | | | | P |
| 5.16.2.5 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 after the conditioning. | | | | | | | P |

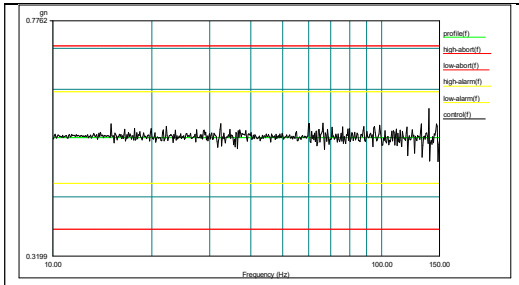
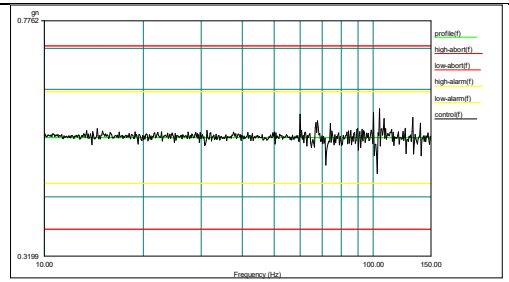
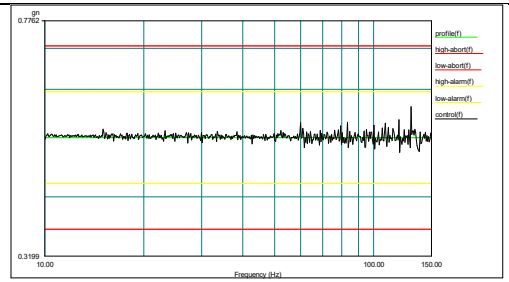
| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 44,5 | 49,4 | 53,1 | 60,1 | 60,4 | 57,6 | 57,0 | 58,4 | 60,0 | 60,3 | 63,7 | 66,3 | 66,6 | 66,9 | 66,1 | 66,0 | 66,9 | 68,2 | 65,0 | 60,2 | 60,2 |
| **b) Frequency response (dB)** | 45,5 | 48,6 | 52,8 | 60,2 | 60,5 | 57,7 | 56,9 | 58,1 | 59,7 | 60,2 | 63,2 | 66,1 | 66,2 | 66,6 | 66,3 | 66,4 | 67,5 | 67,6 | 65,4 | 60,1 | 59,5 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | 0,3 | 0,3 | 0,1 | 0,5 | 0,2 | 0,4 | 0,4 | -0,1 | -0,4 | -0,6 | 0,6 | -0,3 | 0,1 | --- |



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| | | |
|---|---|---|
|  |  |  |
| **X – axis** | **Y – axis** | **Z – axis** |

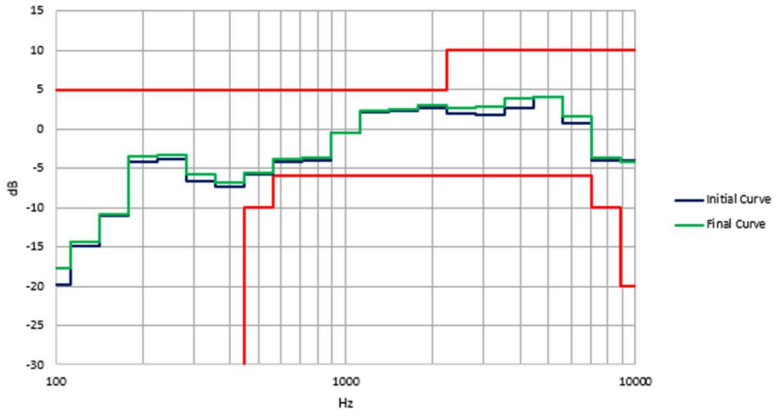




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| Table 5.17 | Vibration, sinusoidal (endurance) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Clause** | **Requirement – Test** | | | | | | **Results – Remarks** | **Verdict** |
| 5.17.2.1 | The test apparatus and procedure shall be as described in EN 60068-2-6:1995, Test Fc. | | | | | | | – |
| 5.17.2.2 | The specimen shall be mounted on a rigid fixture and the vibration shall be applied in each of three mutually perpendicular axes, in turn. The specimen shall be mounted so that one of the three axes is perpendicular to its normal mounting axes. The vibration shall be applied in each of three mutually perpendicular axes in turn. One of these axes shall be perpendicular to the normal mounting plane of the equipment. The specimen shall not be supplied with power during conditioning. | | | | | | | – |
| 5.17.2.3 | Environmental | Frequency range | Acceleration amplitude | Number of axis | Sweep rate | Sweep cycles per axis x funct. Cond. | | – |
| | A and B | 10 to 150 Hz | 10 m s-2 - 1 gn | 3 | 1 oct/min | 20 | | |
| 5.17.2.4 | No measurements are required during the conditioning. | | | | | | | – |
| 5.17.2.5 | The frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6 immediately after the conditioning. | | | | | | | P |

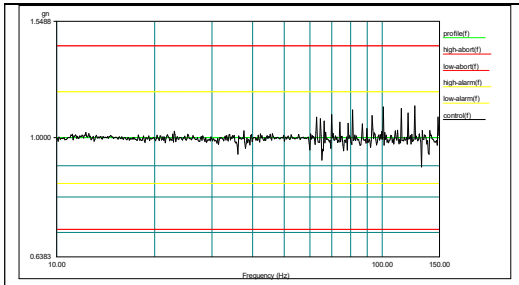
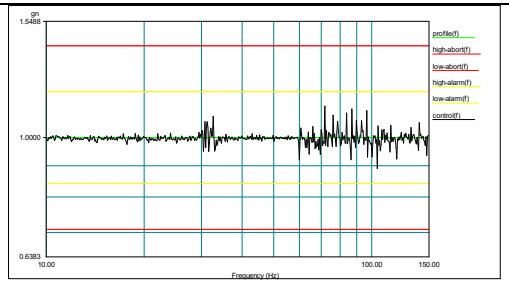
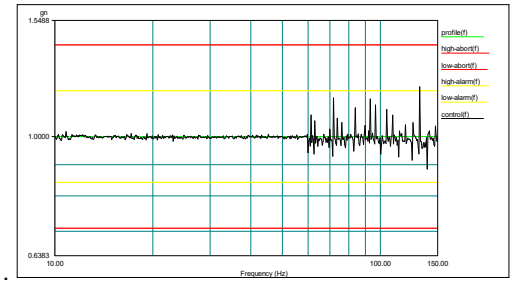
| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 44,5 | 49,4 | 53,1 | 60,1 | 60,4 | 57,6 | 57,0 | 58,4 | 60,0 | 60,3 | 63,7 | 66,3 | 66,6 | 66,9 | 66,1 | 66,0 | 66,9 | 68,2 | 65,0 | 60,2 | 60,2 |
| **b) Frequency response (dB)** | 45,9 | 49,2 | 52,8 | 60,2 | 60,3 | 57,8 | 56,8 | 58,1 | 59,9 | 60,1 | 63,2 | 66,0 | 66,2 | 66,6 | 66,4 | 66,5 | 67,6 | 67,7 | 65,4 | 60,1 | 59,5 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | 0,3 | 0,2 | 0,2 | 0,5 | 0,3 | 0,3 | 0,3 | -0,3 | -0,5 | -0,7 | 0,6 | -0,3 | 0,1 | --- |








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| | | |
|---|---|---|
|  |  |  |
| **X – axis** | **Y – axis** | **Z – axis** |



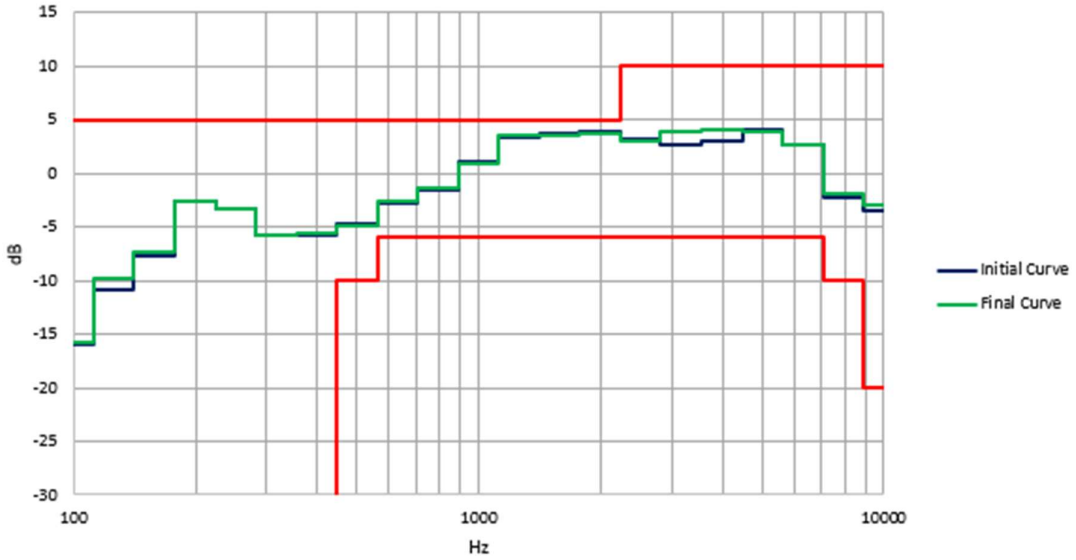
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| Table 5.18 | Enclosure protection | | |
|---|---|---|---|
| **Clause** | **Requirement – Test** | **Results – Remarks** | **Verdict** |
| 5.18.3.1 | The test apparatus and procedures shall be as described in EN 60529 as amended by EN 60529:1991/A1.<br>Loudspeakers shall be tested for the following:<br>a) protection against solid foreign objects as indicated by the first characteristic numeral and<br>b) protection against access to hazardous parts as indicated by the additional letter and<br>c) protection against water as indicated by the second characteristic numeral. | | — |
| 5.18.3.2 | The specimen under test shall be mounted as specified in EN 60529:1991 and shall include all wiring termination boxes which form part of the loudspeaker when installed. The specimen under test shall be:<br>- un-powered during the test for protection against solid foreign objects;<br>- un-powered during the test for protection against access to hazardous parts;<br>- powered, using a simulated programme signal at half the rated noise voltage, during the test for protection against water. | | — |
| 5.18.3.3 | environmental type A IP21C<br>environmental type B IP33C | Type A | |
| 5.18.3.4 | No measurements are required during the conditioning for Type A loudspeakers. | | |
| 5.18.3.5 | At the end of the conditioning period for the test for protection against water:<br>- the frequency response of the specimen shall be measured as described in 5.1.5 or, if applicable, 5.1.6;<br>- the specimen shall be examined for ingress of water inside the enclosure. | | |

| **Frequency response curve** | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) Frequency response (dB)** | 46,7 | 51,8 | 54,9 | 60,0 | 59,3 | 57,0 | 56,9 | 58,0 | 59,9 | 61,2 | 63,7 | 66,1 | 66,5 | 66,6 | 65,8 | 65,4 | 65,7 | 66,7 | 65,3 | 60,5 | 59,3 |
| **b) Frequency response (dB)** | 44,7 | 50,6 | 53,2 | 57,9 | 57,2 | 54,7 | 54,9 | 55,6 | 57,8 | 59,0 | 61,4 | 63,9 | 64,0 | 64,1 | 63,5 | 64,3 | 64,4 | 64,4 | 63,1 | 58,6 | 57,5 |
| **Deviation (limit ±3dB)** | --- | --- | --- | --- | --- | --- | --- | 2,4 | 2,1 | 2,2 | 2,3 | 2,1 | 2,5 | 2,5 | 2,4 | 1,1 | 1,3 | 2,3 | 2,2 | 1,9 | --- |


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