TEST REPORT

Prepared For :	ZHEJIANG PQUAN TECHNOLOGY CO.LTD. 2nd Floor, Building A, 555 Station Road, Liushi Town, Yueqing City, Zhejiang Province
Product Name:	Soft Starter
Model :	PQZR8-22kw, PQZR8-11kW, PQZR8-15kW, PQZR8-18.5kW, PQZR8-30kW, PQZR8-37kW, PQZR8-45kW, PQZR8-55kW, PQZR8-75kW, PQZR8-90kW, PQZR8-110kW, PQZR8-132kW, PQZR8-160kW, PQZR8-185kW, PQZR8-200kW, PQZR8-220kW, PQZR8-250kW, PQZR8-280kW, PQZR8-315kW, PQZR8-350kW, PQZR8-400kW, PQZR8-450kW, PQZR8-500kW, PQZR8-630kW
Prepared By :	Shenzhen HTT Technology Co., Ltd. 1F, B Building, Huafeng International Robotics Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen
Test Date:	Jan. 22, 2025 ~ Feb. 07, 2025
Date of Report :	Feb. 07, 2025
Report No.:	HTT202502038LR

TEST REPORT

EN 60947-2: 2017+A1: 2019

Low-voltage switchgear and controlgear - Part 2: Circuit breakers

Report reference No ..... :	HTT202502038LR
Tested by (+ signature).....	Darek Wang
Approved by (+ signature).....	Kevin Yang
Date of issue :	Feb. 07, 2025
Testing Laboratory Name ..... :	Shenzhen HTT Technology Co., Ltd.
Address ..... :	1F, B Building, Huafeng International Robotics Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen
Testing location ..... :	CBTL ☐ CCATL ☐ SMT ☐ TMP ☐
Address..... :	Same as above.
Applicant's Name ..... :	ZHEJIANG PQUAN TECHNOLOGY CO.LTD.
Address ..... :	2nd Floor, Building A, 555 Station Road, Liushi Town, Yueqing City, Zhejiang Province
Standard..... :	EN 60947-2: 2017+A1: 2019
Test procedure ..... :	LVD Approval
Procedure deviation ..... :	N/A
Non-standard test method ..... :	N/A
Test item Description..... :	Soft Starter
Manufacturer..... :	ZHEJIANG PQUAN TECHNOLOGY CO.LTD.
address..... :	2nd Floor, Building A, 555 Station Road, Liushi Town, Yueqing City, Zhejiang Province
Trademark..... :	N/A
Model and/or type reference..... :	PQZR8-22kW
Rating(s)	Ue:380V 50Hz, Ie:44A Power: 22kW

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Test item particulars :	
Equipment mobility ..... :	Building-in equipment
Test case verdicts:	
Test case does not apply to the test object..... :	N(/A.)
Test item does meet the requirement..... :	P(ass)
Test item does not meet the requirement..... :	F(ail)
Testing:	
Date of receipt of test item	Jan. 22, 2025
Date(s) of performance of test	Jan. 22, 2025 ~ Feb. 07, 2025

Label

Soft Starter
Model: PQZR8-22kW
Ue:380V 50Hz, Ie:44A
Power: 22kW

ZHEJIANG PQUAN TECHNOLOGY CO.LTD..

Note:

1. The height of graphical symbols shall not be less than 5 mm;
2. The height of letters and numerals shall not be less than 2 mm;
3. The main rating label was attached in enclosure,

Model List:	
Test Model	PQZR8-22kW
Other Model	PQZR8-11kW, PQZR8-15kW, PQZR8-18.5kW, PQZR8-30kW, PQZR8-37kW, PQZR8-45kW, PQZR8-55kW, PQZR8-75kW, PQZR8-90kW, PQZR8-110kW, PQZR8-132kW, PQZR8-160kW, PQZR8-185kW, PQZR8-200kW,PQZR8-220kW, PQZR8-250kW, PQZR8-280kW, PQZR8-315kW, PQZR8-350kW, PQZR8-400kW, PQZR8-450kW, PQZR8-500kW, PQZR8-630kW
1.All tests are carried out on PQZR8-22kW 2.All models have same diagram circuit, PCB layout, except different model names and components relevant to different power.	

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General remarks: Clause number between brackets refer to clauses in EN 60947-2 "(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. The test results presented in this report relate only to the object tested. This report shall not be reproduced except in full without the written approval of the testing laboratory. When determining the test conclusion, the Measurement Uncertainty of test has been considered. . Unless otherwise specified, test are made under normal conditions at an ambient temperature within the range of 15℃ to 35℃, RH45% to 75% and an air pressure of 860mbar of 1060mbar	Attachment with: 1) Photo documentation

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EN 60947-2			
Clause	**Requirement-Test**	**Result**	**Verdict**
4	**Characteristics**		--
4.1	**Summary of characteristics**		--
	The characteristics of a circuit-breaker shall be stated in terms of the following, as applicable: – type of circuit-breaker (4.2);		N/A
	– rated and limiting values of the main circuit (4.3);		P
	– utilization categories (4.4);		P
	– control circuits (4.5);		P
	– auxiliary circuits (4.6);		N/A
4.2	**Type of equipment**		--
	The following shall be stated:		--
	Number of poles		P
	Kind of current		P
	Kind of current (a.c. or d.c.) and, in the case of a.c., number of phases and rated frequency.		P
4.3	**Rated and limiting values of the main circuit**		--
	The rated values established for a circuit-breaker shall be stated in accordance with 4.3.1 to 4.4, but it is not necessary to establish all the rated values listed.		P
4.3.1	**Rated voltages**	380V	--
4.3.1.1	**Rated operational voltage (*U*e)**	380V	--
4.3.1.2	**Rated insulation voltage (*U*i)**		--
4.3.1.3	**Rated impulse withstand voltage (*U*imp)**	10KV	--
4.3.2	**Currents**	44A	--
4.3.2.1	**Conventional free-air thermal current (*I*th)**		--
4.3.2.2	**Conventional enclosed thermal current (*I*the)**		--
4.3.2.3	**Rated current (*I*n)**	44A	--
4.3.3	**Rated frequency**	50Hz	--
4.3.4	**Rated duty**		--
4.3.4.1	**Eight-hour duty**		--
4.3.4.2	**Uninterrupted duty**		--
4.3.5	**Normal load and overload characteristics**		--
4.4	**Utilization categories**		--
4.5	**Control circuits**		--
4.6	**Auxiliary circuits**		--
4.7	**Releases**		--
5	**Product information**		--

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EN 60947-2			
Clause	**Requirement-Test**	**Result**	**Verdict**
5.1	**Nature of the information**		--
	Subclause 5.1 of IEC 60947-1 applies, as far as appropriate for a particular design.		P
5.2	**Marking**		--
5.2.1	Each equipment shall be marked in a durable and legible manner with the following data.		--
	a) Indication of the open and closed position. The open and closed position shall be respectively indicated by the graphical symbols 60417-IEC-5007 and 60417-IEC-5008 of IEC 60417-2 (see 7.1.6.1 of IEC 60947-1).		P
	b) Suitability for isolation. The appropriate symbols of Table 1 shall be used.		P
	c)Additional marking for disconnectors.		P
	Devices of utilization category AC-20A, AC-20B, DC-20A and DC-20B shall be marked "Do not operate under load", unless the device is interlocked to prevent such operation.		N/A
5.2.2	The following data shall also be marked on the equipment but need not be visible from the front when the equipment is mounted:		--
	manufacturer's name or trade mark;		P
	type designation or serial number;		P
	Rated operational currents		P
	value (or range) of the rated frequency or the indication "d.c."		P
	For fuse-combimation units, the fuse characteristics and maximum rated current and the maximum power loss of the fuse-link.		N/A
	IEC 60947-3, if the manufacturer claims compliance with this part;		P
	degree of protection of enclosed equipment (see Annex C of IEC 60947-1).		P
5.2.3	The following data shall be made available in the manufacturer's published information:		--
	rated insulation voltage;		P
	rated impulse withstand voltage for equipment suitable for isolation or when determined;		P
	pollution degree, if different from 3;		P
	rated duty;		P
	rated short-time withstand current and duration, where applicable;		P
	rated short-circuit making capacity, where applicable;		P
	rated conditional short-circuit current, where applicable.		P
5.3	Instructions for installation, operation and maintenance		--

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EN 60947-2			
Clause	**Requirement-Test**	**Result**	**Verdict**
	Subclause 5.3 of IEC 60947-1 applies		P
6	**Normal service, mounting and transport conditions**		--
	Clause 6 of IEC 60947-1 applies with the following addition.		P
	Pollution degree (see 6.1.3.2 of IEC 60947-1)		P
	Unless otherwise stated by the manufacturer, the equipment is intended for installation under environmental conditions of pollution degree 3.		P
7	**Constructional and performance requirements**		--
7.1	Constructional requirements		--
	Subclause 7.1 of IEC 60947-1 applies, with the following additions.		P
7.1.2.2	**Glow wire testing**		--
	Subclause 7.1.2.2 of IEC 60947-1 applies with the following additions.		P
	Parts of insulating material necessary to retain current-carrying parts in position shall conform to the glow-wire tests of 8.2.1.1.1 of IEC 60947-1 at a test temperature of 960 °C.		P
7.1.7	Additional requirements for equipment suitable for isolation		--
7.1.7.1	Additional constructional requirements		--
	The equipment shall be marked according to 5.2.1 b).		P
	When no indication of the position of the contacts is provided, for example by the actuator or a separate indicator, all the main contacts shall be clearly visible in the open position.		P
7.1.9	Additional requirements for equipment provided with a neutral pole		--
7.2	Performance requirements		--
7.2.1	Operating conditions		--
7.2.1.1	**General**		--
	Subclause 7.2.1.1 of IEC 60947-1 applies with the following additions.		P
	The following requirements apply to fuse-switches, fuse-disconnectors and fuse-switch- disconnectors with a rated short-circuit making capacity exceeding 10 kA and for which the closing operation is by direct manual operation without an interposing mechanism (dependent and semi-independent manual operation		P
	The test speed for the making operations specified in 8.3.6.2 shall be determined as follows.		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
	The equipment shall be operated 15 times manually under no-load conditions in accordance with the manufacturer's instructions, 5 times by each of three persons. The velocity of the hand actuator at the instant of contact closure of the last closing contact shall be determined by oscillographic or other appropriate means at any convenient part of the device.		P
	The point at which the measurement is made and the velocity at the measurement point shall be stated in the test report. The mean velocity shall be determined after deleting the highest and lowest values.		N/A
	The test apparatus shall ensure that the equipment under test fully closes and that there is no impediment to the free closing movement of the device. The actual test speed shall not exceed the mean velocity determined according to a).		N/A
7.2.1.2	Limits of operation of power operated equipment		--
7.2.2	Temperature rise		--
	Subclause 7.2.2 of IEC 60947-1 applies with the following addition.		P
	For fuse-combination units, the temperature rise of the fuse-link contacts during the test according to 8.3.3.1 shall not cause any damage of a nature which impairs the subsequent performance of the equipment in test sequence I.		N/A
7.2.3	Dielectric properties		--
	Subclause 7.2.3 of IEC 60947-1 applies with the following additions.		P
7.2.3.1	Impulse withstand voltage		--
	Subclause 7.2.3.1 of IEC 60947-1 applies with the following addition.		P
	Clearances across the open contacts of a device not suitable for isolation shall withstand the test voltage given in Table 12 of IEC 60947-1 appropriate to the rated impulse withstand voltage.		P
7.2.3.2	Power-frequency withstand voltage of the main, auxiliary and control circuits		--
	Subclause 7.2.3.2 c) of IEC 60947-1 applies with the following addition.		P
	For equipment suitable for isolation, maximum values of leakage current are specified for all the test sequences in 8.3.3.5, 8.3.4.3, 8.3.5.4, 8.3.6.4 and 8.3.7.3 respectively.		P
7.2.4	Ability to make and break under no-load, normal load and overload conditions		--
7.2.4.1	**Making and breaking capacities**		--

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Clause	**Requirement-Test**	**Result**	**Verdict**
	The rated making and breaking capacities are stated by reference to the rated operational voltage and rated operational current and to the utilization category according to Table 3.		P
7.2.4.2	**Operational performance**		--
	Tests concerning the verification of the operational performance of an equipment are intended to verify that the equipment is capable of making and breaking without failure the currents flowing in its main circuit for the intended use.		P
	The number of operating cycles and the test circuit parameters for the operational performance test for the various utilization categories are given in Tables 4 and 5.		P
7.2.4.3	**Mechanical durability**		--
	Subclause 7.2.4.3.1 of IEC 60947-1 applies. Test conditions are specified in 8.5.1.		P
7.2.4.4	Electrical durability		--
	Subclause 7.2.4.3.2 of IEC 60947-1 applies. Test conditions are specified in 8.5.2.		P
7.2.5	Ability to make, break or withstand short-circuit currents		--
	The equipment shall be so constructed as to be capable of withstanding, under the conditions specified in this part, the thermal, dynamic and electrical stresses resulting from short-circuit currents.		P
	Short-circuit currents may be encountered during current making, current carrying in the closed position and current interruption.		P
	The ability of the equipment to make, carry and break short-circuit currents is stated in terms of one or more of the following ratings.		P
	Rated short-time withstand current (see 4.3.6.1). Rated short-circuit making capacity (see 4.3.6.2). Rated conditional short-circuit current (see 4.3.6.4).		P
7.2.7	**Additional performance requirements for equipment suitable for isolation**		--
	These requirements only apply to equipment with rated operational voltage greater than 50 V.		P
	With the equipment in new condition and the contacts in the open position the equipment shall withstand the dielectric test of 8.3.3.2.		P
	If tests according to 8.3.3.3 and 8.3.4.1 have been made, the equipment in the condition after the tests shall meet the leakage current requirements of 8.3.3.5.		P
7.2.9	**Overload requirements for equipment incorporating fuses**		--

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Clause	**Requirement-Test**	**Result**	**Verdict**
	The main circuit of an equipment shall be capable of carrying an overload current according to 8.3.7.1 and shall not cause any damage of a nature which impairs the subsequent performance of the equipment in test sequence V.		N/A
7.3	Electromagnetic compatibility		--
7.3.1	**General**		--
	Subclause 7.3.1 of IEC 60947-1 applies.		N/A
7.3.2	Immunity		--
7.3.3	**Emission**		--
7.3.3.2	**Equipment incorporating electronic circuits**		--
	Equipment incorporating electronic circuits (e.g. an electronic fuse-blowing indicator) may generate continuous electromagnetic disturbances.		N/A
	Emission shall fulfil the requirements of class A, group 1 of CISPR 11 or those of class A of CISPR 22 (see 8.4.2.2).		N/A
	These limits are given for mechanical switching devices which are used exclusively in an industrial environment. When there exists a likelihood of use outside the industrial environment, the following notice shall be included in the manufacturer's published information.		N/A
	However, this notice is not necessary when the emission limits given in CISPR 22, class B are fulfilled.		N/A
8	**Test**		--
8.1	**Kind of tests**		--
8.1.1	**General**		--
	Subclause 8.1.1 of IEC 60947-1 applies.		P
8.1.2	Type tests		--
	Subclause 8.1.2 of IEC 60947-1 applies. Type tests are given in Table 9 of this part.		N/A
8.1.3	Routine tests		--
	Subclause 8.1.3 of IEC 60947-1 applies with the following additions.		P
8.1.3.1	General		--
	The following tests apply: mechanical operation test (see 8.1.3.2) operation of the switch, disconnector, switch-disconnector or fuse-combination unit during manufacture and/or other routine test may take the place of the tests listed above, provided the same conditions apply and the number of operations is not less than that specified;		P
	dielectric test		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
	if, by the control of materials and manufacturing processes, the integrity of the dielectric properties has been proven, these tests may be replaced by sampling tests according to a recognized sampling plan (see IEC 60410).		P
8.1.3.2	Dielectric test		--
	The test conditions shall be in accordance with 8.3.3.4.2 of IEC 60947-1. As an alternative, the combined test according to 8.3.3.4.2, item 3), of IEC 60947-1 is allowed. The value of the test voltage shall be in accordance with that given in Table 12A of IEC 60947-1. The duration of the test shall not be less than 1 s and the test voltage shall be applied as follows:		P
	with the equipment in the open position, between each pair of terminals which are electrically connected together when the equipment is closed;		P
	with the equipment in the closed position, between each pole and the adjacent pole(s) and between each pole and the frame;		P
	for equipment incorporating electronic circuits connected to the main poles, with the equipment in the open position, between each pole and the adjacent pole(s) and between each pole and the frame, either on the incoming side or the outgoing side depending on the position of the electronic components.		P
	Alternatively, disconnection of the electronic circuit(s) is permitted during dielectric tests.		P
8.1.4	Sampling tests		--
	Sampling tests for verification of clearances shall be made according to 8.3.3.4.3 of IEC 60947-1 in accordance with a recognized sampling plan (see IEC 60410).		P
8.1.5	Special tests		--
	Special tests (see 2.6.4 of IEC 60947-1) are specified in 8.5.		N/A
8.2	Type tests for constructional requirements		--
	Subclause 8.2 of IEC 60947-1 applies with the following additions.		N/A
8.2.4	Mechanical properties of terminals		--
	Subclause 8.2.4 of IEC 60947-1 applies with the following addition.		N/A
	Where equipment is designed to be provided with different designs of terminals, the tests shall be conducted on every design.		N/A
8.2.5	Verification of the effectiveness of indication of the main contacts position of equipment suitable for isolation		--
	Subclause 8.2.5 of IEC 60947-1 applies with the following additions.		N/A

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Clause	**Requirement-Test**	**Result**	**Verdict**
8.2.5.1	Condition of equipment for tests		--
	The test of the actuator mechanism and position indicating device shall be conducted as part of test sequence I (see 8.3.3 and Table 11).		N/A
	If different types of actuators exist, either additional or integral, only one design shall be tested during sequence I. Moreover, the sample representative of the more critical case shall be tested according to 8.3.3.7.		N/A
8.3	**Performance**		--
	Performance type tests to which equipment may be submitted according to its kind are listed in Table 9.		P
8.3.1	Test sequences		--
	Type tests are grouped together in a number of sequences as shown in Table 10.		P
	For each sequence, tests shall be made in the order listed in accordance with the requirements of the appropriate subclause, apart from the temperature-rise test (simplified testing only) and dielectric properties test of test sequence I, which may be conducted on a separate sample.		P
8.3.2	**General test conditions**		--
8.3.2.1	**General requirements**		--
	Subclause 8.3.2.1 of IEC 60947-1 applies to all type tests as applicable. The equipment at the start of any test sequence shall be in new and clean condition.		P
	The force applied for any opening operation shall not be greater than the test force determined in 8.2.5.2 of IEC 60947-1 and shall be applied in the same manner without shock.		P
	Where doubt exists as to the correct opening operation, no more than 3 attempts to operate the equipment to the open position are allowed.		P
	In order to reduce multiple testing for the same fundamental design of equipment, the following test requirements may be used.		P
8.3.2.1.1	Simplified test for equipment having the same fundamental design		--
	When submitting simultaneously a range of switches, disconnectors, switch-disconnectors or fuse combination units of the same fundamental design, the following variations are permitted provided the equipment complies in all other respects.		P
8.3.2.1.2	Requirements for equipment having the same fundamental design		--
	Switches, disconnectors, switch-disconnectors or fuse combination units shall be evaluated with respect to the following criteria during the determination of acceptance as the same fundamental design:		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
	the material, finish and dimensions of the current-carrying parts are identical, except for variation in design of terminals and means of fuse attachment;		P
	the contact size, material, configuration and method of attachment are identical;		P
	the operating mechanism is of the same fundamental design, materials and physical characteristics are identical;		P
	the closing and opening speeds of contacts are substantially the same;		P
	moulding and insulating materials are identical;		P
	method, materials and construction of any arc extinction device are identical.		P
	The following variations are also permitted, provided the simplified test procedure given in 8.3.2.1.3 is used:		P
	utilization category and operational voltage;		P
	application for 50 Hz or 60 Hz;		P
	three or four pole equipment (switched or non-switched neutral), provided the requirements of 7.1.9 are applicable;		P
	design ol terminal provided that clearances and creepage distance are not reduced (see 8.2.4 and 8.3.3.2 ol this standard and also see 7.1.4 and 8.3.3.1 ol I(C 60947-1);		N/A
	different types of actuators, either additional or integral, provided the requirements for strength of actuator are verified (see 8.2.5) on each type of actuator, one of which during test sequence I;		N/A
	fuse-base contacts of switch-fuses, disconnector-fuses and switch-disconnector-fuse with different types of fuse-links (fuse-link removed only under no-load conditions).		N/A
8.3.2.1.3	Simplified test procedure		--
	The following simplified test procedure shall be used.		P
	If equipment having the same fundamental design is marked claiming more than one utilization category and/or more than one operational voltage, the number of test samples may be reduced, providing the tests are conducted under the most severe conditions.		P
	For short-circuit, making and breaking, and operational performance tests, the conditions are deemed more severe if the following conditions are simultaneously fulfilled: operational rated voltage equal or higher; test current equal or higher; power factor equal or lower; number of operations equal or higher.		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
	Tests performed at 50 Hz are deemed to cover 60 Hz applications and vice versa with the following exceptions:		P
8.3.2.2	Test quantities		--
	Subclause 8.3.2.2 of IEC 60947-1 applies.		P
8.3.2.3	Evaluation of test results		--
	The behaviour of the equipment during the tests and its condition after the tests are specified in the appropriate test clause.		P
8.3.3	Test sequence I: general performance characteristics		--
	This test sequence applies to the types of equipment listed in Table 11 and comprises the tests according to the table.		P
8.3.3.1	Temperature-rise		--
	Subclause 8.3.3.3 of IEC 60947-1 applies with the following additions.		P
	Fuse-combination units shall be fitted with fuse-links having a rated current equal to the conventional thermal current of the combination unit.		N/A
	The fuse-link shall have a power loss not exceeding the maximum value specified by the equipment manufacturer.		N/A
	In the case of tests carried out on a fuse-switch, a fuse-disconnector or a fuse-switch- disconnector where the blades of the fuse-links are part of the make-breaking contacts, fuse- links shall be used.		N/A
	Details of the fuse-links used for the test, i.e. the manufacturer's name and reference, the rated current, the power loss of the fuse-link, and the breaking capacity, shall be given in the test report. The type test with the specified fuse-links shall be deemed to cover the use of any other fuse-link having a power loss, at the conventional thermal current of the combination unit, not exceeding the power loss of the fuse-link used for the test.		N/A
8.3.3.2	**Test of dielectric properties**		--
	Subclause 8.3.3.4.1, items 1), 2), 3), 7) and, if applicable, 8) of IEC 60947-1 applies with the following addition.		P
	When, in agreement with the manufacturer, devices are disconnected for the test according to 8.3.3.4.1, item 3) c) of IEC 60947-1, the test report shall state these devices.		P
	For equipment suitable for isolation (see 3.3) having an operational voltage U_e greater than 50 V, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 U_e and shall not exceed 0,5 mA.		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
8.3.3.3	Making and breaking capacities		--
8.3.3.3.1	**Test values and conditions**		--
	Subclause 8.3.3.5 of IEC 60947-1 applies regarding equipment provided with a neutral pole. The test values are stated in 7.2.4.1, Table 3, according to the utilization category.		P
	The stated number of make-break operating cycles shall be made with a time interval between close-open cycles of 30 s ± 10 s except that for equipment of conventional thermal current of 400 A or more, the time interval may be increased by agreement between manufacturer and user and the interval shall be stated in the test report.		P
	During each make-break operating cycle, equipment need only stay in the closed position for a period long enough to allow the switching operation to be completed and to enable the current value to be established and the moving parts of the equipment to come to rest. After each operating cycle, the recovery voltage shall be maintained for at least 0,05 s.		P
	For convenience of testing, equipment of utilization categories AC-23A and AC-23B, make- break operating cycles may be replaced, with the agreement of the manufacturer, by the stated number of 10 I_e make cycles followed by the same number of 8 I_e break cycles.		P
	For a.c. the power-factor of the test circuit shall be determined in accordance with 8.3.4.1.3 of IEC 60947-1. The values shall be in accordance with Table 3.		P
	For d.c. the time-constant of the test circuit shall be determined in accordance with 8.3.4.1.4 of IEC 60947-1. The values shall be in accordance with Table 3.		N/A
	The test voltage and the load shall be applied to the appropriate terminals of the equipment. For equipment in which a moving contact remains connected to one of the terminals when the equipment is in the open position, this test shall be repeated with the supply and load connections interchanged, unless the terminals are specifically and clearly marked for load and supply.		P
	In the case of tests carried out on a fuse-switch or a fuse-switch-disconnector where the blades of the fuse-links are part of the make-breaking contacts, fuse-links shall be used.		N/A
	Details of the fuse-links used for the test, i.e. the manufacturer's name and reference, the rated current, the power loss of the fuse-link and the breaking capacity, shall be given in the test report.		N/A
8.3.3.3.2	Test circuit		--

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Clause	**Requirement-Test**	**Result**	**Verdict**
8.3.3.3.3	Transient recovery voltage		--
	Subclause 8.3.3.5.3 of IEC 60947-1 applies only to utilization categories AC-22 and AC-23. For tests for utilization categories DC-22 and DC-23 the test circuit load may be replaced by a motor producing the specified current and time constant value if agreed between manufacturer and user.		P
8.3.3.4	Dielectric verification		--
	After the test according to 8.3.3.3, a test shall be made according to 8.3.3.4.1 4) of IEC 60947-1.		P
8.3.3.5	Leakage current		--
	This test is made only on equipment suitable for isolation of rated operational voltage U_e greater than 50 V. The leakage current shall be checked across each contact gap and from each terminal to the frame.		P
	The value of leakage current, with a test voltage equal to 1,1 times the rated operational voltage of equipment shall not exceed		P
	0,5 mA per pole for equipment of utilization category AC-20A, AC-20B, DC-20A or DC-20B;		P
	2 mA per pole for equipment of all other utilization categories.		N/A
8.3.3.6	**Temperature-rise verification**		--
	After the tests according to 8.3.3.3, the temperature-rise of the terminals and accessible parts shall be checked according to 8.3.3.1 except that where a utilization category is assigned the tests are made at the rated operational current I_e of the equipment tested.		P
8.3.4	**Strength of actuator mechanism**		--
	This test sequence applies to the types of equipment listed in Table 13 and comprises the tests according to this table.		P
8.3.4.1	**Operational performance test**		--
8.3.4.1.1	**Test values and conditions**		--
	The test values are stated in Tables 4 and 5, according to the utilization category.		P
	The time interval between Table 4 operating cycles with current and without current and the sequential order of the tests shall be stated in the test report.		P
	During each make-break operating cycle, the equipment need only stay in the closed position for a period long enough to allow the switching operation to be completed and to enable the current value to be established and the moving parts of the equipment to come to rest. After each operating cycle, the recovery voltage shall be maintained for at least 0,05 s.		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
	For a.c. the power-factor of the test circuit shall be determined in accordance with 8.3.4.1.3 of IEC 60947-1. The values shall be in accordance with Table 5.		P
	For d.c. the time-constant of the test circuit shall be determined in accordance with 8.3.4.1.4 of IEC 60947-1. The values shall be in accordance with Table 5.		N/A
8.3.4.1.2	Test circuit		--
	Subclause 8.3.3.5.2 of IEC 60947-1 applies.		P
8.3.4.1.3	Transient recovery voltage		--
	It is not necessary to adjust the transient recovery voltage.		P
8.3.4.1.5	Behaviour of the equipment during the operational performance test		--
	The equipment shall perform during the above tests in such a manner as not to endanger an operator or cause damage to adjacent equipment.		P
	There shall be no permanent arcing or flash-over between poles or between poles and frame and no melting of the fuse in the detection circuit.		N/A
	The equipment shall remain mechanically operable. Contact welding, such as to prevent an opening operation using normal operating means, is not permitted.		P
	Some wear on the mechanism and contacts is allowed provided that the equipment functions correctly.		P
8.3.4.1.6	Condition of the equipment after the operational performance test		--
	It shall be demonstrated immediately after the test that the equipment will close and open satisfactorily during a no-load close/open operation.		P
	A closing operation is considered satisfactory when normal operation of the handle through its full stroke will close the contacts sufficiently for the equipment to be able to carry its rated operational current.		P
	After the tests and without maintenance the equipment shall comply with the requirements of 8.3.4.2.		P
	The contacts shall be in a suitable condition to carry the rated operational current without maintenance and shall comply with the temperature-rise verification of 8.3.4.4.		P
	If the equipment is suitable for isolation, it shall comply with 8.3.4.3.		P
8.3.4.2	Dielectric verification		--
	Subclause 8.3.3.4 applies.		P
8.3.4.3	Leakage current		--
	Subclause 8.3.3.5 applies.		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
8.3.4.4	Temperature-rise verification		--
8.3.4.5	Test sequence III: short-circuit performance capability		--
	This test sequence applies to the types of equipment listed in Table 14 and comprises the tests according to this table.		P
	This test sequence is not mandatory if a value of rated short-circuit making capacity is not stated by the manufacturer (see 8.3.5.2.1) and test sequence IV (see 8.3.6) is carried out.		P
8.3.5.1	**Short-time withstand current test**		--
8.3.5.1.1	**Test values and conditions**		--
	The test conditions of 8.3.4.3 of IEC 60947-1 apply.		P
	The test current shall be the rated short-time withstand current stated according to 4.3.6.1.		P
8.3.5.1.2	Test circuit		--
	For a.c., the power-factor of the test circuit shall be in accordance with 8.3.4.1.3 of IEC 60947-1. For d.c., the time-constant of the test circuit shall be in accordance with 8.3.4.1.4 of IEC 60947-1.		P
8.3.5.1.3	Test circuit calibration		--
	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.		P
	For a.c., resistors R_1 and reactors *X* are adjusted so as to obtain, at the applied voltage, a current equal to the rated short-time withstand current as well as the power-factor as indicated in 8.3.4.1.3 of IEC 60947-1.		P
	For d.c., resistors R_1 and reactors *X* are adjusted so as to obtain, at the applied voltage, a current the maximum value of which is equal to the rated short-time withstand current as well as the time-constant as indicated in 8.3.4.1.4 of IEC 60947-1.		N/A
8.3.5.2	Short-circuit making capacity test		--
8.3.5.2.1	**Test values and conditions**		--
	The test shall be made on the same equipment as for the test of 8.3.5.1 without any maintenance.		P
	The test current shall be that assigned by the manufacturer as stated in 4.3.6.2.		P
8.3.5.2.2	Test circuit		--
	Subclause 8.3.5.1.2 applies.		P
8.3.5.3	Dielectric verification		--
8.3.5.4	Leakage current		--

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Clause	**Requirement-Test**	**Result**	**Verdict**
	Subclause 8.3.3.5 applies, except that the maximum value of leakage current shall not exceed 2 mA per pole for all utilization categories		P
8.3.5.5	Temperature-rise verification		--
8.3.6	Test sequence IV: conditional short-circuit current		--
	This test sequence applies to the types of equipment listed in Table 15 and comprises the tests according to the table.		P
	This test sequence is not mandatory if a value of rated conditional short-circuit current is not stated by the manufacturer and test sequence III (see 8.3.5) is carried out.		P
	For switches, disconnectors and switch-disconnectors the short-circuit protective device of the equipment may be a circuit-breaker or a fuse and shall be arranged on the load side of the equipment under test.		P
	The type of circuit breaker or fuse shall be that stated by the manufacturer as suitable for the equipment.		N/A
	Details of the protective device used for the test i.e. manufacturer's name, type designation, rated voltage, current and short-circuit breaking capacity shall be given in the test report.		N/A
	The type test with the specified protective device shall be deemed to cover the use of any other protective device having a Joule integral (I^2t) and cut-off current at the rated voltage, prospective current and power-factor not exceeding the specified values for the type of protective device used for the test.		N/A
8.3.7	Test sequence V: overload performance capability		--
	This test sequence applies to the types of equipment listed in Table 16 and comprises the tests according to the table.		P
8.4	**Electromagnetic compatibility tests**		--
	Subclause 8.4 of IEC 60947-1 applies with the following addition.		P
	During tests, the following performance criterion applies: unintentional separation or closing of contacts shall not occur.		P
8.4.1	Immunity		--
8.4.2	Emission		--
8.4.2.1	**Equipment not incorporating electronic circuits**		--
8.4.2.2	Equipment incorporating electronic circuits		--
	The requirements of 7.3.3.2 apply. The limits contained in Table 7 shall be verified by tests.		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
	Measurements shall be made in the operating mode, including grounding conditions, producing the highest emission in the frequency band being investigated which is consistent with normal service conditions (see Clause 6).		P
8.5	Special tests		--
	Resistance to mechanical and/or electrical wear is demonstrated by the operational performance test detailed in 8.3.4.1.		P
	Where abnormal service conditions are expected (see also note to 7.2.4.3 of IEC 60947-1), the following tests may be necessary.		P
8.5.1	Mechanical durability		--
	The mechanical durability test (see 7.2.4.3 and 8.1.5), where required, is made in accordance with the appropriate requirements of 8.3.4.1, except that for equipment suitable for isolation, the maximum value of leakage current shall not exceed 6 mA per pole for all utilization categories.		P
	The total number of operating cycles shall be as declared by the manufacturer.		P
8.5.2	Electrical durability		--
	The electrical durability test (see 7.2.4.4 and 8.1.5), where required, is made in accordance with the appropriate requirements of 8.3.4.1, except that for equipment suitable for isolation, the maximum value of leakage current shall not exceed 6 mA per pole for utilization categories AC-21, AC-22, AC-23, DC-21, DC-22 and DC-23.		P
	Equipment of utilization categories AC-20A, AC-20B, DC-20A and DC-20B is not submitted to this test.		N/A
	The total number of operating cycles shall be as declared by the manufacturer.		P

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Appendix 1

Photo documentation

Photo 1

Photo 2

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Photo 3

Photo 4

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Photo 5

Photo 6

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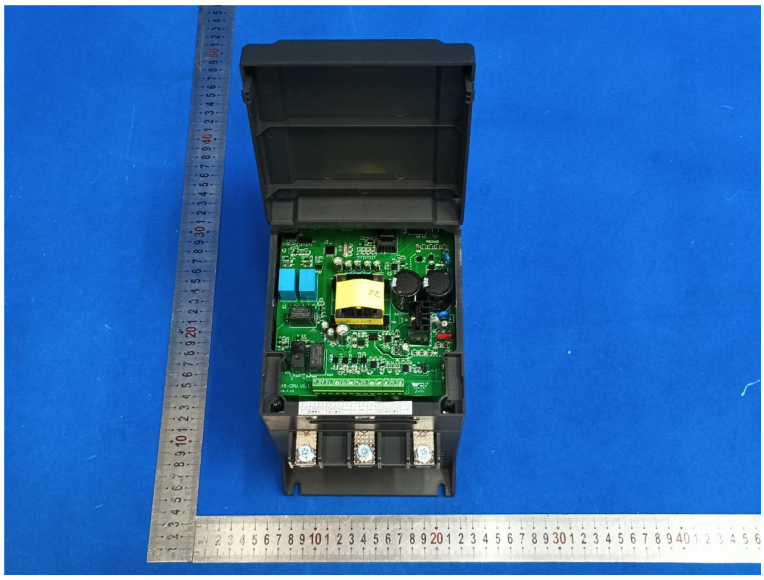
Photo 7



End of Test Report

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