	Test Report issued under the responsibility of:	

TEST REPORT
IEC 60947-4-1
Low voltage switchgear and controlgear
Part 4: Contactors and motor-starters
Section 1 - Electromechanical contactors and motor-starters

Report Number. ..... :	**874102423301-00**
Date of issue ..... :	**2024-06-11**
Total number of pages ..... :	**213**
Name of Testing Laboratory preparing the Report ..... :	TÜV SÜD Certification and Testing (China) Co., Ltd. Ningbo Branch/ Building 2, 1&9/F. of Building 1, Essence Adream of Space II, No.350, Jinghua Road, National Hi-Tech Industrial Development Zone, Ningbo, Zhejiang, China
Applicant's name ..... :	Zhejiang Tengen Electric Co., Ltd.
Address ..... :	Sulv Industrial Area, Liushi Town 325604 Yueqing City PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard ..... :	IEC 60947-4-1:2018 to be used in conjunction with IEC 60947-1:2007, IEC 60947-1:2007/AMD1:2010, IEC 60947-1:2007/AMD2:2014
Test procedure ..... :	CE_LVD
Non-standard test method ..... :	N/A
TRF template used ..... :	IECEE OD-2020-F1:2023, Ed.1.6
Test Report Form No. ..... :	IEC60947_4_1D
Test Report Form(s) Originator .... :	DEKRA Certification B.V.
Master TRF ..... :	Dated 2023-11-10

This report is not valid as a CB Test Report unless signed by an approved IECEE Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description ..... :	Thermal overload relay
Trade Mark ..... :	TENGEN
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	TGR1-25
Ratings ..... :	U_{imp}: 6kV, U_i: 690V, U_e: AC690V, details see general product information and other remarks.

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	TÜV SÜD Certification and Testing (China) Co., Ltd. Ningbo Branch	
Testing location/ address.....:		See page 4	
Tested by (name, function, signature).....:		Xiangyang XIAO (Project Handler)	
Approved by (name, function, signature)...:		Zhenxing XU (Designated Reviewer)	
☐	**Testing procedure: CTF Stage 1:**	N/A	
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**	N/A	
Testing location/ address.....:			
Tested by (name + signature) .....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**	N/A	
☐	**Testing procedure: CTF Stage 4:**	N/A	
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):

Photo documentation (9 pages)

Data form for electrical equipment and machinery (11 pages)

Attachment 1: test report of auxiliary contact No. 874102423301-00 (74 pages)

Summary of testing:

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.

The products are exactly same except the model name and ratings.

Test sequence	Specification	Sample No.
1	TGR1-25: 17A to 25A	I-1#
1	TGR1-25: 0,1A to 0,16A	I-2# 1)
1	TGR1-25: 0,16A to 0,25A	I-3# 1)
1	TGR1-25: 0,25A to 0,4A	I-4# 1)
1	TGR1-25: 0,4A to 0,63A	I-5# 1)
1	TGR1-25: 0,63A to 1A	I-6# 1)
1	TGR1-25: 1A to 6A	I-7# 1)
1	TGR1-25: 1,6A to 2,5A	I-8# 1)
1	TGR1-25: 2,5A to 4A	I-9# 1)
1	TGR1-25: 4A to 6A	I-10# 1)
1	TGR1-25: 5,5A to 8A	I-11# 1)
1	TGR1-25: 7A to 10A	I-12# 1)
1	TGR1-25: 9A to 13A	I-13# 1)
1	TGR1-25: 12A to 18A	I-14# 1)
3	TGR1-25: 9A to 13A	III-1#
3	TGR1-25: 17A to 25A	III-2#
8.2.4 of part 1	TGR1-25	V-01#
7.1.4 of part 1	TGR1-25	V-01#
8.2.1.1 of part 1	/	Y-1#
I of part 2	TGR1-25, auxiliary contact	I-01#
II of part 2	TGR1-25, auxiliary contact	F2-01, F2-02, F2-03
III of part 2	TGR1-25, auxiliary contact	F1-01, F1-02
IV of part 2	TGR1-25, 1000A	F3-01

Note: 1) I-2#, I-3#, I-4#, I-5#, I-6#, I-7#, I-8#, I-9#, I-10#, I-11#, I-12#, I-13#, I-14# only for clause 9.3.3.2.

All test performed with positive result.

Tests performed (name of test and test clause):	**Testing location:**
Test sequence 1: Verification of temperature-rise (see 9.3.3.3) Verification of operation and operating limits (see 9.3.3.1 and 9.3.3.2) Verification of dielectric properties (see 9.3.3.4)	Zhejiang Quality Inspection Center of High and Low-voltage Electrical Products (NEQC) Nanxijiang Road, Daqiao Industrial Area, Beibaixiang, Yueqing, Zhejiang China
Test sequence 3: Performance under short-circuit conditions (see 9.3.4) 8.2.4 of EN 60947-1 mechanical properties of terminals 8.2.1.1 of EN 60947-1 test of resistance to abnormal heat and fire 7.1.4 of EN 60947-1 Clearances and creepage distances Sequence I of EN 60947-5-1 8.3.3.3Temperature rise 8.3.3.4 Dielectric properties Sequence II of EN 60947-5-1 8.3.3.5.3 Making and breaking capacities of switching elements under normal conditions 8.3.3.5.6 b Dielectric verification Sequence III of EN 60947-5-1 8.3.3.5.4 Making and breaking capacities of switching elements under abnormal conditions 8.3.3.5.6b Dielectric verification Sequence IV of EN 60947-5-1 8.3.4 Performance under conditional short-circuit current 8.3.3.5.6b Dielectric verification	Sequence I and clause 9.3.4 (“r”): Zhejiang Tengen Electric Co., Ltd. No.288, Central Avenue, Economic Development Zone, Yueqing, Zhejiang, China

Summary of compliance with National Differences

No National or Group Differences declared.

According to the endorsement notice on relevant standard, the text of the international standard IEC 60947-4-1:2018 was approved by CENELEC as a European Standard without any modification.

☒ The product fulfils the requirements of EN IEC 60947-4-1:2019.

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other: … (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:
The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.
IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate:

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

See CDF.

Test item particulars.....:	Thermal overload relay
Classification of installation and use.....:	Incorporated use
Supply Connection.....:	Screw terminal
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	2024-02-19
Date (s) of performance of tests.....:	2024-02-21 to 2024-04-19

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies).....: Same as applicant

General product information and other remarks:

The product is thermal overload relay intended to use for protection of motor in AC system, and the voltage up to 690VAC.

The product with different current, the construction is similar except the material of the bi-metal and heating element.

Material of Heating element

Rated current	Model	Technical data
0,1A to 0,16A	0Cr25A15	Ø0,16
0,16A to 0,25A		Ø0,18
0,25A to 0,4A		Ø0,25
0,4A to 0,63A		Ø0,4
0,63A to 1A		Ø0,5
1A to 1,6A	Cr15Ni60	Ø0,25x1,2
1,6A to 2,5A		Ø0,3x1,5
2,5A to 4A	CuNi44	Ø0,4x2
4A to 6A		Ø0,4x2,8
5,5A to 8A		Ø0,4x4
7A to 10A	CuNi25	Ø0,3x4
9A to 13A	CuNi6	Ø0,45x3
12A to 18A		Ø0,4x4
17A to 25A	CuNi2	Ø0,45x5

Model:	TRG1-25
Main circuits:	
Rated insulation voltage U_i:	690V
Rated impulse withstand voltage U_{imp}:	6kV
Rated operational voltage U_e:	AC690V
Rated frequency:	50/60Hz
Rated operational current I_e:	0,1A to 0,16A, 0,16A to 0,25A, 0,25A to 0,4A, 0,4A to 0,63A, 0,63A to 1A, 1A to1,6A, 1,6A to 2,5A, 2,5A to 4A, 4A to 6A, 5,5A to 8A, 7A to 10A, 9A to 13A, 12A to 18A, 17A to 25A
Rated conditional short-circuit current I_q:	50kA
Type of co-ordination:	Type 1
Trip class:	10A
Number of poles:	3P
Degree of protection:	IP20 after installation
Auxiliary circuits:	
Rated insulation voltage U_i:	380V
Thermal current I_{th}:	5A
Rated operational voltage U_e:	AC380V, AC220V, DC220V
Rated operational current I_e:	0.95A / AC380V, 1.64A / AC220V, 0.15A / DC220V
Utilization category:	AC-15, DC-13
Rated conditional short-circuit current:	1000A

- kind of equipment ..... :	Thermal overload relay
- number of poles ..... :	3P
- kind of current (a.c. or d.c.) ..... :	a.c.
- interrupting medium ..... :	Air
- method of operation ..... :	Thermal-magnetic
- method of control ..... :	Automatic
- method of change-over for particular types of starters ..... :	N/A
- method of connecting for particular types of starters ..... :	N/A
- rated frequency ..... :	N/A
- rated duties ..... :	Uninterrupted duty
-Utilization category ..... :	N/A
Rated and limiting values, main circuit	
Rated voltages	
- rated operational voltage Ue (V) ..... :	AC690V
- rated stator operational voltage Ues (V) ..... :	N/A
- rated rotor operational voltage Uer (V) ..... :	N/A
- rated insulation voltage Ui (V) ..... :	690V
- rated stator insulation voltage Uis (V) ..... :	N/A
- rated rotor insulation voltage Uir (V) ..... :	N/A
- rated impulse withstand voltage Uimp (kV) ..... :	6kV
- rated starting voltage of an auto-transformer starter ..... :	N/A
Currents or powers	
- conventional free air thermal current Ith (A) ..... :	N/A
- conventional enclosed thermal current Ithe (A) ..... :	N/A
- conventional stator thermal current Iths (A) ..... :	N/A
- conventional rotor thermal current Ithr (A) ..... :	N/A
- rated operational current Ie (A) or rated operational powers ..... :	Details see general product information
- rated stator operational current Ies (A) or rated stator operational powers ..... :	N/A
- rated rotor operational current Ier (A) ..... :	N/A
- rated uninterrupted current Iu (A) ..... :	Same as Ie

-rated duty.....:	Uninterrupted duty
Normal load and overload characteristics	
- ability to withstand motor switching overload currents.....:	N/A
-rated making capacity .....:	N/A
-rated breaking capacity.....:	N/A
-conventional operational performance .....:	N/A
Starting and stopping characteristics of starters	N/A
-service conditions for starters .....:	N/A
Short-circuit characteristics	
- rated ultimate short-circuit breaking capacity of a MPSD I_{cu} (kA).....:	N/A
- rated service short-circuit breaking capacity of a MPSD I_{cs} (kA) .....:	N/A
- rated prospective short-circuit current "r" (kA) .....:	1kA, 3kA
- rated conditional short-circuit current Iq (kA).....:	50kA
- type of co-ordination.....:	Type 1
- Pole impedance of a contactor (Z) .....:	N/A
Control circuits	
Characteristics of electrical and electronic control circuits	
- type of current.....:	N/A
- rated frequency or d.c. .....:	N/A
- rated control circuit voltage Uc (a.c. / d.c.) .....:	N/A
- rated control circuit supply voltage Us (a.c. / d.c.) .....:	N/A
- nature of external control circuit devices (contacts, sensors, optocouplers, electronic active components, etc):	N/A
- power consumption .....:	N/A
- limited energy (if the source is in accordance with 8.1.14):	N/A
- SELV (PELV) supply ……..:	N/A
- holding power ……..…..:	N/A
- pick-up power ……..……..……..:	N/A
Rated and limiting values of air supply control circuit	
- rated pressure and limits.....:	N/A
- volumes of air .....:	N/A

Auxiliary circuits:		
- rated operational voltage Ue (V)	:	AC220V, AC380V, DC220V
- rated insulation voltage: Ui (V)	:	380V
- rated operational current: Ie (A)	:	1,64A, 0,95A, 0,15A (details see general product information)
- kind of current	:	a.c., d.c.
- rated frequency: (Hz)	:	50/60Hz for a.c.
- number of circuits	:	1NO1NC
- number and kind of contact elements	:	2
- rated uninterrupted current: Iu (A)	:	Same as Ie
- utilization category: (AC, DC, current and voltage)	:	AC-15, DC-13
Short-circuit characteristic		
- Rated conditional short-circuit current (kA)	:	1kA
- kind of protective device	:	RT16-00/ 6A

Rated and limiting values of relays and releases	
- types of relay or release.....:	☐ a) release with shunt coil (shunt trip) ☐ b) under voltage and under–current opening relay or release ☒ c) overload time-delay relay the time-lag of which is: ☐ 1) substantially independent of previous load (e.g. time-delay magnetic overload relay) ☐ 2) dependent on previous load (e.g. thermal or electronic overload relay) ☒ 3) dependent on previous load (e.g. thermal or electronic overload relay) and also sensitive to phase loss ☐ d) instantaneous overload relay or release ☐ e) instantaneous short-circuit relays or releases. ☐ f) Stall relay or release ☐ g) other relays or releases (e.g., control relay associated with devices for the thermal protection of the motor
characteristic values	N/A
a) release with shunt coil, under–voltage (under–current) opening relay or release	N/A
- rated voltage (current) .....:	N/A
- rated frequency.....:	N/A
- operating voltage (current) .....:	N/A
- operating time.....:	N/A
- inhibit time.....:	N/A
b) Overload relay and release (including the overload function of MPSD)	Thermal overload relay
-designation and current settings.....:	See general product information
-rated frequency, when necessary (for example in case of a current transformer operated overload relay) .....:	N/A
- time-current characteristics (or range of characteristics), when necessary.....:	N/A
- trip class according to classification in table 2, or the value of maximum tripping time, in seconds, under the conditions specified in 8.2.1.5.1, table 2, column D, when this time exceeds 40 s. .....:	10A
- number of poles.....:	3P
- nature of the relay: thermal, magnetic, electronic without thermal memory.....:	Thermal
- nature of the reset .....:	Automatic
- tripping time of overload relays class 10A if longer than 2 min at –5 °C or below .....:	N/A

c) Release with residual current sensing relay	N/A
- rated current .....:	N/A
- operating current .....:	N/A
- operating time or time-current characteristic according to table T.1 of IEC 60947-1:2007, IEC 60947- 1 :2007 /AMD1:2010 ……..:	N/A
- inhibit time (when applicable) .....:	N/A
- type designation (see Annex T of IEC 60947-1:2007, IEC 60947- 1:2007 /AMD1:2010 .....:	N/A
d) Short-circuit release of an MPSD:	N/A
- rated operational currents (I_e) or rated operational powers	N/A
- rated frequency ……:	N/A
- current setting (or range of settings) if applicable .....:	N/A
Type and characteristics of automatic change-over devices and automatic acceleration control devices	N/A
Types	☐ a) time delay, e.g. time delay contactor relays (see IEC 60947-5-1) applicable to control-devices or specified-time-or nothing relays (see IEC 61810-1) ☐ b) under current devices (undercurrent relays ☐ c) other devices for automatic control - ☐ devices dependent on voltage - ☐ devices on power - ☐ devices depending on speed
Characteristics	N/A
a) the characteristics of time-delay devices are	N/A
- the rated time-delay or its range, if adjustable .....:	N/A
- for time-delay devices fitted with a coil, the rated voltage, when it differs from the starter line voltage .....:	N/A
b) the characteristics of the under voltage devices are	N/A
- the rated current (thermal current and /or rated short-circuit withstand current, according to the indications given by the manufacturer) .....:	N/A
- the current setting or its range, if adjustable .....:	N/A
c) the characteristics of the other devices shall be determined by agreement between manufacturer and user	N/A

Types and characteristics of auto-transformers for two-step auto-transformer starter	N/A
Account being taken of the starting characteristics (see 5.3.5.5.3), starting auto-transformers shall be characterized by	N/A
- rated voltage of auto-transformer .....:	N/A
- the number of taps available for adjusting torque and current .....:	N/A
- the starting voltage, i.e. the voltage at the tapping terminals, as a percentage of the rated voltage of auto-transformer .....:	N/A
- the current they can carry for a specified duration .....:	N/A
-the rated duty(see 5.3.4) .....:	N/A
-the method of cooling .....:	☐ air-cooling
	☐ oil-cooling
-mounting design .....:	☐ built-in
	☐ or provide separately
Types and characteristics of starting resistors for rheostatic starters	N/A
Account being taken of the starting characteristics (see 5.3.5.5.1), the starting resistor shall be characterized by :	N/A
- the rated rotor insulation voltage (Uir)	N/A
- their resistor value .....:	N/A
- the mean thermal current, defined by the value of steady current they can carry for specified duration .....:	N/A
- the rated duty (see 5.3.4) .....:	N/A
- the method of cooling .....:	☐ free air
	☐ forced air
	☐ foil immersion
-mounting design .....:	☐ built-in
	☐ or provide separately

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.2	MARKING		
	Data shall be marked on the equipment (mandatory):		
	a – manufacturer's name or trade mark	TENGEN	P
	b – type designation or serial number	TGR1-25	P
	Data preferably marked on the equipment:		P
	c - number of this standard, if the manufacturer claims compliance	IEC/EN 60947-4-1	P
	n - IP code	IP20	P
	S2) Overload relays and releases: Characteristic values		P
	S2) Overload relays and releases: Designation and current settings of overload relays		P
	e - polarity of terminals, if applicable		N/A
	Data shall be included on the nameplate, or on the equipment, or in the manufacturer's published literature:		
	d - rated operational voltages	AC690V	P
	f - utilization category and rated operational currents (or rated powers), at the rated operational voltages of the equipment	0,1A to 0,16A, 0,16A to 0,25A, 0,25A to 0,4A, 0,4A to 0,63A, 0,63A to 1A, 1A to1,6A, 1,6A to 2,5A, 2,5A to 4A, 5,5A to 8A, 7A to 10A, 9A to 13A, 12A to 18A, 17A to 25A	P
	g - either the value of the rated frequency/ies, or the indication d.c. (or symbol) .....:	a.c.	P
	h - rated duty with the indication of the class of intermittent duty, if any		N/A
	i – pole impedance of the switching device (Z);		N/A
	j - material declaration according to Annex W of IEC 60947-1:2007/AMD2:2014;		N/A
	Associated values:		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	k - rated marking and breaking capacities (these indications may be replaced, where applicable, by the indication of the utilization category, see table 7)		N/A
	Safety an installation:		
	l – rated insulation voltage	690V	P
	m – rated impulse withstand voltage (see 5.3.1.3)	6kV	P
	o – pollution degree	3	P
	- rated conditional short-circuit current (see 5.3.6) and type of co-ordination of the contactor or starter (see 8.2.5.1) and the type, current rating and characteristics of the associated SCPD; - rated conditional short-circuit current (see 5.3.6) of the combination starter, the combination switching device, the protected starter or the protected switching device and type of co-ordination (see 8.2.5.1) - for MPSD, rated ultimate short-circuit breaking capacity (I_{cu}) and rated service short circuit breaking capacity (I_{cs}) (see 8.2.4.7).	Rated prospective short-circuit current “r”: 1kA, 3kA rated conditional short-circuit current Iq = 50kA type of co-ordination: type 1 type of SCPD: RT16-00 (2A to 50A)	P
	p - maximum permissible altitude of the site of installation, if greater than 2 000 m. - length of insulation to be removed before insertion of the conductor into the terminal; - maximum number of conductors which may be clamped. for non-universal screwless terminals: - “s” or "sol" for terminals declared for rigid-solid conductors; - "r" for terminals declared for rigid (solid and stranded) conductors; - “f” for terminals declared for flexible conductors.		N/A
	q - reference of dedicated wiring accessories which can be used for wiring the starter or the combination of contactors;		N/A
	Control circuits		
	The following information concerning control circuits shall be placed either on the coil or on the equipment:		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	r – rated control circuit voltage (Uc), nature of current and rated frequency		N/A
	s - if necessary, nature of current, rated frequency and rated control supply voltages		N/A
	Air supply systems for starter or contactors operated by compressed air		
	t - rated supply systems of the compressed air and limits of variation of this pressure, if they are different from those specified in 8.2.1.2		N/A
	Auxiliary circuits:		
	u – ratings of auxiliary circuits	AC-15: AC220V/ 1,64A, AC380V/ 0,95A; DC-13: DC220V/ 0,15A	P
	Over-current relays and releases:		
	v1 – characteristics according to 5.7.2, 5.7.5 and 5.7.6;		N/A
	v2 – characteristics according to 5.7.3 and 5.7.4;		N/A
	Additional information for certain types of contactor and starter:		
	Rheostatic starters:		
	w – circuit diagram		N/A
	x – severity of start, see 5.3.5.6.1		N/A
	y – starting time, see 5.3.5.6.1		N/A
	Auto-transformer starters:		N/A
	z – rated starting voltage(s), i.e. voltage(s) at the tapping terminals		N/A
	EMC		
	aa – environment A and/or B: see 7.3.1 of part 1	☐ A ☐ B	N/A
	ab – special requirements, if applicable, for example shielded or twisted conductors		N/A
	Sub clause 5.2 of IEC 60947-1:2007, IEC 60947-1:2007/AMD1:2010 applies to contactors, starters and overload relays with the following additions:		
	Data under items d) to ab) in 6.1.2 shall be included on the nameplate or on the equipment or in the manufacturer's published literature:		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Data under items c) in 6.1.1, e), n) (if the degree of protection is different than IP00) and x2) in 6.1.2 shall be marked on the equipment; time-current characteristics (or range of characteristics) may be provided in the manufacturer's published literature.		N/A
	MPSD shall be marked in addition, in a place such that they are visible and legible when the MPSD is installed, for the: - suitability for isolation, if applicable. - indication of the open and closed positions		N/A
	The following data shall be marked externally on the MPSD in a place such they may be visible and legible when the MPSD is installed: – range of the rated instantaneous short-circuit current setting (I_i), for adjustable releases.		N/A
	For dedicated accessories used for wiring the starter or the combination of contactors, data under 6.1.1 c), 6.1.2 l) and the current I_{th}, if applicable, shall be provided in the manufacturer's published literature.		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.3	**Instruction for installation, operation and maintenance, decommissioning and dismantling**		
	Subclause 5.3 of IEC 60947-1:2007 and IEC 60947-1:2007/AMD2:2014 applies with the following addition.		
	The instructions shall also cover the dedicated wiring accessories.		N/A
	Additional information for the decommissioning and dismantling of the device shall be maintained available to the user in case of foreseeable hazardous condition of the device, for example due to stored energy, instability or falling of objects, etc.		N/A
	In case of protected starters, the manufacturer shall also provide the necessary mounting and wiring instruction		N/A
	The manufacturer of a starter incorporating an automatic reset overload relay capable of being connected to enable automatic restarting, shall provide, with the starter, that information necessary to alert the user to the possibility of automatic restarting.		N/A
	If the construction requires energization by an external source that is not a limited energy source as defined in 8.1.14, the manufacturer shall provide the appropriate information for short-circuit and overcurrent protection of the ports.		N/A
	For each relevant potential hazard, the manufacturer shall provide safety signs, graphical symbols or safety notes of the hazard for example by using e.g. IEC 60417-5036. Signal words shall be defined according to ISO 3864-2.		N/A
6.4	**Environmental information**		
	Subclause 5.4 of IEC 60947-1:2007/AMD2:2014 applies.		

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Clause	Requirement + Test	Result - Remark	Verdict

7	NORMAL SERVICE, MOUNTING AND TRANSPORT CONDITIONS		
	Clause 6 of IEC 60947-1:2007 applies with the following addition.		
	Unless otherwise stated by the manufacturer, a contactor or a starter is for use in pollution degree 3 environmental conditions, as defined in 6.1.3.2 of IEC 60947-1:2007. However, other pollution degrees may be considered to apply, depending upon the micro-environment.		P
	Rail mounting shall be specified according to IEC 60715:2017, when relevant.		N/A
	Standard conditions of vibration are defined in footnote b of Table Q.1 of IEC 60947-1:2007/AMD2:2014.		N/A
	Altitude above 2 000 m are subjected to agreement between manufacturer and user.		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

8.1	**Constructional requirements**		
	The equipment with its enclosure, if any, whether integral or not, shall be designed and constructed to withstand the stresses occurring during installation and normal use and, in addition, shall provide a specified degree of resistance to abnormal heat and fire		P
8.1.2	Materials		
7.1.2.1 Part 1	Parts of insulating materials which might be exposed to thermal stresses due to electrical effects, within the equipment, shall not be adversely affected by abnormal heat and by fire.		P
	Test method used:		
7.1.2.2 Part 1	Glow wire testing	(See 8.2.1.1.1 part 1 below)	P
	When tests on the equipment or on sections taken from the equipment are used, parts of insulating materials necessary to retain current-carrying parts in position shall conform to the glow-wire tests of 8.2.1.1.1 of IEC 60947-1:2007 at a test temperature of 850 °C	850°C, 30s (for PF2A4-161J) 650°C, 30s (for PA66)	P
7.1.2.3 Part 1	Test based on flammability category	(See 8.2.1.1.2 part 1 below)	N/A
8.1.3	Current-carrying parts and their connection		
7.1. 3 Part 1	No contact pressure through insulating materials		P
8.1.4	Clearances and creepage distances		
	Clearances		P
	Rated impulse withstand voltage (see test sequence I)	Uimp= __6_ kV	P
	Creepage distances		P
	Pollution degree ..... :	3	P
	Comparative tracking index (V) ..... :	175V	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Material group ..... :	III	P
	Rated insulation voltage Ui (V) ..... :	690V	P
	Minimum creepage distances (mm) ..... :	10mm	P
	Measured creepage distances (mm) ..... :	11,1mm between different poles 25,7mm between main circuit and auxiliary contact	P
8.1.5	Actuator		
7.1.5.1 Part 1	Insulation		
	The actuator of the equipment shall be insulated from the live parts for the rated insulation voltage and, if applicable, the rated impulse withstand voltage. Moreover:		N/A
	- if it is made of metal, it shall be capable of being satisfactorily connected to a protective conductor unless it is provided with additional reliable insulation;		N/A
	- if it is made of or covered by insulating material, any internal metal part, which might become accessible in the event of insulation failure, shall also be insulated from live parts for the rated insulation voltage.		N/A
7.1. 5.2 Part 1	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.		N/A
	Where devices cannot conform to these requirements, e.g. due to special applications or alternative mounting positions, they shall be clearly marked such that there is no doubt as to the "I" and "O" positions and the direction of operation.		N/A
8.1.5.3	Mounting		
	Actuators mounted on removable panels or opening doors are so designed that when the panels are replaced or doors closed the actuator will engage correctly with the associated mechanism		N/A
8.1.5.4	Protection		
	There shall be no path or opening which allows incandescent particles to be discharged from the area of the manual operating means.		N/A
8.1.6	Indication of contact position		

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Clause	Requirement + Test	Result - Remark	Verdict
7.1. 6.1 Part 1	Indication means, applies to manually operated starters		
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated. This is done by means of a position indicating device		N/A
	If symbols are used, they shall indicate the closed and open positions respectively, in accordance with IEC 60417-2: 60417-2-IEC-5007 I On (power) 60417-2-IEC-5008 O Off (power)		N/A
	For equipment operated by means of two push-buttons, only the push-button designated for the opening operation shall be red or marked with the symbol "O"		N/A
	Red colour shall not be used for any other push-button		N/A
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073		N/A
7.1. 6.2 Part 1	Indication by the actuator		
	When the actuator is used to indicate the position of the contacts, it shall automatically take up or stay, when released, in the position corresponding to that of the moving contacts; in this case, the actuator shall have two distinct rest positions corresponding to those of the moving contacts, but for automatic opening a third distinct position of the actuator may be provided		N/A
8.1.7	Additional safety requirements for equipment suitable for isolation		
	If the tripped position of the MPSD is not the indicated open position, it should be clearly visible that it is not the open position. The verification of the main contact position for a manual starter and a MPSD suitable for isolation shall be tested according to 9.3.3.2.3.		N/A
	MPSDs and manual motor starter suitable for isolation shall be provided with means for locking in the open position.		N/A
7.1.7.1 part 1	Additional constructional requirements:		
	Equipment suitable for isolation shall provide in the open position an isolation distance in accordance with the requirements necessary to satisfy the isolating function		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) ..... :		N/A
	- measured clearances (mm) ..... :		N/A
	- test Uimp across gap (kV) ..... :		N/A
	Indication of the position of the main contacts shall be provided by one or more of the following means		N/A
	- the position of the actuator		N/A
	- a separate mechanical indicator		N/A
	- visibility of all moving main contacts		N/A
	The effectiveness of each of the means of indication provided on the equipment and its mechanical strength shall be verified	(See 8.2.5 part 1 below)	N/A
	When means are provided or specified by the manufacturer to lock the equipment in the open position, locking in that position shall only be possible when the main contacts are in the open position	(See 8.2.5 part 1 below)	N/A
	Equipment shall be designed so that the actuator, front plate or cover are fitted to the equipment in a manner which ensures correct contact position indication and locking, if provided		N/A
	For equipment provided with positions such as “tripped position” or “standby position”, which are not the indicated open position, those positions shall be clearly identified. The marking of such positions shall not include the symbols “I” or “O”		N/A
	An actuator having only one position of rest shall not be considered as appropriate to indicate the position of the main contact		N/A
7.1.7.2 part 1	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		
	Auxiliary switch is rated according to IEC 60947-5-1 (unless the equipment is rated AC-23)		
	Time interval between opening of the contacts of the auxiliary contact and the contacts of the main poles: ≥20 ms ..... :		N/A
	Measured time interval (ms) ..... :		N/A
	During the closing operation the contacts of the auxiliary switch closes after or simultaneously with the contacts of the main poles		N/A
7.1.7.3 part 1	Supplementary requirements for equipment provided with means for padlocking the open position:		

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Clause	Requirement + Test	Result - Remark	Verdict
	The locking means is so designed that it cannot be removed with the appropriate padlock(s) installed		N/A
	Test force F applied to the actuator in an attempt to operate to the closed position (N) ..... :		N/A
	Rated impulse withstand voltage (kV) ..... :		N/A
	Test Uimp on open main contacts at the test force		N/A
8.1.8	Terminals		
7.1.8.1 part 1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	(see 8.2.4 part 1 below)	P
	Terminal connections shall be such that necessary contact pressure is maintained	(see 8.2.4 part 1 below)	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	(see 8.2.4 part 1 below)	P
	Terminal shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operator of equipment and the insulation voltage shall not be reduced below the rated value	(see 8.2.4 part 1 below)	P
	If required by application, terminals and conductors may be connected by means of cable lugs for copper conductors only		P
	Screwless-type clamping units, unless otherwise specified by the manufacturer, shall accept rigid and flexible conductors as indicated in Table 1.		N/A
7.1.8.2 part 1	Connecting capacity		
	type of conductors .....:	Copper conductor	
	minimum cross-sectional area of conductor (mm^2) .....:	1mm^2	P
	maximum cross-sectional area of conductor (mm^2) .....:	4mm^2	P
	number of conductors simultaneously connectable to the terminal .....:	2/ 1	P
7.1.8.3 part 1	Connection		
	terminals for connection to external conductors shall be readily accessible during installation		P

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Clause	Requirement + Test	Result - Remark	Verdict
	clamping screws and nuts shall not serve to fix any other component		P
8.1.8.2	Terminal identification and marking,		
	marking comply with Annex A		P
7.1.8.4 part 1	terminal intended exclusively for the neutral conductor		
	protective earth terminal		N/A
	other terminals		P
8.1.9	Additional requirements for equipment provided with a neutral pole		
7.1.9 part 1	marking of neutral pole		
	The switched neutral pole shall not break before and shall not make after the other poles		N/A
	Conventional thermal current of neutral pole		N/A
	If a pole having an appropriate short-circuit breaking and making capacity is used as a neutral pole, then all poles, including the neutral pole, may operate substantially together.		N/A
	Equipment having a value Ith < 63 A, this value shall be identical for all poles		N/A
	For Ith > 63 A, the neutral pole may have a value of Ith different from that of the other poles, but not less than the half that value or 63 A, whichever is the higher.		N/A
8.1.10	Provisions for protective earthing		
7.1.10.1 part 1	The exposed conductive parts shall be electrically interconnected and connected to a protective earth terminal		N/A
7.1.10.2 part 1	The protective earth terminal shall be readily accessible		N/A
	The protective earth terminal shall be suitably protected against corrosion		N/A
	The electrical continuity between the exposed conductive parts of the protective earth terminal and the metal sheathing of connecting conductors		N/A
	The protective earth terminal shall have no other functions		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.1.10.3 part1	Protective earth terminal marking and identification		
8.1.11	Enclosure for equipment		
7.1.11.1 part1	Design		
	Starting resistors mounted within an enclosure shall be so located or guarded that issuing heat is not detrimental to other apparatus and materials within the enclosure.		N/A
	For the specified case of combination starters, the cover or door shall be interlocked so that it cannot be opened without manually operated device being in open position.		N/A
	However, provision may be made to open the door or cover with the manually operated switching device in the ON position by use of a tool.		N/A
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible		N/A
	Sufficient space shall be provided inside the enclosure		N/A
	The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor		N/A
	Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place		N/A
	The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations		N/A
	When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices		N/A
7.1.11.2 part1	Insulation		
	If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure		N/A
8.1.12	Degree of protection of enclosed equipment		
7.1.12 part1	Degrees of protection of enclosed equipment and relevant tests are given in Annex C of IEC 60947-1:2007	(see 8.2.3 part 1 below)	P
8.1.13	Conduit pull-out, torque and bending with metallic conduits		

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Clause	Requirement + Test	Result - Remark	Verdict
7.1.13 part1	Polymeric enclosures of equipment, whether integral or not, provided with threaded conduit entries, intended for the connection of extra heavy duty, rigid threaded metal conduits complying with IEC 60981, shall withstand the stresses occurring during its installation such as pull-out, torque, bending	(see 8.2.7 part 1 below)	N/A
8.1.14	Limited energy source		
8.1.14.2	Limited energy source with galvanic separation		
	The output is inherently limited in compliance with Table 19;		
	A linear or non-linear impedance limits the output in compliance with Table 19. If a positive temperature coefficient device (e.g. PTC) is used, it shall pass the applicable tests specified in IEC 60730-1;		N/A
	A regulating network limits the output in compliance with Table 19, both with and without a single fault in the regulating network;		N/A
	An over-current protective device is used and the output is limited in compliance with Table 20.		N/A
	Type of overcurrent protection device ……:		N/A
8.1.14.3	Limited energy source with current limiting impedance		
	The output voltage is limited in compliance with Table 21 and a linear or non-linear impedance limits the output in compliance with Table 21 both with and without a single fault.		N/A
8.1.15	Stored charge energy circuit		
	Parts including stored charge (capacitors) that are removable for servicing (such as coil replacement), installation, or disconnection shall present no risk of electric energy hazard after disconnection.		N/A
	Capacitors connected to accessible hazardous live parts shall be discharged to an energy level less than 0,5 mJ within 5 s after the removal of power.		N/A
8.1.16	Fault and abnormal conditions		N/A
	The product shall be designed to avoid operating modes or sequences that can cause a fault condition or component failure leading to a hazard.		N/A
8.1.17	Short-circuit and overload protection of ports		

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Clause	Requirement + Test	Result - Remark	Verdict
	Where the power source for a signal port or power port that is external to the device does not comply with the requirements for limited energy sources in 8.1.14, the product shall not present a hazard under short-circuit or overload conditions. Instructions for the installation of external overcurrent protection shall be made available in accordance with 6.3.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

8.2	**Performance requirements**		
A	Starters shall be so constructed that they:		
	a) are trip free;		N/A
	b) can be caused to open their contacts by the means provided when running and at any time during the starting sequence;		N/A
	c) will not function in other than the correct starting sequence.		N/A
B	Starters employing contactors shall not trip due to the shocks caused by operation of the contactors when tested according to 9.3.3.1, after the starter has carried its rated full load current at the reference ambient temperature (i.e. +20 °C) and has reached thermal equilibrium at both minimum and maximum settings of the overload relay, if adjustable	(see 9.3.3.1 below)	N/A
C	For rheostatic starters, the overload relay shall be connected in the stator circuit.		N/A
	Special arrangements may be made to protect the rotor contactors and resistors against overheating, if requested by the user		N/A
D	When starters are used in conditions in which the overheating of the starting resistors or transformers would represent an exceptional hazard, it is recommended that a suitable device be fitted to switch off the starter automatically before a dangerous temperature is reached.		N/A
E	The moving contacts of multipole equipment intended to make and break together shall be so coupled that all poles make and break substantially together, whether operated manually or automatically		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.2.1.2	Limits of operation of contactors and power-operated starters	(see 9.3.3.2 below)	N/A
8.2.1.3	Limits of operation of under-voltage relays and releases	(see 9.3.3.2.2 below)	N/A
8.2.1.4	Limits of operation of shunt-coil operated releases (shunt trip)	(see 9.3.3.2.2 below)	N/A
8.2.1.5	Limits of operation of current sensing relays and releases	(see 9.3.3.2.2 below)	N/A
8.2.2	Temperature rise	(see 9.3.3.3 below)	N/A
8.2.3	Dielectric properties	(see 9.3.3.4 below)	N/A
8.2.4	Normal load and overload performance requirements		N/A
8.2.4.1	Making and breaking capacities	(see 9.3.3.5 below)	N/A
8.2.4.2	Conventional operational performance	(see 9.3.3.6 below)	N/A
8.2.4.3	Durability	(see annex B below)	N/A
8.2.4.4	Overload current withstand capability of contactors	(see 9.3.5 below)	N/A
8.2.4.5	Coil power consumption	(see 9.3.3.2.1.2 below)	N/A
8.2.4.6	Pole impedance	(see 9.3.3.2.1.3 below)	N/A
8.2.4.7	Ability of a MPSD to make and break under short-circuit conditions	(see annex P below)	N/A
8.2.5	Co-ordination with short-circuit protective devices	(see 9.3.4 below)	N/A
8.3	**Electromagnetic compatibility (EMC)**		
	Environment A		N/A
	Environment B		N/A
8.3.2	Immunity	(see 9.4 below)	N/A
8.3.3	Emission	(see 9.4 below)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

9.2	**Compliance with constructional requirements**		
8.2.1 Part 1	Materials		
8.2.1.1.1 part 1	Glow wire test (on equipment)		
	The suitability of materials used is verified by making tests: a) on the equipment; or b) on sections taken from the equipment; or c) on samples of identical material		P
	The suitability shall determined with respect to resistance to abnormal heat and fire		P
	The manufacturer shall indicate which tests, amongst a), b) and c), shall be used	☐ a) ☐ b) ☒ c)	P
	As described in IEC 60695-2-10 and –2-11		P
	parts retaining current-carrying parts ..... Remark : a protective conductor is not considered as a current-carrying part	☒ 850 ± 15°C or ☐ 960 ± 15°C 30 s	P
	all other parts	☒ 650 ± 10°C 30 s	P
	No visible flame, no sustained glowing or flames and glowing extinguish within 30 s	Extinguish within 30s	P
	For the purpose of this test, a protective conductor is not considered as a current-carrying part.		
8.2.1.1.2 part 1	Flammability, hot wire ignition and arc ignition tests (on materials)		
	Suitable specimens of material shall be subjected to the following tests: a) flammability tests, in accordance with IEC 60695-11-10 b) Hot wire ignition (HWI) test, as described in Annex M c) Arc ignition (AI) test, as described in Annex M		N/A
	The test c) is required only if the material is located within the 13 mm of arcing parts or live parts which are subject to loosening of connections.		N/A
	Materials located within 13 mm of arcing arts are exempt from this test if the equipment is subjected to make/break testing.		N/A
a)	Flammability tests, in accordance with IEC 60695-11-10		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test method	☐ A) – Horizontal burning test ☐ B) – Vertical burning test	N/A
b)	Hot wire ignition (HWI) test, as described in Annex M		N/A
c)	Arc ignition (AI) test, as described in Annex M		N/A
8.2.3 part 1	Enclosure for equipment's		
	Degree of protection .....:	IP 20	P
	Test for first characteristic		
	Test for first numeral .....:	1: 2:2 3: 4: 5: 6:	P
	Test for second characteristic		
	Test for second numeral .....:	1: 2: 3: 4: 5: 6: 7: 8:	N/A
8.2.4 part 1	Mechanical and electrical properties of terminals		
8.2.4.2 part 1	Test of mechanical strength of terminals		
	maximum cross-section of conductor (mm^2) :	4mm^2 for main circuit, 1mm^2 for auxiliary circuit,	P
	diameter of thread (mm) .....:	M4 for main circuit, M3,5 for auxiliary circuit	P
	torque (Nm) .....:	1,32Nm for main circuit, 0,88Nm for auxiliary circuit	P

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Clause	Requirement + Test	Result - Remark	Verdict
	5 times on 2 separate clamping units	5 times	P
8.2.4.3 part 1	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the minimum cross-section area (mm^2) .....:	1,0mm^2	P
	number of conductor of the minimum cross-section .....:	2	P
	diameter of bushing hole (mm) .....:	6,5mm	P
	height between the equipment and the platen (mm) .....:	260mm	P
	mass at the conductor(s) (kg) .....:	0,4Kg	P
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.2.4.4 part 1	Pull-out test		
	force (N) .....:	35N	P
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.2.4.3 part 1	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the maximum cross-section (mm^2) ..:		P
	number of conductor of the maximum cross-section .....:	4mm^2 for main circuit 1mm^2 for auxiliary circuit	P
	diameter of bushing hole (mm) .....:	9,5mm/ 6,5mm	P
	height between the equipment and the platen (mm) .....:	280mm/ 260mm	P
	mass at the conductor(s) (kg) .....:	0,9kg/ 0,4kg	P
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.2.4.4 part 1	Pull-out test		

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Clause	Requirement + Test	Result - Remark	Verdict
	force (N) .....:	60N/ 35N	P
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.2.4.3 part 1	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the largest and minimum cross-section (mm^2) .....:	4,0mm^2/ 1,0mm^2	P
	number of conductor of the minimum cross-section, number of conductor of the maximum cross-section .....:	1/ 2	P
	diameter of bushing hole (mm) .....:	9,5mm/ 6,5mm	P
	height between the equipment and the platen (mm) .....:	280mm/ 260mm	P
	mass at the conductor(s) (kg) .....:	0,9kg/ 0,4kg	P
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.2.4.4 part 1	Pull-out test		
	force (N) .....:	60N/ 35N	P
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.2.4.5 part 1	Test for insertability of unprepared round copper conductors having the maximum cross-section		
	Test gauge .....:	A3	P
	The measuring section of the gauge shall be able to penetrate freely into the terminal aperture to the full depth of the terminal		P
	Alternatively, the test can be carried out by inserting the largest conductor of type and rated cross-section among those recommended by the manufacturer, after the insulation has been removed and the end has been reshaped .....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The stripped end of the conductor shall be able to enter completely within the clamping unit aperture, without use of undue force		N/A
9.2.2	Electrical performance of screwless-type clamping units		
	Test according to subclause 9.8 of IEC 60999-1 and 9.8 of IEC 60999-2	See report _____	N/A
	The number of specimens shall be at least 4.		N/A
	Test current is I_{th}.		N/A
9.2.3	Ageing test for screwless-type clamping units		
	Test according to subclause 9.10 of IEC 60999-1 and 9.10 of IEC 60999-2	See report _____	N/A
	Test current is I_{th}.		N/A
9.2.4	Limited energy source test		
	Equipment operating under normal conditions		N/A
	In case the limited energy source requirement depends on over-current protective device(s), the device(s) shall be short-circuited.		N/A
	Maintain the limited VA energy for a period specified in 8.1.14…….:		N/A
	Maintain the limit of apparent energy for the time period indicated in Table 19, Table 20, or Table 21, as applicable……..:		N/A
	Available apparent energy does not exceed the limits indicated in Table 19, Table 20, or Table 21, as applicable……..:		N/A
	In case the limited energy source requirement depends on over-current protective device(s), the current rating of at least one of the protective device(s) in the current path shall not exceed the limit in Table 20.		N/A
	Test conducted under the most unfavourable combination		N/A
9.2.5	Breakdown of components		
	Tested with the product operating with the load creating the more severe condition		N/A
	Each identified component shall be subjected to a breakdown of components test in open- and or short-circuit failure modes, whichever is most severe		N/A
	no emission of flame or molten metal		N/A
	no ignition of cotton		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	no opening of the fusible element F (according to subclause 8.3.4.1.2 d) of IEC 60947-1:2007)		N/A
8.2.5 part 1	Verification of the effectiveness of indication of the main contact position of equipment suitable for isolation		
8.2.5.2.1 part 1	Dependent and independent manual operation		
	actuating force for opening (N) ..... :		N/A
	means to keep the contact(s) closed and the number of contacts……..…:		N/A
	test force for 10 s (N) ..... :		N/A
	After the test, when the test force is no longer applied, the actuator being left free, the open position shall not be indicated by any of the means provided		N/A
	the equipment shall not show any damage such as to impair its normal operation		N/A
	When the equipment is provided with a means of locking in the open position, it shall not be possible to lock the equipment while the test force is applied		N/A
8.2.5.2.2 part 1	Dependent power operation		
	means to keep the contact(s) closed and the number of contacts……..…:		N/A
	Supply voltage of 110% of rated voltage (V)…….:		N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.		N/A
	During and after the test, the open position shall not be indicated by any of the means provided and the equipment shall not show any damage such as to impair its normal operation		N/A
	When the equipment is provided with means for locking in the open position, it shall not be possible to lock the equipment during the test		N/A
8.2.5.2.3 part 1	Independent power operation		
	means to keep the contact(s) closed and the number of contacts……..…:		N/A
	Three attempts to operate the equipment by the stored energy.		N/A
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Position indicator does not show OFF-position after capture of test force at blocked main contacts		N/A
	During and after the test, the open position shall not be indicated by any of the means provided and the equipment shall not show any damage such as to impair its normal operation		N/A
	When the equipment is provided with means for locking in the open position, it shall not be possible to lock the equipment during the test		N/A
8.2.7 part 1	Conduit pull-out test, torque test and bending test with metallic conduits		
8.2.7.1 part 1	Pull-out test		
	Torque for screwing the conduit into the entry.....:		N/A
	Pull force (N) .....:		N/A
	5 min, the displacement of the conduit in relation with the entry shall be less than one thread depth		N/A
	There shall be no evidence of damage impairing further use of the enclosure		N/A
8.2.7.2 part 1	Bending test		
	A slowly increasing bending moment shall be applied without jerk to the free end of the conduit		N/A
	Bending moment is maintained at.....:		N/A
	1 min		N/A
	The test is then repeated in a perpendicular direction		N/A
	There shall be no evidence of damage impairing further use of the enclosure		N/A
8.2.7.3 part 1	Torque test		
	Torque (Nm) .....:		N/A
	it shall be possible to unscrew the conduit and there shall be no evidence of damage impairing further use of the enclosure		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-1#)		
	- verification of temperature rise (Clause 9.3.3.3.)		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	- verification of dielectric properties (Clause 9.3.3.4)		
9.3.3.3	Temperature rise		
	Sub clause 8.3.3.3. of IEC 60947-1 applies		
	ambient temperature 10-40 °C .....:	17°C	P
	Contactor		
	test enclosure W x H x D (mm x mm x mm) .....:	-	N/A
	material of enclosure .....:	-	N/A
9.3.3.3.4	Main circuits, test conditions:		
	Sub clause 8.3.3.3.4 of IEC 60947-1 applies with following addition		
	loaded as stated in 8.2.2.4		P
	- setting of the maximum current setting.....:		N/A
	- setting overload relay.....:	25A	P
	- conventional thermal current Ith (A) .....:		N/A
	- conventional enclosed thermal current Ithe (A) .:		N/A
	- for equipment intended for utilization category AC-6b, the test current for the temperature rise test shall be equal to 1,35 times Ie (the rated capacitive current).		N/A
	- cable/~~busbar~~ cross-section (mm^2) / (mm) .....:	4mm^2x1	P
	- temperature rise of main circuit terminals (K) ....:	< __65__ K see page__211_	P
9.3.3.3.5	Control circuit, test conditions:		
	Sub clause 8.3.3.3.5. of part 1 applies with following addition		
	The temperature rise shall be measures during the test of 9.3.3.3.4		N/A
	- conventional thermal current Ith (A) at their rated voltage.....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- conventional enclosed thermal current Ithe (A) .:		N/A
	- cable/busbar cross-section (mm²) / (mm) .....:		N/A
	- temperature rise of control circuit (K) .....:	<_____ K see page ____	N/A
9.3.3.3.6	Coils and electromagnets circuit, test conditions:		
	The coil with the highest measured holding power consumption, for a given frequency a.c. or d.c., according to 9.3.3.2.1.2.2 is deemed to be representative for all coils, for the same contactor, and shall be used for the temperature rise test.		
	a) Uninterrupted and eight-hour duty windings (8.2.2.6.1)		
	The temperature rise shall be measures during the test of 9.3.3.3.4		N/A
	- rated control supply voltage Us (V) .....:		N/A
	- class of insulating material .....:		N/A
	- uninterrupted or eight-hour duty windings		N/A
	- temperature rise of control circuit terminals (K) .:	< ____ K see page ___	N/A
	b) Intermittent duty windings (8.2.2.6.2)		
	- no current flowing though the main circuit		N/A
	- rated control supply voltage Us (V) .....:		N/A
	- class of insulating material .....:		N/A
	- intermittent duty class .....:		N/A
	- close open operating cycle .....:		N/A
	- on-load factor .....:		N/A
	- temperature rise of control circuit terminals (K) .:	< ____ K see page ___	
	c) temporary or periodic duty (8.2.2.6.3)		N/A
	- no current flowing though the main circuit		N/A
	- rated control supply voltage Us (V) .....:		N/A
	- class of insulating material .....:		N/A
	- close open operating cycle .....:		N/A
	- on-load time .....:		N/A
	- temperature rise of control circuit terminals (K) .:	< ____ K see page ____	N/A
9.3.3.3.7	Auxiliary circuit, test conditions:		

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Clause	Requirement + Test	Result - Remark	Verdict
	Normally loaded with their maximum rated operational current at any convenient voltage		P
	The temperature rise shall be measures during the test of 9.3.3.3.4		P
	- conventional thermal current Ith (A).....:	5A	P
	- conventional enclosed thermal current Ithe (A) .:		N/A
	- cable/~~busbar~~ cross-section (mm²) / (mm) .....:	1,0mm² / 1m	P
	- cable cross-section (mm²) .....:	1,0mm²	P
	- temperature rise of auxiliary circuit terminals (K) :	< __65__ see page __211__	P
9.3.3.3.8	Starting resistors for rheostatic rotor starters test conditions:		
	Normally loaded with their current value I_m		N/A
	Number of starts per hour .....:		N/A
	Rated duty .....:		N/A
	Starting characteristic	See page _____	N/A
	- cable/busbar cross-section (mm²) / (mm) .....:		N/A
	- cable cross-section (mm²) .....:		N/A
	- temperature rise of starting resistor terminals (K) .....:	See table 3 of IEC 60947-1	N/A
	- temperature rise of starting resistor enclosure (K)	See table 3 of IEC 60947-1	N/A
	- temperature rise of issuing air (K) ……:	See table 3 of IEC 60947-1	N/A
9.3.3.3.9	Auto-transformers for two-step auto-transformers starters		
	Normally loaded with max. Starting current multiplied with 0,8 x $^{\text{starting voltage}}/_{Ue}$		N/A
	Number of starts per hour .....:		N/A
	Rated duty .....:		N/A
	Starting characteristic.....:	See page	N/A
	- cable/busbar cross-section (mm²) / (mm) .....:		N/A
	Temperature rise of:		
	- windings (K), See table 5 (+15 K) .....:		N/A
	- operating means (K) , See table 3 of part 1.....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- parts intended to be touched but not hand held (K) , See table 3 of part 1		N/A
	- parts which need not be touched during normal operation (K) , See table 3 of part 1		N/A
9.3.3	Performance under no load, normal load and overload conditions		
9.3.3.1	Operation		
	For starter only:		
	reference ambient temperature (i.e. +20 °C) :		N/A
	Rated full load current (A) :		N/A
	No tripping after 3 operations when stator has reached thermal equilibrium at minimum and maximum settings		N/A
	For overload relay with combined stop and reset actuating mechanism only		
	With closed contactor, the resetting mechanism shall be operated and this shall cause the contactor drop out		N/A
	For overload relay with either a reset or separate stop and reset mechanism only		
	With closed contactor and resetting mechanism in the reset position, the tripping mechanism shall be operated and the contactor shall have been caused to drop out		N/A
9.3.3.2	Operating limits		
9.3.3.2.1	Power-operated equipment:		
8.2.1.2	Limits of operation of contactors and power-operated starters		
7.2.1.2 Part 1	Limits of operation of power operated equipment		
	rated control circuit supply voltage Us (V) .....:		N/A
	frequency (Hz) .....:		N/A
	rated air supply pressure ……..:		N/A
	ambient temperature ……:		N/A
	operation range……..:		N/A
	close at any value between 85% and 110% (V or bar) .....:		

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Clause	Requirement + Test	Result - Remark	Verdict
	drop out voltage: 75% to 20% (or 10% if specified by manufacturer) for a.c. and 75% to 10% for d.c. (V) .....:		N/A
	drop out pressure (bar) 75% to 10% of rated pressure……..……:		N/A
	In the case of coils, the limiting drop-out values apply when the coil circuit resistance is equal to that obtained at –5 °C……:		N/A
	Calculated values……:		N/A
	Drop out time (if applicable)……..:		N/A
	For latched contactors, the device shall drop out and open fully when a de-latching voltage between 85 % and 110 % of the rated de-latching voltage is applied……..:		N/A
8.3.3.2.1 part 1	Capacitive drop out test		
	A capacitor shall be inserted in series in the supply circuit U_s, the total length of the connecting conductors being ≤ 3 m.		N/A
	The capacitor is short-circuit by a switch of negligible impedance.		N/A
	The supply voltage shall then be adjusted to 110 % U_s.....:		N/A
	The value of the capacitor shall be calculated: C (nF) = 30 + 200000 / (f x U_s) .....:	_____nF	N/A
	Verification of the drop out of the contactor when the switch is operated to the open position.....:		N/A
	The test voltage is the highest value of the declared rated supply voltage range *U*s.		N/A
9.3.3.2.1.2 .1	Coil power consumption		
	A contactor coil is evaluated for both holding power and pick-up power		N/A
	In the case where different coils cover a range of voltages, 5 coils shall be tested		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The coil with the lowest rated control supply voltage Us, the coil with the highest rated control supply voltage Us, plus 3 coils deemed to be representative of the coils with the highest calculated hold power at the discretion of the manufacturer		N/A
	The test shall be performed at ambient temperature +23 °C ± 3 °C		N/A
	The test shall be made without any load in the main and auxiliary circuits		N/A
	The coil shall be supplied with the rated control supply voltage Us and at the rated frequency		N/A
	For a given coil, where a voltage range is declared, the test shall be made at the highest voltage at the respective frequency		N/A
	The measured values shall be obtained with a r.m.s. measurement method covering at least a bandwidth from 0 Hz to 10 kHz and the resulting power values shall be given within a measurement uncertainty better than 5 %		N/A
9.3.3.2.1.2 .2	Holding power for conventional and electronically controlled electromagnet		
	The current measurement I(i) of the coil shall be performed after the coil has been energized and has reached a stable temperature		N/A
	The holding power consumption is defined as follows		
	Sh(i) = Us(i) × I(i) [VA] for a.c. controlled electromagnet		N/A
	Pc(i) = Us(i) × I(i) [W] for d.c. controlled electromagnet		N/A
	The published value shall be equal to the average value of the 5 tested coils		N/A
	Sh = Σ (Us(i) × I(i)) / 5 [VA] respectively Pc = Σ (Us(i) × I(i)) / 5 [W]		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For electronically controlled electromagnet with alternating current and direct current ratings, the measurement should be performed for both ratings		N/A
9.3.3.2.1.2.3	Pick-up power for a.c. controlled contactor or d.c. controlled contactor with separate pick-up and hold-on windings		
	The pick-up measurement shall be performed directly after the measurement of the hold current (see 9.3.3.2.1.2.2)		N/A
	The current measurement I(i) of the coil shall be performed immediately after the coil has been de-energized, the contactor has been held in the Off position and re-energized		N/A
	The pick-up power consumption is defined as follows		N/A
	Sp(i) = Us × I(i) [VA] for a.c. controlled contactor		N/A
	Pp(i) = Us × I(i) [W] for d.c. controlled contactor with separate pick-up and hold windings		N/A
	The published value shall be equal to the average value of the 5 tested coils		N/A
	Sp = Σ (Us(i) × I(i)) / 5 [VA] respectively Pp = Σ (Us(i) × I(i)) / 5 [W]		N/A
9.3.3.2.1.3	Pole impedance		
	The pole impedance shall be determined during the test and with the conditions given in 9.3.3.3.4.		N/A
	The test in an enclosure is not deemed necessary even if the contactor can be used in an individual enclosure		N/A
	The voltage drop Ud shall be measured between the line and load terminals (terminals included) of the contactor preferably at the same time the temperature rise is measured		N/A
	The impedance per pole is defined as follows		N/A
	Z = Ud / Ith [Ω]		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Care should be taken that voltage drop measurement does not significantly affect the temperature rise nor affect significantly the impedance		N/A
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	17A to 25A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		P
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	4,0mm^2 / 1m	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 17,9A, 26,3A	P

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Clause	Requirement + Test	Result - Remark	Verdict
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 22,1A, 32,5A	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current_25,5A, 37,5 A Trip-time: 1min36s, 1min24s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; __10A__ Tripping current_123A, 180A Trip-time: _7,8s, 7,8 s	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: __17,9A, 26,3 A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 20,4A, 30,0A Trip time: 10min22s, 12min26s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current 25,5A, 37,5A Trip time: 1min32s, 1min36s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 123A, 180A Trip time: 7,8s, 7,8s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 17,0A, 25,0A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 20,4A, 30,0A Trip time: 7min39s, 10min28s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 25,5A, 37,5A Trip time: 1min22s, 1min20s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 17 A / >2h / 17 A / >2h / 17 A / >2 h 25 A / >2h / 25 A / >2h / 25 A / >2 h	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 19, 6A / 11 min 16s / 19, 6A / 11 min 16s / - / - 28, 8A / 12 min 41s / 28, 8A / 12 min 41s / - / -	P
	d) Instantaneous magnetic overload relays		N/A
8.2.1.5.3	Limits of operation of instantaneous magnetic overload relays		
	For all values of the current setting, instantaneous magnetic overload relays shall trip with an accuracy of ± 10% of the value of the published current value corresponding to the current setting		N/A
	Magnetic settings…… :		N/A
	Accuracy ± 10% of the value……..:		N/A
	e) Short-circuit releases		
	ambient temperature .....:		N/A
	MPSD mounted in accordance with 8.2.2 …….:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test at minimum current setting:		N/A
	cable/busbar cross-section (mm²) / (mm) :		N/A
	test current equal to 80 % of the short-circuit current setting (A) ……:		N/A
	No operation within 0,2 s		N/A
	test current equal to 120 % of the short-circuit current setting (A) ……:		N/A
	Operating time (s) ……:		N/A
	Test at maximum current setting:		N/A
	cable/busbar cross-section (mm²) / (mm) :		N/A
	Test current equal to 80 % of the short-circuit current setting (A) ……:		N/A
	No operation within 0,2 s		N/A
	Test current equal to 120 % of the short-circuit current setting (A) ……:		N/A
	Operating time (s) ……:		N/A
	Additional single pole test for MPSD with electromagnetic over-current releases:		N/A
	Test current equal to 120 % of the short-circuit current setting (A) ……:		N/A
	Operating time (s) ……:		N/A
	Value declared by the manufacturer……:		N/A
	f) Under-current relays		
8.2.1.5.4.1	Limits of operation under-current relays		N/A
	Under-current relays or release, when associated with a switching device, shall operate to open the switching device within 90% to 110 % of the set time when the current during run is below 0,9 times the under-current setting in all poles	Under current setting:_____A Test current:_____A Set time:_____s Measured:_____s	N/A
	g) Under-current relays in automatic change-over		N/A
8.2.1.5.4.2	Limits of operation of automatic change over by under-current relays		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- for star-delta starters from star to delta, and - for auto-transformer starters from the starting to the ON position		N/A
	The lowest drop-out of an under-current relay shall be not greater than 1,5, times the actual current setting of the overload relay which is active in the starting or star connection.	Lowest drop-out:…….A / Actual current setting: …..A = ≤ 1,5 times	N/A
	The under-current real shall be able to carry any value of current , from its lowest current setting to stalled current in the starting position or the star connection, for the tripping times determined by the overload relays at its highest current setting		N/A
8.2.1.5.5.	h) Stall relays		
	The limits of operation shall be verified accordance with cl. 8.2.1.5.5		N/A
	For currents sensing stall relays , the verification shall be made for the minimum and for the maximum set current values and for the minimum and maximum stall inhibit time(four settings)		N/A
	For stall relays operating in conjunction with a rotation sensing mean, the verification shall be made for the minimum and maximum stall inhibit time. The sensor can be simulated by an appropriate signal on the sensor input of the stall relay		N/A
	a) current sensing relays		
	minimum current setting / minimum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____s	N/A
	minimum current setting / maximum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____s	N/A
	maximum current setting / minimum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____s	N/A
	maximum current setting / maximum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____s	N/A
	b) rotation sensing relays: an input signal indicating no rotation exits		
	minimum set stall inhibit time	_____ s Trip time = _____s	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	maximum set stall inhibit time	_____ s Trip time = _____s	N/A
8.2.1.5.6.	i) Jam relays		
	The limits of operation shall be verified accordance with cl. 8.2.1.5.6		N/A
	The verification shall be made for the minimum and for the maximum set current values and for the minimum and maximum stall inhibit time (four settings)		N/A
	For each of the four settings, the test shall be made under the following conditions:		N/A
	- apply a test current of 95% of the set current value. The jam relay shall not trip		N/A
	- increase the test current to 120 % of the set current value. The jam relay shall trip according to the requirements given in 8.2.1.5.6		N/A
	minimum current setting / minimum set stall inhibit time Test current 95 % of set value	 _____ s _____ A no trip	N/A
	minimum current setting / minimum set stall inhibit time Test current increase to 1,2 times	_____ A _____ s Trip time = _____s	N/A
	minimum current setting / maximum set stall inhibit time Test current 95 % of set value	_____ s _____ A no trip	N/A
	minimum current setting / maximum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____s	N/A
	maximum current setting / minimum set stall inhibit time Test current 95 % of set value	_____ s _____ A no trip	N/A
	maximum current setting / minimum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____s	N/A
	maximum current setting / maximum set stall inhibit time Test current 95 % of set value	_____ s _____ A no trip	N/A
	maximum current setting /	_____ A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	maximum set stall inhibit time Test current 1,2 times	_____ s Trip time = _____s	
9.3.3.2.3	Verification of main contact position for manual starter and MPSD suitable for isolation		
8.2.5 Part 1	Verification of the effectiveness of indication of the main contact position of equipment suitable for isolation		
8.2.5.2.1	Dependent and independent manual operation		
	- actuating force for opening (N) :		N/A
	- test force with blocked main contacts (N) :		N/A
	- used method to keep the contact closed :		N/A
	During and after the test, open position not indicated :		N/A
	Equipment with locking mean, no locking in the open position while test force is applied :		N/A
8.2.5.2.2	Dependent power operation		
	- main contacts fixed together in the closed position :		N/A
	- used method to keep the contact closed :		N/A
	- 110% of the rated supply voltage applied to the equipment (3 times) :		N/A
	During and after the test, open position not indicated :		N/A
	Equipment show no damage impairing its normal operation :		N/A
	Equipment with locking mean, no locking in the open position while test force is applied :		N/A
8.2.5.2.3	Independent power operation		
	- main contacts fixed together in the closed position :		N/A
	- used method to keep the contact closed :		N/A
	- stored energy of the power operator released (3 times) :		N/A
	During and after the test, open position not indicated :		N/A
	Equipment show no damage impairing its normal operation :		N/A
	Equipment with locking mean, no locking in the open position while test force is applied :		N/A
9.3.3.4	Test of dielectric properties		
8.3.3.4.1 Part 1	2) Verification of impulse withstand voltage		

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Clause	Requirement + Test	Result - Remark	Verdict
	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		P
	- rated impulse withstand voltage (kV) :	6kV	P
	- sea level of the laboratory:		P
	- test Uimp main circuits (kV) :	7,3kV	P
	- test Uimp auxiliary circuits (kV) :	7,3kV	P
	- test Uimp control circuits (kV) :		N/A
	Application of test voltage		
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		P
	ii) Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		P
	- other circuits		P
	- exposed conductive parts		P
	- enclosure of mounting plate		N/A
	iv) equipment suitable for isolation		
	Across the poles of the main circuit, the line terminals being connected together and the load terminals connected together.		N/A
	- test Uimp on open main contacts (equipment suitable for isolation) (kV) :		N/A
	No unintentional disruptive discharge during the tests		P
8.3.3.4.1 Part 1	3) Power-frequency withstand verification of solid insulation		
	- rated insulation voltage (V) :	690V	P
	- main circuits, test voltage for 1 min (V)	AC1890V	P
	- auxiliary circuits, test voltage for 1 min (V)	AC1890V	P
	- control circuits, test voltage for 1 min (V)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Application of test voltage		
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		P
	ii) Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		P
	- other circuits		P
	- exposed conductive parts		P
	- enclosure of mounting plate		N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur		P
	Equipment suitable for isolation		
	The leakage current shall be measured through each pole with the contacts in open position (< 0,5 mA)	1,1 times U_e= ___V	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-2#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	0,1A to 0,16A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		P

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 0,105A, 0,168A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 0,130A, 0,208A	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current_0,150A, 0,240 A Trip-time: 1min20s, 1min24s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,105A, 0,168A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,120A, 0,192A Trip time: 6min14s, 5min47s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current 0,150A, 0,240A Trip time: 1min25s, 1min17s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 0,720A, 1,16A Trip time: 4,9s, 5,3s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,100A, 0,160A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,120A, 0,192A Trip time: 5min49s, 6min22s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 0,150A, 0,240A Trip time: 1min12s, 1min21s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT: 0,100 A; S: >2; RS: 0,100 A; T: >2; ST: 0,100 A; R: >2 RT: 0,160 A; S: >2; RS: 0,160 A; T: >2; ST: 0,160 A; R: >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT: 0,115 A; S: 9min41s; RS: 0,115 A; T: 9min41s; ST: -; R: - RT: 0,184 A; S: 10 min 27s; RS: 0,184 A; T: 10 min 27s; ST: -; R: -	P
	d) Instantaneous magnetic overload relays		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-3#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	0,16A to 0,25A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 0,168A, 0,263A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 0,208A, 0,325A Trip-time: 8min33s, 10min22s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current_0,240A, 0,375A Trip-time: 1min39s, 1min46s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,168A, 0,263A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,192A, 0,300A Trip time: 7min54s, 9min17s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current 0,192A, 0,375A Trip time: 1min33s, 1min40s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 1,16A, 1,80A Trip time: 6,8s, 7,5s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,160A, 0,250A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,192A, 0,300A Trip time: 6min13s, 7min44s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 0,240A, 0,375A Trip time: 1min12s, 1min27s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 0,160 A / >2 / 0,160 A / >2 / 0,160 A / >2 0,250 A / >2 / 0,250 A / >2 / 0,250 A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 0,184 A / 11 min 27s / 0,184 A / 11 min 27s / - / - 0,288 A / 9min34 s / 0,288 A / 9min34 s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-4#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	0,25A to 0,4A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 0,263A, 0,420A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 0,325A, 0,520A Trip-time: 7min56s, 9min34s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current_0,375A, 0,600A Trip-time: 1min23s, 1min27s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,263A, 0,420A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,300A, 0,480A Trip time: 5min36s, 8min41s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current 0,375A, 0,600A Trip time: 1min06s, 1min12s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 1,80A, 2,88A Trip time: 7,2s, 6,8s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,250A, 0,400A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,300A, 0,480A Trip time: 4min42s, 6min33s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 0,375A, 0,600A Trip time: 1min17s, 1min02s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT: 0,250 A; S: >2; RS: 0,250 A; T: >2; ST: 0,250 A; R: >2 RT: 0,400 A; S: >2; RS: 0,400 A; T: >2; ST: 0,400 A; R: >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT: 0,288 A; S: 9min14s; RS: 0,288 A; T: 9min14s; ST: -; R: - RT: 0,460 A; S: 9min46s; RS: 0,460 A; T: 9min46s; ST: -; R: -	P
	d) Instantaneous magnetic overload relays		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-5#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	0,4A to 0,63A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 0,420A, 0,662A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 0,520A, 0,819A Trip-time: 11min24s, 12min13s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 0,600A, 0,945A Trip-time: 1min29s, 1min24s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,420A, 0,662A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,480A, 0,756A Trip time: 10min36s, 8min52s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current 0,600A, 0,945A Trip time: 1min24s, 1min12s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 2,88A, 4,54A Trip time: 6,6s, 7,3s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,400A, 0,630A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,480A, 0,756A Trip time: 8min37s, 9min44s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 0,600A, 0,945A Trip time: 1min06s, 1min02s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT: 0,400 A; S: >2; RS: 0,400 A; T: >2; ST: 0,400 A; R: >2 RT: 0,630 A; S: >2; RS: 0,630 A; T: >2; ST: 0,630 A; R: >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT: 0,460 A; S: 11 min 33s; RS: 0,460 A; T: 11 min 33s; ST: -; R: - RT: 0,725 A; S: 8min47 s; RS: 0,725 A; T: 8min47 s; ST: -; R: -	P
	d) Instantaneous magnetic overload relays		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-6#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	0,63A to 1A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 0,662A, 1,05A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 0,819A, 1,30A Trip-time: 10min33s, 7min24s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 0,945A, 1,5A Trip-time: 1min21s, 1min10s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,662A, 1,05A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,756A, 1,20A Trip time: 8min33s, 5min36s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current 0,945A, 1,50A Trip time: 1min07s, 57,4s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 4,54A, 7,20A Trip time: 6,6s, 7,4s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 0,630A, 1,00A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 0,756A, 1,20A Trip time: 6min33s, 5min14s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 0,945A, 1,50A Trip time: 1min02s, 52,2s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 0,630 A / >2 / 0,630 A / >2 / 0,630 A / >2 1,00A / >2 / 1,00A / >2 / 1,00A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 0,725 A / 7min54s / 0,725 A / 7min54s / - / - 1,15A / 6min41s / 1,15A / 6min41s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-7#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	1A to 1,6A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m;	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 1,05A, 1,68A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 1,30A, 2,08A Trip-time: 8min27s, 10min13s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 1,5A, 2,40A Trip-time: 1min24s, 1min36s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 1,05A, 1,68A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 1,20A, 1,92A Trip time: 7min46s, 9min22s	P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current 1,50A, 2,40A Trip time: 1min12s, 1min31s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 7,20A, 11,6A Trip time: 5,7s, 6,3s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 1,00A, 1,60A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 1,20A, 1,92A Trip time: 6min33s, 8min26s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 1,50A, 2,40A Trip time: 1min07s, 1min18s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 1,00A / >2 / 1,00A / >2 / 1,00A / >2 1,60A / >2 / 1,60A / >2 / 1,60A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 1,15A / 8min26s / 1,15A / 8min26s / - / - 1,84A / 9min27s / 1,84A / 9min27s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-8#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	1,6A to 2,5A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m;	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 1,68A, 2,63A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 2,08A, 3,25A Trip-time: 8min55s, 8min32s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 2,40A, 3,75A Trip-time: 1min29s, 1min11s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 1,68A, 2,63A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 1,92A, 3,00A Trip time: 8min34s, 7min54s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current 2,40A, 3,75A Trip time: 1min22s, 1min07s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 11,6A, 18,0A Trip time: 6,7s, 6,4s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 1,60A, 2,50A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 1,92A, 3,00A Trip time: 6min53s, 5min47s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 2,40A, 3,75A Trip time: 1min06s, 54,6s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 1,60A / >2 / 1,60A / >2 / 1,60A / >2 2,50A / >2 / 2,50A / >2 / 2,50A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 1,73A / 7min29s / 1,73A / 7min29s / - / - 2,88A / 7min21s / 2,88A / 7min21s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-9#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	2,5A to 4A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m;	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 2,63A, 4,20A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 3,25A, 5,20A Trip-time: 5min10s, 6min14s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 3,75A, 6,00A Trip-time: 1min19s, 1min26s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 2,63A, 4,20A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 3,00A, 4,80A Trip time: 4min29s, 5min31s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current, 3,75A, 6,00A Trip time: 1min14s, 1min22s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 18,0A, 28,8A Trip time: 5,6s, 6,2s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 2,50A, 4,00A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 3,00A, 4,80A Trip time: 4min03s, 4min52s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 3,75A, 6,00A Trip time: 1min04s, 1min10s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 2,50A / >2 / 2,50A / >2 / 2,50A / >2 4,00A / >2 / 4,00A / >2 / 4,00A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 2,88A / 7min12s / 2,88A / 7min12s / - / - 4,60A / 7min37s / 4,60A / 7min37s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-10#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	4A to 6A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m;	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 4,20A, 6,30A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 5,20A, 7,80A Trip-time: 6min49s, 8min15s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 6,00A, 9,00A Trip-time: 1min24s, 1min30s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 4,20A, 6,30A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 4,80A, 7,20A Trip time: 6min12s, 7min33s	P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current, 6,00A, 9,00A Trip time: 1min16s, 1min24s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 28,8A, 43,2A Trip time: 7,2s, 6,8s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 4,00A, 6,00A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 4,80A, 7,20A Trip time: 5min52s, 6min51s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 6,00A, 9,00A Trip time: 1min09s, 1min12s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 4,00A / >2 / 4,00A / >2 / 4,00A / >2 6,00A / >2 / 6,00A / >2 / 6,00A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 4,60A / 5min59s / 4,60A / 5min59s / - / - 6,90A / 6min55s / 6,90A / 6min55s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-11#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	5,5A to 8A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,0mm^2 / 1m;	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 5,78A, 8,40A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 7,15A, 10,4A Trip-time: 11min24s, 13min14s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 8,25A, 12,0A Trip-time: 1min21s, 1min32s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 5,78A, 8,40A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 6,60A, 9,60A Trip time: 10min46s, 11min39s	P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current, 8,25A, 12,0A Trip time: 1min13s, 1min24s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 39,6A, 57,6A Trip time: 5,4s, 6,0s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 5,50A, 8,00A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 6,60A, 9,60A Trip time: 8min33s, 10min52s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 8,25A, 12,0A Trip time: 1min04s, 1min10s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 5,50A / >2 / 5,50A / >2 / 5,50A / >2 8,00A / >2 / 8,00A / >2 / 8,00A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 6,33A / 9min13s / 6,33A / 9min13s / - / - 9,20A / 9min32s / 9,20A / 9min32s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-12#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	7A to 10A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	1,5mm^2 / 1m;	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 7,35A, 10,5A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 9,10A, 13,0A Trip-time: 8min52s, 9min22s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 10,5A, 15,0A Trip-time: 1min37s, 1min39s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 7,35A, 10,5A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 8,40A, 12,0A Trip time: 8min11s, 8min54s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current, 10,5A, 15,0A Trip time: 1min14s, 1min33s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 50,4A, 72,0A Trip time: 4,9s, 5,6s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 7,00A, 10,0A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 8,40A, 12,0A Trip time: 7min36s, 8min14s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 10,5A, 15,0A Trip time: 1min07s, 1min10s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

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Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 7,00A / >2 / 7,00A / >2 / 7,00A / >2 10,0A / >2 / 10,0A / >2 / 10,0A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 8,05A / 7min14s / 8,05A / 7min14s / - / - 11,5A / 8min56s / 11,5A / 8min56s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-13#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	9A to 13A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	2,5mm^2 / 1m;	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 9,45A, 13,7A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 11,7A, 16,9A Trip-time: 6min51s, 8min13s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 13,5A, 19,5A Trip-time: 1min12s, 1min17s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 9,45A, 13,7A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 10,8A, 15,6A Trip time: 6min24s, 7min55s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current, 13,5A, 19,5A Trip time: 1min04s, 1min10s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 64,8A, 93,6A Trip time: 3,9s, 4,6s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 9,00A, 13,0A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 10,8A, 15,6A Trip time: 4min56s, 5min46s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 13,5A, 19,5A Trip time: 53,2s, 1min02s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

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Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 9,00A / >2 / 9,00A / >2 / 9,00A / >2 13,0A / >2 / 13,0A / >2 / 13,0A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 10,4A / 6min43s / 10,4A / 6min43s / - / - 15,0A / 6min16s / 15,0A / 6min16s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
a)	TEST SEQUENCE 1 (I-14#)		
	~~- verification of temperature rise (Clause 9.3.3.3.)~~		
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)		
	~~- verification of dielectric properties (Clause 9.3.3.4)~~		
9.3.3.3	Temperature rise		
9.3.3.2	Operating limits		
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		N/A
	1) Drop-out voltage		
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
	c) Thermal, electronic and time-delay magnetic overload relays		
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay ..... :	Thermal overload relay	P
	trip class ..... :	10A	P
	current setting ..... :	12A to 18A	P
	ambient temperature °C) ..... :	20,1°C	P
	test enclosure W x H x D (mm x mm x mm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	cable~~/busbar~~ cross-section (mm^2) / (mm) ..... :	2,5mm^2 / 1m;	P
	ambient temperature: - 5°C ..... :	-5,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current ..... :	No tripping; 12,6A, 18,9A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current ..... :	Tripping; 15,6A, 23,4A Trip-time: 7min49s, 8min48s	P
	c) for class 2, 3, 5 and 10 A overload relays energized at *C* times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; __10A__ Tripping current 18A, 27,0A Trip-time: 1min03s, 1min12s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current_ Trip-time: _	N/A
	ambient temperature: + 20 °C .....:	20,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 12,6A, 18,9A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 14,4A, 21,6A Trip time: 7min34s, 8min11s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current ..... :	Test current, 18,0A, 27,0A Trip time: 56,6s, 1min06s	P
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s) .....:	Class; _10A___ Test current 86,4A, 130A Trip time: 3,9s, 4,2s	P
	ambient temperature: + 40 °C .....:	40,2°C	P
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current .....:	Test current: 12,0A, 18,0A	P
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current .....:	Test current 14,4A, 21,6A Trip time: 6min54s, 7min37s	P
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current .....:	Test current 18,0A, 27,0A Trip time: 51,8s, 57,7s	P
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time .....:	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s) .....:	Class; ____ Tripping current___ A Trip-time: ____ s	N/A
8.2.1.5.1.2	Thermal memory test verification		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements(see figure 8)		N/A
	Apply a current equal to Ie until the device has reached the thermal equilibrium	Ie = _____ A	N/A
	Interrupt a current for a duration of 2 x *Tp* (see Table 2) with a relative tolerance of 10% (where *Tp* is the time measured at the *D* current according to Table 3).	*Tp* = _____ *A* *D* = _____ A Measured time *Tp* = ____ s	N/A
	Apply a current equal to 7,2 x *Ie*	I test = _____ A	N/A
	The relay shall trip within 50% of the time *TP*	Trip time = _____ s	N/A
8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:		
	ambient temperature (°C).....:	21,3°C	P
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting		P
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT / S / RS / T / ST / R 12,0A / >2 / 12,0A / >2 / 12,0A / >2 18,0A / >2 / 18,0A / >2 / 18,0A / >2	P
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole de-energized, tripping shall occur in less than 2 h; current value; test current	RT / S / RS / T / ST / R 13,8A / 6min34s / 13,8A / 6min34s / - / - 20,7A / 7min17s / 20,7A / 7min17s / - / -	P
	d) Instantaneous magnetic overload relays		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
b)	TEST SEQUENCE 2		
	Verification of rated making and breaking capacities, change-over ability and reversibility, where applicable (Clause 9.3.3.5.)		
	- verification of conventional operational performance (Clause 9.3.3.6)		
9.3.3.5	Making and breaking capacity		
	Conditions, make operations only.....:		N/A
	Type of product .....:		N/A
	utilization category .....:		N/A
	Control supply voltage at 110% U_s for half the number of operation cycles and 85% U_s for the other half, for AC-3, AC-3e and AC-4,	L1: L2: L3:	N/A
	rated operational voltage Ue (V) …….. :		N/A
	rated operational current Ie (A) or power (kW) ....:		N/A
	- test voltage (V) U/Ue = 1,05 .....:	L1: L2: L3:	N/A
	- test current (A) I/Ie = ____ .....:	L1: L2: L3:	N/A
	- power factor/time constant .....:	L1: L2: L3:	N/A
	- on-time (ms) .....:		N/A
	- off-time (s) .....:		N/A
	- number of make operations .....:		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Conditions, make/break operations only.....:		N/A
	Type of product .....:		N/A
	utilization category .....:		N/A
	rated operational voltage Ue (V) .....:		N/A
	rated operational current Ie (A) or power (kW) ....:		N/A
	- test voltage (V) U/Ue = 1,05 .....:	L1: - L2: - L3: -	N/A
	- test current (A) I/Ie = __1,5__.....:	L1: - L2: - L3: -	N/A
	- power factor/time constant .....:	L1: - L2: - L3: -	N/A
	- on-time (ms) .....:		N/A
	- off-time (s) .....:		N/A
	- number of operations	☐ 50 make ☐ 50 make/ break	N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) .....:		N/A
	Measured oscillatory frequency (kHz) .....:		N/A
	Factor y .....:		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
	For starters incorporated two contactors, 2 contactor shall be used with the following sequence: Close A – open A – close B – open B- off period		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Number of operation energized simultaneously		N/A
9.3.3.6	Operational performance capability:		
	Type of product .....:		N/A
	utilization category .....:		N/A
	rated operational voltage Ue (V) .....:		N/A
	rated operational current Ie (A) or power (kW) ....:		N/A
	Conditions, make/break operations:		N/A
	- test voltage (V) U/Ue = 1,05 .....:	L1: - L2: - L3: -	N/A
	- test current (A) I/Ie = ...:	L1: - L2: - L3: -	N/A
	- power factor/time constant .....:	L1: - L2: - L3: -	N/A
	- on-time (ms) .....:		N/A
	- off-time (s) .....:		N/A
	- number of operations	☐ …… make ☐ …… make/ break	N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) .....:		N/A
	Measured oscillatory frequency (kHz) .....:		N/A
	Factor y .....:		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
	Dielectric verification		
	test voltage (2 Ui), min 1000 V for 60 s. (V) ..... :	Test voltage: ___ _ V	N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur.		N/A
	Leakage current equipment suitable for isolation		
	test voltage (1,1 Ue) (V) ..... :		N/A
	Leakage current: ≤ 2 mA /pole ..... :		N/A
	Equipment provided with mirror contacts		
	the mirror contact shall withstand its rated insulation voltage U_i. Ui (V)……..…:	Test voltage: _____ V	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
c)	TEST SEQUENCE 3 (III-1#, TGR1-25: 9A-13A)		
	- Performance under short-circuit conditions (Clause 9.3.4)		
9.3.4	Performance under short-circuit conditions		
	For MPSD	See Annex P	
	If devices tested in free air may also be used in an individual enclosure, they shall be additionally tested in the smallest of such enclosures stated by the manufacturer.		N/A
	For devices tested only in free air, information shall be provided to indicate that the device has not been evaluated for use in an individual enclosure.		P
	The individual enclosure shall be in accordance with the manufacturer specifications. In case of multiple enclosure options are provided, the individual enclosure with the smallest volume shall be taken		N/A
	Sub clause 8.3.4.1.2 of part 1 applies except that, for type “1” co-ordination, the fusible element F and resistor are replaced by a solid 6 mm^2 wire of 1,2 m to 1,8 m length connected to the neutral, or with the agreement of the manufacturer, to one of the phases	☐ neutral ☐ phase ____	N/A
	Maximum motor current Ie and maximum Ue are covered		N/A
	Rated control supply voltage.....:		N/A
9.3.4.2.1	Test at the prospective current "r":		
	type of product.....:	TGR1-25	P
	test circuit, figure 9, 10, 11, 12.....:	Figure 9	P
	type of SCPD .....:	RT16-00/25	P
	ratings of SCPD, co-ordination type 1 .....:	25A	P
	ratings of SCPD, co-ordination type 2 .....:		N/A
	rated operational current Ie (A) AC-3 .....:		N/A
	rated operational voltage (V).....:	690VAC	P
	prospective current "r" (kA) (table 13 or 14).....:	1kA	P
	Wire size (mm^2) type 1	__2,5__ mm^2	P
	Wire size (mm^2) type 2	____ mm^2	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	test voltage (V) .....:	L1: 731V L2: 730V L3: 729V	P
	r.m.s. test current (A) .....:	L1: 1,01kA L2: 1,01kA L3: 1,01kA	P
	peak current (A) .....:	L1: 1,44kA L2: 1,43kA L3: 1,45kA	P
	power factor	0,93	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2dt and Ip (A^2s / A) .....:	L1: 1,85kA²s/ 1,06A L2: 2,24kA²s/ 1,22A L3: 2,56kA²s/ 1,07A	P
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2dt and Ip (A^2s / A)	L1: 2,16kA²s/ 1,06A L2: 2,37kA²s/ 1,18A L3: 2,15kA²s/ 1,01A	P
9.3.4.2.4	Behaviour of the equipment during the test		
	Both types of co-ordination (all devices):		
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X		N/A
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		P
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		P
	Both types of co-ordination (combination starters and protected starters only):		
	E – the circuit breaker or switch is capable of being opened manually by its operating means		N/A
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:		N/A
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A
	Type 1 co-ordination (all devices):		
	H - There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter other than MPSD may be inoperative after each operation. The starter shall therefore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		P
	Type 1 co-ordination (combination and protected starters only):		
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq”) by a dielectric test on the complete unit under test (SCPD plus contactor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:		N/A
	Dielectric verification test voltage (2 Ue) but not less than 1000V for 60 s (V).....:	Test voltage: __ V	N/A
	- between each pole and all other poles connected to the frame of the starter		N/A
	- between all live parts of all poles connected together and the frame of the starter		N/A
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Test voltage: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	N/A
	Type 2 co-ordination (all devices)		

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Clause	Requirement + Test	Result - Remark	Verdict
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts other than MPSD contacts is permitted, if they are easily separated without significant deformation, but no replacement of parts is permitted during the test, except that , in case of fuse protection, all fuse shall be replaced.		N/A
	In the case of welded contact as described above, the functionally of the device shall be verified by carrying out 10 operations under the conditions of table 10 for the applicable utilization category.	Contacts welded ☐ yes ☐ no	N/A
	Operational performance capability (9.3.3.6):		
	Type of product :		N/A
	utilization category :		N/A
	rated operational voltage Ue (V) :		N/A
	rated operational current Ie (A) or power (kW) :		N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,05 (V) :		N/A
	- test current (A) I/Ie = 6 :		N/A
	- power factor/time constant :		N/A
	- on-time (ms) :		N/A
	- off-time (s) :		N/A
	- number of make/break operations :		N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	L - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		N/A
	Dielectric verification test voltage (2 Ue) for 60 s (V) but not less than 1000V :	Test voltage: _____ V	N/A
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation		N/A
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		N/A
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		N/A
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 60 s (V)		
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed	Test voltage: _____ V	N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	Test voltage: _____ V L1: _____ mA L1: _____ mA L1: _____ mA	N/A
9.3.4.2.3	Test at the rated conditional short-circuit current "Iq"		
	Type of product .....:		N/A
	Test circuit, figure 9, 10, 11, 12.....:		N/A
	type of SCPD .....:		N/A
	ratings of SCPD, co-ordination type 1 .....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	ratings of SCPD, co-ordination type 2 .....:		N/A
	rated operational current Ie (A) AC-3 .....:		N/A
	rated operational voltage (V)		N/A
	prospective current "Iq" (kA) .....:		N/A
	Wire size (mm^2) type 1	____ mm^2	N/A
	Wire size (mm^2) type 2	____ mm^2	N/A
	test voltage (V) .....:	L1: L2: L3:	N/A
	r.m.s. test current (A) .....:	L1: L2: L3:	N/A
	peak current (A) .....:	L1: L2: L3:	N/A
	power factor		N/A
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2t and Ip (A^2s / A) .....:	L1: L2: L3:	N/A
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2t and Ip (A^2s / A) .....:	L1: L2: L3:	N/A
	3. one breaking operation of SCPD by closing the switching device on to the short-circuit I^2t and Ip (A^2s / A) .....:	L1: L2: L3:	N/A
	Behaviour of the equipment during the test		
	Both types of co-ordination (all devices):		
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		N/A
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		N/A
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		N/A
	Both types of co-ordination (combination starters and protected starters only):		
	E – the circuit breaker or switch is capable of being opened manually by its operating means		N/A
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N/A
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:		N/A
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A
	Type 1 co-ordination (all devices):		
	H - There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter other than MPSD may be inoperative after each operation. The starter shall therefore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		N/A
	Type 1 co-ordination (combination and protected starters only):		
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq”) by a dielectric test on the complete unit under test (SCPD plus contactor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:		N/A
	Dielectric verification test voltage (2 Ue) but not less than 1000V for 60 s (V).....:	Test voltage: _____ V	N/A
	- between each pole and all other poles connected to the frame of the starter		N/A
	- between all live parts of all poles connected together and the frame of the starter		N/A
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Test voltage: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	N/A
	Type 2 co-ordination (all devices)		
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts other than MPSD contacts is permitted, if they are easily separated without significant deformation, but no replacement of parts is permitted during the test, except that , in case of fuse protection, all fuse shall be replaced.		N/A
	In the case of welded contact as described above, the functionally of the device shall be verified by carrying out 10 operations under the conditions of table 10 for the applicable utilization category.	Contacts welded ☐ yes ☐ no	N/A
	Operational performance capability (9.3.3.6):		
	Type of product :		N/A
	utilization category :		N/A
	rated operational voltage Ue (V) :		N/A
	rated operational current Ie (A) or power (kW) :		N/A
	Conditions, make/break operations:		N/A
	- test voltage U/Ue = 1,05 (V) :		N/A
	- test current (A) I/Ie = 6 :		N/A
	- power factor/time constant :		N/A
	- on-time (ms) :		N/A
	- off-time (s) :		N/A
	- number of make/break operations :	10	N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	L - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		N/A
	Dielectric verification test voltage (2 Ue) for 60 s (V) but not less than 1000V :	Test voltage: _____ V	N/A
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation		N/A
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		N/A
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		N/A
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 60 s (V)		N/A
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed	Test voltage: _____ V	N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	Test voltage: _____ V L1: _____ mA L1: _____ mA L1: _____ mA	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
c)	TEST SEQUENCE 3 (III-2#, TGR1-25: 9A-13A)		
	- Performance under short-circuit conditions (Clause 9.3.4)		
9.3.4	Performance under short-circuit conditions		
	For MPSD	See Annex P	
	If devices tested in free air may also be used in an individual enclosure, they shall be additionally tested in the smallest of such enclosures stated by the manufacturer.		N/A
	For devices tested only in free air, information shall be provided to indicate that the device has not been evaluated for use in an individual enclosure.		P
	The individual enclosure shall be in accordance with the manufacturer specifications. In case of multiple enclosure options are provided, the individual enclosure with the smallest volume shall be taken		N/A
	Sub clause 8.3.4.1.2 of part 1 applies except that, for type “1” co-ordination, the fusible element F and resistor are replaced by a solid 6 mm^2 wire of 1,2 m to 1,8 m length connected to the neutral, or with the agreement of the manufacturer, to one of the phases	☐ neutral ☐ phase ____	N/A
	Maximum motor current Ie and maximum Ue are covered		N/A
	Rated control supply voltage.....:		N/A
9.3.4.2.1	Test at the prospective current "r":		
	type of product.....:		N/A
	test circuit, figure 9, 10, 11, 12.....:		N/A
	type of SCPD .....:		N/A
	ratings of SCPD, co-ordination type 1 .....:		N/A
	ratings of SCPD, co-ordination type 2 .....:		N/A
	rated operational current Ie (A) AC-3 .....:		N/A
	rated operational voltage (V).....:		N/A
	prospective current "r" (kA) (table 13 or 14).....:		N/A
	Wire size (mm^2) type 1	____ mm^2	N/A
	Wire size (mm^2) type 2	____ mm^2	N/A
	test voltage (V) .....:	L1: L2: L3:	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	r.m.s. test current (A) .....:	L1: L2: L3:	N/A
	peak current (A) .....:	L1: L2: L3:	N/A
	power factor		N/A
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2dt and Ip (A^2s / A) .....:	L1: L2: L3:	N/A
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2dt and Ip (A^2s / A)	L1: L2: L3:	N/A
9.3.4.2.4	Behaviour of the equipment during the test		
	Both types of co-ordination (all devices):		
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		N/A
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X		N/A
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		N/A
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		N/A
	Both types of co-ordination (combination starters and protected starters only):		
	E – the circuit breaker or switch is capable of being opened manually by its operating means		N/A
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N/A
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:		N/A
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A
	Type 1 co-ordination (all devices):		
	H - There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter other than MPSD may be inoperative after each operation. The starter shall therefore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		N/A
	Type 1 co-ordination (combination and protected starters only):		
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq”) by a dielectric test on the complete unit under test (SCPD plus contactor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:		N/A
	Dielectric verification test voltage (2 Ue) but not less than 1000V for 60 s (V).....:	Test voltage: __ V	N/A
	- between each pole and all other poles connected to the frame of the starter		N/A
	- between all live parts of all poles connected together and the frame of the starter		N/A
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Test voltage: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	N/A
	Type 2 co-ordination (all devices)		
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts other than MPSD contacts is permitted, if they are easily separated without significant deformation, but no replacement of parts is permitted during the test, except that , in case of fuse protection, all fuse shall be replaced.		N/A
	In the case of welded contact as described above, the functionally of the device shall be verified by carrying out 10 operations under the conditions of table 10 for the applicable utilization category.	Contacts welded ☐ yes ☐ no	N/A
	Operational performance capability (9.3.3.6):		

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Clause	Requirement + Test	Result - Remark	Verdict
	Type of product :		N/A
	utilization category :		N/A
	rated operational voltage Ue (V) :		N/A
	rated operational current Ie (A) or power (kW) :		N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,05 (V) :		N/A
	- test current (A) I/Ie = 6 :		N/A
	- power factor/time constant :		N/A
	- on-time (ms) :		N/A
	- off-time (s) :		N/A
	- number of make/break operations :		N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	L - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		N/A
	Dielectric verification test voltage (2 Ue) for 60 s (V) but not less than 1000V :	Test voltage: _____ V	N/A
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	in all normal positions of operation		
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		N/A
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		N/A
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 60 s (V)		
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed	Test voltage: _____ V	N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	Test voltage: _____ V L1: _____ mA L1: _____ mA L1: _____ mA	N/A
9.3.4.2.3	Test at the rated conditional short-circuit current "Iq"		
	Type of product .....:	TGR1-25	P
	Test circuit, figure 9, 10, 11, 12.....:	Figure 9	P
	type of SCPD .....:	RT16-00/25	P
	ratings of SCPD, co-ordination type 1 .....:	25A	P
	ratings of SCPD, co-ordination type 2 .....:		N/A
	rated operational current Ie (A) AC-3 .....:		N/A
	rated operational voltage (V)	690VAC	P
	prospective current "Iq" (kA) .....:	50kA	P
	Wire size (mm^2) type 1	__2,5__ mm^2	P
	Wire size (mm^2) type 2	____ mm^2	N/A
	test voltage (V) .....:	L1: 734VAC L2: 737VAC L3: 736VAC	P

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Clause	Requirement + Test	Result - Remark	Verdict
	r.m.s. test current (A) .....:	L1: 51,1kA L2: 50,7kA L3: 50,5kA	P
	peak current (A) .....:	L1: 93,4kA L2: 82,0kA L3: 106kA	P
	power factor	0,21	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I²t and Ip (A²s / A) .....:	L1: 1,78 kA²s / 1,42kA L2: 2,23 kA²s / 2,43kA L3: 1,55 kA²s / 1,24kA	P
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I²t and Ip (A²s / A) .....:	L1: 2,82 kA²s / 3,31kA L2: 1,92 kA²s / 1,30kA L3: 2,98 kA²s / 2,00kA	P
	3. one breaking operation of SCPD by closing the switching device on to the short-circuit I²t and Ip (A²s / A) .....:		N/A
	Behaviour of the equipment during the test		
	Both types of co-ordination (all devices):		
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X		N/A
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		P
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		P
	Both types of co-ordination (combination starters and protected starters only):		
	E – the circuit breaker or switch is capable of being opened manually by its operating means		N/A
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:		N/A
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A
	Type 1 co-ordination (all devices):		
	H - There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter other than MPSD may be inoperative after each operation. The starter shall therefore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		P
	Type 1 co-ordination (combination and protected starters only):		
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq”) by a dielectric test on the complete unit under test (SCPD plus contactor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:		N/A
	Dielectric verification test voltage (2 Ue) but not less than 1000V for 60 s (V).....:	Test voltage: _____ V	N/A
	- between each pole and all other poles connected to the frame of the starter		N/A
	- between all live parts of all poles connected together and the frame of the starter		N/A
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Test voltage: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	N/A
	Type 2 co-ordination (all devices)		

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Clause	Requirement + Test	Result - Remark	Verdict
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts other than MPSD contacts is permitted, if they are easily separated without significant deformation, but no replacement of parts is permitted during the test, except that , in case of fuse protection, all fuse shall be replaced.		N/A
	In the case of welded contact as described above, the functionally of the device shall be verified by carrying out 10 operations under the conditions of table 10 for the applicable utilization category.	Contacts welded ☐ yes ☐ no	N/A
	Operational performance capability (9.3.3.6):		
	Type of product :		N/A
	utilization category :		N/A
	rated operational voltage Ue (V) :		N/A
	rated operational current Ie (A) or power (kW) :		N/A
	Conditions, make/break operations:		N/A
	- test voltage U/Ue = 1,05 (V) :		N/A
	- test current (A) I/Ie = 6 :		N/A
	- power factor/time constant :		N/A
	- on-time (ms) :		N/A
	- off-time (s) :		N/A
	- number of make/break operations :	10	N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	L - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		N/A
	Dielectric verification test voltage (2 Ue) for 60 s (V) but not less than 1000V :	Test voltage: _____ V	N/A
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation		N/A
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		N/A
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		N/A
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 60 s (V)		N/A
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed	Test voltage: _____ V	N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	Test voltage: _____ V L1: _____ mA L1: _____ mA L1: _____ mA	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
c)	TEST SEQUENCE 3 (III-3#, TGR1-25: 17A-25A)		
	- Performance under short-circuit conditions (Clause 9.3.4)		
9.3.4	Performance under short-circuit conditions		
	For MPSD	See Annex P	
	If devices tested in free air may also be used in an individual enclosure, they shall be additionally tested in the smallest of such enclosures stated by the manufacturer.		N/A
	For devices tested only in free air, information shall be provided to indicate that the device has not been evaluated for use in an individual enclosure.		P
	The individual enclosure shall be in accordance with the manufacturer specifications. In case of multiple enclosure options are provided, the individual enclosure with the smallest volume shall be taken		N/A
	Sub clause 8.3.4.1.2 of part 1 applies except that, for type “1” co-ordination, the fusible element F and resistor are replaced by a solid 6 mm^2 wire of 1,2 m to 1,8 m length connected to the neutral, or with the agreement of the manufacturer, to one of the phases	☐ neutral ☐ phase ____	N/A
	Maximum motor current Ie and maximum Ue are covered		N/A
	Rated control supply voltage.....:		N/A
9.3.4.2.1	Test at the prospective current "r":		
	type of product.....:	TGR1-25	P
	test circuit, figure 9, 10, 11, 12.....:	Figure 9	P
	type of SCPD .....:	RT16-00/50	P
	ratings of SCPD, co-ordination type 1 .....:	50A	P
	ratings of SCPD, co-ordination type 2 .....:		N/A
	rated operational current Ie (A) AC-3 .....:		N/A
	rated operational voltage (V).....:	690VAC	P
	prospective current "r" (kA) (table 13 or 14).....:	3kA	P
	Wire size (mm^2) type 1	__2,5__ mm^2	P
	Wire size (mm^2) type 2	____ mm^2	N/A
	test voltage (V) .....:	L1: 731V L2: 729V L3: 730V	P

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Clause	Requirement + Test	Result - Remark	Verdict
	r.m.s. test current (A) .....:	L1: 3,04kA L2: 3,04kA L3: 3,03kA	P
	peak current (A) .....:	L1: 4,36kA L2: 4,33kA L3: 4,28kA	P
	power factor	0,87	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2dt and Ip (A^2s / A) .....:	L1: 1,06kA^2s/ 1,24A L2: 2,16kA^2s/ 1,34A L3: 2,08kA^2s/ 1,88A	P
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2dt and Ip (A^2s / A)	L1: 233kA^2s/ 326A L2: 1,95kA^2s/ 1,79A L3: 1,86kA^2s/ 1,80A	P
9.3.4.2.4	Behaviour of the equipment during the test		
	Both types of co-ordination (all devices):		
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X		N/A
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		P
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		P
	Both types of co-ordination (combination starters and protected starters only):		
	E – the circuit breaker or switch is capable of being opened manually by its operating means		N/A
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N/A
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:		N/A
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A
	Type 1 co-ordination (all devices):		
	H - There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter other than MPSD may be inoperative after each operation. The starter shall therefore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		P
	Type 1 co-ordination (combination and protected starters only):		
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq”) by a dielectric test on the complete unit under test (SCPD plus contactor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:		N/A
	Dielectric verification test voltage (2 Ue) but not less than 1000V for 60 s (V).....:	Test voltage: __ V	N/A
	- between each pole and all other poles connected to the frame of the starter		N/A
	- between all live parts of all poles connected together and the frame of the starter		N/A
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Test voltage: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	N/A
	Type 2 co-ordination (all devices)		
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts other than MPSD contacts is permitted, if they are easily separated without significant deformation, but no replacement of parts is permitted during the test, except that , in case of fuse protection, all fuse shall be replaced.		N/A
	In the case of welded contact as described above, the functionally of the device shall be verified by carrying out 10 operations under the conditions of table 10 for the applicable utilization category.	Contacts welded ☐ yes ☐ no	N/A
	Operational performance capability (9.3.3.6):		

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Clause	Requirement + Test	Result - Remark	Verdict
	Type of product :		N/A
	utilization category :		N/A
	rated operational voltage Ue (V) :		N/A
	rated operational current Ie (A) or power (kW) :		N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,05 (V) :		N/A
	- test current (A) I/Ie = 6 :		N/A
	- power factor/time constant :		N/A
	- on-time (ms) :		N/A
	- off-time (s) :		N/A
	- number of make/break operations :		N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	L - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		N/A
	Dielectric verification test voltage (2 Ue) for 60 s (V) but not less than 1000V :	Test voltage: _____ V	N/A
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	in all normal positions of operation		
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		N/A
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		N/A
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 60 s (V)		
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed	Test voltage: _____ V	N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	Test voltage: _____ V L1: _____ mA L1: _____ mA L1: _____ mA	N/A
9.3.4.2.3	Test at the rated conditional short-circuit current "Iq"		
	Type of product .....:		N/A
	Test circuit, figure 9, 10, 11, 12.....:		N/A
	type of SCPD .....:		N/A
	ratings of SCPD, co-ordination type 1 .....:		N/A
	ratings of SCPD, co-ordination type 2 .....:		N/A
	rated operational current Ie (A) AC-3 .....:		N/A
	rated operational voltage (V)		N/A
	prospective current "Iq" (kA) .....:		N/A
	Wire size (mm^2) type 1	____ mm^2	N/A
	Wire size (mm^2) type 2	____ mm^2	N/A
	test voltage (V) .....:	L1: L2: L3:	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	r.m.s. test current (A) .....:	L1: L2: L3:	N/A
	peak current (A) .....:	L1: L2: L3:	N/A
	power factor		N/A
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2t and Ip (A^2s / A) .....:	L1: L2: L3:	N/A
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2t and Ip (A^2s / A) .....:	L1: L2: L3:	N/A
	3. one breaking operation of SCPD by closing the switching device on to the short-circuit I^2t and Ip (A^2s / A) .....:	L1: L2: L3:	N/A
	Behaviour of the equipment during the test		
	Both types of co-ordination (all devices):		
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		N/A
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X		N/A
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		N/A
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		N/A
	Both types of co-ordination (combination starters and protected starters only):		
	E – the circuit breaker or switch is capable of being opened manually by its operating means		N/A
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:		N/A
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A
	Type 1 co-ordination (all devices):		
	H - There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter other than MPSD may be inoperative after each operation. The starter shall therefore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		N/A
	Type 1 co-ordination (combination and protected starters only):		
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq”) by a dielectric test on the complete unit under test (SCPD plus contactor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:		N/A
	Dielectric verification test voltage (2 Ue) but not less than 1000V for 60 s (V).....:	Test voltage: _____ V	N/A
	- between each pole and all other poles connected to the frame of the starter		N/A
	- between all live parts of all poles connected together and the frame of the starter		N/A
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Test voltage: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	N/A
	Type 2 co-ordination (all devices)		

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Clause	Requirement + Test	Result - Remark	Verdict
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts other than MPSD contacts is permitted, if they are easily separated without significant deformation, but no replacement of parts is permitted during the test, except that , in case of fuse protection, all fuse shall be replaced.		N/A
	In the case of welded contact as described above, the functionally of the device shall be verified by carrying out 10 operations under the conditions of table 10 for the applicable utilization category.	Contacts welded ☐ yes ☐ no	N/A
	Operational performance capability (9.3.3.6):		
	Type of product :		N/A
	utilization category :		N/A
	rated operational voltage Ue (V) :		N/A
	rated operational current Ie (A) or power (kW) :		N/A
	Conditions, make/break operations:		N/A
	- test voltage U/Ue = 1,05 (V) :		N/A
	- test current (A) I/Ie = 6 :		N/A
	- power factor/time constant :		N/A
	- on-time (ms) :		N/A
	- off-time (s) :		N/A
	- number of make/break operations :	10	N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	L - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		N/A
	Dielectric verification test voltage (2 Ue) for 60 s (V) but not less than 1000V :	Test voltage: _____ V	N/A
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation		N/A
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		N/A
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		N/A
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 60 s (V)		N/A
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed	Test voltage: _____ V	N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	Test voltage: _____ V L1: _____ mA L1: _____ mA L1: _____ mA	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
c)	TEST SEQUENCE 3 (III-4#, TGR1-25: 17A-25A)		
	- Performance under short-circuit conditions (Clause 9.3.4)		
9.3.4	Performance under short-circuit conditions		
	For MPSD	See Annex P	
	If devices tested in free air may also be used in an individual enclosure, they shall be additionally tested in the smallest of such enclosures stated by the manufacturer.		N/A
	For devices tested only in free air, information shall be provided to indicate that the device has not been evaluated for use in an individual enclosure.		P
	The individual enclosure shall be in accordance with the manufacturer specifications. In case of multiple enclosure options are provided, the individual enclosure with the smallest volume shall be taken		N/A
	Sub clause 8.3.4.1.2 of part 1 applies except that, for type “1” co-ordination, the fusible element F and resistor are replaced by a solid 6 mm^2 wire of 1,2 m to 1,8 m length connected to the neutral, or with the agreement of the manufacturer, to one of the phases	☐ neutral ☐ phase ____	N/A
	Maximum motor current Ie and maximum Ue are covered		N/A
	Rated control supply voltage.....:		N/A
9.3.4.2.1	Test at the prospective current "r":		
	type of product.....:		N/A
	test circuit, figure 9, 10, 11, 12.....:		N/A
	type of SCPD .....:		N/A
	ratings of SCPD, co-ordination type 1 .....:		N/A
	ratings of SCPD, co-ordination type 2 .....:		N/A
	rated operational current Ie (A) AC-3 .....:		N/A
	rated operational voltage (V).....:		N/A
	prospective current "r" (kA) (table 13 or 14).....:		N/A
	Wire size (mm^2) type 1	____ mm^2	N/A
	Wire size (mm^2) type 2	____ mm^2	N/A
	test voltage (V) .....:	L1: L2: L3:	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	r.m.s. test current (A) .....:	L1: L2: L3:	N/A
	peak current (A) .....:	L1: L2: L3:	N/A
	power factor		N/A
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2dt and Ip (A^2s / A) .....:	L1: L2: L3:	N/A
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2dt and Ip (A^2s / A)	L1: L2: L3:	N/A
9.3.4.2.4	Behaviour of the equipment during the test		
	Both types of co-ordination (all devices):		
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		N/A
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X		N/A
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		N/A
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		N/A
	Both types of co-ordination (combination starters and protected starters only):		
	E – the circuit breaker or switch is capable of being opened manually by its operating means		N/A
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N/A
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:		N/A
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A
	Type 1 co-ordination (all devices):		
	H - There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter other than MPSD may be inoperative after each operation. The starter shall therefore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		N/A
	Type 1 co-ordination (combination and protected starters only):		
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq”) by a dielectric test on the complete unit under test (SCPD plus contactor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:		N/A
	Dielectric verification test voltage (2 Ue) but not less than 1000V for 60 s (V).....:	Test voltage: __ V	N/A
	- between each pole and all other poles connected to the frame of the starter		N/A
	- between all live parts of all poles connected together and the frame of the starter		N/A
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Test voltage: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	N/A
	Type 2 co-ordination (all devices)		
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts other than MPSD contacts is permitted, if they are easily separated without significant deformation, but no replacement of parts is permitted during the test, except that , in case of fuse protection, all fuse shall be replaced.		N/A
	In the case of welded contact as described above, the functionally of the device shall be verified by carrying out 10 operations under the conditions of table 10 for the applicable utilization category.	Contacts welded ☐ yes ☐ no	N/A
	Operational performance capability (9.3.3.6):		

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Clause	Requirement + Test	Result - Remark	Verdict
	Type of product :		N/A
	utilization category :		N/A
	rated operational voltage Ue (V) :		N/A
	rated operational current Ie (A) or power (kW) :		N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,05 (V) :		N/A
	- test current (A) I/Ie = 6 :		N/A
	- power factor/time constant :		N/A
	- on-time (ms) :		N/A
	- off-time (s) :		N/A
	- number of make/break operations :		N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	L - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		N/A
	Dielectric verification test voltage (2 Ue) for 60 s (V) but not less than 1000V :	Test voltage: _____ V	N/A
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	in all normal positions of operation		
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		N/A
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		N/A
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 60 s (V)		
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed	Test voltage: _____ V	N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	Test voltage: _____ V L1: _____ mA L1: _____ mA L1: _____ mA	N/A
9.3.4.2.3	Test at the rated conditional short-circuit current "Iq"		
	Type of product .....:	TGR1-25	P
	Test circuit, figure 9, 10, 11, 12.....:	Figure 9	P
	type of SCPD .....:	RT16-00/50	P
	ratings of SCPD, co-ordination type 1 .....:	50A	P
	ratings of SCPD, co-ordination type 2 .....:		N/A
	rated operational current Ie (A) AC-3 .....:		N/A
	rated operational voltage (V)	690VAC	P
	prospective current "Iq" (kA) .....:	50kA	P
	Wire size (mm^2) type 1	__4,0__ mm^2	P
	Wire size (mm^2) type 2	____ mm^2	N/A
	test voltage (V) .....:	L1: 734VAC L2: 737VAC L3: 736VAC	P

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Clause	Requirement + Test	Result - Remark	Verdict
	r.m.s. test current (A) .....:	L1: 51,1kA L2: 50,7kA L3: 50,5kA	P
	peak current (A) .....:	L1: 93,4kA L2: 82,0kA L3: 106kA	P
	power factor	0,21	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2t and Ip (A^2s / A) .....:	L1: 975 kA^2s / 2,07kA L2: 2,27 kA^2s / 2,27kA L3: 2,11 kA^2s / 2,11kA	P
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2t and Ip (A^2s / A) .....:	L1: 1,66 kA^2s / 1,21kA L2: 2,58 kA^2s / 1,86kA L3: 2,44 kA^2s / 3,08kA	P
	3. one breaking operation of SCPD by closing the switching device on to the short-circuit I^2t and Ip (A^2s / A) .....:		N/A
	Behaviour of the equipment during the test		
	Both types of co-ordination (all devices):		
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X		N/A
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		P
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		P
	Both types of co-ordination (combination starters and protected starters only):		
	E – the circuit breaker or switch is capable of being opened manually by its operating means		N/A
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:		N/A
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A
	Type 1 co-ordination (all devices):		
	H - There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter other than MPSD may be inoperative after each operation. The starter shall therefore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		P
	Type 1 co-ordination (combination and protected starters only):		
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq”) by a dielectric test on the complete unit under test (SCPD plus contactor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:		N/A
	Dielectric verification test voltage (2 Ue) but not less than 1000V for 60 s (V).....:	Test voltage: _____ V	N/A
	- between each pole and all other poles connected to the frame of the starter		N/A
	- between all live parts of all poles connected together and the frame of the starter		N/A
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Test voltage: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	N/A
	Type 2 co-ordination (all devices)		

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Clause	Requirement + Test	Result - Remark	Verdict
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts other than MPSD contacts is permitted, if they are easily separated without significant deformation, but no replacement of parts is permitted during the test, except that , in case of fuse protection, all fuse shall be replaced.		N/A
	In the case of welded contact as described above, the functionally of the device shall be verified by carrying out 10 operations under the conditions of table 10 for the applicable utilization category.	Contacts welded ☐ yes ☐ no	N/A
	Operational performance capability (9.3.3.6):		
	Type of product :		N/A
	utilization category :		N/A
	rated operational voltage Ue (V) :		N/A
	rated operational current Ie (A) or power (kW) :		N/A
	Conditions, make/break operations:		N/A
	- test voltage U/Ue = 1,05 (V) :		N/A
	- test current (A) I/Ie = 6 :		N/A
	- power factor/time constant :		N/A
	- on-time (ms) :		N/A
	- off-time (s) :		N/A
	- number of make/break operations :	10	N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	L - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		N/A
	Dielectric verification test voltage (2 Ue) for 60 s (V) but not less than 1000V :	Test voltage: _____ V	N/A
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation		N/A
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		N/A
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		N/A
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 60 s (V)		N/A
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed	Test voltage: _____ V	N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	Test voltage: _____ V L1: _____ mA L1: _____ mA L1: _____ mA	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
d)	TEST SEQUENCE 4		
	- Verification of ability to withstand overload currents: Clause 9.3.5 (applicable for contactors only)		
9.3.5	Verification of ability to withstand overload currents		
	Overload current withstand capability of contactors AC-3 and AC-4:		
	ambient temperature (°C) .....:		N/A
	rated operational current Ie (A) max. AC-3 .....:		N/A
	test current (Ie) (A) .....:		N/A
	duration of test: 10 s .....:		N/A
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3.1	Compliance with performance requirements		
e)	TEST SEQUENCE 5		
	1) verification of mechanical properties of terminals according to 8.2.4 of IEC 60947-1:2007, IEC 60947-1:2007/AMD1:2010, IEC 60947-1:2007/AMD2:2014, 9.2.2 and 9.2.3; 2) verification of degrees of protection of enclosed contactors and starters (see Annex C of IEC 60947-1:2007, IEC 60947-1:2007/AMD1:2010).		
8.2.4 part 1	Verification of mechanical properties of terminals	(see 8.2.4 part 1 above)	P
Annex C Part 1	Verification of degrees of protection of enclosed contactors and starters	(see 8.2.3 part 1 above)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.4	EMC		
	Where a range of contactors or starters comprise similar control electronics, within similar frame sizes, it is only necessary to test a single representative sample of the contactor or starter as specified by the manufacturer.		N/A
	The test sample shall be in the open or closed position, whichever is the worse, and shall be operated with the rated control circuit supply voltage.		N/A
9.4.2	Immunity (for equipment incorporating electronic circuits)		
	Test levels of IEC60947-4-1: table 16 ..... : Special requirements are specified in clause 9.4.2.1 to 9.4.2.7		N/A
9.4.2.1	Performance of the test sample during and after the test		
	The product shall perform according to the performance criteria given in Table 12.		N/A
9.3.6.2	Operating limits		
8.2.1.2	Limits of operation of contactors and power-operated starters		
7.2.1.2 Part 1	Limits of operation of power operated equipment		
	rated control circuit supply voltage Us (V) .....:		N/A
	frequency (Hz) .....:		N/A
	rated air supply pressure ……..:		N/A
	ambient temperature ……:		N/A
	operation range……..:		N/A
	close at any value between 85% and 110% (V or bar).....:	_	N/A
	drop out voltage: 75% to 20% (or 10% if specified by manufacturer) for a.c. and 75% to 10% for d.c. (V) .....:		N/A
	drop out pressure (bar) 75% to 10% of rated pressure……..…….:		N/A
	In the case of coils, the limiting drop-out values apply when the coil circuit resistance is equal to that obtained at –5 °C……:		N/A
	Calculated values……:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Drop out time (if applicable)……..:		N/A
	For latched contactors, the device shall drop out and open fully when a de-latching voltage between 85 % and 110 % of the rated de-latching voltage is applied……..:		N/A
9.4.2.2	Electrostatic discharge		
	Discharges shall be applied only to points which are accessible during normal usage.		N/A
	performance criterion B of Table 12.		N/A
9.4.2.3	Radiated radio-frequency electromagnetic field		
	performance criterion A of Table 12.		N/A
9.4.2.4	Conducted disturbances induced by radio-frequency fields		
	performance criterion A of Table 12.		N/A
9.4.2.5	Electrical fast transient/bursts		
	The contactor shall be operated at least one time during the test and the overload relay is loaded at 0,9 times the current setting with a maximum of 100 A.		N/A
	performance criterion B of Table 12.		N/A
9.4.2.6	Surges (1,2/50 µs – 8/20 µs)		
	performance criterion B of Table 12.		N/A
9.4.2.7	Power frequency magnetic fields		
	performance criterion A of Table 12.		N/A
9.4.2.8	Voltage dips and short-time interruptions		
	performance criterion C of Table 12.		N/A
	performance criterion B of Table 12.		N/A
	Contactors: general criteria of Table 12		N/A
9.4.2.9	Harmonics in the supply		
	For MPSD with electronic over-current release verification up to the fifth harmonic component at 50 % of the fundamental component:		N/A
	Method used……..:		N/A
	Unwanted tripping at 0,9 times the current setting for 10 times the tripping time……..:		N/A
9.4.3	Emission		

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Clause	Requirement + Test	Result - Remark	Verdict
9.4.3.1	Conducted radio-frequency emission tests		
	The test shall be conducted using the method of CISPR 11		N/A
	The emission shall not exceed the levels given in table 17		N/A
9.4.3.2	Radiated radio-frequency emission tests		
	The test shall be conducted using the method of CISPR 11		N/A
	The emission shall not exceed the levels given in table 18		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE Annex B		
	Special tests		
Annex B2	Mechanical durability		
	By convention, the mechanical durability of a design of contactor or starter is defined as the number of no-load operating cycles which would be attained or exceeded by 90 % of all the apparatus of this design before it becomes necessary to service or replace any parts. Normal maintenance including replacement of contacts as specified in B.2.2.1 and B.2.2.3 is permitted		
	numbers of no-load operating cycles		N/A
B.2.2.1	Condition of the contactor or starter for tests		
	The contactor or starter shall be installed as for normal service; in particular, the conductors shall be connected in the same manner as for normal use		N/A
	During the test, there shall be no voltage or current in the main circuit		N/A
	The contactor or starter may be lubricated before the test if lubrication is prescribed in normal service		N/A
B.2.2.2	Operating conditions		
	The coils of the control electromagnets shall be supplied at their rated voltage and, if applicable, at their rated frequency		N/A
	If a resistance or an impedance is provided in series with the coils, whether short-circuited during the operation or not, the tests shall be carried out with these elements connected as in normal operation		N/A
	Pneumatic and electro-pneumatic contactors or starters shall be supplied with compressed air at the rated pressure		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Manual starters shall be operated as in normal service		N/A
B.2.2.3	Test procedure		
	a) The tests are carried out at the frequency of operations corresponding to the class of intermittent duty. However, if the manufacturer considers that the contactor or starter can satisfy the required conditions when using a higher frequency of operations, he may do so.		N/A
	b) In the case of electromagnetic and electro-pneumatic contactors or starters, the duration contactor or starter and the time for which the electromagnet is not energized shall be of such a duration that the contactor or starter can come to rest at both extreme positions.		N/A
	The number of operating cycles to be carried out shall be not less than the number of no-load operating cycles stated by the manufacturer		N/A
	The verification of mechanical durability may be made separately on the various components of the starter which are not mechanically linked together, unless a mechanical interlock not previously tested with its contactor is involved		N/A
	c) For contactors or starters fitted with releases with shunt coils or undervoltage releases, at least 10 % of the total number of opening operations shall be performed by these releases		N/A
	d) After each tenth of the total number of operating cycles given in B.2.1 has been carried out, it is permissible before carrying on with the test:		N/A
	- to clean the whole contactor or starter without dismantling;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- to lubricate parts for which lubrication is prescribed by the manufacturer for normal service;		N/A
	- to adjust the travel and the pressure of the contacts if the design of the contactor or starter enables this to be done		N/A
	e) This maintenance work shall not include any replacement of parts.		N/A
	f) In the case of star-delta starters, the built-in device causing time-delay between closing on star connection and closing on delta connection, if adjustable, may be set at its lowest value.		N/A
	g) In the case of rheostatic starters, the built-in device causing time-delay between closing of the rotor switching devices, if adjustable, may be set at its lowest value.		N/A
	h) In the case of auto-transformer starters, the built-in device causing time-delay between closing on the starting position and closing on the ON position, if adjustable, may be set at its lowest value.		N/A
B.2.2.4	Results to be obtained		
	Following the tests of mechanical durability, the contactor or starter shall still be capable of complying with the operating conditions specified in 9.3.6.2 and 9.3.6.3 at room temperature.		N/A
9.3.6.2	Operating limits		
8.2.1.2	Limits of operation of contactors and power-operated starters		
7.2.1.2 Part 1	Limits of operation of power operated equipment		
	rated control circuit supply voltage Us (V) .....:		N/A
	frequency (Hz) .....:		N/A
	rated air supply pressure ……..:		N/A
	ambient temperature ……:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	operation range……..:		N/A
	close at any value between 85% and 110% (V or bar) .....:	_	N/A
	drop out voltage: 75% to 20% (or 10% if specified by manufacturer) for a.c. and 75% to 10% for d.c. (V) .....:		N/A
	drop out pressure (bar) 75% to 10% of rated pressure……..……:		N/A
	In the case of coils, the limiting drop-out values apply when the coil circuit resistance is equal to that obtained at –5 °C……:		N/A
	Calculated values……..:		N/A
	Drop out time (if applicable)……..:		N/A
	For latched contactors, the device shall drop out and open fully when a de-latching voltage between 85 % and 110 % of the rated de-latching voltage is applied……..:		N/A
	Any timing relays or other devices for the automatic control shall still be operating		N/A
B.2.2.5	Statistical analysis of test results for contactors or starters		
	The mechanical durability of a design of a contactor or starter is assigned by the manufacturer and verified by a statistical analysis of the results of the tests		N/A
	For contactors or starters which are produced in small quantities, the tests described in B.2.2.6 and B.2.2.7 do not apply		N/A
	However, for contactors or starters which are produced in small quantities and which also differ from a basic design only by minor variations without notable influence on characteristics, the manufacturer may assign mechanical durability on the basis of experience with similar designs, analysis, properties of materials, etc., and on the basis of the analysis of test results on large quantity production of the same basic design		N/A
	After this assignment, one of the two tests described below shall be performed. It should be selected by the manufacturer as being the most suitable in each case, for example according to the quantities of planned production or according to the conventional thermal current		N/A
B.2.2.6	Single 8 test		
	Eight contactors or starters shall be tested to the assigned mechanical durability		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If the number of failures does not exceed two, the test is considered passed		N/A
B.2.2.7	Double 3 test		
	Three contactors or starters shall be tested to the assigned mechanical durability		N/A
	The test is considered passed if there is no failure, and failed if there is more than one failure. Should there be one failure, then three additional contactors or starters are tested up to assigned mechanical durability and, providing there is no additional failure, the test is considered passed. The test is failed if at any time there is a total of two or more failures		N/A
B.2.2.8	Other methods		
	Other methods given in ISO 2859-1 may also be used. The maximum acceptance quality level shall be 10 %.		N/A
Annex B3	Electrical durability		
	With respect to its resistance to electrical wear, a contactor or starter is by convention characterized by the number of on-load operating cycles corresponding to the different utilization categories given in Table B.1 which can be made without repair or replacement		N/A
	Since, for star-delta, two-step auto-transformer and rheostatic rotor starters, the operation is subjected to large variations in the service conditions, it is deemed convenient not to give standard values for the test conditions		N/A
	However, it is recommended that the manufacturer indicate the electrical durability of the starter for stated service conditions; this electrical durability may be estimated from the results of tests on the component parts of the starter		N/A
	For categories AC-3, AC-3e and AC-4, the test circuit shall comprise inductors and resistors so arranged as to give the appropriate values of current, voltage and power factor given in Table B.1; moreover, for AC-4, the test circuit testing the making and breaking capacity shall be used, see 9.3.3.5.2		N/A
	In all cases, the speed of operation shall be chosen by the manufacturer		N/A
	The tests shall be taken as valid if the values recorded in the test report differ from the values specified only within the following tolerances: - current: ±5 %; - voltage: ±5 %		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Tests shall be carried out with the contactor or the starter under the appropriate conditions of B.2.2.1 and B.2.2.2 using the test procedure, where applicable, of B.2.2.3, except that replacement of contacts is not permitted		N/A
	In the case of starters, if the associated contactor has already satisfied an equivalent test, the test need not be repeated on the starter		N/A
			N/A
	Type of product .....:		N/A
	utilization category .....:		N/A
	rated operational voltage Ue (V) .....:		N/A
	rated operational current Ie (A) or power (kW) ....:		N/A
	Conditions, make/break operations:		N/A
	- test voltage (V) U/Ue = 1,05 .....:	L1: L2: L3:	N/A
	- test current (A) I/Ie = ...:	L1: L2: L3:	N/A
	- power factor/time constant .....:	L1: L2: L3:	N/A
	- on-time (ms) .....:		N/A
	- off-time (s) .....:		N/A
	- number of operations	☐ …… make ☐ …… make/ break	N/A
	Characteristic of transient recovery voltage for AC-2, AC-3, AC-3e, AC-4, AC-8a and AC-8b only:		
	oscillatory frequency (kHz) .....:		N/A
	Measured oscillatory frequency (kHz) .....:		N/A
	Factor y .....:		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
	Dielectric verification		
	test voltage (2 Ui), min 1000 V for 60 s. (V) ..... :	Test voltage: _____ V	N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur.		N/A
B.3.3	Statistical analysis of test results for contactors or starters		
	The electrical durability of a design of a contactor or starter is assigned by the manufacturer and verified by a statistical analysis of the results of the tests. One of the three test methods shall be selected by the manufacturer between B.3.3.1, B.3.3.2 and B.3.3.3 as being the most suitable for example according to the quantities of planned production or according to the conventional thermal current		N/A
	For contactors or starters which are produced in small quantities, the tests described in B.3.3.1 and B.3.3.2 do not apply. However, for contactors or starters which are produced in small quantities and which also differ from a basic design only by minor variations without notable influence on characteristics, the manufacturer may assign electrical durability on the basis of experience with similar designs, analysis, properties of materials, etc., and on the basis of the analysis of test results on large quantity production of the same basic design		N/A
B.3.3.1	Single 8 test		
	Eight contactors or starters shall be tested to the assigned electrical durability.		N/A
	If the number of failures does not exceed two, the test is considered passed		N/A
B.3.3.2	Double 3 test		
	Three contactors or starters shall be tested to the assigned electrical durability		N/A
	The test is considered passed if there is no failure, and failed if there is more than one failure.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Should there be one failure, then three additional contactors or starters are tested up to assigned electrical durability and, providing there is no additional failure, the test is considered passed.		N/A
	The test is failed if at any time there is a total of two or more failures		N/A
B.3.3.3	Other methods		
	Other methods given in ISO 2859-1 can also be used. The maximum acceptance quality level shall be 10 %.		N/A
Annex B4	Co-ordination at the crossover current between the starter and associated SCPD		
B.4.2	Condition for the test for the verification of co-ordination at the crossover current by a direct method		
B.4.3	Test at lower current		
	- test current = ...:		N/A
	- test voltage = ...:		N/A
	- power factor = ...:		N/A
	- supplied voltage for coil = ...:		N/A
	Test at higher current		N/A
	- test current = ...:		N/A
	- test voltage = ...:		N/A
	- power factor = ...:		N/A
	- supplied voltage for coil = ...:		N/A
B.4.1	With the starter and the SCPD closed, the test currents stated in B.4.3 shall be applied by a separate closing device. In each case, the device tested shall be at room temperature.		N/A
	After each test, it is necessary to inspect the SCPD, reset the overload relay and the release of the circuit-breaker, if necessary, or to replace all fuses if at least one of them has melted		N/A
B.4.4.2	After the test at the lower current (i) in B.4.3, the SCPD shall not have operated and the overload relay or release shall have operated to open the starter. There shall be no damage to the starter		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	After the test at the higher current (ii) in B.4.3, the SCPD shall have operated before the starter. The starter shall meet the conditions of 9.3.4.2.3 for the type of co-ordination stated by the manufacturer		N/A
B.4.5	Verification of co-ordination at the crossover current by an indirect method		
	The indirect method consists in verifying on a diagram (see Figure B.1) that the following conditions for the verification of co-ordination at the crossover current are met:		N/A
	- the time-current characteristic of the overload relay/release, starting from cold state, supplied by the manufacturer, shall indicate how the tripping time varies with the current up to a value of at least I_{co}; this curve has to lie below the time-current characteristic of the SCPD up to I_{co};		N/A
	- I_{cd} of the starter, tested as in B.4.5.1, shall be higher than I_{co};		N/A
	- the time-current withstand characteristic of the contactor, tested as in B.4.5.2, shall be above the time-current characteristic (starting from cold state) of the overload relay up to I_{co}.		N/A
B.4.5.1	Test for Icd		
	The contactor or starter shall make and break the test current (I_{cd}) for the number of operating cycles given in Table B.2. This is made without the SCPD in the circuit.		N/A
	During the test, there shall be no permanent arcing, no flash-over between poles, no blowing of the fusible element in the earth circuit (see 9.3.4.1.2) and no welding of contacts;		N/A
	after the test the contacts shall operate correctly when the contactor or starter is switched by the applicable method of control		N/A
	the dielectric properties of the contactors and starters shall be verified by a dielectric test on the contactor or starter using an essentially sinusoidal test voltage of twice the rated operational voltage U_e used for the I_{cd} test, with a minimum of 1 000 V. The test voltage shall be applied for 60 s, as specified in 8.3.3.4.1 of IEC 60947-1, items 2) c) i) and 2) c) ii.		N/A
B.4.5.2	Time –current characteristic withstand capability		
	This characteristic is issued by the manufacturer and the values are obtained according to the test procedure specified in 9.3.5 but with combinations of overload currents and durations to establish the characteristic at least up to I_{co}, in addition to those stated in 8.2.4.4.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	This characteristic is valid for overload currents, starting with the contactor at room temperature. The minimum cooling duration required by the contactor between two such overload tests should be stated by the manufacturer.		N/A
9.3.5	Verification of ability to withstand overload currents		
	Overload current withstand capability of contactors AC-3 and AC-4:		
	ambient temperature (°C) .....:		N/A
	rated operational current Ie (A) max. AC-3 .....:		N/A
	test current (Ie) (A) .....:		N/A
	duration of test: 10 s .....:		N/A
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE Annex F		
	Requirements for auxiliary contact linked with power contact (mirror contact)		
F.3	All mirror contacts shall also comply with the relevant requirements given in IEC 60947-5-1:2016		N/A
F.4	Product information		
	Mirror contacts shall be clearly identified on the contactor or in the manufacturer documentation.		N/A
	Symbol used:		N/A
F.7	Tests (sample no.)……:		N/A
F 7.2 a)	Contacts kept in closed position by…… :		N/A
	Measurement method (b1 or b2) ……..:		N/A
Table F.1	Test voltage (kV)……:		N/A
	No disruptive discharge.		N/A
F 7.3	Test after conventional operational performance		
	when the electromagnet is energized, the mirror contact shall withstand its rated insulation voltage Ui		
	Rated insulation voltage (V)……:		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE Annex H		
	Extended functions to electronic overload relays		
T.3 Part 1	Classification of electronic overload relays :	☐ Current and voltage asymmetry relay or release. ☐ Over-voltage relay or release. ☐ Ground/earth fault sensing relay or release. ☐ Phase reversal relay or release.	
T.4 Part 1	Types of relays with ground/earth fault detection function	☐ Type CI-A and CI-B ☐ Type CII-A and CII-B	
T.5 Part 1	Performance requirements		
T.5.1 Part 1	Limits of operation of ground/earth fault electronic overload relays		
	A ground/earth fault overload relay, when associated with a switching device, shall operate to open the switching device according to the requirements given in Table T.1.		N/A
	For relays or releases with a ground/earth fault current setting range, the limit of operation of the relay shall be verified at the lowest and highest settings.		N/A
T.5.2 Part 1	Limits of operation of ground/earth fault current sensing electronic relays Type CII(-A and –B)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A ground/earth fault current sensing electronic relay CII, when associated with a switching device, shall not initiate operation of the switching device, in the presence of a ground/earth fault current, when the fault current in any phase reaches or exceeds 95 % the current setting Iic (see T.4) and shall operate to open the equipment when the fault current in any phase is 75 % or less of Iic		N/A
T.5.3 Part 1	Limits of operation of voltage asymmetry relays		
	A voltage asymmetry relay, when associated with a switching device, shall operate to open the switching device within 120 % of the time setting and shall operate to prevent the closing of the switching device when the voltage asymmetry is above 1,2 times the voltage asymmetry setting.		N/A
T.5.4 Part 1	Limits of operation of phase reversal relays		
	A phase reversal relay, when associated with a switching device, shall permit the closing of the equipment when the voltage sequence of phases on the line side of the starter is the same as the voltage sequence setting. After interchanging two phases, the phase reversal relay shall prevent the completion of the closing operation of the switching device.		N/A
T.5.5 Part 1	Limits of operation of current imbalance relays		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	A current imbalance relay, when associated with a switching device, shall operate to open the equipment within 80 % to 120 % of the time setting where the current imbalance, defined as the ratio between the maximum current deviation of any phase from average current and the average current Iavg, is above 1,2 times the current imbalance setting, the general tripping requirements of overload relays given in the product standard being maintained.		N/A
T.5.6 Part 1	Limits of operation of over-voltage relays and releases		
	a) Operating voltage An over-voltage relay or release, when associated with a switching device, shall operate to open the equipment and shall operate to prevent the closing of the equipment when the supply voltage is above the set value, if any, or above 110 % of the rated voltage of the relay or release for a defined duration		N/A
	b) Operating time For a time-delay over-voltage relay or release, the time-lag shall be measured from the instant when the voltage reaches the operating value until the instant when the relay or release actuates the tripping device of the equipment.		N/A
T.6 Part 1	Tests		
T.6.1 Part 1	Limits of operation of ground/earth fault current sensing electronic relays Type CI and CII (-A and -B)		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For overload relays with an adjustable ground/earth fault current setting, the test shall be made at the minimum and at the maximum current settings.		N/A
	The test circuit shall be in accordance with Figure T.1.		N/A
	The test shall be made at any convenient voltage and power factor.		N/A
	The test circuit being calibrated at each of the values of the ground/earth fault operating current specified in the Table T.1, as applicable, and the switch S1 being in the closed position, the test current is suddenly established by closing switch S2.		N/A
	For ground fault current sensing electronic relay type CII, the inhibit current shall be set to a value at least 30 % higher than the maximum ground/earth fault current setting.		N/A
T.6.2 Part 1	Verification of inhibit function of ground/earth fault current sensing electronic relays Type CII (-A and -B)		
	For overload relays with an adjustable ground/earth fault current setting, the test shall be made at the lowest setting.		N/A
	For overload relays with an adjustable inhibit current setting Iic, the test shall be made at the minimum and at the maximum Iic settings.		N/A
	Each phase has to be tested separately		N/A
	The impedance Z is adjusted so as to let a current flow in the circuit equal to:		N/A
	a) 95 % the inhibit current Iic The switch S1 being in the closed position, the test current is established by closing switch S2.		N/A
	The overload relay shall not initiate the opening of the switching device.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) 75 % the inhibit current Iic The switch S1 being in the closed position, the test current is established by closing switch S2.		N/A
	The overload relay shall initiate the opening of the switching device.		N/A
T.6.3 Part 1	Current asymmetry relays		
	80 % < Trip time < 120% of time setting	Itest: _____A, tripping after _____s	N/A
T.6.4 Part 1	Voltage asymmetry relays		
	Test voltage setting : 1,0 times the voltage asymmetry setting Trip time < 120% of time setting Test voltage >1,2 times the voltage asymmetry setting	Test voltage: _____V, tripping after _____s ☐ prevent to close ☐ did not prevent to close	N/A
T.6.5 Part 1	Phase reversal relays		
	Voltage sequence of the line side of the starter are the same as voltage sequence setting	The phase reversal relay permits to close the equipment	N/A
	After interchange of two phases	The phase reversal relay prevents closing of the equipment	N/A
T.6.6 Part 1	Over-voltage relays		
	a) operating voltage: shall operated to open or prevent the closing if U supply > Uset or > 110 % Un or > time setting	U supply=____V U set =____V Time setting= _____s	N/A
	b) operating time: time lag shall be measured from the instant when the voltage reaches the operating value until the instant when the relay or release actuates the device of the equipment	Time setting= _____s Voltage operating Value = _____V Time lag = _____s	N/A
H.3.2	Limits of electronic overload relay with main circuit under-voltage restarting function		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	When under-voltage or loss of voltage occurs in the main circuit, the relay will operate. The following applies		
	a) if the voltage resumes within T1 (off-time for immediate reset), the overload relay shall control the starter circuit to immediately restore the running condition;		N/A
	b) if the voltage resumes between T1 and T2 (off-time for reset), the relay shall reset to the starting sequence;		N/A
	c) if the voltage resumes after T2, the relay shall not reset automatically.		N/A
	T1 and T2 are adjustable, and the value of T2 is greater than T1.		N/A
	The tolerance of the threshold voltage and of the time settings shall be specified by the manufacturer but no more than ±10 %. If the time setting value is lower than 1 s, the manufacturer shall state the tolerances.		N/A
H.4	Test of the control functions		
	The test of the control functions shall be verified according to H.3, and each control function should be verified at least 3 times.		N/A
	For restart functions, the detection time for a voltage dip and the delay of restarting shall be verified according to H.3.		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE Annex K		
	Procedure to determine data for electromechanical contactors used in functional safety applications.		
		See	N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE Annex L		
	Assessment procedure for electromechanical overload protection used in safety applications and especially in explosive atmospheres		
		See	N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE Annex M		
	DC contactors for use in photovoltaic (PV) applications		
M.8.1	Constructional requirements		
	The minimum rated impulse voltage shall be in accordance with Table M.1.		
	Rated impulse withstand voltage……..:		N/A
M.8.2	Performance requirements		
	The minimum rated impulse voltage shall be in accordance with Table M.1.		N/A
	Rated impulse withstand voltage……..:		N/A
M.9.3	Making and breaking capacities and conventional operational performance		
9.3.3.5	Making and breaking capacity		
	Conditions .....:		N/A
	Type of product .....:		N/A
	utilization category .....:		N/A
	rated operational voltage Ue (V) …….. :		N/A
	rated operational current Ie (A) .....:		N/A
	- test voltage (V) U/Ue = 1,05 .....:		N/A
	- test current (A) I/Ie = ____ .....:		N/A
	- time constant .....:		N/A
	- on-time (ms) .....:		N/A
	- off-time (s) .....:		N/A
	- number of operations .....:		N/A
9.3.3.6	Operational performance capability:		
	Type of product .....:		N/A
	utilization category .....:		N/A
	rated operational voltage Ue (V) .....:		N/A
	rated operational current Ie (A) .....:		N/A
	Conditions, make/break operations:		
	- test voltage (V) U/Ue = 1,05 .....:		N/A
	- test current (A) I_c/I_{scl} = ...:		N/A
	- time constant .....:		N/A
	- on-time (ms) .....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- off-time (s) .....:		N/A
	- number of operations		N/A
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor is switched by the applicable method of control		N/A
	Dielectric verification		
	test voltage (2 Ui), min 1000 V for 60 s. (V) ..... :	Test voltage: _____ V	N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur.		N/A
	Leakage current equipment suitable for isolation		
	test voltage (1,1 Ue) (V) ..... :		N/A
	Leakage current: ≤ 2 mA /pole ..... :		N/A
	Equipment provided with mirror contacts		N/A
	The mirror contact shall withstand its rated insulation voltage U_i. Ui (V)……..…:	Test voltage: _____ V	N/A
M.9.4	Thermal cycling test		
	temperature cycling according to IEC 60068-2-14:2009, test Nb		
	each cycle consisting of 1 h at – 40 °C followed by 1 h at + 85 °C. Temperature change rate shall be 1 K/min		N/A
	50 cycles		N/A
	visual inspection to confirm that there is no distortion or damage to parts that will affect normal operation and protection;		N/A
	one open and close operation to confirm normal mechanical operation;		N/A
9.3.3.3	Temperature rise		
	Sub clause 8.3.3.3. of IEC 60947-1 applies		
	ambient temperature 10-40 °C .....:		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Contactor		N/A
	test enclosure W x H x D (mm x mm x mm) .....:		N/A
	material of enclosure .....:		N/A
9.3.3.3.4	Main circuits, test conditions:		
	Sub clause 8.3.3.3.4 of IEC 60947-1 applies with following addition		
	loaded as stated in 8.2.2.4		N/A
	- setting of the maximum current setting.....:		N/A
	- setting overload relay.....:		N/A
	- conventional thermal current Ith (A) .....:		N/A
	- conventional enclosed thermal current Ithe (A) .:		N/A
	- for equipment intended for utilization category AC-6b, the test current for the temperature rise test shall be equal to 1,35 times Ie (the rated capacitive current).		N/A
	- cable/busbar cross-section (mm²) / (mm) .....:		N/A
	- temperature rise of main circuit terminals (K) ....:	< ____ K see page___	N/A
9.3.3.3.5	Control circuit, test conditions:		
	Sub clause 8.3.3.3.5. of part 1 applies with following addition		
	The temperature rise shall be measures during the test of 9.3.3.3.4		N/A
	- conventional thermal current Ith (A) at their rated voltage.....:		N/A
	- conventional enclosed thermal current Ithe (A) .:		N/A
	- cable/busbar cross-section (mm²) / (mm) .....:		N/A
	- temperature rise of control circuit (K) .....:	<_____ K see page ____	N/A
9.3.3.3.6	Coils and electromagnets circuit, test conditions:		
	The coil with the highest measured holding power consumption, for a given frequency a.c. or d.c., according to 9.3.3.2.1.2.2 is deemed to be representative for all coils, for the same contactor, and shall be used for the temperature rise test.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Uninterrupted and eight-hour duty windings (8.2.2.6.1)		N/A
	The temperature rise shall be measures during the test of 9.3.3.3.4		N/A
	- rated control supply voltage Us (V) .....:		N/A
	- class of insulating material .....:		N/A
	- uninterrupted or eight-hour duty windings		N/A
	- temperature rise of control circuit terminals (K) .:	< ____ K see page ___	N/A
	b) Intermittent duty windings (8.2.2.6.2)		
	- no current flowing though the main circuit		N/A
	- rated control supply voltage Us (V) .....:		N/A
	- class of insulating material .....:		N/A
	- intermittent duty class .....:		N/A
	- close open operating cycle .....:		N/A
	- on-load factor .....:		N/A
	- temperature rise of control circuit terminals (K) .:	< ____ K see page ___	N/A
	c) temporary or periodic duty (8.2.2.6.3)		
	- no current flowing though the main circuit		N/A
	- rated control supply voltage Us (V) .....:		N/A
	- class of insulating material .....:		N/A
	- close open operating cycle .....:		N/A
	- on-load time .....:		N/A
	- temperature rise of control circuit terminals (K) .:	< ____ K see page ____	N/A
9.3.3.3.7	Auxiliary circuit, test conditions:		
	Normally loaded with their maximum rated operational current at any convenient voltage		N/A
	The temperature rise shall be measures during the test of 9.3.3.3.4		N/A
	- conventional thermal current Ith (A).....:		N/A
	- conventional enclosed thermal current Ithe (A) .:		N/A
	- cable/busbar cross-section (mm²) / (mm) .....:		N/A
	- cable cross-section (mm²) .....:		N/A
	- temperature rise of auxiliary circuit terminals (K) :	< ____ see page ____	N/A
9.3.3	Performance under no load, normal load and overload conditions		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.3.2	Operating limits		
9.3.3.2.1	Power-operated equipment:		
8.2.1.2	Limits of operation of contactors and power-operated starters		
7.2.1.2 Part 1	Limits of operation of power operated equipment		
	rated control circuit supply voltage Us (V) .....:		N/A
	frequency (Hz) .....:		N/A
	rated air supply pressure ……..:		N/A
	ambient temperature ……:		N/A
	operation range……..:		N/A
	close at any value between 85% and 110% (V or bar) .....:	_	N/A
	drop out voltage: 75% to 20% (or 10% if specified by manufacturer) for a.c. and 75% to 10% for d.c. (V) .....:		N/A
	drop out pressure (bar) 75% to 10% of rated pressure……..……:		N/A
	In the case of coils, the limiting drop-out values apply when the coil circuit resistance is equal to that obtained at –5 °C……:		N/A
	Calculated values……:		N/A
	Drop out time (if applicable)……..:		N/A
	For latched contactors, the device shall drop out and open fully when a de-latching voltage between 85 % and 110 % of the rated de-latching voltage is applied……..:		N/A
8.3.3.2.1 part 1	Capacitive drop out test		
	A capacitor shall be inserted in series in the supply circuit U_s, the total length of the connecting conductors being ≤ 3 m.		N/A
	The capacitor is short-circuit by a switch of negligible impedance.		N/A
	The supply voltage shall then be adjusted to 110 % U_s.....:		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The value of the capacitor shall be calculated: C (nF) = 30 + 200000 / (f x U_s) .....:	_____nF	N/A
	Verification of the drop out of the contactor when the switch is operated to the open position.....:		N/A
	The test voltage is the highest value of the declared rated supply voltage range *Us*.		N/A
9.3.3.2.1.2.1	Coil power consumption		
	A contactor coil is evaluated for both holding power and pick-up power		N/A
	In the case where different coils cover a range of voltages, 5 coils shall be tested		N/A
	The coil with the lowest rated control supply voltage Us, the coil with the highest rated control supply voltage Us, plus 3 coils deemed to be representative of the coils with the highest calculated hold power at the discretion of the manufacturer		N/A
	The test shall be performed at ambient temperature +23 °C ± 3 °C		N/A
	The test shall be made without any load in the main and auxiliary circuits		N/A
	The coil shall be supplied with the rated control supply voltage Us and at the rated frequency		N/A
	For a given coil, where a voltage range is declared, the test shall be made at the highest voltage at the respective frequency		N/A
	The measured values shall be obtained with a r.m.s. measurement method covering at least a bandwidth from 0 Hz to 10 kHz and the resulting power values shall be given within a measurement uncertainty better than 5 %		N/A
9.3.3.2.1.2.2	Holding power for conventional and electronically controlled electromagnet		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The current measurement I(i) of the coil shall be performed after the coil has been energized and has reached a stable temperature		N/A
	The holding power consumption is defined as follows		
	Sh(i) = Us(i) × I(i) [VA] for a.c. controlled electromagnet		N/A
	Pc(i) = Us(i) × I(i) [W] for d.c. controlled electromagnet		N/A
	The published value shall be equal to the average value of the 5 tested coils		
	Sh = Σ (Us(i) × I(i)) / 5 [VA] respectively Pc = Σ (Us(i) × I(i)) / 5 [W]		N/A
	For electronically controlled electromagnet with alternating current and direct current ratings, the measurement should be performed for both ratings		N/A
9.3.3.2.1.2 .3	Pick-up power for a.c. controlled contactor or d.c. controlled contactor with separate pick-up and hold-on windings		
	The pick-up measurement shall be performed directly after the measurement of the hold current (see 9.3.3.2.1.2.2)		N/A
	The current measurement I(i) of the coil shall be performed immediately after the coil has been de-energized, the contactor has been held in the Off position and re-energized		N/A
	The pick-up power consumption is defined as follows		
	Sp(i) = Us × I(i) [VA] for a.c. controlled contactor		N/A
	Pp(i) = Us × I(i) [W] for d.c. controlled contactor with separate pick-up and hold windings		N/A
	The published value shall be equal to the average value of the 5 tested coils		
	Sp = Σ (Us(i) × I(i)) / 5 [VA] respectively Pp = Σ (Us(i) × I(i)) / 5 [W]		N/A
9.3.3.2.1. 3	Pole impedance		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The pole impedance shall be determined during the test and with the conditions given in 9.3.3.3.4.		N/A
	The test in an enclosure is not deemed necessary even if the contactor can be used in an individual enclosure		N/A
	The voltage drop Ud shall be measured between the line and load terminals (terminals included) of the contactor preferably at the same time the temperature rise is measured		N/A
	The impedance per pole is defined as follows		
	Z = Ud / Ith [Ω]		N/A
	Care should be taken that voltage drop measurement does not significantly affect the temperature rise nor affect significantly the impedance		N/A
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum current rating for which the release is suitable		
	1) Drop-out voltage		N/A
	Rated control supply voltage(U) ..... :		N/A
	Frequency (Hz)..... :		N/A
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage .... :		N/A
	The voltage shall be reduced from rated control supply voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without previous heating of the release coil		N/A
	In the case of a release with a range of rated control supply voltage, this test applies to the maximum voltage of the range		N/A
	When associated with a switching device, the test for the lower limit is made without current in the main circuit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles.		N/A
	This test may be combined with the temperature-rise test of 9.3.3.3.		N/A
	In the case of a release with a range of rated control supply voltage, this test is made at the minimum rated control supply voltage		N/A
	2) Test for limits of operation when associated with a switching device		
	Starting with the main circuit open, at the temperature of the test room, and with the supply voltage at 35 % rated maximum control supply voltage, it shall be verified that the switching device cannot be closed by the operation of its actuator		N/A
	When the supply voltage is raised to 85 % of the minimum control supply voltage, it shall be verified that the switching device can be closed by the operation of its actuator		N/A
	3) Performance under over-voltage conditions		
	When associated with a switching device, the test is made without current in the main circuit.		N/A
	The test at 110 % of the rated supply voltage shall be made for 30 min or until the temperature has reached thermal equilibrium and without impairing its functions. Verification shall be made according 2) above		N/A
8.2.1.4	b) Shunt-coil operated releases		
	When associated with a switching device, the release shall be fitted to the switching device having the maximum rated current for which the release is suitable		N/A
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency ..... :		N/A
	In the case of a release having a range of rated control circuit supply voltages, the test voltages shall be 70 % of the minimum rated control circuit supply voltage and 110 % of the maximum rated control voltage		N/A
M.9.6	Dielectric test		
9.3.3.4	Test of dielectric properties		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Test voltage for verification of impulse withstand voltage shall use Table M.1 with altitude correction according to Table 12 of IEC 60947-1:2007.		N/A
8.3.3.4.1 Part 1	2) Verification of impulse withstand voltage		
	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		N/A
	- rated impulse withstand voltage (kV) :		N/A
	- sea level of the laboratory:		N/A
	- test Uimp main circuits (kV) :		N/A
	- test Uimp auxiliary circuits (kV) :		N/A
	- test Uimp control circuits (kV) :		N/A
	Application of test voltage		N/A
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	ii) Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		N/A
	- other circuits		N/A
	- exposed conductive parts		N/A
	- enclosure of mounting plate		N/A
	iv) equipment suitable for isolation		N/A
	Across the poles of the main circuit, the line terminals being connected together and the load terminals connected together.		N/A
	- test Uimp on open main contacts (equipment suitable for isolation) (kV) :		N/A
	No unintentional disruptive discharge during the tests		N/A
8.3.3.4.1 Part 1	3) Power-frequency withstand verification of solid insulation		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- rated insulation voltage (V) :		N/A
	- main circuits, test voltage for 1 min (V)		N/A
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
	Application of test voltage		
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	ii) Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		N/A
	- other circuits		N/A
	- exposed conductive parts		N/A
	- enclosure of mounting plate		N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur		N/A
	Equipment suitable for isolation		
	The leakage current shall be measured through each pole with the contacts in open position (< 0,5 mA)	1,1 times U_e= ___V	N/A
M.9.6	Climatic test		
	Damp heat test at +55 °C		N/A
	Cyclic, according to IEC 60068-2-30, Test Db, 2 cycles at 55 °C, Variant 2		N/A
	Functional test during the first 2 h of the first cycle at the test temperature and during the last 2 h of the second cycle at the test temperature.		N/A
8.3.3.4.1 Part 1	3) Power-frequency withstand verification of solid insulation		
	- rated insulation voltage (V) :		N/A
	- main circuits, test voltage for 1 min (V)		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
	Application of test voltage		N/A
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	ii) Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		N/A
	- other circuits		N/A
	- exposed conductive parts		N/A
	- enclosure of mounting plate		N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur		N/A
9.3.6.2	Operating limits		
8.2.1.2	Limits of operation of contactors and power-operated starters		
7.2.1.2 Part 1	Limits of operation of power operated equipment		
	rated control circuit supply voltage Us (V) .....:		N/A
	frequency (Hz) .....:		N/A
	rated air supply pressure .....:		N/A
	ambient temperature .....:		N/A
	operation range.....:		N/A
	close at any value between 85% and 110% (V or bar).....:	_	N/A
	drop out voltage: 75% to 20% (or 10% if specified by manufacturer) for a.c. and 75% to 10% for d.c. (V) .....:		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	drop out pressure (bar) 75% to 10% of rated pressure……..……:		N/A
	In the case of coils, the limiting drop-out values apply when the coil circuit resistance is equal to that obtained at –5 °C……:		N/A
	Calculated values……:		
	Drop out time (if applicable)……..:		N/A
	For latched contactors, the device shall drop out and open fully when a de-latching voltage between 85 % and 110 % of the rated de-latching voltage is applied……..:		N/A
M.9.7	Critical load current test		
M.9.7.1	Time constant of the test circuit (ms)……:		N/A
M.9.7.2	Test voltage (V) ……:		N/A
	Number of operation cycles……..:		N/A
	Test current start value (A)……:		N/A
	Open 5 times ……..……:		N/A
	Arcing time……..:		N/A
	Test current…… :		N/A
	Open 5 times ……..……:		N/A
	Arcing time……..:		N/A
	Maximum arcing time……..:		N/A
M.9.7.3	Critical load current……:		
9.3.3.6	Operational performance capability:		
	Type of product .....:		N/A
	utilization category .....:		N/A
	rated operational voltage Ue (V) .....:		N/A
	rated operational current Ie (A) .....:		N/A
	Conditions, make/break operations:		N/A
	- test voltage (V) U/Ue = 1,05 .....:		N/A
	- test current (A) I_{crit} = ...:		N/A
	- time constant .....:		N/A
	- on-time (ms) .....:		N/A
	- off-time (s) .....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- number of operations		N/A
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor is switched by the applicable method of control		N/A
	Dielectric verification		
	test voltage (2 Ui), min 1000 V for 60 s. (V) ..... :	Test voltage: _____ V	N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur.		N/A
	Leakage current equipment suitable for isolation		
	test voltage (1,1 Ue) (V) ..... :		N/A
	Leakage current: ≤ 2 mA /pole ..... :		N/A
	Equipment provided with mirror contacts		N/A
	The mirror contact shall withstand its rated insulation voltage U_i. Ui (V)……..…:	Test voltage: _____ V	N/A
M.9.8	Mechanical properties		
	Mechanical properties of terminals	(See 9.3.1.e) above)	N/A
M.9.9	Degree of protection		
	Degree of protection of enclosed contactors	(See 9.3.1.e) above)	N/A
M.9.10	EMC		
	Electromagnetic compatibility	(See 9.4 above)	N/A
M.9.11	Clearance and creepage distances		
	Clearance and creepage distances	(See 8.1.4 above)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE Annex N		
	Additional requirements and tests for equipment with protective separation		
		See	N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE Annex P		
	Short-circuit breaking tests of MPSD		
P.2.2	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number		
	Sample no:		
	Rated current: Ie (A)		
	Rated operational voltage: Ue (V)		
	Rated service short-circuit breaking capacity: (kA)		
	Distances of the metallic screen's: (all sides)		
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm²) :		N/A
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: L3:		N/A
	power factor/time constant :		N/A
	- Factor "n"		N/A
	- peak test current (A) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I²dt (A²s) .....L1: .....L2: L3:		N/A
	Pause, t: (min)		N/A
	Test sequence ”CO”		N/A
	- max. let-through current: (kApeak) .....L1: .....L2: L3:		N/A
	- Joule integral I²dt (A²s) .....L1: .....L2: L3:		N/A
	Pause, t: (min)		N/A
	Test sequence ”CO”		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:		N/A
	- Joule integral I²dt (A²s) .....L1: .....L2: L3:		N/A
	Melting of the fusible element		N/A
	Damage to insulation on conductors		N/A
	No arcing or flashover between the poles		N/A
	No arcing or flashover between the poles and frame		N/A
P.2.3	Verification of operational performance capability		
9.3.3.6	Operational performance capability:		
	Type of product .....:		N/A
	utilization category .....:		N/A
	rated operational voltage Ue (V) .....:		N/A
	rated operational current Ie (A) .....:		N/A
	Conditions, make/break operations:		N/A
	- test voltage (V) U/Ue = 1,05 .....:		N/A
	- test current (A) = ...:		N/A
	- power factor / time constant .....:		N/A
	- on-time (ms) .....:		N/A
	- off-time (s) .....:		N/A
	- number of operations		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor is switched by the applicable method of control		N/A
P.2.4	Verification of dielectric withstand		
8.3.3.4.1 Part 1	3) Power-frequency withstand verification of solid insulation		
	- rated insulation voltage (V) :		N/A
	- main circuits, test voltage for 1 min (V)		N/A
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
	Application of test voltage		N/A
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	ii) Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		N/A
	- other circuits		N/A
	- exposed conductive parts		N/A
	- enclosure of mounting plate		N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur		N/A
	Leakage current equipment suitable for isolation		N/A
	test voltage (1,1 Ue) (V) ..... :		N/A
	Leakage current: ≤ 2 mA /pole ..... :		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
P.2.5	Verification of temperature rise		
9.3.3.3	Temperature rise		
	Sub clause 8.3.3.3. of IEC 60947-1 applies		
	ambient temperature 10-40 °C .....:		N/A
	Contactor		N/A
	test enclosure W x H x D (mm x mm x mm) .....:		N/A
	material of enclosure .....:		N/A
9.3.3.3.4	Main circuits, test conditions:		
	Sub clause 8.3.3.3.4 of IEC 60947-1 applies with following addition		N/A
	loaded as stated in 8.2.2.4		N/A
	- setting of the maximum current setting.....:		N/A
	- setting overload relay.....:		N/A
	- conventional thermal current Ith (A) .....:		N/A
	- conventional enclosed thermal current Ithe (A) .:		N/A
	- cable/busbar cross-section (mm²) / (mm) .....:		N/A
	- temperature rise of main circuit terminals (K) ....:	< ____ K see page___	N/A
	- temperature rise not exceeding 80 K…….:		N/A
P.2.5	Verification of overload release		
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
P.3	Rated ultimate short-circuit breaking capacity		
P.3.2	Verification of overload release		
	Current setting ……..:		N/A
	Test current…….:		N/A
	Temperature correction……:		N/A
	Operating time……..:		N/A
	Operating time according to manufacturer……:		N/A
P.3.3	Test of rated ultimate short-circuit breaking capacity		
	Test sequence of operation: O – t – CO		
	Type designation or serial number		
	Sample no:		

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated current: Ie (A)		
	Rated operational voltage: Ue (V)		
	Rated ultimate short-circuit breaking capacity: (kA)		
	Distances of the metallic screen's: (all sides)		
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm^2) :		N/A
	- test voltage U/Ue = 1,05 (V) .....L1 .....L2 .....L3		N/A
	- r.m.s. test current AC/DC: (A) .....L1 .....L2 .....L3		N/A
	power factor/time constant :		N/A
	- Factor "n"		N/A
	- peak test current (A) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:		N/A
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:		N/A
	Pause, t: (min)		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:		N/A
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:		N/A
	Melting of the fusible element		N/A
	Damage to insulation on conductors		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	No arcing or flashover between the poles		N/A
	No arcing or flashover between the poles and frame		N/A
P.3.4	Verification of dielectric withstand		
8.3.3.4.1 Part 1	3) Power-frequency withstand verification of solid insulation		
	- rated insulation voltage (V) :		N/A
	- main circuits, test voltage for 1 min (V)		N/A
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
	Application of test voltage		N/A
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	ii) Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		N/A
	- other circuits		N/A
	- exposed conductive parts		N/A
	- enclosure of mounting plate		N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur		N/A
	Leakage current equipment suitable for isolation		N/A
	test voltage (1,1 Ue) (V) :		N/A
	Leakage current: ≤ 6 mA /pole :		N/A
P.3.5	Verification of overload release		
	Current setting ……..:		N/A
	Test current……:		N/A
	Temperature correction……:		N/A
	Operating time……..:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time according to manufacturer……:		N/A
P.4	Test of MPSD for IT system		
P.4.2	Individual pole short-circuit		
	Type designation or serial number		
	Sample no:		
	Rated current: Ie (A)		
	Rated operational voltage: Ue (V)		
	Individual pole short-circuit breaking capacity: (kA)		
	Distances of the metallic screen's: (all sides)		
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		
	K - The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.	Test current:_____A Measured:_____s	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm^2) :		N/A
	- test voltage U/Ue = 1,05 (V) ……:		N/A
	- r.m.s. test current AC/DC: (A)……..:		N/A
	power factor/time constant :		N/A
	- Factor "n"		N/A
	- peak test current (A) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) L1:		N/A
	- Joule integral I^2dt (A^2s) L1:		N/A
	- max. let-through current: (kApeak) L2:		N/A
	- Joule integral I^2dt (A^2s) L2:		N/A
	- max. let-through current: (kApeak) L3:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I²dt (A²s) L3:		N/A
	Pause, t: (min)		N/A
	Test sequence ”CO”		
	- max. let-through current: (kApeak) L1:		N/A
	- Joule integral I²dt (A²s) L1:		N/A
	- max. let-through current: (kApeak) L2:		N/A
	- Joule integral I²dt (A²s) L2:		N/A
	- max. let-through current: (kApeak) L3:		N/A
	- Joule integral I²dt (A²s) L3:		N/A
	Melting of the fusible element		N/A
	Damage to insulation on conductors		N/A
	No arcing or flashover between the poles		N/A
	No arcing or flashover between the poles and frame		N/A
P.4.3	Verification of dielectric withstand		N/A
8.3.3.4.1 Part 1	3) Power-frequency withstand verification of solid insulation		
	- rated insulation voltage (V) :		N/A
	- main circuits, test voltage for 1 min (V)		N/A
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
	Application of test voltage		
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A
	ii) Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		N/A
	- other circuits		N/A
	- exposed conductive parts		N/A
	- enclosure of mounting plate		N/A
	No flashover, breakdown of insulation either internally (puncture) or externally (tracking) or any other manifestation of disruptive discharge shall occur		N/A
	Leakage current equipment suitable for isolation		N/A
	test voltage (1,1 Ue) (V) :		N/A
	Leakage current: ≤ 6 mA /pole :		N/A
P.4.4	Verification of overload release		
	K - The tripping of the overload relay shall be verified at twice the current setting and shall conform to the published tripping characteristics, for twice the current setting.	Test current:_____A Measured:_____s	N/A
P.4.5	Marking		
	Rated voltage(s) tested……..:		N/A
	Marking…….:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE Annex Q		
	Co-ordination under short-circuit conditions between a MPSD and another short-circuit protective device associated in the same circuit		
		See	N/A

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9.3.3.3	TABLE: Heating Test		P
	Test voltage (V) ..... :	--	—
	Ambient (°C) ..... :	17,0	—

Thermocouple Locations	max. temperature measured, (K)	max. temperature limit, (K)
Line in terminal	39,0	65
Line out terminal	35,0	65
Line in terminal of auxiliary contact	20,0	65
Line out terminal of auxiliary contact	20,0	65
Button	12,0	25
Enclosure	17,0	40
Supplementary information: I-1#, MC3DC-10P		

9.3.3.3	TABLE: Heating test, resistance method					N/A
	Test voltage (V) :					—
	Ambient, t_1 (°C) :					—
	Ambient, t_2 (°C) :					—
Temperature rise of winding	R_1 (Ω)	R_2 (Ω)	ΔT (K)	Max. dT (K)	Insulation class	
Supplementary information:						

9.3.3.4	TABLE: Dielectric Strength	P
Test voltage applied between:	**Test potential applied (V)**	**Breakdown / flashover (Yes/No)**
Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.	1890VAC	No
Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.	1890VAC	No
Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - other circuit - enclosure of mounting plate	1890VAC	No
Supplementary information:		

	TABLE: insulation resistance measurements		N/A
Insulation resistance R between:	**R (MΩ)**	**Required R (MΩ)**	

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Between mains poles (primary fuse disconnected)		
Between parts separated by basic or supplementary insulation		
Between parts separated by double or reinforced insulation		
Supplementary information:		

8.1.4	**TABLE: Clearance And Creepage Distance Measurements**					P
clearance cl and creepage distance dcr at/of:	**Up (V)**	**U r.m.s. (V)**	**Required cl (mm)**	**cl (mm)**	**required dcr (mm)**	**dcr (mm)**
Between main circuit and control circuit	690V	690V	-	-	10	11,1
Between live part and external live part	690V	690V	-	-	10	25,7
Supplementary information: The clearance is verified by the rated impulse withstand voltage test, and the rated voltage is 6kV.						

	TABLE: Critical components information See CDF				**P**
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1])**
- Description:					
- Description:					
- Description:					
Supplementary information: **[1)] Provided evidence ensures the agreed level of compliance. See OD-CB2039.**					

List of test equipment used:

A completed list of used test equipment shall be provided in the Test Reports when a Customer's Testing Facility according to CTF stage 1 or CTF stage 2 procedure has been used.
Note: This page may be removed when CTF stage 1 or CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date

	Test Report issued under the responsibility of:	

TEST REPORT
IEC 60947-5-1
Part 5: Control circuit devices and switching elements
Electromechanical control circuit devices

Report Number. ..... :	874102423301-00 attachment 1
Date of issue ..... :	2024-06-11
Total number of pages ..... :	74
Name of Testing Laboratory preparing the Report ..... :	TÜV SÜD Certification and Testing (China) Co., Ltd. Ningbo Branch/ Building 2, 1&9/F. of Building 1, Essence Adream of Space II, No.350, Jinghua Road, National Hi-Tech Industrial Development Zone, Ningbo, Zhejiang, China
Applicant's name ..... :	Zhejiang Tengen Electric Co., Ltd.
Address ..... :	Sulv Industrial Area, Liushi Town 325604 Yueqing City PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard ..... :	IEC 60947-5-1:2016 to be used in conjunction with IEC 60947-1:2007, IEC 60947-1:2007/AMD1:2010, IEC 60947-1:2007/AMD2:2014
Test procedure ..... :	Test report
Non-standard test method ..... :	N/A
TRF template used ..... :	IECEE OD-2020-F1:2023, Ed.1.6
Test Report Form No. ..... :	IEC60947_5_1H
Test Report Form(s) Originator .... :	DEKRA Certification B.V.
Master TRF ..... :	Dated 2023-11-10

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved IECEE Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

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 Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	Auxiliary contact
Trade Mark ..... :	TENGEN
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	TGR1-25 (for end product)
Ratings ..... :	U_i: 380V, I_{th}: 5A, U_e/I_e: AC380V/ 0,95A, AC220V/ 1,64A, DC220V/ 0,15A; AC-15, DC-13.

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

☒	**Testing Laboratory:**	TÜV SÜD Certification and Testing (China) Co., Ltd. Ningbo Branch/ Building 2, 1&9/F. of Building 1, Essence Adream of Space II, No.350, Jinghua Road, National Hi-Tech Industrial Development Zone, Ningbo, Zhejiang, China	
Testing location/ address.....:		Zhejiang Quality Inspection Center of High and Low-voltage Electrical Products (NEQC) Nanjiang Road, Daqiao Industrial Area, Beibaixiang Yuecheng, Zhejiang China	
Tested by (name, function, signature).....:		Xiangyang XIAO (Project Handler)	
Approved by (name, function, signature)...:		Zhenxing XU (Designated Reviewer)	
☐	**Testing procedure: CTF Stage 1:**	N/A	
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**	N/A	
Testing location/ address.....:			
Tested by (name + signature) .....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**	N/A	
☐	**Testing procedure: CTF Stage 4:**	N/A	
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):

See main report.

Summary of testing:

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied. All test performed with positive result.

Tests performed (name of test and test clause):	**Testing location:**
Sequence I (See main report) 8.3.3.3Temperature rise 8.3.3.4 Dielectric properties Sequence II 8.3.3.5.3 Making and breaking capacities of switching elements under normal conditions 8.3.3.5.6 b Dielectric verification Sequence III 8.3.3.5.4 Making and breaking capacities of switching elements under abnormal conditions 8.3.3.5.6b Dielectric verification Sequence IV 8.3.4 Performance under conditional short-circuit current 8.3.3.5.6b Dielectric verification	Zhejiang Quality Inspection Center of High and Low-voltage Electrical Products (NEQC) Nanxijiang Road, Daqiao Industrial Area, Beibaixiang, Yueqing, Zhejiang China

Summary of compliance with National Differences

No National or Group Differences declared.

According to the endorsement notice on relevant standard, the text of the international standard IEC 60947-5-1:2016 was approved by CENELEC as a European Standard without any modification.

☒ **The product fulfils the requirements of _ EN 60947-5-1: 2017**_____

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other: … (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:
The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.
IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate:

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

See CDF.

Test item particulars .....:	
Classification of installation and use .....:	Built-in use
Supply Connection.....:	Internal wire
Kind of control circuit device.....:	☐ manual control switches, e.g. push-buttons, rotary switches, foot switches, etc.
	☒ electromagnetically operated control switches, either time delayed or instantaneous, e.g. contactor relays
	☐ pilot switches, e.g. pressure switches, temperature sensitive switches (thermostats)
	☐ position switches
	☐ associated control equipment, e.g. indicator lights, etc.
Kind of switching elements.....:	☒ auxiliary contacts of a switching device (e.g. contactor, circuit-breaker, etc) which are not dedicated exclusively for use with the coil of that device
	☐ interlocking contacts of enclosure doors
	☐ control circuit contacts of rotary switches
	☐ control circuit contacts of overload relays
Number of poles.....:	1
Kind of current.....:	☒ ac and/or ☒ dc
Interrupting medium.....:	☒ air, ☐ oil, ☐ gas, ☐ vacuum, ☐ ...
Operating conditions.....:	
Method of operations.....:	☐ manual
	☒ electromagnetic
	☐ pneumatic
	☐ electro-pneumatic
Method of control.....:	☒ automatic
	☐ non-automatic
	☐ semi-automatic

Rated and limiting values for switching elements:	
Voltages:	
- rated operational voltage Ue (V) .....:	AC220V, AC380V, DC220V
- rated insulation voltage Ui (V) .....:	380V
- rated impulse withstand voltage Uimp (kV) .....:	6kV
Currents:	
- conventional free air thermal current Ith (A) .....:	5A
- conventional enclosed thermal current Ithe (A).....:	N/A
- rated operational current Ie (A) .....:	1,64A (for AC220V), 0,95A (for AC380V), 0,15A (for DC220V)
Rated frequency (Hz).....:	N/A
Utilization category.....:	DC-12, DC-13
Short-circuit characteristic:	
- rated conditional short-circuit current (kA) .....:	1kA
- kind of protective device.....:	RT16-00/ 6A
Electrically separated contact elements.....:	N/A
Actuating quantities for pilot switches .....:	N/A
Pilot switches having two or more contact elements...:	N/A
Indication of contact elements of same polarity.....:	N/A
IP code, in case of an enclosed control device .....:	IP00
Pollution degree .....:	3
Suitability for isolation, with the symbol 07-13-06 of IEC 60617-7 .....:	N/A

Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	2024-02-19
Date (s) of performance of tests.....:	2024-02-21 to 2024-04-19

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies).....: Same as applicant

General product information and other remarks:

The product built-in use, and protection against electric shock shall be evaluated in the final product after installation.

Auxiliary contact:
1NO1NC
I_{th}: 5A, U_i: 380V, U_{imp}: 6kV
DC-13: U_e/I_e: DC220V/ 0,15A
AC-15: U_e/I_e: AC380V/ 0,95A, AC220V/ 1,64A

IEC 60947-5-1			
Clause	Requirement + Test	Result - Remark	Verdict

5	**PRODUCT INFORMATION**		
5.2	Marking		P
	Data shall be preferably marked on the equipment:		
	a - manufacturer's name or trademark	TENGEN	P
	b - type designation or serial number	TGR1-25 (for example, for end product)	P
	Data shall be included on the nameplate, or on the equipment, or in the manufacturer's published literature:		
	c - number of this standard		N/A
	d - rated operational voltages		N/A
	e - utilization category and rated operational currents, at the rated operational voltages of the control circuit device		N/A
	f - rated insulation voltage:		N/A
	g - rated impulse withstand voltage		N/A
	h - vacant		N/A
	i - IP code, in case of enclosed control circuit device		N/A
	j - pollution degree		N/A
	k - type and maximum ratings of short-circuit protective device		N/A
	l - conditional short-circuit current		N/A
	m - suitability for isolation, where applicable, with the symbol S00288 of IEC 60617		N/A
	n - indication of contact elements of same polarity		N/A
	Marking of data under n) shall be included on the nameplate of the control circuit device in order to ensure proper wiring at installation.		N/A
	o) length of insulation to be removed before insertion of the conductor into the terminal.		N/A
	p) for non-universal screwless terminals: – “s” or "sol" for terminals declared for rigid-solid conductors; – "r" for terminals declared for rigid (solid and stranded) conductors; – "f" for terminals declared for flexible conductors.		N/A

IEC 60947-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The indication "s", "sol", "r" or "f" for non-universal screwless terminals shall be marked on the device or, if the space available is not sufficient, on the smallest package unit or in technical information provided with the product.		N/A
5.2.2	Terminal identification and marking (see 7.1.8.4 of IEC 60947-1)		
	Clearly and permanently identified according IEC 60445 and Annex L, unless superseded by relevant standard.		N/A
	Neutral terminal identified by letter .... :		N/A
	Protective earth terminal identified by letter		N/A
5.2.3	Functional markings		
	Actuators may be identified by symbols in the form of engravings, but if a stop button carries any symbol engraved or marked this symbol shall be a circle or oval		N/A
	Letters or words may be used where space is available		N/A
	Symbols shall be in accordance with IEC 60417		N/A
5.2.4	Emergency stop		
	Actuator shape and colour, background colour and direction of unlatching for emergency stop devices with mechanical latching function shall be in accordance with 4.2 of IEC 60947-5-5		N/A
5.2.5	Operating diagram		
5.2.5.1	General		
	As rotary switches may have multiplicity of contacts elements and a multiplicity of actuator positions, it necessary that the manufacturer indicates the relationship between the actuator positions and the associated contact elements position		N/A
5.2.5.2	Position indication and contact position		
	Sub clause 7.1.6.1 of IEC 60947-1 applies		N/A
	The position indication shall be clear, and the associated text or symbols shall be indelible and easily legible		N/A
5.2.5.3	Terminal markings for operating diagrams		
	Terminal markings shall be clearly identifiable with respect to the operating diagram (see also Annex M)		N/A
5.2.6	Time delay markings		

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Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer shall indicate, for each time-delay contact element, the characteristic of the delay, according to 2.4.1.1 or 2.4.1.2		N/A
5.3	Instructions for installation, operation and maintenance		
	The manufacture shall specify, in his documents or catalogues:		
	- the conditions for installation, operation and maintenance, if any, of the equipment during operation and after a fault		N/A
	- the specify the measures to be taken with regard to EMC, if any,		N/A
	- equipment only suitable in environment A shall provided with the following notice	..... This product has been designed for environment B may cause unwanted electromagnetic disturbances in which case the user may be required to take adequate mitigation measures.	N/A
	- if necessary, the instructions for transport, installation and operation of the equipment shall indicate the measures that are particular importance for the proper and correct installation, commissioning and operation of the equipment.		P

IEC 60947-5-1			
Clause	Requirement + Test	Result - Remark	Verdict

6	**Normal service, mounting and transport conditions**		
6.1.1	Ambient temperature		
	Ambient air temperature does not exceed +40 °C and its average over 24 hours does not exceed +35°C and the lower limit is –5°C		P
6.1.2	Altitude		
	Altitude of side of installation does not exceed 2000m		P
6.1.3	Atmospheric conditions		
6.1.3.1	Relative humidity does not exceed 50 % at max temp +40 °C, higher rel. hum may at lower temperatures e.g. 90% at +20 °C		P
6.1.3.2	Pollution degree		
	Unless otherwise stated, equipment for: - industrial use shall have a degree 3, depending upon micro-environment - household and similar shall have degree 2	3	P
6.1.4	Shock and vibration		
	Under consideration		
6.2	Conditions during transport and storage		
	Under consideration		
6.3	Mounting		
	According manufacturer’s instruction	see	N/A
6.3.1	Mounting of single hole mounted devices		
	Dimensions according Table 2		N/A
6.3.1.1	Location of key recess (if any)		
	Dimensions according Table 3		N/A
6.3.1.2	Range of panel thickness		
	The device shall be capable of being mounted on any thickness between 1 and 6 mm		N/A
6.3.1.3	Grouping of devices		
	The distances a between the mounting centres in the same row and b between the centre lines of the rows shall be not less than those given in table 3. Distances a and b may be interchanged		N/A

IEC 60947-5-1			
Clause	Requirement + Test	Result - Remark	Verdict

7	**CONSTRUCTIONAL AND PERFORMANCE REQUIREMENTS**		
7.1	Constructional requirements		
7.1.1	General		
	Sub clause 7.1 of IEC 60947-1 applies except for 7.1.2, 7.1.3, 7.1.7, 7.1.9 and 7.1.13, and with the following additions:		P
7.1.2	Materials		
7.1.2.2	Glow-wire testing		
		See Table 7.1.2.2	P
7.1.2.3	Test based on flammability category		
		See Table	N/A
7.1.3	Current-carrying parts and their connection		
	No contact pressure through insulating materials		P
7.1.4	Clearances and creepage distances		
	Clause 7.1.4 of IEC 60947-1 applies		
	Clearances		
	Minimum values are given in Table 13 and Table 15 of IEC 60947-1		
	Rated impulse withstand voltage		
	Minimum clearance - Case B (mm)		
	Minimum clearance - Case A (mm)		
	Measured clearances (mm) ..... :	See table clearance and creepage distance measurements	N/A
	Creepage distances		
	Pollution degree ..... :	2	
	Comparative tracking index (V) ..... :	175V	
	Material group ..... :	IIIa	
	Rated insulation voltage Ui (V) ..... :	380V	
	Minimum creepage distances (mm) ..... :	6,3	
	Measured creepage distances (mm) ..... :	See table clearance and creepage distance measurements	N/A
7.1.5	Actuator		
7.1.5.1	Insulation		
	Clause 7.1.5.1 of IEC 60947-1 applies		P
7.1.5.2	Direction		

IEC 60947-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Clause 7.1.5.2 of IEC 60947-1 applies		N/A
7.1.5.3	Actuating force (or moment)		
		See test sequence V	N/A
7.1.5.4	Limitation of rotation (of rotary switch)		
	When actuators with limited or unidirectional movement are used, they shall be fitted with robust means of limitation, capable of withstanding five times the actual maximum actuating moment.		N/A
7.1.5.5	Emergency stop		
	The actuator shall preferably latch in the actuated position with the control contact open. This latching shall be released by a separate action, e.g. by pulling, rotation, or by means of a key.		N/A
7.1.6	Indication of the contact position		
	Clause 7.1.6 of IEC 60947-1 applies		N/A
7.1.7	Conditions for control switches suitable for isolation		
	A control switch suitable for isolation shall be manually operated with a direct opening action (see Annex K) and shall comply with the isolating function in the open position (see 2.1.19 and 7.1.7 of IEC 60947-1).		N/A
	The open position of a control switch suitable for isolation shall be a position in which the switch can remain when no actuating force is applied.		N/A
	In order to avoid unintentional reclosing, it shall be possible to prevent the operation of the control switches suitable for isolation when the contact elements are in the open position. This may be obtained by padlocking or by a latch which shall only be releasable by a special tool or key.		N/A
7.1.8	Terminals		
		See clause 8.2.4	P
7.1.10	Provisions for protective earthing		
	Clause 7.1.10 of IEC 60947-1 applies		N/A
7.1.11	Enclosures for equipment		
	Clause 7.1.11 of IEC 60947-1 applies		N/A
7.1.12	Degree of protection of enclosed equipment		
	Degree of protection ..... :	IP00	
	Test for first characteristic		

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Clause	Requirement + Test	Result - Remark	Verdict
	Test for first numeral ..... :	☐ 1: ☐ 2: ☐ 3: ☐ 4: ☐ 5: ☐ 6:	N/A
	Test for second characteristic		
	Test for second numeral ..... :	☐ 1: ☐ 2: ☐ 3: ☐ 4: ☐ 5: ☐ 6: ☐ 7: ☐ 8:	N/A
7.1.14	Class II control circuit devices		
	These devices shall not be provided with means for protective earthing (see IEC 61140)		N/A
	For class II control circuit devices insulated by encapsulation, see Annex F	See annex F	N/A
7.1.15	Requirements for control devices with integrally connected cables		
		See annex G	N/A
7.2	Performance requirements		
	Subclauses 7.2.1.1 and 7.2.2 of IEC 60947-1 apply with the following additions:		P
7.2.1.2	Limits of operation of contactor relays		
	The limits of operation for contactor relays shall be in accordance with IEC 60947-4-1	See clause 8.3.3.2	N/A
7.2.3	Dielectric properties		
	Subclause 7.2.3 of IEC 60947-1 applies with the following addition	See clause 8.3.3.4	P
	For class II control circuit devices insulated by encapsulation	See Annex F	N/A
7.2.4	Ability to make and break under normal and abnormal load conditions		
7.2.4.1	Making and breaking capacities		
	Making and breaking capacities under normal conditions as state in table 4	See clause 8.3.3.5.3	P
	Making and breaking capacities under abnormal conditions as state in table 5	See clause 8.3.3.5.4	N/A
7.2.4.3	Durability		

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Clause	Requirement + Test	Result - Remark	Verdict
	Sub-clause 7.2.4.3 of IEC 60947-1 applies with the following additions:		
	Mechanical durability	See Annex C	N/A
	Electrical durability	See Annex C	N/A
7.2.5	Conditional short-circuit current		
	The switching element shall withstand the stresses resulting from short-circuit current under the conditions specified in 8.3.4		P
7.2.7	Additional requirements for control switches suitable for isolation		
	Control switches suitable for isolation shall be tested according to 8.3.3.4 of IEC 60947-1 with a value of test voltage as specified in Table 14 or IEC 60947-1 corresponding to the rated impulse withstand voltage Uimp declared by the manufacturer.		N/A
	Other additional requirements applicable to such control switches are under consideration		
7.2.8	Maximum recovery time		
	For equipment incorporating electronic circuits the maximum recovery time and the measuring method shall be stated by the manufacturer		N/A
7.3	Electromagnetic compatibility (EMC)		
	Subclause 7.3 of IEC 60947-1 applies with the following additions:		N/A
	The control circuit device to be tested shall have all the essential design details of the type which it represents and shall be in a clean and new condition.		N/A
	The EMC tests shall be conducted at rated operational voltage Ue, or if the rated operational voltage is given as a range, then the test shall be conducted at a voltage which represents the worst case condition.		N/A
	Maintenance or replacement of parts during or after a testing cycle is not permitted.		N/A
	The products covered by this standard are intended for use in environment A.		N/A
	Contactor relays incorporating electronic circuits shall follow the requirements of 8.3.2.2 of IEC 60947-4-1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

8.3.1	TEST SEQUENCE I (sample No. 1)		
	See main report		
Test No. 1	- operating limits of contactor relays (8.3.3.2)		
Test No. 2	- temperature rise (Clause 8.3.3.3.)		
Test No. 3	- dielectric properties (Clause 8.3.3.4)		
Test No. 4	- mechanical properties of terminals (8.2.4 of IEC 60947-1)		
8.3.3.2	Operating limits of contactor relays		
8.3.3.2.1	Power-operated equipment:		
8.2.1.2.1	Electromagnetic contactors and starters		
	rated control supply voltage Us (V) ..... :		
	frequency (Hz) ..... :		
	declared ambient temperature(>40 °C) for 100% Us		
	limits of close satisfactorily at any value between 85% and 110% of rated control supply voltage Us . :		N/A
	limits of drop out and open fully are: 75% to 20% for a.c. and 75% to 10% for d.c. ..... :		N/A
	ambient temperature(-5 °C) for 100% Us		
	limits of close satisfactorily at any value between 85% and 110% of rated control supply voltage Us . :		N/A
	Limits of drop out and open fully are: 75% to 20% for a.c. and 75% to 10% for d.c. ..... :		N/A
8.2.1.2.2	Contactors and starters with electronically controlled electromagnet		
	Rated control supply voltage Us (V) ..... :		
	Frequency (Hz) ..... :		
	Declared ambient temperature(>40 °C) for 100% Us		
	Limits of close satisfactorily at any value between 85% and 110% of rated control supply voltage Us . :		N/A
	Limits of drop out and open fully are: 75% to 20% for a.c. and 75% to 10% for d.c. ..... :		N/A
	Ambient temperature(-5 °C) for 100% Us		
	Limits of close satisfactorily at any value between 85% and 110% of rated control supply voltage Us . :		N/A
	Limits of drop out and open fully are: 75% to 20% for a.c. and 75% to 10% for d.c. ..... :		N/A
8.2.1.2.3	Electro-pneumatic contactors and starters		
	Rated air supply pressure(Bar) ..... :		

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Clause	Requirement + Test	Result - Remark	Verdict
	Declared ambient temperature(>40 °C) for 100% of the rated air supply pressure(Bar)		
	Limits of close satisfactorily at any value between 85% and 110% of rated air supply pressure(Bar) .. :		N/A
	Limits of drop out and open fully are: 75% to 10% of rated air supply pressure(Bar) ..... :		N/A
	Ambient temperature(-5 °C) for 100% of the rated air supply pressure(Bar)		
	Limits of close satisfactorily at any value between 85% and 110% of rated air supply pressure(Bar) .. :		N/A
	Limits of drop out and open fully are: 75% to 10% for the rated air supply pressure(Bar) ..... :		N/A
8.3.3.3	Temperature rise		
	ambient temperature 10-40 °C ..... :	-	
	test enclosure W x H x D (mm x mm x mm) ..... :	-	
	material of enclosure ..... :	-	
	NO-contacts, test conditions:		
	- rated operational current Ie (A) ..... :		N/A
	- cable cross-section (mm²) ..... :		N/A
	- cable length (m) ..... :		N/A
	- temperature rise of NO terminals (K) ..... :		N/A
	NC-contacts, test conditions:		
	- rated operational current Ie (A) ..... :		N/A
	- cable cross-section (mm²) ..... :		N/A
	- cable length (m) ..... :		N/A
	- temperature rise of NC terminals (K) ..... :	See table	N/A
	Coils and electromagnets, test conditions:		
	- rated control supply voltage Us (V / Hz) ..... :		N/A
	- Class of insulating material ..... :		N/A
	- temperature rise of coil and electromagnets (K) ... :		N/A
8.3.3.4	Dielectric properties		
	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
	- verification by measurement of clearances instead of testing		N/A
	- rated impulse withstand voltage (V) ..... :		N/A
	- test Uimp auxiliary circuits (kV) ..... :		N/A
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		

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Clause	Requirement + Test	Result - Remark	Verdict
	- rated insulation voltage (V) ..... :		N/A
	- control and auxiliary circuits, test voltage (V) for 60 sec ..... :		N/A
8.2.4	Mechanical and electrical properties of terminals		
8.2.4.2	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm^2) :	Internal wire	N/A
	diameter of thread (mm) ..... :		N/A
	torque (Nm) ..... :		N/A
	5 times on 2 separate clamping units		N/A
8.2.4.3	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the smallest cross-sectional area (mm^2) ..... :		N/A
	number of conductor of the smallest cross section . :		N/A
	diameter of bushing hole (mm) ..... :		N/A
	height between the equipment and the platen (mm) ..... :		N/A
	mass at the conductor(s) (kg) ..... :		N/A
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
8.2.4.4	Pull-out test		
	force (N) ..... :		N/A
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
8.2.4.3	Flexion test		
	conductor of the largest cross-sectional area (mm^2) :		N/A
	number of conductor of the largest cross-section ... :		N/A
	diameter of bushing hole (mm) ..... :		N/A
	height between the equipment and the platen (mm) ..... :		N/A
	mass at the conductor(s) (kg) ..... :		N/A
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
8.2.4.4	Pull-out test		
	force (N) ..... :		N/A
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.2.4.3	Flexion test		
	conductor of the largest and smallest cross-sectional area (mm^2) ..... :		N/A
	number of conductor of the smallest cross sectional, number of conductor of the largest cross sectional . :		N/A
	diameter of bushing hole (mm) ..... :		N/A
	height between the equipment and the platen (mm) ..... :		N/A
	mass at the conductor(s) (kg) ..... :		N/A
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
8.2.4.4	Pull-out test		
	force (N) ..... :		N/A
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
8.2.4.5	Test for insertability of unprepared round copper conductors having the maximum cross-section		
	The test shall be carried out using the appropriate gauge form A or form B specified in Table 7.		N/A
	The measuring section of the gauge shall be able to penetrate freely into the terminal aperture to the full depth of the terminal (see also note to Table 7).		N/A
	Alternatively, the test can be carried out by inserting the largest conductor of type and rated cross-section among those recommended by the manufacturer, the diameter of which corresponds to the theoretical diameter according to Table 7a, after the insulation has been removed and the end has been reshaped. The stripped end of the conductor shall be able to enter completely within the clamping unit aperture, without use of undue force.		N/A
8.2.4.7	Electrical performance of screwless-type clamping units		
	If terminals are used which are qualified according to IEC 60999-1 and the operating conditions of the terminals in the device are according to the operating conditions specified by the manufacturer of the terminals, then the test does not need to be performed.		N/A
	Sub clause 8.2.4.7 of IEC 60947-1 applies with the following changes:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– The test shall be done on the connecting device equipped with the clamping units; – The number of specimens shall be at least 8; – The test shall be done as a single 8 test: • Eight clamping units shall be tested to the declared voltage drop; • If the number of failed clamping units does not exceed two, the test is considered passed.		N/A
	test current (A) ..... :		N/A
	voltage drop < 15 mV. (V)..... :		N/A
8.2.4.8	Ageing test for screwless-type clamping units		
	If terminals are used which are qualified according to IEC 60999-1 and the operating conditions of the terminals in the device are according to the operating conditions specified by the manufacturer of the terminals, then the test does not need to be performed.		N/A
	Subclause 8.2.4.8 of IEC 60947-1 applies with the following changes:		N/A
	The test shall be done on the connecting device equipped with the clamping units.		N/A
	test current (A) ..... :		N/A
	maximum temperature for the temperature cycles shall be 40°C. Max. temperature (°C) ..... :		N/A
	voltage drop ≤ 22,5 mV or 1,5 times the value measured after the 24th cycle. (V) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.1	TEST SEQUENCE II (sample No. 2)		
Test No. 1	- Making and breaking capacities of switching elements under normal conditions (8.3.3.5.3)		
Test No. 2	- Dielectric verification (8.3.3.5.6.b)		
8.3.3.5.3	Making and breaking capacities of switching elements under normal conditions		
	contact element (figure / form) ..... :	Form A or Form B	
	contact polarity..... :	-	
	utilization category (AC / DC)..... :	AC-15	
	rated operational voltage Ue (V) ..... :	220VAC	
	rated operational current Ie (A) or power (kW) ..... :	1,64A	
No.1	- test voltage U/Ue = 1,1 (V) ..... :	L1: 223VAC L2: L3:	P
	- power factor/~~time constant~~ ..... :	L1: 0,31 L2: L3:	P
	- make operations: test current I/Ie (A) ..... :	L1: 16,6A L2: L3:	P
	- break operations: test current I/Ie (A) ..... :	L1: 1,65A L2: L3:	P
	- a.c. test: Inductor shunted by a resistor taking 3% of the total power consumed - d.c. test: test current increase from zero to steady-state value within limits of figure 9		N/A
	- on-time (ms) ..... :	Appr. 300ms	P
	- operating cycles per minute ..... :	6	P
	- number of operating cycles ..... :	50	P
	- test voltage U/Ue = 1,0 (V) ..... :	L1: 233V L2: L3:	P
	- power factor/time constant ..... :	L1: 0,31 L2: L3:	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- make operations: test current I/Ie (A) ..... :	L1: 1,65A L2: L3:	P
	- break operations: test current I/Ie (A) ..... :	L1: 1,65A L2: L3:	P
No. 2	- on-time (ms) ..... :	Appr. 300ms	P
	- operating cycles per minute ..... :	Rapidly	P
	- number of operating cycles ..... :	10	P
No. 3	- on-time (ms) ..... :	Appr. 480ms	P
	- operating cycles per minute ..... :	60	P
	- number of operating cycles ..... :	990	P
No. 4	- on-time (ms) ..... :	Appr. 480ms	P
	- operating cycles per minute ..... :	6	P
	- number of operating cycles ..... :	5000	P
	Behaviour and condition during and after the test:		
	- no electrical or mechanical failures		P
	- no contact welding or prolonged arcing		P
	- no blowing of the fusible element in the earth circuit		P
8.3.3.5.6.b	Dielectric verification:		
	dielectric test voltage (V) 2 xUe with a min.of 1000V:	1000V	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.1	TEST SEQUENCE II (sample No. 2)		
Test No. 1	- Making and breaking capacities of switching elements under normal conditions (8.3.3.5.3)		
Test No. 2	- Dielectric verification (8.3.3.5.6.b)		
8.3.3.5.3	Making and breaking capacities of switching elements under normal conditions		
	contact element (figure / form) ..... :	Form A or Form B	
	contact polarity..... :	-	
	utilization category (AC / DC)..... :	AC-15	
	rated operational voltage Ue (V) ..... :	380VAC	
	rated operational current Ie (A) or power (kW) ..... :	0,95A	
No.1	- test voltage U/Ue = 1,1 (V) ..... :	L1: 383VAC L2: L3:	P
	- power factor/~~time constant~~ ..... :	L1: 0,31 L2: L3:	P
	- make operations: test current I/Ie (A) ..... :	L1: 9,8A L2: L3:	P
	- break operations: test current I/Ie (A) ..... :	L1: 0,98A L2: L3:	P
	- a.c. test: Inductor shunted by a resistor taking 3% of the total power consumed - d.c. test: test current increase from zero to steady-state value within limits of figure 9		N/A
	- on-time (ms) ..... :	Appr. 300ms	P
	- operating cycles per minute ..... :	6	P
	- number of operating cycles ..... :	50	P
	- test voltage U/Ue = 1,0 (V) ..... :	L1: 383V L2: L3:	P
	- power factor/time constant ..... :	L1: 0,31 L2: L3:	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- make operations: test current I/Ie (A) ..... :	L1: 9,83A L2: L3:	P
	- break operations: test current I/Ie (A) ..... :	L1: 0,98A L2: L3:	P
No. 2	- on-time (ms) ..... :	Appr. 300ms	P
	- operating cycles per minute ..... :	Rapidly	P
	- number of operating cycles ..... :	10	P
No. 3	- on-time (ms) ..... :	Appr. 480ms	P
	- operating cycles per minute ..... :	60	P
	- number of operating cycles ..... :	990	P
No. 4	- on-time (ms) ..... :	Appr. 480ms	P
	- operating cycles per minute ..... :	6	P
	- number of operating cycles ..... :	5000	P
	Behaviour and condition during and after the test:		
	- no electrical or mechanical failures		P
	- no contact welding or prolonged arcing		P
	- no blowing of the fusible element in the earth circuit		P
8.3.3.5.6.b	Dielectric verification:		
	dielectric test voltage (V) 2 xUe with a min.of 1000V:	1000V	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.1	TEST SEQUENCE II (sample No. 2)		
Test No. 1	- Making and breaking capacities of switching elements under normal conditions (8.3.3.5.3)		
Test No. 2	- Dielectric verification (8.3.3.5.6.b)		
8.3.3.5.3	Making and breaking capacities of switching elements under normal conditions		
	contact element (figure / form) ..... :	Form A or Form B	
	contact polarity..... :	-	
	utilization category (AC / DC)..... :	DC-13	
	rated operational voltage Ue (V) ..... :	220VDC	
	rated operational current Ie (A) or power (kW) ..... :	0,15A	
No.1	- test voltage U/Ue = 1,1 (V) ..... :	L1: 298VDC L2: L3:	P
	- power factor/time constant ..... :	L1: 298ms L2: L3:	P
	- make operations: test current I/Ie (A) ..... :	L1: 0,15A L2: L3:	P
	- break operations: test current I/Ie (A) ..... :	L1: 0,15A L2: L3:	P
	- a.c. test: Inductor shunted by a resistor taking 3% of the total power consumed - d.c. test: test current increase from zero to steady-state value within limits of figure 9		N/A
	- on-time (ms) ..... :	Appr. 300ms	P
	- operating cycles per minute ..... :	6	P
	- number of operating cycles ..... :	50	P
	- test voltage U/Ue = 1,0 (V) ..... :	L1: 223VDC L2: L3:	P
	- power factor/time constant ..... :	L1: 298ms L2: L3:	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- make operations: test current I/Ie (A) ..... :	L1: 0,15A L2: L3:	P
	- break operations: test current I/Ie (A) ..... :	L1: 0,15A L2: L3:	P
No. 2	- on-time (ms) ..... :	Appr. 300ms	P
	- operating cycles per minute ..... :	Rapidly	P
	- number of operating cycles ..... :	10	P
No. 3	- on-time (ms) ..... :	Appr. 480ms	P
	- operating cycles per minute ..... :	60	P
	- number of operating cycles ..... :	990	P
No. 4	- on-time (ms) ..... :	Appr. 480ms	P
	- operating cycles per minute ..... :	6	P
	- number of operating cycles ..... :	5000	P
	Behaviour and condition during and after the test:		
	- no electrical or mechanical failures		P
	- no contact welding or prolonged arcing		P
	- no blowing of the fusible element in the earth circuit		P
8.3.3.5.6.b	Dielectric verification:		
	dielectric test voltage (V) 2 xUe with a min.of 1000V:	1000V	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.1	TEST SEQUENCE III (sample No. 3)		
Test No. 1	- Making and breaking capacities of switching elements under abnormal conditions (8.3.3.5.4)		
Test No. 2	- Dielectric verification (8.3.3.5.6.b)		
8.3.3.5.4	Making and breaking capacities of switching elements under abnormal conditions:		
	contact element (figure / form) ..... :	Form A or Form B	
	contact polarity..... :	--	
	utilization category (AC / DC)..... :	AC-15	
	rated operational voltage Ue (V) ..... :	220VAC	
	rated operational current Ie (A) or power (kW) ..... :	1,64A	
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,1 (V) ..... :	L1: 244VAC L2: L3:	P
	- power factor/time constant ..... :	L1: 0,31 L2: L3:	P
	- make operations: test current I/Ie (A) ..... :	L1: 16,5A L2: L3:	P
	- break operations: test current I/Ie (A) ..... :	L1: 16,5A L2: L3:	P
	- a.c. test: Inductor shunted by a resistor taking 3% of the total power consumed - d.c. test: test current increase from zero to steady-state value within limits of figure 9		P
	- on-time (ms) ..... :	Appr. 300ms	P
	- operating cycles per minute ..... :	6	P
	- number of operating cycles ..... :	10	P
	Behaviour and condition during and after the test:		
	- no electrical or mechanical failures		P
	- no contact welding or prolonged arcing		P
	- no blowing of the fusible element in the earth circuit		P
8.3.3.5.6.b	Dielectric verification:		

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Clause	Requirement + Test	Result - Remark	Verdict
	dielectric test voltage (V) 2 xUe with min.of 1000V.. :	1000V	P
8.3.1	TEST SEQUENCE III (sample No. 3)		
Test No. 1	- Making and breaking capacities of switching elements under abnormal conditions (8.3.3.5.4)		
Test No. 2	- Dielectric verification (8.3.3.5.6.b)		
8.3.3.5.4	Making and breaking capacities of switching elements under abnormal conditions:		
	contact element (figure / form) ..... :	Form A or Form B	
	contact polarity..... :	--	
	utilization category (AC / DC)..... :	AC-15	
	rated operational voltage Ue (V) ..... :	380VAC	
	rated operational current Ie (A) or power (kW) ..... :	0,95A	
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,1 (V) ..... :	L1: 420VAC L2: L3:	P
	- power factor/time constant ..... :	L1: 0,31 L2: L3:	P
	- make operations: test current I/Ie (A) ..... :	L1: 9,62A L2: L3:	P
	- break operations: test current I/Ie (A) ..... :	L1: 9,62A L2: L3:	P
	- a.c. test: Inductor shunted by a resistor taking 3% of the total power consumed - d.c. test: test current increase from zero to steady-state value within limits of figure 9		P
	- on-time (ms) ..... :	Appr. 300ms	P
	- operating cycles per minute ..... :	6	P
	- number of operating cycles ..... :	10	P
	Behaviour and condition during and after the test:		
	- no electrical or mechanical failures		P
	- no contact welding or prolonged arcing		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- no blowing of the fusible element in the earth circuit		P
8.3.3.5.6.b	Dielectric verification:		
	dielectric test voltage (V) 2 xUe with min.of 1000V.. :	1000V	P

8.3.1	TEST SEQUENCE IV (sample No. 4)		
Test No. 1	- Performance under conditional short-circuit current (8.3.4)		
Test No. 2	- Dielectric verification (8.3.3.5.6.b)		
8.3.4	Performance under conditional short-circuit current		
	contact element (figure / form) ..... :	Form A	
	contact polarity..... :	-	
	type of SCPD ..... :	RT16-00	
	ratings of SCPD (A / V) ..... :	6A	
	prospective current (kA) ..... :	1000A	
	test voltage (V) U/Ue = 1,1 (V) ..... :	430V	P
	r.m.s. test current obtained (kA) ..... :	1,04kA	P
	power factor (max. 0,7) ..... :	0,54	P
	first CO operation by closing the separate making switch: test Ip / I²dt (kA / kA²s) ..... :	345A/ 221 A²s	P
	time interval between test (min. 3 min) ..... :	3min	P
	second CO operation by closing the separate making switch: test Ip / I²dt (kA / kA²s) ..... :	358A/ 336 A²s	P
	time interval between test (min. 3 min) ..... :	3min	P
	third making operation to closed switching elements: test Ip / I²dt (kA / kA²s) ..... :	356A/ 294 A²s	P
	Behaviour of the equipment during the test:		
	switching elements open by the normal actuating system		P
8.3.3.5.6.b	Dielectric verification:		
	dielectric test voltage (V) 2 xUe with min.of 1000V.. :	1000V	P

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Clause	Requirement + Test	Result - Remark	Verdict

8.3.1	TEST SEQUENCE IV (sample No. 4)		
Test No. 1	- Performance under conditional short-circuit current (8.3.4)		
Test No. 2	- Dielectric verification (8.3.3.5.6.b)		
8.3.4	Performance under conditional short-circuit current		
	contact element (figure / form) ..... :	Form B	
	contact polarity..... :	-	
	type of SCPD ..... :	RT16-00	
	ratings of SCPD (A / V) ..... :	6A	
	prospective current (kA) ..... :	1000A	
	test voltage (V) U/Ue = 1,1 (V) ..... :	430V	P
	r.m.s. test current obtained (kA) ..... :	1,04kA	P
	power factor (max. 0,7) ..... :	0,54	P
	first CO operation by closing the separate making switch: test Ip / I²dt (kA / kA²s) ..... :	361A/ 309 A²s	P
	time interval between test (min. 3 min) ..... :	3min	P
	second CO operation by closing the separate making switch: test Ip / I²dt (kA / kA²s) ..... :	352A/ 167 A²s	P
	time interval between test (min. 3 min) ..... :	3min	P
	third making operation to closed switching elements: test Ip / I²dt (kA / kA²s) ..... :	361A/ 481 A²s	P
	Behaviour of the equipment during the test:		
	switching elements open by the normal actuating system		P
8.3.3.5.6.b	Dielectric verification:		
	dielectric test voltage (V) 2 xUe with min.of 1000V.. :	1000V	P

8.3.1	TEST SEQUENCE V (sample No. 5)		
Test No. 1	- Degree of protection of enclosed control circuit-devices (Annex C of IEC 60947-1)		
Test No. 2	- Verification of actuation force or moment (8.2.5)		
Annex C	Degree of protection of enclosed control circuit-devices		

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Clause	Requirement + Test	Result - Remark	Verdict
	The enclosed control circuit devices shall comply with the requirements of Annex C of IEC60947-1	IP00, built-in use	N/A
8.2.5	Verification of actuation force or moment		
	When required in 7.1.5.3, the minimum actuating force or moment shall be tested during sequence V of 8.3.1. The performance shall be as stated in 7.1.5.3		N/A
7.1.5.3	Actuating force (or moment)		
	The force (or moment) required to operate the actuator shall be compatible with the intended application, taking into account the size of the actuator, the type of enclosure or panel, the environment of the installation and the use for which it is intended		N/A
	The minimum starting force (or moment) shall be sufficiently large to prevent inadvertent operation; e.g. push-buttons and rotary switches to be used with enclosures complying with degrees of protection IPX5 or IPX6 shall not become actuated when hit by the jet of water applied during the test of the enclosed equipment.		N/A
	Minimum force (N)		N/A
	Minimum moment (Nm)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.1.	TEST SEQUENCE VI (sample No. 6)		
Test No. 1	- Measurement of clearances and creepage distances (7.1.4 of IEC 60947-1)		
Test No. 2	- Verification of limitation of rotation of a rotary switch (8.2.6)		
7.1.4	Measurement of clearances and creepage distances		
	Clearances and creepage distances	See clause 7.1.4	N/A
8.2.6	Verification of limitation of rotation of a rotary switch		
	When this test is required in 7.1.4.5, it shall be tested during sequence VI of 8.3.1 The test sample shall be mounted according to the manufacturer's instructions		N/A
7.1.4.5	Limitation of rotation (of a rotary switch)		
	When actuators with limited or unidirectional movement are used, they shall be fitted with robust means of limitation, capable of withstanding five times the actual maximum actuating moment		N/A
8.2.6	The operating moment shall be measured five times and the maximum value recorded (Nm) ..... :		N/A
	The maximum moment value, multiplied by five, shall be applied to the actuator by forcing it against the means of limitation. The moment shall be applied for 10 s (Nm)..... :		N/A
	Means of limitation has not moved, become loose or prevented the actuator's normal operation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.4	TEST FOR EMC		
8.4.1.	General		
	Control circuit devices having only passive components are not required to be tested.		N/A
	Subclauses 8.3.2.1 of IEC 60947-1 and 8.3.2.4 of IEC 60947-1 apply with the following additions:		
	Control circuit devices intended to be mounted in a hole of a panel shall be mounted in a hole which is located in the centre of a grounded square metal plate.		N/A
	Control circuit devices intended to be mounted on surfaces or on standard rails shall be mounted directly on the grounded square metal plate or on the standard rail which is fixed on the grounded square metal plate.		N/A
	Control circuit devices intended to be mounted in associated metal enclosures shall be mounted in the grounded metal enclosure with the smallest dimension available or on the grounded square metal plate, whichever configuration yields the worst results.		N/A
	The dimension of the square metal plate shall be (300 ± 50) mm and the thickness 1,5 $_{0}^{+0,5}$ mm.		N/A
	If not required otherwise by horizontal standard the connecting leads shall be 2 $_{0}^{+0,1}$ m. If the length of the connecting leads is other than 2 m. Cable length (m)……:		N/A
	For control circuit devices not having integral cables, the type of cable or wire used shall be specified by the manufacturer: Type of cable…….:		N/A
	The test sample shall be in the ON-status or in the OFF-status, whichever is the worse. Tested state :	ON / OFF	N/A
	Where a range of control circuit devices are made according to the same principle and design, and using the same type of components, tests may be performed on representative samples.		N/A
8.4.2	Immunity		
8.4.2.1	Electrostatic discharges.		
	The test shall be performed according to IEC 61000-4-2 and 7.3.2.4, and shall be repeated 10 times at each measuring point, with a minimum time interval of 1 s between pulses.	See	N/A
8.4.2.2	Radiated radio-frequency electromagnetic fields		
	The test shall be performed according to IEC 61000-4-3 and 7.3.2.5.	See	N/A
8.4.2.3	Electrical fast transients/bursts		

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Clause	Requirement + Test	Result - Remark	Verdict
	The test shall be performed according to IEC 61000-4-4 and 7.3.2.6, with all the connecting leads placed in the capacitive coupling clamp.	See	N/A
8.4.2.4	Surges		
	The test shall be conducted using the methods of IEC 61000-4-5. Capacitive coupling shall be preferred. Surges shall be supplied between:	See	N/A
	a) between terminals intended to be connected to the power supply;		N/A
	b) between each output terminal and each terminal intended to be connected to the power supply		N/A
	The test voltage values are those of Table 8 but shall not exceed the corresponding U_{imp} value(s) given by the manufacturer following 7.2.3 of IEC 60947-1. Test voltages (V)……..:		N/A
	The repetition rate shall be one surge per minute, with the number of pulses being five positive and five negative.		N/A
8.4.2.5	Conducted disturbances induced by radio-frequency fields		
	The test shall be performed according to IEC 61000-4-6 and 7.3.2.8.	See	N/A
8.4.2.6	Power-frequency magnetic fields		
	The test shall be performed according to IEC 61000-4-8 and 7.3.2.9.	See	N/A
8.4.2.7	Voltage dips and interruptions		
	The test shall be performed according to IEC 61000-4-11 and 7.3.2.10.	See	N/A
8.4.3	Emission		
	The test shall be performed according to CISPR 11, group 1, class A, and 7.3.3.	See	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex C of IEC 60947-1	**DEGREE OF PROTECTION OF ENCLOSED CONTROL CIRCUIT-DEVICES**		
C.1	Scope		
	This annex applies to degrees of protection of enclosed switchgear and control gear at rated voltages not exceeding 1000 V a.c. or 1500 V d.c. hereafter referred as ”equipment”	IP00, built-in use	N/A
C.2	Object		
	Clause 2 of IEC 60529 applies with additional requirements of this annex		N/A
C.3	Definitions		
	Clause 3 of IEC 60529 applies except that ”Enclosure” is replaced by the following:		N/A
	”A part providing a specified degree of protection of equipment against certain external influences and a specified degree of protection against approach to or contact with live parts and moving parts”		N/A
C.4	Designation		
	Clause 4 of IEC 60529 applies except for letters H, M and S		N/A
C.5	Degrees of protection against access to hazardous parts and against ingress of solid foreign objects indicated by the first characteristic numeral		
	Clause 5 of IEC 60529 applies		N/A
C.6	Degrees of protection against ingress of water indicated by the second characteristic numeral		
	Clause 6 of IEC 60529 applies		N/A
C.7	Degrees of protection against access to hazardous parts indicated by the additional letter		
	Clause7 of IEC 60529 applies		N/A
C.8	Supplementary letters		
	Clause 8 of IEC 60529 applies		N/A
C.9	Examples of designations with IP Code		
	Clause 9 of IEC 60529 applies		N/A
C.10	Marking		
	Clause 10 of IEC 60529 applies with the following addition:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If the IP Code is designated for one mounting position only, it shall be indicated by the symbol 0623 of ISO 7000 placed next to the IP Code specifying this position of the equipment, e.g. vertical		N/A
C.11	General requirements for the tests		
C.11.1	Clause 11.1 of IEC 60529 applies		N/A
C.11.2	Clause 11.2 of IEC 60529 applies with the following additions:		N/A
	All tests are made in the unenergized state		N/A
	Certain devices(e.g. exposed faces of push-buttons) can be verified by inspection		N/A
	The temperature of the test sample shall not deviate from the actual temperature by more than 5 K		N/A
	Where equipment is mounted in an empty enclosure which already has an IP code the following requirements apply:		
	a) For IP1X to IP4X and additional letters A to D This shall be verified by inspection and compliance with the enclosure manufacturer's instructions		N/A
	b) For IP6X dust test This shall be verified by inspection and compliance with the enclosure manufacturer's instructions		N/A
	c) For IP5X dust test and IP1X to IP8X water tests testing of the enclosed equipment is only required where the ingress of dust or water may impair the operation of the equipment		N/A
C.11.3	Sub clause 11.3 of IEC 60529 applies with the following addition:		N/A
	Drain and ventilating holes are treated as normal openings		N/A
C.11.4	Clause 11.4 of IEC 60529 applies		N/A
C11.5	Where an empty enclosure is used as a component of an enclosed equipment, Clause 11.5 of IEC 60529 applies		N/A
C.12	Degrees of protection against access to hazardous parts indicated by the first characteristic numeral		
	Clause 12 of IEC 60529 applies except for 12.3.2		N/A
C.13	Degrees of protection against ingress of solid foreign objects indicated by the first characteristic numeral		
	Clause 13 of IEC 60529 applies except for		N/A
C.13.4	Dust test for first characteristic numerals 5 and 6		

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Clause	Requirement + Test	Result - Remark	Verdict
	Enclosed equipment having a degree of protection IP5X shall be tested according to category 2 of 13.4 of IEC 60 529		N/A
	Enclosed equipment having a degree of protection IP6X shall be tested according to category 1 of 13.4 of IEC 60 529		N/A
C.13.5.2	Acceptance conditions for first characteristic numeral 5		
	The following text to be added:		
	Where dust deposits could raise as to the correct functioning and safety of the equipment, a preconditioning and a dielectric test shall be conducted as follows:		N/A
	The preconditioning, after dust test, shall be verified by test Ca: damp heat, steady state, according to IEC 60068-2-3, under the following conditions.		N/A
	The equipment shall be prepared so that the dust deposits are subjected to the test by leaving open the lid and/or removing parts, where possible without the aid of tool		N/A
	Before being placed in the chamber the equipment shall be stored at room temperature at least 4 h before the test		N/A
	The test duration shall be 24 consecutive hours		N/A
	After this period the equipment is to be removed from the chamber within 15 min and submitted to a power-frequency dielectric test for 1 min, the value being 2 Uemax with a minimum of 1000 V (V)..... :	Utest (V):	N/A
C.14	Tests for protection against ingress of water indicated by the second characteristic numeral		
C.14.1	Clause 14.1 of IEC 60529 applies		N/A
C.14.2	Clause 14.2 of IEC 60529 applies		N/A
C.14.3	Clause 14.3 of IEC 60529 applies with following addition:		N/A
	The equipment's then submitted to a power-frequency dielectric test for 1 min, the value being 2 Ue_{max} with a minimum of 1000 V (V) ..... :	Utest (V):	N/A
C.15	Tests for protection against access to hazardous parts indicated by additional letter		
	Clause 15.1 of IEC 60529 applies		N/A
C.16	Summary of responsibilities of relevant technical committees		

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Clause	Requirement + Test	Result - Remark	Verdict

Annex C	**SPECIAL TESTS - DURABILITY TESTS**		
C.1	General		
C.1.1	Durability declaration		
	The special durability tests described in this annex are conducted at the discretion of the manufacturer		
	Declared number of operating cycles by the manufacturer:		
	- mechanical ..... :		N/A
	- electrical..... :		N/A
C.1.2	Test procedures		
	As stated in 8.3.2.1 and at a rate equal or higher than that declared by the manufacturer		N/A
	The moving parts of the device shall reach their maximum operating positions in both directions, as recommended by the manufacturer		N/A
C.1.2.2	Single 8 test		
	Eight control circuit devices shall be tested to the declared number of operating cycles..... :		N/A
	If the number of failed devices does not exceed two, the test is considered passed		N/A
C.1.2.3	Double 3 test		
	Three control circuit devices shall be tested to the declared number of operating cycles..... :		N/A
	The test is considered passed if there is no failure, and failed if there is more than one failure.		N/A
	Should there be only one failure, then three additional control devices are tested to the declared number of operating cycles and providing there is no additional failure, the test is considered passed.		N/A
C.1.3	Failure criteria		
	During the tests described in C.2.2 and C.3.2, there shall be no electrical and/or mechanical failures		N/A
	Following the tests, the switching element shall pass the dielectric test of 8.3.3.4 with a rated test voltage equal to 2 Ue with a minimum of 1000 V (V) ..... :	Utest (V):	N/A
C.2	Mechanical durability		
C.2.1	General		

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Clause	Requirement + Test	Result - Remark	Verdict
	The mechanical durability of a control circuit device is defined as the number of no-load operating cycles which will be attained or exceeding by 90 % of all devices tested without repair or replacement of any part.		N/A
C.2.2	Test procedures		
	Tests are carried out according to C.1.2.		N/A
	During the test, periodically the contacts shall be checked at any voltage and current, selected by the manufacturer, and there shall be no failure	(see C.1.3)	N/A
C.3	Electrical durability		
C.3.1	General		
	Electrical durability of a control device is defined as the number of on-load operating cycles which will be attained or exceeded by 90% of all devices tested, without repair or replacement of any part		N/A
C.3.2	Test procedures		
C.3.2.1	General		
	Electrical durability tests are carried out by operating the device under the conditions defined in table C.1, in accordance with C.3.2.2 for a.c. or with C.3.2.3. for d.c.		N/A
	Each mechanical operation cycle shall include an interruption of the test current		N/A
	The ON-duration of the current shall not more 50% and not-less than 10% of an operating cycle (ms) ... :	ON-duration (ms):	N/A
	If the test circuit shown in figure C.1 is used, the ON-duration of current at 10 times Ie shall not cause overheating		N/A
	Alternatively these test may be performed on the actual load for which the control switch is intended		N/A
C.3.2.2	AC tests		
	Used circuit ..... :	[ ] Figure C.1 [ ] Figure C.2	N/A
	The circuit to be used as shown in fig C.1:		N/A
	- Making circuit consisting air-cored inductor, in series with resistor, power factor of 0,7 ..... :	U test (V): I test (A): Pf:	N/A
	- Breaking circuit consisting air-cored inductor, in series with resistor, parallel damping resistor in which flows 3 % of breaking current, power factor of 0,4 ..... :	U test (V): I test (A): Pf: R (Ohm):	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If the contact element has a bounce time less than 3 ms, the test may be made with the simplified circuit shown in Figure C.2 ..... :	Bounce time (ms):	N/A
C.3.2.3	DC Tests		
	Used inductor..... :	[ ] air-cored [ ] iron-cored	N/A
	The circuit to be used as shown in fig C.1:		N/A
	- circuit consisting air-cored inductor, in series with resistor, parallel damping resistor across the complete circuit in which flows 1 % of test current power factor of $T_{0,95}$ or ..... :	U test (V): I test (A): R (Ohm): $T_{0,95}$ (ms):	N/A
	-circuit consisting iron-cored inductor, in series with resistor, power factor of $T_{0,95}$ $T_{0,95}$ = 6 x P for P< 50 W $T_{0,95}$ = 300 ms for P = 50 W ..... :	U test (V): I test (A): Pf: R (Ohm):	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex E	**ITEMS SUBJECT TO AGREE BETWEEN MANUFACTURER AND USER**		
	Annex J of IEC 60947-1 applies, as far as covered by clauses and of this standard, with the following additions		N/A
5.2.5	Relationship between the positions of the actuator of rotary switches and the associated contact element positions in the operating diagram (indication by the manufacturer)		N/A
5.2.6	Characteristics of the delay of time contact elements with adjustable delay of contactors relays (indication by manufacturer)		N/A
6.1.1 (Annex K)	Choice of connecting conductors for position switches with direct opening action		N/A
8.3.1	Test sequences made on one sample only (at manufacturer’s request)		N/A
8.3.4.3	Conditional short-circuit current test:		N/A
	- adjustment of the test current if the prospective current is different from 1000 A (to be specified by the manufacturer)		N/A
	- power factor of the test circuit less than 0,5 (with manufacturer’s consent		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex F	**CLASS II CONTROL CIRCUIT DEVICES INSULATED BY ENCAPSULATION REQUIREMENTS AND TESTS**		
F.1	General		
	This annex specifies constructional requirements and tests for class II control circuit devices or parts of devices in which insulation of class II according to IEC 61140 is archived by encapsulation		N/A
	All non-encapsulated parts shall have clearances and creepage distances two times those specified in 7.1.3		N/A
F.5	Marking		
	Control devices according to this annex shall be marked with the following symbol		N/A
F.7	Instructional and functional requirements		
F.7.1	Choice of compound		
	The compound shall be chosen so that the encapsulated control devices comply with the tests defined in F.8.		N/A
F.7.2	Adhesion of the compound		
	The adhesion of the compound shall be sufficient to prevent the ingress of moisture between the compound and all encapsulated parts and to prevent movement of the encapsulated portion of cable if any.		N/A
	Compliance shall be verified by tests of F.8.2.5 and F.8.1.2.2.		N/A
F.7.3	Dielectric properties		
	Sub-clause 7.2.3 applies with the following changes:		N/A
	For the verification of the impulse withstand voltage, the test voltage Uimp shall be the next higher category of the maximum rated operational voltage in the first column of Table H.1 of IEC 60947-1 for stated overvoltage category..... :	Uimp (kV):	N/A
	For verification of the power frequency withstand voltage, the test voltage shall be the sum of the voltage stated in Table 12A of IEC 60947-1 plus 1000 V..... :	Utest (V):	N/A
F.8	Tests		
F.8.1	Kind of tests		
F.8.1.1	General		
	Sub clause 8.1.1 of IEC 60947-1 applies		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
F.8.1.2	Type test		
	The following sequence of 6 tests shall be applied to each of 3 samples in the specified order		N/A
F.8.1.2.1	Dielectric tests in new conditions		
	Sub clause 8.3.3.4 of IEC 60947-1 applies with the exception that the values of voltages shall be applied between the stripped joined ends of the cable or the shorted terminals and any point of the surface (or metallic foil on the surface) of the encapsulated device (see fig F.1)		N/A
	No breakdown of the insulation shall occur		N/A
F.1.2.2	Cable tests (if applicable)		
	Control circuit devices provided with integrally connected cables shall comply with the requirements of Annex G		N/A
F.8.1.2.3	Rapid change of temperature test		
	Test Na shall be performed in accordance with IEC 60068-2-14 with the following values:		
	Ta and Tb are the minimum and the maximum temperatures stated in f.2.3 ..... :	T_a (°C): T_b (°C):	N/A
	Transition time t_2 ..... :	t_2 = 2 to 3 min	N/A
	Number of cycles ..... :	5	N/A
	Exposure time t_1 ..... :	t_1 = 3 h	N/A
	After the test no visible damage shall be observed		N/A
F.8.1.2.4	Impact test		
	The test is performed as follow:	See Figure F.2	
	Thee impacts of 0,5 Joule shall applied near the centre of the largest surface or the longest axis (for cylindrical shape) of the encapsulated device		N/A
	The impacts are provided by dropping a steel ball of 0,25 kg from a height of 0,20 m		N/A
	The support is considered sufficiently rigid if its displacement under the impact energy is lower than 0,1 mm		N/A
	After the test no visible damage shall be observed		N/A
F.8.1.2.5	Damp heat, cyclic		
	Test Db shall be performed in accordance with IEC 60068-2-30 with the following values:		
	Upper temperature ..... :	55 °C	N/A
	Number of cycles ..... :	6	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Variant..... :	☐ 1 ☐ 2	N/A
	After the test no visible damage shall be observed		N/A
F.8.1.2.6	Dielectric test after stresses		
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		N/A
	rated insulation voltage (V) test voltage (V) for 5 sec ..... :	Utest (V):	N/A
	Leakage current measurements at 1,1 Ui shall not exceed 2 mA..... :	Leakage current (mA):	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex G	**ADDITIONAL REQUIREMENTS FOR CONTROL CIRCUIT DEVICES WITH INTEGRALLY CONNECTED CABLES**		
G.1	General		
	This annex gives additional requirements applying to control circuit devices with integrally connected cables for electrical connection to other equipment and / or to the power source.		
	The cable integrally connected to such control devices is not considered replaceable by the user.		
	This annex states the constructional and performance requirements for the cable, the cable anchorage and the cable entrance seal		
G.7	Constructional and performance requirements		
G.7.1	Constructional requirements		
G.7.1.1	Cable material		
	The control device shall be provided with flexible cable of appropriate voltage, current and temperature rating and environmental condition		N/A
G.7.1.2	Cable anchorage		
	The cable anchorage shall be such that a force being applied to the cable is not transmitted to electrical connections integral to the device		N/A
	Movement of the cable intro or out of the control circuit device shall not cause damage to the connection or internal parts of the device		N/A
G.7.1.3	Cable entrance sealing means		
	A sealing means shall provided at the cable entrance to the control circuit device suitable for the degree of protection or internal parts of the device		N/A
G.7.2	Performance requirements		
	The cable and the cable entrance sealing means shall be capable of withstanding the tests given in G.8		N/A
G.8	Tests		
	The purpose of these tests is to ensure integrity of the cable anchorage during handling and installation. Once installed, the control circuit device and cable should be fixed relative to each other		N/A
G.8.2	Type test		
	The following sequence of four test shall be performed on a representative sample in the specified order		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.8.2.2	Pull-out test		
	The cable shall be subjected to a steady pull along the axis of the cable entry, applied to the insulating jacket of the cable for a duration of 1 min		N/A
	Sub clause 8.2.4.4 of IEC 60947-1 applies.		N/A
	In cases when cables consist of more than one conductor the pulling force is determined by multiplying the pulling force for a single conductor by the number of conductors in the cable. The maximum pulling force shall not exceed 160 N..... :	Diameter cable (mm): Pull force (N):	N/A
G.8.2.3	Torque test		
	The cable shall be subjected to a torque of 0,1 Nm or limited to the value giving an angle of torque of 360° ..... :	Torque (Nm):	N/A
	The torque shall be applied clockwise and then counter-clockwise for 1 min, to the cable at a distance of 100 mm from the control circuit device entrance		N/A
G.8.2.4	Push test		
	The push force shall be applied along the axis of the cable as close as possible to the cable entrance		N/A
	The force is increased to 20 N. The force shall be applied for 1 min for each time and with 1 min pause between applications		N/A
	After the tests, no visible damage of the cable entrance sealing means and no displacement of the cable shall be observed		N/A
G.8.2.5	Bend test		
	The cable shall be loaded and bent in the following manner:		N/A
	a) suspend a 3 kg mass by attaching it to the cable, 1 m from the cable entrance and with the axis of the cable entrance vertical		N/A
	b) tilt the control circuit device 90° to cause a 90° bend in the cable, maintaining that position for 1 min		N/A
	c) tilt the control device 90° in the opposite direction relative to vertical so as to cause an opposite 90° bend in the cable, maintaining the position for a duration of 1 min.		N/A
G.8.3	Results to be obtained		
	There shall be no damage to the cable, cable sealing means, cable entrance or the electrical connecting means of the control circuit device.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	This will be verified by visual examination and verification of compliance with the stated IP designation	See 7.1.11	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex H	**ADDITIONAL REQUIREMENTS FOR SEMICONDUCTOR SWITCHING ELEMENTS FOR CONTROL CIRCUIT DEVICES**		
H.3	Classification		
H.3.1	Semiconductor switching elements may be classified as follows:		
	1) Utilization categories (see 4.4. and H.4.2)		N/A
	2) Electrical ratings based on utilization categories (see annex A)		N/A
H.5	Product information		
	The following information shall be given by the manufacturer:		
	Clause 5.1 applies with the following additions:		N/A
	Basic rated values and utilization		N/A
	a) Voltage drop (H.7.1.1) ..... :	U_d (mV):	N/A
	b) Minimum operational current ..... :	I_m (A):	N/A
	c) Off-state current..... :	I_r (A):	N/A
	d) Making and breaking capacities ..... :	AC ___ / DC ___	N/A
	e) Conditional short-circuit current ..... :	Normal 1000 A at Ue	N/A
	f) Electromagnetic compatibility, EMC ..... :	☐ environment A ☐ environment B	N/A
H.8	Tests		
H.8.1	Type test		
	Subclause 8.1.2 applies with the following additions:		N/A
H.8.2	Voltage drop (U_d)		
	The voltage drop is measured across the active output of the switching element in the ON state and carrying the current range of I_m and I_e at an ambient temperature of 23°C ± 5 °C and at rated frequency.		N/A
	The measurement is performed with the circuit in figure H.2, with the switch S closed. The loads shall be resistive and R_2 is adjusted to obtain the test current with the supply voltage ..... :	U_e (V): I_m (A): I_e (A):	N/A
	Voltage drop at I_m ..... :	U_d (mV):	N/A
	Voltage drop at I_e ..... :	U_d (mV):	N/A
	The measured voltage drop exceed not the specified value in H.7.1.1		N/A
H.8.3	Minimum operational current (I_m)		

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Clause	Requirement + Test	Result - Remark	Verdict
	The test is performed with the switching element connected to a test circuit shown in fig H.2. With supply voltage (U_e), the switch open and the switching element in ON-state conduction, the resistive load R1 is adjusted to obtain the current I_m :	U_e (V): I_m (A):	N/A
	The measured value shall be according to H.7.1.2.. :	Min. stated value: I_m (A): Measured: I_m (A):	N/A
H.8.4	OFF-state current (I_r)		
	With the circuit in Figure H.2, and the S switch closed, the load R2 is adjusted to obtain the rated operational current (I_e) when the highest supply voltage (U_e) is connected to the circuit. The switching element is then turned off and the OFF-state current is measured ..... :	U_e (V): I_e (A):	N/A
	The measured value shall be according to H.7.1.3.. :	Min. stated value: I_r (A): Measured: I_r (A):	N/A
H.8.5	Making and breaking capacities		
	Subclause 8.3.3.5 applies		N/A
8.3.3.5.2	Making and breaking capacities of switching elements under normal conditions		
	contact element (figure / form) ..... :		
	contact polarity..... :		
	utilization category (AC/DC)..... :		
	rated operational voltage Ue (V) ..... :		
	rated operational current Ie (A) or power (kW) ..... :		
Test No.1	- test voltage U/Ue = 1,1 (V) ..... :	L1: L2: L3:	N/A
	- power factor/time constant ..... :	L1: L2: L3:	N/A
	- make operations: test current I/Ie (A) ..... :	L1: L2: L3:	N/A
	- break operations: test current I/Ie (A) ..... :	L1: L2: L3:	N/A
	- a.c. test: Inductor shunted by a resistor taking 3% of the total power consumed - d.c. test: test current increase from zero to steady-state value within limits of figure 9		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- on-time (ms) ..... :		N/A
	- operating cycles per minute ..... :	6	N/A
	- number of operating cycles ..... :	50	N/A
	- test voltage U/Ue = 1,0 (V) ..... :	L1: L2: L3:	N/A
	- power factor/time constant ..... :	L1: L2: L3:	N/A
	- make operations: test current I/Ie (A) ..... :	L1: L2: L3:	N/A
	- break operations: test current I/Ie (A) ..... :	L1: L2: L3:	N/A
Test No. 2	- on-time (ms) ..... :		N/A
	- operating cycles per minute ..... :	Rapidly	N/A
	- number of operating cycles ..... :	10	N/A
Test No. 3	- on-time (ms) ..... :		N/A
	- operating cycles per minute ..... :	60	N/A
	- number of operating cycles ..... :	990	N/A
Test No. 4	- on-time (ms) ..... :		N/A
	- operating cycles per minute ..... :		N/A
	- number of operating cycles ..... :	5000	N/A
	Behaviour and condition during and after the test:		
	- no electrical or mechanical failures		N/A
	- no contact welding or prolonged arcing		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	Dielectric verification:		
	dielectric test voltage (V) 2 xUe with a min.of 1000V:		N/A
8.3.3.5.3	Making and breaking capacities of switching elements under abnormal conditions:		
	contact element (figure / form) ..... :		
	contact polarity..... :		
	utilization category (AC/DC)..... :		
	rated operational voltage Ue (V) ..... :		
	rated operational current Ie (A) or power (kW) ..... :		

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Clause	Requirement + Test	Result - Remark	Verdict
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,1 (V) ..... :	L1: L2: L3:	N/A
	- power factor/time constant ..... :	L1: L2: L3:	N/A
	- make operations: test current I/Ie (A) ..... :	L1: L2: L3:	N/A
	- break operations: test current I/Ie (A) ..... :	L1: L2: L3:	N/A
	- a.c. test: Inductor shunted by a resistor taking 3% of the total power consumed - d.c. test: test current increase from zero to steady-state value within limits of figure 9		N/A
	- on-time (ms) ..... :		N/A
	- operating cycles per minute ..... :	6	N/A
	- number of operating cycles ..... :	10	N/A
	Behaviour and condition during and after the test:		
	- no electrical or mechanical failures		N/A
	- no contact welding or prolonged arcing		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	Dielectric verification:		
	dielectric test voltage (V) 2 xUe with min.of 1000V.. :		N/A
H.8.6	Performance under short-circuit conditions		
8.3.4	Performance under conditional short-circuit current		
	contact element (figure / form) ..... :		N/A
	contact polarity..... :		N/A
	Maximum cable length	2 m	N/A
	type of SCPD ..... :		N/A
	ratings of SCPD (A / V) ..... :		N/A
	prospective current (min- 1 kA) (kA)..... :		N/A
	test voltage (V) 1,1 x Ue ..... :		N/A
	r.m.s. test current obtained (kA) ..... :		N/A
	power factor (0,5- 0,7) / $T_{0,95}$ (ms)..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	first CO operation by closing the separate making switch: test Ip / I²dt (kA / kA²s) ..... :	L1:	N/A
	time interval between test (min. 3 min) ..... :		N/A
	second CO operation by closing the separate making switch: test Ip / I²dt (kA / kA²s) ..... :	L1:	N/A
	time interval between test (min. 3 min) ..... :		N/A
	third CO operation by closing the separate making switch: test Ip / I²dt (kA / kA²s) .... :	L1:	N/A
8.3.4.4	Condition of the switching element after the test		
	switching elements open by the normal actuating system		N/A
	Dielectric verification:		
	dielectric test voltage (V) 2 xUe with min.of 1000V.. :		N/A
H.8.7	Verification of electromagnetic compatibility		
H.8.7.1	General		
	Subclause 8.4.1 applies with the following addition:		N/A
	The tests shall be performed: with the switching element in the ON–state with the switching element in the OFF-state		N/A
H.8.7.2	Immunity		
H.8.7.2.4	Surges		
	Subclause 8.4.2.4 applies with the following addition:		N/A
	the switching element is powered during the test		N/A
	Five positive and five negative impulses shall be applied between each two points at intervals of not less than 5 s		N/A
H.8.7.3	Emission		
	The test shall be performed under worst case conditions according to CISPR 11 Group 1, Class A, and 7.3.3.2 of IEC 60947-1		N/A
	These limits are given for switching elements exclusively intended for use in industrial environment A. When they can be used in domestic environment B, the following notice shall be included in the instructions for use	NOTICE This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex J	**SPECIAL REQUIREMENTS FOR INDICATOR LIGHTS AND INDICATING TOWERS**		
J.3	Classification		
	Indicator lights may be classified by:		
	rated electrical power		N/A
	colour		N/A
	Fixing hole diameter		N/A
	Means of connection		N/A
	Nature of current and frequency		N/A
	Type of lamp socket		N/A
	Nature of light source (for example: filament lamp, LED).		N/A
J.4	Characteristics		
J.4.1	Rated operational voltage of an indicator light (V) ... :		N/A
J.4.2	Rated thermal power of an indicator light (W) ..... :		N/A
J.4.3	Rated values of the lamp ..... :		N/A
J.5	Product information		
	a - manufacturer's name or trademark		N/A
	b - type designation or serial number		N/A
	c – the following markings shall appear on the indicator light		N/A
	1 rated voltage of indicator light		N/A
	2 rated voltage of the lamp		N/A
	3 rated power of the lamp or its type designation, or rated current for a LED		N/A
J.6	Normal service, mounting and transport conditions		
	There are no supplementary requirements		N/A
J.7	Constructional and performance requirements		
	Clause 7 applies with the following additions		N/A
J.7.1.12	Indicator lights with build-in transformers		
	The transformer shall have separate windings		N/A
	It is assumed that this condition is fulfilled if the indicator light passes the test described in 8.3.3.4.1		N/A
J.7.2.1.6	Limits of operation		

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Clause	Requirement + Test	Result - Remark	Verdict
	The limit value of the supply voltage at the terminals of the indicator light shall be 1,1, times the rated operational voltage		N/A
	This requirement is verified only for indicator lights with built-in transformer according the test described in J.8.3.3.3		N/A
J.7.2.5.1	Short-circuit withstandability of build-in transformer		
	The transformer shall be able to withstand the short-circuit of its secondary winding.		N/A
	It is assumed that this condition is fulfilled if the indicator light passes the test described in 8.3.3.3.		N/A
J.8	Tests		
J.8.3	Tests for indicator lights and indicator towers		
	The tests are type tests. No additional test(routine test or special test) is described in this annex		N/A
	Each of the tests in J 8.3.3.3, -3.4, -4, and j.8.4 shall be made on new apparatus		N/A
J.8.3.3.3	Temperature-rise test		
	a) If the indicator light has the same rated thermal power (see J.4.2) regardless of mounting conditions, a single test is made in an insulated enclosure.		N/A
	b) If the rated thermal power (see J.4.2) is dependent on the mounting conditions, two tests are made: - on a steel plate, and - in an insulated enclosure		N/A
	c) Mounting on a steel plate Five indicator lights fitted with green lenses are fixed in accordance with the following diagram on a steel plate 2 mm thick, painted black		N/A
	The plate is located vertically on a table and the indicator lights are supplied at their rated voltage .... :	Utest (V):	N/A
	The duration of the test shall be such that a steady-state temperature is reached		N/A
	d) Mounting in an insulating enclosure The test described in item c) is carried out again. With the lights into an enclosure of insulating material, such as Bakelite-coated paper 2 mm thick		N/A
	The plate is located vertically on a table and the indicator lights are supplied at their rated voltage .... :	Utest (V):	N/A
	The duration of the test shall be such that a steady-state temperature is reached		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Results obtained on the follow points:		
	- on the body of the indicator light (K) ..... :	measured (K): allowed (K):	N/A
	- on the terminals ..... :	measured (K): allowed (K):	N/A
	- on the accessible part of the lens ..... :	measured (K): allowed (K):	N/A
	f) For indicating towers, an arrangement of 5 units shall be mounting in vertical position. The shall be loaded maximum power of the lamp at the nominal voltage ..... :	Utest (V):	N/A
	The duration of the test shall be such that a steady-state temperature is reached		N/A
	- on the accessible part of the centre lens of the tower ..... :	measured (K): allowed (K):	N/A
	None of the corresponding temperature rises exceed the limits of 7.2.2 of IEC60947-1		N/A
J.8.3.3.4	Dielectric tests		
	Clause 8.3.3.4 applies		N/A
J.8.3.3.4.3	Indicator lights with build-in transformers		
	Two additional dielectric tests shall be made, the duration of each being 1 min		N/A
	- between the primary and secondary windings of the transformer with the test voltage value specified in 8.3.3.4 ..... :	Utest (V):	N/A
	- between the secondary windings of the transformer and the frame of the indicator light with a test voltage of 1000 V		N/A
J.8.3.4	Short-circuit test (on built-in transformer, if any)		
	The test are made under the following conditions:		
	- primary voltage: 1,1 x Ue ..... :	Utest (V):	N/A
	- ambient air temperature: 20 °C ± 5 °C ..... :	Ambient (°C):	N/A
	- duration: 1 h		N/A
	The transformer shall be short-circuit by a conductor of negligible impedance		N/A
	After the test and after cooling to ambient, temperature, the transformer withstand the dielectric test defined in J.8.3.3.4.3		N/A
J.8.3.3.4.3	Indicator lights with build-in transformers		

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Clause	Requirement + Test	Result - Remark	Verdict
	Two additional dielectric tests shall be made, the duration of each being 1 min		N/A
	- between the primary and secondary windings of the transformer with the test voltage value specified in 8.3.3.4 ..... :	Utest (V):	N/A
	- between the secondary windings of the transformer and the frame of the indicator light with a test voltage of 1000 V		N/A
J.8.4	Shock and vibration		
J.8.4.1	General		
	Tests for shock and vibration shall be carried out for indicating towers only. Indicator lights are not considered to be tested.		N/A
J.8.4.2	Direct mounting		
J.8.4.2.1	General		
	An indicating tower with five signalling units shall be mounted as stated by the manufacturer without extension poles and the upper three units powered at the rated voltage..... :	Utest (V):	N/A
	The test shall be performed as follows		N/A
J.8.4.2.2	Shock		
	In accordance with IEC 60068-2-27 with the follow conditions		N/A
	Six shocks applied in each direction along three perpendicular axes (a total of 36 shocks):	- pulse shape: half-sine - peak acceleration: 15 g_n - duration of pulse: 11 ms	N/A
J.8.4.2.3	Vibration		
	In accordance with IEC 60068-2-6 with the following conditions, along three mutually perpendicular axes:	- frequency range: 10 to 55 Hz - amplitude: 0,5 mm - sweep cycle duration: 5 min - duration at resonant frequency or at 55 Hz: 30 min in each of the 3 axes (90 min in total)	N/A
J.8.4.3	Indirect support mounting		
	If the product literature includes other allowable mounting conditions (e.g. pole mounting), the manufacturer shall state the severity level for shock and vibration tests at which the requirements of J.8.4.3 are met		N/A
J.8.4.4	Results to be obtained		

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Clause	Requirement + Test	Result - Remark	Verdict
	After the tests, no visible damage shall be observed and the signalling shall not be impaired		N/A
J.8.5	Degree of protection for indicating towers		
	If the manufacturer declares a degree of protection, the test shall be conducted according to Annex C of IEC 60947-1 with all removable parts equipped as in normal service.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex K	**SPECIAL REQUIREMENTS FOR CONTROL SWITCHES WITH DIRECT OPENING ACTION**		
K.1	General		
	All control switches with direct opening action shall also comply with the relevant requirements of the standard and, where applicable. To those given in Annexes F, G, H and/or J		N/A
K.3	Classification		
	There are two types of control switches with direct opening action: ..... :	☐ type 1 ☐ type 2	N/A
K4	Characteristics		
K.4.3.1.2	Rated insulation voltage (min. 250 V) ..... :	Ui (V):	N/A
K.4.3.2.1	Conventional free air thermal current (min. 2.5 A) .. :	Ith (A):	N/A
K.4.4	Utilization categories for switching elements (AC-15 or DC–13) ..... :		N/A
K.5	Product information		
	Clause 5 is applies with the following additions		N/A
K.5.2	Marking		
K.5.2.7	Every contact element with direct action shall be marked on the outside by the symbol	 IEC 60617-S00226 (2001-07)	N/A
K.5.2.8	Electrical separation for change-over contact element		N/A
	Change-over contact elements with four terminal shall be indelibly and legibly marked with the relevant form Zap or Zebu as state in Figure 4.		N/A
K.5.2	Additional product information		
K.5.4.1	Actuator travel and operation force		
	The manufacturer shall state the following		
	a) the minimum direct opening travel (mm)..... :		N/A
	b) the minimum force to achieve direct opening action of all break contacts (N) ..... :		N/A
	c) the maximum travel including travel beyond the minimum travel position (mm)..... :		N/A
	d) for limit switches only the maximum speed of actuation ..... :		N/A
	e)for limit switches only the maximum frequency of actuation ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	These statements shall appear in the marking or on the circuit diagram or other documents		N/A
K.5.4.2	Short-circuit protection		
	Type of short-circuit protective device shall be stated either as marking on the switch or in the installation instruction		N/A
K.6	Normal service, mounting and transport conditions		
	Clause 6 applies, with the following additions:		N/A
K.6.1.1	Ambient air temperature		
	Sub clause 6.1.1 of IEC 60947-1 applies, except for position switches with direct opening action, for which the upper and lower limits of temperature are respectively +70 °C and +25 °C, and the average temperature, measured over a period of 24 h, does not exceed +35 °C		N/A
K.7	Constructional and performance requirements		
	Clause 7 applies with following additions:		N/A
K.7.1.4.3.1	Robustness of the actuating system		
	The actuating system shall pass the test described in K.8.3.7		N/A
K.7.1.4.3.2	Directness of the opening action		
	The control switch with direct opening action shall pass the tests K.8.3.4, K.8.3.5 and K.8.3.7 without any deformation that would reduce the impulse voltage withstand across the contact gap.		N/A
K.7.1.4.5	Automatic opening of cable operated control switches		
	In case of failure of the cable or its anchorage automatic return to open position		N/A
K.7.1.4.6	Conditions for direct opening action		
	Parts of travel that separates the contacts, shall have no resilient member (springs) between the moving contacts and the point of the actuator to which the actuating force is applied		N/A
K.7.1.4.6.1	Contact elements types		
	Control switches with direct opening action may be provided with snap-on or dependent action contact elements		N/A
	Break-contact shall be electrically separated from each other and from the operating make-contact element		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If C or Za change-over contact elements, only 1 contact element shall be used, and in case of Zebu change-over, both may be used		N/A
K.7.1.5.3	Actuator travel indication		
	In order to facilitate the setting-up of the switch actuator in relation to the external operating means, the switch may include means for indicting the minimum travel		N/A
K8	Tests		
	In addition to clause 8, and Annex, the following applies		N/A
K.8.3.1	Test sequences		
	Clause 8.3.1 applies with the following additions:		N/A
			N/A
	TEST SEQUENCE VII (Sample 7)		
	Mechanical operation of position switches with direct opening action		
K.8.3.5	Test no.1 - Mechanical operation of position switches at limits of temperature		
K.8.3.6	Test no.2 – Verification of direct opening action		
K.8.3.5	Mechanical operation of position switches at limits of temperature		
	The position switch shall be conditioned at 70°C for 8 hours ..... :		N/A
	After 8 hours the contact shall be loaded with the maximum rated operational current for 10 min (A)... :		N/A
	The contact then be operated 10 times by the application of the force stated by the manufacturer (N) ..... :		N/A
	The test shall be repeated, the switch shall be conditioned at - 25 °C for 8 hours ..... :		N/A
	The contact then be operated 10 times by the application of the force stated by the manufacturer (N) ..... :		N/A
K8.3.6	Verification of direct opening action		
	Impulse voltage test over the open position of the contacts at 2500 V or for position switches for isolation in accordance with table 14 of IEC 60 947-1 or as declared Uimp by the manufacturer (V) ..... :		N/A
	5 positive and 5 negative impulses are applied ..... :	Utest (V):	N/A
			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE VIII (Sample 8)		
K.8.3.7	Verification of robustness of the actuating system		
	Closed break contact(s)shall be loaded with a force F1 of 10 N ..... :		N/A
	Stated openings force F2 shall be applied to the actuator through the direct opening travel (N)..... :		N/A
	After the test the actuating system and / or contacts shall remain functional..... :		N/A
	Impulse voltage test in accordance with K.8.3.6		N/A
	Impulse voltage test over the open position of the contacts at 2500 V or for position switches for isolation in accordance with table 14 of IEC 60 947-1 or as declared Uimp by the manufacturer ..... :		N/A
	5 positive and 5 negative impulses are applied ..... :	Utest (V):	N/A
K.8.3.4	Performance under conditional short circuit current		
	Sub clause 8.3.4 applies with the following additions:		N/A
K.8.3.4.2.1	Verification of the conditional short-circuit current		
	The test shall be made as stated in 8.3.4.2, except that the current is made by a direct opening contact element and not by the additional switching device and the test is made on the device by making the current three times by the same contact element in a single phase circuit.		N/A
	For type 2 control switches, the contact element shall be chosen at random		N/A
	Performance under conditional short-circuit current		
	contact element (figure / form) ..... :		N/A
	contact polarity..... :		N/A
	type of SCPD ..... :		N/A
	ratings of SCPD (A / V) ..... :		N/A
	prospective current (min- 1 kA) (kA)..... :		N/A
	test voltage (V) U/Ue = 1,1 (V) ..... :	L1:	N/A
	r.m.s. test current obtained (kA) ..... :	L1:	N/A
	power factor (max. 0,7)		N/A
	Sample 4		N/A
	first C operation by closing the switch element Ip / I^2dt (kA / kA^2s) ..... :	L1: L1: L1:	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	time interval between test (min. 3 min) ..... :		N/A
	second C operation by closing the switch element Ip / I²dt (kA / kA²s)..... :	L1: L1: L1:	N/A
	time interval between test (min. 3 min) ..... :		N/A
	third C operation by closing the switch element Ip / I²dt (kA / kA²s) ..... :	L1: L1: L1:	N/A
	Sample 9		N/A
	first C operation by closing the switch element Ip / I²dt (kA / kA²s)..... :	L1: L1: L1:	N/A
	time interval between test (min. 3 min) ..... :		N/A
	second C operation by closing the switch element Ip / I²dt (kA / kA²s)..... :	L1: L1: L1:	N/A
	time interval between test (min. 3 min) ..... :		N/A
	third C operation by closing the switch element: Ip / I²dt (kA / kA²s)..... :	L1: L1: L1:	N/A
	Sample 10		N/A
	first C operation by closing the switch element Ip / I²dt (kA / kA²s)..... :	L1: L1: L1:	N/A
	time interval between test (min. 3 min) ..... :		N/A
	second C operation by closing the switch element Ip / I²dt (kA / kA²s)..... :	L1: L1: L1:	N/A
	time interval between test (min. 3 min) ..... :		N/A
	third C operation by closing the switch element Ip / I²dt (kA / kA²s)..... :	L1: L1: L1:	N/A
K.8.3.4.4.1	Operation ability after the test		
K.8.3.4.4.1	After each test, the opening contact element shall open by the application of the force stated by the manufacturer through the direct opening travel (see items a) and b) of K.5.4.1).		N/A
	Impulse voltage test in accordance with K.8.3.6		

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Clause	Requirement + Test	Result - Remark	Verdict
	Impulse voltage test over the open position of the contacts at 2500 V or for position switches for isolation in accordance with table 14 of IEC 60 947-1 or as declared Uimp by the manufacturer ..... :		N/A
	5 positive and 5 negative impulses are applied ..... :	Utest (V):	N/A

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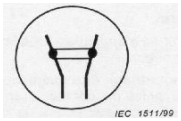
Clause	Requirement + Test	Result - Remark	Verdict

Annex L	**SPECIAL REQUIREMENTS FOR MECHANICALLY LINKED CONTACT ELEMENTS**		
L.1	General		
	This annex applies to mechanically linked auxiliary contact elements included in control circuit devices where actuating force is provided internally, such as contactor relays		N/A
	Linkage between the auxiliary and main contacts is not covered by this annex		N/A
L.5	Product information		
	Clause 5 applies with the following addition		N/A
L.5.2.7	Mechanically linked contact elements identification and marking		
	Mechanically linked contact elements shall be clearly identified:		N/A
	on the control circuit device itself; or in the manufacturers documentation or both		N/A
	The mechanical linkage shall be identified in circuit diagrams by a double parallel line connecting a filled circle on each of the mechanically linked contact symbols.		N/A
	If the devices containing some or all mechanically linked contacts are marked, the symbol shown shall be used		N/A
L.7	Constructional and performance requirements		
	Clause 7 applies with the following addition:		N/A
L.7.1.9	Requirements for mechanically linked contact elements		
	While any of the n Make contact element(s) is closed, none of the m Break contacts element(s) shall be closed		N/A
	While any of the m Break contact element(s) is closed, none of the n Make contacts element(s) shall be closed		N/A
L.8	Tests		
	Clause 8 applies with following addition:		N/A
L.8.4.	Special test for mechanically linked contact elements		
	This special test shall be carried out on a sample of (m+n) products where m is the number of break contacts elements and n is the number of make elements		N/A
	A different sample is used for each test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The test shall be carried out on products in new and clean condition		N/A
	The test procedure shall be as follows:		N/A
	a) test of NC contact:		N/A
	1) the NC contact elements shall be maintained in the closed position e.g. by welding or gluing each point of contact (e.g. for double breaking contact, welding is done at the two contact points) The thickness of welding or gluing shall be such that the distance between contacts is not modified by more than 0,02 mm		N/A
	2)an actuating force shall be applied by energizing the operating coil at 110 % of its rated voltage		N/A
	3) while applying the force, an impulse test voltage of 2,5 kV (1,2/50 µs at sea level; correction should be made according to table 12 of IEC60947-1 shall be applied across every NC contact. There shall be no disruptive discharge		N/A
	b) test of NO contact:		N/A
	1) the NO contact elements shall be maintained in the closed position e.g. by welding or gluing each point of contact (e.g. for double breaking contact, welding is done at the two contact points) The thickness of welding or gluing shall be such that the distance between contacts is not modified by more than 0,02 mm		N/A
	2)an actuating force shall be applied by de-energizing the operating coil		N/A
	3) while applying the force, an impulse test voltage of 2,5 kV (1,2/50 µs at sea level; correction should be made according to table 12 of IEC60947-1 shall be applied across every NO contact. There shall be no disruptive discharge		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex M	**TERMINAL MARKING, DISTINCTIVE NUMBER AND DISTINCTIVE LETTER FOR CONTROL CIRCUIT DEVICES**		
M.1	General		
	This annex applies to control switches and contactor relays irrespective of their construction, having terminal marking.		N/A
M.2	Terminal marking rule		
M.2.1	General		
	Terminal marking in accordance with this annex is based, in principle, on a two-digit number.		N/A
M.2.2	Function digit		
	Sub clause L.3.2.1 of IEC 60947-1 applies.		N/A
M.2.3	Sequence digit		
	The tens digit is a continuous sequence number beginning with 1 (except for control switches designated 01 and contactor relays designated 01E), independent of the contact function		N/A
	Terminals belonging to the same contact are marked with the same sequence digit.		N/A
	For contactor relays having 10 contact elements, the sequence digit 0 is used instead of 10.		N/A
	The sequence digit may be omitted from the terminal marking only if additional information provided by the manufacturer or the user clearly gives such digit.		N/A
M.2.4	Numbering method		
	The contact terminals shall be numbered sequentially from left to right on the device; for devices with tiers of terminals, the numbering shall begin with the tier nearest to the mounting level.		N/A
M.3	Distinctive number distinctive letter		
M.3.1	General		
	The quantity and type of the contact elements of a control switch according to this annex are indicated by a distinctive number. Contacts of contactor relays are indicated by a distinctive number followed by a distinctive letter.		N/A
M.3.2	Distinctive number		

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	The first digit of the distinctive number gives the quantity of make contact elements and the second digit the quantity of break contact elements. The third digit, if any, shall give the quantity of change-over contact elements in control switches.		N/A
M.3.3	Distinctive letter		
	The distinctive letter indicates the location of the contact elements of a contactor relay in relation to each other and their terminal marking.		N/A
M.4	Terminal numbering sequence		
	For control switches having the same distinctive number, the terminal marking is specified in Table M.1.		N/A
	The position of the contact elements of the control switch need not correspond to that shown on diagrams of Table M.1.		N/A
M.5	Contactor relays designated by the distinctive letter E		
	For contactor relays having the same distinctive number and the distinctive letter E, independently of their construction, the sequence of the contact elements within the device is specified in accordance with the diagrams of Table M.2.		N/A
M.6	Contactor relays designated by the distinctive letter X, Y or Z		
M.6.1	Contactor relays designated by the distinctive letter Z		
	If the location of the contact elements within the device (but not the terminal marking) differs from the provisions of Clause M.5, the device shall be designated by the distinctive letter Z instead of the distinctive letter E.		N/A
M.6.2	Contactor relays designated by the distinctive letter X		
	If the location of the contact elements within the device and the terminal marking both differ from the requirements of Clause M.5, the device shall be designated by the distinctive letter X instead of the distinctive letter E.		N/A
	The device shall comply with the requirements of Clauses M.2 and M.3.		N/A
M.6.3	Contactor relays designated by the distinctive letter Y		
	Devices consisting of combinations of contact elements and terminal marking in accordance with Table M.3 shall be designated by the distinctive letter Y instead of the distinctive letter E.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex N	**Procedure to determine reliability data for electromechanical devices in control circuits used in functional safety applications**		
N.3	Method based on durability test results		
N.3.1	General method		
	K.3.1 of IEC 60947-1:2007/AMD2:2014 applies.		N/A
N.3.2	Test requirements		
N.3.2.1	General		
	The test environment shall be in accordance with Clause 6.		N/A
	Every test shall be performed under the general conditions stated in 8.3.2.1 and at a rate equal or higher at the discretion of the manufacturer. The moving parts of the device shall reach their maximum operating positions in both directions, as recommended by the manufacturer. Reliability data to be published are described in Clause N.4.		N/A
N.3.2.2	Mechanical durability		
	The mechanical durability of a control circuit device is defined as the number of no-load operating cycles. For the no-make current or no-break current utilization the mechanical durability is applicable.		N/A
	During the test, periodically the contacts shall be checked at any voltage and current, selected by the manufacturer, and there shall be no failure.		N/A
N.3.2.3	Electrical durability		
	The electrical durability of a control circuit device is defined as the number of on-load operating cycles.		N/A
	Electrical durability shall be determined in accordance with C.3.2 using utilization category AC-15 and / or DC-13 unless otherwise stated by the manufacturer.		N/A
N.3.3	Number of samples		
	K.3.3 of IEC 60947-1 applies with the following addition:		N/A
	The selection of samples to be tested for a series of devices with same fundamental design and without significant difference in construction shall be based on engineering judgment.		N/A
N.3.4	Characterization of a failure mode		
	K.3.4 of IEC 60947-1 applies		N/A
N.3.5	Weibull modelling		
	K.3.5 of IEC 60947-1 applies		N/A
N.3.6	Useful life and upper limit of failure rate		

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Clause	Requirement + Test	Result - Remark	Verdict
	K.3.6 of IEC 60947-1 applies		N/A
N.3.7	Reliability data		
	K.3.7 of IEC 60947-1 applies		N/A
N.4	Data information		
	K.4 of IEC 60947-1 applies		N/A
N.5	Example		
	K.5 of IEC 60947-1 applies		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

8.3.3.3	**TABLE: Heating Test**		**N/A**
	Test voltage (V) ..... :	-	**—**
	Ambient (°C) .....:		**—**

Thermocouple Locations	**Max. temperature measured, (°C)**	**Max. temperature limit, (°C)**
Supplementary information:		

8.3.3.3	**TABLE: Heating test, resistance method**		**N/A**
	Test voltage (V) ..... :	-	**—**
	Ambient, t_1 (°C) ..... :		**—**
	Ambient, t_2 (°C) ..... :		**—**

Temperature rise of winding	**R_1 (Ω)**	**R_2 (Ω)**	**ΔT (K)**	**Max. dT (K)**	**Insulation class**
Supplementary information:					

8.3.3.4	**TABLE: Dielectric Strength**	**N/A**

Test voltage applied between:	**Test potential applied (V)**	**Breakdown / flashover (Yes/No)**
Supplementary information:		

	TABLE: Clearance And Creepage Distance Measurements					**N/A**

clearance cl and creepage distance dcr at/of:	**Up (V)**	**U r.m.s. (V)**	**Required cl (mm)**	**cl (mm)**	**required dcr (mm)**	**dcr (mm)**

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:						

	TABLE: Distance Through Insulation Measurements			N/A
Distance through insulation di at/of:	**U r.m.s. (V)**	**Test voltage (V)**	**Required di (mm)**	**di (mm)**
Supplementary information:				

	TABLE: Needle- flame test (NFT)				N/A
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
Supplementary information: **NFT not relevant (or applicable) for Parts of material classified as V-0 or V-1** **NFT not relevant (or applicable) for Base material of PCBs classified as V-0 or if relevant VTM-0**					

7.1.2.2	TABLE: Resistance to heat and fire - Glow wire tests							N/A
Object/ Part No./ Material	**Manufacturer / trademark**	**Glow wire test (GWT); (°C)**						**Verdict**
		550	**650**		**750**		**850**	
			te	**ti**	**te**	**ti**		
Object/ Part No./	**Manufacturer /**	**Glow-wire flammability index (GWFI), °C**			**GW ignition temp. (GWIT), °C**			**Verdict**

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Clause	Requirement + Test	Result - Remark	Verdict

Material	trademark	550	650	750	850	675	775	

The test specimen passed the glow wire test (GWT) with no ignition [($t_e - t_i$) ≤ 2s] (Yes/No) :	N/A
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No) ..... :	N/A
The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)? ..... :	N/A
Ignition of the specified layer placed underneath the test specimen (Yes/No) ..... :	N/A

Supplementary information:

550 °C GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF
The GWIT pre-selection option, the 850 °C GWFI pre-selection option, and the 850 °C GWT are not relevant (or applicable) for attended appliances.

List of test equipment used:

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to CTF stage 1 or CTF stage 2 procedure has been used.
Note: This page may be removed when CTF stage 1 or CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date