



Test Laboratuvarları

## LVT Test Laboratuvarları Ltd. Şti.

www.lvt.com.tr

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### DENEY RAPORU

Test Report

KD-19-  
1093-R00-  
N01-01

07-19

1/51

<b>Müşteri</b> Client	: ALKANLAR ELEKTRİK TİCARET ve SANAYİ A.Ş.
<b>Adres</b> Address	: MEHMET AKİF ERSOY MAH. MALTEPE CAD. NO:72 ARNAVUTKÖY - İSTANBUL
<b>İmalatçı</b> Manufacturer	: ALKANLAR ELEKTRİK TİCARET ve SANAYİ A.Ş.
<b>Deney Numunesi</b> Test Sample	: ZENA BEYAZ KOMİTATÖR
<b>Marka</b> Trade Mark	: EL-Bİ
<b>Deney Metodu</b> Test Method	: TS EN 60669-1:2018+AC:2019
<b>Deney Tarihi</b> Date of Test	: 03.06.2019 – 16.07.2019
<b>Toplam Sayfa Sayısı</b> Total Number of Pages	: 51

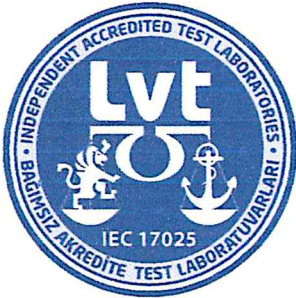
Deney ve / veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri (talep halinde) ve deney metotları, bu raporun tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir.  
The test and / or measurements results, the uncertainties (if required) with confidence probability and test methods are given on the following pages which are part of this report.

**Mühür**  
Seal

**Tarih**  
Date

**Deney Sorumlusu**  
Person in Charge of Test

**Laboratuvar Müdürü**  
Head of Testing Laboratory



17/07/2019

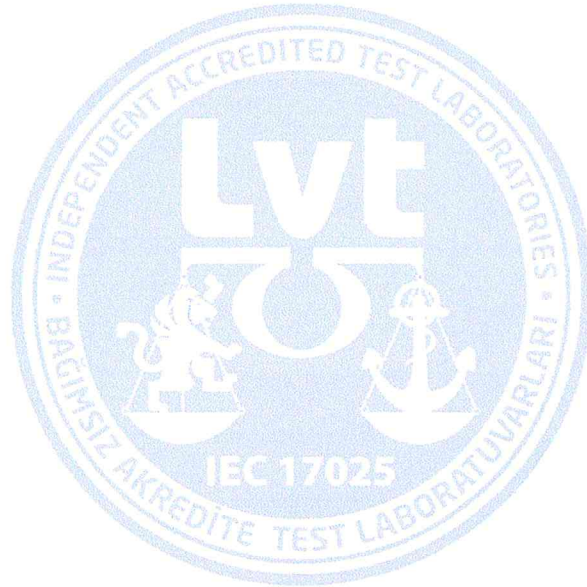
Erdiñç KOLALI

Cahit GÖKSEL

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## 1. Numunelerin Tanımı

Definition of the Samples

### 1.1 ZENA BEYAZ KOMİTATÖR

(KD-19-1093-R00-N01)

Numune Kabul Tarihi Date of Receive	:	30.05.2019
Numune Seri No Serial No	:	-
Tip Type	:	500-010200-202
Kutup Sayısı Number of Poles	:	Monophase
Beyan Gerilimi Rated Voltage	U <sub>n</sub> :	250V
Beyan Akımı Rated Current	I <sub>n</sub> :	10A
Beyan Frekans Rated Frequency	f <sub>n</sub> :	50Hz
Beyan Koruma Derecesi Rated Degree of Protection	IP :	20
Numune Boyutları Dimensions of the Sample	mm :	90x85
Cihaz – Malzeme Listesi Device – Component List	:	Bkz. sf; 41 See pg.

## 2. Deney Sonuçları

Test Results

: Deney sonuçları, müşteri tarafından laboratuvara teslim edilen ve sadece deneyi yapılan numuneye aittir.  
The test results only belong to the tested sample(s) delivered to the laboratory by client.

Numune Sample	Uygulanan Deney Applied Test	Sonuç Result
ZENA BEYAZ KOMİTATÖR	TS EN 60669-1:2018+AC:2019	OLUMLU PASS

## 3. Çevre Şartları

Environmental Conditions

3.1 Ortam Sıcaklığı Ambient Temperature	:	(24±3) °C
3.2 Ortam Nemi Ambient Moisture	:	(41±3) %Rh

4. Çıkarmalar Deviations, Additions & Cutbacks from the Test Method	:	Deneyler, standart deney metoduna göre uygulanmıştır. Tests were made according to the clauses of the relevant standards.
--	---	--

5. Şartnamelere Uygunluk (Gerekli Hallerde) Conformity to Specifications (If Necessary)	:	-
--	---	---

6. Dağıtım Bilgileri Distribution Information	:	ALKANLAR ELEKTRİK TİCARET ve SANAYİ A.Ş.
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7. **Açıklama**  
*Explanation* : -

8. **Ölçüm Belirsizliği**  
*Uncertainty of Measurement* : Detaylar aşağıdaki tabloda verilmiştir.  
*The details are mentioned table below.*

**Beyan edilen genişletilmiş ölçüm belirsizliği, standart belirsizliğin k=2 olarak alınan genişletme katsayısı ile çarpımı sonucunda bulunan değerdir ve % 95 oranında güvenilirlik sağlamaktadır.**

*The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2 which for a normal distribution corresponds to a coverage probability of approximately 95 %.*

<b>Deney bilgisi</b> <i>Test details</i>	<b>Cihaz kodu</b> <i>Device code</i>	<b>Ölçülen değer</b> <i>Measured value</i>	<b>Ölçüm belirsizliği</b> <i>Measurement uncertainty</i>
Temperature Rise Limits	LC117	See related table	%0,54
Ambient Temperature	LC349	See related table	%4,62
Electric Strength	LC85	See related table	%1,47
Insulation Resistance	LC85	See related table	%3,67
Glow-wire Test	LC40	See related table	%0,71
Pull Test	LC204	See related table	%0,17



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# Anahtarlar - Ev ve Benzeri Yerlerde Kullanılan Sabit Elektrik Tesisatları İçin - Bölüm 1: Genel Özellikler

Switches for Household And Similar Fixed Electrical Installations - Part 1: General Requirements

## 9. Deney Uygulamaları:

Test Applications

<b>TEST REPORT</b> <b>IEC 60669-1</b> <b>Switches for household and similar fixed-electrical installations</b> <b>Part 1: General requirements</b>	
<b>Test specification:</b>	
Standard .....	IEC 60669-1:2017
Test procedure.....	Type Test
Non-standard test method.....	N/A
<b>Test Report Form No.</b> .....	IEC60669_1F
Test Report Form(s) Originator .....	VDE
Master TRF .....	Dated 2018-02-09
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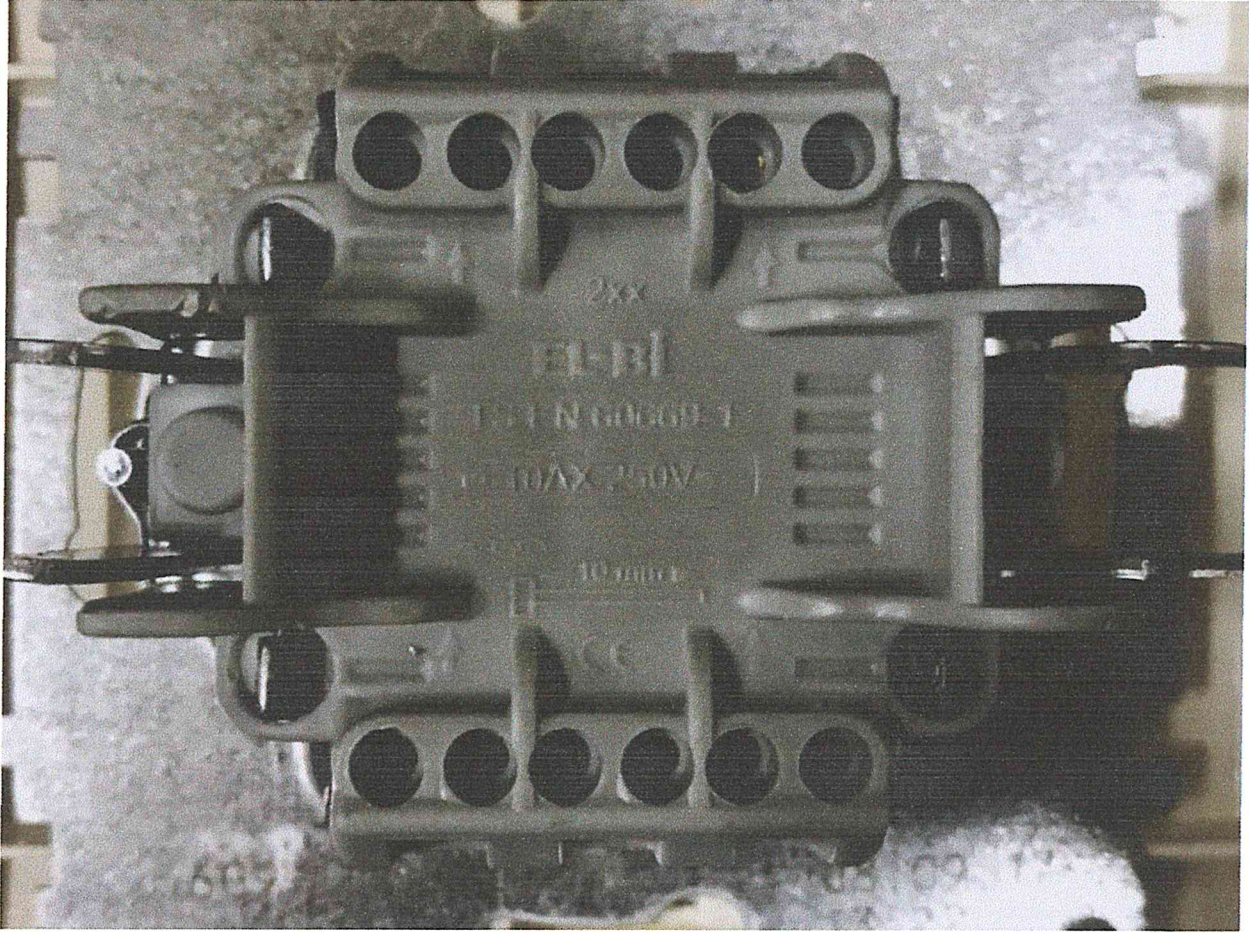
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## Anahtarlar - Ev ve Benzeri Yerlerde Kullanılan Sabit Elektrik Tesisatları İçin - Bölüm 1: Genel Özellikler

Switches for Household And Similar Fixed Electrical Installations - Part 1: General Requirements

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBS that own these marks.





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Switches for Household And Similar Fixed Electrical Installations - Part 1: General Requirements

<b>Test item particulars</b> .....	:	
Pattern number .....	:	
Contact opening (gap) .....	:	normal gap / mini-gap / micro-gap / without contact gap (semiconductor switching device)
Degree of protection against access to hazardous parts and against harmful effects due to the ingress of solid foreign objects .....	:	IP2X / IP4X / IP5X
Degree of protection against harmful effects due to the ingress of water .....	:	IPX0 / IPX4 / IPX5 / IPX6
Method of actuating .....	:	rotary / tumbler / rocker / push-button / cord-operated / momentary contact
Method of application .....	:	surface-type / flush-type / semi-flush-type / panel-type / architrave-type
Method of installation .....	:	design A / design-B
Type of terminals .....	:	screw-type (rigid) / screw-type (rigid and flexible) / screwless (rigid) / screwless (rigid and flexible)
Flexible cable outlet .....	:	without / with
Rated voltage (V) .....	:	
Rated current (A) .....	:	
<b>Possible test case verdicts:</b>		
- test case does not apply to the test object .....	:	N/A
- test object does meet the requirement .....	:	P (Pass)
- test object does not meet the requirement .....	:	F (Fail)
<b>Testing</b> .....		
Date of receipt of test item .....	:	30.05.2019
Date (s) of performance of tests .....	:	03.06.2019 – 16.07.2019
<b>General remarks:</b>		
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.		
Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.		
<b>General product information and other remarks:</b>		





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Switches for Household And Similar Fixed Electrical Installations - Part 1: General Requirements

P: Passed, N: Not Aplicable, F: Fail

IEC 60669-1			
Clause	Requirement – Test	Result - Remark	Verdict
8	<b>MARKING</b>		–
8.1	<b>General</b>		–
	Switches are marked with:		–
	a) rated current(s) (A or AX).....	10AX	P
	b) rated voltage(s) (V).....	250V	P
	c) symbol for nature of supply.....	~	P
	d) manufacturer's or responsible vendor's name, trade mark or identification mark.....	EL-Bİ	P
	e) type reference.....	500-010200-202	P
	f) symbol for mini-gap construction (m).....		N/A
	g) symbol for micro-gap construction (μ).....		N/A
	h) symbol for semiconductor switching device (without contact gap) (ε).....		N/A
	i) first IP characteristic numeral, if declared higher than 4, in which case the second characteristic numeral is also marked.....		N/A
	j) second IP characteristic numeral, if declared higher than 2, in which case the first characteristic numeral is also marked.....		N/A
	i & j) suitable for smooth and even wall only (IPXX)		N/A
	i & j) suitable for smooth and even wall and for rough wall (test wall of figure 21) (IPXX).....		N/A
	k) length of insulation to be removed before the insertion of the conductor into the screwless-type terminal.....		N/A
	l) symbol for the suitability to accept rigid conductors only (r).....		N/A
	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 :		N/A
8.2	<b>Symbols</b>		
	Symbols used: as required in the standard		P
	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		P
	The marking for the nature of supply shall be placed next to the marking for rated current and rated voltage		P







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8.3	<b>Visibility of markings</b>		-
	Markings are clearly visible with normal or corrected vision, without additional magnification		P
	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		P
	Parts such as cover plates, which are necessary for safety purposes and are intended to be sold separately, are marked with the manufacturer's or responsible vendor's name, trade mark or identification mark and type reference		P
	Markings as given in 8.1 i) and j), when applicable, are marked so as to be easily discernible when the switch is mounted and wired as in normal use		N/A
	Markings are placed on parts which cannot be removed without the use of a tool		P
8.4	<b>Marking on terminals for phase conductors</b>		-
	Terminals intended for the connection of phase conductors (supply conductors) are identified unless the method of connection is of no importance, is self-evident or is indicated on a wiring diagram		N/A
	Indications not placed on screws or other easily removable part		N/A
	Alternatively, the surface of such terminals shall be bare brass or copper, other terminals being covered with a metallic layer of another colour		P
	For switches of pattern numbers 2, 3, 03 and 6/2, terminals associated with any one pole have similar identification, if applicable, differing from that of the terminals associated with the other poles, unless the relationship is self-evident		N/A
8.5	<b>Marking on terminals for neutral and earth conductors</b>		-
	Neutral terminals: N..... :		N/A
	Earthing terminals: [earth symbol (IEC 60417-5019:2006-08)] ..... :		N/A
	Markings not placed on screws or other easily removable parts		N/A
	Terminals for conductors not forming part of the main function of the switch:		-
	- clearly identified unless their purpose is self-evident, or		N/A
	- indicated in a wiring diagram fixed to the accessory		N/A
	Identification of switch terminals may be achieved by:		-
	- their marking with graphical symbols according to IEC 60417 or colours and/or alphanumeric system, or		N/A





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	- their physical dimension or relative location		N/A
8.6	<b>Marking of the switch position</b>		-
	Switches marked to indicate the switch position: they are so marked that the direction of movement of the actuating member to its different positions or the actual position is clearly indicated .....		N/A
	Switches having more than one actuating member: marking indicates the effect achieved by the operation		N/A
	Marking clearly visible on the front of the switch		N/A
	Not possible to fix cover, cover plate, or removable actuating members in an incorrect position		N/A
	Symbols for "on" and "off" not used for indication of switch positions unless clearly indicate the direction of movement of the actuating members		N/A
8.7	<b>Additional requirements for marking</b>		-
	Special precautions necessary to take when installing the switch: details of these and clear information given in an instruction sheet which accompanies the switch		N/A
	Instruction sheets are written in the official language(s) of the country in which the switch is to be sold		N/A
8.8	<b>Durability</b>		-
	Marking durable and easily legible. Test: 15 s with water and 15 s with 95 % n-hexane.		N/A
9	<b>CHECKING OF DIMENSIONS</b>		-
	Switches and boxes comply with the appropriate standard sheets, if any		N/A
10	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		-
10.1	<b>Prevention of access to live parts</b>		-
	Switches: live parts not accessible		P
	Switches designed to be fitted with pilot lights supplied at voltage other than ELV have means to prevent direct contact with the lamp		N/A
	Specimen is mounted as in normal use and fitted with conductors as specified		P
	Test probe B of IEC 61032 is applied in every possible position, an electrical indicator with a voltage between 40 V and 50 V being used to show contact with the relevant part		P
	Switches having enclosures or covers in thermoplastic or elastomeric material: additional test carried out at 35 °C ± 2 °C. Switches are subjected for 1 min to a force of 75 N, applied through the tip of test probe 11 of IEC 61032		P





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	Test finger applied to thin-walled knock-outs with a force of 10 N		P
	During the test: switches not deform and no live parts accessible with test probe 11 of IEC 61032		P
10.2	<b>Requirements for operating parts</b>		
	Knobs, operating levers, push buttons, rockers and the like: of insulating material, unless:		P
	- accessible metal parts separated from metal parts of mechanism by double or reinforced insulation, or		P
	- reliably connected to earth		N/A
	Requirement does not apply to removable keys or intermediate parts, such as chains or rods		N/A
10.3	<b>Requirements for accessible metal parts</b>		-
10.3.1	Accessible parts of switches when in normal use are made of insulating material as specified.		P
10.3.2	Metal covers or cover plates are protected by supplementary insulation made by insulating linings or insulating barriers.		N/A
	Insulating linings or insulating barriers:		-
	- cannot be removed without being permanently damaged, or designed that		N/A
	- cannot be replaced in an incorrect position; if they are omitted, accessories are rendered inoperable or manifestly incomplete; there is no risk of accidental contact between live parts and metal covers or cover plates; precautions are taken to prevent creepage distances or clearances becoming less than the values specified in clause 23		N/A
	Linings or barrier comply with the tests of clauses 16 and 23		N/A
10.3.3	Earthing of metal covers or cover plates: connection of low resistance		N/A
10.4	<b>Requirements for insulation of the mechanism</b>		-
	Metal parts of the mechanism which are not insulated from live parts: not protrude from enclosure		P
	Switches operated by means of a removable key or similar device: metal parts of mechanism insulated from live parts		N/A
10.5	<b>Requirements for insulation of the mechanism with respect to the surrounding environment</b>		-
	Metal parts of mechanism not accessible and insulated from accessible metal parts, unless		N/A
	- separated from live parts (creepage distances and clearances have at least twice the value specified in clause 23), or		N/A





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	- reliably connected to earth		N/A
	Unenclosed stack-type switches having a metal spindle pivoting in a metal base plate: creepage distances and clearances between live parts and the spindle, and between metal parts of the mechanism and base plate, have at least twice the values specified in clause 23		N/A
10.6	<b>Requirements for switches operated indirectly</b>		-
	Switches operated by means of a removable key or an intermediate part: key or an intermediate part can only touch parts which are insulated from live parts		N/A
	Key or intermediate part: insulated from metal parts of mechanism, unless		N/A
	Creepage distances and clearances between live parts and metal parts of mechanism have at least twice the values specified in clause 23		N/A
10.7	<b>Requirements for switches with replaceable pull cord</b>		-
	Cord-operated switches: impossible to touch live parts when fitting or replacing the pull cord		N/A
11	<b>PROVISION FOR EARTHING</b>		-
11.1	<b>General</b>		-
	Accessible metal parts: provided with, or permanently and reliably connected to, an earthing terminal (does not apply to the metal cover plates mentioned in 10.3.2)		N/A
	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		N/A
11.2	<b>Earthing terminals</b>		-
	Earthing terminals: with screw clamping or screwless terminals and comply with clause 12		N/A
11.3	<b>Requirements for surface-type switches</b>		-
	Surface-type switches with an enclosure of insulating material, with IP > X0 and more than one cable inlet, are provided with:		-
	- an internal fixed earthing terminal, or		N/A
	- adequate space for a floating terminal allowing the connection of an incoming and outgoing conductor		N/A
11.4	<b>Test for earthing connection</b>		-
	Connection between earthing terminal and accessible metal parts: of low resistance		N/A
	Test current equal to 1,5 In or 25 A (A) .....		-
	Resistance $\leq 0,05 \Omega$ ( $\Omega$ ) .....		-
12	<b>TERMINALS</b>		-



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12.1	<b>General</b>		-
	Switches provided with screw-type terminals or with screwless terminals .....	Screw-type Terminal	P
	Clamping means of terminals: not serve to fix any other components		P
	All the test on terminals, with the exception of the test of 12.3 11, made after the test of 15.1		P
	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		P
12.2	<b>Terminals with screw clamping for external copper conductors</b>		-
12.2.1	Terminals with screw clamping having cross-sectional areas as shown in Table 4		P
	- for rigid copper conductors only, or		N/A
	- for both rigid and flexible copper conductors (tests carried out with rigid and then repeated with flexible conductors)		P
	Rated current (A) .....	10	-
	Type of conductor (rigid / flexible).....	Rigid / Flexible	-
	Smallest / largest cross-sectional area (mm <sup>2</sup> ) .....	1 / 2,5	-
	Diameter of largest conductor (mm).....	2,13	-
	Figure of terminal.....	2	-
	Minimum diameter D (minimum dimensions) of conductor space: required (mm); measured (mm) .....	2,0;2,1	P
12.2.2	Terminals allow the conductor to be connected without special preparation		P
12.2.3	Terminals with screw clamping have adequate mechanical strength		P
	Screws and nut for clamping the conductors have metric ISO thread or a comparable thread		P
	Screws not of soft metal such as zinc or aluminium		P
12.2.4	Terminals with screw clamping are resistant to corrosion		P
12.2.5	Terminals with screw clamping clamp the conductor(s) without undue damage to the conductor(s)	See appended table 12.2.5	P
	For screws having a hexagonal head with slot for tightening, test shall be made twice, first the torque applying to the hexagonal head and then applying the torque by means of a screwdriver		N/A
	During the test: conductor not slip out, no break near clamping unit and no damage		P





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12.2.6	Terminals with screw clamping clamp the conductor reliably between metal surfaces	See appended table 12.2.6	P
	During the test: conductor not move noticeably		P
12.2.7	Terminals with screw clamping are designed or placed that the conductor cannot slip out while the clamping screws or nuts are tightened	See appended table 12.2.7	N/A
	After the test: no wire of the conductor escaped outside the clamping unit thus reducing creepage distances and clearances to values lower than those indicated in table 23		N/A
12.2.8	Terminals not work loose from their fixing to the switch		N/A
	Movement of the terminal is allowed as long as it is sufficiently limited so as to prevent noncompliance with this document		N/A
	Use of sealing compound or resin is considered to be sufficient, provided that:		-
	- the sealing compound or resin is not subject to stress during normal use, and		N/A
	- the effectiveness of the sealing compound or resin is not impaired by temperatures attained by the terminal		N/A
	Torque test:		-
	- rated current (A) .....		-
	- solid rigid copper conductor of the largest cross-sectional area (mm <sup>2</sup> ) (table 4).....		-
	- torque (Nm) (table 5 or appropriate figures 1, 2, 3, 4).....		-
	Screws and nuts tightened and loosened 5 times. During the test: terminals not work loose and show no damage		N/A
12.2.9	Clamping screws or nuts of earthing terminals: adequately locked against accidental loosening, not possible to loosen them without the aid of a tool		P
12.2.10	Earthing terminals: no risk of corrosion		N/A
	Body of brass or other metal no less resistant to corrosion		N/A
	If the body is a part of a frame or enclosure of aluminium alloy, precautions are taken to avoid the risk of corrosion		N/A
12.2.11	Pillar terminals: distance g no less than the value specified in figure 1: required (mm); measured (mm):		N/A
	Mantle terminals: distance g no less than the value specified in figure 5: required (mm); measured (mm):		N/A
12.2.12	Lug terminals:		N/A
	- used only for switches having rated current $\geq 40$ A		N/A





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	- fitted with spring washers or equally effective locking means		N/A
12.3	<b>Screwless terminals for external copper conductors</b>		-
12.3.1	Screwless terminals of the type suitable for:		-
	- for rigid copper conductors only, or		N/A
	- for both rigid and flexible copper conductors (tests carried out with rigid and then repeated with flexible conductors)		N/A
	12.3 is not applicable to switches provided with		-
	- screwless terminals requiring the fixing of special devices to the conductors before clamping in the screwless terminal		N/A
	- screwless terminals requiring twisting of the conductors		N/A
	- screwless terminals providing direct contact to the conductors by means of edges or points penetrating the insulation		N/A
12.3.2	Screwless terminals provided with clamping units which allow the proper connection of rigid or of rigid and flexible conductors having nominal cross-sectional areas as shown in table 8		N/A
	Rated current (A) .....		-
	Type of conductor (rigid / flexible).....		-
	Smallest / largest cross-sectional area (mm <sup>2</sup> ) .....		-
	Diameter of largest rigid conductor (mm).....		-
	Diameter of largest flexible conductor (mm) .....		-
12.3.3	Screwless terminals allow the conductor to be connected without special preparation		N/A
12.3.4	Parts of screwless terminals intended for carrying current of materials as specified in 22.5		N/A
12.3.5	Screwless terminals clamp specified conductors with sufficient contact pressure without undue damage to the conductor		N/A
	Conductor clamped between metal surfaces		N/A
12.3.6	It is clear how the connection and disconnection of the conductors is to be made		N/A
	Disconnection of a conductor require an operation, other than a pull, so that can be made manually with or without a general-purpose tool		N/A
	It is not possible to confuse the opening for the use of a tool with the opening intended for the conductor		N/A
12.3.7	Screwless terminals intended for the interconnection of two or more conductors:		-





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	- the clamping of one of the conductors is independent of the clamping of the other conductor(s)		N/A
	- during the connection or disconnection the conductors can be connected or disconnected either at the same time or separately		N/A
	- each conductor introduced in a separate clamping unit		N/A
	It is possible clamp securely any number of conductors up to the maximum as designed. Number of conductors; Nominal cross-sectional area (mm <sup>2</sup> ) .....		N/A
12.3.8	Screwless terminals: adequate insertion obvious and over-insertion prevented		N/A
	Screwless terminals of switches: undue insertion of the conductor prevented by a stop if further insertion is liable to reduce creepage distances and/or clearances required in table 23, or to influence the mechanism		N/A
12.3.9	Screwless terminals properly fixed to the switch		N/A
	Not work loose when conductors are connected or disconnected		N/A
	Self-hardening resins used to fix terminals which are not subject to mechanical stress		N/A
12.3.10	Screwless terminals withstand mechanical stresses occurring in normal use	See appended table 12.3.10	N/A
	During application of the pull, conductor not come out of the terminal		N/A
	Test with apparatus shown in figure 9	See appended table 12.3.10	N/A
	During the test conductors not move noticeably in the clamping unit		N/A
	After these tests: neither terminals nor clamping means have worked loose and conductors show no deterioration		N/A
12.3.11	Screwless terminals withstand electrical and thermal stresses occurring in normal use	See appended table 12.3.11	N/A
	After the test: inspection show no changes		N/A
	Repetition of test according to 12.3.10: screwless terminals withstand mechanical stresses occurring in normal use	See appended table 12.3.11	N/A
	During application of the pull conductor not come out of the terminal		N/A
	Test with apparatus shown in figure 10	See appended table 12.3.11	N/A
	- measured after 24 <sup>th</sup> and 192 <sup>th</sup> temperature cycle		N/A
	- measured after any three of 48 <sup>th</sup> , 72 <sup>th</sup> , 96 <sup>th</sup> , 120 <sup>th</sup> , 144 <sup>th</sup> or 168 <sup>th</sup> temperature cycle		N/A







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	During the test conductors not move noticeably in the clamping unit		N/A
	After these tests: neither terminals nor clamping means have worked loose and conductors show no deterioration		N/A
12.3.12	Screwless terminals: connected rigid solid conductor remains clamped, even when deflected during normal installation	See appended table 12.3.12	N/A
<b>13</b>	<b>CONSTRUCTIONAL REQUIREMENTS</b>		–
<b>13.1</b>	<b>Mechanical requirements for insulating means</b>		–
	Insulating lining, barriers and like: adequate mechanical strength and secured in a reliable manner		P
<b>13.2</b>	<b>Installation requirements</b>		–
	Switches constructed so as to permit:		–
	- easy introduction into the terminal and reliable connection of the conductors in the terminals, except for lead wires of pilot lights		P
	- correct positioning of the conductors		P
	- easy fixing of the switch to a wall or in a box		P
	- 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)		P
	Surface-type switches: fixing means do not damage insulation of the cable		N/A
	Switches comprising screwless terminals: 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		N/A
	Compliance is checked by inspection and in case of doubt by the following test		N/A
	The test is carried out with a solid copper conductor having the smallest cross-sectional area, as specified in 12.3.2 (mm <sup>2</sup> ).....:		N/A
	If it is not possible to exert a force onto the connecting / disconnecting means, the product is deemed to comply with the requirements of this sub clause without further tests		N/A
	During the application of the pull, the conductor do not come out of the screwless terminal		N/A
	Switches classified as design A: permit easy positioning and removal of the cover or cover plate, without displacing the conductors or activating the connecting and/or disconnecting means of screwless terminals		P



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13.3	<b>Fixing of covers, cover plates and actuating members</b>		–
13.3.1	Covers, cover-plates and actuating members or parts of them intended to ensure protection against electric shock:		–
	- held in place at two or more points by effective fixings		P
	- fixed by means of a single fixing, e.g. by a screw, provided that they are located by another means (e.g. by a shoulder)		N/A
	Where the fixing of covers, cover plates or actuating members of switches of design A serves to fix the main part there are means to maintain the main part in position, even after removal of the covers, cover plates or actuating members.		P
13.3.2	Covers, cover plates or actuating members whose fixing is of the screw-type:		–
	Compliance checked by inspection only		N/A
13.3.3	Covers, cover plates or actuating members whose fixing is not dependent on screws and whose removal is obtained by applying a force in a direction approximately perpendicular to the mounting / supporting surface (see table 12):		–
	- when their removal may give access, with the test probe B of IEC 61032, to live parts:	by the tests of 20.5	N/A
	- 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 tests of 20.6	P
	- when their removal may give access, with the test probe B of IEC 61032, only to	by the tests of 20.7	P
	- insulating parts, or		P
	- earthed metal parts, or		N/A
	- 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		N/A
	- live parts of SELV circuits not greater than 25 V AC and 60 V DC:		N/A
13.3.4	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 the same tests of 13.3.3 except that the covers, cover plates, actuating members or parts of them need not come out when applying a force not exceeding 120 N in directions perpendicular to the mounting / supporting surface		P
13.4	<b>Openings in normal use</b>		–
	Switches: no free openings in their enclosures according to their IP classification	IP20	P





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13.5	<b>Attachment of knobs</b>		-
	Knobs of rotary switches securely attached to the shaft or part operating the mechanism		N/A
	- axial pull be applied for 1 min to try to pull off the actuating member		N/A
	- axial pull is likely to be applied in normal use, the force is 30 N		N/A
	- axial pull is unlikely to be applied in normal use, the force is 15 N		N/A
	- knob of switches having only one direction of operation: turned 100 times in the reverse direction		N/A
	During the test: knob not become detached		N/A
13.6	<b>Mounting means</b>		-
	Screws or other means for mounting the switch on a surface or in a box or enclosure: easily accessible from the front		P
	Fixing means not serve any other fixing purpose		P
13.7	<b>Combination of switches</b>		-
	Combinations of switches, or of switches and socket-outlets, comprising separate bases: correct position of each main part is ensured		P
	Fixing of each main part be independent of the fixing of the combination to the mounting surface		P
13.8	<b>Accessories combined with switches</b>		-
	Accessories combined with switches: comply with their standard		N/A
13.9	<b>Surface-type switches having an IP code higher than IP20</b>		-
	Surface-type switches with IP > 20 are in according to their classification when fitted with conduits or with sheathed cables		N/A
	Surface-type switches with IPX4, IPX5 and IPX6 have provisions for opening a drain hole		N/A
	Switches provided with a drain hole: it is not less than 5 mm in diameter, or 20 mm <sup>2</sup> in area with a width and a length not less than 3 mm .....	Ø mm / mm <sup>2</sup>	N/A
	Drain hole: effective		N/A
	Lid springs (if any): of corrosion resistant material (bronze or stainless steel)		N/A
13.10	<b>Installation in a box</b>		-
	Switches to be installed in a box: conductor ends can be prepared after the box is mounted in position, but before the switch is fitted in the box		P
	Main part has adequate stability when mounted in the box		P





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13.11	<b>Connection of a second current-carrying conductor</b>		–
	Surface-type switches with IP > IPX0, pattern numbers 1, 5 and 6, with more than one inlet opening, provided with:		–
	- fixed additional terminal complying with the requirements of clause 12, or		N/A
	- adequate space for a floating terminal		N/A
13.12	<b>Inlet openings</b>		–
	Inlet openings: allow the introduction of the conduit or the sheath of the cable		N/A
	Surface-type switches: intended conduit or the sheath of the cable can enter at least 1 mm into the enclosure		N/A
	Inlet openings for conduit entries of surface-type switches: capable of accepting conduit sizes of 16, 20, 25 or 32 or a combination of at least two of these sizes not excluding two of the same size.....:		N/A
	Inlet openings for cable entries of surface-type switches: capable of accepting cables having the dimensions specified in table 13 or be as specified by the manufacturer: rated current (A); limits of external diameter of cables min/max (mm) .....		N/A
13.13	<b>Provision for back entry from a conduit</b>		–
	Surface-type switches: provision for back entry (if are intended)		N/A
13.14	<b>Switch provided with membranes or the like for inlet openings</b>		–
	Switch is provided with membranes or the like for inlet openings: replaceable		N/A
13.15	<b>Requirements for membranes in inlet openings</b>		–
13.15.1	Membranes are reliably fixed and not displaced by the mechanical and thermal stresses occurring in normal use		N/A
	Test on membranes subjected to the ageing treatment specified in 15.1 and fitted with the switches		–
	Switches placed at 40 °C for 2 h. Force of 30 N applied for 5 s by means of the tip of test probe 11 of IEC 61032. During the test: no deformation, live parts not accessible		N/A
	Membranes likely to be subjected to an axial pull: axial pull of 30 N applied for 5 s. During the test: membranes not come out		N/A
	Test repeated with membranes not subjected to any treatment		N/A
13.15.2	Membranes be so designed and made of such material that: Introduction of the cables into the switch is permitted when the ambient temperature is low.		N/A



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	Test on membranes not subjected to the ageing treatment, those without opening being suitably pierced:		–
	Switches kept at a temperature of $(-15 \pm 2)$ °C for 2 h: possibility to introduce cables of the heaviest type through the membranes		N/A
	After the test: no harmful deformation, cracks or similar damage		N/A
13.16	<b>Pilot light units</b>		–
	Pilot light units 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		N/A
14	<b>MECHANISM</b>		–
14.1	<b>Indication of the position</b>		–
	Actuating member of a switch, when released, automatically take up the position corresponding to that of moving contacts		N/A
14.2	<b>Rest and intermediate position</b>		–
	Moving contact of switches can come to rest only in "on" and "off" positions		P
	Intermediate position permissible if:		–
	- it corresponds to the intermediate position of the actuating member, and		N/A
	- the insulation between fixed and moving contacts is adequate. Electric strength test as specified in 16.3: test voltage a.c. for 1 min (V) .....	500 V / 750 V / 1250 V / 2000 V	N/A
14.3	<b>Undue arcing</b>		–
	No undue arcing in slowly operation		P
	Test carried out at the end of the test of clause 19.1: breaking of the circuit 10 times, actuating member moved over a period of 2 s. During the test: no sustained arcing		P
14.4	<b>Making and breaking</b>		–
	Switches of pattern numbers 2, 3, 03 and 6/2 make and break all poles substantially simultaneously		N/A
	Neutral pole of switches of pattern number 03 not make after or break before the other poles		N/A
14.5	<b>Action of the mechanism without cover or cover plate</b>		–
	Action of the mechanism: independent of the presence of cover or cover plate. Test: no flicker		P
14.6	<b>Cord-operated switches: effecting a change by application and removal of a steady pull not exceeding:</b>		–
	- 45 N applied vertically, and		N/A





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	- 65 N applied at 45° ± 5°		N/A
15	<b>RESISTANCE TO AGEING, PROTECTION PROVIDED BY ENCLOSURES OF SWITCHES, AND RESISTANCE TO HUMIDITY</b>		-
15.1	<b>Resistance to ageing</b>		-
	Switches are resistant to ageing		P
	Parts intended for decorative purposes only, such as certain lids, are removed		N/A
	Switches and boxes placed for 7 days (168 h) in a heating cabinet at 70 °C ± 2 °C		P
	- no crack visible after test with normal or corrected vision without additional magnification		P
	- no sticky or greasy material as a result of heat		P
	- no trace of cloth (forefinger pressed with 5 N)		P
	- no damage		P
15.2	<b>Protection provided by enclosures of switches</b>		-
15.2.1	General		-
	Enclosure of the switch provides 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		P
15.2.2	Protection against access to hazardous parts and against harmful effects due to ingress of solid foreign objects		-
15.2.2.1	General		-
	Glands: torque (Nm) (2/3 of torque applied in 20.4) :	-	-
	Screws of the enclosure: torque (Nm) (2/3 table 5) .....	-	-
	Parts which can be removed without the aid of a tool are removed		P
	Glands are not filled with sealing compound or the like		N/A
15.2.2.2	Protection against access to hazardous parts		-
	Appropriate test according to IEC 60529.....	IP20	P
15.2.2.3	Protection against harmful effects due to ingress of solid foreign objects		-
	Appropriate test according to IEC 60529.....	IP20	P
	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 not penetrate in a quantity to interfere with satisfactory operation or impair safety		N/A
	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 penetrate		N/A



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15.2.3	Protection against harmful effects due to ingress of water		–
	Enclosure of switches provide a degree of protection against harmful effects due to ingress of water in accordance with their IP classification		N/A
	Appropriate test according to IEC 60529.....: IP		N/A
	Flush-type and semi-flush-type switches fixed:		–
	- in a test wall using an appropriate box in accordance with the manufacturer's instructions		N/A
	- in a test wall according to figure 21		N/A
	Screws of the enclosure: torque (Nm) (2/3 table 5) .....		–
	Glands: torque (Nm) (2/3 of torque applied in table 22).....		–
	Specimens withstand an electric strength test specified in 16.3 which is started within 5 min of completion of the test to 15.2		N/A
15.3	<b>Resistance to humidity</b>		–
	Switches proof against humidity which may occur in normal use		N/A
	Compliance checked by a humidity treatment described in 15.3, carried out in a humidity cabinet containing air with relative humidity maintained between 91 % and 95 %. Specimens kept in the cabinet for:		–
	- 2 days (48 h) for switches with IPX0		N/A
	- 7 days (168 h) for switches with IP>X0		N/A
	After this treatment: specimens show no damage		N/A
16	<b>INSULATION RESISTANCE AND ELECTRIC STRENGTH</b>		–
16.1	<b>General</b>		–
	One pole of any pilot lights (if available), are disconnected for this test		P
	Insulation resistance and electric strength of switches be adequate		P
16.2	<b>Test for measuring the insulation resistance</b>		–
	The insulation resistance measured 1 min after application of 500 V DC	See appended table 16.2	P
	In addition, if electrically independent pattern numbers are combined in a common base, additional tests for each combination performed		N/A
16.3	<b>Electric strength test</b>		–
	Electric strength: AC test voltage applied for 1 min	See appended table 16.3	P
	In addition, if electrically independent pattern numbers are combined in a common base, additional tests for each combination performed		N/A
17	<b>TEMPERATURE RISE</b>		–
17.1	<b>General</b>		–





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	Switches so constructed that the temperature rise in normal use is not excessive	See appended table 17	P
	No oxidation or any other deterioration of contacts		P
17.2	<b>Switches incorporating pilot lights</b>		-
	Switches incorporating or intended to incorporate pilot lights are designed that in normal use temperature of the accessible surface is not excessive	See appended table 17	N/A
18	<b>MAKING AND BREAKING CAPACITY</b>		-
18.1	<b>General</b>		-
	For the purpose of this test, pilot lights are disconnected	There is no such pilot light	N/A
	Switches have adequate making and breaking capacity		P
	- model / type reference .....	Other type	-
	- pattern number .....	5	-
	- rated voltage (V) .....	250	-
	- rated current (A) .....	10	-
	- nominal cross-sectional area as for the test of clause 17 (mm <sup>2</sup> ) .....	2,5	-
18.2	<b>Overload</b>		-
	Test with cos $\phi$ 0,3 alternating current		-
	- test voltage (1,1 V <sub>n</sub> ) (V) .....	275	-
	- test current (1,25 I <sub>n</sub> ) (cos $\phi$ 0,3) (A) .....	12,5	-
	- 200 operations; rate (operations per minute) .....	30	-
	- samples number .....	1	-
	During the test: copper wire F not melt, specimens function correctly, no sustained arcing or welding of contacts		P
	After the test: specimens show no damage		P
	During the test: specimens are not lubricated		P
18.3	<b>Overload test with filament lamps</b>		-
	Test with a number of tungsten filament lamps or a number of halogen filament lamps (switches with I <sub>n</sub> ≤ 16 A / V <sub>n</sub> ≤ 250 V and switches of pattern numbers 3 and 03 with V <sub>n</sub> > 250 V)		-
	- test voltage (V <sub>n</sub> ) (V) .....		-
	- test current (≥ 1,2 I <sub>n</sub> ) (A) .....		-
	- number of 200 W tungsten filament lamps .....		-
	- 200 operations; rate (operations per minute) .....		-
	- samples number .....		-







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	During the test: copper wire F not melt, specimens function correctly, no sustained arcing or welding of contacts		N/A
	After the test: specimens show no damage		N/A
<b>19</b>	<b>NORMAL OPERATION</b>		-
<b>19.1</b>	<b>Test for switches intended for inductive loads</b>		-
	For the purpose of this test, pilot lights are disconnected		N/A
	Switches withstand, without excessive wear or other harmful effect, the mechanical, electrical and thermal stresses occurring in normal use		P
	- model / type reference .....	Other type	-
	- pattern number .....	5	-
	- nominal cross-sectional area per clause 18 (mm <sup>2</sup> ):	2,5	-
	- test voltage (Vn) (V).....	250	-
	- test current (In) (cos φ 0,6) (A) .....	6	-
	- number of operations per table 18 .....	40000	-
	- rate (operations per minute) .....	30	-
	- samples number .....	1	-
	During the test: copper wire F not melt, specimens function correctly, no sustained arcing or welding of contacts		P
	Reduced electric strength per clause 16	See appended table 19.1	P
	Reduced temperature rise test per clause 17	See appended table 19.1	P
	After the tests the specimens not show:		-
	- wear impairing their further use		P
	- discrepancy between the position of the actuating member (if indicated) and that of the moving contacts		N/A
	- deterioration of enclosures, insulating lining or barriers		P
	- seepage of sealing compound		N/A
	- loosening of electrical or mechanical connections		P
	- displacement of moving contacts of switches pattern number 2, 3, 03 or 6/2		N/A
	During the test, specimens are not lubricated		P
	No sustained arcing in slowly operation (sub clause 14.3)		P
<b>19.2</b>	<b>Test for switches intended for externally ballasted lamp loads</b>		-

