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CEPRI

TEST REPORT

CEPRI-EETC09-2022-0818(E)

Client: Baoding Hewei Power Technology Co., Ltd.

Object: RIF Capacitance Wall Bushing

Type: FCRGJ-126/2000

Test Category: Routine Tests /Type Tests

CHINA ELECTRIC POWER RESEARCH INSTITUTE

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Test Report	China Electric Power Research Institute		CEPRI-EETC09-2022-0818(E) Total 25 Page 2
Client	Baoding Hewei Power Technology Co.,Ltd.	Manufacturer	Baoding Hewei Power Technology Co.,Ltd.
Object	RIF Capacitance Wall bushing	Type	FCRGJ-126/2000
Sampling procedure	By the Client	Serial No.	YJ2022-2
Test Category	Routine Tests /Type Tests	Date	2022.12.17~2022.12.22
Requirements	1. GB/T 4109-2022 Insulated bushings for alternating voltages above 1000V 2. IEC 60137:2017 Insulated bushings for alternating voltages above 1000V		
Conclusion	According to GB/T 4109-2022, IEC 60137:2017, routine tests and type tests were performed on FCRGJ-126/2000 RIF capacitance wall bushing which was provided by Baoding Hewei Power Technology Co., Ltd.. All the results were in accordance with the requirements.		
Note	/		
Tested by: 邬文亮		刘西超	
Checked by: 王焱		**Verified by:** 刘勇	
Approved by: 叶国雄		**Date of issue:** 2023-01-29	

Test Result

No.	Item	Requirements	Results	Evaluation
		Routine Tests		
1	Measurement of dielectric Dissipation Factor (tanδ) and capacitance at Ambient temperature	The measured tanδ at the test voltage of 10kV, 1.05Um/$\sqrt{3}$ and Um shall not exceed 0.7%. Δ tanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/$\sqrt{3}$ to Um.	L0kV tanδ: 0.311% Cx: 623.5pF 76kVtanδ: 0.341% Cx: 623.7pF 126kV tanδ: 0.385% Cx: 623.9pF	Pass
2	Dry power-frequency voltage withstand test	The withstand voltage of 230kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.	230kV/50Hz/60s No flashover or puncture occurred.	Pass
3	Measurement of partial discharge quantity	Pre-stress voltage: 230kV/60s Test voltage: 126kV Permissible PD level: lOpC Test voltage: 109kV Permissible PD level: lOpC Test voltage: 76kV Permissible P1) level: 5pC	Pre-stress voltage: 230kV/60s Test voltage: 126kV PD level: 7pC Test voltage: 109kV PD level: 5pC Test voltage: 76kV PD level: 3pC	Pass
4	Measurement of dielectric Dissipation Factor (tan δ) and capacitance at Ambient temperature	The measured tanδ at the test voltage of 10kV, 1.05Um/$\sqrt{3}$ and Um shall not exceed 0.7%. Δ tanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/ $\sqrt{3}$ to Um.	10kV tanδ: 0.319% Cx: 625.7pF 76kVtanδ: 0.325% Cx: 625.9pF 126kV tanδ: 0.332% Cx: 625.9pF	Pass
5	Test of Tap insulation	The withstand voltage of 2kV is applied for 60s between the test tap and earth. No flashover or puncture occurs. Before and after the voltage withstand test, tanδ and capacitance with respect to earth shall be measured, Cx≤10000 pF, tanδ≤5%	Test tap: 2kV/50Hz/60s No flashover or puncture occurred. Before the voltage withstand test 1kV tanδ: 4.669% Cx: 773.4pF After the voltage withstand test 1kV tanδ: 4.683% Cx: 773.5pF	Pass

No.	Item	Requirements	Result	Evaluation
Type Test				
6	Dry lightning impulse voltage withstand test	100% Rated Lightning impulse: 550kV/± 15 Waveform: I .2/50μs No flashover or puncture occurs.	Lightning impulse: 547kV~552kV +15 551kV~554kV -15 No flashover or puncture occurred. Atmosphere correction factor Kt=0.9991	Pass
7	Wet power-frequency voltage withstand test	Under wet condition, the withstand voltage of 230kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.	230kV/50Hz /60s No flashover or puncture occurred. Atmosphere correction factor Kt=1.006	Pass
8	Measurement of dielectric dissipation factor(tan δ) and capacitance at ambient temperature	The measured tanδ at the test voltage of 10kV, 1.05Um/$\sqrt{3}$ and Um shall not exceed 0.7%. Δtanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/$\sqrt{3}$ to Um	10kV tanδ: 0.323% Cx: 625.8pF 76kVtanδ: 0.327% Cx: 626.0pF 126kV tanδ: 0.369% Cx: 626.0pF	Pass
9	Electromagnetic compatibility tests (EMC)	A voltage of 1.1 Um/$\sqrt{3}$ shall be applied between the high voltage terminal of bushing and earth, and maintained for at least 5 min. After that, the voltage shall be decreased by steps down to 0.3 Um/$\sqrt{3}$, then raised again by steps to the initial value and finally decreased by steps to 0.3 Um/$\sqrt{3}$. The radio interference voltage shall not exceed 500μV at 1.1 Um/$\sqrt{3}$.	Details are shown in content 9.	Pass
10	Temperature rise test	The test shall be carried out at Ir(1± 2%) at rated frequency. The test shall be continued until the temperature rise is sensibly constant, the limits of temperature rises and temperature limits are shown as follows: Current carrying and non-current carrying metal parts in contact with insulation: 90K/120℃ Terminals to be connected to exterior conductors by screws or bolts: 75K/105°C	Details are shown in content 10.	Pass

No.	Item	Requirements	Result	Evaluation
Type Test				
11	Verification of thermal short-time current withstandt	The bushing shall be considered to be able to withstand the standard value of Ith if θf does not exceed 180°C.	The calculated final temperature of the conductor(θf): 82°C	Pass
12	Cantilever load withstand test	The bushing shall be completely assembled and installed vertically to a suitable rigid device. The load shall be applied perpendicular to the axis of the bushing at the mid-point of the outdoor side/indoor side terminal for 60s. No evidence of damage (deformation, rupture or leakage) shall be detected, and it shall withstand a repetition of all routine tests without significant change from previous results.	Test load: 2500N Duration: I min No evidence of damage (deformation, rupture or leakage).	Pass
13	Measurement of dielec	The dimensions of the bushing under test shall be in accordance with regard to any dimensions to which special tolerances apply and to details affecting interchangeability.	Creepage distance (indoor side/ outdoor side): 3900/3911mm Arcing distance(indoor side/ outdoor side): 1228/1230mm Total length: 3340mm The dimensions of the busing were in accordance with the relevant drawings.	Pass
Routine tests				
14	Measurement of dielectric dissipation factor(tan δ) and capacitance at ambient temperature	The measured tanδ at the test voltage of 10kV, 1.05Um/ $\sqrt{3}$ and Um shall not exceed 0.7%. Δ tanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/$\sqrt{3}$ to Um.	10kV tanδ: 0.331% Cx: 625.9pF 76kV tanδ: 0.338% Cx: 626.0pF 126kV tanδ: 0.357% Cx: 626.0pF	Pass

No.	Item	Requirements	Result	Evaluation
Type Test				
15	Dry power-frequency voltage withstand test	The withstand voltage of 230kV is applied for 60s between the high voltage terminal of bushing and earth. No flashovcr or puncture occurs.	230kV/50Hz /60s No flashover or puncture occurred.	Pass
16	Measurement of partial discharge quantity	Pre-stress voltage: 230kV/60s Test voltage: 126kV Permissible PD level: l0pC Test voltage: 109kV Permissible PD level: 10pC Test voltage: 76kV Permissible PD level: 5pC	Pre-stress voltage: 230kV/60s Test voltage: 126kV PD level: 8pC Test voltage: 109kV PD level: 6pC Test voltage: 76kV PD level: 3pC	Pass
17	Measurement of dielectric dissipation factor(tan 6) and capacitance at ambient temperature	The measured tanδ at the test voltage of 10kV, 1.05Um/ $\sqrt{3}$ and Um shall not exceed 0.7%. Δ tanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/$\sqrt{3}$ to Um.	10kV tanδ: 0.315% Cx: 625.8pF 76kV tanδ: 0.338% Cx: 626.0pF 126kV tanδ: 0.371% Cx: 626.0pF	Pass
18	Tests of tap insulation	The withstand voltage of 2kV is applied for 60s between the test tap and earth. No flashover or puncture occurs. Before and after the voltage withstand test, tanδ and capacitance with respect to earth shall be measured, Cx≤l0000pF, tanδ ≤5%.	Test tap: 2kV/50Hz/60s No flashover or puncture occurred. Before the voltage withstand test 1kV tanδ: 4.659% Cx: 773.1 pF After the voltage withstand test 1kV tan δ: 4.67 1% Cx: 773.2pF	Pass
19	Visual inspection and dimensional check	No surface defects shall be tolerated which could affect the satisfactory performance in service. Dimensions of parts for assembling and/or interconnection shall be in accordance with the relevant drawings, checked by sampling.	Meet the requirements.	Pass

Content

1.Measurement of dielectric dissipation factor (tanδ) and capacitance at ambient temperature

1.1 Reference standard requirement

The measured tanδ at the test voltage of 10kV, 1.05Um/$\sqrt{3}$ and Um shall not exceed 0.7%.

Δ tanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/$\sqrt{3}$ and Um.

1.2 Data

Ambient temperature: 10°C Relative humidity: 68%

Modality of application	Test voltage(kV)	tanδ	Cx(pF)
Between high voltage terminal and test tap	10	0.311	623.5
	76	0.341	623.7
	126	0.385	623.9

1.3 Test result

The test object passed the tests.

2. Dry power-frequency voltage withstand test

2.1 Reference standard requirement

The withstand voltage of 230kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.

2.2 Data

Ambient temperature: 10°C Relative humidity: 48% Ambient air pressure: 102.6kPa

Modality of application	Test voltage/Frequency/Duration
Between high voltage terminal and earth	230kV/50Hz/60s

2.3 Test result

The test object passed the tests.

Content

3. Measurement of partial discharge quantity

3.1 Reference standard requirement

Pre-stress voltage:230kV Test frequency:50Hz

Test voltage:126kV Permissible PD level:10pC

Test voltage:109kV Permissible PD level:10pC

Test voltage:76kV Permissible PD level:5pC

3.2 Data

Ambient temperature: 10°C Relative humidity: 48%

Test frequency (Hz)	50		
Pre-stress voltage (kV)	230		
Test voltage (kV	126	109	76
PD level (pC)	7	5	3

3.3 Test result

The test object passed the tests.

4. Measurement of dielectric dissipation factor(tanδ) and capacitance at ambient temperature

4.1 Reference standard requirement

The measured tanδ at the test voltage of 10kV, 1.05Um/$\sqrt{3}$ and Um shall not exceed 0.7%.

Δ tanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/$\sqrt{3}$ and Um.

4.2 Data

Ambient temperature: 10°C Relative humidity: 48% Ambient air pressure: 102.6kPa

Modality of application	Test voltage(kV)	tanδ(%)	Cx(pF)
Between high voltage terminal and test tap	10	0.319	625.7
	76	0.325	625.9
	126	0.332	625.9

4.3 Test result

The test object passed the tests.

Content

5. Tests of tap insulation

5.1 Reference standard requirement

The withstand voltage of 2kV shall be applied for 60s between the test tap and earth. No flashover or puncture occurs.

Before and after the voltage withstand test, tanδ and capacitance with respect to earth shall be measured, Cx≤10000pF, tanδ≤5%.

5.2 Data

Ambient temperature: 10°C Relative humidity: 48%

Test voltage(kV)	Duration(s)	Tanδ (%)	Cx(pF)
1	/	4.669	773.4
2	60	Voltage withstand test between the test tap and earth. No flashover or puncture occurs.	
1	/	4.683	773.5

5.3 Test result

The test object passed the tests.

6. Drylightning impluse voltage withstand test

6.1 Reference standard requirement

The test object shall be subjected to 15 full lightning impulses of positive and negative polarity at 550kV (peak value) separately.

No disruptive discharge on non-self restoring insulation shall occur and no evidence of insulation failure shall be detected.

6.2 Data

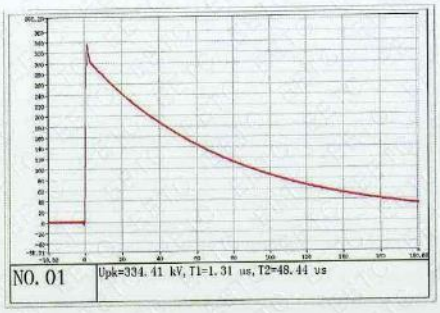
Ambient temperature: 11°C Relative humidity: 69%

Ambient air pressure: 102.8kPa Atmosphere correction factor: K1=0.9991

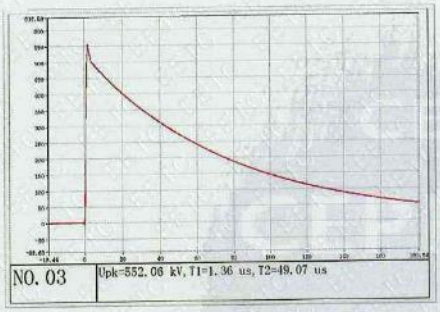
No.	Voltage polarity	Test voltage (peak) (kV)	Chopped time(μs)	Waveform No.	Result
1	Positive lightning impulse	334	/	1	Pass
2	Positive lightning impulse	547	/	2	Pass
3	Positive lightning impulse	552	/	3	Pass
4	Positive lightning impulse	552	/	4	Pass
5	Positive lightning impulse	552	/	5	Pass
6	Positive lightning impulse	552	/	6	Pass
7	Positive lightning impulse	551	/	7	Pass

No.	Voltage polarity	Test voltage (peak) (kV)	Chopped time(μs)	Waveform No.	Result
8	Positive lightning impulse	551	/	8	Pass
9	Positive lightning impulse	552	/	9	Pass
10	Positive lightning impulse	550	/	10	Pass
11	Positive lightning impulse	551	/	11	Pass
12	Positive lightning impulse	551	/	12	Pass
13	Positive lightning impulse	551	/	13	Pass
14	Positive lightning impulse	551	/	14	Pass
15	Positive lightning impulse	551	/	15	Pass
16	Negative lightning impulse	550	/	16	Pass
17	Negative lightning impulse	349	/	17	Pass
18	Negative lightning impulse	552	/	18	Pass
19	Negative lightning impulse	553	/	19	Pass
20	Negative lightning impulse	551	/	20	Pass
21	Negative lightning impulse	552	/	21	Pass
22	Negative lightning impulse	553	/	22	Pass
23	Negative lightning impulse	554	/	23	Pass
24	Negative lightning impulse	552	/	24	Pass
25	Negative lightning impulse	553	/	25	Pass
26	Negative lightning impulse	553	/	26	Pass
27	Negative lightning impulse	552	/	27	Pass
28	Negative lightning impulse	552	/	28	Pass
29	Negative lightning impulse	552	/	29	Pass
30	Negative lightning impulse	552	/	30	Pass
31	Negative lightning impulse	551	/	31	Pass
32	Negative lightning impulse	552	/	32	Pass

Test waveforms:

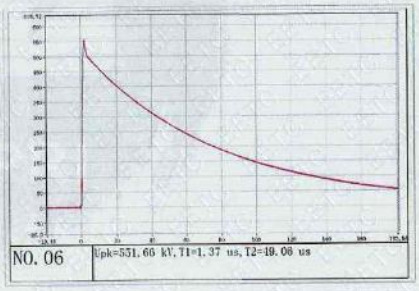




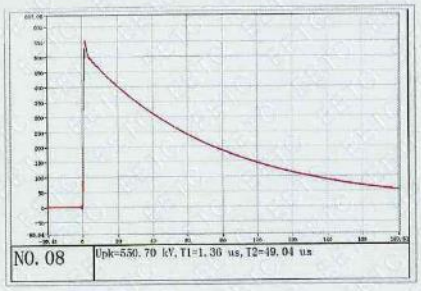


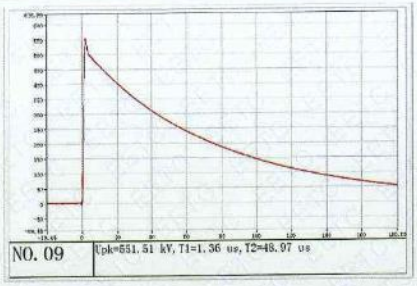






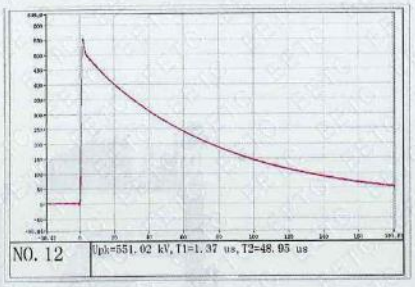




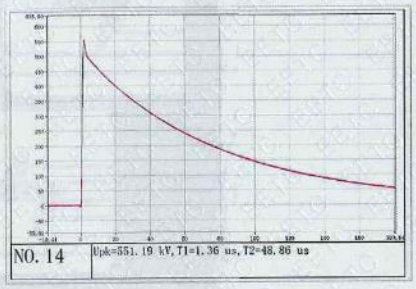

NO. 09 Upk=551.51 kV, T1=1.36 us, T2=48.97 us

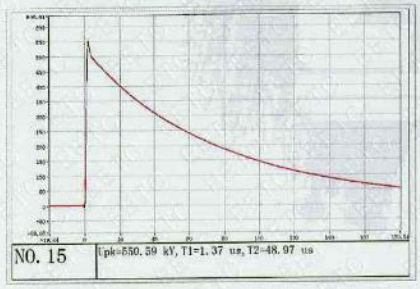

NO. 10 Upk=550.08 kV, T1=1.36 us, T2=48.96 us

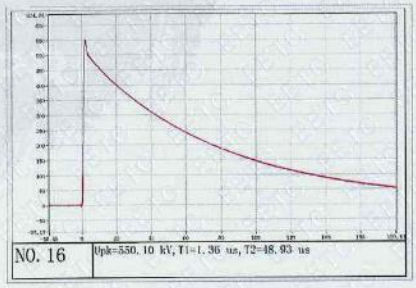

NO. 11 Upk=550.70 kV, T1=1.36 us, T2=48.94 us

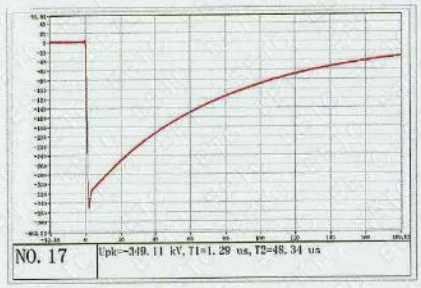

NO. 12 Upk=551.02 kV, T1=1.37 us, T2=48.95 us


NO. 13 Upk=551.41 kV, T1=1.36 us, T2=48.84 us

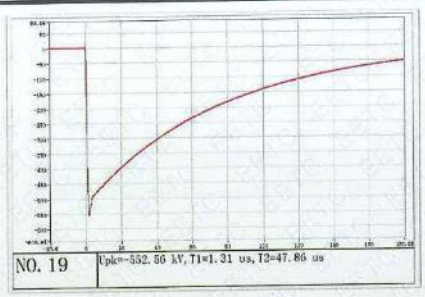

NO. 14 Upk=551.19 kV, T1=1.36 us, T2=48.86 us

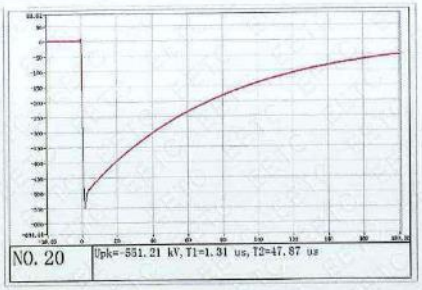

NO. 15 Upk=550.59 kV, T1=1.37 us, T2=48.97 us

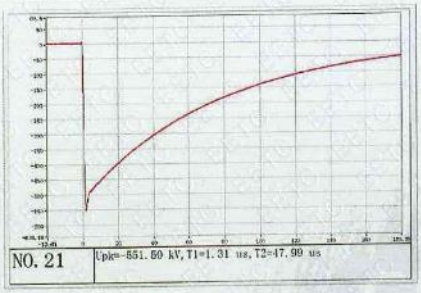

NO. 16 Upk=550.10 kV, T1=1.36 us, T2=48.93 us

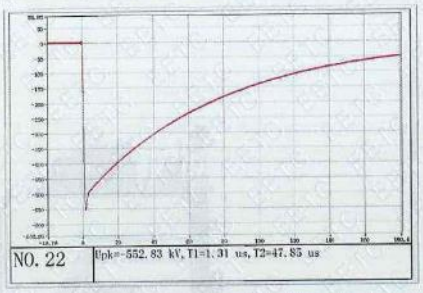

NO. 17 Upk=-349.11 kV, T1=1.29 us, T2=48.34 us

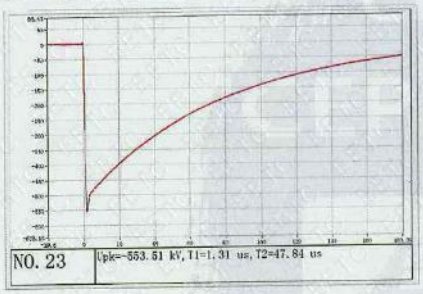

NO. 18 Upk=-852.14 kV, T1=1.32 us, T2=47.88 us


NO. 19 Upk=-552.56 kV, T1=1.31 us, T2=47.86 us

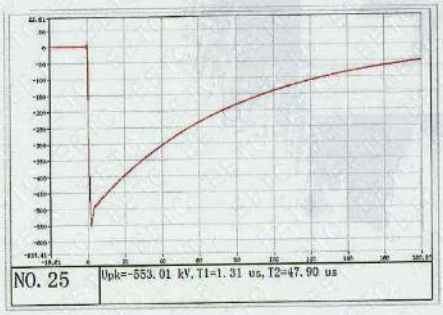

NO. 20 Upk=-551.21 kV, T1=1.31 us, T2=47.87 us

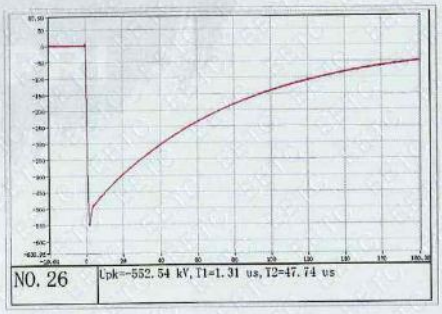

NO. 21 Upk=-551.69 kV, T1=1.31 us, T2=47.99 us

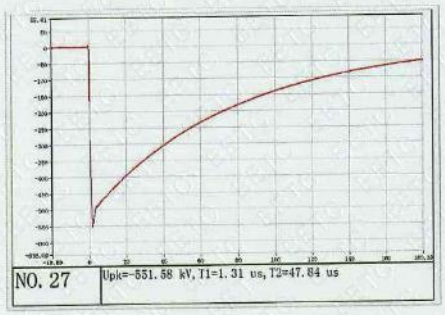

NO. 22 Upk=-552.83 kV, T1=1.31 us, T2=47.85 us

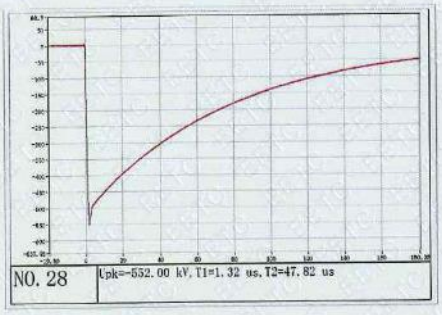

NO. 23 Upk=-553.51 kV, T1=1.31 us, T2=47.84 us

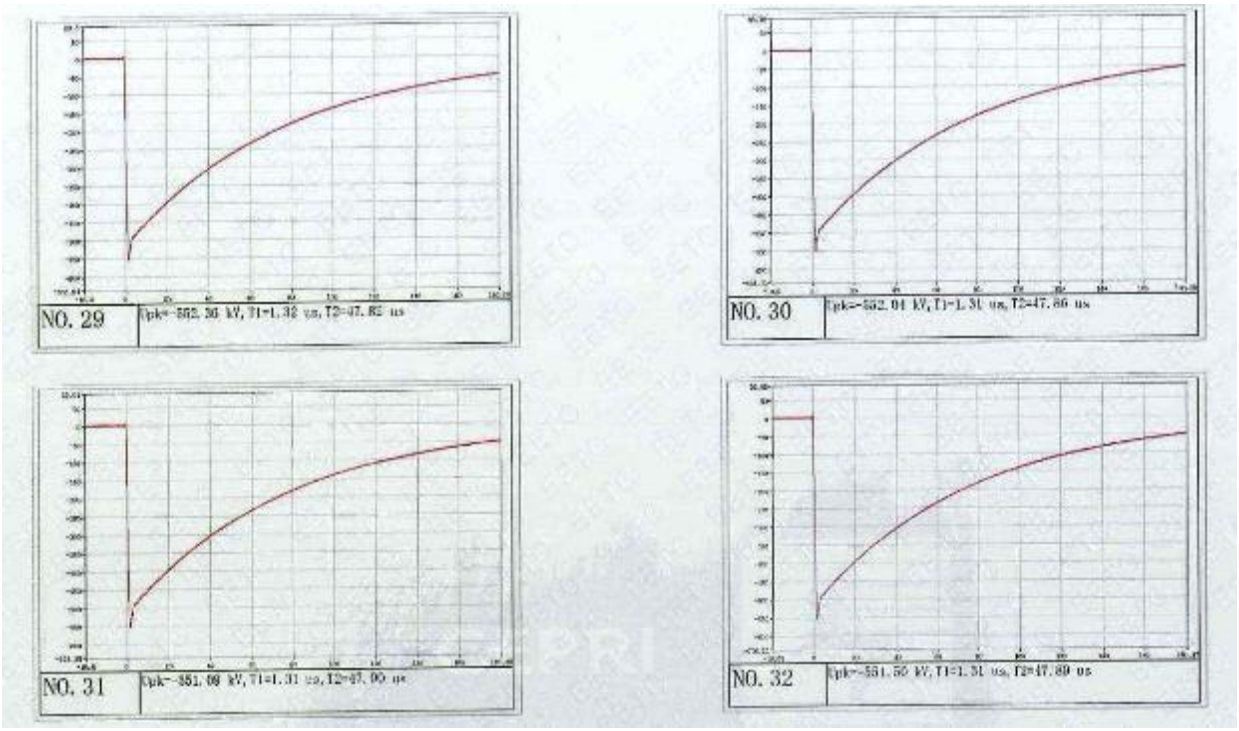

NO. 24 Upk=-552.07 kV, T1=1.31 us, T2=47.85 us


NO. 25 Upk=-553.01 kV, T1=1.31 us, T2=47.90 us


NO. 26 Upk=-552.54 kV, T1=1.31 us, T2=47.74 us


NO. 27 Upk=-551.58 kV, T1=1.31 us, T2=47.84 us


NO. 28 Upk=-552.00 kV, T1=1.32 us, T2=47.82 us



6.3 Test result

The test object passed the tests.

7. Wet power-frequency voltage withstand test

7.1 Reference standard requirement

Under we condition, the withstand voltage of 230kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.

7.2 Data

Water temperature: 7℃ Water conductivity: 99μS/cm Atmosphere correction factor: Kt=1.006

Vertical precipitation: 1.4mm/min Horizontal precipitation: 1.3mm/min

Ambien temperature: 11℃ relative humidity:69% Ambient air pressure: 102.8kPa

Modality of application	Test voltage/Frequency/Duration
Between the high voltage terminal and earth	230kV/50Hz/60s

7.3 Test result

The test object passed the tests.

8. Measurement of dielectric dissipation factor(tanδ) and capacitance at ambient temperature

8.1 Reference standard requirement

The measured tanδ at the test voltage of 10kV, 1.05Um/$\sqrt{3}$ and Um shall not exceed 0.7%.

Δ tanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/$\sqrt{3}$ and Um.

8.2 Data

Ambient temperature: 11℃ Relative humidity: 68%

Modality of application	Test voltage(kV)	Tanδ (%)	Cx (pF)
Between high voltage terminal and test tap	10	0.323	625.8
	76	0.327	626.0
	126	0.369	626.0

8.3 Test result

The test object passed the tests.

9. Electromagnetic compatibility tests(EMC)

9.1 Reference standard requirement

A voltage of 1.1 Um/$\sqrt{3}$ shall be applied between the high voltage terminal of bushing and earth, and maintained for at least 5 min. After that, the voltage shall be decreased by steps down to 0.3 Um/$\sqrt{3}$, then raised again by steps to the initial value and finally decreased by steps to 0.3 Um/$\sqrt{3}$. The radio interference voltage shall not exceed 500μV at 1.1 Um/$\sqrt{3}$.

9.2 Data

Ambient temperature: 11℃ Relative humidity: 68%

Test voltage(kV)		Test frequency (MHz)	Ratio interference level (μV)	Standard limites ((μV)
1.1 Um/$\sqrt{3}$.	80/5min	1.0	127	/
1.0 Um/$\sqrt{3}$.	73		118	
0.9 Um/$\sqrt{3}$.	66		113	
0.8 Um/$\sqrt{3}$.	58		107	
0.7 Um/$\sqrt{3}$.	51		101	
0.6 Um/$\sqrt{3}$.	44		98	
0.5 Um/$\sqrt{3}$.	37		96	

Test voltage(kV)		Test frequency (MHz)	Ratio interference level (μV)	Standard limites ((μV)
0.4 Um/√3.	29	1.0	95	/
0.3 Um/√3.	22		91	
0.4 Um/√3.	29		93	
0.5 Um/√3.	37		95	
0.6 Um/√3.	44		97	
0.7 Um/√3.	51		99	
0.8 Um/√3.	58		103	
0.9 Um/√3.	66		115	
1.0 Um/√3.	73		120	
1.1 Um/√3.	80		129	< 500
1.0 Um/√3.	73		119	
0.9 Um/√3.	66		114	
0.8 Um/√3.	58		110	
0.7 Um/√3.	51		101	
0.6 Um/√3.	44		97	
0.5 Um/√3.	37		96	
0.4 Um/√3.	29		95	
0.3 Um/√3.	22		95	

9.3 Test result

The test object passed the tests.

10. Temperature rise test

10.1 Reference standard requirement

The test shall be carried out at Ir (1 ± 2%) at rated frequency. The test shall be continued until the temperature rise is sensibly constant, the limits of temperature rises and temperature limits are shown as follows:

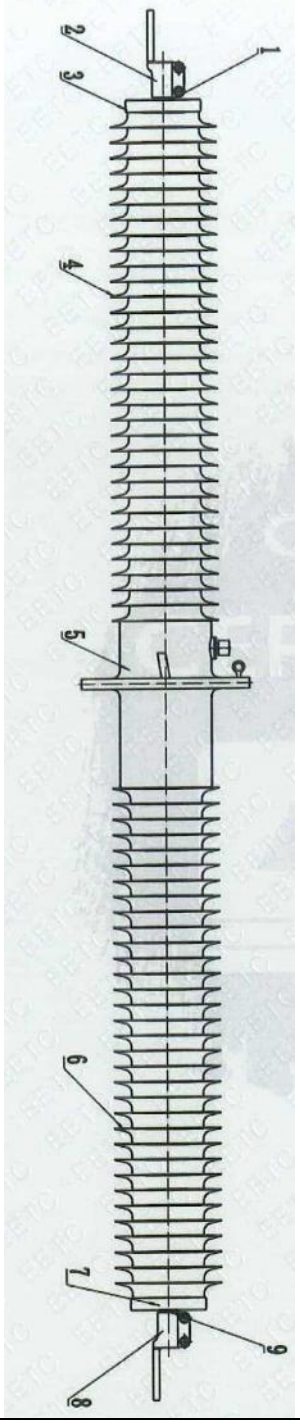
Terminals to be connected to exterior conductors by screws or bolts: 75K/105℃

Current carrying and non-current carrying metal parts in contact with insulation: 90K/120℃

10.2 Data

Test current:2000A Ambient temperature:22℃ Relative humidity:67%

Thermocouple No.	Location	Description of component	Temperature rise/ temperature (K/℃)	Maximum temperature rise/temperature (K/℃)
1	Outdoor conductor rod	Terminals to be connected to exterior conductors by screws or bolts (Tinned copper)	29/51	90/120
2	Outdoor clamp	Terminals to be connected to exterior conductors by screws or bolts (Tinned copper)	33/55	75/105
3	Grading ring	Current carrying and non-current carrying metallic parts in contact with insulation (Non-current carrying, aluminum alloy)	18/40	90/120
4	Shed	Silicon rubber	13/35	/
5	Flange	Current carrying and non-current carrying metallic parts in contact with insulation (Non-current carrying, aluminum alloy)	8/30	90/120
6	Shed	Silicon rubber	10/32	/
7	Grading ring	Current carrying and non-current carrying metallic parts in contact with insulation (Non-current carrying, aluminum alloy)	21/43	90/120
8	Indoor clamp	Terminals to be connected to exterior conductors by screws or bolts (Tinned copper)	32/54	75/105
9	Indoor conductor rod	Terminals to be connected to exterior conductors by screws or bolts (Tinned copper)	30/52	90/120



Name of measuring poin/material

1. Conductor rod (Outdoor, Tinned copper)
2. Clamp (Outdoor, Tinned copper)
3. Grading ring (Outdoor, Aluminum alloy)
4. Shed (Outdoor, Silicon rubber)
5. Flange(Aluminum alloy)
6. Shed(Indoor, Silicon rubber)
7. Grading ring (indoor, Aluminum alloy)
8. Clamp (Indoor, Tinned copper)
9. Conductor rod (lndoor, Tinned copper)

10.3Test result

The test object passed the tests.

11. Verification of thermal short-time current withstand

11.1 Reference standard requirement

According to clause 8.9 of GB/T4109-2022 and IEC60137:2017 "Verification of thermal short-time current withstand", the bushing shall be considered to be able to withstand the standard value of Ith if θf does not exceed 180℃.

11.2 Data

θ_0 (℃)	α	I_{th} (kA)	t_{th}(S)	S_t(cm²)	S_e(cm²)
72	0.8	50	1	15.90	12.23
$\theta_f=\theta_0+\alpha*{I_{th}}^2*I_{th}/(S_t*S_e)$=82(℃)					

Where: θ_0, S_t, S_e are provided by the client.

θ_0: the conductor temperature under continuous operation with $I_r$at an ambient temperature of 40℃;

α: 0.8(k/s)/(kA/ cm²) for copper;

I_{th}: the standard value as specified;

t_{th}: the standard as specified;

S_t: the total cross-section;

S_e: the equivalent cross-section taking account of skin effect.

11.3Test result

The test object passed the tests.

12. Cantilever load withstand test

12.1 Reference standard requirement

The bushing shall be completely assembled and installed vertically to a suitable rigid device. The load shall be applied perpendicular to the axis of the bushing at the mid-point of the indoor side/outdoor side terminal for 60s, test loaded 2500N. No evidence of damage (deformation, rupture or leakage), and it shall withstand a repetition of all routine tests without significant change from previous results.

12.2 Data

Ambient temperature:11℃ Relative humidity:65%

Mounting	Location	Test load (N)	Duration(s)	Sample status
Mounted vertically	Indoor side/ Outdoor side	2500	60	No evidence of damage (deformation, rupture or leakage)

12.3Test result

The test object passed the tests.

13. Verification of dimensions

13.1 Reference standard requirement

The dimensions of the bushing under test shall be in accordance with the relevant drawings, particularly with regard to any dimensions to which special tolerances apply and to details affecting interchangeability.

13.2 Data

Ambient temperature:11℃ Relative humidity:65%

Test object	Item	Nominal value(mm)	Measured value(mm)
Silicon rubber	Creepage distance (Indoor side/Outdoor side)	3150/3906	3900/3911
	Arcing distance (Indoor side/Outdoor side)	1220 +10/1220±10	1228/1230
	Total length	3330±20	3340
	Dimensions of parts for assembling and/or interconnection are in accordance with the relevant drawings		

11.3Test result

The test object passed the tests.

14. Measurement of dielectric dissipation factor (tanδ) and capacitance at ambient temperature

14.1 Reference standard requirement

The measured tanδ at the test voltage of 10kV, 1.05 Um/$\sqrt{3}$ and Um shall not exceed 0.7%.

Δ tanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/$\sqrt{3}$ to Um.

14.2 Data

Ambient temperature:11℃ Relative humidity:65%

Modality of application	Test voltage (kV)	tanδ (%)	Cx(pF)
Between high voltage terminal and test tap	10	0.331	625.9
	76	0.338	626.0
	126	0.357	626.0

14.3Test result

The test object passed the tests.

15. Dry power-frequency voltage withstand test

15.1 Reference standard requirement

The withstand voltage of 230kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.

15.2 Data

Ambient temperature:11℃ Relative humidity:65%

Modality of application	Test voltage/Frequency/Duration
Between high voltage terminal and earth	230kV/50Hz/60s

15.3Test result

The test object passed the tests.

16. Measurement of partial discharge quantity

16.1 Reference standard requirement

Pre-stress voltage: 230kV Test frequency: 50Hz

Test voltage: 126kV Permissible PD level: l0pC

Test voltage: 109kV Permissible PD level: I0pC

Test voltage: 76kV Permissible PD level: 5pC

16.2 Data

Ambient temperature:11℃ Relative humidity:65%

Test frequency (Hz)	50		
Pre-stress voltage (kV)	230		
Test voltage (kV	126	109	76
PD level (pC)	8	6	3

16.3Test result

The test object passed the tests.

17. Measurement of dielectric dissipation factor(tanδ) and capacitance at ambient temperature

17.1 Reference standard requirement

The measured tanδ at the test voltage of 10kV, 1.05Um/$\sqrt{3}$ and Um shall not exceed 0.7%.

Δ tanδ shall not exceed 0.1% when the power frequency voltage increases from 1.05Um/$\sqrt{3}$ and Um.

17.2 Data

Ambient temperature: 11℃ Relative humidity: 65%

Modality of application	Test voltage(kV)	tanδ (%)	Cx (pF)
Between high voltage terminal and test tap	10	0.315	625.8
	76	0.338	626.0
	126	0.371	626.0

17.3 Test result

The test object passed the tests.

18. Test of tap insulation

18.1 Reference standard requirement

The withstand voltage of 2kV shall be applied for 60s between the test tap and earth. No flashover or puncture occurs.

Before and after the voltage withstand test, tanδ and capacitance with respect to earth shall be measured, Cx≤10000pF, tanδ≤5%.

18.2 Data

Ambient temperature: 11℃ Relative humidity: 65%

Test voltage(kV)	Duration(s)	tanδ (%)	Cx(pF)
1	/	4.659	773.1
2	60	Voltage withstand test between the test tap and earth. No flashover or puncture occurs.	
1	/	4.671	773.2

18.3 Test result

The test object passed the tests.

19. Visual inspection and dimensional check

19.1 Reference standard requirement

No surface defects shall be tolerated which could affect the satisfactory performance in service.

Dimensions of parts for assembling and/or interconnection shall be in accordance with the relevant drawings, checked by sampling.

19.2Data

Visual inspection	No surface defects shall be tolerated
Dimensional check	In accordance with the relevant draws

19.3Test result

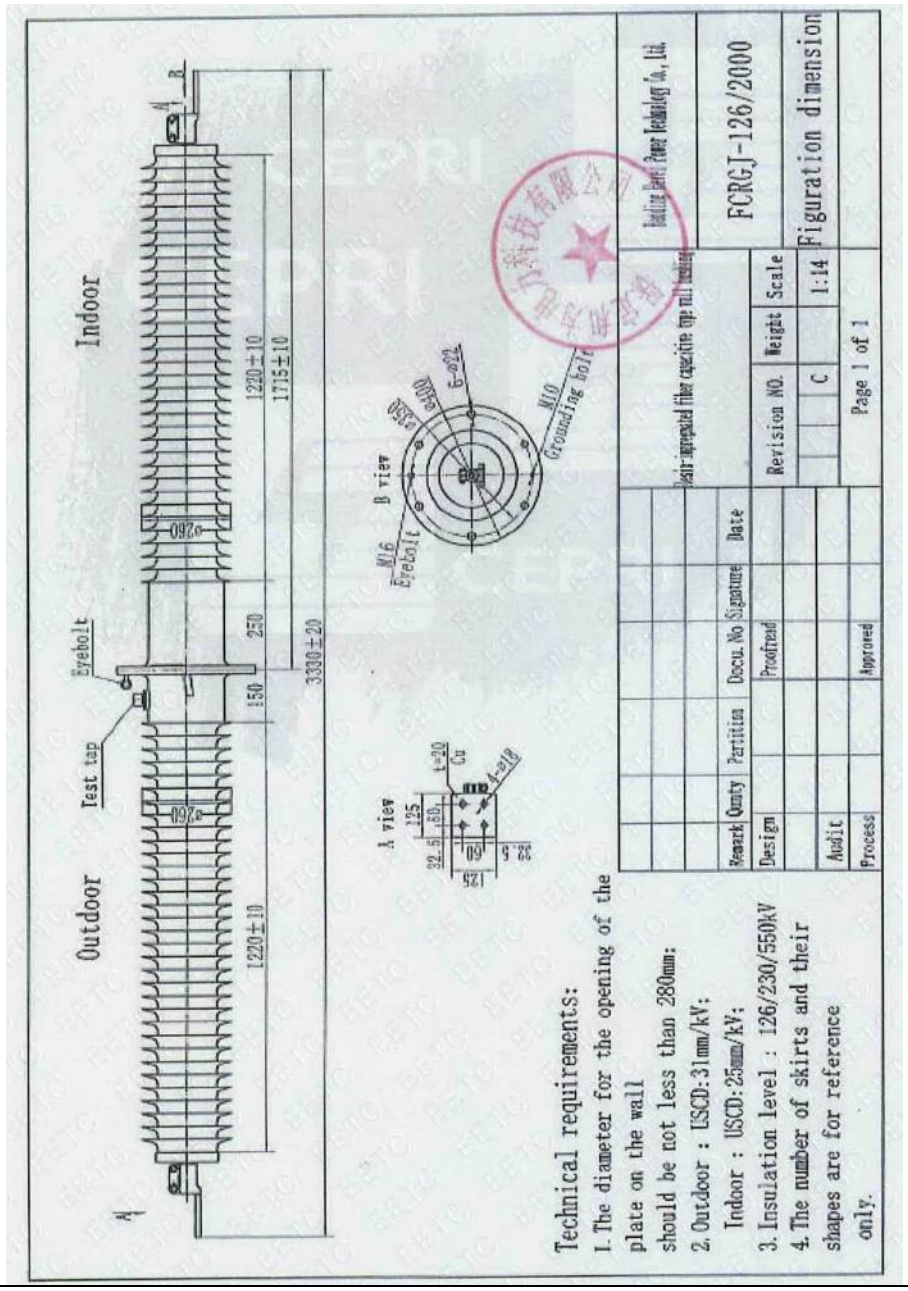
The test object passed the tests.

Appendix A Object Parameters

A.1 Parameter

Highest voltage for equipment(Um)	126kV	Rated current(Ir)	2000A
Altitude	≤1000m	Rated frequency	50Hz
Rated insulation level	126/230/550kV	Rated short-time thermal current(r.m.s)	50kA/1s
Insulating material	Resin	Temperature range	-40℃~40℃

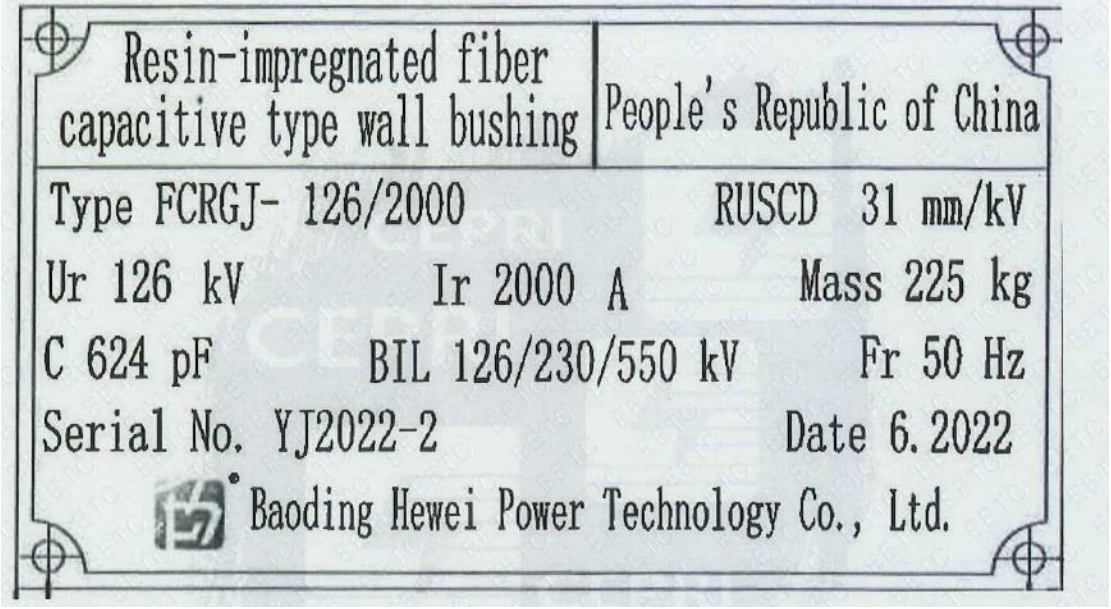
A.2 Drawings



Appendix A Object Parameters

A.3 Photographs of test object





A.4 Statement

A.4.1 The test object offered by the client is a new, clean Resin-impregnated fiber (RIF) capacitive type wall bushing, including mounting flange and all the other parts in normal operation with outer insulation of silicone rubber.

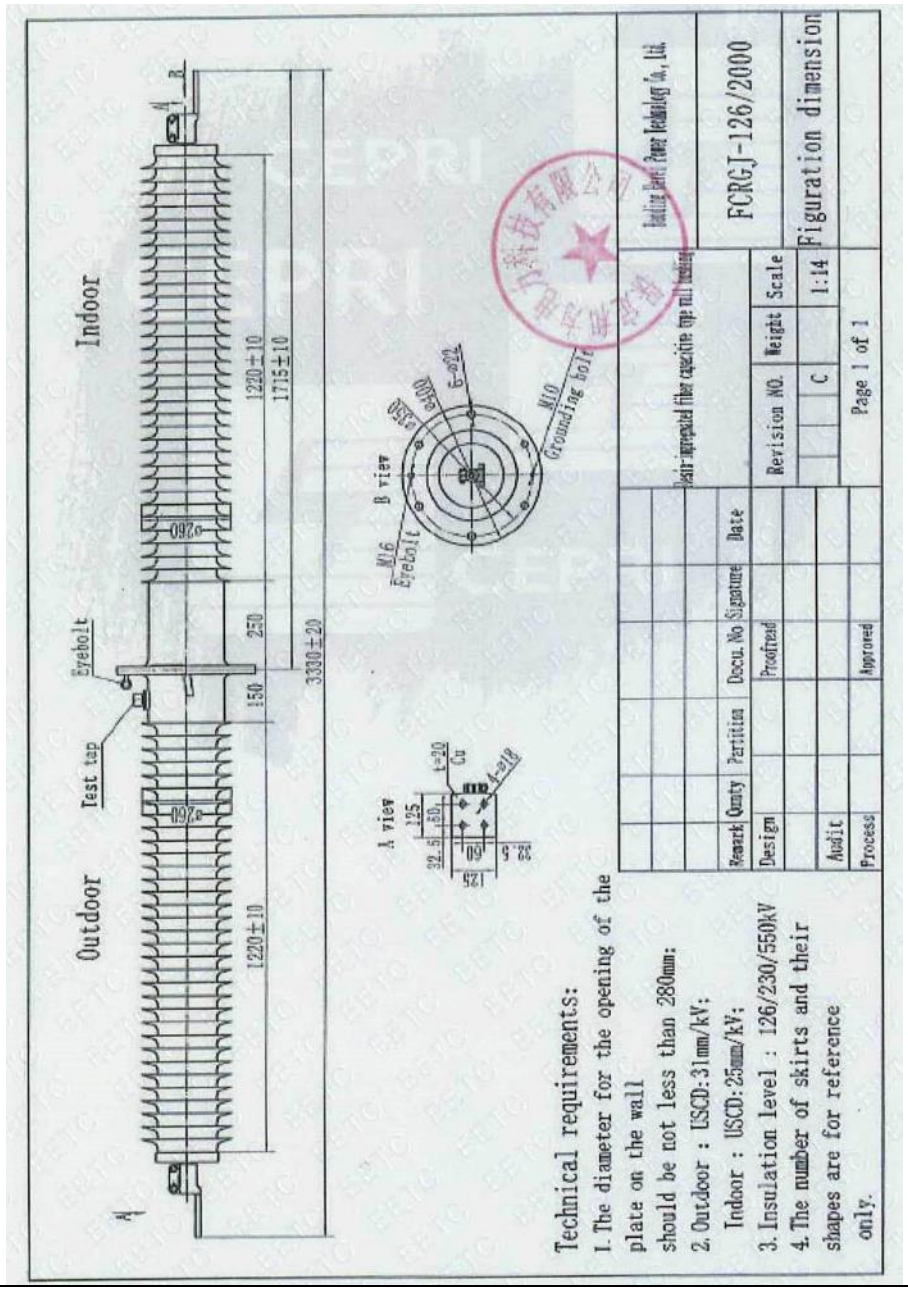
A.4.2 The testing laboratory has checked that the drawings and other data submitted by the client can adequately represent the essential details and parts of the equipment to be tested, but isn't responsible for the accuracy of the detailed information.

Appendix A Object Parameters

A.1 Parameter

Highest voltage for equipment(Um)	126kV	Rated current(Ir)	2000A
Altitude	≤1000m	Rated frequency	50Hz
Rated insulation level	126/230/550kV	Rated short-time thermal current(r.m.s)	50kA/1s
Insulating material	Resin	Temperature range	-40℃~40℃

A.2 Drawings



Appendix B main tet devices

No.	Name/Type/ Specification	Serial No.	Measurement range	Uncertainty/ Accuracy class/ Maximum Permissible Error	Calibration Institute	Valid Date
1	Power-frequency voltage measuring system	#111030 EETC09-1029	(40-1100)kV	3	National Center for High Voltage Measurement	2024.02.10
2	Impulse voltage measuring system	#17015-1 EETC09-1030	(200-3000)kV	3	National Center for High Voltage Measurement	2024.10.17
3	Partial discharge detector	#20071203 EETC09-1046	0-500pC	10	National Center for High Voltage Measurement	2023.03.07
4	Standard capacitor	#12001 EETC09-1033	(10-550)kV	C:50pF±lpF tgδ:lx10^{-4}	National Center for High Voltage Measurement	2024.03.27
5	High voltage bridge	#031302Z (EETC09-1038)	C:1:(1-1000) tgδ:±10%	C:± (0.005R_N X+0.5%R_ND) tgδ:±0.5%(D+0. 01)	National Center for High Voltage Measurement	2024.10.19
6	Multi-channel thermometer	#TPV91986 EETC09-1024	(0-100) ℃	±2℃	GRG Metrology & Test Co., Ltd.	2023.06.08
7	Weight indicator	#1610099647 EETC09-1052	(50-l000)kg	5	GRG Metrology & Test Co.,Ltd.	2023.01.09
8	Digital conductivity meter	#722014072713 EETC09-1043	(50-150) μs/cm	±5%	GRG Metrology & Test Co.,Ltd	2023.01.12