

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

(2011) 检字 JDL361 号



检 测 报 告

Inspection Report



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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

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Ref: 2011JDL361

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: 26/35 kV 交联电缆冷缩式直通接头
型号规格: 35 kV WLJ 3×185
制造厂: 深圳市沃尔核材股份有限公司

试样编号: DL 2011-362
制造日期: 2011年06月
取样方式: 送样

Description of Samples

Name of Test Samples: 26/35 kV XLPE cable cold shrinkable straight joint
Type and Size: 35 kV WLJ 3×185 Year of Manufacture: June., 2011
Manufacturer: Shenzhen Woer Heat-Shrinkable Material Co., Ltd.
Sample No: DL 2011-362 Sampling Way: taken by client self

检测标准

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

Specification

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)

检测类别 型式试验

Category of Test Type tests

检测日期 2011-07-08~2011-10-11

Date of Testing 2011-07-08~2011-10-11

检测结论 根据 GB/T 12706.4-2008 标准, 对深圳市沃尔核材股份有限公司送检的 35 kV WLJ 3×185 型 26/35 kV 交联电缆冷缩式直通接头样品进行检测, 型式试验项目合格。

Conclusion The type of 35 kV WLJ 3×185, 26/35 kV XLPE cable cold shrinkable straight joints taken to test by client self have passed the type tests specified in GB/T 12706.4-2008.

检测人员: _____

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Approved by Huang Weimin

签发日期:

Date of issue: 2011-10-27

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

由制造厂将两套被试直通接头样品安装在两根 YJV-26/35 3×185 的电缆上构成 1 号和 2 号组合试样，组合试样中接头与电缆终端之间的电缆长度均大于 2 m。1 号和 2 号组合试样用于进行标准中表 5 规定的 2.1 系列的试验；其中，2 号组合试样还用于进行标准中表 5 规定的 2.2 系列和 2.3 系列的试验。

另将两根 YJV-26/35 1×630 的电缆各安装一套户内终端、户外终端和直通接头，构成 1 个组合试样，用于进行标准中表 10 规定的试验。

The Number and Installation of Combination Samples

It was required that two sets of straight joints to be tested were installed by the manufacturer on two length of cables forming No.1 and No.2 combination samples. The length of the cable in the combination sample was greater than 2 m between the terminations and straight joints. The cable used in the combination sample was a XLPE insulated three cores cable for rated voltage 26/35 kV, a cross- section of 185 sq.mm. The type tests sequence 2.1 were carried out on No.1 and No.2 combination samples. The type tests sequence 2.2, 2.3 were carried out on No.2 combination samples.

In addition, one set of indoor terminations, outdoor terminations and straight joints were installed on one cable which used in the combination sample was a XLPE insulated single core cables for rated voltage 26/35 kV, a cross- section of 630 sq.mm, to carried out the tests of table 10.

3 试验方法

Test Methods

3.1 工频电压试验

试验按 GB/T 18889—2002 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 GB/T 18889—2002, clause 4.

3.2 局部放电试验

试验按 GB/T 18889—2002 第 7 章的规定进行。

Partial discharge test

The tests were carried out in accordance with GB/T 18889—2002, clause 7.

3.3 冲击电压试验

试验按 GB/T 18889—2002 第 6 章的规定进行。

Impulse voltage withstand test

The tests were carried in accordance with GB/T 18889—2002, 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 65 kV 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 65 kV shall be applied to the sample.

3.5 动热稳定试验

试验按 GB/T 18889—2002 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 GB/T 18889—2002, clause 11 and clause 12.

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 2.1 系列)、表 2(标准中规定 2.2 和 2.3 系列) 表3 (最大导体截面附加试验)。

Test Sequence and Results

The test sequence and results were given in Table 1(sequence 2.1), Table 2(sequence 2.2, 2.3) Table 3 (additional test for Maximum conductor cross-section).

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	117 kV, 5 min, 不击穿 No breakdown shall occur at 117 kV for 5 min	117 kV, 5 min, 组合试样各相 均未击穿 No breakdown occurred on the combination samples at 117 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	45 kV 放电量 不大于 10 pC The magnitude of the discharge at 45 kV shall not exceed 10 pC	相别 phase	黄 Y	绿 G	红 R	符合要求 Pass
			电压,kV voltage	45	45	45	
			背景, pC noise background	2.0	2.0	2.0	
			放电量, pC discharge	≤ 2.0	≤ 2.0	≤ 2.0	
3	高温下冲击电压 试验 Impulse withstand voltage test at 95 °C ~ 100 °C	200 kV, 正负极性各 10次不击穿 No breakdown shall occur at 10 positive and 10 negative impulses of 200 kV	200 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 200 kV (See Annex B)				符合要求 Pass
4	恒压负荷循环 试验 Heating cycle voltage test	在 65 kV 电压和导 体加热至温度 95 °C ~ 100 °C 下, 30 次循环在空气 中, 30次循环在水 中, 不击穿 No breakdown shall occur during 30 cycles in air and 30 cycles under water at the conductor temperature of 95 °C-100 °C and 65 kV	在 65 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 65 kV				符合要求 Pass
5	高温下局部放电 试验 Partial discharge test at 95 °C ~ 100 °C	45 kV 放电量 不大于10 pC The magnitude of the discharge at 45 kV shall not exceed 10 pC	相别 phase	黄 Y	绿 G	红 R	符合要求 Pass
			电压,kV voltage	45	45	45	
			背景, pC noise background	2.1	2.1	2.1	
			放电量, pC discharge	≤ 2.1	≤ 2.1	≤ 2.1	

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	45 kV 放电量 不大于 10 pC The magnitude of the discharge at 45 kV shall not exceed 10 pC	电压,kV voltage	45	45	45	符合要求 Pass
			背景, pC noise background	2.1	2.1	2.1	
			放电量, pC discharge	≤ 2.1	≤ 2.1	≤ 2.1	
			相别 phase				
7	冲击电压试验 Impulse withstand voltage test	200 kV, 正负极性各 10 次不击穿 No breakdown shall occur at 10 positive and 10 negative impulses of 200 kV	200 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 200 kV (See Annex C)				符合要求 Pass
8	工频电压试验 AC withstand voltage test	65 kV, 15 min, 不击穿 No breakdown shall occur at 65 kV for 15 min	65 kV, 15 min, 组合试样各相 均未击穿 No breakdown occurred on the combination samples at 65 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	117 kV, 5 min, 不击穿 No breakdown shall occur at 117 kV for 5 min	117 kV, 5 min, 组合试 样各相均未击穿 No breakdown occurred on the combination samples at 117 kV for 5 min	符合要求 Pass
2	热稳定试验 (导体) Thermal short-circuit test (conductor)	23.8 kA, 2 s 两次, 无可见的损坏 No visible deterioration at 23.8 kA, 2 s	23.93 kA, 2.01 s 和 23.91 kA, 2.00 s 无可见的损坏 (见附录F2) No visible deterioration at 23.93 kA, 2.01 s and 23.91 kA, 2.00 s (See Annex F2)	符合要求 Pass
3	动稳定试验 (导体) Dynamic short-circuit test (conductor)	84.7 kA, 不少于 10 ms, 无可见的损坏 No visible deterioration at 84.7 kA, not less than 10 ms	84.83 kA, 49 ms, 无可见的损坏 (见附录F1) No visible deterioration at 84.83 kA, 49 ms (See Annex F1)	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	200 kV, 正负极性各 10 次不击穿 No breakdown shall occur at 10 positive and 10 negative impulses of 200 kV	200 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 200 kV (See Annex D)	符合要求 Pass
5	工频电压试验 AC withstand voltage test	65 kV, 15 min, 不击穿 No breakdown shall occur at 65 kV for 15 min	65 kV, 15 min, 组合试样 各相均未击穿 No breakdown occurred on the combination samples at 65 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	工频电压试验 AC withstand voltage test	117 kV, 5 min, 不击穿 No breakdown shall occur at 117 kV for 5 min	117 kV, 5 min, 组合试样各相 均未击穿 No breakdown occurred on the combination samples at 117 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	45 kV 放电量 不大于 10 pC The magnitude of the discharge at 45 kV shall not exceed 10 pC	相别 phase	试样1	试样2	符合要求 Pass
			电压, kV voltage	45	45	
			背景, pC noise background	2.1	2.1	
			放电量, pC discharge	4.5	5.3	
3	冲击电压试验 Impulse withstand voltage tes	200 kV, 正负极性 各10 次不击穿 No breakdown shall occur at 10 positive and 10 negative impulses of 200 kV	200 kV, 正负极性各 10 次(见附 录 E) 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 200 kV (See Annex E)			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 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	7800-3200 SR 4A 800 kV 工频分压器 4A 800 kVAC voltage divider	003190- 00	(0~800) kV	1 级 Grade 1	国家高电压计量站 National high voltage measurement station	2012-09-07
2	TAWF 串联谐振装置 Series resonance system	0312068	(0~75) kV	1 级 Grade 1	国家高电压计量站 National high voltage measurement station	2011-10-16
3	JFD-2H 局放检测系统 PD measurement system	2004120 2	(0.5~1000) pC	10 级 Grade 10	国家高电压计量站 National high voltage measurement station	2012-05-20
4	冲击分压器 Impulse voltage divider	03	(0~900) kV	1 级 Grade 1	国家高电压计量站 National high voltage measurement station	2012-05-20
5	IPM23A 峰值电压表 Meter in peak value of voltage	070	±1600 V	1 级 Grade 1	国家高电压计量站 National high voltage measurement station	2011-10-20
6	LM-0.5 电流互感器 Current transformer	0810	(0~3000) A	0.5 级 Grade 0.5	国家高电压计量站 National high voltage measurement station	2014-11-16
7	H-DJF-2 数据采集系统 Data collected system	CJ-06	(0~100) kA	0.5 级 Grade 0.5	国家高电压计量站 National high voltage measurement station	2012-01-03
8	DT9806 数字电压表 Digital voltage meter	3070047 484	(0~200) V	±0.8%	湖北省计量测试技 术研究院 Hubei Institute of Measurement and Testing Technology	2011-11-14

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, 200 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, 200 kV, ±3% tolerance)

B1 冲击电压实际耐受电压值

The values of impulse voltages

温度: 24.5 °C 相对湿度: 95 % 大气压: 0.1001 MPa

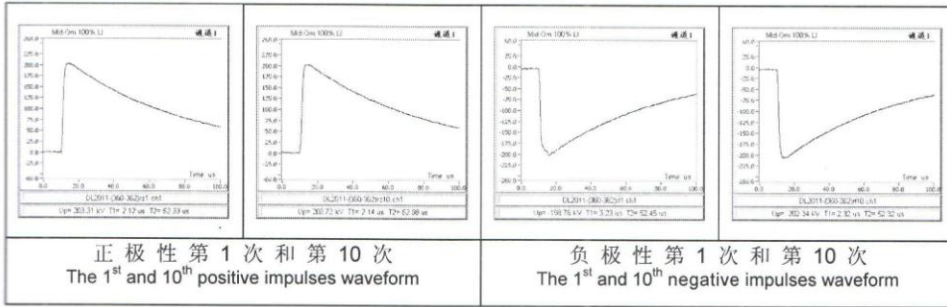
Ambient temperature: 24.5 °C, Relative humidity: 95 %, Atmosphere: 0.1001 MPa

单位/unit: kV

正极性 Positive polarity	203	203	202	202	203	203	202	202	202	201
负极性 Negative polarity	199	200	200	200	201	201	201	202	202	202

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, 200 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, 200 kV, ±3 % tolerance)

C1 冲击电压实际耐受电压值

The values of impulse voltages

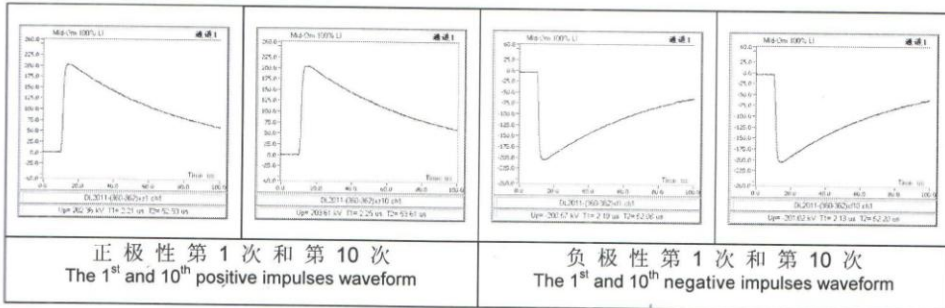
温度: 29.5 °C 相对湿度: 71 % 大气压: 0.1003 MPa

Ambient temperature: 29.5 °C, Relative humidity: 71 %, Atmosphere: 0.1003 MPa

单位/unit: kV

正极性 Positive polarity	202	202	202	202	203	203	202	202	203	204
负极性 Negative polarity	201	200	201	201	201	201	200	200	201	201

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, 200 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, 200 kV, ±3 % tolerance)

D1 冲击电压实际耐受电压值

The values of impulse voltages

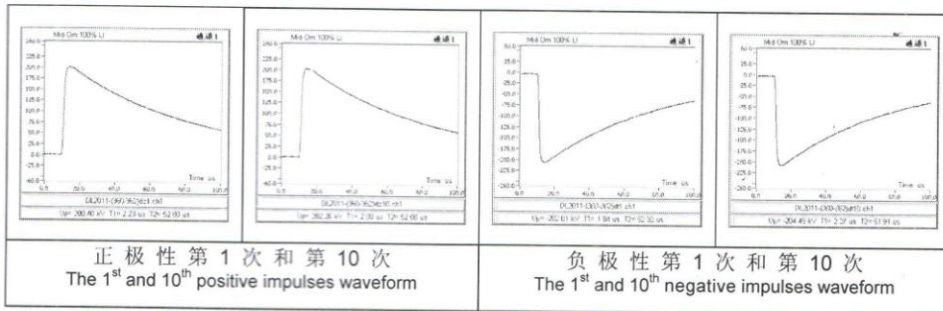
温度: 24.0 °C 相对湿度: 71 % 大气压: 0.1010 MPa

Ambient temperature: 24.0 °C, Relative humidity: 71 %, Atmosphere: 0.1010 MPa

单位/unit: kV

正极性 Positive polarity	200	200	200	200	201	201	201	201	201	202
负极性 Negative polarity	202	202	202	202	202	203	203	204	204	204

D2 冲击电压波形图
Oscillograms of the impulse voltages waveform



附录E 最大导体截面组合试样冲击电压试验实际耐受电压值(室温下, 200 kV, 允许±3%偏差)
Annex E The values of impulse voltages on the maximum conductor cross-section combination samples (at ambient temperature, 200 kV, ±3 % tolerance)

E1 冲击电压实际耐受电压值

The values of impulse voltages

温度: 28.5 °C 相对湿度: 75 % 大气压: 0.1000 MPa

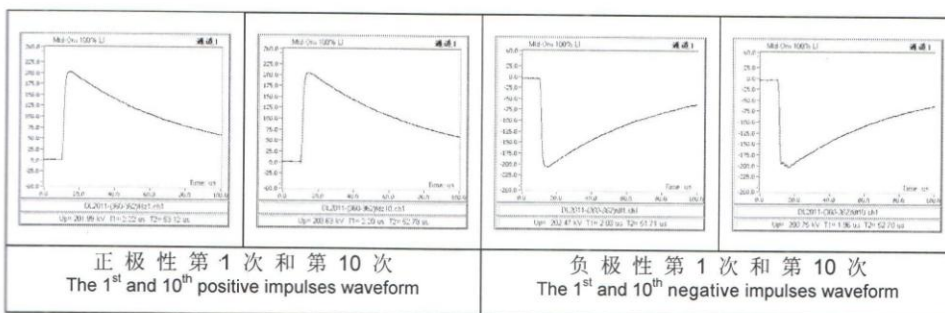
Ambient temperature: 28.5 °C, Relative humidity: 75 %, Atmosphere: 0.1000 MPa

单位/unit: kV

正极性 Positive polarity	202	202	202	202	203	203	203	204	203	204
负极性 Negative polarity	202	202	202	202	202	201	201	201	201	201

E2 冲击电压波形图

Oscillograms of the impulse voltages waveform

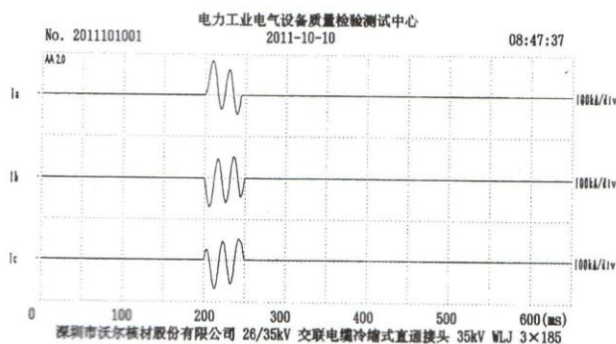


附录F 组合试样动热稳定试验波形

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

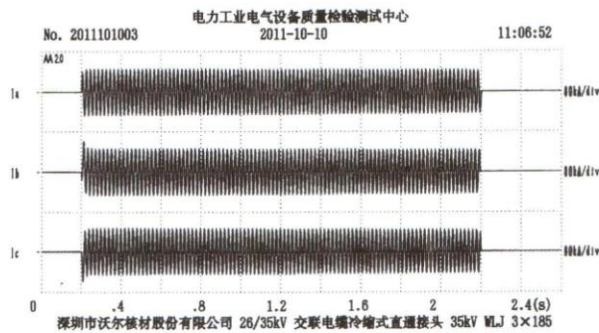
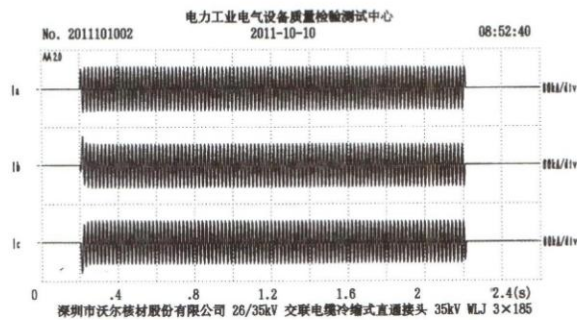
F1 组合试样动热稳定试验波形(导体)

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



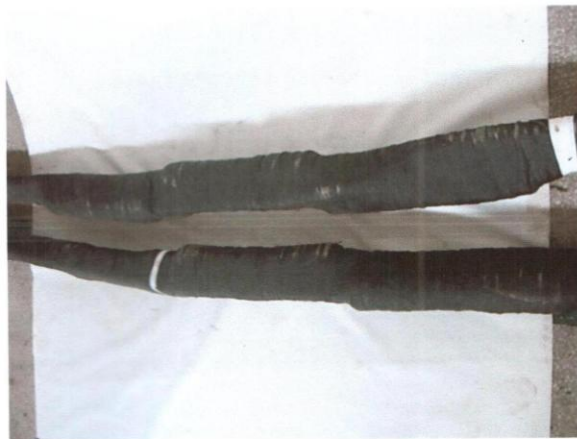
F2 组合试样热稳定试验波形(导体)

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



附录G 型式试验照片

Annex G Photograph about type testing



附录H 型式试验电缆描述
Annex H Identification of type test cable

额定电压 rated voltage U_0/U kV		26/35
结构 construction	芯数 core	三芯 three cores
	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 ²
	外径 diameter	15.2 mm
绝缘 insulation	材质 material	交联聚乙烯 XLPE
	厚度 thickness	10.6 mm
	外径 diameter	38.4 mm
屏蔽 screen	导体屏蔽厚度 thickness of conductor screen	1.0 mm
	绝缘屏蔽厚度 thickness of insulation screen	1.2 mm
	绝缘屏蔽是否可剥离 strippability of insulation screen	不可剥离 unstrippable
	绝缘屏蔽外径 diameter of insulation screen	40.4 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	92.7 mm
电缆标示 mark of cable		YJV-26/35 3×185

附录I 最大导体截面附加试验照片
Annex I Photograph about additional test of the Maximum conductor cross-section



附录J 最大导体截面电缆描述
Annex J Identification of the Maximum conductor cross-section cable

额定电压 rated voltage U_0/U kV		26/35
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	630 mm ²
	外径 diameter	28.1 mm
绝缘 insulation	材质 material	交联聚乙烯, XLPE
	厚度 thickness	10.5 mm
	外径 diameter	51.1 mm
屏蔽 screen	导体屏蔽厚度 thickness of conductor screen	1.0 mm
	绝缘屏蔽厚度 thickness of insulation screen	1.1 mm
	绝缘屏蔽是否可剥离 strippability of insulation screen	不可剥离 unstrippable
	绝缘屏蔽外径 diameter of insulation screen	53.0 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	60.7 mm
电缆标示 mark of cable		YJV-26/35 1×630