INTERNATIONAL STANDARD

ISO 14878

First edition
2015-12-15

Cycles — Audible warning devices — Technical specification and test methods

Cycles — Dispositifs avertisseurs sonores — Spécifications techniques et méthodes d'essai

Reference number
ISO 14878:2015(E)

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Contents

Page

Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 149, *Cycles*, Subcommittee SC 1, *Cycles and major sub-assemblies*.

Cycles — Audible warning devices — Technical specification and test methods

1 Scope

This International Standard lays down the technical specifications, such as the sound pressure level and the durability, and specifies the corresponding test method for audible warning devices (AWD) which may be fitted to cycles.

This International Standard applies to all types of audible warning devices (AWD) for use on bicycles.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9227, *Corrosion test in artificial atmosphere — Salt spray tests*

ISO 26101, *Acoustics — Test methods for the qualification of free-field environments*

IEC 60942, *Electroacoustics — Sound calibrators*

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*

IEC 61672-3, *Electroacoustics — Sound level meters — Part 3: Periodic tests*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
cycle
any vehicle that has at least two wheels and is propelled solely or mainly by the muscular energy of the person on that vehicle, in particular by means of pedals

3.2
bicycle
two-wheeled cycle

3.3
audible warning device
AWD
device designed for the purpose to warn people by an audible signal

Note 1 to entry: Including all types of technologies (i.e. bells, horns, electronic audible warning device).

3.4
audible warning device class I
AWD designed for general purpose

3.5
audible warning device class II
AWD designed for purpose of use in area primarily shared by pedestrians and cyclists, such as a pedestrian zone

4 Symbols and abbreviated terms

AWD Audible warning device

5 Instrumentations

5.1 Instruments for acoustical measurement

5.1.1 General

The apparatus used for measuring the sound pressure level shall be a sound level meter or equivalent measurement system meeting the requirements of class 1 instruments (inclusive of the recommended windscreen, if used). These requirements are described in IEC 61672-1.

The entire measurement system shall be checked by means of a sound calibrator that fulfils the requirements of class 1 sound calibrators according to IEC 60942.

Measurements shall be carried out using the time weighting "F" of the acoustic measurement instrument and the "A" frequency weighting curve also described in IEC 61672-1. When using a system that includes a periodic monitoring of the A-weighted sound pressure level, a reading should be made at a time interval not greater than 30 ms.

The instruments shall be maintained and calibrated in accordance to the instructions of the instrument manufacturer.

When no general statement or conclusion can be made about conformance of the sound level meter model to the full specifications of IEC 61672-1, the apparatus used for measuring the sound pressure level shall be a sound level meter or equivalent measurement system meeting the requirements of class 1 instruments as described in IEC 61672-3.

NOTE The tests of IEC 61672-3 cover only a limited subset of the specifications in IEC 61672-1 for which the scope is large (temperature range, frequency requirements up to 20 kHz, EMC tests). It is economically impossible to verify the whole IEC 61672-1 standard requirements one each item of a computerized data acquisition systems model.

5.1.2 Calibration

At the beginning and at the end of every measurement session, the entire acoustic measurement system shall be checked by means of a sound calibrator as described in 5.1.1. Without any further adjustment, the difference between the readings shall be less than or equal to 0,5 dB. If this value is exceeded, the results of the measurements obtained after the previous satisfactory check shall be discarded.

5.1.3 Compliance with requirements

Compliance of the sound calibrator with the requirements of IEC 60942 shall be verified once a year.

Compliance of the instrumentation system with the requirements of IEC 61672-3 shall be verified at least every two years.

All compliance testing shall be conducted by a laboratory which is authorized to perform calibrations traceable to the appropriate standards.

5.1.4 Meteorological Instrumentation

The meteorological instrumentation used to monitor the environmental conditions during the test shall meet the following specifications:

— ±1 °C or less for a temperature measuring device;

— ±1,0 m/s for a wind speed-measuring device;

— ±5 hPa for a barometric pressure measuring device;

— ±5 % for a relative humidity measuring device.

6 Acoustical environment, meteorological conditions, and background noise

6.1 Test site

The AWD shall be tested in an anechoic environment. Alternatively, it may be tested in a semi anechoic chamber or in an open space. In this case, precautions shall be taken to avoid reflections from the ground within the measuring area (for instance, by erecting a set of absorbing screens).

The test facility shall meet requirements of ISO 26101 with the following qualification criteria and measurement requirement appropriate to this test method as recommended by ISO 26101:

— space to be deemed anechoic shall be at least a 5-metre radius volume;

— test sound source location shall position in the middle of the space to be deemed anechoic, on the floor;

— microphone transverses shall be from the centre of the source to each microphone position;

— the maximum spacing of the measurement points shall depend on the size of the space to be deemed anechoic. A minimum of 10 points shall be used for spatial resolution of measurement;

— qualification band width shall be defined to cover the typical of the spectral range of interest that will be measured. Without any information, it is recommended from 100 Hz to 10 000 Hz;

— generation of sound shall be a broadband noise and a 1/3 octave filter for measurement requirements.

For indoor test site, the test facility shall have a cut-off frequency lower than the frequency of the lowest component of the sound emitted by the AWD under test.

In the vicinity of the microphone, there shall be no obstacle that could influence the acoustic field and no person shall remain between the microphone and the noise source. The meter observer shall be positioned so as not to influence the meter reading.

NOTE It is expected that users of this International Standard will understand that valid measurements can only be made when the cut-off frequency is lower than the lowest frequency of interest. A specific numerical requirement for cut-off frequency is not given due to the range of variation of appropriate cut-off frequencies depending upon the measured article.

6.2 Meteorological conditions

The meteorological instrumentation shall deliver data representative for the test site and shall be positioned adjacent to the test area at a height representative of the height of the measuring microphone.

The measurements shall be made when the ambient air temperature is within the range from 10 °C to 30 °C.

The tests shall not be carried out if the wind speed, including gusts, at microphone height exceeds 5 m/s, during the sound measurement interval.

A value representative of temperature, wind speed and direction, relative humidity, and barometric pressure shall be recorded during the sound measurement interval.

6.3 Background noise

Any sound peak which appears to be unrelated to the characteristics of the general sound level of the AWD shall be ignored in taking the readings.

The background noise shall be measured for duration of 10 s immediately before and after a series of tests. The measurements shall be made with the same microphones and microphone locations used during the test. The maximum A-weighted sound pressure level shall be reported.

The background noise (including any wind noise) shall be at least 10 dB below the A-weighted sound pressure level produced by the AWD under test.

6.4 Mounting of the AWD

The AWD to be tested shall be fitted as specified by the manufacturer. A representative tube (e.g. for a handlebar) or other required mounting point shall be rigidly fixed to a solid metallic base, which shall have a mass of at least 15 kg.

Unless otherwise specified by the manufacturer, the bell shall be mounted horizontally. Any tilt shall be stated in the Test Report.

The base shall be so designed that reflections from its faces, or vibrations, do not noticeably affect the measurements results.

6.5 Microphone and AWD positions

The microphone and the AWD shall be located 1,2 m ± 0,05 m above the ground level.

The reference direction for free field conditions (see IEC 61672-1) shall be horizontal and directed perpendicularly towards the centre of the AWD.

The microphone shall be located at a distance of 2 m ± 0,01 m from the centre of the bell.

7 Measurement of the sound pressure level

7.1 Actuation of the AWD

The AWD to be tested shall be rung by the operator who activates (push, pull, press) the control device as required by the manufacturer. The presence of this operator shall have no noticeable influence on the test results.

One measurement sequence consists 10 times consecutively over its full travel in 4 s ± 0,5 s.

Five sequences shall be carried out and each sequence has to be interrupted by a pause.

This operation shall be carried out five times.

7.2 Measurement readings and reported values

7.2.1 General

The maximum A-weighted sound pressure level in relation to 2×10^{-5} Pa (N/m^2), indicated during each sequence of 10 actuations shall be noted, to the first significant digit after the decimal place (for example -XX,X). If a sound peak obviously out of character with the general sound pressure level is observed, the measurement shall be discarded.

Five measurement results, within 2,0 dB, shall be used for the calculation of the final result.

7.2.2 Data compilation

The final value to be reported as the test result is the average value of the 5^{th} result obtained during each of the five sequences.

7.3 Required sound pressure

Measured under the conditions specified above, the final value of the measured sound pressure level of three out of four AWD class I

— shall be equal or greater than 85 dB(A), and

— shall not exceed 95 dB(A).

Measured under the conditions specified above, the final value of the measured sound pressure level of three out of four AWD class II

— shall be equal or greater than 75 dB(A), and

— shall not exceed 85 dB(A).

NOTE 1 An AWD may have two positions: one for normal use and one for quiet area according to AWD class II definition.

NOTE 2 For electronic AWD to have a sound similar to a bell sound, it is recommended also to produce acoustic signature equivalent to mechanical AWD with impact noise following by a tone signal from 1 900 Hz to 4 600 Hz, which decreases in 1 s or 2 s.

7.4 Low battery indicator

The battery-powered AWD system shall include a low battery indicator. This indicator shall be located on the AWD, clearly and easily visible.

The indicator shall be activated at the latest when the requirements given in 7.3 are not fulfilled anymore.

8 Test of durability

8.1 Test procedure

Four examples of each model of AWD shall be subjected to the durability test as specified in 8.1.1 and 8.1.2. The apparatus shall be in new condition and shall not be lubricated during the test.

8.1.1 Stability mechanical test

a) Mechanical AWD

Four AWDs shall be activated 30 000 times over the working travel of the lever at a rate of 100 ± 5 operations per minute.

b) Electric or electronic AWD

The product securely attached, apply a cyclic force of 0 N to (13 ± 1) N (or the force enough to activate the sound, if higher) during 30 000 cycles. The contact duration from 0 to 13 and 13 to 0 shall be 1 s and the pause duration shall be 1 s. The force shall be applied progressively in order to avoid any shock.

The force must be applied at the centre of the button and perpendicular to the tangent of its surface (±5°).

Application of the force shall be done with a hemispherical tip made from Polyamide PA2200. Figure 1 shows the dimension of the tip.