

भारतीय मानक का मसौदा
ऑटोमोटिव वाहनों के लिए पुश-बटन प्रकार के स्विच — विशिष्टि
(IS 9521 का प्रथम पुनरीक्षण)

Draft Indian Standard

**PUSH-BUTTON TYPE SWITCH FOR AUTOMOTIVE VEHICLES —
SPECIFICATION**
(*First Revision of IS 9521*)

ICS 43.040.30

**Not to be reproduced without permission
of BIS or used as standard**

**Last date for receipt of
comments is 24 11 2023**

Automotive Electrical Equipment and Instruments Sectional Committee, TED 11

FOREWORD

This draft Indian Standard (First Revision) shall be adopted by 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 Indian 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:

- Requirements of 6 V have been deleted since it is no longer used in automobiles.
- Requirements of Voltage drop test, Dry heat test, Drop test, Dust test and Low temperature test have been modified.
- Reference of latest Indian Standard has been given.
- The Indian Standard has been drafted as per latest grafting guidelines.

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

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

September 2023

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

1.1 This standard specifies the basic mechanical and electrical requirements and methods of test for push-button type switches for use in automotive vehicles. These switches are normally used for starters, heaters, etc.

1.2 This specification does not cover the requirements for horn 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:

<i>IS No.</i>	<i>Title</i>
IS 4905:2015	Random sampling and randomization procedures (First Revision)
IS 9000 (Part II/ Sec 4) : 1977	Basic environmental testing procedures for electronic and electrical items: Part II Cold test, Section 4 Cold test for heat dissipating items with change of temperature.
IS 9000 (Part III/ Sec 5) : 1977	Basic environmental testing procedures for electronic and electrical items: Part III Dry heat test, Section 5 Dry heat test for dissipating items gradual change of temperature.
IS 9000 (Part 7/ Sec 3) : 2019	Basic environmental testing procedures for electronic and electrical items Part 7 tests :: Sec 3 test ec: rough handling shocks, primarily for equipment - Types specimens (First Revision)
IS 9000 (Part 11) : 1983	Basic environmental testing procedures for electronic and electrical items: Part 11 Salt mist test

September 2023

<i>IS No.</i>	<i>Title</i>
IS 9000 (Part 12) : 1981	Basic environmental testing procedures for electronic and electrical items - Part 12: Dust test
IS 9000 (Part 16) : 1983	Basic environmental testing procedures for electronic and electrical items - Part 16: Driving rain 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 push-button type switches of the same type, design and rating, manufactured by the same factory during the same period, using the same process and materials, offered for inspection at a time shall constitute a lot.

3.3 Rated Current — The maximum current specified by the manufacturer at which the switch is designed to operate satisfactorily.

3.4 Rated Voltage — The operating voltage specified by the manufacturer at which the switch is designed to operate satisfactorily.

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

3.6 Type Tests — Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of switch.

4 RATINGS

The rated voltage and rated current shall be as specified by the manufacturer.

5 DIMENSIONS

The panel cut out for mounting of push-button switches shall be circle of diameter 23 mm. The push-button shall comply with the dimensions given in the manufacturer's outline diagram.

September 2023

6 MATERIAL AND CONSTRUCTION

6.1 Materials

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

6.2 Construction

The switch shall be so designed and constructed as to be mechanically robust and free from any operational difficulties. They shall function safely and reliably under the conditions of vibrations, shocks, etc encountered during normal installation and use. They shall have adequate resistance to corrosion, heat and humidity.

7 TESTS

7.1 Visual Examination

The switch shall have a smooth finish and a proper assembly.

7.2 Performance and Continuity Test

The force required for pressing the push-button knob to establish contact shall be between 7 and 20 N. With the switch knob depressed, the continuity between terminals shall be checked. Continuity shall break when the switch knob is released.

7.3 High Voltage (Flash) Test

The push-button switch shall be subjected to a flash test with an ac voltage of 250 V rms at a convenient frequency between 40 and 60 Hz for a period of 5 s between the insulated terminal and the body. The contact shall satisfactorily withstand this test without arcing or puncture.

7.4 Voltage Drop Test

The switch shall be connected in a suitable circuit adjusted to pass 10 A through the contacts. The voltage at the terminals shall be maintained at 14 V and 28 V for switches rated at 12 V and 24 V respectively. Three consecutive voltage drop readings (due to contact resistance) between the terminals shall be noted after depressing the push-button with a force of 20 N. The average value of voltage drop shall not exceed the following values:

- | | |
|---|--------|
| a) Before endurance and environmental tests | 100 mV |
| b) After endurance and environmental tests | 300 mV |

7.5 Insulation Resistance Test

With 500 V dc applied at 27 °C between the body and any terminal or between the terminals, the value of the resistance shall be not less than 1 MΩ.

7.6 Endurance Test

The switch shall be tested for operational endurance at the rated voltage and current. The travel time from one position to the other shall be 0.1 to 0.5 s. The dwell time in each position shall be 1 to 2 s. The switch shall complete 30 000 operations. The switch shall then be allowed to cool down to room temperature.

The switch shall comply with the requirements of visual examination (*see 7.1*), performance and continuity test (*see 7.2*) and voltage drop test (*see 7.4*).

7.7 Vibration Test

The switch with the mounting after being rigidly mounted on a suitable vibrating machine constructed to produce a simple harmonic motion, shall be subjected to vibration (a total lift of 1.5 mm) through a frequency range of 10-55-10 Hz in a period of one min. With continuously varying frequencies vibration shall be applied for not less than one hour in each of the three major axes of the switch. At the end of the vibration test the switch shall be examined for any evidence of damage and shall pass in visual examination (*see 7.1*) and voltage drop test (*see 7.4*).

7.8 Dry Heat Test

The test shall be carried out in accordance with IS 9000 (Part III/ Sec 5). The test chamber temperature shall be 85 ± 2 °C for 96 h. The recovery period shall be 2 h.

After the dry heat test the switch shall meet the requirements of performance and continuity test (*see 7.2*).

7.9 Test for Water Spray

The test shall be carried out in accordance with IS 9000 (Part 16).

This test shall be carried out only on those switches which are covered with rubber cap. At the end of the test there shall be no rust formation, abnormal increase in voltage drop or loss of operation / function. After the test the switch shall meet with the requirements of performance and continuity test (*see 7.2*).

September 2023

7.10 Drop Test

7.10.1 The test shall be conducted as specified in IS 9000 (Part VII/ Sec 3) under the following conditions:

- | | |
|--------------------|----------|
| a) Number of drops | 2 |
| b) Drop height | 1 000 mm |

7.10.2 First fall of device can be at any dimensional axis. The second fall shall be on the same axis but on the opposite side of the housing.

7.10.3 At the end of the test, the switch shall comply with the requirements of visual examination (*see 7.1*) and performance and continuity test (*see 7.2*).

7.11 Dust Test

The test shall be carried out in accordance with IS 9000 (Part 12). The switch shall pass the requirements of IPX5. After the test, the switch shall pass performance and continuity test (*see 7.2*).

7.12 Salt Spray Test

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

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

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

7.12.4 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.

7.12.5 After the test the switch shall meet the requirements of visual examination (*see 7.1*) and voltage drop test (*see 7.4*).

7.13 Low Temperature Test

The test shall be carried out in accordance with IS: 9000 (Part II/Sec 4). The temperature severity for this shall be $-30 \pm 3^{\circ}\text{C}$ for 72 h and the recovery period shall be 2 h.

After the test the switch shall meet the requirements of performance and continuity test (*see 7.2*) and voltage drop test (*see 7.4*).

September 2023

8 CLASSIFICATION OF TESTS

8.1 Type Tests

The following shall constitute type tests:

- a) Dimensions (*see 5*);
- b) Visual examination (*see 7.1*);
- c) Performance and continuity test (*see 7.2*);
- d) High voltage (Flash) test (*see 7.3*);
- e) Voltage drop test (*see 7.4*);
- f) Insulation resistance test (*see 7.5*);
- g) Endurance test (*see 7.6*);
- h) Vibration test (*see 7.7*);
- j) Dry heat test (*see 7.8*);
- k) Test for water spray (*see 7.9*);
- m) Drop test (*see 7.10*);
- n) Dust test (*see 7.11*);
- p) Salt spray test (*see 7.12*); and
- q) Low temperature test (*see 7.13*).

8.1.1 Criteria for Approval

Ten samples shall be submitted for testing together with the relevant data. These shall be tested as given in **8.1.1.1** and **8.1.1.2**

8.1.1.1 All samples shall be tested for:

- a) Dimensions (*see 5*);
- b) Visual examination (*see 7.1*);
- c) Performance and continuity test (*see 7.2*);
- d) High voltage (Flash) test (*see 7.3*);
- e) Voltage drop test (*see 7.4*); and
- f) Insulation resistance test (*see 7.5*).

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

- | | |
|---|-----------|
| a) Endurance test (<i>see 7.6</i>); | 3 samples |
| b) Vibration test (<i>see 7.7</i>). | 1 samples |
| c) Dry heat test (<i>see 7.8</i>). | 1 samples |
| d) Test for water spray (<i>see 7.9</i>); | 1 samples |
| e) Drop test (<i>see 7.10</i>); | 1 samples |
| f) Dust test (<i>see 7.11</i>); | 1 samples |
| g) Salt spray test (<i>see 7.12</i>); and | 1 samples |

September 2023

h) Low temperature test (*see 7.13*).

1 sample

8.1.2 In case of failure of one or more type tests, fresh samples not exceeding twice the number of original samples shall be called and subject them to the test(s) in which failure occurred. If, on repeat tests no failure occurs, the tests may be considered to have been satisfactory.

8.2 Acceptance Tests

The following shall constitute acceptance tests:

- a) Dimensions (*see 5*);
- b) Visual examination (*see 7.1*);
- c) Performance and continuity test (*see 7.2*);
- d) High voltage (Flash) test (*see 7.3*);
- e) Voltage drop test (*see 7.4*); and
- f) Insulation resistance test (*see 7.5*).

8.2.1 Sampling Scheme and Criteria for Acceptance

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

8.3 Routine Tests

The following shall constitute routine tests:

- a) Dimensions (*see 5*);
- b) Visual examination (*see 7.1*);
- c) Performance and continuity test (*see 7.2*);
- d) High voltage (Flash) test (*see 7.3*); and
- e) Voltage drop test (*see 7.4*).

9 MARKING

9.1 Each push button switch shall be distinctly and indelibly marked with the following:

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

September 2023

9.2 BIS Certification Marking

The push button switch may also be marked with the Standard Mark.

9.2.1 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.

September 2023

ANNEX A
(Clause 8.2.1)

SAMPLING OF PUSH-BUTTON TYPE SWITCHES

A-1 LOT

A-1.1 In any consignment all the push-button switches of the same type and manufactured in the same batch, shall be grouped together to constitute a lot.

A-1.2 From each lot, samples shall be taken and tested for acceptance test. If a push-button switch fails in any one of the acceptance tests, it shall be called a defective.

A-2 SCALE OF SAMPLING

A-2.1 The number of push-button switches to be selected from a lot, shall depend upon col 1 and 2 of Table 1.

Table 1 Sample Size and Criteria for Conformity

Sl. No.	LOT SIZE <i>N</i> (2)	SAMPLE SIZE <i>n</i> (3)	PERMISSIBLE NUMBER OF DEFECTIVES (4)
(1)			
i)	Up to 200	13	1
ii)	201 ,, 300	20	1
iii)	301 ,, 500	32	2
iv)	501 ,, 800	50	3
v)	801 ,, 1 300	80	5
vi)	1 301 and above	125	7

NOTE —The sampling plan recommended here assures that lots with 2.5 percent or less defectives would be accepted most of the times.

A-2.1.1 The push-button switches shall be selected at random. In order to ensure the randomness of selection, the procedures given in IS 4905, shall be followed.

A-3 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-3.1 The push-button switches selected as per col 1 and 2 of Table 1, shall be tested for all acceptance tests (*see 8.2*). If a push-button switch fails in any one of the acceptance tests, it shall be called a defective. A lot shall be considered as conforming to the specification if the

**TED 11 (20737) W
IS 9521 : XXXX**

September 2023

number of push-button switches failing to satisfy any one of the acceptance tests, shall not exceed the corresponding permissible number of defectives (*see* col 3 of Table 1).

**TED 11 (20737) W
IS 9521 : XXXX**

September 2023

ANNEX B
(Forward)

COMPOSITION COMMITTEE
To be added