

# 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



2011000711D



检测  
CNAS L1026

(2012) 检字 JDL675 号

## 检测报告

## Inspection Report



地址：湖北省武汉市洪山区珞喻路 143 号  
邮编：430074  
电话：4006565689  
传真：(027) 59832255  
网址：China-qitc.sgepri.sgcc.com.cn

# 电力工业电气设备质量检验测试中心 检测报告

Quality Inspection and Test Center for Equipment of Electric Power  
Inspection Report

(2012)检字 JDL675 号

委托单位 北京芳远新合电器技术有限公司  
Client Beijing Fangyuan Xinhe Electric Technology Co., Ltd.

### 试样说明

名称: 8.7/15 (17.5) kV 屏蔽型可分离连接器  
型号规格: JOK-15/630  
制造厂: 北京芳远新合电器技术有限公司

试样编号: DL2012-676  
制造日期: 2012年10月  
取样方式: 送样

### Description of Samples

Name of Test Samples: 8.7/15 (17.5) kV screened separable connector  
Type & Size: JOK-15/630  
Manufacturer: Beijing Fangyuan Xinhe Electric Technology Co., Ltd.  
Sample No.: DL2012-676  
Date of Manufacturing: Oct., 2012  
Sampling Way: taken by client self

### 检测标准/依据

GB/T 12706.4-2008 额定电压 1 kV ( $U_m=1.2$  kV)到 35 kV ( $U_m=40.5$  kV)挤包绝缘电力电缆及附件 第 4 部分: 额定电压 6 kV ( $U_m=7.2$  kV)到 35 kV ( $U_m=40.5$  kV)电力电缆附件试验要求  
IEC 60502-4:2005 额定电压 1 kV ( $U_m=1.2$  kV) 到 30 kV ( $U_m=36$  kV)挤包绝缘电力电缆及其附件 第 4 部分: 额定电压 6 kV ( $U_m=7.2$  kV)到 30 kV ( $U_m=36$  kV)电缆附件试验要求

### Inspection Standard/Reference

GB/T 12706.4-2008 Power cables with extruded insulation and their accessories for rated voltages from 1 kV ( $U_m=1.2$  kV) up to 35 kV ( $U_m=40.5$  kV) — Part 4: Test requirements on accessories for cables with rated voltages from 6 kV ( $U_m=7.2$  kV) up to 35 kV ( $U_m=40.5$  kV)  
IEC 60502-4:2005 Power cables with extruded insulation and their accessories for rated voltages from 1 kV ( $U_m=1.2$  kV) up to 30 kV ( $U_m=36$  kV) Part 4: Test requirements on accessories for cables with rated voltages from 6 kV ( $U_m=7.2$  kV) up to 30 kV ( $U_m=36$  kV)

### 检测类别 型式试验

Category of Inspection Type tests

检测日期 2012-11-19~2013-01-30

Inspection Dates 2012-11-19~2013-01-30

### 检测结论

根据 GB/T 12706.4-2008 和 IEC 60502-4:2005 标准标准, 对北京芳远新合电器技术有限公司送的 JOK-15/630 型 8.7/15 (17.5) kV 屏蔽型可分离连接器试样进行检测, 型式试验项目合格。

### Conclusion

The 8.7/15 (17.5) kV screened separable connectors, the type and size of which is JOK-15/630 submitted for inspection by the client's own self have passed the type tests specified in GB/T 12706.4-2008 and IEC 60502-4:2005.

检测人员: \_\_\_\_\_  
Inspected by

赫留洋  
He Liuyang

周成  
Zhou Cheng

校核: \_\_\_\_\_  
Checked by Miao Fugui

审核: \_\_\_\_\_  
Examined and verified by Yan Mengkun

批准: \_\_\_\_\_  
Approved by Huang Weimin

签发日期: \_\_\_\_\_  
Date of issue

2013-02-27

## 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 version.

## 2 试样的数量和安装

由制造厂将六个被试样品安装在两根 YJV-8.7/15 3×185 的电缆上构成组合试样, 用于进行标准中表 7 规定的 4.1 系列, 4.2 系列和 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 5 m。标准中表 7 规定的其它试验在单独试样上进行。

### The Number and Installation of Combination Samples

It was required that six samples to be tested were installed by the manufacturer on the cables forming combination samples on which the type tests sequence 4.1 and 4.2 and 4.3 in table 7 were carried out. The cable used in the combination sample was a XLPE insulated three-core cable with rated voltage 8.7/15 kV, a cross-section of 185 sq.mm. The length of the cable in the combination sample was greater than 5m between the 8.7/15 kV screened separable connectors and terminations. Other type tests listed in table 7 were carried out on other 8.7/15 kV screened separable connectors.

## 3 试验方法

### Test Methods

#### 3.1 工频电压试验

试验按 IEC 61442:2005 第 4 章的规定进行。

#### AC Voltage Withstand Test

The tests were carried out in accordance with IEC 61442:2005, clause 4.

#### 3.2 局部放电试验

试验按 IEC 61442:2005 第 7 章的规定进行。

#### Partial Discharge Test

The tests were carried out in accordance with IEC 61442:2005, clause 7.

#### 3.3 冲击电压试验

试验按 IEC 61442:2005 第 6 章的规定进行。

#### Impulse Voltage Withstand Test

The tests were carried out in accordance with IEC 61442:2005, clause 6.

### 3.4 恒压负荷循环试验

每个负荷循环时间为 8 h, 其中至少有 2 h 使导体温度保持在正常运行时最高温度以上 5 °C~10 °C, 随后至少 3 h 自然冷却至不超过环境温度 10 °C。在整个试验期间, 试品上应施加 23 kV 的工频电压。

#### Heating cycle voltage test

Each thermal cycle was of 8 h 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 test period a voltage of 23 kV shall be applied to the sample.

### 3.5 动热稳定试验

试验按 IEC 61442:2005 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 61442:2005, clause 11 and clause 12.

### 3.6 屏蔽电阻试验

试验按 IEC 61442:2005 第 15 章的规定进行。

#### Screen resistance tests

The tests were carried out in accordance with IEC 61442:2005, clause 15.

### 3.7 屏蔽泄漏电流试验

试验按 IEC 61442:2005 第 16 章的规定进行。

#### Screen leakage current tests

The tests were carried out in accordance with IEC 61442:2005, clause 16.

## 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)、表 2 (标准中规定 4.2 和 4.3 系列)和表 3(其它项目)。

### Test Sequence and Results

The test sequence and results were given in Table 1 (sequence 4.1) and Table 2 (sequence 4.2 and 4.3) and Table 3(the other items).

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 voltage test	39 kV, 5 min, 不击穿 No breakdown shall occur at 39 kV for 5 min	39 kV, 5 min, 组合试样各相 均未击穿 No breakdown occurred on the combination samples at 39 kV for 5 min				符合要求 Pass
2	室温下局部放 电试验 Partial discharge test at ambient temperature	15 kV 放电 量 不大于 10 pC The magnitude of the discharge at 15 kV shall not exceed 10 pC	相别 phase	黄 Y	绿 G	红 R	符合要求 Pass
			电压, kV voltage	15	15	15	
			背景, pC noise background	1.6	1.6	1.6	
			放电量, pC discharge	3.7	≤ 1.6	≤ 1.6	
3	高温下冲击电 压试验 Impulse withstand voltage test at 95 °C ~ 100 °C	95 kV, 正负极性各 10 次, 不击穿 No breakdown shall occur at 10 positive and 10 negative impulses of 95 kV	95 kV, 正负极性各 10 次 (见附录 B) 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 95 kV (See Annex B)				符合要求 Pass
4	恒压负荷循环 电压试验 Heating cycle voltage test	在 23 kV 电压和 导体温度加热至 95 °C ~ 100 °C 下, 30 次循环在空气中, 30 次循环在水中, 不击穿 30 cycles in air and 30 cycles under water at the conductor temperature of 95 °C ~ 100 °C and 23 kV, no breakdown shall occur	在 23 kV 电压和导体温度 95 °C ~ 100 °C 下, 共经受了 30 次循环在空气中, 30 次循环在 水中, 组合试样均未击穿 No breakdown occurred on the combination samples subjected to 30 cycles in air and 30 cycles under water at the conductor temperature of 95 °C to 100 °C and 23 kV				符合要求 Pass
5	高温下局部放 电试验 Partial discharge test at 95 °C ~ 100 °C	15 kV 放电 量 不大于 10 pC The magnitude of the discharge at 15 kV shall not exceed 10 pC	相别 phase	黄 Y	绿 G	红 R	符合要求 Pass
			电压, kV voltage	15	15	15	
			背景, pC noise background	2.0	2.0	2.0	
			放电量, pC discharge	3.6	≤ 2.0	≤ 2.0	

续表1/ Continuing 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
			相别 phase	黄 Y	绿 G	红 R	
6	室温下局部放电试验 Partial discharge test at ambient temperature	15 kV 放电量不大于 10 pC The magnitude of the discharge at 15 kV shall not exceed 10 pC	电压, kV voltage	15	15	15	符合要求 Pass
			背景, pC noise background	1.8	1.8	1.8	
			放电量, pC discharge	3.7	≤ 1.8	≤ 1.8	
			相别 phase				
7	冲击电压试验 Impulse withstand voltage test	95 kV, 正负极性各 10 次, 不击穿 No breakdown shall occur at 10 positive and 10 negative impulses of 95 kV	95 kV, 正负极性各 10 次 (见附录 C) 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 95 kV (See Annex C)				符合要求 Pass
8	工频电压试验 AC withstand voltage test	23 kV, 15 min, 不击穿 No breakdown shall occur at 23 kV for 15 min	23 kV, 15 min, 组合试样各相均未击穿 No breakdown occurred on the combination samples at 23 kV for 15 min				符合要求 Pass

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 voltage test	39 kV, 5 min, 不击穿 No breakdown shall occur at 39 kV for 5 min	39 kV, 5 min, 组合试样各相均未击穿 No breakdown occurred on the combination samples at 39 kV for 5 min	符合要求 Pass
2	热稳定试验 (导体) Thermal short-circuit test (conductor)	24.0 kA, 2 s 两次, 无可见的损坏 No visible deterioration at 24.0 kA, 2 s	24.37 kA, 2.00 s 和 24.36 kA, 2.00 s 无可见的损坏 (见附录 E2) No visible deterioration at 24.37 kA, 2.00 s and 24.36 kA, 2.00 s (See Annex E2)	符合要求 Pass
3	动稳定试验 (导体) Dynamic short-circuit test (conductor)	88.0 kA, 不少于 10 ms, 无可见的损坏 No visible deterioration at 88.0 kA at least 10 ms	88.68 kA, 85 ms, 无可见的损坏 (见附录 E1) No visible deterioration at 88.68 kA, 85 ms (See Annex E1)	符合要求 Pass

续表2/ Continuing 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
4	冲击电压试验 Impulse withstand voltage test	95 kV, 正负极性各 10 次, 不击穿 No breakdown shall occur at 10 positive and 10 negative impulses of 95 kV	95 kV, 正负极性各 10 次 (见附录 D) 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 95 kV (See Annex D)	符合要求 Pass
5	工频电压试验 AC withstand voltage test	23 kV, 15 min, 不击穿 No breakdown shall occur at 23 kV for 15 min	23 kV, 15 min, 组合试样 各相均未击穿 No breakdown occurred on the combination samples at 23 kV for 15 min	符合要求 Pass

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 5000 Ω Screen resistance before and after the heating period shall not exceed 5000 Ω	老化前 before ageing	老化后 after ageing	符合要求 Pass
			124 Ω	140 Ω	
2	屏蔽泄漏电流 Screen leakage	在 17.5 kV 下, 泄漏 电流不大于 0.5 mA Screen leakage shall not exceed 0.5 mA at 17.5 kV	在 17.5 kV 下, 泄漏电流 小于 0.5 mA Screen leakage didn't exceed 0.5 mA at 17.5 kV		符合要求 Pass

此页以下空白  
The below area in this page is blank

附录A 检测中使用的主要试验仪器设备清单  
Annex A List of the main equipment and instruments used in tests

序号 Sequence	仪器设备名称 型号/规格 Name of the equipment and instruments Model / Type	设备编号 No.	测量范围 Measuring range	不确定度/ 准确度 Uncertainty / Veracity	检定/校准 机构 Verification /Calibration institution	有效日期 valid period
1	TAWF 串联谐振装置 Series resonance system	312068	(0~75) kV	3 级 Grade 3	国家高电压计量站 National high voltage measurement station	2013-09-09
2	JFD-2H 局放检测系统 PD measurement system	20041202	(0.5~1000) pC	10 级 Grade 10	国家高电压计量站 National high voltage measurement station	2014-05-20
3	FY I 900/600 弱阻尼电容分 压器 Weakly damped capacitive voltage divider	11165-2- 1	(0~900) kV	3 级 Grade 3	国家高电压计量站 National high voltage measurement station	2014-07-01
4	H-DJF-2 数据采集系统 Data collected system	CJ06	(0~100) kA	0.5 级 Grade 0.5	国家高电压计量站 National high voltage measurement station	2016-01-03
5	LM-0.5 电流互感器 Current transformer	514	(0~3000) A	0.5 级 Grade 0.5	国家高电压计量站 National high voltage measurement station	2014-05-30
6	MAS- II 数字微安表 MAS- II digital microammeter	20001	(0-1999) uA	2 级 Grade 2	国家高电压计量站 National high voltage measurement station	2013-10-21
7	35 kV 高压 试验系统 35 kV High voltage test system	105	(0~35) kV	1.5 级 Grade 1.5	国家高电压计量站 National high voltage measurement station	2014-01-03
8	JSGB-100 数字高压表 Digital high voltage meter	9266	100 kV	1 级 Grade 1	国家高电压计量站 National high voltage measurement station	2014-01-05
9	UT56 数字电压表 Digital voltage meter	30800995 22	700 V	1 级 Grade 1	湖北省计量测试技 术研究院 Hubei Institute of Measurement and Testing Technology	2013-10-22



附录B 恒压负荷循环试验前组合试样冲击电压试验实际耐受电压值和冲击电压波形(高温下, 95 kV, 允许 ±3 % 偏差)

Annex B The values and oscillograms of impulse voltages on the combination samples before heating cycles voltage test (at high temperature, 95 kV, ±3% tolerance)

B1 冲击电压实际耐受电压值

The values of impulse voltages

温度: 16.5 °C 相对湿度: 45 % 大气压: 0.1015 MPa

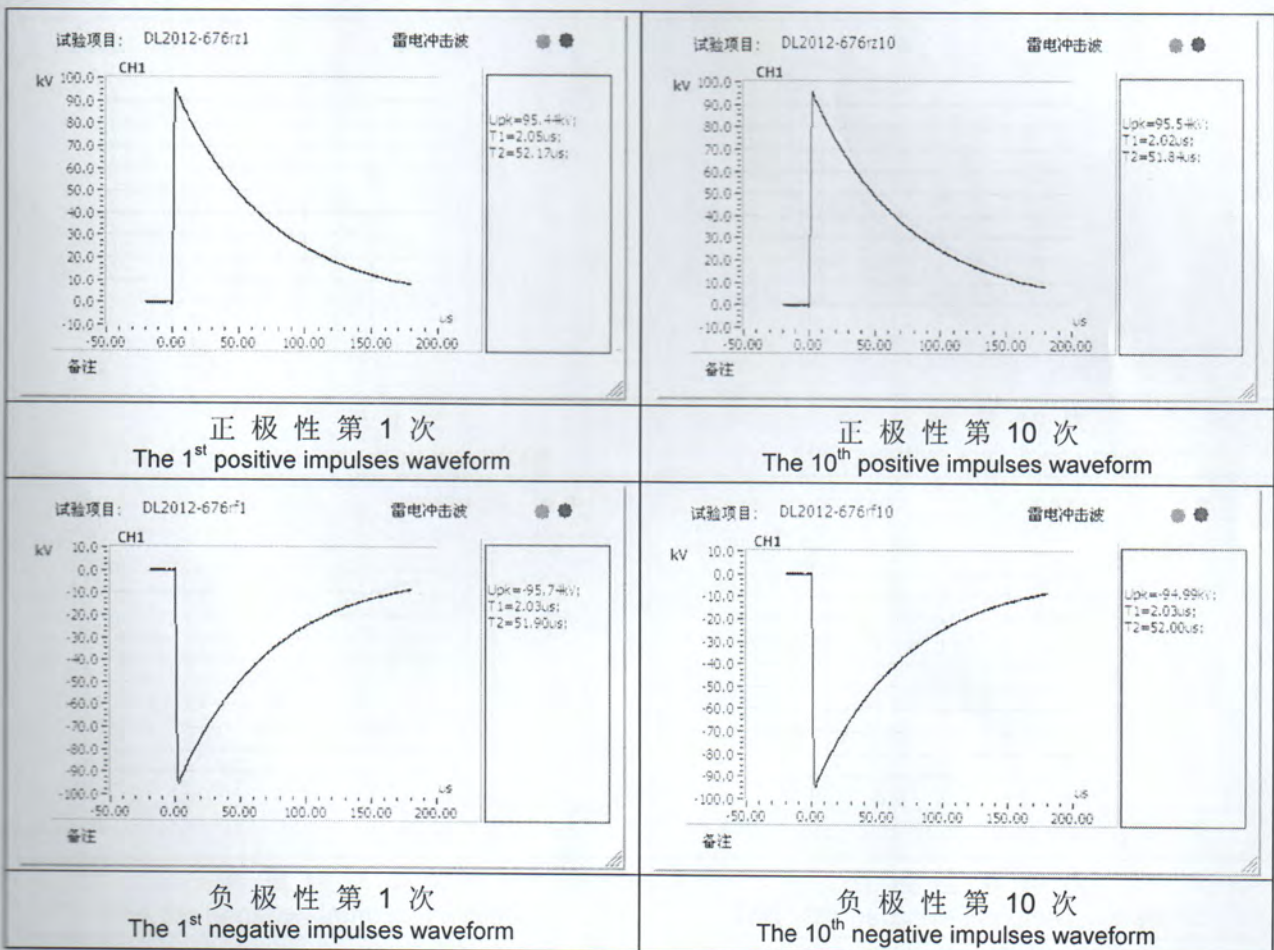
Ambient temperature: 16.5 °C, Relative humidity: 45 %, Atmosphere: 0.1015 MPa

单位/unit: kV

正极性 Positive polarity	95.4	95.2	95.4	95.4	95.5	95.4	95.6	95.5	95.3	95.5
负极性 Negative polarity	95.7	95.8	95.5	95.2	95.4	95.3	94.9	94.8	95.2	95.0

B2 冲击电压波形图

Oscillograms of the impulse voltages waveform



附录C 恒压负荷循环试验后组合试样冲击电压试验实际耐受电压值和冲击电压波形(室温下, 95 kV, 允许  $\pm 3\%$  偏差)

Annex C The values and oscillograms of impulse voltages on the combination samples after heating cycles voltage test (at ambient temperature, 95 kV,  $\pm 3\%$  tolerance)

C1 冲击电压实际耐受电压值

The values of impulse voltages

温度: 8.0 °C 相对湿度: 47 % 大气压: 0.1023 MPa

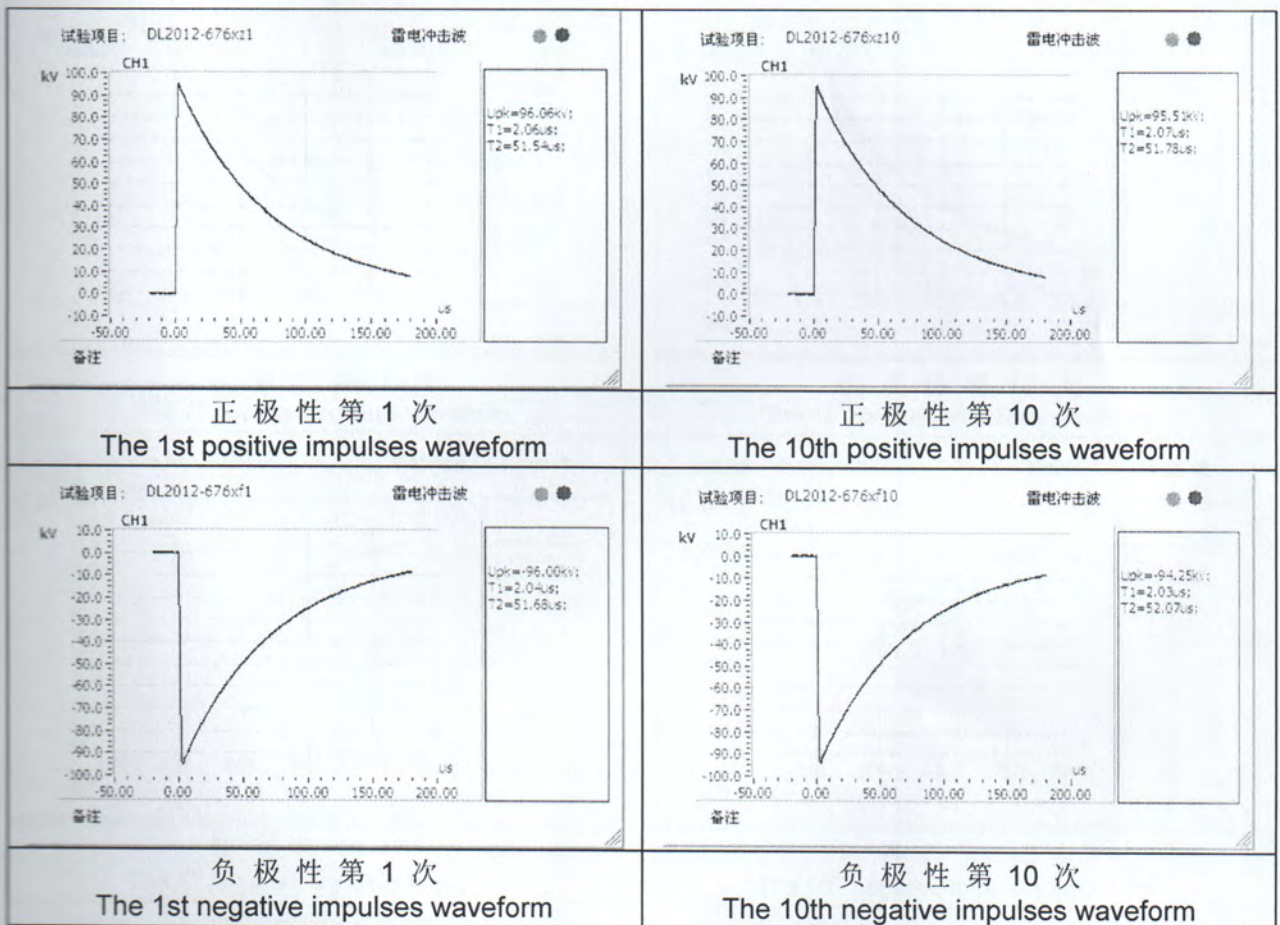
Ambient temperature: 8.0 °C, Relative humidity: 47 %, Atmosphere: 0.1023 MPa

单位/unit: kV

正极性 Positive polarity	96.1	95.9	95.9	95.6	96.1	95.8	95.7	96.0	95.8	95.5
负极性 Negative polarity	96.0	95.7	95.8	95.7	95.5	95.6	95.3	94.7	94.9	94.3

C2 冲击电压波形图

Oscillograms of the impulse voltages waveform



附录D 动热稳定试验后组合试样冲击电压试验实际耐受电压值(室温下, 95 kV, 允许±3%偏差)  
Annex D The values of impulse voltages on the combination samples after thermal short-circuit tests (at ambient temperature, 95 kV, ±3 % tolerance)

D1 冲击电压实际耐受电压值

The values of impulse voltages

温度: 12.5 °C 相对湿度: 43 % 大气压: 0.1017 MPa

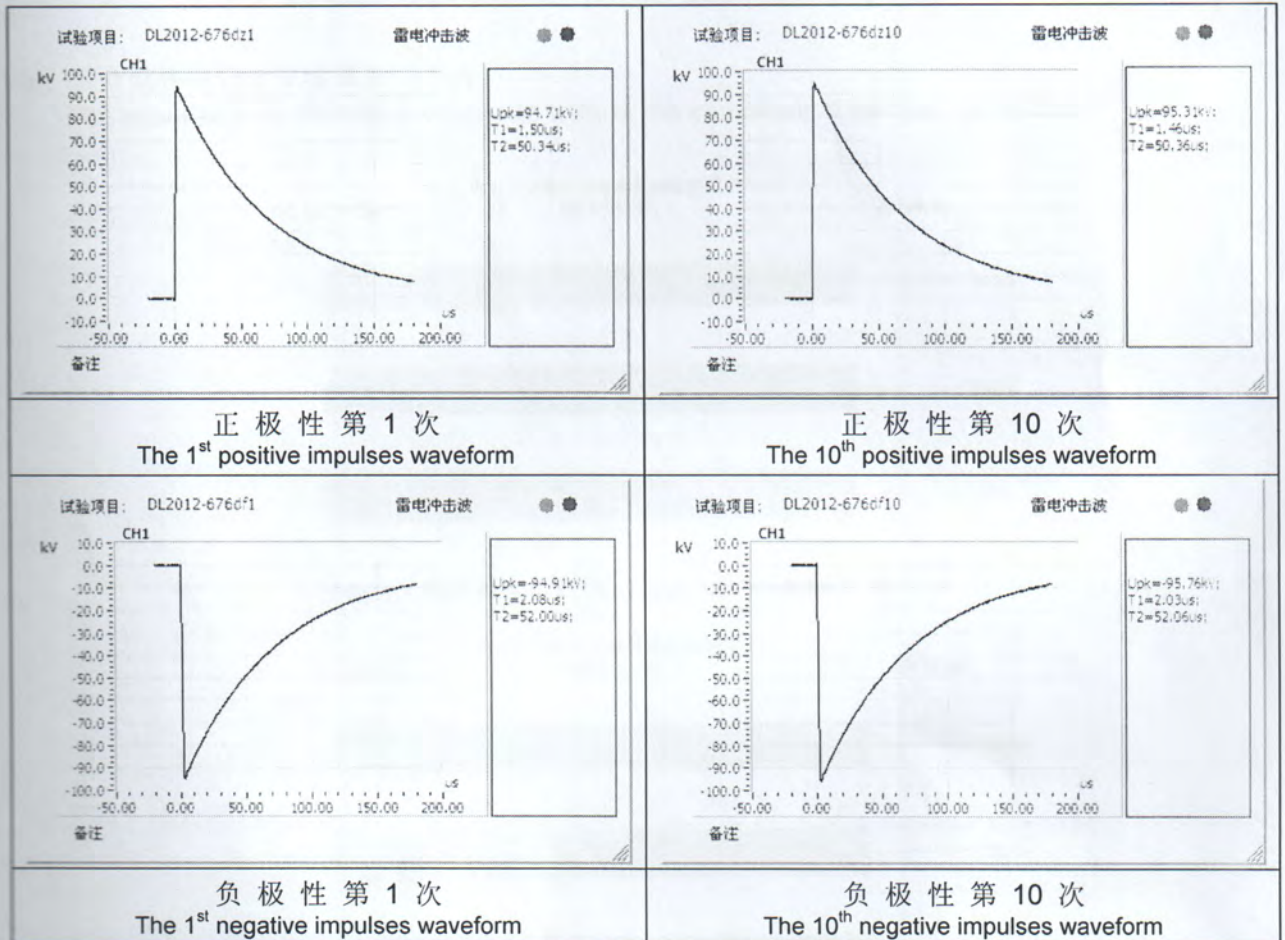
Ambient temperature: 12.5 °C, Relative humidity: 43 %, Atmosphere: 0.1017 MPa

单位/unit: kV

正极性 Positive polarity	94.7	94.9	94.9	95.2	95.3	95.3	95.1	95.0	95.2	95.3
负极性 Negative polarity	94.9	95.2	95.4	95.9	95.9	96.0	96.1	95.7	95.9	95.8

D2 冲击电压波形图

Oscillograms of the impulse voltages waveform

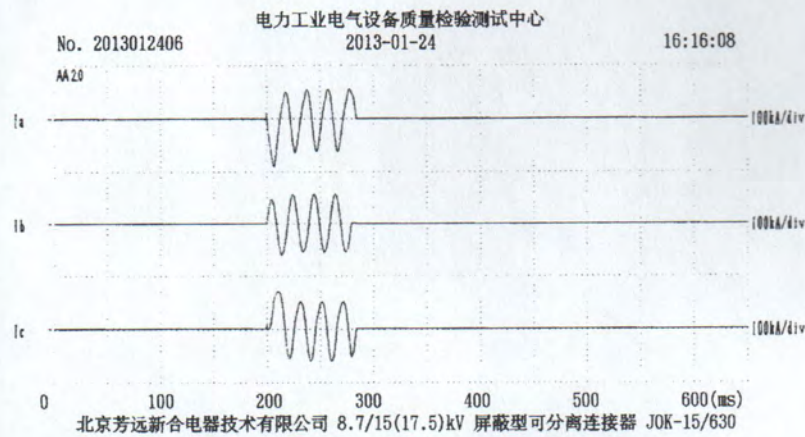


附录E 组合试样动热稳定试验波形

Annex E The waveform of dynamic short-circuit tests and thermal short-circuit tests of the combination sample

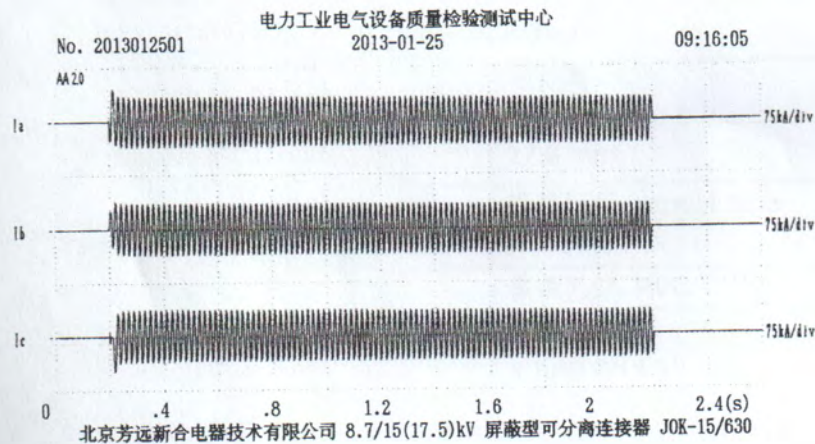
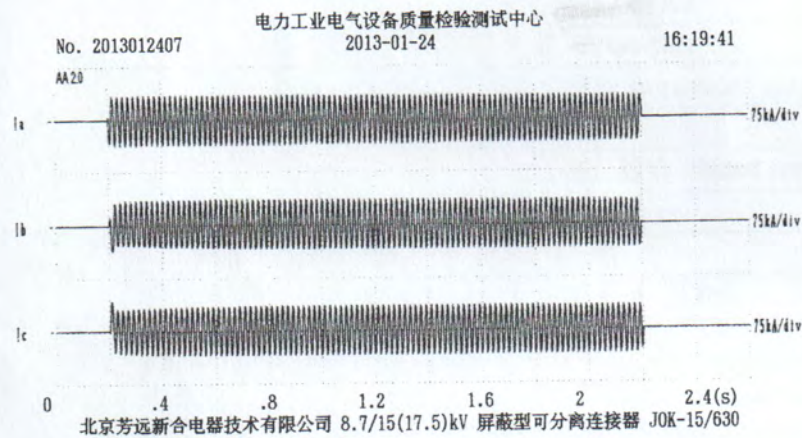
E1 组合试样动稳定试验波形 (导体)

The waveform of dynamic short-circuit tests of the combination sample (conductor)



E2 组合试样热稳定试验波形 (导体)

The waveform of thermal short-circuit tests of the combination sample (conductor)



附录F 试验照片

Annex F Photograph about testing



附录G 试验电缆描述

Annex G Identification of test cable

额定电压 rated voltage $U_0/U(U_m)$		8.7/15(17.5) kV
结构 construction	芯数 core	三芯 three-core
	屏蔽结构 construction of screen	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	185 mm <sup>2</sup>
	外径 diameter	15.3 mm
绝缘 insulation	材质 material	交联聚乙烯 XLPE
	厚度 thickness	4.6 mm
	外径 diameter	24.8 mm
屏蔽 screen	导体屏蔽厚度 thickness of conductor screen	0.8 mm
	绝缘屏蔽厚度 thickness of insulation screen	0.8 mm
	绝缘屏蔽是否可剥离 strippability of insulation screen	可剥离 strippable
	绝缘屏蔽外径 diameter of insulation screen	27.6 mm
	金属屏蔽 metallic screen	铜带屏蔽 copper tape
铠装 armour		/
外护套 oversheath	材质 material	聚氯乙烯 PVC
	外径 diameter	68.7 mm
电缆标示 mark of cable		YJV-8.7/15 3×185