SCC(18)-600813S-EMC

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△n=30, 100, 300mA / Type: AC, A, B, Im=I△m=500 or 10In, I△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, Zheijang Province, P.R.China**
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Report Number:	**SCC(18)-600813S-EMC**
Date of Test:	**Dec.21, 2018**
Date of Report:	**Dec.31, 2018**

CHINA CEPREI SICHUAN LABORATORY EPREI TESTING SEAL

SCC(18)-600813S-EMC

TEST REPORT DECLARATION

Applicant	:	Zhejiang ETEK Electrical Technology Co.,Ltd.
Address	:	NO.288 Wei 17th Road, Yueqing Economic Development Zone, Yueqing, Wenzhou, Zheijang Province, P.R.China
Manufacturer	:	Zhejiang ETEK Electrical Technology Co.,Ltd.
Address	:	NO.288 Wei 17th Road, Yueqing Economic Development Zone, Yueqing, Wenzhou, Zheijang 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△n=30, 100, 300mA / Type: AC, A, B, Im=I△m=500 or 10In, I△c=Inc=10000A, IEC/EN61008-1, IEC62423
Technical Data	:	AC 230/240V~
Remark	:	N/A

Test Procedure Used:
EN 61543:1995/A2:2006

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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)

CEPREI (SICHUAN) LABORATORY EPREI TESTING SEAL

EN 61543:1995/A2:2006			
Clause	**Requirement-Test**	**Result-Remark**	**Verdict**
1	Scope		P
	This International Standard is intended to ensure electromagnetic compatibility (EMC) of devices providing residual current protection, for rated voltages not exceeding 440 V a.c., intended principally for protection of persons against shock hazards. This standard applies for environmental conditions which occur in installations connected to low-voltage public networks or similar. It may also provide guidance for ensuring EMC for other products intended for safety purposes or for products including electronic circuits and for which a high level of continuity of service is required. For EMC test requirements not included in the product standards reference should be made to this product family standard.		P
2	Normative references		P
	The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.		P
3	Standard electromagnetic environmental conditions		P
	Standard electromagnetic environmental conditions are those conditions which occur in installations connected to low-voltage public networks or similar.		P
3.1	Low-frequency electromagnetic phenomena		P

EN 61543:1995/A2:2006			
Clause	**Requirement-Test**	**Result-Remark**	**Verdict**
	Table 1 lists the low-frequency electromagnetic phenomena considered under the environmental conditions taken into account.		P
3.2	High-frequency electromagnetic phenomena		P
	Table 2 lists the high frequency electromagnetic phenomena considered, whether conducted, induced or radiated, whether continuous or transient, under the environmental conditions taken into account.		P
3.3	Electrostatic discharges		P
	Table 3 gives the electrostatic discharge phenomenon considered, under the environmental conditions taken into account.		P

Table 1 — [C11] Standard low-frequency environmental conditions [C11]

Reference	Phenomena	Environmental conditions
T 1.1	Harmonics, interharmonics	With levels of harmonics and interharmonics according to IEC 61000-2-2
T 1.2	[C11] Signalling voltages[2] [C11]	In presence of signalling voltages (without resonance)
T 1.3	Voltage amplitude variations	Between 0,85 and 1,1 U_n and possible voltage dips of short duration or voltage interruptions[1]
T 1.4	Voltage unbalance	Refer to IEC 61000-2-2
T 1.5	Power frequency variations	Within normal frequency deviation range of ±5 %
T 1.6	Induced low frequency voltages	Not applicable
T 1.7	Direct current in a.c. network	Without appreciable direct current component
T 1.8	Radiated magnetic field	Vicinity of low-voltage power line

[1] Voltage dips are occasional voltage drops greater than 15 % of U_n and less than 100 % of U_n. Typical values of these dips are 30 % to 50 % of U_n. Short voltage interruptions are voltage drops of 100 % of U_n. The duration of these dips and short interruptions may be of more than half a cycle up to about 1 s.
[C11]
[2] Superimposed mains signalling voltages are not allowed in common mode, except under specific conditions as indicated in IEC 60364-4-44. [C11]

Table 2 — [C11] Standard high-frequency environmental conditions [C11]

Reference	Phenomena	Environmental conditions
T 2.1	Conducted oscillatory voltages or currents	Refer to **2.5**
T 2.2	Conducted unidirectional transients of the nano-second time scale (burst)	Low-voltage installations
T 2.3	Conducted unidirectional transients of the micro/millisecond time scale	Overhead and underground networks with possible distant lightning at less than 1 km from the installation
T 2.4	Current oscillatory transients	Switching overvoltages or indirect lightning
T 2.5	Radiated high-frequency phenomena	Less than 10 V/m (e.g., radio, television stations at a distance over 1 km, portable transceivers not closer than 1 m)
[A2] T 2.6	Conducted common mode disturbances in the frequency range lower than 150 kHz	Direct connection to the low voltage main network [A2]

Table 3 — [C11] Standard electrostatic environmental conditions [C11]

Reference	Phenomena	Environmental conditions
T 3.1	Electrostatic discharges	Possible presence of electrostatically charged materials (for example, synthetic carpets) at low humidity

EN 61543:1995/A2:2006			
Clause	**Requirement-Test**	**Result-Remark**	**Verdict**
4	Electromagnetic emission of RCDs		P
	Emission tests are required only for RCDs containing a continuously operating oscillator. They shall be carried out according to CISPR 14.		P
5	Electromagnetic immunity of RCDs		P
	Unless otherwise stated the tests are made without load.		P
5.1	Performance criteria		P
	For the purpose of this standard the performance criteria of the IEC 61000 series are replaced by 5.1.1, 5.1.2, 5.1.3 and 5.1.4. For safety reasons, some tests levels and test specifications have been chosen at levels higher than those required by the standard of the IEC 61000 series.		P
	5.1.1 During the test making reference to this performance criterion, the RCD shall remain closed at continuously applied residual current of 0,3 I%n and shall trip at 1,25 I%n.		P
	5.1.2 During the tests making reference to this performance criterion the RCD shall not trip. After the test, compliance with item a) of 9.9.2.3 of IEC 61008-1 at I%n only shall be checked.		P
	5.1.3 During the test making reference to this performance criterion the RCD may trip. ☐After each tripping the RCD shall be reclosed., After the test, compliance with item a) of 9.9.2.3 of IEC 61008-1 at I%n only shall be checked.		P
	5.1.4 Other performance criteria are contained in the clauses of the product standards, for example IEC 61008-1 and/or IEC 61009-1.		P
5.2	Low-frequency immunity tests		P
	The data for the low frequency immunity tests to be applied are given in Table 4.		P
5.3	High-frequency immunity tests		P
	The data for the high frequency immunity tests to be applied are given in Table 5.		P
5.4	Electrostatic discharges		P
	The data for the electrostatic discharge test to be applied are given in Table 6.		P

Clause	Requirement-Test	Result-Remark	Verdict

〈C11〉

Table 4 — Low-frequency immunity test conditions

Reference (see Table 1)	Electromagnetic phenomena	Reference of basic standard for test description	Test level and test specification	Subclauses including the performance criteria
T 1.1	Harmonics, inter harmonics	No requirements[1)]		
T 1.2	Signalling voltages	Under consideration. See Secretariat Note (*)		
T 1.3	Voltage amplitude variations[2)]			
	Voltage fluctuations[3)]	**9.9.5** and **9.17** of IEC 61008-1; **9.9.1.5** and **9.17** of IEC 61009-1	From 0,85 U_n to 1,1 U_n[4)]	**9.16** and **9.17** of IEC 61008-1 and IEC 61009-1
	Voltage dips[5)]	**9.17** of IEC 61008-1 and IEC 61009-1		
	Voltage interruptions[5)]	**9.17** and IEC 61008-1 and IEC 61009-1		
T 1.4	Voltage unbalance	Refer to T1.3		
T 1.5	Power frequency variations	[5)]		
T 1.8	Radiated magnetic field[2)]	**9.11** and **9.18** of IEC 61008-1 (RCCBs) **9.12** and **9.18** of IEC 61009-1 (RCBOs)		

(*) Secretariat Note Throughout the existing TC 23E product standards for RCDs no test can be found, which could be indicated as covering immunity from signalling voltages. Consequently Note 2 is not applicable for those tests and only the wording "under consideration", without note reference, can be kept.

[1)] A study is undertaken for possible inclusion of requirements in a future revision.
[2)] For the purpose of this standard, the relevant product tests are used to cover the EMC requirements.
[3)] Tests specified in product standards do not need be repeated. The functioning of RCDs functionally independent of line voltage is not affected by voltage amplitude variations. The tests of this standard apply only to RCDs dependent on line voltage.
[4)] For PRCDs 0,7 U_n instead of 0,85 U_n.
[5)] Immunity from power frequency variations is ensured by the fact that all performances of the device are tested at frequencies which may be subject to variations in the range of ±5 % of the rated frequency: see **9.2** of IEC 61008-1 and IEC 61009-1.

〈C11〉

Clause	Requirement-Test	Result-Remark	Verdict

Table 5 — High-frequency immunity test conditions

Reference (see Table 2)	Electromagnetic phenomena	Reference of basic standard for test description	Test level and test specification	Subclauses including the performance criteria
T 2.1	Conducted sine-wave form voltages or currents	C12 IEC 61000-4-6[9]	0,15 MHz to 80 MHz Z = 150 Ω 10 V for RCDs with $I_{\Delta n}$ ≥ 30 mA 3 V for RCDs with $I_{\Delta n}$ < 30 mA and PRCDs/SRCDs C12	**5.1.1**
T 2.2	Fast transients (bursts) Common mode	IEC 61000-4 4[2]	Level 4: 4 kV (peak)[5] Tr/Th 5/50 ns Repetition frequency: 2,5 kHz	**5.1.2**[3]
T 2.3a	Surges	IEC 61000-4-5	Tr/Th 1,2/50 µs 5 kV (peak) (4 kV for SRCDs and PRCDs)[1] common mode 4 kV (peak) (2 kV for SRCDs and PRCDs)[1] differential mode	**5.1.2**[8]
T 2.3b			Tr/Th 1,2/50 µs 4 kV (peak)[1] common mode 2 kV (peak)[1] differential mode	**5.1.2**
T 2.4	Current oscillatory transients (ring wave)	**9.19** of IEC 61008-1 and IEC 61009-1	Tr/Th 0,5 µs/100 kHz 200 A (peak)[4]	**5.1.4**
T 2.5	Radiated magnetic field	IEC 61000-4-3[6]	10 V/m[x 7]	**5.1.1**
A2 T 2.6(*)	Conducted common mode disturbances in the frequency range lower than 150 kHz	Values derived from IEC 61000-4-16	-Level 2[j] for $I_{\Delta n}$ < 30 mA -Level 3[j] for $I_{\Delta n}$ ≥ 30 mA A2	**5.1.1**

[1] Tests with lower voltages than those given in this table are not required (reason: IEC 61000-4-5, subclause **8.2** requires to carry out the tests at each voltage up to the chosen level). This test shall be carried out on the device in the closed position and supplied at rated voltage. 5 positive and 5 negative pulses shall be applied successively:
— between the metal support and parts intended to be earthed (PE conductor, earthing terminal), if any, connected together and each live conductor in turn at an impedance of 12 Ω;
— between each phase and neutral, in turn, and between each couple of poles, in turn, at an impedance of 2 Ω.
For SRCDs and PRCDs the performance criterion is given in **5.1.3** and only T2.3a has to be performed.

[2] In addition, the sample shall be mounted as in normal use on a flat insulating support at a distance of 10 cm from the earth plane.

[3] The test is carried out in single-phase on one pole of each sample taken at random.
Three new samples are submitted to the test. If one sample does not comply with the criterion by tripping during the test, three further samples are tested, which shall fully comply with criterion of **5.1.2**.

[4] For PRCDs and SRCDs the current level is at present 25 A.

[5] For PRCDs and SRCDs the level is 3, i.e. 2 kV (peak).

C12 [6] Verification of non-tripping shall be carried out by sweeping the frequency range. Verification of tripping shall be carried out at 450 MHz and at 900 MHz and at 3 other frequencies selected at random within the specified range and different from one sample to another. C12

[7] For PRCDs and SRCDs the level is 3 V/m.

[8] If the RCD doesn't trip after the test T 2.3a (performance criteria **5.1.2**), the test T 2.3b has not to be performed.

C12 [9] Verification of non-tripping shall be carried out by sweeping the frequency range. Verification of tripping shall be carried out at 5 frequencies selected at random within the specified range and different from one sample to another. C12

A2 [j] — Current levels are given in Table 5a. They are derived from IEC 61000-4-16, taking into account a common mode impedance of 150 Ω. Conventional test currents are applied according to Figure 1.
— The test circuit is given in Figure 1.
— In order to simplify the tests:
the test is made once with a residual current of 0,3 $I_{\Delta n}$ at rated frequency, by sweeping the frequency from 1 kHz to 150 kHz at the rate according to IEC 61000-4-16, Subclause 6.1.3. The device shall not trip;
tripping tests, with residual current of 1,25 $I_{\Delta n}$ at rated frequency, are carried out on each sample at 5 different frequency values selected at random over the frequency range and different from one sample to another. The device shall trip.

(*) In the USA, this test is not applicable. A2

C11

A2

Table 5a — Current level according to the frequency and RCD sensitivity for the conditions of T 2.6

Frequency range	RMS current value for Level 2 $I_{\Delta n}$ < 30 mA	RMS current value for Level 3 $I_{\Delta n}$ ≥ 30 mA
1 kHz to 1,5 kHz	2 mA [a]	6,6 mA [a]
1,5 kHz to 15 kHz	2 mA to 20 mA [b]	6,6 mA to 66 mA [b]
15 kHz to 150 kHz	20 mA [a]	66 mA [a]

[a] Constant current level in the complete range.

[b] The current level increases from 1,5 kHz to 15 kHz at 20 dB/decade.

Unless otherwise stated in the relevant product standard, the test is carried out on three samples as a single phase test on one pole on each sample as shown in Figure 1. Three new samples, lowest $I_{\Delta n}$ and any I_n, are submitted to test if one sample does not comply with the criteria. A2

C11

Clause	Requirement-Test	Result-Remark	Verdict

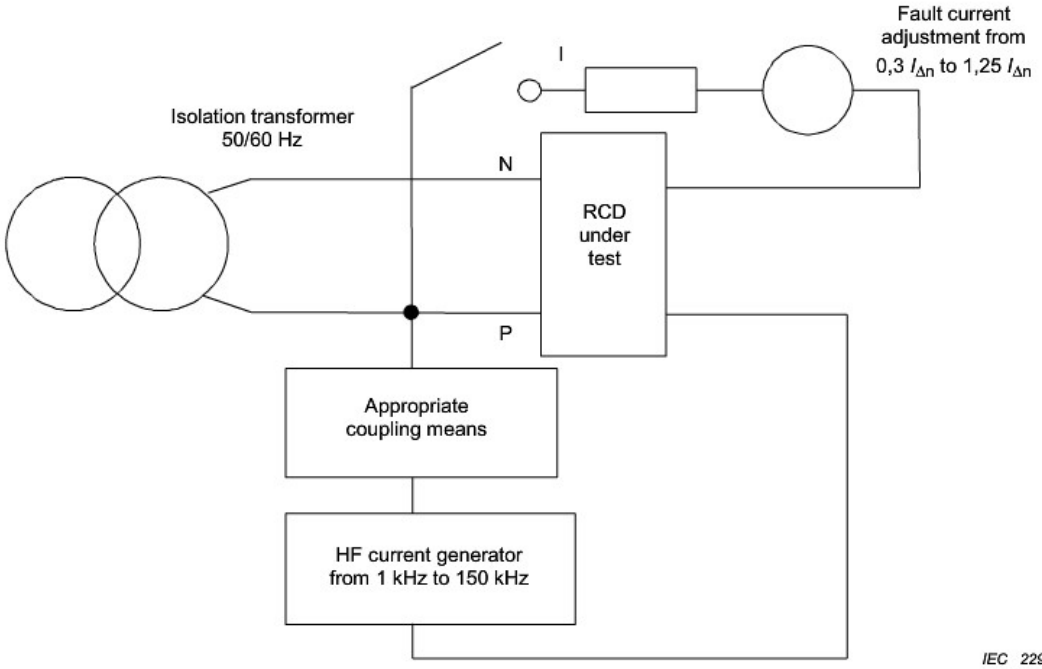
Table 6 — Test conditions for electrostatic discharges

Reference (see Table 3)	Electromagnetic phenomenon	Reference of basic standard for test description	Test level and test specification	Subclauses including the performance criteria
T 3.1	Electrostatic discharges	IEC 61000-4-2	Level 3 8 kV air 6 kV contact	**5.1.3** [1)]

1) Three new samples are submitted to the test. All three shall pass the test.

The point to which discharges shall be applied is selected by an exploration of the accessible surfaces of the RCD, when installed as for normal use. The selection is made with 20 discharges per second.

The selected point is tested with 10 positive and 10 negative polarity discharges with a time interval of minimum 1 s between subsequent discharges.



The characteristics of HF generator shall comply with IEC 61000-4-16.

If the RCD has an earthing terminal, it shall be connected to the neutral terminal, if any, and if so marked on the RCD or, failing that, to any phase terminal.

Figure 1 — Example of an appropriate test circuit

ANNEX: Technical Informations

(1)Product Photos