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检测
TESTING
CNAS L1020

实验室名称:国家电器产品质量监督检验中心
Lab Name: China National Center for Quality Supervision and Test of Electrical Apparatus Products

№ 18N0443-S

型式试验报告
Type Test Report

委 托 单 位: Chint Electric Co., Ltd.
Client:

产 品 名 称: Dry-type transformer
Name of Product:

产 品 型 号: SCB10-2500/10
Product Type:

检 验 类 别: Commission test
Test Category:

本实验室对出具的检验(试验)结果负责,未经实验室书面同意,不得部分地复制本报告.

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China National Center for Quality Supervision and Test of Electrical Apparatus Products

Test Report

№: 18N0443-S

Client	Chint Electric Co., Ltd.	Test category	Commission test
Manufacturer	Chint Electric Co., Ltd.	Date of sample receiving	Jul. 6, 2018
Name of sample	Dry-type transformer	Type of sample	SCB10-2500/10
Address of manufacturer	No. 3555 Sixian Road, Songjiang District, Shanghai	Original number or date of production	ZNG1805023
Date of test	From Jul. 8, 2018 to Jul. 11, 2018	Number of sample	1 set
Test items	Routine Type test Determination of sound levels Short-circuit withstand test	Test standards	GB/T1094.1—2013 GB/T1094.11—2007 GB/T10228—2015 JB/T10088—2016 IEC60076-1: 2011 IEC60076-11: 2004 Commission requirements
Test conclusion	The test results of routine, type test, determination of sound levels and short-circuit withstand test of dry-type transformer (type: SCB10-2500/10) are in accordance with test standards and commission requirements. The sample has passed the above tests. Signing and issuing date: 2018-07-17 Period of validity: 5 years Note: the conclusion is valid only for the inspected and tested sample.		
Remarks	/		

Compiled by: 王雪灵 Proofread by: Checked by: Approved by: 李明磊

1. Sample parameters

Rated power: 2500kVA

Rated voltage: 10/0.4kV

Rated current: 144.34/3608.44A

Rated frequency: 50Hz

Number of phases: three-phase

Tapping ranges: ±2×2.5%

Connection symbol: Dyn11

Cooling method: AN

Class of insulation and heat-resistant: H

Insulation level: HV	Line terminal	Um/LI/AC	12/75/35kV
LV	Line terminal	Um/AC	≤1.1/3kV

2. Test standards

GB/T 1094.1—2013 *Power transformers—Part 1: General*

GB/T 1094.11—2007 *Power transformers Part 11: Dry-type transformers*

GB/T 10228—2015 *Specification and technical requirements for dry-type power transformers*

JB/T 10088—2016 *Sound level for 6kV~1000kV power transformers*

IEC 60076-1: 2011 *Power transformers—Part 1: General*

IEC 60076-11: 2004 *Power transformers —Part 11:Dry-type transformers*

Commission requirements

3. Sample description

The dry-type transformer meets the requirements of GB 1094.11—2007 and it is for indoor use, and the structure of the LV winding which is made by copper foil is non-rotundate concentric type coil. The type used in this report meets the requirements of JB/T 3837—2016 *Identification method of transformer's product type* and external photos of the sample have been attached.

Photos of the sample

Test Report	China National Center for Quality Supervision and Test of Electrical Apparatus Products	№: 18N0443-S Total 38 Page 04

Summary of test results

No	Test items	Specified value	Measured value		Conc-lusion
		Standards (commission requirements)	Before short-circuit test	After short-circuit test	
1	Measurement of d.c. insulation resistance windings-to-earth and between windings (routine test)	Providing the value of insulation resistance (GΩ)	H-L.E: 45.8 L-H.E: 57.8 H.L-E: 42.5 Core-earth: 3.45	H-L.E: 61.2 L-H.E: 70.4 H.L-E: 58.3 Core-earth: 4.11	/
2	Measurement of voltage ratio and check of phase displacement (routine test)	Voltage ratio tolerance of principal tapping: obtaining the lower of the following values between ±0.5% of declared ratio and ±1/10 of the actual percentage impedance Connection symbol: Dyn11	-0.03%~0.23% Dyn11	-0.03%~0.20% Dyn11	PASS
3	Measurement of winding resistance (routine test)	Maximum resistance unbalance rate Line resistance: ≤2%	HV (line): 0.36% LV (line): 1.61%	HV (line): 0.11% LV (line): 1.45%	PASS
4	Separate-source AC withstand voltage test (routine test)	HV: 35 kV 60s LV: 3kV 60s	35.0kV 60s 3.0kV 60s	35.0kV 60s 3.0kV 60s	PASS
5	Induced AC withstand voltage test (routine test)	Applied voltage (kV): 2Ur Induced voltage (kV): 20 Duration (s): 120 (f_n/f) Frequency (Hz): >50	0.800 20.0 30 200	0.800 20.0 30 200	PASS
6	Measurement of no-load loss and current (routine test)	I_0(%): 0.7 +30% P_0(kW): 3.600 +15%	0.19 3.051	0.19 3.046	PASS
7	Measurement of short-circuit impedance and load loss (routine test)	t: 145℃ Z(%): 6.0 ±10% P_k(kW): 18.400 +15% P_{total}(kW): 22.000 +10%	6.03 17.341 20.392	6.05 16.944 19.990	PASS
8	Partial discharge measurement (routine test)	Three-phase measurement Applied voltage (kV): 1.3Ur Duration (min): 3 Discharge magnitude (pC): ≤10	0.520 3 A: <7, B: <7, C: <8	0.520 3 A: <6, B: <5, C: <6	PASS
9	Temperature-rise test (type test)	Winding temperature-rise limits (K): 125	HV winding temperature-rise: 98.1 LV winding temperature-rise: 107.4		PASS
10	Determination of sound levels (special test)	Sound pressure level $\overline{L_{pA}}$ dB(A): Sound power level L_{WA} dB(A): ≤65	47 62		PASS
11	Short-circuit withstand test (special test)	Test times of each phase: 3 times Duration (s): 0.5±10% The test oscillogram shall be normal. The reactance tolerance of phase before and after the test is not more than 7.5%. The out-of-tank inspection does not reveal any obvious defects. Routine retests shall be passed after short-circuit test.	3 times 0.505~0.512 Without abnormity. The maximum reactance tolerance of phase is 0.13%. Without obvious defects. Routine retests are passed.		PASS
12	Lightning impulse test (type test)	Full wave (kV): 75 ±3%	74.36~74.98		PASS

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4. Test items and results

4.1 Measurement of d.c. insulation resistance windings-to-earth and between windings (routine test)

Test date: Jul. 8, 2018

Relative humidity: 76%; Ambient temperature: 27.4℃

Measured parts	Measured voltage (kV)	Measured insulation resistance (GΩ)
HV—LV and earth	2.5	45.8
LV—HV and earth	2.5	57.8
HV and LV—earth	2.5	42.5
Core—earth	1.0	3.45

4.2 Measurement of voltage ratio and check of phase displacement (routine test) Test date: Jul. 8, 2018

HV winding		LV winding		Transformer ratio by calculation	Measured voltage ratio tolerance (%)			Connection symbol
Tapping position	Voltage (kV)	Tapping position	Voltage (kV)		AB/ab	BC/bc	CA/ca	
I	10.50	/	0.4	26.250	0.05	0.02	0.04	Dyn11
II	10.25			25.625	0.23	0.22	0.22	
III	10.00			25.000	0.15	0.15	0.16	
IV	9.75			24.375	0.09	0.09	0.09	
V	9.50			23.750	0.01	-0.01	-0.03	

4.3 Measurement of winding resistance (routine test)

Test date: Jul. 8, 2018

Ambient temperature: 27.4℃

Winding	Tapping position	Measured resistance values (Ω)			Resistance unbalance rate (%)
		A~B a~b	B~C b~c	C~A c~a	
HV	I	0.19598	0.19601	0.19624	0.13
	II	0.19146	0.19158	0.19169	0.12
	III	0.18632	0.18648	0.18652	0.11
	IV	0.18150	0.18155	0.18166	0.09
	V	0.17653	0.17663	0.17716	0.36
LV	/	0.2241×10^{-3}	0.2224×10^{-3}	0.2260×10^{-3}	1.61
		ao: 0.1101×10^{-3}	/	/	/

4.4 Separate-source AC withstand voltage test (routine test) Test date: Jul. 9, 2018

Relative humidity: 68%; Ambient temperature: 26.8℃; Air pressure: 100kPa

Parts of applied voltage	Test voltage (kV)	Test duration (s)	Result
HV—LV and earth	35.0	60	PASS
LV—HV and earth	3.0	60	

4.5 Induced AC withstand voltage test (routine test) Test date: Jul. 9, 2018

Relative humidity: 68%; Ambient temperature: 26.8℃; Air pressure: 100kPa

Tapping position	Applied voltage (kV)	Induced voltage (kV)	Induced multiple	Frequency (Hz)	Test duration (s)	Result
	LV	HV				
III	0.800	20.0	2	200	30	PASS

4.6 Measurement of no-load loss and current (routine test) Test date: Jul. 8, 2018

r.m.s voltage (kV)		No-load current		No-load loss (kW)	
Average voltmeter reading	r.m.s voltmeter reading	(A)	(%)	Measured value	Corrected value
0.4002	0.3997	6.93	0.19	3.050	3.051

Remark: the difference between r.m.s voltmeter reading and average voltmeter reading is within 3%.

4.7 Measurement of short-circuit impedance and load loss (routine test) Test date: Jul. 8, 2018

Ambient temperature: 27.4℃

Winding	Tapping position	Applied current I		Measured voltage (kV)	Short-circuit impedance (for each phase)		Load loss (kW)	Total loss (kW)
		(A)	I/Ir (%)		HV impedance (Ω)	(%)	Corrected value	Corrected value
					t=145℃ I=Ir	t=145℃ I=Ir	t=145℃ I=Ir	t=145℃ I=Ir
HV | LV	I	77.81	56.60	0.3610	2.69	6.10	17.025	20.076
	III	88.27	61.15	0.3672	2.41	6.03	17.341	20.392
	V	91.22	60.04	0.3389	2.16	5.97	17.781	20.832

4.8 Partial discharge measurement

Three-phase measurement (routine test) Test date: Jul. 9, 2018

Frequency (Hz)	Applied voltage		Duration	Partial discharge magnitude (pC)		
	(kV)	Multiple		A	B	C
200	0.720	1.8Ur	30s	/	/	/
	0.520	1.3Ur	3min	<7	<7	<8

Remarks: the background noise levels are less than 1pC before and after the test.

4.9 Temperature-rise test (type test) Test date: from Jul. 8, 2018 to Jul. 9, 2018

The method of temperature-rise is imitating load, and the tapping positions is III for 24h. It is required to apply 0.400kV of no-load loss; 144.34A of specified current is required of load loss, and 144.30A is actually applied during testing.

Measured data of no-load loss

Winding	Measurement of resistance (Ω)		Ambient temperature (℃)		Temperature-rise of winding (K)
	Cold resistance	Hot resistance	Measurement of cold resistance	Measurement of hot resistance	
HV	0.18648	0.1910	27.4	27.2	6.6
LV	0.2224×10^{-3}	0.2390×10^{-3}			19.8

Measured data of load loss

Winding	Measurement of resistance (Ω)		Ambient temperature (℃)		Temperature-rise of winding (K)
	Cold resistance	Hot resistance	Measurement of cold resistance	Measurement of hot resistance	
HV	0.18648	0.2560	27.4	29.8	95.5
LV	0.2224×10^{-3}	0.3065×10^{-3}			96.9

Calculations of temperature-rise

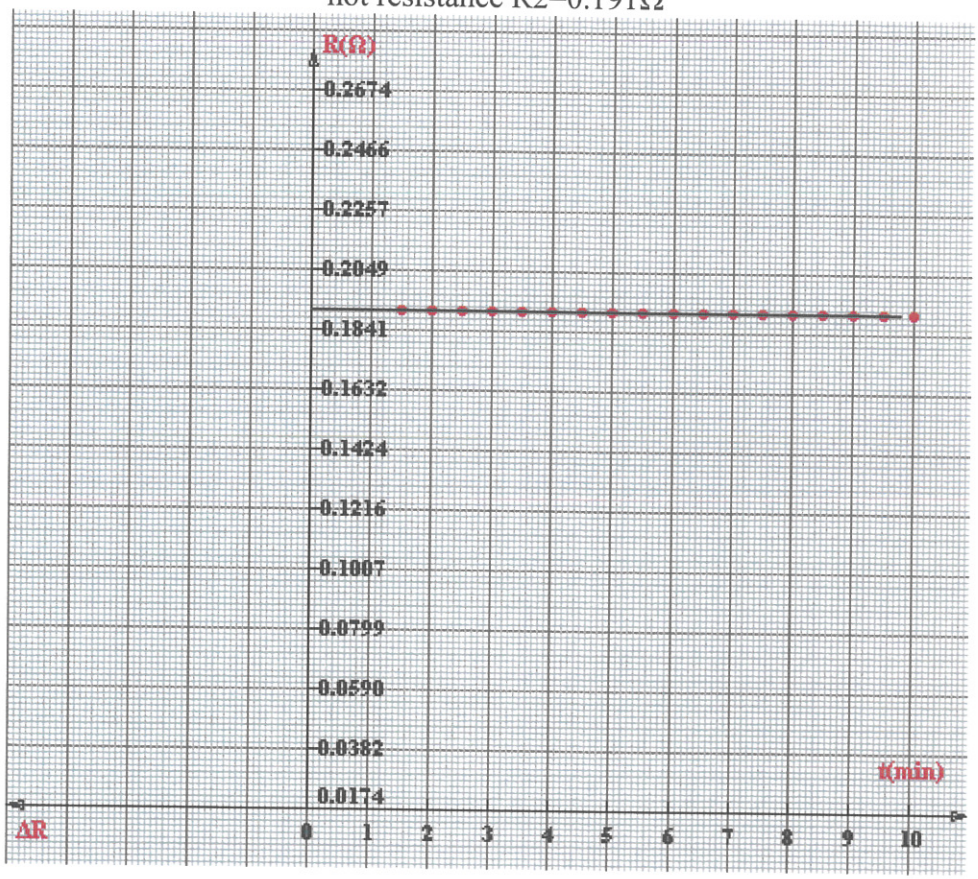
Temperature-rise of winding (K)	HV	98.1
	LV	107.4

Hot resistance curve

HV hot resistance data

HV hot resistance	0.1910Ω

HV winding hot resistance temperature-rise curve at no-load condition
hot resistance R2=0.191Ω

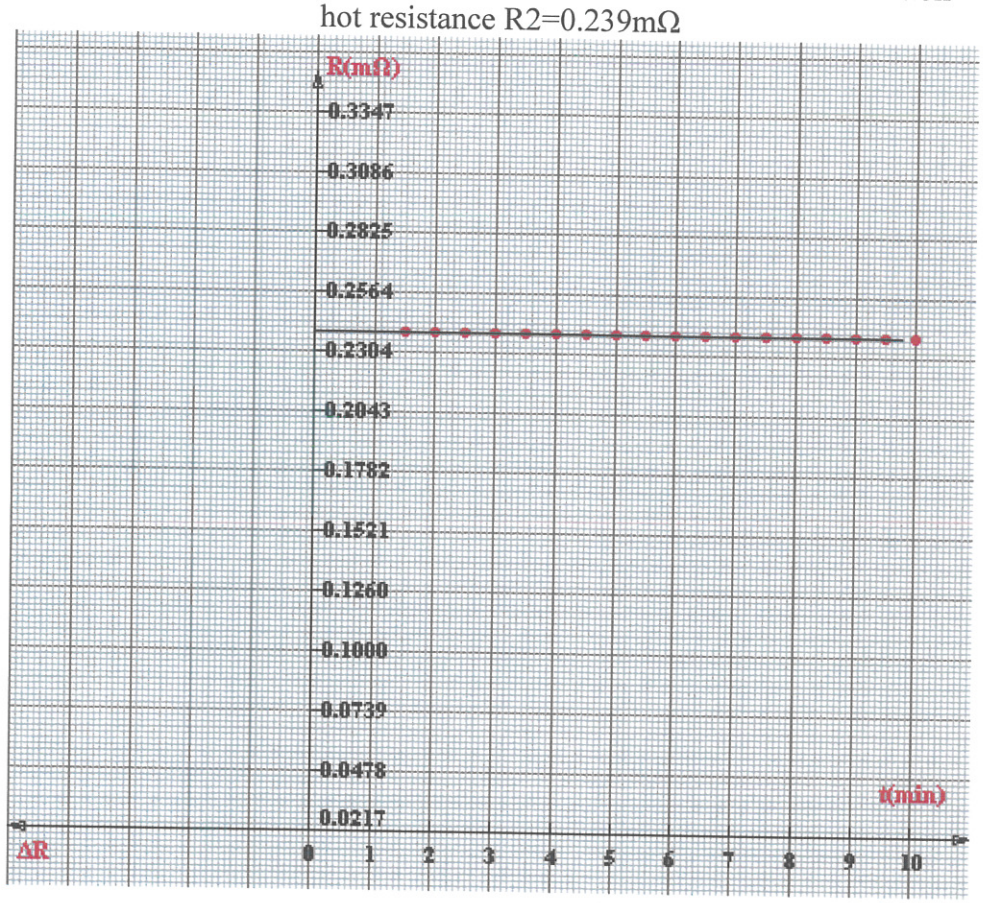


Hot resistance curve

LV hot resistance data

LV hot resistance	$0.2390\times10^{-3}\Omega$

LV winding hot resistance temperature-rise curve at no-load condition
hot resistance R2=0.239mΩ

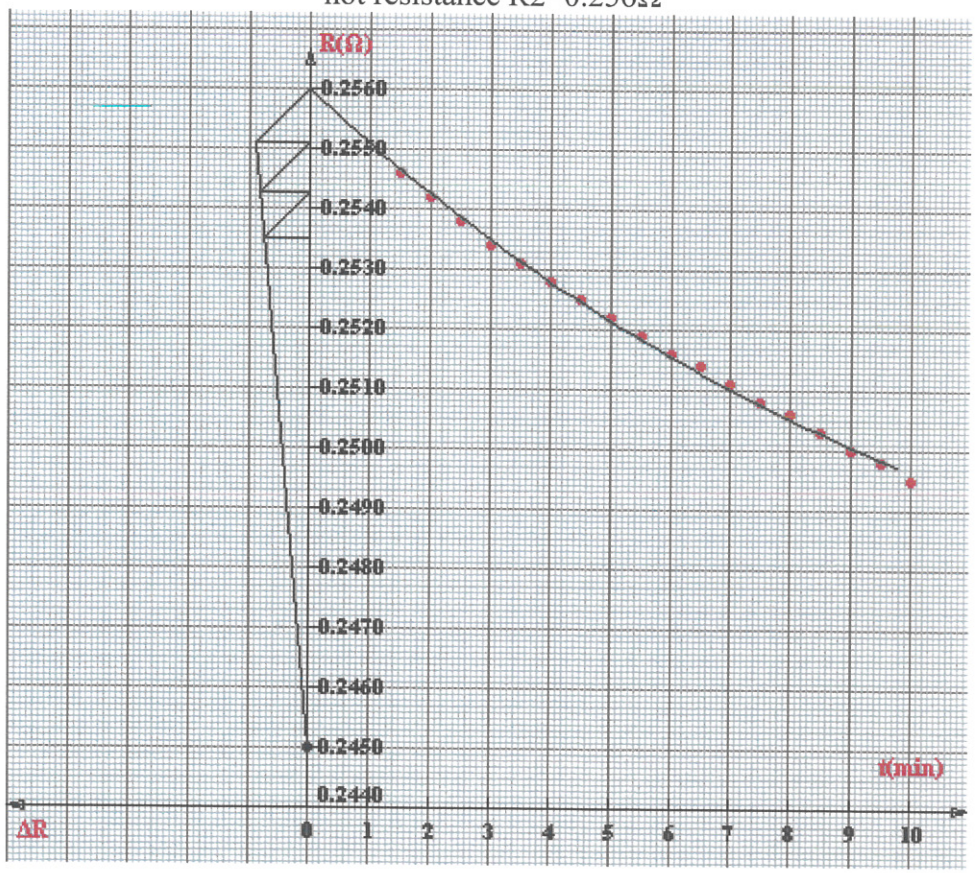


Hot resistance curve

HV hot resistance data

HV hot resistance	0.2560Ω

HV winding hot resistance temperature-rise curve at load condition
hot resistance R2=0.256Ω

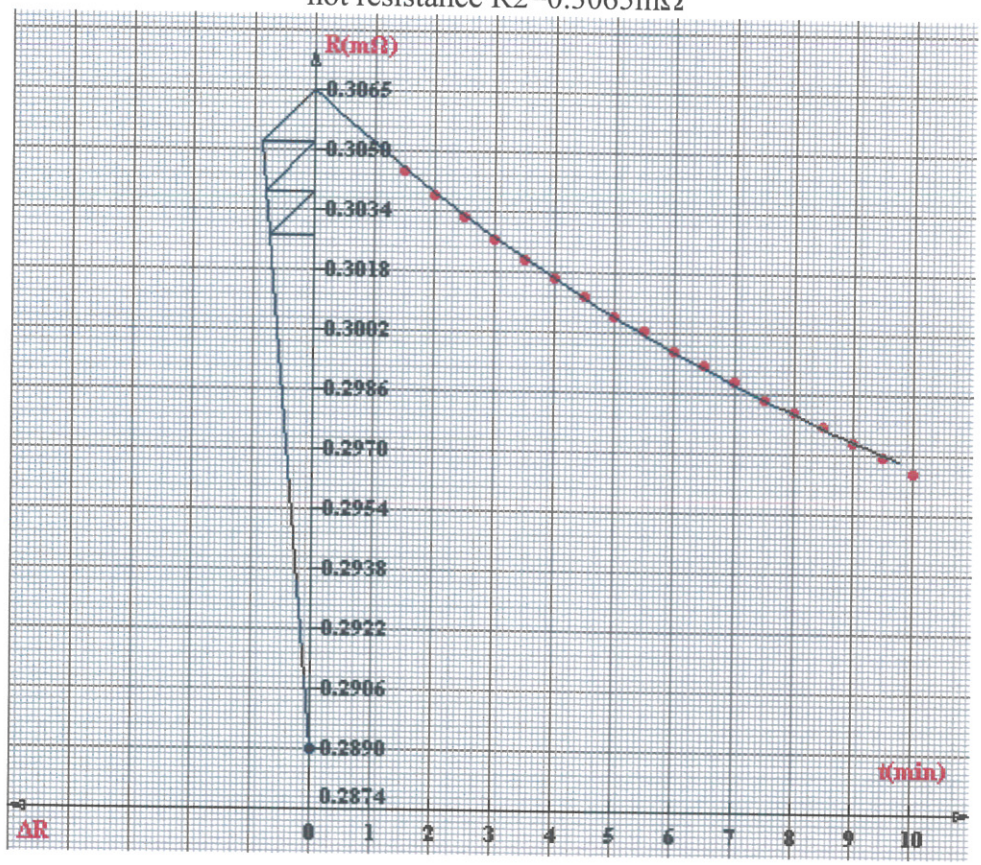


Hot resistance curve

LV hot resistance data

LV hot resistance	$0.3065\times10^{-3}\Omega$

LV winding hot resistance temperature-rise curve at load condition
hot resistance R2=0.3065mΩ



4.10 Determination of sound levels (special test) Test date: Jul. 9, 2018

4.10.1 Rough estimation of the load current sound power level

Equation:

$$L_{WA,IN} \approx 39 + 18\lg\frac{Sr}{Sp} = 46.2\text{dB(A)}$$

where: Sr—the rated power is 2.5MVA;

Sp—the reference power is 1MVA.

Because $L_{WA,IN}$ is less 25.8dB(A) than limit value 72dB(A) of assured sound power level, according to standard requirement, it need not to measure load current sound level.

4.10.2 Measurement of sound pressure level and calculation of sound power level

The transformer is rated excitation; the prescribed contour shall be spaced 1.0m away from the principal radiating surface, the distance between measured points is 0.98m, the number of measured point is 12, the height of measured point is 0.87m.

Measurement of test environment

The total area of the surface of the test room Sv (m^2)	The average acoustic absorption coefficient α	The amount of acoustic absorption A (m^2)	From the principal radiating surface (m)	The area of the measurement surface S (m^2)	Environmental correction K (dB)
738.0	0.15	110.7	1.0	32.1	3.3

Measured results (dB)

Status of cooling device	Average of background noise		Average noise value of transformer $\overline{L_{pA0}}$	A weighted sound pressure level $\overline{L_{pA}} = 10\lg(10^{0.1\overline{L_{pA0}}} - 10^{0.1\overline{L_{bgA}}}) - K$	A weighted sound power level $L_{WA} = \overline{L_{pA}} + 10\lg(S/S_0)$
	Before the test	After the test			
/	33.1	33.3	50.2	47	62

Remarks: $\overline{L_{pA0}}$: the uncorrected average A-weighted sound pressure level; $\overline{L_{pA0}} = 10\lg(\frac{1}{N}\sum_{i=1}^{N} 10^{0.1L_{pAi}})$

$\overline{L_{bgA}}$: the lower of the two calculated average A weighted background noise pressure level.

4.11 Short-circuit withstand test (special test) Test date: Jul. 10, 2018

Three-phase supply should be used, and test voltage shall be supplied among the HV line terminals A-B-C, and the LV line terminals a-b-c was connected by short-circuit. The test oscillogram shall be normal. For the test oscillogram, see $P_{15\sim23}$.

4.11.1 Current calculation of short-circuit test (reference temperature 145℃)

Tapping positions	Symmetrical short-circuit current value of phase (A)			Asymmetrical current first peak value of phase (A)			Peak coefficient ($K\sqrt{2}$)
I	1211	Positive deviation	1332	2926	Positive deviation	3072	2.416
		Negative deviation	1090		Negative deviation	2780	
III	1276	Positive deviation	1404	3071	Positive deviation	3225	2.407
		Negative deviation	1148		Negative deviation	2917	
V	1345	Positive deviation	1480	3220	Positive deviation	3381	2.394
		Negative deviation	1211		Negative deviation	3059	

4.11.2 Current injection of short-circuit test

Tapping position/ phase category	Applied voltage terminal	Times	Measurement of current						Duration (s)	Oscillogram No
			Symmetrical short-circuit current value of phase (A)			Asymmetrical current first peak value of phase (A)				
			A	B	C	A	B	C		
I /A	A-B-C	The first time	1153	1159	1158	2933	2611	2055	0.512	18N0443-S-T001
		The second time	1189	1182	1175	2959	2516	2155	0.512	18N0443-S-T002
		The third time	1199	1190	1185	2987	2497	2210	0.512	18N0443-S-T003

Tapping position/ phase category	Applied voltage terminal	Times	Measurement of reactance					
			Reactance values of phase (Ω)			Reactance variation of phase (%)		
			A	B	C	A	B	C
I /A	A-B-C	Before tests	8.144	7.932	8.140	/	/	/
		The first time	8.146	7.932	8.140	0.02	0.00	0.00
		The second time	8.154	7.933	8.144	0.12	0.01	0.05
		The third time	8.159	7.932	8.143	0.18	0.00	0.04

The maximum reactance variation of phase is 0.18%.

Tapping position/ phase category	Applied voltage terminal	Times	Measurement of current							
			Symmetrical short-circuit current value of phase (A)			Asymmetrical current first peak value of phase (A)			Duration (s)	Oscillogram No
			A	B	C	A	B	C		
III/B	A-B-C	The first time	1221	1226	1218	2361	3063	2380	0.505	18N0443-S-T004
		The second time	1222	1225	1215	2353	3129	2471	0.505	18N0443-S-T005
		The third time	1227	1232	1220	2348	3084	2439	0.505	18N0443-S-T006

Times	Measurement of reactance					
	Reactance values of phase (Ω)			Reactance variation of phase (%)		
	A	B	C	A	B	C
Before tests	7.305	7.104	7.336	/	/	/
The first time	7.316	7.111	7.340	0.15	0.10	0.06
The second time	7.318	7.111	7.340	0.18	0.10	0.06
The third time	7.314	7.112	7.338	0.12	0.11	0.03

Tapping position/ phase category	Applied voltage terminal	Times	Measurement of current							
			Symmetrical short-circuit current value of phase (A)			Asymmetrical current first peak value of phase (A)			Duration (s)	Oscillogram No
			A	B	C	A	B	C		
V/C	A-B-C	The first time	1270	1285	1278	2323	2619	3215	0.508	18N0443-S-T007
		The second time	1280	1295	1284	2377	2577	3223	0.508	18N0443-S-T008
		The third time	1282	1299	1293	2292	2683	3260	0.508	18N0443-S-T009

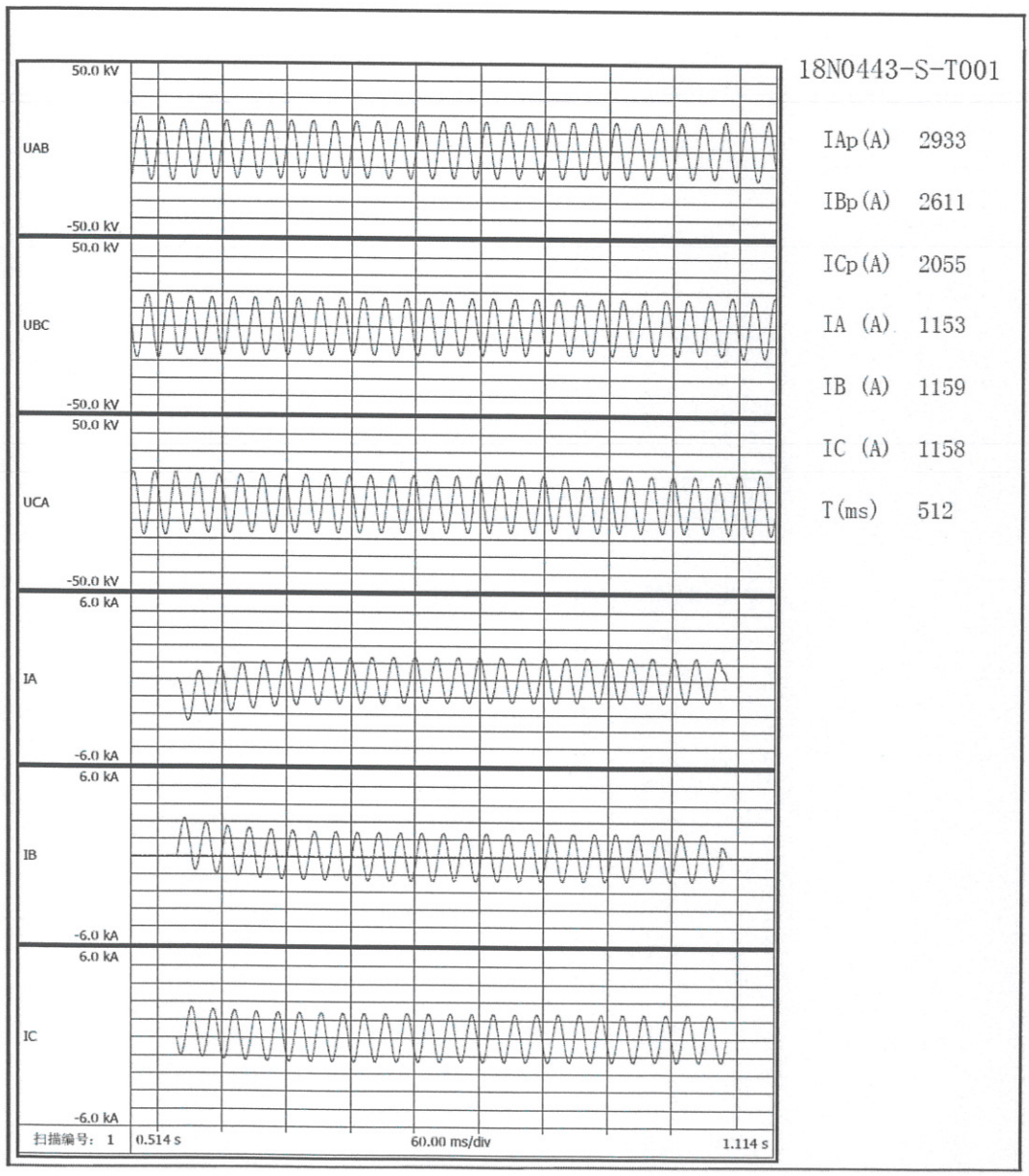
Times	Measurement of reactance					
	Reactance values of phase (Ω)			Reactance variation of phase (%)		
	A	B	C	A	B	C
Before tests	6.523	6.351	6.527	/	/	/
The first time	6.540	6.356	6.546	0.26	0.08	0.29
The second time	6.540	6.353	6.547	0.26	0.03	0.31
The third time	6.539	6.355	6.542	0.24	0.06	0.23

The maximum reactance variation of phase B is 0.18% and phase C is 0.31%.

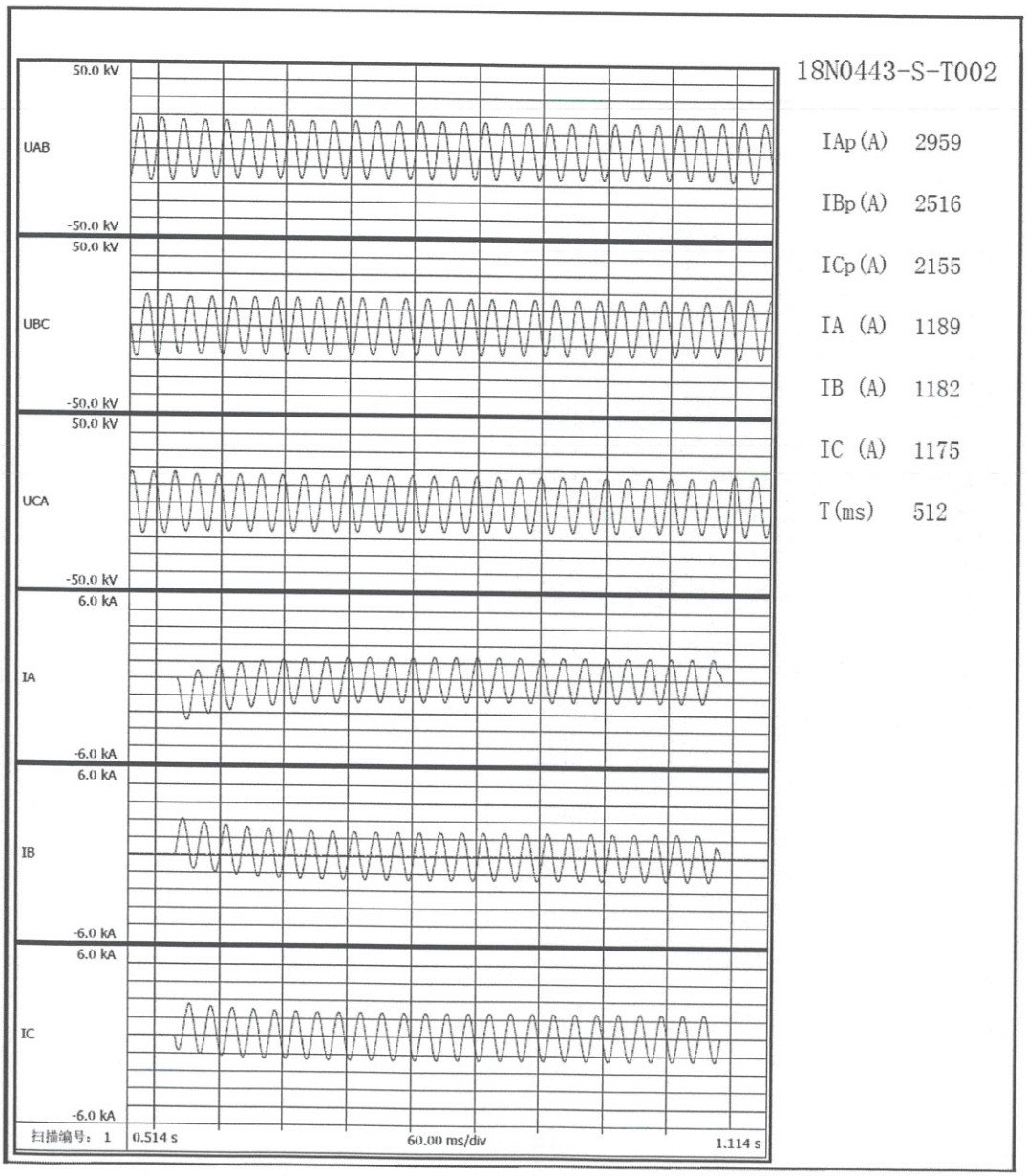
4.11.3 The out-of-tank inspection

The out-of-tank inspection does not reveal any obvious distortion and displacement of coil, lead and supporting structures after the short-circuit test and no traces of discharge are found. For the pictures before and after the short-circuit test, see P_{30}~P_{31}.

Oscillogram



Oscillogram



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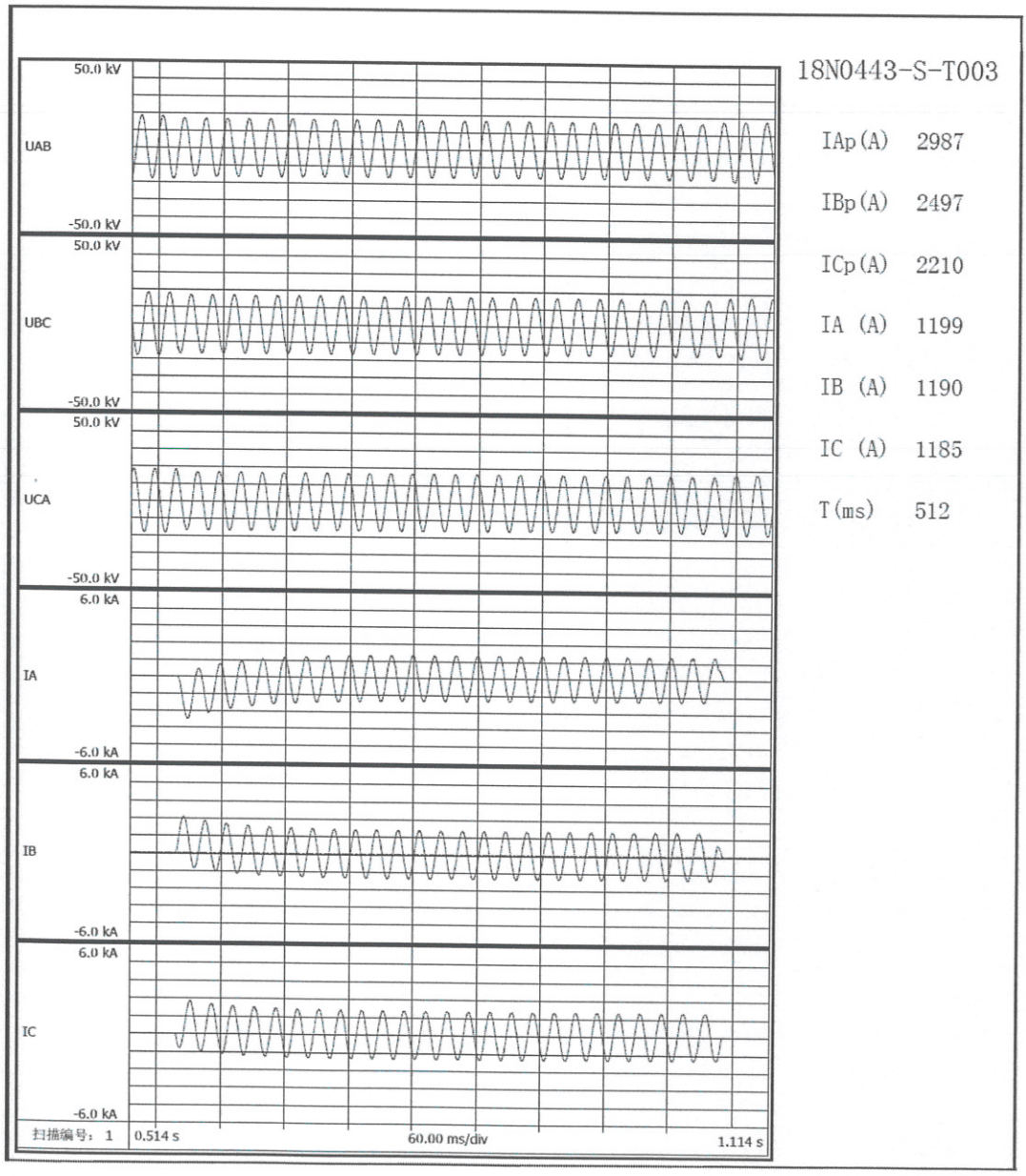
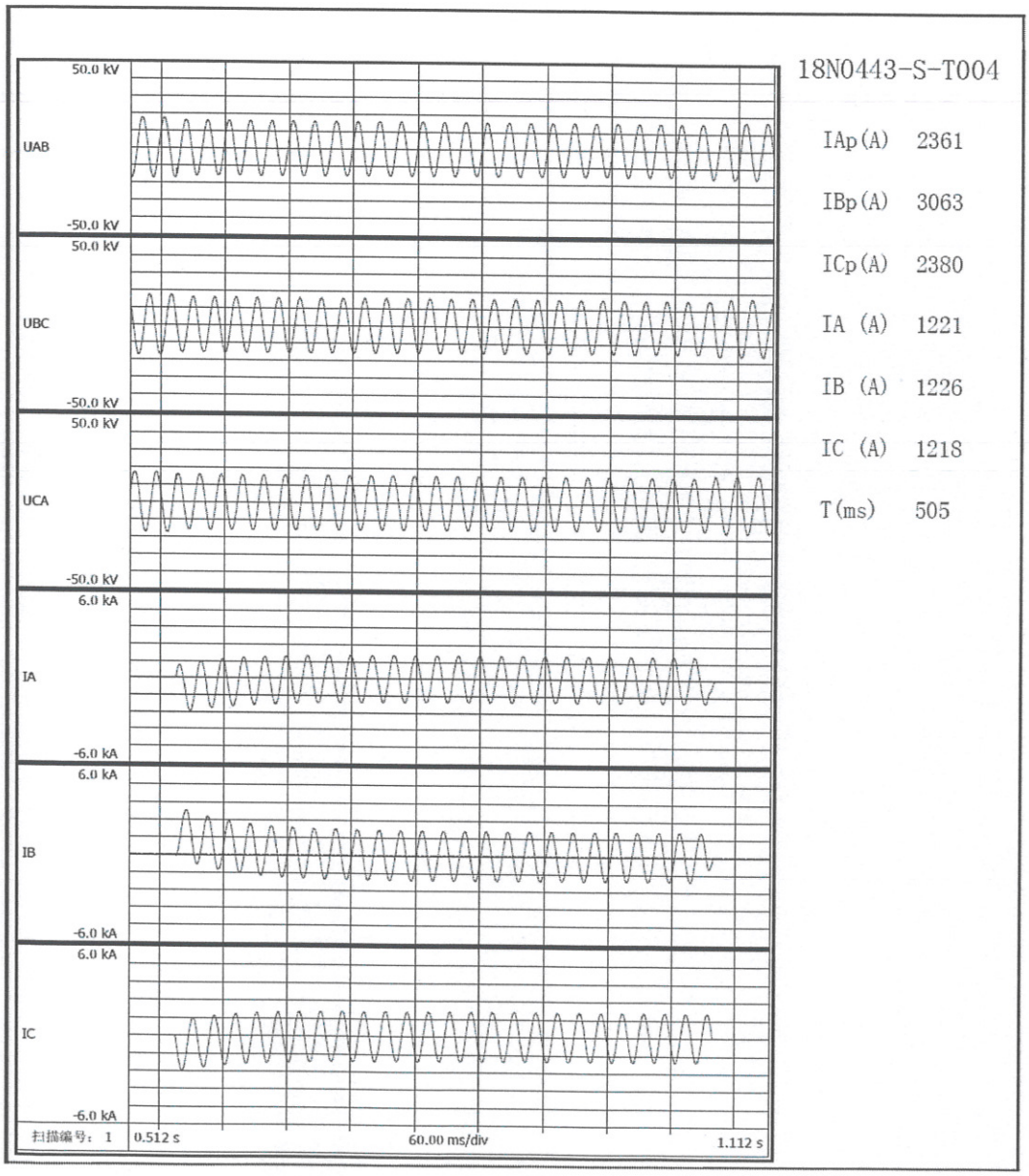
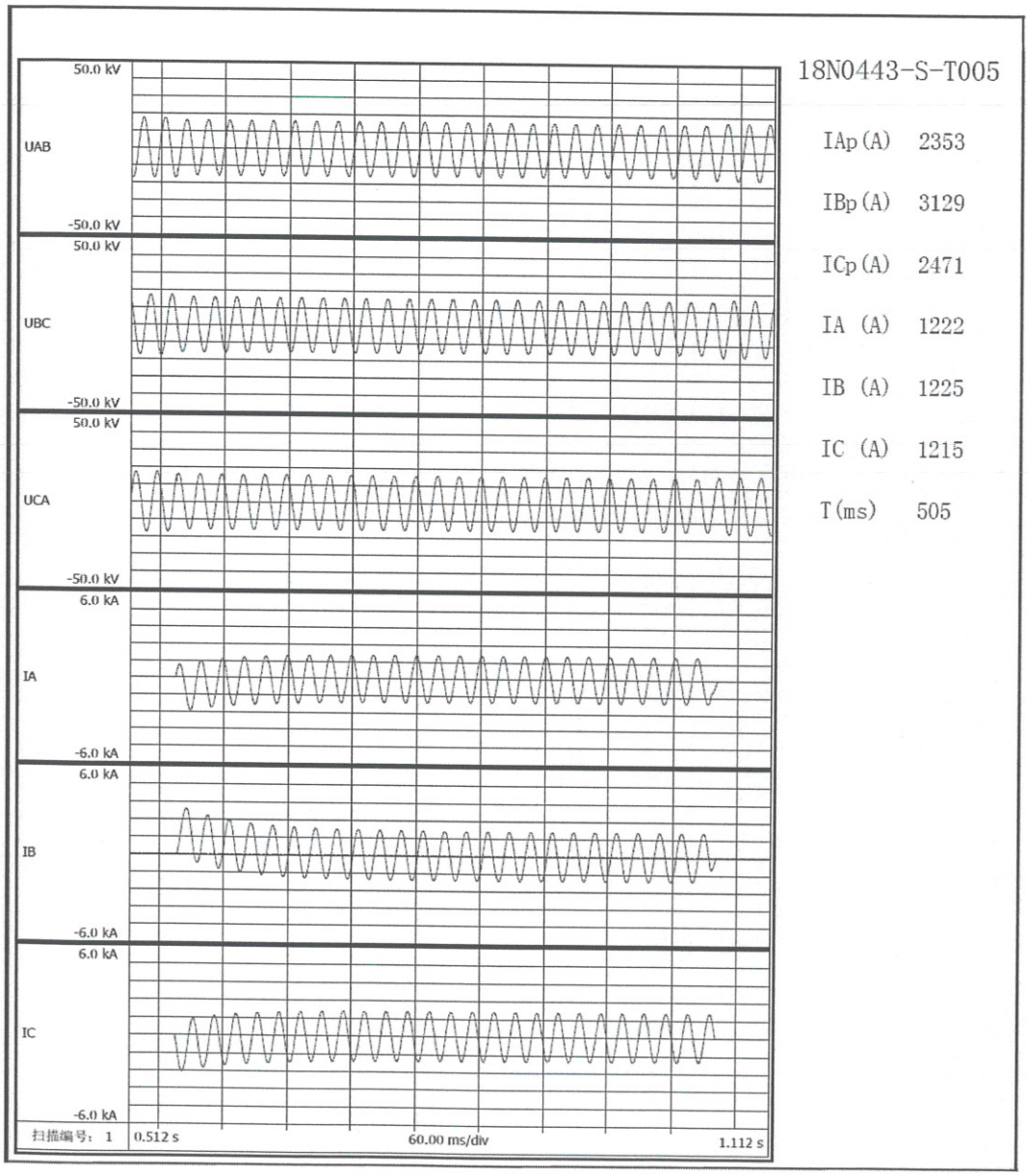


Oscillogram



Oscillogram



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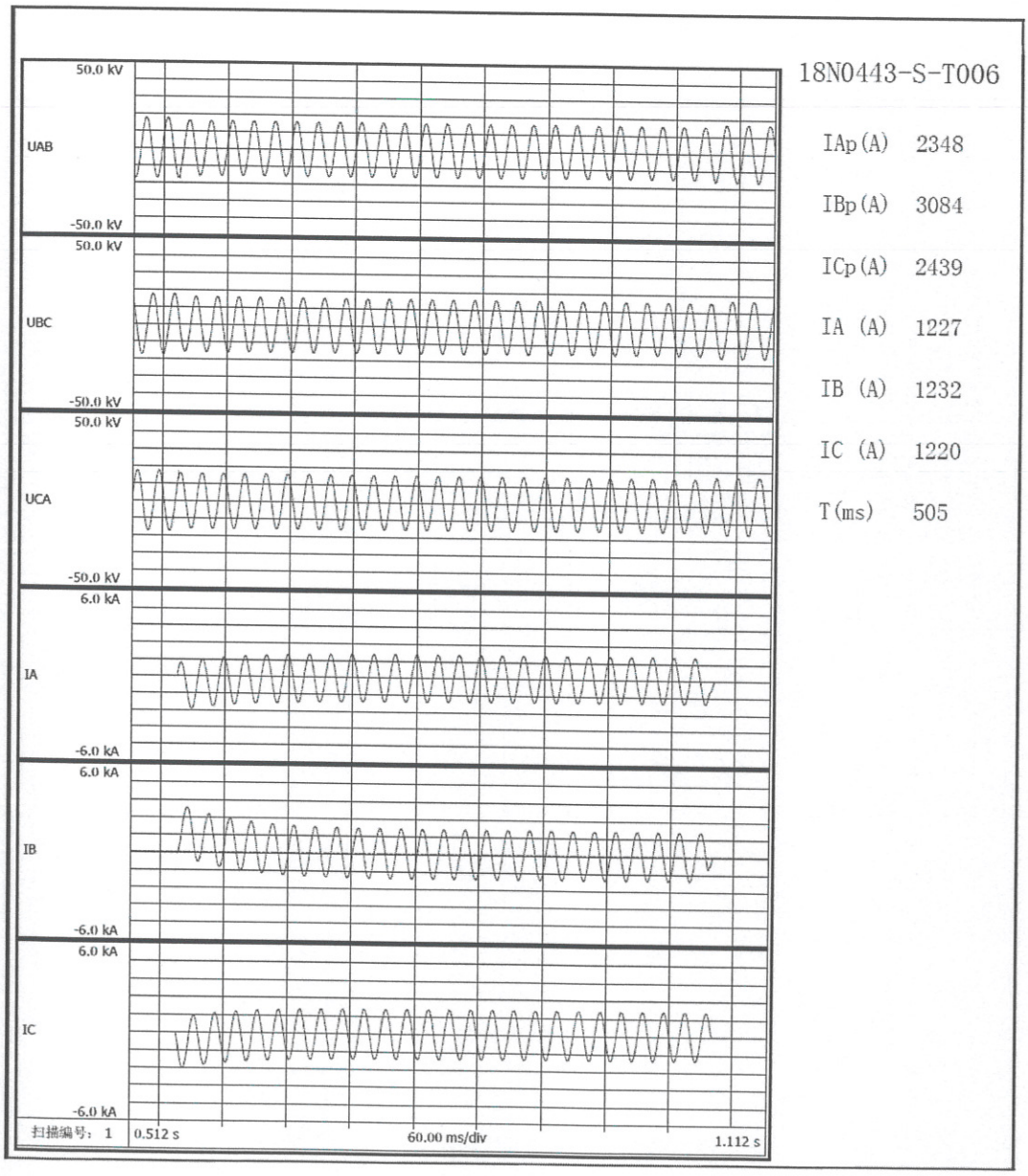

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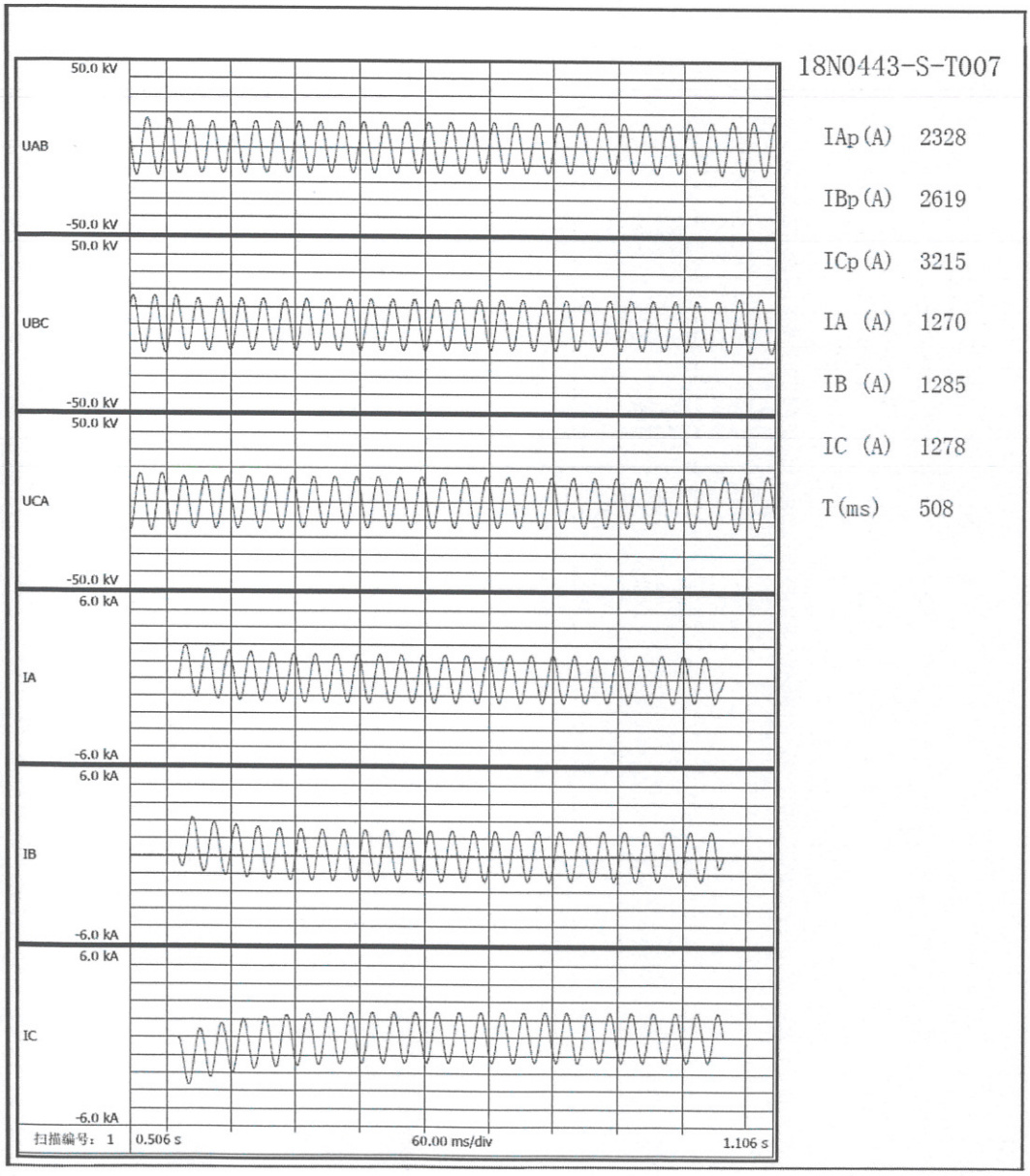

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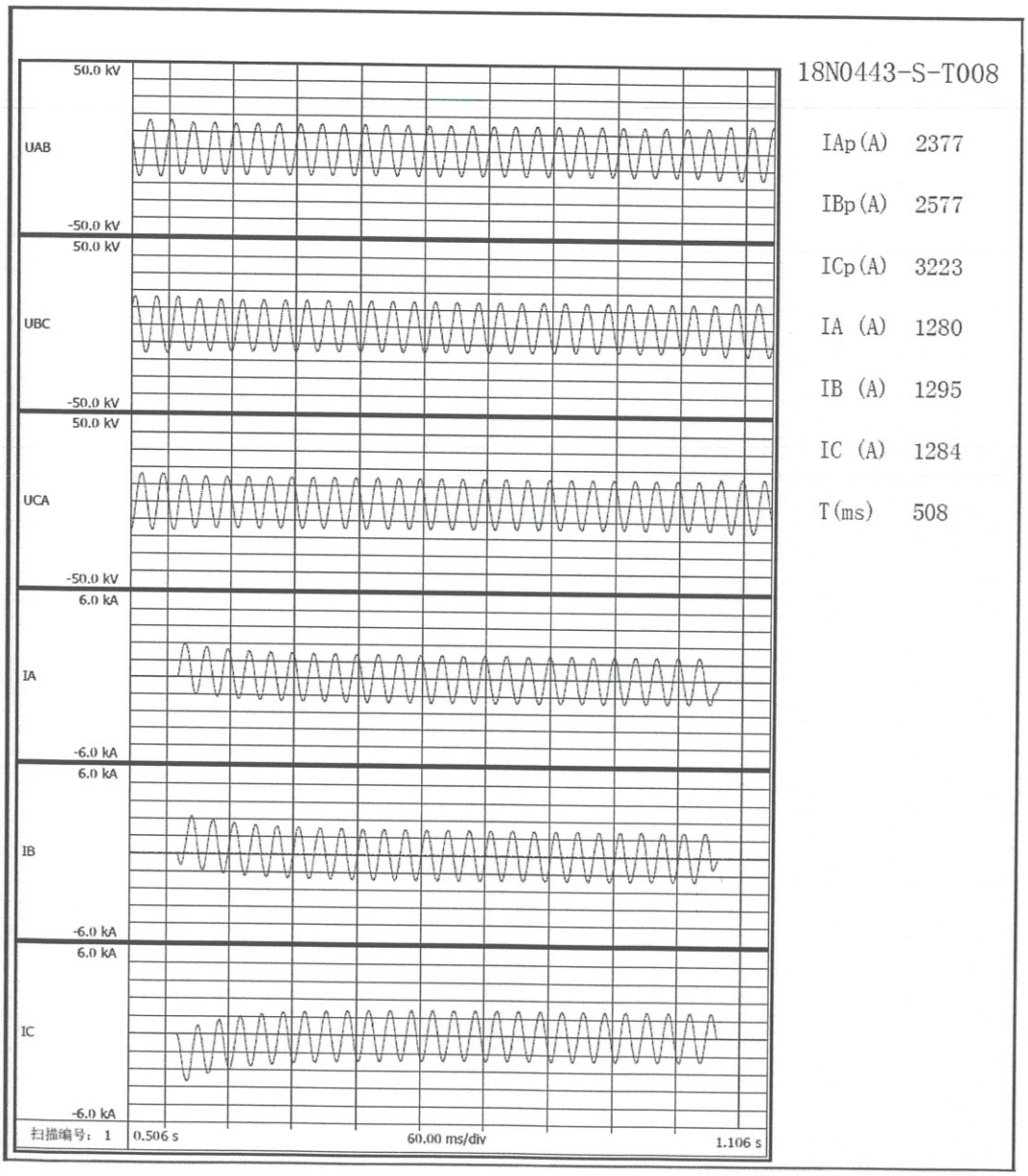
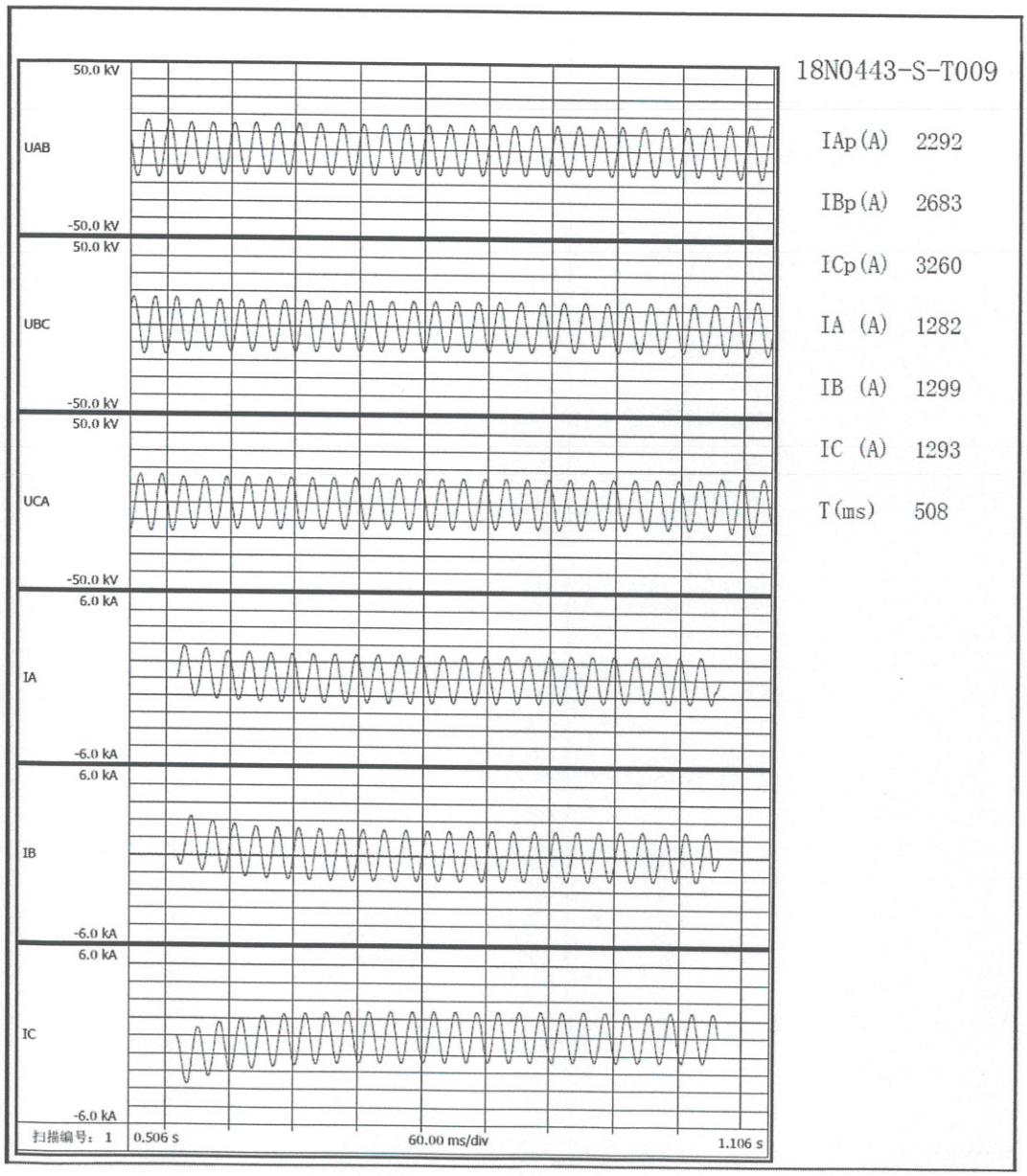


Oscillogram



4.11.4 Routine retests

4.11.4.1 Measurement of d.c. insulation resistance windings-to-earth and between windings (routine test)

Test date: Jul. 11, 2018

Relative humidity: 70%; Ambient temperature: 29.0℃

Measured parts	Measured voltage (kV)	Measured insulation resistance (GΩ)
HV—LV and earth	2.5	61.2
LV—HV and earth	2.5	70.4
HV and LV—earth	2.5	58.3
Core—earth	1.0	4.11

4.11.4.2 Measurement of voltage ratio and check of phase displacement (routine test) Test date: Jul. 11, 2018

HV winding		LV winding		Transformer ratio by calculation	Measured voltage ratio tolerance (%)			Connection symbol
Tapping position	Voltage (kV)	Tapping position	Voltage (kV)		AB/ab	BC/bc	CA/ca	
I	10.50	/	0.4	26.250	0.01	-0.03	0.01	Dyn11
II	10.25			25.625	0.20	0.19	0.20	
III	10.00			25.000	0.13	0.14	0.14	
IV	9.75			24.375	0.06	0.06	0.07	
V	9.50			23.750	-0.01	0.00	-0.01	

4.11.4.3 Measurement of winding resistance (routine test)

Test date: Jul. 11, 2018

Ambient temperature: 29.0℃

Winding	Tapping position	Measured resistance values (Ω)			Resistance unbalance rate (%)
		A~B a~b	B~C b~c	C~A c~a	
HV	I	0.19716	0.19726	0.19736	0.10
	II	0.19268	0.19269	0.19278	0.05
	III	0.18762	0.18764	0.18776	0.07
	IV	0.18258	0.18257	0.18272	0.08
	V	0.17738	0.17752	0.17758	0.11
LV	/	0.2266×10^{-3}	0.2262×10^{-3}	0.2295×10^{-3}	1.45
		ao:0.1093×10^{-3}	/	/	/

4.11.4.4 Separate-source AC withstand voltage test (routine test)

Test date: Jul. 11, 2018

Relative humidity: 72%; Ambient temperature: 25.2℃; Air pressure: 101kPa

Parts of applied voltage	Test voltage (kV)	Test duration (s)	Result
HV—LV and earth	35.0	60	PASS
LV—HV and earth	3.0	60	

4.11.4.5 Induced AC withstand voltage test (routine test)

Test date: Jul. 11, 2018

Relative humidity: 72%; Ambient temperature: 25.2℃; Air pressure: 101kPa

Tapping position	Applied voltage (kV)	Induced voltage (kV)	Induced multiple	Frequency (Hz)	Test duration (s)	Result
	LV	HV				
III	0.800	20.0	2	200	30	PASS

4.11.4.6 Measurement of no-load loss and current (routine test)

Test date: Jul. 11, 2018

r.m.s voltage (kV)		No-load current		No-load loss (kW)	
Average voltmeter reading	r.m.s voltmeter reading	(A)	(%)	Measured value	Corrected value
0.4002	0.4003	6.93	0.19	3.046	3.046

Remark: the difference between r.m.s voltmeter reading and average voltmeter reading is within 3%.

4.11.4.7 Measurement of short-circuit impedance and load loss (routine test)

Test date: Jul. 11, 2018

Ambient temperature: 29.0℃

Winding	Tapping position	Applied current I		Measured voltage (kV)	Short-circuit impedance (for each phase)		Load loss (kW)	Total loss (kW)
		(A)	I/Ir (%)		HV impedance (Ω)	(%)	Corrected value	Corrected value
					t=145℃ I=Ir	t=145℃ I=Ir	t=145℃ I=Ir	t=145℃ I=Ir
HV | LV	I	77.90	56.67	0.3622	2.69	6.11	16.550	19.596
	III	83.41	57.79	0.3480	2.42	6.05	16.944	19.990
	V	89.93	59.19	0.3351	2.16	5.99	17.355	20.401

4.11.4.8 Partial discharge measurement

Three-phase measurement (routine test)

Test date: Jul. 11, 2018

Frequency (Hz)	Applied voltage		Duration	Partial discharge magnitude (pC)		
	(kV)	Multiple		A	B	C
200	0.720	1.8Ur	30s	/	/	/
	0.520	1.3Ur	3min	<6	<5	<6

Remarks: the background noise levels are less than 1pC before and after the test.

4.12 Lightning impulse test (type test)

Test date: Jul. 11, 2018

Atmospheric conditions of test:

Relative humidity: 72%; Ambient temperature: 25.2℃; Air pressure: 100kPa.

Test items and voltage

Withstand terminals	Rated lightning full wave withstand voltage (kV)	Tapping positions
A, B, C	75	III

Test sequence:

One negative reduced level full impulse;

Three negative rated level full impulse;

Test waveform records:

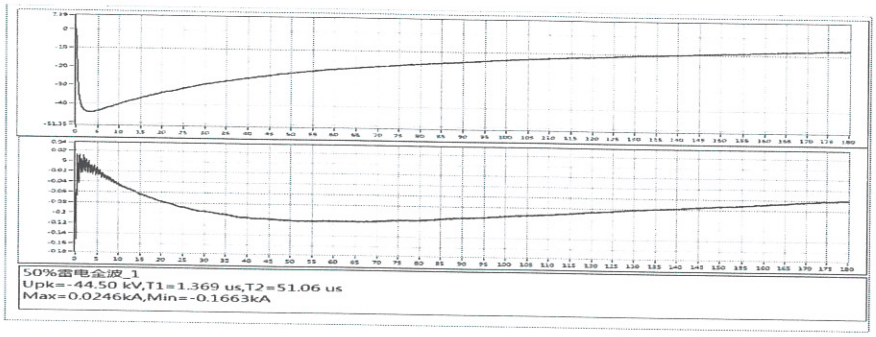
T1: wave front time; T2: time to half peak value; Upk: peak voltage.

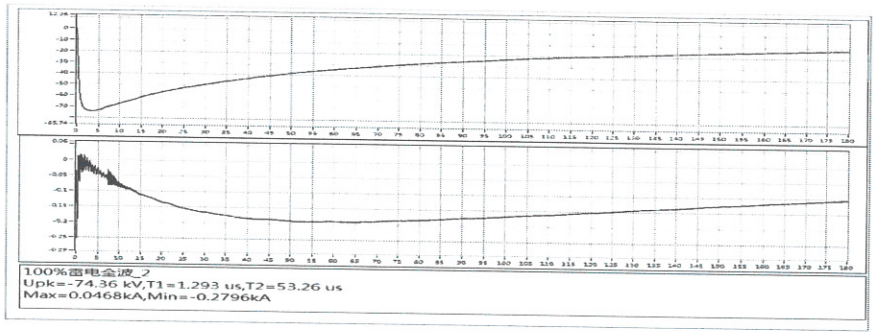
For waveform diagram, see $P_{27\sim29}$.

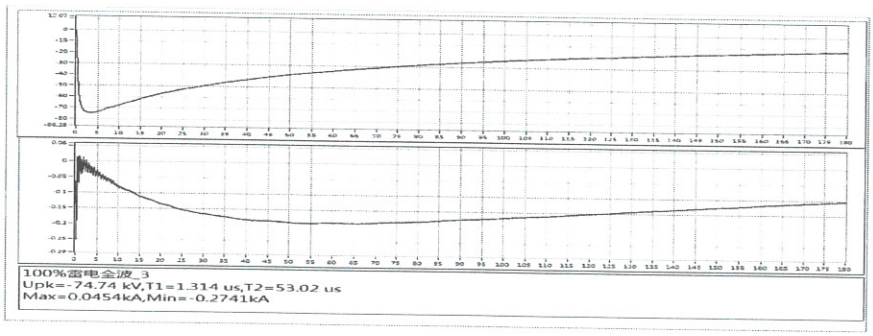
Voltage ranges of oscillograms are as below:

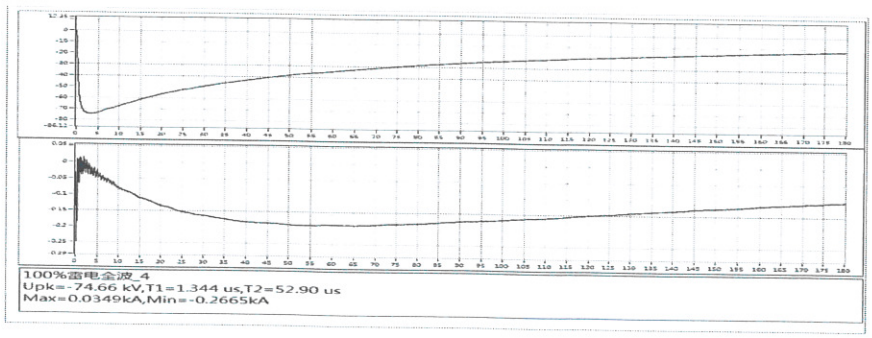
Full wave (kV)	Chopped wave (kV)
74.36~74.98	/

Tested terminal: A Test polarity: negative Channel 1: voltage wave Channel 2: current wave

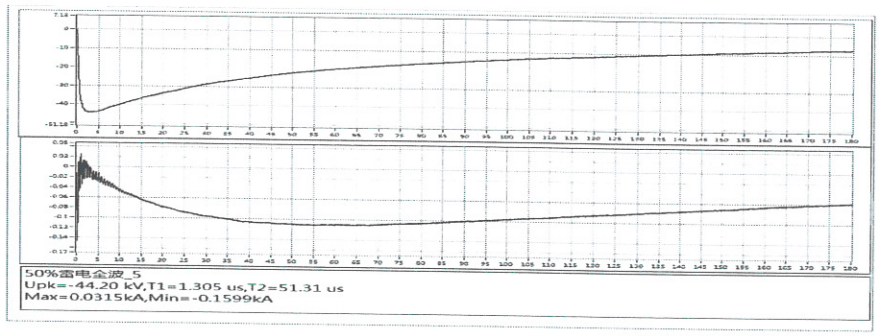


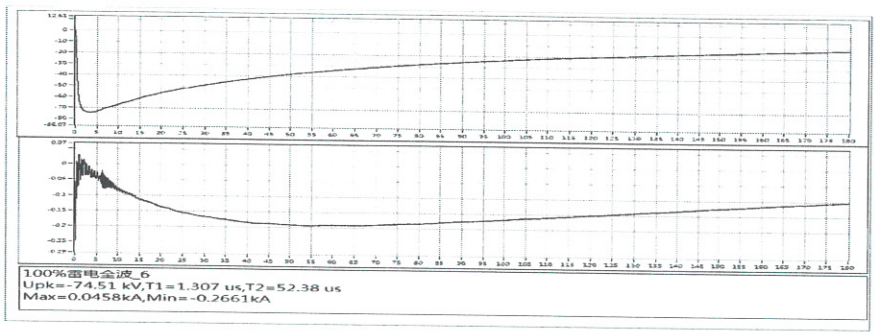


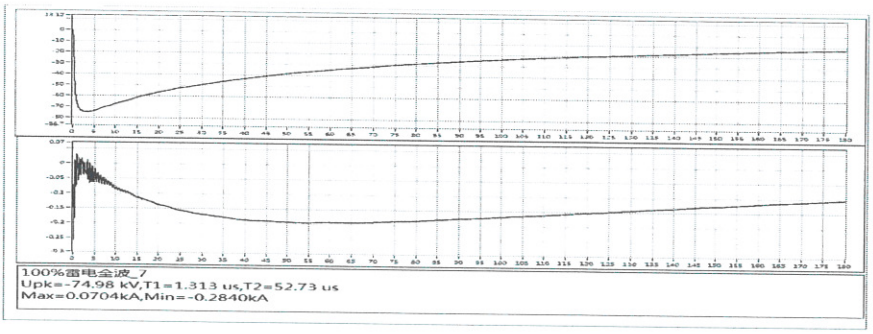


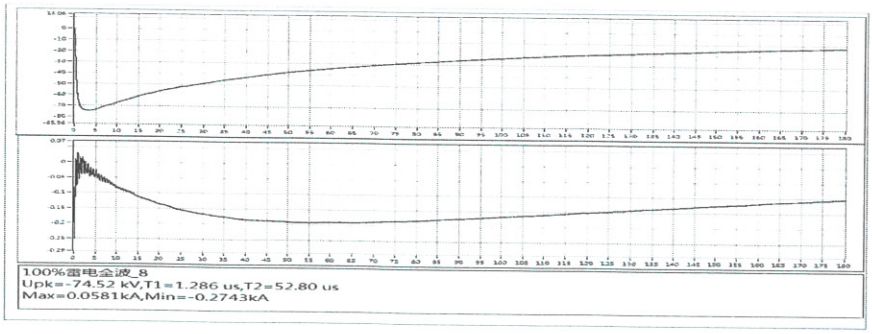


Tested terminal: B Test polarity: negative Channel 1: voltage wave Channel 2: current wave

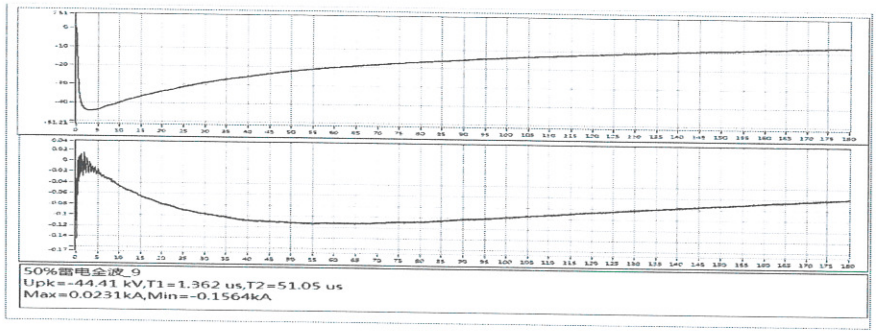


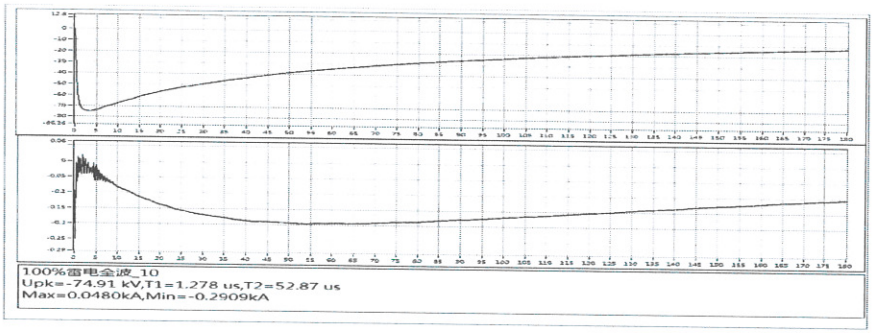


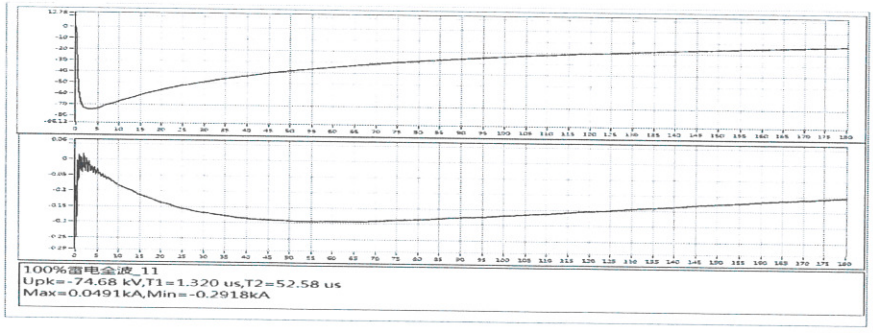


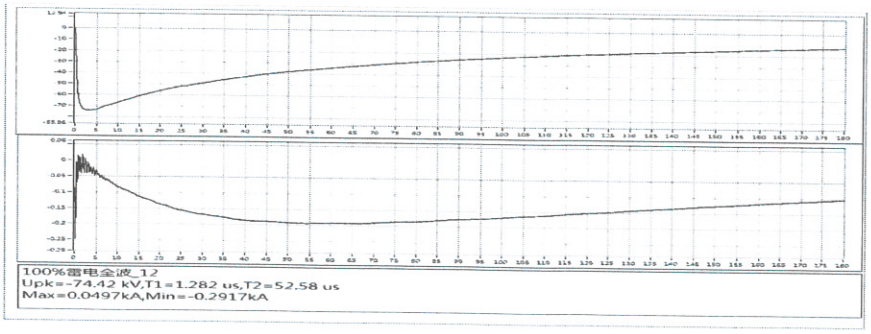


Tested terminal: C Test polarity: negative Channel 1: voltage wave Channel 2: current wave

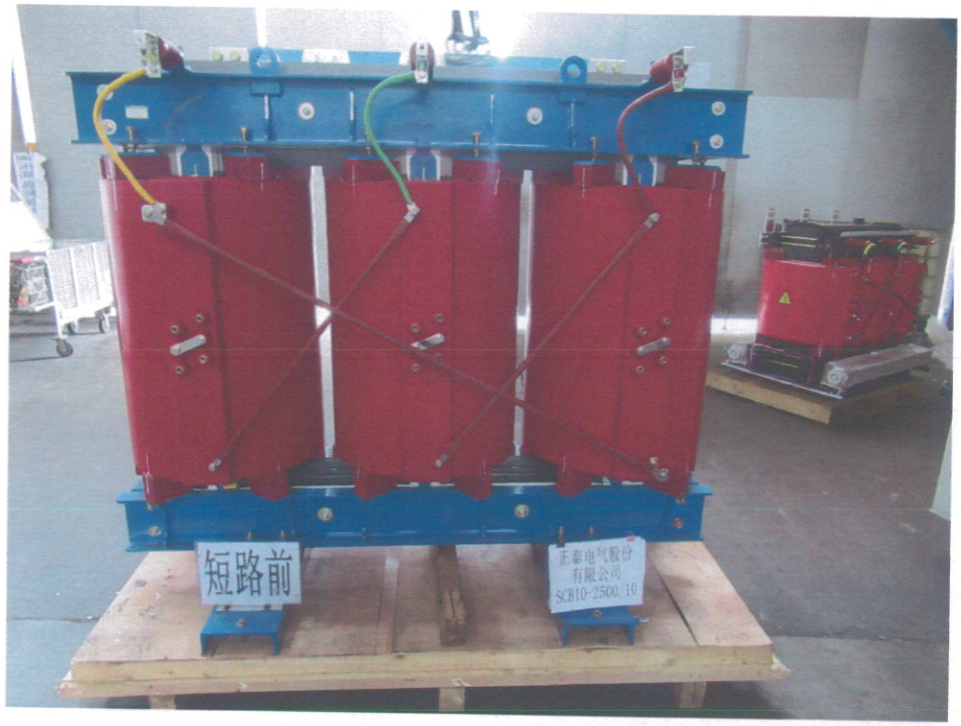






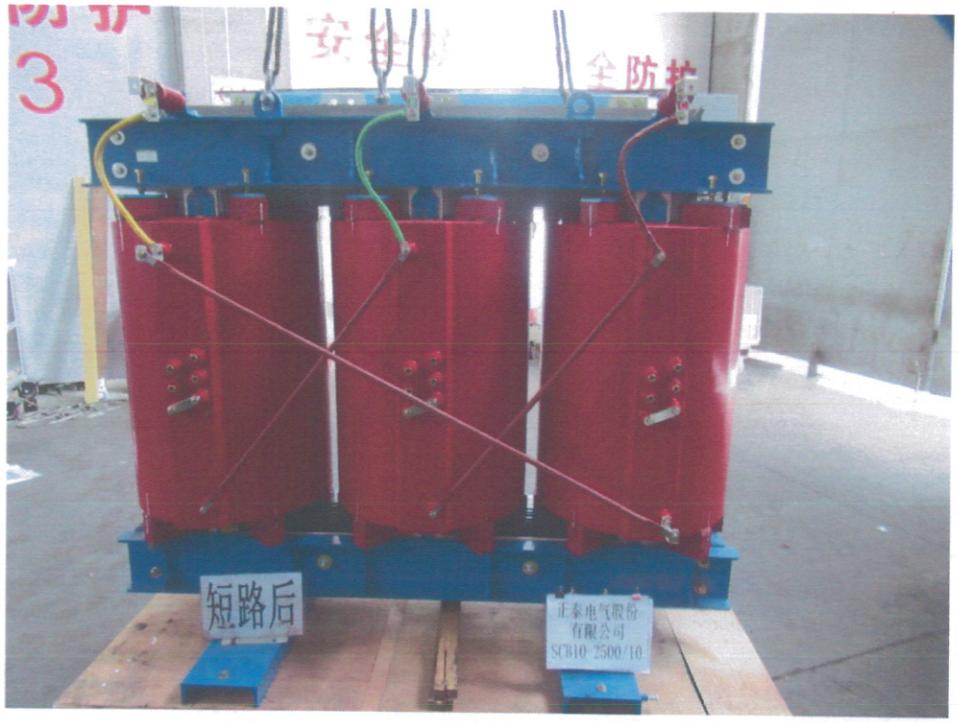


HV side before short-circuit:

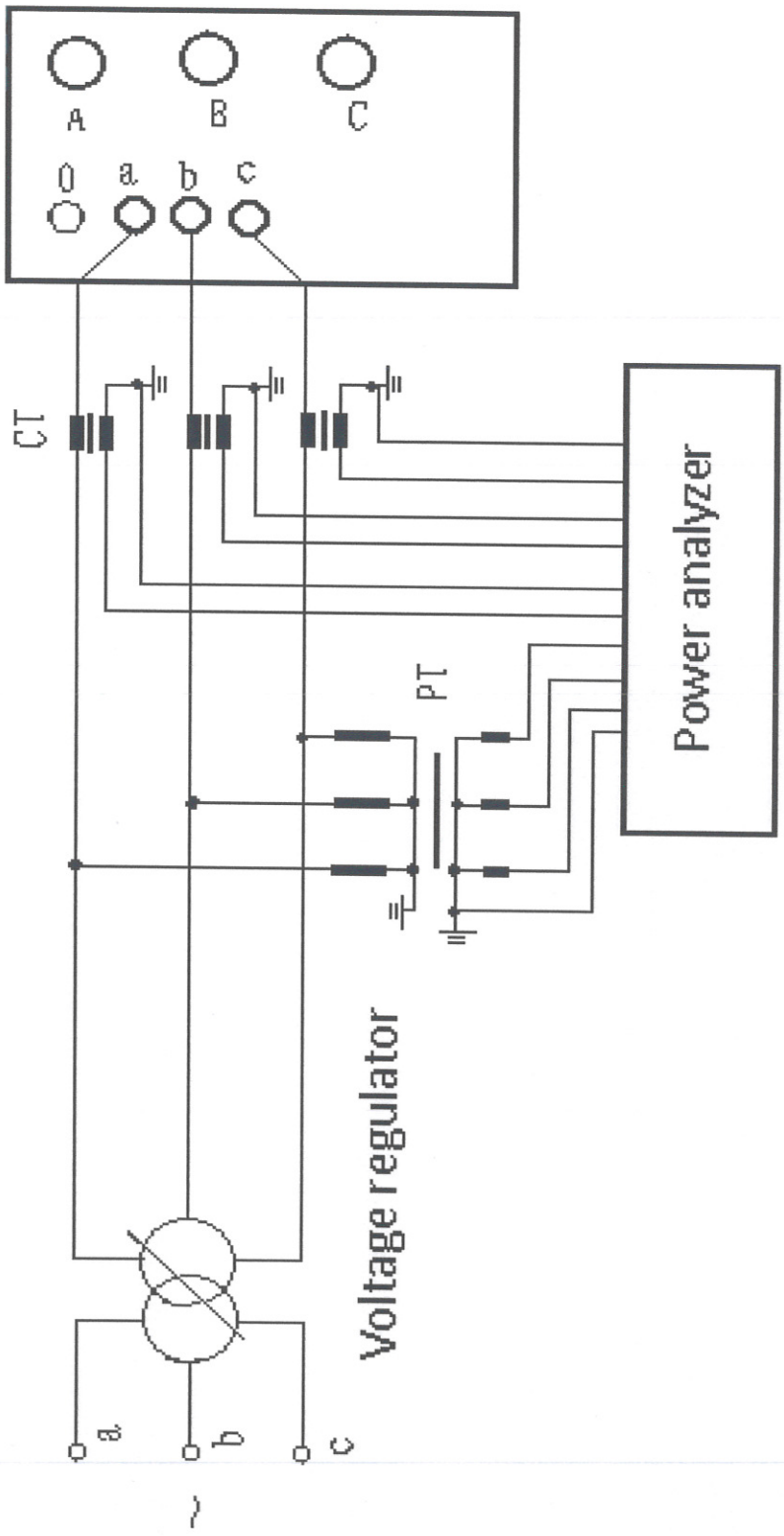


LV side before short-circuit:

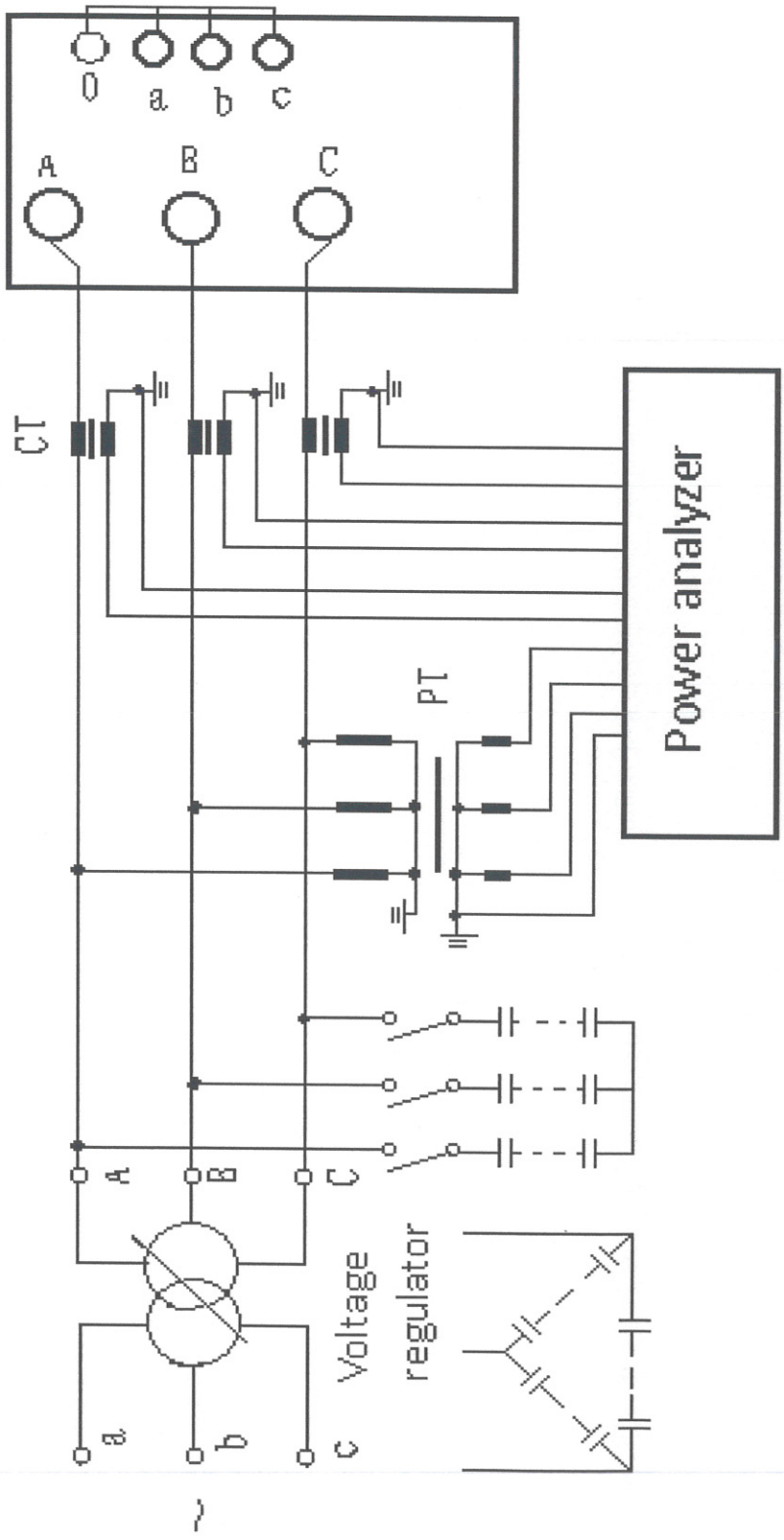
HV side after short-circuit:



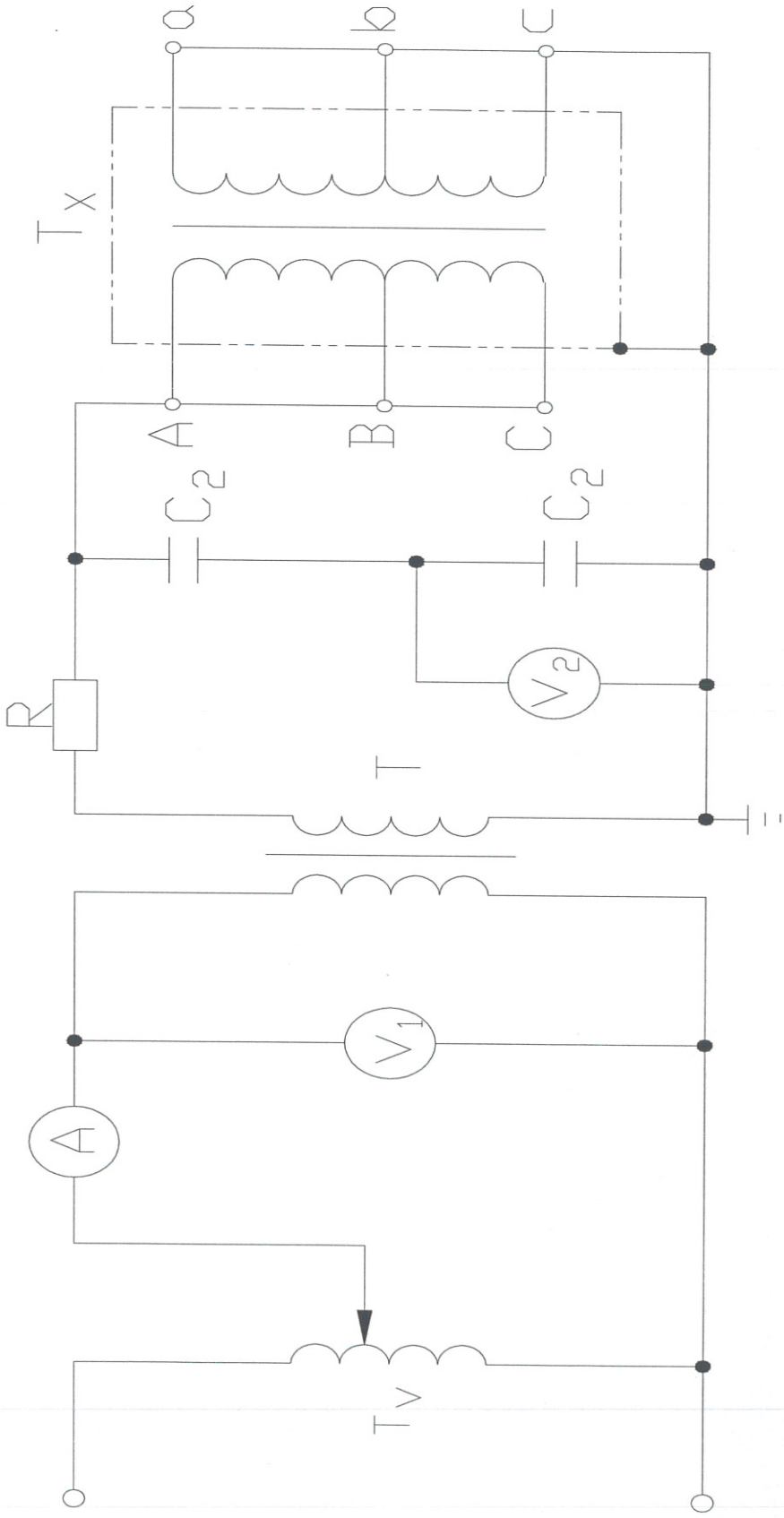
LV side after short-circuit:



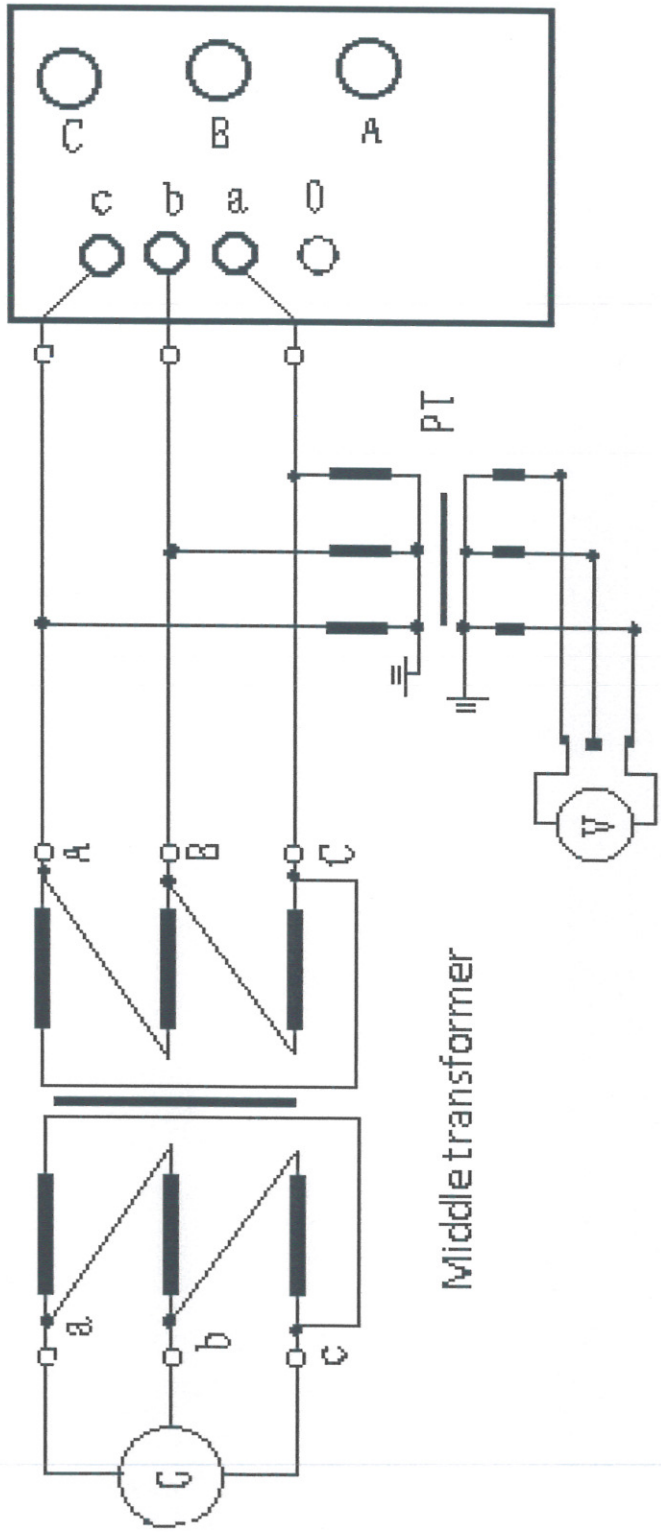
Schematic of no-load test



Schematic of load test



Schematic of separate-source AC withstand voltage test



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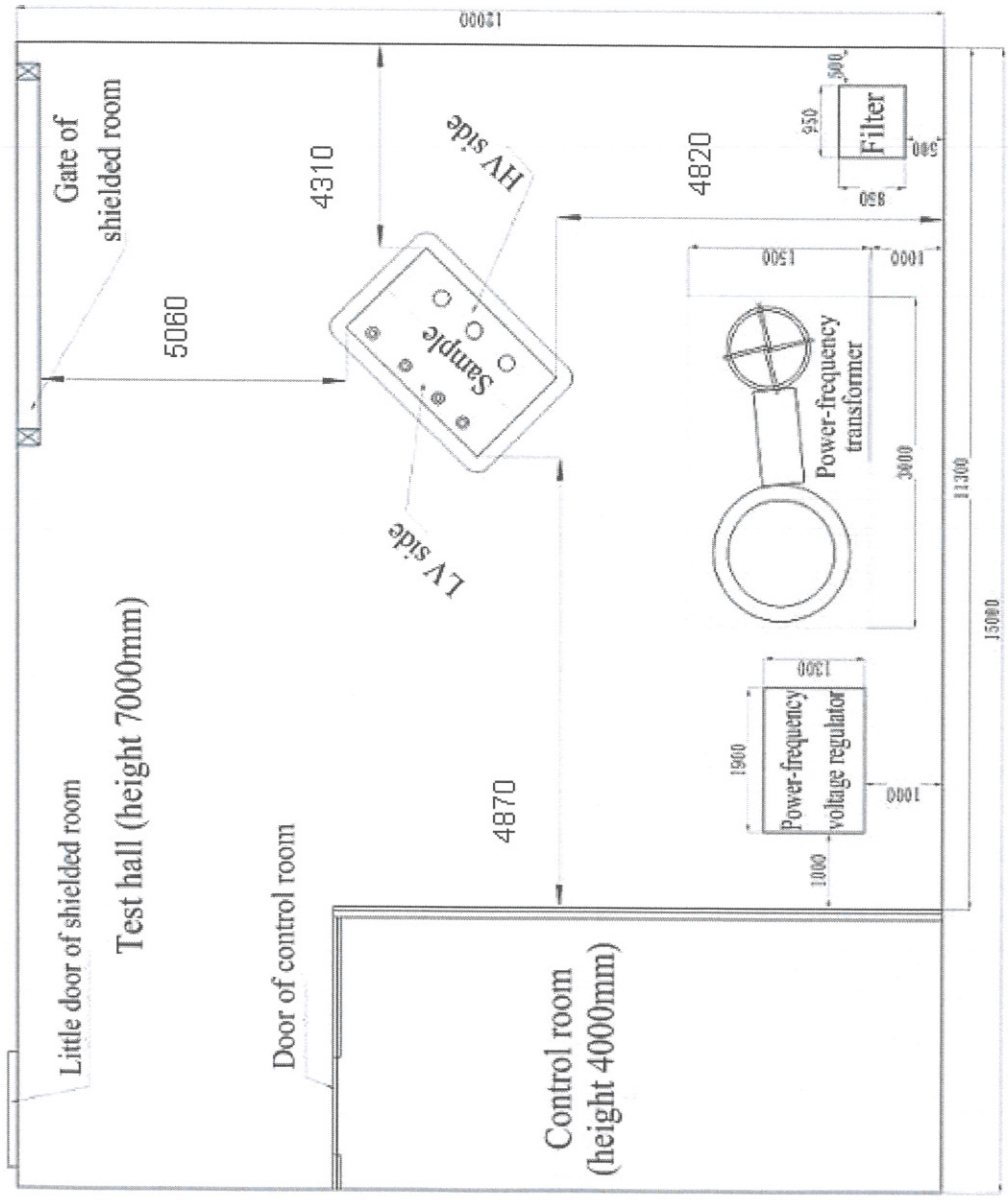
Schematic of induced AC withstand voltage test



Sound levels arrangement diagram

Instruments used in the tests

No	Test items	Name & type of instrument	Number & validity	Accuracy level
1	Measurement of d.c. insulation resistance windings-to-earth and between windings	Digital mega-ohm meter F1550C	ER17-011 2019-05-09	200k~5/10/20/50/100GΩ class 5, others class 20
2	Measurement of winding resistance	DC resistance tester JYR (50C)	ER16-023 2019-05-09	0.2%±0.2μΩ
		DC resistance tester JYR (50C)	ER16-024 2019-05-09	0.2%±0.2μΩ
3	Measurement of voltage ratio and check of phase displacement	Transformer ratio tester JYT	RI15-018 2019-02-09	AC10V:±0.3%; AC160V: <500 ±0.1%; 500~2000±0.2%; >2000±0.3%
4	Measurement of short-circuit impedance and load loss	Transformer test and control system 13 SYBS-210	749-1612 2018-07-21	Class 0.1
5	Measurement of no-load loss and current			
6	Separate-source AC withstand voltage test	Assemblies transformer equipment of power-frequency partial discharge-free test YDTW-240kVA/120kV	745-065 2018-08-14	/
7	Induced AC withstand voltage test	Assemblies testing equipment of transformer mutual-load temperature-rise test SYBS-211	749-1582 2019-04-16	Class 0.1
8	Partial discharge measurement	Multi-channel digital partial discharge comprehensive tester TWPD-2E	RU10-005 2019-06-28	Non-linear error of the span is 5%
		Assemblies testing equipment of transformer mutual-load temperature-rise test SYBS-211	749-1582 2019-04-16	Class 0.1
9	Temperature-rise test	Transformer test and control system 13 SYBS-210	749-1612 2018-07-21	Class 0.1
		Thermocouple Type T	TT33-223/224 2018-09-01	/
		Data acquisition/switch unit 34970A	TT11-086 2018-09-01	V±5.25%, A±1.5% T±1℃ Ω±0.81%
		Glass-thermometer	TT10-111 2019-05-07	0.1℃
		Glass-thermometer	TT10-112 2019-05-07	0.1℃
		Glass-thermometer	TT10-113 2019-05-07	0.1℃
		Glass-thermometer	TT10-114 2019-05-07	0.1℃
		DC resistance tester JYR (50C)	ER16-023 2019-05-09	0.2%±0.2μΩ
		DC resistance tester JYR (50C)	ER16-024 2019-05-09	0.2%±0.2μΩ
		Electronic stopwatch PC396	HT15-017 2019-06-09	/
10	Determination of sound levels	Assemblies testing equipment of transformer mutual-load temperature-rise test SYBS-211	749-1582 2019-04-16	Class 0.1
		Precision sound level meter HS5661A	SP01-031 2018-11-27	Class 1
		Sound level calibrator HS6021	SP01-024 2019-05-01	94dB±0.2 dB, 114dB±0.3 dB
		Steel tapeline L19-50	LS05-030 2019-02-02	/

Instruments used in the tests

No	Test items	Name & type of instrument	Number & validity	Accuracy level
11	Short-circuit withstand test	Data collector 1-GEN16T-2	EI56-019 2019-01-24	/
		LCR automatic tester XC2819	ER16-014 2018-08-06	/
		Voltage transformer JDZX8-35R2	EH105-001 2020-03-02	/
		Voltage transformer JDZX8-35R2	EH105-002 2020-03-02	/
		Voltage transformer JDZX8-35R2	EH105-006 2020-03-02	/
		Current transformer AGU-40.5	EH166-001 2018-08-21	/
		Current transformer AGU-40.5	EH166-002 2018-08-21	/
		Current transformer AGU-40.5	EH166-003 2018-08-21	/
12	Measurement of short-circuit impedance and load loss	Transformer test and control system 8 SYBS-2/10	749-1328 2019-06-27	Class 0.1
13	Measurement of no-load loss and current			
14	Lightning impulse test	Assemblies testing equipment of impulse voltage generator CDYL-400kV/30kJ	750-026 2018-11-17	/

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DECLARATION

1. The report is invalid without special seal for testing and page combining seal on the report;
2. The report is invalid if altered;
3. The report is invalid without signatures of persons for drawing up, proof-reading, reviewing and approval;
4. The report is valid only for the inspected and tested samples.

NOTICE

1. In case there is any objection to this report, please raise it to the laboratory within fifteen days starting from the date of receiving the report. Thank you for your cooperation.
2. In case there is no objection, please take back the samples within one month starting from the date of receiving the report, when the manufacturer is going to take back the samples, certificate for sample taking and along with the written approval for the report should be brought in presence, only then the samples could be taken back. On time due, the samples will be in the laboratory's own disposal.

The test report is in total 38 pages including 21 figures and 3 photos

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