
CESI

CESI

INSPECTION REPORT

APPROVED B2024559

Client	CTQC-China National Transformer Quality Supervision And Testing Center STI-Shenyang Transformer Institute Co., Ltd. Transformer Laboratory
Subject	Inspection activity to routine, type and special tests on a 3-phase oil immersed power transformer 180 MVA-220/38,5 kV, YNd11, Cooling method ONAN, Type SZ11-180000/220, Serial Number 12S0871-1. Manufacturer: Jiangxi People Transmit & Transform Electric Co., Ltd Nanchang City, Jiangxi Province, China
Place and date of inspection	STI Laboratories - Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang, China June 11 to 22, 2012
Notes	

N. of pages 9 **N. of pages annexed** -

Issue date August 13, 2012

Prepared TCE/CER/PRO – Umberto DI MARCO

Verified TCE/CER/PRO – Giorgio CRIPPA

Approved TCE/CER – Fiorenzo BREGANI

CESI S.p.A.
Testing & Certification Division
Business Area Certification
Il Responsabile
Fiorenzo Bregani

Mod. RISP v. 5

CESI S.p.A.
Via Rubattino 54
I 20134 Milano Italy
Tel. +39 02 21251
Fax. +39 02 21255440
e-mail: info@cesi.it
www.cesi.it

Capitale sociale € 8.550.000 interamente versato
C.F. e numero iscrizione Reg. Imprese di Milano 00793580150
P.I. IT00793580150
N. R.E.A. 429222

Table of contents

CESI S.p.A.
Via Rubattino 54
I 20134 Milano Italy
Tel: +39 02 21251
Fax: +39 02 21255440
e mail: info@cesi.it
www.cesi.it

1 GENERAL

This report concerns the inspection activity to routine, type and special tests requested by STI- Shenyang on a three-phase oil immersed Power Transformer 180 MVA - 220/38,5 kV, Serial Number 12S0871-1

During the tests were present:

- Mr Tian Venge - Director of STI High Power Department
- Mr Umberto Di Marco - CESI Inspector

2 RATINGS

2.1 Rated values

Manufacturer:	Jangxi People Transmit & Transform Electric Co., Ltd - Nanchang City	
Type:	SZ11-180000/220 [Core-type, 5 limbs]	
Serial number:	12S0871-1	
Sampling date:	May 30, 2012	
Rated Power:	180 MVA	
Cooling system:	ONAN	
Rated Frequency:	50 Hz	
Rated Voltage Ratio:	220 ± 8x1,25% kV / 38,5 kV	
Rated Current Ratio:	472,39 A / 2699,4 A	
Connection Symbol:	YNd11	
Insulation levels:		
HV:	SI/LI/AC	750/950/395 kV
HV neutral:	LI/AC	400/200 kV
LV:	LI/AC	200/85 kV

3 IDENTIFICATION OF THE TESTED SAMPLE

The tested transformer was identified by own Rating Plate and Outline Drawing. Relevant documents are annexed to STI Test Report [Ref. 4.2]

4 REFERENCE DOCUMENTS

4.1 Normative documents

[1] IEC Standard 60076-1 Ed. 3.0 (2011-04): "Power transformers - Part 1: General".
[2] IEC Standard 60076-2 Ed. 3.0 (2011-02): "Power transformers - Part 2: Temperature-rise for liquid immersed transformers.
[3] IEC Standard 60076-3 Ed.2 (2000-03) + Corrigendum (2000-11): "Power transformers – Part 3: Insulation levels, dielectric tests and external clearances in air".
[4] IEC Standard 60076-5 (Ed. 3.0, 2006-02): "Power transformers - Part 5: Ability to withstand short circuit".
[5] IEC Standard 60076-10 (Ed. 1.0, 2001-05): "Power transformers – Part 10: Determination of sound levels".

4.2 Report of tests performed in STI Laboratories

STI Test Report N° CTQC/B-12.113: Routine tests, type tests, special tests - 54 total sheets. Issuing date: July 9, 2012. - **[CESI registration number: B2024560].**

5 ASSESSMENT OF LABORATORY ADEQUACY

During the inspection the adequacy of the laboratory for the performance of the required tests was assessed.
In particular the adequacy and calibration state of the used measuring instruments were checked, verifying the expiry dates of calibration indicated on the labels of the instruments and all relevant calibration certificates. A list with all the instruments used during the tests is included in the STI Test Report [ref. 4.2].
On the basis of the modalities of performing and managing the tests, the competence of the laboratory personnel charged with the performance of the tests themselves, was also ascertained.

6 TESTS PERFORMED

The performed tests are chronologically listed in the following table where the clauses of reference Standards and the test results are also indicated.
The details of the test results are reported in the STI Test Report [Ref. 4.2].

6.1 Acronysm and abbreviations

- **W** Witnessed by CESI Inspector
- **NW** Not witnessed by CESI Inspector
- **NC** Non Conformities
- **NGV** Not guaranteed values
- **Passed** Test passed

6.2 Table of the tests

Test N°	Standard	Clause	Test Description	Test Results	Notes
			ROUTINE TESTS (before Short-circuit Test)		
1	IEC 60076-1	11.1.4	Test on transformer oil and Dissolved Gas Analysis	Passed	NW
2	IEC60076-1	11.1.2.2	Measurement of dc insulation resistance and tan ∂	NGV	NW
3	IEC 60076-1	11.3	Measurement of voltage ratio and check phase displacement	Passed	NW
4	IEC 60076-1	11.2	Measurement of winding resistance	Passed	NW
5	IEC 60076-1	11.8	Leak testing with pressure	Passed	NW
6	IEC 60076-1	11.7	Tests on on-load tap-changer	Passed	NW
7	IEC 60076-1	11.5	Measurement of no-load loss and current	Passed	NW
8	IEC 60076-1	11.4	Measurement of short-circuit impedance and load loss	Passed	NW
9	IEC 60076-3	11	Separate-source AC withstand voltage test	Passed	NW
10	IEC 60076-3	12.4	Long-duration induced AC voltage test ACLD	Passed	NW
11	IEC 60076-3	15	Switching impulse test	Passed	NW
12	IEC 60076-5	4.2	SHORT-CIRCUIT WITHSTAND TEST	Passed	W
13	IEC 60076-3	15	Switching impulse test	Passed	W
14	IEC 60076-3	14	Test with Lightning Impulse chopped on the tail (LIC)	Passed	W

Test N°	Standard	Clause	Test Description	Test Results	Notes
15 to 22			Repeated ROUTINE TESTS AFTER SHORT-CIRCUIT TEST (from Test N. 2 to 4 and N. 6 to 9)	Passed	W
23	IEC 60076-1	11.1.3e 11.5	Measurement of no-load loss and current at 90% and 110% of rated voltage	NGV	W
23	IEC 60076-3	12.3	Short-duration induced AC voltage test ACSD	Passed	W
24	IEC 60076-3	12.4	Long –duration induced AC voltage test ACLD	Passed	W
25	Special request		Long duration no-load test (Supply at 1.1 rated voltage per 12 hours)	Passed	NW
26	Special request		Measurement of the harmonics of the no-load current	NGV	W
27	IEC 60076-1	11.6	Measurement of zero-sequence impedance	NGV	W
28	IEC 60076-10	11	Measurement of sound levels	Passed	W
29	Special request		Radio interference voltage test RIV	Passed	NW
30	IEC 60076-2	7	Temperature-rise test	Passed	W
31	IEC 60076-1	11.1.4	Test on transformer oil and Dissolved Gas Analysis after dielectric tests and temperature-rise test	Passed	NW
32	IEC 60076-5	4.2.7.4b	Transformer untanking and visual inspection of active parts after the Short-circuit Test	Passed	W

PHOTOS OF THE TESTED TRANSFORMER:

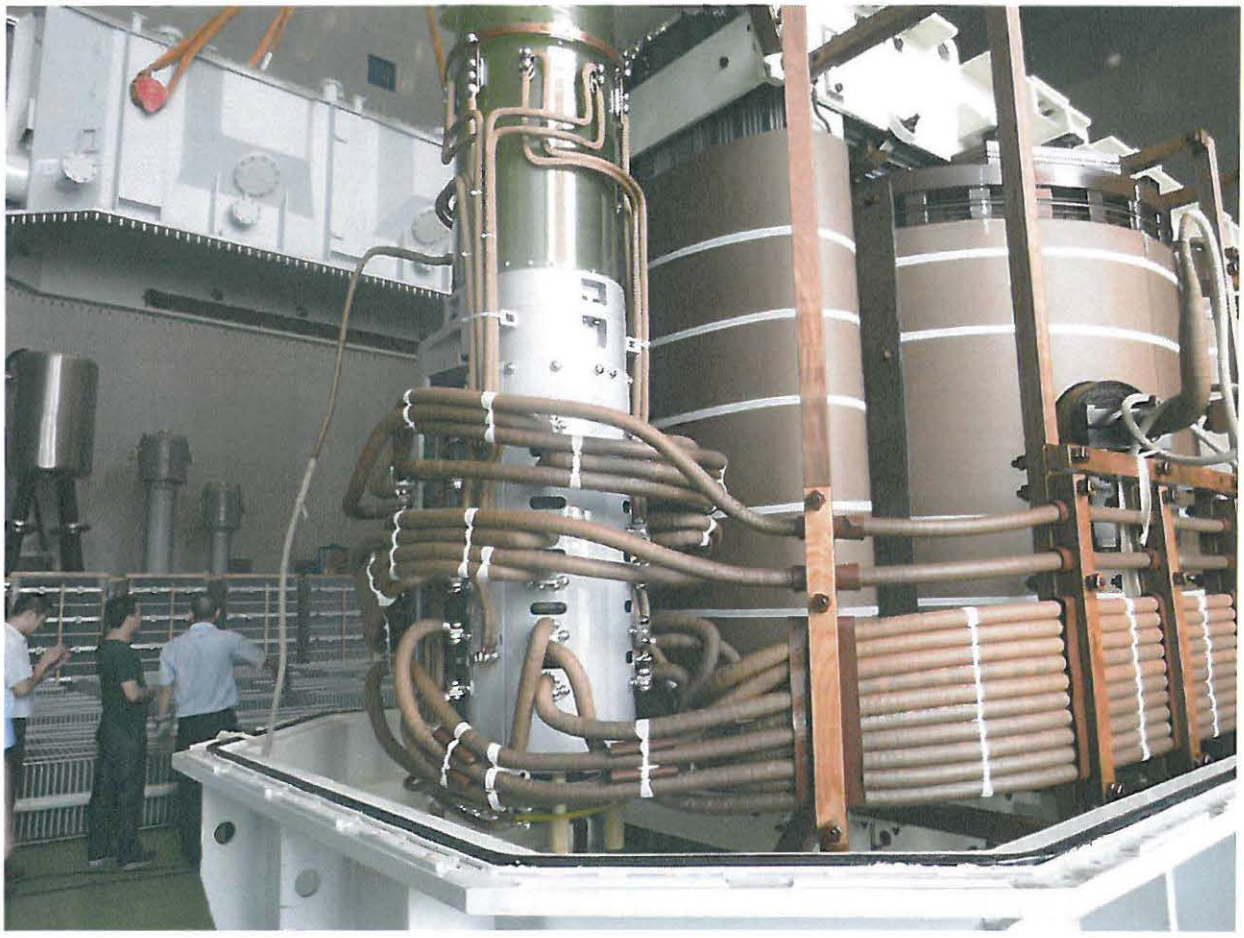
- Page 7: during short-circuit test
- Page 8: during AC dielectric tests
- Page 9: detail after untanking

7 NON CONFORMITIES

No NC were pointed out during present inspection activity.

8 CONCLUSIONS

The tested transformer passed all the tests listed in clause 6.



CTQC

TESTING
No. L0681

(2010)国认监认字(080)号

2010000394Z

CERTIFICATION OF REPORT

№:CTQC/B-12.113

Manufacturer: Jiangxi People Transmit & Transform Electric Co., Ltd.
Test object name: Power transformer
Test object type: SZ11-180000/220
Serial: 12S0871-1
Test items: Routine tests, type tests, special test.
Standards: IEC60076-1:2011, IEC60076-2:2011, IEC60076-3:2000, IEC60076-5:2006, GB1094.1-1996, GB1094.2-1996, GB1094.3-2000, GB1094.5-2008 GB/T 6451/T-2008, technical contract.
Results: The test results of routine tests, type tests, special tests of SZ11-180000/220 are in accordance with standards and technical contract. The sample passed tests.

Period of validity10years
Approved: Lishicheng

2012.07.09

变压器质量监督检验中心 检验专用章

CHINA NATIONAL TRANSFORMER QUALITY SUPERVISION AND TESTING CENTER
SHENYANG TRANSFORMER INSTITUTE CO.,LTD.TRANSFORMER LABORATORY

Address: Hushitai South Avenue No.18, Shenbei New District, Shenyang Postal code:110122 Tel:(024)89874449
E-mail: ctqc@vip.sina.com http://www.ctn.cn Fax:(024)89707949 Tel:(024)89872527

CX-F-01

CTQC

TESTING
No. L0681

(2010)国认监认字(080)号

2010000394Z

TEST REPORT

№:CTQC/B-12.113

Apparatus: Power transformer

Manufacturer: Jiangxi People Transmit & Transform Electric Co., Ltd.

Kind of testing: Trust testing

CESI

Protocol B2024560 Date 10 August 2012

Signature:

CESI
Inspection service
verified by U. DI MARCO

CHINA NATIONAL TRANSFORMER QUALITY SUPERVISION AND TESTING CENTER

SHENYANG TRANSFORMER INSTITUTE CO.,LTD.TRANSFORMER LABORATORY

CX-F-01	Test Report	№: CTQC/B-12.113 Total 54 Page 1

CONTENTS

Page

CESI
Inspection service
verified by U. DI MARCO

Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel:(024)89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024)89707949 Tel:(024)89872527

CTQC

China National Transformer Quality Supervision And Testing Center

Shenyang Transformer Institute Co.,Ltd. Transformer Laboratory

Test Report

№: CTQC/B-12.113

Test object name	Power transformer	Test object type	SZ11-180000/220
		Brand	/
Entrusted by	Jiangxi People Transmit & Transform Electric Co., Ltd.	Kind of testing	Trust testing
Manufacturer	Jiangxi People Transmit & Transform Electric Co., Ltd.	Sampling date	May 30, 2012
Address	No.111, Xiaolan M Road, Xiaolan Economic Development Zone, Nanchang City, Jiangxi Province, China.	Serial №	12S0871-1
Standards	IEC60076-1:2011, GB1094.1-1996 IEC60076-2:2011, GB1094.2-1996 IEC60076-3:2000, GB1094.3-2000 IEC60076-5:2006, GB1094.5-2008 GB/T 6451-2008 Technical contract	Test items	Routine tests Type tests Special tests
Results	The test results of routine tests, type tests, special tests of SZ11-180000/220 are in accordance with standards and technical contract. The sample passed the above tests. CESI Inspection service verified by U. DI MARCO Signing and issuing date: 2012.07.09 Period of validity 10 years		
Note			

Test witnessed by: Umberto Di Marco (CESI Senior Inspector)

Approved by: Lishicheng Checked by: Zhengjiujiang Compiled by: Tongqing

Statement : 1. Testing report is invalid without test special seal.
2. Testing report is invalid without compiler, checker and approver's signature.
3. Please inform CTQC in time after received the testing report if you have some disagreement to the testing report.
4. Testing or witnessing only apply to sample.
5. Copying testing certificate or testing report is forbidden without written permission from CTQC(expect for copying all the testing report).

Test Report

Test results

№	Test items	Specified values Standards (Technical contract)	Measured values Before S.C.T.	 After S.C.T.	Conclusions
1	Measurement of insulation resistance and tan δ (Routine test)	Providing insulation resistance Providing absorption ratio(R_{60}/R_{15}) and tan δ	See 4.1	See 4.18.5.1	/
2	Measurement of voltage ratio and check of connection group (Routine test)	The tolerances of voltage ratio : ±0.5% Connection group: YNd11	0.03%~0.06% YNd11	0.03%~0.07% YNd11	Passed
3	Measurement of winding resistance (Routine test)	Maximum unbalancedness Phase: ≤2% Line: ≤1%	H.V(phase): 0.87% L.V(line): 0.35%	H.V(phase): 0.88% L.V(line): 0.37%	Passed
4	Separate-source AC withstand voltage test (Routine test)	H.V. neutral: 200kV; 60s L.V. : 85kV; 60s	200kV; 60s 85kV; 60s	200kV; 60s 85kV; 60s	Passed
5	Long-duration AC withstand voltage test (Routine test)	Phase to earth test			Passed
		$U_1=1.7Um/\sqrt{3}$ (kV) Duration (s): 120 (f_n/f)	247.34 30	247.34 30	
		$U_2=1.5Um/\sqrt{3}$ (kV) Duration(min): 30 PD≤500pC	218.24 30 <80	218.24 30 <100	
		$1.1Um/\sqrt{3}$ (kV) Duration(min): 5 PD≤100pC	160.05 5 <90	160.05 5 <100	
		Frequency (Hz): >50	200		
6	Measurement of no-load loss and current (Routine test)	I_0%: 0.2 +30% P_0 (kW): 112.0 +15%	0.08 87.29	0.08 87.63	Passed
7	Measurement of short-circuit impedance and load loss (Routine test)	t: 75℃ Z%: 16.0 ±7.5% P_k (kW): 451.2 +15% P_{total} (kW): 563.2 +10%	15.57 420.91 508.20	15.58 420.51 508.14	Passed

Test Report

№	Test items	Specified values	Measured values		Conclusions
		Standards (Technical contract)	Before S.C.T.	After S.C.T.	
8	Test on transformer oil (Routine test)	Breakdown voltage (kV): ≥40 tan δ (90℃): ≤0.01 Water dissolved in oil (mg/L): ≤15 Providing gas chromatography	62.40 0.00156 7.0 Providing gas chromatography	62.37 0.00157 7.1 Providing gas chromatography	Passed
9	Test on on-load tap-changers (Routine test)	According to Clause 10.8 of IEC60076-1:2011,GB1094.1-1996	Comply with standard	Comply with standard	Passed
10	Leakage test (Routine test)	Applied pressure (kPa): 30 Duration (h): 24 No leakage oil and damage	30 24 No leakage oil and damage		Passed
11	Switching impulse test (Routine test)	Switching impulse wave (kV): 750 ±3%	738～754	738～757	Passed
12	Temperature-rise test(Type test)	Temperature–rise limit (K): Top oil: 55 Winding: 65	50.4 H.V. : 54.1 L.V. : 52.5		Passed
13	Short-duration AC withstand voltage test (Special test)	A phase-to-earth test with single-phase supply			Passed
		U_1 (kV): 395 Duration (s): 120 (f_n/f)	395 30		
		U_2=1.5Um/$\sqrt{3}$ (kV) Duration(min): 5 PD≤500pC	218.2 5 <100		
		1.1Um/$\sqrt{3}$ (kV) Duration(min): 5 PD≤100pC	160.0 5 <50		
		Frequency (Hz): >50	200		
		A phase-to-phase test with three-phase supply			
		U_1 (kV): 395 Duration (s): 120 (f_n/f)	395 30		
		U_2=1.3Um (kV) Duration(min): 5 PD≤300pC	327.6 5 <130		
		1.1Um (kV) Duration(min): 5 PD≤100pC	277.2 5 <100		
		Frequency (Hz): >50	200		

CESI
Inspection service
verified by U. DI MARCO

Test Report

№	Test items	Specified values Standards (Technical contract)	Measured values	Conclusions
14	Measurement of sound levels (Special test)	Sound level $\overline{L_{PA}}$ dB(A): / Sound power level $L_{WA,SN}$ dB(A): ≤97	58 80	Passed
15	Measurement of the harmonics of the no-load current (Special test)	Providing no-load current harmonic values of each phase	I_1-I_{26} no load current harmonics	/
16	Measurement of zero sequence impedance on three phase transformers (Special test)	Providing zero sequence impedance value (Ω)	41.66	/
17	Long-duration no-load test (Special test)	Applied voltage(kV): 1.1Ur Duration(h): 12 No C_2H_2 in oil	42.35 12 No C_2H_2 in oil	Passed
18	Short-circuit withstand test (Special test)	Three times each phase Duration (s): 0.25±10% Test waveshapes have no distortion Deviation of reactance before and after S.C.T.≤1% The untanking inspection shows no apparent defects Successfully check items after S.C.T.	3 0.24 No distortion 0.21% No apparent defects Passed	Passed
19	Lightning impulse test (Routine test, type test)	Full wave / Chopped wave H.V. (kV): 950 / 1050 ±3% O (kV): 400 / / ±3% L.V. (kV): 200 / 220 ±3%	939.8～961.3 1045～1053 392.3～404.2 197.1～200.9 217.4～220.3	Passed
20	Radio interference voltage test (Special test)	Applied voltage (kV): 277.2 Radio interference level(μV): ≤500	277.2 A: 355 B: 251 C: 282	Passed

Note: 1.The guaranteed values of no-load loss and no-load loss current are in accordance with the technical contract.
2.The guaranteed values of load loss and impedance voltage are in accordance with the technical contract.
3.The guaranteed value of sound level measurement is in accordance with the technical contract.
4.The measurement of no-load current harmonics is in accordance with Chinese national standard GB1094.1-1996.
5.Um in GB1094.3-2003 is 252kV, in IEC60076-3:2000 is 245kV, the technical contract requires 252kV.
6.The applied voltage of Lightning impulse full wave test (950kV) in accordance with the technical contract.
7.The applied voltage of Lightning impulse chopped wave test in GB1094.3-2003 is 1050kV, in IEC 60076-3:2000 is 1045kV, the technical contract requires 1050kV.
8.The applied voltage of switching impulse test (750kV) is in accordance with the technical contract.
9.RIV test is required in the technical contract.

Test Report

1. Test object parameters

Rated power (kVA): 180000
Rated voltage (kV): 220/38.5
Rated current (A): 472.39/2699.4
Rated frequency (Hz): 50
Number of phases: 3
Tap range (kV): (220±8×1.25%) /38.5
Connection symbol: YNd11
Cooling method: ONAN
Core-form type: 5 magnetic limbs.
Temperature class of insulation: A

Insulation level:	h.v. line terminal	SI/LI/AC	750/950/395kV
	h.v. neutral	LI/AC	400/200kV
	l.v. line terminal	LI/AC	200/85kV

2. Sample condition description

Sample exterior construction and major dimensions(length, width, height) are in compliance with drawing. Measured values: length is 9370mm, width is 7650mm, height is 6455mm.

Outline dimensions	Rating plate	Body assembly	Core assembly
1RD.710.087.1Z	8RD.860.087.1Z	5RD.700.087.1J	5RD.640.087.2T
H.V. lead	L.V. lead	H.V. winding	L.V. winding
5RD.516.087.1Y	5RD.516.087.2Y	6RD.600.087.2X	6RD.600.087.1X

Rating plate and outline drawings are in testing report annex, other drawings should be conserved by enterprise after affirming by testing center.

The form, performance data , specifications of sample rating plate are in compliance with drawings.

The marking of the phase sequence on high voltage and low voltage side of the sample is clear and right.

The surface of the sample has no collision and damage.

3. Standards

GB1094.1-1996, IEC60076—1:2011《Power transformers Part 1: General》
GB1094.2-1996, IEC60076—2:2011《Power transformers Part 2: Temperature rise》
GB1094.3-2003, IEC60076—3:2000《Power transformers Part 3: Insulation levels, dielectric tests and external clearances in air》
GB1094.5-2008, IEC60076—5:2006《Power transformers Part 5: Ability to withstand short circuit》
GB/T6451-2008《Specification and technical requirements for oil-immersed power transformers》
Technical contract

CESI
Inspection service
verified by U-DIMARCO

Test Report

4. Test items and conclusions

4.1 Measurement of insulation resistance and tan δ (Routine test) Test date: Jun.04,2012

Humidity: 75%; Oil temperature: 22.7℃

Measurement position	Insulation resistance (MΩ)			R_{60}/R_{15}	R_{600}/R_{60}	Cx(pF)	tan δ
	R_{600}	R_{60}	R_{15}				
H.V.—L.V. &E	18200	9400	7760	1.21	1.94	14110	0.0026
L.V.—H.V. E	16700	7150	4590	1.56	2.34	26440	0.0024
H.V. & L.V.—E	/	5770	4160	1.39	/	25670	0.0034
H.V.—L.V.	/	/	/	/	/	7440	0.0029
Core—E	/	42.8	/				
Clamp—E	/	42.4	/				
Core &Clamp—E	/	3130	/				

CESI Inspection service verified by Y. DI MARCO

4.2 Measurement of voltage ratio and check of connection group (Routine test)

Test date: Jun.04,2012

H.V.		L.V.		Ratio	Measured deviation (%)			Connection group
Tap position	Voltage (kV)	Tap position	Voltage (kV)		AB/ab	BC/bc	CA/ca	
1	242.000	/	38.5	6.286	0.05	0.07	0.09	YNd11
2	239.250			6.214	-0.04	-0.02	-0.01	
3	236.500			6.143	0.08	0.07	0.09	
4	233.750			6.071	-0.04	-0.02	0.00	
5	231.000			6.000	0.05	0.06	0.08	
6	228.250			5.929	-0.05	-0.03	-0.02	
7	225.500			5.857	0.04	0.05	0.07	
8	222.750			5.786	-0.06	-0.05	-0.03	
9b	220.000			5.714	0.03	0.04	0.06	
10	217.250			5.643	-0.08	-0.06	-0.04	
11	214.500			5.571	0.02	0.03	0.05	
12	211.750			5.500	-0.09	-0.07	-0.06	
13	209.000			5.429	0.01	0.02	0.04	
14	206.250			5.357	-0.11	-0.9	-0.07	
15	203.500			5.286	-0.01	0.01	0.03	
16	200.750			5.214	-0.12	-0.10	-0.08	
17	198.000			5.143	-0.02	-0.01	0.02	

Test Report

4.3 Measurement of winding resistance(Routine test) Test date: Jun.05,2012

Oil temperature:22.3℃

Winding	Tap position	Measured values (Ω)			Unbalancedness (%)
		A~O a~b	B~O b~c	C~O c~a	
H.V.	1	0.2611	0.2609	0.2629	0.76
	2	0.2561	0.2559	0.2580	0.82
	3	0.2519	0.2517	0.2536	0.75
	4	0.2470	0.2469	0.2486	0.69
	5	0.2427	0.2426	0.2445	0.78
	6	0.2379	0.2378	0.2395	0.71
	7	0.2336	0.2335	0.2353	0.77
	8	0.2289	0.2287	0.2304	0.74
	9	0.2241	0.2235	0.2248	0.58
	10	0.2295	0.2292	0.2312	0.87
	11	0.2339	0.2335	0.2355	0.85
	12	0.2387	0.2384	0.2404	0.84
	13	0.2429	0.2426	0.2447	0.86
	14	0.2479	0.2475	0.2495	0.81
	15	0.2519	0.2517	0.2538	0.83
	16	0.2569	0.2565	0.2586	0.82
	17	0.2610	0.2607	0.2628	0.80
L.V.	/	0.009881	0.009884	0.009916	0.35

4.4 Separate-source AC withstand voltage test(Routine test) Test date: Jun.05,2012

Test circuit is given in Annex2-a

Humidity: 61.6%; Oil temperature: 22.3℃; Atmospheric pressure: 99.7kPa

Position	Applied voltage (kV)	Duration (s)	Results
H.V.neutral—L.V.&E	200	60	Passed
L.V.—H.V. &E	85	60	

CESI
Inspection service
verified by Y.DIMARCO

Test Report

4.5 Long-duration AC withstand voltage test (ACLD) (Routine test) Test date: Jun.05,2012

Test circuit is given in Annex2-b.

Phase to earth test, tap position 9b, frequency 200Hz.

Induced voltage		Duration	Partial discharge levels (pC)		
Multiple	Phase-to-earth (kV)		A	B	C
$1.1Um/\sqrt{3}$	160.05	5 min	<100	<100	<100
$U_2=1.5Um/\sqrt{3}$	218.24	5 min	<100	<100	<100
$U_1=1.7Um/\sqrt{3}$	247.34	30s	/	/	/
$U_2=1.5Um/\sqrt{3}$	218.24	5 min	<50	<40	<70
		10 min	<50	<40	<70
		15 min	<60	<50	<70
		20 min	<60	<50	<70
		25 min	<60	<50	<70
		30 min	<60	<50	<80
$1.1Um/\sqrt{3}$	160.05	5 min	<80	<70	<90

Note: Um=252kV
Background noise level is <15pC before and after test.
Start voltage: 155.20kV Extinction voltage: 62.69kV.

4.6 Measurement of no-load loss and current(Routine test) Test date: Jun.05,2012

Test circuit is given in Annex2-c.

r.m.s voltage (kV)		No-load current		No-load loss (kW)	
Reading of mean value voltmeter	Reading of r.m.s. voltmeter	(A)	(%)	Measured value	Corrected value
38.500	38.608	2.10	0.08	87.53	87.29

CESI
Inspection service
verified by Y. DI MARCO

Test Report

4.7 Measurement of short-circuit impedance and load loss(Routine test) Test date: Jun.05,2012

Test circuit is given in Annex2-d.

Winding	Tap position	Applied current I		Measured voltage (kV)	H.V. short-circuit Impedance (Each phase)		Load loss (kW)		Total loss (kW)
					(Ω)	(%)	Measured value	Corrected value	Corrected value
		(A)	I/Ir (%)		t=75℃ I=Ir	t=75℃ I=Ir	t=22.3℃	t=75℃ I=Ir	t=75℃ I=Ir
H.V. | L.V.	1	268.41	62.50	24.702	53.13	16.33	160.06	434.89	522.18
	9b	284.86	60.30	20.658	41.87	15.57	142.00	420.91	508.20
	17	318.99	60.77	18.484	33.45	15.36	163.10	488.09	575.38

4.8 Test on transformer oil(Routine test) Test date: Jun.01, 2012

tan δ (90℃)	Breakdown voltage (kV)	Water dissolved in oil (mg/L)
0.00156	62.40	7.0

Gas chromatography(before routine tests) Test date: Jun.01, 2012 μL/L

H_2	CO	CO_2	CH_4	C_2H_6	C_2H_4	C_2H_2	Hydrocarbons
0.00	4.07	145.80	0.15	0.00	0.00	0.00	0.15

Gas chromatography (after S.C.T test, before before long-duration no-load test)

Test date: Jun.19, 2012 μL/L

H_2	CO	CO_2	CH_4	C_2H_6	C_2H_4	C_2H_2	Hydrocarbons
2.10	8.76	150.20	0.21	0.00	0.00	0.00	0.21

Gas chromatography (after long-duration no-load test, 1.1 times over-current test)

Test date: Jun.20, 2012 μL/L

H_2	CO	CO_2	CH_4	C_2H_6	C_2H_4	C_2H_2	Hydrocarbons
2.80	9.03	151.70	0.26	0.00	0.00	0.00	0.26

Gas chromatography (after 1.1 times over-current test, before temperature-rise test)

Test date: Jun.20, 2012 μL/L

H_2	CO	CO_2	CH_4	C_2H_6	C_2H_4	C_2H_2	Hydrocarbons
3.76	9.68	152.60	0.31	0.00	0.00	0.00	0.31

Gas chromatography (after temperature-rise test)

Test date: Jun.21, 2012 μL/L

H_2	CO	CO_2	CH_4	C_2H_6	C_2H_4	C_2H_2	Hydrocarbons
14.35	33.27	315.60	1.17	0.00	0.00	0.00	1.17

CESI
Inspection service
verified by Y.DI MARCO

Test Report	№: CTQC/B-12.113 Total 54 Page 11

4.9 Test on on-load tap-changers (Routine test) Test date: Jun.04, 2012

Operation test:

a. 8 complete operating cycles with the transformer not energized(a cycle of operation goes from one end of the tapping range to the other and back again).

b. 1 complete operate cycle with the transformer is not energized, with 85% of the rated operation voltage.

c. 1 complete operating cycle with the transformer is energized at rated voltage and rated frequency at no-load.

d. With one winding short-circuited and made rated current in the tapped winding, 10 cycles of tap-change operations across the range of two steps on each side from where a coarse or reversing changeover selector operates, or otherwise from the middle tapping(the tapchangger will pass 20 times through the changeover position).

4.10 Leakage test (Routine test) Test date: Jun.04, 2012

Test method	Applied pressure (kPa)	Duration (h)	Residual pressure (kPa)	Result
Atmospheric pressure	30	24	30	No leakage oil and damage

4.11 Switching impulse test (Routine test) Test date: Jun.04,2012

Humidity: 83.3%; Ambient temperature: 20.6℃; Atmospheric press: 99.9kPa.

Test items and voltage

Tested terminals	Rated withstand voltage (kV)	Tap position
A, B, C	750	1

Test sequence:

One reduced negative polarity switching impulse;

Three rated negative polarity switching impulse.

Test records:

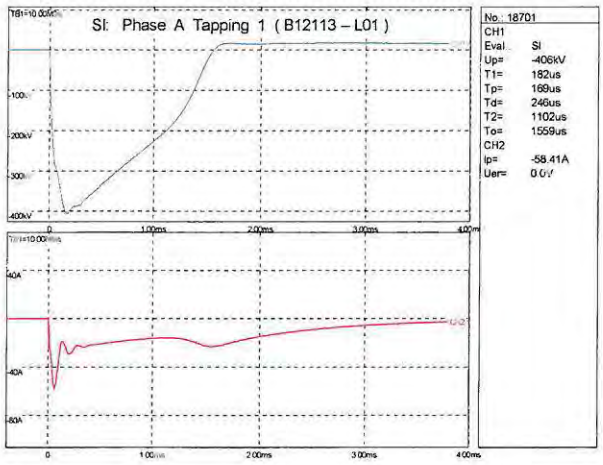
T1:Front time; T0:A total duration from the virtual origin to the first zero passage;

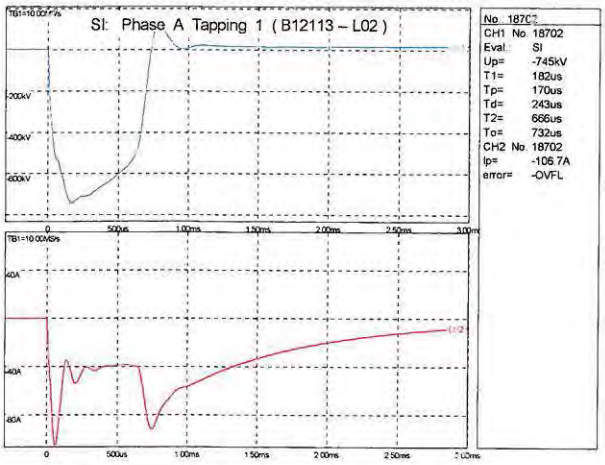
Td:Time above 90%Up; Up:Peak voltage.

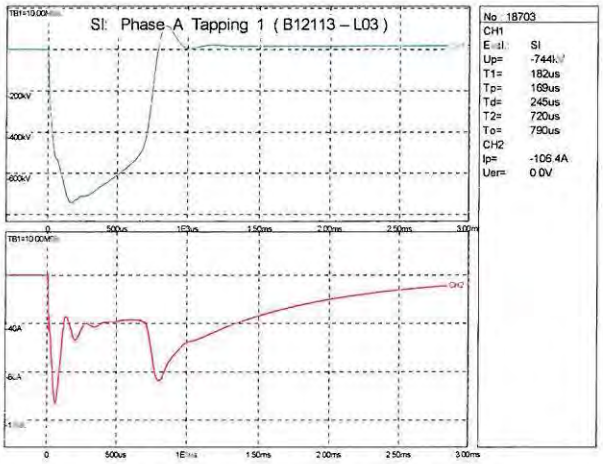
CESI
Inspection service
verified by Y. DI MARCO

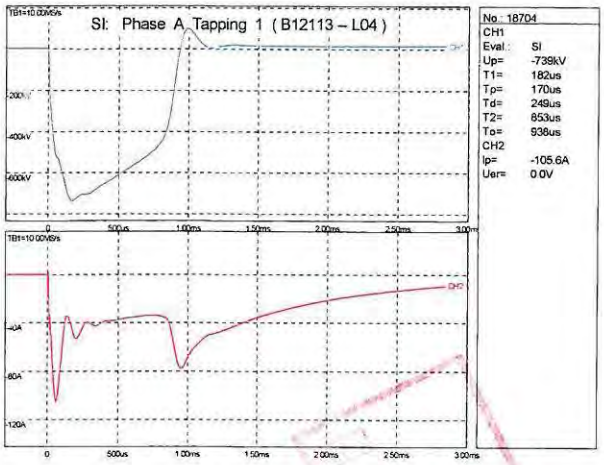
Test Report

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





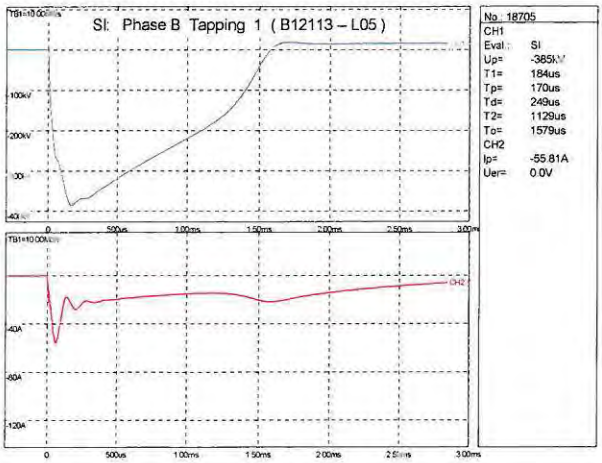


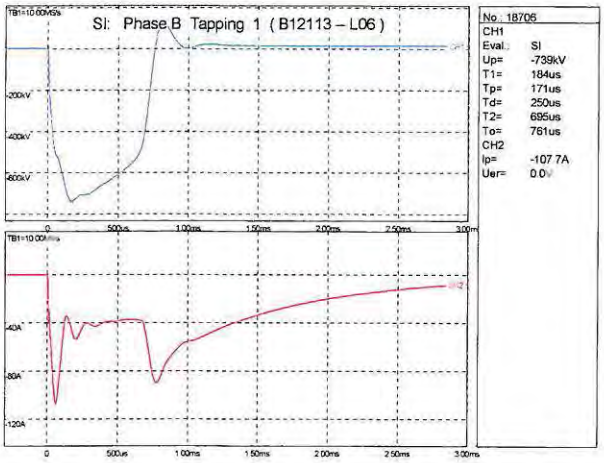


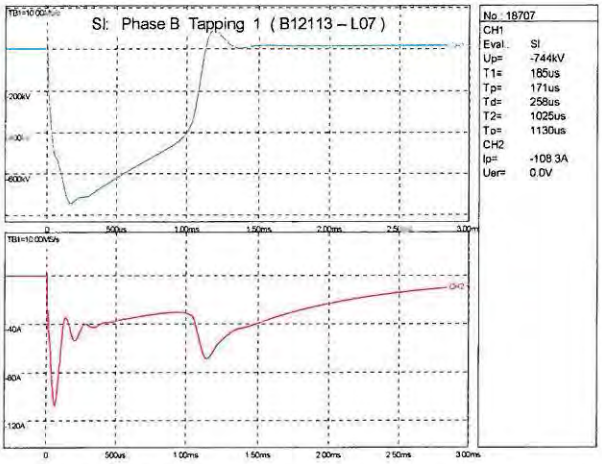
CESI
Inspection service
verified by Y. Di MARCO

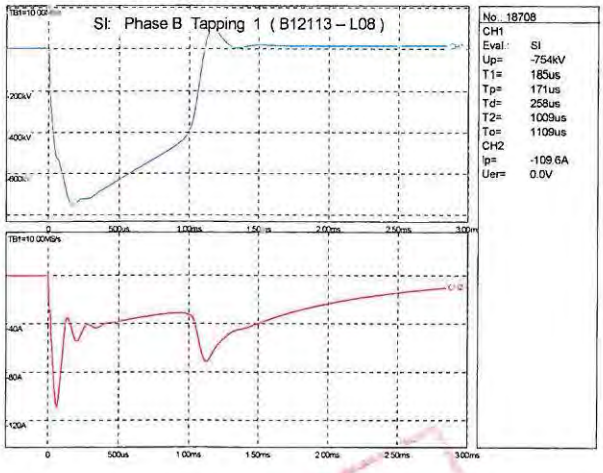
Test Report

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





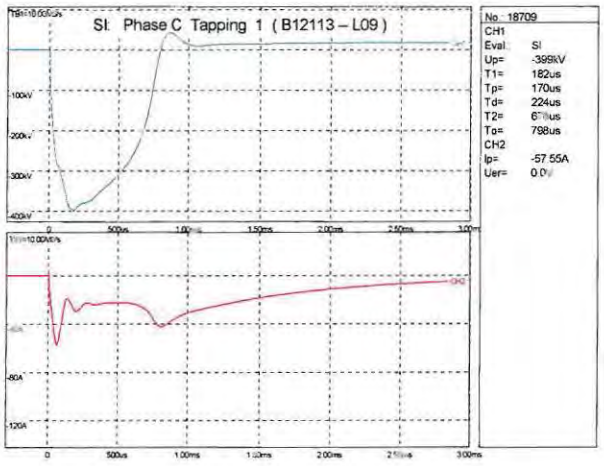


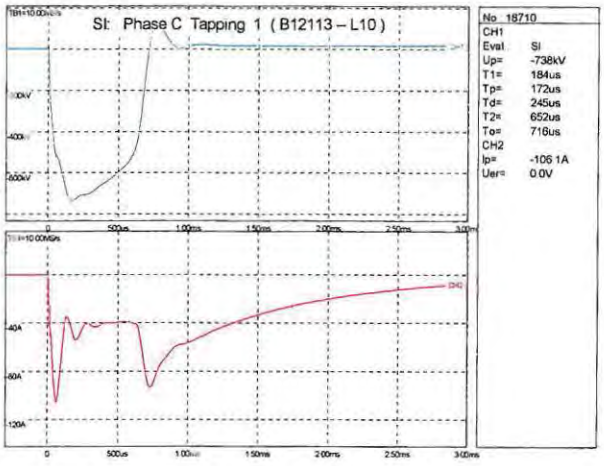


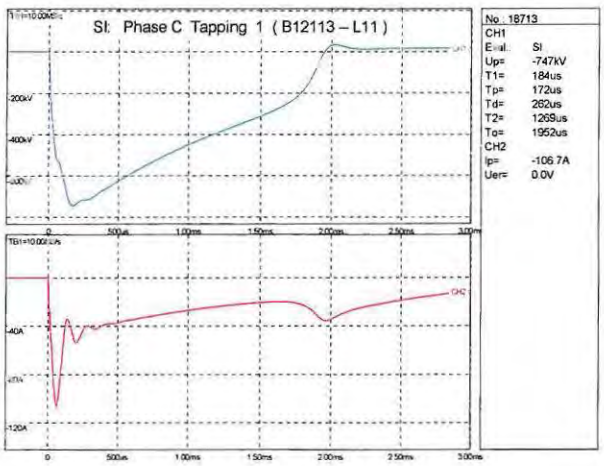
CESI
Inspection service
verified by Y. DI MARCO

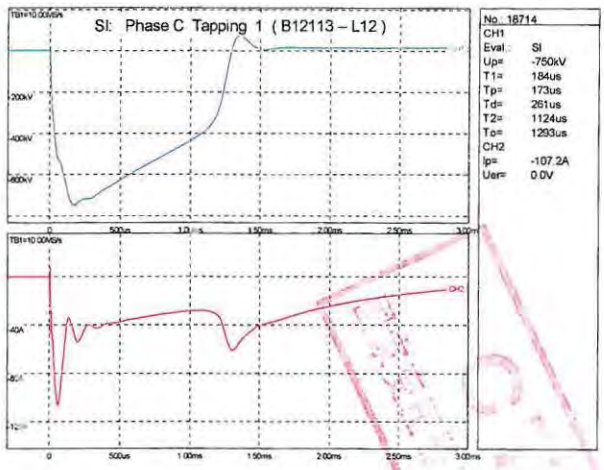
Test Report

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









CESI
Inspection service
verified by U.DI MARCO

Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel:(024)89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024)89707949 Tel:(024)89872527

4.12 Temperature-rise test (Type test) Test date: Jun.20, 2012

The test is conducted by means of short-circuit method, test duration is 13h, stability duration is 4h. Tap 17.

Measure top oil temperature-rise: Specified total loss is 574.72kW, injected total loss of 574.72kW during test.

Measure winding temperature-rise: Specified current is 524.88A, injected test current of 524.88A during test.

Temp.-rise calculation:

Oil temp.-rise calculation under test losses:

Temp. of top oil(℃): $\theta_{o\_test\ loss} = \frac{1}{n} \Sigma\, \theta_o(i)_{test\ loss}$ = (83.2+83.2+82.0) / 3 = 82.8

Temp. of bottom oil(℃): $\theta_{b\_test\ loss} = \frac{1}{n} \Sigma\, \theta_b(i)_{test\ loss}$ = (55.7+57.2+57.2+57.6) / 4 = 56.9

Average temp. of oil(℃): $\theta_{om\_test\ loss} = \frac{\theta_{o\_test\ loss} + \theta_{b\_test\ loss}}{2}$ = (82.8+56.9) / 2 = 69.9

Ambient temp.(℃): $\theta_{a\_test\ loss} = \frac{1}{n} \Sigma\, \theta_a(i)_{test\ loss}$ = (32.4+31.8+33.1+31.8+32.4+32.5) / 6 = 32.3

Top oil temp.-rise(K): $\Delta\theta_{o\_test\ loss} = \theta_{o\_test\ loss} - \theta_{a\_test\ loss}$ = 82.8 - 32.3 = 50.5

Average oil temp.-rise(K): $\Delta\theta_{om\_test\ loss} = \theta_{om\_test\ loss} - \theta_{a\_test\ loss}$ = 69.9 - 32.3 = 37.6

Oil temp.-rise under corrected losses:

Top oil temp.-rise(K): $\Delta\theta_o = \Delta\theta_{o\_test\ loss} \times (\frac{P_{total\ loss}}{P_{test\ loss}})^x = 50.5 \times (\frac{574.72}{574.72})^{0.9} = 50.5$

Average oil temp.-rise(K): $\Delta\theta_{om} = \Delta\theta_{om\_test\ loss} \times (\frac{P_{total\ loss}}{P_{test\ loss}})^x = 37.6 \times (\frac{574.72}{574.72})^{0.9} = 37.6$

CESI
Inspection service
verified by Y. DI MAR 80

Oil temp. calculation during switching off:

Temp. of top oil(℃): $\theta_{o\_start} = \frac{1}{n} \Sigma \theta_o(i)_{\_start} = (82.1+82.0+80.6) / 3 = 81.6$

Temp. of bottom oil(℃): $\theta_{b\_start} = \frac{1}{n} \Sigma \theta_b(i)_{\_start} = (56.1+57.3+57.5+57.9) / 4 = 57.2$

Average temp. of oil(℃): $\theta_{om\_start} = \frac{\theta_{o\_start} + \theta_{b\_start}}{2} = (81.6+57.2) / 2 = 69.4$

Oil temp. calculation under measuring R:

Temp. of top oil(℃): $\theta_{o\_end} = \frac{1}{n} \Sigma \theta_o(i)_{\_end} = (75.1+75.1+66.4) / 3 = 72.2$

Temp. of bottom oil(℃): $\theta_{b\_end} = \frac{1}{n} \Sigma \theta_b(i)_{\_end} = (48.7+52.4+52.7+46.9) / 4 = 50.2$

Average temp. of oil(℃): $\theta_{om\_end} = \frac{\theta_{o\_end} + \theta_{b\_end}}{2} = (72.2+50.2) / 2 = 61.2$

Cold R measurement at 26℃ ambient temp.: H.V.(Ω): 2.627×10^{-1} L.V.(Ω): 0.9983×10^{-2}

CESI
Inspection service
verified by U. DI MARCO

Legend: Data to be inserted

Time interval	Δt=	1	min
Initial average liquid temp.	θom_start=	69.4	℃
Final average-liquid temp.	θom_end=	61.2	℃
Liquid temperature slope	k=	0.27	K/min

Estimated winding time constant	Tw=	7.50	min
Estimated average liquid temp.	Ao=	74.62	℃
Estimated winding to liquid temp.	B=	11.39	K
Average winding temp. at the instant of shut down	θwo=	86.0	℃

Auxiliary variables:

tc= -10.6469

te= 0.1427

	n	sa	sb	sc	sd	se
Abs Sums:	27	7.42	2066.89	582.48	158322.51	4.57

Time (min)	R(i) (Ω) ×10^{-1}	θom(i)= Ao-kt	θwm(i) as measured	θwval(i)	θwcor(i)	υ{_ (0/1)	θw(i) as corrected and validated	△θw(i) as per eq. (C.5)	θw(i) × △θw(i)	(θw(i))^2	e$^{(-i/Tw)}$	θw(i) as calculated
0		74.62										86.01
1		74.35										84.32
2		74.08	79.66	79.66	79.99	1						82.80
3	3.187	73.80	81.64	81.64	82.46	1	78.63	-1.358	-106.78	6182.65	0.7087	81.44
4	3.175	73.53	80.45	80.45	81.54	1	81.54	-0.919	-74.93	6648.56	0.5866	80.21
5	3.164	73.26	79.35	79.35	80.72	1	80.72	-0.820	-66.15	6515.58	0.5133	79.10
6	3.154	72.98	78.36	78.36	80.00	1	80.00	-0.720	-57.61	6399.83	0.4492	78.10
7	3.144	72.71	77.37	77.37	79.28	1	79.28	-0.720	-57.10	6285.12	0.3931	77.19
8	3.135	72.44	76.47	76.47	78.66	1	78.66	-0.621	-48.83	6187.07	0.3440	76.36
9	3.127	72.16	75.68	75.68	78.14	1	78.14	-0.521	-40.75	6105.30	0.3011	75.59
10	3.119	71.89	74.88	74.88	77.61	1	77.61	-0.521	-40.48	6024.08	0.2635	74.89
11	3.113	71.62	74.29	74.29	77.29	1	77.29	-0.323	-24.95	5974.08	0.2306	74.24
12	3.106	71.34	73.59	73.59	76.87	1	76.87	-0.422	-32.45	5909.00	0.2018	73.64
13	3.100	71.07	72.99	72.99	76.55	1	76.55	-0.323	-24.71	5859.48	0.1766	73.08
14	3.095	70.80	72.50	72.50	76.32	1	76.32	-0.223	-17.05	5825.32	0.1546	72.56
15	3.089	70.52	71.90	71.90	76.00	1	76.00	-0.323	-24.53	5776.16	0.1353	72.06
16	3.085	70.25	71.50	71.50	75.88	1	75.88	-0.124	-9.41	5757.31	0.1184	71.60
17	3.080	69.98	71.01	71.01	75.65	1	75.65	-0.223	-16.90	5723.45	0.1036	71.16
18	3.076	69.70	70.61	70.61	75.53	1	75.53	-0.124	-9.37	5704.70	0.0907	70.74
19	3.072	69.43	70.21	70.21	75.41	1	75.41	-0.124	-9.36	5685.97	0.0793	70.33
20	3.067	69.16	69.72	69.72	75.18	1	75.18	-0.223	-16.80	5652.32	0.0694	69.95
21	3.064	68.88	69.42	69.42	75.16	1	75.16	-0.025	-1.86	5648.61	0.0608	69.58
22	3.061	68.61	69.12	69.12	75.13	1	75.13	-0.025	-1.86	5644.89	0.0532	69.22
23	3.057	68.34	68.72	68.72	75.01	1	75.01	-0.124	-9.31	5626.26	0.0465	68.87
24	3.054	68.06	68.42	68.42	74.98	1	74.98	-0.025	-1.85	5622.55	0.0407	68.53
25	3.051	67.79	68.13	68.13	74.96	1	74.96	-0.025	-1.85	5618.84	0.0356	68.20
26	3.048	67.52	67.83	67.83	74.93	1	74.93	-0.025	-1.85	5615.14	0.0312	67.87
27	3.046	67.24	67.63	67.63	75.01	1	75.01	0.075	5.60	5626.33	0.0273	67.56
28	3.043	66.97	67.33	67.33	74.98	1	74.98	-0.025	-1.85	5622.62	0.0239	67.24
29	3.041	66.70	67.13	67.13	75.06	1	75.06	0.075	5.60	5633.82	0.0209	66.94
30	3.038	66.42	66.83	66.83	75.03	1	75.03	-0.025	-1.86	5630.11	0.0183	66.63

H.V. Winding temp.-rise (K): $\Delta\theta_{WH} = (\theta_{w0} - \theta_{om\_start}) \times (\frac{I_{rated}}{I_{start}})^{y} + \Delta\theta_{om} = (86.0 - 61.2) \times (\frac{524.88}{524.88})^{1.6} = 54.2$

CESI
Inspection service
verified by Y. DI MARCO

Test Report

Legend Data to be inserted

Time interval	Δt=	1	min
Initial average liquid temp.	θom_start=	69.4	℃
Final average-liquid temp.	θom_end=	61.2	℃
Liquid temperature slope	k=	0.27	K/min

Estimated winding time constant	Tw=	7.17	min
Estimated average liquid temp.	Ao=	74.17	℃
Estimated winding to liquid temp.	B=	10.52	K
Average winding temp. at the instant of shut down	θwo=	84.7	℃

Auxiliary variables:

tc= -11.1029

te= 0.1497

	n	sa	sb	sc	sd	se
Abs Sums:	27	6.76	2047.80	525.29	155396.83	4.29

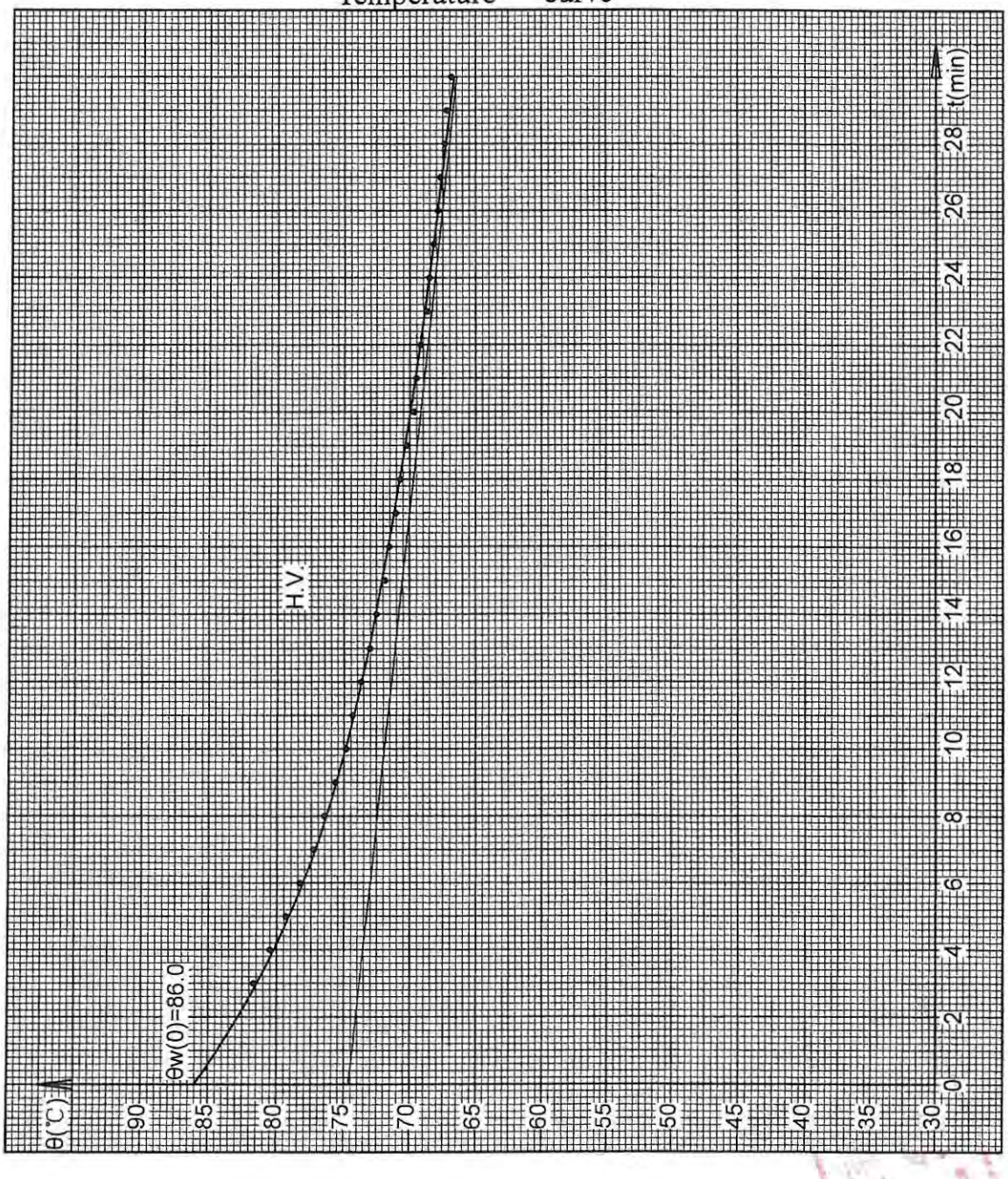
Time (min)	R(i) (Ω) ×10 $^{-2}$	θom(i)= Ao-kt	θwm(i) as measured	θwval(i)	θwcor(i)	υ{ _ (0/1)	θw(i) as corrected and validated	△θw(i) as per eq. (C.5)	θw(i) × △θw(i)	(θw(i)) ^{2}	e $^{(-i/Tw)}$	θw(i) as calculated
0		74.17										84.69
1		73.90										83.05
2		73.62	79.66	79.66	79.99	1						81.59
3	1.2067	73.35	80.49	80.49	81.31	1	78.63	-1.358	-106.78	6182.65	0.7087	80.28
4	1.2024	73.08	79.36	79.36	80.45	1	80.45	-0.851	-68.46	6472.87	0.5724	79.10
5	1.1984	72.80	78.32	78.32	79.68	1	79.68	-0.772	-61.55	6349.17	0.4978	78.04
6	1.1945	72.53	77.30	77.30	78.94	1	78.94	-0.746	-58.91	6230.80	0.4330	77.09
7	1.1910	72.26	76.38	76.38	78.29	1	78.29	-0.642	-50.24	6129.90	0.3766	76.22
8	1.1879	71.98	75.57	75.57	77.76	1	77.76	-0.537	-41.77	6046.08	0.3276	75.43
9	1.1849	71.71	74.79	74.79	77.25	1	77.25	-0.511	-39.47	5966.87	0.2849	74.71
10	1.1822	71.44	74.08	74.08	76.81	1	76.81	-0.433	-33.23	5900.23	0.2478	74.05
11	1.1797	71.16	73.43	73.43	76.43	1	76.43	-0.380	-29.07	5841.96	0.2156	73.43
12	1.1774	70.89	72.82	72.82	76.10	1	76.10	-0.328	-24.96	5791.93	0.1875	72.86
13	1.1753	70.62	72.28	72.28	75.83	1	75.83	-0.276	-20.91	5750.04	0.1631	72.33
14	1.1733	70.34	71.75	71.75	75.58	1	75.58	-0.250	-18.86	5712.25	0.1419	71.84
15	1.1714	70.07	71.26	71.26	75.36	1	75.36	-0.223	-16.84	5678.53	0.1234	71.37
16	1.1696	69.80	70.79	70.79	75.16	1	75.16	-0.197	-14.83	5648.84	0.1073	70.93
17	1.1679	69.52	70.34	70.34	74.99	1	74.99	-0.171	-12.83	5623.15	0.0933	70.51
18	1.1664	69.25	69.95	69.95	74.87	1	74.87	-0.119	-8.90	5605.34	0.0812	70.11
19	1.1649	68.98	69.56	69.56	74.75	1	74.75	-0.119	-8.88	5587.56	0.0706	69.72
20	1.1634	68.70	69.16	69.16	74.63	1	74.63	-0.119	-8.87	5569.81	0.0614	69.35
21	1.1622	68.43	68.85	68.85	74.59	1	74.59	-0.040	-3.01	5563.78	0.0534	68.99
22	1.1609	68.16	68.51	68.51	74.52	1	74.52	-0.067	-4.96	5553.86	0.0465	68.65
23	1.1597	67.88	68.20	68.20	74.48	1	74.48	-0.040	-3.01	5547.84	0.0404	68.31
24	1.1586	67.61	67.91	67.91	74.47	1	74.47	-0.014	-1.06	5545.71	0.0352	67.98
25	1.1575	67.34	67.62	67.62	74.46	1	74.46	-0.014	-1.06	5543.59	0.0306	67.66
26	1.1564	67.06	67.33	67.33	74.44	1	74.44	-0.014	-1.06	5541.47	0.0266	67.34
27	1.1554	66.79	67.07	67.07	74.45	1	74.45	0.012	0.89	5543.24	0.0231	67.03
28	1.1544	66.52	66.81	66.81	74.46	1	74.46	0.012	0.89	5545.01	0.0201	66.73
29	1.1535	66.24	66.58	66.58	74.50	1	74.50	0.038	2.83	5550.67	0.0175	66.43
30	1.1526	65.97	66.34	66.34	74.54	1	74.54	0.038	2.84	5556.34	0.0152	66.13

L.V. Winding temp.-rise (K): $\Delta\theta_{WL} = (\theta_{wo} - \theta_{om\_start}) \times (\frac{I_{rated}}{I_{start}})^{y} + \Delta\theta_{om} = (84.7 - 61.2) \times (\frac{524.88}{524.88})^{1.6} = 52.9$

CESI
Inspection service
verified by U. DI MARCO

Test Report

Temperature curve



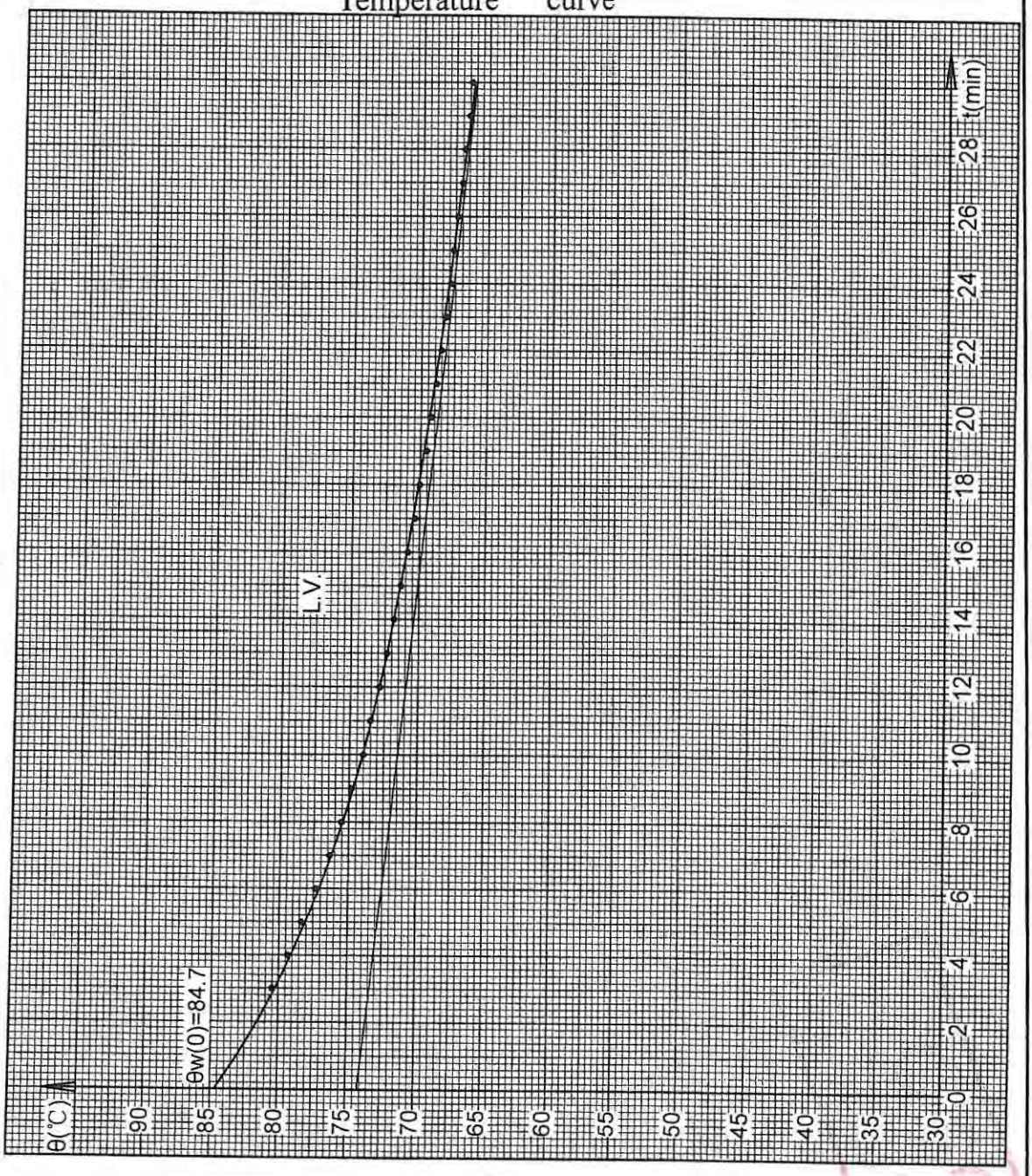
CESI
Inspection service
verified by Y. DI MARCO

Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel: (024) 89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024) 89707949 Tel: (024) 89707951

Test Report

№: CTQC/B-12.113
Total 54 Page 20

Temperature curve



CESI
Inspection service
verified by Y. DI MARCO

Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel: (024) 89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024) 89707949 Tel: (024) 89707951

Test Report

4.13 Short-duration AC withstand voltage test(Special test) Test date: Jun.18,2012

Test circuit is given in Annex2-e.

4.13.1 A phase-to-earth test with single-phase supply

H.V. tap position 5, frequency 200Hz。

Induced voltage		Duration	Partial discharge levels (pC)		
Multiple	Phase-to-earth (kV)		A	B	C
$1.1Um/\sqrt{3}$	160.0	5 min	<40	<40	<40
$U_2=1.5Um/\sqrt{3}$	218.2	5 min	<50	<50	<50
U_1	395	30s	/	/	/
$U_2=1.5Um/\sqrt{3}$	218.2	5 min	<100	<100	<100
$1.1Um/\sqrt{3}$	160.0	5 min	<50	<50	<50

Note: Um=252kV

Background noise level is <10pC before and after test.

Start voltage: 121kV Extinction voltage: 109kV.

4.13.2 A phase-to-phase test with three-phase supply

H.V. tap position 9b, frequency 200Hz。

Induced voltage		Duration	Partial discharge levels (pC)		
Multiple	Phase-to-phase (kV)		A	B	C
1.1Um	277.2	5 min	<80	<90	<70
$U_2=1.3Um$	327.6	5 min	<90	<90	<80
U_1	395	30s	/	/	/
$U_2=1.3Um$	327.6	5 min	<90	<130	<90
1.1Um	277.2	5 min	<80	<100	<80

Note: Um=252kV

Background noise level is <10pC before and after test.

Start voltage: 250.8kV Extinction voltage: 241.4kV.

CFSI
Inspection service
verified by Y.DI MARCO

4.14 Determination of sound levels(Special test) Test date: Jun. 20, 2012

4.14.1 Sound power level calculation under on load current:

Calculation equation: $L_{WA.IN} \approx 39 + 18\lg\frac{Sr}{Sp} = 80dB\ (A)$

In which: Sr—Rated power 180MVA;

Sp—Reference power 1MVA。

$L_{WA,IN}$ is found to be 17dB(A) below the guaranteed sound power level 97dB(A), so load current sound measurements are not appropriate.

4.14.2 Sound pressure level measurement and sound power level calculation

Transformer is energized at rated voltage. There are 44 measurement points, the measurement point interval is 0.8m, The height of oil tank is 3.7m, the height of measurement points is 1.23m and 2.47m.

Environmental conditions

Area of the surface of the test room Sv (㎡)	Mean sound absorption coefficient α	Sound absorption A (㎡)	d (m)	Area of effective surface S (㎡)	Environmental correction factor K dB(A)
13968	0.5	6984	0.3	161.88	0.4

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 $\overline{L_{PAO}}$	A-weighted surface sound pressure level $\overline{L_{PA}} = 10\lg(10^{0.1\overline{L_{PAO}}} - 10^{0.1\overline{L_{bgA}}}) - K$	A-weighted sound power level $\overline{L_{WA.UN}} = \overline{L_{PA}} + 10\lg(S/S_0)$
	Before	After			
ONAN	32.0	31.8	58	58	80

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

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

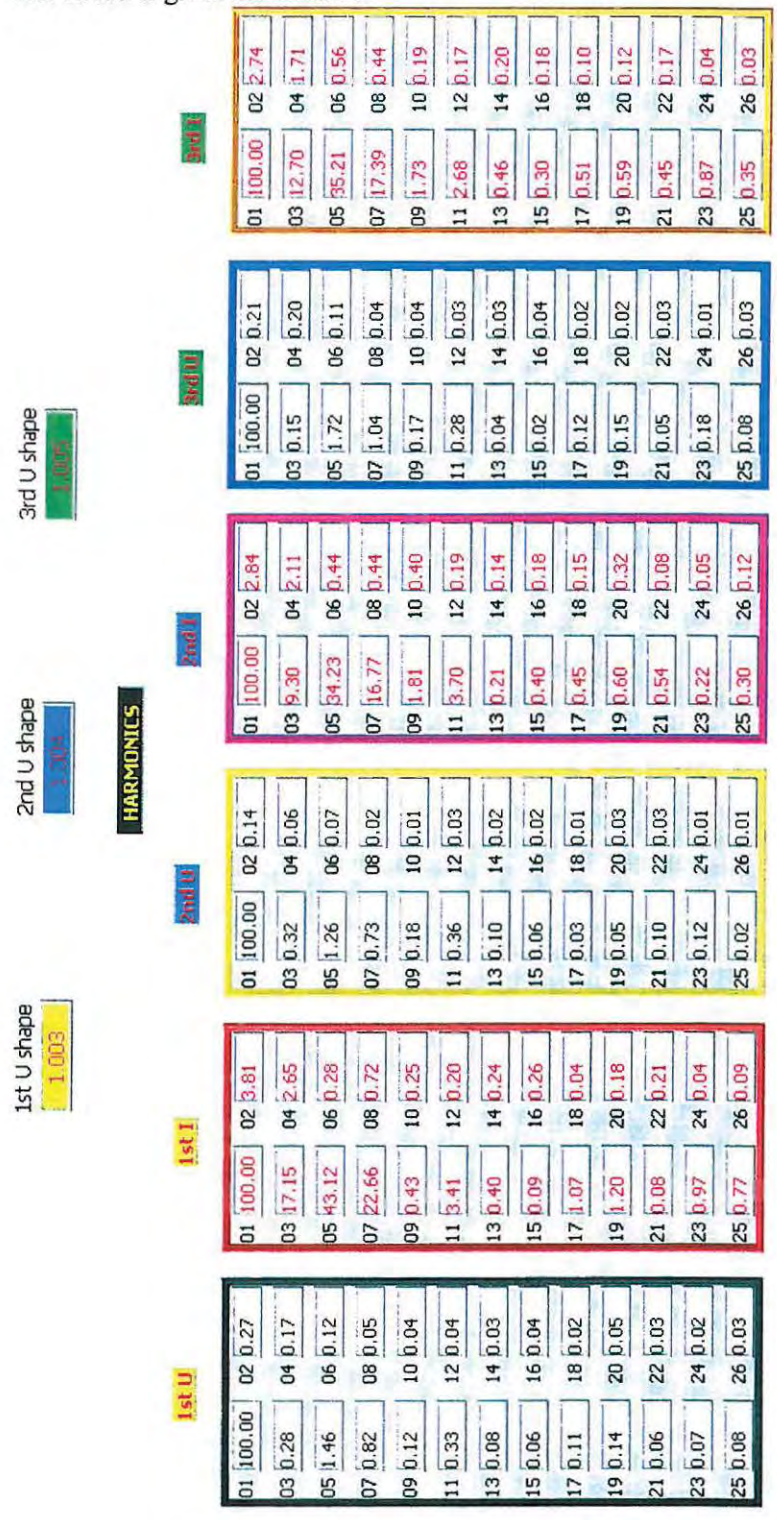
In according to 4.14.1, $L_{WA.SN}$= 80dB(A)

CESI
Inspection service
verified by Y.DIMARCO

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

Test date: Jun.20, 2012

Test circuit is given in Annex2-f.



CESI
Inspection service
verified by Y. DI MARCO

Test Report

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

Test date: Jun.20, 2012

Test circuit is given in Annex2-g.

Connection group	Tap position	Applied voltage terminal	Short circuit terminal	Applied current (A)	Measured voltage (V)	Impedance (Ω)
YNd11	9b	A.B.C-O	/	128	1777.7	41.66

4.17 Long duration no-load test (Special test) Test date: Jun.20, 2012

Apply 1.1 rated voltage 42.35kV on L.V. winding side. There is not any C_2H_2 in oil before and after 12 hours no load test. Hydro carbons has no apparent change , gas chromatography shown in clause 4.8 item.

Duration (h)	Applied voltage (kV)		Measured current (A)	Load loss (kW)
	Reading of r.m.s. voltmeter	Reading of mean value voltmeter		
1	43.34	42.35	9.002	129.20
2	43.39	42.35	9.356	129.85
3	43.40	42.35	9.356	129.28
4	43.41	42.35	9.422	129.30
5	43.42	42.35	9.569	129.42
6	43.46	42.35	9.908	129.83
7	43.48	42.35	9.923	129.82
8	43.50	42.35	10.144	130.24
9	43.45	42.35	9.803	129.23
10	43.43	42.35	9.736	128.98
11	43.43	42.35	9.764	128.83
12	43.47	42.35	10.17	129.56

CESI
Inspection service
verified by Y.DI MARCO

Test Report

4.18 Short-circuit withstand test(Special test) Test date: Jun.13,2012

4.18.1 Calculated short-circuit current (Reference temperature 75℃)

Tap position	H.V. current value (A)		L.V. current value (kA)		Multipe ($K\sqrt{2}$)
	The first peak of the asymmetrical short-circuit current	The r.m.s value of the symmetrical short-circuit current	The first peak of the phase asymmetrical short-circuit current	The r.m.s value of the phase symmetrical short-circuit current	
1	6765	2515	24.55	9.13	2.69
9b	7715	2868	25.45	9.46	2.69
17	8573	3187	25.46	9.46	2.69

4.18.2 Measurement of short-circuit current

Test circuit is given in Annex 2-h.

Perform single-phase test, supply is provided between H.V. terminal and neutral point, 9 times.Test waveshapes have no distortion.Test oscillograms are shown in Page 44~52.

Tap position	Phase	H.V. current value		I_{tank}	Duration (s)	Serial №.
		The first peak of the asymmetrical short-circuit current (A)	The r.m.s value of the symmetrical short-circuit current (A)			
1	AO	6852	2454	7.21	0.24	B12113-S01-1
		6921	2468	7.00	0.24	B12113-S01-2
		6920	2484	7.00	0.24	B12113-S01-3

L.V. current value					
The first peak of the phase asymmetrical short-circuit current(kA)			The r.m.s value of the phase symmetrical short-circuit current(kA)		
a	b	c	a	b	c
24.70	/	/	8.90	/	/
24.92	/	/	8.97	/	/
24.96	/	/	9.03	/	/

Note: I_{tank} is the earthing current of oil tank.

CESI
Inspection service
verified by Y. DI MARCO

Test Report

Tap position	Phase	H.V. current value		I_{tank}	Duration (s)	Serial №.
		The first peak of the asymmetrical short-circuit current (A)	The r.m.s value of the symmetrical short-circuit current (A)			
9b	BO	7812	2797	5.59	0.24	B12113-S02-1
		7823	2806	5.87	0.24	B12113-S02-2
		7861	2811	5.66	0.24	B12113-S02-3

L.V. current value					
The first peak of the phase asymmetrical short-circuit current(kA)			The r.m.s value of the phase symmetrical short-circuit current(kA)		
a	b	c	a	b	c
/	25.70	/	/	9.20	/
/	25.75	/	/	9.23	/
/	25.87	/	/	9.23	/

Tap position	Phase	H.V. current value		I_{tank}	Duration (s)	Serial №.
		The first peak of the asymmetrical short-circuit current (A)	The r.m.s value of the symmetrical short-circuit current (A)			
17	CO	8373	3045	5.94	0.24	B12113-S03-1
		8373	3046	6.08	0.24	B12113-S03-2
		8433	3048	5.52	0.24	B12113-S03-3

L.V. current value					
The first peak of the phase asymmetrical short-circuit current(kA)			The r.m.s value of the phase symmetrical short-circuit current(kA)		
a	b	c	a	b	c
/	/	24.80	/	/	9.07
/	/	24.75	/	/	9.07
/	/	24.96	/	/	9.09

CESI
Inspection service
verified by U. DI MARCO

4.18.3 Measurement of short-circuit reactance before and after S.C.T.

Tap position	№.	Measured reactance value (Ω)			Deviation of reactance (%)		
		A	B	C	A	B	C
1	Before	52.84	52.39	53.01	/	/	/
	1	53.08	/	/	0.45	/	/
	2	53.08	/	/	0.45	/	/
	3	53.06	/	/	0.42	/	/
9b	Before	41.76	41.41	41.90	/	/	/
	1	/	41.69	/	/	0.68	/
	2	/	41.58	/	/	0.41	/
	3	/	41.54	/	/	0.31	/
17	Before	33.41	33.12	33.52	/	/	/
	1	/	/	33.60	/	/	0.24
	2	/	/	33.58	/	/	0.18
	3	/	/	33.55	/	/	<0.1

Measurement of short-circuit reactance after S.C.T.:

Tap position	Measured reactance value (Ω)			Deviation of reactance (%)		
	A	B	C	A	B	C
1	52.90	52.50	53.09	0.11	0.21	0.15
9b	41.80	41.48	41.96	0.10	0.17	0.14
17	33.43	33.16	33.55	<0.1	0.12	<0.1

The maximum deviation of short-circuit reactance is 0.21%.

CESI
Inspection service
verified by Y.DIMARCO

4.18.4 The visual inspection

There is no deformation of winding, connection or supporting structures, no traces of electrical discharge was found after S.C.T. The active part photos taken before and after S.C.T. are shown in Page 53 and Page 54.

Test Report

4.18.5. Repeated routine tests after short-circuit withstand test

4.18.5.1 Measurement of insulation resistance and tan δ Test date: Jun.16,2012

Humidity: 83.2%; Oil temperature: 19.9℃

Measurement position	Insulation resistance (MΩ)			R_{60}/R_{15}	R_{600}/R_{60}	Cx(pF)	tan δ
	R_{600}	R_{60}	R_{15}				
H.V.—L.V. &E	23000	14600	12800	1.58	1.14	13960	0.0025
L.V.—H.V. E	25500	11400	8070	2.24	1.41	26700	0.0026
H.V. & L.V.—E	/	12600	9670	/	1.30	25830	0.0025
H.V.—L.V.	/	19700	14000	/	1.41	7450	0.0030
Core—E	/	38.5	/				
Clamp—E	/	39.8	/				
Core &Clamp—E	/	7460	/				

Note:After temperature-rise test end,top-oil pemperature is 70℃.Measured Insulation resistance of core—E clamp—E, core&clamp—E. core—E:135 MΩ, clamp—E:205 MΩ, core&clamp—E :5080MΩ.

4.18.5.2 Measurement of voltage ratio and check of connection group Test date: Jun.16,2012

H.V.		L.V.		Ratio	Measured deviation (%)			Connection group
Tap position	Voltage (kV)	Tap position	Voltage (kV)		AB/ab	BC/bc	CA/ca	
1	242.000			6.286	0.05	0.07	0.11	
2	239.250			6.214	-0.04	-0.01	0.00	
3	236.500			6.143	0.06	0.08	0.10	
4	233.750			6.071	-0.03	-0.01	0.01	
5	231.000			6.000	0.05	0.07	0.10	
6	228.250			5.929	-0.05	-0.03	0.00	
7	225.500			5.857	0.04	0.06	0.08	
8	222.750			5.786	-0.06	-0.04	-0.02	
9b	220.000	/	38.5	5.714	0.03	0.05	0.07	YNd11
10	217.250			5.643	-0.07	-0.05	-0.03	
11	214.500			5.571	0.02	0.04	0.06	
12	211.750			5.500	-0.09	-0.07	-0.04	
13	209.000			5.429	0.01	0.03	0.05	
14	206.250			5.357	-0.10	-0.08	-0.05	
15	203.500			5.286	0.00	0.02	0.04	
16	200.750			5.214	-0.11	-0.10	-0.07	
17	198.000			5.143	-0.02	0.00	0.03	

Test Report

4.18.5.3 Measurement of winding resistance Test date: Jun.16,2012

Oil temperature:19.9℃

Winding	Tap position	Measured values (Ω)			Unbalancedness (%)
		A~O a~b	B~O b~c	C~O c~a	
H.V.	1	0.2571	0.2571	0.2589	0.70
	2	0.2522	0.2521	0.2541	0.79
	3	0.2481	0.2480	0.2498	0.72
	4	0.2432	0.2431	0.2449	0.74
	5	0.2389	0.2389	0.2407	0.75
	6	0.2343	0.2342	0.2358	0.68
	7	0.2302	0.2300	0.2317	0.74
	8	0.2254	0.2252	0.2268	0.71
	9b	0.2207	0.2201	0.2214	0.59
	10	0.2260	0.2256	0.2276	0.88
	11	0.2303	0.2299	0.2319	0.87
	12	0.2351	0.2348	0.2367	0.81
	13	0.2392	0.2389	0.2410	0.88
	14	0.2441	0.2437	0.2457	0.82
	15	0.2481	0.2479	0.2499	0.80
	16	0.2531	0.2526	0.2547	0.83
	17	0.2572	0.2568	0.2589	0.82
L.V.	/	0.009732	0.009731	0.009767	0.37

4.18.5.4 Separate-source AC withstand voltage test Test date: Jun.16,2012

Humidity: 83.2%; Oil temperature: 19.9℃; Atmospheric pressure: 99.8kPa

Position	Applied voltage (kV)	Duration (s)	Results
H.V.neutral—L.V.&E	200	60	Passed
L.V.—H.V. &E	85	60	

CESI
Inspection service
verified by Y. DI MARCO

Test Report

4.18.5.5 Long-duration AC withstand voltage test (ACLD) Test date: Jun.18,2012

Phase to earth test, tap position 9b, frequency 200Hz。

Induced voltage		Duration	Partial discharge levels (pC)		
Multiple	Phase-to-earth (kV)		A	B	C
$1.1Um/\sqrt{3}$	160.05	5 min	<100	<100	<100
$U_2=1.5Um/\sqrt{3}$	218.24	5 min	<100	<100	<100
$U_1=1.7Um/\sqrt{3}$	247.34	30s	/	/	/
$U_2=1.5Um/\sqrt{3}$	218.24	5 min	<100	<100	<100
		10 min	<100	<100	<100
		15 min	<100	<100	<100
		20 min	<100	<100	<100
		25 min	<100	<100	<100
		30 min	<100	<100	<100
$1.1Um/\sqrt{3}$	160.05	5 min	<100	<100	<100

Note: Um=252kV
Background noise level is <10pC before and after test.
Start voltage: 100.0kV Extinction voltage: 91.0kV.

4.18.5.6 Measurement of no-load loss and current Test date: Jun.16,2012

Ur(%)	r.m.s. voltage (kV)		No-load current		No-load loss (kW)	
	Reading of mean value voltmeter	Reading of r.m.s. voltmeter	(A)	(%)	Measured value	Corrected value
90	34.650	34.665	1.23	0.05	65.75	65.72
100	38.500	38.619	2.15	0.08	87.91	87.63
110	42.350	43.119	8.52	0.32	129.10	126.66

CESI
Inspection service
verified by U. DI MARCO

Test Report

4.18.5.7 Measurement of short-circuit impedance and load loss Test date: Jun.16,2012

Winding	Tap position	Applied current I		Measured voltage (kV)	H.V. short-circuit Impedance (Each phase)		Load loss (kW)		Total loss (kW)
					(Ω)	(%)	Measured value	Corrected value	Corrected value
		(A)	I/Ir (%)		t=75℃ I=Ir	t=75℃ I=Ir	t=19.9℃	t=75℃ I=Ir	t=75℃ I=Ir
H.V. | L.V.	1	277.26	64.56	25.495	53.10	16.32	170.899	435.29	522.92
	9b	287.32	60.82	20.849	41.89	15.58	144.113	420.51	508.14
	17	330.84	63.03	19.118	33.37	15.32	174.535	487.09	574.72

4.18.5.8 Test on transformer oil Test date: Jun.18, 2012

tan δ (90℃)	Breakdown voltage (kV)	Water dissolved in oil (mg/L)
0.00157	62.37	7.1

Gas chromatography see 4.8 item.

4.18.5.9 Test on on-load tap-changers Test date: Jun.20, 2012

Operation test:

a. 8 complete operating cycles with the transformer not energized(a cycle of operation goes from one end of the tapping range to the other and back again).
b. 1 complete operate cycle with the transformer is not energized, with 85% of the rated operation voltage.
c. 1 complete operating cycle with the transformer is energized at rated voltage and rated frequency at no-load.
d. With one winding short-circuited and made rated current in the tapped winding, 10 cycles of tap-change operations across the range of two steps on each side from where a coarse or reversing changeover selector operates, or otherwise from the middle tapping(the tapchangger will pass 20 times through the changeover position).

4.18.5.10 Switching impulse test Test date: Jun.15, 2012

Humidity: 80.7%; Ambient temperature: 20.6℃; Atmospheric press: 99.6kPa.

Test items and voltage

Tested terminals	Rated withstand voltage (kV)	Tap position
A, B, C	750	1

Test sequence:

One reduced negative polarity switching impulse;

Three rated negative polarity switching impulse.

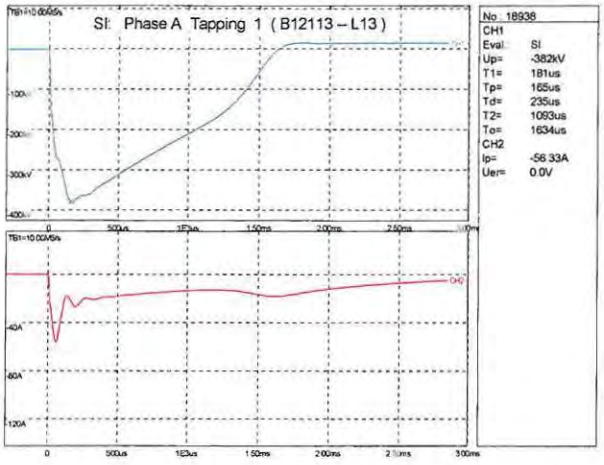
CESI
Inspection service
verified by Y.DI MARCO

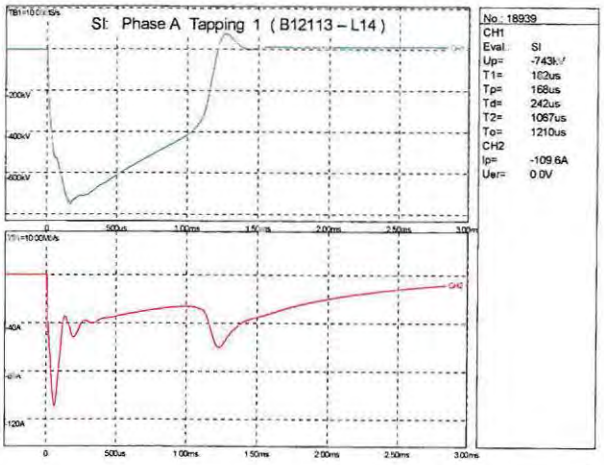
Test records:

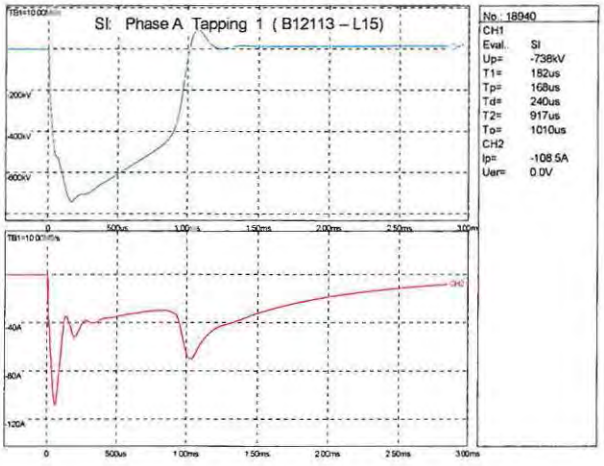
T1:Front time; T_0:A total duration from the virtual origin to the first zero passage;

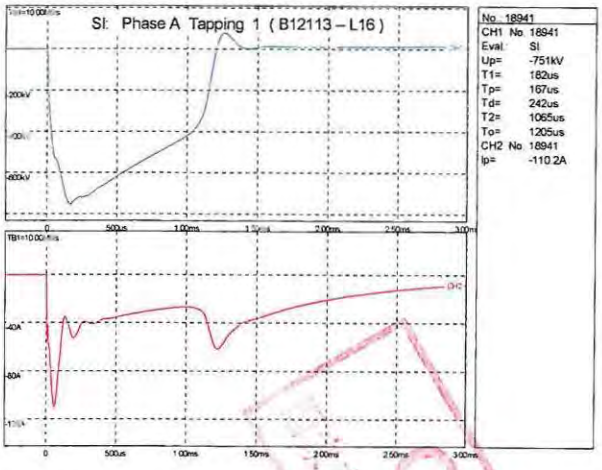
Td:Time above 90%Up; Up:Peak voltage.

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





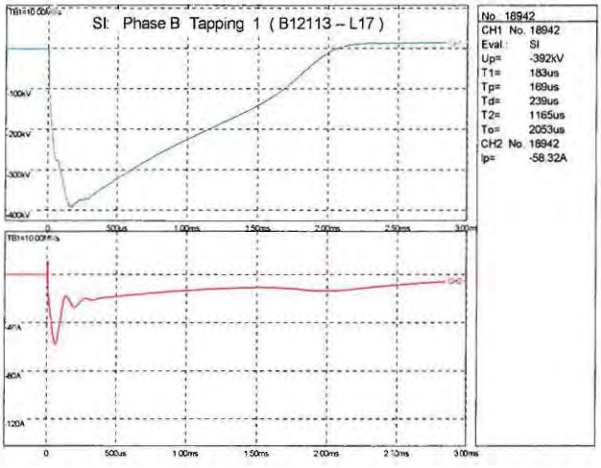


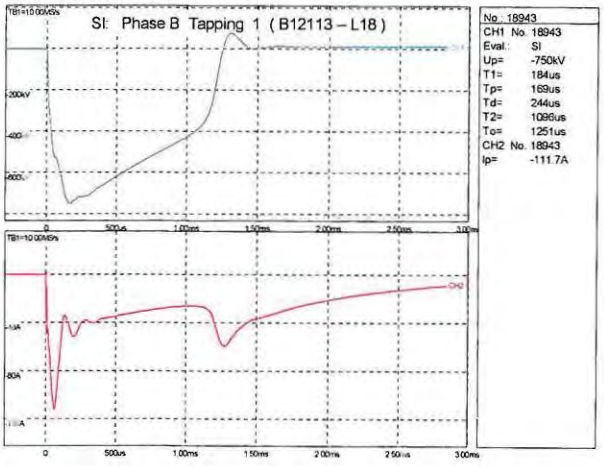


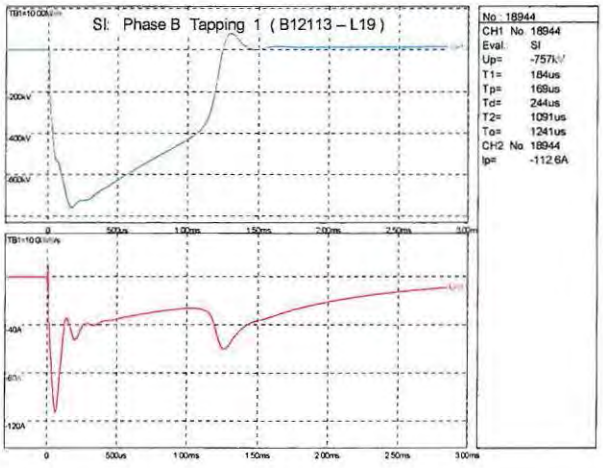
CESI
Inspection service
verified by Y. DI MARCO

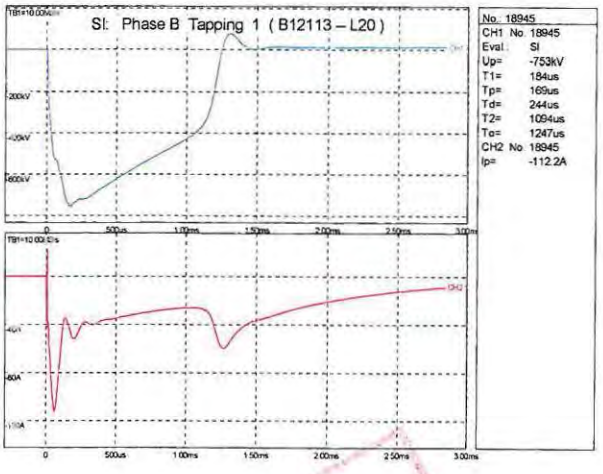
Test Report

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







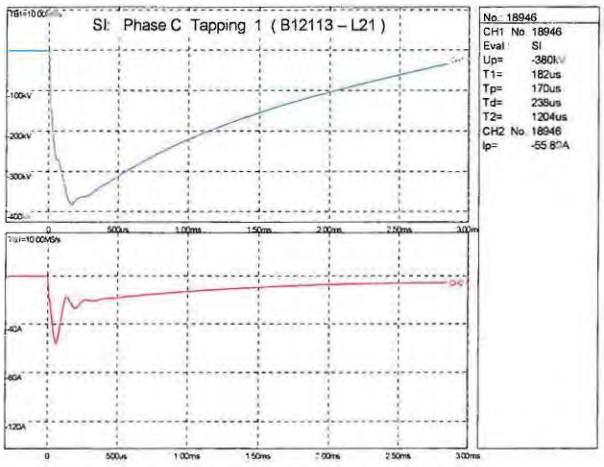


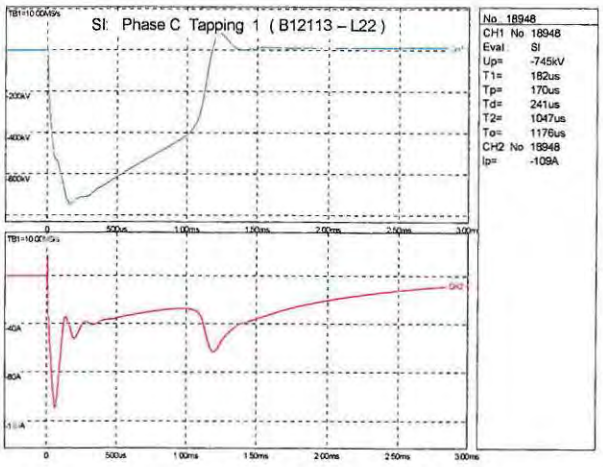
CESI
Inspection service
verified by U. DI MARCO

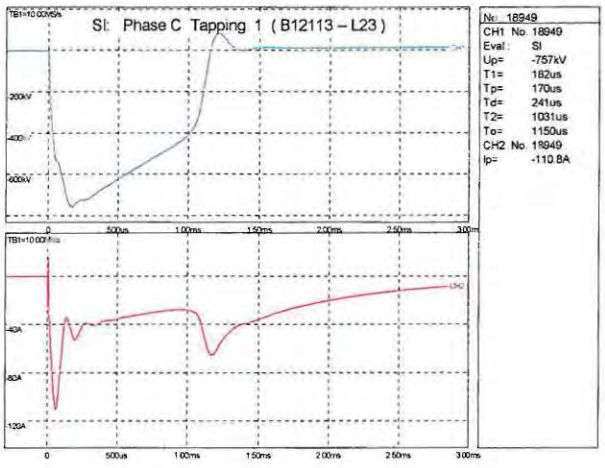
Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel:(024)89874449
E-mail: ctqc@vip.sina.com http://www.ctn.cn Fax: (024)89707949 Tel:(024)89872527

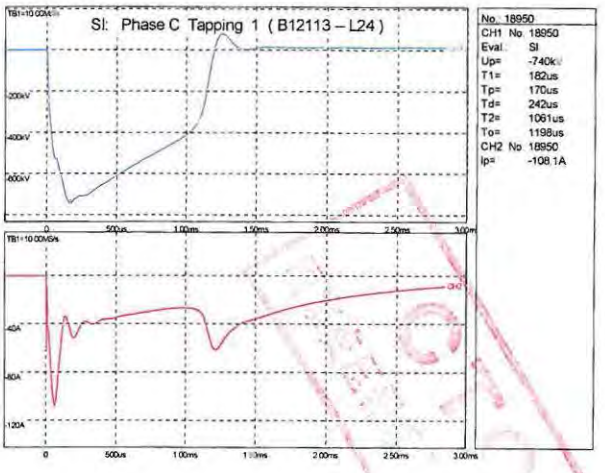
Test Report

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









CESI
Inspection service
verified by U. DI MARCO

Test Report

4.19 Lightning impulse test(Routine test, type test) Test date: Jun.15,2012

Test circuit is given in Annex 2-i

.

Humidity: 80.7%; Ambient temperature: 20.6℃; Atmospheric press: 99.6kPa

Test items and voltage

Tested terminals	Rated withstand voltage (kV)		Tap position
	Full wave	Chopped wave	
A, B, C	950	1050	A:9b; B:17; C:1
O	400	/	1
a,b,c	200	220	/

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:

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

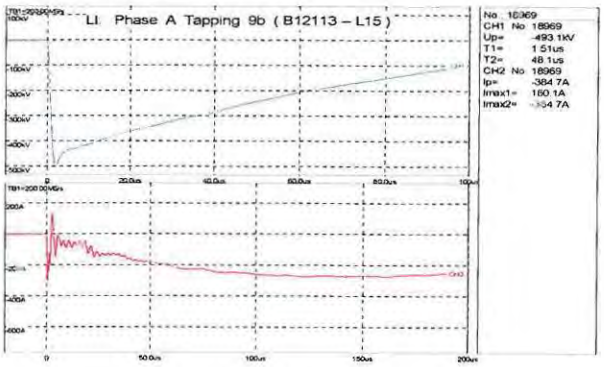
Test oscillogram records:

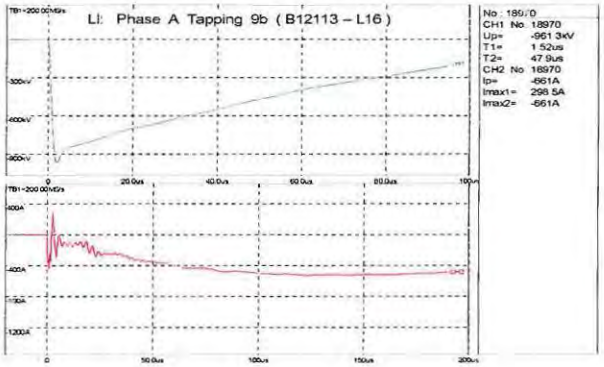
T1:Front time; T2:Time to half value; Tc:Time to chopping;
Up2:Factor of over crossing; Up:Peak voltage.

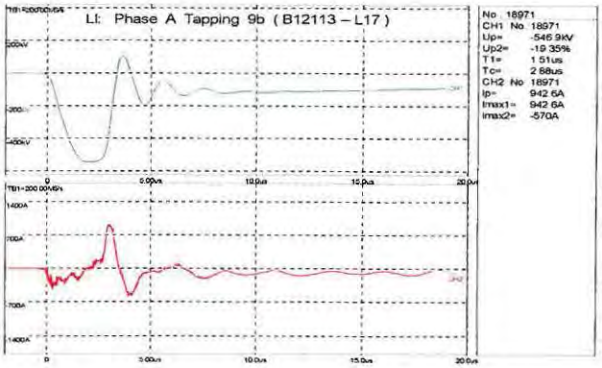
CESI
Inspection service
verified by U. DI MARCO

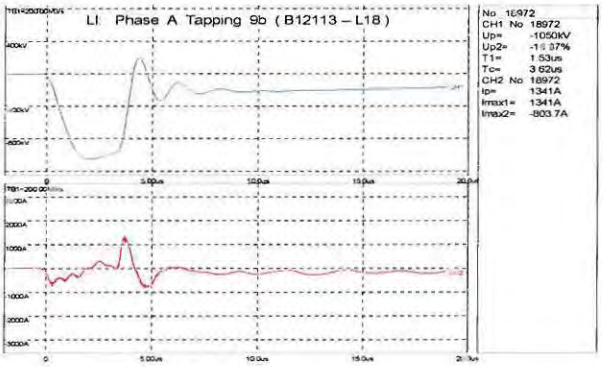
Test Report

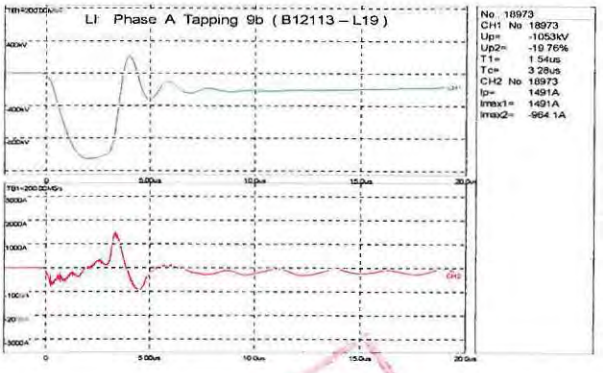
Tested terminal: A Test polarity: Negative CH1. Voltage records CH2. Neutral current records

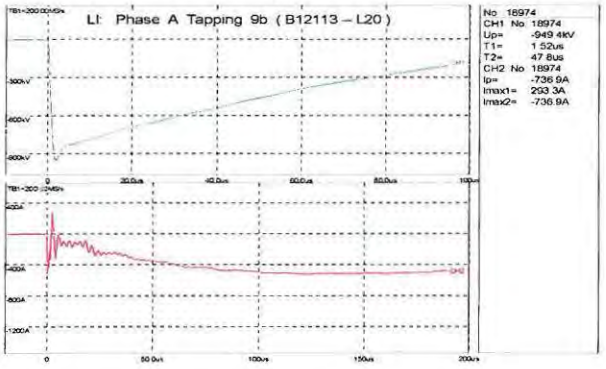


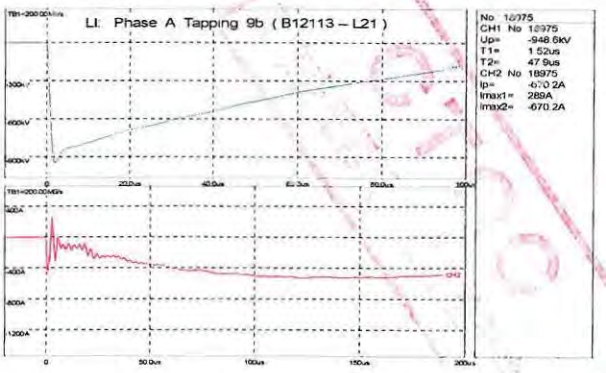










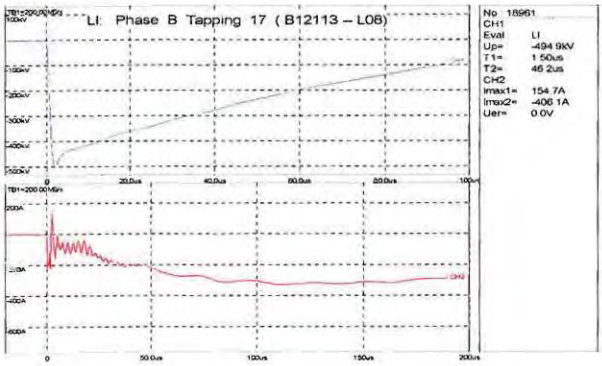


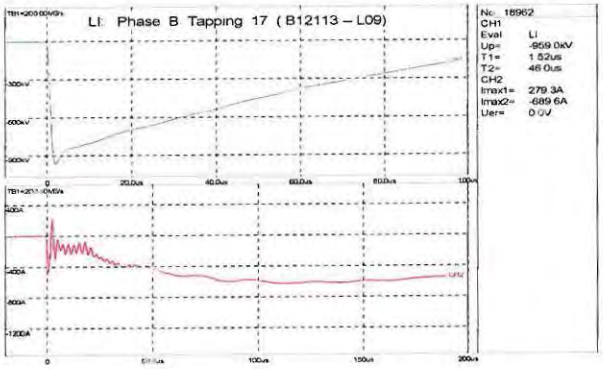
Test Report

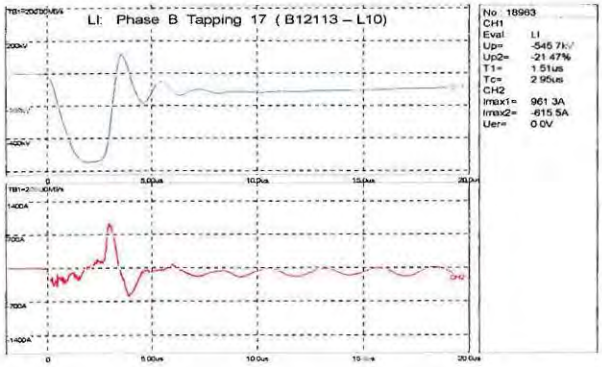
№: CTQC/B-12.113
Total 54 Page 37

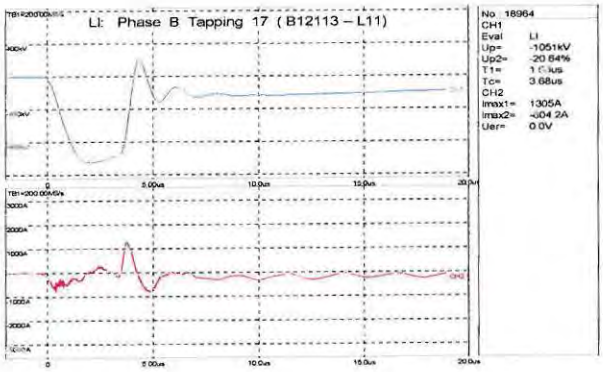
Tested terminal: B Test polarity: Negative CH1.Voltage records CH2. Neutral current records

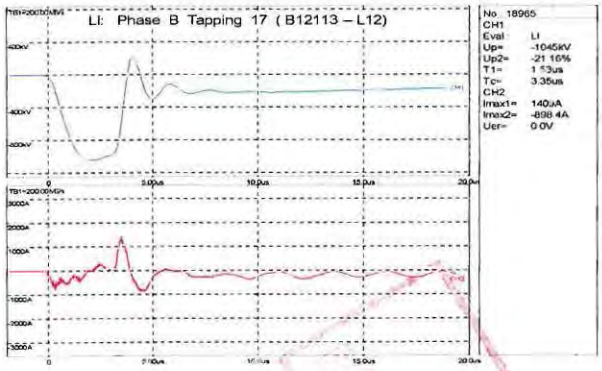
CESI
Inspection service
verified by Y-Di MARCO

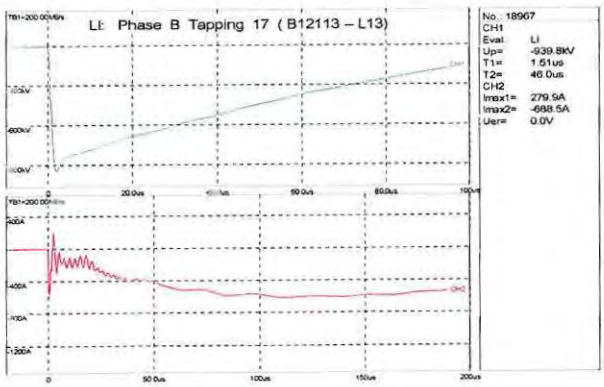


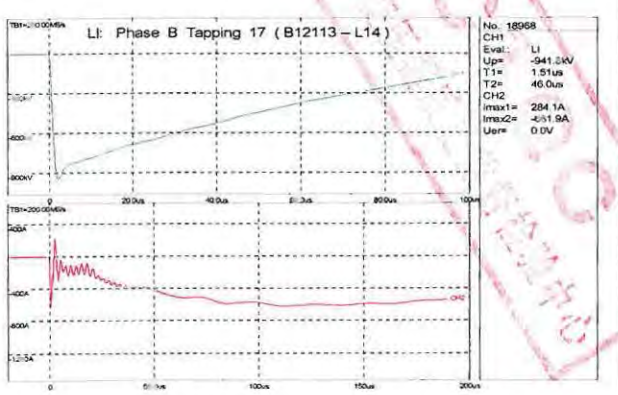










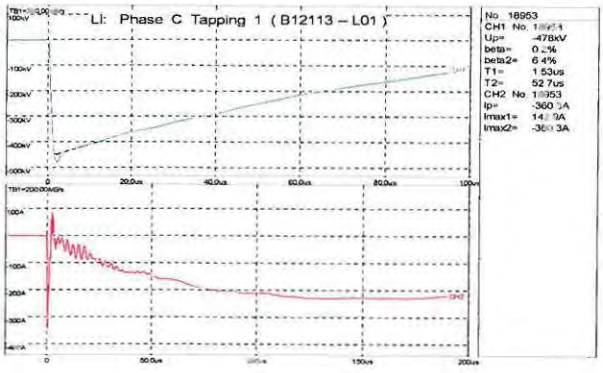


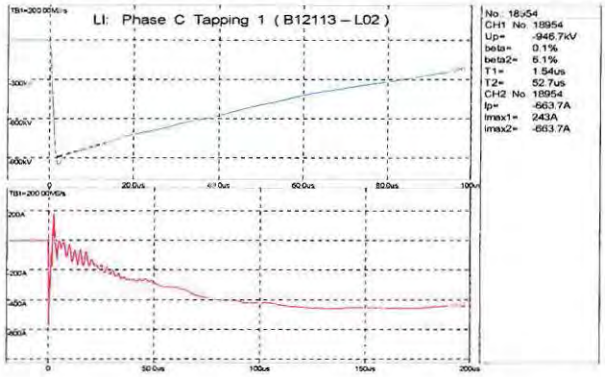
Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel: (024) 89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024) 89707949 Tel: (024) 89707951

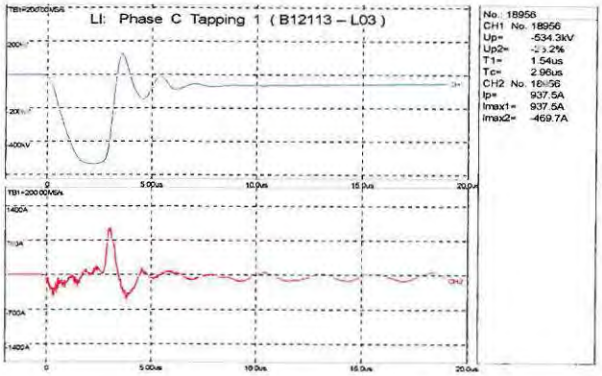
Test Report

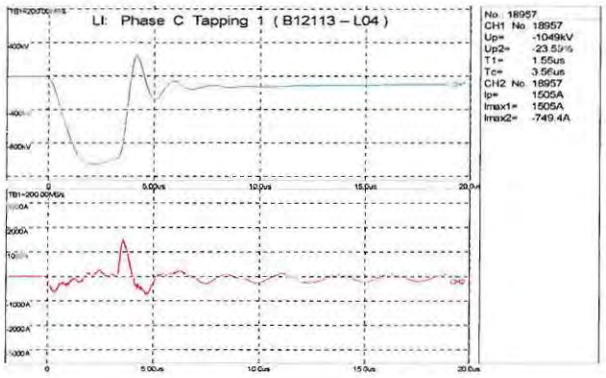
№: CTQC/B-12.113
Total 54 Page 38

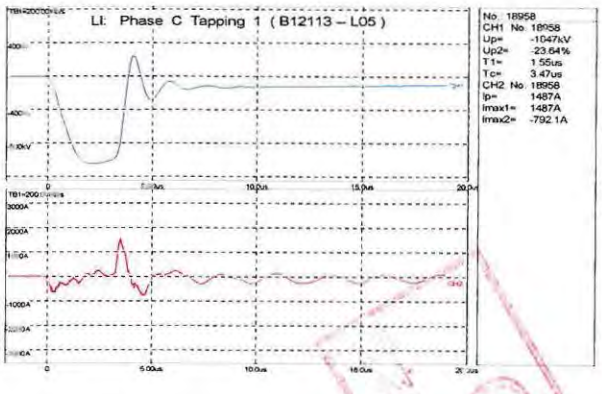
Tested terminal: C Test polarity: Negative CH1.Voltage records CH2. Neutral current records

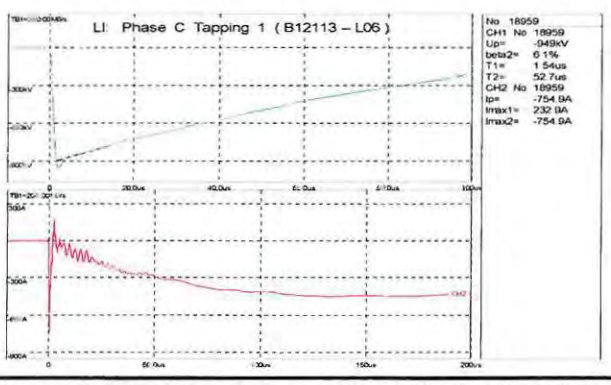


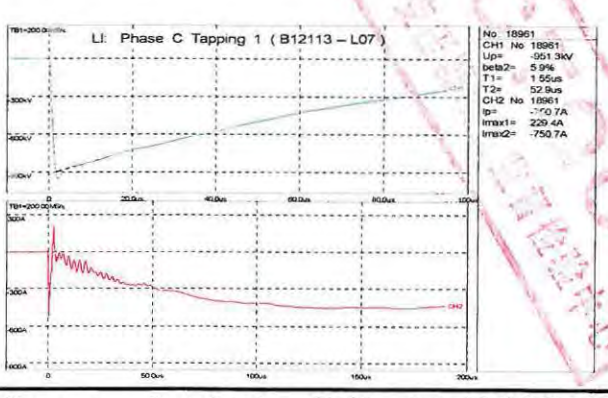








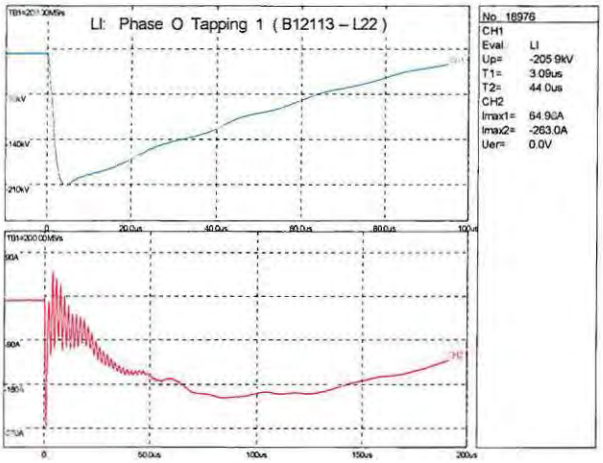


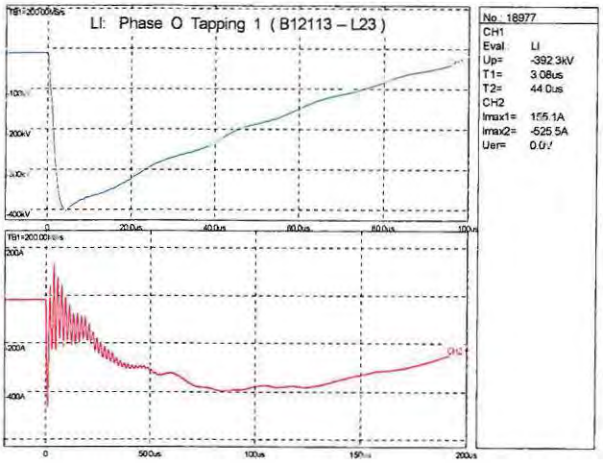


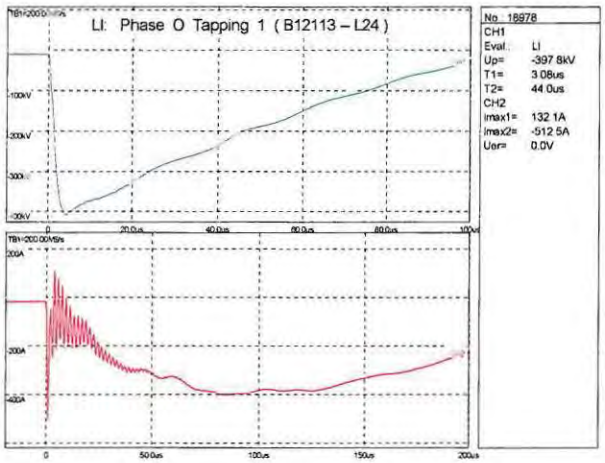
Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel: (024) 89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024) 89707949 Tel: (024) 89707951

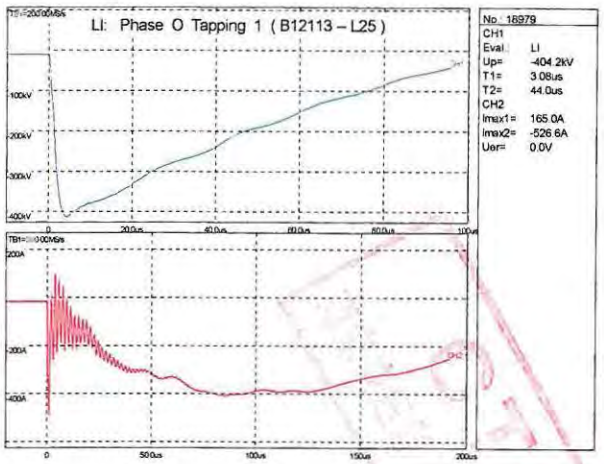
Test Report

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









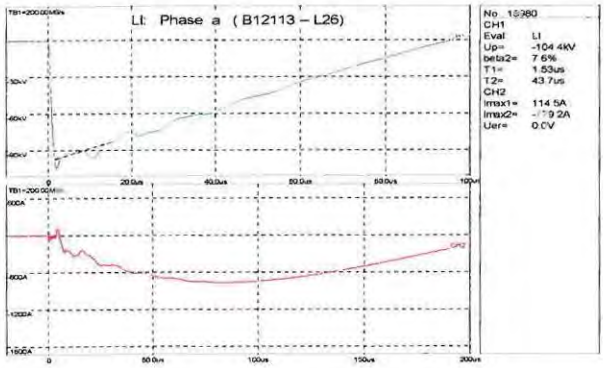
CESI
Inspection service
verified by Y. DI MARCO

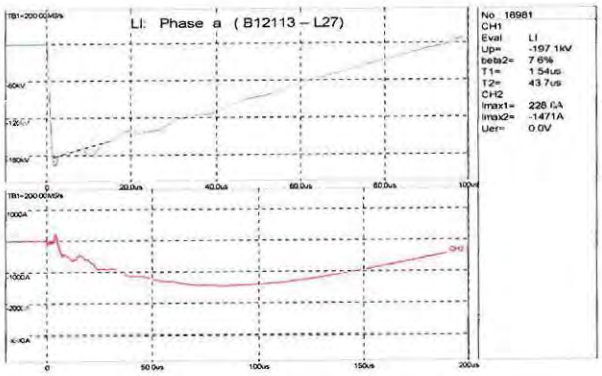
Test Report

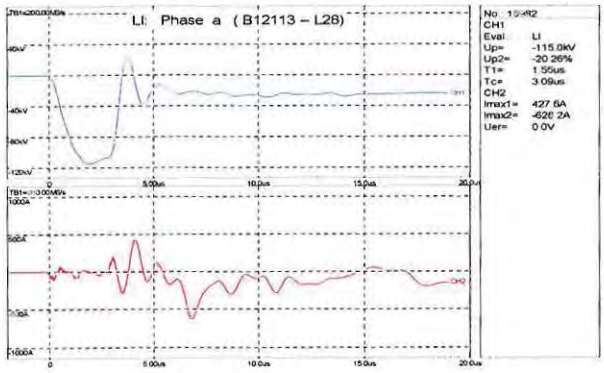
№: CTQC/B-12.113
Total 54 Page 40

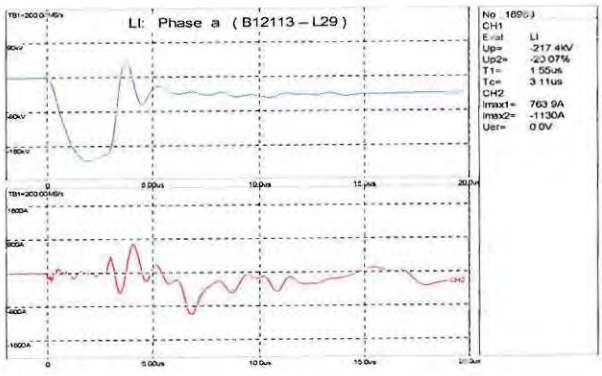
Tested terminal: a Test polarity: Negative CH1.Voltage records CH2. Neutral current records

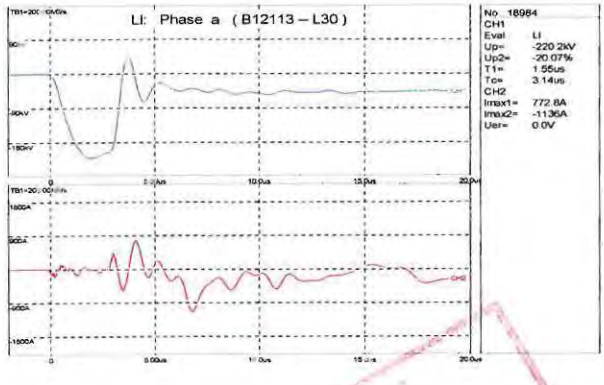
CESI
Inspection service
verified by Y.DI MARCO

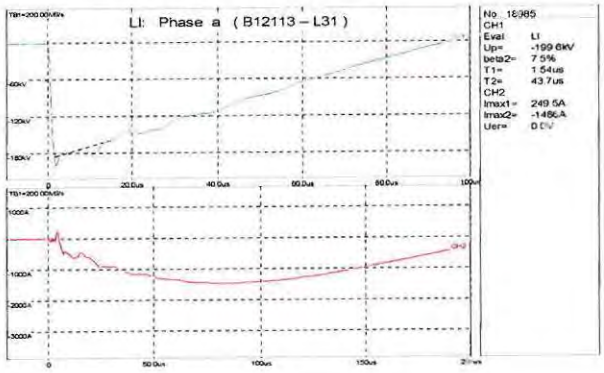


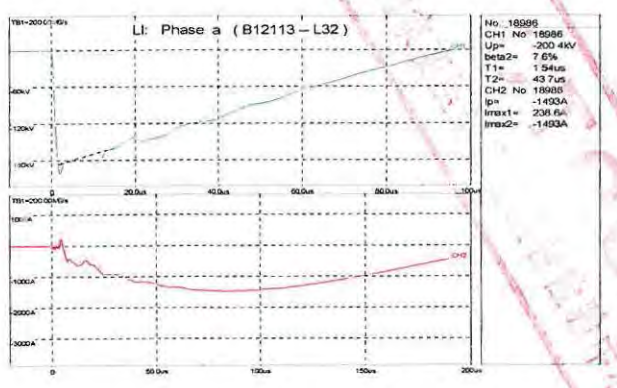










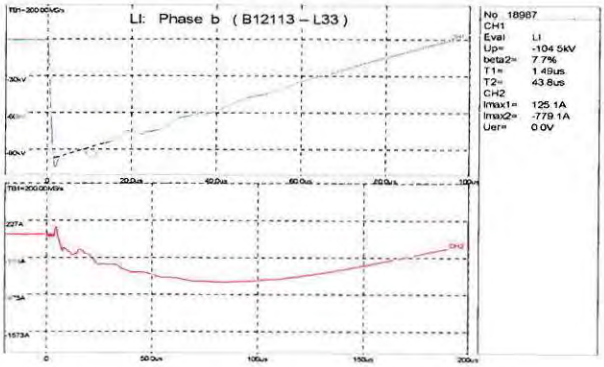


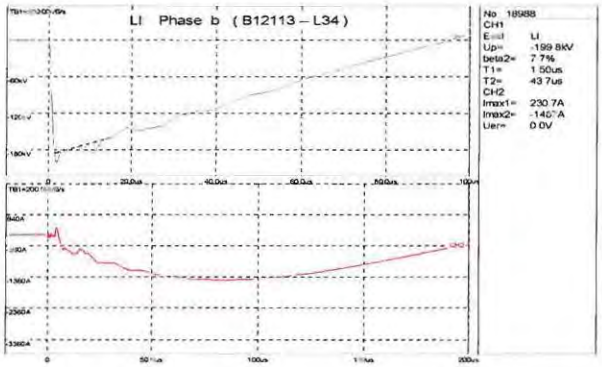
Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel: (024) 89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024) 89707949 Tel: (024) 89707951

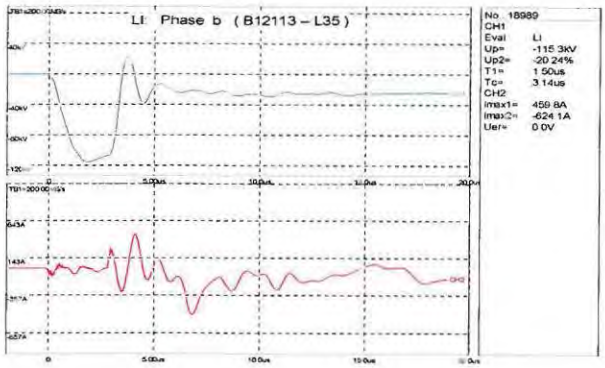
Test Report

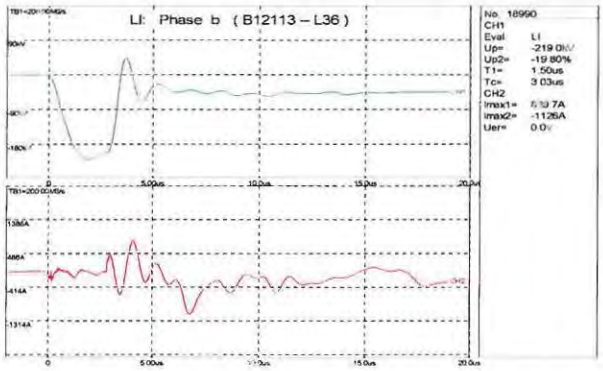
Tested terminal: b Test polarity: Negative CH1.Voltage records CH2. Neutral current records

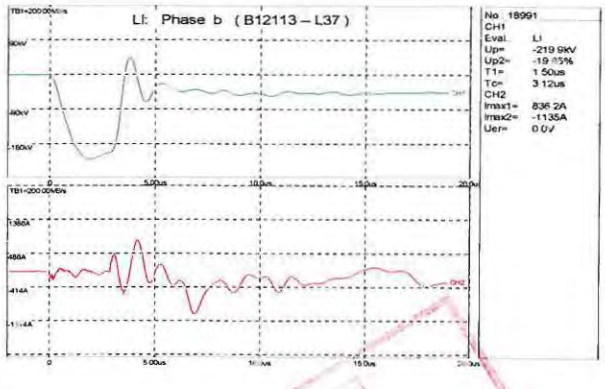
CESI
Inspection service
verified by Y. DI MARCO

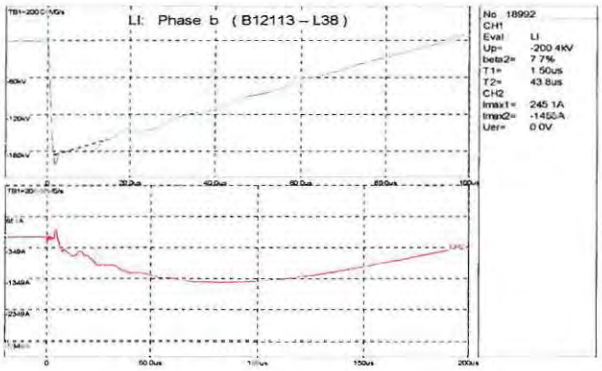


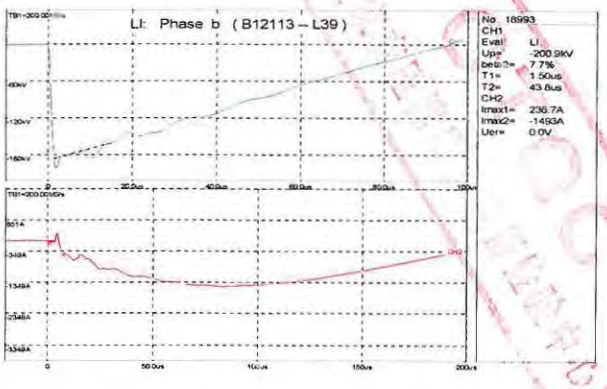








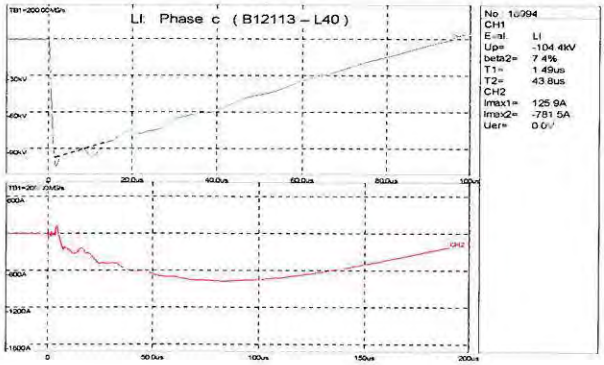


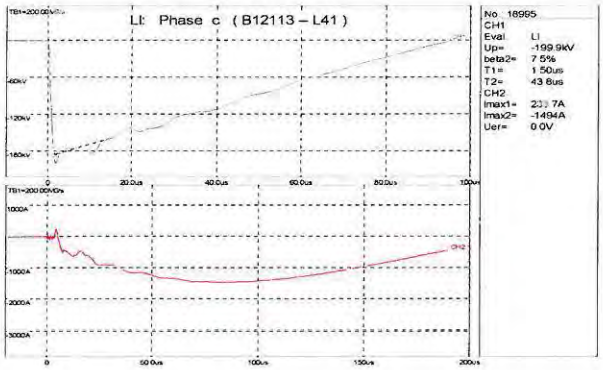


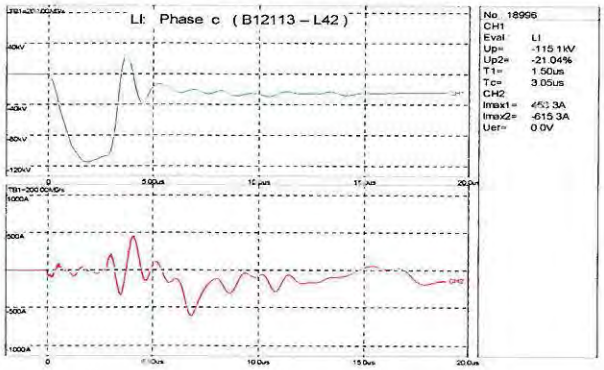
Test Report

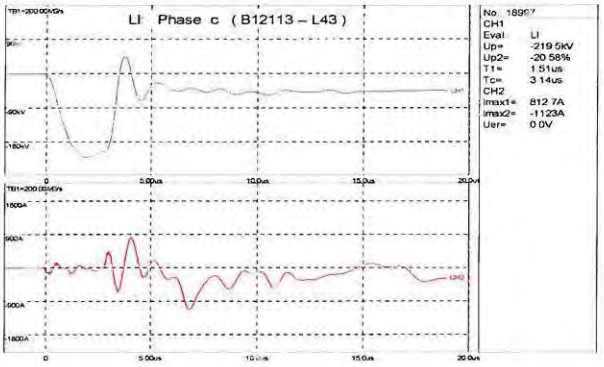
Tested terminal: c Test polarity: Negative CH1.Voltage records CH2. Neutral current records

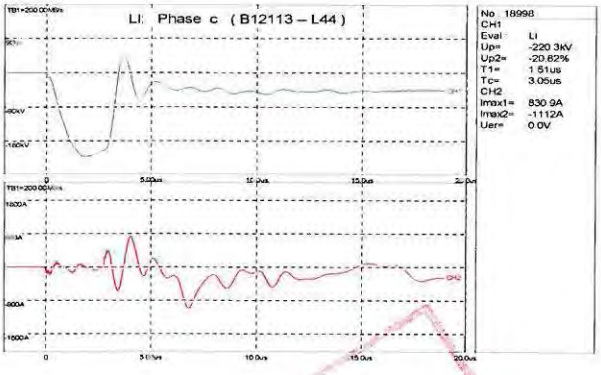
CESI
Inspection service
verified by U-DI MARCO

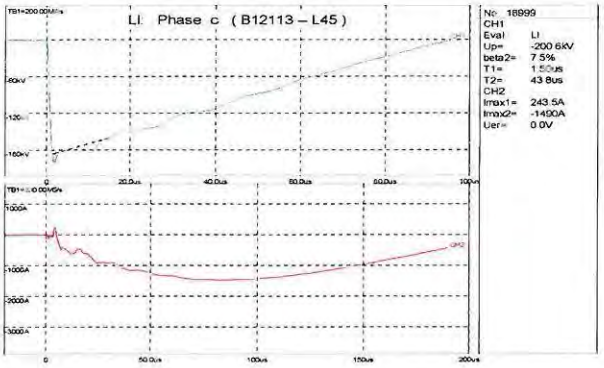


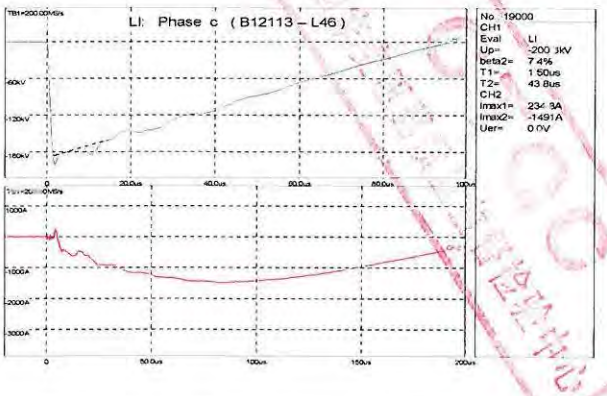












Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel:(024)89874449
E-mail: ctqc@vip.sina.com http://www.ctn.cn Fax: (024)89707949 Tel:(024)89707951

Test Report

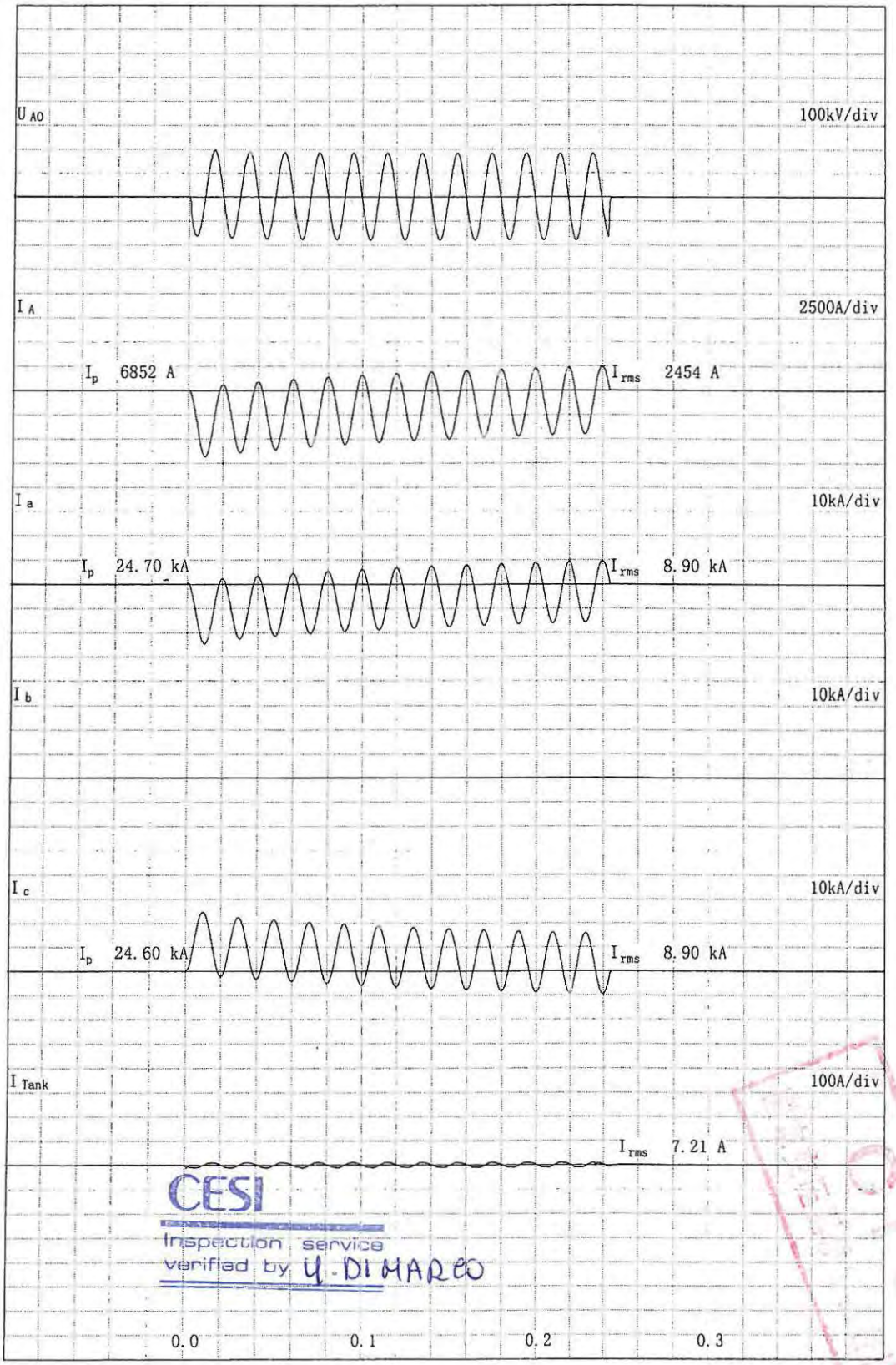
4.20 Radio interference voltage measurement (Special test) Test date: Jun.20, 2011

Measured frequency (MHz)	Term-inal	Attenuation factorof resistance network (dB)	Attenuation factor of measurement circuit (dB)	Radio interference Level B (dB)	Applie Voltage (kV)	Radio interference level (μv)
1.41	A	22	22	7	277.2	355
	B		22	4		251
	C		24	3		282

CESI
Inspection service
verified by U. DI MARCO

Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel: (024) 89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024) 89707949 Tel: (024) 89707951

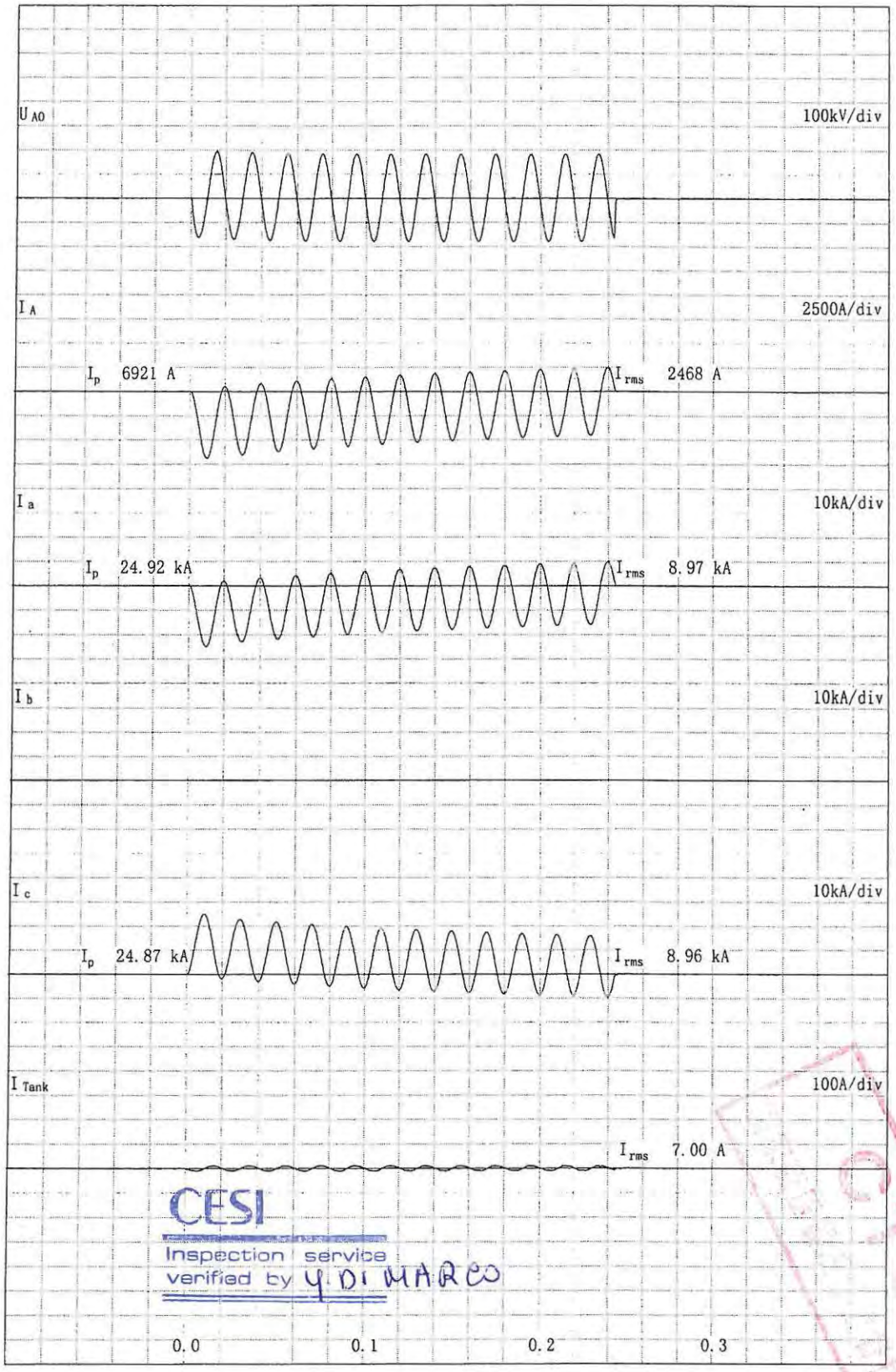
Test Report



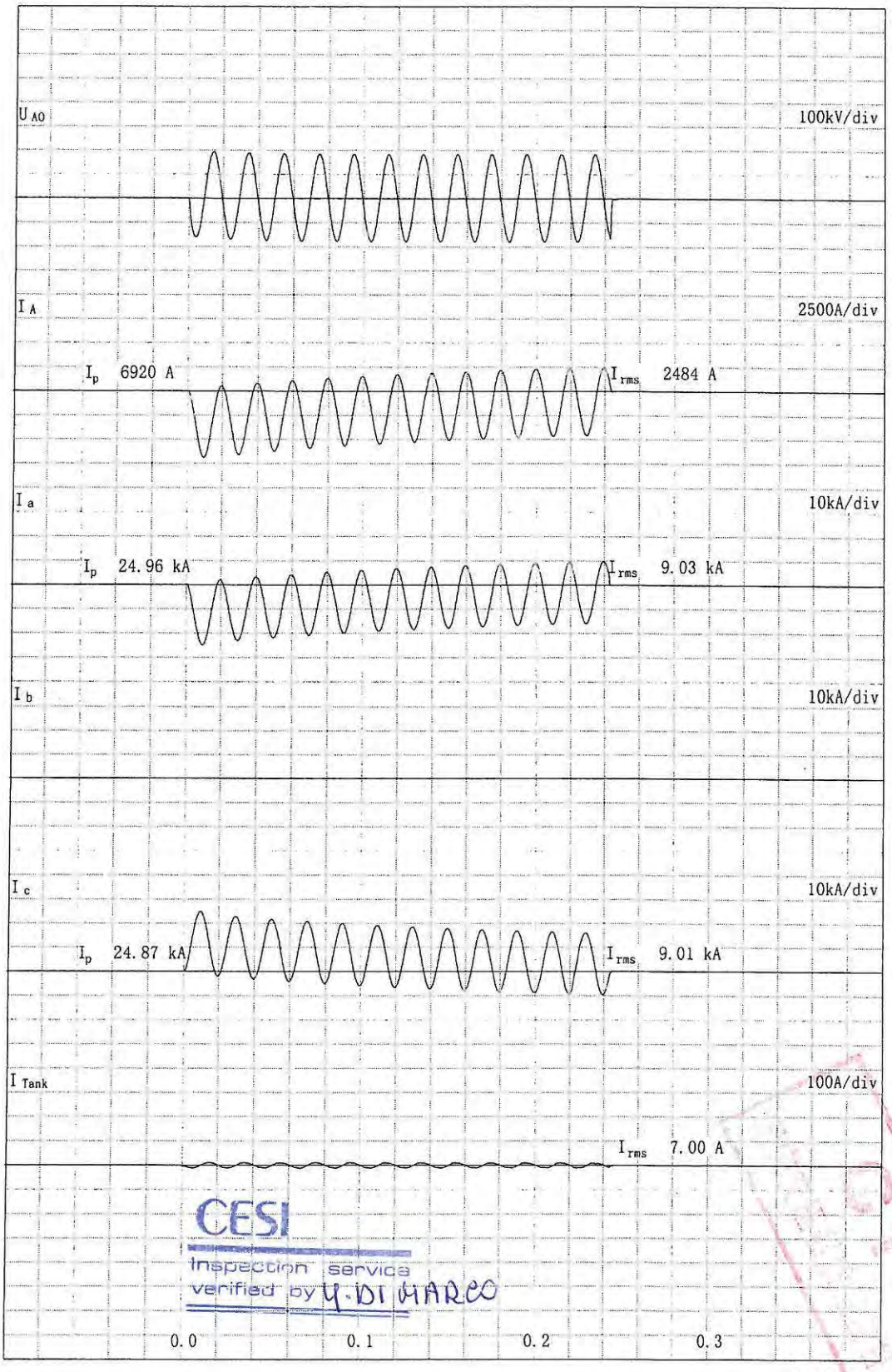
CESI
Inspection service
verified by Y. DI MARCO

B12113-S01-1

Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel:(024)89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024)89707949 Tel:(024)89872527


U A0
100kV/div
I A
2500A/div
I p 6921 A
I rms 2468 A
I a
10kA/div
I p 24.92 kA
I rms 8.97 kA
I b
10kA/div
I c
10kA/div
I p 24.87 kA
I rms 8.96 kA
I Tank
100A/div
I rms 7.00 A
CESI
Inspection service
verified by Y. DI MARCO
0.0
0.1
0.2
0.3
0.02s/div

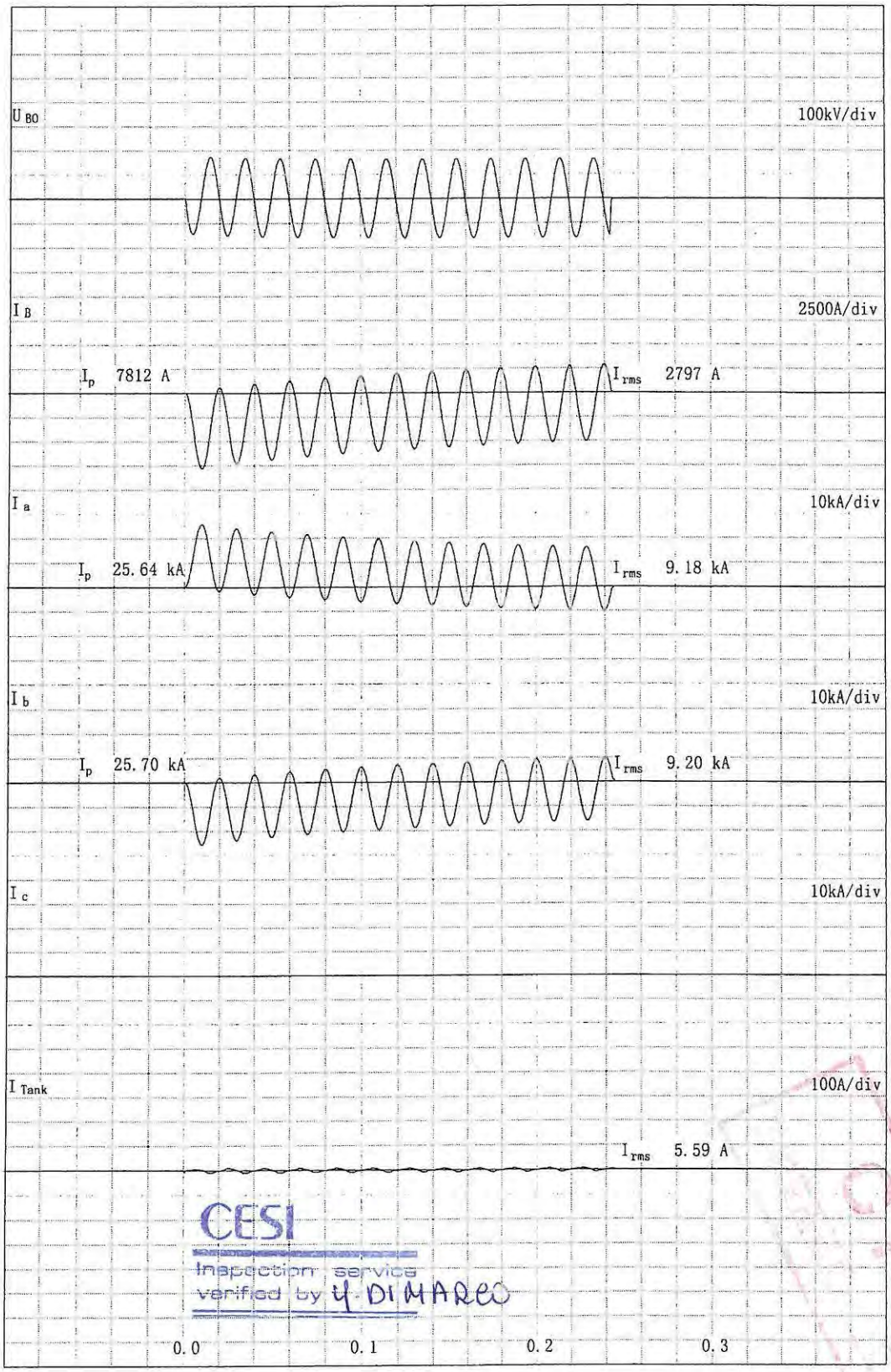
B12113-S01-2



CESI
Inspection service
verified by Y. DI MARCO

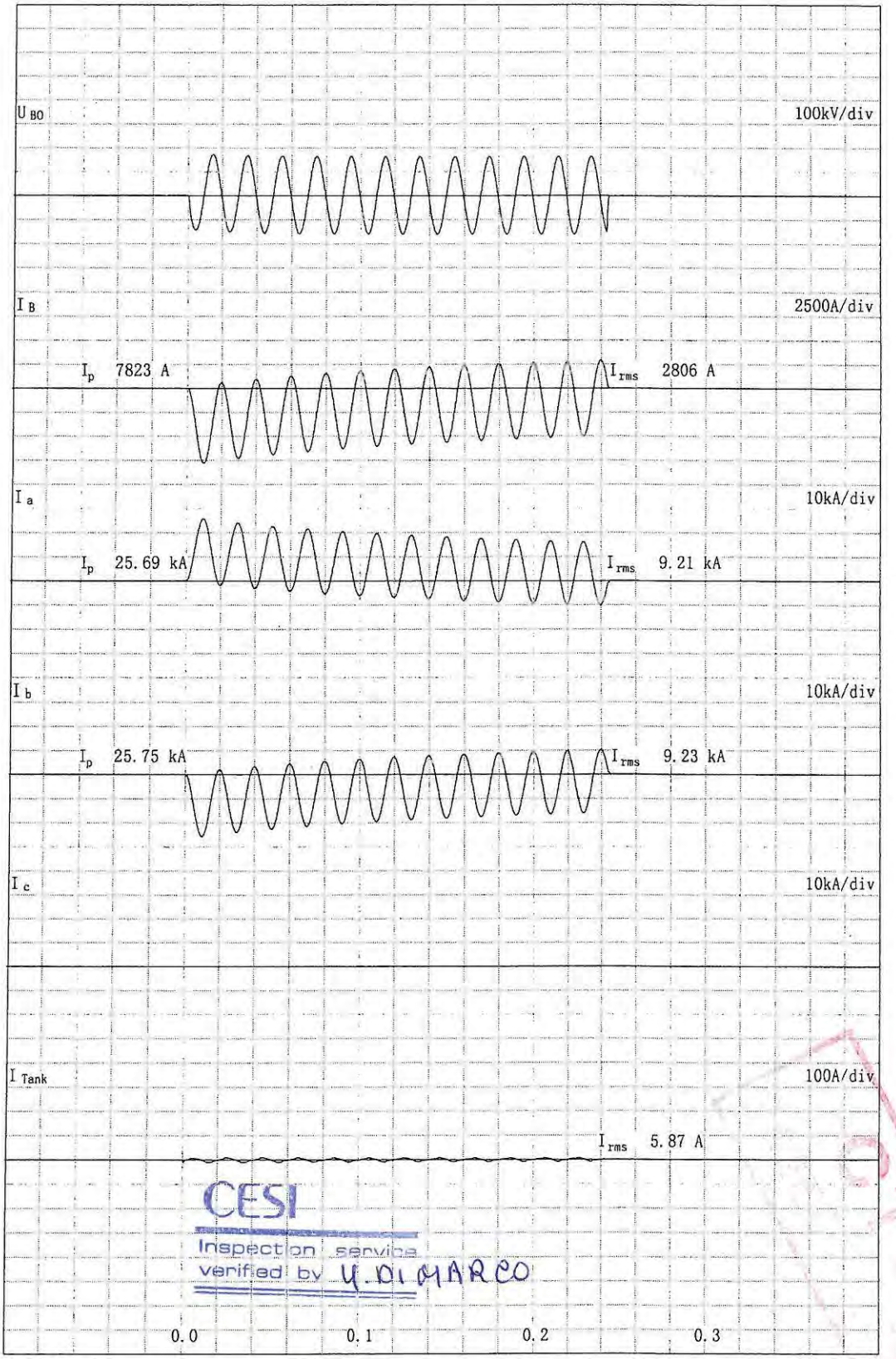
B12113-S01-3

Test Report



B12113-S02-1

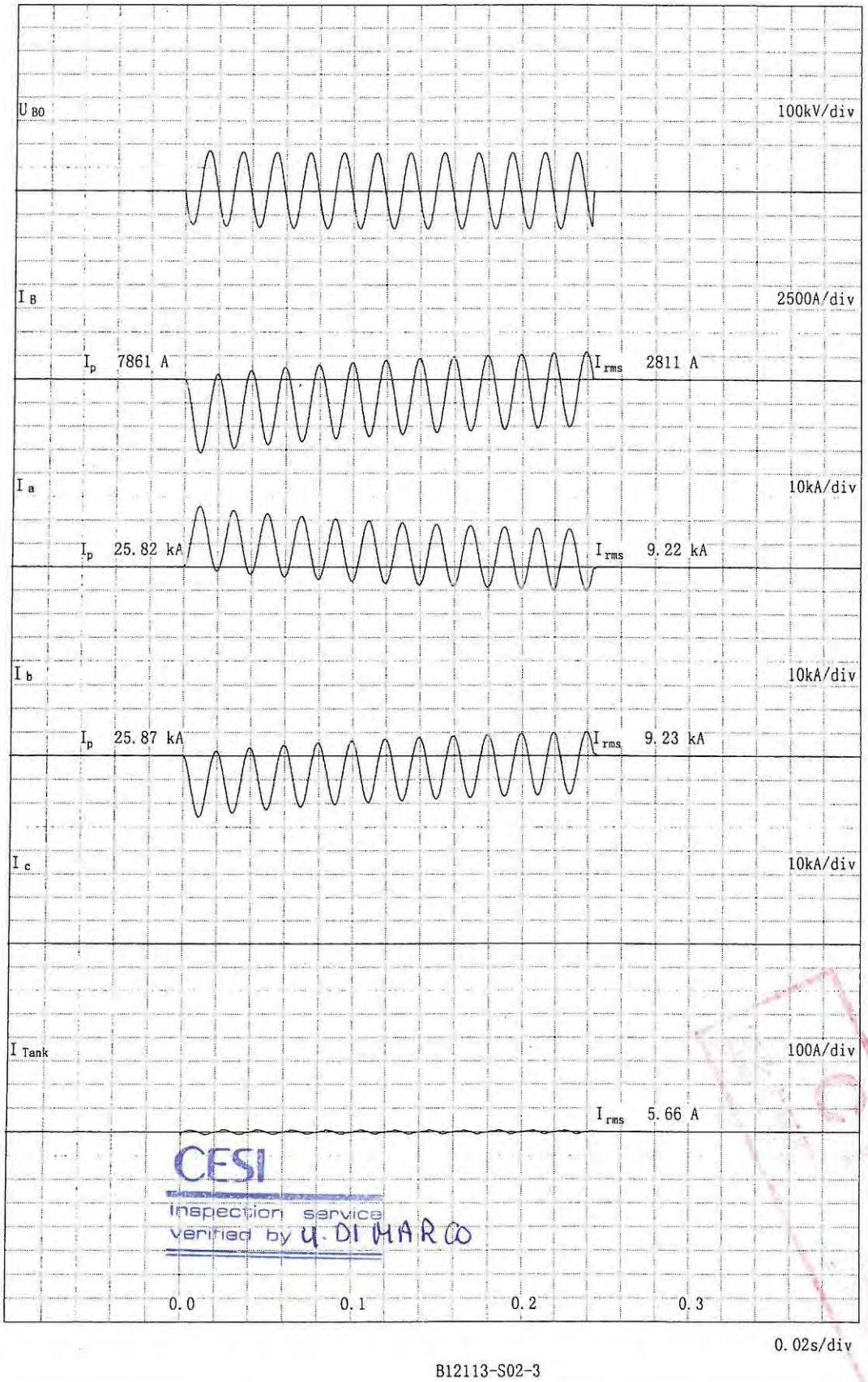
Test Report



B12113-S02-2

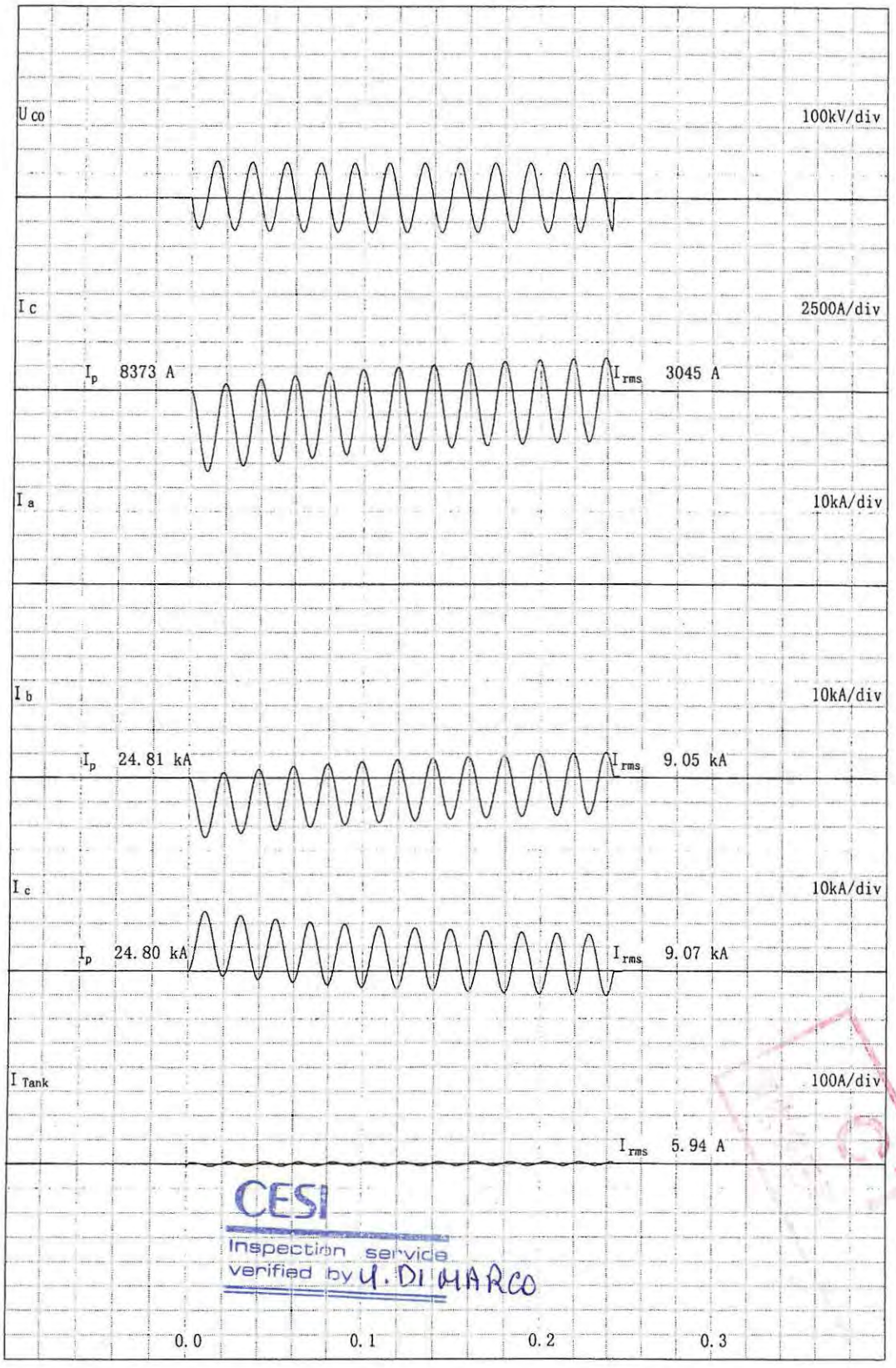
Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel:(024)89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024)89707949 Tel:(024)89872527

Test Report



B12113-S02-3

Test Report

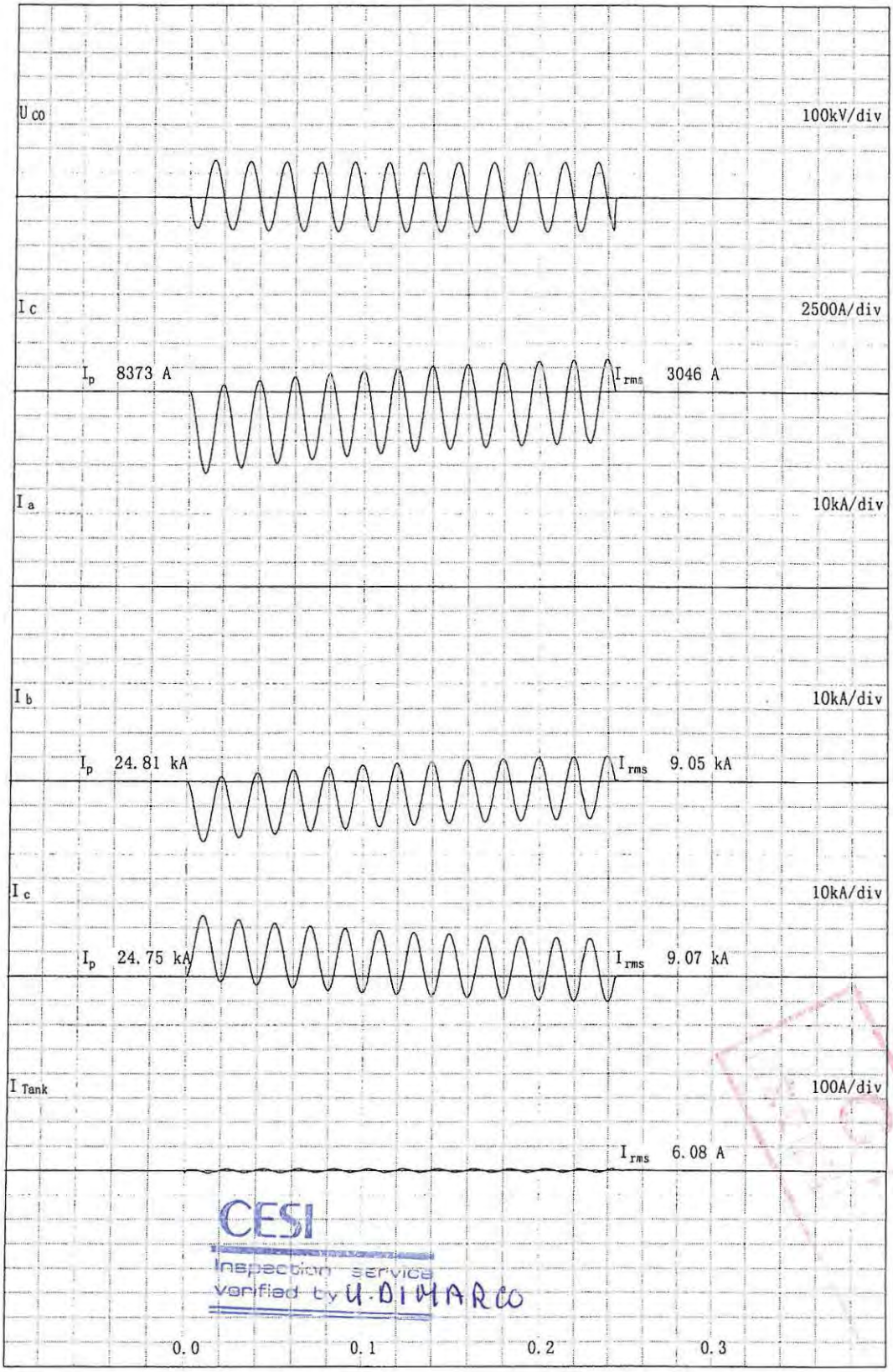


B12113-S03-1

Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel:(024)89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024)89707949 Tel:(024)89872527

Test Report

№: CTQC/B-12.113
Total 54 Page 51

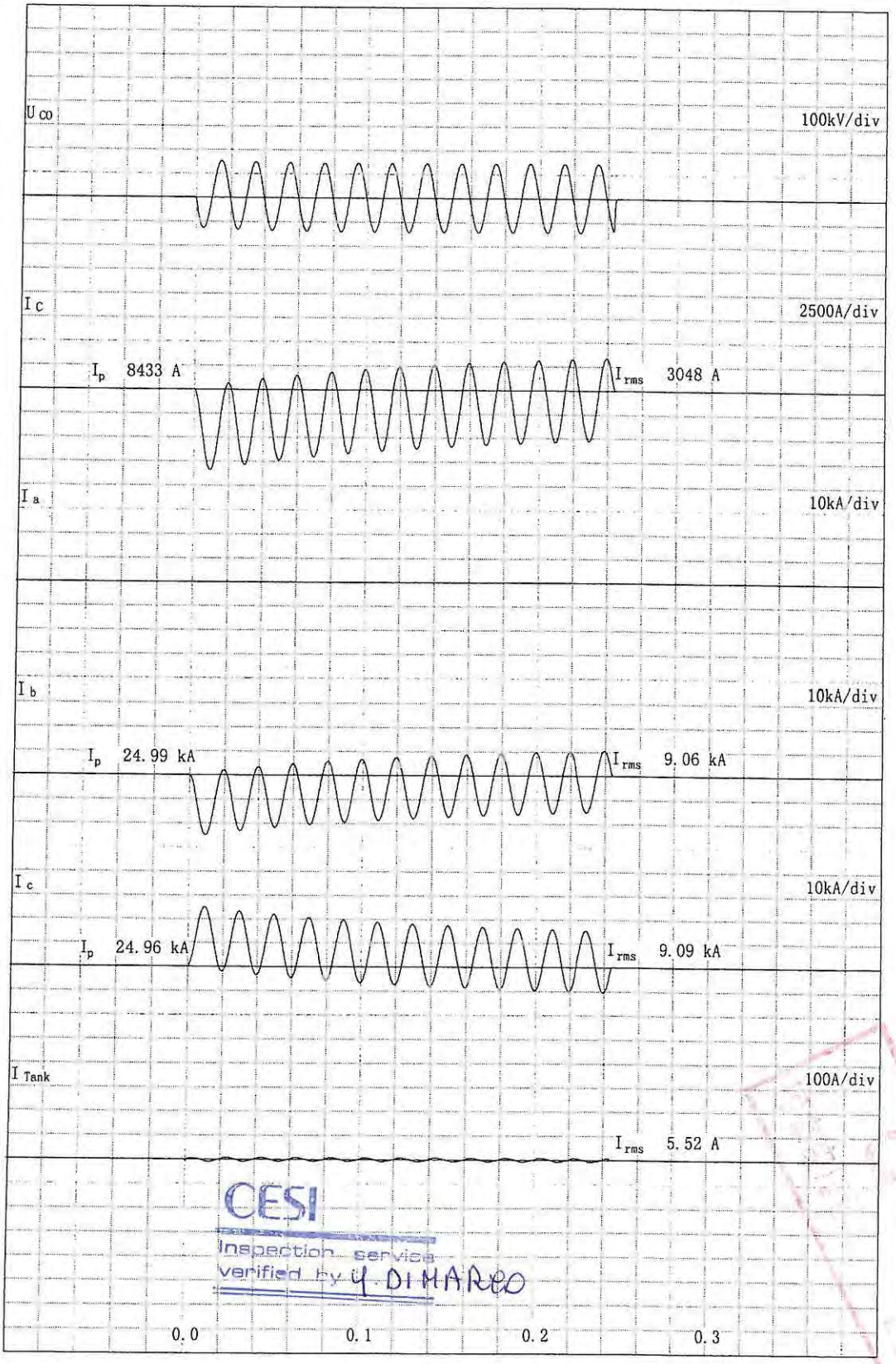


B12113-S03-2

Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel: (024) 89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024) 89707949 Tel: (024) 89872527

Test Report

№: CTQC/B-12.113
Total 54 Page 52

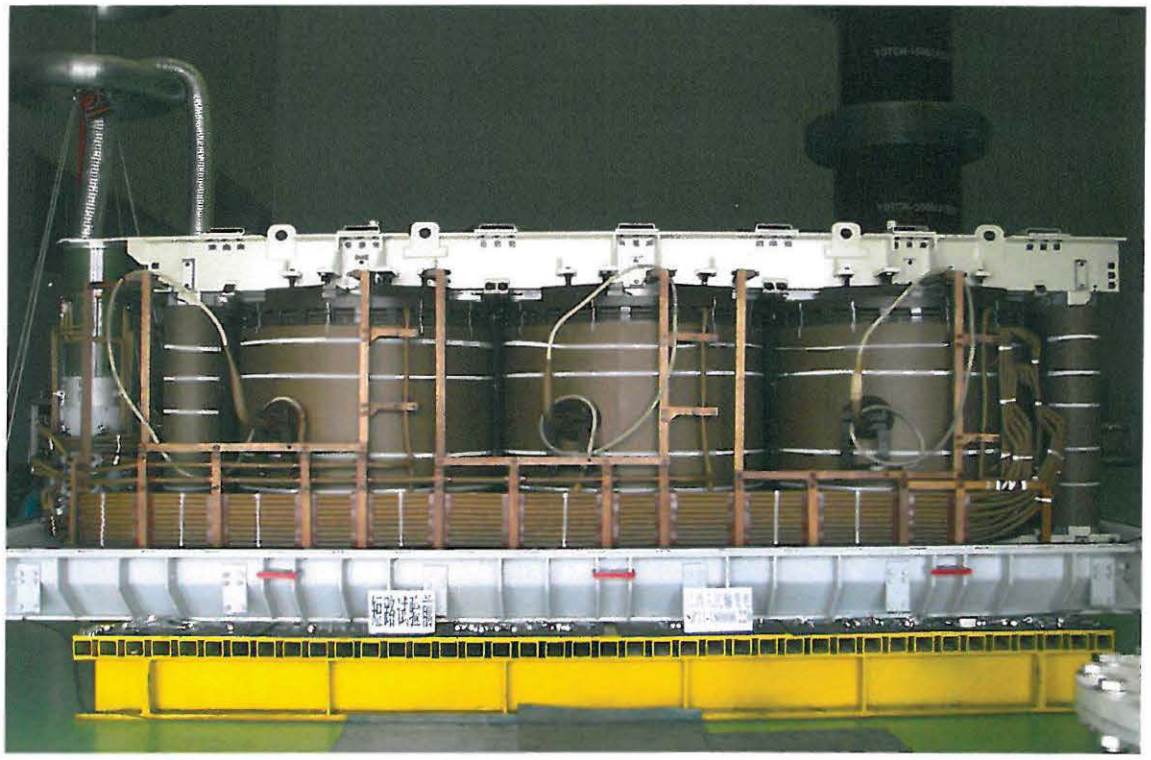


CESI
Inspection service
verified by Y. DIMARCO

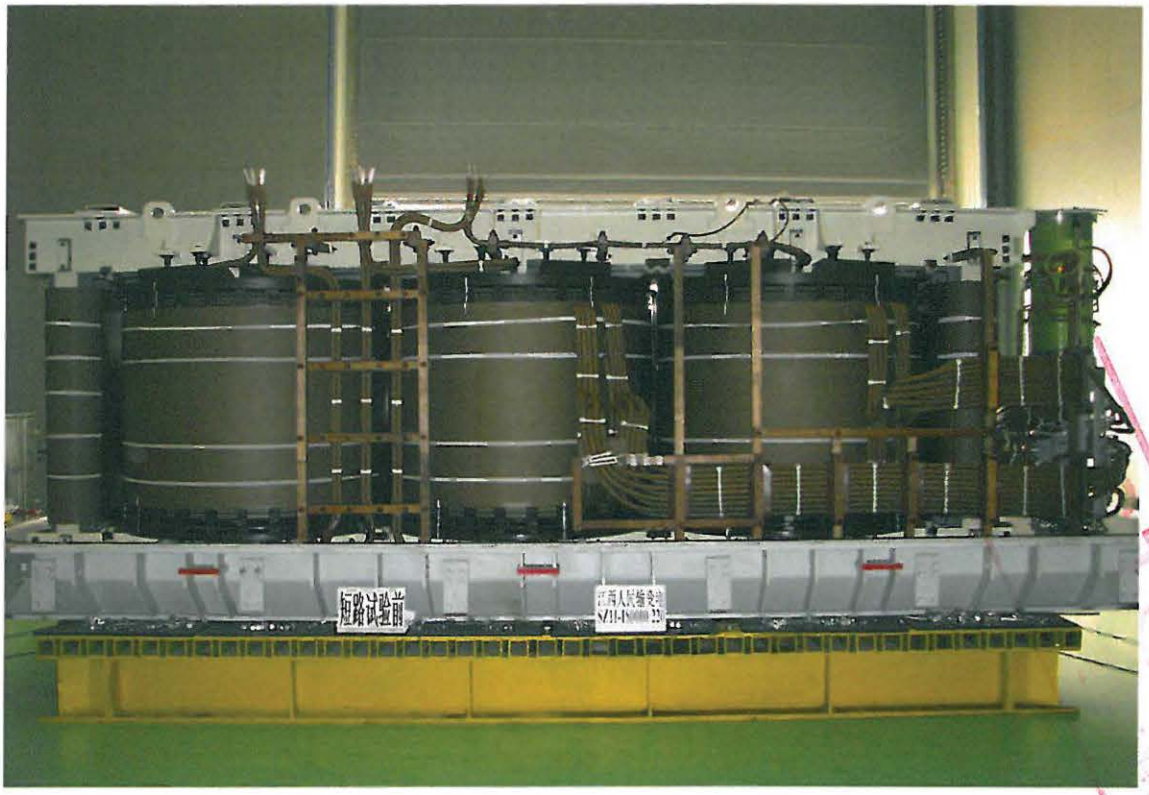
B12113-S03-3

Address: Hushitai Sounth Avenue No. 18, Shenbei New District, Shenyang Postal code: 110122 Tel:(024)89874449
E-mail: ctqc@vip.sina.com http: //www.ctn.cn Fax: (024)89707949 Tel:(024)89872527

H.V. before S.C.T:

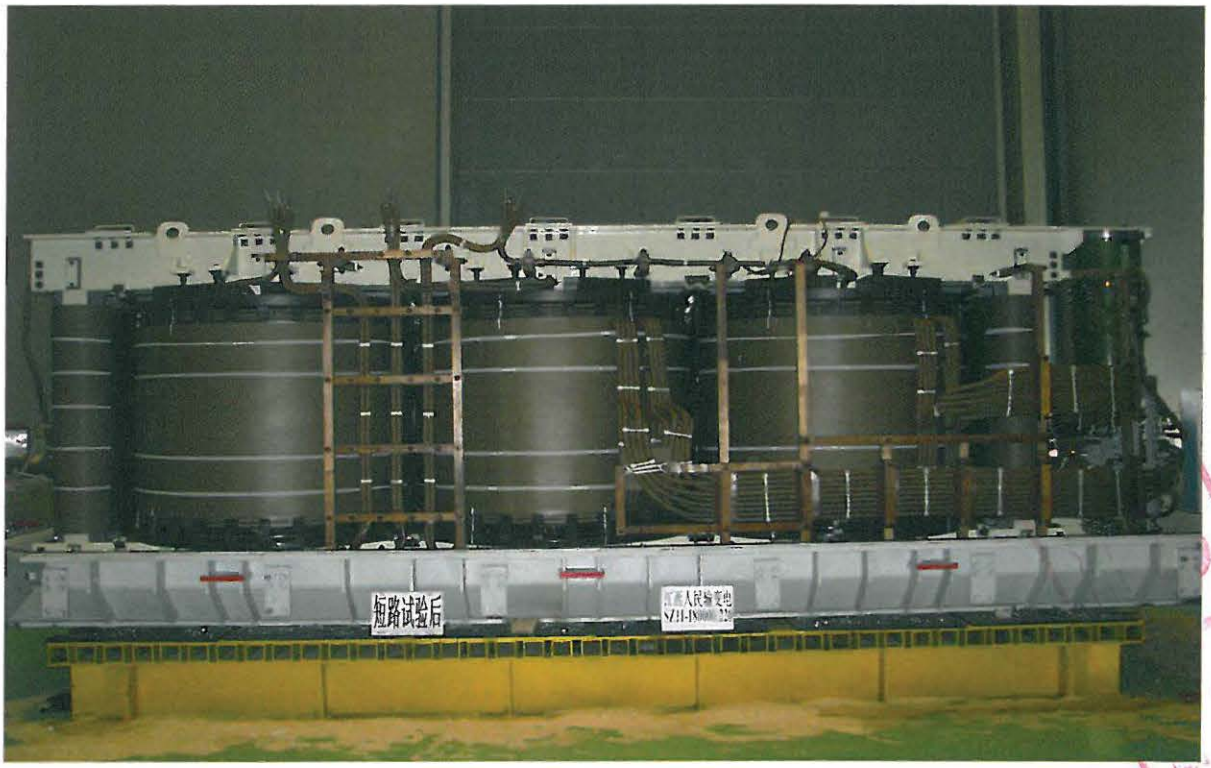


L.V. before S.C.T.:



H.V. after S.C.T:

L.V. after S.C.T.:



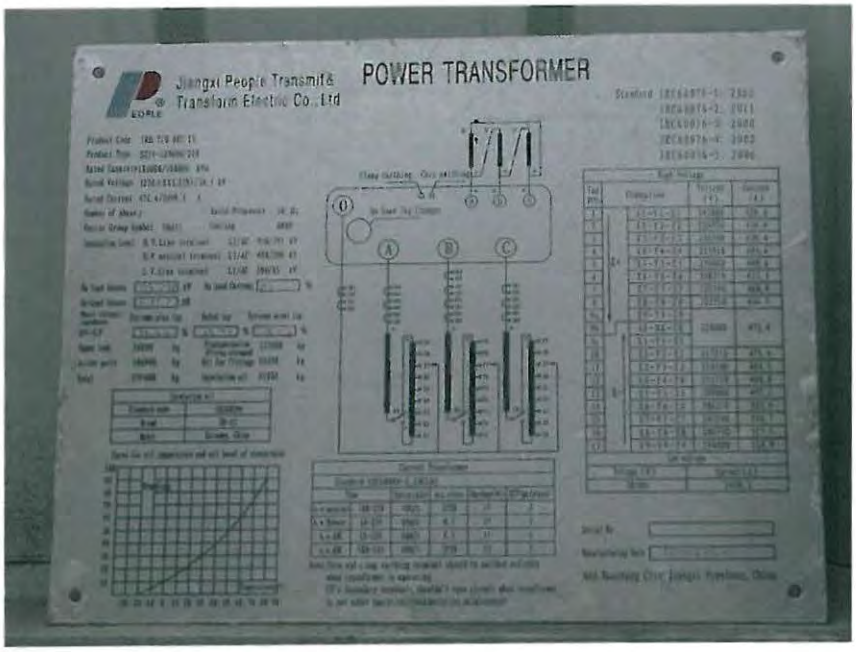
Annex 1

RATING PLATE AND OUTLINE PHOTOS

CESI
Inspection service
verified by Y. DI MARCO

№: CTQC/B-12.113

Rating plate:

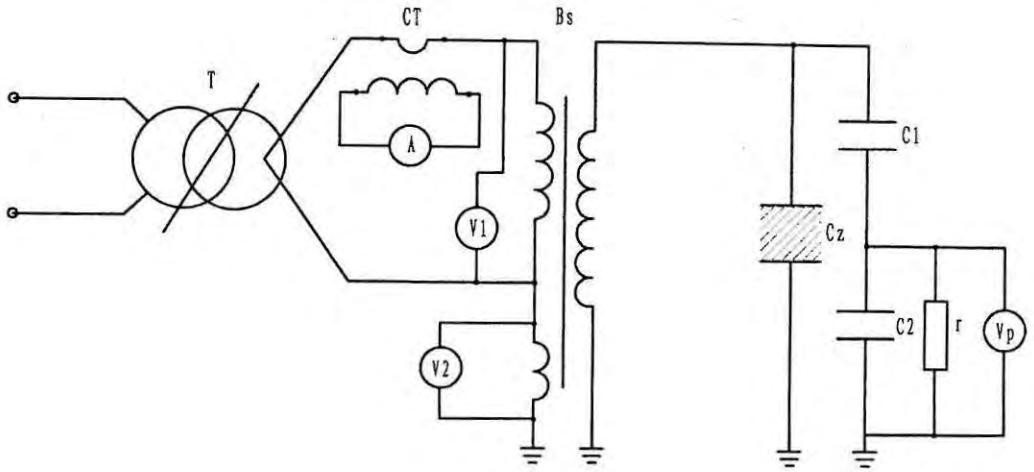


Outline:

CESI
Inspection service
verified by Y. DI MARCO

Annex 2

TEST CIRCUITS



外施耐压试验线路图

Separate-source voltage withstand diagram

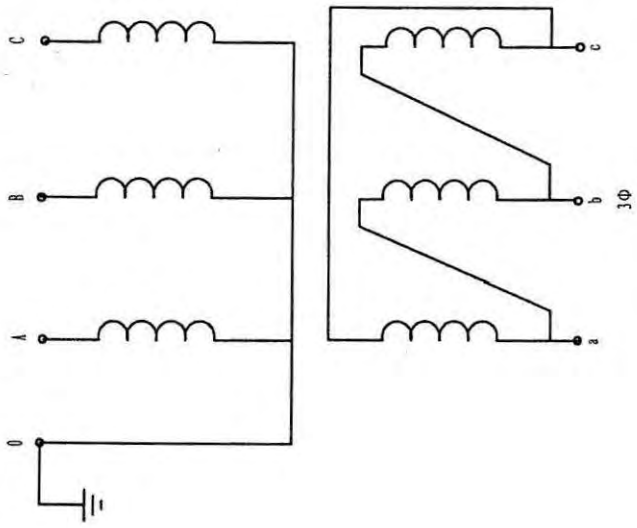
T-调压器 Regulator　　A-电流表 Amperemeter　　Bs-试验变压器 Testing transformer

CT-电流互感器 Current transformer　　V1, V2-电压表 Voltmeter

C1, C2-分压电容 Capacitive devider　　Cz-试品 Sample

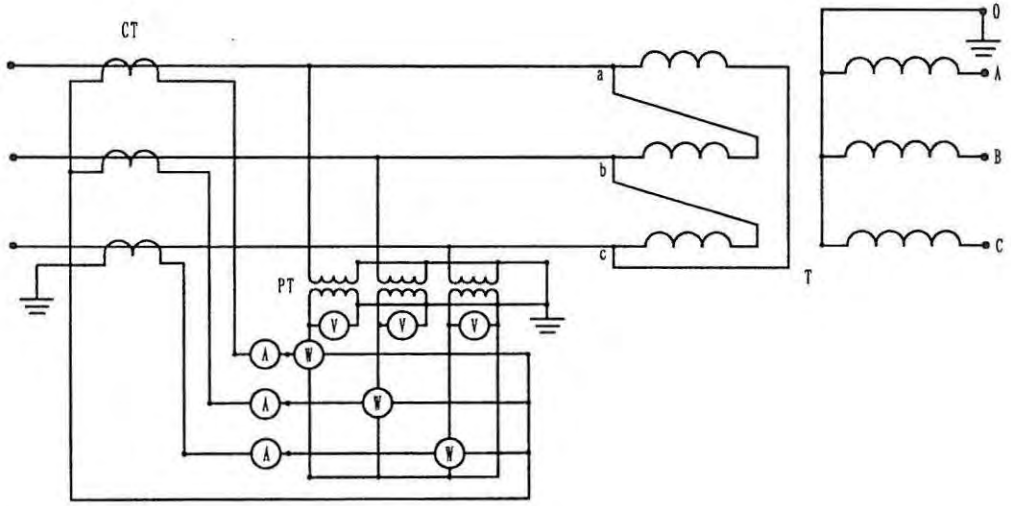
r-放电电阻 Discharge resistance　　Vp-峰值电压表 Peak value voltmeter

№：CTQC/B-12.113
Annex 2-b



长时感应耐压试验
Long duration AC withstand voltage test circuit

CESI
Inspection service
verified by Y. DI MARCO



空载损耗及空载电流测量线路图

No-load loss and current measurement circuit

T-被试变压器 Sample

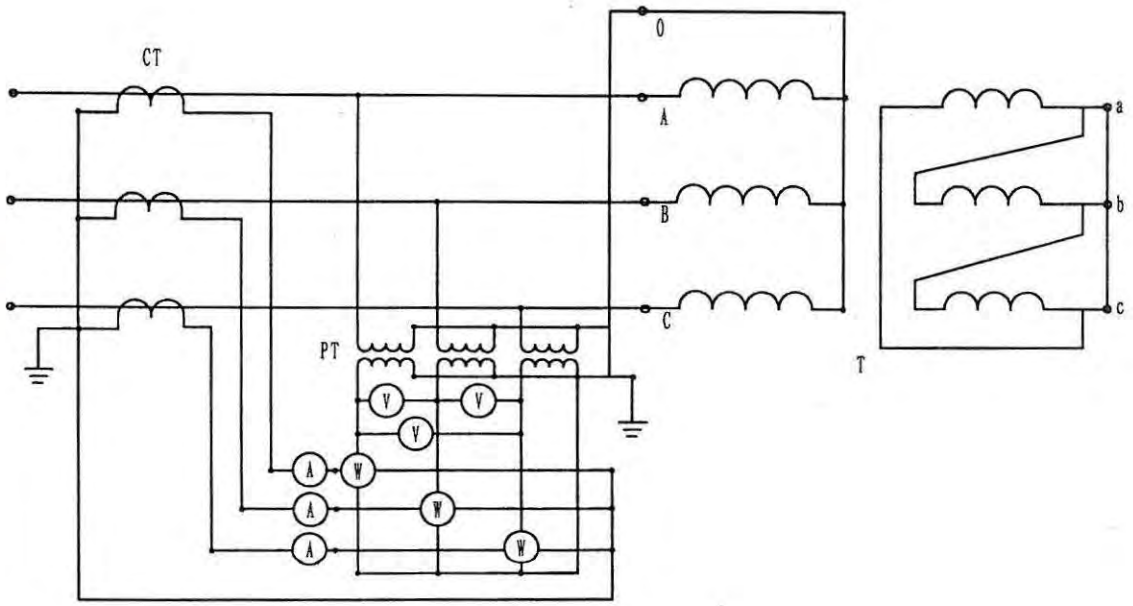
CT-电流互感器 Current transformer

PT-电压互感器 Voltage transformer

A-电流表 Amperemeter

W-瓦特表 Wattmeter

V-电压表 voltmeter



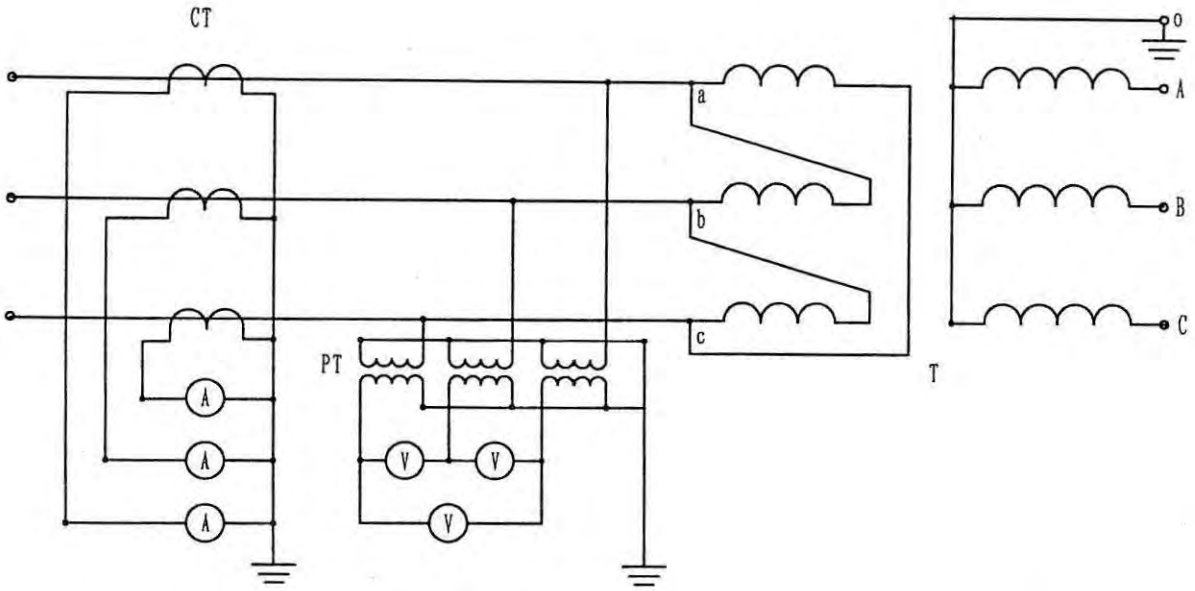
短路阻抗及负载损耗测量线路图

Short circuit impedance and on load loss measurement circuit

T-被试变压器 Sample　　CT-电流互感器 Current transformer

PT-电压互感器 Voltage transformer　　A-电流表 Amperemeter

W-瓦特表 Wattmeter　　V-电压表 voltmeter



短时感应耐压试验线路图

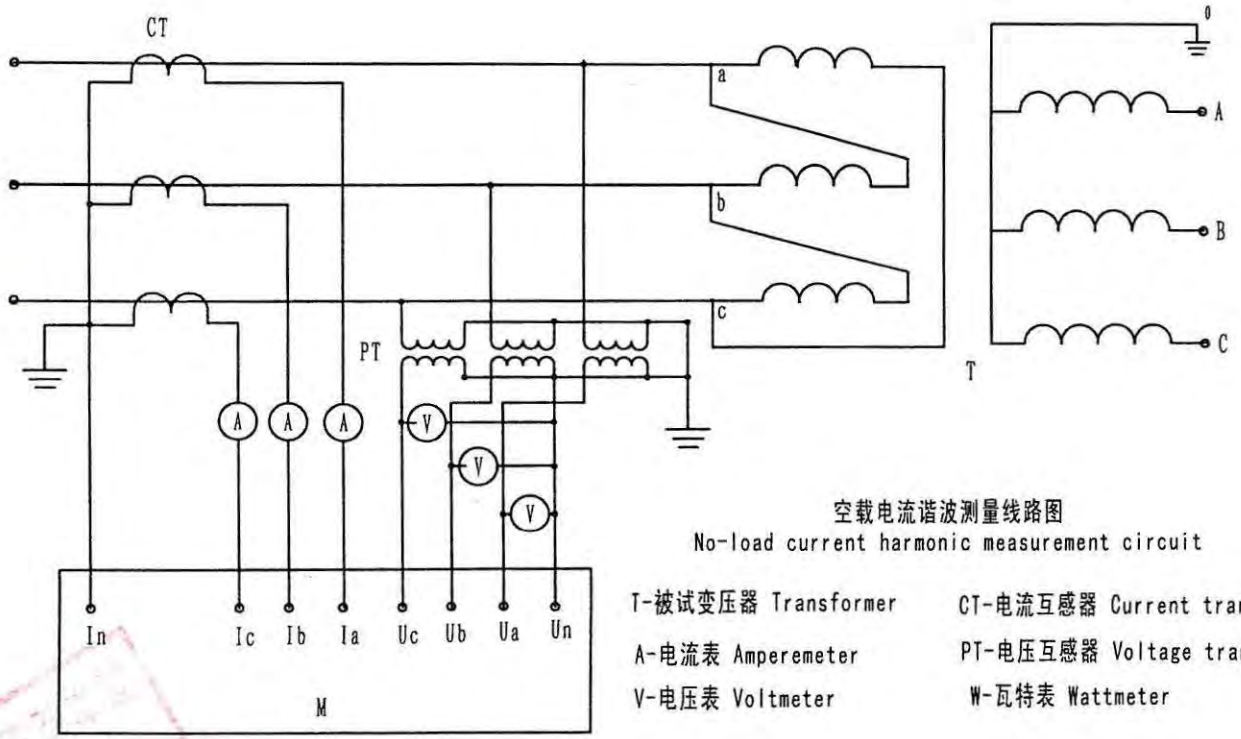
Induced overvoltage withstand test circuit

T-被试变压器 Sample　　CT-电流互感器 Current transformer

PT-电压互感器 Voltage transformer　　A-电流表 Amperemeter

V-电压表 Voltmeter

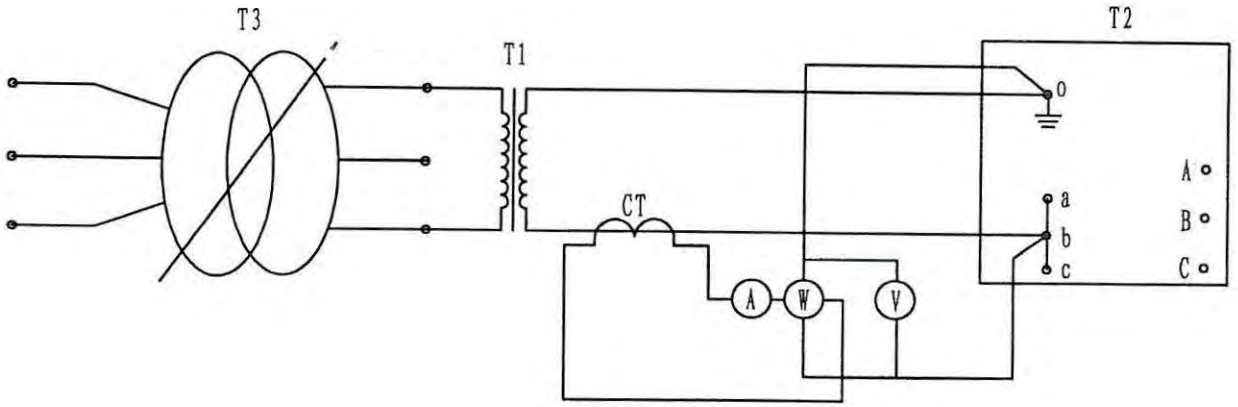
№: CTQC/B-12.113
Annex 2-e



空载电流谐波测量线路图
No-load current harmonic measurement circuit

T-被试变压器 Transformer
CT-电流互感器 Current transformer
A-电流表 Amperemeter
PT-电压互感器 Voltage transformer
V-电压表 Voltmeter
W-瓦特表 Wattmeter

№: CTQC/B-12.113
Annex 2-f



变压器零序阻抗测量线路图

Zero-sequence impedence measurement circuit

T1-大电流变压器 Heavy current testing transformer

T2-被试变压器 Sample

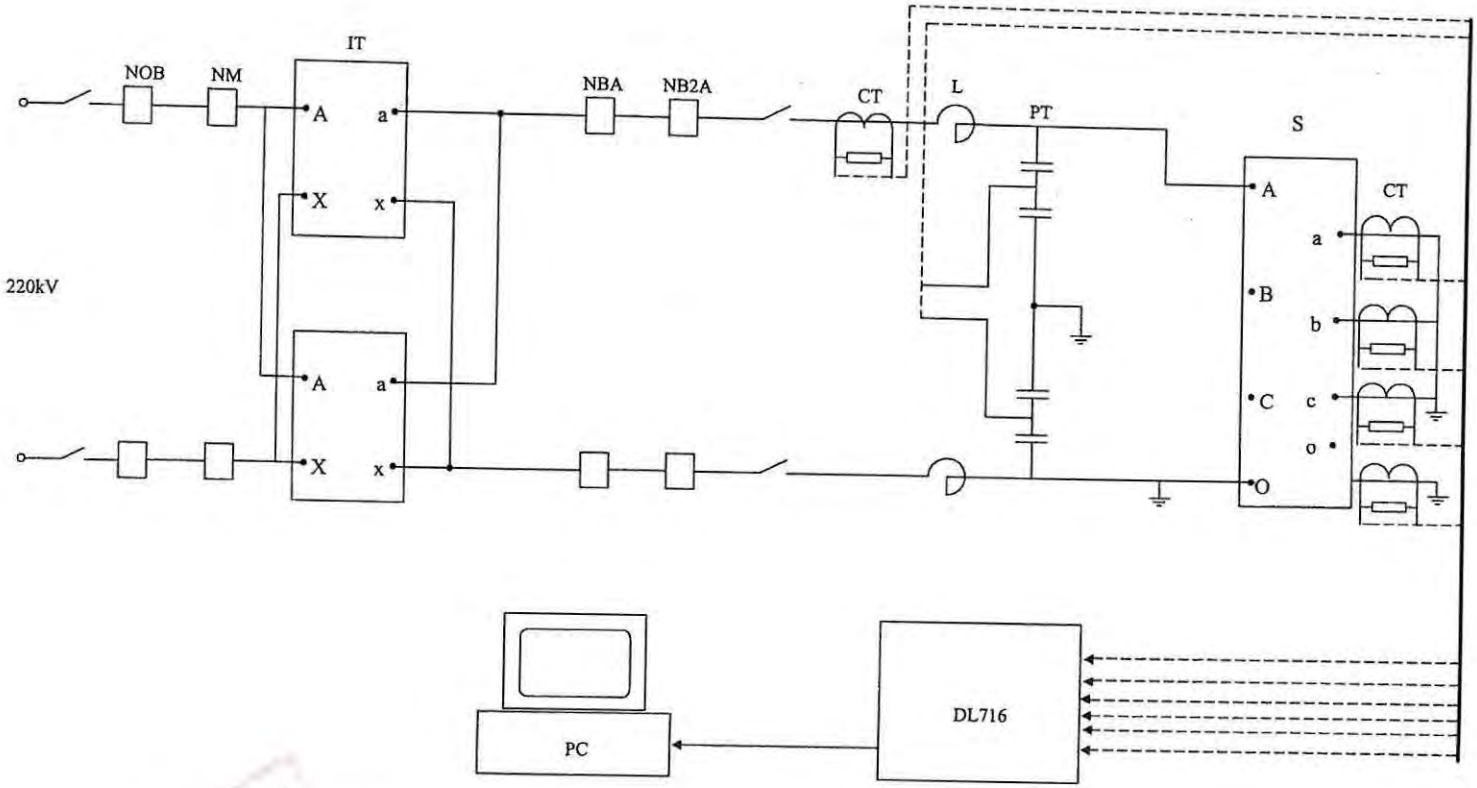
T3-调压器 Regulator

V-电压表 Voltmeter

A-电流表 Amperemeter

W-瓦特表 Wattmeter

CT-电流互感器Current transformer



短路承受能力试验线路图　　Short circuit tests of transformer:

IT：中间变压器 Intermediate transformer　CT：电流互感器 Standard current transformer　PC：计算机 Computer

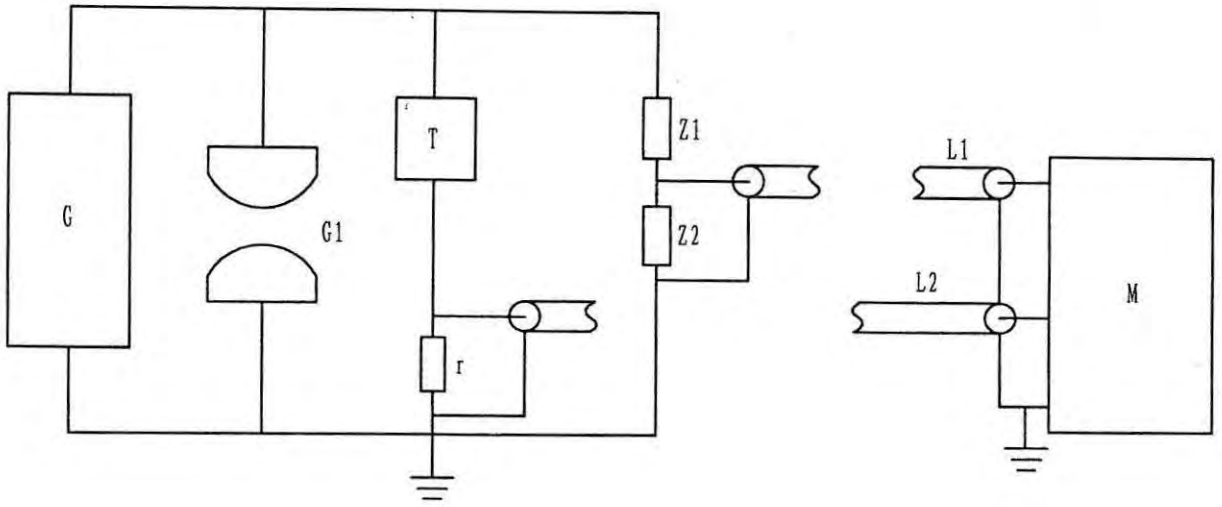
L：限流电抗器 Reactors　　PT：电容分压器 Voltage divider　　DL716：瞬态记录仪 16 channels analyzer

S：被试变压器 Sample　　NOB,NM,NB,NB2：SF6断路器 SF6 switchgear

CESI Inspection service verified by Q. DI MARCO

№：CTQC/B-12.113

Annex 2-h



雷电冲击试验线路图
Lightning impulse withstand test system circuit

G-冲击电压发生器 Impulse generator

G1-截断装置 Chopping device

Z1, Z2-阻容分压器 Voltage divider

M-测量仪器 Measurement instrument

L1, L2-高频传输电缆 High frequency transmission cable

T-试品 Sample

r-分流器 Shunt

№: CTQC/B-12.113
Annex 2-i

Annex 3

TRANSFORMER DRAWINGS

CESI
Inspection service
verified by Y. DI MARCO

Jiangxi People Transmit & Transform Electric Co., Ltd

POWER TRANSFORMER

Standard IEC60076-1: 2011
IEC60076-2: 2011
IEC60076-3: 2000
IEC60076-4: 2002
IEC60076-5: 2006

Product Code	1RD.710.087.1Z
Product Type	SZ11-180000/220
Rated Capacity	180000/180000 kVA
Rated Voltage	(220±8X1.25%)/38.5 kV
Rated Current	472.4/2699.3 A
Number of phase	3
Rated Frequency	50 HZ
Vector Group Symbol	YNd11
Cooling	ONAN

Insulation Level
- H.V.Line terminal LI/AC 950/395 kV
- H.V.neutral terminal LI/AC 400/200 kV
- L.V.Line terminal LI/AC 200/85 kV

No load losses [ ] kW No Load Current [ ] %

On-Load losses [ ] kW

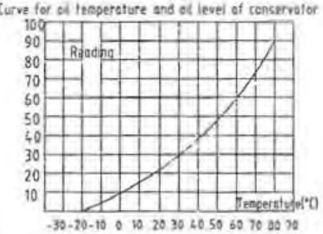
Short circuit impedance: Extreme plus tap, Rated tap, Extreme minus tap

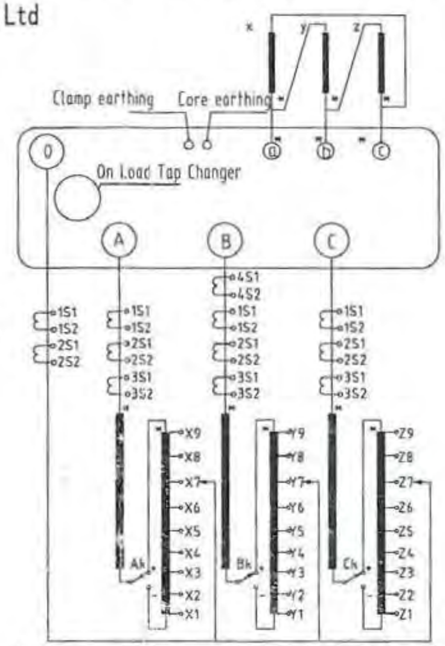
HV-LV [ ] % [ ] % [ ] %

Upper tank	15800 kg	Transportation (Filling nitrogen)	127800 kg
Active parts	106900 kg	Oil for fittings	11000 kg
Total	199000 kg	Insulation oil	41800 kg

Insulation oil	
Standard code	IEC60296
Brand	DB-45
Maker	Karamay,China

Curve for oil temperature and oil level of conservator





Current Transformer					
Standard IEC60044-1, IEC185					
Type		Ratio (A/A)	Acc.class	Burden(VA)	QTY(pc/phase)
h.v.neutral	LRD-110	400/5	5P30	15	2
h.v.Bphase	LR-220	800/5	0.5	15	1
h.v.ABC	LR-220	800/5	0.5	15	1
h.v.ABC	LRB-220	800/5	5P30	15	2

Note: Core and clamp earthing terminal should be earthed reliably when transformer is operating
CT's Secondary terminals shouldn't open circuit when transformer is not under operation(transportation,maintenance)

High Voltage				
Tap pos.	Connection		Voltage (V)	Current (A)
1	K+	X1-Y1-Z1	242000	429.4
2		X2-Y2-Z2	239250	434.4
3		X3-Y3-Z3	236500	439.4
4		X4-Y4-Z4	233750	444.6
5		X5-Y5-Z5	231000	449.6
6		X6-Y6-Z6	228250	455.3
7		X7-Y7-Z7	225500	460.9
8		X8-Y8-Z8	222750	466.5
9a		X9-Y9-Z9	220000	472.4
9b		AK-BK-CK		
9c	K-	X1-Y1-Z1		
10		X2-Y2-Z2	217250	478.4
11		X3-Y3-Z3	214500	484.5
12		X4-Y4-Z4	211750	490.8
13		X5-Y5-Z5	209000	497.2
14		X6-Y6-Z6	206250	503.9
15		X7-Y7-Z7	203500	510.7
16		X8-Y8-Z8	200750	517.7
17		X9-Y9-Z9	198000	524.9

Low voltage	
Voltage(V)	Current(A)
38500	2699.3

Serial No [ ]

Manufacturing Date [ ]

Add: Nanchang City,Jiangxi Province, China

315 285 15 15 370 400 4-R5 4-φ6

CESI Inspection service verified by G. DI MARCO

江西人民输变电有限公司

Design	2012.5.11	Sign	Date
Check	5.11		
Review	5.4	Approve	5.11
Technology	5.11		5.11

Stage label | QTY | Scale

S

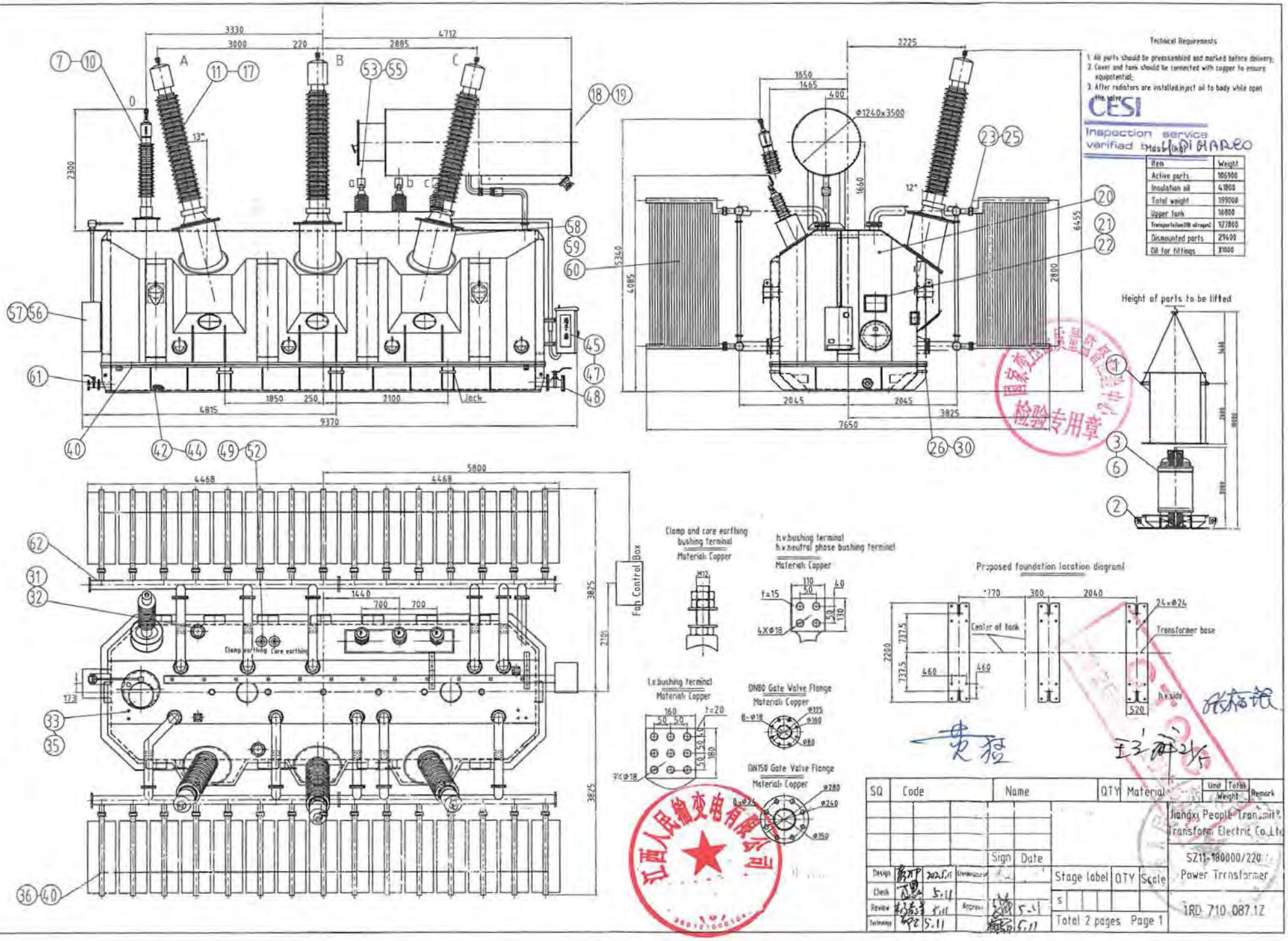
Total 1 page Page 1

Jiangxi People Transmit& Transform Electric Co.,Ltd

SZ11-180000/220

Name Plate

8RD.860.087.1Z


Technical Requirements
1. All parts should be preassembled and marked before delivery;
2. Cover and tank should be connected with copper to ensure equipotential;
3. After radiators are installed,inject oil to body while open the valve.
CESI
Inspection service verified by
Item | Weight
Active parts | 106900
Insulation oil | 41800
Total weight | 199000
Upper tank | 16800
Transportation(Oil charged) | 127800
Dismounted parts | 29400
Oil for fittings | 31000
Height of parts to be lifted
Clamp and core earthing bushing terminal
Materials: Copper
h.v.bushing terminal
h.v.neutral phase bushing terminal
Materials: Copper
l.v.bushing terminal
Materials: Copper
DN80 Gate Valve Flange
Materials: Copper
DN150 Gate Valve Flange
Materials: Copper
Fab Control Box
Proposed foundation location diagram
Center of tank
Transformer base
h.v.side
SQ | Code | Name | QTY | Material | Unit Weight | Total Weight | Remark
Jiangxi People Transmit% Transform Electric Co.,Ltd
SZ11-180000/220
Power Transformer
Design | Check | Review | Technology | Standardization | Approval
Sign | Date
Stage label | QTY | Scale
Total 2 pages Page 1
IRD 710 087.1Z

Annex 4

THE TABLE OF CHECK INSTRUMENTS

CESI
Inspection service
verified by Y. DI MARCO

The table of check instruments
仪器、仪表一览表

Type 型号	Name 名称	Precision 准确级	Serial No. 序号	Available date 有效日期	Manufacture 制造企业
D6000	Wideband power analyzer 宽带功率分析仪	0.05	YB-114150	2012.12.04	LEM 莱姆公司
ASQJ-1	Ratio bridge 变比电桥	0.05	YB-107198	2012.12.06	Shenyang zhong chuan 沈阳中川
3391	Resistance bridge 电阻电桥	0.2	YB-107191	2013.06.08	Baoding sirui 保定斯锐
ZTGC10 2D	Gas chromatogram detector 气象色谱检测仪	0.5u/l	YB-117165	2012.08.18	Shenzhen 深圳
HL-D40	Current transformer 电流互感器	0.01	YB-109189	2012.12.13	Dandong luote 丹东罗特
HL-D40	Current transformer 电流互感器	0.01	YB-109188	2012.12.13	Dandong luote 丹东罗特
HL-D40	Current transformer 电流互感器	0.01	YB-109190	2012.12.13	Dandong luote 丹东罗特
DL716	Digital oscilloscope 数字示波器	12bit	YB-312730	2012.08.29	Japan 日本
6801	Automatic dielectric intensity measuring system 全自动介电强度测量系统	1.5	YB-117160	2012.07.23	Baoding 保定
QS40	Dielectric loss and capacitance bridge 介损电容电桥	1.5	YB-117161	2012.12.05	Heilongjiang 黑龙江

CESI
Inspection servica
verified by U. DI MARCO

Type 型号	Name 名称	Precision 准确级	Serial No. 序号	Available date 有效日期	Manufacture 制造企业
HL-28	Current transformer 电流互感器	0.05	YB-109065	2013.05.12	Dandong luote 丹东罗特
HL-28	Current transformer 电流互感器	0.05	YB-109066	2013.05.12	Dandong luote 丹东罗特
HL-28	Current transformer 电流互感器	0.05	YB-109067	2013.05.12	Dandong luote 丹东罗特
BLY-1	Voltage transformer 电压互感器	0.05	YB-111083	2013.05.12	Shenyang zhong chuan 沈阳中川
BLY-1	Voltage transformer 电压互感器	0.05	YB-111084	2013.05.12	Shenyang zhong chuan 沈阳中川
BLY-1	Voltage transformer 电压互感器	0.05	YB-111085	2013.05.12	Shenyang zhong chuan 沈阳中川
HL28-26	Current transformer 电流互感器	0.1	YB-109061	2013.05.12	Dandong 丹东
JZF-9	Calibration pulse generator 校准脉冲发生器		YB-114207	2012.10.09	Shanghaisongbao 上海松宝
KMSB-30	Dielectric dissipation bridge 介损电桥	0.005	YB-107205	2013.04.09	Shanghai xilin 上海熙林
DL716	Transient recorder 瞬态记录仪	12bit	YB-312729	2012.10.31	Japan 日本

CESI
Inspection service
verified by Y. DI MARCO

Type 型号	Name 名称	Precision 准确级	Serial No. 序号	Available date 有效日期	Manufacture 制造企业
LRBT-220	Current transformer 电流互感器	0.5	YB-309786	2013.03.21	Shenyang transformer factory 沈阳变压器厂
LRBT-220	Current transformer 电流互感器	0.5	YB-309787	2013.03.21	Shenyang transformer factory 沈阳变压器厂
LRBT-220	Current transformer 电流互感器	0.5	YB-309788	2013.03.21	Shenyang transformer factory 沈阳变压器厂
LMZC-10	Current transformer 电流互感器	0.5	YB-309781	2013.10.26	Shenyang special transformer factory 沈阳特种变压器厂
LMZC-10	Current transformer 电流互感器	0.5	YB-309780	2013.10.26	Shenyang special transformer factory 沈阳特种变压器厂
LMZC-10	Current transformer 电流互感器	0.5	YB-309779	2013.05.12	Shenyang special transformer factory 沈阳特种变压器厂
FL-5/5000	Standard resistance 标准电阻	0.2	YB-316797	2013.06.01	Shenyang 沈阳
FL-5/5000	Standard resistance 标准电阻	0.2	YB-316798	2013.06.01	Shenyang 沈阳
FL-5/5000	Standard resistance 标准电阻	0.2	YB-316799	2013.06.01	Shenyang 沈阳
FL-10/1000	Standard resistance 标准电阻	0.2	YB-316804	2013.03.26	Shenyang 沈阳

CESI
Inspection service
verified by Y. DI MARCO

FL-10/1000	Standard resistance 标准电阻	0.2	YB-316805	2013.03.26	Shenyang 沈阳
FL-10/1000	Standard resistance 标准电阻	0.2	YB-316806	2013.03.26	Shenyang 沈阳
CT106	Open-circuit voltage meter 开路电压测量仪	1.0	YB-114140	2012.12.04	Shenyang zhongchuan 沈阳中川
HESD	Transformer checkout meter 互感器检验仪	1.0	YB-114138	2012.12.12	Shenyang zhongchuan 沈阳中川
T24-AV	Amperometer 安培表	0.2	YB-105035	2012.12.02	Shanghai 上海
FY49-1	Current transformer load 电流互感器负荷箱	3.0	YB-111096	2013.08.29	Shenyang zhong chuan 沈阳中川
ZN3950	Radio interference detecter 无线电干扰测试仪		YB-114147	2013.06.14	Beijing 北京
420A	Digital impulse analysis system 数字冲击系统	8bit	YB-112130	2012.12.28	America 美国
SR3301	Resistance detector 电阻检测仪	0.2	YB-104201	2013.01.05	Baoding sirui 保定斯锐
SR3301	Resistance detector 电阻检测仪	0.2	YB-104202	2013.01.05	Baoding sirui 保定斯锐
SR3301	Resistance detector 电阻检测仪	0.2	YB-104203	2013.01.05	Baoding sirui 保定斯锐
SR3301	Resistance detector 电阻检测仪	0.2	YB-104204	2013.01.05	Baoding sirui 保定斯锐

CESI
Inspection service
verified by Y. DI MARCO