

电力工业电气设备质量检验测试中心

Quality Inspection and Test Center
for Equipment of Electric Power

(2005) 缆字 第 453A 号



(2002)量认(国)字(K0711)号



No.L1026

检 测 报 告

Inspection Report

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QUALITY INSPECTION AND TESTING CENTRE FOR EQUIPMENT OF ELECTRIC POWER
P. R. OF CHINA

检测报告

INSPECTION AND TEST REPORT

(2005)缆字第 453A 号

Ref: 2005LZ453A

委托单位: 广东长园电缆附件有限公司
Client: Guangdong Changyuan Cable Accessory Co., Ltd.

试样说明:

名称: 20kV 250A肘形不带电插拔屏蔽型可分离连接器(可分离式终端) 试品编号: DL 2005-477
制造厂: 广东长园电缆附件有限公司 制造日期: 2005年10月
型号规格: GCA CB20-250 取样方式: 送样

Description of Samples

Name of Test Samples: 20kV 250A Elbow Screened Separable Connector (Deadbreak)
Type and Size: GCA CB20-250 Year of Manufacture: Oct. 2005 Sample No: DL 2005-477
Manufacturer: Guangdong Changyuan Cable Accessory Co., Ltd. Sampling way: taken by client self

检测标准 GB/T 12706.4—2002 额定电压 1kV($U_m=1.2kV$)到 35kV($U_m=40.5kV$)挤包绝缘电力电缆及其附件 第4部分: 额定电压 6kV($U_m=7.2kV$)到 35kV($U_m=40.5kV$)电缆附件试验要求

IEC 60502-4:2005 额定电压 1kV($U_m=1.2kV$)到 30kV($U_m=36kV$)挤包绝缘电力电缆及其附件 第4部分: 额定电压 6kV($U_m=7.2kV$)到 30kV($U_m=36kV$)电缆附件试验要求

Specification

GB/T 12706.4—2002 Power cables with extruded insulation and their accessories for rated voltages from 1kV($U_m=1.2kV$) up to 35kV($U_m=40.5kV$) Part 4: Test requirements on accessories for cables with rated voltages from 6kV($U_m=7.2kV$) up to 35kV($U_m=40.5kV$)

IEC 60502-4:2005 Power cables with extruded insulation and their accessories for rated voltages from 1kV($U_m=1.2kV$) up to 30kV($U_m=36kV$) Part 4: Test requirements on accessories for cables with rated voltages from 6kV($U_m=7.2kV$) up to 30kV($U_m=36kV$)

检测类型: 型式试验

Category of Test: Type tests

检测日期: 2005-11-02 ~ 2005-12-10

Date of Testing: 2005-11-02 ~ 2005-12-10

检测结论: 根据 GB/T 12706.4—2002 和 IEC 60502-4:2005 标准, 对广东长园电缆附件有限公司送检的 GCA CB20-250 型肘形不带电插拔屏蔽型可分离连接器样品进行检测, 所检测型式试验项目合格。

Conclusion: The type GCA CB20-250 20kV 250A Elbow Screened Separable Connector (Deadbreak) taken to test by client self have passed the type tests specified in GB/T 12706.4-2002 and IEC 60502.4:2005. The 20kV 250A Elbow Screened Separable Connector (Deadbreak) tested was up to standard.

检测人员: 赵建康 饶文彬 苗福贵
Inspected and Tested by Zhao Jiankang Rao Wenbin Miao Fugui

校核: 杨荣凯 审核: 杨黎明
Checked by Yang Rongkai Examined and verified by Yang Liming

批准: 沈鼎申 签发日期: 2005-12-27
Approved by Shen Dingshen Date of issue: 2005-12-27

http://www.whvni.com/jcbg

1 前言

本报告用中文书写, 应委托方要求译成英文对照。如对本报告的解释有意义上的差异时则以中文为准。

Foreword

This report was written in Chinese and translated into English as requested by the client. In the event of any differences in the interpretation of this report, the Chinese text shall take precedence over the English translation.

2 试样的数量和安装

制造厂将四个被试250A肘形不带电插拔屏蔽型可分离连接器安装在四根 YJV-12/20 1×95 的电缆上构成1号组合试样, 用于进行标准中表7规定4.1系列的试验, 将三个被试250A肘形不带电插拔屏蔽型可分离连接器安装在一根 YJV22-12/20 3×95 的电缆上构成2号组合试样, 用于进行标准中表7规定4.2和4.3系列的试验。在组合试样中电缆终端和被试品之间的电缆长度均大于5m。

The Number and Installation of Combination Samples

It was required that the 250A Elbow Screened Separable Connector (Deadbreak) to be tested was installed by the manufacturer on four length of cables forming No.1 combination samples on which the type tests sequence 4.1 were carried out. The cable used in the combination sample was a XLPE insulated single core cable with rated voltage 12/20 kV, a cross-section of 95 sq.mm. The three samples was installed by the manufacturer on one length of cables forming No.2 combination samples on which the type tests sequence 4.2 and 4.3 were carried out. The cable used in the combination sample was a XLPE insulated three cores cable with rated voltage 12/20 kV, a cross-section of 95 sq.mm. The length of the cable in the combination sample was greater than 5m between the Screened Separable Connector (Deadbreak) and terminations.

3 试验方法

Test Methods

3.1 工频电压试验

试验按IEC 61442:1997第4章的规定在室温下进行。

AC Voltage Withstand Test

The test was made at ambient temperature in accordance with IEC 61442:1997, clause 4.

3.2 局部放电试验

试验按IEC 61442:1997第7章的规定进行, 试验时背景干扰为1pC。

Partial Discharge Test

The tests were carried out in accordance with IEC 61442:1997, clause 7, the level of maximum noise background being 1pC during the tests.

3.3 冲击电压试验

试验按IEC 61442:1997第6章的规定进行。

Impulse Voltage Withstand Test

The tests were carried in accordance with IEC 61442:1997, clause 6.

3.4 热循环电压试验

每个负荷循环时间为8h, 其中至少有2h使导体温度保持在正常运行时最高温度以上5℃~10℃, 随后至少3h自然冷却至不超过环境温度10℃。在整个试验期间, 试品上应施加30kV的工频电压。

Heating cycle voltage test

Each thermal cycle was of 8h duration with at least 2 h at a steady temperature of 5°C~10°C above the maximum cable conductor temperature in normal operation followed by at least 3 h of natural cooling to within 10°C of ambient temperature. During the whole of the test period a voltage of 30kV shall be applied to the sample.

3.5 动热稳定试验

试验按IEC 61442:1997第11章和第12章的规定进行。

Dynamic short-circuit and thermal short-circuit tests

The tests were carried out in accordance with IEC 61442:1997, clause 11 and clause 12.

3.6 屏蔽电阻试验

试验按IEC 61442:1997第14章的规定进行。

Screen resistance tests

The tests were carried out in accordance with IEC 61442:1997, clause 14.

4 试验顺序和检测结果

试验顺序和检测结果见表1(标准中规定4.1系列)和表2(标准中规定4.2和4.3系列)。

Test Sequence and Results

The test sequence and results were given in Table 1(sequence 4.1)and Table 2(sequence 4.2 and4.3).

表1/ Table 1

试验顺序 Test sequence	检测项目 Items	标准要求 Requirements	检测结果 Results	评价 Remarks
1	工频电压试验 AC withstand	54kV,5 min,不击穿 No breakdown shall occur at 54kV for 5 min	54kV下, 5min, 组合试样 各相均未击穿 No breakdown occurred on the combination samples at 54 kV for 5 min	符合要求 OK
2	室温下局部放电 试验 Partial discharge test at ambient temperature	20 kV下放电电量不 大于10pC The magnitude of the discharge at 20 kV shall not exceed 10pC	20 kV下,组合试样各相放 电量均≤2pC The magnitude of the discharge of the combination Samples didn't exceed 2pC at 20 kV	符合要求 OK
3	高温下冲击电压 试验 Impulse voltage withstand at 95°C~100°C	125 kV,正负极性各 10次不击穿 No breakdown flashover shall occur at 10 positive and 10 negative impulses of 125 kV	125 kV, 正负极性各10次组 合试样各相均未击穿 No breakdown occurred on the combination samples at 10 positive and 10 negative impulses of 125 kV	符合要求 OK
4	在空气中热循环 电压试验 Heating cycles voltage test in air	在30kV电压和导体 加热至温度95°C~ 100°C下, 共3个循 环, 不击穿 3 cycles at the conductor temperature of 95 to 100°C and 30kV, No breakdown shall occur	在30kV电压和导体温度 95°C~100°C下, 共经受3个 循环, 未击穿 Subjected to 3 cycles in air at the conductor temperature of 95 to 100°C and 30kV, No breakdown occurred	符合要求 OK

试验顺序 Test sequence	检测项目 Items	标准要求 Requirements	检测结果 Results	评价 Remarks
5	高温下局部放电 试验 Partial discharge test at 95℃~ 100℃	20kV下放电量不大 于10pC The magnitude of the discharge at 20kV shall not exceed 10pC	20kV下,组合试样各相放电 量均≤2pC The magnitude of the discharge of the combination samples didn't exceed 2pC at 20 kV	符合要求 OK
6	室温下局部放电 试验 Partial discharge test at ambient temperature	20 kV下放电量不大 于10pC The magnitude of the discharge at 20kV shall not exceed 10pC	20 kV下,组合试样各相放电 量均≤2pC The magnitude of the discharge of the combination samples didn't exceed 2pC at 20 kV	符合要求 OK
7	热循环电压试验 Heating cycles voltage test	在30 kV电压和导体 加热至温度95℃~ 100℃下,30个循环 在空气中,30个循环 在水中,不击穿 30 cycles in air and 30 cycles under water at the conductor temperature of 95℃ to 100℃ and 30 kV, No breakdown shall occur	在30 kV电压和导体温度 95℃~100℃下,共经受了 30个循环在空气中,30个循 环在水中,未击穿 Subjected to 30 cycles in air and 30 cycles under water at the conductor temperature of 95℃ to 100℃ and 30 kV, No breakdown occurred	符合要求 OK
8	插拔试验 Disconnect/conn- ect	五次触点无可见损伤 Five complete operations No visible damage to contact	五次,触点未见损伤 No visible damage to contact at five complete operations	符合要求 OK
9	高温下局部放电 试验 Partial discharge test at 95℃~ 100℃	20kV下放电量不大 于10pC The magnitude of the discharge at 20kV shall not exceed 10pC	20kV下,组合试样各相放电 量均≤2pC The magnitude of the discharge of the combination samples didn't exceed 2pC at 20 kV	符合要求 OK
10	室温下局部放电 试验 Partial discharge test at ambient temperature	20kV下放电量不大 于10pC The magnitude of the discharge at 20kV shall not exceed 10pC	20kV下,组合试样各相放电 量均≤2pC The magnitude of the discharge of the combination samples didn't exceed 2pC at 20 kV	符合要求 OK
11	冲击电压试验 Impulse voltage withstand	125 kV,正负极性各 10次不击穿 No breakdown shall occur at 10 positive and 10 negative impulses of 125 kV	125 kV,正负极性各10次组 合试样各相均未击穿 No breakdown occurred on the combination samples at 10 positive and 10 negative impulses of 125 kV	符合要求 OK
12	工频电压试验 AC withstand	30kV, 15 min,不击穿 No breakdown shall occur at 30kV for 15 min	30kV下, 15min,组合试样 各相均未击穿 No breakdown occurred on the combination samples at 30kV for 15 min	符合要求 OK

表2 / Table 2

试验顺序 Test sequence	检测项目 Items	标准要求 Requirements	检测结果 Results	评价 Remarks
1	工频电压试验 AC withstand	54kV, 5 min, 不击穿 No breakdown shall occur at 54kV for 5 min	54kV下, 5min, 组合试样各相均未击穿 No breakdown occurred on the combination samples at 54 kV for 5 min	符合要求 OK
2	热稳定试验 Thermal short-circuit test	12.2 kA, 2s 两次, 所有部件不得有变形、损坏及焊住现象 No transfigure and welding shall occur on all parts at 12.2 kA, 2s	12.2 kA, 2.02s和12.1kA, 2.02s 所有部件无变形、损坏及焊住现象 No transfigure and welding occurred on all parts at 12.2kA, 2.02s and 12.1 kA, 2.02 s	符合要求 OK
3	动稳定试验 Dynamic short-circuit test	—	44.3 kA, 60ms, 所有部件无变形损坏及焊住现象 No transfigure and welding occurred on all parts at 44.3kA, 60ms	—
4	插拔试验 Disconnect/connect	五次触点无可见损伤 Five complete operations No visible damage to contact	五次, 触点未见损伤 No visible damage to contact at five complete operations	符合要求 OK
4	冲击电压试验 Impulse voltage withstand	125 kV, 正负极性各10次不击穿 No breakdown shall occur at 10 positive and 10 negative Impulses of 125 kV	125 kV, 正负极性各10次组合试样各相均未击穿 No breakdown occurred on the combination samples at 10 positive and 10 negative impulses of 125 kV	符合要求 OK
5	工频电压试验 AC withstand	30kV, 15 min, 不击穿 No breakdown shall occur at 30kV for 15 min	30kV下, 15min, 组合试样各相均未击穿 No breakdown occurred on the combination samples at 30kV for 15 min	符合要求 OK

表3 / Table 3

试验顺序 Test sequence	检测项目 Items	标准要求 Requirements	检测结果 Results		评价 Remarks
1	屏蔽电阻试验 Screen resistance tests	老化前后屏蔽电阻不大于5000Ω Screen resistance before and after the heating period shall not exceed 5000 Ω	老化前 before the heating period	老化后 after the heating period	符合要求 OK
			244 Ω	265 Ω	

附录A: 热循环电压试验前组合试样冲击电压试验实际耐受电压值(125kV, 允许±3%偏差)
 Annex A: The values of impulse voltages on the combination samples before heating cycles
 voltage test (125kV, ±3% tolerance)

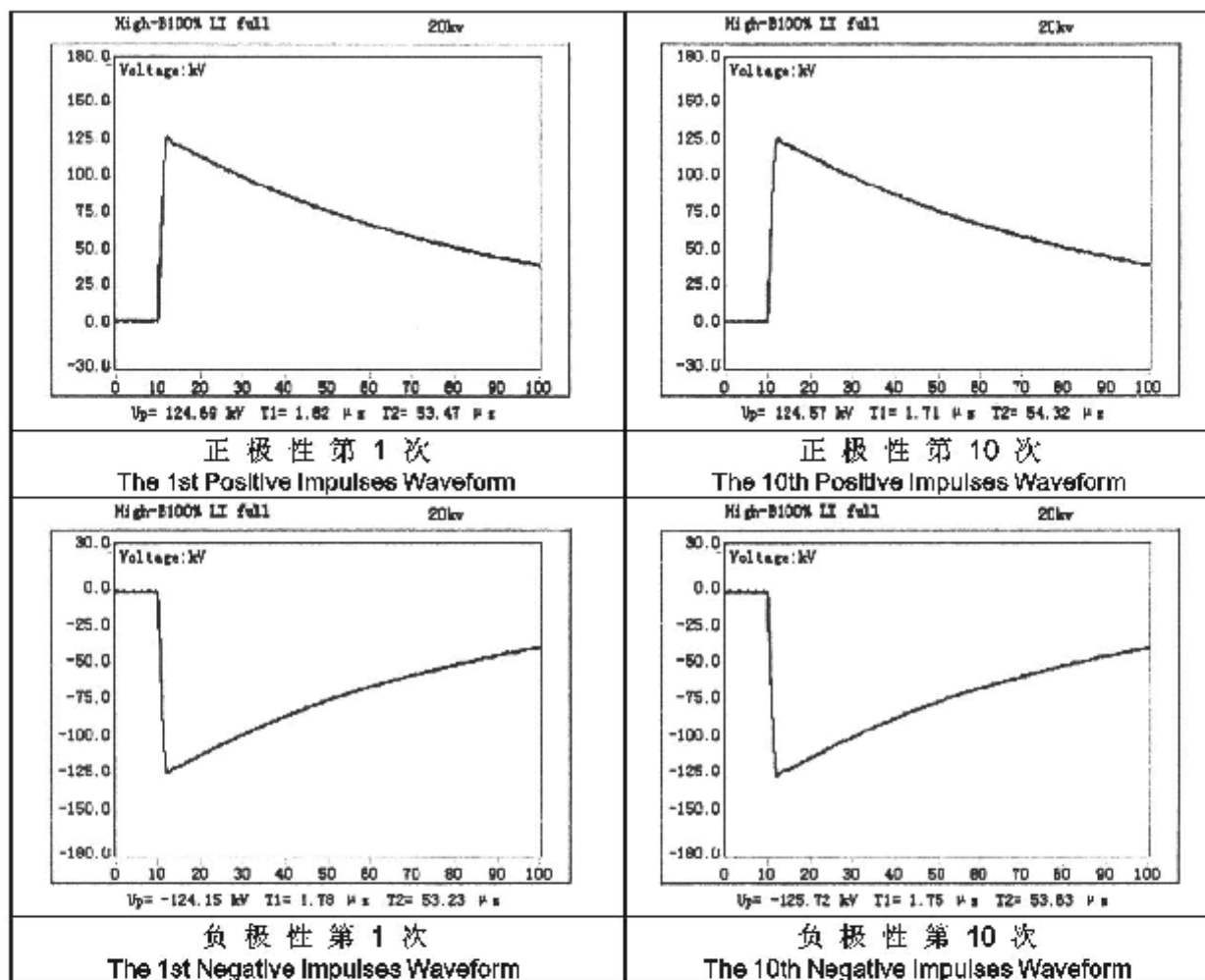
温度: 19℃ 相对湿度: 77% 大气压: 0.1022MPa
 Ambient temperature: 19℃, Relative humidity: 77%, Atmosphere: 0.1022MPa

单位/unit: kV

正极性 Positive polarity	124.9	124.7	125.6	125.9	124.3	126.4	126.4	126.3	127.1	124.7
负极性 Negative polarity	124.3	125.1	124.3	125.2	125.3	125.7	125.1	124.1	126.3	125.7

冲击电压波形图 (时标: 10 μs/格)

Oscillograms of the impulse voltages waveform (timing mark: 10 μs/div)



附录B: 热循环电压试验后组合试样冲击电压试验实际耐受电压值(125kV, 允许±3%偏差)
 Annex B: The values of impulse voltages on the combination samples after heating cycles
 voltage test (125kV, ±3% tolerance)

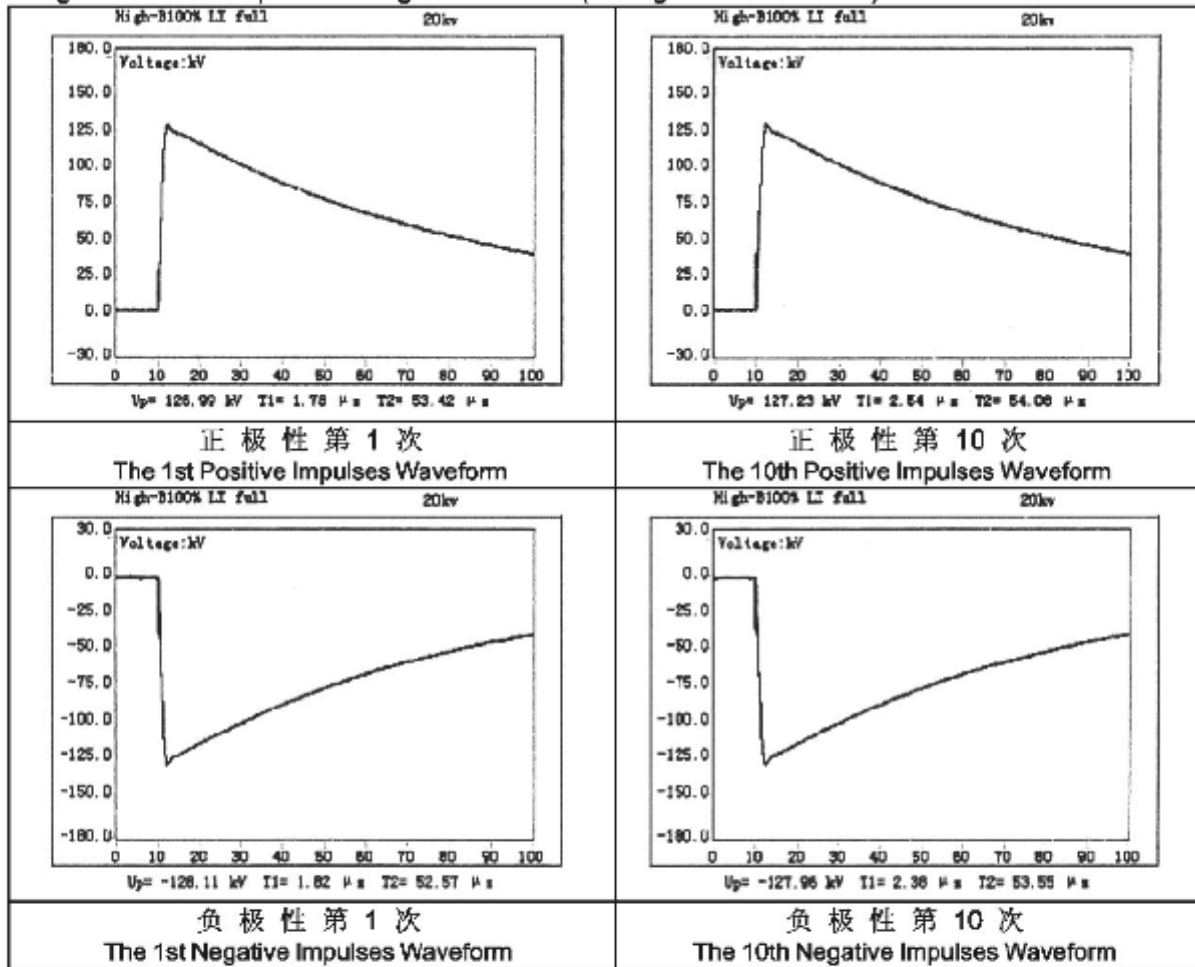
温度: 19℃ 相对湿度: 74% 大气压: 0.1010MPa
 Ambient temperature: 19℃, Relative humidity: 74%, Atmosphere: 0.1010MPa

单位/unit: kV

正极性 Positive polarity	126.9	124.6	126.8	125.1	125.7	127.3	126.3	126.2	125.1	127.2
负极性 Negative polarity	128.1	125.6	126.0	125.3	124.3	125.3	125.3	124.8	125.0	127.9

冲击电压波形图 (时标: 10 μs/格)

Oscillograms of the impulse voltages waveform (timing mark: 10 μs/div)



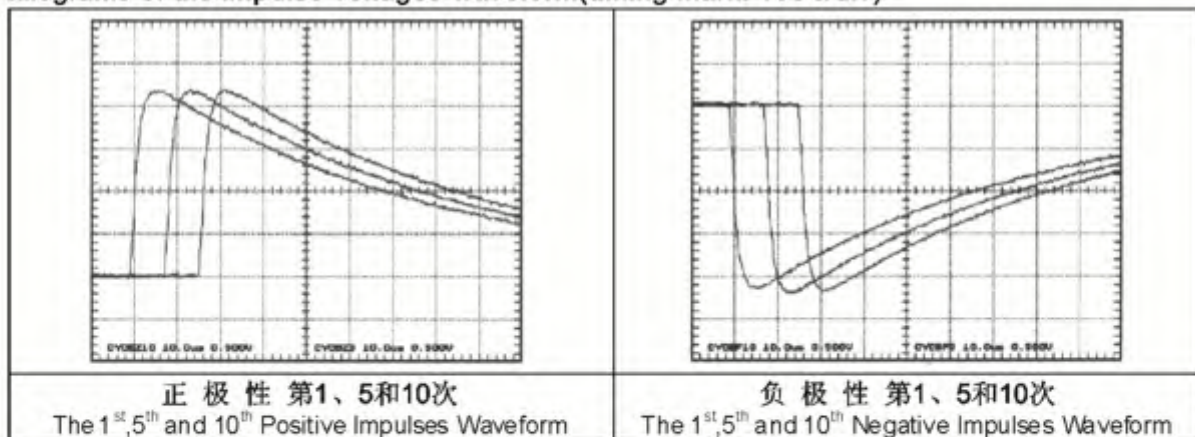
附录C: 动热稳定试验后组合试样冲击电压试验实际耐受电压值(125kV, 允许±3%偏差)
 Annex C: The values of impulse voltages on the combination samples after Dynamic short-circuit and thermal short-circuit tests (125kV, ±3% tolerance)

温度: 19℃ 相对湿度: 80% 大气压: 0.1003MPa
 Ambient temperature: 19℃, Relative humidity: 80%, Atmosphere: 0.1003MPa

单位/unit: kV

正极性 Positive polarity	125.5	125.7	124.9	125.0	125.3	125.6	124.9	124.9	124.1	125.3
负极性 Negative polarity	124.1	125.5	125.7	126.1	126.5	125.4	125.4	125.6	125.1	125.0

冲击电压波形图 (时标: 10 μs/格)
 Oscillograms of the impulse voltages waveform (timing mark: 10 μs/div)



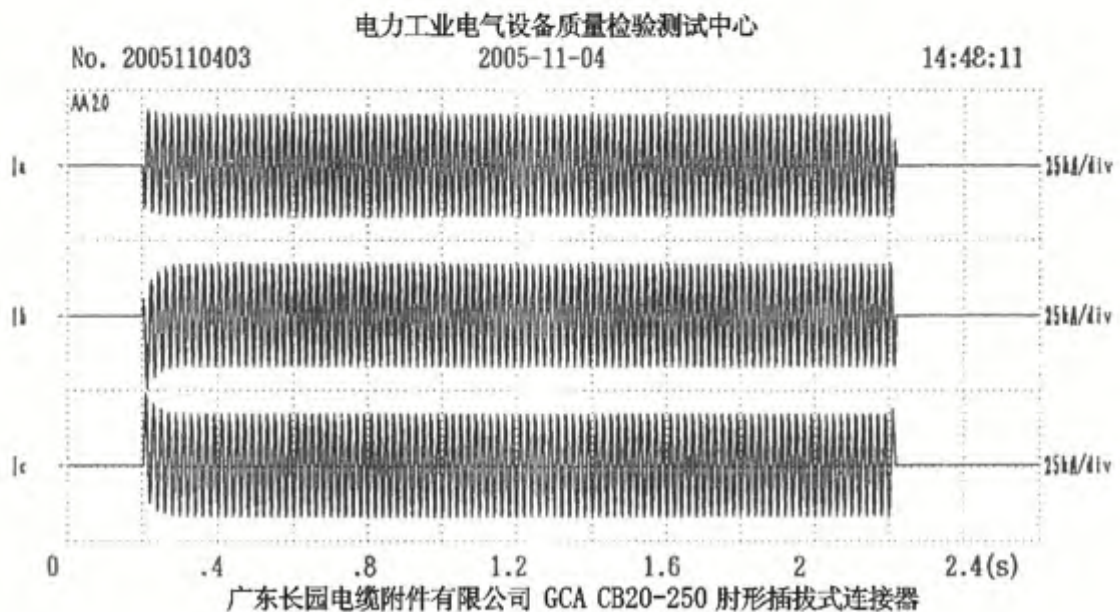
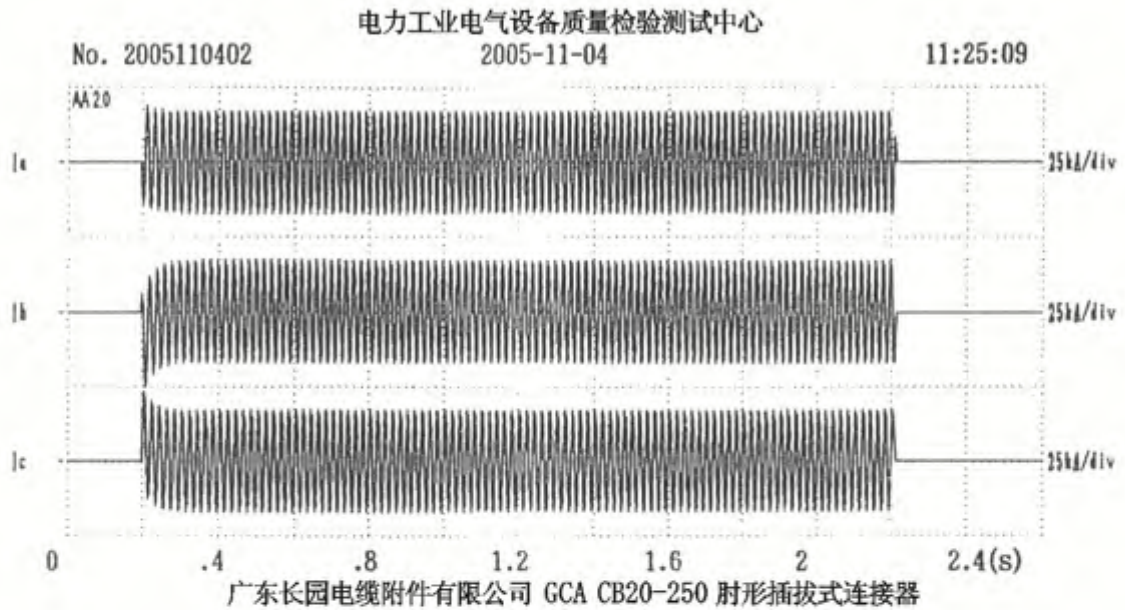
附录D: 试验照片
 Annex D: Photograph about testing

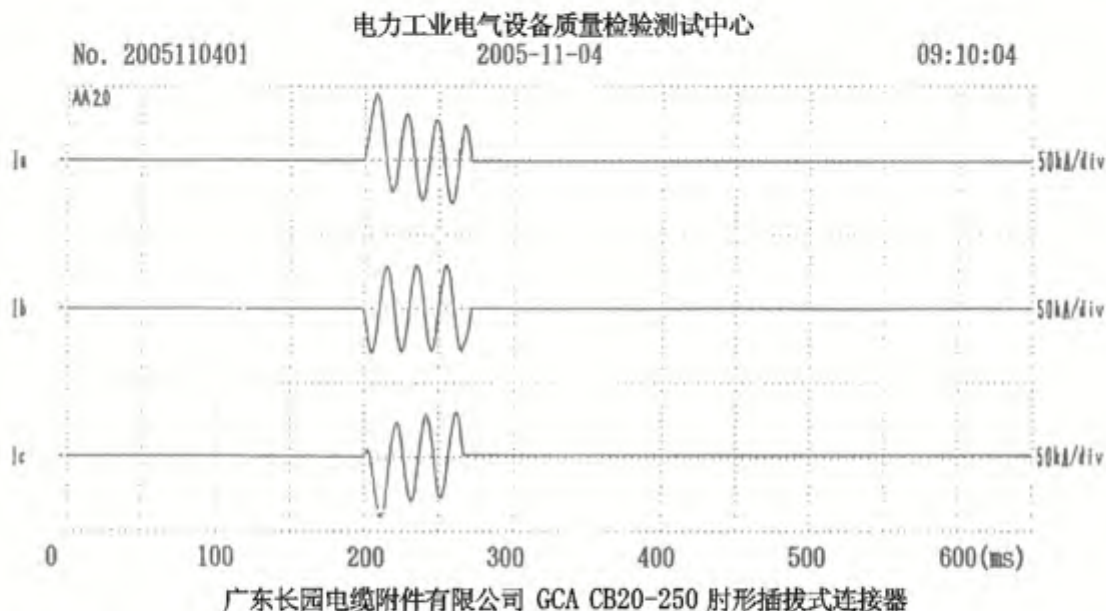


图1: 试品外观图
 Fig1: The appearance of the sample

附录E:组合试样动热稳定试验波形

Annex E: The waveform of Dynamic short-circuit and thermal short-circuit tests of the combination Sample





附录F：试验电缆描述

Annex F: Identification of test cable

额定电压	rated voltage $U_0/U(U_m)$ kV	12/20(24)
结构 construction	芯数 core	三芯 three-cores
	屏蔽结构 construction of screed	分相屏蔽 separated screen
导体 conductor	材质 material	铜 copper
	形状 type	紧压圆形绞合 round compact stranded
	截面 cross section	95 mm ²
	外径 diameter	11.3 mm
绝缘 insulation	材质 material	交联聚乙烯 XLPE
	厚度 thickness	5.54mm
	外径 diameter	23.6 mm
屏蔽 screen	导体屏蔽厚度 thickness of conductor screed	0.6 mm
	绝缘屏蔽厚度 thickness of insulation screed	0.8 mm
	绝缘屏蔽是否可剥离 strippability of insulation screed	可剥离 strippable
	绝缘屏蔽外径 diameter of insulation screed	24.7mm
	金属屏蔽 metallic screed	铜带屏蔽 copper tape
铠装 armour		钢带铠装 steel strip armour
外护套 oversheath	材质 material	聚氯乙烯 PVC
	外径 diameter	65.0 mm
电缆标示 mark of cable		YJV22-12/20(24) 3×95

附录G: 检测中使用的主要试验仪器设备清单

Annex G: List of the equipment and instruments used in tests

序号 Seque- -nce	仪器设备名称 Name of the equipment and instruments	型 号 Type	编 号 No	检定有效期 Effective duration
1	交直流试验变压器 AC/DC test transformer	TSB (JZ)	6104	—
2	数字高压表 Digital HV meter	JSGB-100	9266	2005-01-11~2006-01-10
3	局放检测系统 PD measurement system	JFD-2B	96018	2004-05-20~2006-05-19
4	大电流试验装置 Equipment of have current test	DDG-A-180/18 ×2	—	—
5	电流互感器 Current transformer	LM-0.5	0513	2004-05-22~2006-05-21
6	数字电压表 Digital voltage meter	DT9806	3225271	2005-11-05~2006-11-04
7	试验变压器 Test transformer	YS 630/10	SB12	—
8	数据采集系统 Data collected system	H-DJF-2	C11-13	2003-12-30~2005-12-29
9	冲击电压发生器 Impulse voltage generator	CYF900-0.022	03	—
10	峰值电压表 Meter in peak value of voltage	64M	080816	2005-05-22~2006-05-21