TYPE TEST REPORT

Type test report no. 2601133.03-MHV 25-0274

Type test on a MV outdoor vacuum recloser RCW-38/800-16

Manufacturer
Wenzhou Rockwill Electric Co., Ltd.
Wengyang Industrial Zone, Wenzhou City, Zhejiang Province, China

Document number: 5494:4

OVERVIEW OF DEKRA Test Reports and DEKRA Certificates

1 Type Test Report / Type Test Certificate
A Type Test Report / Certificate provides the verification of the rated characteristics of the equipment as assigned by the manufacturer, by means of the appropriate type tests carried out strictly in accordance with a recognized standard. This Type Test Report / certificate can be issued if the test object is completely prepared for testing, test circumstances and results fully comply with one or more (type) tests or test series defined by the applicable standard and all drawings serving the identification of the sample were submitted prior testing and approved by DEKRA.

2 Test Report / Inspection Certificate
A Test Report with or without an Inspection Certificate can be issued if the tests have been performed in accordance with a recognized standard, but the series of tests does not completely fulfil the requirement for a Type Test Report / Certificate (for example, if the number of the test duties is not a complete series of type tests). This Test Report / Inspection Certificate contains verified drawings and a description of the object tested.

3 Test Report
Test report is issued in all cases not listed above.

DEKRA Type Test Report / Type Test Certificate or Test Report / Inspection Certificates embedding a VEIKI-VNL review process

A Type Test Report / Type Test Certificate or Test Report / Inspection Certificate with both DEKRA VEIKI-VNL logo can be issued if the tests have been performed in accordance with a recognized standard and the series of tests has been witnessed by employee of DEKRA / VEIKI-VNL, and the final report has been reviewed and approved by VEIKI-VNL also. This Test Report and Certificate contains verified drawings and a description of the object tested.

VEIKI-VNL Test Reports and VEIKI-VNL Certificates

1 STL Type Test Certificate of …(*) Performance
VEIKI-VNL as a STL Member organization with its own testing laboratories (Member Laboratories) is entitled to issue *STL Type Test Certificate of…(*) Performance* if the product to be tested is inside the STL scope, all STL rules are fulfilled and the proven tests fully comply with the applicable IEC Standard and the corresponding STL Guide.
*(*Dielectric, Temperature Rise, Short-Circuit, Switching, Internal Arc)*

2 Type Test Report / Certificate
Type Test Report provides the verification of the rated characteristics of the equipment as assigned by the manufacturer, by means of the performance of the appropriate (type) tests specified by the standard. This report/certificate can be issued if the test object is completely prepared for testing, test circumstances and results fully comply with one or more (type) tests or test series defined by the applicable standard and all drawings serving the identification of the sample were submitted prior testing and approved by the laboratory. In case of special request Type Test Certificate can be issued which is equal in status, meaning and content requirement of the Type Test Report.

3 Test Report
Test report is issued in all cases not listed above.

4 Product Certificate
One sheet Product Certificate according ISO/IEC 17065 requirements and related evaluation report can be issued if the product in scope of VEIKI-VNL has been tested in an independent and accredited testing laboratory and the submitted test documents fully comply with the certification procedure of our Product Certification Office. For detailed information and request please contact on VEIKI-info@dekra.com.

Short-Circuit Testing Liaison (STL)

VEIKI-VNL is a member of the Short-Circuit Testing Liaison. For further information please refer to www.stl-liaison.org

TYPE TEST REPORT

OBJECT	MV outdoor vacuum recloser RCW-38/800-16 38 kV, 800 A, 50 Hz Serial No.: 2025105-01
CLIENT	Wenzhou Rockwill Electric Co., Ltd. Wengyang Industrial Zone, Wenzhou City, Zhejiang Province, China
MANUFACTURERS	Wenzhou Rockwill Electric Co., Ltd. Wengyang Industrial Zone, Wenzhou City, Zhejiang Province, China
REFERENCE	260113300
INSPECTED BY	DEKRA Testing and Certification (Shanghai) Ltd. Shanghai, China
TEST LOCATION	Suzhou Electrical Apparatus Science Academy Co., Ltd. (EETI) No.5 Qianzhu Road, Yuexi, Wuzhong District, Suzhou City, China.
DATE(S) OF TESTS	08 August 2025 to 28 August 2025
TEST SPECIFICATION	The tests have been carried out in accordance with IEC 62271-111 Edition 3.0, 2019-02, clause 7.2, 7.3, 7.4, 7.5, 7.11, 7.106, 7.109. STL Guide to IEC 62271-111 (Edition 2.0 2012-09) Issue 2.1, 1st June 2022.
SUMMARY AND CONCLUSION	The object passed the tests.

This report applies only to the object(s) tested. The responsibility for conformity of any object having the same type references as that tested rests with the manufacturer.

This report consists of 60 pages in total.

DEKRA Certification B.V.

H.L. Schendstok
Certification Manager
Medium & High Voltage Components

Arnhem, 10 December 2025

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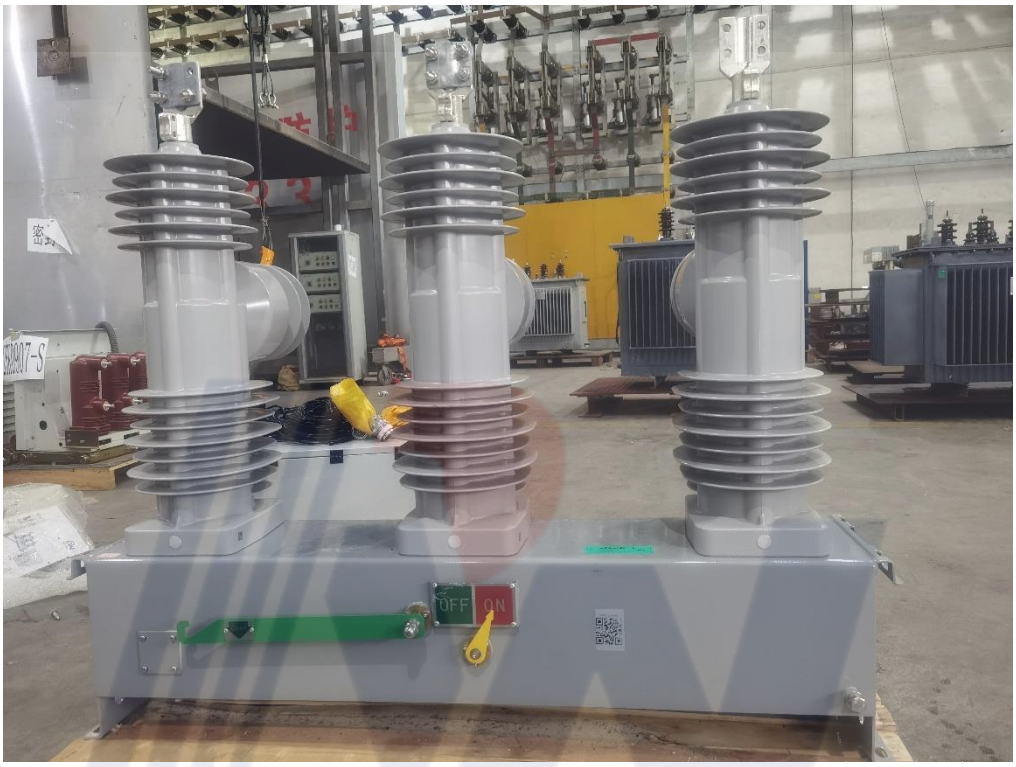
1 IDENTIFICATION OF THE OBJECT TESTED



Front view of test object

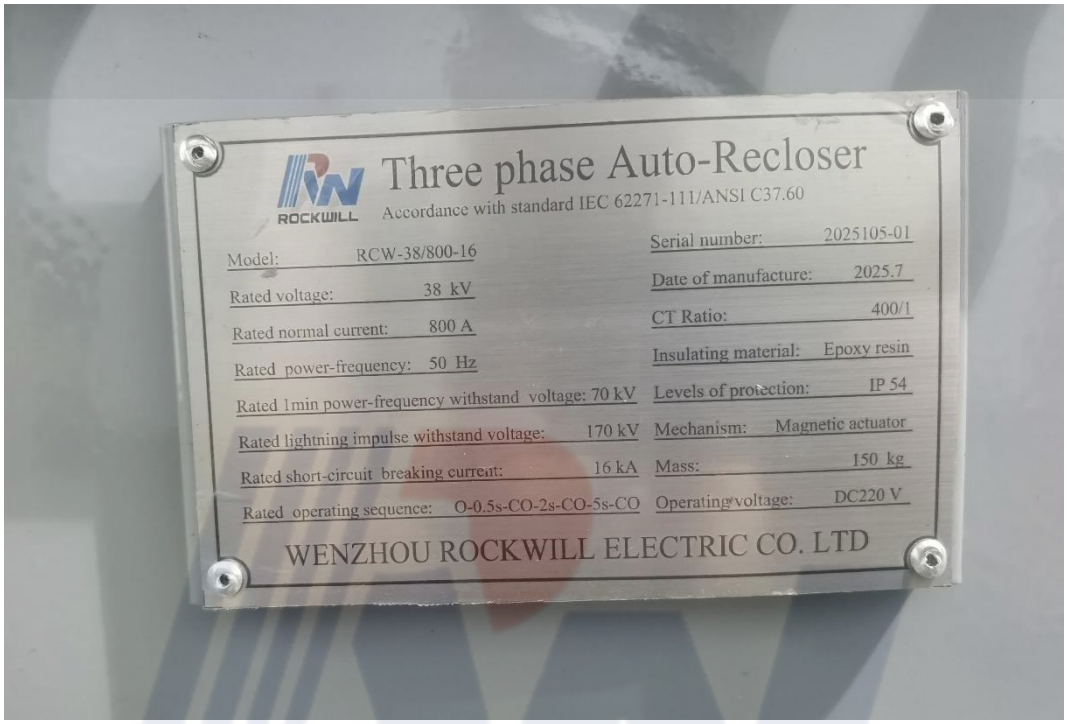
lateral view of test object

Rear view of test object

Front view of test object

lateral view of test object

Rear view of test object


Three phase Auto-Recloser
ROCKWILL
Accordance with standard IEC 62271-111/ANSI C37.60
Model: RCW-38/800-16
Serial number: 2025105-01
Rated voltage: 38 kV
Date of manufacture: 2025.7
Rated normal current: 800 A
CT Ratio: 400/1
Rated power-frequency: 50 Hz
Insulating material: Epoxy resin
Rated 1min power-frequency withstand voltage: 70 kV
Levels of protection: IP 54
Rated lightning impulse withstand voltage: 170 kV
Mechanism: Magnetic actuator
Rated short-circuit breaking current: 16 kA
Mass: 150 kg
Rated operating sequence: O-0.5s-CO-2s-CO-5s-CO
Operating voltage: DC220 V
WENZHOU ROCKWILL ELECTRIC CO. LTD

Nameplate

1.1 Ratings/characteristics of the object tested

Automatic circuit recloser (ACR)

Manufacturer	Wenzhou Rockwill Electric Co., Ltd. Wengyang Industrial Zone, Wenzhou City, Zhejiang Province, China		
Type designation	RCW-38/800-16		
Serial number	2025105-01		
Rated voltage	38	kV	x
Rated normal current	800	A	x
Rated insulation level (AC/LI) between phases and earth	70 / 170	kV	x
Rated insulation level (AC/LI) between vacuum distance	77 / 170	kV	x
Rated frequency	50	Hz	
Rated short-time withstand current / duration	16 / 4	kA / s	
Rated peak-withstand current	40	kA	
Rated short-circuit breaking current	16	kA	
Rated short-circuit making current	40	kA	
Line charging breaking current	5	A	
Cable charging breaking current	40	A	
Rated supply voltage of closing coil	220	Vdc	x
Rated supply voltage of opening coil	220	Vdc	x
Rated operating sequence	O-0.5s-CO-2s-CO-5s-CO		x
First-pole-to-clear factor	1.5		
Number of poles	3		x
Restrike performance during capacitive current switching	C2		
mechanical operations	10 000		x
Normal service altitude	≤ 1000	m	x
Year of manufacture	2025.07		x

Vacuum interrupter

Manufacturer	Zhejiang VIZMAN Powertech Co., Ltd. Lishui, China		
Type designation	RCW38.008.01		
Rated voltage	38	kV	x
Rated normal current	800	A	
Rated frequency	50	Hz	x
Rated short-circuit breaking current	16	kA	x
Serial numbers of circuit breaker and vacuum interrupter	A:2506261266, B:2506261267, C:2506261268		
Year of manufacture	2025.06		

Operation mechanism

Manufacturer	Wenzhou Rockwill Electric Co., Ltd. Wenzhou, China		
Type designation	Magnetic actuator		
Rated supply voltage of closing coil	220	Vdc	
Rated supply voltage of opening coil	220	Vdc	
Serial numbers of circuit breaker and operation mechanism	25063225		
Year of manufacture	2025.06		

Control unit

Manufacturer	Zhejiang Rockwill Energy Technology Co., Ltd. Wenzhou, China		
Type designation	RWK-351		
Rated supply voltage	220	Vac	x
Serial numbers of circuit breaker and control unit	02506-25806		
Year of manufacture	2025.06		

x = This rating has been proved by the tests of this report.

1.2 Notes on tests

The main purpose of this report issued is for continuous current test. All other partial and specific tests were specified by the manufacturer.
Sampling procedure: by the manufacturer.

1.3 List of drawings

The manufacturer has guaranteed that the object submitted for tests has been manufactured in accordance with the following drawings. DEKRA has verified that the drawings adequately represent the object tested. The manufacturer is responsible for the correctness of the drawing and the technical data presented. Details of drawings and documents see Annex A.
The following drawing have been included in this report:

Drawing no./ Document no.	Revision	Date
2025105-1 (Sample drawing)	01	2025-08-02

The following drawings and documents are only listed for reference and are kept in DEKRA's files:

Drawing no./ Document no.	Revision	Date
2025105-2 (Schematic diagram of TR)	01	2025-08-02

2 GENERAL INFORMATION

2.1 Persons attending the inspection

Name	Company	Role and responsibility during the inspection
Mr. Wu Mengkuan	Wenzhou Rockwill Electric Co., Ltd. Shanghai, China	Observation
Mr. Ran Zhifeng	Suzhou Electrical Apparatus Science Academy Co., Ltd. Suzhou, China	Test equipment handler
Mr. Li Yongbin	Suzhou Electrical Apparatus Science Academy Co., Ltd. Suzhou, China	Test equipment handler

2.2 The inspection was carried out by

Name	Company
Mr. Edwin Chen	DEKRA Testing and Certification (Shanghai) Ltd. Shanghai, China
Mr. Zheng Jiankang	DEKRA Testing and Certification (Shanghai) Ltd. Shanghai, China

2.3 Purpose of the tests

Purpose of the tests was to verify whether the object complies with the specified requirements.

2.4 Measurement uncertainty

A table with measurement uncertainties is enclosed in annex E. Unless otherwise indicated in the report, the measurement uncertainties of the results presented are as indicated in the table.

2.5 Inspection of the test set-up

The tests were carried out in 3rd party laboratory Suzhou Electrical Apparatus Science Academy Co., Ltd. (EETI), it is therefore responsible for the correctness of the results obtained. The measuring devices and the test set-up were checked by DEKRA, calibration, traceability, measurement uncertainty was verified and recorded in document AM1900 Checklist compliance with requirements of ISO 17025 with respect to witnessed testing (WMT / CTF stage 2) at Customer Test Facility (CTF), a copy is separately attached to this report.

2.6 Symbols and abbreviation used in test report

Symbols and abbreviation	Description
LI	Lightning impulse
LIC	Chopped lightning impulse
IG	Impulse voltage generator
DCG	Direct current voltage generator
HV	High voltage
LV	Low voltage
PF	Power-frequency
P-to-P & P-to-E	Phase to phase and phase to earth
SN	Serial number
ACR	Automatic circuit recloser

2.7 Result

The inspection did not give rise to remarks.

ROCKWILL

3 SUMMARY OF TESTS

Manufacturer		Wenzhou Rockwill Electric Co., Ltd. Wenzhou, China		
Object		MV outdoor vacuum recloser		
No	Item	Parameters	Standard	Result
1	Power-frequency voltage tests	Between phases and phase to earth: 70 kV, 1 min Across vacuum distance: 77 kV, 1 min	IEC 62271-111 Edition 3.0, 2019-02, clause 7.2	Passed
2	Lightning impulse voltage tests	Between phases and phase to earth: 170 kV Across vacuum distance: 170 kV	IEC 62271-111 Edition 3.0, 2019-02, clause 7.2	Passed
3	Radio interference voltage (RIV) test	1.1 U_r / √3, ≤ 2500 μV	IEC 62271-111 Edition 3.0, 2019-02, clause 7.3	Passed
4	Resistance Measurement	≤65 μΩ	IEC 62271-111 Edition 3.0, 2019-02, clause 7.4	Passed
5	Continuous current tests	Main circuit: 1.0×800 A	IEC 62271-111 Edition 3.0, 2019-02, clause 7.5	Passed
6	X-radiation test procedure for vacuum interrupters	≤ 5 μSv/h at 38 kV, 1 m; ≤ 150 μSv/h at 77 kV, 1 m	IEC 62271-111 Edition 3.0, 2019-02, clause 7.11	Passed
7	Partial discharge (corona) tests	1.1 U_r ≤ 10 pC	IEC 62271-111 Edition 3.0, 2019-02, clause 7.106	Passed
8	Mechanical test at ambient temperature	10000 times	IEC 62271-111 Edition 3.0, 2019-02, clause 7.109	Passed

4 DIELECTRIC TESTS

4.1 Power-frequency voltage tests

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.2.7.2
Test date	08 August 2025

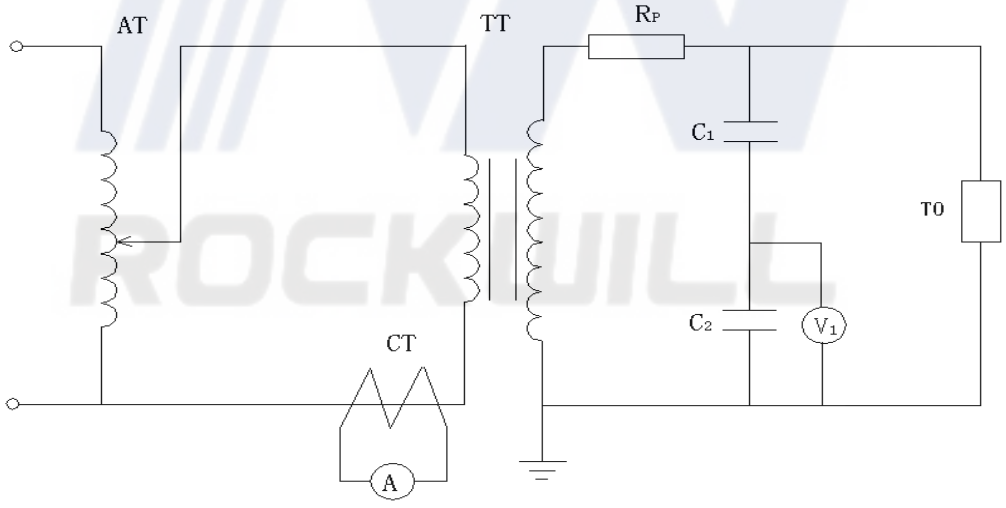
Environmental conditions

Ambient temperature	26.9 °C	Ambient air pressure	1014 hPa
Temperature of object	26.9 °C	Humidity	59 %

Characteristic test data

Specified test voltage	70 kV, 50 Hz (phase to earth and phase to phase) 77 kV, 50 Hz (across vacuum distance)
Atmospheric correction factor, Kt:	0.9780
Serial no	2025105-01

Test circuit



AT	Regulator	R_p	Protection resistance
CT	Current transformer	TT	PF transformer
TO	Test object	A	Current meter
C_1	H.V arm capacitance	C_2	L.V arm capacitance
V_1	Voltmeter		

Procedure

The test was carried out with one voltage source and test installation was in dry and new condition. The actual atmospheric correction factor during the test was 1.0. During test of across the insulating distance, the preferred method was used in accordance with the standard, the non-tested terminals and the frame were insulated from earth.

Phase to earth and phase to phase-100% test voltage: 70 kV					
Condition of ACR	Voltage applied to	Earth connected to	Applied voltage (kV)	Frequency (Hz)	Duration (s)
Closed	Aa	BbCcF	70	50	60
Closed	Bb	AaCcF	70	50	60
Closed	Cc	AaBbF	70	50	60
Open	A	aBbCcF	70	50	60
Open	a	ABbCcF	70	50	60
Open	B	AabCcF	70	50	60
Open	b	AaBCcF	70	50	60
Open	C	AaBbcF	70	50	60
Open	c	AaBbCF	70	50	60
Across open vacuum distance-100% test voltage: 77 kV					
Open	A	a	77	50	60
Open	a	A	77	50	60
Open	B	b	77	50	60
Open	b	B	77	50	60
Open	C	c	77	50	60
Open	c	C	77	50	60
Notes 1） F: Frame or enclosure. 2） A, B, C: Fixed contact terminal. 3） a, b, c: Moving contact terminal. 4） The actual atmospheric correction factor during the test was 1.0.					

Requirement

No disruptive discharge shall occur.

Result

No flashover was occurred, the object passed the test.

Photograph

Power-frequency voltage tests arrangement

ROCKWILL

4.2 Lightning impulse voltage tests

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.2.7.3
Test date	08 August 2025

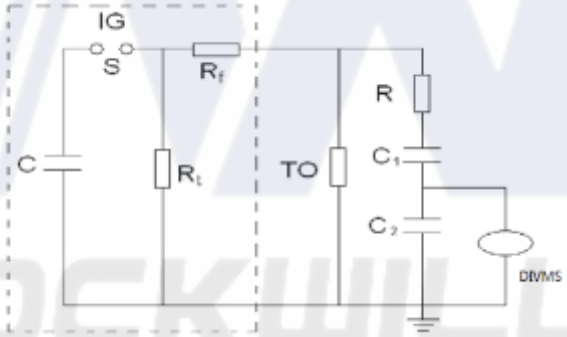
Environmental conditions

Ambient temperature	26.9 °C	Ambient air pressure	1014 hPa
Temperature of object	26.9 °C	Humidity	59 %

Characteristic test data

Specified test voltage	170 kV (phase to earth and phase to phase) 170 kV (across vacuum distance)
Specified wave shape	1.2 / 50 µs
Atmospheric correction factor, Kt:	0.9780
Serial no	2025105-01

Test circuit



C	IG capacitance	R_f	Front resistance	TO	Tested object
R_t	Tail resistance	S	Sphere gap	C_2	L.V arm capacitance
R	Damping resistance	C_1	H.V arm capacitance	DIVMS	Digital impulse voltage measuring systems

Procedure

The wave shape of the voltage impulses was within the permissible tolerances of the standard IEC 60060-1 wave shape of 1.2 / 50 µs.

The test was carried out with one voltage source and test installation was in dry condition. The actual atmospheric correction factor during the test was 1.0. During test of across the insulating distance, the preferred method was used in accordance with the standard, the non-tested terminals and the frame were insulated from earth.

Phase to earth and phase to phase-100% test voltage: 170 kV **Across open vacuum distance-100% test voltage: 170 kV**						
Condition of ACR	Voltage applied to	Earth connected to	Polarity	Voltage applied (kV)	No. of impulses	See figure in Annex B
Closed	Aa	BbCcF	Pos.	170	15	Fig. 1
			Neg.	170	15	Fig. 2
Closed	Bb	AaCcF	Pos.	170	15	Fig. 3
			Neg.	170	15	Fig. 4
Closed	Cc	AaBbF	Pos.	170	15	Fig. 5
			Neg.	170	15	Fig. 6
Open	A	aBbCcF	Pos.	170	15	Fig. 7
			Neg.	170	15	Fig. 8
Open	a	ABbCcF	Pos.	170	15	Fig. 9
			Neg.	170	15	Fig. 10
Open	B	AabCcF	Pos.	170	15	Fig. 11
			Neg.	170	15	Fig. 12
Open	b	AaBCcF	Pos.	170	15	Fig. 13
			Neg.	170	15	Fig. 14
Open	C	AaBbcF	Pos.	170	15	Fig. 15
			Neg.	170	15	Fig. 16
Open	c	AaBbCF	Pos.	170	15	Fig. 17
			Neg.	170	15	Fig. 18
Notes 1） F: Frame or enclosure. 2） A, B, C: Fixed contact terminal. 3） a, b, c: Moving contact terminal. 4） Each series of impulse has been preceded by impulses at 60% to 80% of the test voltage. 5） The actual atmospheric correction factor during the test was 1.0. 6） The dielectric test of the vacuum distance is covered by the test between the pole to frame or enclosure when the circuit breaker is opened.						

Requirement

During and after the impulse test:

- Each series has at least 15 tests;
- The number of disruptive discharges does not exceed two for each complete series;
- No disruptive discharge on non-self-restoring insulation occurs. This is confirmed by 5 consecutive impulse withstands following the last disruptive discharge.

Result

No flashover was occurred, the object passed the test.

The wave shapes are documented in Annex B.

Photograph

Lightning impulse voltage tests arrangement

ROCKWILL

5 RADIO INTERFERENCE VOLTAGE (RIV) TEST

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.3
Test date	11 August 2025

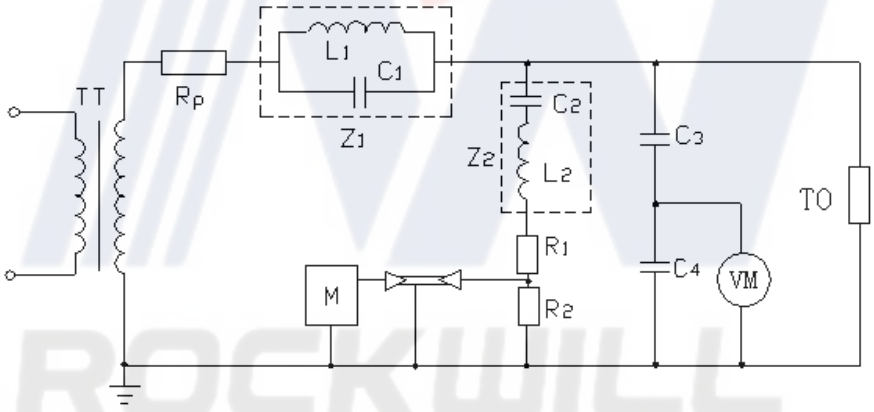
Environmental conditions

Ambient temperature	29.6 °C	Ambient air pressure	1004 hPa
Temperature of object	29.6 °C	Humidity	80 %

Characteristic test data

Rated voltage, Ur	38 kV, 50 Hz
Test voltage of RIV measurement	24.1 kV, 50 Hz
Serial no	2025105-01

Test circuit



TT	PF transformer	Z_2	Coupling impedance
Z_1	Blocking impedance	C_4	L.V arm capacitance
C_3	H.V arm capacitance	VM	Voltmeter
TO	Test object	M	RIV measuring device
R_P	Protection resistance		

Procedure

The test object was dry and clean and at approximately the same temperature as the room in which the test was made. During the tests the test object was equipped with all accessories which may influence the radio interference voltage performance.

A voltage of 1.1×Ur/√ 3 was applied to the test object and maintained for at least 5 min, The voltage was then be decreased in steps to 30% of the specified test voltage, raised in steps to the initial value, maintained there for 1 min and finally decreased in steps to 30% value. Each voltage step was approximately 10% of the specified test voltage.

Requirement

The radio interference level shall not be exceed 2500 µV at the test voltage.

Result

The measured RIV values were lower than the maximum of 2500 µV. The object passed the test.
The results are stated in the table below. The wave shapes are documented in Annex C.

Testing position	Condition of switch	Voltage applied to	Earth connected to	Applied voltage (Ur / √ 3)	Applied voltage (kV)	Field density (dB)	RIV value (µV)
ACR	Closed	Aa	BbCcF	1.1	24.1	23.78	15.5
				1.0	21.9	23.58	15.1
				0.9	19.7	23.38	14.8
				0.8	17.6	23.18	14.4
				0.7	15.4	23.08	14.3
				0.6	13.2	22.88	13.9
				0.5	11.0	22.68	13.6
				0.4	8.8	22.58	13.5
				0.3	6.6	22.58	13.5
				0.4	8.8	22.58	13.5
				0.5	11.0	22.68	13.6
				0.6	13.2	22.78	13.8
				0.7	15.4	22.98	14.1
				0.8	17.6	23.18	14.4
				0.9	19.7	23.28	14.6
				1.0	21.9	23.48	14.9
				1.1	24.1	23.68	15.3
				1.0	21.9	23.48	14.9
				0.9	19.7	23.28	14.6
				0.8	17.6	23.18	14.4
				0.7	15.4	22.98	14.1
				0.6	13.2	22.78	13.8
				0.5	11.0	22.68	13.6
				0.4	8.8	22.58	13.5
				0.3	6.6	22.58	13.5

Notes

1） F: Frame or enclosure.

2） A, B, C: Fixed contact terminal.

3） a, b, c: Moving contact terminal.

4） Attenuation coefficient: 1.0 dB, background noise: 8.8 dB.

Testing position	Condition of switch	Voltage applied to	Earth connected to	Applied voltage (Ur / √ 3)	Applied voltage (kV)	Field density (dB)	RIV value (μV)
ACR	Closed	Bb	AaCcF	1.1	24.1	24.18	16.2
				1.0	21.9	23.88	15.6
				0.9	19.7	23.68	15.3
				0.8	17.6	23.38	14.8
				0.7	15.4	23.18	14.4
				0.6	13.2	22.88	13.9
				0.5	11.0	22.78	13.8
				0.4	8.8	22.68	13.6
				0.3	6.6	22.68	13.6
				0.4	8.8	22.68	13.6
				0.5	11.0	22.78	13.8
				0.6	13.2	22.88	13.9
				0.7	15.4	23.08	14.3
				0.8	17.6	23.48	14.9
				0.9	19.7	23.78	15.5
				1.0	21.9	23.98	15.8
				1.1	24.1	24.08	16.0
				1.0	21.9	23.98	15.8
				0.9	19.7	23.68	15.3
				0.8	17.6	23.48	14.9
				0.7	15.4	23.18	14.4
				0.6	13.2	22.88	13.9
				0.5	11.0	22.78	13.8
				0.4	8.8	22.68	13.6
				0.3	6.6	22.68	13.6

Notes

1） F: Frame or enclosure.

2） A, B, C: Fixed contact terminal.

3） a, b, c: Moving contact terminal.

4） Attenuation coefficient: 1.0 dB, background noise: 8.8 dB.

Testing position	Condition of switch	Voltage applied to	Earth connected to	Applied voltage (Ur / √ 3)	Applied voltage (kV)	Field density (dB)	RIV value (μV)
ACR	Closed	Cc	AaBbF	1.1	24.1	24.68	17.1
				1.0	21.9	24.28	16.4
				0.9	19.7	23.88	15.6
				0.8	17.6	23.48	14.9
				0.7	15.4	23.18	14.4
				0.6	13.2	22.98	14.1
				0.5	11.0	22.68	13.6
				0.4	8.8	22.58	13.5
				0.3	6.6	22.58	13.5
				0.4	8.8	22.58	13.5
				0.5	11.0	22.68	13.6
				0.6	13.2	22.88	13.9
				0.7	15.4	23.28	14.6
				0.8	17.6	23.58	15.1
				0.9	19.7	23.88	15.6
				1.0	21.9	24.18	16.2
				1.1	24.1	24.58	16.9
				1.0	21.9	24.28	16.4
				0.9	19.7	23.78	15.5
				0.8	17.6	23.48	14.9
				0.7	15.4	23.18	14.4
				0.6	13.2	22.78	13.8
				0.5	11.0	22.68	13.6
				0.4	8.8	22.58	13.5
				0.3	6.6	22.58	13.5

Notes

1） F: Frame or enclosure.

2） A, B, C: Fixed contact terminal.

3） a, b, c: Moving contact terminal.

4） Attenuation coefficient: 1.0 dB, background noise: 8.8 dB.

Testing position	Condition of switch	Voltage applied to	Earth connected to	Applied voltage (Ur / √ 3)	Applied voltage (kV)	Field density (dB)	RIV value (μV)
ACR	Open	A	aBbCcF	1.1	24.1	23.98	15.8
				1.0	21.9	23.68	15.3
				0.9	19.7	23.48	14.9
				0.8	17.6	23.28	14.6
				0.7	15.4	23.08	14.3
				0.6	13.2	22.98	14.1
				0.5	11.0	22.88	13.9
				0.4	8.8	22.78	13.8
				0.3	6.6	22.78	13.8
				0.4	8.8	22.78	13.8
				0.5	11.0	22.88	13.9
				0.6	13.2	22.98	14.1
				0.7	15.4	23.08	14.3
				0.8	17.6	23.28	14.6
				0.9	19.7	23.48	14.9
				1.0	21.9	23.68	15.3
				1.1	24.1	23.88	15.6
				1.0	21.9	23.68	15.3
				0.9	19.7	23.58	15.1
				0.8	17.6	23.38	14.8
				0.7	15.4	23.18	14.4
				0.6	13.2	23.08	14.3
				0.5	11.0	22.88	13.9
				0.4	8.8	22.78	13.8
				0.3	6.6	22.78	13.8

Notes

1） F: Frame or enclosure.

2） A, B, C: Fixed contact terminal.

3） a, b, c: Moving contact terminal.

4） Attenuation coefficient: 1.0 dB, background noise: 8.8 dB.

Testing position	Condition of switch	Voltage applied to	Earth connected to	Applied voltage (Ur / √ 3)	Applied voltage (kV)	Field density (dB)	RIV value (μV)
ACR	Open	B	AabCcF	1.1	24.1	24.58	16.9
				1.0	21.9	24.38	16.6
				0.9	19.7	24.08	16.0
				0.8	17.6	23.68	15.3
				0.7	15.4	23.28	14.6
				0.6	13.2	22.98	14.1
				0.5	11.0	22.78	13.8
				0.4	8.8	22.68	13.6
				0.3	6.6	22.68	13.6
				0.4	8.8	22.68	13.6
				0.5	11.0	22.78	13.8
				0.6	13.2	23.08	14.3
				0.7	15.4	23.28	14.6
				0.8	17.6	23.78	15.5
				0.9	19.7	24.08	16.0
				1.0	21.9	24.48	16.7
				1.1	24.1	24.68	17.1
				1.0	21.9	24.38	16.6
				0.9	19.7	24.08	16.0
				0.8	17.6	23.58	15.1
				0.7	15.4	23.38	14.8
				0.6	13.2	23.08	14.3
				0.5	11.0	22.88	13.9
				0.4	8.8	22.68	13.6
				0.3	6.6	22.68	13.6

Notes

1） F: Frame or enclosure.

2） A, B, C: Fixed contact terminal.

3） a, b, c: Moving contact terminal.

4） Attenuation coefficient: 1.0 dB, background noise: 8.8 dB.

Testing position	Condition of switch	Voltage applied to	Earth connected to	Applied voltage (Ur / √ 3)	Applied voltage (kV)	Field density (dB)	RIV value (μV)
ACR	Open	C	AaBbcF	1.1	24.1	24.58	16.9
				1.0	21.9	24.38	16.6
				0.9	19.7	24.08	16.0
				0.8	17.6	23.68	15.3
				0.7	15.4	23.38	14.8
				0.6	13.2	23.08	14.3
				0.5	11.0	22.88	13.9
				0.4	8.8	22.78	13.8
				0.3	6.6	22.78	13.8
				0.4	8.8	22.78	13.8
				0.5	11.0	22.88	13.9
				0.6	13.2	23.08	14.3
				0.7	15.4	23.28	14.6
				0.8	17.6	23.78	15.5
				0.9	19.7	24.08	16.0
				1.0	21.9	24.28	16.4
				1.1	24.1	24.68	17.1
				1.0	21.9	24.38	16.6
				0.9	19.7	23.98	15.8
				0.8	17.6	23.68	15.3
				0.7	15.4	23.38	14.8
				0.6	13.2	23.08	14.3
				0.5	11.0	22.88	13.9
				0.4	8.8	22.78	13.8
				0.3	6.6	22.78	13.8

Notes

1） F: Frame or enclosure.

2） A, B, C: Fixed contact terminal.

3） a, b, c: Moving contact terminal.

4） Attenuation coefficient: 1.0 dB, background noise: 8.8 dB.

Testing position	Condition of switch	Voltage applied to	Earth connected to	Applied voltage (Ur / √ 3)	Applied voltage (kV)	Field density (dB)	RIV value (μV)
ACR	Open	a	ABbCcF	1.1	24.1	24.18	16.2
				1.0	21.9	23.88	15.6
				0.9	19.7	23.68	15.3
				0.8	17.6	23.28	14.6
				0.7	15.4	23.08	14.3
				0.6	13.2	22.78	13.8
				0.5	11.0	22.68	13.6
				0.4	8.8	22.58	13.5
				0.3	6.6	22.58	13.5
				0.4	8.8	22.58	13.5
				0.5	11.0	22.68	13.6
				0.6	13.2	22.88	13.9
				0.7	15.4	23.08	14.3
				0.8	17.6	23.20	14.6
				0.9	19.7	23.58	15.1
				1.0	21.9	23.88	15.6
				1.1	24.1	24.08	16.0
				1.0	21.9	23.78	15.5
				0.9	19.7	23.58	15.1
				0.8	17.6	23.28	14.6
				0.7	15.4	23.08	14.3
				0.6	13.2	22.88	13.9
				0.5	11.0	22.68	13.6
				0.4	8.8	22.58	13.5
				0.3	6.6	22.58	13.5

Notes

1） F: Frame or enclosure.

2） A, B, C: Fixed contact terminal.

3） a, b, c: Moving contact terminal.

4） Attenuation coefficient: 1.0 dB, background noise: 8.8 dB.

Testing position	Condition of switch	Voltage applied to	Earth connected to	Applied voltage (Ur / √ 3)	Applied voltage (kV)	Field density (dB)	RIV value (μV)
ACR	Open	b	AaBCcF	1.1	24.1	25.18	18.2
				1.0	21.9	24.78	17.3
				0.9	19.7	24.38	16.6
				0.8	17.6	23.98	15.8
				0.7	15.4	23.48	14.9
				0.6	13.2	23.08	14.3
				0.5	11.0	22.98	14.1
				0.4	8.8	22.88	13.9
				0.3	6.6	22.88	13.9
				0.4	8.8	22.88	13.9
				0.5	11.0	22.98	14.1
				0.6	13.2	23.18	14.4
				0.7	15.4	23.58	15.1
				0.8	17.6	23.98	15.8
				0.9	19.7	24.38	16.6
				1.0	21.9	24.88	17.5
				1.1	24.1	25.18	18.2
				1.0	21.9	24.78	17.3
				0.9	19.7	24.38	16.6
				0.8	17.6	23.88	15.6
				0.7	15.4	23.58	15.1
				0.6	13.2	23.18	14.4
				0.5	11.0	22.98	14.1
				0.4	8.8	22.88	13.9
				0.3	6.6	22.88	13.9

Notes

1） F: Frame or enclosure.

2） A, B, C: Fixed contact terminal.

3） a, b, c: Moving contact terminal.

4） Attenuation coefficient: 1.0 dB, background noise: 8.8 dB.

Testing position	Condition of switch	Voltage applied to	Earth connected to	Applied voltage (Ur / √ 3)	Applied voltage (kV)	Field density (dB)	RIV value (μV)
ACR	Open	c	AaBbCF	1.1	24.1	34.98	56.1
				1.0	21.9	32.38	41.6
				0.9	19.7	30.48	33.4
				0.8	17.6	29.18	28.8
				0.7	15.4	27.88	24.8
				0.6	13.2	25.88	19.7
				0.5	11.0	23.68	15.3
				0.4	8.8	22.58	13.5
				0.3	6.6	22.58	13.5
				0.4	8.8	22.58	13.5
				0.5	11.0	23.78	15.5
				0.6	13.2	25.98	19.9
				0.7	15.4	27.98	25.1
				0.8	17.6	29.18	28.8
				0.9	19.7	30.38	33.0
				1.0	21.9	32.08	40.2
				1.1	24.1	34.88	55.5
				1.0	21.9	32.18	40.6
				0.9	19.7	30.38	33.0
				0.8	17.6	29.08	28.4
				0.7	15.4	227.88	24.8
				0.6	13.2	25.98	19.9
				0.5	11.0	23.78	15.5
				0.4	8.8	22.58	13.5
				0.3	6.6	22.58	13.5

Notes

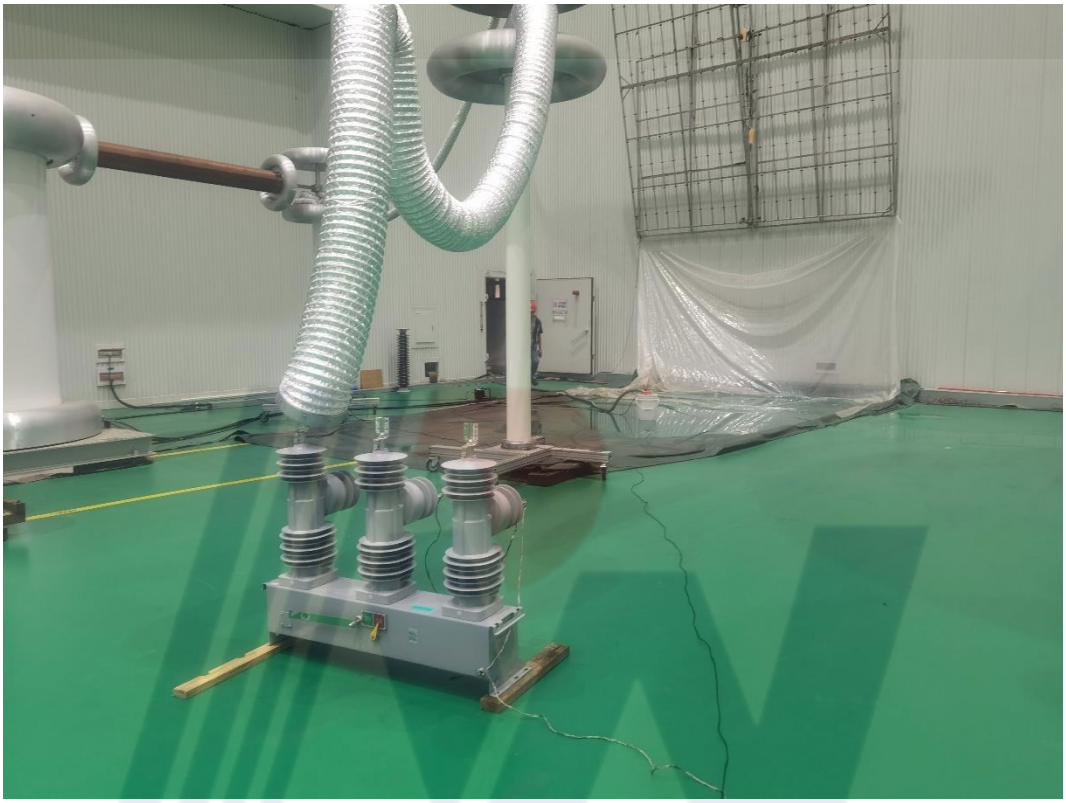
1） F: Frame or enclosure.

2） A, B, C: Fixed contact terminal.

3） a, b, c: Moving contact terminal.

4） Attenuation coefficient: 1.0 dB, background noise: 8.8 dB.

Photographs



Radio interference voltage (RIV) test arrangement

Radio interference voltage (RIV) test arrangement

6 X-RADIATION TEST PROCEDURES FOR VACUUM INTERRUPTERS

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.11
Test date	08 August 2025

Environmental conditions

Ambient temperature	26.9	°C
Humidity	59	%

Characteristic test data

Serial number of vacuum interrupter 2506261269

Procedure

X-radiation was measured on the single vacuum interrupter with the contact spacing was the minimum distance 13.0 mm. The radiation survey instrument was positioned in the plane of the separable contacts and pointed at the contacts.

The distance between the measuring instrument and the external surface of the vacuum interrupter is 1 m when the voltage 38 kV was applied across the interrupter contacts, 1 m when the voltage of 77 kV was applied across the interrupter contacts. After a minimum of 15 s, the X-radiation level on the radiation survey instrument was recorded.

Requirement

The X-radiation emitted from vacuum interrupters at the rated voltage shall not exceed 5 μSv/h at 1m distance.

The X-radiation emitted at the short-duration rated power-frequency withstand voltage shall not exceed 150 μSv/h at 1 m distance.

Result

The object passed the test.

Voltage applied to	Earth connected to	Contact distance (mm)	Voltage applied (kV)	Duration ≥15(s)	X-radiation level (μSv/h)	Requirement (μSv/h)
A	a	13.0	38	15	2.4	≤ 5
a	A	13.0	38	15	2.6	≤ 5
A	a	13.0	77	15	18.7	≤ 150
a	A	13.0	77	15	19.8	≤ 150
Notes 1） A: Fixed contact terminal. 2） a: Moving contact terminal.						

7 PARTIAL DISCHARGE (CORONA) TESTS

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.106
Test date	08 August 2025

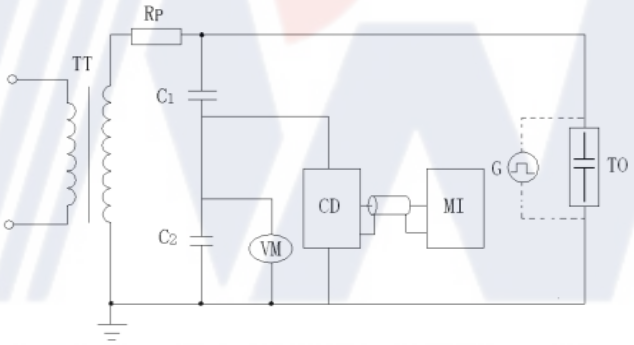
Environmental conditions

Ambient temperature	26.9 °C	Ambient air pressure	1014 hPa
Temperature of object	26.9 °C	Humidity	59 %

Characteristic test data

Background noise level	＜1.0 pC
Serial no	2025105-01

Test circuit



TT	PF transformer	R_P	Protection resistance
C_1	H.V arm capacitance	C_2	L.V arm capacitance
CD	Coupling device	TO	Tested object
VM	Voltmeter	MI	Measuring instrument
G	Step voltage generator	/	/

Procedure

The partial discharge measurement test was carried out in accordance with IEC 60270. The sensitivity of the measuring circuit was checked with a calibrator (100 pC) before the partial discharge measurement. According to the manufacturer's requirements, the prestress voltage is 49.4kV (1.3*Ur), the partial discharge was measured at 41.8 kV (1.1*U_r) after energized for 60 s. The test was carried out while the test installation was at ambient temperature.

The test parameters and arrangement are described in the table below.

Requirement

There shall be no detectable discharge exceeding 10 pC at 41.8 kV as specified by manufacturer.

Result

The object passed the test.

The results are stated in the table below.

Phase to earth and phase to phase							
Condition of ACR	Voltage applied to	Earth connected to	$U_{pre\text{-}stress}$, (kV)	Frequency (Hz)	Measuring voltage (kV)	Duration (s)	Noise level (pC)
Closed	Aa	BbCcF	49.4	50	41.8	60	＜2.5
Closed	Bb	AaCcF	49.4	50	41.8	60	＜2.6
Closed	Cc	AaBbF	49.4	50	41.8	60	＜2.7
Notes 1） F: Frame or enclosure. 2） A, B, C: Fixed contact terminal. 3） a, b, c: Moving contact terminal.							

Across the open switching device							
Condition of ACR	Voltage applied to	Earth connected to	$U_{pre\text{-}stress}$, (kV)	Frequency (Hz)	Measuring voltage (kV)	Duration (s)	Noise level (pC)
Opened	A	aBbCcF	49.4	50	41.8	60	＜2.5
Opened	B	AabCcF	49.4	50	41.8	60	＜2.6
Opened	C	AaBbcF	49.4	50	41.8	60	＜2.7
Opened	a	ABbCcF	49.4	50	41.8	60	＜2.8
Opened	b	AaBCcF	49.4	50	41.8	60	＜2.6
Opened	c	AaBbCF	49.4	50	41.8	60	＜2.9
Notes 1） F: Frame or enclosure. 2） A, B, C: Fixed contact terminal. 3） a, b, c: Moving contact terminal.							

Photograph

Partial discharge (corona) tests arrangement

8 RESISTANCE MEASUREMENT

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.4
Test date	20 August and 21 August 2025

Environmental conditions

Ambient temperature	30.0 ~ 30.5	°C

Characteristic test data

Measuring DC current	100	A
Serial no	2025105-01	

Procedure

The DC resistance of each phase of the main circuit was measured when the circuit was supplied with a current of 100 A. The resistance values were the average values calculated based on three measurements, among each measurement, one no-load open and close operation cycle were executed on the sample under test. The resistance of one phase was measured between the incoming terminal and outgoing terminal of ACR.

The measurements were made before the temperature-rise test with the ACR and switchgear at ambient air temperature and after the temperature-rise test when the switchgear cooled down to the ambient air temperature.

Requirement

The measured resistances after the temperature-rise test shall not be vary by more than 20% when compared with the values measured before the temperature-rise test.

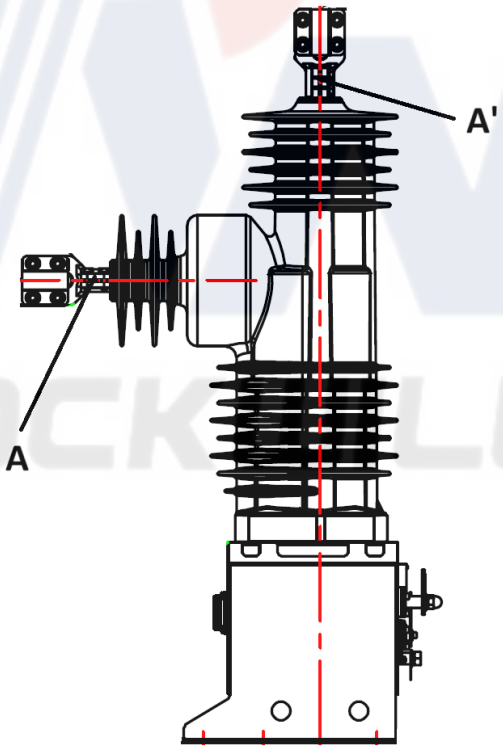
Result

The object passed the test.

The result of DC resistance:

DC resistances of Automatic circuit recloser				
Item	Phase A (μΩ)	Phase B (μΩ)	Phase C (μΩ)	Requirement
Before test at 30.0 °C	48.8	52.0	49.1	≤ 65 μΩ
After test at 30.5 °C	49.3	52.7	50.4	≤ 65 μΩ
After test corrected to 30.0 °C	49.2	52.6	50.3	≤ 65 μΩ
Difference at 30.0 °C	+ 2.1	+ 1.2	+ 2.4	≤ 20%

The measuring position diagram of the resistance of the circuit



The measuring position diagram of the resistance of the circuit: A - A'

9 CONTINUOUS CURRENT TESTS

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.5
Test date	20 August 2025

Environmental conditions

Ambient temperature	30.0	°C

Characteristic test data

Rated current	800	A
Test current	800*1.0	A
Frequency	50	Hz
Serial no	2025105-01	

Procedure

The Automatic circuit recloser (ACR) was tested with a 50 Hz current source of 800 A (1.0*800A) per phase connected to the moving contact terminals of ACR by copper bar with cross section 40 mm x 10 mm, length 2.0 meters, short circuited at the copper bar end, which connected to the fixed contact terminals of ACR by copper bar with cross section 40 mm x 10 mm, length 2.0 meters. The temperature rises of the various points were measured by means of thermocouples (Type T), including the ambient temperature.
The schematic overview of the test set up and positions of the thermocouples are indicated in the drawing below.

Requirement

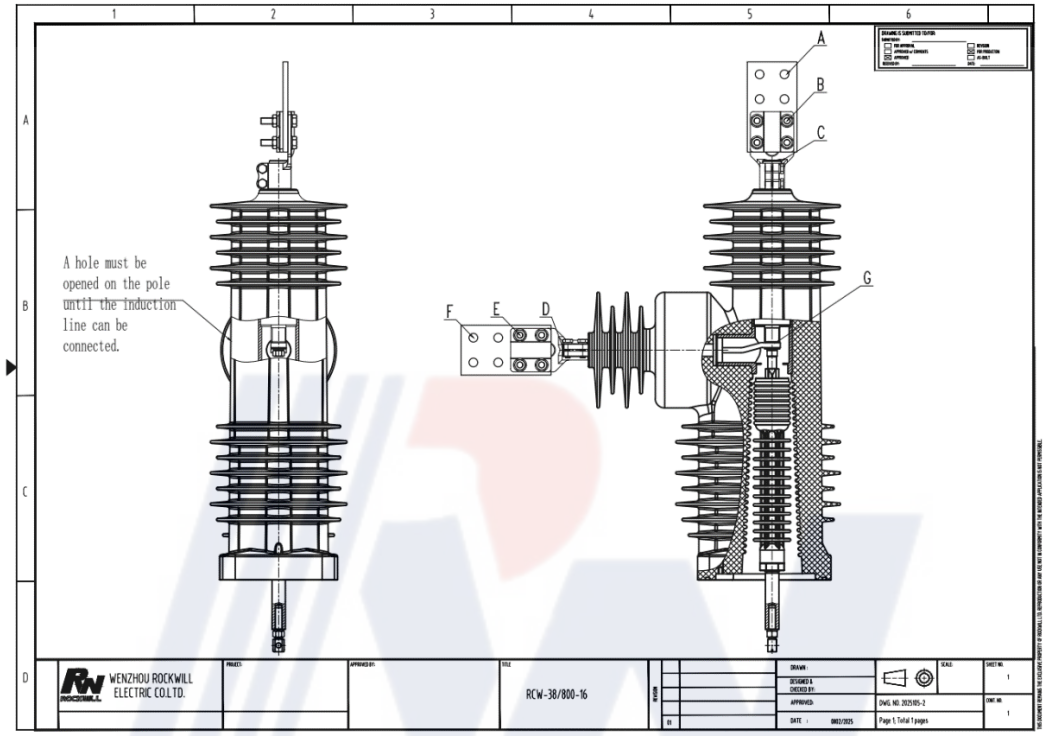
The temperature rises of the various points shall not exceed the values specified in the standard.
The measured DC resistances when the ACR has cooled to the ambient air temperature after the test shall not be vary by more than 20% compared to the values measured before test.

Result

The object passed the test.
The results are listed below.

T.C. location	Location description	Coatings	Temperature rise (K)	Max. allowable temperature rise (K)
A	The bus-bar 1 meter away from the terminal	/	37.1 35.4 35.0	/
B	Terminal	Tin	38.0 36.3 35.3	65
C	Bolted connection	Silver	38.2 36.9 36.0	75
G	Bolted connection	Silver	35.4 33.7 33.0	75
D	Bolted connection	Silver	33.8 35.7 35.1	75
E	Terminal	Tin	34.4 37.1 36.5	65
F	The bus-bar 1 meter away from the terminal	/	35.7 37.0 38.0	/
	Ambient temperature	-	30.0 ℃	

Schematic diagram of continuous current test



Photograph

Continuous current test arrangement

10 MECHANICAL TEST AT AMBIENT TEMPERATURE

10.1 Mechanical characteristics and operation test of the automatic circuit recloser before and after mechanical endurance test

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.109.2.1
Test date	11 August and 18 August 2025

Environmental conditions (before test)

Ambient temperature	30.0	°C
Humidity	59	%

Environmental conditions (after test)

Ambient temperature	29.6	°C
Humidity	63	%

Characteristic test data

Rated voltage of closing coil of ACR	220	Vdc
Rated voltage of opening coil of ACR	220	Vdc
Rated voltage of control unit	220	Vac
Serial number of ACR	2025105-01	
Serial number of Control unit	02506-25806	

Procedure

The mechanical characteristics was produced during a no-load test made with a single O operation, a single C operation at rated supply voltage of control unit.

Requirement

The variation between the mean values of each parameter measured before and after the extended mechanical endurance tests shall be within the tolerances given by the manufacturer.

All parts, including contacts, shall be in good condition and shall not show undue wear.

The automatic circuit recloser shall be working well at the specified operating cycles with rated supply voltage of the control unit.

The vary of the resistance of the main circuit after tests shall be less than or equal to 20% of the value measured before tests.

Result

The object passed the test.

The time-travel charts are documented in annex D.

The results of mechanical characteristics test of single O operation and a single C operation:

No.	Item	Operating voltage	Test requirement	Unit	Mechanical characteristics					
					Before test			After 2000 times		
					A	B	C	A	B	C
1	Closing time	220 Vac	≤60	ms	53.8	54.3	54.7	55.4	55.1	56.0
2	Opening time	220 Vac	≤50	ms	45.2	45.4	45.5	46.2	46.3	46.4
3	closing synchronism	220 Vac	≤2	ms	0.9			0.9		
4	Opening synchronism	220 Vac	≤2	ms	0.3			0.20		
No load curve no.: 25K0180-S-001~004.										

No.	Item	Operating voltage	Test requirement	Unit	Mechanical characteristics					
					After 4000 times			After 6000 times		
					A	B	C	A	B	C
1	Closing time	220 Vac	≤60	ms	55.7	56.1	56.5	55.8	56.2	56.9
2	Opening time	220 Vac	≤50	ms	46.1	46.3	46.1	45.2	45.5	45.3
3	closing synchronism	220 Vac	≤2	ms	0.8			1.1		
4	Opening synchronism	220 Vac	≤2	ms	0.2			0.3		
No load curve no.: 25K0180-S-005~008.										

No.	Item	Operating voltage	Test requirement	Unit	Mechanical characteristics					
					After 8000 times			After 10000 times		
					A	B	C	A	B	C
1	Closing time	220 Vac	≤60	ms	58.1	57.4	57.0	57.7	58.2	58.9
2	Opening time	220 Vac	≤50	ms	45.8	46.0	46.2	47.6	47.2	47.2
3	closing synchronism	220 Vac	≤2	ms	1.1			1.2		
4	Opening synchronism	220 Vac	≤2	ms	0.4			0.4		
No load curve no.: 25K0180-S-009~012.										

ROCKWILL

10.2 Measurement of the resistance of Automatic circuit recloser before and after mechanical endurance test

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.109.2.2
Test date	11 August and 18 August 2025

Environmental conditions (before test)

Ambient temperature	30.0	°C
Humidity	59	%

Environmental conditions (after test)

Ambient temperature	29.6	°C
Humidity	63	

Characteristic test data

Measuring current	100	Adc
Serial number of ACR	2025105-01	
Serial number of Control unit	02506-25806	

Procedure

The DC resistance of each phase of the main circuit was measured when the circuit supplied with a current of 100 A. The resistance values were the average values calculated based on three measurements, among each measurement, one no-load open and close operation cycle was executed on the sample under test. The resistance was measured between the incoming terminal and outgoing terminal of the Automatic circuit recloser.

The measurements were made before and after the mechanical endurance test with the automatic circuit recloser at ambient air temperature.

Requirement

The measured resistances after the mechanical endurance test shall not be vary by more than 20% when compared with the values measured before the mechanical endurance test.

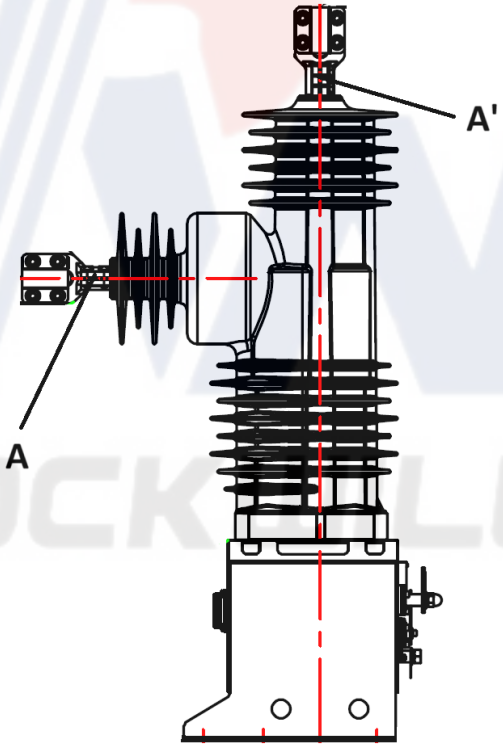
Result

The object passed the test.

The result of DC resistance:

DC resistances of main circuits				
Pole	Before test at 30.0 °C (μΩ)	After test at 29.6 °C (μΩ)	After test corrected to 30.0 °C (μΩ)	Difference (%)
A	43.1	48.5	48.6	+12.8
B	45.0	52.0	52.1	+15.8
C	44.1	49.1	49.2	+11.6

The measuring position diagram of the resistance of the circuit



The measuring position diagram of the resistance of the circuit: A - A'

10.3 Mechanical endurance tests of Automatic circuit recloser

Standard and date

Standard	IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.109.3
Test date	11 August and 17 August 2025

Environmental conditions

Ambient temperature	30.0~31.2	°C

Characteristic test data

Mechanical endurance	10 000 operations	
Rated voltage of closing coil of ACR	220	Vdc
Rated voltage of opening coil of ACR	220	Vdc
Rated voltage of control unit	220	Vac
Automatic operation frequency	8	time / min
Manual operation frequency	2	time / min
Serial number of ACR	2025105-01	
Serial number of Control unit	02506-25806	

Procedure

The test was carried out at ambient temperature. All the mechanical operations were executed with no load. Each series of 2000 operations were executed as the sequence described in the table below.

Each series of 2000 operations were performed five times, resulting in a total of 10000 operations. Before the mechanical endurance test and after each switching programmer of 2000 cycles, the characteristics were measured with rated supply voltage of the control unit.

Included in the total number of cycles, a minimum of 200 operations was performed using the manual opening mechanism. A minimum of 1 800 cycles shall be performed by automatic operation of the recloser control, a complete operating sequence of the automatic circuit recloser includes 'O-0.5s-CO-2s-CO-5s-CO'. The automatic opening shall be initiated by a simulated fault current through one phase of the recloser exercising the normal current sensing and control functions of the recloser.

During the test series described above, no lubrication and mechanical adjustment of the operating mechanism were executed as specified by the manufacturer.

Operating sequence	1st series	2nd series	3rd series	4th series	5th series
	Numbers	Numbers	Numbers	Numbers	Numbers
Automatic operation O-0.5s-CO-2s-CO-5s–CO-t_1-C	450	450	450	450	450
Manual operation O-t_2-(C)O	200	200	200	200	200
Notes t_1 : 30 s, t_2 : 30 s (C) : Electric control closing operation.					

Requirement

– During the tests, the recloser operates on command and does not operate without command;
– After the tests, the characteristics measured should be within the tolerances given by the manufacturer;
– Resistance of the main circuit has not increased by more than 20 %;
– After the tests, the recloser is capable of passing a power-frequency withstand test at 80 % of the values;
– After the tests all accessible parts, including contacts, do not show undue wear;
– During and after the tests, any distortion of mechanical parts is not such that it adversely affects the operation of the recloser or prevents the proper fitting of any replacement part.

Result

The vary of the resistance of main circuit of Automatic circuit recloser under test was less than 20% of the value before test.
The object passed the extended mechanical endurance tests of 10 000 operations.

Photograph

Mechanical endurance tests arrangement

10.4 Power-frequency voltage tests as condition check

Standard and date

Standard IEC 62271-111 Edition 3.0, 2019-02, Subclause 7.109.2.2
Test date 18 August 2025

Environmental conditions

Ambient temperature	30.3	°C	Ambient air pressure	1012	hPa
Temperature of object	30.3	°C	Humidity	56	%

Characteristic test data

Specified test voltage: 77 kV
Serial number of ACR 2025105-01

Procedure

The test was carried out with one voltage source and test installation was in dry condition as condition check required after extended mechanical endurance tests. The test voltage was 100% across vacuum distance as specified by manufacturer.

Across vacuum distance			**test voltage:77 kV**		
Condition of ACR	Voltage applied to	Earth connected to	Applied voltage (kV)	Frequency (Hz)	Duration (s)
open	A	a	77	50	60
open	B	b	77	50	60
open	C	c	77	50	60
open	a	A	77	50	60
open	b	B	77	50	60
open	c	C	77	50	60

Note: the power frequency withstand voltage after test was 100% of rated power frequency withstand voltage specified by the manufacturer.

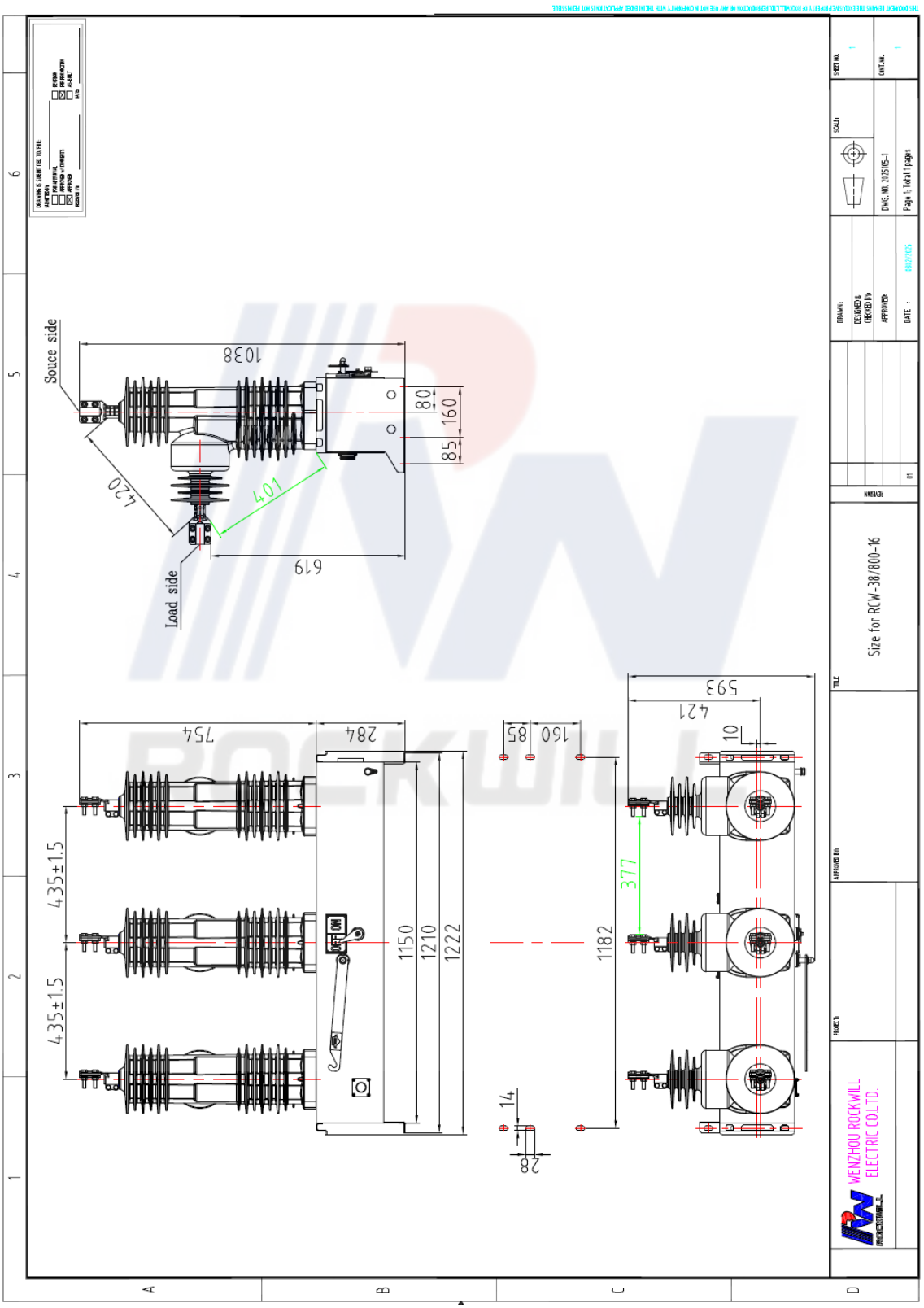
Requirement

No disruptive discharge shall occur.

Result

The object passed the test.

11 ANNEX A DRAWING



12 ANNEX B OSCILLOGRAM OF THE LIGHTNING IMPULSE TESTS

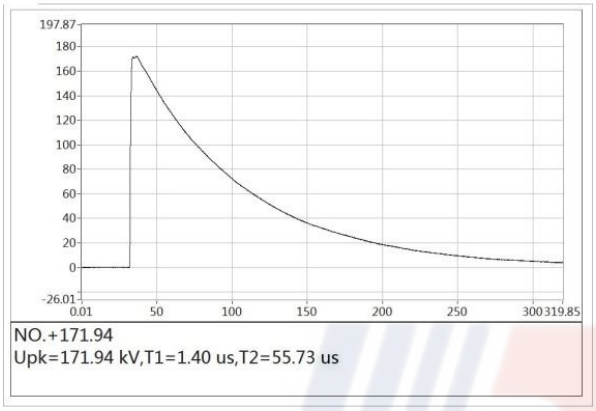


Fig. 01

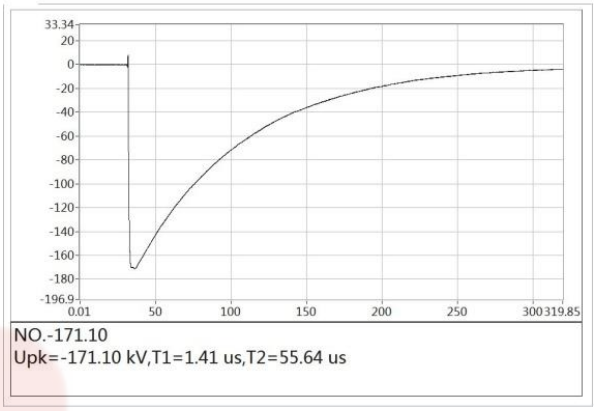


Fig. 02

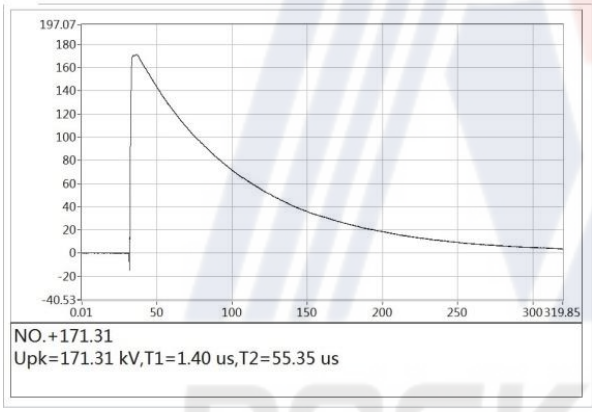


Fig. 03

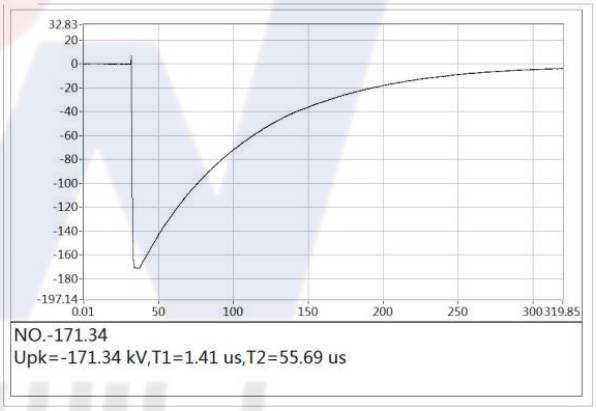


Fig. 04

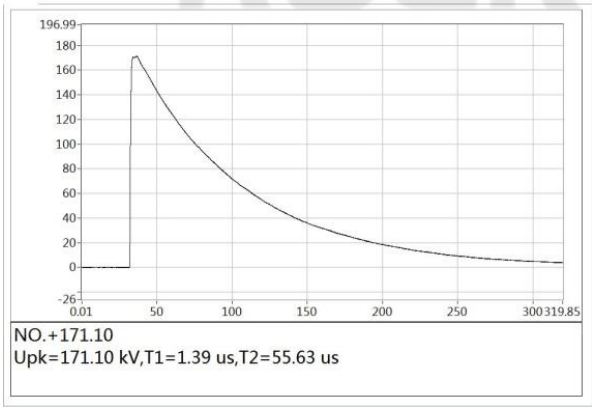


Fig. 05

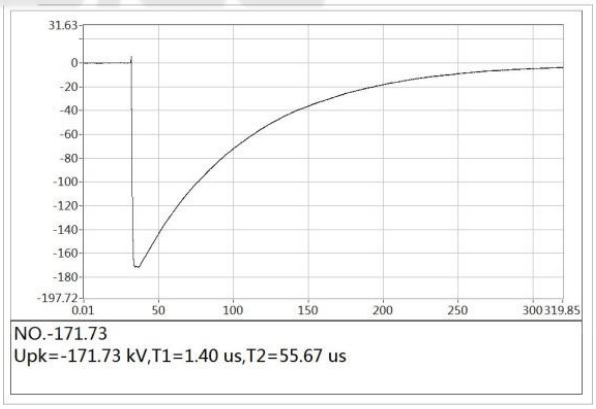


Fig. 06

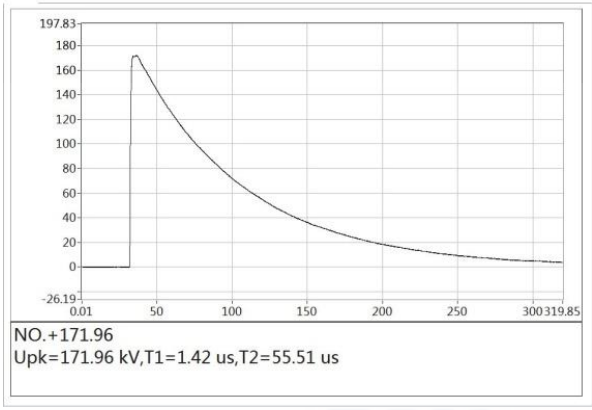


Fig. 07

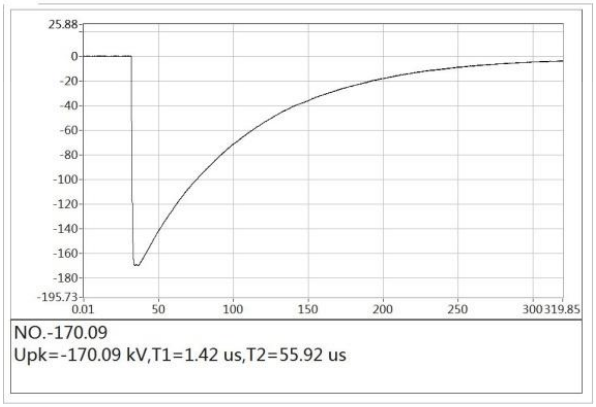


Fig. 08

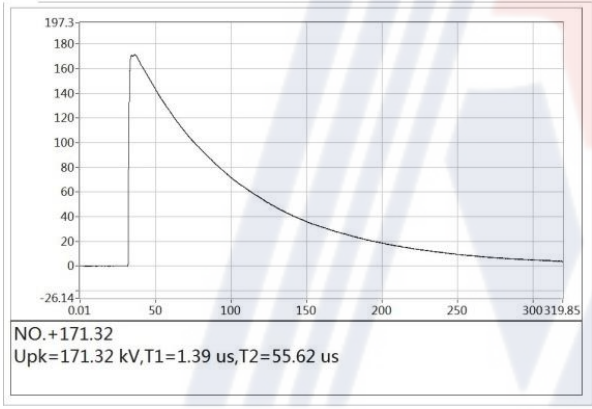


Fig. 09

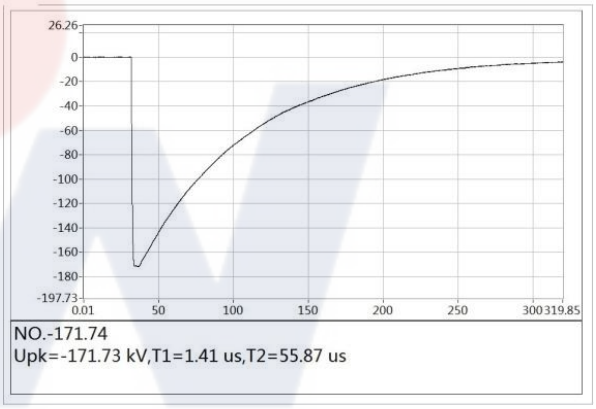


Fig. 10

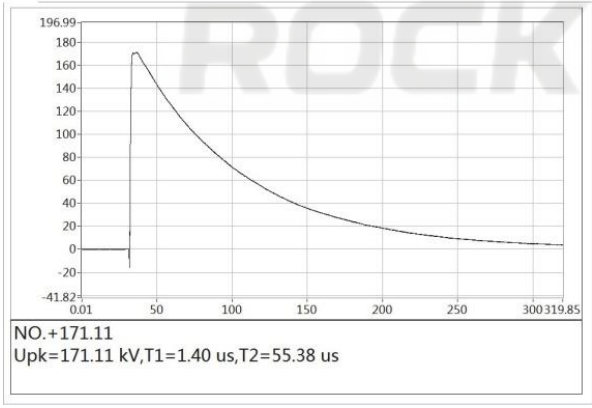


Fig. 11

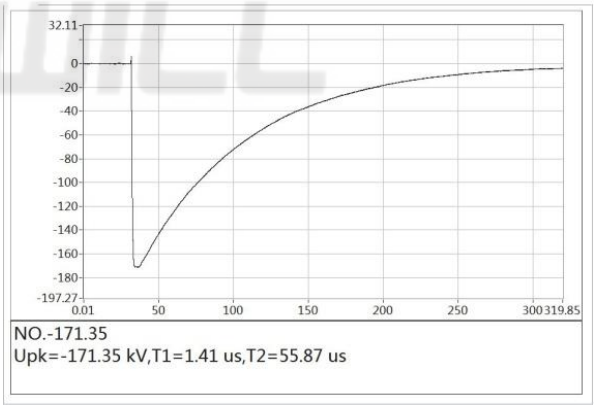


Fig. 12

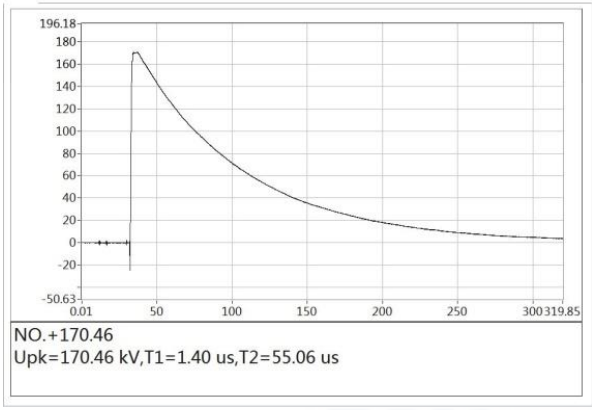


Fig. 13

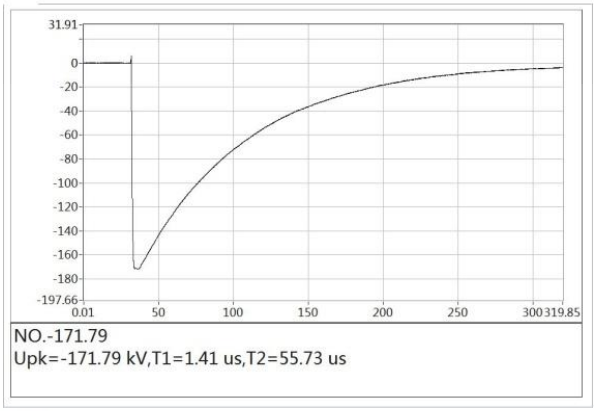


Fig. 14

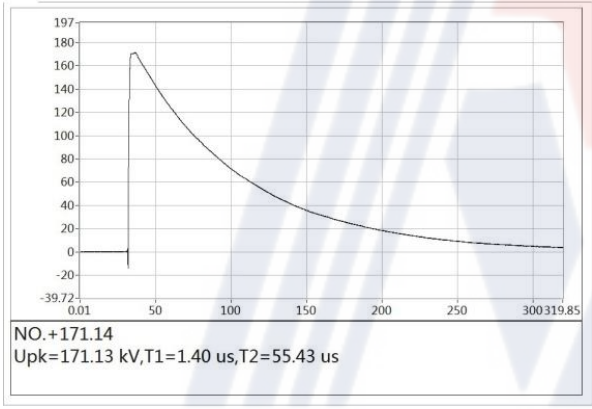


Fig. 15

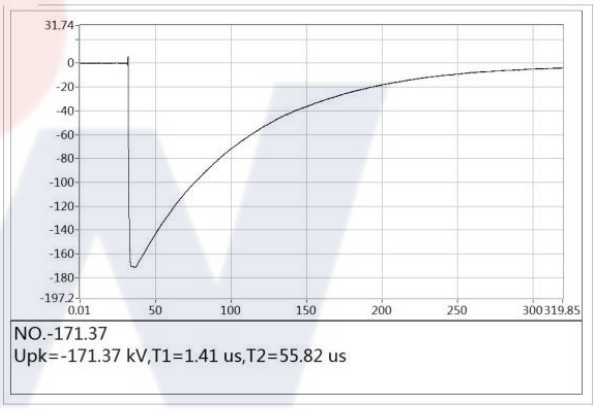


Fig. 16

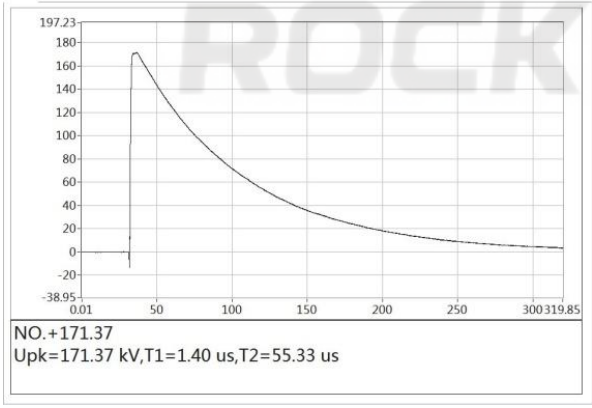


Fig. 17

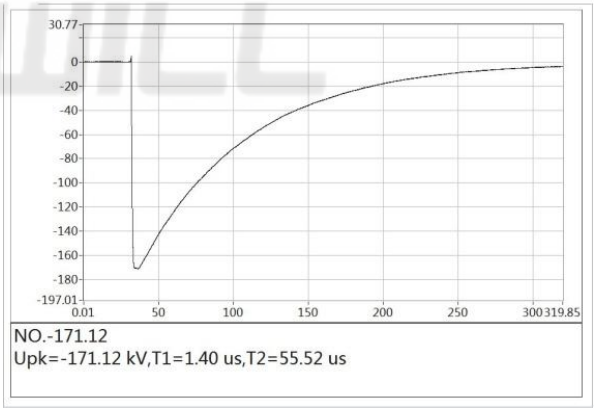
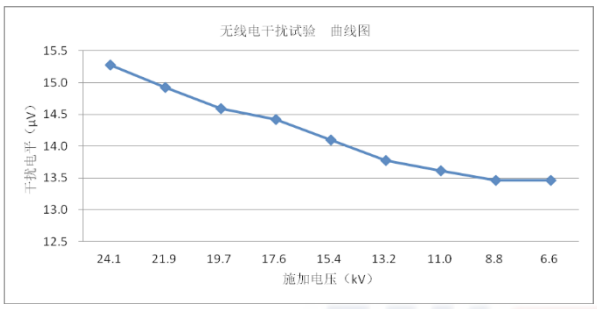
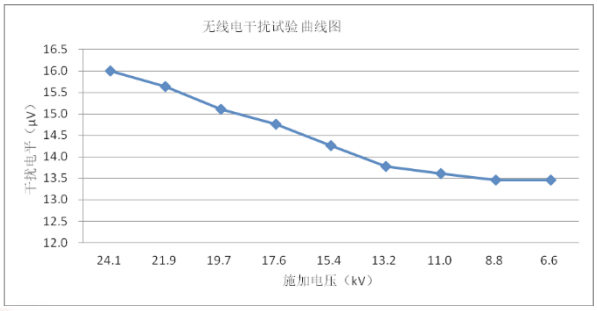


Fig. 18

13 ANNEX C RADIO INTERFERENCE VOLTAGE CURVE



RIVCV25K0180-S-001 (Aa-BbCcF)



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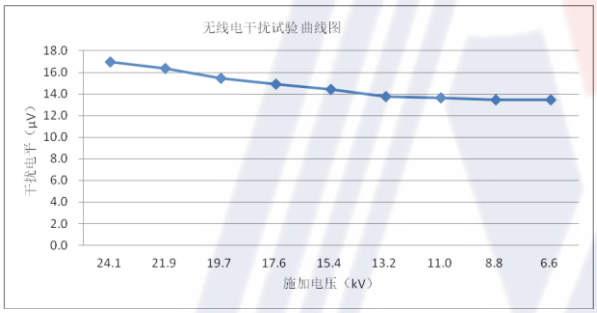
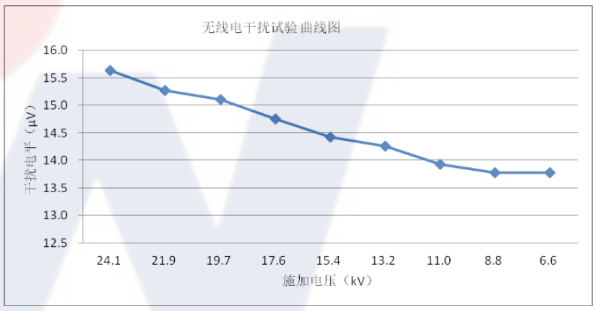


RIVCV25K0180-S-003 (Cc-AaBbF)



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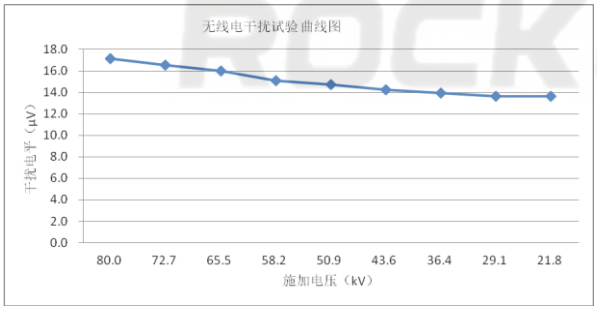

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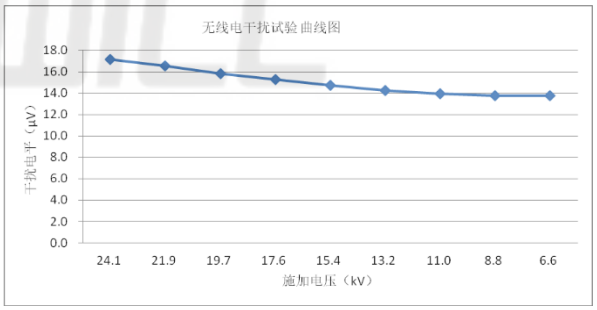

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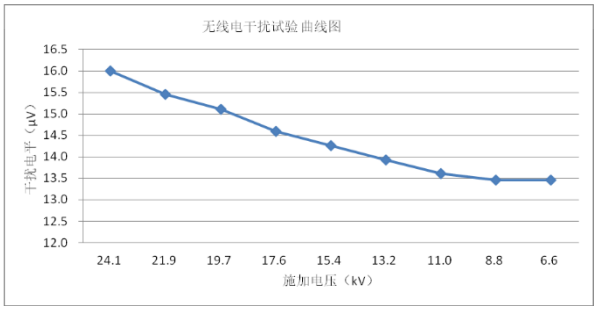
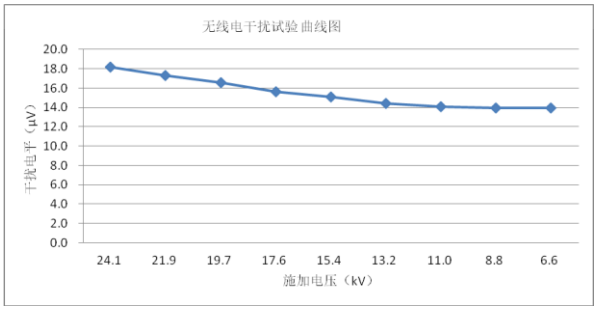


RIVCV25K0180-S-007 (a-ABbCcF)



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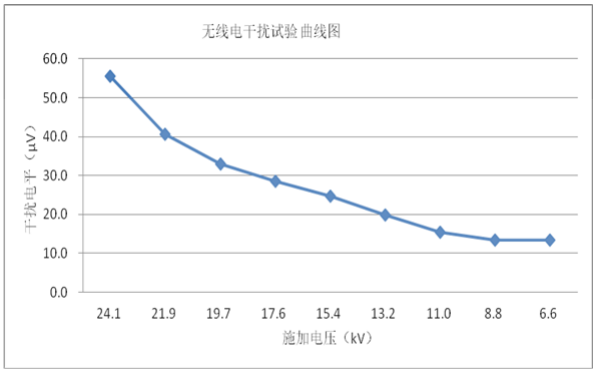

RIVCV25K0180-S-009 (c-AaBbCF)

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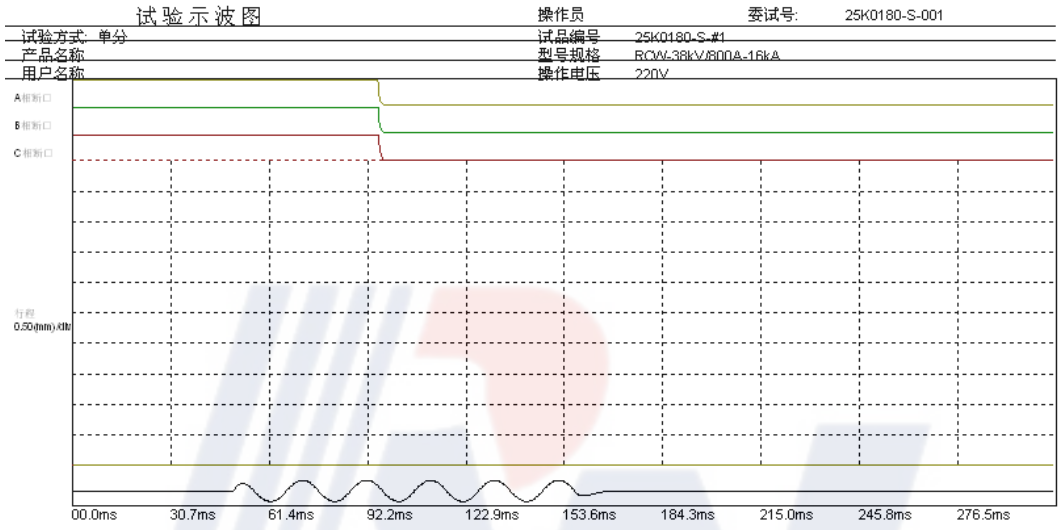
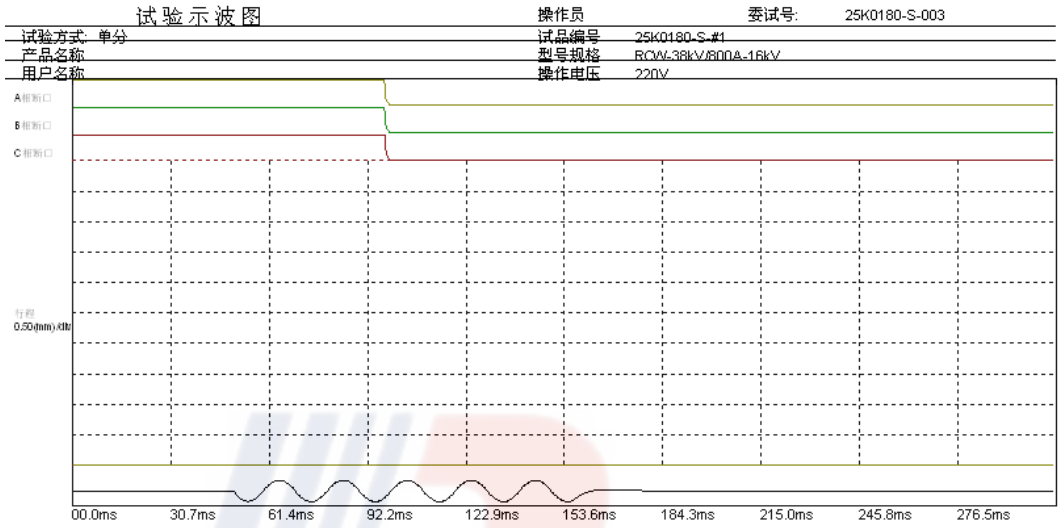
14 ANNEX D NO-LOAD TIME-TRAVEL CHART

Verification test of mechanical endurance test



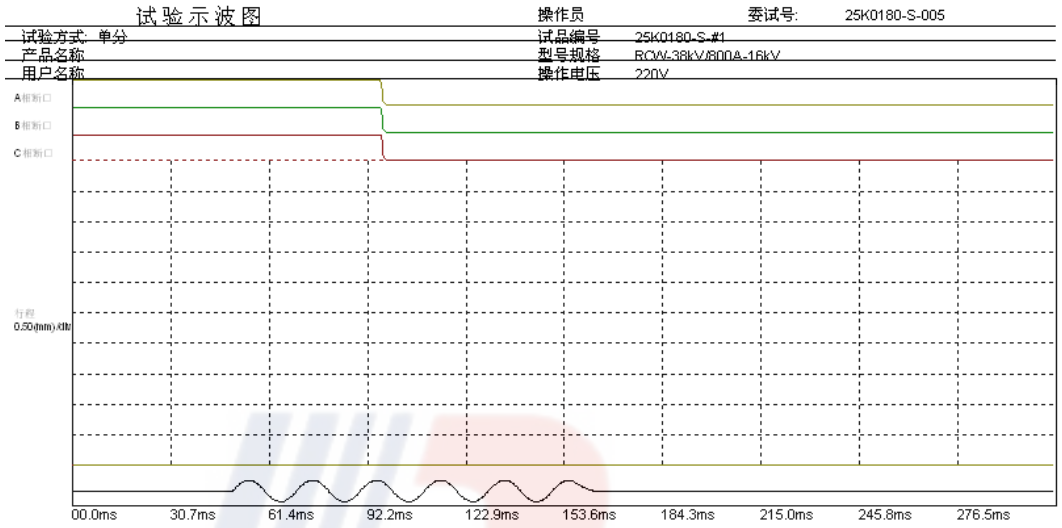
O operation at 220 Vac before mechanical endurance test

C operation at 220 Vac before mechanical endurance test



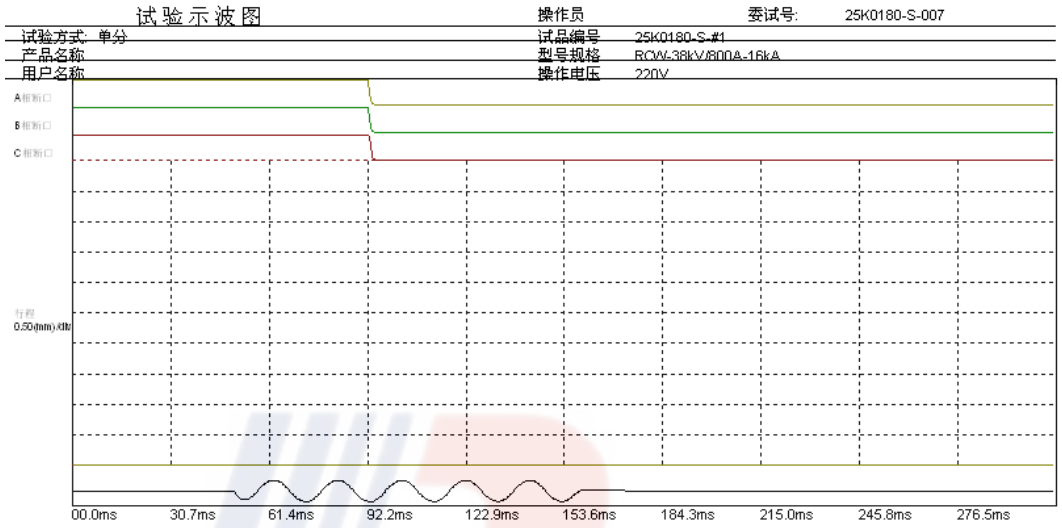
O operation at 220 Vac after 2000 operations mechanical endurance test

C operation at 220 Vac after 2000 operations mechanical endurance test

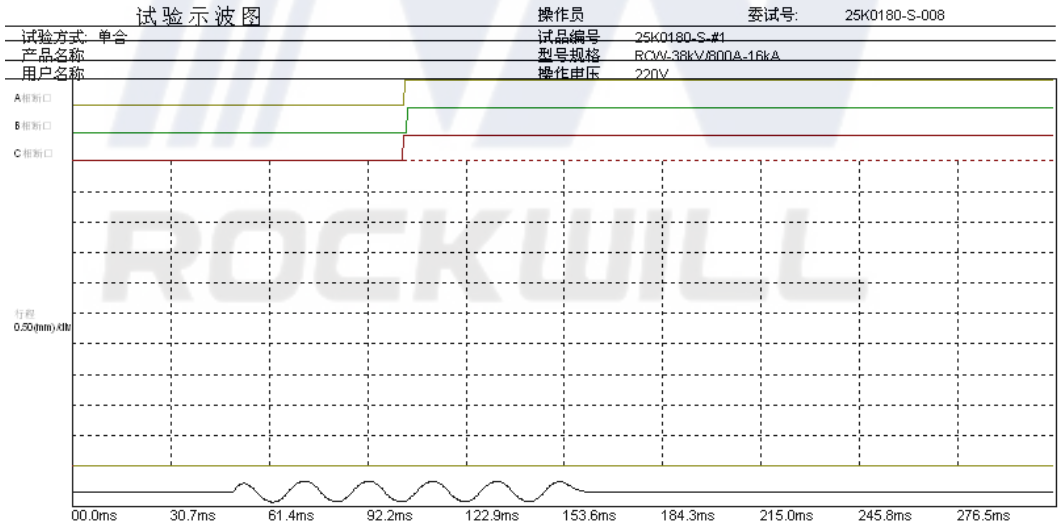


O operation at 220 Vac after 4000 operations mechanical endurance test

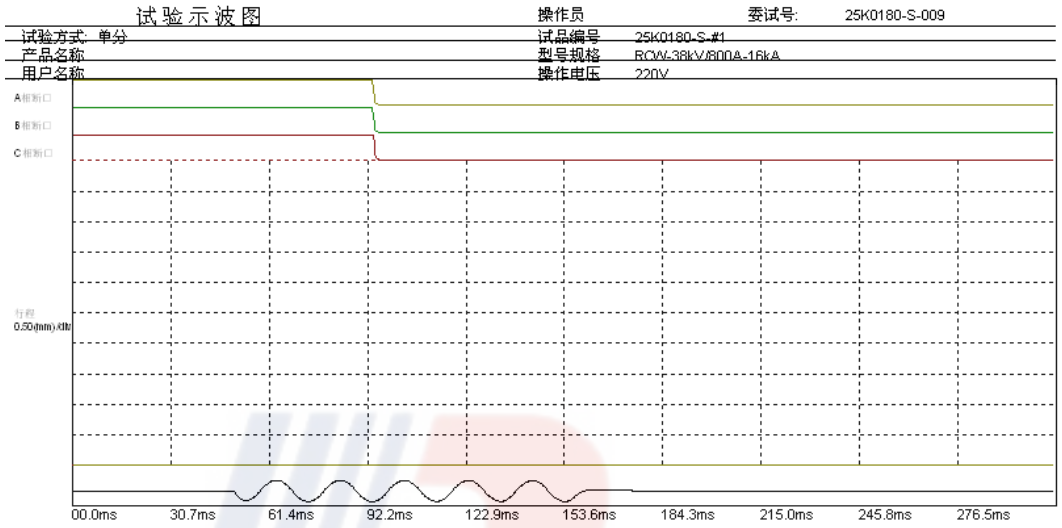
C operation at 220 Vac after 4000 operations mechanical endurance test



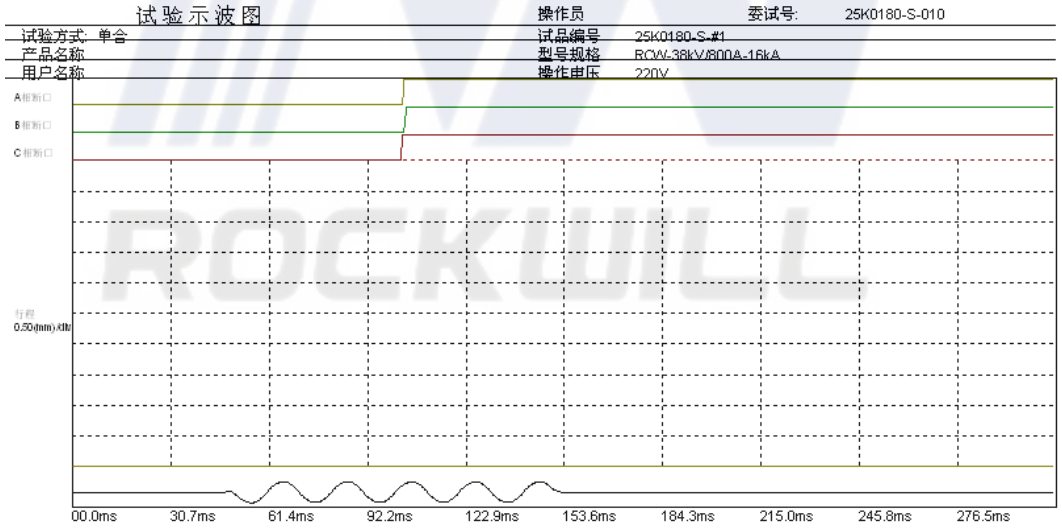
O operation at 220 Vac after 6000 operations mechanical endurance test



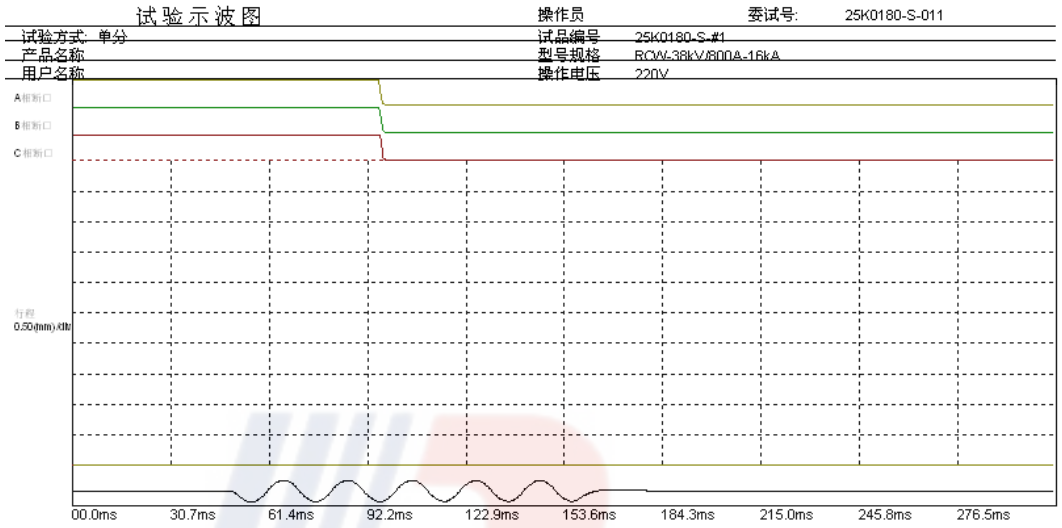
C operation at 220 Vac after 6000 operations mechanical endurance test



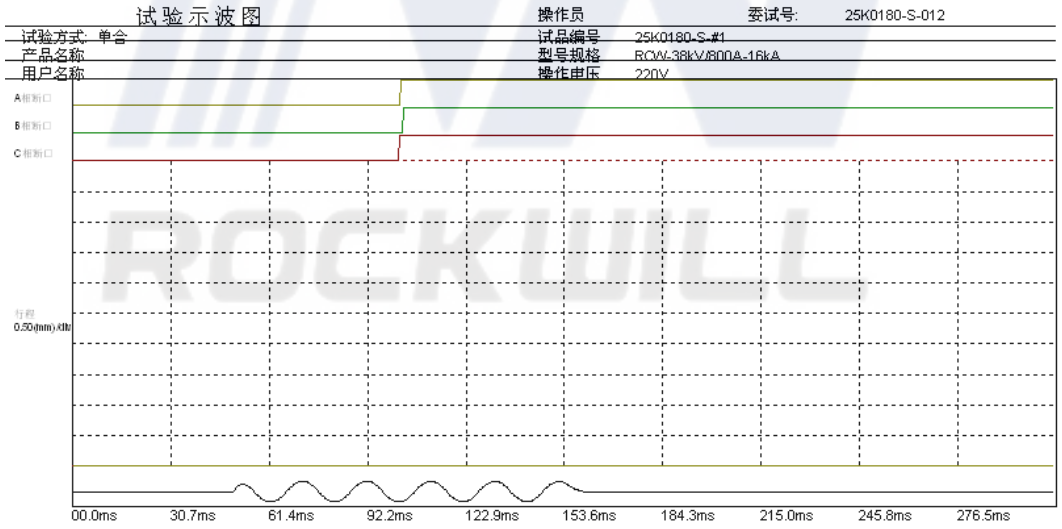
O operation at 220 Vac after 8000 operations mechanical endurance test



C operation at 220 Vac after 8000 operations mechanical endurance test



O operation at 220 Vac after 10 000 operations mechanical endurance test



C operation at 220 Vac after 10 000 operations mechanical endurance test

15 ANNEX E UNCERTAINTY OF MEASUREMENTS

No	Measuring system	Expanded uncertainty
1	Ambient temperature	U < 1.0 °C (k=2)
2	Temperature and humidity recorder	U < 1 g/m^3 (k=2)
3	Voltage/Current measurement system	U < 2% (k=2)
4	RIV measuring system	U=2dB (k=2)
5	Time measurement system for impulse voltage waveform	U<5% (k=2)
6	PD measuring system	<20pC: U=2.4pC (k=2) 20pC～50pC: U=5.4pC (k=2) >50pC: U=12% (k=2)
7	Measurement uncertainty of the circuit resistance test	≤1.5% (k=2)
8	Measurement uncertainty of the temperature-rise test	＜2.0K (k=2)

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