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भारतीय मानक प्रारूप

ऑटोमोबाइल में उपयोग के लिए पियानो चाबी प्रकार के स्विच —— विशिष्टी

(आई एस 9433 का प्रथम पुनरीक्षण)

Draft Indian Standard

PIANO KEY TYPE SWITCHES FOR USE IN AUTOMOBILES – SPECIFICATION

(First Revision of IS 9433)

(ICS 43.040.30; 29.120.40)

Last date for receipt of comments is 24 09 2023

Automotive Electrical Equipment and Instruments Sectional Committee, TED 11

FOREWORD

This Indian Standard (First 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 1980. This first revision of the standard 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 grafting guidelines.
c) Requirements of Voltage drop test, Dry heat test, Dust test and Low temperature test have been modified.

This standard does not recommend any envelope dimensions of push button switches but to facilitate interchangeability, only panel cut out dimension have been specified.

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.

Draft *Indian Standard*

PIANO KEY TYPE SWITCH FOR USE IN AUTOMOBILES - SPECIFICATION

1 SCOPE

1.1 This standard specifies the constructional and performance requirements for piano key type switches for use with 12 and 24 V automotive electrical systems.

1.2 This standard covers both single and grouped switches.

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 No.	*Title*
4905 : 2015	Random sampling and randomization procedures (First Revision)
8395 (Part 1) : 1977	Specification for cable terminations for automobile wiring: Part 1 Blade type connectors (male and female)
9000 (Part 2/Sec 4) : 1963	Basic environmental testing procedures for electronic and electrical items: Part 3 Cold test, Section 4 Gold test for heat dissipating items with gradual change of temperature.
9000 (Part 3/Sec 5) : 1977	Basic environmental testing procedures for electronic and electrical items: Part 3 Dry heat test, Section 5 Dry heat test for dissipating items with gradual change of temperature.
9000 (Part 5/Sec 1 & 2) : 1981	Basic environmental testing procedures for electronic and electrical items: Part 5 damp heat (Cyclic) test
9000 (Part 12) : 1981	Basic environmental testing procedures for electronic and electrical items: Part 12 dust test

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 Lot — All piano key switches of the same type, design and rating, manufactured by the same factory during the same period, using the same process and materials and which as offered for inspection at a time shall constitute a lot.

3.3 Rated Current — The maximum current specified by the manufacturer for each terminal or pair of terminals at which the switch is designed to operate satisfactorily.

3.4 Rated Voltage — Tests operating voltage specified by the manufacturer for each terminal or pair of terminals at which the switch is designed to operate satisfactorily.

3.5 Ratings — The Voltage and current range at which the switch is designed to operate satisfactorily.

3.6 Routine Tests — Tests carried out on each piano key type switch to check requirements which are likely to vary during production.

3.7 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 piano key switch.

4 TYPES

4.1 The piano key type switches shall be of following two types:

a) Type I (SPST) — A switch having two terminals and capable of making and breaking a single circuit only (*see* Fig. 1).

b) Type II (SPDT) — A switch having three terminals and capable of changing over of connection from one load to another (*see* Fig. 2).

5 RATINGS

5.1 Rated Voltage — The rated voltage shall be either 12 or 24 V dc.

5.2 Rated Current — The rated current of the switch shall be specified by the manufacturer.

6 DIMENSIONS

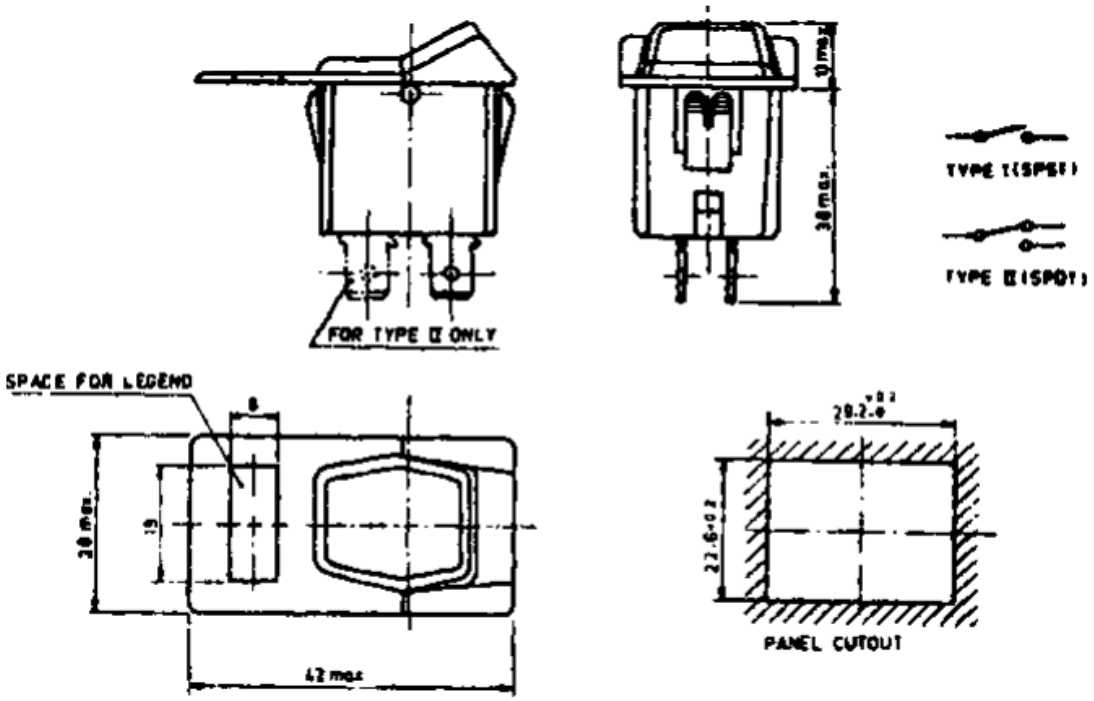
6.1 The dimensions of the single switch (with and without legend plate) and grouped switches shall be as shown in Fig. 1, 2 and 3 respectively.

NOTE — The dimensions of the panel cut-out are given for the information of the user.

7 MATERIAL AND CONSTRUCTION

7.1 Material

All materials used in the construction of the switch shall be suitable for tropical use.



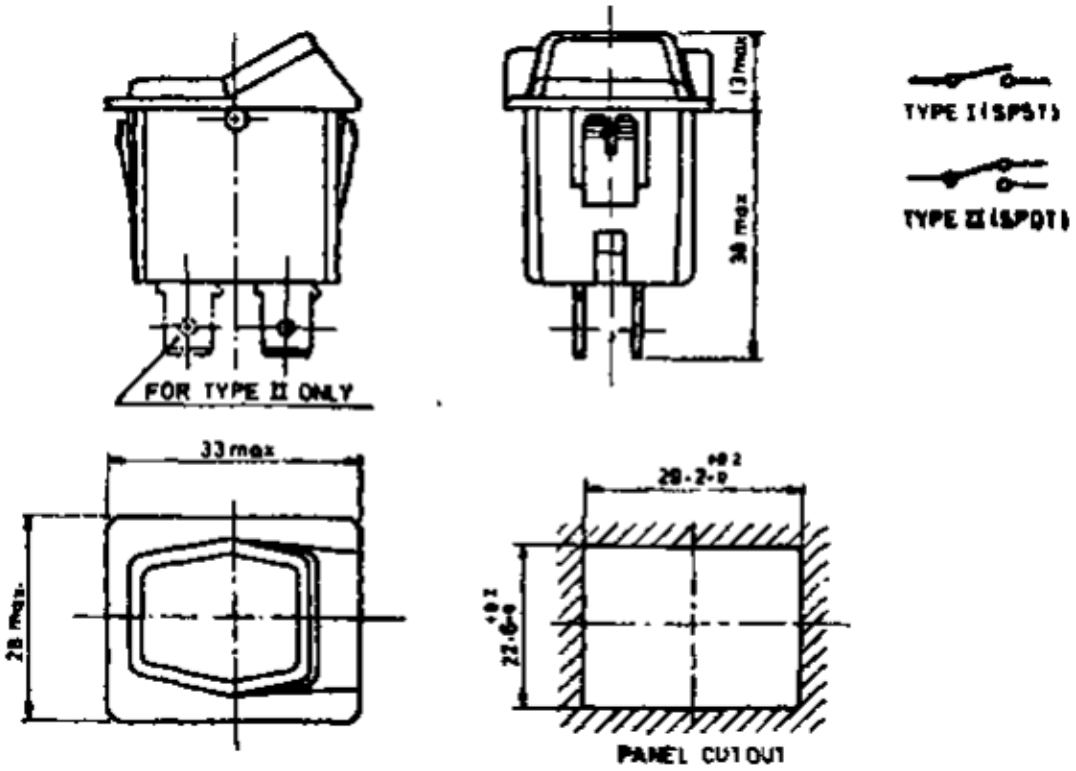
All dimensions in millimetres.
Terminals: Male blade connectors 7.3 as per IS: 8395 (Part 1)

Fig. 1 Piano Key Switch (Single Switch with Legend Plate)

7.2 Construction

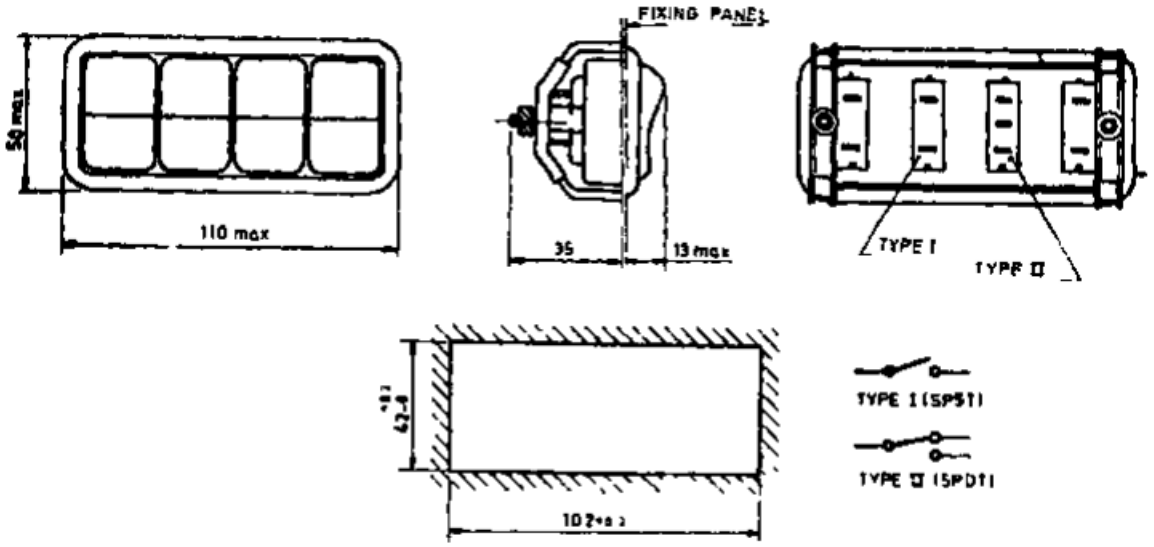
The switches shall be so designed and constructed as to be mechanically robust and free from any operational difficulties. They should be safe and easy to operate under the conditions of vibration, shocks, etc, met with in normal installation and use. They shall have adequate resistance to heat and corrosion. The switch shall function without excessive force. The changeover from one position to the other (on and off) shall have a minimum dwell in the mid-position.

7.3 The switches shall be suitable for mounting on panels of thickness from 0.8 to 4 mm.



All dimensions in millimetres.
Terminals: Male blade connectors 7.3 as per IS: 8395 (Part 1)

Fig. 2 Piano Key Switch (Single Switch without separate legend plate)



All dimensions in millimetres.
Terminals: Male blade connectors 7.3 as per IS: 8395 (Part 1)

FIG. 3 Piano Key Switch (Grouped)

8 CLASSIFICATION OF TESTS

8.1 Type Tests

The following shall constitute type tests:

a) Visual examination (*see* **9.2**);
b) Measurement of dimensions (*see* **9.3**);
c) Performance test (*see* **9.4**);
d) Voltage drop test (*see* **9.5**);
e) Insulation resistance test (*see* **9.6**);
f) Endurance test (*see* **9.7**);
g) Vibration test (*see* **9.8**);
h) Dry heat test (*see* **9.9**);
j) Damp heat (cycling) test (*see* **9.10**);
k) Low temperature test (*see* **9.11**);
m) Dust test (*see* **9.12**); and
n) Temperature-rise test (*see* **9.13**).

8.1.1 *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 **8.1**.

8.1.2 All samples shall be tested for the following:

a) Visual examination (*see* **9.2**);
b) Measurement of dimensions (*see* **9.3**);
c) Performance test (*see* **9.4**);
d) Voltage drop test (*see* **9.5**); and
e) Insulation resistance test (*see* **9.6**)

The samples shall then be subjected to the tests in the following manner:

f)	Endurance test (*see* **9.7**);	3 samples
g)	Vibration test (*see* **9.8**);	1 samples
h)	Dry heat test (*see* **9.9**);	1 samples
j)	Damp heat (cycling) test (*see* **9.10**);	1 samples
k)	Low temperature test (*see* **9.11**);	1 samples
m)	Dust test (*see* **9.12**); and	1 samples
n)	Temperature-rise test (*see* **9.13**).	1 samples

8.1.3 In case of failure in one or more type tests, fresh samples not exceeding 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.

8.2 Acceptance Tests — The following shall constitute acceptance tests:

a) Visual examination (*see* **9.2**);
b) Measurement of dimensions (*see* **9.3**);
c) Performance test (*see* **9.4**); and
d) Voltage drop test (*see* **9.5**).

8.2.1 *Sampling Plan and Criteria for Acceptance* — A recommended sampling plan and criteria for acceptance of a lot is given in Annex A.

8.3 Routine Tests — The following shall constitute routine tests:

a) Visual examination (*see* **9.2**); and
b) Performance test (*see* **9.3**)

9 TESTS

9.1 For carrying out electrical tests, the single Type I, Type II and grouped switches shall be connected in suitable lamp-load circuits.

9.2 Visual Examination — The switches shall have a smooth finish and proper assembly.

9.3 Measurement of Dimensions — The switch with legend and without legend and grouped switches shall conform to the dimensions shown in Fig. 1, 2 and 3 respectively.

9.4 Performance Test — The switch shall be connected in a suitable circuit (*see* **9.1**) adjusted to pass rated current through the switch. The switch shall be operated ten times.

9.4.1 *Requirements* — The circuit operation shall be positive and free from any abnormalities, for example, flicker of lamp-load.

9.5 Voltage Drop Test — The switch shall be connected in a suitable circuit (*see* **9.1**) and rated current shall be passed through the switch. For Type II switch the test shall be carried out with rated current passing through the switch in both the positions.

9.5.1 *Requirements* — The voltage drop shall not exceed the following values:

a) Before endurance test — 100 mV.
b) After endurance test — 200 mV.

9.6 Insulation Resistance Test — The insulation resistance shall be measured between any pair of non-shorted terminals with a voltage of 500 V dc.

9.6.1 *Requirement* — The insulation resistance shall be not less than 1 MΩ.

9.7 Endurance Test

The test switch shall be suitably mounted at an ambient temperature of 27 ± 2°C. The switch shall be connected in a suitable circuit (*see* **9.1**) adjusted to pass the rated current through the switch. The test voltage at terminals shall be 14 and 28 V for switches intended for 12 and 24 V respectively. The switch shall be operated for 100 000 cycles, each cycle being one 'on ' and one 'off'. The rate of operation shall be 25 to 30 cycles per minute. The switch after being subjected to the test shall be allowed to cool down to room temperature.

9.7.1 *Requirement*

The switch after the endurance test shall meet the requirements of visual examination (**9.2**) and voltage drop test (**9.5**).

9.8 Vibration Test

The switch shall be rigidly mounted on a suitable vibrating machine capable of producing simple harmonic motion and subjected to the following conditions of vibration:

a) Total lift — 15 mm
b) Frequency cycle — 10-55-10 Hz per minute

The frequency shall be varied continuously. The vibration shall continue for not less than 2 h each for X and Y axes (right-left, forward-backward) and not less than 4 h for Z axis (up-down).

9.8.1 *Requirements*

The switch after vibration test shall meet the requirements of visual examination (**9.2**) and voltage drop test (**9.5**).

9.9 Dry Heat Test

The test shall be carried out in accordance with IS 9000 (Part 3/Sec 5). The test chamber temperature shall be 85 ± 2°C. The recovery period shall be 2 hours.

9.9.1 *Requirement*

The switch after the dry heat test shall meet the requirements of performance test (**9.4**).

9.10 Damp Heat (Cycling) Test

This test shall be carried out in accordance with IS 9000 (Part 5/Sec 1 & 2). The number of conditioning cycles shall be 7.

9.10.1 *Requirement*

The switch after the test shall meet the requirements of performance test (**9.4**).

9.11 Low Temperature Test

The test shall be carried out in accordance with IS 9000 (Part 2/Sec 4). The temperature severity for this shall be -30 ± 3°C and the recovery period shall be 2 hours.

9.11.1 *Requirement*

The switch after the low temperature test shall meet the requirements of performance test (**9.4**) and voltage drop test (**9.5**).

9.12 Dust Test

The test shall be carried out in accordance with IS 9000 (Part 12). The switch shall pass the requirements of IP5X.

9.12.1 *Requirement*

After the test the switch shall meet the requirements of performance test (**9.4**).

9.13 Temperature-Rise Test

The switch shall be connected in a suitable circuit (***see*** **9.1**) adjusted to pass 120 percent of the rated circuit for 2 hours. For Type II switch the test shall be carried out for that position of the switch which has higher current rating.

9.13.1 *Requirement*

The temperature of switch shall not exceed 70°C.

10 MARKING

10.1 Each piano key type switch shall be distinctly and indelibly marked with the following information:

a) Name and/or trade-mark of the manufacturer,
b) Terminal number,
c) Ratings,
d) Part number,
e) Month and year of manufacture, and
f) Country of manufacture.

10.2 BIS Certification Marking

This Piano key type switches also be marked with the Standard Mark.

10.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 2016 and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A
(*Clause* 8.2.2.1)

SAMPLING PLAN OF PIANO KEY TYPE SWITCHES

A-1 SCALE OF SAMPLING

A-1.1 Lot

In any consignment, all piano key type switches of the same rating manufactured from the same raw material under similar conditions or production shall be grouped together to constitute

A-1.2 The number of piano key type switches to be selected from each 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 Permissible Number of Defectives
(*Clauses* A-1.2 and A-2.1)

Sl. No.	LOT SIZE	SAMPLE SIZE	PERMISSIBLE NUMBER OF DEFECTIVES
(1)	(2)	(3)	(4)
i)	Up to 100	8	0
ii)	101 to 300	13	1
iii)	301 to 500	20	1
iv)	501 to 1 000	32	2
v)	1 001 and above	50	3

A-1.2.1 These switches shall be selected from the lot at random. In order to ensure the randomness of selection, procedure given in IS 4905 may be followed.

A-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-2.1 The piano key type switches selected at random according to col 1 and 2 of Table 1 shall be examined for visual requirements and subjected to performance and mV drop test. The switches failing to satisfy any of these requirements shall be considered as defective. The lot shall be considered as conforming to the requirements of this specification if the number of defective piano key type switches found in the sample is less than or equal to corresponding permissible number given in col 3 of Table 1, otherwise the lot shall be rejected