No. DY201020

中国认可
国际互认
检测
TESTING
CNAS L0153

TEST REPORT

Name of product	Metal Oxide Surge Arresters Without Gaps
Type Specification	YH10W-36
Applicant	SHIJIAZHUANG YONGRUI ELECTRICAL EQUIPMENT CO., LTD.
Testing category	Type Test

GUANGDONG TESTING INSTITUTE OF PRODUCT QUALITY SUPERVISION

广东产品质量监督检验研究院

Guangdong Testing Institute of Product Quality Supervision

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产品名称 Name of product	Metal Oxide Surge Arresters Without Gaps	生产日期/有效日期 Date of manufacturing/ expiry	——/ ——
型号、规格、商标、等级 Type,Specification, Trade mark, Class	YH10W-36	编号/批号 Batch No.	——/ ——
受检单位 Inspected unit	——	检测/抽样单号 No. of testing/sampling plan	YGY20/000875/ ——
受检单位地址 Address of inspected unit	——	检测类别 Testing category	Type Test
委托单位(申请人) Applicant	SHIJIAZHUANG YONGRUI ELECTRICAL EQUIPMENT CO., LTD.	抽样地点 Location of sampling	——
生产单位 Factory	SHIJIAZHUANG YONGRUI ELECTRICAL EQUIPMENT CO., LTD.	抽样基数 Basic quantity of sampling	——
生产单位地址 Address of factory	No.268, Xingye East Street, Xinji Economic Development Zone, Hebei,China	来样方式 Way of sample incoming 送/抽样者 Personnel performing sending /sampling	Customer Sampling sending (Wu Pin)
样品数量 Quantity of sample	See notes	到/抽样日期 Date of receipt of sample/ sampling	2020-04-22/ ——
样品状态 Status of sample	Good condition	检测日期 Date (s) of performance of tests	2020-04-22 to 2020-07-29
检测依据 Testing reference	IEC 60099-4: 2014 Surge arresters - Part 4: Metal-oxide surge arresters without gaps for a.c. systems		
判定依据 Judgment reference	Consignor's technical condition		
检测结论 Conclusion	Type tests were carried out in accordance with the requirements of testing reference and judgement reference. The samples were found to comply with the above testing reference and the basis of judgement. 检验检测专用章 Official testing stamp of the institute 签发日期 Date of issue 2020-07-29		
备注 Notes	Arrester:1#~12#, Composite housing:W_1~W_3, Section of an arrester:B_1~B_{15}, MO resistance:R_1~R_{40}, Arrester disconnector:T_1~T_{50},Specimens of shed and housing material:Y_1~Y_3.		

批准: 马松涛 Approved by:

审核: 袁小娟 Reviewed by:

主检: 张一帆 Tested by:

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Catalogue

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Test items summary

Item	Test items		Specified values Standards (Consigner's technology condition)	Measured values	Conclu-sions
1	Insulation withstand tests on the arrester housing	Lightning impulse test	Specified voltage (kV):170 Atmospheric correction factor Kt: 1.001 Corrected voltage (kV): 170.2 Application number: 15 times for each polarity. During the test, no internal disruptive discharges shall occur and if the number of the external disruptive discharges does not exceed two in each series of 15 impulses.	W_1 170.0 1.001 +168.32~+171.80/ -169.40~-172.31 15 times for each polarity Complied	Pass
		Power-frequency voltage test	Wet conditions test Specified voltage (kV):70 Atmospheric correction factor Kt: 0.996 Corrected voltage (kV):69.7 Duration (s):60 No flashover or pucture shall occur during the test.	70.0 0.996 69.7 60 No flashover or pucture/ Complied	Pass
2	Residual voltage test	Lightning impulse residual voltage test	Lightning impulse current (8/20μs) (kA):10 Residual voltage (kV):≤103	R_1 R_2 R_3 101.14	Pass
		Steep current impluse residual voltage test	Steep impulse current (1μs) (kA):10 Residual voltage (kV):≤123	119.57	
3	Test to verify long term stability under continuous operating voltage		See page 9	B_1 B_2 B_3 See page 9	Pass
4	Repetitive charge transfer withstand test		Repetitive charge transfer rating, Qrs (C): 0.4	R_4~ R_{13} See page 10	Pass
5	Heat dissipation behaviour verification of test sample		See page 11~12	$1^{\#}$ B_4 Heat dissipation behaviour curve See page 12	/

Note: In conclusions,"/" means provide test data only.

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Test items summary					
Item	Test items		Specified values Standards (Consigner's technology condition)	Measured values	Conclu-sions
6	Operating duty test		4/10μs Peak current (kA):100 Impact times:1 Thermal charge transfer rating Qth (C):1.1 Thermal recovery has been demonstrated; No physical damage is evident; U_{res} changed ratio (%):≤±5	B_5~B_7 See page 13	Pass
7	Power-frequency voltage versus time test		See page 14	B_8~ B_{12} See page 14	Pass
8	Arrester disconn-ector test	Repetitive charge transfer withstand test	Repetitive charge transfer rating, Qrs (C):0.4	T_1~ T_3 See page 15	Pass
		Operating duty test	4/10μs Peak current (kA):100 Impact times:1 Thermal charge transfer rating,Qth (C):1.1 The disconnectors shall withstand the tests without operating.	B_{13}+T_4~ B_{15}+T_6 See page16	Pass
		Time versus current test	See page 17	T_7~T_{21} See page 17	/
		Temperature cycling and seal pumping test	See page 17~18	T_{22}~T_{31} See page 17~18	Pass
9	Short-circuit tests		See page 19	$2^{\#}$~$5^{\#}$ See page 19	Pass
10	Bending moment test		See page20~21	$6^{\#}$~$8^{\#}$ See page 20~21	Pass

Note: In conclusions,"/" means provide test data only.

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Test items summary

Item	Test items		Specified values Standards (Consigner's technology condition)	Measured values	Conclu-sions
11	Seal leak rate test		Seal leak rate test (Hot water immersion) Water temperature (℃):— Environment temperature (℃):≥5 Temperature difference (K):45±5 Immersion duration (min):≥30 Duration of test, there should be no continuous bubbles produced.	9# 77.0 32.0 45 35 No continuous bubbles produced	Pass
12	Weather ageing test	Salt fog test	See page 23	10# See page 23	Pass
		UV light test	See page 23	Y_1 Y_2 Y_3 See page 23	Pass

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Main technical data assigned by the manufacturer

Type:YH10W-36

Name of sample: Metal Oxide Surge Arresters Without Gaps

1)arrester

a) Designation: DH

b) Rated voltage, Ur (kV):36

c) Continuous operating voltage, Uc (kV):29

d) Nominal discharge current, In (kA):10

e) Reference current (resistive current peak), (mA):1

f) Bending moment (N):SSL=785 SLL=314

g) Repetitive charge transfer rating, Qrs (C):0.4

h) Thermal charge transfer rating, Qth (C):1.1

i) Rated Short-circuit current, Is (kA):16

g) Residual voltage:

Lightning impulse residual voltage at I_n (kV):≤103

Steep current impulse residual voltage at I_n (kV):≤123

2) MO resistance

a) Specification (mm):Φ38×24

3) Composite housing

a) Insulation withstand of the arrester housing:

Rated power frequency withstand voltage (kV):70

Rated lightning impulse withstand voltage (kV):170

b)Housing material and color: Grey silicone rubber

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Test items and result

1 Insulation withstand tests on the arrester housing

1.1 Lightning impulse test

Test date: April 27, 2020

Humidity: 56%; Ambient temperature: 26.1℃; Atmospheric pressure: 100.4kPa

Minimum discharge path of sample:L= 370 (mm)

Specified value: 170 kV Atmospheric correction factor:K_t= 1.001 Corrected value: 170.2 kV

No.	Voltage polarity	Test voltage (kV)	Application number	Test result
W_1	+	+168.32~+171.80	15	No internal disruptive discharges /Complied
	-	-169.40~-172.31	15	No internal disruptive discharges /Complied

Note: No internal disruptive discharges occur during the test.

1.2 Power-frequency voltage test

Test date: April 27, 2020

Humidity: 56%; Ambient temperature: 26.4℃; Atmospheric pressure: 100.3kPa

Conductivity of water: 99 (μS/cm)

Precipitation of vertical component: 1.3 (mm/min)

Precipitation of horizontal component: 1.3 (mm/min)

Minimum discharge path of sample: L= 370 (mm)

Specified value: 70 kV Atmospheric correction factor: K_t= 0.996 Corrected value: 69.7 kV

No.	Test voltage (kV)	Duration (s)	Application number	Test result
W_1	69.7	60	1	No flashover or puncture/ Complied

Note: No flashover or pucture shall occur during the test.

Conclusions: Pass

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2 Residual voltage test

Test date: April 28, 2020

Humidity: 62%; Ambient temperature: 29.0℃; Atmospheric pressure: 100.3kPa

2.1 Lightning impulse residual voltage test

No.			R_1	R_2	R_3
29.0 ℃,U_{ref}(kV)		kV	3.69	3.66	3.68
8/20μs,Residual voltage at 5kA U_{5kA}		kVp	8.55	8.43	8.51
8/20μs,Residual voltage at 10kA U_{10kA}		kVp	9.35	9.25	9.33
8/20μs,Residual voltage at 20kA U_{20kA}		kVp	10.33	10.30	10.36
Residual voltage of arrester at 10kA	Scale factor	-	10.81	10.90	10.84
	8/20μs 10kA	kVp	101.07	100.82	101.14
	Requirements	kVp	≤103		

R_1~R_3 Lightning impulse residual voltage test oscillogram No.: L20-GY0875-S01~L20-GY0875-S03.

2.2 Steep current impulse residual voltage test

No.			R_1	R_2	R_3
29.0 ℃,U_{ref}(kV)		kV	3.69	3.66	3.68
1μs,Residual voltage at 10kA U_{10kA}		kVp	10.57	10.52	10.55
Residual voltage of arrester at 10kA	Scale factor	-	10.81	10.90	10.84
	1μs 10kA	kVp	114.26	114.67	114.36
	Maximum steep current impulse residual voltage excluding inductive voltage contribution	kVp	114.67		
Inductive voltage U_L		kVp	4.90		
Maximum steep current impulse residual voltage including inductive voltage contribution		kVp	119.57		

Note:A steep current impulse as described above shall be applied to a metal block having the same dimensions as the resistor samples being tested.The peak voltage on the metal block is 0.1(kV), 0.1 / 10.52 = 0.9 %≤2%, No correction required.

R_1~R_3 Steep current impulse residual voltage test oscillogram No.: L20-GY0875-S04~L20-GY0875-S06.

Conclusions: Pass

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3 Test to verify long term stability under continuous operating voltage

Test date: April 27, 2020~June 8, 2020

Humidity: (53~71)%; Ambient temperature: (26.1~32.1)℃; Atmospheric pressure: (100.4~101.3)kPa

Arrester technical data: U_r= 36 kV, U_c= 29 kV, Arrester length =0.490(m).

Applied voltage $U_{ct}=U_c(1+0.15H)$

Test duration: 1000_0^{+100} h; Actual duration: 1004h; Test temperature: 115℃±4K

No.	B_1	B_2	B_3
27.4 ℃, U_{ref}(kV) (kV)	3.68	3.68	3.68
U_c(kV)	2.96	2.96	2.96
U_{ct}(kV)	3.18	3.18	3.18
P_{start}(W)	0.987	0.974	0.981
P_{min}(W)	0.844	0.836	0.838
P_{end}(W)	0.910	0.904	0.908
Any increase of power losses from P_{min}, is not greater than 1,3 times P_{min} during the remaining test period, all measurements of power losses throughout the ageing period, including the final measurement, P_{end}, is not greater than 1,1 times P_{start}.			

Conclusions: Pass

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4 Repetitive charge transfer withstand test

Test date: April 29, 2020~April 30, 2020

Humidity: (54~62)%; Ambient temperature: (26.4~29.2)℃; Atmospheric pressure: (100.3~100.7)kPa

No.		R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	R_{11}	R_{12}	R_{13}	Requirements
27.4 ℃,U_{ref}(kV)		3.69	3.58	3.66	3.66	3.67	3.60	3.62	3.70	3.68	3.72	/
8/20μs,U_{res}(kV)		9.37	9.23	9.34	9.33	9.33	9.24	9.27	9.42	9.34	9.46	/
Q_{rs}(C)	1st	0.46	0.46	0.46	0.46	0.46	0.46	0.45	0.46	0.46	0.45	0.4(110%~120%)
	2st	0.45	0.44	0.44	0.45	0.45	0.46	0.45	0.45	0.44	0.46	
	3st	0.45	0.45	0.45	0.46	0.46	0.45	0.44	0.45	0.45	0.45	
	4st	0.45	0.45	0.44	0.45	0.44	0.45	0.45	0.45	0.46	0.45	
	5st	0.44	0.44	0.46	0.44	0.45	0.46	0.46	0.44	0.45	0.44	
	6st	0.45	0.44	0.44	0.45	0.44	0.45	0.45	0.46	0.44	0.46	
	7st	0.45	0.45	0.45	0.46	0.45	0.45	0.45	0.44	0.46	0.45	
	8st	0.44	0.45	0.44	0.45	0.46	0.45	0.45	0.46	0.44	0.44	
	9st	0.46	0.44	0.45	0.44	0.45	0.46	0.46	0.45	0.45	0.46	
	10st	0.44	0.46	0.46	0.45	0.45	0.45	0.44	0.44	0.46	0.44	
	11st	0.45	0.45	0.45	0.44	0.44	0.45	0.44	0.45	0.45	0.45	
	12st	0.45	0.44	0.45	0.45	0.45	0.45	0.44	0.45	0.45	0.44	
	13st	0.46	0.46	0.44	0.46	0.45	0.44	0.46	0.46	0.44	0.46	
	14st	0.45	0.44	0.46	0.46	0.44	0.46	0.46	0.45	0.45	0.44	
	15st	0.44	0.45	0.45	0.45	0.45	0.44	0.45	0.45	0.46	0.45	
	16st	0.46	0.45	0.44	0.44	0.44	0.44	0.44	0.44	0.45	0.46	
	17st	0.44	0.45	0.46	0.46	0.44	0.45	0.45	0.46	0.44	0.44	
	18st	0.45	0.46	0.45	0.45	0.45	0.46	0.45	0.45	0.45	0.45	
	19st	0.44	0.45	0.45	0.44	0.46	0.45	0.44	0.45	0.46	0.46	
	20st	0.45	0.47	0.45	0.45	0.46	0.45	0.46	0.46	0.46	0.45	
28.1 ℃,U_{ref} (kV)		3.60	3.51	3.59	3.58	3.59	3.52	3.55	3.61	3.59	3.64	/
U_{ref} changed ratio (%)		-2.44	-1.96	-1.91	-2.19	-2.18	-2.22	-1.93	-2.43	-2.45	-2.15	≤±5
8/20μs,U_{res} (kV)		9.55	9.47	9.51	9.49	9.50	9.48	9.49	9.53	9.51	9.62	/
U_{res} changed ratio (%)		+1.88	+2.53	+1.79	+1.69	+1.79	+2.53	+2.32	+1.15	+1.79	+1.66	≤±5
Application a current impulse 8/20 μs (kA)		5.72	5.70	5.77	5.71	5.72	5.69	5.73	5.74	5.76	5.71	5.67 (MO resistors cross area: 11.34cm^2)
Visual inspection		No damage	No damage	No damage	No damage	No damage	No damage	No damage	No damage	No damage	No damage	No mechanical damage

R_4~R_{13} 1st&20st test oscillogram No.: L20-GY0875-S07~L20-GY0875-S26.

Conclusions: Pass

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5 Heat dissipation behaviour verification of test sample

Test date: May 11, 2020

Humidity: 63%; Ambient temperature: 29.1℃; Atmospheric pressure: 100.3kPa

No.	1#	B_4
Measuring point location	1/3 of the section from the top	1/3 of the section from the top
Heated time(min)	55	55
Maximum heating temperature T_0(℃)	143	142
Average ambient temperature during the test T_A(℃)	28.1	28.1
Cooling time curve	See page 12	
The relative over temperature (Trel) time curve	See page 12	
At any time,the section of arrester relative overtemperature value higher than the complete arrester.		

Note: The relative over temperature $T_{rel}= (T-T_A) / (T_0-T_A)$, The corresponding temperature added: $k\times (T_0-T_A)$.

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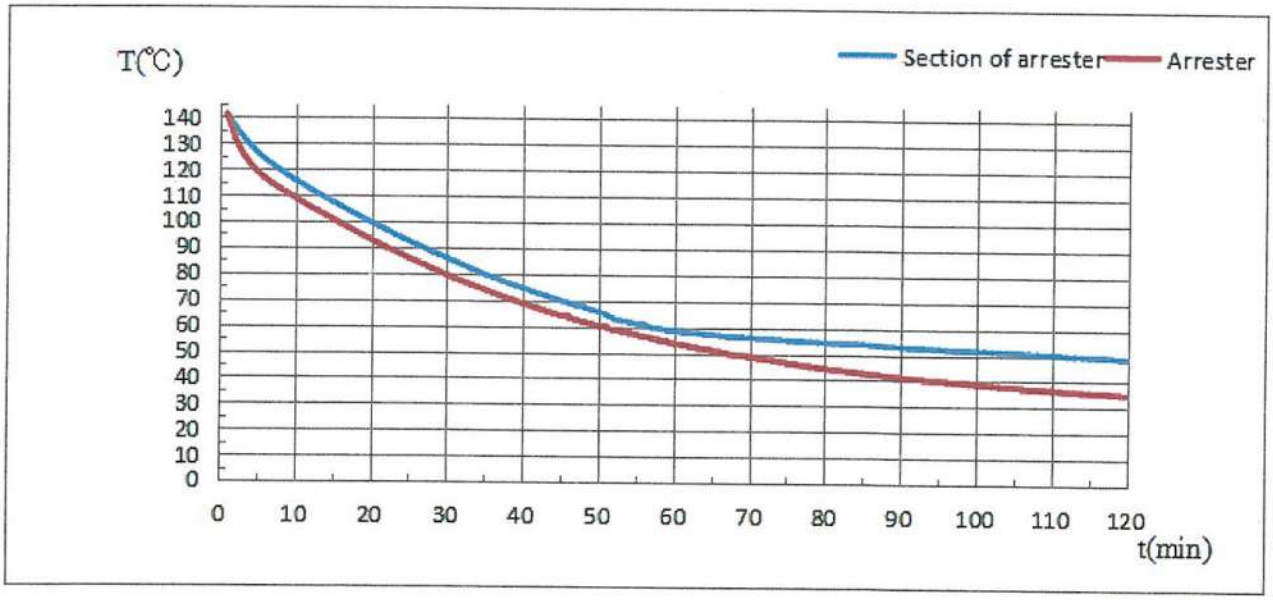
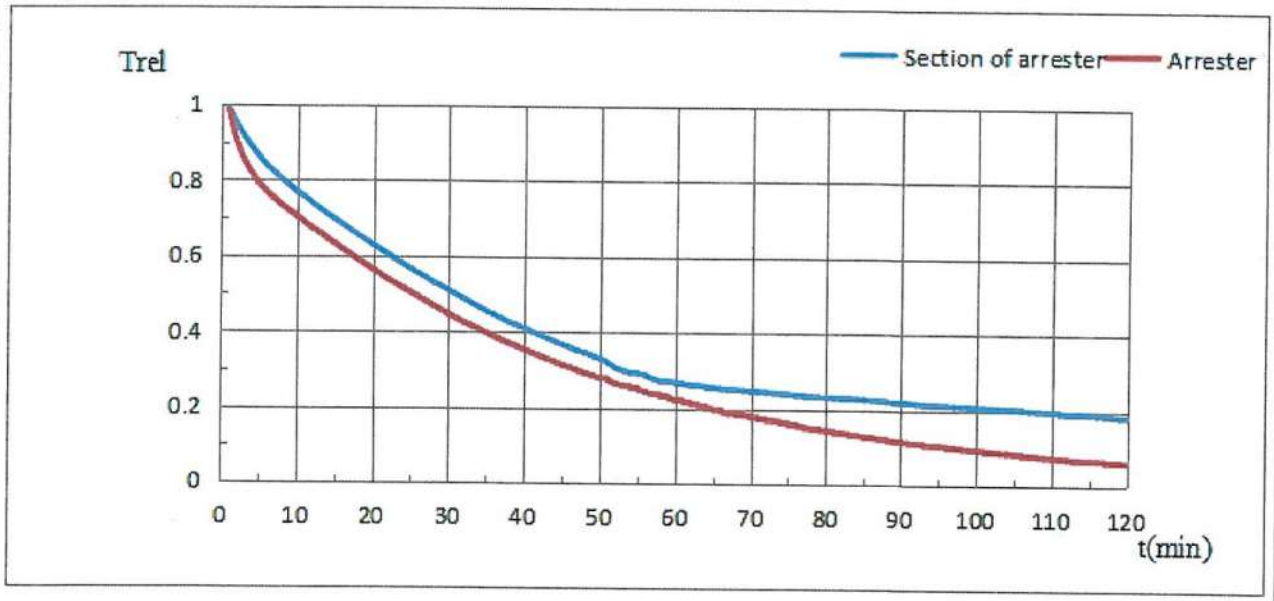


Arrester&section of arrester cooling time curve



Arrester&section of arrester relative over temperature (T_{rel}) time curve

Conclusions: /

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6 Operating duty test

Test date: May 12, 2020

Humidity: 64%; Ambient temperature: 27.8℃; Atmospheric pressure: 100.1kPa

No.		B_5	B_6	B_7
27.8 ℃, U_{ref} (kV)		3.68	3.68	3.68
8/20μs, U_{res} (kV)		9.36	9.34	9.33
U_r (kV)		3.68	3.68	3.68
U_c (kV)		2.96	2.96	2.96
4/10μs High current impulse	1st impulse current (kA)	101.451	100.687	101.124
Preheated to 60 ℃				
8/20μs current impulse, Q_{th}	1st impulse current (C)	0.55	0.56	0.58
	2st impulse current (C)	0.56	0.58	0.58
After 66 ms applied a power frequency voltage				
Application U_r (kV)		3.68	3.68	3.68
Duration (s)		10	10	10
Application U_c (kV)		2.96	2.96	2.96
Duration (min)		30	30	30
Visual inspection		No damage	No damage	No damage
8/20μs, U_{res} (kV)		9.43	9.41	9.39
U_{res} changed ratio (%)≤±5		+0.75	+0.75	+0.64

Note:1) Thermal recovery has been demonstrated;

2) No physical damage is evident.

B_5~B_7 test oscillogram No.: L20-GY0875-S27~L20-GY0875-S35.

Conclusions: Pass

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7 Power-frequency voltage versus time test

Test date: May 13, 2020

Humidity: 61%; Ambient temperature: 28.6℃; Atmospheric pressure: 100.2kPa

No.		B_8	B_9	B_{10}	B_{11}	B_{12}
28.6 ℃, U_{ref} (kV)		3.67	3.68	3.68	3.64	3.66
8/20μs, U_{res} (kV)		9.36	9.37	9.37	9.33	9.34
U_r (kV)		3.67	3.68	3.68	3.64	3.66
U_c (kV)		2.96	2.96	2.96	2.92	2.93
Preheated to 60 ℃						
8/20μs current impulse, Q_{th}	1st impulse current (C)	0.56	0.57	0.56	0.57	0.57
	2st impulse current (C)	0.57	0.57	0.57	0.57	0.57
After 66 ms applied a power frequency voltage						
Applied power frequency overvoltage duration	Applied power frequency overvoltage (kV)	4.40	4.23	4.05	3.64	2.93
	Application times of U_r	1.20	1.15	1.10	1.00	0.80
	Duration	0.1s	1.1s	10.1s	1h	24h
	Application U_c (kV)	2.96	2.96	2.96	2.92	2.93
	Duration (min)	30	30	30	30	30
Visual inspection		No damage	No damage	No damage	No damage	No damage
8/20μs, U_{res} (kV)		9.44	9.46	9.45	9.41	9.43
U_{res} changed ratio (%)≤±5		+0.85	+0.96	+0.85	+0.86	+0.96

Note:1) Thermal recovery has been demonstrated;

2) No physical damage is evident.

B8~B10 test oscillogram No.: L20-GY0875-S36~L20-GY0875-S45.

Conclusions: Pass

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8 Arrester disconnector test

Test date: May 12, 2020~May 15, 2020

Humidity: (61~69)%; Ambient temperature: (27.0~30.6)℃; Atmospheric pressure: (100.3~100.7)kPa

8.1 Repetitive charge transfer withstand test

No.		T_1	T_2	T_3	Requirements
Q_{rs} (C)	1st	0.46	0.46	0.45	0.4(110%~120%)
	2st	0.44	0.45	0.45	
	3st	0.45	0.45	0.46	
	4st	0.45	0.44	0.45	
	5st	0.45	0.46	0.44	
	6st	0.44	0.44	0.44	
	7st	0.46	0.45	0.45	
	8st	0.44	0.45	0.45	
	9st	0.45	0.45	0.44	
	10st	0.45	0.44	0.45	
	11st	0.44	0.45	0.44	
	12st	0.44	0.44	0.45	
	13st	0.46	0.45	0.45	
	14st	0.45	0.45	0.46	
	15st	0.45	0.46	0.45	
	16st	0.45	0.45	0.45	
	17st	0.44	0.45	0.45	
	18st	0.45	0.44	0.44	
	19st	0.44	0.44	0.45	
	20st	0.45	0.45	0.45	
Visual inspection		Without operation	Without operation	Without operation	Without operation
Disconnector operation at 20A (rms)					
Visual inspection		Successful operation	Successful operation	Successful operation	Shall successful operation

Note: 1) The disconnectors shall withstand the tests without operating.

2) Each of the samples used for the tests successfully operates in a subsequent test of operation when conducting a current of 20 A rms symmetrical.

T_1~T_3 1st&20st test oscillogram No.: L20-GY0875-S46~L20-GY0875-S51.

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8.2 Operating duty test

No.		$B_{13}+T_4$	$B_{14}+T_5$	$B_{15}+T_6$
28.7 ℃, U_{ref} (kV)		3.68	3.68	3.68
8/20μs, U_{res} (kV)		9.37	9.35	9.36
U_r (kV)		3.68	3.68	3.68
U_c (kV)		2.96	2.96	2.96
4/10μs High current impulse	1st impulse current (kA)	100.457	100.341	100.684
Preheated to 60 ℃				
8/20μs current impulse, Q_{th}	1st impulse current (C)	0.58	0.58	0.55
	2st impulse current (C)	0.56	0.58	0.58
After 66 ms applied a power frequency voltage				
Application U_r (kV)		3.68	3.68	3.68
Duration (s)		10	10	10
Application U_c (kV)		2.96	2.96	2.96
Duration (min)		30	30	30
Visual inspection		Without operation	Without operation	Without operation
8/20μs, U_{res} (kV)		9.44	9.43	9.41
U_{res} changed ratio (%)≤±5		+0.75	+0.86	+0.53
Disconnector operation at 20A (rms)				
Visual inspection		Successful operation	Successful operation	Successful operation

Note: 1) The sample disconnector in series with a test sample section of the arrester.
2) The disconnectors shall withstand the tests without operating.
3) Each of the samples used for the tests successfully operates in a subsequent test of operation when conducting a current of 20 A rms symmetrical.

$B_{12}+T_4$ ~ $B_{14}+T_6$ test oscillogram No.: L20-GY0875-S52 ~ L20-GY0875-S60.

8.3 Time versus current test

No.	Requirements (rms) (A)	Measurements (rms) (A)	Operation time(ms) Measurements	Maxiumum operation time (ms)	Test results
T_7	20A±10%	20.3	1831	3059	Successful operation
T_8		20.1	2970		Successful operation
T_9		20.1	3059		Successful operation
T_{10}		20.2	2493		Successful operation
T_{11}		20.3	1804		Successful operation
T_{12}	200A±10%	191	497	501	Successful operation
T_{13}		189	457		Successful operation
T_{14}		194	253		Successful operation
T_{15}		191	501		Successful operation
T_{16}		192	497		Successful operation
T_{17}	800A±10%	770	60	60	Successful operation
T_{18}		765	42		Successful operation
T_{19}		767	42		Successful operation
T_{20}		790	32		Successful operation
T_{21}		770	41		Successful operation

8.4 Temperature cycling and seal pumping test

8.4.1 Temperature cycling

Test items	Requirements	No. T_{22}~T_{31}
Hot period temperature (℃)	40~70	50.0
Cold period temperature (℃)	At least 85 K below the hot period,the lowest temperature shall not be lower than -50℃	-35.0
Duration of each temperature (h)	3	3
Temperature change gradient (K/min)	1	1.0
Number of cycles	10	10

8.4.2 Seal pumping test

Test items	Requirements	No.
		T_{22}~T_{31}
Hot period temperature(℃)	60±3	60.0
Duration(h)	≥1	1
Cold water temperature(℃)	4±3	4.0
Duration(h)	≥2	2
The transfer time(min)	≤5	3
Temperature number of cycles	10	10

8.4.3 Temperature cycling and seal pumping test evaluation

Opened the arrester disconnectors for visual inspection, no moisture were founded within the each test samples.

Conclusions: Pass

检测报告

TEST REPORT

9 Short-circuit tests

Test date: June 30, 2020 ~ July 3, 2020

9.1 Contents, methods, circuits and prospective of capacitive current switching tests

Test items	Test times	Test voltage(kV)	Short-circuit current (kA)		Duration (s)	Note
			R.M.S.	Peak		
Rated-current short-circuit test	1	< 77 % of Ur	16	40	≥0.2	—
Reduced-current short-circuit test	1	< 77 % of Ur	6	8.49		—
Reduced-current short-circuit test	1	< 77 % of Ur	3	4.25		—
Low-current short-circuit test	1	< 77 % of Ur	0.6	0.85	1	—

9.2 Short-circuit tests

No.	Test items	Test oscillograms No.	Test voltage (kV)	Short-circuit current (kA)		Duration (s)
				R.M.S	Peak	
2#	Rated-current test	D20G-GY0875-S1	12.0	16.9	40.2	0.210
3#	Reduced-current test	D20D-GY0875-S1	10.1	5.81	9.61	0.204
4#	Reduced-current test	D20D-GY0875-S2	10.2	3.02	5.57	0.204
5#	Low-current test	D20D-GY0875-S3	10.1	0.606	1.30	1.000

9.3 Visual inspection

Evaluation of test results	2#	3#	4#	5#
a)No violent shattering.Structural failure of sample is permitted as long as criteria b) and c) are met.	Complied	Complied	Complied	Complied
b)No parts of sample shall be allowed to be found outside the enclosure,except for	Complied	Complied	Complied	Complied
—fragments,less than 60 g each,of ceramic material such as MO resistors of porcelain; —pressure relief vent covers and diaphragms; —soft parts of polymeric materials.	—	—	—	—
c)The arrester shall be able to self-extinguish open flames within 2 min after the end of the test.Any ejected part(in or out of the enclosure)must also self-extinguish open flames within 2 min.	Complied	Complied	Complied	Complied

Note:Short-circuit tests photos: page 28~31 .

Conclusions: Pass

10 Bending moment test

Test date: May 15, 2020

Humidity: 65%; Ambient temperature: 29.4℃; Atmospheric pressure: 100.6kPa

10.1 Sample preparation

No.	6#	7#	8#
Watt losses measured at U_c (mW)	1236	1244	1252
Internal partial discharge at $1.05U_C$ (pC)≤10	2.6	2.8	2.4
U_{res} at 1.0 In (kV)	100.46	100.72	100.30

10.2 Bending moment test

No.	Application SSL (N)	Duration (s)	Maximum deflection (mm)	Residual deflection (mm)	Visual inspection
6#	800	70	64	14.6	No damage
7#	800	70	67	15.7	No damage
Requir-e ments	$785^{+5\%}_{0}$	60 ~ 90	/	/	No visible damage

10.3 Mechanical/thermal preconditioning

10.3.1 Terminal torque preconditioning

No.	Torque(N•M)	Duration(s)	Visual inspection
8#	—	—	—
Requirements	—	—	—

Note: No torque requirements.

10.3.2 Thermo-mechanical and thermal preconditioning

No.	Test temperature (℃)	Duration (h)	Application	
			Load direction (°)	SLL (N)
8#	+60	16	0	320
	-25	16	180	320
	+45	16	270	320
	-40	16	90	320
Requirements	+60~-25 ~ +45~-40	16	0~360	$314^{+5\%}_{0}$

10.4 Water immersion test and Bending moment Test evaluation

The test samples shall be kept immersed in a vessel, in boiling deionised water with 1 kg/m^3 of NaCl, for 42 h.

No.	6#	7#	8#
Boiling duration (h)	42	42	42
Verification tests (h)≤8	8	8	8
Watt losses measured at U_c (mW)	1266	1270	1283
Watt losses changed (mW/kV)≤20	1.03	0.90	1.07
Watt losses changed ratio (%)≤±5	+2.43	+2.09	+2.48
Internal partial discharge at 1.05U_C (pC)≤10	2.9	3.2	3.4
U_{res} at 1.0 In (kV)	100.87	101.21	100.94
U_{res} at 1.0 In changed ratio between sample preparation (%)≤±5	+0.4	+0.5	+0.6
30.6 ℃,U_{ref} (kV)	39.26	39.44	39.10
U_{res} at In (kV)	100.86	101.24	100.96
U_{res} at In (kV)	100.98	101.37	101.10
U_{res} changed ratio (%):≤±2	+0.1	+0.1	+0.1
31.0 ℃,U_{ref} (kV)	39.41	39.52	39.23
U_{ref} changed ratio (%):≤±2	+0.4	+0.2	+0.3

Conclusions: Pass

检测报告

TEST REPORT

11 Seal leak rate test

Test date: May 15, 2020

Humidity: 59%; Ambient temperature: 32.0℃; Atmospheric pressure: 100.3kPa

Hot water immersion

No.	9#
Water temperature(℃)	77.0
Environment temperature(℃)≥5	32.0
Temperature difference(K)45±5	45
Immersion duration(min)≥30	35
Should no continuous bubbles produced	No continuous bubbles produced

Conclusions: Pass

检测报告

TEST REPORT

12 Weather ageing test

Test date: April 25, 2020~ June 8, 2020

Humidity: (49~73)%; Ambient temperature: (26.9~31.0)℃; Atmospheric pressure: (100.1~101.4)kPa

12.1 Salt fog test

No.		$10^{\#}$
27.8 ℃,U_{ref}(kV)		39.6
Internal partial discharge at 1.05U_C (pC)≤10		2.6
Water flow rate (l/h/m^3) 0.4±0.1		0.41
Temperature (℃)20±5		21.0
NaCl content of water (kg/m^3)1~10		2.0
Application U_c (kV)		29.0
Duration (h)≥1000		1004
Visual inspection	No tracking occurs	Complied
	Erosion does not occur through the entire thickness of any shed or other part of the external coating up to the next layer of material	Complied
	The sheds and housing are not punctured	No punctured
Internal partial discharge at 1.05U_C (pC)≤10		4.7
28.6 ℃,U_{ref}(kV)		39.3
U_{ref} changed ratio (%)≤±5%		-0.8

12.2 UV light test

Xenon-arc methods

No.		Y_1	Y_2	Y_3
Without dark periods,standard spray cycle, black-standard/black panel temperatures of 65 °C, an irradiance of around 550 W/m^2.				
Duration (h)≥1000		1007	1007	1007
Visual inspection	Markings on shed or housing material shall be legible	Complied	Complied	Complied
	Surface degradations such as cracks and raised areas are not permitted	Complied	Complied	Complied
	In case of doubt concerning such degradation, two surface roughness measurements,*Rz* shall not exceed 0,1 mm.	—	—	—

Conclusions: Pass

检测报告

TEST REPORT

Annex

1.Drawing

YH10W-36 Metal Oxide Surge Arrester Without Gaps Drawing

2.Tested object photos

21 photos

3.Test circuit

Short-circuit tests circuit: D20G-GY0875-YLT1;

(4/10μs)High current impulse withstand and Residual voltage tests circuit:D20-GY0875-YLT1;

(1.2/50μs)lightning impulse withstand voltage test circuit:D20-GY0875-YLT2;

4. Tests oscillograms

Short-circuit test(16000A)oscillograms:D20G-GY0875-S1;

Short-circuit test(6000A) oscillograms:D20D-GY0875-S1;

Short-circuit test(3000A) oscillograms:D20D-GY0875-S2;

Short-circuit test(600A) oscillograms:D20D-GY0875-S3;

Lightning impulse residual voltage test oscillograms:L20-GY0875-S01~L20-GY0875-S03;

Steep current impulse residual voltage test oscillograms:L20-GY0875-S04~L20-GY0875-S06;

Repetitive charge transfer withstand test Typical oscillograms:L20-GY0875-S07~L20-GY0875-S26;

Operating duty test oscillograms :L20-GY0875-S27~L20-GY0875-S35;

Power-frequency voltage versus time test oscillograms:L20-GY0875-S36~L20-GY0875-S45;

Disconnector repetitive charge transfer withstand test Typical oscillograms:

L20-GY0875-S46~L20-GY0875-S51;

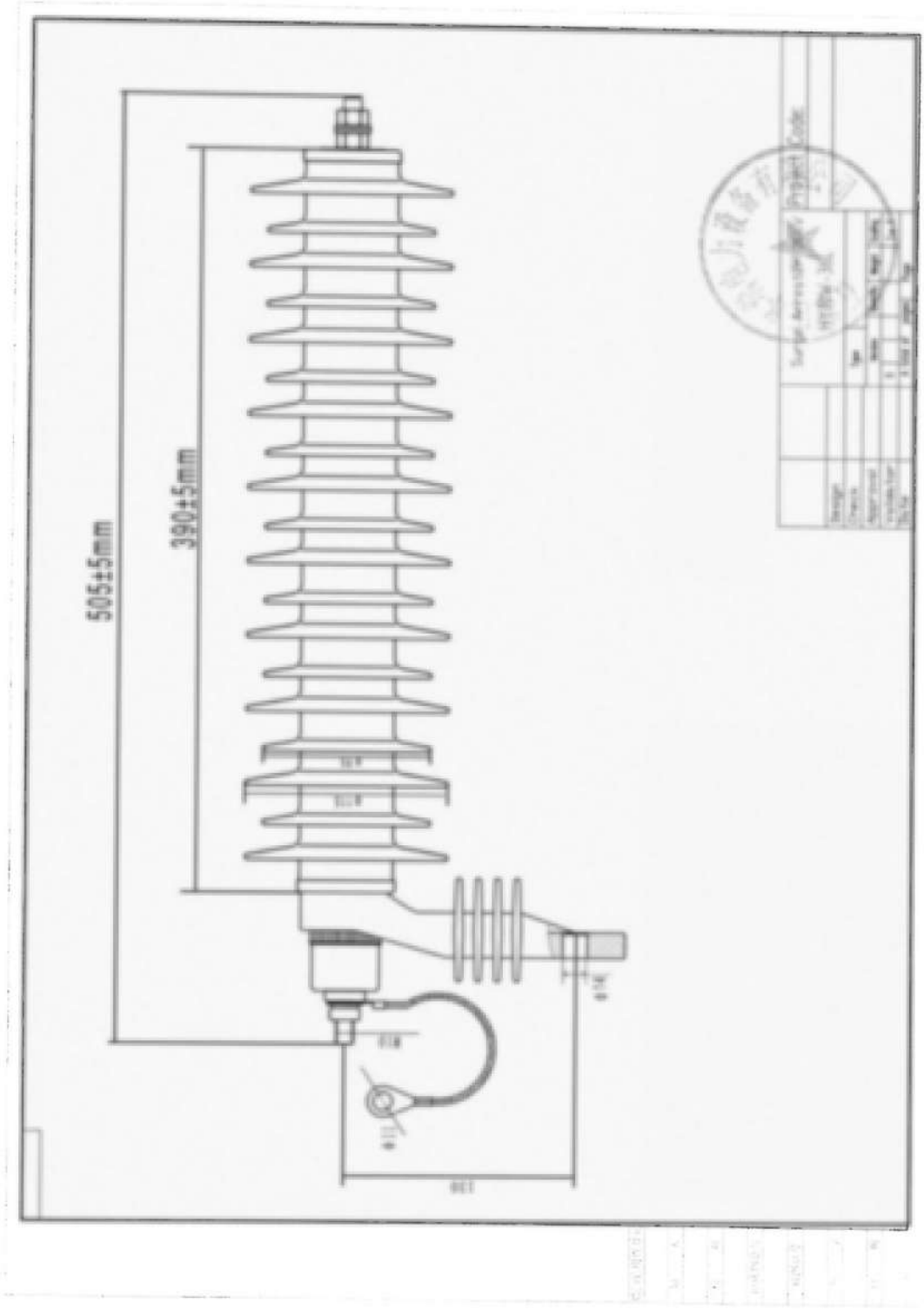
Disconnector operating duty test oscillograms :L20-GY0875-S52~L20-GY0875-S60;

Lightning impulse residual voltage test oscillograms:L20-GY0875-S61~L20-GY0875-S72.

检测报告

TEST REPORT

Drawing	YH10W-36 Metal Oxide Surge Arrester Without Gaps

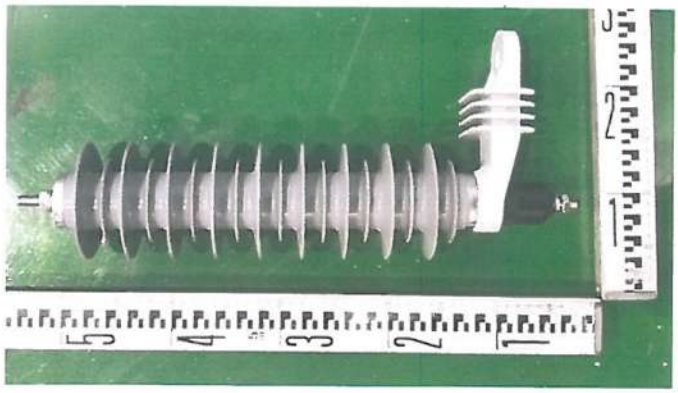


检测报告

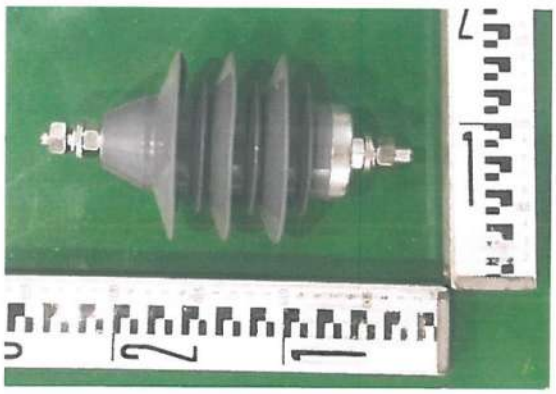
TEST REPORT

Tested object photos

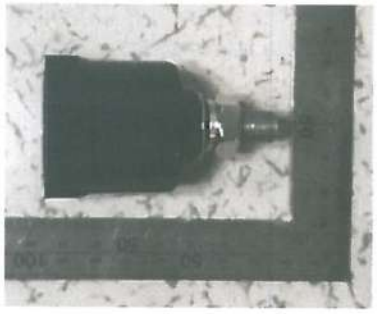
Arrester:



Section of an arrester:



Arrester disconnector:

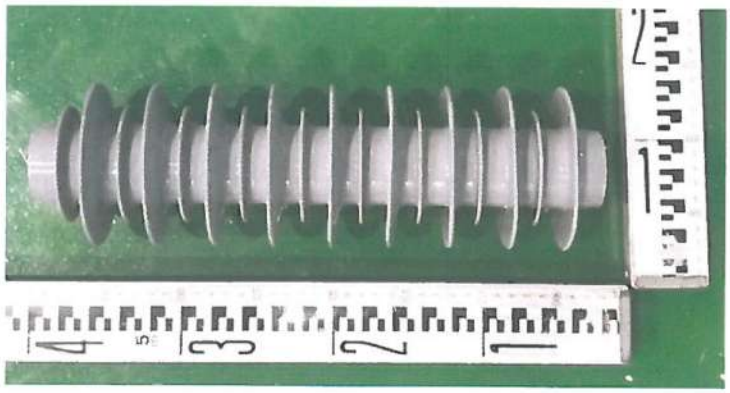


检测报告

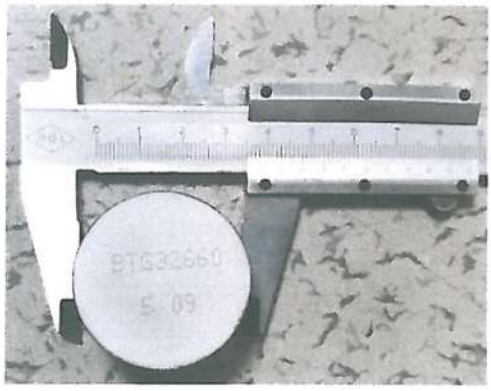
TEST REPORT

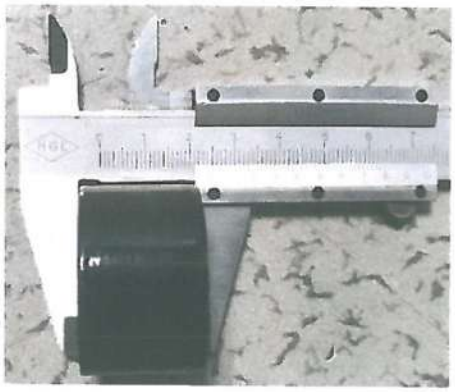
Tested object photos

Composite housing:



MO resistance:





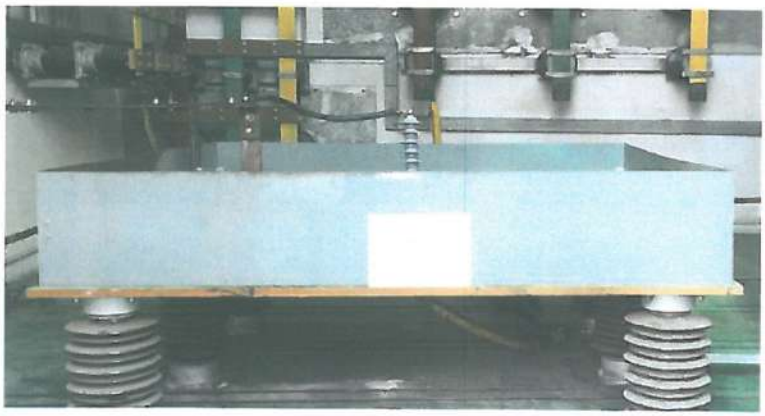
Opened arrester disconnector after temperature cycling and seal pumping test:

检测报告

TEST REPORT

Tested object photos

Short-circuit tests photos:



2# Arrester before short-circuit test (16000A)

2# Arrester after short-circuit test (16000A)

检测报告

TEST REPORT

Tested object photos

3# Arrester before short-circuit test (6000A)

3# Arrester after short-circuit test (6000A)

检测报告

TEST REPORT

Tested object photos

4# Arrester before short-circuit test (3000A)

4# Arrester after short-circuit test (3000A)

检测报告

TEST REPORT

Tested object photos

5# Arrester before short-circuit test (600A)

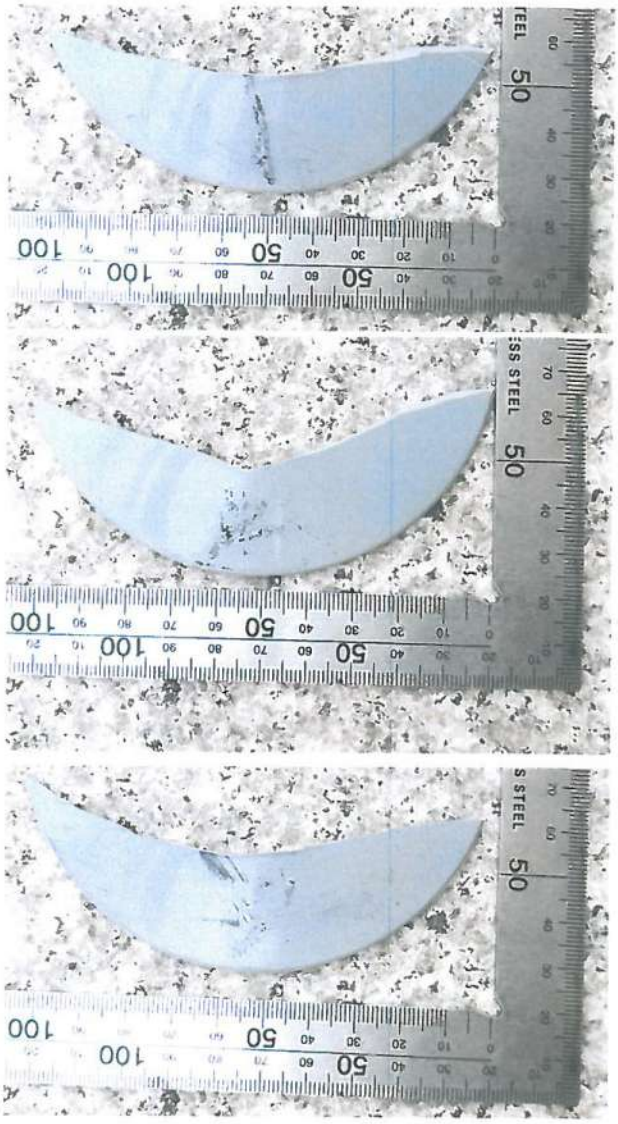
5# Arrester after short-circuit test (600A)

检测报告

TEST REPORT

Tested object photos

UV light test photos:

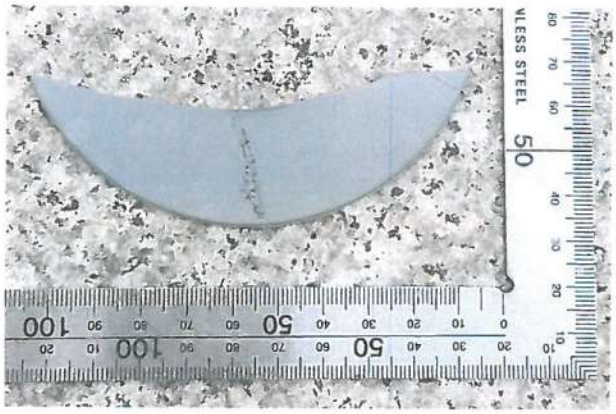


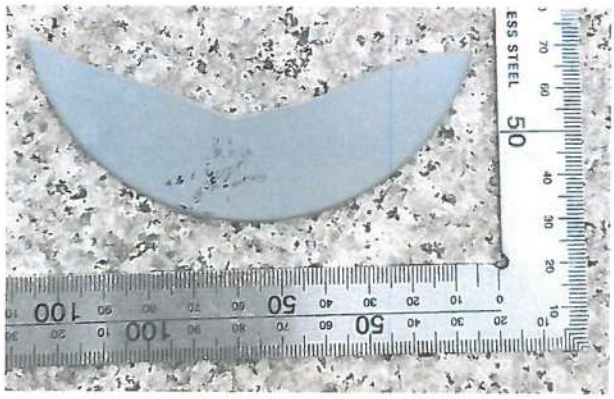
Before UV light test

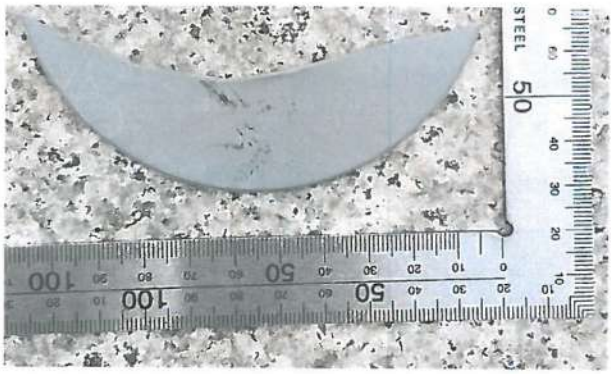
检测报告

TEST REPORT

Tested object photos





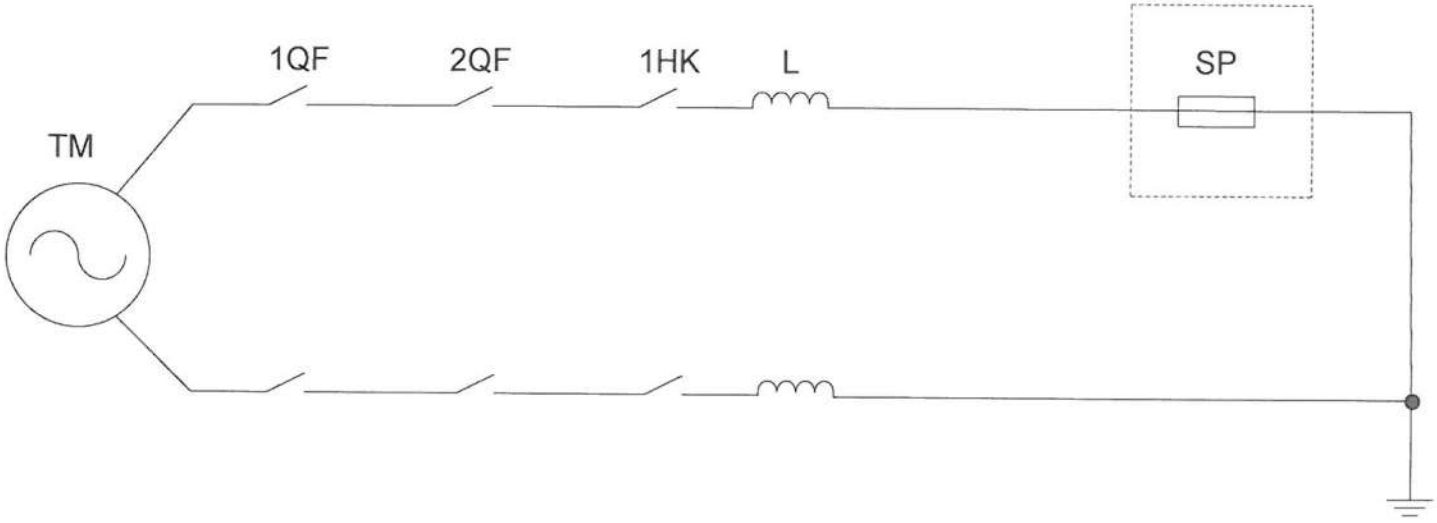


After UV light test

检测报告

TEST REPORT

Short-circuit tests circuit	D20G-GY0875-YLT1



TM : 试验电源（Test power supply）

1QF : 保护开关（Protective switch）

1HK : 合闸开关（Making switch）

L ：调节电抗（Reactor）

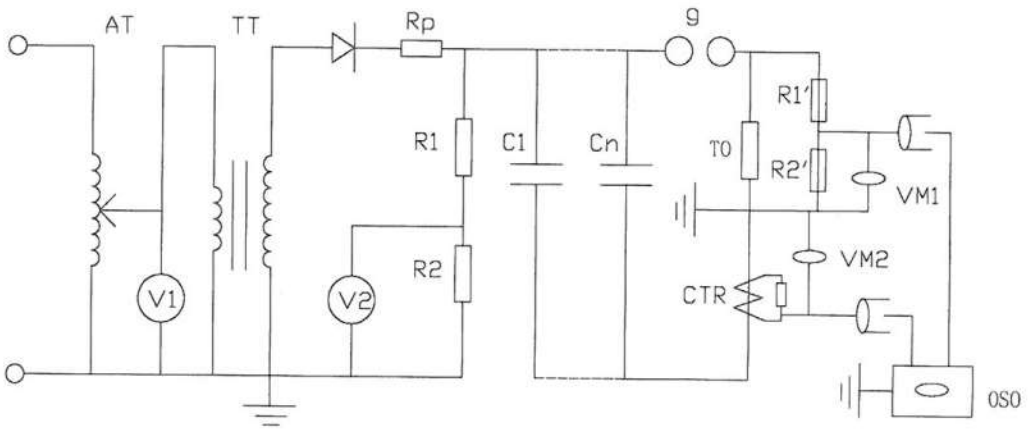
2QF : 操作开关（Master breaker）

SP : 试品（Test specimen）

检测报告

TEST REPORT

(4/10μs)High current impulse withstand and Residual voltage tests circuit	D20-GY0875-YLT1



AT:voltage regulator

TT:power frequency testing transformer

R_p:charging protection resistor

R_1:High voltage side resistance of voltage divider for charging protection

R_2:Low voltage side resistance of voltage divider for charging protection

C_1 ~ C_n:capacitor

g:discharge gap

T_0:test samples

R_1' :High voltage side resistance of voltage divider for measurement

R_2' :Low voltage side resistance of voltage divider for measurement

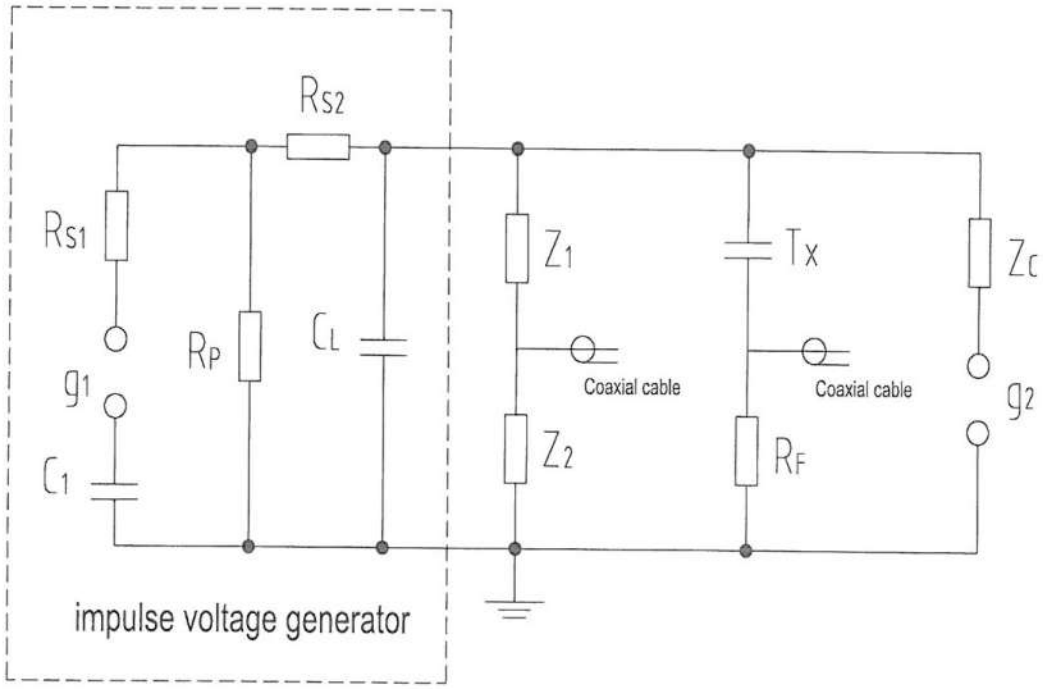
CTR:Rogowski Coil

OSO:measurement system

检测报告

TEST REPORT

(1.2/50μs) lightning impulse withstand voltage test circuit	D20-GY0875-YLT2



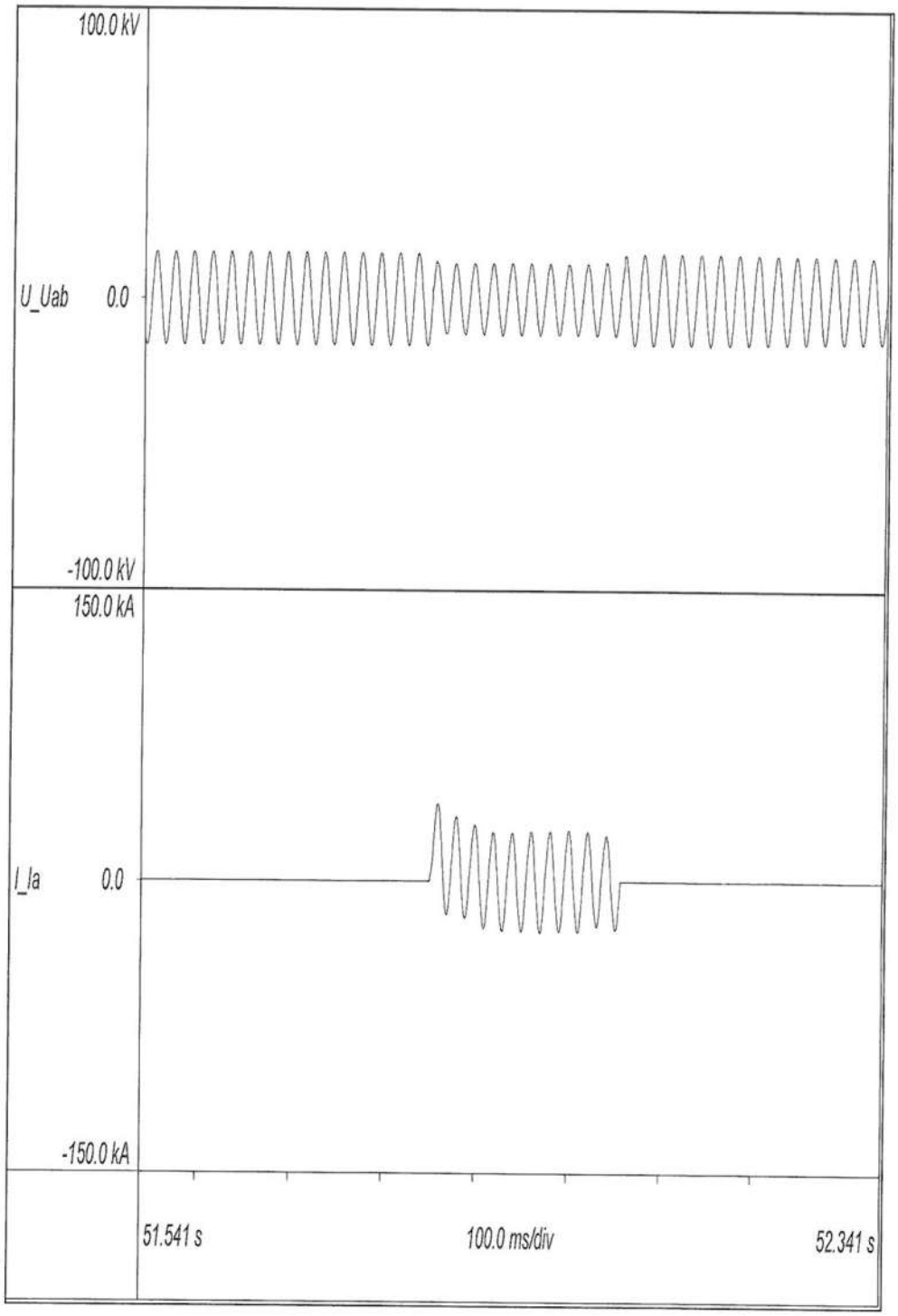
C_1: generator capacitance g_1: discharge gap R_{S1}: internal series resistance R_{S2}: front resistance
R_P: tail resistance C_L: load capacitance Z_1, Z_2: voltagedivider impedance T_X: texted object
R_F: shunt current resistance Z_c: additional impedance g_2:Chopping wave gap

检测报告

TEST REPORT

Short-circuit tests oscillograms

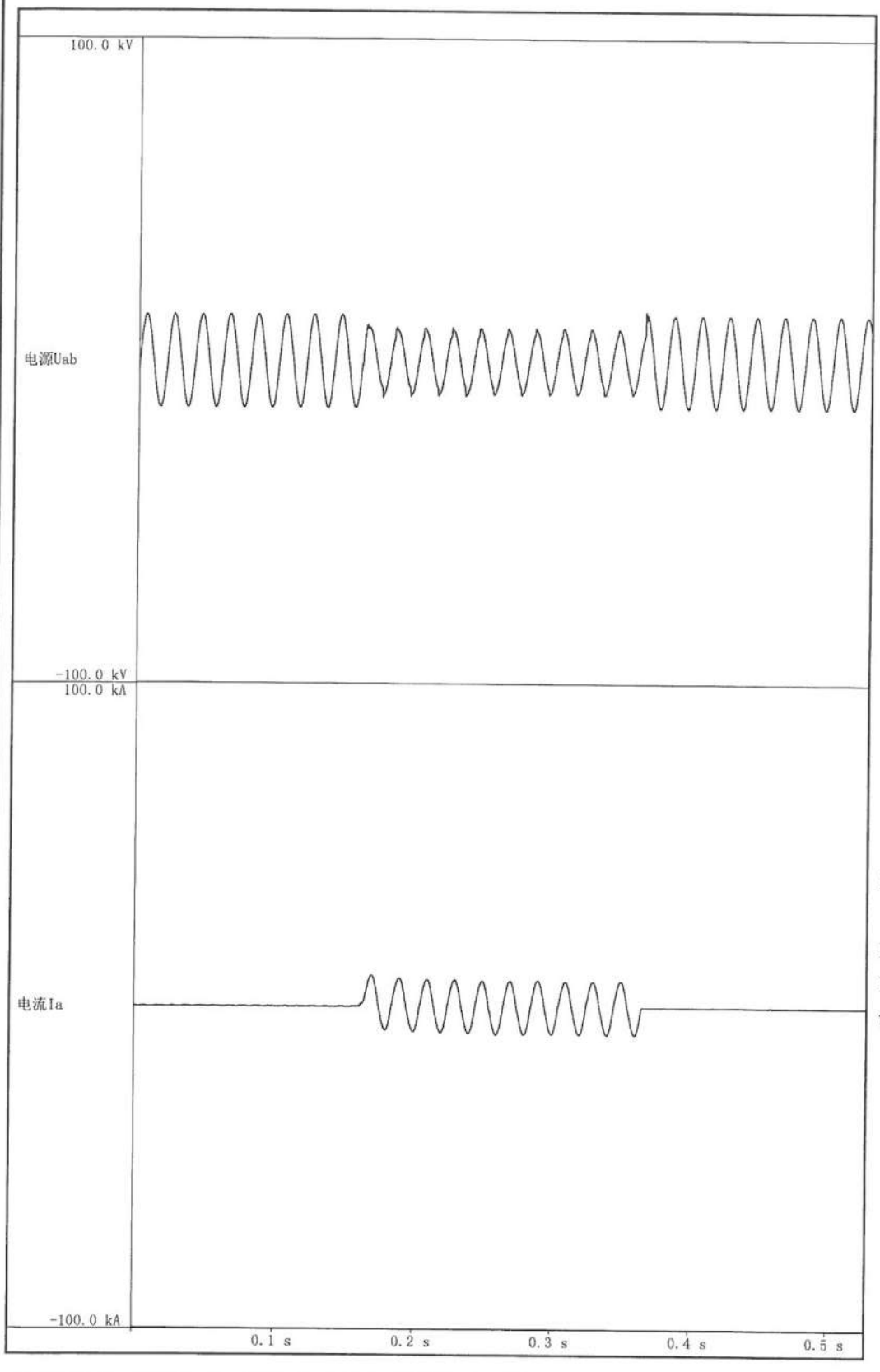
D20G-GY0875-S1



检测报告

TEST REPORT

Short-circuit tests oscillograms



D20D-GY0875-S1

I_p=9.61kA

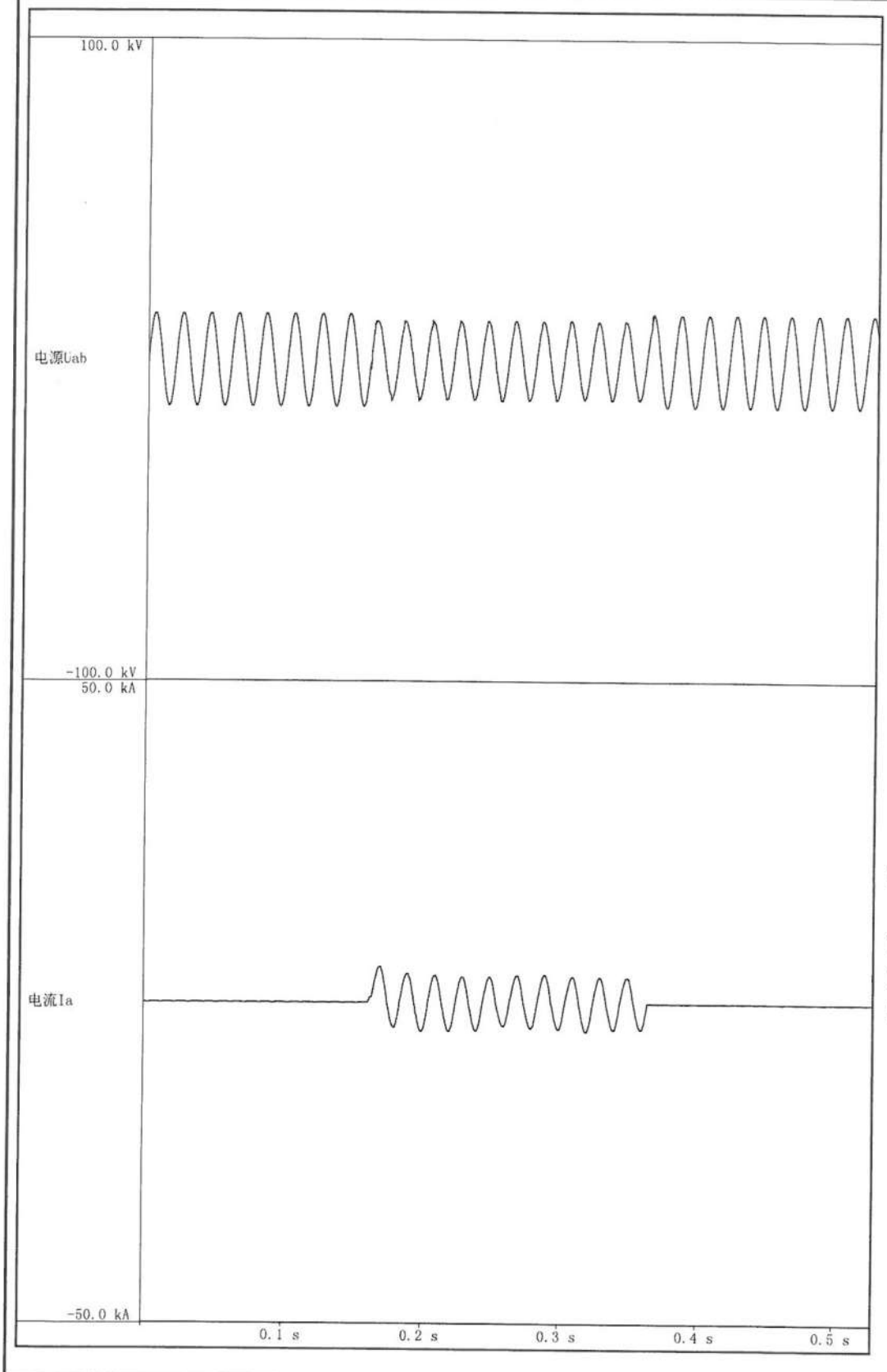
I_{rms}=5.81kA

t=0.204s

检测报告

TEST REPORT

Short-circuit tests oscillograms



D20D-GY0875-S2

I_p=5.57kA

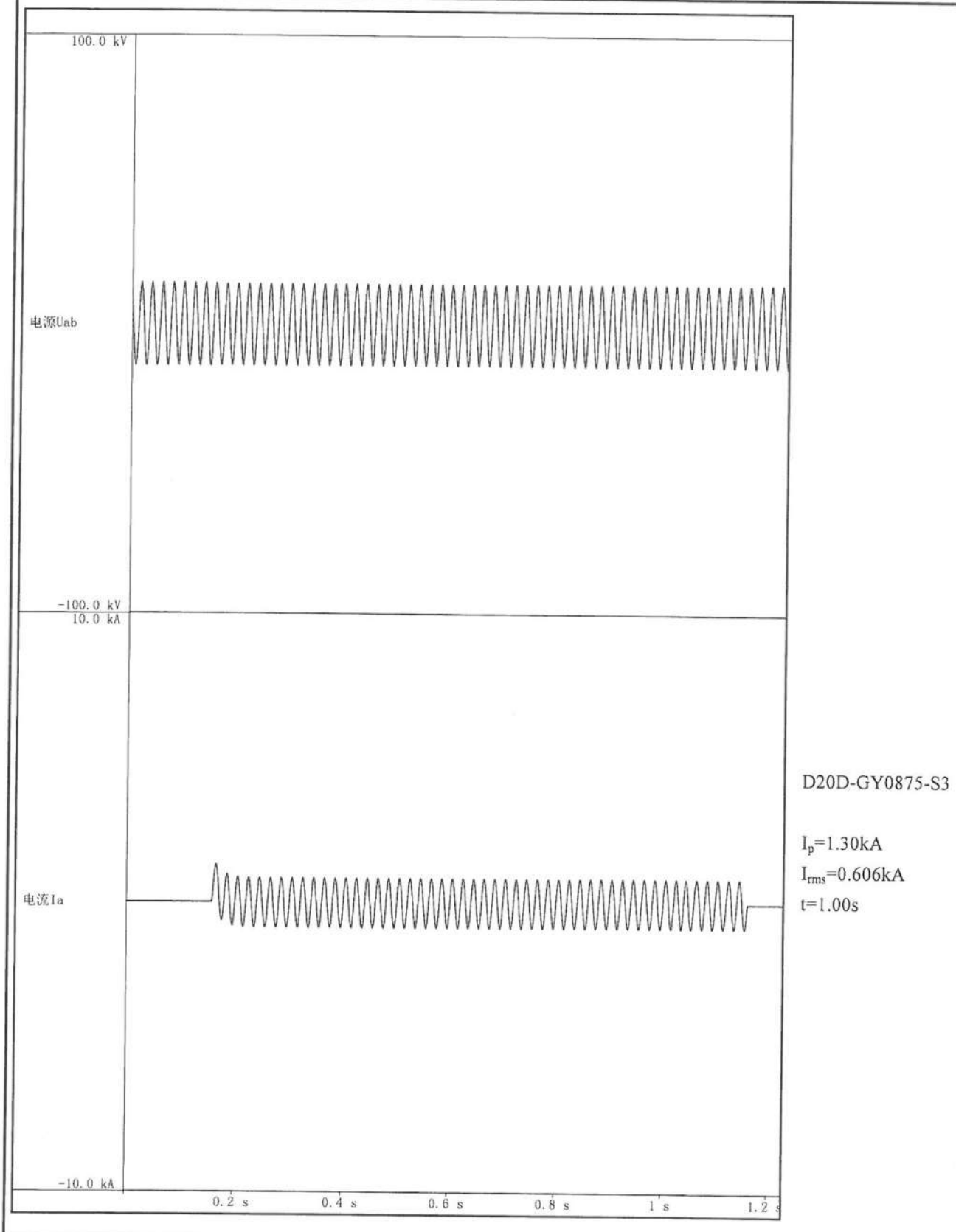
I_{rms}=3.02kA

t=0.204s

检测报告

TEST REPORT

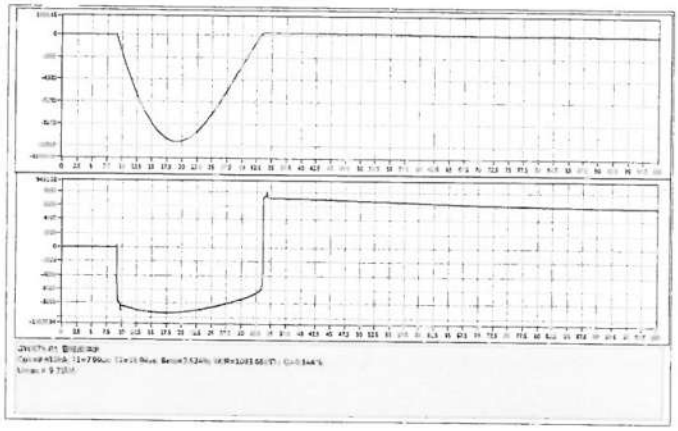
Short-circuit tests oscillograms



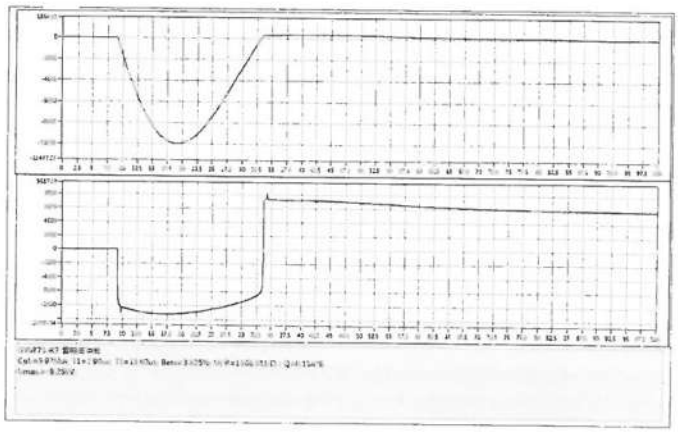
检测报告

TEST REPORT

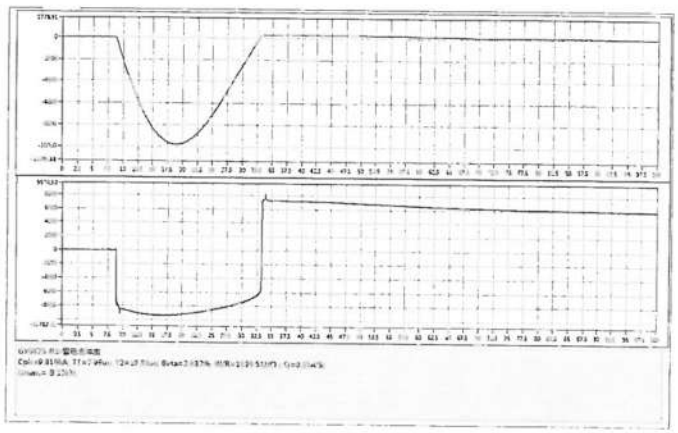
Lightning impulse residual voltage test oscillograms



R_1(10kA)oscillogram No.: L20-GY0875-S01



R_2(10kA)oscillogram No.: L20-GY0875-S02

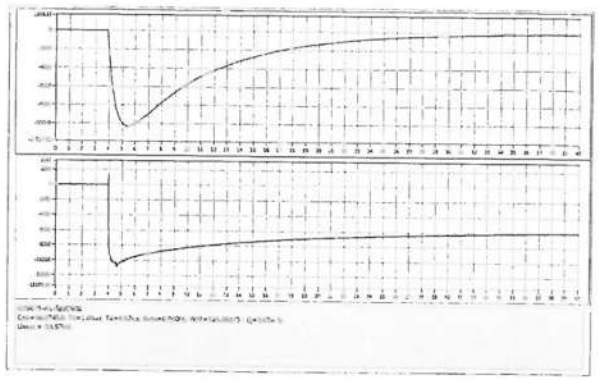


R_3(10kA)oscillogram No.: L20-GY0875-S03

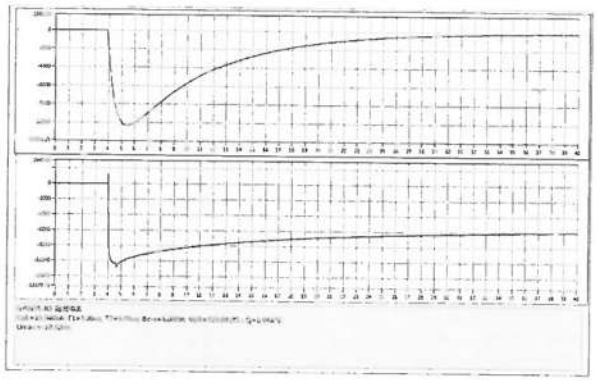
检测报告

TEST REPORT

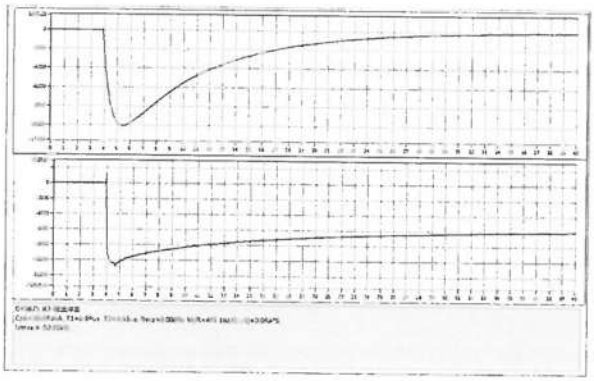
Steep current impulse residual voltage test oscillograms



R_1(10kA)oscillogram No.: L20-GY0875-S04



R_2(10kA)oscillogram No.: L20-GY0875-S05

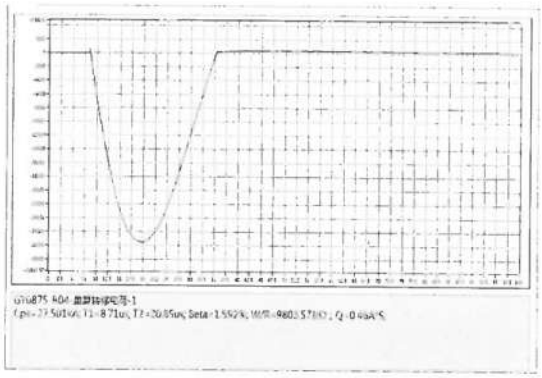


R_3(10kA)oscillogram No.: L20-GY0875-S06

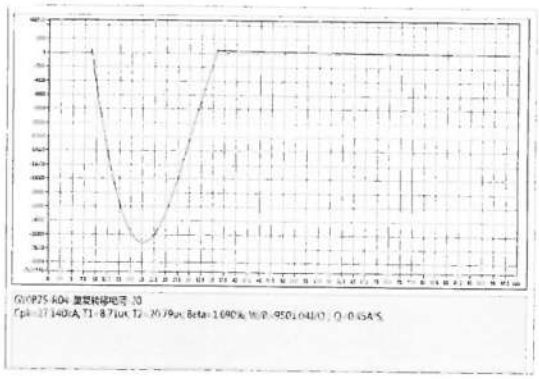
检测报告

TEST REPORT

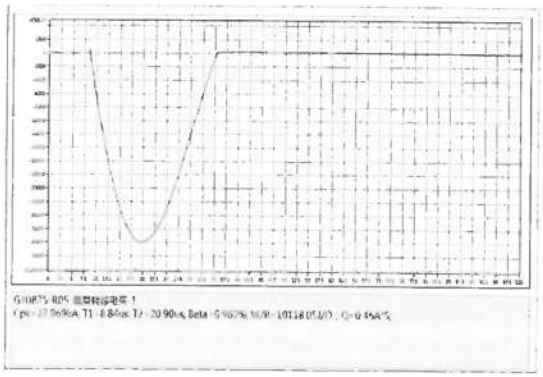
Repetitive charge transfer withstand test Typical oscillograms



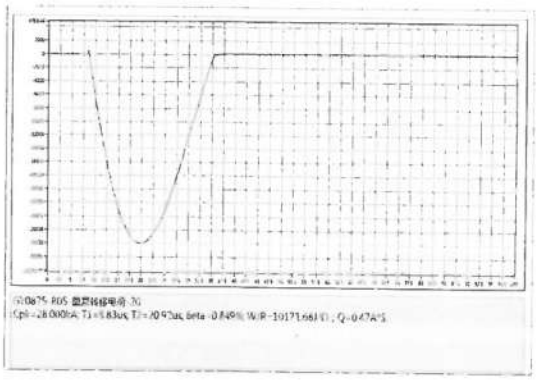
R_4 1st test oscillogram No.: L20-GY0875-S07



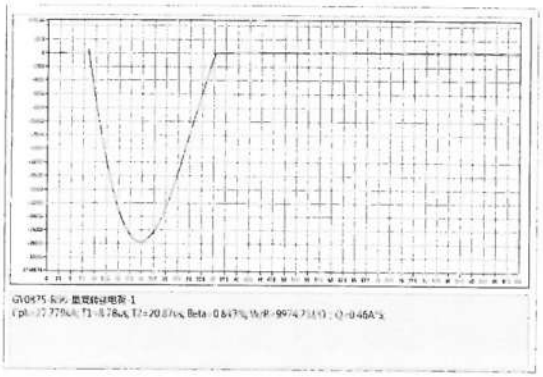
R_4 20st test oscillogram No.: L20-GY0875-S08



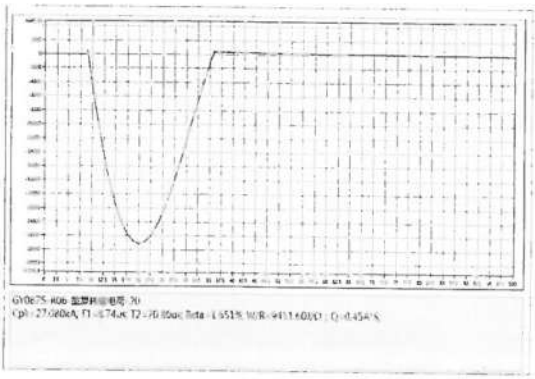
R_5 1st test oscillogram No.: L20-GY0875-S09



R_5 20st test oscillogram No.: L20-GY0875-S10

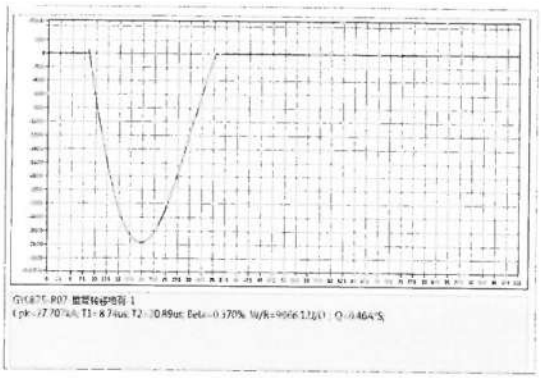


R_6 1st test oscillogram No.: L20-GY0875-S11

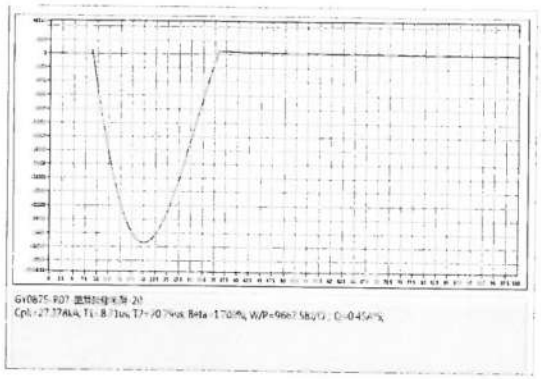


R_6 20st test oscillogram No.: L20-GY0875-S12

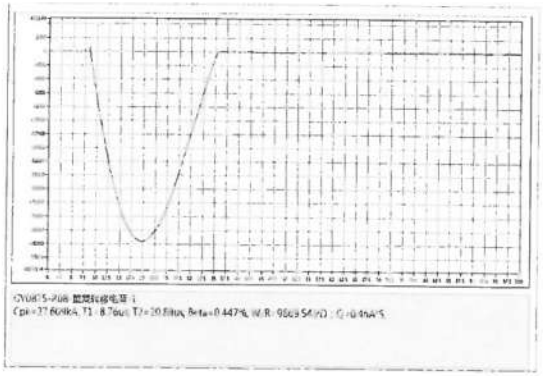
Repetitive charge transfer withstand test Typical oscillograms



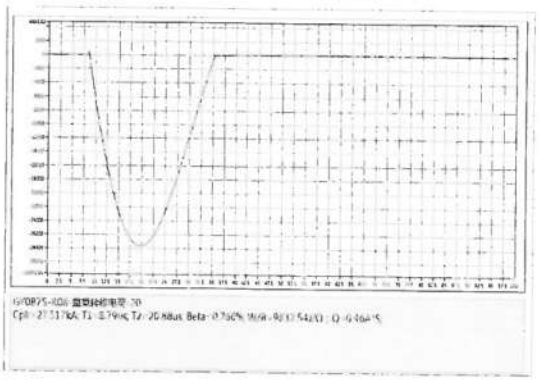
R_7 1st test oscillogram No.: L20-GY0875-S13



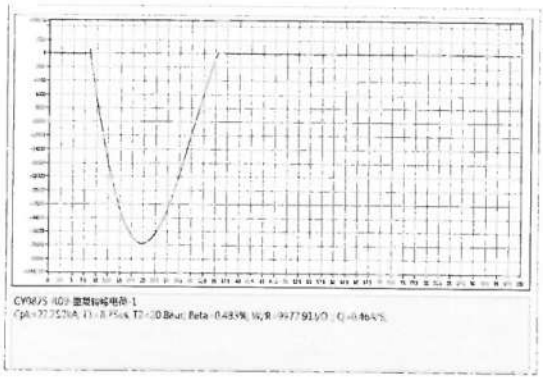
R_7 20st test oscillogram No.: L20-GY0875-S14



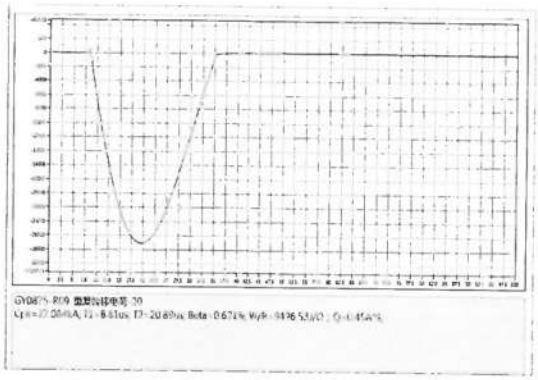
R_8 1st test oscillogram No.: L20-GY0875-S15



R_8 20st test oscillogram No.: L20-GY0875-S16



$R_9$1st test oscillogram No.: L20-GY0875-S17

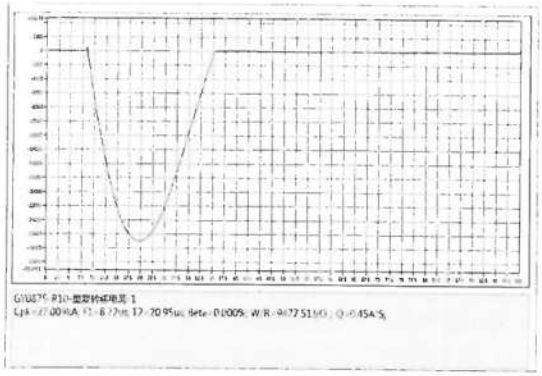


R_9 20st test oscillogram No.: L20-GY0875-S18

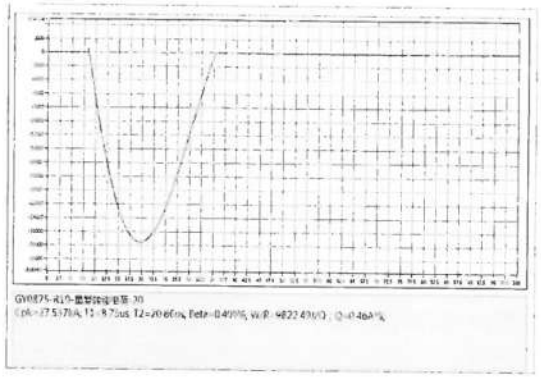
检测报告

TEST REPORT

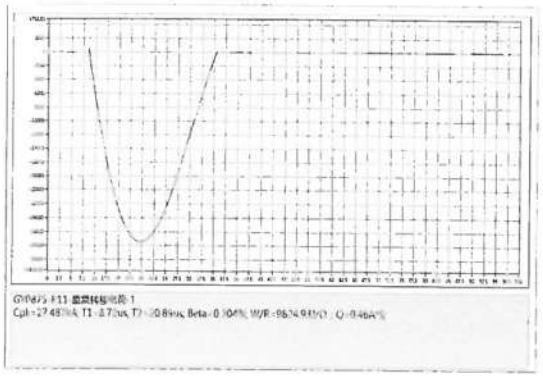
Repetitive charge transfer withstand test Typical oscillograms



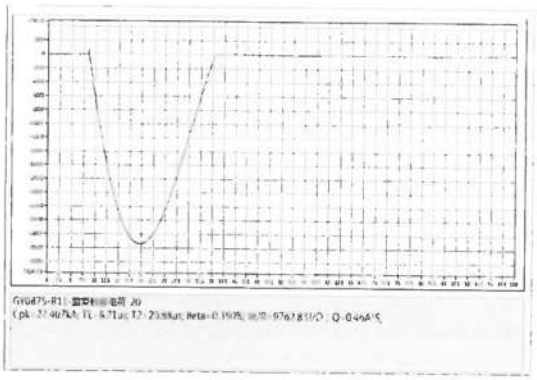
R_{10} 1st test oscillogram No.: L20-GY0875-S19



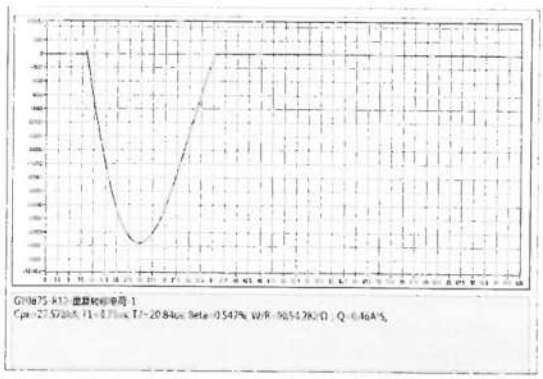
R_{10} 20st test oscillogram No.: L20-GY0875-S20



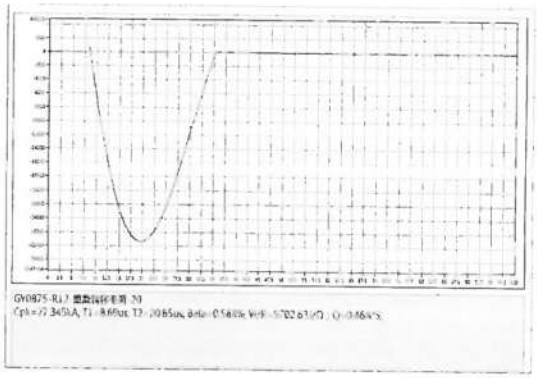
R_{11} 1st test oscillogram No.: L20-GY0875-S21



R_{11} 20st test oscillogram No.: L20-GY0875-S22

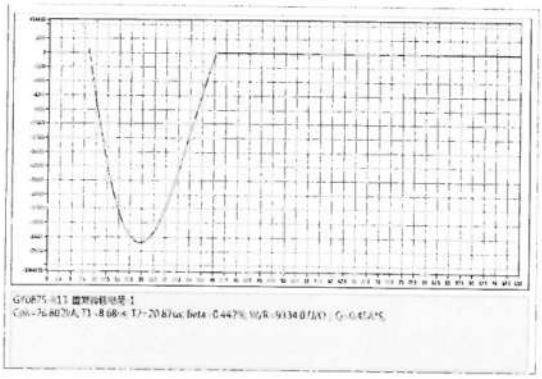


R_{12} 1st test oscillogram No.: L20-GY0875-S23

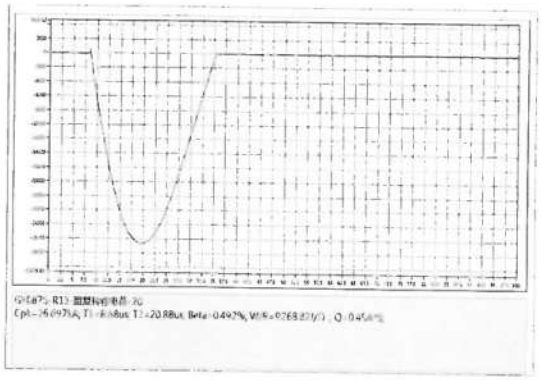


R_{12} 20st test oscillogram No.: L20-GY0875-S24

Repetitive charge transfer withstand test Typical oscillograms



R_{13} 1st test oscillogram No.: L20-GY0875-S25

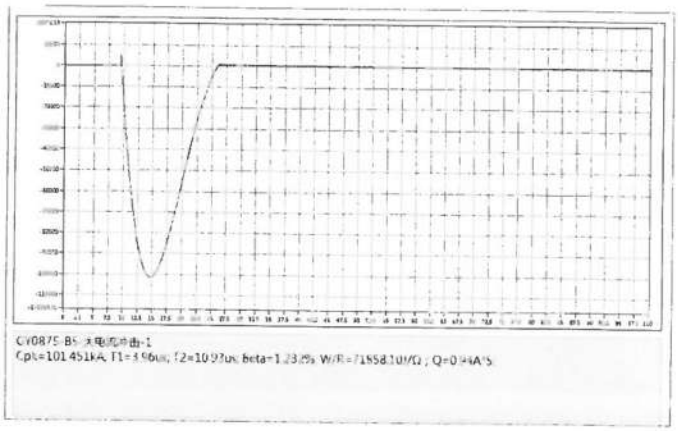


R_{13} 20st test oscillogram No.: L20-GY0875-S26

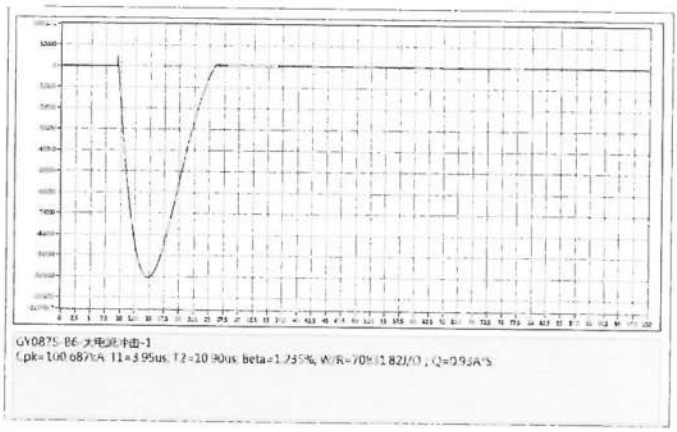
检测报告

TEST REPORT

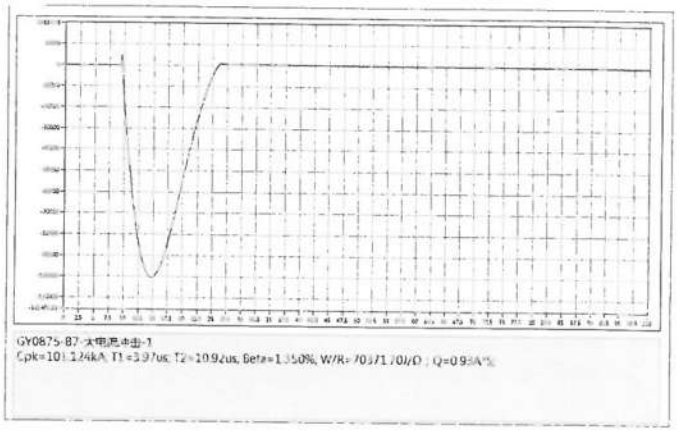
Operating duty test oscillograms



B_5 1st test oscillogram No.: L20-GY0875-S27



B_6 1st test oscillogram No.: L20-GY0875-S28

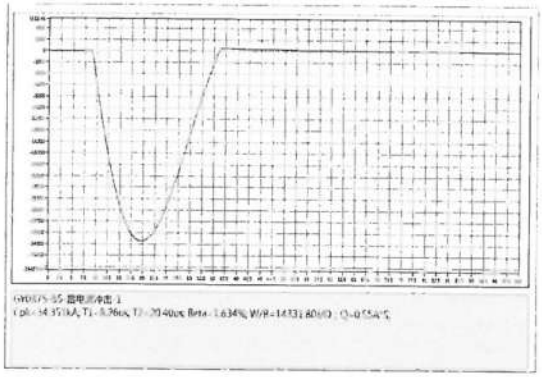


B_7 1st test oscillogram No.: L20-GY0875-S29

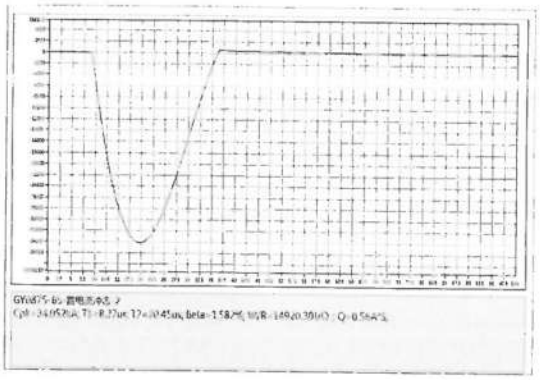
检测报告

TEST REPORT

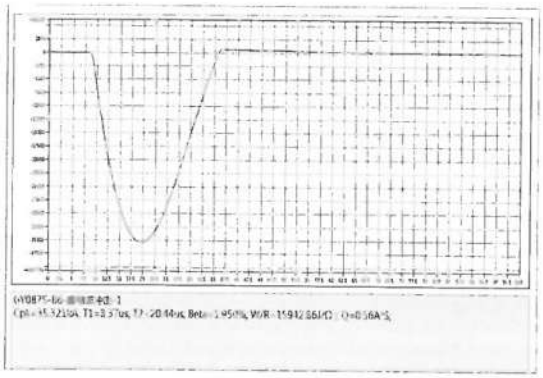
Operating duty test oscillograms



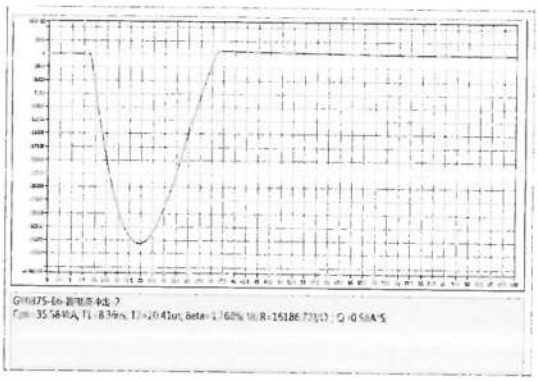
B_5 1st test oscillogram No.: L20-GY0875-S30



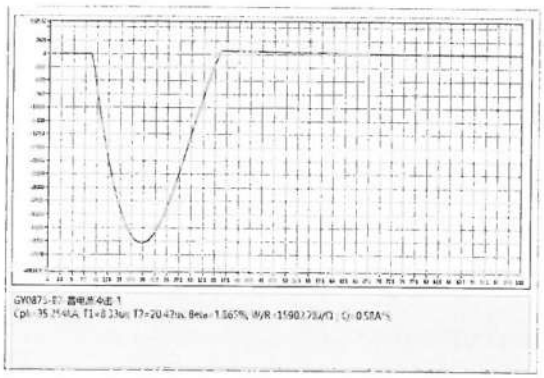
B_5 2st test oscillogram No.: L20-GY0875-S31



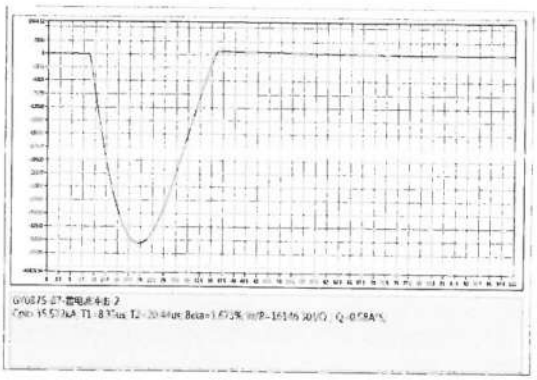
B_6 1st test oscillogram No.: L20-GY0875-S32



B_6 2st test oscillogram No.: L20-GY0875-S33



B_7 1st test oscillogram No.: L20-GY0875-S34

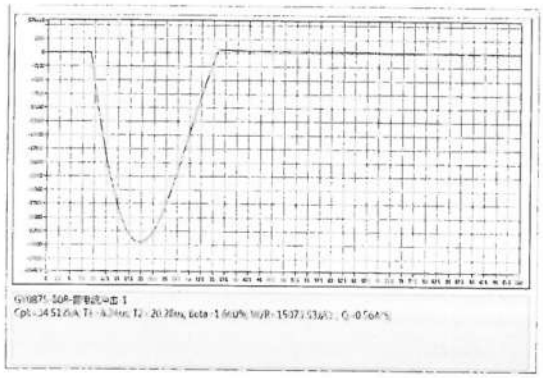


B_7 2st test oscillogram No.: L20-GY0875-S35

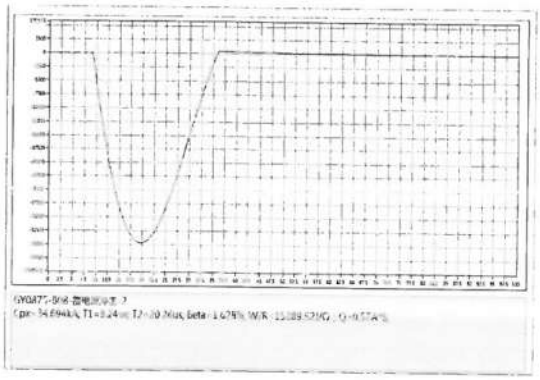
检测报告

TEST REPORT

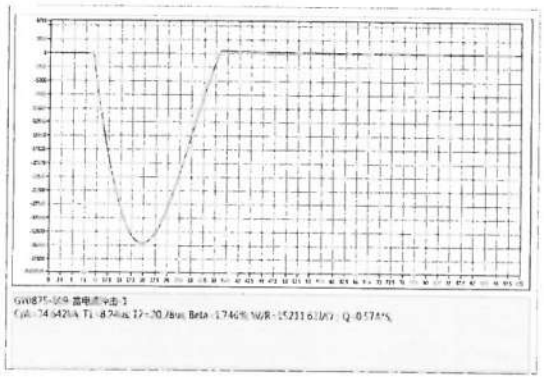
Power-frequency voltage versus time test oscillograms



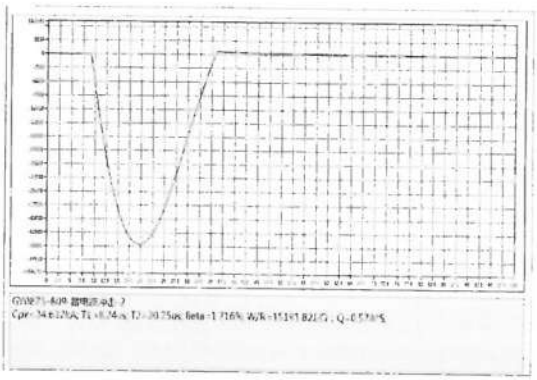
B_8 1st test oscillogram No.: L20-GY0875-S36



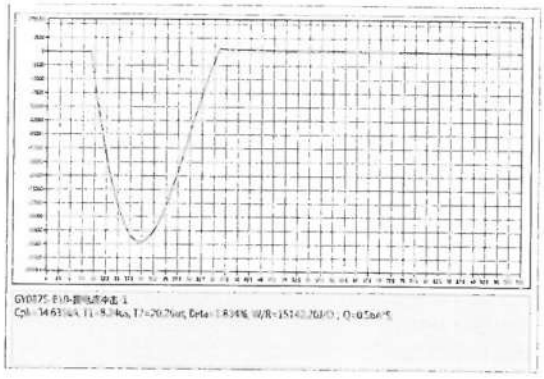
B_8 2st test oscillogram No.: L20-GY0875-S37



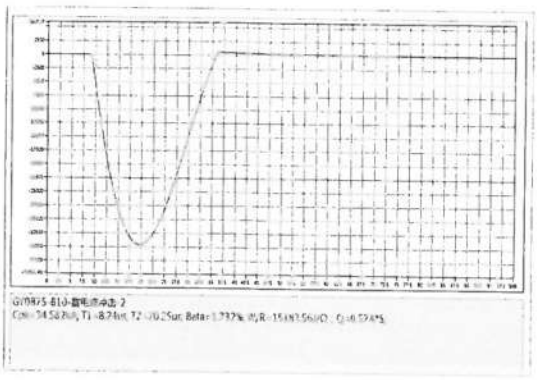
B_9 1st test oscillogram No.: L20-GY0875-S38



B_9 2st test oscillogram No.: L20-GY0875-S39

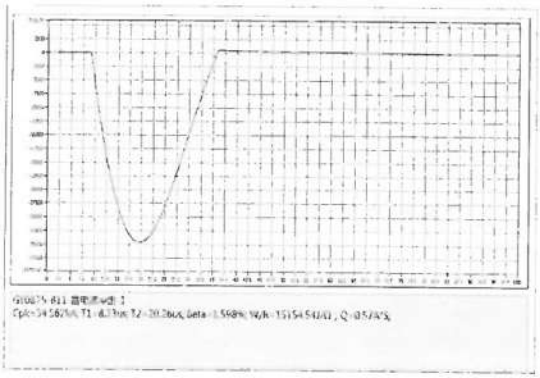


B_{10} 1st test oscillogram No.: L 20-GY0875-S40

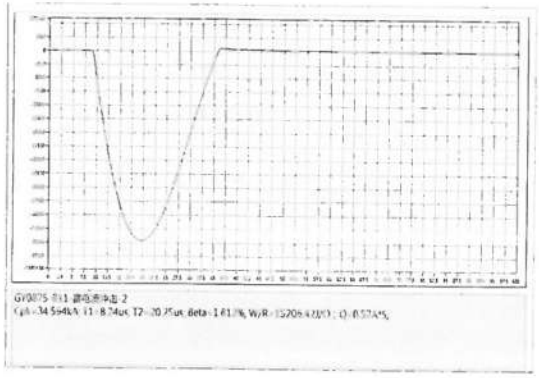


B_{10} 2st test oscillogram No.: L20-GY0875-S41

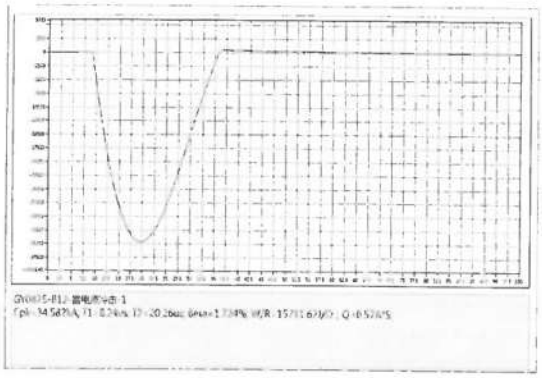
Power-frequency voltage versus time test oscillograms



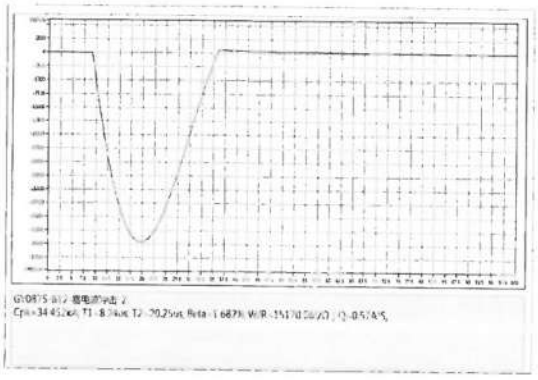
B_{11} 1st test oscillogram No.: L20-GY0875-S42



B_{11} 2st test oscillogram No.: L20-GY0875-S43



B_{12} 1st test oscillogram No.: L20-GY0875-S44



B_{12} 2st test oscillogram No.: L20-GY0875-S45

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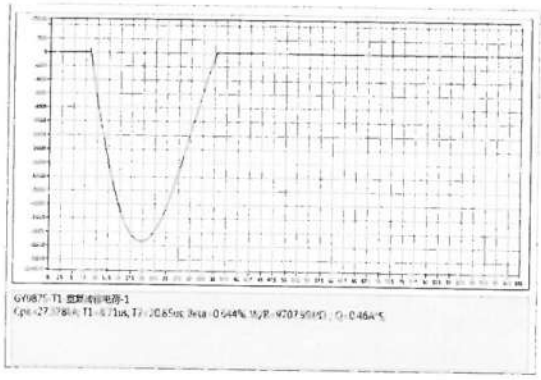
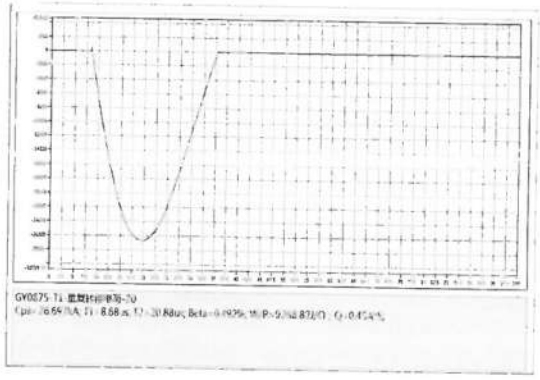
TEST REPORT

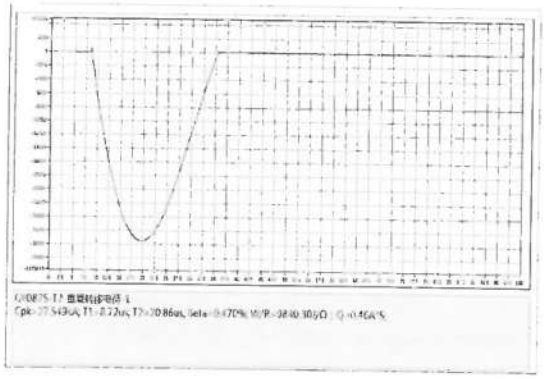
Disconnector repetitive charge transfer withstand test Typical oscillograms



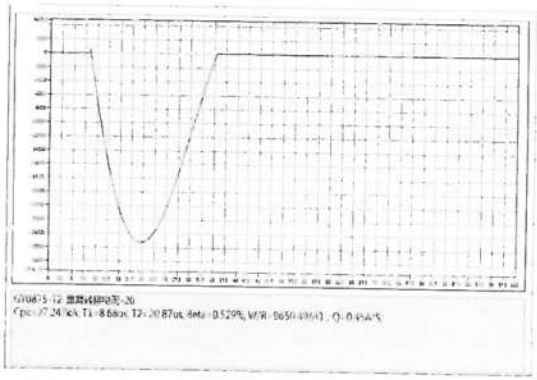
T_1 1st test oscillogram No.: L20-GY0875-S46



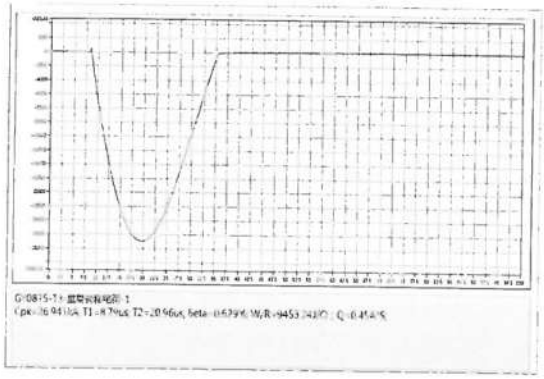
T_1 20st test oscillogram No.: L20-GY0875-S47



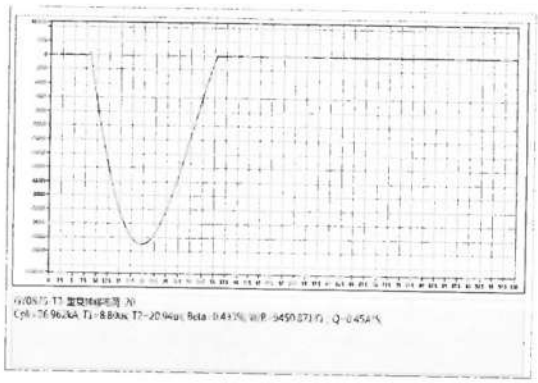
T_2 1st test oscillogram No.: L20-GY0875-S48



T_2 20st test oscillogram No.: L20-GY0875-S49



T_3 1st test oscillogram No.: L20-GY0875-S50



T_3 20st test oscillogram No.: L20-GY0875-S51

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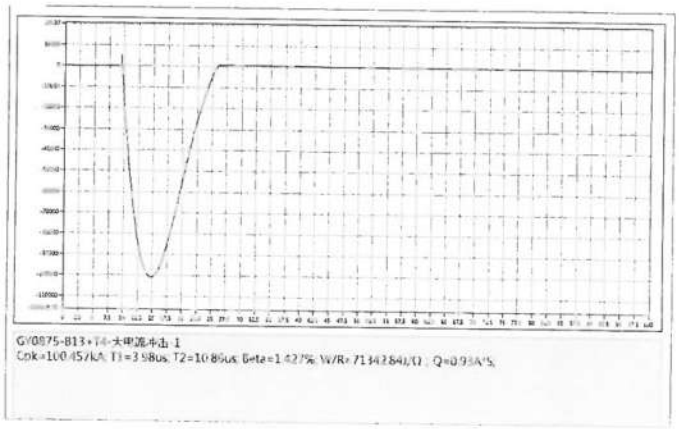
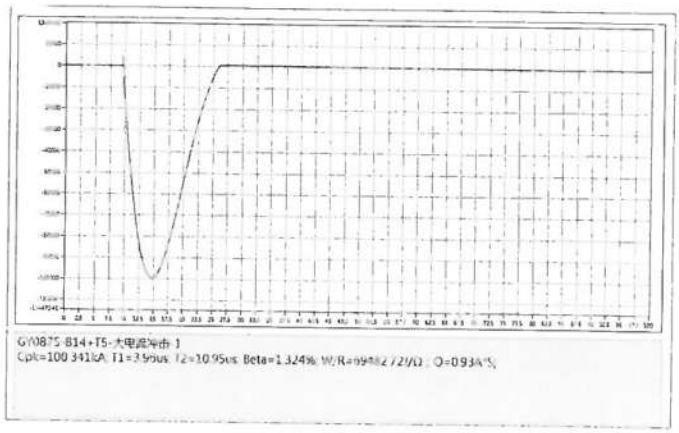
TEST REPORT

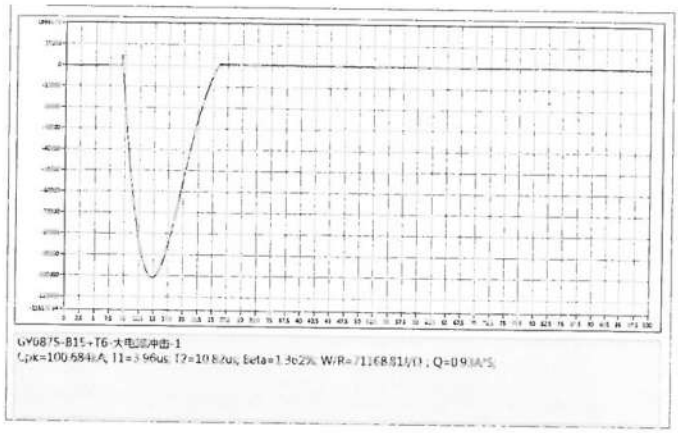
Disconnector operating duty test oscillograms



B_{13}+T_4 1st test oscillogram No.: L20-GY0875-S52



B_{14}+$T_5$1st test oscillogram No.: L20-GY0875-S53



B_{15}+T_6 1st test oscillogram No.: L20-GY0875-S54

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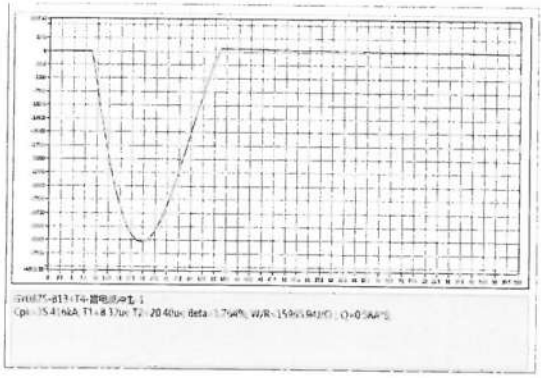
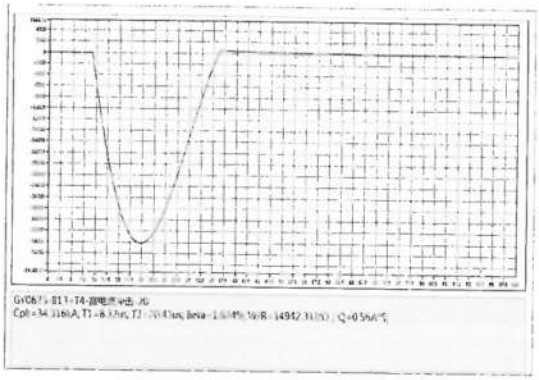
TEST REPORT

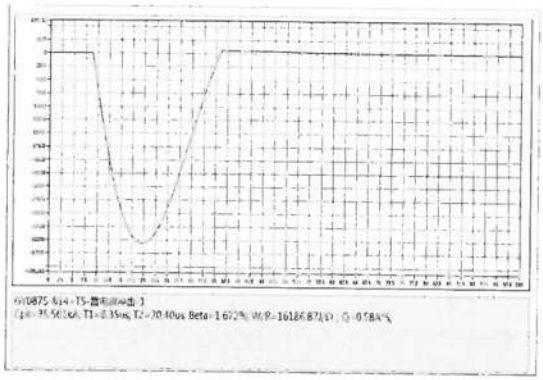
Disconnector operating duty test oscillograms



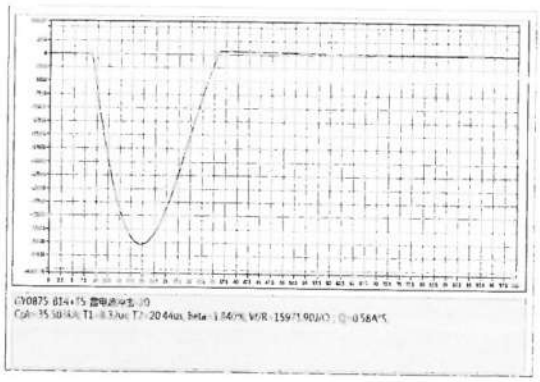
B_{13}+T_4 1st test oscillogram No.: L20-GY0875-S55



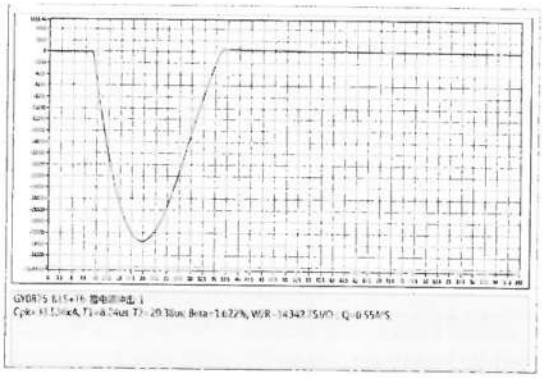
B_{13}+T_4 2st test oscillogram No.: L20-GY0875-S56



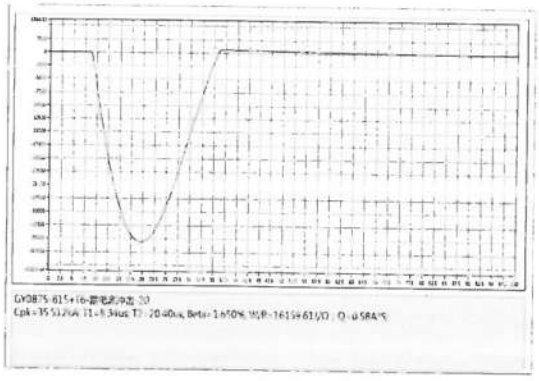
B_{14}+T_5 1st test oscillogram No.: L20-GY0875-S57



B_{14}+T_5 2st test oscillogram No.: L20-GY0875-S58



B_{15}+T_6 1st test oscillogram No.: L20-GY0875-S59



B_{15}+T_6 2st test oscillogram No.: L20-GY0875-S60

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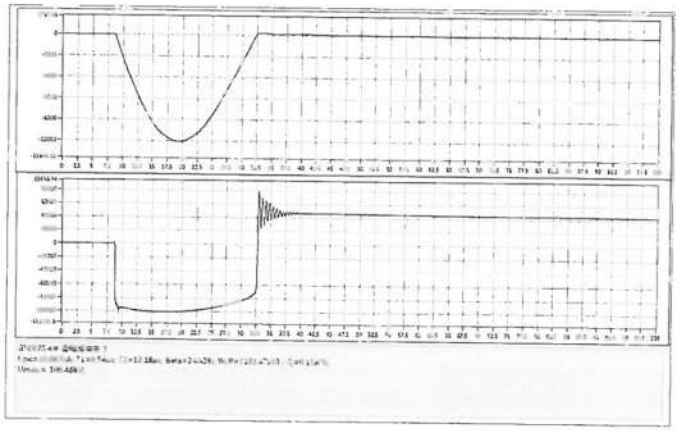
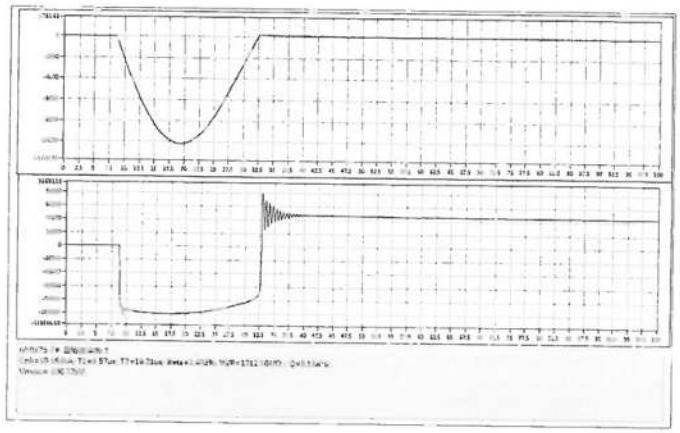
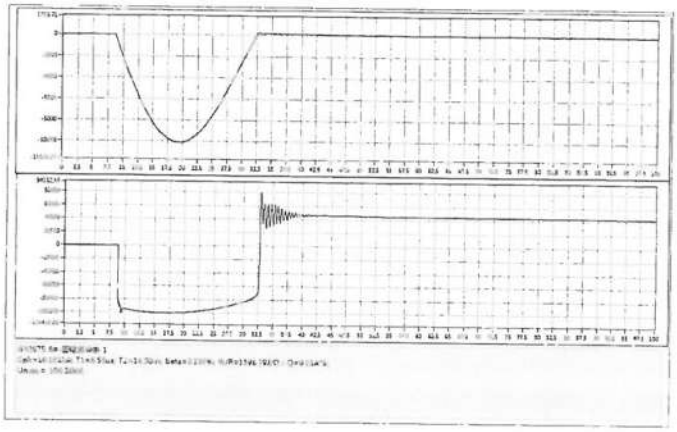


6#(10kA)oscillogram No.:L20-GY0875-S61



7#(10kA)oscillogram No.:L20-GY0875-S62



8#(10kA)oscillogram No.:L20-GY0875-S63

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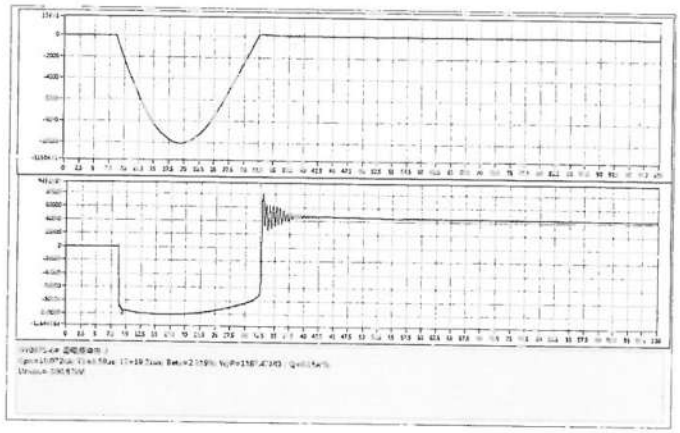
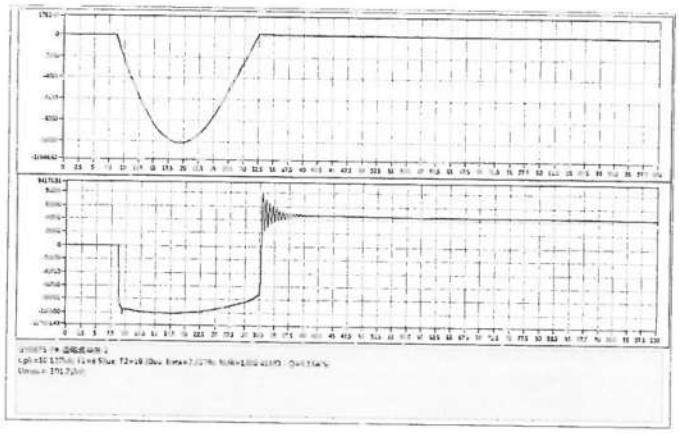
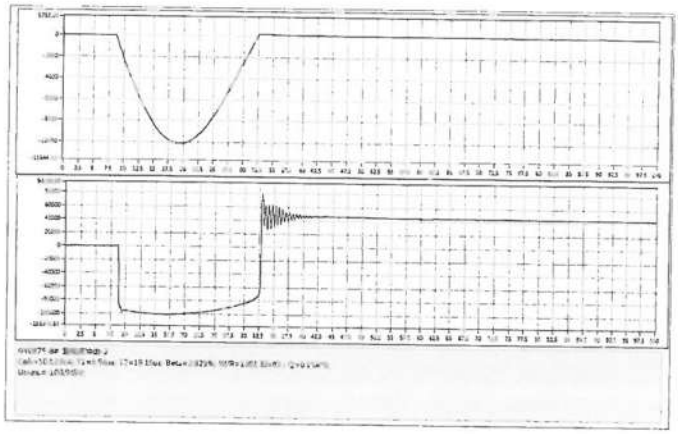
Lightning impulse residual voltage test oscillograms



6#(10kA)oscillogram No.:L20-GY0875-S64



7#(10kA)oscillogram No.:L20-GY0875-S65



8#(10kA)oscillogram No.:L20-GY0875-S66

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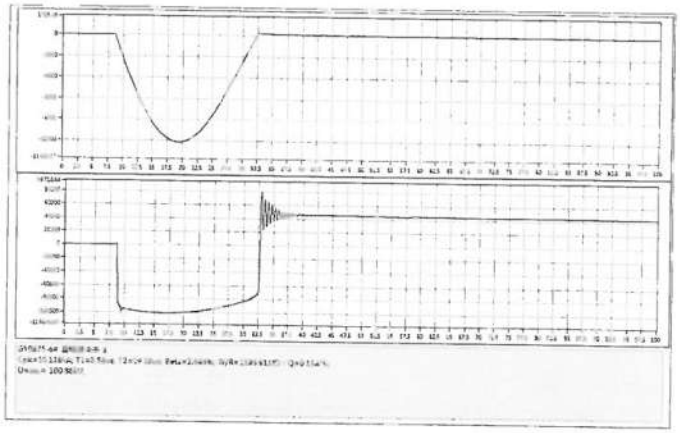
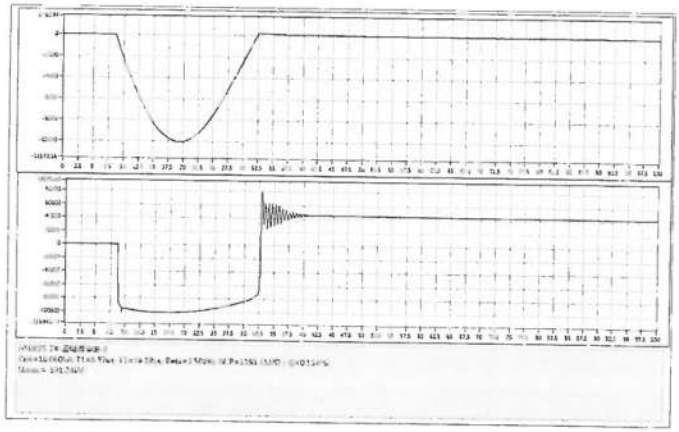
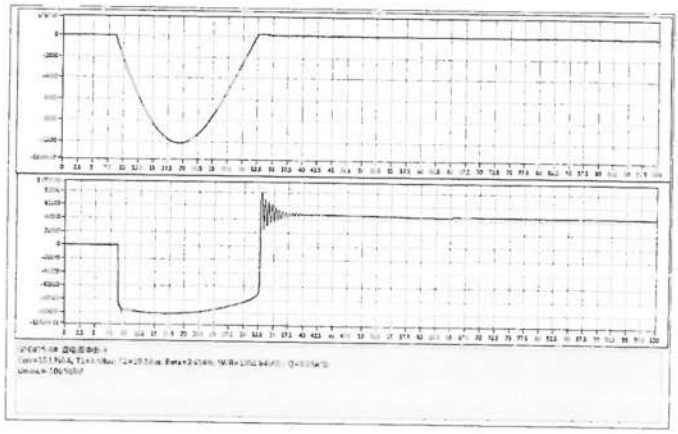
Lightning impulse residual voltage test oscillograms



6#(10kA)oscillogram No.:L20-GY0875-S67



7#(10kA)oscillogram No.:L20-GY0875-S68



8#(10kA)oscillogram No.:L20-GY0875-S69

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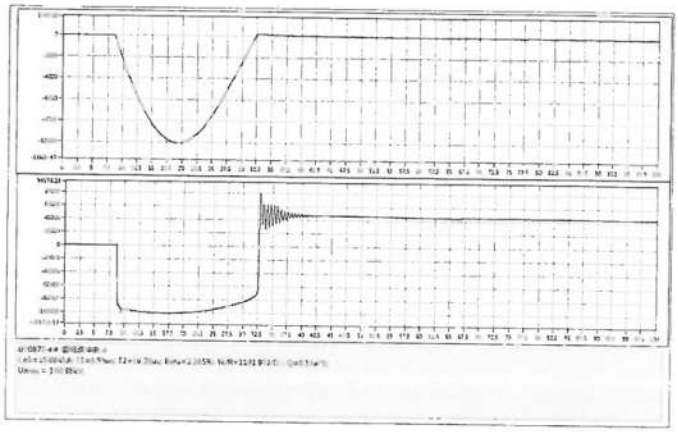
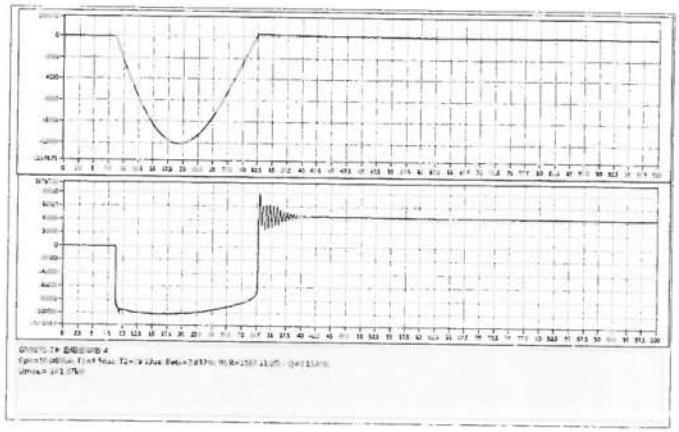
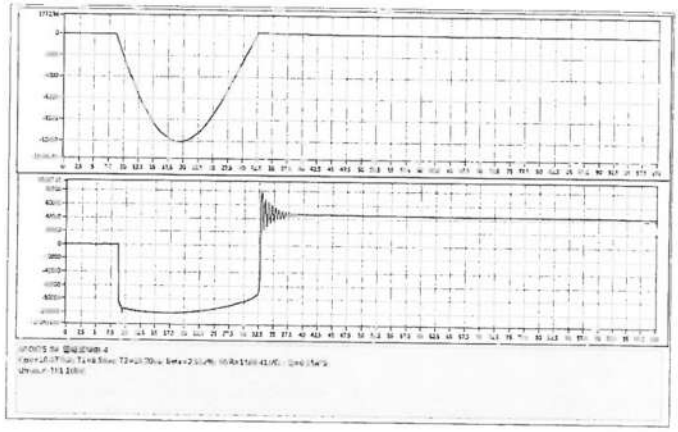
Lightning impulse residual voltage test oscillograms



6#(10kA)oscillogram No.:L20-GY0875-S70



7#(10kA)oscillogram No.:L20-GY0875-S71



8#(10kA)oscillogram No.:L20-GY0875-S72

检测报告

TEST REPORT

附注：

Notions:

1. 试验地点：

Testing location/ address No.68, XiHu East Road, ShiLong Town, Dongguan City, Guangdong Province, China

2.委托单位（申请人）地址及邮编：

Address of applicant No.268, Xingye East Street, Xinji Economic Development Zone, Hebei,China

3.检测环境条件（如适用）：

Environmental conditions (if applicable)

温度： 相对湿度： 其它：

Temperature (25.4~33.6) ℃， Humidity 47%~76% ， Other ———

4.抽样程序（如适用）：

Sampling procedure (if applicable) ———

5.偏离标准方法的说明（如适用）：

The interpretation of the deviation (s) from standard method (s) (if applicable) ———

6.检测结果不确定度说明（如适用）：

The interpretation of the measurement uncertainty of the result (s) (if applicable) ———

7.分包项目及分包方（如适用）：

Subcontractitems and subcontractor (if 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).

GQI is a legal third party institute specializing in product testing, inspection and certification;it is subordinate to Guangdong Administration for Market Regulation (Administration for Intellectual Property); it is a national-level testing and inspecting organization accredited by China National Accreditation Service for Conformity Assessment (CNAS); it is an international CB testing laboratory recognized by International Electro-technical Commission System for Conformity Testing and Certification of Electro-technical Equipment and Components(IECEE); it is the national compulsory CCC testing organization designated by Certification and Accreditation Administration of the People's Republic of China(CNCA).

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

- China National Quality Supervision and Testing Center for Safety of Electrical Products China National Quality Supervision and Testing Center for Furniture (Guangdong)
- 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)