

TEST REPORT



IEC 60947-3

Low voltage switchgear and controlgear -

Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units

Test Report

Reference No. : **13CA31408-SD02**

Tested by (+ signature) : John Fisher
ENGINEER

Approved by (+ signature)..... : R. A. Hills
SECTION MANAGER

Date of issue : 29 July 2013

Date of testing : July 2013

Contents : 46 pages

Laboratory details

Name : **UL International New Zealand Ltd**

Physical Address : 10 Vanadium Place, Middleton, Christchurch 8024, New Zealand

Contact Details : Telephone (+64) 3 940 4400 Facsimile (+64) 3 940 4411

Test specification

Standard : IEC 60947-3 : 2012 Ed. 3.1
IEC 60947-1 : 2011 Ed. 5.1

Client details

Applicant : Legrand (S) PTE LTD

Address : 15 Jalan Kilang Barat, # 07-05 Frontech Centre,
Singapore 159357

Product details (see additional details on page 3)

Type of test object : Isolator switch

Model/type reference : 7 353 02, 7 353 01, 7 353 00
7 353 12, 7 353 11, 7 353 10
7 353 22, 7 353 21, 7 353 20

Rating : 250 & 440 V, 40 A, 32 A 20 A, AC22A, IP66

Accreditation details



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

TRF revision 121024

The issuance of this report in no way implies Listing, Classification or Recognition by UL and does not authorize the use of UL Listing, Classification or Recognition Marks or any other reference to UL on or in connection with the product or system. You cannot use this test data or UL's name or marks in connection with any product, packaging, advertising, promotion or marketing without UL's prior written permission. Please be informed that Underwriters Laboratories neither selected the sample nor determined whether the sample was representative of production samples. The test results apply only to the actual samples tested.



Possible results

Test case does not apply to the test object : N(.A.)
Test sample does meet the requirement..... : P(ass)
Test sample does not meet the requirement..... : F(ail)

General remarks

"(see remark #)" refers to a remark appended to the report.
"(see appended table)" refers to a table appended to the report.
"(see appended results)" refers to results appended to the report.
The test results presented in this report relate only to the samples tested.
The test samples were provided by the client and were tested as submitted.
This report does not contain corrections or erasures.
All measurements within this test report are made using instruments with an accuracy in accordance with IEC/IEEE CTL Decision Sheet DSH 251B. Details of specific measurement uncertainty is available upon request.
This report shall not be reproduced except in full without the written approval of the testing laboratory.

Specific remarks

This report also covers the requirements of BSEN 60947-1 and BSEN 60947-3 and AS 60947-1 and AS/NZS 3947-3 as the requirements of these standards are covered by the IEC standards.
The testing for this report was conducted on a 4 pole 40 A unit but was considered to apply to the 2 and 3 pole versions also and to the 32 A and 20 A versions which have identical terminals.
This report supersedes report 13CA31408-SD01. This report was reissued to include AS 60947-1 and AS/NZS 3947-3.

Statement of results

The test samples were fully assessed to all clauses of the test specification.
The test samples COMPLY with all clauses of the test specification.

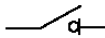


Product details	
Method of operation	: Dependent manual operation
Suitability for isolation	: 2 (ON and OFF)
Degree of protection	: IP66
Number of poles	: 2, 3, & 4
Kind of current	: AC
Number of positions (main contacts)	: 2 (ON and OFF)
Rated operational voltage U_e	: 250 / 440 V
Rated insulation voltage (U_i)	: 250 / 440 V
Rated impulse withstand voltage (U_{imp})	: 2.5 kV
Conventional free air thermal current (I_{th})	: 40 A, 32 A, 20 A
Conventional enclosed thermal current (I_{the})	: 40 A, 32 A, 20 A
Rated operational current (I_e)	: 40 A, 32 A, 20 A
Rated uninterrupted current (I_u)	: 40 A, 32 A, 20 A
Rated Duty	: Uninterrupted duty
Rated frequency	: 50 & 60 Hz
Utilization category	: AC22A
Rated short-time withstand current (I_{cw})	: 480 A, 384 A, 240 A
Rated short-time making capacity (I_{cm})	: 480 A, 384 A, 240 A
Product mass	: 397 grams (4 pole), 387 grams (3 pole), 330 grams (2 pole)
Product dimensions	: 170 mm (H) x 83 mm (W) x 85 mm (D)

Marking details			



IEC 60947-3

1.	GENERAL		NOTED
2.	TERMS AND DEFINITIONS		NOTED
3.	CLASSIFICATION		P
3.1	According to utilization category	AC22A	P
3.2	According to method of operation of manually operated equipment	Independent manual operation	P
3.3	According to suitability for isolation		P
3.4	According to degree of protection provided	IP66	P
4.	CHARACTERISTICS		P
4.1	Summary of characteristics		P
4.2	Type of equipment		P
4.2.1	Number of poles	2, 3 & 4 poles	P
4.2.2	Kind of current	AC	P
	Number of phases for a.c.	1 & 3 phases	P
	Rated frequency	50 / 60 Hz	P
4.2.3	Number of positions of the main contacts	2	P
4.3	Rated and limiting values for the main circuit		P
4.3.1	Rated voltages		P
4.3.1.1	Rated operational voltage (Ue)	250 V / 440 V	P
4.3.1.2	Rated insulation voltage (Ui)	250 V / 440 V	P
4.3.1.3	Rated impulse withstand voltage (Uimp)	2500 V	P
4.3.2	Currents		P
4.3.2.1	Conventional free air thermal current (Ith)	40 A, 32 A, 20 A	P
4.3.2.2	Conventional enclosed thermal current (Ithe)	40 A, 32 A, 20 A	P
4.3.2.3	Rated operational currents (Ie)	40 A, 32 A, 20 A	P
4.3.2.4	Rated uninterrupted current (Iu)	40 A, 32 A, 20 A	P
4.3.3	Rated frequency	50 / 60 Hz	P
4.3.4	Rated duty		P
4.3.4.1	Eight-hour duty		N
4.3.4.2	Uninterrupted duty		P
4.3.5	Normal load and overcurrent characteristics		P
4.3.5.1	Ability to withstand motor switching overload currents		N

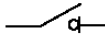



IEC 60947-3

4.3.5.2	Rated making capacity	AC22A	P
4.3.5.3	Rated breaking capacity	AC22A	P
4.3.6	Short-circuit characteristics		P
4.3.6.1	Rated short-time withstand current (I _{cw})	480 A, 384 A, 240 A	P
4.3.6.2	Rated short circuit making capacity (I _{cm})	480 A, 384 A, 240 A	P
4.3.6.3	Vacant		
4.3.6.4	Rated conditional short-circuit current		N
4.4	Utilization category	AC22A	P
4.5	Control circuits		N
IEC 60947-1	Electrically or electronically controlled circuits:		N
	Type of current		N
	Rated frequency or d.c.		N
	Rated control circuit voltage (U _c)		N
	Rated control supply voltage (U _s)		N
	Nature of external control circuit devices		N
	Power consumption		N
IEC 60947-1	Air-supply control circuits		N
	Rated pressure and limits		N
	Volume of air required for closing		N
	Volume of air required for opening		N
4.6	Auxiliary circuits		N
4.7	Relays and releases		N
IEC 60947-1	Type or relay or release		N
	Rated values		N
	Current setting (or range)		N
	Time / current characteristics		N
	Influence of ambient air temperature		N
	Extended functions		N
4.8	Co-ordination with short circuit devices		N
	Manufacturer state the type or characteristics of the SCPD		N
	Maximum prospective short circuit current		N



IEC 60947-3

5.	PRODUCT INFORMATION		P
5.1	Nature of information		NOTED
5.2	Marking		P
5.2.1	Equipment marked in durable and legible manner with the following data on the equipment itself or on nameplate attached to the equipment; legible from the front after mounting		P
	a) Indication of open and closed position	'I' = ON and 'O' = OFF	P
	b) Suitability for isolation		P
	c) Additional marking for disconnectors		N
	Devices of utilization category AC-20A, AC-20B, DC-20A, DC-20B marked "Do not operate under load"; unless		N
	Device interlocked to prevent such operation		N
5.2.2	Marking on the equipment but needs not be visible from the front after mounting		P
	a) Manufacturer's name or trademark	Legrand	P
	b) Type designation or serial number		P
	c) Rated operational currents	40 A, 32 A, 20 A	P
	d) Value of rated frequency (ies)	50 / 60 Hz	P
	Indication for d.c.		N
	e) Fuse type		N
	Maximum rated fuse current		N
	Power loss of fuse-link		N
	f) IEC 60947-3		P
	g) Degree of protection	IP66	P
5.2.3	Following terminals identified:		
	a) Line and load terminals	1, 2, 3, 4, 5 & 6	P
	b) Neutral pole terminal	N	P
	c) Protective earth terminal		P
5.2.4	Following data available in manufacturer's published information:		
	a) Rated insulation voltage	250 V & 440 V	P
	b) Rated impulse withstand voltage	2500 V	P
	c) Pollution degree	3	P
	d) Rated duty	Uninterrupted	P
	e) Rated short-time withstand current and duration	480 A, 384 A, 240 A for 1 s	P
	f) Rated short-circuit making capacity	480 A, 384 A, 240 A	P
	g) Rated conditional short-circuit current		N
5.3	Instructions for installation, operation and		P



IEC 60947-3

	maintenance		
IEC 60947-1	Conditions for installation, operation and maintenance		P
	Measures to be taken with regards to EMC		N
	Specified notice for equipment only suitable in environment A		N
	Measures of particular importance for proper and correct transport, installation, commissioning and operation		N
	Recommended extent and frequency of maintenance		N

6.	NORMAL SERVICE, MOUNTING AND TRANSPORT CONDITIONS		P
6.1 IEC 60947-1	Normal service conditions		P
6.2 IEC 60947-1	Conditions during transport and storage		P
6.3 IEC 60947-1	Mounting		P

7.	CONSTRUCTIONAL AND PERFORMANCE REQUIREMENTS		P
7.1	Constructional requirements		P
7.1.1	General		NOTED
7.1.2	Materials		P
7.1.2.1	Insulating materials not adversely affected by abnormal heat and fire		P
	Method of 7.1.2.2, or		P
	Method of 7.1.2.3		N
7.1.2.2	Glow wire testing		P
IEC 60947-1	Suitability of materials verified by making tests :		P
	On the equipment, or		N
	On sections taken from the equipment, or		P
	On any parts of identical material having representative cross section		N
	Glow-wire tests according to IEC 60695-2-10 and IEC 60695-2-11		P
	Parts made of insulating material necessary to retain current-carrying parts in position; tested at 960 °C	(see appended results)	P



IEC 60947-3

	Parts of insulating material not necessary to retain current-carrying parts in position, even though in contact with them; tested at 650 °C	(see appended results)	P
7.1.2.3 IEC 60947-1	Tests based on flammability category		N
	Hot wire ignition and arc ignition tests conducted as specified; based on flammability category		N
	Data from insulating material supplier		N
7.1.3 IEC 60947-1	Current carrying parts and their connections		P
	Current carrying parts have necessary mechanical strength and current carrying capacity		P
	No contact pressure transmitted through insulating material unless sufficient resiliency in metallic parts to compensate		P
7.1.4	Clearances and creepage distances		P
IEC 60947-1	Clearances not less than specified in Table 13	(see appended table)	P
	Creepage distances not less than specified in Table 15	(see appended table)	P
	Pollution degree	3 (See remark 1)	
	Material group	IIIa	
7.1.5 IEC 60947-1	Actuator		P
7.1.5.1	Insulation	250 V, 440 V	P
	Actuator insulated from live parts for rated insulation voltage		P
	Actuator made of metal; capable of being connected to protective conductor; unless		N
	Provided with additional reliable insulation		N
	Actuator covered by insulating material, any internal metal part which might become accessible is also insulated for rated insulation voltage		N
7.1.5.2	Direction of movement		P
	Direction of operation complies with IEC 60447; or		P
	Clearly marked to indicate "I" and "O" positions and direction of operation	I = ON; O = OFF	P
7.1.6 IEC 60947-1	Indication of the contact position		P
7.1.6.1	Indicating means		P
7.1.6.2	Indication by the actuator		P



IEC 60947-3

	Two distinct rest positions corresponding to the position of the moving contact		P
	For automatic opening a third position provided		N
7.1.7	Additional safety requirements for equipment suitable for isolation		P
7.1.7.1	Additional constructional requirements		P
	Marking according to 5.2.1 b)		P
	Indication of position of contacts; or		P
	All main contacts clearly visible in open position		P
	Strength of actuating mechanism and reliability of indication checked according to 8.2.5		P
	Means provided to lock equipment in open position; locking only possible when main contacts in open position		P
	Clearance across open contacts not less than minimum specified in Table 13 and comply with 7.2.3.1 b) or IEC 60947-1		P
IEC 60947-1	Equipment suitable for isolation provide required isolation distance		P
	Indication of position of main contacts provided by		P
	- Position of actuator		P
	- A separate mechanical indicator		N
	- Visibility of moving contacts		N
	Effectiveness of indication verified according to 8.2.5		P
	For equipment able to be locked in the open position can only lock when contacts are open		P
	Equipment with other positions than open and closed these positions are clearly identified and		P
	Do not include "I" or "O"		P
7.1.7.2 IEC 60947-1	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers		N
	Auxiliary switch rated according to IEC 60947-5-1; unless		N
	Equipment rated AC-23		N
	Time interval between opening of the contacts of the auxiliary contact and the contacts of the main poles does not exceed 20 ms		N
	Measured	---	
	During closing operation, contacts of auxiliary switch close after or simultaneously with contacts of the main poles		N
7.1.7.3	Supplementary requirements for equipment provided		P



IEC 60947-3

IEC 60947-1	with means for padlocking the open position		
	Locking means so designed that it cannot be removed with the appropriate padlock(s) installed		P
	Test force applied to actuator in attempt to operate to the closed position	100 N	
	Rated impulse withstand voltage (Uimp)	2.5 kV	
	Test Uimp on open main contacts at test force		P
7.1.8 IEC 60947-1	Terminals		P
7.1.8.1	Constructional requirements		P
	All parts of terminals which maintain contact and carry current are of metal having adequate mechanical strength		P
	Terminal connections such that necessary contact pressure is maintained		P
	Terminals so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal		P
	Terminals do not allow conductor to be displaced or to be displaced themselves in a manner detrimental to the operation of equipment and insulation voltage is not reduced below rated value		P
7.1.8.2	Connection capacity		P
	Type of conductors	Rigid conductors	
	Minimum cross-sectional area of conductor	2.5 mm ²	
	Maximum cross-sectional area of conductor	10 mm ²	
	Number of conductors simultaneously connectable to the terminal	1	
7.1.8.3	Connection		P
	Terminals for connection to external conductors are readily accessible during installation		P
	Clamping screws and nuts do not serve to fix any other component		P
7.1.8.4	Terminal identification and marking		P
	Terminal intended exclusively for the neutral conductor	N	P
	Protective earth terminal	⊕	P
7.1.9 IEC 60947-1	Additional requirements for equipment provided with a neutral pole		P
	Equipment provided with pole intended for the connection of neutral, pole clearly marked "N"	N	P
	Switched neutral pole does not break before and does not make after the other poles; except		P



IEC 60947-3

	Pole having appropriate short-circuit breaking and making capacity is used as neutral pole, all poles may operate together		P
	Conventional thermal current not exceeding 63A; identical for all poles		P
	Higher conventional thermal current; neutral pole reduced value permitted		N
	Stated reduced value	---	
7.1.10 IEC 60947-1	Provisions for protective earthing		P
7.1.10.1	The exposed conductive parts are electrically interconnected and connected to a protective earth terminal	No metal enclosure	N
7.1.10.2	Protective earth terminal readily accessible		P
	Protective earth terminal readily accessible and earthing maintained when removable parts removed		P
	Protective earth terminal suitably protected against corrosion	Brass terminal	P
	Electrical continuity between the exposed conductive parts of the protective earth terminal and the metal sheathing of connecting conductors	No exposed conductive parts	N
	Protective earth terminal has no other functions		P
7.1.10.3	Protective earth terminal marking and identification		P
	Identification method	⊕	
7.1.11 IEC 60947-1	Enclosure for equipment		P
7.1.11.1	Design		P
	When enclosure opened, all parts requiring access for installation and maintenance readily accessible		P
	Sufficient space provided inside the enclosure		P
	Fixed parts of metal enclosure electrically connected to other exposed conductive parts of equipment and connected to terminal which enables them to be earthed or connected to protective conductor	No metal enclosure	N
	Under no circumstances removable metal part of the enclosure is insulated from part carrying the earth terminal when removable part is in place	No metal enclosure	N
	Removable parts of enclosure firmly secured to fixed parts by device such that they cannot be accidentally loosened or detached owing to effects of operation of the equipment or vibrations		P



IEC 60947-3

	Enclosure designed to allow covers to be opened without the use of tools; means provided to prevent loss of the fastening devices		P
	Enclosure used for mounting push-buttons, not possible to remove buttons from outside of enclosure		N
7.1.11.2	Insulation		P
	If, in order to prevent accidental contact between metallic enclosure and live parts, enclosure is partly or completely lined with insulating material, lining securely fixed to the enclosure		N
7.1.12 IEC 60947-1	Degree of protection of enclosed equipment		P
	Degree of protection	IP66	
7.1.13 IEC 60947-1	Conduit pull-out, torque and bending with metallic conduits		N
	Polymeric enclosures intended for metal conduit connection withstand stresses occurring during installation as specified		N
7.2	Performance requirements		P
7.2.1	Operating conditions		P
7.2.1.1	General		P
	Operated in accordance with manufacturers instructions		P
	This requirement applies to fuse-switches, fuse disconnectors, and fuse-switch-disconnectors with rated short circuit making > 10 kA and for direct manual operation		N
	Test speed for making operations specified in 8.3.6.2 as follows:		N
a)	Equipment operated 15 times manually under no-load, 5 times by each of three persons		N
	Velocity of hand actuator determined		N
	Point of measurement	---	
	Measured velocity (highest)	---	
	Measured velocity (lowest)	---	
	Measured velocity (mean)	---	
	Degree of protection	---	
b)	Test apparatus ensures equipment under test fully closes without impediment to free closing movement		N
	Actual test speed not exceeding mean velocity		N
	Mass of apparatus moving parts not exceeding 2 kg		N
7.2.1.2 IEC 60947-1	Limits of operation of power operated equipment		N



IEC 60947-3

	Electromagnetic and electro-pneumatic equipment close with control voltage between 85% and 110% of rated value, and		N
	Ambient temperature between -5 °C and 40 °C		N
	Drop out voltage not higher than 75% or lower than 20% of Us for ac (10% for dc)		N
	Pneumatic and electro-pneumatic equipment air supply pressure between 85% and 110% of rated pressure		N
	Opening at between 75% and 10 % rated pressure		N
7.2.1.3 IEC 60947-1	Limits of operation of under voltage relays and releases		N
a)	Operating voltage		N
	Operates to open equipment within range of 70% to 35% of rated voltage		N
	Prevents closing of equipment when supply voltage below 35%		N
	Allows closing of equipment when supply voltage equal to or above 85%		N
b)	Operating time		N
	Time lag measured from when voltage reaches operating value and tripping device actuated		N
7.2.1.4 IEC 60947-1	Limits of operation of shunt releases		N
	Shunt release for opening causes tripping under all operating conditions when supply voltage between 70% and 110% of rated control supply and rated frequency		N
7.2.2	Temperature rise		P
	Temperature rise of fuse link contacts in fuse-combination units not cause damage that impairs performance		N
IEC 60947-1	Temperature rises not exceeding specified values when tested as per 8.3.3.3		P
7.2.2.1 IEC 60947-1	Temperature rise of terminals not exceeding values in Table 2	(see 8.3.3.3)	P
7.2.2.2 IEC 60947-1	Temperature rise of accessible parts not exceeding values in Table 3	(see 8.3.3.3)	P
7.2.2.3 IEC 60947-1	Ambient air temperature remains within limits specified in 6.1.1		P
7.2.2.4 IEC 60947-1	Main circuit capable of carrying conventional thermal current of the equipment without temperature rises exceeding limits specified in Tables 2 and 3 when tested in accordance with 8.3.3.3.4	(see 8.3.3.3.4)	P



IEC 60947-3			
7.2.2.5 IEC 60947-1	Control circuits permit rated duty according to 4.3.4; temperature rise tests made without exceeding limits in Tables 2 and 3		N
7.2.2.6 IEC 60947-1	Windings of coils and electromagnets withstand rated voltage without exceeding limits in 7.2.2.8		N
7.2.2.7 IEC 60947-1	Auxiliary circuits capable of carrying conventional thermal current of the equipment without temperature rises exceeding limits specified in Tables 2 and 3 when tested in accordance with 8.3.3.3.7		N
7.2.2.8 IEC 60947-1	Temperature rises of other parts do not impair performance of the product		P
	Fuse-combination units, temperature rise of fuse-link contacts do not cause damage of nature which impairs subsequent performance of equipment		N
7.2.3 IEC 60947-1	Dielectric properties		P
	Equipment capable of withstanding rated impulse withstand		P
	Impulse withstand voltage across contact gaps of devices suitable for isolation from Table 14		P
7.2.3.1 IEC 60947-1	Impulse withstand voltage		P
	Clearances across open contacts in equipment not suitable for isolation withstand test voltage of table 12 of IEC 60947-1		N
	1) Main circuit:		
	a) Clearances from live parts intended to be earthed and between poles withstand test voltage of Table 12	(see 8.3.3.4)	P
	b) Clearances across open contact not suitable for isolation withstand test voltage of Table 12		N
	Clearances across open contact suitable for isolation withstand test voltage of Table 14	(see 8.3.3.4)	P
	2) Auxiliary and control circuits:		
	a) Circuits which operate directly from main circuit at rated voltage, withstand test voltage of Table 12		N
	b) Circuits which do not operate directly from main circuit at rated voltage, withstand test voltage of Annex H		N
7.2.3.2 IEC 60947-1	Power frequency withstand voltage of the main, auxiliary and control circuits		P
	a) Power frequency tests used in specified cases		P
	b) Type test of dielectric properties	(see 8.3.3.4)	P
	c) Verification of dielectric withstand after switching	(see 8.3.3.4)	P



IEC 60947-3

	Equipment suitable for isolation; maximum values of leakage current not exceeding specified values		P
d)	vacant		
e)	Verification of dielectric withstand during routine testing		N
7.2.3.3 IEC 60947-1	Clearances sufficient to enable equipment to withstand rated impulse voltage; not less than values in Table 13, case B	(see appended table)	P
	Verified by test according to 8.3.3.4.3		P
	Test not required if clearances higher than values in Table 13, case A		N
7.2.3.4	Creepage distances		P
a)	Creepage distances not less than clearances according to 7.2.3.3	(see appended table)	P
	Pollution degrees 3 and 4; creepage distances not less than case A clearances	(see appended table)	P
b)	Creepage distance may be reduced to 0.8 of relevant value by using ribs of 2 mm height		P
	Minimum base of rib determined by mechanical requirements		P
c)	Special applications		N
7.2.3.5	Solid insulation verified by either:		
	Power-frequency tests in accordance with item 3) of 8.3.3.4.1; or		P
	d.c. tests for d.c. equipment		N
7.2.3.6	Spacing between separate circuits		P
	Highest voltage ratings used		P
7.2.3.7	Requirements for equipment with protective separation		N
7.2.4	Ability to make and break under no-load, normal load and overload conditions		P
7.2.4.1	Making and breaking capacities	(see 8.3.3.3.1)	P
7.2.4.2	Operational performance	(see 8.3.4.1)	P
7.2.4.3	Mechanical durability		N
7.2.4.4	Electrical durability		N
7.2.5	Ability to make, break or withstand short-circuit currents		P
7.2.6	Vacant		
7.2.7	Additional performance requirements for equipment suitable for isolation		P
	Equipment tested as specified withstands dielectric test of 8.3.3.2	(see 8.3.3.2)	P



IEC 60947-3

	Equipment in condition as specified withstands leakage current requirements of 8.3.3.5	(see 8.3.3.5)	P
7.2.8	Vacant		
7.2.9	Overload requirements for equipment incorporating fuses		N
	Main circuit capable of carrying overload current according to 8.3.7.1 and not cause damage of a nature which impairs subsequent performance		N
7.3	Electromagnetic compatibility		N
7.3.1	Vacant		
7.3.2	Immunity		N
7.3.2.1	Equipment not incorporating electronic circuits; no tests required		N
7.3.2.2	Equipment incorporating electronic circuits have satisfactory immunity to electromagnetic disturbance		N
	Appropriate test specified in IEC 60947-1 clause 8.4		N
	Specific performance criteria given in relevant product standard based on criteria in Table 2 of IEC 60947-1		N
7.3.3	Emission		N
7.3.3.1	Equipment not incorporating electronic circuits; requirements deemed to be satisfied without verification		N
7.3.3.2	Equipment incorporating electronic circuits		N
	Class A, group 1 of CISPR 11; or		N
	Class A of CISPR 22		N
	Specified warning for equipment used outside the industrial environment; unless		N
	Emission limits in CISPR 22, class B fulfilled		N

8.	TESTS		P
8.1	Kind of tests		P
8.1.1	General		P
8.1.2	Type tests as given in Table 9		P
8.1.3	Routine tests	not covered in this report	N
8.1.4	Sampling tests for clearances as per 8.3.3.4.3 in accordance with recognised sampling plan	not covered in this report	N
8.1.5	Special tests as per 8.5		N
8.2	Type tests for constructional requirements		P
8.2.1 IEC 60947-1	Material		P



IEC 60947-3

8.2.1.1	Test of resistance to abnormal heat and fire		P
8.2.1.1.1	Glow wire test under conditions of 7.1.2.2	(see attached results)	P
8.2.1.1.2	Flammability, hot wire ignition and arc ignition tests (on materials)		N
a)	Flammability test in accordance with IEC 60695-11-20;		N
b)	Hot wire ignition test as per Annex M		N
c)	Arc ignition test as per Annex M		N
8.2.2 IEC 60947-1	Equipment		NOTED
8.2.3 IEC 60947-1	Enclosure for equipment	(see Annex C)	P
8.2.4	Mechanical properties of terminals		P
	Where equipment designed with different types of terminals, test carried out on every design		N
8.2.4.1 IEC 60947-1	General conditions for tests		P
8.2.4.2	Tests of mechanical strength of terminals; 5 times on 2 separate clamping units		P
	Maximum cross-sectional area of conductor	10 mm ²	
	Diameter of thread	5.8 (L1; L2; L3; N) 4.8 (E) mm	
	Torque	2.5 (L1; L2; L3; N) 2.0 (E) Nm	
	Type of head	Pan head slotted.	
	New conductor used each time clamping screw or nut loosened		P
	During the test clamping units and terminals not work loose and no damage that will impair further use		P
8.2.4.3	Testing for damage to and accidental loosening of conductor (flexion test)		P
	Each test carried out on 2 samples		P
	Conductor of the smallest cross-sectional area	2.5 mm ²	
	Number of conductor of the smallest cross section	1	
	Diameter of bushing hole	9.5 mm	
	Height between the equipment and the platen	280 mm	
	Mass at the conductor(s)	0.7 kg	
	Conductor of the largest cross-sectional area	10 mm ²	
	Number of conductor of the largest cross section	1	
	Diameter of bushing hole	9.5 mm	



IEC 60947-3

	Height between the equipment and the platen	280 mm	
	Mass at the conductor(s)	2.0 kg	
	Number of conductor of the smallest and largest cross section	---	
	Diameter of bushing hole	---	
	Height between the equipment and the platen	---	
	Mass at the conductor(s)	---	
	Terminals intended for rigid and flexible conductors are tested with both on different sets of samples		N
	135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit		P
8.2.4.4	Pull-out test		P
	Force (N), applied for 1 min	50 N, 90 N	
	During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit		P
8.2.4.5	Test for insertability of unprepared round copper conductors having the maximum specified cross-section		P
	Test using gauge form A or B as per Table 7; gauge penetrates to full depth of terminal; or		N
	Largest conductor of type and rated cross-section among those recommended by manufacturer; conductor enters completely within clamping unit aperture without undue force		P
8.2.4.6	Tests for insertability of flat conductors with rectangular cross-section	under consideration	
8.2.5	Verification of the effectiveness of indication of the main contacts position of equipment suitable for isolation	(see 8.3.3.7)	P
8.2.6	Vacant		
8.2.7	Conduit pull-out test, torque test and bending test with metallic conduits		N
	Test made with appropriate sized metal conduit		N
	Enclosure installed according to manufacturer's instructions		N
	All tests conducted on same entry being the most unfavourable		N
	Tests made in sequence		N
8.2.7.1	Pull-out test		
	Conduit screwed into entry with torque of two-thirds value of Table 22		N
	Torque value	---	



IEC 60947-3

	Direct pull applied without jerks for 5 min		N
	Pull value	---	
	Displacement less than 1 thread depth		N
	No damage impairing further use		N
8.2.7.2	Bending test		
	Slowly increasing bending moment applied to end of conduit		N
	Bending moment applied as specified		N
	In two perpendicular directions		N
	No evidence of damage impairing further use		N
8.2.7.3	Torque test		
	Conduit tightened with torque of table 22		N
	Torque value	---	
	After the test, possible to unscrew conduit		N
	No evidence of damage impairing further use		N
8.3	Performance		P
8.3.1	Test sequences		P
	Tests made in the order specified in Table 10		P
8.3.2	General test conditions		P
8.3.3	Test sequence I: general performance characteristics		P
8.3.3.1	Temperature rise		P
	Ambient temperature	23 °C	
	Test enclosure (W x H x D)	85 x 170 x 88	
	Material of enclosure	Thermoplastic	
	Main circuits, test conditions:		
	Rated operational current I _e	40 A	
	Cable / length	10 mm ² / >1 m	
	Fuse-link details (fuse-combination units only)		N
	- manufacturer's name or mark	---	
	- manufacturer's model or type reference	---	
	- rated current	---	
	- power loss	---	
	- rated breaking capacity	---	
	Measured temperature rises	(See appended table)	P
	Auxiliary circuits, test conditions:		
	- rated operation current	---	



IEC 60947-3

	- cable cross-section	---	
	Measured temperature rises		N
8.3.3.2	Test of dielectric properties		P
	Rated impulse withstand voltage		P
	- test Uimp main circuits	2.95 kV	
	- test Uimp auxiliary circuits	---	
	- test Uimp on open main contacts (equipment suitable for isolation)	3.5 kV	
	Power-frequency withstand voltage	2.5 kV	
	- main circuits, test voltage for 5 s		P
	- control and auxiliary circuits, test voltage for 5 s		N
	Devices, which have been disconnected for the power-frequency withstand voltage test		N
	Equipment suitable for isolation, leakage current not exceeding 0.5 mA/pole		P
	Test voltage 1,1 Ue	484 V	
	Measured leakage current	0.005 mA/pole	
8.3.3.3	Making and breaking capacities		P
	Utilization category	AC22A	
	Rated operational voltage Ue	440 V	
	Rated operational current Ie or power	40 A	
	Fuse-link details (fuse-combination units only)		N
	- manufacturer's name or mark	---	
	- manufacturer's model or type reference	---	
	- rated current	---	
	- power loss	---	
	- rated breaking capacity	---	
8.3.3.3.1	Conditions for make and break operation: AC22A		
	- test voltage, U = 1,05 Ue (L1)	263 V	
	- test voltage, U = 1,05 Ue (L2)	263 V	
	- test voltage, U = 1,05 Ue (L3)	263 V	
	- test current, I (L1)	122 A	
	- test current, I (L2)	125 A	
	- test current, I (L3)	121 A	
	- power factor (L1)	0.63	
	- power factor (L2)	0.63	
	- power factor (L3)	0.68	



IEC 60947-3

	Conditions for make operation: AC23A		
	- test voltage, U = 1,05 Ue (L1)	---	
	- test voltage, U = 1,05 Ue (L2)	---	
	- test voltage, U = 1,05 Ue (L3)	---	
	- test current, I (L1)	---	
	- test current, I (L2)	---	
	- test current, I (L3)	---	
	- power factor (L1)	---	
	- power factor (L2)	---	
	- power factor (L3)	---	
	Conditions for break operation:		
	- test voltage, U = 1,05 Ue (L1)	---	
	- test voltage, U = 1,05 Ue (L2)	---	
	- test voltage, U = 1,05 Ue (L3)	---	
	- test current, I (L1)	---	
	- test current, I (L2)	---	
	- test current, I (L3)	---	
	- power factor (L1)	---	
	- power factor (L2)	---	
	- power factor (L3)	---	
	Number of make/break or make and break operations	5 operations (Make) 5 operations (Break)	
	Current duration	50 ms	
	Time interval between operations	30 seconds	
	Characteristic of transient recovery voltage for AC-22 and AC-23 only		
	Oscillatory frequency	50.5	
	- measured oscillatory frequency (L1)	36.4	
	- measured oscillatory frequency (L2)	33.3	
	- measured oscillatory frequency (L3)	37.0	
	- factor (L1)	1.1	
	- factor (L2)	1.1	
	- factor (L3)	1.1	
8.3.3.3.5	Behaviour of the equipment during making and breaking capacity tests		P
	Test performed without:		
	Danger to the operator		P



IEC 60947-3

	Causing damage to adjacent equipment		P
	No permanent arcing		P
	No flash over between poles and poles and frame		P
	No melting of the fuse in the detection circuit		P
8.3.3.3.6	Condition of the equipment after making and breaking capacity tests		P
	Immediately after the test equipment must work satisfactorily		P
	Required opening force not greater than the test force of 8.2.5.2 and table 8		P
	Equipment able to carry its rated current after normal closing operation		P
8.3.3.4	Dielectric verification		P
	Test voltage: $2 \cdot U_e$ with a minimum of 1000V~	1000 V	
	No flashover or breakdown		P
8.3.3.5	Leakage current		P
	Test voltage ($1,1 U_e$) (V)	484 V	
	Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B): $\leq 0,5$ mA/pole	---	
	Leakage current (other utilization categories): ≤ 2 mA/pole	0.005 mA	
8.3.3.6	Temperature-rise verification		P
	Fuse-link details (fuse-combination units only)		
	- manufacturer's name or mark	---	
	- manufacturer's model or type reference	---	
	- rated current	---	
	- power loss	---	
	- rated breaking capacity	---	
	Measured temperature rises	(See appended table)	P



IEC 60947-3

8.3.3.7	Strength of actuator mechanism		P
	Subclause 8.2.5 applies to equipment suitable for isolation		P
8.2.5.2.1	Dependent and independent manual operation		P
	Actuating force for opening	19.3 N	
	Test force with blocked main contacts	100 N	
	Method used to keep the contact closed		P
	During and after the test, open position not indicated		P
	Equipment with locking means, no locking in the open position while test force is applied		P
8.2.5.2.2	Dependent power operation		N
	Main contacts fixed together in the closed position		N
	Method used to keep the contact closed	---	
	110% of the rated supply voltage applied to the equipment (3 times)	---	
	During and after the test, open position not indicated		N
	Equipment show no damage impairing its normal operation		N
	Equipment with locking mean, no locking in the open position while test force is applied		N
8.2.5.2.3	Independent power operation		N
	Main contacts fixed together in the closed position		N
	Method used method to keep the contact closed	---	
	Stored energy of power operator released 3 times		N
	During and after the test, open position not indicated		N
	Equipment show no damage impairing its normal operation		N
	Equipment with locking mean, no locking in the open position while test force is applied		N
8.3.4	Test sequence II – operational performance capability		P
8.3.4.1	Operational performance test		
	Utilization category	AC22A	
	Rated operational voltage	440 V	
	Rated operational current	40 A	
	Test conditions for electrical operation cycles		
	- test voltage (L1)	251 V	
	- test voltage (L2)	251 V	
	- test voltage (L3)	253 V	
	- test current, I (L1)	42 A	



IEC 60947-3			
	- test current, I (L2)	42 A	
	- test current, I (L3)	41 A	
	- power factor / time constant (L1)	0.77	
	- power factor / time constant (L2)	0.76	
	- power factor / time constant (L3)	0.77	
	Number of cycles without current	8500	
	Number of cycles with current	1500	
	First test sequence	Without	
	Second test sequence	With	
8.3.4.1.5	Behaviour of the equipment during the operational performance test		P
	Test performed without:		
	Danger to the operator		P
	Causing damage to adjacent equipment		P
	No permanent arcing		P
	No flash over between poles and poles and frame		P
	No melting of the fuse in the detection circuit		P
8.3.4.1.6	Condition of the equipment after making and breaking capacity tests		P
	Immediately after the test equipment must work satisfactorily		P
	Required opening force not greater than the test force of 8.2.5.2 and table 8		P
	Equipment is able to carry its rated current after normal closing operation		P
8.3.4.2	Dielectric verification		P
	test voltage: $2 \cdot U_e$ with a minimum of 1000V~	1000 V	
	No flashover or breakdown		P
8.3.4.3	Leakage current		P
	Test voltage (1,1 U_e) (V):	484 V	
	Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B): $\leq 0,5$ mA/pole	---	
	Leakage current (other utilization categories): ≤ 2 mA/pole)	0.003 mA	
8.3.4.4	Temperature rise verification		P
	Fuse-link details (fuse-combination units only)		
	- manufacturer's name or mark	---	
	- manufacturer's model or type reference	---	
	- rated current	---	



IEC 60947-3

	- power loss	---	
	- rated breaking capacity	---	
	Measured temperature rises	(see appended table)	P
8.3.5	Test sequence III – short-circuit performance capability		P
8.3.5.1	Short-time withstand current test		P
	Rated short-time withstand current I _{cw} (>12.I _e max)	480 A	
	- test voltage (L1)	Any convenient (See remark 2)	
	- test voltage (L2)	Any convenient	
	- test voltage (L3)	Any convenient	
	- test current, I (L1)	490 A	
	- test current, I (L2)	490 A	
	- test current, I (L3)	490 A	
	- power factor (L1)	0.95 pf	
	- power factor (L2)	0.95 pf	
	- power factor (L3)	0.95 pf	
	Test duration	1 second	
8.3.5.1.5	Behaviour of the equipment during the test		P
	Test performed without:		
	Danger to the operator		P
	Causing damage to adjacent equipment		P
	No permanent arcing		P
	No flash over between poles and poles and frame		P
	No melting of the fuse in the detection circuit		P
8.3.5.1.6	Condition of the equipment after making and breaking capacity tests		P
	Immediately after the test equipment must work satisfactorily		P
	Required opening force not greater than the test force of 8.2.5.2 and table 8		P
	Equipment is able to carry its rated current after normal closing operation		P
8.3.5.2	Short-circuit making capacity		P
	Rated short-time withstand current I _{cw} (>12.I _e max)	480 A	
	- test voltage (1.05xU _e) (L1)	Any convenient (See remark 2)	
	- test voltage (1.05xU _e) (L2)	Any convenient	
	- test voltage (1.05xU _e) (L3)	Any convenient	



IEC 60947-3

	- r.m.s. test current (L1)	490 A	
	- r.m.s. test current (L2)	490 A	
	- r.m.s. test current (L3)	490 A	
	- power factor / time constant (L1)	0.95 pf	
	- power factor / time constant (L2)	0.95 pf	
	- power factor / time constant (L3)	0.95 pf	
	Current duration	0.05 second	
	Time interval between cycles	3 minutes	
8.3.5.2.5	Behaviour of the equipment during the test		P
	Test performed without:		
	Danger to the operator		P
	Causing damage to adjacent equipment		P
	No permanent arcing		P
	No flash over between poles and poles and frame		P
	No melting of the fuse in the detection circuit		P
8.3.5.2.6	Condition of the equipment after making and breaking capacity tests		P
	Immediately after the test equipment must work satisfactorily		P
	Required opening force not greater than the test force of 8.2.5.2 and table 8		P
	Equipment is able to carry its rated current after normal closing operation		P
8.3.5.3	Dielectric verification		P
	test voltage: $2 \cdot U_e$ with a minimum of 1000V~	1000 V	
	No flashover or breakdown		P
8.3.5.4	Leakage current		P
	Test voltage (1,1 U_e) (V):	484 V	
	Leakage current: ≤ 2.0 mA/pole	0.003 mA	
8.3.5.5	Temperature rise verification		P
	Fuse-link details (fuse-combination units only)		
	- manufacturer's name or mark	---	
	- manufacturer's model or type reference	---	
	- rated current	---	
	- power loss	---	
	- rated breaking capacity	---	
	Measured temperature rises	(see appended table)	P



IEC 60947-3

8.3.6	Test sequence IV: conditional short-circuit test		N
	Protective device details		N
	- manufacturer's name or mark	---	
	- manufacturer's model or type reference	---	
	- rated voltage	---	
	- rated current	---	
	- rated breaking capacity	---	
8.3.6.2	Fuse protected short-circuit withstand		N
	- test voltage (1.05xUe) (L1)	---	
	- test voltage (1.05xUe) (L2)	---	
	- test voltage (1.05xUe) (L3)	---	
	- test current (L1)	---	
	- test current (L2)	---	
	- test current (L3)	---	
	Rated frequency	---	
	Power factor	---	
	Time constant	---	
	Fuse protected short-circuit withstand (equipment in closed position)		N
	- max. let through current (L1)	---	
	- max. let through current (L2)	---	
	- max. let through current (L3)	---	
	- Joule integral I ² dt (L1)	---	
	- Joule integral I ² dt (L2)	---	
	- Joule integral I ² dt (L3)	---	
	Fuse protected short-circuit making		N
	Mean velocity of 15 manually under no-load conditions operations	---	
	Point at which the measurement is made	---	
	Test speed during the fuse protected short-circuit making	---	
	- max. let through current (L1)	---	
	- max. let through current (L2)	---	
	- max. let through current (L3)	---	
	- Joule integral I ² dt (L1)	---	
	- Joule integral I ² dt (L2)	---	
	- Joule integral I ² dt (L3)	---	
8.3.6.2.5	Behaviour of the equipment during the test		N



IEC 60947-3

	Test performed without:		
	Danger to the operator		N
	Causing damage to adjacent equipment		N
	No permanent arcing		N
	No flash over between poles and poles and frame		N
	No melting of the fuse in the detection circuit		N
8.3.6.2.6	Condition of the equipment after making and breaking capacity tests		N
	Immediately after the test equipment must work satisfactorily		N
	Required opening force not greater than the test force of 8.2.5.2 and table 8		N
	Equipment is able to carry its rated current after normal closing operation		N
8.3.6.3	Dielectric verification		N
	Test voltage: $2 \cdot U_e$ with a minimum of 1000V~	---	
	No flashover or breakdown		N
8.3.6.4	Leakage current		N
	Test voltage (1,1 U_e) (V) :		N
	Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B): $\leq 0,5$ mA/pole	---	
	Leakage current (other utilization categories): ≤ 2 mA/pole)	---	
8.3.6.5	Temperature-rise verification		N
	Fuse-link details (fuse-combination units only)		
	- manufacturer's name or mark	---	
	- manufacturer's model or type reference	---	
	- rated current	---	
	- power loss	---	
	- rated breaking capacity	---	
	Measured temperature rises	---	N
8.3.7	Test sequence V: overload performance capability		N
8.3.7.1	Overload test		N
	Ambient temperature	---	
	Test enclosure (W x H x D)	---	
	Material of enclosure	---	
	Test current $1,6 \cdot I_{th}$ or $1,6 \cdot I_{th}$	---	
	Cable/busbar cross-section / length	---	



IEC 60947-3

Fuse-link details (fuse-combination units only)			
	- manufacturer's name or mark	---	
	- manufacturer's model or type reference	---	
	- rated current	---	
	- power loss	---	
	- rated breaking capacity	---	
	Time duration of the overload test	---	
	Within 3 to 5 min after fuse operation (or 1 h), equipment has been operated once		N
	Required opening force not greater than test force of 8.2.5.2 and table 8		N
	Equipment has not undergone any impairment hindering such operation		N
8.3.7.2	Dielectric verification		N
	Test voltage: 2*Ue with a minimum of 1000V~	---	
	No flashover or breakdown		N
8.3.7.3	Leakage current		N
	Test voltage (1,1 Ue) (V) :		N
	Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B): ≤ 0,5 mA/pole	---	
	Leakage current (other utilization categories): ≤ 2 mA/pole	---	
8.3.7.4	Temperature-rise verification		N
Fuse-link details (fuse-combination units only)			
	- manufacturer's name or mark	---	
	- manufacturer's model or type reference	---	
	- rated current	---	
	- power loss	---	
	- rated breaking capacity	---	
	Fuse links aged during the overload test are replaced by new fuse-links		N
	Conductor cross-section	---	
	Test current Ie	---	
	Measured temperature rises		N
8.4	Electromagnetic compatibility		N
8.4.1	Immunity		N
8.4.1.1	Equipment not incorporating electronic circuits		N
8.4.1.2	Equipment incorporating electronic circuits		N



IEC 60947-3

	Requirements according to 7.3.3.2 and limits according table 6 apply		N
	Tests applied	---	
	Please refer to UL test report XXXX dated XXXX		
	No unintentional separation or closing of contacts has occurred during these tests		N
8.4.2	Emission		N
8.4.2.1	Equipment not incorporating electronic circuits	no tests necessary	NOTED
8.4.2.2	Equipment incorporating electronic circuits		N
	Requirements according to 7.3.3.2 and limits according table 7 apply		N
	Tests applied	---	
	No unintentional separation or closing of contacts has occurred during these tests		N
8.5	Special tests		N
8.5.1	Mechanical durability		N
	Test (see 7.2.4.3 and 8.1.5) carried out as specified		N
8.5.2	Electrical durability		
	Test (see 7.2.4.4 and 8.1.5) carried out as specified		N



IEC 60947-3

A.	ANNEX A: EQUIPMENT FOR DIRECT SWITCHING OF A SINGLE MOTOR	N
B.	ANNEX B: ITEMS SUBJECT TO AGREEMENT BETWEEN MANUFACTURER AND USER	NOTED
C.	ANNEX C: SINGLE POLE OPERATED THREE POLE SWITCHES	N
C. IEC 60947-1	ANNEX C: DEGREES OF PROTECTION OF ENCLOSED EQUIPMENT	N
C.1.	SCOPE AND OBJECT	NOTED
C.2.	OBJECT	NOTED
C.3.	DEFINITIONS	NOTED
C.4.	DESIGNATIONS	NOTED
C.5.	DEGREES OF PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS AND AGAINST SOLID FOREIGN OBJECTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL	NOTED
C.6.	DEGREES OF PROTECTION AGAINST INGRESS OF WATER INDICATED BY THE SECOND CHARACTERISTIC NUMERAL	NOTED
C.7.	DEGREES OF PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE ADDITIONAL LETTER	NOTED
C.8.	SUPPLEMENTARY LETTERS	NOTED
C.9.	EXAMPLES OF DESIGNATIONS WITH THE IP CODE	NOTED
C.10.	MARKING	NOTED
	Requirements for marking given in relevant product standard	
	If IP code applies to one mounting position only then position indicated by symbol 0623 of ISO 7000 next to IP code	N
C.11.	GENERAL REQUIREMENTS FOR TESTS	NOTED
C.12.	TESTS FOR PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL	P
C.12.1	Access probes as per Table 6	NOTED



IEC 60947-3

C.12.2	Test conditions		P
	Access probe pushed against or inserted through any openings of the enclosure with a test force as specified in Table 6		P
	Access probe	1.0 mm (Ø) x 100 mm wire	
	Test force	1.0 N	
C.12.3	Acceptance conditions		P
	Adequate clearance kept between the access probe and hazardous parts		P
	For the test of numeral 1; access probe does not completely pass through the opening		P
	For the test of numeral 2; jointed test finger may penetrate but stop face does not pass through the opening		P
C.12.3.1	For low voltage equipment (rated voltage not exceeding 1000V ac and 1500V dc); access probe does not touch hazardous live parts		P
C.12.3.2	This clause not applicable		N
C.12.3.3	Access probe does not touch hazardous mechanical parts		P
C.13.	TESTS FOR PROTECTION AGAINST SOLID FOREIGN OBJECTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL		P
C.13.1	Test means and main test conditions as per Table 7		P
C.13.2	Test conditions for first characteristic numerals 1, 2, 3, 4		P
	Object probe pushed against any openings of the enclosure with a test force as specified in Table 7		P
	Object probe	1.0 mm (Ø) wire	
	Test force	1.0 N	
C.13.3	Acceptance conditions for first characteristic numerals 1, 2, 3, 4		P
	Full diameter of the object probe does not pass through any opening		P
C.13.4	Dust test for first characteristic numerals 5 and 6		P
	Test made using dust chamber as per Figure 2		P
	Tests for IP 5X conducted according to category 2		N
	Tests for IP 6X conducted according to category 1		P
C.13.5	Special conditions for first characteristic numeral 5		N
C.13.5.1	Test conditions for first characteristic numeral 5		N



IEC 60947-3

C.13.5.2	Acceptance conditions for first characteristic numeral 5		N
	Talcum powder not accumulated in quantity or location such as could interfere with correct operation or impair safety		N
	No dust deposited where it could lead to tracking along creepage distances		N
	Where dust deposits could raise doubts about correct functioning and safety of equipment preconditioning and dielectric test conducted		N
	Preconditioning after dust test by test Cab: Damp heat steady state according to IEC 60068-2-78 under the following conditions		N
	Lid open and /or parts removed without the aid of a toll		N
	Stored at room temperature for at least 4 h before test		N
	Test duration 24 h		N
	After the test equipment removed from the chamber within 15 min and subjected to power frequency dielectric test for 1 min the value being 2 U _e with a minimum of 1000 V		N
C.13.6	Special conditions for first characteristic numeral 6		P
C.13.6.1	Test conditions for first characteristic numeral 6	Category 1	P
C.13.6.2	Acceptance conditions for first characteristic numeral 6		P
	No deposit of dust is observable inside the enclosure		P

C.14.	TESTS FOR PROTECTION AGAINST WATER INDICATED BY THE SECOND CHARACTERISTIC NUMERAL		P
C.14.1	Test means and main test conditions as per Table 8		P
C.14.2	Test conditions		P
	Tests conducted with fresh water as specified		P
	Water temperature	19 °C	
C.14.2.1	Test for second characteristic numeral 1 with the drip box		N
	Enclosure placed in normal operating position on turntable		N
	Enclosures normally fixed to wall or ceiling fixed in normal position		N
	Water flow rate	---	
	Test duration	---	
C.14.2.2	Test for second characteristic numeral 2 with the drip box		N



IEC 60947-3

	Enclosure placed in normal operating position in four positions of 15° tilt		N
	Enclosures normally fixed to wall or ceiling fixed in normal position		N
	Water flow rate	---	
	Test duration	---	
C.14.2.3	Test for second characteristic numeral 3 with the oscillating tube or spray nozzle		N
	Test means	---	
	Enclosures subjected to spraying water through angle of 120°, 60° either side of vertical		N
	Water flow rate	---	
	Test duration	---	
C.14.2.4	Test for second characteristic numeral 4 with the oscillating tube or spray nozzle		N
	Test means	---	
	Enclosures subjected to spraying water through angle of almost 360°, 180° either side of vertical		N
	Water flow rate	---	
	Test duration	---	
C.14.2.5	Test for second characteristic numeral 5 with the 6.3 mm spray nozzle		N
	Enclosure sprayed from all practicable directions with test nozzle as per Figure 6		N
	Water flow rate	---	
	Test duration	---	
C.14.2.6	Test for second characteristic numeral 6 with the 12.5 mm spray nozzle		P
	Enclosure sprayed from all practicable directions with test nozzle as per Figure 6		P
	Water flow rate	---	
	Test duration	---	
C.14.2.7	Test for second characteristic numeral 7		N
	Enclosure immersed in water as specified		N
	Depth of immersion	---	
	Test duration	---	
C.14.2.8	Test for second characteristic numeral 8		N
	Enclosure immersed in water as specified		N
	Depth of immersion	---	
	Test duration	---	



IEC 60947-3

C.14.3	Acceptance conditions		P
	No water entered enclosure; or		P
	If water has entered:		N
	Not sufficient to interfere with correct operation of the equipment or impair safety		N
	Not deposited on insulation parts where it could lead to tracking along creepage distances		N
	Not reach live parts or windings not designed to operate when wet		N
	Not accumulate near cable end or enter cable		N
	Enclosure provided with drain holes; any water which enters does not accumulate and drains away		N
	Enclosure without drain holes, water cannot accumulate to reach live parts		N
	Equipment then subjected to power frequency dielectric test for 1 min the value being $2 U_e$ with a minimum of 1000 V		P
C.15.	TESTS FOR PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE ADDITIONAL LETTER		N
C.15.1	Access probes as per Table 6		N
C.15.2	Test conditions		N
	Access probe pushed against any openings of the enclosure with a test force as specified in Table 6		N
	Access probe	---	
	Test force	---	
	Stop face does not penetrate through any opening		N
C.15.3	Acceptance conditions		N
	Adequate clearance kept between the access probe and hazardous parts		N
	For the test of additional letter B; jointed test finger may penetrate but stop face does not pass through the opening		N
	For the test of additional letters C and D; access probe may penetrate to full length but stop face does not pass through the opening		N
C.16	SUMMARY OF RESPONSIBILITIES OF RELEVANT TECHNICAL COMMITTEES		NOTED



IEC 60947-3

TABLES OF RESULTS

7.1.4	TABLE: Clearance and creepage distance measurements						P
clearance cl and creepage distance dcr at/of:	Uimp (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)	
L to L	2500	440	1.5	5.7	5	5.7	
L to N	2500	250	1.5	5.7	2.5	5.7	
L to E	2500	250	1.5	9.5	2.5	13.7	

8.3.3.1	TABLE: Temperature rise		P
Temperature rise dT of part:	dT (K) measured	dT (K) required	
Terminal 1	22	80	
Terminal 2	23	80	
Terminal 3	23	80	
Terminal 4	21	80	
Terminal 5	22	80	
Terminal 6	22	80	
Manual operating means: non-metallic	4	25	
Parts intended to be touched but not hand-held:non-metallic	8	25	
Parts which need not be touched during normal operation	8	25	

8.3.3.6	TABLE: Temperature rise		P
Temperature rise dT of part:	dT (K) measured	dT (K) required	
Terminal 1	28	80	
Terminal 2	30	80	
Terminal 3	29	80	
Terminal 4	28	80	
Terminal 5	30	80	
Terminal 6	29	80	
Manual operating means: metallic / non-metallic	3	35	
Parts intended to be touched but not hand-held: metallic / non-metallic	9	35	
Parts which need not be touched during normal operation	9	35	



IEC 60947-3

8.3.4.4	TABLE: Temperature rise	P	
Temperature rise dT of part:		dT (K) measured	dT (K) required
Terminal 1		29	80
Terminal 2		31	80
Terminal 3		30	80
Terminal 4		28	80
Terminal 5		31	80
Terminal 6		29	80
Manual operating means: metallic / non-metallic		3	35
Parts intended to be touched but not hand-held: metallic / non-metallic		9	35
Parts which need not be touched during normal operation		9	35

8.3.5.5	TABLE: Temperature rise	P	
Temperature rise dT of part:		dT (K) measured	dT (K) required
Terminal 1		31	80
Terminal 2		34	80
Terminal 3		31	80
Terminal 4		30	80
Terminal 5		34	80
Terminal 6		32	80
Manual operating means: metallic / non-metallic		4	35
Parts intended to be touched but not hand-held: metallic / non-metallic		8	35
Parts which need not be touched during normal operation		8	35



GLOW WIRE TEST

Glow-wire testing was conducted in accordance with AS/NZS 60695.2.10 and AS/NZS 60695.2.11.

Test specimens arranged so that the surface in contact with the tip of the glow-wire was vertical and glow wire tip applied to surface of the specimen likely to be subjected to thermal stresses in normal use.

A layer of white pineboard and wrapping tissue was placed beneath the specimen.

SPECIMEN NUMBER	1	2	3	4
SPECIMEN DESCRIPTION	Base Enclosure	Cover Enclosure	Switch lever	Switch cam
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Colour	Light Grey	Light Grey	Light Grey	Black
Test specimen	SC	SC	SC	SC
Glow wire tip temperature (°C)	650	650	650	650
Duration of glow wire application (t _a) (s)	30	30	30	30
OBSERVATIONS				
Duration from beginning of glow-wire tip application to ignition of specimen or layer (t _i) (s)	NI	NI	NI	NI
Duration from beginning of glow-wire tip application to when flames extinguish (t _e) (s)	NI	NI	NI	NI
Maximum height of flames after initial 1s (to nearest 5 mm) (mm)	0	0	0	0
Flame impingement on other parts	NA	NA	NA	NA
Degree of tip penetration	WPNI	WPNI	WPNI	WPNI
Degree of specimen distortion	SMD	SMD	SMD	SMD
Scorching of pinewood board	NO	NO	NO	NO
EVALUATION CRITERIA				
Visible flame or sustained glowing	NO	NO	NO	NO
Duration of flaming or glowing after tip removal (max. allowable 30 s) (s)	0	0	0	0
Surrounding parts burned away completely (not permitted)	NA	NA	NA	NA
Ignition of wrapping tissue layer (not permitted)	NO	NO	NO	NO
RESULTS	COMPLIED	COMPLIED	COMPLIED	COMPLIED

- LEGEND:
- | | | |
|-------------------------------|-----------------------------------|--------------------------------------|
| CE Complete Equipment | SA Sub Assembly | SE Self Extinguished |
| EBD Emittted Burning Droplets | SBD Specimen Burned and Distorted | SMD Specimen Melted and Distorted |
| ME Manually Extinguished | SC Separate Component | SS Specimen Scorched |
| NA Not Applicable | SCC Specimen Completely Consumed | WPNI Wall Penetrated but no Ignition |
| NI No Ignition | X Flame Appeared for an Instant | |



GLOW WIRE TEST

Glow-wire testing was conducted in accordance with AS/NZS 60695.2.10 and AS/NZS 60695.2.11.

Test specimens arranged so that the surface in contact with the tip of the glow-wire was vertical and glow wire tip applied to surface of the specimen likely to be subjected to thermal stresses in normal use.

A layer of white pineboard and wrapping tissue was placed beneath the specimen.

SPECIMEN NUMBER	5	6	7	8
SPECIMEN DESCRIPTION	M25 Caps	Cover Screw Caps	Mounting Screw Caps	Reducer
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Colour	Light Grey	Light Grey	Light Grey	Light Grey
Test specimen	SC	SC	SC	SC
Glow wire tip temperature (°C)	650	650	650	650
Duration of glow wire application (t _a) (s)	30	30	30	30
OBSERVATIONS				
Duration from beginning of glow-wire tip application to ignition of specimen or layer (t _i) (s)	NI	NI	NI	NI
Duration from beginning of glow-wire tip application to when flames extinguish (t _e) (s)	NI	NI	NI	NI
Maximum height of flames after initial 1s (to nearest 5 mm) (mm)	0	0	0	0
Flame impingement on other parts	NA	NA	NA	NA
Degree of tip penetration	WPNI	WPNI	WPNI	WPNI
Degree of specimen distortion	SMD	SMD	SMD	SMD
Scorching of pinewood board	NO	NO	NO	NO
EVALUATION CRITERIA				
Visible flame or sustained glowing	NO	NO	NO	NO
Duration of flaming or glowing after tip removal (max. allowable 30 s) (s)	0	0	0	0
Surrounding parts burned away completely (not permitted)	NA	NA	NA	NA
Ignition of wrapping tissue layer (not permitted)	NO	NO	NO	NO
RESULTS	COMPLIED	COMPLIED	COMPLIED	COMPLIED

- LEGEND:
- | | | |
|------------------------------|-----------------------------------|--------------------------------------|
| CE Complete Equipment | SA Sub Assembly | SE Self Extinguished |
| EBD Emitted Burning Droplets | SBD Specimen Burned and Distorted | SMD Specimen Melted and Distorted |
| ME Manually Extinguished | SC Separate Component | SS Specimen Scorched |
| NA Not Applicable | SCC Specimen Completely Consumed | WPNI Wall Penetrated but no Ignition |
| NI No Ignition | X Flame Appeared for an Instant | |

Glow-wire testing was conducted in accordance with AS/NZS 60695.2.10 and AS/NZS 60695.2.11.



GLOW WIRE TEST

Test specimens arranged so that the surface in contact with the tip of the glow-wire was vertical and glow wire tip applied to surface of the specimen likely to be subjected to thermal stresses in normal use.

A layer of white pineboard and wrapping tissue was placed beneath the specimen.

SPECIMEN NUMBER	9	10	11	12
SPECIMEN DESCRIPTION	Cover Enclosure Screws	Switch Assembly Cover	Switch Assembly Base	Switch Assembly Rocker
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Colour	Light Grey	Cream	Cream	Black
Test specimen	SC	SC	SC	SC
Glow wire tip temperature (°C)	650	960	960	960
Duration of glow wire application (t _a) (s)	30	30	30	30
OBSERVATIONS				
Duration from beginning of glow-wire tip application to ignition of specimen or layer (t _i) (s)	NI	1	1	1
Duration from beginning of glow-wire tip application to when flames extinguish (t _e) (s)	NI	37	37	46
Maximum height of flames after initial 1s (to nearest 5 mm) (mm)	0	40	40	30
Flame impingement on other parts	NA	NA	NA	NA
Degree of tip penetration	WPNI	WP	WP	WP
Degree of specimen distortion	SMD	SBD	SBD	SBD
Scorching of pinewood board	NO	NO	NO	NO
EVALUATION CRITERIA				
Visible flame or sustained glowing	NO	YES	YES	YES
Duration of flaming or glowing after tip removal (max. allowable 30 s) (s)	0	7	7	16
Surrounding parts burned away completely (not permitted)	NA	NA	NA	NA
Ignition of wrapping tissue layer (not permitted)	NO	NO	NO	NO
RESULTS	COMPLIED	COMPLIED	COMPLIED	COMPLIED

LEGEND: CE Complete Equipment SA Sub Assembly SE Self Extinguished
 EBD Emitted Burning Droplets SBD Specimen Burned and Distorted SMD Specimen Melted and Distorted
 ME Manually Extinguished SC Separate Component SS Specimen Scorched
 NA Not Applicable SCC Specimen Completely Consumed WPNI Wall Penetrated but no Ignition
 NI No Ignition X Flame Appeared for an Instant



REMARKS

Remark 1. The micro environment inside the enclosure is considered to be pollution degree 2.

Remark 2. The short circuit testing was conducted at a convenient voltage but with no opening of the contacts during the test as allowed by clause 8.3.4.3 of IEC 60947-1.



PHOTOGRAPHS



Legrand AC22 front view



Legrand AC22 side view



PHOTOGRAPHS



Legrand AC22 side view

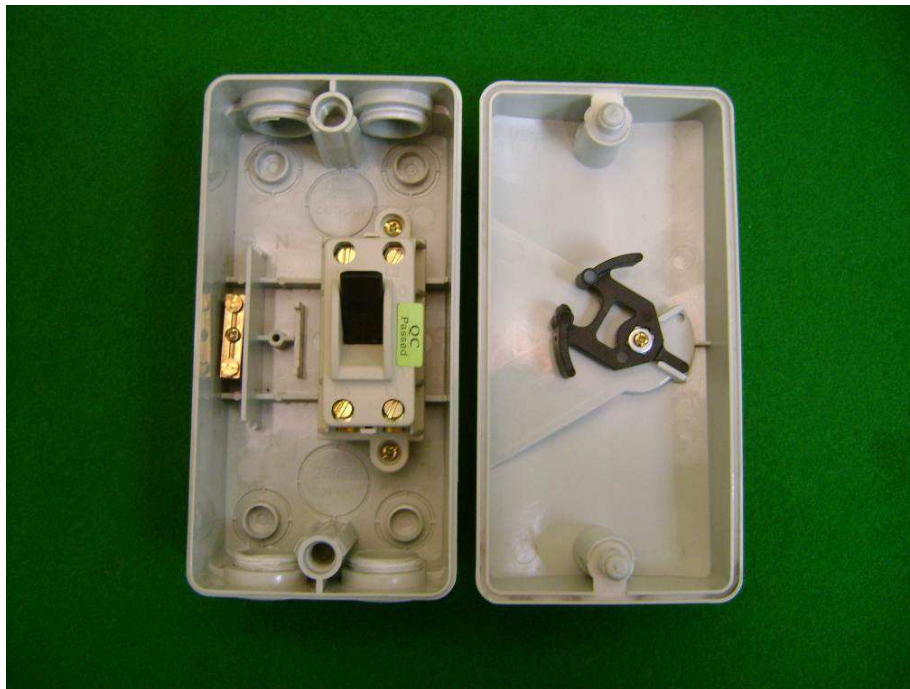


Legrand AC22 bottom view

PHOTOGRAPHS



Legrand AC22 back view



Legrand AC22 2 pole internal view



PHOTOGRAPHS



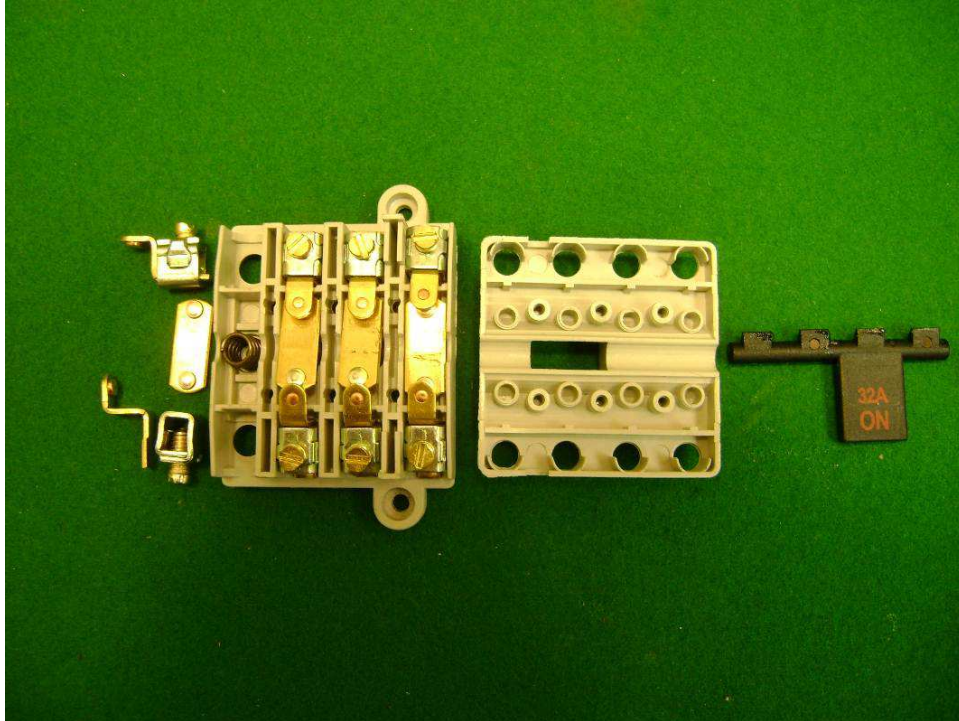
Legrand AC22 3 pole internal view



Legrand AC22 4 pole internal view



PHOTOGRAPHS



Legrand AC22 4 pole component view

**** END OF TEST REPORT ****