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TESTING
CNAS L0699



TEST REPORT

CEPRI-EETC08-2022-0451 (E)

Client: Shenzhen Woer Heat - Shrinkable Material Co., Ltd.

Object: Pre-moulded sectionalizing joint for 64/110 kV
XLPE cable

Type: WYJJJ2 64/110 1×2000

Test Category: Type tests

**POWER INDUSTRY QUALITY INSPECTION AND TEST
CENTER FOR ELECTRIC EQUIPMENT**



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Catalogue

1. Catalogue.....	1
2. Signature Page	2
3. Test Results.....	3
4. Content.....	4
5. Appendix A The Main Test Devices.....	7
6. Appendix B Identification of test cable.....	8
7. Appendix C Photographs of the sample tested.....	9
8. Appendix D The dimensions of main construction of the sample tested.....	10



Test Report	Power Industry Quality Inspection and Test Center for Electric Equipment		CEPRI-EETC08-2022-0451(E) Total 10 Page 2
Client	Shenzhen Woer Heat - Shrinkable Material Co., Ltd.	Manufacturer	Shenzhen Woer Heat - Shrinkable Material Co., Ltd.
Object	Preamoulded sectionalizing joint for 64/110 kV XLPE cable	Type	WYJJJ12 64/110 1×2000
Sampling procedure	Taken by client self	Serial No.	EETC08-22/02/17-014
Test Category	Type tests	Date	2022.03.28~2022.06.01
Requirements	1. GB/T 11017.3—2014 Power cables with cross-linked polyethylene insulation and their accessories for rated voltage of 110 kV ($U_m=126$ kV) —Part 3: Accessories 2. IEC 60840(Edition 5.0): 2020 Power cables with extruded insulation and their accessories for rated voltages above 30 kV ($U_m=36$ kV) up to 150 kV ($U_m=170$ kV) -Test methods and requirements		
Conclusion	The pre-moulded sectionalizing joint for 64/110 kV XLPE cable, the type and size of which is WYJJJ12 64/110 1×2000 taken to test by the client's own self has successfully passed the type tests specified in GB/T 11017.3—2014 and IEC 60840(Edition 5.0): 2020.		
Note	In the event of any difference in meanings, the Chinese report shall take priority over the English version.		
Tested by: 马文瀚	马文瀚	倪玉林	倪玉林
Checked by: 侯俊平	侯俊平	Verified by: 徐明忠	徐明忠
Approved by: 阎孟昆	阎孟昆	Date of issue: 2022-06-09	



Test Results				
No.	Item	Requirements	Results	Evaluation
1	Partial discharge test at ambient temperature	No detectable discharge exceeding the sensitivity from the test object at 96 kV	No detectable discharge was found at 96 kV exceeding the sensitivity of 2.62 pC	Passed
2	Heating cycle voltage test	As per clause 2.2 of content in this report	Subjected to heating cycle voltage test, and heating cycle had been carried out 20 times	Passed
3	Partial discharge test at high temperature	No detectable discharge exceeding the sensitivity from the test object at 96 kV	No detectable discharge was found at 96 kV exceeding the sensitivity of 2.62 pC	Passed
4	Partial discharge test at ambient temperature	No detectable discharge exceeding the sensitivity from the test object at 96 kV	No detectable discharge was found at 96 kV exceeding the sensitivity of 2.62 pC	Passed
5	Lightning impulse voltage test	The test assembly shall withstand without failure or flashover 10 positive and 10 negative voltage impulses of 550 kV	No breakdown or flashover occurred at 10 positive and 10 negative voltage impulses of 550 kV	Passed
6	Power frequency voltage test after lightning impulse voltage test	The test assembly shall be subjected to a power frequency voltage test at 160 kV for 15 min, and no breakdown of the insulation or flashover shall occurred	No breakdown or flashover occurred at 160 kV for 15 min	Passed
7	Tests of outer protection for buried joints	As per clause 2.4 of this report	After the heating cycle voltage test and a total of 20 times heating and cooling cycles in water were applied to the joint, the dc voltage tests and the impulse voltage tests were carried out successfully and the test assembly was examined. There are no visible evidence of either internal voids or internal displacement of compound by water ingress, or of compound loss via the various seals or box walls during the examination.	Passed
8	Examination	As per clause 2.5 of content in this report	No signs of deterioration which could affect the system in service operation was found	Passed

检测
 合格
 日期
 测
 日期



Content**1 Specification of sample****1.1 Sample state**

The sample was manufactured in January, 2022, and was received on February 17, 2022 at Power Cable Quality Inspection Station of Power Industry Quality Inspection and Test Center for Electric Equipment, and it was in good condition without breakage.

1.2 Related information of sample

The material of connector is copper T₂, the material used for stress relief cone is silicon rubber, the filler for the insulation in termination is polyisobutylene, and the cable conductor is compacted with the connector by pressure, the structure of the termination is shown in Appendix D.

1.3 Installation description

The sample to be tested has been installed by the manufacturer on a XLPE insulated single core cable with rated voltage 64/110 kV and having a cross-section of 2000 mm², the type and size of cable is ZC-YJLW02 64/110 1×2000, the identification of test cable is shown in Appendix B.

2. Test methods**2.1 Partial discharge tests**

The tests were carried out at ambient temperature and high temperature in accordance with GB/T 3048.12 and IEC 60885-3, There shall be no detectable discharge exceeding the declared sensitivity from the test object at 96 kV.

The test voltage shall be raised gradually to and held at 112 kV for 10 s and then slowly reduced to 96 kV and the partial discharge tests were carried out at 96 kV. At high temperature the test shall be performed on the sample at a conductor temperature of (95~100) °C. The conductor temperature shall be maintained within the stated temperature limits for at least 2 h.

2.2 Heating cycle voltage test

According to GB/T 11017.3—2014 and IEC 60840(Edition 5.0): 2020, the test assembly shall be heated by conductor current until the cable conductor reaches a temperature of (95~100) °C. The heating shall be applied for at least 8 h. The conductor temperature shall be maintained within the stated temperature limits for at least 2 h of each heating period. This shall be followed by at least 16 h of natural cooling to a conductor temperature less than or equal to 30 °C or within 10 K of ambient temperature, whichever is the higher. The cycle of heating and cooling shall be carried out 20 times. During the whole of the test period a voltage of 128 kV shall be applied to the sample.

2.3 Lightning impulse voltage test followed by a power frequency voltage test

The assembly shall be heated by conductor current only, until the cable conductor reaches a steady temperature of (95~100) °C. The conductor temperature shall be maintained within the stated temperature limits for at least 2 h.

The lightning impulse voltage shall be applied according to the GB/T 3048.13. The assembly shall withstand without failure or flashover 10 positive and 10 negative voltage impulses of 550 kV. After the lightning impulse voltage test, the test assembly shall be subjected to a power frequency voltage test at 160 kV for 15 min. No breakdown of the insulation or flashover shall occur.

2.4 Tests of outer protection for buried joints

The water immersion tests on the joint outer protection for a sheath sectionalizing insulation were carried out in accordance with annex H of IEC 60840(Edition 5.0): 2020. The tests shall be applied successively to a joint which has passed the heating cycle voltage test or to a separate joint which has undergone at least three thermal cycles without voltage. The test assembly shall be immersed in water. A total of 20 heating/cooling cycles shall be applied. On completion of the heating cycles and with the test assembly still immersed, voltage tests shall be carried out as follows.

A test dc voltage of 25 kV. shall be applied for 1 min between the metallic sheaths of the power cable, at either end of the accessory, and also between each metallic sheath and the earthed exterior of the joint outer protection.

Then the impulse voltage of 75 kV shall be applied between the metallic sheath of power cable at either end of the accessory and also 37.5 kV between each metallic sheath and the earthed exterior of the joint outer protection. The impulse voltage testing procedure shall be performed in accordance with IEC 60230, the joint to be tested being at ambient temperature.

No breakdown shall occur during any of the above tests.

On completion of the above voltage tests, the test assembly shall be examined. For joint outer protection boxes filled with removable compounds, there shall be no visible evidence of either internal voids or internal displacement of compound by water ingress, or of compound loss via the various seals or box walls.

For joint outer protections employing alternative designs and materials, there shall be no evidence of water ingress or internal corrosion.

2.5 Examination

Examination of the accessories by dissection of a sample and, whenever possible, of the accessories by dismantling with normal or corrected vision without magnification shall reveal no signs of deterioration (e.g. electrical degradation, leakage, corrosion or harmful shrinkage) which could affect the system in service operation.



3 Test data

3.1 Oscillograms of partial discharges

The oscillogram of the background noise during partial discharge tests is shown in Figure 3.1, The oscillogram of partial discharges at 96 kV (After heating cycle voltage test at high temperature) is shown in Figure 3.2.

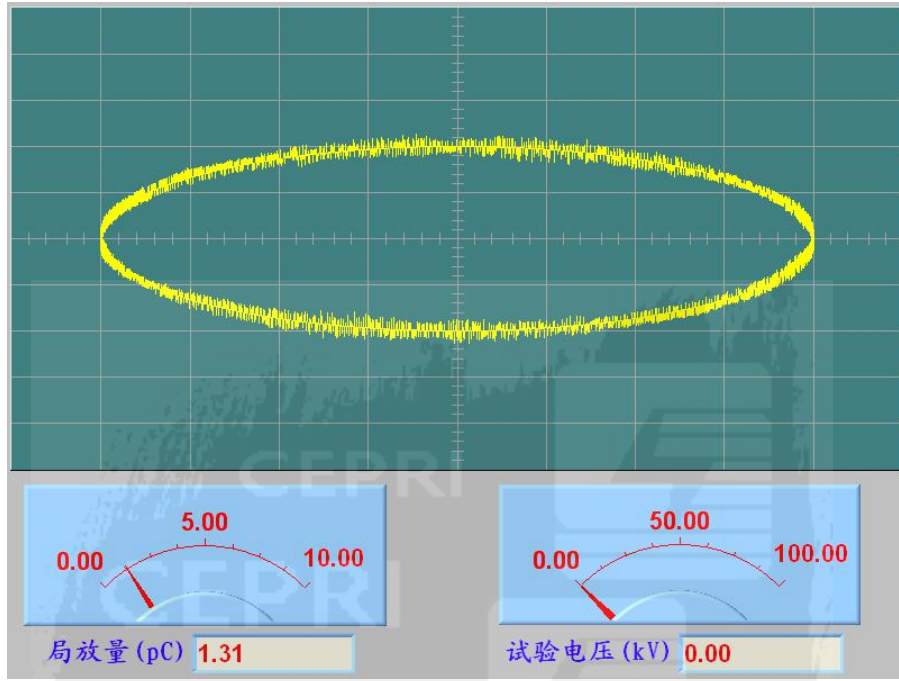


Figure 3.1 The background noise during partial discharge tests

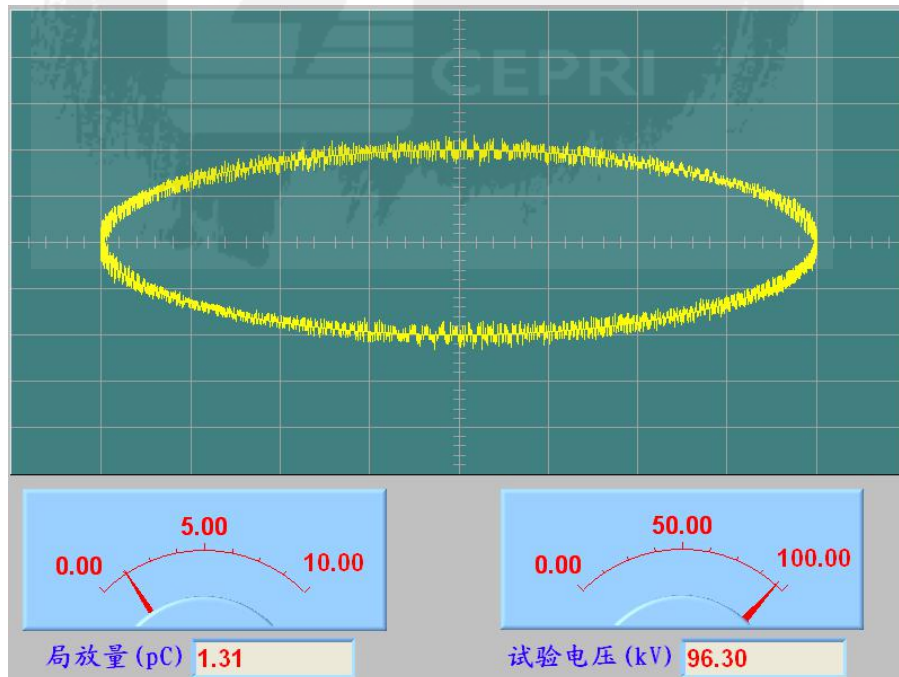


Figure 3.2 The oscillogram of partial discharges at 96 kV (After heating cycle voltage test at high temperature)



3.2 Test data of lightning impulse voltage test

The values of lightning impulse voltages on the test assembly after heating cycle voltage test (at high temperature, 550 kV, ±3 % tolerance) are shown in Table 3.1.

Ambient temperature: 20.0 °C Relative humidity: 48 % Barometric pressure: 0.1012 MPa

Table 3.1 The actual peak values of the lightning impulse voltage test unit: kV

Positive voltages	551	550	542	549	553	552	552	555	555	554
Negative voltages	553	552	554	554	552	554	554	553	555	552

Oscillograms of the lightning impulse voltages waveform are shown in Figure 3.3.

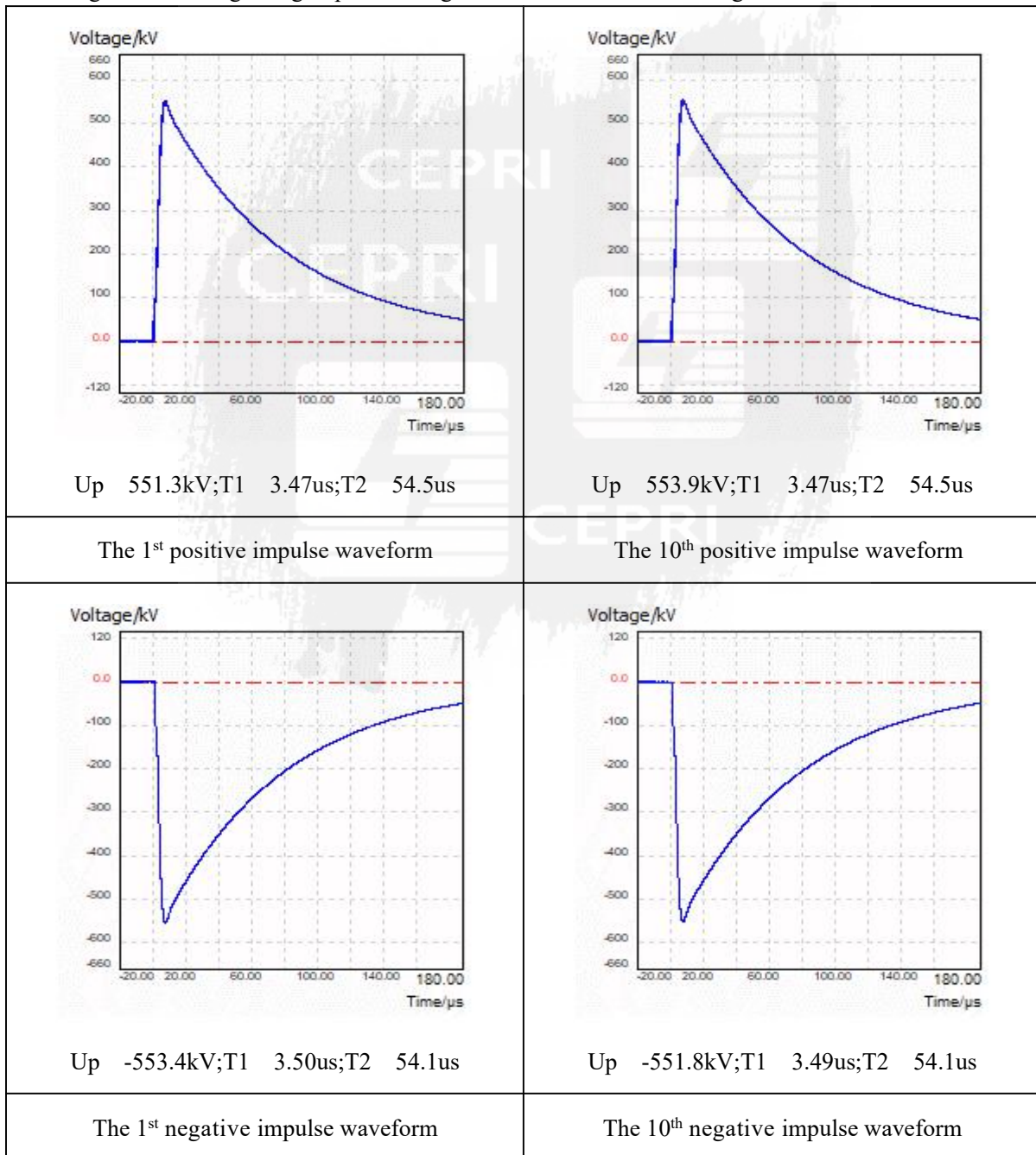


Figure 3.3 Oscillograms of the switching impulse voltages waveform



Appendix A The Main Test Devices

Sequence	Name of the equipment and instruments Type/Size	Serial No.	Full-scale range	Uncertainty / Accuracy	Verification / Calibration authority	Term of validity
1	RSZ-800-6-50 Corona-free series-resonant test system	EETC08-9011	(0~800) kV	—	—	—
2	KKF-800-5 Power frequency voltage divider	EETC08-0024	(0~800) kV	Class 1	National Meterage Center of High Voltage and Heavy Current	2022.08.23
3	Digital partial discharge detectot	EETC08-0051	(0.1~999) pC	10 %	National Meterage Center of High Voltage and Heavy Current	2023.03.08
4	CJDY-3000/600 Impulse voltage generator	EETC08-9019	(0~3000) kV	—	—	—
5	CJDY-3000 HV divider for impulse voltage divider measurement	EETC08-0027	(0~3000) kV	Class 1	National Meterage Center of High Voltage and Heavy Current	2023.08.24
6	FYJZ-3000 impulse voltage analysis system	EETC08-0241	(0~3000) kV	—	National Meterage Center of High Voltage and Heavy Current	2023.03.14
7	Digital temperature and humidity atmospheric pressure gauge	EETC08-0174	(0~50) °C	General	Hubei Meteorological Metrology Station	2023.04.10



Appendix B Identification of test cable

Rated voltage $U_0/U(U_m)$ kV		64/110 (126)
Construction	Core	Single core
Conductor	Material	Copper TR
	Construction	Milliken conductor
	Cross section	2000 mm ²
	Diameter	55.2 mm
	Average thickness of conductor screen	2.1 mm
Insulation	Material	XLPE
	Average thickness	16.0 mm
	Diameter	92.1 mm
Screen	Average thickness of insulation screen	1.1 mm
	Diameter of insulation screen	94.3 mm
Cushion and longitudinal water impermeable barrier	Material	Two layers of semi-conducting elastic water impermeable swell tape
Corrugated metallic sheath	Material	Aluminum
	Average thickness	2.7 mm
	Manufacturing technology of metallic sheath	Seam welded corrugated aluminum sheath
Oversheath	Material	PVC
	Average thickness	5.6 mm
	Diameter	129.3 mm
Capacitance		292 pF/m
Outer diameter of complete cable		129.3 mm
Marking of cable		尚纬股份有限公司 ZC-YJLW02 64/110kV 1×2000 mm ² S0000344550-1 2021.07



Appendix C Photographs of the sample tested



Figure C.1 The appearance of the sample tested

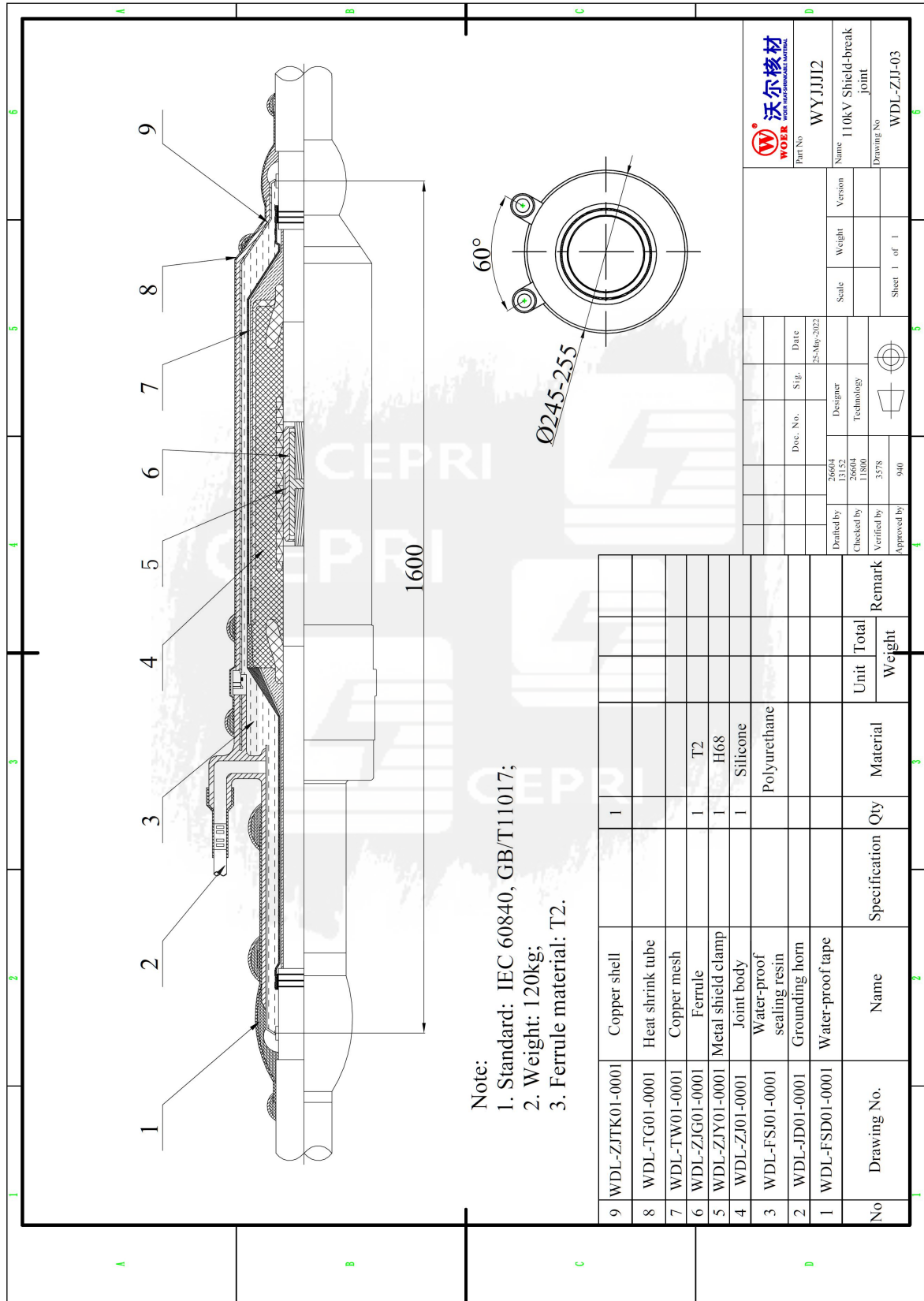


Figure C.1 The test loop of sample tested

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Appendix D The dimensions of main construction of the sample tested



Note:
1. Standard: IEC 60840, GB/T11017;
2. Weight: 120kg;
3. Ferrule material: T2.

No	Drawing No.	Name	Specification	Qty	Material	Unit	Total Weight	Remark
9	WDL-ZJTK01-0001	Copper shell		1				
8	WDL-TG01-0001	Heat shrink tube						
7	WDL-TW01-0001	Copper mesh						
6	WDL-ZJG01-0001	Ferrule		1	T2			
5	WDL-ZJY01-0001	Metal shield clamp		1	H68			
4	WDL-ZJ01-0001	Joint body		1	Silicone			
3	WDL-FS01-0001	Water-proof sealing resin			Polyurethane			
2	WDL-JD01-0001	Grounding horn						
1	WDL-FSD01-0001	Water-proof tape						
						Unit Total		
						Weight		


沃尔核材
 WOLV NUCLEAR MATERIALS

Part No: WYJJJ2
 Name: 110kV Shield-break joint
 Drawing No: WDL-ZJJ-03

Doc. No.	2604	Designer		Scale		Version	
Checked by	2604	Technology		Weight			
Verified by	11800			Sheet	1 of 1		
Approved by	3578			940			

Date: 25-May-2022
 Date: 25-May-2022

