



REPORT

EN60947-1:2007+AC:2011

Low –voltage switchgear and controlgear - Part 1:General rule

Report

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Address..... : No.398, Nan Wenzao Road, Shanghai China

Manufacturer

Name : Shanghai Long-Join Electronics Co., Ltd

Address..... : No.398, Nan Wenzao Road, Shanghai China

Test specification

Standard : EN60947-1:2007+AC:2011

Test procedure : CE-LVD

Test report form/blank test report

Test report form No. : SCC60947

TRF modified by..... : CHINA CEPREI (SICHUAN) LABORATORY

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Test item	
Type of test object	: Photocontrol Receptacle
Trademark	: /
Model and/or type reference.....	: JL-210K, JL-210, JL-210N, JL-230, JL-200, JL-200X, JL-200Z , JL-240,JL-240-R,JL-240T,JL-240T-R ,JL-240TL ,JL-240TL-R, JL-240TZ, JL- 250C, JL- 250H
Rating(s)	: 480V~,50/60Hz
Equipment mobility.....	: Stationary
Operating condition.....	: Continuous
Tested for IT power systems.....	: N.A
Mass of equipment (kg)	: /
Protection against ingress of water.....	: /
Testing	
Date of receipt of test item	: 2015-3-2
Date(s) of performance of test	: 2015-3-2 to 2015-4-10
Possible test case verdicts	
Test case does not apply to the test object	: N(A.)
Test object does meet the requirement	: P(ass)
Test object does not meet the requirement	: F(ail)
General remarks	
<p>This test report shall not be reproduced except in full without the written approval of the testing laboratory. The test results presented in this report relate only to the object tested. "(See remark #)" refers to a remark appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a comma is used as the decimal separator.</p>	
<p>Brief description of the tested sample(s): Ambient temperature: 22°C~26°C, humidity: 50% ~65% RH Complete test was conducted on JL-210K. 480V~,50/60Hz</p> <p>JL-210K,JL-210,JL-210N,JL-230,JL-200,JL-200X,JL-200Z ,JL-240,JL-240-R,JL-240T,JL-240T-R ,JL-240T L ,JL-240TL-R,JL-240TZ, JL-250C, JL-250H are the same series products.</p> <p>A representative sample of the product covered by this report has been tested and complies with the applicable requirements of this standard.</p>	

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			

3	Classification		P
	This clause is intended to list the characteristics of an equipment on which information may be given by the manufacturer and which may not necessarily have to be verified by testing.	Pass muster	P
4	Characteristics of circuit-breakers		P
4.1	Summary of characteristics		P
	The characteristics of an equipment shall be stated in the relevant product standard in respect of the following, where applicable:	According with standard	P
4.2	Type of circuit-breaker		P
	The product standard shall state the following, where applicable:		P
	– kind of equipment: e.g. contactor, circuit-breaker, etc.;	See the nameplate	P
	– number of poles;	See the nameplate	P
	– kind of current;	~	P
	– interrupting medium;	See instruction	P
	– operating conditions (method of operation, method of control, etc.).	See instruction	P
4.3	Rated and limiting values of the main circuit		P
	Ratings are assigned by the manufacturer. They shall be stated in accordance with 4.3.1 to 4.3.6 as required by the relevant product standard, but it is not necessary to establish all the ratings listed.	Pass muster	P
4.3.1	Rated voltages		P
4.3.1.1	Rated operational voltage (U_e)		P
4.3.1.2	Rated insulation voltage (U_i)		N
4.3.1.3	Rated impulse withstand voltage (U_{imp})		N
	The peak value of an impulse voltage of prescribed form and polarity which the equipment is capable of withstanding without failure under specified conditions of test and to which the values of the clearances are referred.		N
4.3.2	Currents		P
4.3.2.1	Conventional free air thermal current (I_{th})		P
	The conventional free air thermal current is the maximum value of test current to be used for temperature-rise tests of unenclosed equipment in free air (see 8.3.3.3).	Pass muster	P
4.3.2.2	Conventional enclosed thermal current (I_{the})		P
4.3.2.3	Rated operational current (I_e) or rated operational power		P
4.3.2.4	Rated uninterrupted current (I_u)	See instruction	P
4.3.3	Rated frequency		P
4.3.4	Rated duties	See instruction	P
4.3.4.1	Eight-hour duty		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	A duty in which the main contacts of an equipment remain closed, whilst carrying a steady current long enough for the equipment to reach thermal equilibrium but not for more than eight hours without interruption.		N
4.3.4.2	Uninterrupted duty		P
	A duty without any off-load period in which the main contacts of an equipment remain closed, whilst carrying a steady current without interruption for periods of more than eight hours (weeks, months, or even years).	See instruction	P
4.3.4.3	Intermittent periodic duty or intermittent duty		P
	A duty with on-load periods, in which the main contacts of an equipment remain closed, having a definite relation to off-load periods, both periods being too short to allow the equipment to reach thermal equilibrium.	Intermittent periodic duty	P
	Intermittent duty is characterized by the value of the current, the duration of the current flow and by the on-load factor which is the ratio of the in-service period to the entire period, often expressed as a percentage.	Pass muster	P
	Standardized values of the on-load factor are 15 %, 25 %, 40 % and 60 %.	Pass muster	P
4.3.4.4	Temporary duty		N
	Duty in which the main contacts of an equipment remain closed for periods insufficient to allow the equipment to reach thermal equilibrium, the unload periods being separated by off-load periods of sufficient duration to restore equality of temperature with the cooling medium.		N
4.3.4.5	Periodic duty		P
	A type of duty in which operation, whether at constant or variable load, is regularly repeated.	Pass muster	P
4.3.5	Normal load and overload characteristics		P
	This subclause gives general requirements concerning ratings under normal load and overload conditions.	According with requirement of standard	P
4.3.5.1	Ability to withstand motor switching overload currents		P
	An equipment intended for switching motors shall be capable of withstanding the thermal stresses due to starting and accelerating a motor to normal speed and due to operating overloads.	Pass muster	P
4.3.5.2	Rated making capacity		P
4.3.5.3	Rated breaking capacity	See instruction	P
	The rated breaking capacity of all equipment is a value of current, stated by the manufacturer, which the equipment can satisfactorily break, under specified breaking conditions.	Pass muster	P
4.3.6	Short-circuit characteristics	No danger	P

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
4.3.6.1	Rated short-time withstand current (I _{cw})	See instruction	P
4.3.6.2	Rated short-circuit making capacity (I _{cm})	See instruction	P
4.3.6.3	Rated short-circuit breaking capacity (I _{cn})	See instruction	P
4.3.6.4	Rated conditional short-circuit current	See instruction	P
4.4	Utilization categories		P
	The utilization category of an equipment defines the intended application and shall be specified in the relevant product standard; it is characterized by one or more of the following service conditions: Examples of utilization categories for low-voltage switchgear and controlgear are given in Annex A.	Pass muster	P
4.5	Control circuits		P
4.5.1	Electrical control circuits		P
	– kind of current;	AC	P
	– rated frequency if a.c.;	AC	P
	– rated control circuit voltage U _c (nature, and frequency if a.c.);	See instruction	P
	– rated control supply voltage U _s (nature, and frequency if a.c.), where applicable.	See instruction	P
4.5.2	Air-supply control circuits (pneumatic or electro-pneumatic)		N
4.6	Auxiliary circuits		P
	The characteristics of auxiliary contacts and switches shall comply with the requirements of the above standard.	Pass muster	P
4.7	Releases	Not this appliance	N
	The following characteristics of relays and releases shall be stated in the relevant product standard,		N
4.8	Integral fuses (integrally fused circuit-breakers)		N
4.9	Switching overvoltages		P
	The manufacturer shall specify the maximum value of switching overvoltages caused by the operation of the switching device, when required by the product standard.	According with requirement of standard	P
5	Product information		
5.1	Nature of the information	Pass muster	P
	The following information shall be given by the manufacturer, when required by the relevant product standard	Shanghai Long-Join Electronics Co., Ltd	P
5.2	Marking		P
	All relevant information, as detailed in 5.1, which is to be marked on the equipment, shall be specified in the relevant product standard.	According with requirement of standard	P
	Markings shall be indelible and easily legible.	Indelible and easily legible	P

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	Marking of the manufacturer's name or trademark and type designation or serial number is mandatory on the equipment and preferably on the nameplate, if any, in order to permit the complete data to be obtained from the manufacturer.	See nameplate	P
5.3	Instructions for installation, operation and maintenance	Have these information	P
	The manufacturer shall specify in his documents or catalogues the conditions for installation, operation and maintenance, if any, of the equipment during operation and after a fault.	Pass muster	P
6	Normal service, mounting and transport conditions		P
6.1	Normal service conditions		P
	Equipment complying with this standard shall be capable of operating under the following standard conditions:	May operate	P
6.1.1	Ambient air temperature		P
	The ambient air temperature does not exceed +40 °C and its average over a period of 24 h does not exceed +35 °C.	Pass muster	P
	The lower limit of the ambient air temperature is -5 °C.	Pass muster	P
	Ambient air temperature is that existing in the vicinity of the equipment if supplied without enclosure, or in the vicinity of the enclosure if supplied with an enclosure.	Pass muster	P
6.1.2	Altitude		P
	The altitude of the site of installation does not exceed 2 000 m.	<2 000 m.	P
6.1.3	Atmospheric conditions		P
6.1.3.1	Humidity		
	The relative humidity of the air does not exceed 50 % at a maximum temperature of +40 °C. Higher relative humidities may be permitted at lower temperatures, e.g. 90 % at +20 °C. Special measures may be necessary in cases of occasional condensation due to variations in temperature.	<85 %	P
6.1.3.2	Pollution degree		P
	The pollution degree (see 2.5.58) refers to the environmental conditions for which the equipment is intended.		P
6.1.4	Shock and vibration		P
	Standard conditions of shock and vibration to which the equipment can be submitted are under consideration.	No damage	P
6.2	Conditions during transport and storage		P

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	A special agreement shall be made between user and manufacturer if the conditions during transport and storage, e.g. temperature and humidity, differ from those defined in 6.1, except that, unless otherwise specified, the following temperature range applies during transport and storage: between $-25\text{ }^{\circ}\text{C}$ and $+55\text{ }^{\circ}\text{C}$ and, for short periods not exceeding 24 h, up to $+70\text{ }^{\circ}\text{C}$.	Pass muster	P
	Equipment subjected to these extreme temperatures without being operated shall not undergo any irreversible damage and shall then operate normally under the specified conditions.	No damage	P
6.3	Mounting		P
	The equipment shall be mounted in accordance with the manufacturer's instructions.	See the manufacturer's instructions	P
7	Constructional and performance requirements		P
7.1	Constructional requirements		P
	The equipment with its enclosure, if any, whether integral or not, shall be designed and constructed to withstand the stresses occurring during installation and normal use and, in addition, shall provide a specified degree of resistance to abnormal heat and fire.	Pass muster	P
7.1.1	Materials		P
	The suitability of materials used is verified by making tests:	Pass muster	P
	a) on the equipment; or		P
	b) on sections taken from the equipment; or		N
	c) on samples of identical material having representative cross-section.		N
	The suitability shall be determined with respect to resistance to abnormal heat and fire	May prevent to abnormal heat and fire	P
7.1.1.1	Resistance to abnormal heat and fire		P
	Parts of insulating materials which might be exposed to thermal stresses due to electrical effects, and the deterioration of which might impair the safety of the equipment, shall not be adversely affected by abnormal heat and by fire.	Pass muster	P
	Parts of insulating materials necessary to retain current-carrying parts in position shall conform to the glow-wire tests of 8.2.1.1.1 at a test temperature of $850\text{ }^{\circ}\text{C}$ or $960\text{ }^{\circ}\text{C}$ according to the expected fire hazard.	Glow-wire test $960\text{ }^{\circ}\text{C}$. No fire and no danger	P
	Parts of insulating materials other than those specified in the previous paragraph shall conform to the requirements of the glow-wire test of 8.2.1.1.1 at a temperature of $650\text{ }^{\circ}\text{C}$.	Glow-wire test $650\text{ }^{\circ}\text{C}$. No fire and no danger	P
	When tests on materials are used, they shall be made according to the tests for flammability classification, hot wire ignition and, where applicable, arc ignition, as specified in 8.2.1.1.2.		N
7.1.2	Current-carrying parts and their connections		P

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	Current-carrying parts shall have the necessary mechanical strength and current-carrying capacity for their intended use.	Pass muster	P
	For electrical connections, no contact pressure shall be transmitted through insulating material other than ceramic or other material with characteristics not less suitable, unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage or yielding of the insulation material		P
7.1.3	Clearances and creepage distances		P
	For equipment tested according to 8.3.3.4 of this standard, minimum values are given in Tables 13 and 15.	According with requirement of standard	P
	In the other cases, guidance for minimum values is given in the relevant product standard.		P
7.1.4	Actuator	Not applicable	N
7.1.4.1	Insulation		N
	The actuator of the equipment shall be insulated from the live parts for the rated insulation voltage and, if applicable, the rated impulse withstand voltage.		
7.1.4.2	Direction of movement		N
	The direction of operation for actuators of devices shall normally conform to IEC 60447. Where devices cannot conform to these requirements, e.g. due to special applications or alternative mounting positions, they shall be clearly marked such that there is no doubt as to the "I" and "O" positions and the direction of operation.		N
7.1.5	Indication of the contact position	Pass muster	P
7.1.5.1	Indicating means		P
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated. This is done by means of a position indicating device (see 2.3.18).	Clearly indicated	P
	If symbols are used, they shall indicate the closed and open positions respectively, in accordance with IEC 60417-2:	Clearly indicated	P
	For equipment operated by means of two push-buttons, only the push-button designated for the opening operation shall be red or marked with the symbol "O".	Red	P
	Red colour shall not be used for any other push-button.	Don't be used for any other push-button	P
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073.	No indicator lights	P
7.1.5.2	Indication by the actuator		P
7.1.6	Additional requirements for equipment suitable for isolation		P

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			

	The effectiveness of each of the means of indication provided on the equipment and its mechanical strength shall be verified in accordance with 8.2.5.	Pass muster	P
7.1.6.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers	Supplementary have be provided	P
	If equipment suitable for isolation is provided with an auxiliary switch for the purpose of electrical interlocking with contactor(s) or circuit-breaker(s) and intended to be used in motor circuits, the following requirements shall apply unless the equipment is rated for AC-23 utilization category		P
	The time interval between the opening of the contacts of the auxiliary switch and the contacts of the main poles shall be sufficient to ensure that the associated contactor or circuit-breaker interrupts the current before the main poles of the equipment open		P
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles		P
7.1.6.3	Supplementary requirements for equipment provided with means for padlocking the open position		P
	The locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed. When the equipment is locked by even of a single padlock, it shall not be possible by operating the actuator, to reduce the clearance between open contacts to the extent that it no longer complies with the requirements of 7.2.3.1b)		P
	Alternatively, the design may provide padlockable means to prevent access to the actuator.		P
7.1.7	Terminals		P
7.1.7.1	Constructional requirements		P
	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength.		P
	Terminal connections shall be such that the conductors may be connected by means of screws, springs or other equivalent means so as to ensure that the necessary contact pressure is maintained.		P
	Terminals shall be so constructed that the conductors can be clamped between suitable surfaces without any significant damage either to conductors or terminals.		P
	Terminals shall not allow the conductors to be displaced or be displaced themselves in a manner detrimental to the operation of equipment and the insulation voltage shall not be reduced below the rated values.		P

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	If required by the application, terminals and conductors may be connected by means of cable lugs for copper conductors only.		N
7.1.7.2	Connecting capacity		P
7.1.7.3	Connection		
	Terminals for connection to external conductors shall be readily accessible during installation	Pass muster	P
	Clamping screws and nuts shall not serve to fix any other component although they may hold the terminals in place or prevent them from turning	No danger	P
7.1.7.4	Terminal identification and marking	See the sample	
	Terminals shall be clearly and permanently identified in accordance with IEC 60445 and Annex L, unless superseded by the requirements of the relevant product standard	Clearly and permanently on the sample	P
	Terminals intended exclusively for the neutral conductor shall be identified by the letter "N", in accordance with IEC 60445	"N"	P
	The protective earth terminal shall be identified in accordance with 7.1.9.3	No this terminal	N
	Additional requirements for equipment provided with a neutral pole	Pass muster	P
7.1.8	Additional requirements for equipment provided with a neutral pole	Pass muster	P
	When an equipment is provided with a pole intended only for connecting the neutral, this pole shall be clearly identified to that effect by the letter N	"N" "clearly identified	P
	A switched neutral pole shall break not before and shall make not after the other poles	After the other poles	P
	For equipment having a value of conventional thermal current (free air or enclosed, see 4.3.2.1 and 4.3.2.2) not exceeding 63 A, this value shall be identical for all poles		N
	For higher conventional thermal current values, the neutral pole may have a value of conventional thermal current different from that of the other poles, but not less than half that value or 63 A, whichever is the higher		N
7.1.9	Provisions for protective earthing		N
7.1.9.1	Constructional requirements		N
	The exposed conductive parts other than those which cannot constitute a danger shall be electrically interconnected and connected to a protective earth terminal for connection to an earth electrode or to an external protective conductor		N
	This requirement can be met by the normal structural parts providing adequate electrical continuity and applies whether the equipment is used on its own or incorporated in an assembly		N
7.1.9.2	Protective earth terminal		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	The protective earth terminal shall be readily accessible and so placed that the connection of the equipment to the earth electrode or to the protective conductor is maintained when the cover or any other removable part is removed		N
	The protective earth terminal shall be suitably protected against corrosion		N
	The protective earth terminal shall have no other function, except when it is intended to be connected to a PEN conductor		N
7.1.9.3	Protective earth terminal marking and identification		N
7.1.10	Enclosures for equipment	Pass muster	P
7.1.10.1	Design		P
	The enclosure shall be so designed that, when it is opened and other protective means, if any, are removed, all parts requiring access for installation and maintenance, as prescribed by the manufacturer, are readily accessible	No danger	P
	Sufficient space shall be provided inside the enclosure for the accommodation of external conductors from their point of entry into the enclosure to the terminals to ensure adequate connection	Sufficient space have be provided inside the enclosure	P
	The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor	Not this enclosure	N
	Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place		P
	The removable parts of the enclosure shall be firmly secured to the fixed parts by a device so that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations		P
	When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices	Need use a tool	N
	An integral enclosure is considered to be a non-removable part		P
	If the enclosure is used for mounting push-buttons, removal of buttons should be from the inside of the enclosure. Removal from the outside shall only be by use of a tool intended for this purpose	Need use a tool	P
7.1.10.2	Insulation		P
	If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure	Securely fixed to the enclosure	P

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
7.1.11	Degrees of protection of enclosed equipment		P
7.1.12	Conduit pull-out, torque and bending with metallic conduits	Not applicable	N
	Polymeric enclosures of equipment, whether integral or not, provided with threaded conduit entries, intended for the connection of extra heavy duty, rigid threaded metal conduits complying with IEC 60981, shall withstand the stresses occurring during its installation such as pull-out, torque, bending.		N
7.2	Performance requirements		P
	The following requirements apply to clean new equipment unless otherwise stated in the relevant product standard.	Pass muster	P
7.2.1	Operating conditions		P
7.2.1.1	General		P
7.2.1.2	Limits of operation of power operated equipment	According with the requirement	P
7.2.1.3	Limits of operation of under-voltage relays and releases	Not this appliance	N
7.2.1.4	Limits of operation of shunt releases	Not this appliance	N
7.2.1.5	Limits of operation of current operated relays and releases	Not this appliance	N
7.2.2	Temperature-rise		P
7.2.2.1	Terminals	19°C	P
7.2.2.2	Accessible parts	Enclosure: 11°C	P
7.2.2.3	Ambient air temperature	24°C	P
7.2.2.4	Main circuit	Pass muster	P
7.2.2.5	Control circuits	Pass muster	P
7.2.2.6	Windings of coils and electromagnets		N
7.2.2.7	Auxiliary circuits	Pass muster	P
7.2.2.8	Other parts		P
7.2.3	Dielectric properties	No breakdown or flashover	P
7.2.3.1	Impulse withstand voltage		P
7.2.3.2	Power-frequency withstand voltage of the main, auxiliary and control circuits		P
7.2.3.3	Clearances	Pass muster	P
7.2.3.4	Creepage distances	Pass muster	P
7.2.3.5	Solid insulation	Pass muster	P
7.2.3.6	Spacing between separate circuits		P
7.2.4	Ability to make, carry and break currents under no-load,	Pass muster	P
7.2.4.1	Making and breaking capacities	Pass muster	P
7.2.4.2	Operational performance	Pass muster	P
7.2.4.3	Durability		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
7.2.4.3.1	Mechanical durability		N
7.2.4.3.2	Electrical durability		N
7.2.5	Ability to make, carry and break short-circuit currents	According with the requirement of standard	P
7.2.6	Switching overvoltages	Pass muster	P
7.2.7	Leakage currents of equipment suitable for isolation	No danger	P
7.3	Electromagnetic compatibility (EMC)	Not applicable	N
7.3.1	For products falling within the scope of this standard, two sets of environmental conditions are considered and are referred to as a) environment A; b) environment B.		N
7.3.2	Immunity		N
7.3.2.1	Equipment not incorporating electronic circuits		N
	Equipment not incorporating electronic circuits is not sensitive to electromagnetic disturbances in normal service conditions, and therefore no immunity tests are required.		N
7.3.2.2	Equipment incorporating electronic circuits		N
7.3.3	Emission		N
7.3.3.1	Equipment not incorporating electronic circuits		N
7.3.3.2	Equipment incorporating electronic circuits		N
7.3.3.2.1	Limits for high-frequency emissions		N
7.3.3.2.2	Limits for low-frequency emissions		N
8	Type tests		P
	Type tests are intended to verify compliance of the design of a given equipment with this standard, where applicable, and the relevant product standard.	According with requirement of standard	P
8.1.3	Routine tests		N
8.1.4	Sampling tests		N
	If engineering and statistical analysis show that routine tests (on each product) are not required, sampling tests may be made instead, if so stated in the relevant product standard.		N
	The tests may comprise a) functional tests; b) dielectric tests.		N
8.2	Compliance with constructional requirements		P
	The verification of compliance with the constructional requirements stated in 7.1 concerns, for example	Pass muster	P
	– the materials;	Pass muster	P
	– the equipment;	Pass muster	P
	– the degrees of protection of enclosed equipment;	See nameplate	P
	– the mechanical properties of terminals;	Pass muster	P
	– the actuator;		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	– the position indicating device (see 2.3.18).	Pass muster	P
8.2.1	Materials		P
8.2.1.1	Test of resistance to abnormal heat and fire	May resist to abnormal heat and fire	P
8.2.1.1.1	Glow-wire test (on equipment)		P
	The glow-wire test shall be made according to clauses 4 to 10 of IEC 60695-2-10 and IEC 60695-2-11 under the conditions specified in 7.1.1.1.	No danger	P
8.2.1.1.2	Flammability, hot wire ignition and arc ignition tests (on materials)	Not applicable	N
8.2.2	Equipment		P
8.2.3	Enclosures for equipment		P
8.2.3	Enclosures for equipment see Annex C.	Pass muster	P
8.2.4	Mechanical properties of terminals		P
	This subclause does not apply to aluminium terminals nor to terminals for connection of aluminium conductors.	No aluminium conductors nor aluminium terminals	P
8.2.4.1	General conditions for tests		P
	Unless otherwise stated by the manufacturer, each test shall be made on terminals in a clean and new condition.	Pass muster	P
8.2.4.2	Tests of mechanical strength of terminals		P
	Tests shall be made with the appropriate type of conductor having the maximum cross-sectional area.		P
	The conductor shall be connected and disconnected five times.	No damage	P
	For screw-type terminals, the tightening torque shall be in accordance with Table 4 or 110 % of the torque specified by the manufacturer, whichever is the greater.	No damage	P
8.2.4.3	Testing for damage to and accidental loosening of conductors (flexion test)	No damage	P
	The test applies to terminals for the connection of unprepared round copper conductors, of number, cross-section and type (flexible and/or rigid (stranded and/or solid)), specified by the manufacturer.		P
	Terminals intended for connection of both flexible or rigid (solid and/or stranded) conductors simultaneously shall be tested as stated in c) above		P
	During the test, the conductor shall neither slip out of the terminal nor break near the clamping unit.	Don't slip out nor r break	P
	Immediately after the flexion test, each conductor under test shall be submitted in the test equipment to the test of 8.2.4.4 (pull-out test).		N
8.2.4.4	Pull-out test		N
8.2.4.4.1	Round copper conductors		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	The force shall be applied without jerks for 1 min.		N
	During the test, the conductor shall neither slip out of the terminal nor break near the clamping unit.		N
8.2.4.4.2	Flat copper conductors		N
	A suitable length of conductor shall be secured in the terminal and the pulling force given in Table 6 applied without jerks for 1 min in a direction opposite to that of the insertion of the conductor.		N
	During the test, the conductor shall neither slip out of the terminal nor break near the clamping unit.		N
8.2.4.5	Test for insertability of unprepared round copper conductors having the maximum specified cross-section	Pass muster	P
8.2.4.5.1	Test procedure		P
	The measuring section of the gauge shall be able to penetrate freely into the terminal aperture to the full depth of the terminal (see also note to Table 7).	According with requirement of standard	P
8.2.4.5.2	Construction of gauges		P
	Details of dimensions a and b and their permissible deviations are shown in Table 7. The measuring section of the gauge shall be made from gauge steel.	See instruction	P
8.2.4.6	Tests for insertability of flat conductors with rectangular cross-section		N
	Under consideration.		N
8.2.5	Verification of the effectiveness of indication of the main contact position of equipment suitable for isolation	Pass muster	P
	To verify the effectiveness of the indication of the main contact position as required by 7.1.6, all means of indication of contact position shall continue to function correctly after the operational performance type tests, and special durability tests if performed.		P
8.2.5.1	Condition of equipment for the tests		P
	The condition of the equipment for the tests shall be stated in the relevant product standard.	According with requirement of standard	P
8.2.5.2	Method of test		P
8.2.5.3	Condition of equipment during and after test		P
8.2.5.3.1	Dependent and independent manual operation		P
	After the test, when the test force is no longer applied, the actuator being left free, the open position shall not be indicated by any of the means provided and the equipment shall not show any damage such as to impair its normal operation.	No damage	P
8.2.5.3.2	Dependent and independent power operation		N
	During and after the test, the open position shall not be indicated by any of the means provided and the equipment shall not show any damage such as to impair its normal operation.		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	When the equipment is provided with means for locking in the open position, it shall not be possible to lock the equipment during the test.		N
8.2.6	Vacant	Not applicable	N
8.2.7	Conduit pull-out test, torque test and bending test with metallic conduits	No this metallic conduits	N
	The tests shall be made in the sequence 8.2.7.1, 8.2.7.2 and 8.2.7.3.		N
8.2.7.1	Pull-out test	Not applicable	N
	After the test, the displacement of the conduit in relation with the entry shall be less than one thread depth and there shall be no evidence of damage impairing further use of the enclosure.		N
8.2.7.2	Bending test	Not applicable	N
	When the bending moment results in a deflection of the conduit of 25 mm per 300 mm length, or the bending moment has reached the value given in Table 21, the moment is maintained for 1 min. The test is then repeated in a perpendicular direction.		N
	After the test there shall be no evidence of damage impairing further use of the enclosure.		N
8.2.7.3	Torque test	Not applicable	N
	For enclosures provided with a single conduit connection up to and including 16 H, the tightening torque is reduced to 25 N · m.		N
	After the test, it shall be possible to unscrew the conduit and there shall be no evidence of damage impairing further use of the enclosure.		N
8.3	Performance	Pass muster	P
8.3.1	Test sequences		P
	Where applicable, the relevant product standard shall specify the test sequences to which the equipment is to be submitted.	According with requirement of standard	P
8.3.2	General test conditions		P
8.3.2.1	General requirements		P
8.3.2.2	Test quantities	According with requirement of standard	P
8.3.2.2.1	Values of test quantities		P
	All the tests shall be made with the values of test quantities corresponding to the ratings assigned by the manufacturer, in accordance with the relevant tables and data of the relevant product standard.	Pass muster	P
8.3.2.2.2	Tolerances on test quantities		P
	The test recorded in the test report shall be within the tolerances given in Table 8, unless otherwise specified in the relevant subclauses. However, with the agreement of the manufacturer, the tests may be made under more severe conditions than those specified.	According with requirement of standard	P
8.3.2.2.3	Recovery voltage		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	a) Power-frequency recovery voltage		N
	b) Transient recovery voltage		N
8.3.2.3	Evaluation of test results		N
	Behaviour of the equipment during the tests and its condition after the tests shall be specified in the relevant product standard. For short-circuit tests, see also 8.3.4.1.7 and 8.3.4.1.9.		N
8.3.2.4	Test reports		P
8.3.3	Performance under no-load, normal load and overload conditions		P
8.3.3.1	Operation		P
	Tests shall be made to verify that the equipment operates correctly according to the requirements of 7.2.1.1.	Pass muster	P
8.3.3.2	Operating limits		P
8.3.3.2.1	Power operated equipment		P
	It shall be verified that the equipment opens and closes correctly within the limiting values of the control quantities, such as voltage, current, air pressure and temperatures, specified in the relevant product standard. Tests are made with no current flowing through the main circuit, unless otherwise specified.	Pass muster	P
8.3.3.2.2	Relays and releases	Not this appliance	N
8.3.3.3	Temperature-rise	Pass muster	P
8.3.3.3.1	Ambient air temperature		P
	During the tests, the ambient air temperature shall be between +10 °C and +40 °C and shall not vary by more than 10 K		P
8.3.3.3.2	Measurement of the temperature of parts	Pass muster	P
8.3.3.3.3	Temperature-rise of a part	Pass muster	P
8.3.3.3.4	Temperature-rise of the main circuit		P
8.3.3.3.5	Temperature-rise of control circuits		P
8.3.3.3.6	Temperature-rise of coils of electromagnets		N
8.3.3.3.7	Temperature-rise of auxiliary circuits		P
8.3.3.4	Dielectric properties		P
8.3.3.4.1	Type tests		P
	1) General conditions for withstand voltage tests		P
	The equipment to be tested shall comply with the general requirements of 8.3.2.1.		P
	2) Verification of impulse withstand voltage		P
	3) Power-frequency withstand verification of solid insulation		P
	4) Power-frequency withstand verification after switching and short-circuit tests		P
	5) Vacant		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	6) Verification of d.c. withstand voltage Under consideration.		N
	7) Verification of creepage distances		P
	8) Verification of leakage current of equipment suitable for isolation		P
8.3.3.4.2	Routine tests		N
8.3.3.4.3	Sampling tests for verification of clearances		N
8.3.3.4.4	Tests for equipment with protective separation		P
	Tests for equipment with protective separation are given in Annex N.	Pass muster	P
8.3.3.5	Making and breaking capacities	Pass muster	P
8.3.3.5.1	General test conditions		P
	Tests for verification of making and breaking capacities shall be made according to the general test requirements stated in 8.3.2.	Pass muster	P
8.3.3.5.2	Test circuit		P
8.3.3.5.3	Characteristics of transient recovery voltage		N
8.3.3.5.4	Vacant	Not applicable	N
8.3.3.5.5	Test procedure for making and breaking capacities		P
	The number of operations, the "on" and "off" times and the ambient conditions shall be stated in the relevant product standard.	According with requirement of relevant standard	P
8.3.3.5.6	Behaviour of the equipment during and after making and breaking capacity tests		P
	The criteria for acceptance during and after the tests shall be stated in the relevant product standard.	Pass muster	P
8.3.3.6	Operational performance capability		P
	Detailed test conditions shall be stated in the relevant product standard.	Pass muster	P
8.3.3.7	Durability		N
	Durability tests are intended to verify the number of operating cycles that an equipment is likely to be capable of performing without repair or replacement of parts.		N
8.3.3.7.1	Mechanical durability		N
8.3.3.7.2	Electrical durability		N
	Evaluation of test results shall be defined in the relevant product standard.		N
8.3.4	Performance under short-circuit conditions	No damage	P
8.3.4.1	General conditions for short-circuit tests	No damage	P
8.3.4.1.1	General requirements		P
	Additional test conditions may be specified in the relevant product standard.	Pass muster	P
8.3.4.1.2	Test circuit		P
8.3.4.1.3	Power-factor of the test circuit		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			
	For a.c., the power-factor of each phase of the test circuit should be determined according to an established method which shall be stated in the test report.		N
8.3.4.1.4	Time-constant of the test circuit		N
	For d.c., the time-constant of the test circuit may be determined according to the method given in Annex F, clause F.2.	Not applicable	N
8.3.4.1.5	Calibration of the test circuit		N
	The calibration of the test circuit is carried out by placing temporary connections B of negligible impedance as close as reasonably possible to the terminals provided for connecting the equipment under test.		N
8.3.4.1.6	Test procedure		P
	Tests for the performance under short-circuit conditions shall be made according to the requirements of the relevant product standard.	Pass muster	P
8.3.4.1.7	Behaviour of the equipment during short-circuit making and breaking tests	Pass muster	P
	There shall be neither arcing nor flashover between poles, or between poles and frame, and no melting of the fusible element F in the leakage detection circuit (see 8.3.4.1.2).	Pass muster	P
8.3.4.1.8	Interpretation of records		P
8.3.4.1.9	Condition of the equipment after the tests	Pass muster	P
8.3.4.2	Short-circuit making and breaking capacities	Pass muster	P
8.3.4.3	Verification of the ability to carry the rated short-time withstand current		P
	The test shall be made with the equipment in the closed position, at a prospective current equal to the rated short-time withstand current and the corresponding operational voltage under the general conditions of 8.3.4.1.		P
8.3.4.4	Co-ordination with short-circuit protective devices and rated conditional shortcircuit current		P
	Test conditions and procedures, where applicable, shall be stated in the relevant product standard.		P
8.4	Tests for EMC	Not applicable	N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			

Annex A			
A.1	General		N
A.2	Rated duty		N
A.2.1	Intermittent periodic duty or intermittent duty		N
A.2.2	Temporary duty		N
A.3	Making and breaking capacities		N
A.4	Utilization category		N
A.5	Operational performance		N
A.6	Mechanical durability		N
A.7	Electrical durability		N
A.8	Verification of making and breaking capacities		N
A.9	Operational performance test		N
A.10	Special tests		N
A.10.1	Mechanical durability test		N
A.10.1.1	Condition of the equipment for tests		N
A.10.1.2	Operating conditions		N
A.10.1.3	Test procedure		N
A.10.1.4	Results to be obtained		N
A.10.2	Electrical durability test		N
Annex B			
4.4	Switching of capacitors or of tungsten filament lamps	No such components	N
7.1.7.1	Locking in the closed position for particular applications		N
7.1.7.2	Operating time of auxiliary contacts provided for interlocking		N
7.2.4.2 and Table 4	Increase of the operating rate for the verification of the operational performance		N
8.3.3.3.1	Time interval greater than $30 \text{ s} \pm 10 \text{ s}$ between close-open cycles for making and breaking capacity test of equipment of $I_{th} > 400 \text{ A}$ For categories AC-23A and AC-23B testing of making and breaking capacities by make cycles at $10 I_e$ followed by the same number of make-break cycles at $8 I_e$		N
8.3.3.3.3	Verification of making and breaking capacities for utilization categories DC-22 and DC-23: replacement of the load of the test circuit by a motor		N
8.3.5.2.3	AC test circuit calibration for the short-circuit making capacity test in the case of d.c. equipment		N

Clause	Requirement-Test	Result-Remark	Verdict
EN 60947-1			

Annex A	Utilization categories other than those listed in Table A.2		N
Table A.1	Switching of rotor circuits, capacitors or tungsten filament lamps		N
A.8	Verification of making and breaking capacities		N
A.9	Operational performance test		N
Annex C			
C.1	General		N
C.2	Tests		N
C.3	Test set-up and sequence		N
C.3.1	Making and breaking capacities (8.3.3.3) and operational performance (8.3.4.1)		N
C.3.2	Fuse protected short-circuit test (8.3.6.2)		N
C.4	Condition of equipment after tests		N
C.5	Instructions for use		N

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