

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



(2012) 检字 JDL265 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
QUALITY INSPECTION AND TEST CENTER FOR EQUIPMENT OF ELECTRIC POWER

检测报告
INSPECTION REPORT

(2012)检字 JDL265 号
Ref: 2012JDL265

委托单位 深圳市沃尔核材股份有限公司
Client Shenzhen Woer Heat-Shrinkable Material Co., Ltd.

试样说明
名称: 8.7/15 kV 欧式 250 A 可分离连接器
型号规格: WEZT 15/250 1×50
制造厂: 深圳市沃尔核材股份有限公司

试品编号: DL 2012-265
制造日期: 2012年04月
取样方式: 送样

Description of Samples

Name of Test Samples: 8.7/15 kV continental 250 A separable connector
Type and Size: WEZT 15/250 1×50
Manufacturer: Shenzhen Woer Heat-Shrinkable Material Co., Ltd.
Sample No.: DL2012-265
Year of Manufacture: Apr., 2012
Sampling Way: taken by client self

检测标准

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

Specification

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

检测类型 型式试验

Category of Test Type tests

检测日期 2012-05-09~2012-07-16
Date of Testing 2012-05-09~2012-07-16

检测结论 根据 GB/T 12706.4-2008 和 IEC 60502-4:2005 标准, 对深圳市沃尔核材股份有限公司送检的 WEZT 15/250 1×50 型 8.7/15 kV 欧式 250 A 可分离连接器样品进行检测, 型式试验项目合格。

Conclusion The type of WEZT 15/250 1×50 8.7/15 kV continental 250 A separable connectors taken to test by client self have passed the type tests specified in GB/T 12706.4-2008 and IEC 60502-4:2005.

检测人员: 李东胜 韩卫京
Inspected and Tested by Li Dongsheng Han Weijing

校核: 苗福贵 审核: 阎孟昆
Checked by Miao Fugui Examined and verified by Yan Mengkun

批准: 黄维敏 签发日期: 2012-07-31
Approved by Huang Weimin Date of issue: 2012-07-31

1 前言

本报告用中文书写，应委托方要求译成英文。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

由制造厂将四个被试样品安装在四根 YJV-8.7/15 1×50 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 four 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 single core cable with rated voltage 8.7/15 kV, a cross-section of 50 sq.mm. The length of the cable in the combination sample was greater than 5 m between terminations and the samples. Other type tests listed in table 7 were carried out on other samples.

3 试验方法

Test Methods

3.1 工频电压试验

试验按 IEC 61442:2005 第 4 章的规定在室温下进行。

AC Voltage Withstand Test

The tests were carried out at ambient temperature 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.

3.8 操作环试验

试验按 IEC 61442:2005 第 19 章的规定进行。

Operating eye

The tests were carried out in accordance with IEC 61442:2005, clause 19.

3.9 操作力试验

试验按 IEC 61442:2005 第 18 章的规定进行。

Operating force

The tests were carried out in accordance with IEC 61442:2005, clause 18.

3.10 电容试验点测试

试验按 IEC 61442:2005 第 20 章的规定进行。

Capacitive test point

The tests were carried out in accordance with IEC 61442:2005, clause 20.

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	15 kV (试验时背景干扰为 2.0 pC), 组合试样各相放电量均 不大于2.0 pC The magnitude of the discharge of the combination samples didn't exceed 2.0 pC at 15 kV (the level of maximum noise background being 2.0 pC during the tests)	符合要求 PASS
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 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	插拔试验 Disconnect/ connect	五次, 触点无可见损伤 Five times, No visible damage to contact	插拔五次, 触点未见损伤 Five times and no visible damage to contact	符合要求 PASS
6	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	15 kV (试验时背景干扰为 2.0 pC), 组合试样各相放电量均 不大于2.0 pC The magnitude of the discharge of the combination samples didn't exceed 2.0 pC at 15 kV (the level of maximum noise background being 2.0 pC during the tests)	符合要求 PASS

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
7	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	15 kV (试验时背景干扰为 2.1 pC), 组合试样各相放电量均不大于 2.1 pC The magnitude of the discharge of the combination samples didn't exceed 2.1 pC at 15 kV (the level of maximum noise background being 2.1 pC during the tests)	符合要求 PASS
8	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
9	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)	10.2 kA, 0.74 s 两次, 无可见的损坏 No visible deterioration at 10.2 kA, 0.74 s	10.32 kA, 0.748 s 和 10.22 kA, 0.747 s 无可见的损坏 (见附录 E2) No visible deterioration at 10.32 kA, 0.748 s and 10.22 kA, 0.747 s (See Annex E2)	符合要求 PASS
3	动稳定试验 (导体) Dynamic short-circuit test (conductor)	23.0 kA, 不少于 10 ms, 无可见的损坏 No visible deterioration at 23.0 kA at least 10 ms	23.23 kA, 88 ms, 无可见的损坏 (见附录 E1) No visible deterioration at 23.23 kA, 88 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	插拔试验 Disconnect/ connect	五次,触点无可见损伤 Five times, No visible damage	插拔五次,触点未见损伤 Five times and no visible damage to contact	符合要求 PASS
5	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
6	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	操作环试验 Operating eye	施加轴向力 2200 N, 1 min, 顺时针和逆时 针方向分别施加力矩 14 N·m Axial force 2200 N for 1 min Clockwise torgue and Anticlockwise torgue 14 N· m	施加轴向力 2200 N, 1 min, 顺时针和逆时针方向分别施加 力矩 14 N·m Axial force 2200 N for 1 min Clockwise torgue and Anticlockwise torgue 14 N· m		符合要求 PASS
2	局部放电试验 Partial discharge test at ambient temperature	15 kV下放电量不大 于10 pC The magnitude of the discharge at 15 kV shall not exceed 10 pC	15 kV下, 组合试样各相放电 量均不大于 2.1 pC The magnitude of the discharge of the combination samples didn't exceed 2.1 pC at 15 kV		符合要求 PASS
3	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
			131 Ω	61 Ω	

续表3/ Continuing 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
4	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
5	操作力试验 Operating force	力 < 900 N Force < 900 N	分开力 = 480 N 闭合力 = 410 N Opening-force: 480 N Closing-force: 410 N	符合要求 PASS
6	电容试验点测试 Capacitive test point	试验点对电缆导体的 电容 $C_{tc} > 1.0 \text{ pF}$ 试验点对地电容 C_{te} 与 试验点对电缆导体的 电容的比率 $C_{te} / C_{tc} \leq 12.0$ Capacitive of test point to cable conductor: $C_{tc} > 1.0 \text{ pF}$ Ratio of capacitance of test point to earth C_{te} and capacitive of test point to cable conductor C_{tc} : $C_{te} / C_{tc} \leq 12.0$	$C_{tc} = 2.2 \text{ pF}$ $C_{te} = 17.3 \text{ pF}$ $C_{te} / C_{tc} = 7.9$	符合要求 PASS

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 Sequenc -e	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 Uncertaint y/ 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	2012-09-25
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	冲击分压器 Impulse voltage divider	03	(0~900) kV	2 级 Grade 2	国家高电压计量站 National high voltage measurement station	2014-05-20
4	IPM 23 A 峰值电压表 Meter in peak value of voltage	070	±1600 V	2 级 Grade 2	国家高电压计量站 National high voltage measurement station	2012-10-12
5	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
6	LM-0.5 电流互感器 Current transformer	514	(0~2000) A	0.5 级 Grade 0.5	国家高电压计量站 National high voltage measurement station	2014-05-30
7	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	2012-10-10
8	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	2013-01-03
9	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	2013-01-10
10	DT9806 数字多用表 Digital voltage meter	A053632	(0~700) V	1 级 Grade 1	湖北省计量测试技 术研究院 Hubei Institute of Measurement and Testing Technology	2012-10-09

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: 26.0 °C 相对湿度: 56% 大气压: 0.1005 MPa

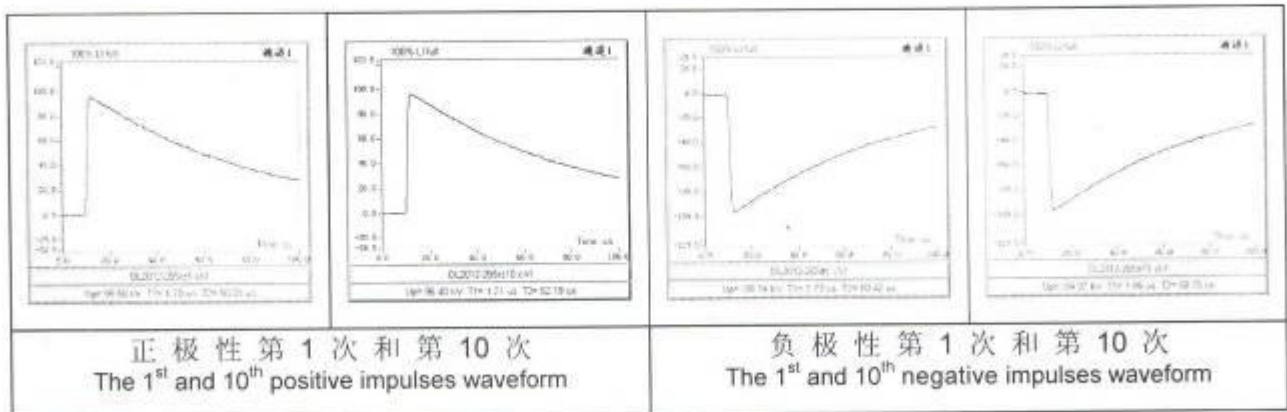
Ambient temperature: 26.0 °C, Relative humidity: 56%, Atmosphere: 0.1005 MPa

单位/unit: kV

正极性 Positive polarity	95.6	95.7	95.3	95.9	96.5	96.4	96.5	95.8	96.4	96.4
负极性 Negative polarity	95.1	95.4	95.1	95.4	95.6	95.3	95.8	95.3	95.5	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 ±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, ±3% tolerance)

C1 冲击电压实际耐受电压值

The values of impulse voltages

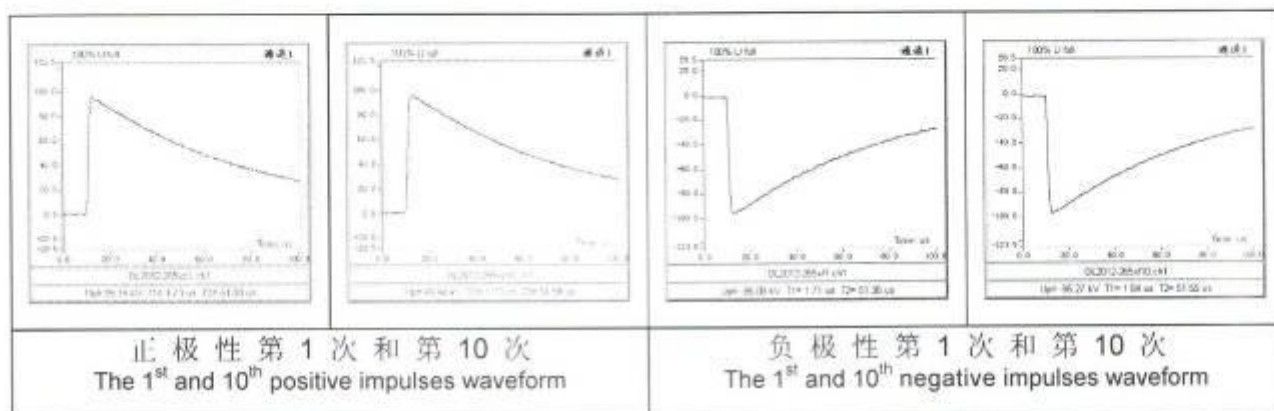
温度: 32.5 °C 相对湿度: 72% 大气压: 0.0993 MPa

Ambient temperature: 32.5 °C, Relative humidity: 72%, Atmosphere: 0.0993 MPa

单位/unit: kV

正极性 Positive polarity	95.2	95.7	95.4	95.8	96.4	96.1	96.7	96.3	96.1	95.9
负极性 Negative polarity	95.1	95.3	95.5	95.4	95.1	95.7	95.6	95.2	95.7	95.3

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

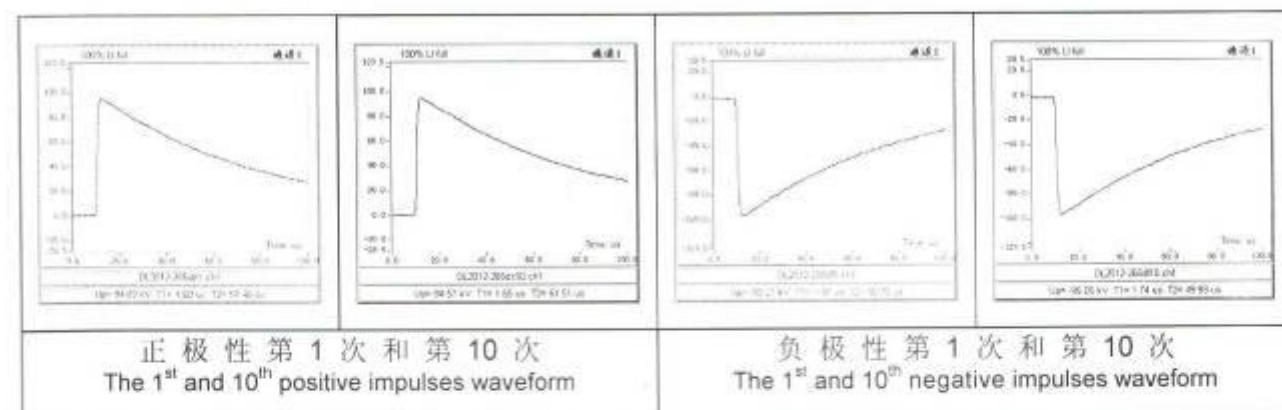
温度: 35.5 °C 相对湿度: 66 % 大气压: 0.0994 MPa

Ambient temperature: 35.5 °C, Relative humidity: 66 %, Atmosphere: 0.0994 MPa

单位/unit: kV

正极性 Positive polarity	94.9	94.8	95.4	95.3	95.8	95.5	95.2	95.3	94.3	94.6
负极性 Negative polarity	95.2	95.4	95.6	95.7	95.2	95.8	95.2	95.4	95.4	95.1

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

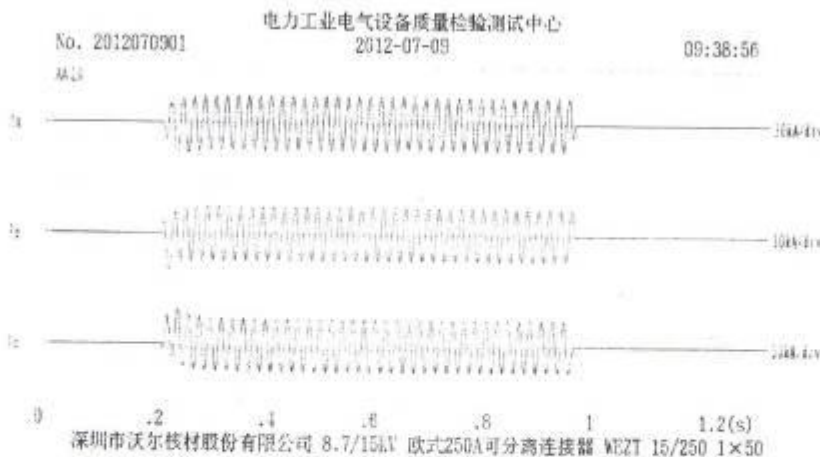
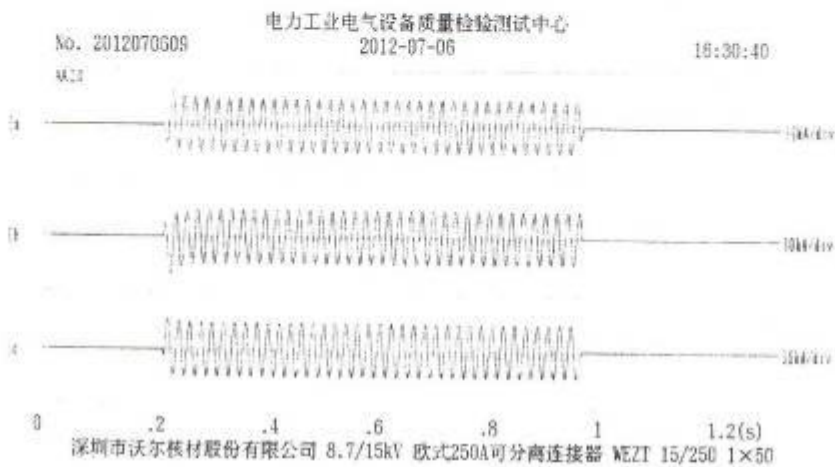
E1 组合试样动稳定试验波形 (导体)

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		8.7/15 kV
结构 construction	芯数 core	单芯 single core
	屏蔽结构 construction of screen	单相屏蔽 single-phase 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	50 mm ²
	外径 diameter	8.0 mm
绝缘 insulation	材质 material	交联聚乙烯 XLPE
	厚度 thickness	4.5 mm
	外径 diameter	18.6 mm
屏蔽 screen	导体屏蔽厚度 thickness of conductor screen	0.7 mm
	绝缘屏蔽厚度 thickness of insulation screen	0.6 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	20.1 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	26.7 mm
电缆标示 mark of cable		YJV-8.7/15 1×50