



SCC(18)-600813A-LVD

EMC TEST REPORT

For

Zhejiang ETEK Electrical Technology Co.,Ltd.

Product Name:RCCB

Model: EKL1-63B No of Poles: 2P(1P+N), 4P(3P+N), Ue:
2P(230/240V~), 4P(400/415V~), In: 16, 25, 32, 40, 63A,
I Δ n=30, 100, 300mA / Type: AC, A, B, Im=I Δ m=500 or 10In, I Δ
c=Inc=10000A, IEC/EN61008-1, IEC62423

Prepared For : Zhejiang ETEK Electrical Technology Co.,Ltd.
NO.288 Wei 17th Road, Yueqing Economic Development Zone,
Yueqing, Wenzhou, Zhejiang Province, P.R.China

Prepared By : China Ceprei (Sichuan) Laboratory
No.45 Wenming Dong Road Longquanyi District, Chengdu,
Sichuan

Report Number: SCC(18)-600813A-LVD

Date of Test: Dec.21, 2018

Date of Report: Dec.31, 2018





SCC(18)-600813A-LVD

TEST REPORT DECLARATION

Applicant : Zhejiang ETEK Electrical Technology Co.,Ltd.
Address : NO.288 Wei 17th Road, Yueqing Economic Development Zone,
Yueqing, Wenzhou, Zhejiang Province, P.R.China
Manufacturer : Zhejiang ETEK Electrical Technology Co.,Ltd.
Address : NO.288 Wei 17th Road, Yueqing Economic Development Zone,
Yueqing, Wenzhou, Zhejiang Province, P.R.China
EUT Description : RCCB
Model No. : EKL1-63B No of Poles: 2P(1P+N), 4P(3P+N), Ue:
2P(230/240V~), 4P(400/415V~), In: 16, 25, 32, 40, 63A,
I Δ n=30, 100, 300mA / Type: AC, A, B, Im=I Δ m=500 or 10In, I
 Δ c=Inc=10000A, IEC/EN61008-1, IEC62423
Technical Data : AC 230/240V~
Remark : N/A

Test Procedure Used:
EN 61008-1:2012/A11:2015

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The test results of this report relate only to the tested sample identified in this report.

Date of Test : Dec.21, 2018


Prepared by :


(Jack)

Checked by :


(Gina)

Approved by :


(Johnson)



EN 61008-1:2012/A11:2015			
Clause	Requirement-Test	Result-Remark	Verdict
1	Scope		P
	<p>This International Standard applies to residual current operated circuit-breakers functionally independent of, or functionally dependent on, line voltage, for household and similar uses, not incorporating overcurrent protection (hereafter referred to as RCCBs), for rated voltages not exceeding 440 V a.c. with rated frequencies of 50 Hz, 60 Hz or 50/60 Hz and rated currents not exceeding 125 A, intended principally for protection against shock hazard. These devices are intended to protect persons against indirect contact, the exposed conductive parts of the installation being connected to an appropriate earth electrode. They may be used to provide protection against fire hazards due to a persistent earth fault current, without the operation of the overcurrent protective device. RCCBs having a rated residual operating current not exceeding 30 mA are also used as a means for additional protection in case of failure of the protective means against electric shock. This standard applies to devices performing simultaneously the functions of detection of the residual current, of comparison of the value of this current with the residual operating value and of opening of the protected circuit when the residual current exceeds this value.</p>		P
2	Normative references		P
	<p>The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.</p>		P
3	Terms and definitions		P
	<p>For the purposes of this document, the following terms and definitions apply. here the terms voltage or current are used, they imply r.m.s. values, unless otherwise specified.</p>		P
4	Classification		P
4.1	According to the method of operation		P
	<p>.1.1 RCCB functionally independent of line voltage (see 3.3.4) .1.2 RCCB functionally dependent on line</p>		P

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Clause	Requirement-Test	Result-Remark	Verdict
	<p>voltage (see 3.3.5)</p> <p>.1.2.1 Opening automatically in case of failure of the line voltage, without or with delay (see 8.12): a) Reclosing automatically when the line voltage is restored; b) Not reclosing automatically when the line voltage is restored.</p> <p>.1.2.2 Not opening automatically in case of failure of the line voltage: a) Able to trip in case of a hazardous situation (e.g. due to an earth fault) arising on failure of the line voltage (requirements under consideration); b) Not able to trip in case of a hazardous situation (e.g. due to an earth fault) arising on failure of line voltage.</p>		
4.2	According to the type of installation		P
	RCCB for fixed installation and fixed wiring; RCCB for mobile installation and corded connection (of the device itself to the supply).		P
4.3	According to the number of poles and current paths		P
	single-pole RCCB with two current paths; two-pole RCCB; three-pole RCCB; three-pole RCCB with four current paths; four-pole RCCB.		P
4.4	According to the possibility of adjusting the residual operating current		P
	RCCB with a single value of rated residual operating current; RCCB with multiple settings of residual operating current by fixed steps		P
4.5	According to resistance to unwanted tripping due to voltage surges		P
	RCCBs with normal resistance to unwanted tripping (general type as in Table 1, and Table 2 if applicable); RCCBs with increased resistance to unwanted tripping (S type as in Table 1, and Table 2 if applicable).		P
4.6	According to behaviour in presence of d.c. components		P
	RCCBs of type AC; – RCCBs of type A.		P
4.7	According to time-delay (in presence of a residual current)		P
	RCCB without time-delay: type for general use; – RCCB with time-delay: type S for selectivity.		P
4.8	According to the protection against external influences		P
	enclosed-type RCCB (not requiring an appropriate enclosure); – unenclosed-type RCCB (for use with an appropriate enclosure).		P
4.9	According to the method of mounting		P

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Clause	Requirement-Test	Result-Remark	Verdict
	surface-type RCCB; – flush-type RCCB; – panel board type RCCB, also referred to as distribution board type.		P
4.10	According to the method of connection		P
	RCCBs, the electrical connections of which are not associated with the mechanical mounting; – RCCBs, the electrical connections of which are associated with the mechanical mounting.		P
4.11	According to the type of terminals		P
	RCCBs with screw-type terminals for external copper conductors; – RCCBs with screwless type terminals for external copper conductors;		P
4.12	According to the range of ambient air temperature		P
	RCCBs for use at ambient air temperatures between -5 °C and +40 °C; – RCCBs for use at ambient air temperatures between -25 °C and +40 °C.		P
5	Characteristics of RCCBs		P
5.1	Summary of characteristics		P
	<p>The characteristics of an RCCB shall be stated in the following terms: – number of poles (see 4.3); – rated current I_n (see 5.2.2); – rated residual operating current $I_{\Delta n}$ (see 5.2.3); – rated residual non-operating current (see 5.2.4); – rated voltage U (see 5.2.1); – rated frequency (see 5.2.5); – rated making and breaking capacity I_m (see 5.2.6); – rated residual making and breaking capacity $I_{\Delta m}$ (see 5.2.7); – time-delay, if applicable, (see 5.2.8); – operating characteristics in case of residual currents with d.c. components (see 5.2.9); – degree of protection (see IEC 60529); – rated conditional short-circuit current I_{nc} (see 5.4.2); – rated conditional residual short-circuit current $I_{\Delta c}$ (see 5.4.3); – method of mounting (see 4.9); – method of connection (see 4.10). For RCCBs functionally dependent on line voltage: – behaviour of the RCCB in case of failure of line voltage (see 4.1.2).</p> <p>4.Z1 According to the type of terminals: – RCCBs with screw-type terminals for external copper conductors; – RCCBs with screwless type terminals for external copper conductors; NOTE The requirements for RCCBs equipped with this type of terminals are given in Annex J.</p> <p>4.Z2 According to the range of ambient air temperature – RCCBs for use at ambient air temperatures between -5 °C and +40 °C; – RCCBs for use at</p>		P

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Clause	Requirement-Test	Result-Remark	Verdict
	ambient air temperatures between -25 °C and +40 °C. ~}}text deleted~}text deleted~ - ranges of ambient air temperature (see 5.3.Z1)		
5.2	Rated quantities and other characteristics		P
5.2.1	Rated voltage (Un)		P
5.2.1.1	Rated operational voltage		P
	The rated operational voltage (hereafter referred to as "rated voltage") of an RCCB is the value of voltage, assigned by the manufacturer, to which its performance is referred		P
5.2.1.2	Rated insulation voltage		P
	The rated insulation voltage of an RCCB is the value of voltage, assigned by the manufacturer, to which dielectric test voltages and creepage distances are referred. Unless otherwise stated, the rated insulation voltage is the value of the maximum rated voltage of the RCCB. In no case shall the maximum rated voltage exceed the rated insulation voltage.		P
5.2.1.3	Rated impulse withstand voltage		P
	The rated impulse withstand voltage of an RCCB shall be equal to or higher than the standard values of rated impulse withstand voltage given		P
5.2.2	Rated current		P
	The value of current, assigned to the RCCB by the manufacturer, which the RCCB can carry in uninterrupted duty.		P
5.2.3	Rated residual operating current		P
	The value of residual operating current (see 3.2.4), assigned to the RCCB by the manufacturer, at which the RCCB shall operate under specified conditions		P
5.2.4	Rated residual non-operating current		P
	The value of residual non-operating current (see 3.2.5), assigned to the RCCB by the manufacturer, at which the RCCB does not operate under specified conditions.		P
5.2.5	Rated frequency		P
	The rated frequency of an RCCB is the power frequency for which the RCCB is designed and to which the values of the other characteristics correspond.		P
5.2.6	Rated making and breaking capacity		P

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Clause	Requirement-Test	Result-Remark	Verdict								
	The r.m.s. value of the a.c. component of prospective current (see 3.4.4), assigned by the manufacturer, which an RCCB can make, carry and break under specified conditions. The conditions are those specified in 9.11.2.2.		P								
5.2.7	Rated residual making and breaking capacity		P								
	The r.m.s. value of the a.c. component of residual prospective current (3.2.3 and 3.4.4), assigned by the manufacturer, which an RCCB can make, carry and break under specified conditions. The conditions are those specified in 9.11.2.3.		P								
5.2.8	RCCB type S		P								
	A time-delay RCCB (see 3.3.11) which complies with the relevant part of Table 1, and Table 2 if applicable.		P								
5.2.9	Operating characteristics in case of residual currents with d.c. components		P								
	5.2.9.1 RCCB type AC An RCCB for which tripping is ensured for residual sinusoidal alternating currents, whether suddenly applied or slowly rising. 5.2.9.2 RCCB type A An RCCB for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether suddenly applied or slowly rising.		P								
5.3	Standard and preferred values		P								
5.3.1	values of rated voltage		P								
	<div>Ⓔ<table><tr><th>RCCB</th><th>Rated voltage of RCCBs for use in systems 230 V, 230 V/400 V, 400V</th></tr><tr><td>Two-pole</td><td>230 V</td></tr><tr><td>Three-pole</td><td>400 V</td></tr><tr><td>Four-pole</td><td>400 V</td></tr></table>Ⓔ</div>	RCCB	Rated voltage of RCCBs for use in systems 230 V, 230 V/400 V, 400V	Two-pole	230 V	Three-pole	400 V	Four-pole	400 V		P
RCCB	Rated voltage of RCCBs for use in systems 230 V, 230 V/400 V, 400V										
Two-pole	230 V										
Three-pole	400 V										
Four-pole	400 V										
5.3.2	Preferred values of rated current		P								
	Preferred values of rated current are 10 – 13 – 16 – 20 – 25 – 32 – 40 – 63 – 80 – 100 – 125 A.		P								
5.3.3	Standard values of rated residual operating current		P								
	Standard values of rated residual operating current are Ⓔ 0,01 – 0,03 – 0,1 – 0,3 – 0,5 – 1 A.Ⓔ		P								
5.3.4	Standard value of residual non-operating current		P								





EN 61008-1:2012/A11:2015			
Clause	Requirement-Test	Result-Remark	Verdict
	The standard value of residual non-operating current is $0,5 I_{\Delta n}$		P
5.3.5	Standard minimum value of non-operating overcurrent in case of a multiphase balanced load through a multipole RCCB (see 3.4.2.1)		P
	The standard minimum value of the non-operating current in case of a multiphase balanced load through a multipole RCCB is $6 I_n$		P
5.3.6	Standard minimum value of the non-operating overcurrent in case of a single-phase load through a three-pole or four-pole RCCB (see 3.4.2.2)		P
	The standard minimum value of the non-operating overcurrent in case of a single-phase load through a three-pole or four-pole RCCB is		P
5.3.7	Preferred value of rated frequency		P
	The preferred value of rated frequency is 50 Hz.		P
5.3.8	Minimum value of the rated making and breaking capacity		P
	The minimum value of the rated making and breaking capacity I_{mis} is $10 I_{nor}$ or 500 A, whichever is the greater. The associated power factors are specified in Table 19.		P
5.3.9	Minimum value of the rated residual making and breaking capacity		P
	The minimum value of the rated residual making and breaking capacity $I_{\Delta mis}$ is $10 I_{nor}$ or 500 A, whichever is the greater. The associated power factors are specified in Table 19.		P
5.3.10	Standard and preferred values of the rated conditional short-circuit current		P
5.3.11	Standard values of the rated conditional residual short-circuit current		P
5.3.12	Limit values of break time and non-actuating time for RCCB of type AC and A		P

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Clause	Requirement-Test								Result-Remark	Verdict																																																									
	<div>Table 1 – Limit values of break time and non-actuating time for alternating residual currents (r.m.s. values) for type AC and A RCCB</div> <table><tr><th colspan="9">Limit values of break time and non-actuating time (s) for type AC and A RCCB in event of alternating residual currents (r.m.s. values) equal to</th></tr><tr><th>Type</th><th>I_n A</th><th>$I_{\Delta n}$ A</th><th>$I_{\Delta n}$</th><th>$2 I_{\Delta n}$</th><th>$5 I_{\Delta n}$</th><th>$5 I_{\Delta n}$ or 0,25 A^a</th><th>5 A - 200 A^b</th><th>500 A</th></tr><tr><td rowspan="3">General</td><td rowspan="3">Any</td><td>< 0,03</td><td>0,3</td><td>0,15</td><td></td><td>0,04</td><td>0,04</td><td>0,04</td></tr><tr><td>0,03</td><td>0,3</td><td>0,15</td><td></td><td>0,04</td><td>0,04</td><td>0,04</td></tr><tr><td>> 0,03</td><td>0,3</td><td>0,15</td><td>0,04</td><td></td><td>0,04</td><td>0,04</td></tr><tr><td rowspan="2">S</td><td rowspan="2">≥ 25</td><td>> 0,03</td><td>0,5</td><td>0,2</td><td>0,15</td><td></td><td>0,15</td><td>0,15</td></tr><tr><td>> 0,03</td><td>0,13</td><td>0,06</td><td>0,05</td><td></td><td>0,04</td><td>0,04</td></tr></table> <div>^a Value to be decided by the manufacturer for this test. ^b The tests are only made during the verification of the correct operation as mentioned in 9.9.2.4.</div>								Limit values of break time and non-actuating time (s) for type AC and A RCCB in event of alternating residual currents (r.m.s. values) equal to									Type	I_n A	$I_{\Delta n}$ A	$I_{\Delta n}$	$2 I_{\Delta n}$	$5 I_{\Delta n}$	$5 I_{\Delta n}$ or 0,25 A ^a	5 A - 200 A ^b	500 A	General	Any	< 0,03	0,3	0,15		0,04	0,04	0,04	0,03	0,3	0,15		0,04	0,04	0,04	> 0,03	0,3	0,15	0,04		0,04	0,04	S	≥ 25	> 0,03	0,5	0,2	0,15		0,15	0,15	> 0,03	0,13	0,06	0,05		0,04	0,04		P
Limit values of break time and non-actuating time (s) for type AC and A RCCB in event of alternating residual currents (r.m.s. values) equal to																																																																			
Type	I_n A	$I_{\Delta n}$ A	$I_{\Delta n}$	$2 I_{\Delta n}$	$5 I_{\Delta n}$	$5 I_{\Delta n}$ or 0,25 A ^a	5 A - 200 A ^b	500 A																																																											
General	Any	< 0,03	0,3	0,15		0,04	0,04	0,04																																																											
		0,03	0,3	0,15		0,04	0,04	0,04																																																											
		> 0,03	0,3	0,15	0,04		0,04	0,04																																																											
S	≥ 25	> 0,03	0,5	0,2	0,15		0,15	0,15																																																											
		> 0,03	0,13	0,06	0,05		0,04	0,04																																																											
5.4	Coordination with short-circuit protective devices (SCPDs)									P																																																									
5.4.1	General									P																																																									
	RCCBs shall be protected against short-circuits by means of circuit-breakers or fuses complying with their relevant standards according to the installation rules of IEC 60364. Coordination between RCCBs and the SCPD shall be verified under the general conditions of 9.11.2.1, by means of the tests described in 9.11.2.4 which are designed to verify that there is an adequate protection of the RCCBs against short-circuit currents up to the conditional short-circuit current Inc and up to the conditional residual short-circuit current									P																																																									
5.4.2	Rated conditional short-circuit current									P																																																									
	The r.m.s. value of prospective current, assigned by the manufacturer, which an RCCB, protected by a SCPD, can withstand under specified conditions without undergoing alterations impairing its functions. The conditions are those specified in 9.11.2.4 a).									P																																																									
5.4.3	Rated conditional residual short-circuit current									P																																																									
	The value of the residual prospective current, assigned by the manufacturer, which an RCCB, protected by an SCPD, can withstand under specified conditions without undergoing alterations impairing its functions. The conditions are those specified in 9.11.2.4 c).									P																																																									
6	Marking and other product information									P																																																									
6.1	Standard marking									P																																																									

EN 61008-1:2012/A11:2015			
Clause	Requirement-Test	Result-Remark	Verdict
	<p>Each RCCB shall be marked in a durable manner according to the following Table Z3. If a degree of protection higher than IP20 according to EN 60529 is marked on the device, it shall comply with it, whichever the method of installation. If the higher degree of protection is obtained only by a specific method of installation and/or with the use of specific accessories (e.g. terminal covers, enclosures, etc.), this shall be specified in the manufacturer's literature. The manufacturer shall state the Joule integral I2t and the peak current Ip withstand capabilities of the RCCB. Where these are not stated, minimum values as given in Table 15 apply. The manufacturer shall give the reference of one or more suitable SCPDs in his catalogues and in a sheet accompanying each RCCB. For RCCBs classified according to 4.1.2.1 and opening with delay in case of failure of the line voltage the manufacturer shall state the range of such delay. For RCCBs other than those operated by means of push-buttons the open position shall be indicated by the symbol "O" and the closed position by the symbol "I" (a short straight line). Additional national symbols for this indication are allowed. Provisionally the use of national indications only is allowed. These indications shall be readily</p>		P
6.2	Additional marking		P
	<p>Additional marking to other standards (EN or IEC or other) or additional requirements are allowed under the following conditions: - the RCCB shall comply with all the requirements of the additional standard; - the relevant standard to which the additional marking refers shall be indicated adjacent to this marking and shall be clearly differentiated or separated from the standard marking according to 6.Z1.</p> <p>Compliance is checked by inspection and by carrying out all the test sequences required by the relevant standard. Equivalent or less severe test sequences need not be repeated</p>		P

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Clause	Requirement-Test	Result-Remark	Verdict		
EN 61831-2:2012/AM1:2013					
Table Z3 – Requirements for marking					
Marking and other product information		Marking on the RCCB itself		Product information in the catalogue	
	Each RCCB shall be marked in a durable manner with all or, for small apparatus, part of the following data: The minimum requirements are indicated by the symbol "X"	If, for small devices the space available does not allow all the data to be marked, at least the following information shall be marked and visible when the device is installed.	The following information may be marked on the side or on the back of the device and be visible only before the device is installed..	Alternatively the following information may be on the inside of any cover which has to be removed in order to connect the supply wires.	Any remaining information not marked shall be given in the manufacturer's catalogues.
a)	the manufacturer's name or trademark;		X		
b)	type designation, catalogue number or serial number;		X		
c)	rated voltage(s) with the symbol ~;		X		
d)	rated frequency, if the RCCB is designed frequencies other than 50 Hz		X		
e)	rated current	X			
f)	rated residual operating current ($I_{\Delta n}$) in A or in mA	X			
g)	deleted				
h)	rated making and breaking capacity (I_m)				X (*)
j)	the degree of protection (only if different from IP20);				X
k)	the position of use (symbol according to EN 60051), if necessary;		X		
l)	rated residual making and breaking capacity ($I_{\Delta m}$), if different from rated short-circuit capacity (I_{sc})				X (*)
m)	the symbol  (S in a square) for type S devices;	X			
n)	symbol of the method of operation according to table Z1 of 4.1 if the RCCB is functionally dependent on the line voltage;		X	X	
o)	operating means of the test device, by the letter T(**);	X			
p)	wiring diagram unless the correct mode of operation is evident;		X	X	
r)	operating characteristic in presence of residual currents with d.c. components		X		
	- RCCBs of type AC with the symbol  - RCCBs of type A with the symbol 	X			
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Clause	Requirement-Test	Result-Remark	Verdict
Table 4 – Standard conditions for operation in service			
Influencing quantity	Standard range of application	Reference value	Test tolerances ⁶⁾
Ambient temperature ^{1) 7)}	–5 °C to +40 °C ²⁾ ☐ –25 °C to 40 °C ²⁾ ☐	20 °C	±5 °C
Altitude	Not exceeding 2 000 m		
Relative humidity maximum value 40 °C	50 % ³⁾		
External magnetic field	Not exceeding 5 times the earth's magnetic field in any direction	Earth's magnetic field	⁴⁾
Position	As stated by the manufacturer, with a tolerance of 2° in any direction ⁵⁾	As stated by the manufacturer	2° in any direction
Frequency	Reference value ±5 % ⁶⁾	Rated value	±2 %
Sinusoidal wave distortion	Not exceeding 5 %	Zero	5 %
<p>¹⁾ The maximum value of the mean daily temperature is +35 °C.</p> <p>²⁾ Values outside the range are admissible where more severe climatic conditions prevail, subject to agreement between manufacturer and user.</p> <p>³⁾ Higher relative humidities are admitted at lower temperature (for example 90 % at 20 °C).</p> <p>⁴⁾ When an RCCB is installed in proximity of a strong magnetic field, supplementary requirements may be necessary.</p> <p>⁵⁾ The device shall be fixed without causing deformation liable to impair its functions.</p> <p>⁶⁾ The tolerances given apply unless otherwise specified in the relevant test.</p> <p>⁷⁾ ☐ Extreme limits of –20 °C and + 60 °C, for RCCBs for use in the range of –5 °C to +40 °C and of –35 °C and + 60 °C, for RCCBs for use in the range of –25 °C to +40 °C, are admissible during storage and transportation. These conditions should be taken into account in the design of the device. ☐</p> <p>⁸⁾ For installations at higher altitudes, it is necessary to take into account the reduction of the dielectric strength and of the cooling effect of the air. RCCBs intended to be so used shall be designed specially or used according to an agreement between manufacturer and user. Information given in the manufacturer's catalogue may take the place of such an agreement. ☐</p>			
7.2	Conditions of installation		P
	RCCBs shall be installed in accordance with the manufacturer's instructions.		P
7.3	Pollution degree		P
	RCCBs complying with this standard are intended for environment with pollution degree 2, i.e.: normally, only non-conductive pollution occurs; occasionally, however, a temporary conductivity caused by condensation may be expected.		P
8	Requirements for construction and operation		P
8.1	Mechanical design		P
8.1.1	General		P
	The residual current detection and the residual current release shall be located between the incoming and outgoing terminals of the RCCB.		P
8.1.2	Mechanism		P

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Clause	Requirement-Test	Result-Remark	Verdict
	The moving contacts of all poles of multipole RCCBs shall be mechanically coupled so that all poles except the switched neutral, if any, make and break substantially together, whether operated manually or automatically. The switched neutral pole (see 3.3.15) of four-pole RCCBs shall not close after and shall not open before the other poles (see 3.3.14). Compliance is checked by inspection and by manual tests, using any appropriate means (e.g.: indicator lights, oscilloscope, etc.).		P
8.1.3	Clearances and creepage distances(see Annex B)		P
	The minimum required clearances and creepage distances are given in Table 5 which is based on the RCCB being designed for operating in an environment with pollution degree		P

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Clause	Requirement-Test	Result-Remark	Verdict
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Table 5 – Minimum clearances and creepage distances

	Minimum clearances mm			Minimum creepage distances ^{e, f} mm											
				Group IIIa ^h (175 V ≤ CTI < 400 V) ^d				Group II (400 V ≤ CTI < 600 V) ^d				Group I (600 V ≤ CTI) ^d			
	Rated voltage V			Working voltage ^e V											
	U _{imp}														
	2,5 kV	4 kV	4 kV												
Description	[C] 230/400 230 400			>25 ≤50 ⁱ	120	250	400	>25 ≤50 ⁱ	120	250	400	>25 ≤50 ⁱ	120	250	400
1. Between live parts which are separated when the main contacts are in the open position ^a	4,0			1,2	2,0	4,0	4,0	0,9	2,0	4,0	4,0	0,6	2,0	4,0	4,0
2. Between live parts of different polarity ^a	3,0			1,2	1,5	3,0	4,0	0,9	1,5	3,0	3,0	0,6	1,5	3,0	3,0
3. Between circuits supplied from different sources, one of which being PELV or SELV ^{g,j} [C]	8,0				3,0	6,0	8,0		3,0	6,0	8,0		3,0	6,0	8,0
				Rated voltage V											
				120 / 240		230 / 400		120 / 240		230 / 400		120 / 240		230 / 400	
4. Between live parts and - accessible surfaces of operating means - screws or other means for fixing covers which have to be removed when mounting the RCCB - surface on which the RCCB is mounted ^b - screws or other means for fixing the RCCB ^b - metal covers or boxes ^b - other accessible metal parts ^c - metal frames supporting flush-type RCCBs	3,0			1,5	4,0		1,5		3,0		1,5		3,0		
[C] text deleted [C]															
	[C]														

NOTE 1 The values given for 400 V are also valid for 440 V.

NOTE 2 ~~text deleted~~ The parts of the neutral pole, if any, are considered to be live parts.

NOTE 3 ~~text deleted~~

NOTE 4 ~~text deleted~~

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Clause	Requirement-Test	Result-Remark	Verdict
Table 5 (continued)			
<p>a For auxiliary and control contacts the values are given in the relevant standard.</p> <p>b The values are doubled if clearances and creepage distances between live parts of the device and the metallic screen or the surface on which the RCCB is mounted are not dependent on the design of the RCCB only, so that they can be reduced when the RCCB is mounted in the most unfavourable condition.</p> <p>c [C] Including a metal foil in contact with the surfaces of insulating material which are accessible after installation for normal use. The foil is pushed into corners, grooves, etc., by means of a straight jointed test finger according to 9.6 (see Figure 3)." [C]</p> <p>d See IEC 60112.</p> <p>e Interpolation is allowed in determining creepage distances corresponding to voltage values intermediate to those listed as working voltage. For determination of creepage distances, see Annex B.</p> <p>f Creepage distances cannot be less than the associated clearances.</p> <p>g To cover all different voltages including ELV in an auxiliary contact.</p> <p>h For material group IIIb (100 V ≤ CTI < 175 V), the values for material group IIIa multiplied by 1,6 apply.</p> <p>i For working voltages up to and including 25 V, reference may be made to IEC 60664-1.</p> <p>j This applies also to clearance and creepage distances between live parts of different polarity of the RCCB and equipments mounted close to it. [C]</p>			
8.1.4	Screws, current-carrying parts and connections		P
	<p>8.1.4.1</p> <p>Connections, whether electrical or mechanical, shall withstand the mechanical stresses occurring in normal use.</p> <p>8.1.4.2</p> <p>For screws in engagement with a thread of insulating material and which are operated when mounting the RCCB during installation, correct introduction of the screw into the screw hole or nut shall be ensured.</p> <p>8.1.4.3</p> <p>Electrical connections shall be so designed that contact pressure is not transmitted through insulating material other than ceramic, pure mica or other material with characteristics no less suitable, unless there is sufficient resilience in the metallic parts to compensate for any possible shrinkage or yielding of the insulating material.</p> <p>8.1.4.4</p> <p>Current-carrying parts including parts intended for protective conductors, if any, shall be of – copper; – an alloy containing at least 58 % copper for parts worked cold, or at least 50 % copper for other parts; – other metal or suitably coated metal, no less resistant to corrosion than copper and having mechanical properties no less suitable.</p>		P
8.1.5	Terminals for external conductors		P
	<p>8.1.5.1</p> <p>Terminals for external conductors shall be such that the conductors may be connected so as to</p>		P

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Clause	Requirement-Test	Result-Remark	Verdict
	<p>ensure that the necessary contact pressure is maintained permanently.</p> <p>8.1.5.2</p> <p>RCCBs shall be provided with terminals which shall allow the connection of copper conductors having nominal cross-sectional areas as shown in Table 6.</p> <p>8.1.5.3</p> <p>The means for clamping the conductors in the terminals shall not serve to fix any other component, although they may hold the terminals in place or prevent them from turning.</p> <p>8.1.5.4</p> <p>Terminals for rated currents up to and including 32 A shall allow the conductors to be connected without special preparation. Compliance is checked by inspection.</p> <p>8.1.5.5</p> <p>Terminals shall have adequate mechanical strength. Screws and nuts for clamping the conductors shall have a metric ISO thread or a thread comparable in pitch and mechanical strength. Compliance is checked by inspection and by the tests of 9.4 and 9.5.1.</p> <p>8.1.5.6</p> <p>Terminals shall be so designed that they clamp the conductor without undue damage to the conductor. Compliance is checked by inspection and by the test of 9.5.2.</p> <p>8.1.5.7</p> <p>Terminals shall be so designed that they clamp the conductor reliably and between metal surfaces. Compliance is checked by inspection and by the tests of 9.4 and 9.5.1.</p> <p>8.1.5.8</p> <p>Terminals shall be so designed or positioned that neither a rigid solid conductor nor a wire of a stranded conductor can slip out while the clamping screws or nuts are tightened. This requirement does not apply to lug terminals. Compliance is checked by the test of 9.5.3.</p> <p>8.1.5.9</p> <p>Terminals shall be so fixed or located that, when</p>		

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Clause	Requirement-Test	Result-Remark	Verdict
	<p>the clamping screws or nuts are tightened or loosened, their fixings do not work loose. These requirements do not imply that the terminals shall be so designed that their rotation or displacement is prevented, but any movement shall be sufficiently limited so as to prevent non-compliance with the requirements of this standard. The use of sealing compound or resin is considered to be sufficient for preventing a terminal from working loose, provided that – the sealing compound or resin is not subject to stress during normal use; – the effectiveness of the sealing compound or resin is not impaired by temperatures attained by the terminal under the most unfavourable conditions specified in this standard. Compliance is checked by inspection, by measurement and by the test of 9.4.</p> <p>8.1.5.10</p> <p>Clamping screws or nuts of terminals intended for the connection of protective conductors shall be adequately secured against accidental loosening and it shall not be possible to unclamp them without a tool. Compliance is checked by manual test.</p> <p>In general, the designs of terminals of which examples are shown in annex IC provide sufficient resilience to comply with this requirement; for other designs special provisions, such as the use of an adequately resilient part which is not likely to be removed inadvertently, may be necessary.</p> <p>8.1.5.11</p> <p>Screws and nuts of terminals intended for the connection of external conductors shall be in engagement with a metal thread and the screws shall not be of the tapping screw type.</p>		

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Clause	Requirement-Test	Result-Remark	Verdict
Table 6 – Connectable cross-sections of copper conductors for screw-type terminals			
Rated current ^a A		Range of nominal cross-section to be clamped ^b mm ²	
Greater than	Up to and including	Rigid (solid or stranded) conductors	Flexible conductors
—	13	1 to 2,5	1 to 2,5
13	16	1 to 4	1 to 4
16	25	1,5 to 6	1,5 to 6
25	32	2,5 to 10	2,5 to 6
32	50	4 to 16	4 to 10
50	80	10 to 25	10 to 16
80	100	16 to 35	16 to 25
100	125	25 to 50	25 to 35
<p>a A range of RCCBs having the same fundamental design and having the same design and construction of terminals, the terminals are fitted with copper conductors of the smallest cross-section for the minimum rated current and largest cross-section for the maximum rated current, as specified, solid and stranded, as applicable.</p> <p>b It is required that, for current ratings up to and including 50 A, terminals be designed to clamp solid conductors as well as rigid stranded conductors. Nevertheless, it is permitted that terminals for conductors having cross-sections from 1 mm² up to 6 mm² be designed to clamp solid conductors only.</p>			
<div> <div></div> <div>text deleted</div> <div></div> </div>			
8.2	Protection against electric shock		P
	RCCBs shall be so designed that, when they are mounted and wired as for normal use, live parts are not accessible.		P
8.3	Dielectric properties and isolating capability		P
	RCCBs shall have adequate dielectric properties and shall ensure isolation. Control circuits connected to the main circuit shall not be damaged by high d.c. voltage due to insulation measurements which are normally carried out after RCCBs are installed. Compliance is checked by the tests of 9.7 and 9.20.		P
8.4	Temperature-rise		P

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Clause	Requirement-Test	Result-Remark	Verdict
Table 7 – Temperature-rise values			
Parts ^{a, b}		Temperature rise K	
Terminals for external connections ^c		65	
External parts liable to be touched during manual operation of the RCCB, including operating means of insulating material and metallic means for coupling insulated operating means of several poles		40	
External metallic parts of operating means		25	
Other external parts, including that face of the RCCB in direct contact with the mounting surface		60	
<p>^a No value is specified for the contacts, since the design of most RCCBs is such that a direct measurement of the temperature of those parts cannot be made without the risk of causing alterations or displacement of parts likely to affect the reproducibility of the tests.</p> <p>The test of reliability (see 9.22) is considered to be sufficient for checking indirectly the behaviour of the contacts with respect to undue temperature-rises in service.</p> <p>^b No value is specified for parts other than those listed, but no damage shall be caused to adjacent parts of insulating materials, and the operation of the RCCB shall not be impaired.</p> <p>^c For plug-in type RCCBs the terminals of the base on which they are installed.</p>			
8.5	Operating characteristic		P
	The operating characteristic of RCCBs shall comply with the requirements of 9.9, and 9.21, if applicable.		P
8.6	Mechanical and electrical endurance		P
	RCCBs shall be capable of performing an adequate number of mechanical and electrical operations. Compliance is checked by the test of 9.10.		P
8.7	Performance at short-circuit currents		P
	RCCBs shall be capable of performing a specified number of short-circuit operations during which they shall neither endanger the operator nor initiate a flashover between live conductive parts or between live conductive parts and earth. Compliance is checked by the tests of 9.11.		P
8.8	Resistance to mechanical shock and impact		P
	RCCBs shall have adequate mechanical behaviour so as to withstand the stresses imposed during installation and use. Compliance is checked by the test of 9.12.		P
8.9	Resistance to heat		P
	RCCBs shall be sufficiently resistant to heat. Compliance is checked by the test of 9.13.		P
8.10	Resistance to abnormal heat and to fire		P

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Clause	Requirement-Test	Result-Remark	Verdict
	External parts of RCCBs made of insulating material shall not be liable to ignite and to spread fire if current-carrying parts in their vicinity, under fault or overload conditions, attain a high temperature. The resistance to abnormal heat and to fire of the other parts made of insulating material is considered as checked by the other tests of this standard. Compliance is checked by inspection and by the test of 9.14.		P
8.11	Test device		P
	RCCBs shall be provided with a test device to simulate the passing through the detecting device of a residual current in order to allow a periodic testing of the ability of the residual current device to operate		P
8.12	Requirements for RCCBs functionally dependent on line voltage		P
	RCCBs functionally dependent on line voltage shall operate correctly at any value of the line voltage between 0,85 and 1,1 times their rated voltage, for which purpose multipole RCCBs shall have all supplied from the phases and neutral, if any. Compliance is checked by the test of 9.17 under the supplementary test conditions specified in 9.9.2. According to their classification, RCCBs shall comply with the requirements given in Table 8.		P
Table 8 – Requirements for RCCBs functionally dependent on line voltage			
Classification of the device according to 4.1		Behaviour in case of failure of the line voltage	
RCCBs opening automatically in case of failure of the line voltage (4.1.2.1)	Without delay	Opening without delay according to the test conditions stated in 9.17.2 a)	
	With delay	Opening with delay, according to 9.17.2 b). Correct operation during the delay shall be verified according to 9.17.3	
RCCBs which do not open automatically in case of failure of the line voltage (4.1.2.2)		No opening	
8.13	Behaviour of RCCBs in case of overcurrents in the main circuit		P
	RCCBs shall not operate under specified conditions of overcurrents. Compliance is checked by the test of 9.18.		P
8.14	Behaviour of RCCBs in the case of current surges caused by impulse voltages		P

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Clause	Requirement-Test	Result-Remark	Verdict
	RCCBs shall adequately withstand the current surges to earth due to the loading of the capacitances of the installation and the current surges to earth due to flashover in the installation. RCCBs of the S-type shall additionally show adequate resistance against unwanted tripping in case of current surges to earth due to flashover in the installation. Compliance is checked by the tests of 9.19.		P
8.15	Behaviour of RCCBs in case of earth fault currents comprising a d.c. component		P
	RCCBs shall adequately perform in presence of earth fault currents comprising a d.c. component in accordance with their classification. Compliance is checked by the tests of 9.21.		P
8.16	Reliability		P
	RCCBs shall operate reliably even after long service, taking into account the ageing of their components. Compliance is checked by the tests of 9.22 and 9.23.		P

ANNEX: Technical Informations

(1)Product Photos

