भारतीय मानक प्रारूप

स्वचलित वाहन – ध्वनि चेतावनी यंत्र – विशिष्टि

(आई एस 14813 के एकीकरण सहित आई एस 1884 का चतुर्थ पुनरीक्षण)

Draft *Indian Standard*

AUTOMOTIVE VEHICLES - AUDIBLE WARNING DEVICES – SPECIFICATION

(Fourth Revision of IS 1884 amalgamating IS 14813)

ICS NO: 43.040.20

Last date for receipt of comments is 22 10 2023

Automotive Electrical Equipment and Instruments Sectional Committee, TED 11

FOREWORD

This draft Indian Standard (Fourth Revision) will be adopted by the Bureau of Indian Standards after the draft finalized by the Automotive Electrical Equipment and Instruments Sectional Committee is approved by the Transport Engineering Division Council.

This standard was first published in 1967 and was revised in 1970. The second revision of this standard was published in 1981 which enlarged the scope to cover horns for mopeds and three wheelers. The third revision of the standard was published in 1993 in which 12 V ac high frequency type horns were included and all the amendments issued till that time were incorporated. This fourth revision is being undertaken to update the standard and to incorporate latest technological advancement/ development that has taken place. The salient features of this first revision are:

a) Title of the standard has been changed.
b) Reference of latest Indian Standard has been given.
c) The Indian Standard has been drafted as per latest drafting guidelines.
d) Reference of Indian Standards have been given in the tests and some of the tests have been deleted to align the standard with ECE Regulation No. 28.
e) Requirements of air horns (covered under IS 14813:2000) have been included.

Audible warning devices (AWD) are essential safety feature fitment on motor vehicles. This draft standard is in line with ECE R 28, Uniform provision concerning the approval of audible

warning devices of motor vehicles with regard to their audible signals. Requirement of installation of audible warning devices on vehicles, prescribed in ECE R 28 is covered in IS 15796 : 2008 Automotive vehicles - Horn installation requirements'. Inputs have also been taken from Directive 93/30/EC.

This draft standard incorporates requirements of air horns which presently are covered under IS 14813 : 2000 'Automotive vehicles – Air horns'. After the publication of revised standard IS 14813:2000 shall be withdrawn.

Annex B is for information of manufacturers who intend to mark BIS Standard mark on their product and Annex C is for consideration during operation of licence.

Clause 5.5.1 of the standard calls for agreement between manufacturer and purchaser.

The composition of the Committee responsible for the formulation of this standard is given at Annex XX (Will be added later).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard specifies requirements of Audible Warning Devices (AWD) supplied with direct or alternating current or compressed air, which are intended for fitting to motor vehicles of categories L1, L2, L5, M, N, A and C as defined in IS 14272.

2 REFERENCES

The following standards contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

IS / IEC No	*Title*
9000 (Part 11) : 1983	Basic environmental testing procedures for electronic and electrical items: Part 11 Salt mist test
10250 : 1982	Specification for severities for environmental tests for automotive electrical equipment
14272:2011	Automotive vehicles – Types – Terminology (*first revision*)
15575 (Part 1) : 2016/ IEC 61672-1: 2013	Electroacoustics - Sound level meters – Part 1: Specification (*first revision*)
15575 (Part 2) : 2017/ IEC 61672-2: 2013	Electroacoustics - Sound level meters – Part 2: Pattern evaluation tests (*first revision*)
IEC 61260	Electro acoustics – Octave-band and fractional – octave – band filters

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3 DEFINITIONS

For the purpose of this standard the following definitions shall apply.

3.1 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

3.2 Audible Warning Devices (AWD) – A device consisting of one or several sound emission outlets that are excited simultaneously, emitting an acoustic signal which is intended to give audible warning of the presence of a vehicle in a dangerous road traffic situation and which is intentionally operated by a driver.

3.2.1. *Single Audible Warning Devices* **-** Audible warning devices consisting of several sound outlets activated by a single power unit shall be regarded as a single AWD.

3.3 Routine Tests — Tests carried out on each horn switch to check requirements which are likely to vary during production.

3.4 Types of Audible Warning Devices (AWD) - Audible warning devices (AWD) of different types shall be understood to mean devices essentially different from one another with respect to following aspects.

i) Manufacturers' trade name or mark;
ii) Principle of operation of device;
iii) Type of electrical supply (direct or alternating current);
iv) Outer shape of housing;
v) Shape and dimensions of diaphragm(s);
vi) Shape or kind of sound outlet(s);
vii) Rated sound frequency or frequencies;
viii) Rated supply voltage; and
ix) Operating pressure for AWD operating on compressed air.

3.5 Type Tests — Tests carried out to prove conformity with the requirements of this standard. These are intended to prove the general quality and design of a given type of horn switch.

4 CLASS

Audible warning devices (AWD) shall be of following two classes:

i) Class I - Vehicles of L Category having engine power less or equal to 7 kW; and
ii) Class II - Vehicle of other categories including L category having engine power greater than 7 kW.

5 REQUIREMENTS

5.1 General Requirements

5.1.1 The audible warning device shall emit a continuous and uniform sound; its acoustic spectrum shall not vary substantially during its operation. For AWD supplied with alternating current, this requirement shall apply only at constant generator speed, within the range specified in **5.2.3.2**.

5.1.2 The audible warning device shall have acoustic characteristics (spectral distribution of the acoustic energy, sound pressure level) and mechanical characteristics such that it passes, in the order indicated, the following tests.

5.2 Measurement of Sound Characteristics

5.2.1 The audible warning device shall, preferably, be tested in an anechoic environment. Alternatively, it may be tested in a semi-anechoic chamber or in an open space. In the latter case, precautions shall be taken to avoid reflections from the ground within the measuring area (for instance, by erecting a set of absorbing screens). Compliance with the spherical divergence to a limit of 1 dB within a hemisphere of not less than 5 m radius, up to the maximum frequency to be measured, especially in the measuring direction and at the height of the apparatus and the microphone, shall be checked. The ambient noise level shall be at least 10 dB lower than the sound pressure level to be measured. The device to be tested and the microphone shall be placed at the same height. This height shall be between 1.15 and 1.25 m. The axis of maximum sensitivity of the microphone shall coincide with the direction of the maximum sound level of the device. The microphone shall be so placed that its diaphragm is at a distance of 2 ± 0.01 m from the exit plane of the sound emitted of the device. In the case of devices with several exists, the distance shall be determined in relation to the exit plane closest to the microphone.

5.2.2 The measurements of the sound pressure levels shall be made with a class 1 precision sound level meter conforming to the IS 15575 (Part 1). All measurements shall be made using the time constant *F*. The measurement of the over-all sound pressure level shall be made using the weighting curve A. The spectrum of the sound emitted shall be measured according to the Fourier transform of the acoustic signal. Alternatively, one-third octave filters conforming to IEC 61260 may be used: in this case, the sound pressure level in the mid-band frequency 2 500 Hz shall be determined by adding the quadratic means of the sound pressures in the one-third mid-band frequencies 2 000, 2 500 and 3 150 Hz. In every case, only the Fourier transform method shall be regarded as a reference method.

5.2.3 The AWD shall be supplied with current, as appropriate at the following voltages:

5.2.3.1 In the case of AWD supplied with direct current, voltage measured at the terminal of the electric power source shall be 6.5 V, 13 V and 26 V for rated voltage of 6 V, 12 V and 24 V respectively.

5.2.3.2 In the case of AWD supplied with alternating current, the current shall be supplied by an electric generator of the type normally used with this type of AWD. The acoustic characteristics of the AWD shall be recorded for electric generator speeds corresponding to 50 percent, 75 percent and 100 percent of the maximum speed indicated by the manufacturer of the generator for continuous operation. During this test, no other electrical load shall be imposed on the electric generator. The endurance test described in **5.3** shall be carried out at a speed indicated by the manufacturer of the equipment and selected from the above range.

5.2.3.3 In the case of AWD supplier with compressed air, the pressure shall be maintained at 700 ± 25 kPa (7.0 ± 0.25 kg/cm^2) and the maximum air consumption shall not exceed 4 l/s during the test.

5.2.4 If a rectified current source is used for the test of an AWD supplied with direct current, the alternating component of the voltage measured at its terminals, when the AWD are in operation, shall not be more than 0.1 volt, peak to peak.

5.2.5 For AWD supplied with direct current, the resistance of the connecting leads, expressed in ohms, including terminals and contacts, shall be as close as possible to [(0.10/12) × rated voltage].

5.2.6 The warning device shall be mounted rigidly, by means of the equipment recommend by the manufacturer, on a support whose mass is at least ten times that of the warning device under test and not less than 30 kg. In addition, arrangements shall be made to ensure that reflections on the sides of the support and its own vibrations have no appreciable effect on the measuring results.

5.2.7 Under the conditions set forth above, the sound-pressure level weighted in accordance with curve A shall not exceed the following values: -

a) 115 dB (A) for AWD of Class I.
b) 118 dB (A) for AWD of Class II.

5.2.7.1 In addition, the sound-pressure level in the frequency band 1 800 to 3 550 Hz shall be greater than that of any component of a frequency above 3 550 Hz and in any event equal to or greater than: -

a) 95 dB (A), for AWD of Class I.
b) 105 dB (A) for AWD of Class II.

5.2.7.2 AWD meeting the sound characteristics mentioned in (b) may be used on the vehicles mentioned in (a).

5.2.8 The requirement indicated above shall also be met by a device subjected to the endurance test referred to in **5.3**, with the supply voltage specified in **5.2.3.1** for AWD supplied with direct current or, for AWD supplied with alternating current, between 50 percent and 100 percent of the maximum speed of the generator indicated by the manufacturer for continuous operation.

5.2.9 The time lapse between the moment when the device is actuated and the moment when the sound reaches the minimum value prescribed in **5.2.7** shall not exceed 0.2 s measured at an ambient temperature of 20 ± 5 °C. This provision is applicable to pneumatic or electro-pneumatic AWD.

5.2.10 Pneumatic or electro-pneumatic AWD shall, when operating under the power supply conditions established for the devices by the manufacturers, satisfy the same acoustic requirements as are prescribed for electrically-operated AWD.

5.2.11 In the case of multiple-tone devices in which each sound-emitting unit is capable of functioning independently, the minimum values specified above shall be obtained when each of

the constituent units is operated separately. The maximum value of the over-all sound level shall not be exceeded when all the constituent units are operated simultaneously.

5.3 Endurance Test

5.3.1 The device shall be mounted in the manner specified by the manufacturer and shall be fixed in a rigid manner on a base whose mass shall be at least ten times that of the device and not less than 15 kg.

5.3.2 The voltage at the device terminals shall be 6.5 ± 0.2, 13 ± 0.3 and 26.0 ± 0.5 V for rated voltages 6, 12 and 24 V respectively. For ac devices operation the power shall be supplied by the generator of the vehicles for which the device is intended or the test shall be carried out with a generator of similar design with speeds agreed mutually between the manufacturers and the purchasers. The resistance in the systems including the resistance at terminals and contacts shall be less than 0.05, 0.10 and 0.20 ohms for rated voltages of 6, 12 and 24 V respectively.

5.3.3 If several devices are tested simultaneously appropriate precautions must be taken so that operation does not result in mutual interference. It shall be ensured that the support of the various devices are mechanically isolated from each other or if they are mounted on the same support, they shall be operated one after the other instead of simultaneous operation.

5.3.4 The device shall be operated for 100 000 cycles and there shall be no significant change in volume and tone of the device with a maximum of three adjustments. Each cycle shall consist of ON for one second and OFF for three seconds. During the test the device shall be ventilated by an air current having a speed of about 10 m/s.

5.3.5 *Requirements*

After 100 000 cycles the device shall be subjected to measurement of sound characteristics test (*see* **5.2**). The drop in sound pressure level shall not exceed 5 dB below that measured before the endurance test.

5.4 Thermal Stability Test

5.4.1 The following tests shall be performed on devices:

a) Dry heat test, and
b) Cold test.

5.4.2 *Dry Heat Test*

The test shall be carried out as specified in **4.2** of IS 10250. The equipment shall be tested for group 2 requirement.

5.4.3 *Cold Test*

The test shall be carried out as specified in **4.4** of IS 10250.

5.4.4 *Requirement*

After the test, the device shall be allowed to return to ambient temperature and it shall be subjected to measurement of sound characteristics test (*see* **5.2**). The depreciation in the sound pressure level shall be not more than 5 dB from the initial value.

5.5 Continuous Operation Test

5.5.1 With a terminal voltage of 6.5 ± 0.1 V, 13 ± 0.2 V for 26 ± 0.4 V as appropriate, the device shall be continuously operated for a period of five minutes and then allowed to cool to ambient temperature. For devices operated by ac power, the power shall be supplied by a generator of the vehicle for which the device is intended and the test shall be carried out at a frequency speed agreed to between manufacturers and purchasers.

5.5.2 *Requirement*

The device shall then satisfy the requirements of measurement of sound characteristics test (*see* **5.2).**

5.6 Corrosion Resistance Test (Optional Test)

5.6.1 The test shall be carried out as per procedure 1 as specified in **7.3** of IS 9000 (Part 11)**.**

5.6.2 The salt solution shall be a 5 percent solution of sodium chloride in water.

5.6.3 The device shall be sprayed at a temperature of 35 ± 3°C, for a cycle of 50 hours consisting of two periods of 24 hours each and one hour draining period.

5.6.4 After removal from the chamber, the parts shall not show any sign of corrosion which will adversely affect the functioning of any part of the device.

5.6.5 *Requirement*

5.6.5.1 After removal from the salt spray, that is, within two hours after draining and again when tested 24 h later, the device shall satisfy the requirements of measurement of sound characteristics test (*see* **5.2).** The depreciation in the sound pressure level shall be not more than 5 dB from the initial value.

5.6.5.2 After removal from the salt spray chamber, the device shall not show any sign of corrosion or electrolytic action.

NOTE — This is an optional test and is to be required to be carried out only when the switch is intended to be exposed directly to open air conditions in actual usage.

5.7 High Voltage Test

5.7.1 An ac voltage of 240 rms at a frequency between 40 and 60 Hz shall be applied between the insulated terminals and the body for a period of five seconds. In case of earth return devices the test piece shall be isolated from the condensers, if any, and the internal ground. For earth return devices one such device in a lot sampled shall be tested for high voltage test and rest of the devices be subjected to other tests

5.7.2 *Requirement*

The device shall withstand this test without arcing or puncture indicative of insulation breakdown.

NOTE — Before carrying out the high voltage test, the unit under test shall be cleaned and thoroughly dried. The high voltage test shall be conducted with caution, as repeated application of the test voltage on the same unit may injure the insulation and thereby reduce the safety factor. If for any reason, it is desired to conduct additional high voltage test, the test voltage shall be reduced to 200 V rms. Before applying the supplementary high voltage, the unit under test should be cleaned and thoroughly dried up.

5.8 Water Spray Proof Test (Optional Test)

5.8.1 The sample device shall be attached by its bracket to a rigid structure in the position recommended by the manufacturer, for horizontal projection of the sound waves. The devices shall be subjected to a precipitation of 2.54 mm of water per minute directed downwards at an angle of 45° in the form of a spray. During the water spray test, the unit shall resolve about the vertical axis at a rate of four revolutions per minute.This test shall be continued for 6 hours. The unit shall then be allowed to drain for 1 hour.

5.8.2 *Requirement*

At the end of the test, the device shall function satisfactorily and shall satisfy the requirements of measurement of sound characteristics test (*see* **5.2).** The depreciation in the sound pressure level shall be not more than 5 dB from the initial value. Strip examination shall show no evidence of water ingress into the contact breaker and coil housing.

NOTE — This is an optional test and is to be required to be carried out only when the switch is intended to be exposed directly to open air conditions in actual usage.

6 CLASSIFICATION OF TEST

6.1 Type Test – The following shall constitute type tests:

a) Measurement of Sound Characteristics Test (*see* **5.2**);
b) Endurance Test (*see* **5.3**);
c) Thermal Stability Test (*se*e **5.4**);

d) Continuous Operation Test (*see* **5.5**);
e) Corrosion Resistance Test (*see* **5.6**);
f) High Voltage Test (*see* **5.7**); and
g) Water Spray Proof Test (*see* **5.8**)

6.1.1 *Criteria for Approval* — At least seven samples shall be submitted for testing together with the relevant data given in Annex B.

6.1.2 All the samples shall be tested for:

a) Measurement of Sound Characteristics (*see* **5.2**)
b) High Voltage Test (*see* **5.7**)

6.1.3 They shall then be subjected to the tests in the following manner:

	Tests	***No. of sample(s)***
a)	Endurance Test (*see* **5.3**);	3
b)	Thermal Stability Test (*see* **5.4**)	1
c)	Continuous Operation Test (*see* **5.5**)	1
e)	Corrosion resistance test (*see* **5.6**); and	1
h)	Water Spray Proof Test (*see* **5.8**)	1

6.1.4 In case of failure in one or more type tests, twice the number of original samples shall be called and subjected to the test(s) in which failure occurred. If, in repeated test(s) no failure occurs, the tests may be considered to have been satisfied.

6.1.5 *Criteria for Approval* — A type approval certificate may be issued if the AWD are found to comply with the requirements of tests given in **5.2 to 5.8.**

6.2 Acceptance/ Routine test:

a) Test for Measurement of Sound Characteristics (s*ee* **5.2**)

6.2.1 The number of samples for acceptance tests shall be agreed upon between the purchaser and the manufacturer, however a recommended plan of sampling is given in Annex A.

7 MARKINGS

7.1 Audible warning device shall be clearly legibly and indelibly marked with the following:

a) Manufacturer’s name or trade mark or both
b) Rated voltage,

c) Class of device (in case of Class I),
d) Month and year of manufacture, and
e) Country of manufacture

8 BIS CERTIFICATION MARKING

Audible warning device may also be marked with the standard mark.

8.1 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act* 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

ANNEX A
(*Clause* 6.2.1)

RECONMMENDED PLAN OF SAMPLING

A-1 GENERAL

If statistical quality control techniques have been used for production control such test results and relevant charts may be made available along with the material supplied to enable the purchaser to judge the acceptability or otherwise of a lot. In case such information is not available, the procedure given in **A-2** to **A-4** is recommended for judging conformity of a lot with the requirements of this specification.

A-2 SCALE OF SAMPLING

A-2.1 Lot — In any consignment, all the horn switches of the same size and from the same batch of manufacture shall be grouped together to constitute a lot.

A-2.2 The number of horn switches to be selected from a lot shall depend upon the lot size and shall be in accordance with col 1 and 2 of Table 1.

Table 1 Size of Sample and Criterion for Conformity

Sl. No.	LOT SIZE	SAMPLE SIZE	PERMISSIBLE NUMBER OF DEFECTIVES
(1)	(2)	(3)	(4)
i)	51 to 150	5	0
ii)	151to 300	13	1
iii)	301 to 500	20	1
iv)	501 to 1 000	32	2
v)	1 001and above	50	3

NOTE — The sampling plan recommended here assures that lots with 3 percent of less defectives would be accepted most of the times and lots with defectives above 20 percent would be rejected most of the times.

A-2.3 These horn switches shall be selected at random. In order to ensure randomness, the following procedure may be adopted:

Arrange the horn switches in a systematic manner and starting from any horn switch count them as 1, 2,….., etc, up to *r, r* being equal to the integral part of *N/n, N* being the lot size and *n* the sample size. Every *r*th horn switch shall be included in the sample.

A-3 NUMBER OF TESTS

All the horn switches selected under **A-2.2** shall be subjected to acceptance tests given in **4.2.**

A-4 CRITERION FOR CONFORMITY

A lot shall be considered as conforming to this specification, if the number of horn switches out of those tested, failing to satisfy the requirements of any one or more of acceptance tests, does not exceed the corresponding number given in col 3 of Table 1.

Annex B
(*Clause* 6.1.1**)**

DETAILS TO BE SUBMITTED WITH APPLICATION

Sl. No.	Details
a)	Manufacturer's name and address
b)	Trade mark or Logo
c)	Name and address of manufacturers' representative, if applicable.
d)	Type and operating principle (electro-pneumatic, electro-magnetic with resonator disc, electro-magnetic device and single-tone or multiple-tone, etc.)
e)	Class of device, if intended for use on L1, L2 and L5 categories of vehicles.
f)	Rated Supply voltage, ac / dc
g)	Rated Operating Pressure(s), kg/cm² (in case of *AWD* working on compressed air)
h)	Geometrical characteristics (internal length and diameter) of connecting line between compressor or control and the *AWD* (in case of *AWD* working on compressed air)
j)	Rated frequency, Hz
k)	Drawing showing shape and overall dimensions, place for approval or BIS marking, list of components with indication of materials used.

Annex C
(*Foreword*)

MODIFICATION IN THE TYPE OF AUDIBLE WARNING DEVICE

C-1 Any functional modification in technical requirements declared in accordance with Annex A shall be intimated to the competent authority.

C-2 The competent authority may then consider, whether;

a) The component with modification complies with specified requirements; or

b) Any further verification is required.

C-3 For deciding whether any further verification is required, guidelines given in Table 1 shall be followed.

Table 1 GUIDELINE FOR SELECTING VERIFICATIONS REQUIRED
(*see* C-3)

Sl No. (1)	**Parameter / Criteria** (2)	**Verification required** (3)
1	Change of class I to class II	Tests required if tested values are not satisfactory for intended use.
2	Change of class II to class I	Tests required if tested values are not satisfactory for intended use.
3	Type of voltage ac to dc or vice versa.	All verifications shall be done.
4	For only change in mounting brackets of device.	No verification required.
5	Addition of marking	No verification required.
6	Trade name or mark change with same manufacturer.	No testing required, extension can be granted.
7	Change in rated supply voltage or rated operating pressure.	All verifications shall be done.
8	Change in rated frequency.	Test for Measurement of Sound characteristics shall be done.

Annex D
(*Foreword*)

Committee Composition