SOUTH QUALITY

PROFICIENCY TESTING PROVIDER

PROFICIENCY TESTING PROGRAM REPORT No 11668

Date of issue: *March 28, 2026*

Status: FINAL REPORT

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IEC 60669-1

SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED - ELECTRICAL INSTALLATIONS

Program: SQ-2593

****

Prepared by:	Reviewed by:	Approved by:
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TABLE OF CONTENTS

1. FOREWORD

This report summarizes the results of the **SQ-2593** proficiency testing program on the determination of compliance with the general requirements. This program is conducted in a bilateral format, following the A.3.3 classification of the ISO/IEC 17043: 2023 standard ("Split-sample testing schemes").

South Quality conducted the testing program in February 2026 with the aim of assessing the laboratory's ability to competently perform the designated tests.

2. ORGANIZATION

Program Coordinator:	Eng. Esteban Di Marco
Assistant Technician:	Valentyn Kravchenko
Statistic:	Lic. Manuel Tozaki
Supervision:	Eng. Emiliano Medina

3. OBJECTIVE

The objective of this proficiency testing program is to determine compliance with the general requirements of a switch for household and similar fixed-electrical installations, using the following standards:

Standard
IEC 60669-1: 2017

To verify this, batches of switch samples have been selected.

Participants in this program have not been previously informed about the expected behavior of the samples they receive.

4. PARTICIPANT

Company:	**Alfanar Electrical Systems**
Laboratory:	**Alfanar Electrical Systems Lab**
Adress:	Alfanar Industrial City, New Alkharj Road, P.o. Box: 564, Riyadh 11383, Saudi Arabia
Client ID:	S341
Contact person:	Thyagarajan Selvam - Senior Engineer - Laboratory (thyagarajan.selvam@alfanar.com) Mahmoud Sawalhi - Laboratory Manager (mahmoud.alsawalhi@alfanar.com)

5. HOMOGENEITY

Several batches were prepared identically by the staff at South Quality.

Subsequently, a homogeneity study was conducted with an ISO/IEC 17025: 2017 accredited laboratory.

The control process followed ISO 33405: 2024, clauses 7.4.1.1 / 7.4.1.2. Stratified random sampling was applied, and samples were selected using random number generation software.

The results of this test are presented below:

Size of each batch: **500 units** Tested samples from each batch: **100 units**

IEC 60669-1 CHAPTER NO	SAME RESULTS IN THE SAMPLES TESTED			
	BATCH: LEM3446	BATCH: LEM3447	BATCH: LEM3448	BATCH: LEM3449
6	YES	YES	YES	YES
7	YES	YES	YES	YES
8	YES	YES	YES	YES
9	YES	YES	YES	YES
10	YES	YES	YES	YES
11	NA	NA	NA	NA
12	YES	YES	YES	YES
13	YES	YES	YES	YES
14	YES	YES	YES	NO
15	YES	YES	YES	YES
16	YES	YES	YES	YES
17	YES	YES	YES	YES
18	YES	YES	YES	YES
19	YES	YES	YES	YES
20	YES	YES	YES	YES
21	NO	YES	YES	YES
22	YES	YES	YES	YES
23	NO	YES	YES	YES
24	YES	YES	YES	YES
25	YES	YES	YES	YES
26	NA	NA	NA	NA

Samples for this program are taken from the selected batch identified as **LEM3448**.

For the indicated batch, the values determined in the homogeneity study are utilized as the assigned values.

The analysis of the test data indicated that the selected samples exhibited sufficient homogeneity for the program. Therefore, the results of participants identified as outliers cannot be attributed to sample variability.

6. SAMPLE INFORMATION

The following sample was sent for testing:

Batch:	LEM3448
Sample ID:	06
Characteristics:	Switch - 250V - 16AX - 20 units Trademark: KALOP

7. IMAGES

SAMPLES

8. ASSIGNED VALUES

BATCH: LEM3448		
CHAPTER	**REQUIREMENT**	**VEREDICT**
6	Ratings	PASS
7	Classification	PASS
8	Marking	FAIL
9	Checking of dimensions	PASS
10	Protection against electric shock	PASS
11	Provision for earthing	N/A
12	Terminals	FAIL
13	Constructional requirements	PASS
14	Mechanisms	PASS
15	Resistance to ageing, protection provided by enclosures of switches and resistance to humidity	PASS
16	Insulation resistance and electric strength	PASS
17	Temperature rise	FAIL
18	Making and breaking capacity	PASS
19	Normal operation	FAIL
20	Mechanical strength	PASS
21	Resistance to heat	PASS
22	Screws, current carrying parts and connections	PASS
23	Creepage distances, clearances distances through sealing compound	PASS
24	Resistance of insulating material to abnormal heat, to fire and to tracking	PASS
25	Resistance to rusting	PASS
26	EMC requirements	N/A

9. PARTICIPANT RESULTS (SEE APPENDIX B)

CODE: LEM3448-06		
CHAPTER	**REQUIREMENT**	**VEREDICT**
6	Ratings	PASS
7	Classification	PASS
8	Marking	FAIL
9	Checking of dimensions	PASS
10	Protection against electric shock	PASS
11	Provision for earthing	N/A
12	Terminals	FAIL
13	Constructional requirements	PASS
14	Mechanisms	PASS
15	Resistance to ageing, protection provided by enclosures of switches and resistance to humidity	PASS
16	Insulation resistance and electric strength	PASS
17	Temperature rise	FAIL
18	Making and breaking capacity	PASS
19	Normal operation	FAIL
20	Mechanical strength	PASS
21	Resistance to heat	PASS
22	Screws, current carrying parts and connections	PASS
23	Creepage distances, clearances distances through sealing compound	PASS
24	Resistance of insulating material to abnormal heat, to fire and to tracking	PASS
25	Resistance to rusting	PASS
26	EMC requirements	N/A

10. STATISTICS

The results must be treated as qualitative.

For qualitative results, the comparison will be made directly against the assigned values, so any difference will be evaluated as **Unsatisfactory**.

The comparison is carried out by assigning a compliance verdict (PASS or FAIL) to each chapter. If any clause is rated as FAIL, the corresponding chapter is also assigned a FAIL verdict. If all clauses within a chapter are marked as NOT APPLICABLE, the chapter is assigned NA.

11. EVALUATION OF PERFORMANCE

CHAPTER	REQUIREMENT	BATCH: LEM3448		PERFORMANCE RESULT
		PARTICIPANT RESULT	ASSIGNED VALUE	
6	Ratings	PASS	PASS	SATISFACTORY
7	Classification	PASS	PASS	SATISFACTORY
8	Marking	FAIL	FAIL	SATISFACTORY
9	Checking of dimensions	PASS	PASS	SATISFACTORY
10	Protection against electric shock	PASS	PASS	SATISFACTORY
11	Provision for earthing	N/A	N/A	SATISFACTORY
12	Terminals	FAIL	FAIL	SATISFACTORY
13	Constructional requirements	PASS	PASS	SATISFACTORY
14	Mechanisms	PASS	PASS	SATISFACTORY
15	Resistance to ageing, protection provided by enclosures of switches and resistance to humidity	PASS	PASS	SATISFACTORY
16	Insulation resistance and electric strength	PASS	PASS	SATISFACTORY
17	Temperature rise	FAIL	FAIL	SATISFACTORY
18	Making and breaking capacity	PASS	PASS	SATISFACTORY
19	Normal operation	FAIL	FAIL	SATISFACTORY
20	Mechanical strength	PASS	PASS	SATISFACTORY
21	Resistance to heat	PASS	PASS	SATISFACTORY
22	Screws, current carrying parts and connections	PASS	PASS	SATISFACTORY
23	Creepage distances, clearances distances through sealing compound	PASS	PASS	SATISFACTORY
24	Resistance of insulating material to abnormal heat, to fire and to tracking	PASS	PASS	SATISFACTORY
25	Resistance to rusting	PASS	PASS	SATISFACTORY
26	EMC requirements	N/A	N/A	SATISFACTORY

12. CONCLUSIONS

The overall performance of this **SQ-2593** program from the participant laboratory **ALFANAR ELECTRICAL SYSTEMS - Alfanar Electrical Systems Lab**, is **SUFFICIENT** based on expected results.

The criteria used for the evaluation of the overall performance is the following:

- **SUFFICIENT** performance: No unsatisfactory results were obtained.
- **INSUFFICIENT** performance: An unsatisfactory result was obtained.

APPENDIX A

INSTRUCTIONS

INSTRUCTIONS

PROGRAM:	Switches for household and similar fixed-electrical installations
CODE:	SQ-2593
VERSION:	-
STANDARD:	IEC 60669-1
COORDINATOR:	Eng. Esteban Di Marco (edimarco@ptsouthquality.com)

DSQ-012 - REV 06 - SQ-2593 1 de 3

1 - **General**

This document serves as a guide for managing the results of the **SQ-2593** program.

2 - **Standard**

IEC 60669-1: 2017

3 - **Tests involved**

TEST
Determination of compliance with the general requirements (Complete standard)

4 - **Samples**

CODE	SAMPLE	QUANTITY
LEM3448-06	Switch 250V - 16AX Trademark: KALOP	20

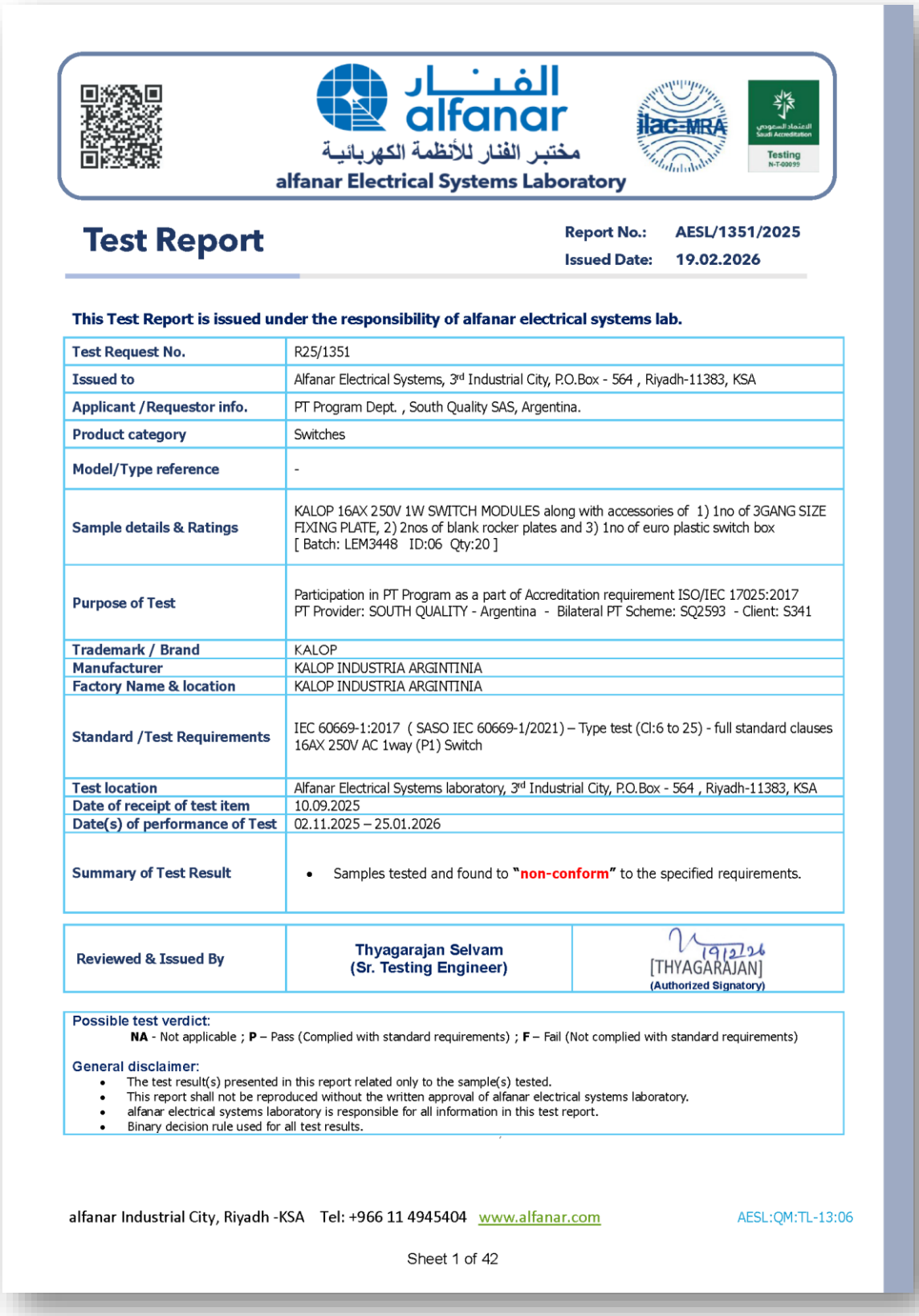
5 - **Notes**

a) Being a bilateral program, there is no deadline for submitting results.
b) The participant must submit the results using the usual report employed by their laboratory.
c) Samples must be retained until the end of the program, which concludes with the submission of the final report.
d) To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.

PHOTOGRAPHS

APPENDIX B

PARTICIPANT RESULTS (TR #AESL/1351/2025)



الفنار alfanar
مختبر الفنار للأنظمة الكهربائية
alfanar Electrical Systems Laboratory

ilac-MRA

Testing N-T-00099

Test Report

Report No.: AESL/1351/2025
Issued Date: 19.02.2026

This Test Report is issued under the responsibility of alfanar electrical systems lab.

Test Request No.	R25/1351
Issued to	Alfanar Electrical Systems, 3rd Industrial City, P.O.Box - 564 , Riyadh-11383, KSA
Applicant /Requestor info.	PT Program Dept. , South Quality SAS, Argentina.
Product category	Switches
Model/Type reference	-
Sample details & Ratings	KALOP 16AX 250V 1W SWITCH MODULES along with accessories of 1) 1no of 3GANG SIZE FIXING PLATE, 2) 2nos of blank rocker plates and 3) 1no of euro plastic switch box [Batch: LEM3448 ID:06 Qty:20]
Purpose of Test	Participation in PT Program as a part of Accreditation requirement ISO/IEC 17025:2017 PT Provider: SOUTH QUALITY - Argentina - Bilateral PT Scheme: SQ2593 - Client: S341
Trademark / Brand	KALOP
Manufacturer	KALOP INDUSTRIA ARGINTINIA
Factory Name & location	KALOP INDUSTRIA ARGINTINIA
Standard /Test Requirements	IEC 60669-1:2017 (SASO IEC 60669-1/2021) – Type test (Cl:6 to 25) - full standard clauses 16AX 250V AC 1way (P1) Switch
Test location	Alfanar Electrical Systems laboratory, 3rd Industrial City, P.O.Box - 564 , Riyadh-11383, KSA
Date of receipt of test item	10.09.2025
Date(s) of performance of Test	02.11.2025 – 25.01.2026
Summary of Test Result	• Samples tested and found to **"non-conform"** to the specified requirements.

Reviewed & Issued By	**Thyagarajan Selvam (Sr. Testing Engineer)**	19/2/26 [THYAGARAJAN] (Authorized Signatory)

Possible test verdict:
NA - Not applicable ; **P** – Pass (Complied with standard requirements) ; **F** – Fail (Not complied with standard requirements)

General disclaimer:
- The test result(s) presented in this report related only to the sample(s) tested.
- This report shall not be reproduced without the written approval of alfanar electrical systems laboratory.
- alfanar electrical systems laboratory is responsible for all information in this test report.
- Binary decision rule used for all test results.

alfanar Industrial City, Riyadh -KSA Tel: +966 11 4945404 www.alfanar.com AESL:QM:TL-13:06

Sheet 1 of 42

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict

Summary of the test report

Cl. No.	Name of test	Remarks
6	Ratings	P
7	Classification	P
8	Marking	F
9	Checking of dimensions	P
10	Protection against electric shock	P
11	Provision for earthing	NA
12	Terminals	F
13	Constructional requirements	P
14	Mechanism	P
15	Resistance to ageing, protection provided by enclosures of switches and resistance to humidity	P
16	Insulation resistance and electric strength	P
17	Temperature rise	F
18	Making and breaking capacity	P
19	Normal operation	F
20	Mechanical strength	P
21	Resistance to heat	P
22	Screws, current-carrying parts and connections	P
23	Creepage distances, clearances and distances through sealing compound	P
24	Resistance of insulating material to abnormal heat, to fire and to tracking	P
25	Resistance to rusting	P
26	EMC requirements	NA

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[THYAGARAJAN]
AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
6.0	**Rating**		Sample: A	P
6.1	**Rated Voltage** Preferred values of rated voltage are 130 V, 220 V, 230 V, 240 V, 250 V, 277 V, 380 V, 400 V, 415 V or 440 V.		Rated voltage: 250V	
6.2	**Rated Current** Preferred values of rated current are 6 A, 10 A, 13 A, 16 A, 20 A, 25 A, 32 A, 40 A, 45 A, 50 A or 63 A. The rated current of switches shall not be less than 6 A, except for momentary contact switches where a rated current of 1 A, 2 A or 4 A is allowed. Switches with a rated current not exceeding 16 A shall have an externally ballasted lamp current rating equal to the rated current. This requirement does not apply to switches of pattern numbers 3 and 03 or to momentary contact switches. Switches with a rated current not exceeding 20 A shall be tested with self ballasted lamp (SBL) circuits as given in 19.3.. Switches which are tested according to 19.3 are capable of switching the rated power of SBL circuits according to Table 2. Table 2 - Relationship between rated current of the switch and rated power of the SBL circuit Compliance with the requirements of 6.1 and 6.2 is checked by inspection of the marking.		Rated current: 16AX 16AX switch is applicable for Externally ballasted lamp (EBL). Switch complied as per standard requirement (refer clause 19.2) 16AX switch is applicable for Self ballasted lamp (SBL). Switch complied as per standard requirement 200W (refer clause 19.3)	P
6.3	**Preferred combinations of number of poles and ratings** Preferred combinations of number of poles and ratings are shown in Table 3.		No. of poles: 1	P

Rated current of the switch [A]	Rated power of the SBL circuit [W]
Up to and including 10	100
Above 10 up to and including 13	150
Above 13 up to and including 16	200
Above 16 up to and including 20	250

Table 3 – Preferred combinations of numbers of poles and ratings

Rated current A	Number of poles	
	Rated voltage from 120 V to 250 V inclusive	Rated voltage over 250 V
1, 2 and 4	1	–
6	1 2	1 2
10 and 13	1 2	1 2 3 4
16, 20, 25, 32, 40, 45, 50 and 63	1 2 3 4	1 2 3 4

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Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
7.0	**Classification** Switches are classified as:		**Sample: A**	P
7.1	according to the possible connections (see figure 8)		-Single pole switches(Pattern No.: 1);	
7.2	according to the contact opening		-Normal-gap construction (3mm);	
7.3	according to the degree of protection against access to hazardous parts and against harmful effects due to the ingress of solid foreign objects as described in IEC 60529.		-IP2X	
7.4	according to the degree of protection against harmful effects due to the ingress of water as described in IEC 60529.		-IPX0	
7.5	According to the method of actuating the switch. (rotary, tumbler, rocker, push button, cord operated)		-rocker;	
7.6	According to the method of mounting the switch. (surface type, flush type, semi flush type, panel type, architrave type)		-flush-type;	
7.7	According to the method of installation, as a consequence of the design of the switch (design A – clip-on; design B – w/o clip-on);		-design A	
7.8	According to the type of terminal (screw-type or screwless type)		- with screw-type terminals;	
7.9	According to the suitability to accept conductors (rigid only or rigid and flexible conductors)		-switches with rigid conductors;	
8.0	**Marking**			
8.1	**General** Switches shall be marked with:		**Sample : A**	
	(a) rated current(s) - in ampere (A) or rated externally / self ballasted load in amperes (AX) or a combination of both if the two ratings are different		Marked as '16AX'	P
	(b) rated voltage(s) in volts;		Marked as ' 250V'	P
	(c) symbol for nature of supply;		Marked as ' ~'	P
	(d) manufacture's or responsible vendor's name, trade mark or identification mark;		Marked as 'KALOP'	P
	(e) type reference, which may be a catalogue number;		Type reference not marked on main part of the product	F
	(f) symbol for switches of mini-gap construction, if applicable;		NA	
	(g) symbol for switches of micro-gap construction, if applicable;		NA	
	(h) symbol for switches without contact gap (semiconductor switching device), if applicable;		NA	
	(i) first characteristic numeral for the degree of protection against access to hazardous parts and against harmful effects due to ingress of solid foreign objects, if declared higher that, in which case the second characteristic numeral shall also be marked;		NA (IP2X)	
	(j) Second characteristic numeral for the degree of protection against harmful effects due to the ingress of water, if declared higher than 2 in which case the first characteristic numeral shall also be marked;		NA (IPX0)	
	(k) length of insulation to be removed before the insertion of the conductor into the screwless type terminal;		NA	
	(l) symbol for the suitability to accept rigid conductors only;		NA	
	In addition the following information shall be given in the manufacturer's documentation:			
	(m). for SBL loads: the rated power in watts and the type of load if the switch is tested according to 19.3.		rated SBL load as per std: 200W	

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Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
8.2	**Symbols** When symbols are used, they shall be as follows:			P
	– Amperes (Rated current for Externally ballasted load-AX), (other currents-A)		Marked as ' AX'	
	– Volts-V		Marked as ' V'	
	– Alternating current-~		Marked as ' ~'	
	– Watt -W		NA	
	– Neutral - N		NA	
	– Line - L		Marked as "1"(Common / incoming) & "3" (outgoing)	P
	– Protective earth - ⏚		NA	
	– "open" position (off) - O		NA	
	– "closed: position (on) - I		NA	
	– Mini-gap construction - m		NA	
	– Micro-gap construction - μ		NA	
	– Without-gap const (Semiconductor switching device)-ε		NA	
	– Degree of protection, when relevant-IPXX		NA	
	– Degree of protection for fixed accessories to be installed on rough surfaces (test wall of Figure 21) IPXX		NA	
	– Suitability to accept rigid conductors only - r		NA	
	The symbol "AX" may be replaced by the symbol "X". For the marking with rated current and rated voltage the figures may be used alone.			
	The marking of the nature of supply shall be placed next to the marking of rated current and rated voltage.		Marked as '16AX 250V ~'	P
8.3	**Visibility of marking** Markings shall be clearly visible with normal or corrected vision, without additional magnification. Markings as given in 8.1 a), b), c), d), e) and, if applicable, f), g), h), k), and l) shall be placed on the main part of the switch.		Markings are visible. 8.1 a), b), c),d) marked on main part (housing).	F
	Parts such as cover plates, which are necessary for safety purposes and are intended to be sold separately, shall be marked with the manufacturer's or responsible vendor's name, trade mark or identification mark and type reference. Markings i) and j), when applicable, shall be marked so as to be easily discernible when the switch is mounted and wired as in normal use. These markings shall be placed on parts which cannot be removed without the use of a tool.		Marking e) i.e type reference not marked on product.	
8.4	**Marking on terminals for phase conductors** Terminals intended for the connection of phase conductors (supply conductors) shall be identified unless the method of connection is of no importance, is self-evident or is indicated on a wiring diagram. Such identification may take the form of a letter L or, in the case of more than one of such terminals, the letters L1, L2, L3, etc. The letters L1, L2, L3 may be accompanied by an arrow or arrows pointing to the relevant terminal or terminals.		Marked as; Terminal markings are provided. Common terminal marked as ' **1** ' and outgoing terminal marked as ' 3 '. Available markings are engraved	P

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Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
8.5	**Marking on terminals for neutral and earth conductors** Terminals intended exclusively for the neutral conductor shall be indicated by the letter N. Protective earthing shall be indicated by the symbol ⏚. These markings shall not be placed on screws or any other easily removable parts.		NA	NA
8.6	**Marking of the switch position** If switches are marked to indicate the switch position, they shall be so marked that the direction of movement of the actuating member to its different positions or the actual position is clearly indicated. For switches having more than one actuating member, this marking shall indicate, for each of the actuating members, the effect achieved by its operation. The marking shall be clearly visible on the front of the switch when fitted with its cover or cover plate. If this marking is placed on the cover, cover plate, or removable actuating members, it shall not be possible to fix them in a position such that the marking is incorrect. The symbols for "on" and "off" shall not be used for the indication of the switch positions unless, at the same time, they clearly indicate the direction of the movement of the actuating members. The short straight line indicating the "on" position shall be radial for rotary switches, perpendicular to the axis of rotation of the dolly for tumbler switches and rocker switches and vertical for push-button switches when mounted vertically. These requirements do not apply to cord-operated switches and to switches of pattern numbers 6, 6/2 and 7. Compliance with the requirements of 8.1 to 8.6 is checked by inspection.		NA	NA
8.7	**Additional requirements for marking** If it is necessary to take special precautions when installing the switch, details of these shall be given in an instruction sheet which accompanies the switch. Instruction sheets shall be written in the official language(s) of the country in which the switch is to be sold. Compliance is checked by inspection.		NA (No any special precautions provided)	NA
8.8	**Durability** Marking shall be durable and easily legible. Compliance is checked by inspection and by the following test. The marking is rubbed by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with 95 % n-hexane.		All the markings are marked in mould. No markings are made with pad printed or labels.	P
9.0	**Checking of dimensions** Switches and boxes shall comply with the appropriate standard sheet if any. Compliance checked by measurement.		**Samples: A, B, C** KALOP 16AX 250V Switch with 3gang plate fixing with 3gang size box.	P

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Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
10.0 10.1	**Protection against electric shock.** **Prevention of access to live parts:** Switches shall be so designed that when they are mounted and wired as in normal use, live parts are not accessible even after removal of parts which can be removed without the use of a tool. Switches which are designed to be fitted with pilot lights supplied at voltages other than ELV shall have means to prevent direct contact with the lamp. Compliance shall be checked by inspection and, if necessary, by the test as in clause description.		**Samples: A, B, C** Live parts are not accessible when wired and mounted as in normal use. Conductors used: smallest 1.5sq.mm and largest 4.0sq.mm. Test probe B of IEC 61032–40V to 50V electrical indicator. 35°C with 75N for 1min, probe 11 of IEC 61032. No live parts accessible.	P
10.2	**Requirements for operating parts:** Knobs, operating levers, push buttons, rockers and the like shall be of insulating material, unless their accessible metal parts are separated from the metal parts of the mechanism by double insulation or reinforces insulation, or as an alternative, they are reliably connected to earth. Compliance is checked by inspection and by the tests of clauses 16 and 23. This requirement does not apply to removable key or intermediate parts, such as chains or rods.		Rocker is made of insulating material. Compliance checked with clauses 16 & 23.	P
10.3 10.3.1	**Requirements for accessible metal parts:** Accessible parts of switches when in normal use shall be made of insulating material with the exception of the following: -small screws and the like which are isolated from live parts and which are used for fixing bases and covers, cover plates and other parts of enclosures; -actuating members complying with 10.2; -the covers, cover plates and other parts of the enclosure of metal which comply with the requirements of 10.3.2 or 10.3.3;		Insulating materials are used on accessible parts. NA Complied with 10.2 Complied with Cl: 10.3.3.	P
10.3.2	Covers, cover plates and other parts of the enclosure of metal shall be protected by additional insulation made by insulating linings or insulating barriers. The insulating lining or insulating barriers shall either – be fixed to covers, cover plated and other parts of the enclosure or the body of the switches in such a way they cannot be removed without being permanently damaged, or - be designed that – they cannot be replaced in an incorrect position; – if they are omitted, the accessories are rendered inoperable or manifestly incomplete; – there is no accidental contact in between live parts and metal covers, cover plates, and other parts of the enclosure, for example through their fixing screws, even if a conductor should come away from its terminal; – precautions are taken in order to prevent creepage distances or clearances becoming less than the values specified in clause 23. Compliance shall be checked by inspection. The above linings or barrier shall comply with the tests of Clauses 16 and 23.		NA NA	NA

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AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
10.3.3	The earthing of metal covers, cover plates and other parts of the enclosure is made while fixing the covers or cover plates and other parts of the enclosure and the resulting connection shall be of low resistance. Compliance checked by inspection and by the test of 11.4.		NA	NA
10.4	**Requirements for insulation of the mechanism** Metal parts of the mechanism, such as the spindle or the pivot of the dolly or rocker that are not insulated from live parts shall not protrude from the enclosure. However, for switches operated by means of a removable key or similar device, such metal parts of the mechanism shall be insulated from live parts. Compliance is checked by inspection and, if necessary, after the actuating member has been removed or broken. If the actuating member has to be broken, compliance is checked by the test of Clause 23.		NA (No metal parts of mechanism protrude from the enclosure)	NA
10.5	**Requirements for insulation of the mechanism with respect to the surrounding environment:** Metal parts of the mechanism, such as the spindle or the pivot of the dolly or rocker shall not be accessible when the switch is fixed as in normal use. These requirements do not apply if the metal parts of the mechanism are separated from live parts in such a way that the creepage distances and clearances have at least twice the values specified in Clause 23, or, as an alternative, if they are reliably connected to earth. Compliance is checked by inspection and, if necessary, by measurement and by the tests of Clauses 10 and 16. For unenclosed stack-type switches having a metal spindle pivoting in a metal base plate, the additional requirement means that the creepage distances and clearances between live parts and the spindle, and between metal parts of the mechanism and base plate, shall have at least twice the values specified in Clause 23.		NA (No metal parts of mechanism protrude from the enclosure)	NA
10.6	**Requirements for switches operated indirectly:** Switches operated by means of a removable key or by means of an intermediate part such as a chord, a chain or a rod, shall be so designed that the key or intermediate part can only touch parts which are insulated from live parts. The key or intermediate part shall be insulated from metal parts of the mechanism, unless the creepage distances and clearances between live parts and metal parts of the mechanism have at least twice the values specified in Clause 23. Compliance is checked by inspection, by the test of 16.3 and, if necessary, by measurement. NOTE Lacquer or enamel is not considered to be insulating material for the purposes of 10.1 to 10.6.		NA	NA
10.7	**Requirements for switches with replaceable pull cord:** Where cord operated switches are provided with a pull cord, which can be fitted or replaced by the user, they shall be so designed that it is impossible to touch live parts when fitting or replacing the pull cord in normal way. Compliance is checked by inspection.		NA	NA

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19/2/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
11.0 11.1	**Provision for earthing** **General** Accessible metal parts, which can be live in the event of an insulation failure, shall be provide with, or permanently or reliably connected to an earth terminal. This requirement does not apply to the metal cover plates mentioned in 10.3.2. For the purpose of this requirement, small screws and the like, isolated from live parts, are not considered as accessible parts which can become live in the event of an insulation fault.		NA (No earth provision available)	NA
11.2	**Earthing terminals:** Earthing terminals shall be terminals with screw clamping or screwless terminals and shall comply with the appropriate requirements of clause 12.		NA	NA
11.3	**Requiremnets for surface-type switches** Surface type switches with an enclosure of insulating material, having an IP code higher than IPX0 and more than one cable inlet, shall be provided with either an internal earthing terminal or adequate space for a floating terminal allowing the connection of an incoming and outgoing conductor for the continuity of the earthing circuit. Clause 12 does not apply for floating terminal. Compliance with 11.1 to 11.3 is checked by inspection and b the tests of clause 12. Compliance for adequate space for floating terminal is checked by performing a test connection using the type of terminal specified by the manufacturer.		NA (tested switches are flush-type)	NA
11.4	**Test for earthing connection:** The connection between the earthing terminal and accessible metal parts to be connected there to shall be of low resistance. Compliance is checked by the following test: A current derived from an AC source having a no-load voltage not exceeding 12 V and equal to 1,5 times the rated current or 25 A, whichever is the greater, is passed between the earthing terminal and each of the accessible metal parts in turn. The voltage drop between the earthing terminal and the accessible metal part is measured, and the resistance calculated from the current and this voltage drop. In no case shall the resistance exceed 0,05 Ω. NOTE Care is taken that the contact resistance between the tip of the measuring probe and the metal part under test does not influence the test results.		NA	NA
12	**Terminals** (Refer Clause 12 results provided after clause 15.1)		Refer Clause 12 after Clause 15.1	-

REVIEWED & ISSUED BY
19/2/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
13.0	**Constructional requirements.**		**Samples: A, B, C**	
13.1	**Mechanical requirements for insulating means:** Insulating linings, barriers and the like shall have adequate mechanical strength and shall be secured in a reliable manner. Compliance checked by inspection after the test of Cl 20.		Verified as per Clause 20 and found satisfactory.	P
13.2	**Installation requirements:** Switches shall be construct so as to permit: – easy introduction and connection of the conductors in the terminals, except for lead wires of pilot lights; NOTE 1 Screw terminals shown in Figures 1 to 5 are considered suitable for reliable connection of the conductors.		Possible to connect 4mm² cable easily.	P
	– correct positioning of the conductors;		Correct positioning of the conductors achieved.	
	– easy fixing of the switch to a wall or in a box		Possible to fit easily.	
	– adequate space between the underside of the main part and the surface on which the main part is mounted or between the sides of the main part and the enclosure (cover or box) so that, after installation of the switch, the insulation of the conductors is not necessarily pressed against live parts of different polarity or against moving parts of the mechanism, such as the spindle of a rotary switch. NOTE 2 This requirement does not imply that the metal parts of the terminals are necessarily protected by insulation barriers or insulating shoulders, to avoid contact, due to incorrect installation of the terminal metal parts, with the insulation of the conductor.		Adequate space provided underside of the main part.	
	Surface-type switches shall be constructed so that the fixing means do not damage the insulation of the cables during the installation. Compliance is checked by inspection and by an installation test using conductors of the largest cross-sectional area specified, for the relevant ranges of rated currents, in Table 4. NOTE 3 For surface-type switches, mounted on a mounting plate, a wiring channel may be needed to comply with this requirement. In addition, for switches comprising screwless terminals, the switches shall be so constructed that the connecting and/or disconnecting means of the screwless terminals cannot be activated by the conductors during and after installation of the switch in a box or on a wall. NOTE 4 This requirement does not imply that the connecting and/or disconnecting means cannot be touched by the conductors. NOTE 5 This requirement can be met by the placement of the connecting and/or disconnecting means and/or the use of protective barriers or shoulders placed around the connecting and/or disconnecting means. Compliance is checked by inspection and in case of doubt by the following test. (further info refer standard for screwless terminals).		NA	

REVIEWED & ISSUED BY
19/12/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
13.3	**Fixing of covers, cover plates and actuating members:**			
13.3.1	Covers, cover plates and actuating members or part of them, which are intended to ensure protection against electric shock, shall be held in place at two or more points by effective fixing. Covers, cover plates and actuating members or part of them may fixed by means of a single fixing., for example by a screw, provided that they are located by another means(for example by a shoulder). Where the fixing of covers, cover plates or actuating members of switches of type A severs to fix the base, there shall be means to maintain the base in position, even after removal of the covers, cover plates/ actuating members. Compliance shall be checked according to 13.3.2, 13.3.3 or13.3.4.		Switch actuatinig member (rocker) effectively fixed by two pivot points. Cover and cover plates fixed effectively at two or more than two points.	P
13.3.2	For covers, cover plates or actuating members, whose fixing is of the screw-type: by inspection only.		Back plate fixed with 2 screws. Checked by inspection.	P
13.3.3	For covers, cover plates or actuating members whose fixing is not dependent on screws are whose removal is obtained by applying a force in a direction approximately perpendicular to the mounting or supporting surface (see Table 12), -when their removal may give access, with the test probe B of IEC 61032, to live parts: by tests of 20.5; -when their removal may give access, with the test probe B of IEC 61032, to non-earthed metal parts separated from live parts in such a way that creepage distances and clearances have the values at least equal to those shown in Table 23: by the test of 20.6; -when their removal may give access, with the test probe B of IEC61032, only to -insulating parts, or -earthed metal parts, or -metal parts separated from live parts in such a way that creepage distances and clearances have at least twice the values shown in Table 23, or -live pars of SELV circuits not greater than 25 V AC and 60 V DC: by the test of 20.7;		NA Removal of cover plates (Clip-on plate) can be achived by tool only as stated in clause 13.3.4 and give access with insulating parts only with probe B of IEC61032 – Joint test finger. No any live parts accessible after removal of cover plate. Test performed as per 20.7 and the removal force of cover plate (clip-on) is within the range of >10N and <120N mainly with the help of tool.	

Table 12 – Forces to be applied to covers, cover-plates or actuating members whose fixing is not dependent on screws

Accessibility with the test probe B of IEC 61032 after removal of covers, cover plates or parts of them	Test according to ...	Force to be applied N			
		Switches complying with 20.5 and 20.9		Switches not complying with 20.5 and 20.9	
		Shall not come off	Shall come off	Shall not come off	Shall come off
To live parts	20.5	40	120	80	120
To non-earthed metal parts separated from live parts by creepage distances according to 23.1	20.6	10	120	20	120
To insulating parts, earthed metal parts, the live parts of SELV ≤ 25 V AC or metal parts separated from live parts by creepage distances and by clearances twice those according to 23.1	20.7	10	120	10	120

REVIEWED & ISSUED BY
19/12/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
13.3.4	For covers, cover plates or actuating members whose fixing is not dependent on screws and whose removal is obtained by using a tool, in accordance with the manufacturer's instructions given in an instruction sheet or catalogue: by same tests of 13.3.3 except that the covers, cover plates, actuating members of parts of them need not come out when applying a force not exceeding 120N in directions perpendicular to the mounting/supporting surface.		Cover plates (clip-on) fixing not dependent on screws and their removal is obtained by a tool only.	P
13.4	**Openings in normal use** Switches shall be so constructed that, when they are fixed and wired as in normal us, there are no free openings in their enclosures according to their IP classification. Compliance is checked by inspection and by an installation test with conductors of the smallest cross-sectional area specified specified in table 4. Note: Drain holes, small gaps between enclosures and conduits or cables or between enclosures and operating means can be neglected if they comply with the relevant IP classification.		NA	P
13.5	**Attachment of knobs** Knobs or rotary switches shall be securely attached to the shaft or part operating the mechanism. Compliance is checked by the following test. Where it is possible to apply an axial pull in normal use, an axial pull shall be applied for 1 min to try to pull off the actuating member. If the shape of the actuating member is such that an axial pull is likely to be applied in normal use, the force is 30 N. If the shape of the actuating member is such that an axial pull is unlikely to be applied in normal use, the force is 15 N. After this, knobs of switches having only one direction of operation are turned, if possible, without undue force, 100 times in the reverse direction. During the test, the knob shall not become detached.		NA	P
13.6	**Mounting means** Screws or other means for mounting the switch on a surface or in a box or enclosure shall be easily accessible from the front. That means it shall not serve any other fixing purpose. NOTE Switch mounting means, if used to lock the rotation of the box, do not constitute a use for "any fixing purpose".		Cover fixing screws easily accessible from the front and it not served any other fixing purpose.	P
13.7	**Combination of switches** Combination of switches or of switches and socket outlets, comprising separate bases shall be so designed that the correct position of each base is ensured. The fixing of each main part shall be independent of the fixing of the combination to the mounting surface. Compliance with the requirements of 13.6 and 13.7 is checked by inspection.		No combination switches or socket outlets are provided.	NA
13.8	**Accessories combined with switches** Accessories combined with switches shall comply with their standard, if any, unless a standard exists for the combination.		NA	NA

REVIEWED & ISSUED BY
19/12/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
13.9	**Surface-type swithces having an IP code higher than IP20** Surface-type switches that have an IP code higher than IP20 shall be according to their IP classification when fitted with conduits or with sheathed cables as for normal use. Surface-type switches that have degrees of protection IPX4, IPX5 and IPX6 shall have provisions for opening a drain hole. If a switch is provided with a drain hole, it shall be not less than 5 mm in diameter, or 20 mm2 in area with a width and a length not less than 3 mm. If the design of the switch is such that only one mounting position is possible, the drain hole shall be effective in that position. Alternatively, the drain hole shall be effective in at least two positions of the switch when this is mounted on a vertical wall, one of these with the conductors entering at the top and the other with the conductors entering at the bottom. Lid springs, if any, shall be of corrosion resistant material, such as bronze or stainless steel. Compliance is checked by inspection, by measurement and by the relevant tests of 15.2. NOTE A drain hole in the back of the enclosure is deemed to be effective only if the design of the enclosure ensures a clearance of at least 5 mm from the wall, or provides a drainage channel of at least the size specified.		NA	NA
13.10	**Installation in a box** Switches to be installed in a box shall be so designed that the conductor ends can be prepared after the box is mounted in position, but before the switch is fitted in the box. In addition, the main part shall have adequate stability when mounted in the box. Compliance is checked by inspection and by an installation test with conductors of the largest cross-sectional area specified for the relevant current rating in Table 4.		The conductor can be prepared after the box is mounted and before the switch is fitted.	P
13.11	**Connection of a second current-carrying conductor** Surface-type switches that have an IP code higher than IPX0, of pattern numbers 1, 5 and 6 with an enclosure having more than one inlet opening shall be provided for maintaining the continuity of a second current-carrying conductor either with a fixed additional terminal complying with the requirements of Clause 12 or with adequate space for a floating terminal. Compliance is checked by inspection and by the relevant tests of Clause 12.		NA	NA
13.12	**Inlet openings** Inlet openings shall allow the introduction of the conduit or the sheath of the cable so as to afford complete mechanical protection. Surface-type switches shall be so constructed that the intended conduit or the sheath of the cable can enter at least 1 mm into the enclosure. In surface-type switches, the inlet opening for conduit entries, or at least two of them if there are more than one, shall be capable of accepting conduit sizes of 16, 20, 25 or 32 or a combination of at least two of any of these sizes not excluding two of the same size.		NA	NA

REVIEWED & ISSUED BY
19/12/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
	Compliance is checked by inspection during the test of 13.10 and by measurement. In surface-type switches, the inlet opening for cable entries shall preferably be capable of accepting cables having the dimensions specified in Table 13 or be as specified by the manufacturer. NOTE Inlet openings of adequate size can also be obtained by the use of knock-outs or of suitable insertion pieces.			
13.13	**Provision for back entry from a conduit** If surface-type switches are intended for back entry from a conduit, they shall be so designed that they have provision for back entry from a conduit perpendicular to the mounting surface of the switch. Compliance is checked by inspection.		NA	NA
13.14	**Switch provided with membranes or the like for inlet openings** If the switch is provided with membranes or the like for inlet openings, they shall be replaceable. Compliance is checked by inspection.		NA	NA
13.15	**Requirements of membranes in inlet openings**		NA	NA
13.15.1	Membranes shall be reliably fixed and shall not be displaced by the mechanical and thermal stresses occurring in normal use. Compliance is checked by the following test: Membranes are tested when assembled in the switches. First the switches are fitted with membranes which have been subjected to the treatment specified in 15.1. The switches are then placed for 2 h in a heating cabinet as described in 15.1, the temperature being maintained at (40 ± 2) °C. Immediately after this period, a force of 30 N is applied for 5 s to various parts of the membranes by means of the tip of test probe 11 of IEC 61032. During these tests, the membranes shall not deform to such an extent that the live parts become accessible. For membranes likely to be subjected to an axial pull in normal use, an axial pull of 30 N is applied for 5 s. During this test, the membranes shall not come out. The test is then repeated with membranes which have not been subjected to any treatment.		NA	NA
13.15.2	It is recommended that membranes be so designed and made of such material that the introduction of the cables into the switch is permitted when the ambient temperature is low. NOTE In the following countries, compliance with this requirement is considered as necessary, due to installation practices in cold conditions: SE, FI, DK and NO. Compliance is checked by the following test: The switches are fitted with membranes which have not been subjected to any ageing treatment, those without opening being suitably pierced. The switches are then kept, for 2 h, in a refrigerator at a temperature of (−15 ± 2) °C.		NA	NA

REVIEWED & ISSUED BY
19/2/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Sheet 14 of 42

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
	After this period, the switches are removed from the refrigerator and immediately afterwards, while the switches are still cold, it shall be possible to introduce, without undue force, cables of the heaviest type, as declared by the manufacturer, through the membranes. After the tests of 13.15.1 and 13.15.2, the membranes shall show no harmful deformation, cracks or similar damage which would lead to non-compliance with this document.			
13.16	**Pilot light units** Pilot light units shall comply with IEC 60669-2-1:2002, IEC 60669-2-1:2002/AMD1:2008 and IEC 60669-2-1:2002/AMD2:2015, 101.1.1.1 and Clause 102, as far as applicable.		NA (No pilot lights provided in switch)	NA
14	**Mechanism**		Samples: A, B, C	
14.1	**Indication of the position** The actuating member of a switch, when released, shall automatically take up the position corresponding to that of the moving contacts, except that for cord-operated switches and for those with a single push-button, the actuating member may take up a single rest position.		Actuating member of switch automatically take the position when released. Single resting position in switch when operated.	P
14.2	**Rest and intermediate position** Switches shall be so constructed that the moving contacts can come to rest only in the "on" and "off" positions, an intermediate position being, however, permissible if it corresponds to the intermediate position of the actuating member, and if the insulation between the fixed and the moving contacts is then adequate. If necessary, the insulation between the fixed and the moving contact, when in an intermediate position, is checked by an electric strength test as specified in 16.3, the test voltage being applied between the relevant terminals without removing the cover or cover plate of the switch. Compliance with the requirements of 14.1 and 14.2 is checked by inspection and by manual test.		Swithches resting only "on" or "off" positions. No intermediate position found when operating.	P
14.3	**Undue arcing** Switches shall be so constructed that undue arcing cannot occur when the switch is operated slowly. Compliance is checked at the end of the test of 19.1, breaking the circuit a further ten times, the actuating member being, however, moved steadily by hand over a period of 2 s and moving contacts being stopped, if possible, in an intermediate position, the actuating member being then released. During the test, no sustained arcing shall occur		No sustained arcing observed when tested after clause 19.1.	P
14.4	**Making and breaking** Switches of pattern numbers 2, 3, 03 and 6/2 shall make and break all poles substantially simultaneously except that for switches of pattern number 03, the neutral shall not make after or break before the other poles. Compliance is checked by inspection and by manual test when the switch is mounted with the cover, cover plates and actuating members installed as for normal use.		NA (this switch is pattern number 1)	NA

REVIEWED & ISSUED BY
19/2/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Sheet 15 of 42

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
14.5	**Action of the mechanism without cover or cover plate** The action of the mechanism if the covers or cover plates are removable for installation purposes shall be independent of the presence of the cover or cover plate. NOTE The actuating member, in some constructions, can constitute the cover. Compliance is checked by connecting the switch, without cover or cover plate fitted, in series with a lamp and by pressing the actuating member without undue force as in normal use. During the test, the lamp shall not flicker.		Action of the mechanism (rocker) is independent of removable cover plates. Compliance checked as per test requirement and found OK.	P
14.6	**Pull force for cord-operated switches** Cord-operated switches shall be capable of effecting a change from the "off" to the "on" position, and from the "on" to the "off" position by application and removal of a steady pull not exceeding 45 N applied vertically and 65 N applied at 45° ± 5° to the vertical and in a plane perpendicular to the mounting surface when the switches are mounted as in normal use as specified by the manufacturer. Compliance is checked by manual test.		NA	NA
15	**Resistance to ageing, protection provided by enclosures of switches and resistance to humidity.**			
15.1	**Resistance to ageing** Switches shall be resistant to ageing. Parts intended for decorative purposes only, such as certain lids, shall be removed if possible and these parts are not subjected to the test. Compliance is checked by the following test: Switches and boxes, mounted as for normal use, are subjected to a test in a heating cabinet with an atmosphere having the composition and pressure of the ambient air and ventilated by natural circulation. Switches having an IP code higher than IPX0 are tested after having been mounted and assembled as specified in 15.2.2. The temperature in the cabinet is maintained at (70 ± 2) °C. The specimens are kept in the cabinet for 7 days (168 h). The use of an electrically heated cabinet is recommended. Natural circulation may be provided by holes in the wall of the cabinet. After the treatment, the specimens are removed from the cabinet and kept at room temperature and at a relative humidity between 45 % and 55 % for at least 4 days (96 h). The specimens shall show no crack visible with normal or corrected vision without additional magnification, nor shall the material have become sticky or greasy, this being judged as follows: With the forefinger wrapped in a dry piece of rough cloth the specimen is pressed with a force of 5 N. No traces of the cloth shall remain on the specimen and the material of the specimen shall not stick to the cloth. After the test, the specimens shall show no damage which would lead to non-compliance with this document.		Samples: A, B, C The temperature: 70°C The duration: 168hrs After 168 h with 70°C test, samples kept in room temperature as defined for 96 h and examined. Not cracked or deformed. Not became sticky or greasy. No trace of the cloth when force of 5N applied.	P

REVIEWED & ISSUED BY
19/2/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Sheet 16 of 42

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
12	**Terminals**			
12.1	**General** Switches shall be provided with terminals having screw clamping or with screwless terminals. The means for clamping the conductors in the terminals shall not serve to fix any other component, although they may hold the terminals in place or prevent them from turning. All the tests on terminals, with the exception of 12.3.11, shall be carried out after the test of 15.1. Rigid solid conductors shall be of Class 1, rigid stranded conductors shall be of Class 2 and flexible conductors shall be of Class 5 according to IEC 60228. Compliance is checked by inspection and by the tests of 12.2 or 12.3, as applicable.		**Samples: A, B, C** Samples provided with screw clamping-type terminals. Terminal test done after Clause 15.1 (Resistance to Ageing test). Compliance checked with clause 12.2.	P
12.2	**Terminals with screw clamping for external copper conductors**		Terminal tested with stranded copper conductors.	P
12.2.1	Terminals with screw clamping may be of the type suitable for rigid copper conductors only or of the type suitable for both rigid and flexible copper conductors having cross-sectional areas as shown in Table 4. The conductor space shall be at least that specified in Figures 1, 2, 3, 4 and 5. Compliance is checked by inspection and by fitting conductors of the smallest and largest cross-sectional areas specified		As per table 4: Smallest cross-sectional cable: 1.5mm² stranded Largest cross-sectional cable: 4mm² stranded	
12.2.2	Terminals with screw clamping shall allow the conductor to be connected without special preparation. Compliance is checked by inspection.		Both above mentioned cables are connected in terminals without special preparation.	P
12.2.3	Terminals with screw clamping shall have adequate mechanical strength. Screws and nuts for clamping the conductors shall have a metric ISO thread or a thread comparable in pitch and mechanical strength. Screws shall not be of metal which is soft or liable to creep, such as zinc or aluminium. Compliance is checked by inspection and by the tests of 12.2.6 and 12.2.8.		All screws are 3.1mm dia (M3) screws used and are made of steel. Terminal screw clamping having adequate mechanical strength if fitted two cables each side of nut. Compliance is verified by inspection and by tests of 12.2.6 & 12.2.8.	P
12.2.4	Terminals with screw clamping shall be resistant to corrosion. Terminals, the body of which is made of copper or copper alloy as specified in 22.5 are considered as complying with this requirement.		The terminal body is made of steel subjected to resistance to rusting test (Cl.25)	P
12.2.5	Terminals with screw clamping shall be so designed and constructed that they clamp the conductor(s) without undue damage to the conductor(s). Compliance is checked by the following test: Terminals suitable for rigid conductors only are checked with rigid solid conductors and on a new set of specimens with rigid stranded conductors, if existing. Terminals suitable for rigid and flexible conductors are checked with rigid conductors as above and on a new set of samples with flexible conductors. The terminal is placed in the test apparatus according to Figure 9. The terminal is fitted first with a conductor of the smallest and then with a conductor of the largest cross-sectional area according to Table 4, the clamping screw(s) or nut(s) being		Smallest cross-sectional cable: 1.5mm² stranded Full torque: 0.6Nm Length of conductor: (260+75)mm Bushing dia: 6.5mm Mass suspended: 0.4Kg Largest cross-sectional cable: 4mm² stranded Full torque: 0.6Nm Length of conductor: (260+75)mm Bushing dia:9.5mm Mass suspended: 0.9Kg	F

REVIEWED & ISSUED BY
19/2/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Sheet 17 of 42

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
	tightened with the torque according to Table 5. The length of the test conductor shall be 75 mm longer than the height (H) specified in Table 6. The end of the conductor is passed through an appropriate sized bushing in a platen positioned at a height (H) below the equipment as given in Table 6. The bushing shall be positioned in a horizontal plane such that its centre line describes a circle of 75 mm diameter, concentric with the centre of the clamping unit in the horizontal plane. The platen is then rotated at a rate of (10 ± 2) r/min. The distance between the mouth of the clamping unit and the upper surface of the bushing shall be within ± 15 mm of the height of Table 6. The bushing may be lubricated to prevent binding, twisting, or rotation of the insulated conductor. A mass as specified in Table 6 is to be suspended from the end of the conductor. The duration of the test shall be 15 min. During the test, the rigid conductor, or any wire of rigid stranded or flexible conductor, shall neither slip out of the clamping unit nor break near the clamping unit, nor shall the conductor be damaged in such a way as to render it unfit for further use. In the case of the flexible conductor, the breakage of a few wires shall not be taken into account provided it does not exceed 15 % of the original number of wires.		The samples completed 15 Min. at the speed of 10 rev./min Test done with smallest size 1.5mm² stranded conductor and found OK. Neither slip nor the conductor damage observed after the test. Then test perfomed with single largest size of conductor i.e 4mm². During the test, conductor slipped out from terminal @4th (fourth) rotation when test conducted with 4mm² stranded cable. Again tested with two nos. of 4mm² conductor inserted in terminal and found failure at 5th rotation.	F
12.2.6	Terminals with screw clamping shall be so designed that they clamp the conductor reliably between metal surfaces. Compliance is checked by inspection and by the following test: Terminals suitable for rigid conductors only are checked with rigid solid conductors and on a new set of specimens with rigid stranded conductors, if existing. Refer clause description for more details. Terminals suitable for rigid and flexible conductors are checked with rigid conductors as above and on a new set of specimens with flexible conductors. The terminals are fitted first with conductors of the smallest and then with conductors of the largest cross-sectional area specified in Table 4, the terminal screws being tightened with a torque equal to two-thirds of the torque shown in the appropriate column of Table 5. The conductor is then subjected to a pull as specified in Table 7, applied without jerks, for 1 min, in the direction of the axis of the conductor space. If the clamp is intended for two conductors, the appropriate pull is applied consecutively to each conductor. During the test, the conductor shall not move noticeably in the terminal. If the clamp is intended for connection of more than two conductors, reference is made for the testing to the requirements given in the appropriate part of IEC 60998.		Smallest cross-sectional cable: 1.5mm² Stranded 2/3rd torque: 0.4Nm Pull exerted: 40N Largest cross-sectional cable: 4mm² stranded 2/3rd torque: 0.4Nm Pull exerted: 50N The samples were subjected to pull test for 1 minute without jerk, and conductor didn't displaced from the terminal.	P

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9/2/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
12.2.7	Terminals with screw clamping shall be so designed or placed that neither a rigid solid conductor nor a wire of a stranded conductor can slip out while the clamping screws or nuts are tightened. This requirement does not apply to lug terminals. Compliance is checked by the following test: The terminal should fit with conductor of largest cross sectional area as per table 4 and The clamping screw(s) or nut(s) is (are) then tightened with a torque equal to two-thirds of the torque shown in the appropriate column of Table 5. After the test, no wire of the conductors shall have escaped outside the clamping unit thus reducing creepage distances and clearances to values lower than those indicated in Table 23.		Cable connected: 4mm² stranded 2/3rd torque: 0.4Nm During the test, No strands of conductor slipped out form the terminals.	P
12.2.8	Terminals with screw clamping shall be so fixed or located within the switch that, when the clamping screws or nuts are tightened or loosened, the terminals shall not work loose from their fixing to the switch. Compliance is checked by inspection, by measurement and by the following test: A solid rigid copper conductor of the largest cross-sectional area specified in Table 4 is placed in the terminal. Screws and nuts are tightened and loosened five times by means of a suitable test screwdriver or spanner, the torque applied when tightening being equal to the torque shown in the appropriate column of Table 5 or in the table of the appropriate Figures 1 to 4, whichever is the highest. The conductor is moved each time the screw or nut is loosened. During the test, terminals shall not work loose and there shall be no damage, such as breakage of screws or damage to the heads, slots, threads, washers or stirrups that will impair the further use of the terminals.		Cable connected: 4mm² Stranded Full torque: 0.6Nm No: of times tightened and loosened: 5 times. Terminals found OK after the torque test.	P
12.2.9	Clamping screws or nuts of earthing terminals with screw clamping shall be adequately locked against accidental loosening and it shall not be possible to loosen them without the aid of a tool. Compliance is checked by manual test. In general, the designs of terminals shown in Figures 1, 2, 3, 4 and 5 provide sufficient resiliency to comply with this requirement; for other designs, special provisions, such as the use of an adequately resilient part which is not likely to be removed inadvertently, may be necessary.		Screw clamping is adequately locked against accidental loosening and it shall not possible to loosen them wihtout the aid of tool.	P
12.2.10	Earthing terminals with screw clamping shall be such that there is no risk of corrosion resulting from contact between these parts and the copper of the earthing conductor, or any other metal that is in contact with these parts. The body of the earthing terminals shall be of brass or other metal no less resistant to corrosion, unless it is a part of the metal frame or enclosure, when the screw or nut shall be of brass or other metal no less resistant to corrosion. If the body of the earthing terminal is a part of a frame or enclosure of aluminium alloy, precautions shall be taken to avoid the risk of corrosion resulting from contact between copper and aluminium or its alloys. Compliance is checked by inspection.		NA.	NA

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9/2/24
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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
12.2.11	For pillar terminals, the distance between the clamping screw and the end of the conductor, when fully inserted, shall be at least that specified in Figure 1. For mantle terminals, the distance between the fixed part and the end of the conductor, when fully inserted, shall be at least that specified in Figure 5. Compliance is checked by measurement, after a solid conductor of the largest cross-sectional area specified for the appropriate rated current in Table 4 has been fully inserted and fully clamped.		NA (Stirrup terminals)	NA
12.2.12	Lug terminals shall be used only for switches having a rated current of 40 A or greater; if such terminals are provided, they shall be fitted with spring washers or equally effective locking means. Compliance is checked by inspection.		NA	NA
12.3	**Screwless terminals for external copper conductors** (Sub clauses 12.3.1 to 12.3.12, refer standard if swithces provided with screwless terminals.)		NA	NA
15	**Resistance to ageing, protection provided by enclosures of switches, and resistance to humidity.**			
15.2	**Protection provided by enclosures of switches**		Samples: A, B, C	
15.2.1	**General** The enclosure of the switch shall provide protection against access to hazardous parts, against harmful effect due to ingress of solid foreign objects and against effects due to ingress of water in accordance with the IP classification of the switch. Compliance is checked by the tests of 15.2.2 and 15.2.3.		No enclosure provided with switch. Switch considered IP 20 since there is no IP rating marking.	
15.2.2	**Protection against access to hazardous parts and against harmful effects due to ingress of solid foreign objects**		As markings are not available, the degree of protection is considered as IP20 and verified.	P
15.2.2.1	**General** Enclosures of switches shall provide a degree of protection against access to hazardous parts and against harmful effects due to ingress of solid foreign objects in accordance with the IP classification of the switch. Compliance is checked by the appropriate tests of IEC 60529 under the conditions specified below. The switches are mounted as in normal use. Flush-type and semi-flush-type switches are mounted in an appropriate box according to the manufacturer's instructions. Switches with screwed glands or membranes are fitted and connected with cables within the connecting range specified in Table 4. Glands are tightened with a torque equal to two-thirds of that applied during the test of 20.4. Screws of the enclosure are tightened with a torque equal to two-thirds of the values given in Table 5. Parts which can be removed without the aid of a tool are removed. If a switch passes the test successfully, then this test is deemed to be passed for a combination of such single switches. Glands are not filled with sealing compound or the like.			

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9/2/24
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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
15.2.2.2	**Protection against access to hazardous parts** The appropriate test specified in IEC 60529 is performed (see also Clause 10).		Applied jointed test finger and didn't touch the live parts.(IP2X)	P
15.2.2.3	**Protection against harmful effects due to ingress of solid foreign bodies** The appropriate test according to IEC 60529 is performed. Test probes are not applied to drain holes. For the test of the first characteristic numeral 5, enclosures of switches are considered to be of category 2 (see IEC 60529:1989 and IEC 60529:1989/AMD1:1999, 13.4); dust shall not penetrate in a quantity to interfere with satisfactory operation or impair safety. For the test of the first characteristic numeral 6, enclosures of switches are considered to be of category 1 (see IEC 60529:1989, 13.6); no dust shall penetrate.		Applied 12.5mm steel ball and didn't pass through. (IP2X)	P
15.2.2	**Protection against harmful effects due to ingress of water** Enclosures of switches shall provide a degree of protection against harmful effects due to ingress of water in accordance with their IP classification. Compliance is checked by the appropriate tests of IEC 60529 under the conditions specified below. Flush-type and semi-flush-type switches are fixed in a test wall representing the intended use of the switch using an appropriate box in accordance with the manufacturer's instructions. Where the manufacturer's instructions specify particular types of walls, these walls as well as any special installation requirements for the switch, shall be described in sufficient detail (see 8.7). Where the manufacturer's instructions do not specify a type of wall, the test wall according to Figure 21 is used. It is made with bricks having flat smooth surfaces. When the box is mounted in the test wall, it shall fit tight against the wall so that water cannot enter between the box and the wall. If sealing material is used in order to seal the box into the wall, it shall not influence the sealing properties of the specimen to be tested. The test wall is placed in a vertical position. Surface-type switches are mounted as in normal use on a vertical surface and fitted with cables with conductors whose largest and smallest cross-sectional area is given in Table 4, as appropriate for their rating. Screws of the enclosure operated when mounting the switch are tightened with a torque equal to two-thirds of the appropriate value given in Table 5. Glands are tightened with a torque equal to two-thirds of the appropriate value given in Table 22.		NA (IP20)	NA

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Report No: AESL/1351/2025

Cl.No.	Name of test / Standard Requirement	Actual result	Verdict
	Glands are not filled with sealing compound or the like. Parts which can be removed without the aid of a tool are removed. If the enclosure of a switch that has an IP code less than IPX5 is designed with drain holes, one drain hole is opened and in the lowest position. If an enclosure of a switch that has an IP code equal to or greater than IPX5 is designed with drain holes, they shall not be opened. Care should be taken not to disturb, for example knock or shake, the assembly to such an extent as to affect test results. If the switch has drain holes which have been opened, it shall be proved by inspection that any water which enters does not accumulate and that it drains away without doing any harm to the complete assembly. The specimens shall withstand an electric strength test as specified in 16.3, which shall be started within 5 min of completion of the tests according to 15.2.		
15.3	**Resistance to humidity** Switches shall be proof against humidity which may occur in normal use. Compliance is checked by the humidity treatment described in 15.3, followed immediately by the measurement of the insulation resistance and by the electric strength test specified in Clause 16. The humidity treatment is carried out in a humidity cabinet containing air with relative humidity maintained between 91 % and 95 %. The temperature of the air in which the specimens are placed is maintained within ±1 K of any convenient value t between 20 °C and 30 °C. Before being placed in the humidity cabinet, the specimens are brought to a temperature between t and t + 4 °C. The specimens are kept in the cabinet for – two days (48 h) for switches that have an IP code IPX0; – seven days (168 h) for switches that have an IP code higher than IPX0. After the treatment, the specimens shall show no damage within the meaning of this document.	**Samples: A, B, C** Test temperature: 25°C at an RH of 95%. Test duration: 48hrs. After the humidity treatment samples are are inspected for any damage. No damages observed. Samples are subjected to insulation resistance and electric strength test immediately (clause 16)	P
16	**Insulation resistance and electric strength**	**Samples: A, B, C**	P
16.1	**General** The insulation resistance and electric strength of switches shall be adequate. One pole of any pilot light is disconnected for the test of Clause 16. Compliance is checked by the following tests, which are made immediately after the tests of 15.3, in the humidity cabinet or in the room in which the specimens were brought to the prescribed temperature, after reassembly of those parts which can be removed without the aid of a tool and were removed for the test.	Insulation resistance electric strength of switches are adequate. Compliance checked immediately after the tests of clause 15.3.	P

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Report No: AESL/1351/2025

Cl.No.	Name of test / Standard Requirement	Actual result	Verdict
16.2	**Test for measuring the insulation resistance** The insulation resistance is measured with a DC voltage of approximately 500 V, the measurement being made not more than 1 min after application of the voltage. **Table 14 – Points of application of the test voltage for the verification of insulation resistance and electric strength** Pattern number: 1 Diagrams of connections: Single-pole switch Position: Off / On Number of poles: 1 Application of the voltage *: Between Terminal No. 1 / 2; Between body (B) together with terminal No. B + 2 / B + 1 Test points: 1, 2 Test points: 1 – 2 Test points: B Test points: 1, 4, 5 - minimum values of IR – 5MΩ Test points: 2, 3 – minimum values of IR – 2MΩ	Samples: A, B, C Insulation resistance measured with 500V DC for 1min. All the test points (1 & 3) applicable for pattern number 1 found >999 MΩ in all samples.	P
16.3	**Electric strength test** The electric strength is subjected for 1min to a voltage of substantially sine wave form, having a frequency of 50Hz or 60Hz. Test voltage applied shall be 1 250 V for ratings not exceeding 130 V or 2 000 V for ratings greater than 130 V. Initially, not more than half the prescribed voltage is applied; then it is raised rapidly to the full value. No flashover or breakdown shall occur during the test. Test voltage according to switch rated voltage and test points: Test points: 1, 2, 4, 5 - Test voltage – 2000V (>130V) Test points: 3 - Test voltage – 2000V/1250V (>130V) Test points: 6, 7 - Test voltage – 3000V (>130V) Test points: 8 - Test voltage – 4000V (>130V)	**Samples: A, B, C** All samples withstood the test for 1min. Electric strength (High voltage) test done with 2000V ac 60Hz for 1min. All the test points (1 & 3) applicable for pattern number 1 found no flashover or breakdown during test. Test points 2, 4, 6, 7 and 8 not applicable.	P
17 17.1	**Temperature rise** **General** Switches shall be so constructed that the temperature rise in normal use is not excessive. The metal and the design of the contacts shall be such that the operation of the switch is not adversely affected by oxidation or any other deterioration. Compliance is checked by the following test: The switches are mounted vertically as in normal use fitted with PVC insulated rigid solid or stranded copper conductors as specified in Table 16, the terminal screws or nuts being tightened with a torque equal to two-thirds of that specified in Table 5. To ensure normal cooling of the terminal, the conductors connected to them shall have a length of at least 1 m. The switches are loaded for 1 h with alternating current having the value shown in Table 16. For switches of pattern numbers 4, 5, 6, 6/2 and 7, only one circuit is loaded. The temperature rise of the terminals shall not exceed 45 K. During the test, the temperature rise necessary to perform the test of 21.4 shall be determined. In the case of combination of switches, the test is carried out separately on each switch.	**Samples: A, B, C** Test current for 20A (16A switch) Test voltage: Low voltage (<12V) Cable: 4mm² stranded Cable length: >1meter Tightening torque:0.4Nm for 3.1mm dia screw (2/3rd of 0.6Nm) Test duration: 1hr (metal box) Temperature rise (K) values: | Sample	1 (IN)	3 (OUT)
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A	69	39
B	43	33
C	67	49 | Observation: After tightened with stranded 4 mm² cable in terminal with 0.4Nm torque, cable found slightly loose.When we test with flexible cable 4 mm².Temperature rise values found <45K due to no loose found after tight of 0.4Nm.	F

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Report No: AESL/1351/2025

Cl.No.	Name of test / Standard Requirement	Actual result	Verdict
17.2	**Switches incorporating pilot lights** Switches incorporating pilot lights or intended to incorporate pilot lights shall be so designed that in normal use the temperature of accessible surfaces is not excessive. Compliance is checked by the following test: The switch is mounted and connected as in 17.1 with the pilot light supplied at rated voltage so that it is constantly illuminated for 1 h. The switch is loaded at its rated current. The temperature rise of the external surface of the switch shall not exceed: • 45 K for knobs, handles, sensing surfaces, etc., of non-metallic material; • 55 K for other external parts of non-metallic material; • 35 K for knobs, handles, sensing surfaces, etc., of metallic material; • 45 K for other external parts of metallic material. Pilot lights using neon lamps or LEDs consuming no more than 3 mA are not tested.	NA (No pilot light incorporated with switch)	NA
18 18.1	**Making and breaking capacity** **General** Switches shall have adequate making and breaking capacity. For the purpose of this test, pilot lights are disconnected. Compliance is checked by the test of 18.2. In addition, for switches having a rated current not exceeding 16 A with a rated voltage up to and including 250 V and for switches of pattern numbers 3 or 03 having a rated voltage over 250 V, by the tests of 18.3. Switches are fitted with conductors as for the test of Clause 17.	Samples: A, B, C Switches are adequate making and breaking capacity. Clause 18.3 applicable for 16A with rated voltage <=250V.	P
18.2	**Overload** Switches are tested at 1.1 times the rated voltage and 1.25 times the rated current and with 0.3±0.05 power factor During the test, no sustained arcing nor welding of the contacts shall occur. After the test, the specimens shall show no damage which may impair their use.	Test current :20A Test voltage :275V Power factor :0.3 lag Rate of operation:15 opr/min (25% on & 75% off , i.e 2s ON / 6s OFF) No. of operations: 200 oprns Over load test completed 200 operations successfully without any damage and switch function found OK.	
18.3	**Overload test with filament lamps** Switches are normally tested at the rated voltage and at 1.2 times the rated current. The test is carried out by using either a number of 200 W tungsten filament lamps or a number of halogen filament lamps. During the test, no sustained arcing nor welding of the contacts shall occur. After the test, the specimens shall show no damage which may impair their further use.	Test current :19.2A (20A applied @237.5V for 18lamps) Test voltage :237.5V Load Halogen lamp:250W×18Nos Rate of operation :15 opr/min No: of operation: 200 Oprns. Over load test with filament lamps (halogen) completed 200 operations successfully without any damage and switch function found OK.	P

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Report No: AESL/1351/2025

Cl.No.	Name of test / Standard Requirement	Actual result	Verdict
19 19.1	**Normal operation** **Test for switches intended for inductive loads** Switches shall withstand, without excessive wear or other harmful effect, the mechanical, electrical and thermal stresses occurring in normal use. For the purpose of this test, pilot lights are disconnected. Compliance is checked by the following test. The switches are tested with rated voltage, rated current in the apparatus and with the connections specified in clause 18. The test specimens shall be connected to the test circuit with cables of length (1 ± 0.1) m. During the test, the specimens shall function correctly. After the test, the specimens shall withstand an electric strength test as specified in Clause 16 and a terminal temperature rise test as specified in Clause 17. For the electric strength test, the test voltage of 4 000 V shall be reduced by 1 000 V and the other test voltages by 500 V. For the terminal temperature rise test, the test current shall be reduced to the value of the rated current and the only measurement made shall be at the terminals. The specimens shall then not show – wear impairing their further use; – discrepancy between the position of the actuating member and that of the moving contacts, if the position of the actuating member is indicated; – deterioration of enclosures, insulating linings or barriers to such an extent that the switch cannot be further operated or that it no longer complies with the requirements of Clause 10; – seepage of sealing compound; – loosening of electrical or mechanical connections; – relative displacement of the moving contacts of switches of pattern numbers 2, 3, 03 or 6/2. During the test, the specimens are not lubricated. The test is followed by the test of 14.3. During the test, no sustained arcing nor welding of the contacts shall occur.	**Samples: A, B, C** Test current : 16A Test voltage : 250V Power factor : 0.6 Rate of operation: 15 opr/min (2s ON / 6s OFF) Cable length : 1.0m No: of operation: 40,000 oprns Completed 40,000 operations successfully without any damage and switch function found OK. After test, conformation tests done on samples as per clause 16 (electric strength) & 17 (temperature rise) . -No wear observed impairing its further use. - Met with the requirement. Checked by inspection. -Met with requirement. Conformed by IR and HV test. -No loosening observed. After test Clause 14.3 tested and found ok.	P
14.3	**Undue arcing** (after Cl.19.1 test) Switches shall be so constructed that undue arcing cannot occur when the switch is operated slowly. Compliance is checked at the end of the test of 19.1, breaking the circuit a further ten times, the actuating member being, however, moved steadily by hand over a period of 2 s and moving contacts being stopped, if possible, in an intermediate position, the actuating member being then released. During the test, no sustained arcing shall occur.	No sustained arcing noticed when operated slowly with 16A at 250V. Possible to make and break the circuit with 16A at 250V.	P

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Report No: AESL/1351/2025

Cl.No.	Name of test / Standard Requirement	Actual result	Verdict
16.3	**Electric strength test** (after Cl.19.1 test) The electric strength is subjected for 1min to a voltage of substantially sine wave form, having a frequency of 50Hz or 60Hz. Test voltage applied shall be 750 V for ratings not exceeding 130 V or 1 500 V for ratings greater than 130 V. Initially, not more than half the prescribed voltage is applied; then it is raised rapidly to the full value. No flashover or breakdown shall occur during the test.	Samples: A, B, C All samples withstood the test. Electric strength (High voltage) test done with 1500V ac 60Hz for 1min. All the test points (1 & 3) applicable for pattern number 1 and found no flashover or breakdown during test.	P
17 17.1	**Temperature rise** (after Cl.19.1 test) **General** Switches shall be so constructed that the temperature rise in normal use is not excessive. The metal and the design of the contacts shall be such that the operation of the switch is not adversely affected by oxidation or any other deterioration. Test current will be rated current after Cl.19.1 test. The temperature rise of the terminals shall not exceed 45 K. During the test, the temperature rise necessary to perform the test of 21.4 shall be determined. In the case of combination of switches, the test is carried out separately on each switch.	Test current : 16A Test voltage: Low voltage (<12V) Cable: 4mm² stranded Cable length: >1meter Tightening torque:0.4Nm for 3.1mm dia screw (2/3rd of 0.6Nm) Test duration: 1hr (metal box) Temperature rise (K) values: Sample / 1 (IN) / 3 (OUT) A / 23 / 18 B / 38 / 33 C / 32 / 32	P
17.2	**Switches incorporating pilot lights** (after Cl.19.1 test) Switches incorporating pilot lights or intended to incorporate pilot lights shall be so designed that in normal use the temperature of accessible surfaces is not excessive. Compliance is checked by the following test: The switch is mounted and connected as in 17.1 with the pilot light supplied at rated voltage so that it is constantly illuminated for 1 h. The switch is loaded at its rated current. The temperature rise of the external surface of the switch shall not exceed: • 45 K for knobs, handles, sensing surfaces, etc., of non-metallic material; • 55 K for other external parts of non-metallic material; • 35 K for knobs, handles, sensing surfaces, etc., of metallic material; • 45 K for other external parts of metallic material. Pilot lights using neon lamps or LEDs consuming no more than 3 mA are not tested.	NA	NA
19.2	**Test for switches intended for externally ballasted lamp loads** Switches intended for externally ballasted lamp loads shall withstand, without excessive wear or other harmful effect, the electrical and thermal stresses occurring when controlling externally ballasted lamp circuits. Compliance is checked by the test circuit indicated in Figure 12a with the following test conditions.	**Samples: D E F** Test current : 16A Test voltage : 250V Power factor : 0.9 Rate of operation:15 Opr/min No: of operation: 5,000 opn.	

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Report No: AESL/1351/2025

Cl.No.	Name of test / Standard Requirement	Actual result	Verdict
	The prospective short-circuit current of the supply shall be between 3 kA and 4 kA at cos ϕ = 0.9 ± 0.05 (lagging). For the test, new specimens are used. The switches are tested at rated voltage and at the rated current assigned by the manufacturer for the externally ballasted lamp loads in the test apparatus and with the connections specified in 18.2. The number of operations is as follows: For switches with a rated externally ballasted lamp current of 6 A up to and including 13 A: 10 000 operations with 30 operations per minute. For switches with rated current above 13 A up to and including 20 A: 5 000 operations with 15 operations per minute. During the test, the specimens shall function correctly. After the test, the specimens shall withstand an electric strength test as specified in Clause 16 and a terminal temperature rise test as specified in Clause 17. For the electric strength test, the test voltage of 4 000 V shall be reduced by 1 000 V and the other test voltages by 500 V. For the terminal temperature rise test, the test current shall be reduced to the value of the rated current and the only measurement made shall be at the terminals. After these tests, it shall also be possible to make and break the switch by hand in the test circuit and the specimen shall not show any issues in switches.	Completed 5,000 operations successfully without any damage and switch function found OK. After test, conformation tests done on samples as per clause 16 (electric strength) & 17 (temperature rise) .	
16.3	**Electric strength test** (after Cl.19.2 – EBL endurance test) The electric strength is subjected for 1min to a voltage of substantially sine wave form, having a frequency of 50Hz or 60Hz. Test voltage applied shall be 750 V for ratings not exceeding 130 V or 1 500 V for ratings greater than 130 V. Initially, not more than half the prescribed voltage is applied; then it is raised rapidly to the full value. No flashover or breakdown shall occur during the test.	**Samples: D, E, F** All samples withstood the test. Electric strength (High voltage) test done with 1500V ac 60Hz for 1min. All the test points (1 & 3) applicable for pattern number 1 and found no flashover or breakdown during test.	P
17 17.1	**Temperature rise** (after Cl.19.2 – EBL endurance test) **General** Switches shall be so constructed that the temperature rise in normal use is not excessive. The metal and the design of the contacts shall be such that the operation of the switch is not adversely affected by oxidation or any other deterioration. Test current will be rated current after Cl.19.2 test. The temperature rise of the terminals shall not exceed 45 K. During the test, the temperature rise necessary to perform the test of 21.4 shall be determined. In the case of combination of switches, the test is carried out separately on each switch.	Test current : 16A Test voltage: Low voltage (<12V) Cable: 4mm² stranded Cable length: >1meter Tightening torque:0.4Nm for 3.1mm dia screw (2/3rd of 0.6Nm) Test duration: 1hr (metal box) Temperature rise (K) values: Sample / 1 (IN) / 3 (OUT) D / 32 / 30 E / 27 / 22 F / 16 / 16	P

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Report No: AESL/1351/2025

Cl.No.	Name of test / Standard Requirement	Actual result	Verdict
17.2	**Switches incorporating pilot lights** Switches incorporating pilot lights or intended to incorporate pilot lights shall be so designed that in normal use the temperature of accessible surfaces is not excessive. Compliance is checked by the following test: The switch is mounted and connected as in 17.1 with the pilot light supplied at rated voltage so that it is constantly illuminated for 1 h. The switch is loaded at its rated current. The temperature rise of the external surface of the switch shall not exceed: • 45 K for knobs, handles, sensing surfaces, etc., of non-metallic material; • 55 K for other external parts of non-metallic material; • 35 K for knobs, handles, sensing surfaces, etc., of metallic material; • 45 K for other external parts of metallic material. Pilot lights using neon lamps or LEDs consuming no more than 3 mA are not tested.	NA	NA
19.3	**Test for switches intended for self ballasted lamp loads** Switches intended for self ballasted lamp (SBL) loads shall withstand, without excessive wear or other harmful effect, the electrical and thermal stresses occurring when controlling self ballasted lamp circuits. Compliance is checked by connecting the load as given in Figure 12b via the switch under test to a power supply. The calculations are based on the following parameters in order to have the required values for inrush current and I²t: – a prospective short-circuit current (rms) of the supply of 3 kA at cos ϕ = 0,9 (lagging); – a resistance R3 equal to 0,25 Ω in the test circuit to the load. This value is obtained with a wire having a cross-sectional area of 1,5 mm2 when switches with rated current up to and including 13 A are being tested and 2,5 mm2 when switches with rated current over 13 A up to and including 20 A are being tested. The load shall be in accordance with Figure 12b. The values for the maximum peak value and the maximum I²t of the inrush current are given in Table 19. The number of operations is as follows (as per table 18): As same as Clause 19.1. Compliance is checked by the following test: For the test, new specimens are used. The switches are tested at rated voltage in the apparatus and with the connections specified in 18.2. The test specimens shall be connected to the test circuit with cables of length (1 ± 0,1) m. During the test, the specimens shall function correctly. After the test, the specimens shall withstand an electric strength test as specified in Clause 16 and a terminal temperature rise test as specified in Clause 17.	**Samples: J K L** Self Ballast Lamp Wattage: 200W (16A rating switch) Test voltage : 250V Rate of operation : 15 Opr/min No: of operation: 40,000 opms Completed 40,000 operations successfully without any damage and switch function found OK. After test, conformation tests done on samples as per clause 16 (electric strength) & 17 (temperature rise) .	

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Report No: AESL/1351/2025

Cl.No.	Name of test / Standard Requirement	Actual result	Verdict
	For the electric strength test, the test voltage of 4 000 V shall be reduced by 1 000 V and the other test voltages by 500 V. For the terminal temperature rise test, the test current shall be reduced to the value of the rated current and the only measurement made shall be at the terminals. After these tests, it shall also be possible to make and break the switch by hand in the test circuit and the specimen shall not show any issues in switches.		
16.3	**Electric strength test** (after Cl.19.3 – SBL endurance test) The electric strength is subjected for 1min to a voltage of substantially sine wave form, having a frequency of 50Hz or 60Hz. Test voltage applied shall be 750 V for ratings not exceeding 130 V or 1 500 V for ratings greater than 130 V. Initially, not more than half the prescribed voltage is applied; then it is raised rapidly to the full value. No flashover or breakdown shall occur during the test.	**Samples: J , K , L** All samples withstood the test. Electric strength (High voltage) test done with 1500V ac 60Hz for 1min. All the test points (1 & 3) applicable for pattern number 1 and found no flashover or breakdown during test.	P
17 17.1	**Temperature rise** (after Cl.19.3 – SBL endurance test) **General** Switches shall be so constructed that the temperature rise in normal use is not excessive. The metal and the design of the contacts shall be such that the operation of the switch is not adversely affected by oxidation or any other deterioration. Test current will be rated current after Cl.19.3 test. The temperature rise of the terminals shall not exceed 45 K. During the test, the temperature rise necessary to perform the test of 21.4 shall be determined. In the case of combination of switches, the test is carried out separately on each switch.	Test current : 16A Test voltage: Low voltage (<12V) Cable: 4mm² stranded Cable length: >1meter Tightening torque:0.4Nm for 3.1mm dia screw (2/3rd of 0.6Nm) Test duration: 1hr (metal box) Temperature rise (K) values: Sample / 1 (IN) / 3 (OUT) J / 47 / 44 K / 22 / 22 L / 34 / 35	F
17.2	**Switches incorporating pilot lights** Switches incorporating pilot lights or intended to incorporate pilot lights shall be so designed that in normal use the temperature of accessible surfaces is not excessive. Compliance is checked by the following test: The switch is mounted and connected as in 17.1 with the pilot light supplied at rated voltage so that it is constantly illuminated for 1 h. The switch is loaded at its rated current. The temperature rise of the external surface of the switch shall not exceed: • 45 K for knobs, handles, sensing surfaces, etc., of non-metallic material; • 55 K for other external parts of non-metallic material; • 35 K for knobs, handles, sensing surfaces, etc., of metallic material; • 45 K for other external parts of metallic material. Pilot lights using neon lamps or LEDs consuming no more than 3 mA are not tested.	NA	NA

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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
20	**Mechanical strength**			
20.1	**General** The test of the relevant subclauses 20.5 to 20.9 shall be applied according to the type of construction as specified in 13.3. Accessories, surface mounting boxes, screwed glands and shrouds shall have adequate mechanical strength so as to withstand the stresses imposed during installation and use. Compliance is checked by the following tests: – all types of switches ....20.2 ; – for switches with a base intended to be mounted directly on a surface. .... 20.3 ; – for boxes.... 20.2 ; – for screwed glands of switches that have an IP code higher than IP20 .. 20.4 ; – for operating members of cord-operated switches..... 20.10 ; Combinations of switches or of switches and socket-outlets are tested in the following way: – in the case of one common cover, as a single product; – in the case of separate covers, as separate products.		Samples: A, B, C Test related to cover plate removal force checked as specified in clause 13.3. Compliance checked as per Clause 20.2. Clauses 20.3, 20.4 and 20.10 are not applicable.	P
20.2	**Pendulum hammer test** The specimens are checked by applying blows by means of the pendulum hammer test apparatus as described in IEC 60068-2-75 (test Eha), with an equivalent mass of 250 g. The specimens are mounted on a sheet of plywood, 8 mm nominal thickness and approximately 175 mm square, secured at its top and bottom edges to a rigid bracket which is part of the mounting support. The mounting support shall have a mass of (10 ± 1) kg and shall be mounted on a rigid frame by means of pivots. The frame is fixed to a solid wall. The switches and boxes are mounted on the plywood as in normal use. The specimens are subjected to nine blows, which are evenly distributed over the specimens. The blows are not applied to knock-out areas. The following blows are applied: – for parts A, five blows: • one blow in the centre, after the specimen has been moved horizontally; • one each on the unfavourable points between the centre and the edges; and then • one each on similar points after the specimen has been turned 90° about its axis perpendicular to the plywood; – for parts B (as far as applicable), C and D, four blows: • two blows on each of the two sides of the specimen on which blows can be applied after the plywood sheet has been turned 60° in each of the opposite directions; • two blows on each of the other two sides of the specimen on which blows can be applied after the specimen has been turned 90° about its axis perpendicular to the plywood sheet and the plywood sheet has been turned 60° in each of the opposite directions		Equivalent mass : 250 g Height of fall : 80mm (A&B: IPX0 where B is <=15mm) Samples are subjected to 9 blows. 5 blows on parts A: 1 blow on middle of the rocker & other 2 blows middle to side and then 2 blows similar after rotated switch 90°. 4 blows on parts B: 2 blows on each of the two sides with an angle 60° and another 2 blows on similar after rotated samples 90°. During and after the test no breakage or deformation found.	P

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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
	After the test, the specimen shall show no damage within the meaning of this document. In particular live parts shall not become accessible. After the test on a lens (window for pilot lights), the lens may be cracked and/or dislodged, but it shall not be possible to touch live parts with – the test probe B of IEC 61032 under the conditions stated in 10.1; – the test probe 11 of IEC 61032 under the conditions stated in 10.1, but with a force of 10 N. Damage to the finish, small dents which do not reduce creepage distances or clearances below the value specified in 23.1 and small chips which do not adversely affect the protection against electric shock are neglected.		No damages observed. No dent observed.	
20.3	**Test on the main parts of surface-type switches** The main parts of surface-type switches are first fixed to a cylinder of rigid steel sheet, which has a radius equal to 4,5 times the distance between fixing holes but in any case no less than 200 mm. The axes of the holes are in a plane perpendicular to the axis of the cylinder and parallel to the radius through the centre of the distance between the holes. The fixing screws of the main part are gradually tightened, the maximum torque applied being 0,5 Nm for screws with a thread diameter up to and including 3 mm and 1,2 Nm for screws with a larger thread diameter. The main parts are then fixed in a similar manner to a flat steel sheet. During and after the tests the main parts of the switch shall show no damage likely to impair their future use.		NA	NA
20.4	**Screwed glands** Screwed glands are fitted with a cylindrical metal rod having a diameter, in millimetres, equal to the nearest whole number below the internal diameter, in millimetres, of the packing. The glands are then tightened by means of a suitable spanner, the torque shown in Table 22 being applied to the spanner for 1 min. After the test, the glands and the enclosures of the specimens shall show no damage within the meaning of this document.		NA	NA
20.5	**Covers, cover plates or actuating members – accessibility to live parts**			
20.5.1	**General** When testing the force necessary for covers, cover plates or actuating members to come off or not come off, the switches are mounted as for normal use. Flush-type switches are fixed in appropriate mounting boxes, which are installed as for normal use so that the rims of the boxes are flush with the walls, and the covers, cover plates or actuating members are fitted. If they are provided with locking means which can be operated without the aid of a tool, these means are unlocked. Compliance is then checked by the tests of 20.5.2 and 20.5.3.		NA	NA

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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
20.5.2	**Verification of the non-removal of covers, cover plates or actuating members** Forces are gradually applied in directions perpendicular to the mounting surfaces, in such a way that the resulting force acting on the centre of the covers, cover plates, actuating members or parts of them is – 40 N, for covers, cover plates, actuating members or parts of them complying with the tests of 20.8 and 20.9; or – 80 N, for other covers, cover plates, actuating members or parts of them. The force is applied for 1 min. The covers, cover plates, or actuating members shall not come off. The test is then repeated on new specimens, the cover or cover plate being fitted on the wall after a sheet of hard material, 1 mm ± 0.1 mm thick, has been fitted around the supporting frame, as shown in Figure 13. After the test the specimens shall show no damage within the meaning of this document.		NA	NA
20.5.3	**Verification of the removal of covers, cover plates or actuating members** A force not exceeding 120 N is gradually applied, in directions perpendicular to the mounting/supporting surfaces, to covers, cover plates, actuating members or parts of them by means of a hook placed in turn in each of the grooves, holes, spaces or the like provided for removing them. The covers, cover plates or actuating members shall come off. The test is made 10 times on each separable part the fixing of which is not dependent on screws (the application points being equally distributed as far as practicable). The removal force is applied each time to the different grooves, holes or the like provided for removing the separable part. The test is then repeated on new specimens, the cover, cover plate, or actuating member being fitted on the wall after a sheet of hard material, (1 ± 0,1) mm thick has been fitted around the supporting frame, as shown in Figure 13. After the test, the specimens shall show no damage within the meaning of this document.		NA	NA
20.6	**Covers, cover plates or actuating members – accessibility to non-earthed metal parts separated from live parts** The test is made as described in 20.5, but applying, for 20.5.2, the following forces: – 10 N, for covers or cover plates or actuating members complying with the tests of 20.8 and 20.9; – 20 N, for other covers or cover plates or actuating members.		NA	NA
20.7	**Covers, cover plates or actuating members – accessibility to insulating parts, earthed metal parts, the live parts of SELV ≤ 25 V AC or metal parts separated from live parts** The test is made as described in 20.5, but applying, for 20.5.2, the force of 10 N for all covers, cover plates, or actuating members.		Force necessary for cover plate (clip-on) to not come off at 10N checked when switch mounted normal use as per 20.5.2. Cover plate came off >10N and found OK with aid of tool.	P

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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
20.8	**Covers, cover plates or actuating members – application of gauges** The gauge shown in Figure 14 is pushed toward each side of each cover, cover plate or actuating member which is fixed without screws on a mounting or supporting surface, as shown in Figure 15. With face B resting on the mounting/supporting surface, and face A perpendicular to it, the gauge is applied at right angles to each side under test. In the case of a cover or cover plate fixed without screws to another cover or cover plate or to a mounting box, having the same outline dimensions, face B of the gauge shall be placed at the same level as the junction; the outline at the cover or cover plate shall not exceed the outline of the supporting surface. The distances between face C of the gauge and the outline of the side under test, measured parallel to face B, shall not decrease (with the exception of grooves, holes, reverse tapers or the like, placed less than 7 mm from a plane including face B and complying with the test of 20.9) when measurements are repeated starting from point x in the direction of the arrow y (see Figure 16).		Compliance checked according to the standard requirement with gauge as per figure 14.	P
20.9	**Grooves, holes and reverse tapers** A gauge according to Figure 17, applied with a force of 1 N, shall not enter more than 1,0 mm from the upper part of any groove, hole or reverse taper or the like when the gauge is applied parallel to the mounting/supporting surface and at right angles to the part under test, as shown in Figure 18.		NA (No grooves, holes and reverse tapers in product)	NA
20.10	**Additional test for cord-operated switch** The operating member of a cord-operated switch shall have adequate strength. Compliance is checked on a new specimen by the following test (as mentioned in standard)		NA	NA
21	**Resistance to heat**			
21.1	**General** Switches and boxes shall be sufficiently resistant to heat. Parts intended for decorative purposes only, such as certain lids, shall be removed if possible and these parts are not subjected to the test. Compliance is checked a) for surface mounting boxes, separable covers, separable cover plates and separable frames by the test of 21.4; b) for switches, with the exception of the parts, if any, covered by a), by the tests of 21.2, 21.3 and, with the exception of the switches made from natural or synthetic rubber or a mixture of both, by the test of 21.4.		Samples: A, B, C Switches are sufficiently resistance to heat. Compliance checked as below: -base plate & separable cover plates (clip-on plate) – 21.4 - switches – 21.2 & 21.3.	P

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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
21.2	**Basic heating test** The specimens are kept for 1 h in a heating cabinet at a temperature of (+100 ± 2) °C. During the test, they shall not undergo any change impairing their further use and sealing compound, if any, shall not flow to such an extent that live parts are exposed. After the test and after the specimens have been allowed to cool down to approximately room temperature, there shall be no access to live parts which are normally not accessible when the specimens are mounted as in normal use, even if the test probe B of IEC 61032 is applied with a force not exceeding 5 N. After the test, markings shall still be legible. Discoloration, blisters or slight displacement of the sealing compound is disregarded provided that safety is not impaired within the meaning of this document.		Samples are kept 100°C for 1h in heating cabinet. After test , live parts are not accessible after the application of test finger (probe B of IEC 61032) with a force of 5N.	P
21.3	**Ball-pressure test on parts of insulating material necessary to retain current carrying parts and parts of the earthing circuit in position** Parts of insulating material necessary to retain current carrying parts and parts of the earthing circuit in position are subjected to a ball pressure test by means of the apparatus shown in fig 25, except the insulating parts necessary to retain the earthing terminals in a box shall be tested as specified in 21.3. Test temperature : 125°C Force applied : 20N Test duration : 1 hour.		Ball pressure test @125°C for parts (applied on): Housing Test duration: 1 hour After the test, sample put plain water to cool and measured the diameter of impression. The diameter found less than 1.5mm.	P
21.4	**Ball-pressure test on parts of insulating material not necessary to retain current-carrying parts and parts of the earthing circuit in position** Parts of insulating material necessary to retain current-carrying parts and parts of the earthing circuit in position are subjected to a ball-pressure test by means of the apparatus shown in Figure 19, except for the insulating parts necessary to retain the earthing terminals in a box, which shall be tested as specified in 21.4. Speciment thick at least 2mm or can get stack upto 4 layers total thick >=2.5mm. The surface of the part to be tested is placed in the horizontal position and a steel ball of 5 mm diameter is pressed against the surface with a force of 20 N. The test is made in a heating cabinet at a temperature of (+125 ± 2) °C. After 1 h, the ball is removed from the specimen, which is then cooled down within 10 s to approximately room temperature by immersion in cold water. The diameter of the impression caused by the ball is measured and shall not exceed 2 mm.		Ball pressure test @70°C for parts (applied on): Rocker, Back plate (Fixing cover), Cover plate (Clip-on) Test duration: 1 hour After the test, sample put plain water to cool and measured the diameter of impression. The diameter found less than 1mm.	P

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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
22	**Screws current carrying parts and connections**		Samples: A, B, C	
22.1	**General** Connections, electrical or mechanical, shall withstand the mechanical stresses occurring in normal use. Mechanical connections to be used during installation of accessories may be made using thread-forming screws or thread-cutting screws only when the screws are supplied together with the piece in which they are intended to be inserted. In addition, thread-cutting screws intended to be used during installation shall be captive with the relevant part of the accessory. Screws or nuts which transmit contact pressure shall be in engagement with a metal thread. Compliance is checked by inspection and, for screws and nuts which are operated when connecting the external conductors and mounting the switch during the installation, by the following test. The screws or nuts are tightened and loosened -10 times for screws in engagement with a thread of insulating material; -5 times in all other cases. The test is made by means of a suitable test screwdriver or a suitable tool, applying the relevant torque as specified in 12.2.5. The conductor should move each time the screw or nut is loosened. During the test, no damage impairing the further use of the screwed connections shall occur, such as breakage of screws or damage to the head slots (rendering the use of an appropriate screwdriver impossible), threads, washers or stirrups.		Connections, electrical or mechanical withstood stresses occurring in normal use. Thread forming or thread cutting screws are not used. Terminal screws are only engagement with metal threads. Compliance verified as follows: The terminals with it screws are tightened and loosened 5 times with 0.6Nm torque with 4mm² external conductor. No damage found for futher use of the screwed connections.	P
22.2	**Correct insertion of screws** For screws in engagement with a thread of insulating material which are operated when mounting the switch during installation, their correct introduction into the screw hole or nut shall be ensured. Compliance is checked by inspection.		NA	NA
22.3	**Contact pressure of electrical connections** Electrical connections shall be so designed that contact pressure is not transmitted through insulating material other than ceramic, pure mica or other material with characteristics no less suitable, unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage or yielding of the insulating material. Compliance is checked by inspection and by manual test.		Contact pressure is not transmitted through insulating material. Compliance checked by inspection and by manual test of operational.	P
22.4	**Screws and rivets used both as electrical and mechanical connections** Screws and rivets which serve as electrical as well as mechanical connections shall be locked against loosening and/or turning. Compliance is checked by inspection.		Screws used in terminal for electrical connection is locked against loosening and turning unless using tool.	P

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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
22.5	**Material of current-carrying parts** Current-carrying parts, including those of terminals (also earthing terminals), shall be of a metal having, under the conditions occurring in the accessory, mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use. The requirement of 22.5 does not apply to screws, nuts, washers, clamping plates and similar parts of terminals. Compliance is checked by inspection and, if necessary, by chemical analysis. Current-carrying parts which may be subjected to mechanical wear shall not be made of steel provided with an electroplated coating. Under moist conditions metals showing a great difference of electrochemical potential with respect to each other shall not be used in contact with each other. Compliance is checked by a test which is under consideration.		Current carrying parts except terminals are made of brass and copper. Screws and nuts are made of steel and these parts complied resistance to rust test (refer clause 25).	P
22.6	**Contacts subjected to sliding actions** Contacts which are subjected to a sliding action in normal use shall be of a metal resistant to corrosion. Compliance with the requirements of 22.5 and 22.6 is checked by inspection and, in case of doubt, by chemical analysis.		The contact which undergone sliding action is the moving contact which made of copper. Compliance checked by inspection.	P
22.7	**Thread-forming and thread-cutting screws** Thread forming screws and thread cutting screws shall not be used for the connection of current carrying parts. Thread forming screws and thread cutting screws may be used to provide earthing continuity, provided that it is not necessary to disturb the connection the normal use and at least two screws are used for each connection. Compliance shall be checked by inspection.		NA (Thread-forming and thread-cutting screws are not used)	NA
23	**Creepage distances, clearances and distance through sealing compound**		**Samples: A, B, C**	
23.1	**General** Creepage distances, clearances and distances through sealing compound shall be not less than the values shown in Table 23. Subclause 23.1 does not apply to pilot light units. Requirements for pilot light units are given in 13.16.			P
	Creepage distances:			
	1 - Between live parts which are separated when the contacts are open; [>=3mm]		Creepage: 3.01mm (normal gap)	P
	2 - Between live parts of different polarity including all terminals for external wiring; [>=3mm for <=250V]		NA	NA
	3 - Between live parts and -accessible surfaces of parts of insulating material; [>=3mm]		Creepage: >3mm	P
	- earthed metal parts including the earthing circuit; [>=3mm]		Creepage: NA	
	-metal frames supporting the base of flush-type switches; [>=3mm]		Creepage: NA	
	-screws or devices for fixing main parts, covers or cover-plates; [>=3mm]		Creepage: >3mm	
	-metal parts of the mechanism, if required to be insulated from live parts (see 10.4). [>=3mm]		Creepage: NA	

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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
	4 - Between metal parts of the mechanism, if required to be insulated from accessible metal parts (see 10.5), and – screws or devices for fixing main parts, covers or cover-plates; [>=3mm]		Creepage: NA	NA
	– metal frames supporting the base of flush-type switches; [>=3mm]		Creepage: NA	
	– accessible metal parts. [>=3mm]		Creepage: NA	
	5 - Between live parts and accessible unearthed metal parts, with the exception of screws and the like.[>=4.5mm for <=250V]		Creepage: NA	NA
	Clearances:			
	6 - Between live parts which are separated when the contacts are open. [>=3mm for normal gap, 1.2 to <3mm for mini gap and <1.2mm for micro gap]		Clearance: >3mm (normal gap) (measured 3.04mm)	P
	7 - Between live parts of different polarity including all terminals for external wiring. [>=3mm (reduced to 1mm between lead wires of neon or LED lamps with external resistor)]		Clearance: NA	
	8 - Between live parts and -accessible surfaces of parts of insulating material; [>=3mm]		Clearance: >3mm	P
	- earthed metal parts, including the earthing circuit, not mentioned under items 9 and 11; [>=3mm]		Clearance: NA	
	- metal frames supporting the base of flush-type switches; [>=3mm]		Clearance: NA	
	- screws or devices for fixing main parts, covers, or cover-plates; [>=3mm]		Clearance: >3mm	
	- metal parts of the mechanism, if required to be insulated from live parts (see 10.4). [>=3mm]		Clearance: NA	
	9 - Between live parts and – exclusively earthed metal boxes (see NOTE) with the switch mounted in the most unfavourable position; [>=3mm]		Clearance: NA	NA
	– unearthed metal boxes, without insulating lining, with the switch mounted in the most unfavourable position; [>=4.5mm]		Clearance: NA	
	10 - Between metal parts of the mechanism, if required to be insulated from accessible metal parts (see 10.5), and – screws or devices for fixing main parts, covers or cover-plates; [>=3mm]		Clearance: NA Clearance: NA	NA
	– metal frames supporting the base of flush-type switches; [>=3mm]		Clearance: NA	
	-accessible metal parts when the base is fixed directly on the wall; [>=3mm]			
	11 - Between live parts and the surface on which the base of a surface-type switch is mounted when the base is fixed directly on the wall. [>=6mm]		Clearance: NA	NA
	12 - Between live parts and the bottom of the space, if any, for external conductors, for surface-type switches. [>=3mm]		Clearance: NA	NA
	13 - Between live parts and accessible unearthed metal parts with the exception of screws and the like. [>=3mm for <=250V]		Clearance: NA	NA

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Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
	Distances through insulating sealing compounds **14 -** Between live parts covered with at least 2 mm of sealing compound and the surface on which the base of a surface-type switch is mounted: [>=3mm for <=250V]		NA	NA
	15 - Between live parts covered with at least 2 mm of sealing compound and the bottom of the space, if any, for external conductors, for surface-type switches. [>=2.5mm]		NA	NA
23.2	**Insulating compound** Insulating compound shall not protrude above the edge of the cavity in which it is contained. Compliance is checked by inspection		NA	NA
24	**Resistance of insulating material to abnormal heat, to fire and to tracking**			
24.1	**Resistance to abnormal heat and to fire** Parts of insulating material which might be exposed to thermal stresses due to electric effects, and the deterioration of which might impair the safety of the accessory, shall not be unduly affected by abnormal heat and by fire. Compliance is checked by performing the glow-wire test according to IEC 60695-2-10 and IEC 60695-2-11 under the following conditions: a) for parts made of insulating material necessary to retain current-carrying parts and parts of the earthing circuit in position, by the test made at a temperature of 850 °C, with the exception of parts of insulating material needed to retain the earth terminal in position in a box, which shall be tested at a temperature of 650 °C; b) for parts of insulating material not necessary to retain current-carrying parts and parts of the earthing circuit in position, even though they are in contact with them, by the test made at a temperature of 650 °C. A current-carrying part or a part of the earthing circuit retained by mechanical means is considered to be retained in position. The use of grease or the like is not considered to be mechanical means. Small parts, where each surface lies completely within a circle of 15 mm in diameter, or where any part of the surface lies outside a 15 mm diameter circle and it is not possible to fit a circle of 8 mm in diameter on any of the surfaces, are not subjected to the test of 24.1 (see Figure 20 for diagrammatic representation). The tests are not made on parts of ceramic material. If possible, the specimen should be a complete switch. The test is made on one specimen. In case of doubt, the test shall be repeated on two further specimens. The specimen shall be stored for 24 h at standard ambient atmospheric conditions before the test, in accordance with IEC 60212. The test is made applying the glow-wire once. During the application time of the glow-wire and during a period of 30 s from the end of the application time, the specimen and the surrounding parts, including the layer under the specimen, shall be observed.		**Samples: G, H, I** Compliance checked on samples by Glow wire test. Samples are conditioned 24hrs before performing glow wire test. Glow wire test with below parts and temperature with its observation. **Glow wire applied parts with its test temperature** / **Observation** (flame extinguished time after removal from glow wire tip, No. ofdrops, flame height, tissue paper/wood conditions) Housing (@850°C) — 3 sec max. Flame height : 4 CM max. (0 drop) Rocker (@650°C) — No flame or glowing (0drop) Fixing Plate (@650°C) — No flame or glowing (0drop) Clip-on plate (@650°C) — No flame or glowing (0drop)	P

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Report No: AESL/1351/2025

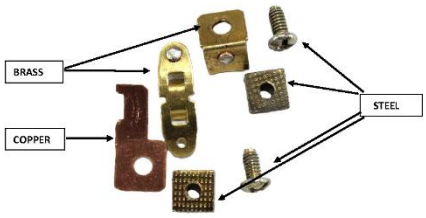
Cl.No.	Name of test	Standard Requirement	Actual result	Verdict
	The time when the ignition of the specimen occurs and/or the time when the flames extinguish during or after the application time shall be measured and recorded. The switch is regarded as having passed the glow-wire test if one of the following conditions is met: – there is no visible flame and sustained glowing; – flames and glowing at the switch extinguish within 30 s after the removal of the glow-wire. There shall be no ignition of the wrapping tissue or scorching of the board.			
24.2	**Resistance to tracking** For switches that have an IP code higher than IPX0, parts of insulating material retaining live parts in position shall be of material resistant to tracking. Compliance is checked according to IEC 60112. Ceramic parts are not tested. A flat surface of the part to be tested at least 15 mm × 15 mm is placed in the horizontal position on the apparatus. The material under test shall pass a proof tracking index of 175V using the solution A with an interval between drops of (30 ± 5) s. No flashover or breakdown between electrodes shall occur before a total of 50 drops have fallen.		NA (switches rated IPX0)	NA
25	**Resistance to rusting** Ferrous parts, including covers and boxes, shall be adequately protected against rusting. Compliance is checked by the following test: All grease is removed from the parts to be tested, using a suitable degreasing agent. The parts are then immersed for 10 min in a 10 % solution of ammonium chloride in water at a temperature of (+20 ± 5) °C. Without drying, but after shaking off any drops, the parts are placed for 10 min in a box containing air saturated with moisture at a temperature of (+20 ± 5) °C. After the parts have been dried for 10 min in a heating cabinet at a temperature of (+100 ± 5) °C, their surfaces shall show no signs of rust.		Samples: G, H, I Ferrous parts of switches are subjected to resistance to rusting test. Parts tested: Spring of plunger, terminal screws and nuts. No sign of rust observed on tested parts after the test.	P
26	**EMC requirements**			NA
26.1	**Immunity** Switches within the scope of this document are tolerant of electromagnetic disturbances and therefore no immunity tests are necessary.		NA	NA
26.2	**Emission** Electromagnetic disturbances may only be generated during switching operations. Since this is not continuous, no emission tests are necessary.		NA	NA

REVIEWED & ISSUED BY
9/2/24
[THYAGARAJAN]
AUTHORIZED SIGNATORY

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict

Image(s) of tested sample(s)



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9/2/24
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Report No: AESL/1351/2025

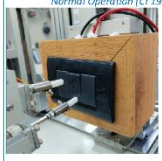
Cl.No.	Name of test	Standard Requirement	Actual result	Verdict

TESTING PRODUCTS IMAGES

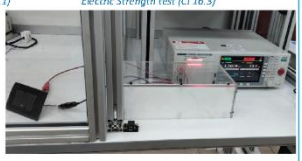
Terminal Test (Cl - 12.2.3)

Temperature Rise test (Cl 17.1)

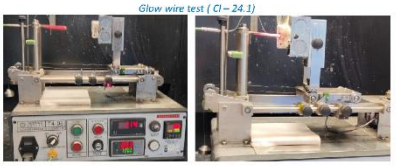
Normal Operation (Cl 19.1)



Electric Strength test (Cl 16.3)



Glow wire test (Cl – 24.1)



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مختبر الفنار للأنظمة الكهربائية
alfanar Electrical Systems Laboratory

Report No: AESL/1351/2025

Cl.No.	Name of test	Standard Requirement	Actual result	Verdict

SAMPLES RECEIVED FROM PT PROVIDER (PT SOUTH QUALITY)

*** END OF TEST REPORT ***

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9/12/24
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Sheet 42 of 42

----- END OF REPORT -----