

# CTQC



No. L0681



(2006)国认监认字(080)号



2006000394Z



机检电(2004)07号

## TEST REPORT

No: CTQC/B-07.097

Apparatus: POWER TRANSFORMER

Manufacturer: Hangzhou Qiantang River Electric

Group Co., Ltd (Hangzhou Qiandian Power  
Transmission and Transformation Equipment  
Co., Ltd)

Kind of testing: TRUST INSPECTION



CHINA NATIONAL TRANSFORMER QUALITY  
SUPERVISION TESTING CENTER

## Test Report

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Test object name	Power Transformer	Test object type	SFP10-200000/220
		Brand	/
Entrusted by	Hangzhou Qiantang River Electric Group Co., Ltd. (Hangzhou Qiandian Power transmission and transformation Equipment Co., Ltd)	Kind of testing	Trust inspection
Manufacturer	Hangzhou Qiantang River Electric Group Co., Ltd. (Hangzhou Qiandian Power transmission and transformation Equipment Co., Ltd)	Sampling date	/
Address	Xingang Village, Kanshan Town, Xiaoshan District, Hangzhou City, Zhejiang Province, P. R. China	Serial No	0650010001
Standards	GB1094.1—1996 GB1094.2—1996 GB1094.3—2003 GB/T1094.10—2003 JB/T10088—2004 Technical contract	Test items	Routine tests, Temp.-rise test Lightning impulse test Determination of sound levels Measurement of zero sequence impedance on three phase transformers Measurement of the harmonics of the no-load current Measurement of the power taken by the fan and oil pump motor
Results	The test results of routine tests, temp.-rise test, lightning impulse test, determination of sound levels, measurement of zero sequence impedance on three phase transformers, measurement of the harmonics of the no-load current, measurement of the power taken by the fan and oil pump motor of SFP10-200000/220 are in accordance with standards and contract requirements.		
Note	Signing and issuing date: Apr. 05, 2007 Period of validity 5 years		

Approved by: 李明智 Checked by: 李斌 Compiled by: 孙永

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Test results					
No	Test items	Specified values		Measured values	Conclusions
		Standards (Technical contract)			
1	Measurement of insulation resistance and $\tan \delta$ (Routine test)	Providing insulation resistance ( $G\Omega$ ), Providing $R_{60}/R_{15}$ and $\tan \delta$		See 4.1	/
2	Measurement of voltage ratio and check of phase displacement (Routine test)	The tolerances of voltage ratio : $\pm 0.5\%$ Connection symbol: YNd11		0.15%~0.27% YNd11	Passed
3	Measurement of winding resistance (Routine test)	Maximum unbalancedness Phase: $\leq 2\%$ Line: $\leq 1\%$		H.V.(phase): 0.60% L.V.(line): 0.82%	Passed
4	Separate-source AC withstand voltage test (Routine test)	H.V. neutral: 200kV; 60s L.V.: 45kV; 60s		200kV; 60s 45kV; 60s	Passed
5	Long-duration AC withstand voltage test (Routine test)	A phase-to- earth test		247.3 60 218.2 30 H.V.: 50~60 160.0 5 H.V.: 25~30 100	Passed
		$U_2=1.7U_m/\sqrt{3}$ (kV)			
		Duration(s): 120(fn/f)			
		$U_2=1.5U_m/\sqrt{3}$ (kV) Duration(min): 30 PD $\leq$ (150pC)			
		$1.1U_m/\sqrt{3}$ (kV) Duration(min): 5 PD $\leq$ 100pC			
		Frequency (Hz): $>50$			
6	Measurement of no-load loss and current (Routine test)	$I_0\%$ : 0.2 $P_0$ (kW) 110	+30% +15%	0.09 106.33	Passed
7	Measurement of short-circuit impedance and load loss (Routine test)	t: 75 $^{\circ}C$ Z%: 13.5 $P_k$ (kW): 500 $P_{total}$ (kW): 610	$\pm 7.5\%$ +15% +10%	14.0 497.84 604.17	Passed



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No	Test items	Specified values		Measured values	Conclusions
		Standards (Technical contract)			
8	Test on transformer oil (Routine test)	Breakdown voltage (kV): $\geq 60$ tan $\delta$ (90°C): ( $\leq 0.005$ ) Water dissolved in oil (mg/L): $\leq 15$ Providing gas chromatography		60.3 0.0027 4.1 Providing gas chromatography	Passed
9	Leakage test (Routine test)	Applied pressure (kPa): 50 Duration: (h): 72 No leakage and damage		50 72 No leakage and damage	Passed
10	Switching impulse test (Routine test)	Switching impulse wave (kV): 750 $\pm 3\%$		737.9~771.9	Passed
11	Temp.-rise test (Type test)	Temp.-rise limit (K): Top oil: (45) Winding: 65		Top oil: 37.9 H.V.: 47.4 L.V.: 50.1	Passed
12	Lightning impulse test (Routine test Type test)	Full wave Chopped wave: H.V. (kV): 950 1050 $\pm 3\%$ O (kV): 400 / $\pm 3\%$ L.V. (kV): 105 115 $\pm 3\%$		Full wave Chopped wave 946.3~959.5 1047.0~1058.7 401.2~403.7 104.3~105.1 113.0~114.4	Passed
13	Determination of sound levels (Special test)	Sound level $L_{PA}$ (dB): ( $\leq 75$ ) Sound power level $L_{WA,SN}$ dB(A): ( $\leq 98$ )		ONAN ODAF 65 68 85 91	Passed
14	Measurement of the harmonics of the no-load current (Special test)	Providing no-load current harmonic values of each phase		$I_1$ - $I_{19}$ no load current harmonics	/
15	Measurement of zero sequence impedance on three phase transformers (Special test)	Providing zero sequence impedance value ( $\Omega$ )		38.7	/
16	Measurement of the power taken by the fan motor and oil pump motor (Special test)	Providing total power (kW)		Fan: 10.55 Pump motor: 5.20	/
Annex 1: Rating plate and outline photo (1 page totally) Annex 2: Transformer drawings (2 pages totally)					

## 1. Test object parameters

Rated power: 200000 kVA

Rated voltage: 242/13.8 kV

Rated current: 477.15/8367.40 A

Rated frequency: 50 Hz

Number of phases: 3

Tap range:  $(242 \pm 2 \times 2.5\%) / 13.8$  kV

Connection symbol: YNd11

Cooling method: ODAF

Temperature class of insulation: A

Insulation level: H.V. line terminal SI/LI/AC 750/950/395 kV

H.V. neutral LI/AC 400/200 kV

L.V. line terminal LI/AC 105/45 kV

## 2. Sample condition description

(1) Sample exterior construction and major dimensions (length, width, height) are in compliance with drawing. Measured values: length is 8320mm, width is 5065mm, height is 8000mm.

(2) The form, performance data, specifications of sample rating plate are in compliance with drawing.

(3) The mark of the phase sequence on high voltage and low voltage side of the sample is clear and right.

(4) The surface of the sample has no collision and damage.

## 3. Standards

GB1094.1—1:1996 《Power transformers Part1: General》

GB1094.2—2:1996 《Power transformers Part2: Temperature rise》

GB1094.3—3:2003 《Power transformers Part3: Insulation levels, dielectric tests and external clearances in air》

GB1094.10—10:2003 《Power transformers Part10: Determination of sound levels》

GB/T10088—2004 《Sound level for 6~500kV transformers》

Contract requirements



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## 4. Test items and conclusions:

4.1 Measurement of insulation resistance and  $\tan\delta$  (Routine test) Test date: Feb.27,2007  
Humidity: 51%; Ambient temperature: 21.0°C; Oil temperature: 21.0°C; Atmospheric press: 101.2kpa;

Measurement position	Insulation resistance (M $\Omega$ )			R <sub>600</sub> /R <sub>60</sub>	R <sub>60</sub> /R <sub>15</sub>	tan $\delta$
	R <sub>600</sub>	R <sub>60</sub>	R <sub>15</sub>			
H.V.—L.V.&E	91100	58300	52600	1.56	1.10	0.0032
L.V.—H.V.&E	55400	31800	24400	1.74	1.30	0.0032
H.V. & L.V.—E	73100	40500	27200	1.80	1.48	/
Core—E	/	>2500	/	/	/	/

## 4.2 Measurement of voltage ratio and check of connection group and measurement of phase displacement angle (Routine test) Test date: Feb.27,2007

H.V.		L.V.		Ratio	Measured deviation (%)			Conne- tion symbol
Tap position	Voltage (kV)	Tap position	Voltage (kV)		AB/ab	BC/bc	CA/ca	
1	254.10	/	13.8	18.413	-0.05	-0.18	-0.13	YNd11
2	248.05			17.975	0.11	0.00	0.02	
3	242.00			17.536	0.27	0.15	0.19	
4	235.95			17.098	0.44	0.32	0.35	
5	229.90			16.659	0.62	0.49	0.54	

## 4.3 Measurement of winding resistance (Routine test) Test date: Feb.28,2007

Oil temperature: 21.0°C

Winding	Tap position	Measured values ( $\Omega$ )			Unbalancedness (%)
		A~O a~b	B~O b~c	C~O c~a	
H.V.	1	0.2826	0.2843	0.2834	0.60
	2	0.2758	0.2772	0.2765	0.51
	3	0.2686	0.2700	0.2692	0.52
	4	0.2617	0.2631	0.2622	0.53
	5	0.2547	0.2560	0.2548	0.51
L.V.	/	0.0014892	0.0014783	0.0014770	0.82

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4.4 Separate-source AC withstand voltage test (Routine test)      Test date: Mar.02,2007

Humidity: 55%; Oil temperature: 20.5°C; Ambient temperature: 20.5°C; Atmospheric press: 101.5kPa

Position	Applied voltage (kV)	Duration (s)	Results
H.V. neutral—L.V.&E	200	60	Passed
L.V.—H.V.&E	45	60	

4.5 Long-duration AC withstand voltage test (ACLD) (Routine test)      Test date: Mar.04,2007

A phase to earth test with single-phase supply ,Tap position 3. Frequency 100Hz.

Induced voltage		duration	Partial discharge levels (pC)		
Multiple	Phase-to-earth (kV)		A	B	C
$1.1U_m/\sqrt{3}$	160.0	5 min	/	/	/
$U_2=1.5U_m/\sqrt{3}$	218.2	5 min	/	/	/
$U_2=1.7U_m/\sqrt{3}$	247.3	60s	/	/	/
$U_2=1.5U_m/\sqrt{3}$	218.2	5 min	60	50	60
		10min	60	50	55
		15 min	60	55	50
		20min	60	50	55
		25 min	60	50	50
		30min	60	50	55
$1.1U_m/\sqrt{3}$	160.0	5 min	30	30	25

Note:  $U_m=252kV$

Background partial discharge level is  $<20pC$  before and after test.

Start voltage:140.6kV      Extinction voltage:138.2 kV

4.6 Measurement of no-load loss and current (Routine test)      Test date: Feb.27,2007

RMS voltage (kV)		No-load current		No-load loss (kW)	
Reading of mean value voltmeter	Reading of RMS voltmeter	(A)	(%)	Measured value	Corrected value
14.03	14.04	7.29	0.09	106.33	106.33

Note: The reading tolerance between RMS value voltmeter and mean value voltmeter is less than 3%.



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4.7 Measurement of short-circuit impedance and load loss (Routine test) Test date: Mar.01,2007  
Oil temperature: 19.5°C

Winding	Tap position	Applied current I		Measured voltage (kV)	Short-circuit impedance (Each phase)		Load loss (kW)	Total loss (kW)
		(A)	I/Ir (%)		H.V. impedance (Ω)	(%)	Corrected value	Corrected value
					t=75°C I=Ir	t=75°C I=Ir	t=75°C I=Ir	t=75°C I=Ir
H.V.   L.V.	3	482.7	101.2	34.37	41.0	14.0	497.84	604.17
	5	502.4	100.0	32.89	37.8	14.3	517.14	623.47

4.8 Test on transformer oil (Routine test) Test date: Feb.11,2007

tan δ (90°C)	Breakdown voltage (kV)	Water dissolved in oil (mg/L)
0.0027	60.3	4.1

Gas chromatography (Before insulation test) Test date: Feb.11,2007 μ L/L

H <sub>2</sub>	CO	CO <sub>2</sub>	CH <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	C <sub>2</sub> H <sub>4</sub>	C <sub>2</sub> H <sub>2</sub>	Hydro cardons
4	3	79	0.46	0	0.05	0	0.51

Gas chromatography (Before temp.-rise test) Test date: Mar.01,2007 μ L/L

H <sub>2</sub>	CO	CO <sub>2</sub>	CH <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	C <sub>2</sub> H <sub>4</sub>	C <sub>2</sub> H <sub>2</sub>	Hydro cardons
5	10	111	0.5	0	0.06	0	0.56

Gas chromatography (After temp.-rise test) Test date: Mar.02,2007 μ L/L

H <sub>2</sub>	CO	CO <sub>2</sub>	CH <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	C <sub>2</sub> H <sub>4</sub>	C <sub>2</sub> H <sub>2</sub>	Hydro cardons
5	11	110	0.5	0	0.06	0	0.56

Gas chromatography (After all test) Test date: Mar.05,2007 μ L/L

H <sub>2</sub>	CO	CO <sub>2</sub>	CH <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	C <sub>2</sub> H <sub>4</sub>	C <sub>2</sub> H <sub>2</sub>	Hydro cardons
7	14.0	114	0.5	0	0.06	0	0.56





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4.9 Leakage test (Routine test)      Test date: Mar.07,2007

Test method	Applied pressure (kPa)	Duration (h)	Residual pressure (kPa)	Result
Atmospheric pressure	50	72	48	No leakage and damage

4.10 Switching impulse test (Routine test)      Test date: Mar.04, 2007

Humidity: 55%; Ambient temperature: 21.0°C; Atmospheric pressure: 101.5kPa

Test items and voltage:

Tested terminals	Rated withstand voltage (kV)	Tap position
A, B, C	750	3

Test sequence:

- One reduced negative polarity switching impulse;
- Three rated negative polarity switching impulse.

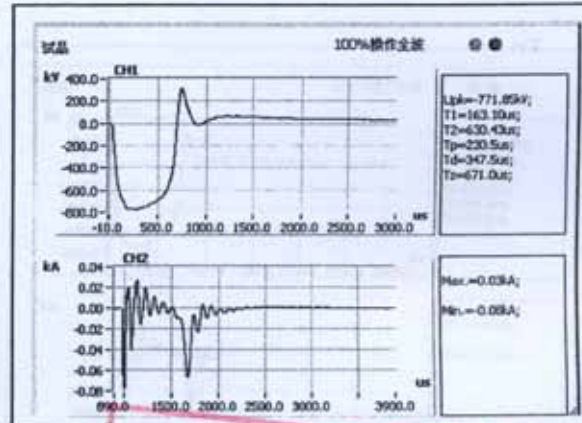
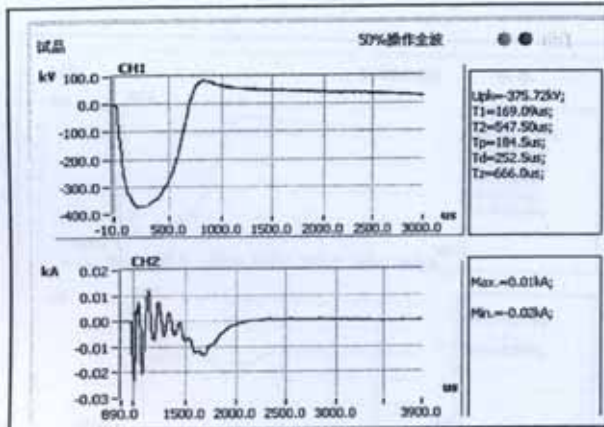
Test records:

T1:Front time;      Td:Time above 90% Upk;

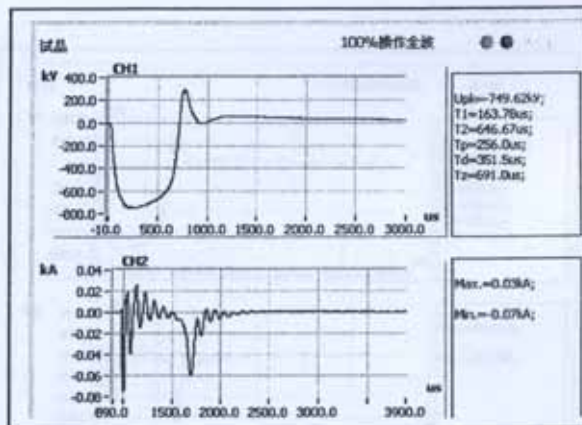
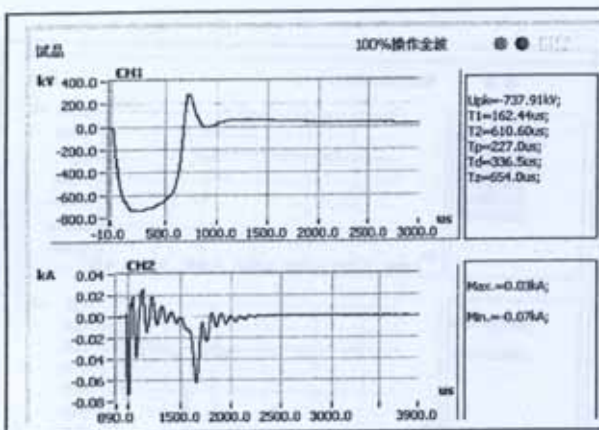
Tz:A total duration from the virtual origin to the first zero passage.      Upk:Peak voltage.



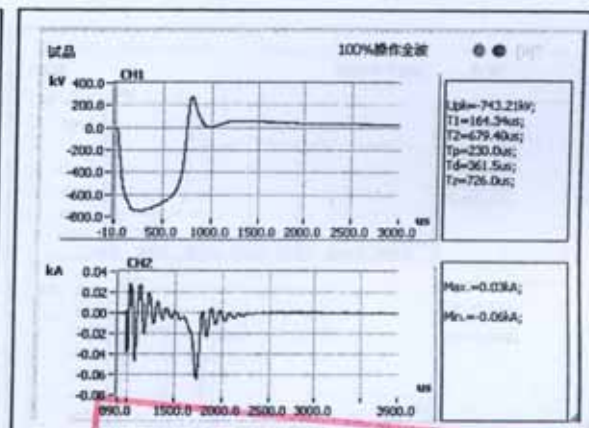
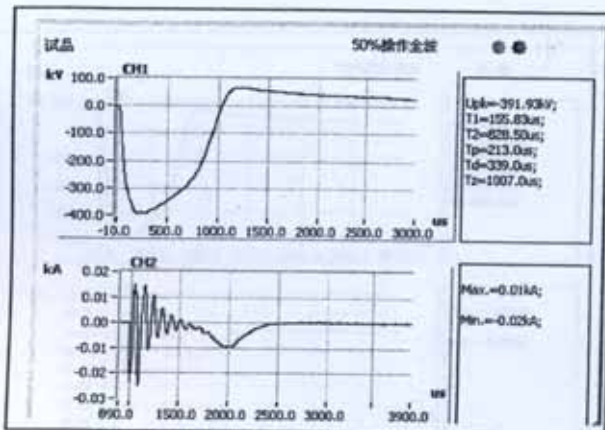
Tested terminal: A Test polarity: Negative CH1.Voltage records CH2. Neutral current records



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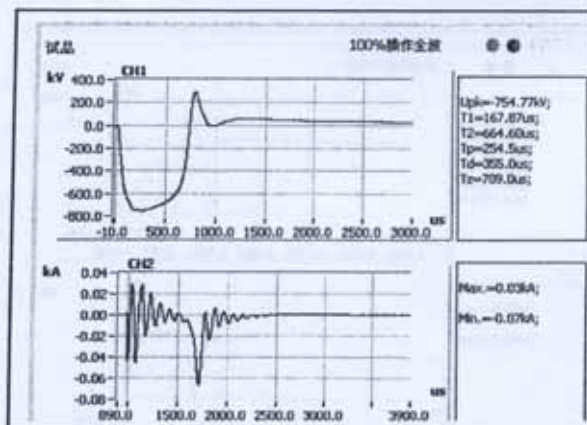
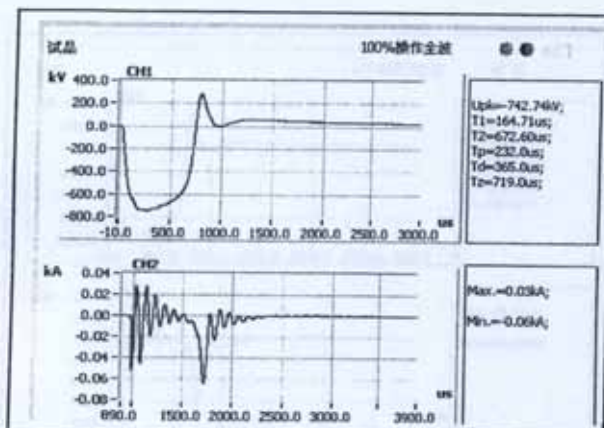


Tested terminal: B Test polarity: Negative CH1.Voltage records CH2. Neutral current records



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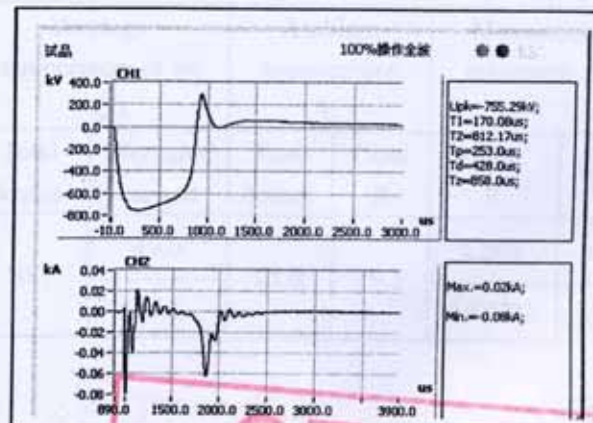
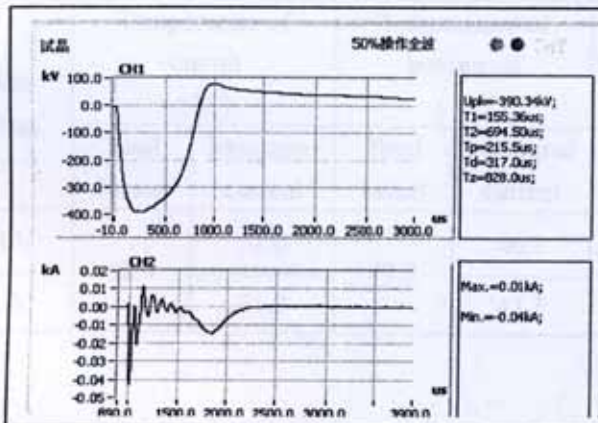
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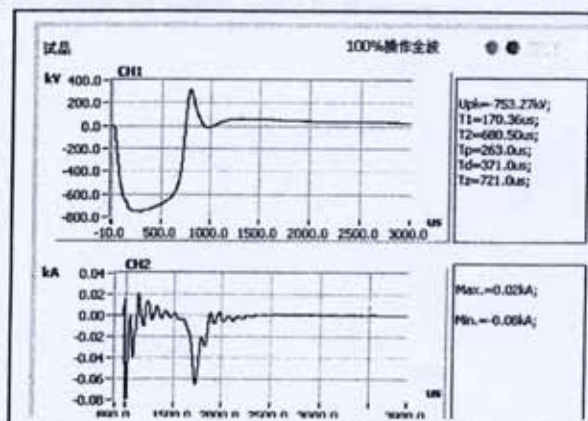
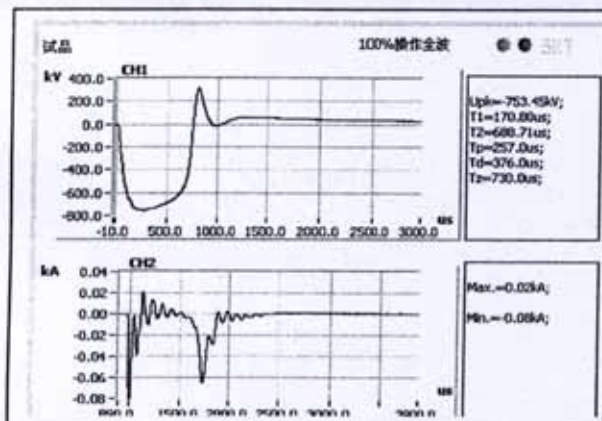
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Tested terminal: C Test polarity: Negative CH1.Voltage records CH2. Neutral current records



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**4.11 Temperature-rise test (ODAF) (Routine test)      Test date: Mar.02,2007**

The test is conducted by means of short-circuit method, Applied voltage on H.V., L.V. is short-circuit, the test duration is 9h, stability duration is 4h. Tap 5.

Measure top oil temp.-rise: Specified total loss is 623.4kW, injected total loss of 510.9kW during test.

Measure winding temp.-rise: Specified current is 502.2A, injected test current of 502.2A during test.

**Measured values**

Winding	Temperature of top oil (°C)		Temperature of bottom oil (°C)		Average temperature of oil (°C)		Ambient temperature (°C)		Measurement of resistance (Ω)	
	Total losses	Measured current	Total losses	Measured current	Total losses	Measured current	Total losses	Cold R	Hot R	Cold R
H.V.	52.9	51.6	47.3	46.3	50.1	49.0	21.8	19.5	0.2986	0.2533
L.V.		51.2		43.3		47.3			0.001727	0.001462

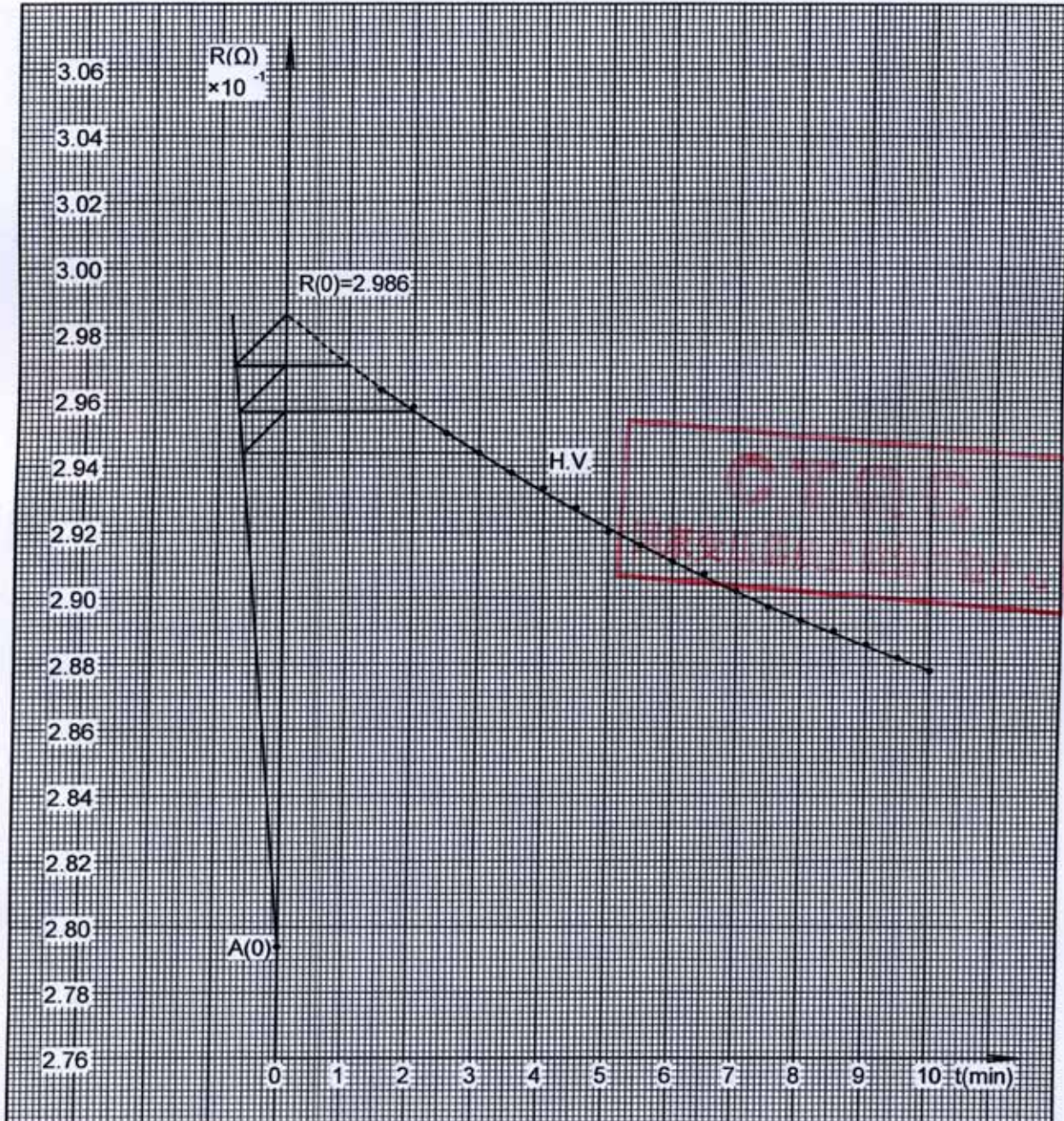
**Conclusions of temperature-rise**

Top oil temp. -rise (K)	37.9	
Winding temp.-rise (K)	H.V.	47.4
	L.V.	50.1

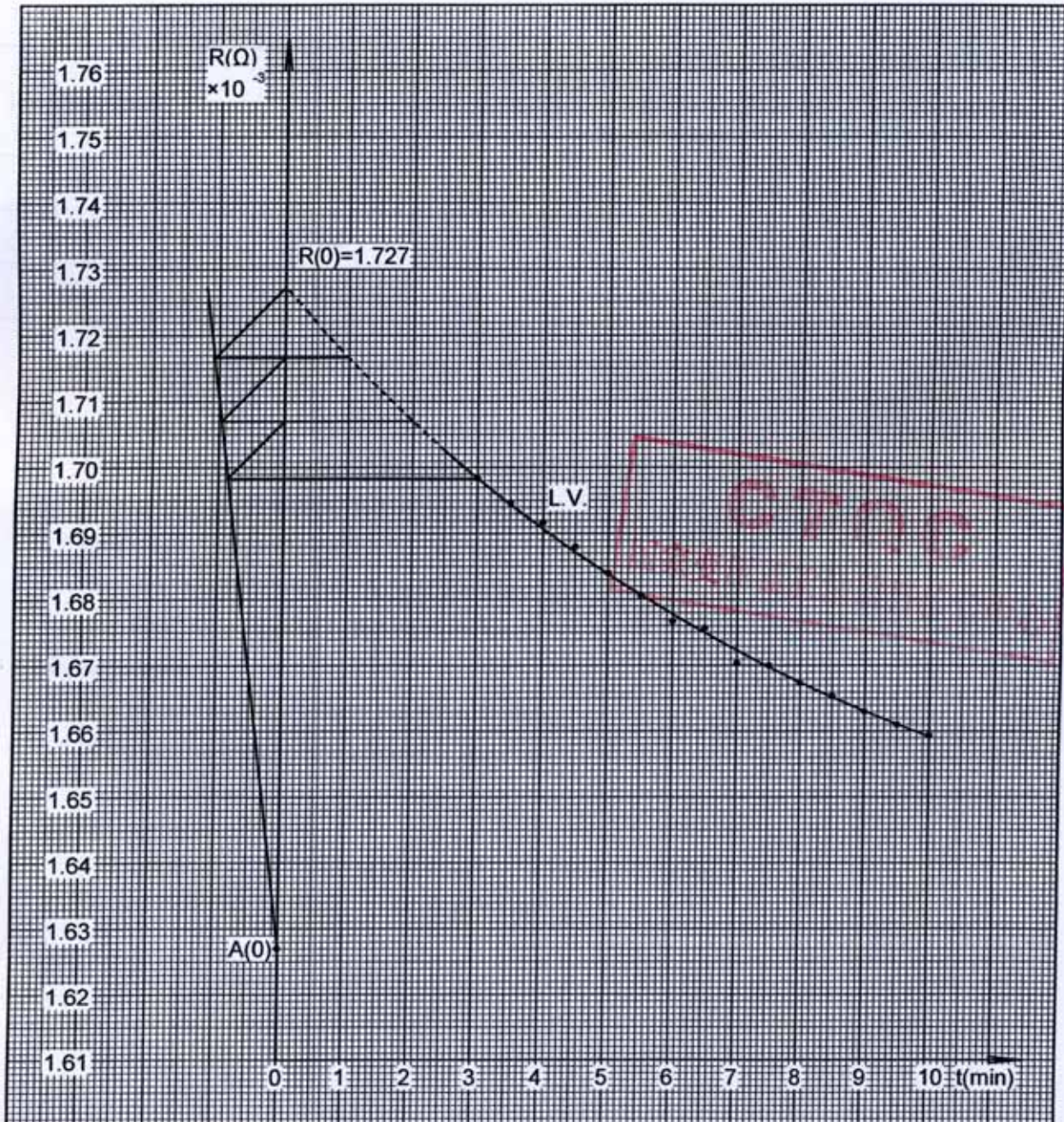


Note: The results of top oil temperature rise calculation are the corrected values under total losses.

## Hot resistance curve



## Hot resistance curve



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4.12 Lightning impulse test (Routine test, type test) Test date: Mar.04,2007

Humidity: 55%; Ambient temperature: 21.0℃; Atmospheric press: 101.5kPa

Test items and voltage:

Tested terminals	Rated withstand voltage (kV)		Tap position
	Full wave	Chopped wave	
A, B, C	950	1050	3
O	400	/	3
a,b,c	105	115	/

Test sequence:

Line terminal:

- One reduced negative polarity full wave impulse;
- One rated negative polarity full wave impulse;
- One reduced negative polarity chopped wave impulse;
- Two rated negative polarity chopped wave impulse;
- Two rated negative polarity full wave impulse.

Neutral terminal:

- One reduced negative polarity full wave impulse;
- Three rated negative polarity full wave impulse.

Test oscillogram records :

- T1:Front time; T2:Time to half value; Tc:Time to chopping;
- Oz:Factor of over crossing; Upk:Peak voltage.



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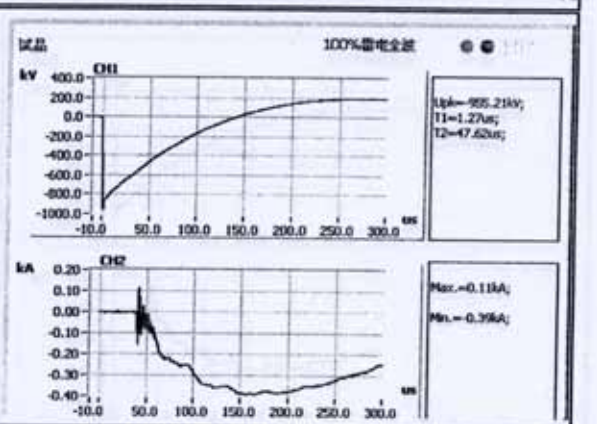
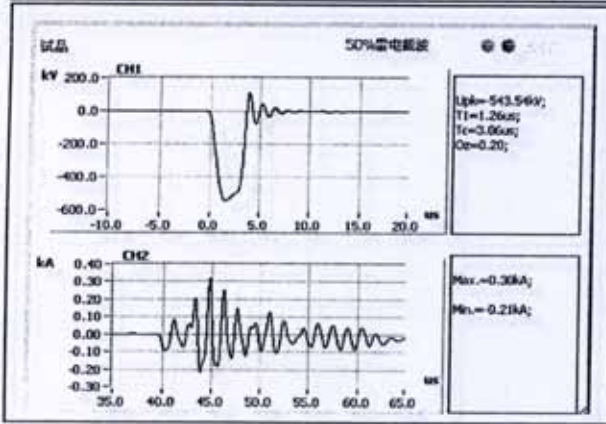
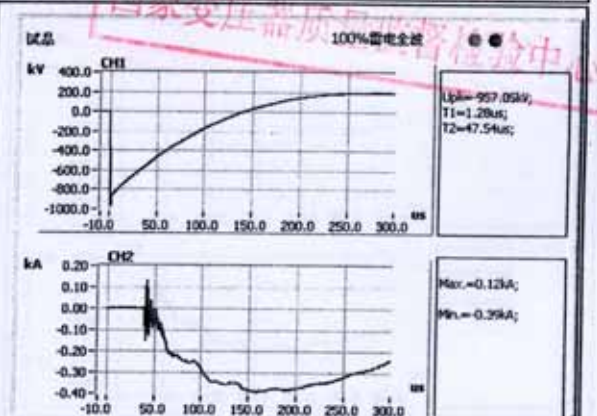
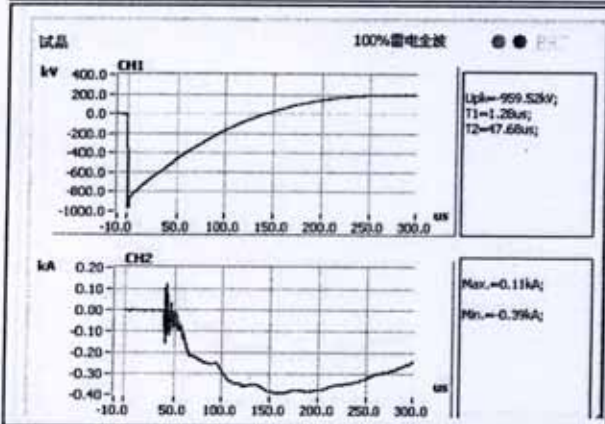
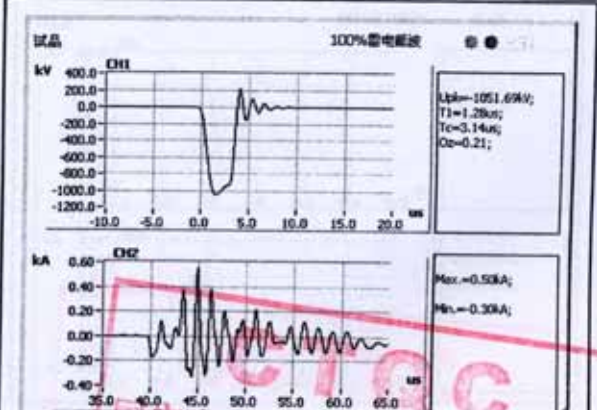
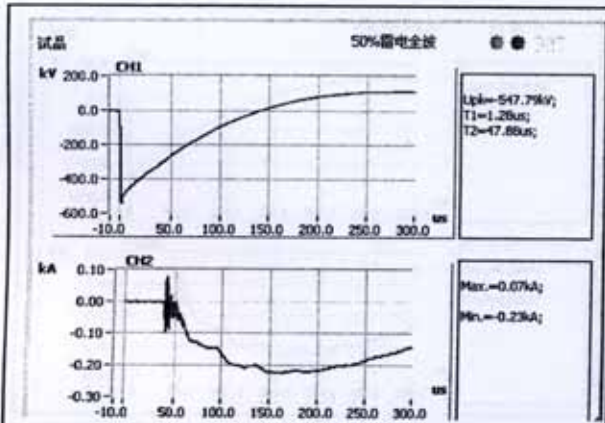
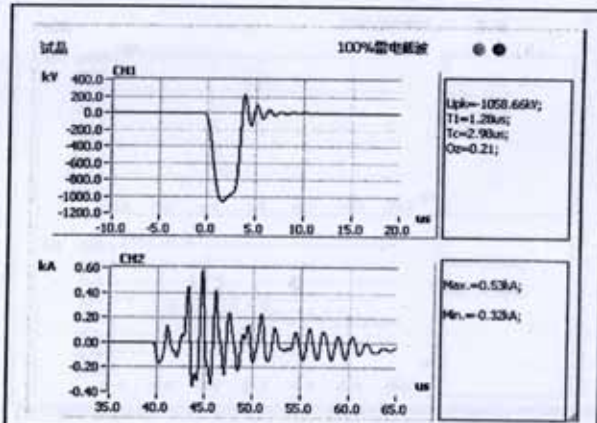
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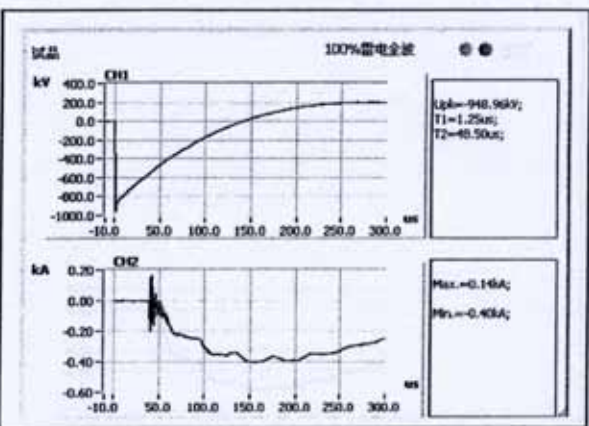
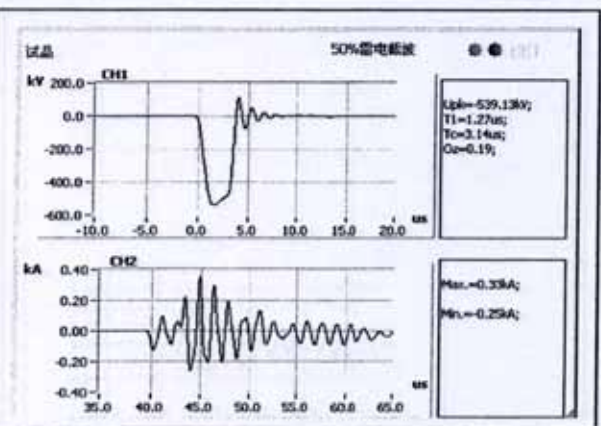
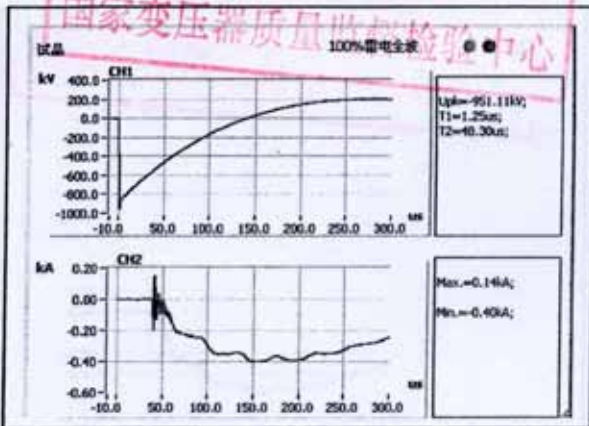
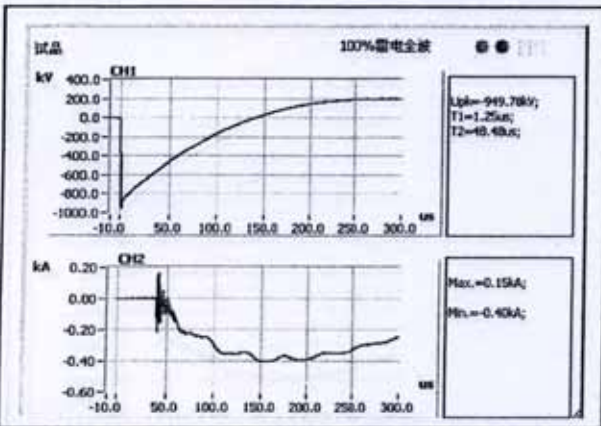
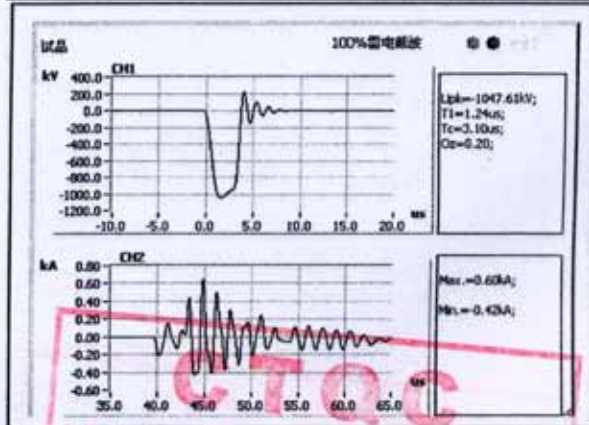
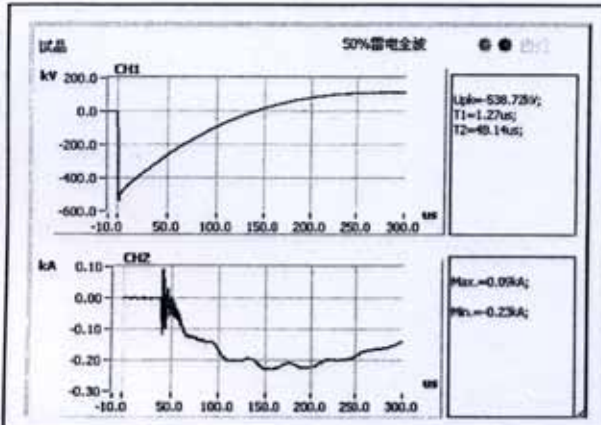
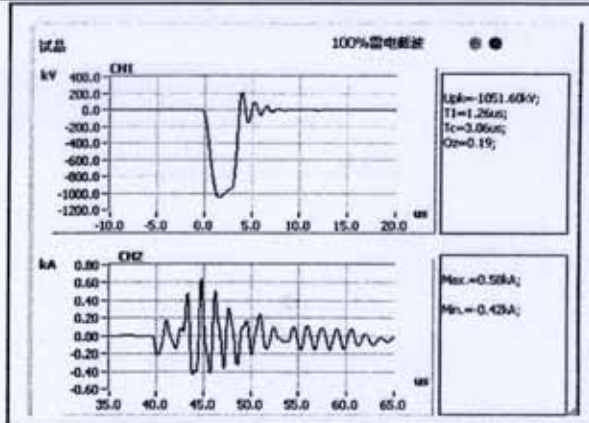
Fax: (024) 89707949



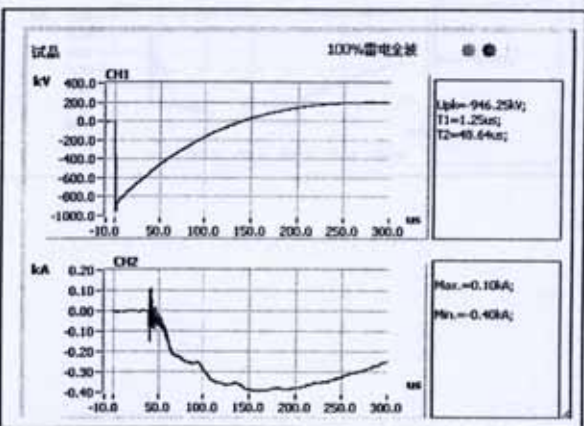
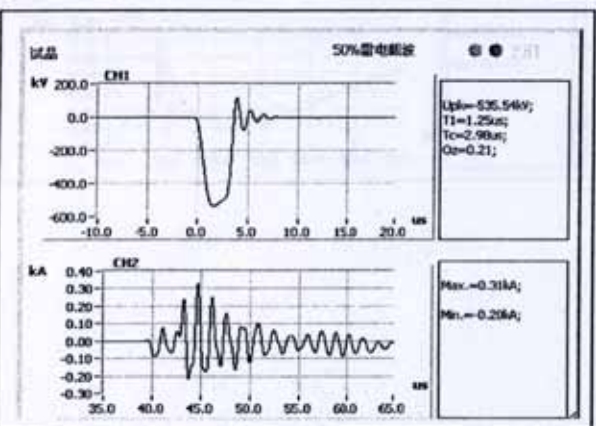
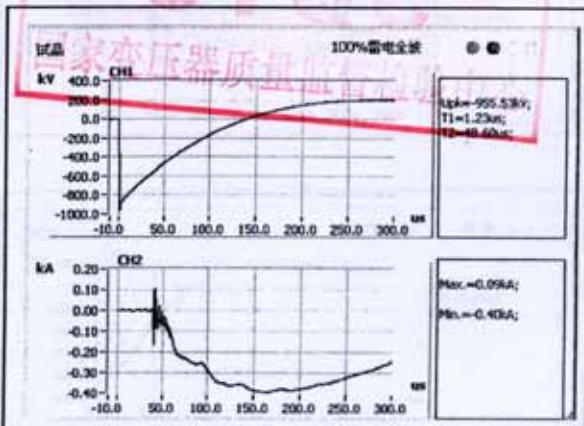
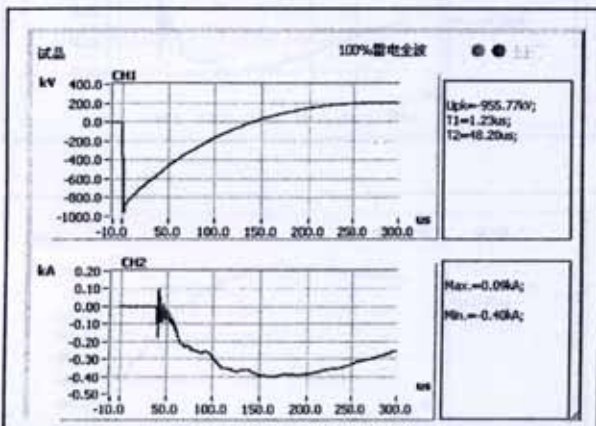
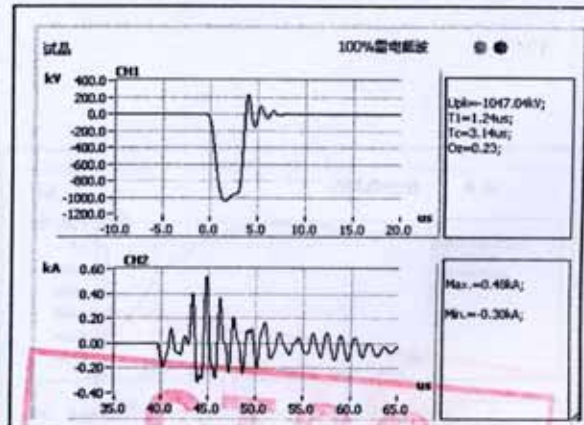
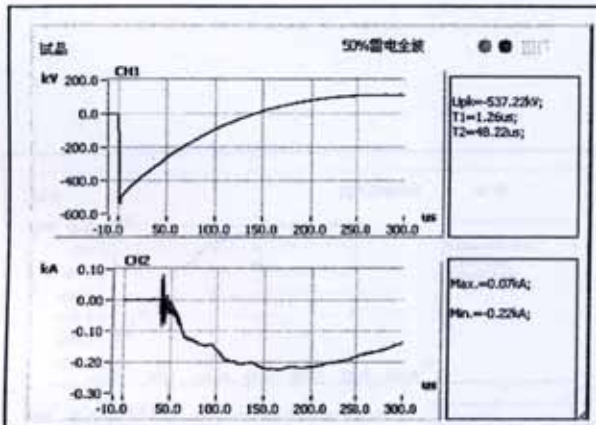
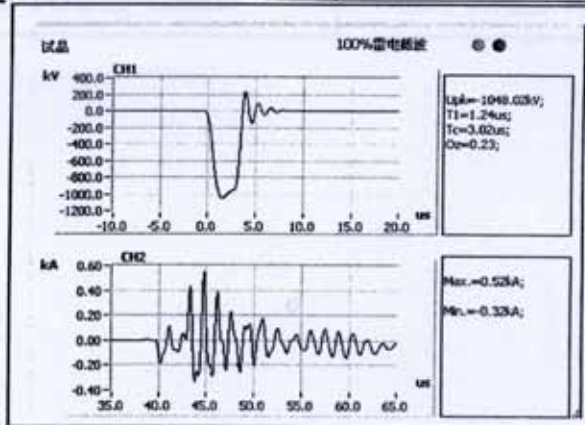
Tested terminal: A  
 Test polarity: Negative  
 CH1. Voltage records  
 CH2. Neutral current records



Tested terminal: B  
 Test polarity: Negative  
 CH1. Voltage records  
 CH2. Neutral current records



Tested terminal: C  
 Test polarity: Negative  
 CH1. Voltage records  
 CH2. Neutral current records



## Test Report

China National Transformer Quality  
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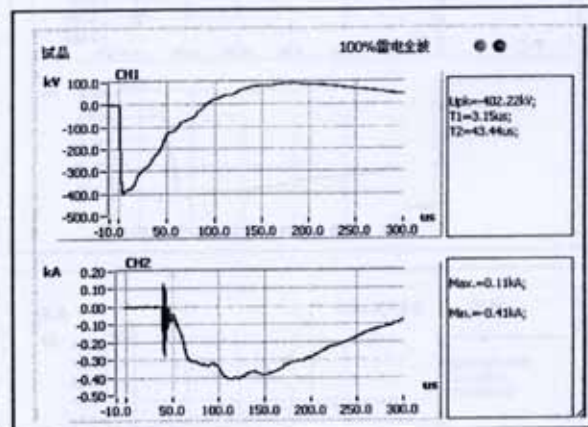
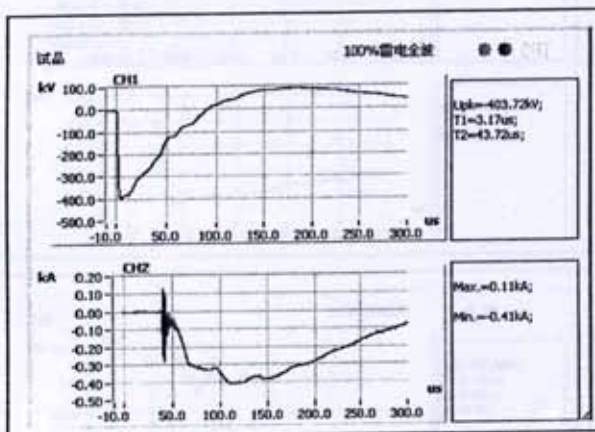
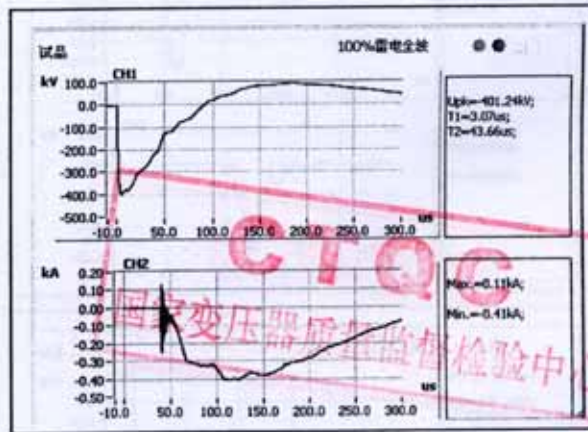
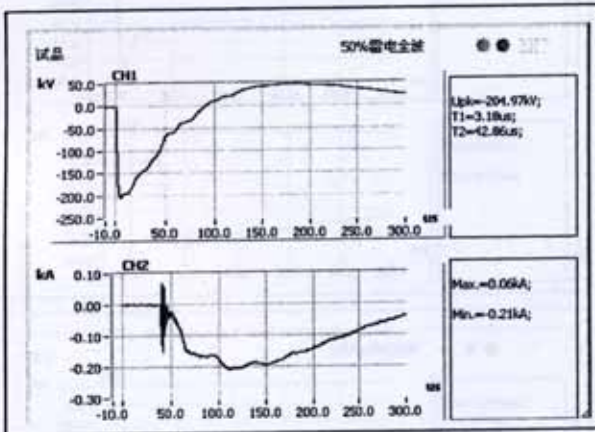
Total 25Page 19

Tested terminal: O

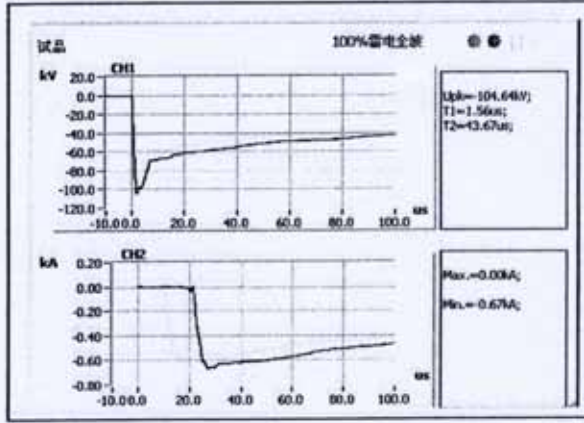
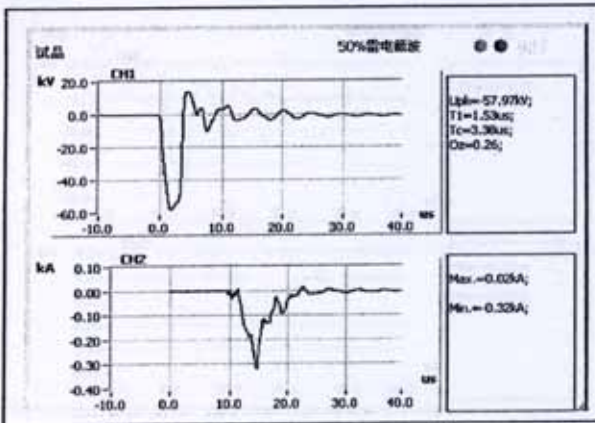
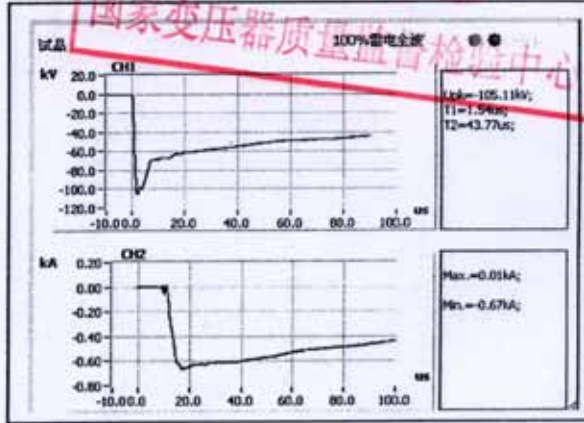
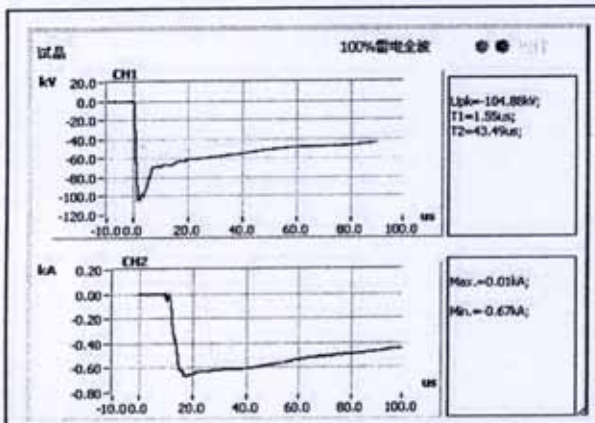
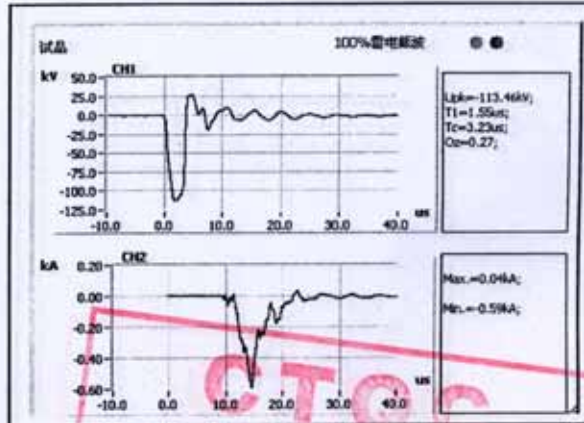
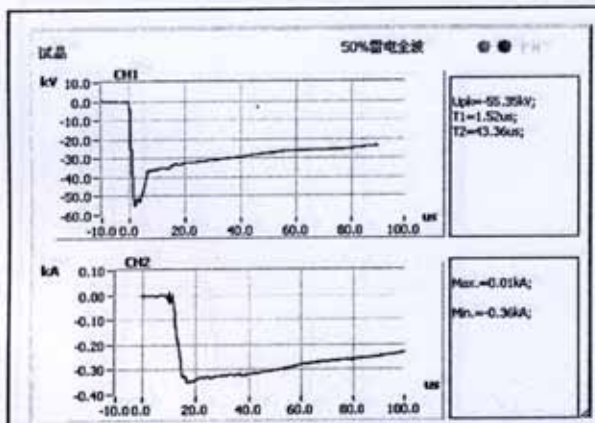
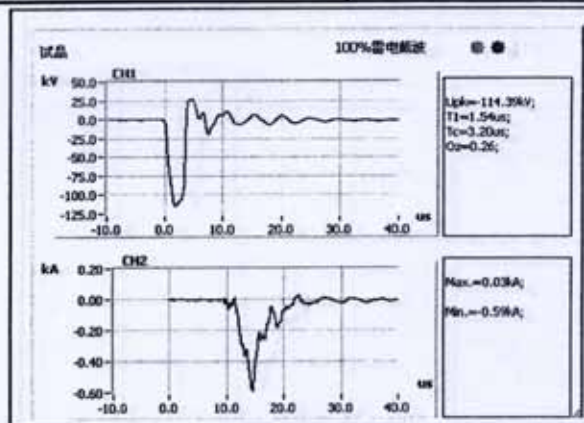
Test polarity: Negative

CH1. Voltage records

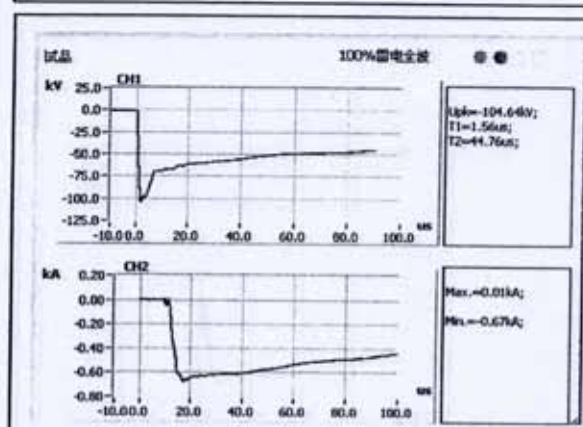
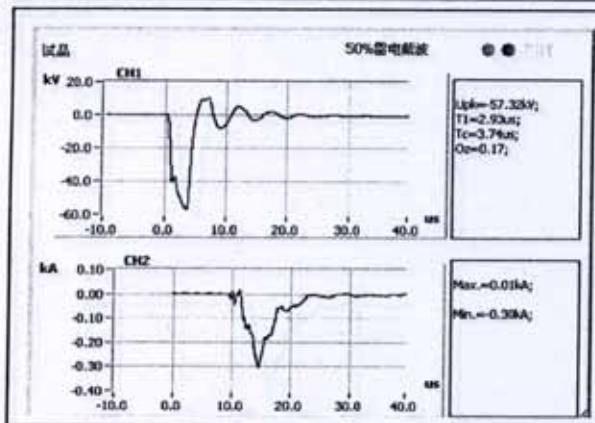
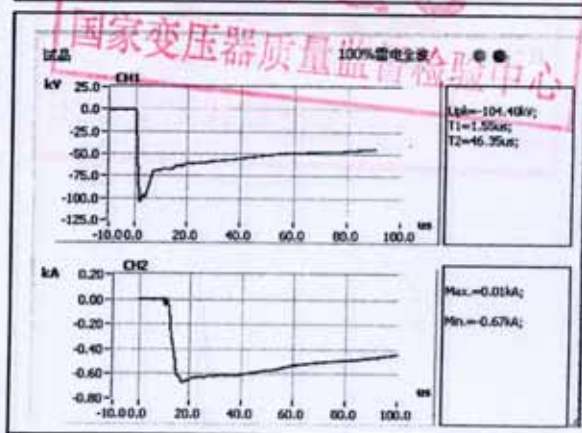
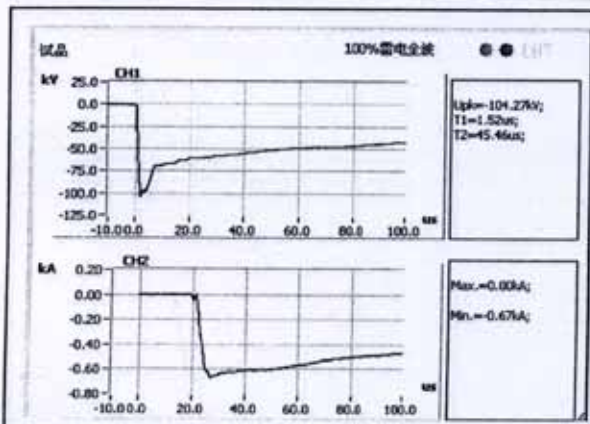
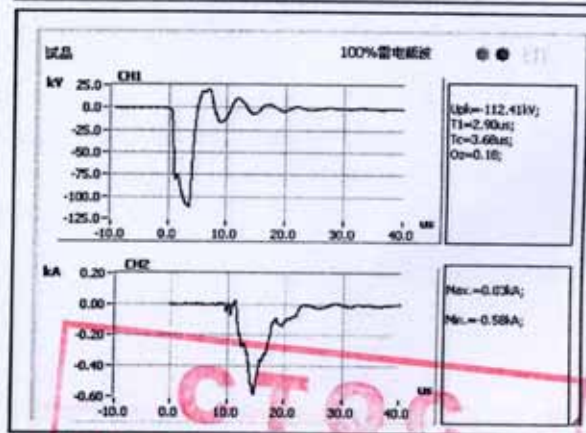
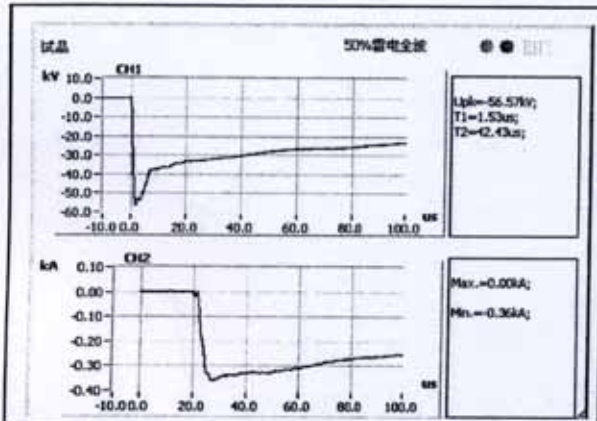
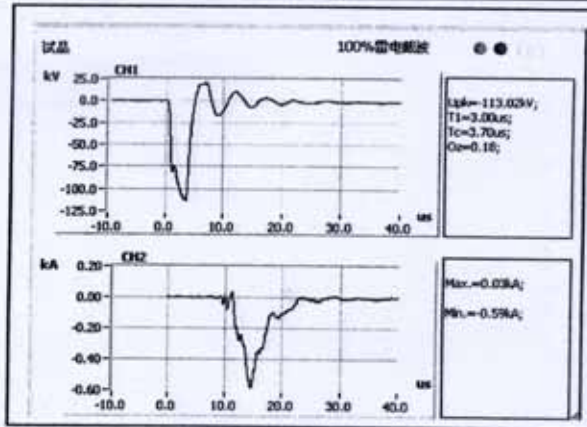
CH2. Neutral current records



Tested terminal: a  
 Test polarity: Negative  
 CH1. Voltage records  
 CH2. Neutral current records



Tested terminal: b  
Test polarity: Negative  
CH1. Voltage records  
CH2. Neutral current records

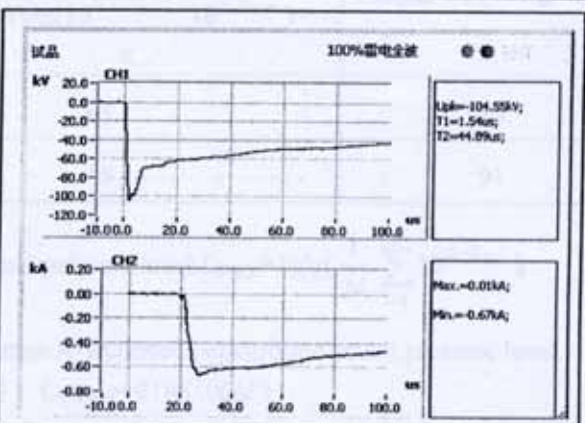
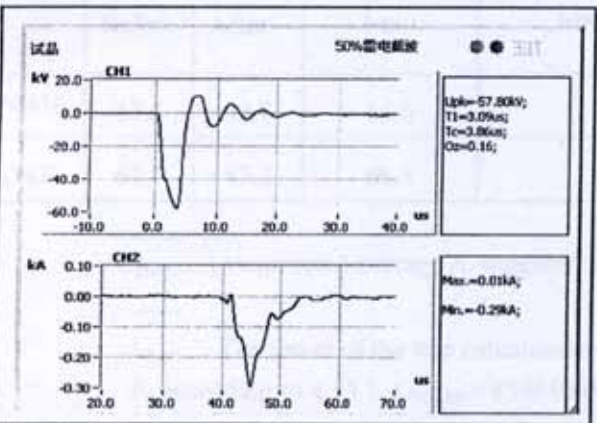
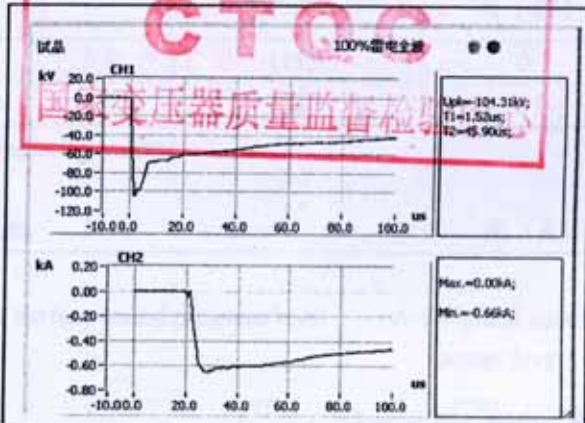
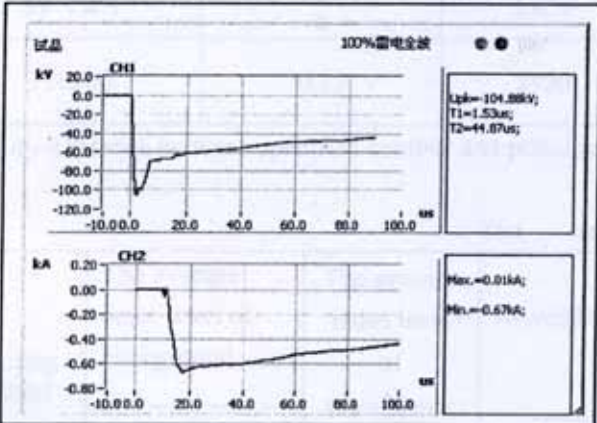
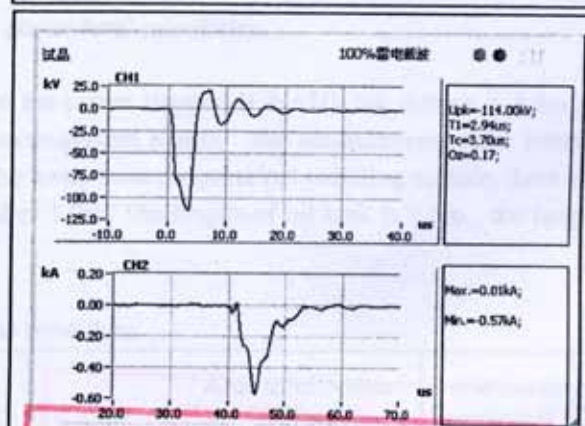
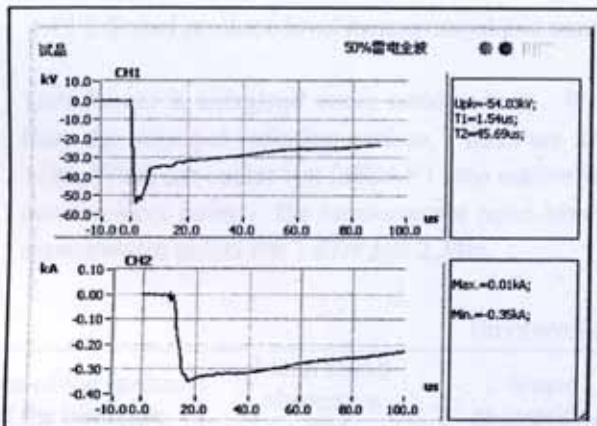
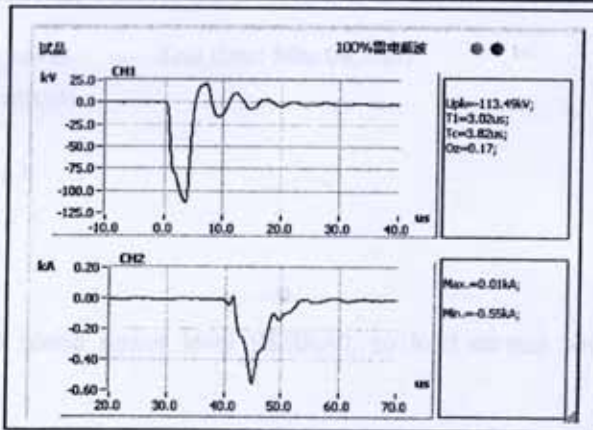


Tested terminal: c

Test polarity: Negative

CH1. Voltage records

CH2. Neutral current records



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4.13 Determination of sound levels (Special test) Test date: Mar.04,2007

4.13.1 Sound power level calculation under on load current:

Calculation equation:  $L_{WA,IN} \approx 39 + 181g \frac{S_r}{S_p} = 80\text{dB (A)}$

In which:  $S_r$ —Rated power 200MVA;

$S_p$ —Reference power 1.0MVA.

$L_{WA,IN}$  is found to be 18dB below the guaranteed sound power level 98dB(A), so load current sound measurements are not appropriate.

4.13.2 Sound pressure level measurement and sound power level calculation

Transformer is energized under rated voltage, When the cooler stopped (ONAN), the outline is 0.3m away from the principal radiating surface, there are 27 measurement points, the measurement point interval is 1.0m; When the cooler run (ODAF), the outline is 2m away from the principal radiating surface, there are 37 measurement points, the measurement point interval is 1.0m. The height of oil tank is 3.5m, the height of measurement points are 1.67m and 2.34m.

Environmental conditions

Area of the surface of the test room $S_v$ (m <sup>2</sup> )	Mean sound absorption coefficient $\alpha$	Sound absorption A (m <sup>2</sup> )	d (m)	Area of effective surface S (m <sup>2</sup> )	Environmental correction factor K (dB)
16200	0.15	2430	0.3	111.3	0.7
			2.0	208.1	1.3

d—Distance between specified contour and principal radiating surface.

Test results dB (A)

Cooling method	The average noise level of background		The average noise level of transformer $L_{PAO}$	A-weighted surface sound pressure level	A-weighted sound power level
	Before	After		$L_{PA} = 10\lg(10^{0.1L_{PAO}} - 10^{0.1L_{bgA}}) - K$	$L_{WA,UN} = L_{PA} + 10\lg(S/S_0)$
ONAN	47.6	47.7	65.6	65	85
ODAF	47.3	47.2	69.4	68	91

$L_{PAO}$ —Uncorrected average A-weighted sound pressure level.  $L_{PAO} = 10\lg\left(\frac{1}{N} \sum_{i=1}^N 10^{0.1L_{PAi}}\right)$

$L_{bgA}$ —The lower of the two calculated average A-weighted background sound pressure level.

In according to 4.13.1,  $L_{WA,SN} = 85\text{dB (ONAN)}$ ;  $L_{WA,SN} = 91\text{dB (ODAF)}$



## 4.14 Measurement of the harmonics of the no-load current (Special test)

Test date: Mar.05,2007

No.	Voltage						Current					
	U1		U2		U3		I1		I2		I3	
	(V)	(°)	(V)	(°)	(V)	(°)	(A)	(°)	(A)	(°)	(A)	(°)
1	7886	0.000	7962	0.000	7880	0.000	7.718	0.000	5.631	0.000	6.356	0.000
2	12.41	0.000	12.27	0.000	8.87	0.000	0.089	-158.9	0.138	-154.96	0.133	-172.7
3	138.4	125.29	87.04	-106.6	109.4	0.000	0.000	-64.22	0.744	74.17	0.788	127.7
4	15.13	0.000	15.99	0.000	13.88	-2.25	0.844	-24.84	0.111	-11.24	0.086	-103.3
5	365.5	-19.87	319.5	-15.83	317.7	0.000	0.083	93.12	1.365	130.22	1.301	18.56
6	2.683	0.000	3.716	0.000	2.945	-17.40	0.003	0.000	0.023	177.80	0.026	-122.9
7	167.4	-158.6	198.8	-170.2	154.5	0.000	0.665	-117.2	0.791	-83.71	0.656	130.8
8	10.28	0.000	12.98	0.000	16.00	-169.3	0.028	61.18	0.041	80.47	0.048	-53.9
9	15.43	0.000	42.52	38.15	45.51	0.000	0.021	-57.37	0.106	79.99	0.109	69.49
10	6.247	0.000	8.448	0.000	5.362	-154.0	0.013	0.000	0.022	-80.65	0.014	0.000
11	66.54	99.43	93.94	66.69	117.2	0.000	0.145	29.57	0.199	64.35	0.244	-130.6
12	2.719	0.000	2.581	0.000	0.732	105.2	0.004	0.000	0.005	0.000	0.002	0.000
13	9.923	0.000	10.71	0.000	21.86	0.000	0.013	0.000	0.039	137.63	0.042	-79.29
14	1.091	0.000	3.146	0.000	2.962	0.000	0.003	0.000	0.004	0.000	0.006	0.000
15	6.797	0.000	4.239	0.000	4.923	0.000	0.010	0.000	0.005	0.000	0.007	0.000
16	2.004	0.000	2.545	0.000	1.796	0.000	0.003	0.000	0.004	0.000	0.003	0.000
17	6.648	0.000	4.670	0.000	5.700	0.000	0.008	0.000	0.007	0.000	0.005	0.000
18	0.497	0.000	0.763	0.000	0.522	0.000	0.001	0.000	0.001	0.000	0.007	0.000
19	6.019	0.000	8.137	0.000	9.338	0.000	0.028	130.3	0.029	-113.68	0.031	-135.8

检验报告

国家变压器质量监督检验中心

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## 4.15 Measurement of zero sequence impedance on three phase transformers (Special test)

Test date: Mar.04,2007

Connection group	Applied voltage terminal	Open circuit terminal	Short circuit terminal	Applied current (A)	Measured voltage (V)	Impedance ( $\Omega$ )
YNd11	A.B.C-O	abc	/	136.08	1756	38.7

## 4.16 Measurement of the power taken by the fan motor and oil pump motor (Special test)

Test date: Mar.05,2007

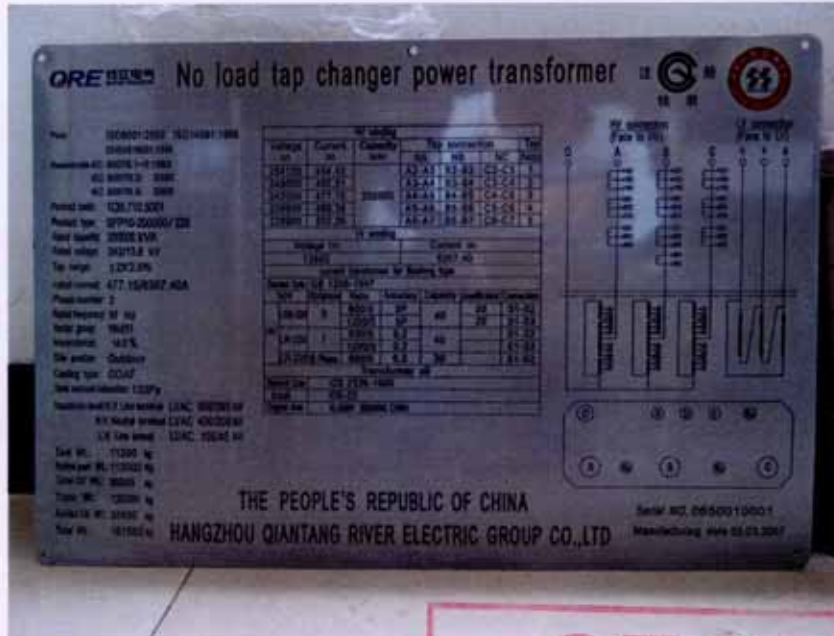
Motor serial No.	Applied voltage (V)	Measured current value (A)	Measured losses value (W)
668054	380.5	6.073	2643.2
668056	380.6	6.047	2628.7
668050	380.2	6.064	2637.1
668049	380.4	6.050	2637.4
Total losses (kW)		10.55	
Fan serial No.	Applied voltage (V)	Measured current value (A)	Measured losses value (W)
441	380.63	3.452	1299.6
442	380.16	3.446	1299.1
443	380.91	3.463	1302.1
444	380.66	3.455	1298.4
Total losses (kW)		5.20	



RATING PLATE AND OUTLINE PHOTO



Rating plate:



**CTQC**  
 国家变压器质量监督检验中心

Outline:



### TRANSFORMER DRAWINGS

QARZ system No. had tap changer power transformer



Item No.	Description	Quantity	Unit
1	Core	1	PC
2	Primary Winding	1	PC
3	Secondary Winding	1	PC
4	Tap Changer	1	PC
5	Oil	100	L
6	Insulation Paper	10	kg
7	Transformer Oil	100	L
8	Tap Changer Oil	10	L
9	Tap Changer Winding	1	PC
10	Tap Changer Core	1	PC
11	Tap Changer Winding	1	PC
12	Tap Changer Core	1	PC
13	Tap Changer Winding	1	PC
14	Tap Changer Core	1	PC
15	Tap Changer Winding	1	PC
16	Tap Changer Core	1	PC
17	Tap Changer Winding	1	PC
18	Tap Changer Core	1	PC
19	Tap Changer Winding	1	PC
20	Tap Changer Core	1	PC

QARZ system No. had tap changer power transformer

THE PEOPLE'S REPUBLIC OF CHINA  
HANGZHOU QIANTONG RIVER ELECTRIC GROUP CO., LTD.

Item No.	Description	Quantity	Unit
1	Core	1	PC
2	Primary Winding	1	PC
3	Secondary Winding	1	PC
4	Tap Changer	1	PC
5	Oil	100	L
6	Insulation Paper	10	kg
7	Transformer Oil	100	L
8	Tap Changer Oil	10	L
9	Tap Changer Winding	1	PC
10	Tap Changer Core	1	PC
11	Tap Changer Winding	1	PC
12	Tap Changer Core	1	PC
13	Tap Changer Winding	1	PC
14	Tap Changer Core	1	PC
15	Tap Changer Winding	1	PC
16	Tap Changer Core	1	PC
17	Tap Changer Winding	1	PC
18	Tap Changer Core	1	PC
19	Tap Changer Winding	1	PC
20	Tap Changer Core	1	PC



# No load tap changer power transformer

Pass ISO9001:2000 ISO14001:1996

DHSAS18001:1999

standard code IEC 60076-2/1993

IEC 60076.3 2000

IEC 60076.5 2000

Product code: 1QB.710.5001

Product type: SFP10-200000/220

Rated capacity: 200000kVA

Rated voltage: 242/13.8 kV

Tap range:  $\pm 2 \times 2.5\%$

rated current: 477.15 / 8367.40A

Phase number: 3

Rated frequency: 50 Hz

Vector group: YNd11

Impedance: 14.0 %

site position: Outdoor

Cooling type: ODAF

Tank vacuum intensification: 33Pa

Insulation level: HV. Line terminal LI/AC 950/395kV

HV. Neutral terminal LI/AC 400/200kV

L.V. Line terminal LI/AC 105/45kV

Tank Vt: 11200 kg

Active part Vt: 113000 kg

Total Oil Vt: 35000 kg

Trans. Vt: 135000 kg

Added oil Vt: 30500 kg

Total Vt: 181500 kg

Voltage (V)	Current (A)	HV winding			Tap connection	Tap Position
		Capacity (kVA)	NA	NB		
254100	454.43	200000	A2-A3	B2-B3	C2-C3	1
248050	465.51		A3-A4	B3-B4	C3-C4	2
242000	477.15		A4-A5	B4-B5	C4-C5	3
235950	489.38		A5-A6	B5-B6	C5-C6	4
229900	502.26		A6-A7	B6-B7	C6-C7	5

Voltage (V) Current (A)

13800 8367.40

current transformer for Bushing type

Standard code GB 1208-1997

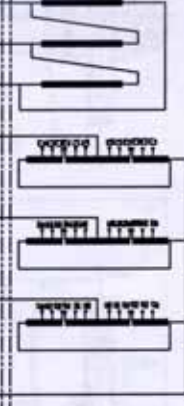
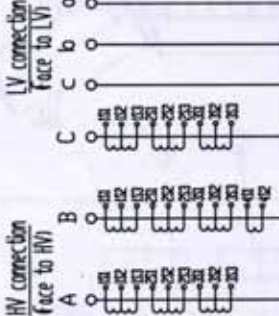
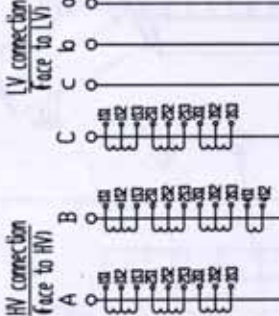
type	Qty/phase	Ratio	Accuracy	Capacity	coefficient	Connection
LRB-220	2	600/5	5P	40	20	S1-S2
		1200/5	5P	40	20	S1-S3
LR-220	1	600/5	0.2	40		S1-S2
		1200/5	0.2			S1-S3
LR-220 B phase		600/5	0.5	30		S1-S2

transformer oil

Standard code GB 2536-1990

brand DB-25

Original Area HANGZHOU QIANTANG RIVER ELECTRIC GROUP CO., LTD



Serial No. 0750010001  
Manufacturing date 05.03.2007

## THE PEOPLES REPUBLIC OF CHINA HANGZHOU QIANTANG RIVER ELECTRIC GROUP CO., LTD



Reviewed By	Area	Inspector	Signature	Date
Inspector	Area	Standard	12.13	
Checker				
Verifier				
Approve				By 12.13
Total Page				/

Hangzhou Qiantang river Electric Group Co., Ltd  
SFP10-200000/220 Transformer  
1QB.710.5001

