



Comments:					
A	Wu 15/3/2014	Duan 18/3/2014	Duan 18/3/2014	ORIGINAL ISSUE	I
REV	PREPARED	CHECKED	APPROVED	MODIFICATIONS	STATUS
<p align="center"> SOCIALIST REPUBLIC OF VIET NAM VIETNAM ELECTRICITY SONG BUNG 4 HYDROPOWER MANAGEMENT BOARD SONG BUNG 4 HYDROPOWER PROJECT 2x78MW Turbine Generator, 250rpm, 106m PACKAGE 4 (TB-04) SUPPLY, TRANSPORTATION, STORAGE AND PRESERVATION, INSTALLATION, PRE-COMMISSIONING AND COMMISSIONING OF ELECTRO-MECHANICAL EQUIPMENT AND TECHNICAL SERVICES Contract N° : 192-TB04/ASB4-Huadong&ALSTOM </p>					
BETWEEN	PURCHASER SB4 HPMB		ENGINEER MOTT MACDONALD		
	CONTRACTOR:  HYDROCHINA HUADONG – ALSTOM CONSORTIUM 				
TITLE :	<p align="center"> Manufacturer Documents for 220kV Current Transformer </p>				
DOCUMENT NUMBER		VNSB4-C6-4-900/Rev.A		FOR INFORMATION	
		OUR REF NUMBER :			

Part 1:

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Part 3: Erection, installation, operation and maintenance

VNSB4-C6-4-901 Instruction for 220kV Current Transformer

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VNSB4-C6-4-001	Current Transformer Outline Drawing (Type 1: 400-800-1000/1A)
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Part 5: Test Reports

VNSB4-C6-4-801	Product Certificate for Current Transformer (Type 1: 400-800-1000/1A)
VNSB4-C6-4-802	Product Certificate for Current Transformer (Type 2: 200-300/1A)

Part 2:

Descriptions

The current transformers will be single-phase, oil insulated, outdoor installed type. Current transformers will be accommodated with five (05) and two (02) cores, one for measuring purpose and the others for protection purpose. All the current transformers will be installed at the outdoor switchyard.

The primary winding of the current transformers will be designed for the rated current of the circuit and will withstand the specified through fault current without damage.

Each current transformer will be fitted with the following accessories:

- a. Oil level glass;
- b. Oil filling plug;
- c. Oil drain valve;
- d. Watertight box for secondary terminals;
- e. Earthing terminal.

Porcelain bushings will be designed to withstand environmental conditions.

Main parameters for type 1 current transformers (400-800-1000/1A)

1. Rated primary current	400-800-1000 A
2. Maximum thermal withstand current 1 second)	40kA
3. Number of coils	5
4. Accuracy	
a. For measuring (two coils)	0.5
b. For protection (three coils)	5P20

Main parameters for type 2 current transformers (200-300/1A)

1. Rated primary current	200-300 A
2. Maximum thermal withstand current (1 second)	40 kA
3. Number of coils	2
4. Accuracy	0.2

Part 3:

Erection, installation, operation and maintenance

Comments:

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SOCIALIST REPUBLIC OF VIET NAM
VIETNAM ELECTRICITY
SONG BUNG 4 HYDROPOWER MANAGEMENT BOARD



SONG BUNG 4 HYDROPOWER PROJECT

2x78MW Turbine Generator, 250rpm, 106m

PACKAGE 4 (TB-04)

SUPPLY, TRANSPORTATION, STORAGE AND PRESERVATION,
 INSTALLATION, PRE-COMMISSIONING AND COMMISSIONING OF
 ELECTRO-MECHANICAL EQUIPMENT AND TECHNICAL SERVICES

Contract N° : 192-TB04/ASB4-Huadong&ALSTOM

BETWEEN	EMPLOYER SB4 HPMB	ENGINEER MOTT MACDONALD
	CONTRACTOR:  HYDROCHINA HUADONG - ALSTOM CONSORTIUM 	
TITLE :	Instruction for 220kV Current Transformer	
DOCUMENT NUMBER	VNSB4-C6-4-901/Rev.A	For Information
	OUR REF NUMBER :	



陕制 00000520

**Instruction for
220kV Current Transformer
220 kV 系列电流互感器
使用说明书**

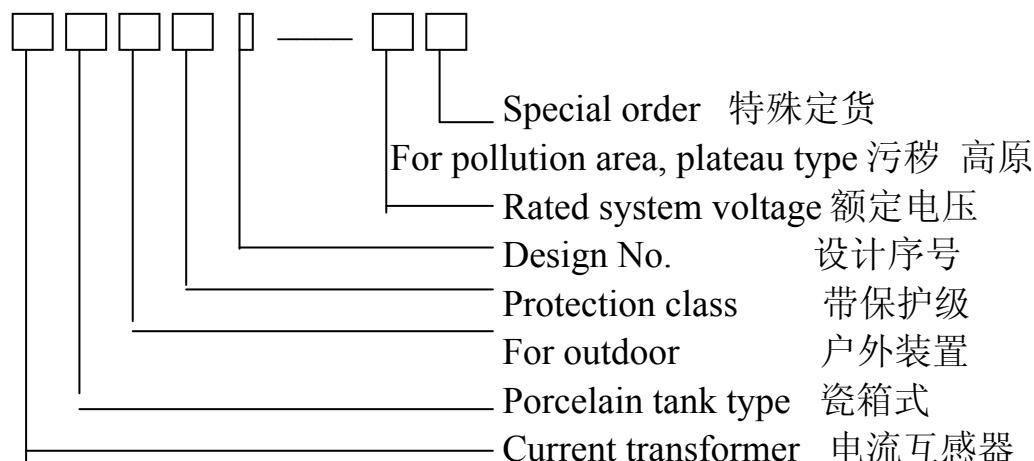
Please read the instruction carefully
Before installing and using the product
在安装和使用该产品之前，请仔细阅读说明书

Xi'an XD Power Capacitor Co., Ltd.
西安西电电力电容器有限责任公司

36-18-01
36-18-02

1 Brief 概述

1.1 Type and Name of the Product 产品型号和名称



Note: Main type as follow. 注：主要类型如下

LB-220(W2), LB₆-220(W2), LCWB-220(W2), LCWB₆-220(W2),
LB-220GYW, LB-230W, LB₆-220THW3

1.2 All performance index of 220kV current transformer accord with national standard GB1208-2006<Current Transformer>, IEC60044-1 and enterprise technical condition.

220kV 系列电流互感器的各项性能指标符合国标 GB1208-2006<<电流互感器>>、IEC60044-1 及工厂技术条件的规定。

2 Main Application, Scope and Operating Condition of the Product 产品主要用途、适用范围和环境条件

2.1 Product Application 产品用途

The product is intended to be used for current measurements and relay protection in grounded neutral power system with rated voltage of 220kV at a frequency of 50 Hz.

本系列产品适用于额定电压 220kV,频率 50Hz,中性点直接接地的电力系统中,作电流测量和继电保护用。

2.2 Scope 适用范围

The product is intended for outdoor installation with an altitude not exceeding 1000m.

本系列产品为户外装置,使用于海拔高度不超过 1000m。

Ambient Temperature 环境温度

Highest	40℃
Lowest	-45℃
Mean in any day	not exceeding 30℃

最高:	40℃
最低:	-45℃
日平均气温	不超过 30℃

3 The Main Technical Data and Performance Index

主要技术参数和性能指标

3.1 Technical Data 技术参数

3.1.1 Rated voltage 额定电压 220kV

3.1.2 Equipment maximum operating voltage 252kV
设备电高工作电压

3.1.3 Rated frequency 额定频率 50Hz

3.1.4 Rated current 额定一次电流

2×300、2×400、2×600、2×800、2×1000、2×1250A

the tap is permitted on the secondary winding

2×300、2×400、2×600、2×800、2×1000、2×1250A

(二次绕组允许有抽头)

3.1.5 Rated secondary current 5 A or 1 A

额定二次电流 5 A 或 1 A

3.1.6 Rated output 10~50 VA or according to the requirements
from the customers

额定输出 10~50 VA 或按用户要求

3.1.7 Combine of the accuracy classes 准确级次组合

According to the customers' requirements, transformers can be combined into 2-6 classes on the basis of 0.2 class、0.5 class、0.2S class、0.5S class、5P class、10P class and so on

符合用户合同要求, 可由 0.2 级、0.5 级、0.2S 级、0.5S 级、5P 级、10P 级等任意组成 2~8 个级次。

3.1.8 Standard accuracy limit factor ALF: 15、20

标准准确限值系数: ALF 为 15、20

3.1.9 Measuring instrument security factor FS: FS=5 or FS=10。

测量级仪表保安系数 FS: FS≤5 或 FS≤10。

3.1.10 Rated continuous thermal current 额定连续热电流

Rated continuous thermal current is rated primary current or as the requirements of the customers.

额定连续热电流为额定一次电流或按用户要求。

3.1.11 Short-time thermal current (r.m.s) and rated dynamic current (peak value), and listed in table 1 as follows:

短时热电流（方均根值）和额定动稳定电流（峰值）见表 1

Table 1

Rated current (A)	Short-time thermal current (max) kA	Rated dynamic current (max) (kA)
2×300	31.5-45 (3S)	80-115
2×400	31.5-45 (3S)	80-115
2×600	31.5-45 (3S)	80-115
2×800	50 (3S)	125
2×1000	50 (3S)	125
2×1250	50 (3S)	125
Note: It could also meet the special demands of customers.		

表 1

额定一次电流 (A)	额定短时热电流 (kA)	动稳定电流 (kA)
2×300	31.5-45 (3S)	80-115
2×400	31.5-45 (3S)	80-115
2×600	31.5-45 (3S)	80-115
2×800	50 (3S)	125
2×1000	50 (3S)	125
2×1250	50 (3S)	125
也可以满足客户的特殊要求。		

3.1.12 The polarity of the transformer: reduced polarity

互感器极性：减极性

3.2 Insulation Level 绝缘水平

3.2.1 1min short time power frequency withstand voltage

460kV (dry wet) (rms)
1min 工频耐受电压 460kV (干或湿) (有效值)

3.2.2 Rated lightning impulse withstand voltage

1050kV (peak)
雷电冲击耐受电压 1050kV (峰值)

3.3 Limits of temperature rise 温升限值

The primary current passed by the transformer is equal to the rated continuous thermal current, and brings with the load which is equal to the

rated output. Moreover, the temperature rise is less than that listed in table 3 when the power factor of the current transformer is from 0.8 (lag) to 1.

互感器通过的一次电流等于额定连续热电流，且带有相当于额定输出的负荷，其功率因数为 0.8（滞后）～1 时，其各部位的温升不超过表 2 规定数值

Table 2

Part	Limits of temperature rise
Primary, secondary winding	65K
Winding outlet or contact area	50 K
Oil top layer	55 K

表 2

部位	温升限值
一次绕组、二次绕组	65 K
绕组出头或接触连接处	50 K
油顶层	55 K

3.4 Partial Discharge 局部放电

After a prestressing performed according to procedures A or B, the partial discharge test voltages are reached, and the corresponding partial discharge levels are measured in a time within 30 s, the partial discharge capacity shall not exceed 5 pC.

在按程序A或程序B预加电压后，当达到局部放电试验电压时，在30S内测量局部放电水平，测量的局部放电水平应不超过5PC。

Procedure A: the partial discharge test voltages are reached while decreasing the voltage after the power-frequency withstand test.

Procedure B: the partial discharge test is performed after the power-frequency withstand test. The applied voltage is raised to 80 % of the power-frequency withstand voltage, maintained for not less than 60 s, then reduced without interruption to the specified partial discharge test voltages.

程序 A 在工频耐压试验之后的降压过程中，使电压达到局部放电测量电压。

程序 B 在工频耐压试验之后，进行局部放电试验。施加的电压升至工频耐受电压的 80%，持续时间不少于 60s。然后，直接降到规定的局部放电测量电压。

3.5 The Loss Rate of the Dielectric 介质损耗率($\tan \delta$)

The $\tan \delta$ is not exceeding 0.5%. 介质损耗率 $\tan \delta$ 不超过 0.5 %。

3.6 Limits of error 误差限值

3.6.1 Limits of error for measuring class 测量级误差限值

When the secondary burden is any value between 25%~100% of the rated burden, the current error and phase displacement at rated frequency should not exceed the limits given in table 4 as follows.

在二次负荷为额定负荷的 25%~100%之间的任一值时，其额定频率下的电流误差和相位差应不超过表 3 所列限值。

table 3

Accuracy class	Current (ratio) error $\pm\%$ at rated current shown below (%)				Phase displacement at rated current shown below (%)							
					$\pm (^{\circ})$				$\pm (\text{crad})$			
	5	20	100	120	5	20	100	120	5	20	100	120
0.1	0.4	0.2	0.1	0.1	15	8	5	5	0.45	0.24	0.15	0.15
0.2	0.75	0.35	0.2	0.2	30	15	10	10	0.9	0.45	0.3	0.3
0.5	1.5	0.75	0.5	0.5	90	45	30	30	2.7	1.35	0.9	0.9

表 3

准确级	电流误差 ($\pm\%$) 在下列额定电流 (%) 时				相位差, 在下列额定电流 (%) 时							
					$\pm (^{\circ})$				$\pm (\text{crad})$			
	5	20	100	120	5	20	100	120	5	20	100	120
0.1	0.4	0.2	0.1	0.1	15	8	5	5	0.45	0.24	0.15	0.15
0.2	0.75	0.35	0.2	0.2	30	15	10	10	0.9	0.45	0.3	0.3
0.5	1.5	0.75	0.5	0.5	90	45	30	30	2.7	1.35	0.9	0.9

3.6.2 Limits of error for protective class 保护级的误差限值

At rated frequency and rated burden, the current error, phase displacement and composite error of the transformer should be less than the limits given in table 5 as below:

在额定频率和额定负荷下，其电流误差、相位差和复合误差应不超过表 4 所列限值。

Table4

Accuracy class	The current error of the rated primary current, $\pm\%$	The phase difference of the rated primary current	
		$\pm (^{\circ})$	$\pm (\text{crad})$
5P	1	60	1.8
10P	3	---	---

表 4

准确级	电流误差 ($\pm\%$) 在下列额定电流 (%) 时	相位差, 在下列额定电流 (%) 时	
		$\pm (^{\circ})$	$\pm (\text{crad})$
5P	1	60	1.8

10P	3	---	---
-----	---	-----	-----

3.7 Product dimensions and installation dimensions see Figure 1.

产品外形尺寸及安装尺寸见附图 1.

4. Configuration of the product 产品结构

The product consists of body, oil tank, porcelain bushing, porcelain top cover, metallic expander. Inside it, there is filled with transformer oil.

该产品属全密封性，油纸复合绝缘型正立式电流互感器，由器身、油箱、瓷套、瓷箱帽、金属膨胀器等五部分构成。

5. Installation and Running 安装和运行

The product must be installed on the solid platform, and installed in a place without serious vibration and without filth, erodent and explosive dielectric which effect transformer's insulation seriously in atmosphere.

产品必须安装在坚固的平台上，安装场所应无严重的震动，且大气中无严重影响互感器绝缘的污秽及侵蚀性和爆炸性介质。

6. Usage and Maintenance 使用与维护

***6.1 The end shield and grounded terminal should be earthed reliably before putting into running.

投运前，应将末屏、接地端子可靠接地。

***6.2 The terminal P1 is the inlet end of the primary winding. The terminal P2 is the outlet end of the primary winding.

P1 端子为一次线圈进线端，P2 端子为一次线圈的出线端。

***6.3 When the product put into operation, it isn't allowed that every secondary winding is in open circuit (except the empty terminal), otherwise there will be high open voltage.

使用时各二次线圈不允许开路（空端子除外），否则将出现较高的开路电压。

6.4.1 The product is fully sealed construction with slight positive pressure inside and ensure inner insulation reliability.

本产品为全密封结构，其内部处于微正压状态，保证产皮你内部绝缘性能稳定。

6.4.2 The oil level indicator shall not be lower than oil level line relevant to the actual temperature.

油位指示应不低于相应温度的油位线。

7. Packaging, Transportation and Storage 包装、运输和保存

7.1 运输 Transportation

产品卧放运输。

使用何种运输方式（如：铁路运输，海/河运，公路运输，空运等），取决于产品运输的距离和范围。运输中产品包装须保证必要的支架和衬垫，以防止运输中的损坏。

仔细查看包装箱上的所有运输标记，尤其是运输方向。

Transportation for the fell flat of production

It depends on the distance and the scope of transportation for product that what kind of transport mode to be chosen, such as by railway, by sea/ river, by road, by air and so on. Moreover, in order to avoid attainting the products during the transportation, the bracket and the gasket must be included in the package of the products.

It should check out all of the markers, especially the transport direction on the package carefully.

7.2 现场搬运和存储 Storage

在接着的现场搬运中应采用与运输中相同的防范措施。如需进行长距离搬运，建议保持互感器的原有包装或按原有形式进行重新装箱。

It should carry the products as the measurement of the transportation. If it needs to move for long distance, it is suggested that to pack the products as original form or keep original package before movement.

如果互感器在投入运行前将被放置一段时间，则应采取以下措施：

- a) 将互感器存储在安全、通风条件良好，并且不会使其倾覆的环境中，装箱或不装箱均可。
- b) 在任何情况下，互感器卧倒放置的时间都不能过长。
- c) 按 8 节所述移开金属膨胀器周围的运输防护装置。
- e) 存储时的温度条件同运行。

It should take the measures as follows, if the transformer has been kept for long time before the operation:

- a) The place for the reservation of the transformer should be safe, perfect ventilated environment with or without package.
- b) In any case, the current can not be laid for long time
- c) The protect fittings of the dilate organ should be moved as the requirement mentioned in the section8.
- e) The temperature should be considered when the product is stored.

8. 金属膨胀器的运输保护

Transportation protection for the metal dilate organ

- 注意：（1）在运输和现场搬运后移开膨胀器外罩。
（2）移走所有的运输保护垫块并将外罩放回原处。
（3）用预先安装的螺栓紧固。请参见图 4

Note: please take the drawing 4 as the reference.

- （1）It should remove the cover of dilate organ after load on the transportation and the site.
（2）It should remove all the protect mat block for the transportation.
（3）It should put the cover on the original place, and the dilate organ should be fastened by the pre-installed bolt.

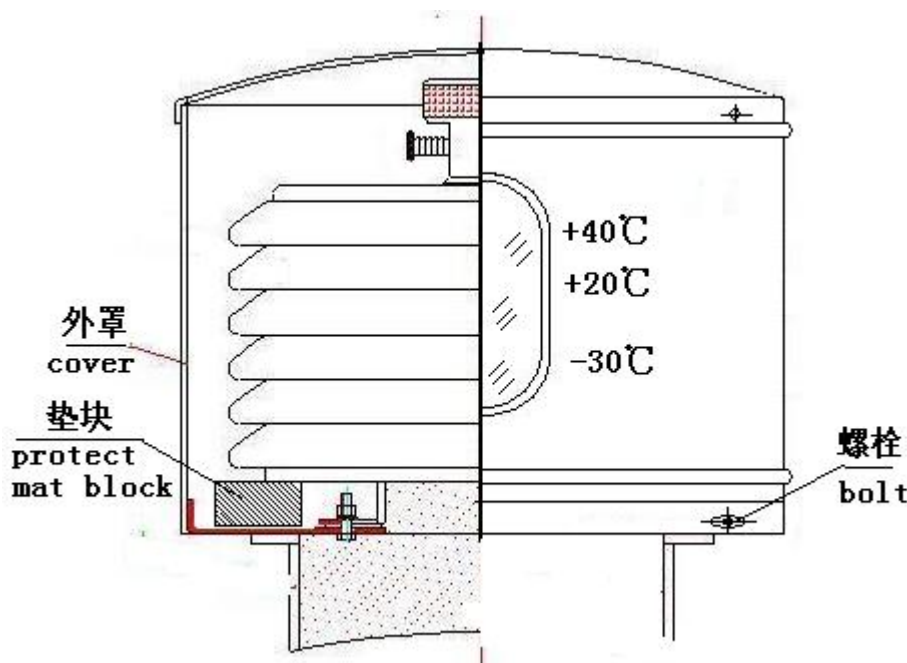


图 (Fig) 4

9. Attached Documents 随机文件

Instruction, Certificate of routine test.
使用说明书、出厂试验合格证。

10. Ordering 订货须知

When ordering, please specify clearly the product type, rated voltage, rated current ratio, accuracy class, rated output capacitance and temperature classification of service condition.

订货时应指明产品型号、额定电压、额定电流比、准确级、额定输出容量及使用环境的温度类别。

Note: “***”-----user must attention specially
 注: “***” 用户需要特别注意

Please make contact with the factory party right away if there is any question in the process of use.

用户在使用过程中如有什么疑问，请速与厂家联系。

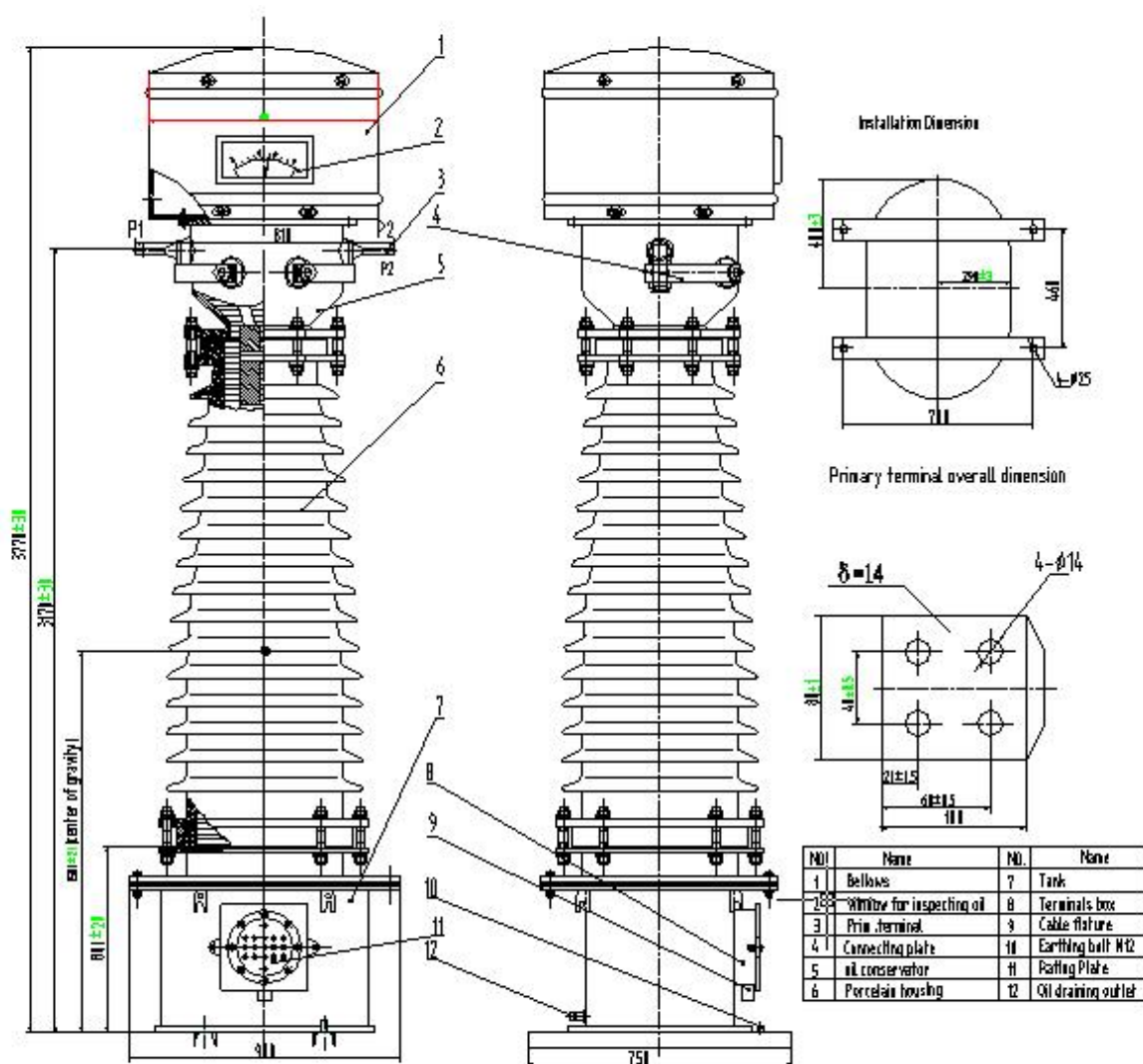


Fig.1 Current transformer

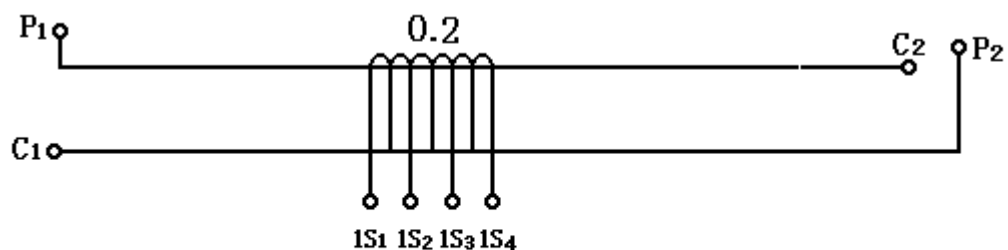


Fig. 2 Principle diagram

电气原理图

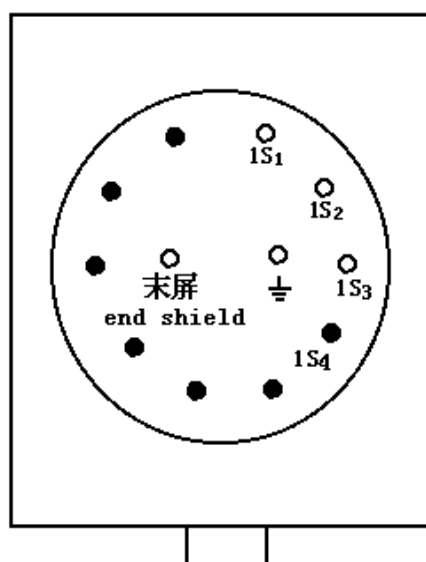


Fig. 3 Secondary connections

※ 1、The end shield and grounded terminal should be earthed reliably before putting into running.

在投入运行前请将末屏与接地端子可靠接地。

2、When the product put into operation, it isn't allowed that every secondary winding is in open circuit (except the empty terminal), otherwise there will be high open voltage.

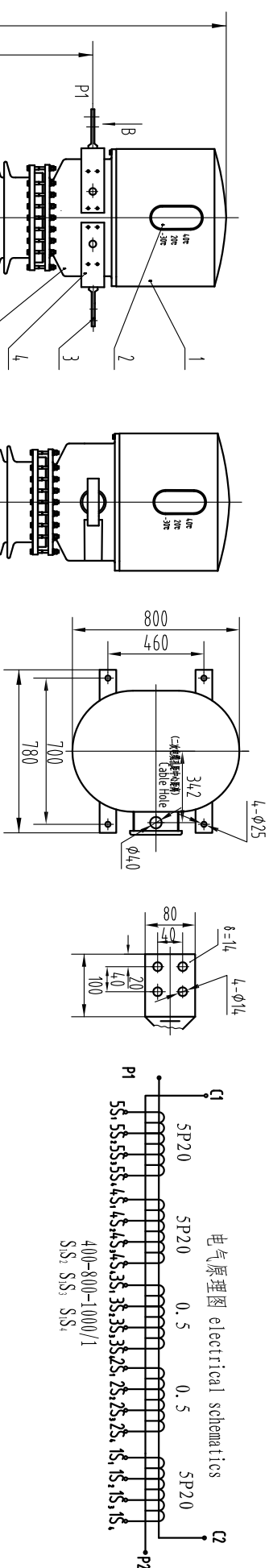
使用时各二次线圈不允许开路（空端子除外），否则将出现较高的开路电压。

Xi' an XD Power Capacitor Co., Ltd.
西安西电电力电容器有限责任公司
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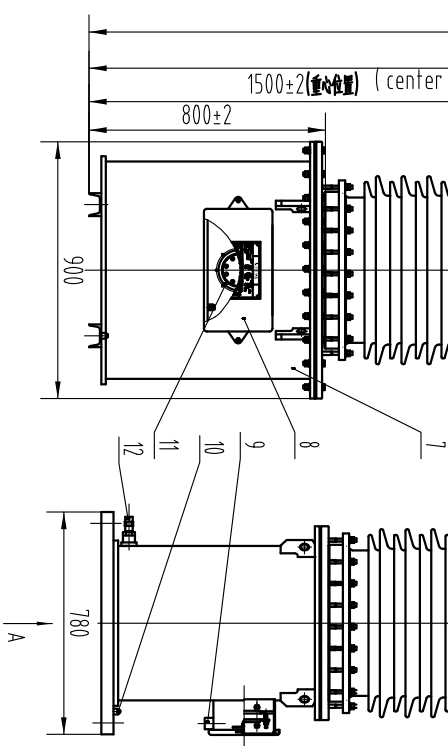
Part 4:

Drawings

安装尺寸A向
Installation Dimension
一次接线端子尺寸(B向)
Primary terminal overall dimension



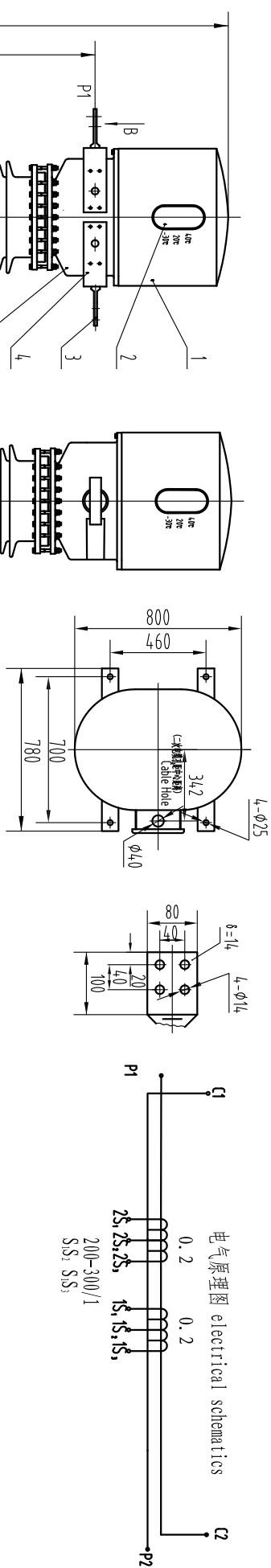
一次端子板材质: 紫铜 primary terminal material: red copper
出线盒材质: 钢制 Outgoing line box material: steel
产品净重 product NW: 1350kg 油重 Oil weight: 350kg 运输重量 Shipping eight: 1778kg
运输尺寸 Shipping dimension: 422*1060*4300mm
型号 type: LB-220 额定电流比 rated transformation ratio: 400-800-1000/1A (13台 set)
准确级组合 accuracy class: 5P20/5P20/0.5/0.5/5P20 (5S 1S)
额定输出 rated output: 30VA
爬电距离 creepage distance: 2.5cm/kV 海拔高度 altitude: 1000m



- 膨胀器 Bellows
- 油位视窗 Window for inspecting oil
- 一次接线端子 Prim. terminal
- 联板 Connecting plate
- 瓷箱帽 oil conservator
- 瓷套 Porcelain housing
- 油箱 Tank
- 出线盒 Terminals box
- 出线头 outgoing line
- 接地螺栓 Earthing bolt
- 二次接线盘 Rating Plate
- 放油阀 oil draining outlet

Comments:									

安装尺寸A向
Installation Dimension
一次接线端子尺寸(B向)
Primary terminal overall dimension





一次端子板材质: 紫铜 primary terminal material: red copper
出线盒材质: 钢制 Outgoing line box material: steel
产品净重product NW: 1350kg 油重 Oil weight: 350kg 运输重量Shipping eight: 1778kg
运输尺寸Shipping dimension: 422*1060*4300mm
型号type: LB-220 额定电流比rated transformation ratio: 200-300/1A (7台set)
准确级组合accuracy class: 0.2/0.2(2S_1S)
额定输出rated output: 30VA
爬电距离creepage distance: 2.5cm/kV 海拔高度altitude: 1000m

- 1 膨胀器 Bellows
- 2 油位视察窗 Window for inspecting oil
- 3 一次接线端子 Prim. terminal
- 4 联板 Connecting plate
- 5 瓷箱帽 oil conservator
- 6 瓷套 Porcelain housing
- 7 油箱 Tank
- 8 出线盒 Terminals box
- 9 出线头 outgoing line
- 10 接地螺栓 Earthing bolt M12
- 11 二次接线盘 Rating Plate
- 12 放油阀 Oil draining outlet

Comments:									
REV	DRAWN	CHECKED	APPROVED	MODIFICATIONS			STATUS		
A	Wong Hing Hoi Date: 2013.10.22	Wong Hing Hoi Date: 2013.10.22	None None	ORIGINAL ISSUE					
VIET NAM ELECTRICITY									
Song Bung 4 Hydropower Project									
(2 x 75MW Turbine Generator, 250rpm, 116kv)									
Package 4 (TB-04): SUPPLY, TRANSPORTATION, STORAGE AND PRESERVATION, INSTALLATION, PRE-COMMISSIONING AND COMMISSIONING OF ELECTRO-MECHANICAL EQUIPMENT AND TECHNICAL SERVICES									
Contract No.: 192-TB04/SSB-HuadongAUSTON									
EMPLOYER: SBA HNB		ENGINEER: MOTT MACDONALD		CONTRACTOR: HUADONGA HUADONG-AUSTON CONSORTIUM					
PROJECT DRAWING No.			VNSB-C6-4-002/Rev A		FOR INFORMATION				
Designed		Standardized	Current Transformer		Drawing No.		Weight/kg		Scale
Checked		authorized							
B x amined		Approved			Total page		Page		
Signature		Date			XD XI'AN XD POWER CAPACITOR CO., LTD.				

Part 5:

Test Reports

Comments:					
A	Wu 15/3/2014	Duan 18/3/2014	Duan 18/3/2014	ORIGINAL ISSUE	I
REV	PREPARED	CHECKED	APPROVED	MODIFICATIONS	STATUS
<p align="center"> SOCIALIST REPUBLIC OF VIET NAM VIETNAM ELECTRICITY SONG BUNG 4 HYDROPOWER MANAGEMENT BOARD SONG BUNG 4 HYDROPOWER PROJECT 2x78MW Turbine Generator, 250rpm, 106m PACKAGE 4 (TB-04) SUPPLY, TRANSPORTATION, STORAGE AND PRESERVATION, INSTALLATION, PRE-COMMISSIONING AND COMMISSIONING OF ELECTRO-MECHANICAL EQUIPMENT AND TECHNICAL SERVICES Contract N° : 192-TB04/ASB4-Huadong&ALSTOM </p>					
BETWEEN	PURCHASER SB4 HPMB		ENGINEER MOTT MACDONALD		
	CONTRACTOR:  HYDROCHINA HUADONG – ALSTOM CONSORTIUM 				
TITLE :	Product Certificate for Current Transformer (Type 1: 400-800-1000/1A)				
DOCUMENT NUMBER		VNSB4-C6-4-801/Rev.A		FOR INFORMATION	
		OUR REF NUMBER :			

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陕制 00000520 号

NO:201304029

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.285	0.316	0.405
电容量(pF) Capacitance	936	936	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	850	60	通过 Passed
2s1s4	1000	800	60	通过 Passed
3s1s4	1000	775	60	通过 Passed
4s1s4	1000	910	60	通过 Passed
5s1s4	1000	685	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1668.5	1732.7	1761.0	1783.2	1803.1
2S ₁ S ₄	195.67	197.86	199.60	200.96	202.32
3S ₁ S ₄	206.02	207.85	209.65	211.03	212.41
4S ₁ S ₄	1676.9	1731.6	1758.0	1780.1	1799.3
5S ₁ S ₄	1672.8	1724.7	1753.4	1777.0	1796.3

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.45
2S ₁ S ₄	4.34
3S ₁ S ₄	4.35
4S ₁ S ₄	7.52
5S ₁ S ₄	7.55

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error
3S ₁ S ₃	5	7.5	-0.02	+1	30	-0.09	+4

	20		-0.02	+1		-0.08	+3
	100		-0.02	+1		-0.07	+1
	120		-0.02	+1		-0.07	+1
2S ₁ S ₃	5	7.5	-0.03	+1	30	-0.11	+4
	20		-0.03	+1		-0.11	+3
	100		-0.03	+1		-0.07	+1
	120		-0.03	+1		-0.07	+1
3S ₁ S ₄	5	7.5	-0.10	+1	30	-0.15	+4
	20		-0.10	+1		-0.15	+3
	100		-0.10	+1		-0.12	+1
	120		-0.10	+1		-0.12	+1
2S ₁ S ₄	5	7.5	-0.03	+1	30	-0.06	+3
	20		-0.03	+1		-0.06	+2
	100		-0.03	+1		-0.05	+1
	120		-0.03	+1		-0.05	+1
1S ₁ S ₄	100	7.5	+0.14	+1	30	+0.09	+1
4S ₁ S ₄	100	7.5	+0.14	+1	30	+0.08	+1
5S ₁ S ₄	100	7.5	+0.15	+1	30	+0.07	+1
1S ₁ S ₃	100	7.5	+0.19	+2	30	+0.08	+2
4S ₁ S ₃	100	7.5	+0.20	+2	30	+0.09	+2
5S ₁ S ₃	100	7.5	+0.17	+2	30	+0.07	+2
3S ₁ S ₂	5	7.5	-0.09	+4	30	-0.35	+11
	20		-0.09	+4		-0.30	+6
	100		-0.07	+2		-0.16	+2
	120		-0.07	+2		-0.16	+2
2S ₁ S ₂	5	7.5	-0.10	+5	30	-0.39	+15
	20		-0.11	+5		-0.37	+8
	100		-0.11	+1		-0.19	+1
	120		-0.11	+1		-0.18	+1
1S ₁ S ₂	7.5	7.5	+0.27	+4	30	-0.09	+5
4S ₁ S ₂	7.5	7.5	+0.21	+3	30	-0.06	+4
5S ₁ S ₂	7.5	7.5	+0.30	+3	30	-0.05	+4
备注 Remark	Workpiece No.: 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A						

2、结论 Conclusion:

本产品通过上述试验，其结果均符合技术条件及 GB1208-2006、JJG1021-2007 标准，产品合格，准许出厂。

The product passed all the tests above, the test result conform to the technical

specification and standard GB1208-2006、JJG1021-2007 The product is qualified and permitted to leave factory.



陕制 00000520 号

NO:201304030

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.307	0.340	0.453
电容量(pF) Capacitance	909	909	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	855	60	通过 Passed
2s1s4	1000	810	60	通过 Passed
3s1s4	1000	750	60	通过 Passed
4s1s4	1000	915	60	通过 Passed
5s1s4	1000	680	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1681.9	1731.1	1760.6	1784.1	1804.1
2S ₁ S ₄	206.02	207.85	209.65	211.03	212.41
3S ₁ S ₄	205.63	207.56	209.36	210.51	211.66
4S ₁ S ₄	1675.6	1722.2	1747.3	1768.1	1786.3
5S ₁ S ₄	1675.9	1763.3	1763.3	1784.0	1803.5

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.52
2S ₁ S ₄	4.34
3S ₁ S ₄	4.33
4S ₁ S ₄	7.47
5S ₁ S ₄	7.49

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
3S ₁ S ₃	5	7.5	-0.01	+1	30	-0.08	+4
	20		-0.02	+1		-0.08	+3
	100		-0.02	+1		-0.06	+1
	120		-0.02	+1		-0.06	+1
2S ₁ S ₃	5	7.5	-0.04	+2	30	-0.11	+5
	20		-0.04	+2		-0.11	+3
	100		-0.04	+1		-0.08	+1
	120		-0.04	+1		-0.08	+1
3S ₁ S ₄	5	7.5	-0.10	+1	30	-0.14	+3
	20		-0.10	+1		-0.14	+2
	100		-0.10	+1		-0.11	+1
	120		-0.10	+1		-0.11	+1
2S ₁ S ₄	5	7.5	-0.03	+1	30	-0.07	+3
	20		-0.03	+1		-0.07	+2
	100		-0.03	+1		-0.05	+1
	120		-0.03	+1		-0.05	+1
1S ₁ S ₄	100	7.5	+0.14	+1	30	+0.07	+1
4S ₁ S ₄	100	7.5	+0.15	+1	30	+0.08	+1
5S ₁ S ₄	100	7.5	+0.15	+1	30	+0.09	+1
1S ₁ S ₃	100	7.5	+0.18	+2	30	+0.09	+2
4S ₁ S ₃	100	7.5	+0.17	+1	30	+0.08	+2
5S ₁ S ₃	100	7.5	+0.20	+1	30	+0.10	+2
3S ₁ S ₂	5	7.5	-0.09	+4	30	-0.34	+12
	20		-0.09	+4		-0.30	+6
	100		-0.08	+2		-0.17	+2
	120		-0.08	+2		-0.17	+2
2S ₁ S ₂	5	7.5	-0.09	+5	30	-0.42	+15
	20		-0.09	+5		-0.38	+8
	100		-0.08	+1		-0.20	+1
	120		-0.08	+1		-0.18	+1
1S ₁ S ₂	7.5	7.5	+0.29	+4	30	-0.10	+5
4S ₁ S ₂	7.5	7.5	+0.28	+4	30	-0.09	+4
5S ₁ S ₂	7.5	7.5	+0.31	+3	30	-0.08	+4

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品通过上述试验，其结果均符合技术条件及 GB1208-2006、JJG1021-2007 标准，产品合格，准许出厂。

The product passed all the tests above, the test result conform to the technical specification and standard GB1208-2006、JJG1021-2007 The product is qualified and permitted to leave factory.



陕制 00000520 号

NO:201304031

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.304	0.329	0.465
电容量(pF) Capacitance	918	918	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	955	60	通过 Passed
2s1s4	1000	710	60	通过 Passed
3s1s4	1000	650	60	通过 Passed
4s1s4	1000	815	60	通过 Passed
5s1s4	1000	780	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1675.6	1722.2	1747.3	1768.1	1786.3
2S ₁ S ₄	195.67	197.86	199.60	200.96	202.32
3S ₁ S ₄	206.02	207.85	209.65	211.03	214.41
4S ₁ S ₄	1672.8	1724.7	1753.4	1777.0	1796.3
5S ₁ S ₄	1681.9	1731.1	1760.6	1784.1	1804.1

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.52
2S ₁ S ₄	4.33
3S ₁ S ₄	4.34
4S ₁ S ₄	7.49
5S ₁ S ₄	7.59

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
3S ₁ S ₃	5	7.5	-0.02	+1	30	-0.08	+4
	20		-0.02	+1		-0.08	+3
	100		-0.02	+1		-0.06	+1
	120		-0.02	+1		-0.06	+1
2S ₁ S ₃	5	7.5	-0.03	+2	30	-0.10	+4
	20		-0.03	+2		-0.10	+3
	100		-0.03	+1		-0.07	+1
	120		-0.03	+1		-0.07	+1
3S ₁ S ₄	5	7.5	-0.11	+1	30	-0.15	+3
	20		-0.11	+1		-0.15	+2
	100		-0.11	+1		-0.12	+1
	120		-0.11	+1		-0.12	+1
2S ₁ S ₄	5	7.5	-0.02	+1	30	-0.06	+3
	20		-0.02	+1		-0.06	+2
	100		-0.02	+1		-0.05	+1
	120		-0.02	+1		-0.04	+1
1S ₁ S ₄	100	7.5	+0.15	+1	30	+0.08	+1
4S ₁ S ₄	100	7.5	+0.14	+1	30	+0.08	+1
5S ₁ S ₄	100	7.5	+0.16	+1	30	+0.11	0
1S ₁ S ₃	100	7.5	+0.18	+2	30	+0.08	+2
4S ₁ S ₃	100	7.5	+0.17	+2	30	+0.07	+2
5S ₁ S ₃	100	7.5	+0.20	+1	30	+0.10	+2
3S ₁ S ₂	5	7.5	-0.08	+4	30	-0.32	+12
	20		-0.08	+4		-0.29	+6
	100		-0.07	+2		-0.17	+2
	120		-0.07	+2		-0.17	+2
2S ₁ S ₂	5	7.5	-0.10	+5	30	-0.40	+15
	20		-0.10	+5		-0.37	+8
	100		-0.08	+1		-0.21	+1
	120		-0.08	+1		-0.19	+1
1S ₁ S ₂	7.5	7.5	+0.28	+4	30	-0.09	+5
4S ₁ S ₂	7.5	7.5	+0.31	+3	30	-0.05	+4
5S ₁ S ₂	7.5	7.5	+0.30	+3	30	-0.04	+4

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品通过上述试验，其结果均符合技术条件及 GB1208-2006、JJG1021-2007 标准，产品合格，准许出厂。

The product passed all the tests above, the test result conform to the technical specification and standard GB1208-2006、JJG1021-2007 The product is qualified and permitted to leave factory.



陕制 00000520 号

NO:201304032

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.302	0.321	0.473
电容量(pF) Capacitance	934	934	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	930	60	通过 Passed
2s1s4	1000	795	60	通过 Passed
3s1s4	1000	680	60	通过 Passed
4s1s4	1000	825	60	通过 Passed
5s1s4	1000	760	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1656.8	1722.6	1748.7	1770.9	1787.8
2S ₁ S ₄	206.47	207.69	208.91	210.13	211.36
3S ₁ S ₄	200.45	202.83	207.57	205.97	207.38
4S ₁ S ₄	1666.3	1712.8	1740.9	1760.6	1779.6
5S ₁ S ₄	1656.8	1722.6	1748.7	1770.9	1787.8

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.56
2S ₁ S ₄	4.17
3S ₁ S ₄	4.34
4S ₁ S ₄	7.53
5S ₁ S ₄	7.57

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error
3S ₁ S ₃	5	7.5	-0.03	+1	30	-0.08	+3
	20		-0.02	+1		-0.05	+2
	100		-0.02	+1		-0.05	+1
	120		-0.02	+1		-0.05	+1
2S ₁ S ₃	5	7.5	-0.03	+2	30	-0.10	+4
	20		-0.03	+2		-0.09	+3
	100		-0.03	+1		-0.07	+1
	120		-0.02	+1		-0.07	+1
3S ₁ S ₄	5	7.5	-0.11	+1	30	-0.17	+4
	20		-0.11	+1		-0.15	+2
	100		-0.10	+1		-0.12	+1
	120		-0.09	+1		-0.12	+1
2S ₁ S ₄	5	7.5	-0.02	+1	30	-0.06	+3
	20		-0.03	+1		-0.06	+3
	100		-0.02	+1		-0.05	+1
	120		-0.02	+1		-0.04	+1
1S ₁ S ₄	100	7.5	+0.17	+1	30	+0.08	+1
4S ₁ S ₄	100	7.5	+0.16	+1	30	+0.08	+1
5S ₁ S ₄	100	7.5	+0.15	+1	30	+0.13	+2
1S ₁ S ₃	100	7.5	+0.16	+2	30	+0.09	+2
4S ₁ S ₃	100	7.5	+0.18	+2	30	+0.10	+2
5S ₁ S ₃	100	7.5	+0.19	+2	30	+0.11	+2
3S ₁ S ₂	5	7.5	-0.08	+4	30	-0.31	+12
	20		-0.07	+2		-0.28	+6
	100		-0.07	+2		-0.17	+2
	120		-0.06	+2		-0.17	+2
2S ₁ S ₂	5	7.5	-0.11	+5	30	-0.41	+15
	20		-0.10	+5		-0.38	+10
	100		-0.09	+2		-0.21	+2
	120		-0.08	+1		-0.19	+1
1S ₁ S ₂	7.5	7.5	+0.28	+4	30	-0.09	+5
4S ₁ S ₂	7.5	7.5	+0.31	+3	30	-0.07	+4
5S ₁ S ₂	7.5	7.5	+0.30	+3	30	-0.04	+3

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304033

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.294	0.346	0.393
电容量(pF) Capacitance	949	949	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	935	60	通过 Passed
2s1s4	1000	790	60	通过 Passed
3s1s4	1000	685	60	通过 Passed
4s1s4	1000	820	60	通过 Passed
5s1s4	1000	765	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1683.9	1732.3	1760.5	1782.7	1802.6
2S ₁ S ₄	207.53	210.37	211.41	212.45	213.49
3S ₁ S ₄	198.91	200.08	201.24	202.41	203.68
4S ₁ S ₄	1686.9	1750.6	1778.9	1801.8	1822.4
5S ₁ S ₄	1669.1	1734.8	1765.2	1785.9	1805.6

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.50
2S ₁ S ₄	4.20
3S ₁ S ₄	4.20
4S ₁ S ₄	7.46
5S ₁ S ₄	7.64

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
3S ₁ S ₃	5	7.5	-0.02	+1	30	-0.08	+4
	20		-0.02	+1		-0.08	+3
	100		-0.02	+1		-0.06	+1
	120		-0.02	+1		-0.06	+1
2S ₁ S ₃	5	7.5	-0.03	+2	30	-0.10	+4
	20		-0.03	+2		-0.10	+3
	100		-0.03	+1		-0.07	+1
	120		-0.03	+1		-0.07	+1
3S ₁ S ₄	5	7.5	-0.11	+1	30	-0.15	+3
	20		-0.11	+1		-0.15	+2
	100		-0.11	+1		-0.12	+1
	120		-0.11	+1		-0.12	+1
2S ₁ S ₄	5	7.5	-0.02	+1	30	-0.06	+3
	20		-0.02	+1		-0.06	+2
	100		-0.02	+1		-0.05	+1
	120		-0.02	+1		-0.04	+1
1S ₁ S ₄	100	7.5	+0.15	+1	30	+0.08	+1
4S ₁ S ₄	100	7.5	+0.14	+1	30	+0.08	+1
5S ₁ S ₄	100	7.5	+0.16	+1	30	+0.11	0
1S ₁ S ₃	100	7.5	+0.18	+2	30	+0.08	+2
4S ₁ S ₃	100	7.5	+0.17	+2	30	+0.07	+2
5S ₁ S ₃	100	7.5	+0.20	+1	30	+0.10	+2
3S ₁ S ₂	5	7.5	-0.08	+4	30	-0.31	+12
	20		-0.07	+2		-0.28	+6
	100		-0.07	+2		-0.17	+2
	120		-0.06	+2		-0.17	+2
2S ₁ S ₂	5	7.5	-0.11	+5	30	-0.41	+15
	20		-0.10	+5		-0.38	+10
	100		-0.09	+2		-0.21	+2
	120		-0.08	+1		-0.19	+1
1S ₁ S ₂	7.5	7.5	+0.28	+4	30	-0.09	+5
4S ₁ S ₂	7.5	7.5	+0.31	+3	30	-0.07	+4
5S ₁ S ₂	7.5	7.5	+0.30	+3	30	-0.04	+3

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304034

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.314	0.329	0.511
电容量(pF) Capacitance	917	917	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	945	60	通过 Passed
2s1s4	1000	760	60	通过 Passed
3s1s4	1000	675	60	通过 Passed
4s1s4	1000	850	60	通过 Passed
5s1s4	1000	735	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1681.9	1731.1	1760.6	1784.31	1804.1
2S ₁ S ₄	198.06	200.14	201.81	203.17	204.53
3S ₁ S ₄	195.67	197.86	199.60	200.96	202.32
4S ₁ S ₄	1672.8	1724.7	1753.4	1777.0	1796.3
5S ₁ S ₄	1675.6	1722.2	1747.3	1768.1	1786.3

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.59
2S ₁ S ₄	4.33
3S ₁ S ₄	4.34
4S ₁ S ₄	7.49
5S ₁ S ₄	7.59

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error
3S ₁ S ₃	5	7.5	-0.03	+1	30	-0.09	+5
	20		-0.03	+1		-0.09	+3
	100		-0.03	+1		-0.07	+1
	120		-0.03	+1		-0.07	+1
2S ₁ S ₃	5	7.5	-0.04	+2	30	-0.11	+5
	20		-0.04	+1		-0.11	+3
	100		-0.04	+1		-0.08	+1
	120		-0.04	+1		-0.08	+1
3S ₁ S ₄	5	7.5	-0.12	+1	30	-0.16	+4
	20		-0.12	+1		-0.16	+2
	100		-0.11	+1		-0.13	+1
	120		-0.11	+1		-0.13	+1
2S ₁ S ₄	5	7.5	-0.03	+1	30	-0.07	+3
	20		-0.03	+1		-0.07	+2
	100		-0.03	+1		-0.05	+1
	120		-0.03	+1		-0.05	+1
1S ₁ S ₄	100	7.5	+0.16	+1	30	+0.09	+1
4S ₁ S ₄	100	7.5	+0.15	+1	30	+0.08	+1
5S ₁ S ₄	100	7.5	+0.17	+1	30	+0.10	+1
1S ₁ S ₃	100	7.5	+0.20	+2	30	+0.09	+2
4S ₁ S ₃	100	7.5	+0.19	+2	30	+0.09	+2
5S ₁ S ₃	100	7.5	+0.18	+2	30	+0.10	+2
3S ₁ S ₂	5	7.5	-0.08	+4	30	-0.33	+11
	20		-0.08	+4		-0.30	+7
	100		-0.07	+2		-0.16	+2
	120		-0.07	+2		-0.16	+2
2S ₁ S ₂	5	7.5	-0.11	+5	30	-0.42	+14
	20		-0.11	+4		-0.37	+8
	100		-0.09	+1		-0.20	+1
	120		-0.09	+1		-0.18	+1
1S ₁ S ₂	7.5	7.5	+0.27	+4	30	-0.10	+5
4S ₁ S ₂	7.5	7.5	+0.28	+4	30	-0.09	+4
5S ₁ S ₂	7.5	7.5	+0.30	+3	30	-0.07	+4

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304035

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.325	0.306	0.395
电容量(pF) Capacitance	850	850	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	645	60	通过 Passed
2s1s4	1000	860	60	通过 Passed
3s1s4	1000	975	60	通过 Passed
4s1s4	1000	750	60	通过 Passed
5s1s4	1000	835	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1683.9	1732.3	1760.5	1782.7	1802.6
2S ₁ S ₄	207.53	210.37	211.41	212.45	213.49
3S ₁ S ₄	198.91	200.08	201.24	202.41	203.68
4S ₁ S ₄	1686.9	1750.6	1778.9	1801.8	1822.4
5S ₁ S ₄	1669.1	1734..8	1765.2	1785.9	1805.6

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.50
2S ₁ S ₄	4.20
3S ₁ S ₄	4.20
4S ₁ S ₄	7.46
5S ₁ S ₄	7.64

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error
3S ₁ S ₃	5	7.5	-0.03	+1	30	-0.09	+4
	20		-0.03	+1		-0.09	+3
	100		-0.03	+1		-0.07	+1
	120		-0.03	+1		-0.07	+1
2S ₁ S ₃	5	7.5	-0.02	+2	30	-0.11	+4
	20		-0.02	+1		-0.11	+3
	100		-0.02	+1		-0.08	+1
	120		-0.02	+1		-0.08	+1
3S ₁ S ₄	5	7.5	-0.12	+1	30	-0.16	+3
	20		-0.12	+1		-0.16	+2
	100		-0.12	+1		-0.13	+1
	120		-0.12	+1		-0.13	+1
2S ₁ S ₄	5	7.5	-0.03	+1	30	-0.07	+3
	20		-0.03	+1		-0.07	+2
	100		-0.03	+1		-0.06	+1
	120		-0.03	+1		-0.05	+1
1S ₁ S ₄	100	7.5	+0.14	+1	30	+0.07	+1
4S ₁ S ₄	100	7.5	+0.13	+1	30	+0.07	+1
5S ₁ S ₄	100	7.5	+0.15	+1	30	+0.10	0
1S ₁ S ₃	100	7.5	+0.17	+2	30	+0.07	+2
4S ₁ S ₃	100	7.5	+0.16	+2	30	+0.06	+2
5S ₁ S ₃	100	7.5	+0.19	+1	30	+0.09	+2
3S ₁ S ₂	5	7.5	-0.09	+4	30	-0.33	+12
	20		-0.09	+4		-0.30	+6
	100		-0.08	+2		-0.18	+2
	120		-0.08	+2		-0.18	+2
2S ₁ S ₂	5	7.5	-0.11	+5	30	-0.41	+15
	20		-0.11	+5		-0.38	+8
	100		-0.09	+1		-0.22	+1
	120		-0.09	+1		-0.20	+1
1S ₁ S ₂	7.5	7.5	+0.27	+4	30	-0.10	+5
4S ₁ S ₂	7.5	7.5	+0.30	+3	30	-0.06	+4
5S ₁ S ₂	7.5	7.5	+0.29	+3	30	-0.05	+4

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304036

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核:

Checker :

批准:

Approval:

日期:

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.304	0.339	0.462
电容量(pF) Capacitance	944	944	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	640	60	通过 Passed
2s1s4	1000	865	60	通过 Passed
3s1s4	1000	970	60	通过 Passed
4s1s4	1000	755	60	通过 Passed
5s1s4	1000	830	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1657.4	1725.5	1753.7	1775.7	1795.5
2S ₁ S ₄	207.75	210.26	211.39	212.53	213.66
3S ₁ S ₄	200.45	202.83	204.57	205.97	207.38
4S ₁ S ₄	1667.1	1715.2	1742.1	1763.7	1782.1
5S ₁ S ₄	1679.7	1739.8	1765.7	1788.6	1807.0

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.50
2S ₁ S ₄	4.20
3S ₁ S ₄	4.20
4S ₁ S ₄	7.46
5S ₁ S ₄	7.56

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
3S ₁ S ₃	5	7.5	-0.04	+2	30	-0.09	+3
	20		-0.03	+2		-0.07	+2
	100		-0.02	+1		-0.05	+1
	120		-0.01	+1		-0.04	+1
2S ₁ S ₃	5	7.5	-0.04	+2	30	-0.11	+4
	20		-0.03	+1		-0.09	+3
	100		-0.03	+1		-0.07	+1
	120		-0.01	+1		-0.07	+1
3S ₁ S ₄	5	7.5	-0.13	+1	30	-0.08	+4
	20		-0.12	+1		-0.07	+3
	100		-0.11	+1		-0.05	+2
	120		-0.09	+1		-0.04	+1
2S ₁ S ₄	5	7.5	-0.04	+1	30	+0.08	+1
	20		-0.03	+2		+0.07	+1
	100		-0.02	+1		+0.08	+2
	120		-0.02	+1		+0.04	+2
1S ₁ S ₄	100	7.5	+0.18	+1	30	+0.09	+2
4S ₁ S ₄	100	7.5	+0.18	+1	30	+0.09	+2
5S ₁ S ₄	100	7.5	+0.17	+1	30	+0.11	+2
1S ₁ S ₃	100	7.5	+0.22	+2	30	+0.13	+4
4S ₁ S ₃	100	7.5	+0.19	+2	30	+0.11	+3
5S ₁ S ₃	100	7.5	+0.18	+2	30	+0.11	+3
3S ₁ S ₂	5	7.5	-0.08	+4	30	-0.27	+11
	20		-0.08	+3		-0.25	+8
	100		-0.07	+2		-0.15	+3
	120		-0.06	+2		-0.14	+3
2S ₁ S ₂	5	7.5	-0.08	+4	30	-0.30	+12
	20		-0.08	+2		-0.29	+6
	100		-0.07	+2		-0.18	+2
	120		-0.06	+2		-0.16	+2
1S ₁ S ₂	7.5	7.5	+0.28	+4	30	-0.11	+5
4S ₁ S ₂	7.5	7.5	-0.31	+5	30	-0.09	+4
5S ₁ S ₂	7.5	7.5	-0.29	+4	30	-0.07	+3

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304037

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.326	0.316	0.395
电容量(pF) Capacitance	921	921	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	680	60	通过 Passed
2s1s4	1000	875	60	通过 Passed
3s1s4	1000	960	60	通过 Passed
4s1s4	1000	745	60	通过 Passed
5s1s4	1000	820	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1686.9	1750.6	1778.9	1801.8	1822.4
2S ₁ S ₄	207.53	210.37	211.41	212.45	213.49
3S ₁ S ₄	198.91	200.08	201.24	202.41	203.68
4S ₁ S ₄	1683.9	1732.3	1760.5	1782.7	1802.6
5S ₁ S ₄	1669.1	1734.8	1765.2	1785.9	1805.6

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.64
2S ₁ S ₄	4.20
3S ₁ S ₄	4.20
4S ₁ S ₄	7.64
5S ₁ S ₄	7.50

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
3S ₁ S ₃	5	7.5	0	+1	30	-0.06	+4
	20		0	+1		-0.06	+3
	100		0	+1		-0.04	+1
	120		0	+1		-0.04	+1
2S ₁ S ₃	5	7.5	-0.01	+2	30	-0.08	+4
	20		-0.01	+2		-0.08	+3
	100		-0.01	+1		-0.05	+1
	120		-0.01	+1		-0.05	+1
3S ₁ S ₄	5	7.5	-0.09	+1	30	-0.13	+3
	20		-0.09	+1		-0.13	+2
	100		-0.09	+1		-0.10	+1
	120		-0.09	+1		-0.10	+1
2S ₁ S ₄	5	7.5	0	+1	30	-0.04	+3
	20		0	+1		-0.04	+2
	100		0	+1		-0.04	+1
	120		0	+1		-0.04	+1
1S ₁ S ₄	100	7.5	+0.17	+1	30	+0.10	+1
4S ₁ S ₄	100	7.5	+0.16	+1	30	+0.10	+1
5S ₁ S ₄	100	7.5	+0.18	+1	30	+0.13	0
1S ₁ S ₃	100	7.5	+0.19	+2	30	+0.10	+2
4S ₁ S ₃	100	7.5	+0.19	+2	30	+0.09	+2
5S ₁ S ₃	100	7.5	+0.21	+1	30	+0.12	+2
3S ₁ S ₂	5	7.5	-0.06	+4	30	-0.30	+12
	20		-0.06	+4		-0.27	+6
	100		-0.06	+2		-0.15	+2
	120		-0.05	+2		-0.14	+2
2S ₁ S ₂	5	7.5	-0.08	+5	30	-0.38	+15
	20		-0.08	+5		-0.35	+8
	100		-0.06	+1		-0.19	+1
	120		-0.06	+1		-0.17	+1
1S ₁ S ₂	7.5	7.5	+0.29	+4	30	-0.07	+5
4S ₁ S ₂	7.5	7.5	+0.33	+3	30	-0.07	+4
5S ₁ S ₂	7.5	7.5	+0.32	+3	30	-0.03	+4

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304038

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.316	0.325	0.560
电容量(pF) Capacitance	917	917	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	685	60	通过 Passed
2s1s4	1000	870	60	通过 Passed
3s1s4	1000	965	60	通过 Passed
4s1s4	1000	740	60	通过 Passed
5s1s4	1000	825	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1669.1	1734.8	1765.2	1785.9	1805.6
2S ₁ S ₄	198.91	200.08	201.24	202.41	203.68
3S ₁ S ₄	207.53	210.37	211.41	212.45	213.49
4S ₁ S ₄	1683.9	1732.3	1760.5	1782.7	1802.6
5S ₁ S ₄	1686.9	1750.6	1778.9	1801.8	1822.4

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.64
2S ₁ S ₄	4.20
3S ₁ S ₄	4.20
4S ₁ S ₄	7.46
5S ₁ S ₄	7.50

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
3S ₁ S ₃	5	7.5	-0.01	+1	30	-0.07	+4
	20		-0.01	+1		-0.07	+3
	100		-0.01	+1		-0.05	+1
	120		-0.01	+1		-0.05	+1
2S ₁ S ₃	5	7.5	-0.02	+2	30	-0.09	+4
	20		-0.02	+2		-0.09	+3
	100		-0.02	+1		-0.08	+1
	120		-0.02	+1		-0.06	+1
3S ₁ S ₄	5	7.5	-0.10	+1	30	-0.14	+3
	20		-0.10	+1		-0.14	+2
	100		-0.10	+1		-0.11	+1
	120		-0.10	+1		-0.11	+1
2S ₁ S ₄	5	7.5	-0.01	+1	30	-0.05	+3
	20		-0.01	+1		-0.05	+2
	100		-0.01	+1		-0.04	+1
	120		-0.01	+1		-0.03	+1
1S ₁ S ₄	100	7.5	+0.16	+1	30	+0.09	+1
4S ₁ S ₄	100	7.5	+0.15	+1	30	+0.09	+1
5S ₁ S ₄	100	7.5	+0.17	+1	30	+0.12	0
1S ₁ S ₃	100	7.5	+0.19	+2	30	+0.09	+2
4S ₁ S ₃	100	7.5	+0.18	+2	30	+0.08	+2
5S ₁ S ₃	100	7.5	+0.21	+1	30	+0.11	+2
3S ₁ S ₂	5	7.5	-0.07	+4	30	-0.31	+12
	20		-0.07	+4		-0.28	+6
	100		-0.05	+2		-0.16	+2
	120		-0.05	+2		-0.16	+2
2S ₁ S ₂	5	7.5	-0.09	+5	30	-0.39	+15
	20		-0.09	+5		-0.38	+8
	100		-0.07	+1		-0.20	+1
	120		-0.07	+1		-0.18	+1
1S ₁ S ₂	7.5	7.5	+0.29	+4	30	-0.08	+5
4S ₁ S ₂	7.5	7.5	+0.32	+3	30	-0.04	+4
5S ₁ S ₂	7.5	7.5	+0.31	+3	30	-0.03	+4

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304039

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.311	0.336	0.450
电容量(pF) Capacitance	928	928	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	785	60	通过 Passed
2s1s4	1000	970	60	通过 Passed
3s1s4	1000	865	60	通过 Passed
4s1s4	1000	640	60	通过 Passed
5s1s4	1000	725	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1679.7	1739.8	1765.7	1788.6	1807.0
2S ₁ S ₄	206.47	207.69	208.91	210.13	211.36
3S ₁ S ₄	206.47	207.69	208.91	210.13	211.36
4S ₁ S ₄	1666.3	1712.8	1740.9	1760.6	1779.6
5S ₁ S ₄	1679.7	1739.8	1765.7	1788.6	1807.0

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.57
2S ₁ S ₄	4.34
3S ₁ S ₄	4.34
4S ₁ S ₄	7.53
5S ₁ S ₄	7.56

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error
3S ₁ S ₃	5	7.5	-0.02	+1	30	-0.07	+3
	20		-0.02	+1		-0.06	+2
	100		-0.02	+1		-0.05	+1
	120		-0.01	+1		-0.05	+1
2S ₁ S ₃	5	7.5	-0.04	+2	30	-0.11	+4
	20		-0.03	+1		-0.09	+3
	100		-0.03	+1		-0.07	+1
	120		-0.01	+1		-0.07	+1
3S ₁ S ₄	5	7.5	-0.11	+1	30	-0.06	+3
	20		-0.11	+1		-0.06	+3
	100		-0.10	+1		-0.05	+1
	120		-0.09	+1		-0.04	+1
2S ₁ S ₄	5	7.5	-0.02	+1	30	+0.08	+1
	20		-0.03	+1		+0.08	+1
	100		-0.02	+1		+0.03	+2
	120		-0.01	+1		+0.03	+2
1S ₁ S ₄	100	7.5	+0.19	+1	30	+0.09	+2
4S ₁ S ₄	100	7.5	+0.17	+1	30	+0.10	+2
5S ₁ S ₄	100	7.5	+0.15	+1	30	+0.13	+2
1S ₁ S ₃	100	7.5	+0.20	+2	30	+0.10	+2
4S ₁ S ₃	100	7.5	+0.17	+2	30	+0.10	+2
5S ₁ S ₃	100	7.5	+0.18	+2	30	+0.11	+2
3S ₁ S ₂	5	7.5	-0.09	+4	30	-0.30	+12
	20		-0.08	+2		-0.29	+6
	100		-0.07	+2		-0.17	+2
	120		-0.06	+2		-0.16	+2
2S ₁ S ₂	5	7.5	-0.11	+5	30	-0.42	+15
	20		-0.10	+4		-0.38	+8
	100		-0.09	+2		-0.21	+1
	120		-0.08	+1		-0.18	+1
1S ₁ S ₂	7.5	7.5	+0.28	+4	30	-0.09	+5
4S ₁ S ₂	7.5	7.5	+0.31	+4	30	-0.07	+4
5S ₁ S ₂	7.5	7.5	+0.29	+2	30	-0.06	+4

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304040

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.279	0.289	0.412
电容量(pF) Capacitance	932	932	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	780	60	通过 Passed
2s1s4	1000	975	60	通过 Passed
3s1s4	1000	860	60	通过 Passed
4s1s4	1000	645	60	通过 Passed
5s1s4	1000	720	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1674.1	1731.5	1761.5	1785.3	1804.5
2S ₁ S ₄	200.45	202.83	204.57	205.97	207.38
3S ₁ S ₄	207.58	209.92	212.27	213.56	214.71
4S ₁ S ₄	1671.7	1720.3	1748.6	1769.6	1789.4
5S ₁ S ₄	1657.4	1725.5	1753.7	1775.7	1795.5

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.48
2S ₁ S ₄	4.17
3S ₁ S ₄	4.38
4S ₁ S ₄	7.57
5S ₁ S ₄	7.57

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
3S ₁ S ₃	5	7.5	-0.03	+3	30	-0.11	+4
	20		-0.03	+2		-0.08	+3
	100		-0.03	+1		-0.07	+2
	120		-0.02	+1		-0.05	+1
2S ₁ S ₃	5	7.5	-0.04	+1	30	-0.12	+4
	20		-0.03	+1		-0.10	+3
	100		-0.02	+1		-0.09	+2
	120		-0.03	+1		-0.08	+2
3S ₁ S ₄	5	7.5	-0.14	+1	30	-0.08	+4
	20		-0.13	+1		-0.08	+3
	100		-0.12	+1		-0.05	+3
	120		-0.09	+1		-0.04	+1
2S ₁ S ₄	5	7.5	-0.04	+1	30	-0.09	+1
	20		-0.03	+1		-0.08	+1
	100		-0.04	+1		-0.07	+2
	120		-0.01	+1		-0.05	+2
1S ₁ S ₄	100	7.5	+0.19	+1	30	+0.09	+2
4S ₁ S ₄	100	7.5	+0.18	+1	30	+0.08	+2
5S ₁ S ₄	100	7.5	+0.17	+1	30	+0.13	+3
1S ₁ S ₃	100	7.5	+0.22	+2	30	+0.15	+4
4S ₁ S ₃	100	7.5	+0.18	+2	30	+0.12	+3
5S ₁ S ₃	100	7.5	+0.17	+1	30	+0.12	+3
3S ₁ S ₂	5	7.5	-0.09	+4	30	-0.31	+12
	20		-0.08	+2		-0.29	+6
	100		-0.06	+2		-0.18	+3
	120		-0.05	+2		-0.15	+2
2S ₁ S ₂	5	7.5	-0.11	+5	30	-0.38	+14
	20		-0.10	+4		-0.37	+13
	100		-0.09	+2		-0.27	+4
	120		-0.07	+1		-0.18	+2
1S ₁ S ₂	7.5	7.5	+0.27	+4	30	-0.08	+4
4S ₁ S ₂	7.5	7.5	+0.30	+2	30	-0.06	+3
5S ₁ S ₂	7.5	7.5	+0.27	+2	30	-0.05	+2

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304041

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 1000/1A

Rated transformation ratio

准确级次: 5P20/0.5/0.5/5P20/5P20

Accuracy class

抽头准确级次: 5P20/0.5/0.5/5P20/5P20

Tap accuracy class :

额定输出: 30/30/30/30/30VA

Rated output

抽头额定负荷: 30/30/30/30/30VA

Tap rated output:

环境温度 Ambient temperature T= -3℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.298	0.307	0.542
电容量(pF) Capacitance	900	900	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s4	1000	730	60	通过 Passed
2s1s4	1000	955	60	通过 Passed
3s1s4	1000	870	60	通过 Passed
4s1s4	1000	695	60	通过 Passed
5s1s4	1000	780	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₄	1656.8	1722.6	1748.7	1770.9	1787.8
2S ₁ S ₄	206.47	207.69	208.91	210.13	211.36
3S ₁ S ₄	207.58	209.92	212.27	213.56	214.71
4S ₁ S ₄	1667.1	1715.2	1742.1	1763.7	1782.1
5S ₁ S ₄	1671.7	1720.3	1748.6	1769.6	1789.4

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₄	7.53
2S ₁ S ₄	4.34
3S ₁ S ₄	4.38
4S ₁ S ₄	7.56
5S ₁ S ₄	7.57

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.


出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
3S ₁ S ₃	5	7.5	-0.04	+3	30	-0.10	+3
	20		-0.04	+2		-0.07	+2
	100		-0.03	+1		-0.07	+2
	120		-0.02	+1		-0.05	+1
2S ₁ S ₃	5	7.5	-0.04	+2	30	-0.11	+4
	20		-0.03	+1		-0.10	+3
	100		-0.03	+1		-0.09	+2
	120		-0.03	+1		-0.07	+1
3S ₁ S ₄	5	7.5	-0.14	+1	30	-0.09	+4
	20		-0.13	+1		-0.07	+3
	100		-0.11	+1		-0.05	+2
	120		-0.09	+1		-0.04	+1
2S ₁ S ₄	5	7.5	-0.04	+1	30	+0.08	+1
	20		-0.03	+2		+0.08	+1
	100		-0.01	+1		+0.06	+2
	120		-0.01	+1		+0.05	+2
1S ₁ S ₄	100	7.5	+0.18	+1	30	+0.09	+2
4S ₁ S ₄	100	7.5	+0.17	+1	30	+0.09	+2
5S ₁ S ₄	100	7.5	+0.15	+1	30	+0.11	+2
1S ₁ S ₃	100	7.5	+0.21	+1	30	+0.13	+4
4S ₁ S ₃	100	7.5	+0.19	+2	30	+0.12	+3
5S ₁ S ₃	100	7.5	+0.18	+2	30	+0.12	+3
3S ₁ S ₂	5	7.5	-0.08	+4	30	-0.30	+11
	20		-0.06	+3		-0.29	+6
	100		-0.06	+3		-0.18	+2
	120		-0.05	+2		-0.16	+2
2S ₁ S ₂	5	7.5	-0.11	+5	30	-0.38	+14
	20		-0.10	+5		-0.39	+12
	100		-0.10	+3		-0.22	+3
	120		-0.09	+1		-0.19	+2
1S ₁ S ₂	7.5	7.5	+0.27	+4	30	-0.09	+5
4S ₁ S ₂	7.5	7.5	+0.30	+3	30	-0.07	+4
5S ₁ S ₂	7.5	7.5	+0.30	+3	30	-0.04	+3

备注 Remark	Workpiece No. : 36-18-01 工 号: S ₁ S ₂ 抽头的电流比为 400/1A ; S ₁ S ₂ tap:the current ratio is 400/1A S ₁ S ₃ 抽头的电流比为 800/1A ; S ₁ S ₃ tap:the current ratio is 800/1A S ₁ S ₄ 抽头的电流比为 1000/1A ; S ₁ S ₄ tap:the current ratio is 1000/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.

Comments:					
A	Wu 15/3/2014	Duan 18/3/2014	Duan 18/3/2014	ORIGINAL ISSUE	I
REV	PREPARED	CHECKED	APPROVED	MODIFICATIONS	STATUS
<p align="center"> SOCIALIST REPUBLIC OF VIET NAM VIETNAM ELECTRICITY SONG BUNG 4 HYDROPOWER MANAGEMENT BOARD SONG BUNG 4 HYDROPOWER PROJECT 2x78MW Turbine Generator, 250rpm, 106m PACKAGE 4 (TB-04) SUPPLY, TRANSPORTATION, STORAGE AND PRESERVATION, INSTALLATION, PRE-COMMISSIONING AND COMMISSIONING OF ELECTRO-MECHANICAL EQUIPMENT AND TECHNICAL SERVICES Contract N° : 192-TB04/ASB4-Huadong&ALSTOM </p>					
BETWEEN	PURCHASER SB4 HPMB		ENGINEER MOTT MACDONALD		
	CONTRACTOR:  HYDROCHINA HUADONG – ALSTOM CONSORTIUM 				
TITLE :	Product Certificate for Current Transformer (Type 2: 200-300/1A)				
DOCUMENT NUMBER		VNSB4-C6-4-802/Rev.A		FOR INFORMATION	
		OUR REF NUMBER :			

Contents

1. Product Certificate for CT NO: 201304042
2. Product Certificate for CT NO: 201304043
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4. Product Certificate for CT NO: 201304045
5. Product Certificate for CT NO: 201304046
6. Product Certificate for CT NO: 201304047
7. Product Certificate for CT NO: 201304048



陕制 00000520 号

NO:201304042

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 300/1A

Rated transformation ratio

准确级次: 0.2/0.2

Accuracy class

抽头准确级次: 0.2/0.2

Tap accuracy class :

额定输出: 30/30 VA

Rated output

抽头额定负荷: 30/30 VA

Tap rated output:

环境温度 Ambient temperature T= 7℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 395kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 395kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.301	0.306	0.554
电容量(pF) Capacitance	927	927	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
368	60s	175	5	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s3	300	795	60	通过 Passed
2s1s3	300	860	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间	3	60	通过

secondary windings			Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₂	98.361	98.890	99.419	99.948	100.56
2S ₁ S ₂	102.73	103.38	104.03	104.67	105.40

1.11 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (°) Phasic error
2S ₁ S ₂	5	7.5	+0.02	0	30	-0.02	+2
	20		+0.01	-1		-0.02	+1
	100		+0.01	-1		-0.01	-1
	120		+0.01	-1		-0.01	-1
1S ₁ S ₂	5	7.5	+0.02	0	30	-0.08	+5
	20		+0.02	0		-0.07	+3
	100		+0.02	-1		-0.05	+1
	120		+0.02	-1		-0.05	+1
2S ₁ S ₃	5	7.5	+0.05	0	30	+0.01	+1
	20		+0.02	0		+0.01	+1
	100		+0.02	-1		0	0
	120		+0.02	-1		0	0
1S ₁ S ₃	5	7.5	+0.03	0	30	+0.01	+1
	20		+0.03	0		+0.01	+1
	100		+0.03	-1		+0.02	0
	120		+0.03	-1		+0.02	0

备注 Remark	Workpiece No. : 36-18-02 工 号: 1S ₁ S ₂ 2S ₁ S ₂ 抽头的电流比为 200/1A ; 1S ₁ S ₂ 2S ₁ S ₂ tap:the current ratio is 200/1A
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2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。

The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304043

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 300/1A

Rated transformation ratio

准确级次: 0.2/0.2

Accuracy class

抽头准确级次: 0.2/0.2

Tap accuracy class :

额定输出: 30/30VA

Rated output

抽头额定负荷: 30/30 VA

Tap rated output:

环境温度 Ambient temperature T= 7℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 460kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 460kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.279	0.298	0.451
电容量(pF) Capacitance	898	898	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s3	300	750	60	通过 Passed
2s1s3	300	915	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₃	274.68	275.52	276.37	277.22	278.07
2S ₁ S ₃	250.82	274.94	275.77	276.60	277.42

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₃	2.57
2S ₁ S ₃	2.61

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
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2S ₁ S ₂	5	7.5	+0.01	-1	30	-0.03	+2
	20		+0.01	-1		-0.03	+1
	100		+0.01	-1		-0.02	0
	120		0	-1		-0.02	0
1S ₁ S ₂	5	7.5	+0.01	0	30	-0.10	+6
	20		+0.01	-1		-0.09	+4
	100		+0.01	-1		-0.07	+1
	120		+0.01	-1		-0.07	+1
2S ₁ S ₃	5	7.5	+0.03	0	30	-0.02	+1
	20		+0.03	0		-0.02	+1
	100		+0.01	-1		-0.01	0
	120		+0.01	-1		-0.01	0
1S ₁ S ₃	5	7.5	+0.02	0	30	+0.01	+1
	20		+0.02	0		0	+1
	100		+0.02	0		0	0
	120		+0.02	-1		+0.01	0
备注 Remark	Workpiece No. : 36-18-02 工 号: 1S ₁ S ₂ 2S ₁ S ₂ 抽头的电流比为 200/1A ； 1S ₁ S ₂ 2S ₁ S ₂ tap:the current ratio is 200/1A						

2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。
The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304044

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 300/1A

Rated transformation ratio

准确级次: 0.2/0.2

Accuracy class

抽头准确级次: 0.2/0.2

Tap accuracy class :

额定输出: 30/30VA

Rated output

抽头额定负荷: 30/30 VA

Tap rated output:

环境温度 Ambient temperature T= 7℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 460kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 460kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.295	0.323	0.460
电容量(pF) Capacitance	894	894	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s3	300	850	60	通过 Passed
2s1s3	300	715	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₃	268.90	270.90	272.89	274.79	276.29
2S ₁ S ₃	266.76	271.65	276.53	278.98	279.92

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₃	2.57
2S ₁ S ₃	3.25

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
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2S ₁ S ₂	5	7.5	+0.01	0	30	-0.03	+2
	20		+0.01	-1		-0.03	+1
	100		0	-1		-0.01	-1
	120		0	-1		-0.01	-1
1S ₁ S ₂	5	7.5	+0.01	0	30	-0.09	+6
	20		+0.01	0		-0.08	+3
	100		+0.01	0		-0.06	+1
	120		+0.01	0		-0.06	+1
2S ₁ S ₃	5	7.5	+0.04	0	30	-0.02	+1
	20		+0.02	0		-0.01	+1
	100		+0.02	-1		0	0
	120		+0.02	-1		0	0
1S ₁ S ₃	5	7.5	+0.03	0	30	+0.01	+1
	20		+0.03	0		+0.01	+1
	100		+0.03	-1		+0.02	0
	120		+0.03	-1		+0.02	0
备注 Remark	Workpiece No. : 36-18-02 工 号: 1S ₁ S ₂ 2S ₁ S ₂ 抽头的电流比为 200/1A ； 1S ₁ S ₂ 2S ₁ S ₂ tap:the current ratio is 200/1A						

2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。
 The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304045

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 300/1A

Rated transformation ratio

准确级次: 0.2/0.2

Accuracy class

抽头准确级次: 0.2/0.2

Tap accuracy class :

额定输出: 30/30VA

Rated output

抽头额定负荷: 30/30 VA

Tap rated output:

环境温度 Ambient temperature T= 7℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 460kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 460kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.296	0.330	0.455
电容量(pF) Capacitance	932	932	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局

部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s3	300	850	60	通过 Passed
2s1s3	300	800	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s;末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间	3	60	通过

secondary windings			Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₃	190.94	198.29	202.75	219.91	222.68
2S ₁ S ₃	192.12	198.87	203.96	229.27	231.27

1.11 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
2S ₁ S ₂	5	7.5	+0.02	0	30	-0.02	+2
	20		+0.01	-1		-0.02	+1
	100		+0.01	-1		-0.01	-1
	120		+0.01	-1		-0.01	-1
1S ₁ S ₂	5	7.5	+0.02	0	30	-0.08	+5
	20		+0.02	0		-0.07	+3
	100		+0.02	-1		-0.05	+1
	120		+0.02	-1		-0.05	+1
2S ₁ S ₃	5	7.5	+0.05	0	30	+0.01	+1
	20		+0.02	0		+0.01	+1
	100		+0.02	-1		0	0
	120		+0.02	-1		0	0
1S ₁ S ₃	5	7.5	+0.03	0	30	+0.01	+1
	20		+0.03	0		+0.01	+1
	100		+0.03	-1		+0.02	0
	120		+0.03	-1		+0.02	0

备注 Remark	Workpiece No. : 36-18-02 工 号: 1S ₁ S ₂ 2S ₁ S ₂ 抽头的电流比为 200/1A ; 1S ₁ S ₂ 2S ₁ S ₂ tap:the current ratio is 200/1A
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2、结论 Conclusion:

本产品通过上述试验，其结果均符合技术条件及 GB1208-2006、JJG1021-2007 标准，产品合格，准许出厂。

The product passed all the tests above, the test result conform to the technical specification and standard GB1208-2006、JJG1021-2007 The product is qualified and permitted to leave factory.



陕制 00000520 号

NO:201304046

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核:

Checker :

批准:

Approval:

日期:

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 300/1A

Rated transformation ratio

准确级次: 0.2/0.2

Accuracy class

抽头准确级次: 0.2/0.2

Tap accuracy class :

额定输出: 30/30VA

Rated output

抽头额定负荷: 30/30 VA

Tap rated output:

环境温度 Ambient temperature T= 7℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 460kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 460kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.298	0.328	0.491
电容量(pF) Capacitance	906	906	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s3	300	755	60	通过 Passed
2s1s3	300	810	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₃	268.90	270.90	272.89	274.79	276.29
2S ₁ S ₃	266.76	271.65	276.53	278.98	279.92

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₃	2.64
2S ₁ S ₃	3.25

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
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2S ₁ S ₂	5	7.5	+0.02	-1	30	-0.02	+3
	20		+0.01	-1		-0.02	+2
	100		0	-1		-0.01	0
	120		0	-1		-0.01	0
1S ₁ S ₂	5	7.5	+0.02	0	30	-0.09	+7
	20		+0.02	-1		-0.08	+4
	100		+0.03	-1		-0.06	+2
	120		+0.03	-1		-0.05	+1
2S ₁ S ₃	5	7.5	+0.05	0	30	+0.01	+1
	20		+0.04	0		+0.02	+1
	100		+0.03	-1		+0.02	0
	120		+0.03	-1		+0.02	0
1S ₁ S ₃	5	7.5	+0.03	0	30	+0.01	+1
	20		+0.03	0		+0.01	+1
	100		+0.04	0		+0.02	+1
	120		+0.04	-1		+0.03	0
备注 Remark	Workpiece No. : 36-18-02 工 号: 1S ₁ S ₂ 2S ₁ S ₂ 抽头的电流比为 200/1A ； 1S ₁ S ₂ 2S ₁ S ₂ tap:the current ratio is 200/1A						

2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。
The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304047

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 300/1A

Rated transformation ratio

准确级次: 0.2/0.2

Accuracy class

抽头准确级次: 0.2/0.2

Tap accuracy class :

额定输出: 30/30VA

Rated output

抽头额定负荷: 30/30 VA

Tap rated output:

环境温度 Ambient temperature T= 7℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 460kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 460kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.293	0.310	0.521
电容量(pF) Capacitance	919	919	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s3	300	765	60	通过 Passed
2s1s3	300	890	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₃	274.68	275.52	276.37	277.22	278.07
2S ₁ S ₃	268.90	270.90	272.89	274.79	276.29

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₃	2.61
2S ₁ S ₃	2.64

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
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2S ₁ S ₂	5	7.5	+0.03	-1	30	0	+3
	20		+0.03	-1		0	+1
	100		+0.02	-1		+0.01	0
	120		+0.02	-1		+0.01	0
1S ₁ S ₂	5	7.5	+0.03	0	30	-0.07	+6
	20		+0.03	0		-0.05	+3
	100		+0.03	-1		-0.04	+1
	120		+0.03	-1		-0.04	+1
2S ₁ S ₃	5	7.5	+0.06	0	30	+0.02	+1
	20		+0.04	0		+0.02	+1
	100		+0.03	-1		+0.01	0
	120		+0.03	-1		+0.01	0
1S ₁ S ₃	5	7.5	+0.04	0	30	+0.02	+1
	20		+0.03	0		+0.02	+1
	100		+0.03	-1		+0.02	0
	120		+0.03	-1		+0.02	0
备注 Remark	Workpiece No. : 36-18-02 工 号: 1S ₁ S ₂ 2S ₁ S ₂ 抽头的电流比为 200/1A ； 1S ₁ S ₂ 2S ₁ S ₂ tap:the current ratio is 200/1A						

2、结论 Conclusion:

本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。
The tested product complied with IEC60044-1 standard , permitted to leave the company.



陕制 00000520 号

NO:201304048

The Product Certificate for Current Transformer

电流互感器 产品试验报告

审核：

Checker :

批准：

Approval:

日期：

Date:

Xi'an XD Power Capacitor Co., Ltd.

西安西电电力电容器有限责任公司

产品主要技术参数

The main technical parameters

型号: LB-220

Type of testing product

额定频率: 50 Hz

Rated frequency

额定电流比: 300/1A

Rated transformation ratio

准确级次: 0.2/0.2

Accuracy class

抽头准确级次: 0.2/0.2

Tap accuracy class :

额定输出: 30/30VA

Rated output

抽头额定负荷: 30/30 VA

Tap rated output:

环境温度 Ambient temperature T= 7℃ 湿度 humidity f= 46 %

1、试验项目 (Test items):

1.1 外观检查及端子标志检验(Verification of terminal markings): (标准: 减极性)

依据企业标准 OKF.973.014, 检查产品瓷套、油箱、瓷套帽表面应无磕碰、磨损; 产品应无渗油现象; 产品铭牌应正确; 油位指示应在 MIN 和 MAX 之间; 验证端子标志的正确性。

According to corporate standards OKF.973.014, Check the products porcelain sets, fuel tank, porcelain sets cap surface should be no bump, wear; product should be no oil leakage phenomenon; product nameplate should be correct; indicating the oil level should be between the MIN and MAX; verify the correctness of the terminal signs.

结论: 合格

Conclusion: Qualified

1.2 绝缘油性能试验 (Test on transformer oil):

依据企业标准 OKF.913.044, 从产品放油阀处抽取油样, 进行击穿电压、介质损耗因数测量、含水量和色谱分析试验。

According to corporate standards OKF.913.044, From products put oil valve at the extracted oil samples, the breakdown voltage, dielectric loss factor measurement, moisture content and chromatographic analysis of the test results should meet the standard requirements.

结论: 合格

Conclusion: Qualified

1.3 密封性能试验 (Sealing test):

依据企业标准 OKF.973.013, 采用油压和膨胀器压力对产品施压。

According to corporate standards OKF.973.013, the use of hydraulic pressure products and expansion pressure.

结论: 无渗漏

Conclusion: no leakage

1.4 绕组绝缘电阻测量 (Winding insulation resistance measurements):

用 2500V 摇表测量产品绝缘电阻。

The winding insulation resistance measured by 2500V meager.

测量部位 Position	绝缘电阻 insulation resistance	结论 Results
一次对二次绕组及末屏和地 Between primary windings and secondary windings and earth	$\geq 1500\text{M}\Omega$	通过 Passed
二次绕组之间及对地 Between secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed
末屏对二次绕组及地 Between end screen and secondary windings and earth	$\geq 1000\text{ M}\Omega$	通过 Passed

1.5 一次绕组工频耐压试验(Power-frequency withstand tests on primary windings)

将二次绕组、末屏及外壳短接接地，在一次绕组和地之间施加工频电压 460kV，保持 60s，试验时不应有击穿和闪络。

Will the secondary windings, end screen and shell shall be connected to earth ,The test voltage 460kV(AC) shall be applied between the short-circuited primary winding and earth, maintain for 60 s, when testing should not have breakdown and flash collaterals.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组和地 short-circuited primary winding and earth	395	60	通过 Passed

1.6 电容量和介质损耗因数测量

Measurement of capacitance and dielectric dissipation factor:

在额定电压下，用 2801 电桥测量产品电容量及介质损耗因数。

In the rated voltage, Use 2801 bridge measurement products the capacity and dielectric dissipation factor.

施加电压(kV) Applied voltage	10	145	末屏对地(3kV) End screen:
$\tan\delta$ (%)	0.306	0.327	0.453
电容量(pF) Capacitance	895	895	---

1.7 局部放电测量 Partial discharge measurement:

给产品施加电压至额定工频耐压值的 80%，至少保持 60s，然后降到规定的局部放电测量电压下，测量局部放电量。

Applied voltage to rated power frequency withstand voltage of 80% for at least the 60s, and then down to the required partial discharge measurement voltage, measuring the amount of partial discharge to the product.

预加电压(kV) Pre-voltage	保持时间 Keep time	测量电压 (kV) Measuring voltage	局部放电量 Partial discharge level (pC)	通过 Passed
316	60s	175	4	

1.8 匝间过电压试验(Inter-turn overvoltage test):

各二次绕组逐个开路，对一次绕组通以额定频率的额定扩大一次电流，二次绕组开路电压不大于4.5kV,保持60s。

The secondary windings open-circuited one by one, to primary winding with rated the frequency of expanding a rated current, keep 60s.

绕组 Winding	一次电流 Primary current (A)	二次开路电压峰值 Voltage peak for secondary open circuit (V)	试验时间 Duration (s)	结论 Results
1s1s3	300	965	60	通过 Passed
2s1s3	300	650	60	通过 Passed

1.9 一次绕组段间、二次绕组对地及二次绕组之间及末屏工频耐压试验:

(Power-frequency withstands tests Between primary winding sections , Secondary winding to earth , secondary windings, end screen and earth)

对一次绕组段间、二次绕组对地及二次绕组之间逐个施加工频电压 3kV,历时 60s; 末屏对地之间施加工频电压 5kV,历时 60s,无击穿。

primary winding sections, Secondary winding to earth , secondary windings applied the processing frequency voltage 3kV lasted 60s; frequency voltage 5kV last screen on the ground between facilities processing lasted 60s, no breakdown.

加压部位 Position	施加电压 Applied voltage (kV)	持续时间 Duration (s)	结论 Results
一次绕组段间 primary winding sections	3	60	通过 Passed
二次绕组对地 Secondary winding to earth	3	60	通过 Passed
二次绕组之间 secondary windings	3	60	通过 Passed
末屏对地 Between end screen and earth	5	60	通过 Passed

1.10 伏安特性

Volt-ampere characteristics

U(V) I(A) terminal	0.2000	0.4000	0.6000	0.8000	1.0000
1S ₁ S ₃	250.8	274.94	275.77	276.60	277.42
2S ₁ S ₃	274.68	275.52	276.37	277.22	278.07

1.11 直流电阻测量

Measurement of DC resistance

Secondary winding 绕组	DC resistance 直阻 (Ω)
1S ₁ S ₃	2.61
2S ₁ S ₃	3.25

1.12 误差试验 Determination of errors: (COSΦ=0.8)

在额定频率、额定功率因数及额定负荷范围内，分别测量各二次绕组误差。

In the rated frequency, rated power factor and rated load, testing the secondary

Windings current error and phase displacement.

出线端子及准确度 Leading out terminal and accuracy	额定电流 (%) Rated current	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error	负荷 VA Burden	电流误差 f(%) Current error	相位差 δ (′) Phasic error
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2S ₁ S ₂	5	7.5	+0.02	0	30	-0.03	+3
	20		+0.02	0		-0.03	+1
	100		+0.01	-1		-0.02	+1
	120		+0.01	-1		-0.02	+1
1S ₁ S ₂	5	7.5	+0.02	0	30	-0.09	+5
	20		+0.01	0		-0.07	+3
	100		+0.01	-1		-0.04	+1
	120		+0.01	-1		-0.04	+1
2S ₁ S ₃	5	7.5	+0.03	-1	30	+0.01	+1
	20		+0.02	-1		+0.01	+1
	100		+0.02	-1		0	0
	120		+0.02	-1		0	0
1S ₁ S ₃	5	7.5	+0.02	0	30	+0.01	+1
	20		+0.02	0		0	+1
	100		+0.01	-1		0	-1
	120		+0.01	-1		0	-1
备注 Remark	Workpiece No. : 36-18-02 工 号: 1S ₁ S ₂ 2S ₁ S ₂ 抽头的电流比为 200/1A ； 1S ₁ S ₂ 2S ₁ S ₂ tap:the current ratio is 200/1A						

2、结论 Conclusion:
 本产品经试验符合 IEC60044-1 及技术条件规定,准予出厂。
 The tested product complied with IEC60044-1 standard , permitted to leave the company.