

No. DY203960



中国认可
国际互认
检测
TESTING
CNAS L0153

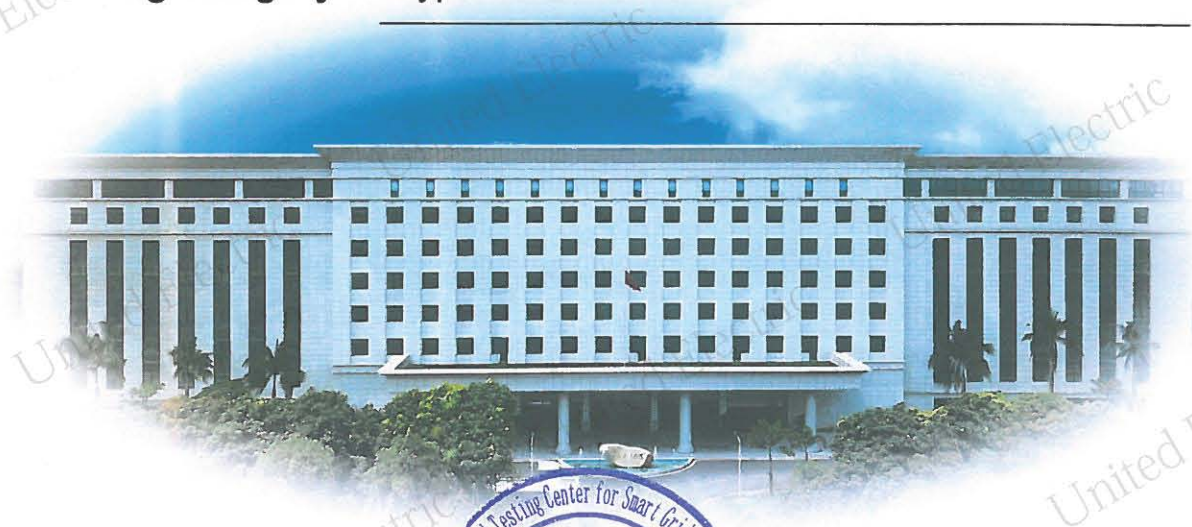
TEST REPORT

Name of product 20 kV Silicone Separable Connector

Type Specification GCA CJB20-3*400

Applicant GCA Co.,Ltd

Testing category Type tests



**CHINA NATIONAL QUALITY SUPERVISION AND TESTING CENTER FOR SMART
GRID TRANSMISSION AND DISTRIBUTION EQUIPMENT(CEST)**



CHINA NATIONAL QUALITY SUPERVISION AND TESTING CENTER FOR
SMART GRID TRANSMISSION AND DISTRIBUTION EQUIPMENT (CEST)

TEST REPORT

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1 Applicant

GCA Co.,Ltd

2 Sample description

Name: 20 kV Silicone Separable Connector

Model: GCA CJB20-3*400

Serial number: —

Date of manufacture: —

Manufacturer/Address: GCA Co.,Ltd/ South Road 4, Guicheng, Nanhai District, Foshan City, Guangdong Province, China

Quantity of sample: 8 PCS

Status of sample: Good condition

3 Testing reference

IEC 60502-4:2010 Power cables with extruded insulation and their accessories for rated voltages from 1 kV ($U_m=1,2$ kV) up to 30 kV ($U_m=36$ kV) - Part 4: Test requirements on accessories for cables with rated voltages from 6 kV ($U_m=7,2$ kV) up to 30 kV ($U_m=36$ kV).

IEC 61442: 2005 Test methods for accessories for power cables with rated voltages from 6 kV ($U_m=7,2$ kV) up to 30 kV ($U_m=36$ kV).

4 Judgment reference

IEC 60502-4:2010 Power cables with extruded insulation and their accessories for rated voltages from 1 kV ($U_m=1,2$ kV) up to 30 kV ($U_m=36$ kV) - Part 4: Test requirements on accessories for cables with rated voltages from 6 kV ($U_m=7,2$ kV) up to 30 kV ($U_m=36$ kV).

Consigner's technical requirements.

5 Testing category

Type tests

6 Test items

22 items

7 Date of testing

From 2020-10-09 to 2020-12-02

8 Conclusion

The sample was tested according to test standards and product technical requirements, all items were found to comply with testing reference.

9 Notes

1. The rated current of separable connector refers to the rating of the mating bushing;
2. According to consigner's technical requirements, the dynamic and thermal short-circuit test current were tested refer to the test current of 300 mm² copper-core cable.

Tested by: _____

Reviewed by: _____

Approved by: _____

Date: _____

2020-12-04



10 Number and installation of samples

8 PCS of 20 kV Silicone Separable Connector and 3 cables (ZC-YJV22-12/20 3×400 (mm²)) were sent by the manufacturer to form 1#, 2#, 3# and 4# combined samples, as follows:

1#: Cold shrinkable termination (Cooperation test) +Cable+20 kV Silicone Separable Connector (8-1, 8-2, 8-3);

2#: Cold shrinkable termination (Cooperation test) +Cable+20 kV Silicone Separable Connector (8-4, Cooperation test 1, Cooperation test 2);

3#: Cold shrinkable termination (Cooperation test) +Cable+20 kV Silicone Separable Connector (8-5, 8-6, 8-7);

4#: 20 kV Silicone Separable Connector (8-8).

Among them, 1# and 2# combined samples were used for the tests of procedure 4.1 in Table 8 of IEC 60502-4:2010, 3# combined sample was used for the tests of procedure 4.2 and 4.3 in Table 8 of IEC 60502-4:2010, and 4# combined sample was used for the test of screen resistance and screen leakage current in Table 8 of IEC 60502-4:2010.

The cables between the 20 kV Silicone Separable Connector and the Cold shrinkable termination (Cooperation test) were all greater than 2m.

11 Test items and results

Cl.	Test item	Test Requirement	Result-Remark			Verdict
			1#	2#		
1	AC voltage (dry test)	Voltage: <u>54</u> kV Time: <u>5</u> min No breakdown, No flashover.	<u>54 kV</u> <u>5 min</u> <u>Complied</u>			Pass
2	DC voltage (dry test)	Voltage: <u>48</u> kV Time: <u>15</u> min No breakdown, No flashover.	<u>48 kV</u> <u>15 min</u> <u>Complied</u>			Pass
3	Partial discharge (at ambient temperature)	Voltage: <u>20</u> kV Noise background: ≤ <u>5</u> pC Discharge: ≤ <u>10</u> pC	A	B	C	Pass
			<u>≤5 pC</u>	<u>20 kV</u> <u><2 pC</u> <u>≤5 pC</u>	<u>≤5 pC</u>	
4	Impulse (at the maximum cable conductor temperature in normal operation +5 K to 10 K)	Power cable temperature (<u>95 - 100</u>)°C: Voltage(peak): <u>125</u> kV 10 impulses of each polarity No breakdown, No flashover.	<u>96°C</u> <u>See Annex B.1.1</u> <u>Complied</u> <u>Complied</u>			Pass

Cl.	Test item	Test Requirement	Result-Remark		Verdict	
			1#	2#		
5	Heating cycles in air	Power cable temperature (95 - 100.)°C: Voltage: <u>30</u> kV Cycles: <u>30</u> No breakdown, No flashover.	<u>96°C</u> <u>30 kV</u> <u>30</u> <u>Complied</u>		Pass	
6	Heating cycles under water	Power cable temperature (95 - 100.)°C: Voltage: <u>30</u> kV Cycles: <u>30</u> No breakdown, No flashover.	<u>98°C</u> <u>30 kV</u> <u>30</u> <u>Complied</u>		Pass	
7	Disconnect/connect	Five times, No visible damage to contact.	<u>Complied</u>		Pass	
8	Partial discharge test (at ambient temperature)	Voltage: <u>20</u> kV Noise background: ≤ <u>5</u> pC Discharge: ≤ <u>10</u> pC	A	B	C	Pass
			<u>20 kV</u> <u><2 pC</u> <u>≤6 pC</u>	<u><2 pC</u> <u>≤6 pC</u>	<u>≤6 pC</u>	
9	Partial discharge test (at the maximum cable conductor temperature in normal operation +5 K to 10 K)	Power cable temperature (95 - 100.)°C: Voltage: <u>20</u> kV Noise background: ≤ <u>5</u> pC Discharge: ≤ <u>10</u> pC	A	B	C	Pass
			<u>96°C</u> <u>20 kV</u> <u><2 pC</u> <u>≤6 pC</u>	<u><2 pC</u> <u>≤6 pC</u>	<u>≤6 pC</u>	
10	Impulse (at ambient temperature)	Voltage (peak): <u>125</u> kV 10 impulses of each polarity No breakdown, No flashover.	<u>See Annex B.2.1</u> <u>Complied</u> <u>Complied</u>		Pass	
11	AC voltage (dry test)	Voltage: <u>30</u> kV Time: <u>15</u> min No breakdown, No flashover.	<u>30 kV</u> <u>15 min</u> <u>Complied</u>		Pass	
12	Examination	No cracking in the filling media and/or tape or tube components; No moisture path across a primary seal; No corrosion and/or tracking and/or erosion; No leakage of any insulating material.	<u>Complied</u> <u>Complied</u> <u>Complied</u> <u>Complied</u>		Pass	

Cl.	Test item	Test Requirement	Result-Remark	Verdict
			3#	
13	AC voltage (dry test)	Voltage: <u>54</u> kV Time: <u>5</u> min No breakdown, No flashover.	<u>54 kV</u> <u>5 min</u> <u>Complied</u>	Pass
14	DC voltage (dry test)	Voltage: <u>48</u> kV Time: <u>15</u> min No breakdown, No flashover.	<u>48 kV</u> <u>15 min</u> <u>Complied</u>	Pass
15	Dynamic short-circuit	Test Current (peak): <u>132.7</u> ^{+5%} ₀ kA Test duration: ≥ 10 ms No visible deterioration. Oscillogram No.	<u>133.6 kA</u> <u>23.1 ms</u> <u>Complied</u> <u>D20E-GY1836-S1</u>	Pass
16	Thermal short-circuit (conductor)	Test Current (rms): <u>30.7</u> ^{+5%} ₀ kA Test duration: 3 s Test times: Twice No visible deterioration. Oscillogram No.	<u>31.2 kA</u> <u>31.4 kA</u> <u>3.04 s</u> <u>3.03 s</u> <u>Twice</u> <u>Complied</u> <u>D20E-GY1836-S2</u> <u>D20E-GY1836-S3</u>	Pass
17	Disconnect/connect	Five times, No visible damage to contact	<u>Complied</u>	Pass
18	Impulse (at ambient temperature)	Voltage(peak): <u>125</u> kV 10 impulses of each polarity No breakdown, No flashover.	<u>See Annex B.3.1</u> <u>Complied</u> <u>Complied</u>	Pass
19	AC voltage (dry test)	Voltage: <u>30</u> kV Time: <u>15</u> min No breakdown, No flashover.	<u>30 kV</u> <u>15 min</u> <u>Complied</u>	Pass
20	Examination	No cracking in the filling media and/or tape or tube components; No moisture path across a primary seal; No corrosion and/or tracking and/or erosion; No leakage of any insulating material.	<u>Complied</u> <u>Complied</u> <u>Complied</u> <u>Complied</u>	Pass

Cl.	Test item	Test Requirement	Result-Remark	Verdict
			4#	
21	Screen resistance	Before thermal ageing Screen resistance $\leq 5 \text{ k}\Omega$ Thermal ageing test temperature: $120^\circ\text{C} \pm 2^\circ\text{C}$ Thermal ageing test time: 168 h After thermal ageing Screen resistance $\leq 5 \text{ k}\Omega$	<u>198 Ω</u> <u>120$^\circ\text{C}$</u> <u>168 h</u> <u>178 Ω</u>	Pass
22	Screen leakage current	Voltage: <u>24 kV</u> Screen leakage current $\leq 0.5 \text{ mA}$	<u>24 kV</u> <u>$\leq 0.05 \text{ mA}$</u>	Pass

ANNEX A List of main test equipments

List of main test equipments					
Cl.	Device name	Type	No. of equipment	Term of validity	Check before test Normal/ abnormal
1	AC withstand voltage test equipment	LH-AC2000	24183	2020-12-25	√
2	Peak voltmeter	YXY-09	C24E006	2021-08-25	√
3	Digital DC high-voltage generator	NDZGF-60kV/5mA	C28G253	2020-12-26	√
4	Calibration pulse generator	TWPD-02	24184-A	2021-09-08	√
5	Multichannel digital PD integrative analysis system	TWPD-2B-4CH	24184	2021-07-09	√
6	Impulse voltage generator	CDYL-400kV/20kJ	C24E083	2021-08-29	√
7	Data acquisition recorder	34972A	C24E071-03	2021-07-13	√
8	Digital multimeter	34410A	24194	2021-07-13	√
9	AC/DC clamp meter 2000A	F603	C24E068	2021-05-12	√
10	Instantaneous recorder	Saturn 8 channels	C28E032-02	2020-12-25	√
11	Heating cabinet	LC-212	03037	2021-03-11	√

ANNEX B Impulse voltage test

B.1 Before heating cycles in air

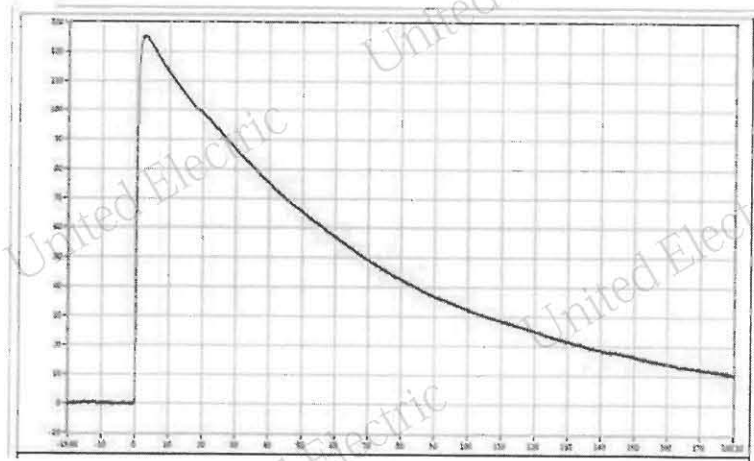
B.1.1 Voltage value of Impulse voltage test (at the maximum cable conductor temperature in normal operation +5 K to 10 K)

Ambient temperature: 28 °C Relative humidity: 60% Atmosphere: 100.8 kPa

(kV)

1#, 2#	Positive (+)	125.10	124.98	125.37	125.66	125.31	125.62	125.16	125.41	125.23	125.36
	Negative (-)	125.53	125.36	124.85	124.81	125.28	125.19	125.39	125.26	125.31	125.12

B.1.2 The oscillogram of impulse (at the maximum cable conductor temperature in normal operation +5 K to 10 K)



Positive



Negative

B.2 After heating cycles under water

B.2.1 Voltage value of Impulse voltage test (at ambient temperature)

Ambient temperature: 27 °C

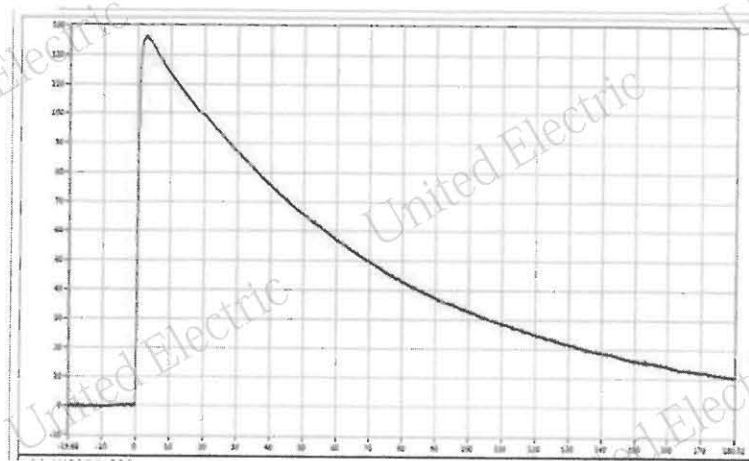
Relative humidity: 58%

Atmosphere: 100.5 kPa

(kV)

1#	Positive (+)	124.96	125.11	125.63	125.22	125.75	125.35	125.29	122.14	124.80	124.55
2#	Negative (-)	125.18	125.32	125.45	125.27	125.61	124.90	124.87	125.26	125.40	125.24

B.2.2 The oscillogram of impulse (at ambient temperature)



Positive



Negative

B.3 After short-circuit (conductor)

B.3.1 Voltage value of Impulse voltage test (at ambient temperature)

Ambient temperature: 28 °C

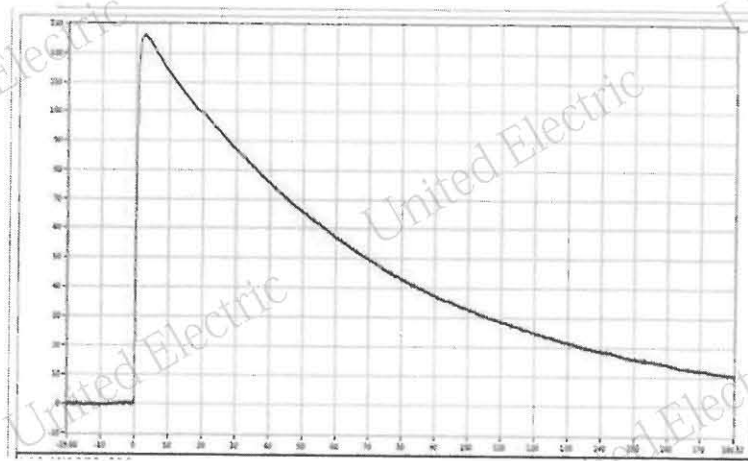
Relative humidity: 58%

Atmosphere: 100.9 kPa

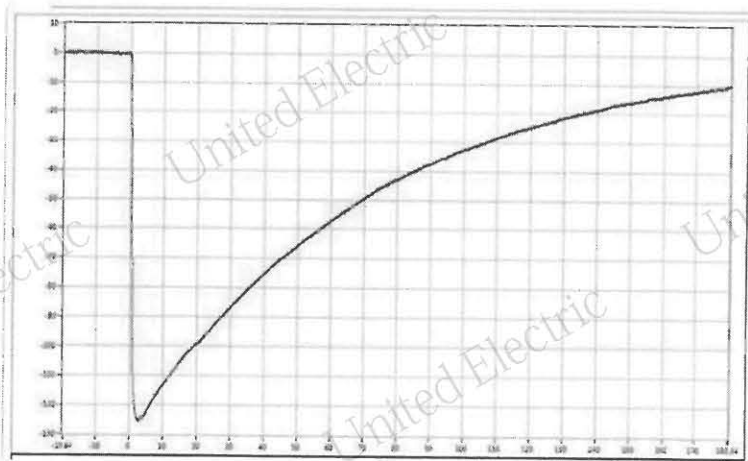
(kV)

3#	Positive (+)	125.37	125.16	124.91	124.80	125.31	125.37	125.78	125.32	125.43	125.39
	Negative (-)	124.64	124.87	125.44	125.30	125.26	125.33	125.63	125.41	125.39	125.34

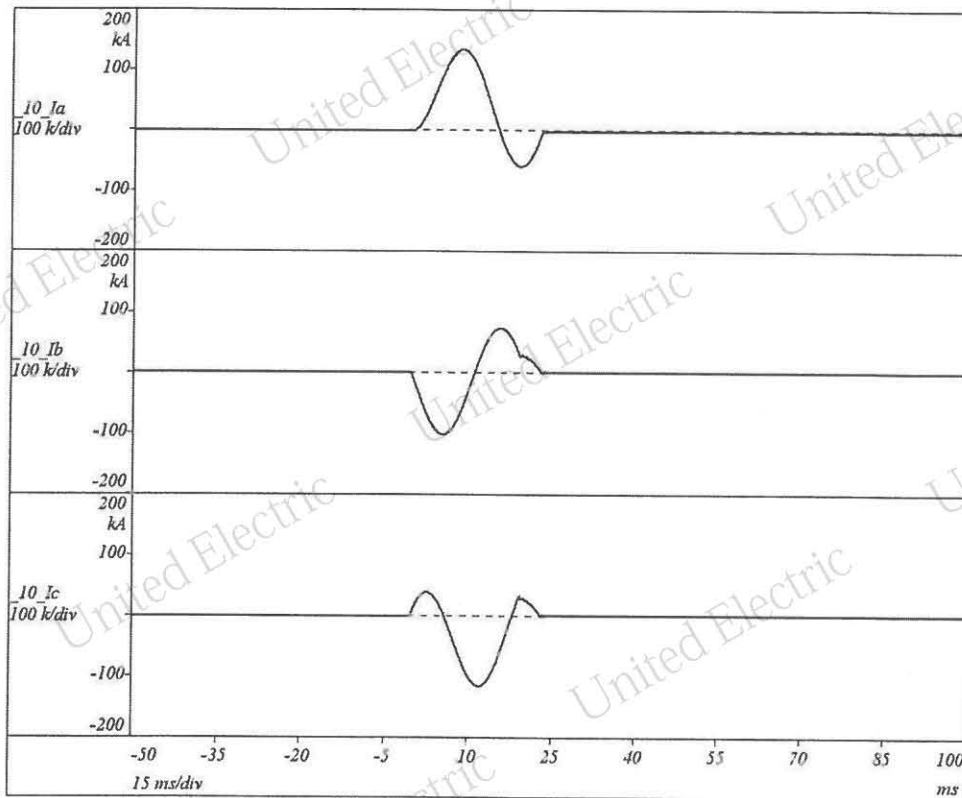
B.3.2 The oscillogram of impulse (at ambient temperature)



Positive

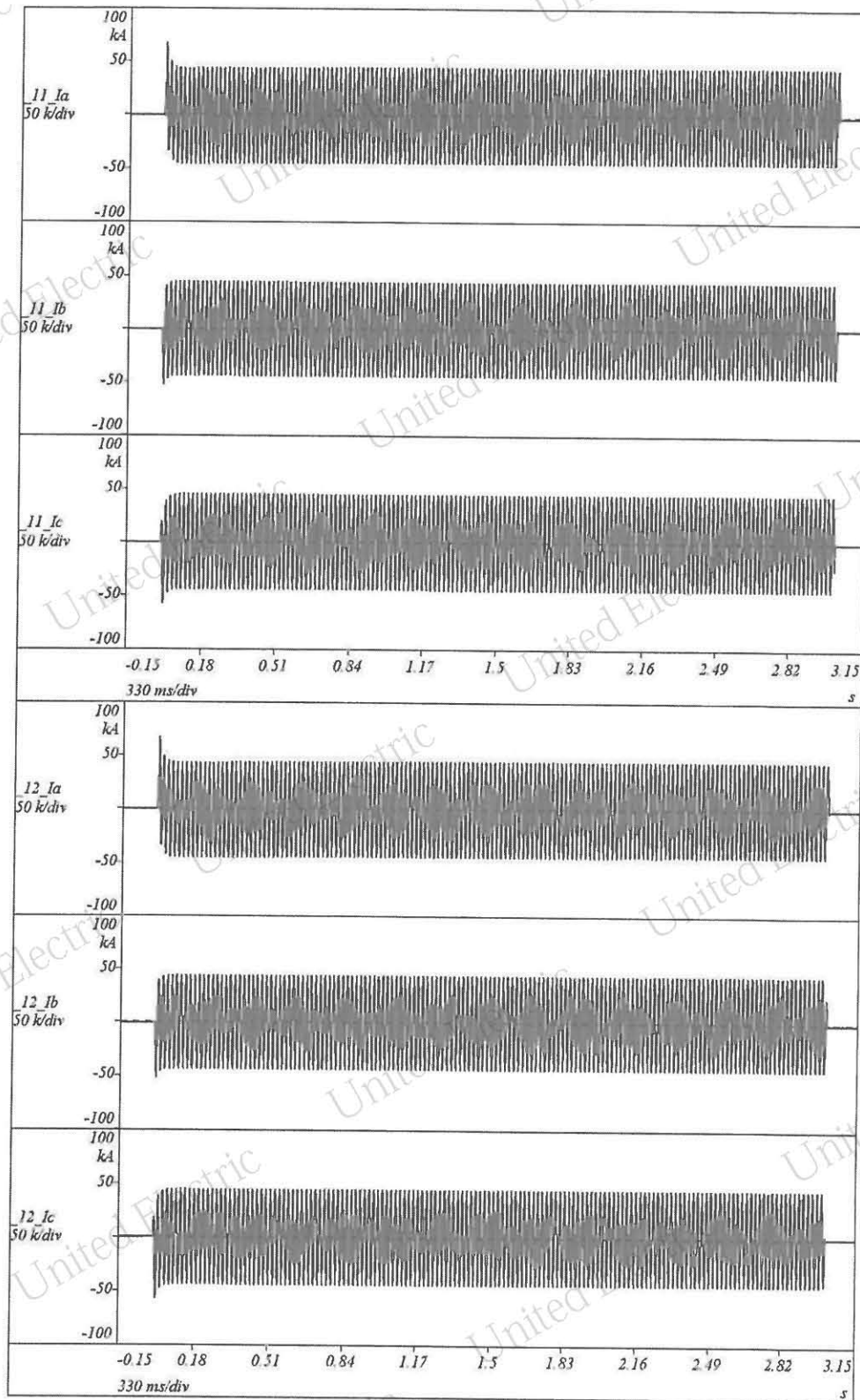


Negative

ANNEX C Short-circuit oscillogramDynamic short-circuit
(conductor)Conductor
 I_{dy} $I_p=133.6\text{ kA}$

Duration: 23.1ms

D20E-GY1836-S1



Thermal short-circuit
(conductor)

Conductor
lth-1

$I_a=31.4\text{kA}$
 $I_b=31.0\text{kA}$
 $I_c=31.2\text{kA}$

$I_p=66.9\text{kA}$

$I^2t=3000\text{MA}^2\text{s}$

Duration: 3.04s

D20E-GY1836-S2

Conductor
lth-2

$I_a=31.2\text{kA}$
 $I_b=30.9\text{kA}$
 $I_c=31.0\text{kA}$

$I_p=66.8\text{kA}$

$I^2t=2953\text{MA}^2\text{s}$

Duration: 3.03s

D20E-GY1836-S3

ANNEX D Photo



20 kV Silicone Separable Connector

ANNEX E Identification of test cable

Rated voltage $U_0/U(U_m)$ kV		12/20(24) kV
Structure	Core number	3
	Screen structure	Phase separation shielding
Conductor	Material	Copper
	Shape	Compact circular stranding
	Cross-section	400 mm ²
	External diameter	22.2 mm
Insulation	Material	XLPE
	Thickness	5.9 mm
	External diameter	35.4 mm
The highest temperature of conductor during normal operation of cable		90°C
Maximum permissible short-circuit temperature of cable		250°C
Screen	Conductor screen thickness	0.5 mm
	Insulation screen thickness	0.6 mm
	Whether the insulation shield can be stripped	Yes
	Insulation screen external diameter	36.6 mm
	Metallic screen	Copper braid
Armour		Fine steel wire armour
Outer sheath	Material	PVC
	External diameter	94~96 mm
Cable marking		ZC-YJV22-12/20 3×400

Notations:

1. Test address: No.68, XiHu East Road, ShiLong Town, Dongguan City, Guangdong Province, China
 2. Consigner address and postcode: South Road 4, Guicheng, Nanhai District, Foshan City, Guangdong Province, China
 3. Test ambient condition: Temperature: (20.0~31.0) °C, humidity: 45% ~ 70%, other: -----
 4. Bill of testing plan: YGY20/001876
 5. Sampling sequence (when applicable): -----
 6. Explanation for deviation from the Standards (when applicable): -----
 7. Explanation for uncertainty of test results (when applicable): -----
 8. Sub-contracted items (when applicable): -----
-



广东产品质量监督检验研究院

GUANGDONG TESTING INSTITUTE OF PRODUCT QUALITY SUPERVISION

Guangdong Testing Institute of Product Quality Supervision (In Short GQI), also called Guangzhou Electrical Safety Testing Institute, Guangdong Testing and Certification Institute, was set up in September, 1983. It is a public institution affiliated to Guangdong Administration for Market Regulation (Administration for Intellectual Property).

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GQI currently undertakes commitment of 10 national supervision and testing centers, which are:

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- ▼ China National Quality Supervision and Testing Center for Smart Grid Transmission and Distribution Equipment (CEST)
- ▼ China National Quality Supervision and Testing Center for Paintings and Dopes (Guangdong)
China National Quality Supervision and Testing Center for Food (Guangdong)
- ▼ China National Quality Supervision and Testing Center for Machinery Safety
- ▼ China National Quality Supervision and Testing Center for Fire Fighting Products (Guangdong)
- ▼ China National Quality Supervision and Testing Center for Solar Energy Photovoltaic Products (Guangdong)
- ▼ China National Quality Supervision and Testing Center for Cables and Wires (Guangdong)
China National Quality Supervision and Testing Center for Industrial Robots (Guangdong)