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भारतीय मानक प्रारूप
ऑटोमोबाइल के लिए हॉर्न स्विच — परीक्षण पद्धतियाँ
(आई एस 4050 का द्वितीय पुनरीक्षण)

Draft *Indian Standard*
HORN SWITCHES FOR AUTOMOBILES — METHODS OF TESTS
(Second Revision of IS 4050)

(ICS 43.040.30; 29.120.40)

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Automotive Electrical Equipment and Instruments Sectional Committee, TED 11

FOREWORD

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

This standard was first published in 1967. The first revision of the standard was undertaken in 1976 to update the contents by including the environmental testing procedures. This second 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) Reference of latest Indian Standard has been given.
- b) The Indian Standard has been drafted as per latest drafting guidelines.
- c) Drop test and Dust test have been added.
- d) Salt Spray test has been renamed as Corrosion resistance test and it has been made an optional test.
- e) Requirements of Voltage drop test and Water spray test have been modified.

Horn switch invariably forms an integral part of steering column and many of its properties are associated with the function of the latter. This standard is intended to cover the testing procedures for horn switches when they are made as isolated items and later fitted to the steering columns.

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 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 covers the methods of test for horn switches used in automobiles.

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:

<i>IS No.</i>	<i>Title</i>
9000 (Part 5/ Sec 1 & 2) : 1981	Basic environmental testing procedures for electronic and electrical items: Part 5 damp heat (Cyclic) test
9000 (Part 11) : 1983	Basic environmental testing procedures for electronic and electrical items Part 11: Salt mist test
9000 (Part 12) : 1981	Basic environmental testing procedures for electronic and electrical items: Part 12 dust test
10250 : 1982	Specification for severities for environmental tests for automotive electrical equipment

3 TERMINOLOGY

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

3.3 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 CLASSIFICATION OF TESTS

4.1 Type Tests — The following shall constitute type tests:

- a) Visual examination (*see 5.1*);
- b) Performance test (*see 5.2*);
- c) Insulation resistance test (*see 5.3*);
- d) Voltage drop test (*see 5.4*);
- e) Endurance test (*see 5.5*);
- f) High voltage (flash) test (*see 5.6*);
- g) Water spray test (*see 5.7*);
- h) Damp heat (cycling) test (*see 5.8*);
- j) Corrosion resistance test (*see 5.9*);
- k) Mechanical strength test (*see 5.10*);
- m) Test for circuit making load (*see 5.11*);
- n) Vibration test (*see 5.12*);
- p) Heat (cycling) test (*see 5.13*);
- q) Drop test (*see 5.14*); and
- r) Dust test (*see 5.15*)

4.1.1 All samples shall be tested for:

- a) Visual examination (*see 5.1*);
- b) Performance test (*see 5.2*);
- c) Insulation resistance test (*see 5.3*);
- d) High voltage (flash) test (*see 5.6*);
- e) Mechanical strength test (*see 5.10*); and
- f) Test for circuit making load (*see 5.11*).

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

<i>Tests</i>	<i>No. of sample(s)</i>
a) Voltage drop test (<i>see 5.4</i>);	1
b) Endurance test (<i>see 5.5</i>);	3
c) Water spray test (<i>see 5.7</i>);	1
d) Damp heat (cycling) test (<i>see 5.8</i>);	1
e) Corrosion resistance test (<i>see 5.9</i>);	1
f) Vibration test (<i>see 5.12</i>); and	1
g) Heat (cycling) test (<i>see 5.13</i>);	1
h) Drop test (<i>see 5.14</i>); and	1
j) Dust test (<i>see 5.15</i>)	1

4.1.3 In case of failure of one or more type tests, the testing authority may call for fresh samples not exceeding twice the number of original samples and subject them 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.

4.1.4 Criteria for Approval — Nine samples shall be submitted for testing together with the relevant data. A type approval certificate may be issued if the switches are found to comply with the tests given in **4.1**.

4.2 Acceptance Tests — The acceptance tests shall constitute:

- a) Visual examination (*see 5.1*); and
- b) Performance test (*see 5.2*).

4.2.1. The number of samples for acceptance tests shall be agreed upon between the purchaser and the manufacturer. However, the recommended plan of sampling is given in Appendix A.

4.3 Routine Tests — The following shall constitute routine tests:

- a) Visual examination (*see 5.1*);
- b) Performance test (*see 5.2*); and
- c) High voltage (flash) test (*see 5.6*).

5 TESTS

5.1 Visual Examination — The switches shall be visually examined for finish and appearance.

5.2 Performance Test — The operating force for the horn switches shall be as mutually agreed between the manufacturer and the purchaser.

5.3 Insulation Resistance Test — The insulation resistance between the insulated terminals and between the terminal and any other metallic part, when measured with dc voltage of 500 V at the prevailing atmospheric temperature and humidity shall be not less than 1 megohm.

5.4 Voltage Drop Test — When load of 10 A is applied across the switch terminal and the earth potential with the normal force applied at the pressure point of 10 N applied at right angles, the voltage drop due to the contact resistance shall not exceed the following:

Before the endurance test	200 mV
After the endurance test	350 mV per contact

5.5 Endurance Test — The test piece shall be suitably mounted and operated for 100 000 cycles with an inductive load connected in parallel drawing 120 percent of the rated current required for the particular application and with an applied pressure of 20 N. Each cycle shall consist of sequencing through each position with travel time and dwell time as given below:

- a) Travel time (time from 0.1 to 0.5 s. Position to the other)
- b) Dwell time (time in each 1.0 to 2.0 s position)

NOTE – The travel and dwell periods are for guidance only. The actual values which depend upon the application shall be subject to agreement between the manufacturer and the user.

5.5.1 The switch after being subjected to this test shall be allowed to come down to room temperature and then tested for Voltage drop test. (*see 5.4*).

5.6 High Voltage (Flash) Test — The switch shall be subjected to a flash test with an ac voltage of 500 V rms at a convenient frequency between 40 and 60 Hz for a period of 5 s between each of the terminals and the cover. The switch shall satisfactorily withstand this test without arcing or puncture.

5.7 Water Spray Test — The switch shall be subjected to this test, in accordance with **4.13** of IS 10250 as applicable to group 2 equipment, in vehicle mounted condition.

5.7.1 The switch shall be sprayed with water, for one hour three times a day, from above by a sprinkler for ten continuous days. At the end of the test there shall be no rust formation, abnormal increase in voltage drop or loss of operation / function.

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.

5.8 Damp Heat (Cycling) Test

5.8.1 The test shall be conducted according to IS 9000 (Part 5/ Sec 1 & 2). The number of conditioning cycles shall be 7.

5.8.2 At the end of the conditioning, the switch shall be subjected to Insulation resistance test (*see 5.3*).

5.9 Corrosion Resistance Test (Optional Test)

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

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

5.9.3 The device shall be sprayed at a temperature of $35 \pm 3^{\circ}\text{C}$, for a cycle of 50 hours consisting of two periods of 24 hours each and one hour draining period.

5.9.4 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.

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.

5.10 Mechanical Strength Test

5.10.1 A force of 200 N shall be applied to the horn switch to check its mechanical strength against accidental sudden high forces.

5.10.2 The horn switch shall be operated with a maximum force of 50 N for 1 000 applications to ensure its mechanical strength.

5.10.3 After the test for mechanical strength the sample shall be subjected to Voltage drop test (*see 5.4*).

5.11 Test for Circuit Making Load — The load required to determine electric circuit making, applied at any joint on button shall result:

Push button	4 to 10 N
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5.12 Vibration Test — The horn switch mounted on a suitable support shall withstand vibration in simple harmonic motion, at the rate of 10-55-10 Hz continuously varying in a period of one minute and with a total lift of 1.5 mm, for one hour in each of the three major axes of the assembly.

5.13 Heat (Cycling) Test — The horn switch shall be subjected to three thermal cycles, each consisting of:

- a) 6 hours at 0°C, and
- b) 18 hours at 70°C.

5.13.1 The transfer of the switch from one ambient to the other shall be immediate. At the end of the test, no deformation or breakage shall be observed and shall pass the tests given in **5.3**, **5.4** and **5.11**.

NOTE — Subject to agreement between purchaser and supplier, the lower ambient may be specified as 25°C.

5.14 Drop Test — The horn switch shall be dropped 20 times from the height of 500 mm on concrete base.

5.14.1 At the end of the test, no deformation or breakage shall be observed and the switch shall pass the tests given in **5.2**, **5.3** and **5.4**.

5.15 Dust Test — The switch shall be subjected to this test in accordance with **4.6** of IS 10250 and IS 9000 (Part 12).

ANNEX A
(Clause 4.2.1)

RECOMMENDED 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)	Up to 200	15	1
ii)	201 ,, 300	20	1
iii)	301 ,, 500	30	2
iv)	501 ,, 800	40	3
v)	801 ,, 1 300	55	3
vi)	1 301 and above	75	4

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
(Foreword)

Committee Composition