CÔNG TY TNHH NGUYÊN VĨNH TIẾN

Sẵn sàng liên kết cùng phát triển – Hợp tác Vĩnh Tiến cùng thành công

SẢN PHẨM ĐẦU NỐI KẾT NỐI THIẾT BỊ
(EQUIPMENT BUSHING)

TÀI LIỆU GIỚI THIỆU SẢN PHẨM

Ver 07.08.2025

DANH MỤC

CHARDON GROUP

24-DIB250

ĐẦU NỐI KẾT NỐI THIẾT BỊ
(EQUIPMENT BUSHING)
GIAO DIỆN A1, LOẠI 24kV 250A

www.chardongroup.com

ỨNG DỤNG

Đầu nối kết nối thiết bị giao diện A1 24kV của Chardon đáp ứng toàn bộ các yêu cầu theo tiêu chuẩn EN 50180, EN 50181 và IEC 60137, cung cấp dạng kết nối cắm trượt được chế tạo bằng ê-pô-xi chất lượng. Bộ phận này được sử dụng trong thiết bị được cách điện bằng dầu như máy biến áp, thiết bị đóng cắt và tụ điện. Nó được trang bị với 6 ngàm giữ.

THỬ NGHIỆM SẢN PHẨM

Thử nghiệm sản phẩm được thực hiện phù hợp với tiêu chuẩn IEC 60137

- Cấp điện áp vầng quang tối thiểu: 20.8 kV
- Điện áp AC chịu đựng trong 5 phút: 55 kV

Thử nghiệm sản phẩm được thực hiện phù hợp với yêu cầu về quy trình sản xuất của Chardon:

- Kiểm tra vật lý
- Kiểm tra định kỳ
- Kiểm tra phân tích X quang định kỳ

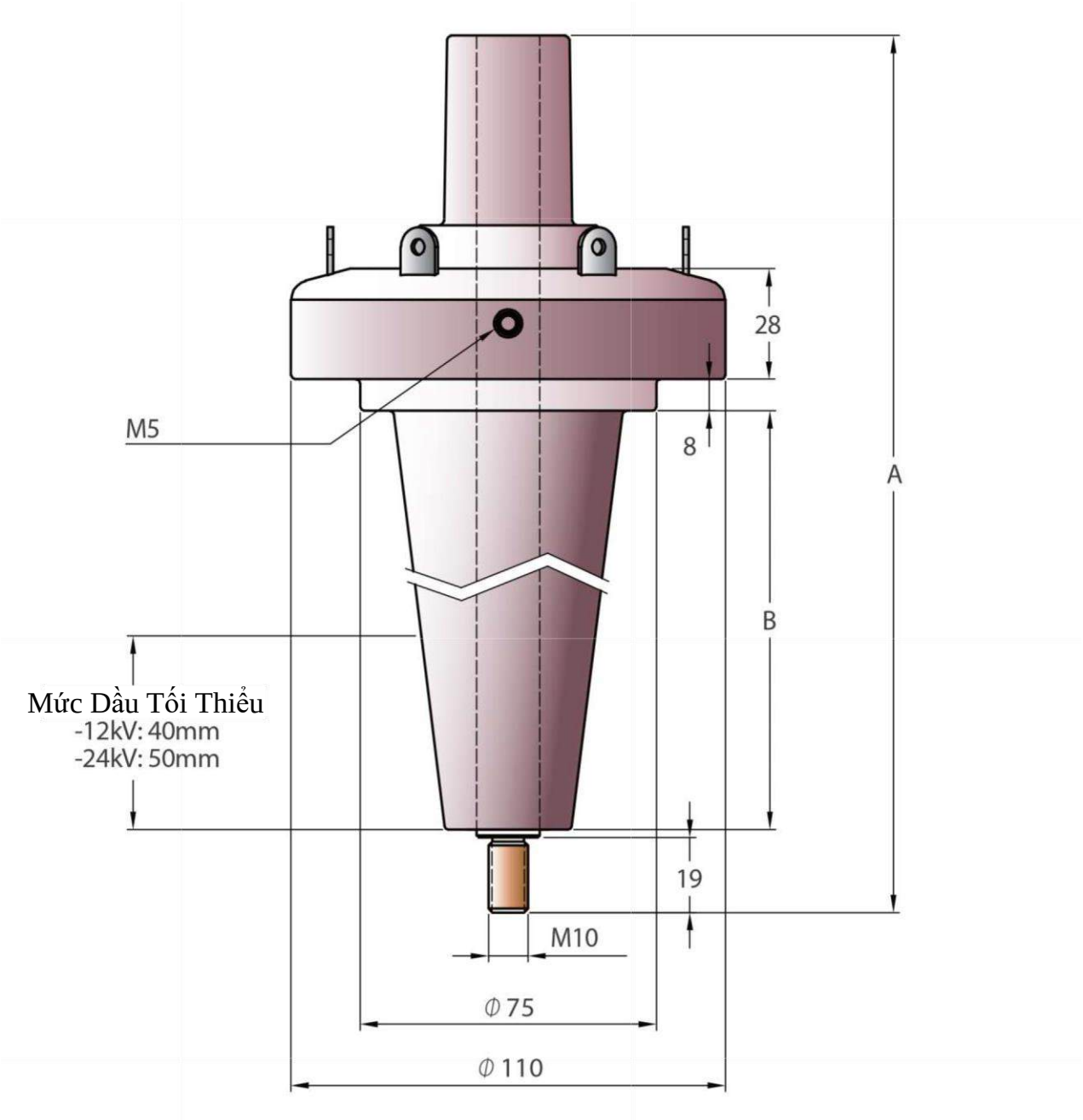
ĐIỆN ÁP ĐỊNH MỨC

Loại điện áp (Um)	24 kV
Điện áp AC chịu đựng trong 5 phút	55 kV
Tỷ số sóng BIL và FWC	125 kV
Cấp điện áp vầng quang tối thiểu	20.8 kV < 10 pC

DÒNG ĐỊNH MỨC

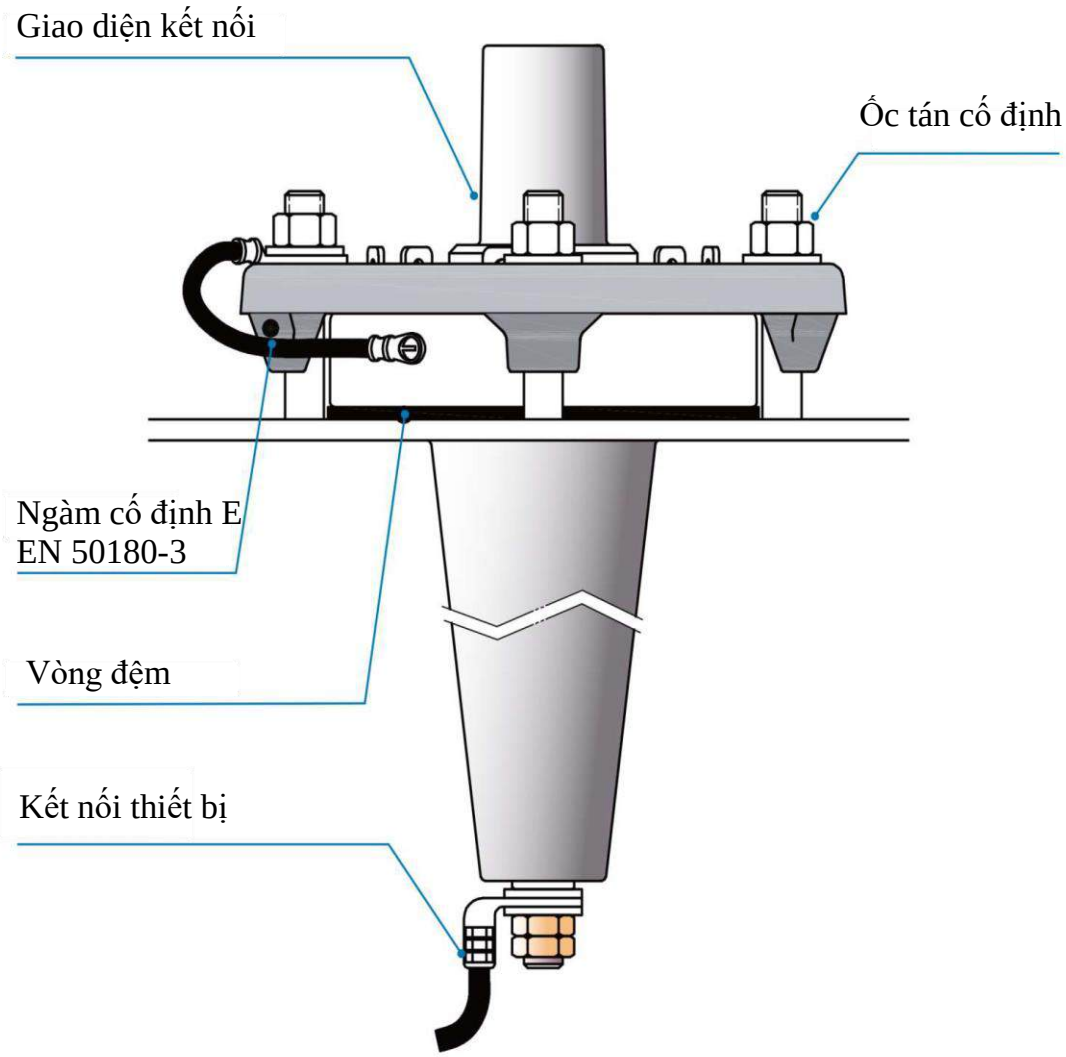
Dòng liên tục	250 A

THÔNG TIN ĐẶT HÀNG



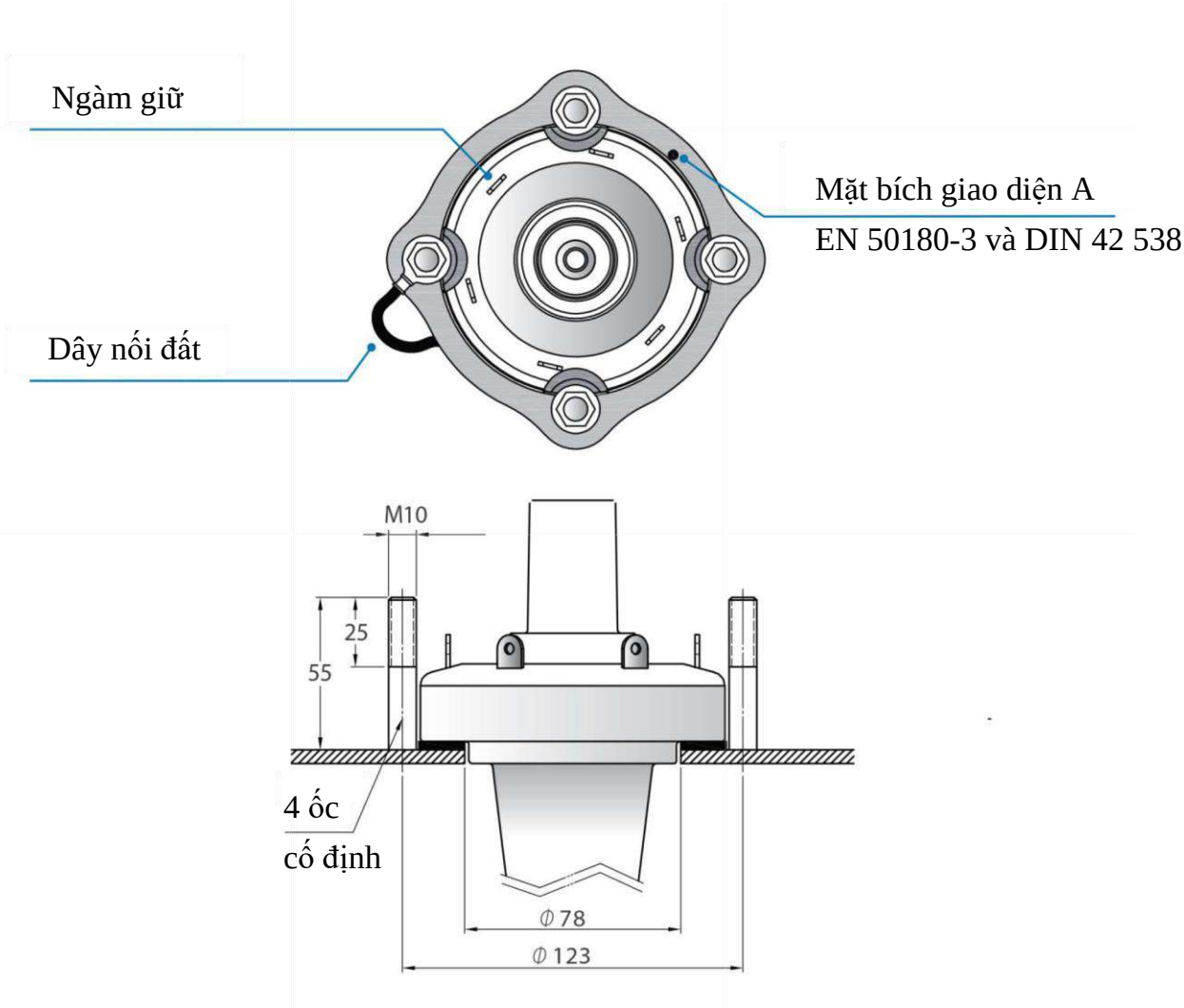
Mã hàng Chardon	Kích thước	
Trong nhà	A	B
24-DIB250-1-I	284	168
24-DIB250-2-I	222	106
24-DIB250-3-I	171	55

THÔNG TIN ĐẶT HÀNG



Cố định ống lót kết nối thiết bị giao diện A	EN 50180-3 và DIN 42 538

THÔNG TIN ĐẶT HÀNG



Ghi chú:
Để đặt hàng phụ kiện kèm theo đầu nối kết nối thiết bị xin vui lòng xem bảng dưới đây

Dây tiếp địa	Số mã hàng + EL
Miếng tiếp địa	Số mã hàng + EP
Mặt bích (tùy chọn)	Số mã hàng + EL hoặc EP + FL

Ví dụ đặt hàng:

Để đặt hàng đầu nối kết nối thiết bị giao diện A loại 2, với miếng tiếp địa và mặt bích, mã là**: 24-DIB250-2-I-EP-FL**

Để đặt hàng đầu nối kết nối thiết bị giao diện A loại 2, chỉ với dây tiếp địa, mã là: **24-DIB250-2-I-EL**

CHARDON GROUP

36-DIB400

ĐẦU NỐI KẾT NỐI THIẾT BỊ
(EQUIPMENT BUSHING)
GIAO DIỆN B2, LOẠI 36kV 400A

www.chardongroup.com

ỨNG DỤNG

Đầu nối kết nối thiết bị giao diện B2 36kV cung cấp dạng kết nối cắm trượt được chế tạo bằng ê-pô-xi chất lượng, đáp ứng toàn bộ các yêu cầu theo tiêu chuẩn CENELEC EN 50180 và IEC 60137. Bộ phận này được sử dụng trong thiết bị được cách điện bằng dầu, thường được sử dụng trong máy biến áp, thiết bị đóng cắt và tụ điện.

THỬ NGHIỆM SẢN PHẨM

Thử nghiệm sản phẩm được thực hiện phù hợp với tiêu chuẩn IEC 60137

- Cấp điện áp vầng quang tối thiểu: 31.2 kV
- Điện áp AC chịu đựng trong 1 phút: 77 kV

Thử nghiệm sản phẩm được thực hiện phù hợp với yêu cầu về quy trình sản xuất của Chardon:

- Kiểm tra vật lý
- Kiểm tra định kỳ
- Kiểm tra phân tích X quang định kỳ

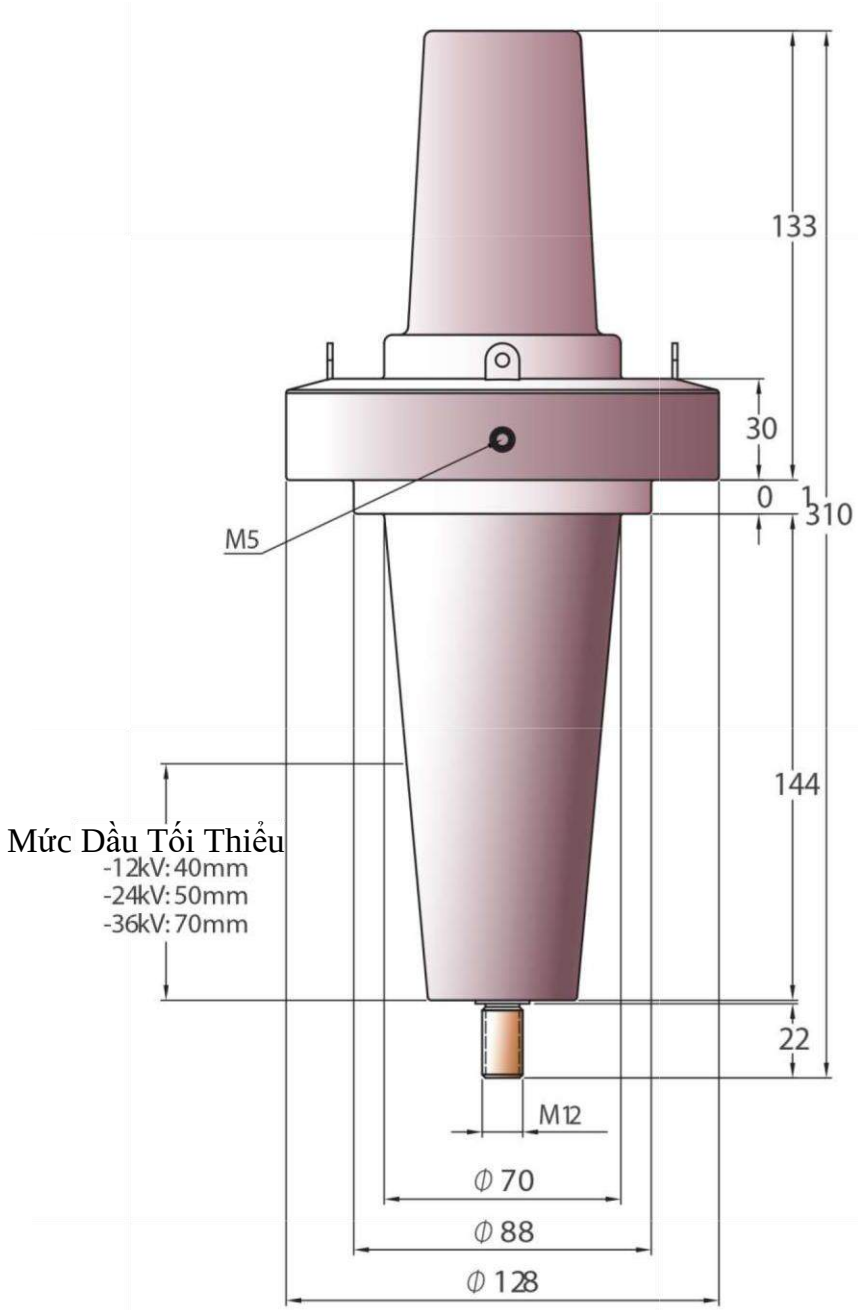
ĐIỆN ÁP ĐỊNH MỨC

Loại điện áp (Um)	36 kV
Điện áp AC chịu đựng trong 1 phút	77 kV
Tỷ số sóng BIL và FWC	170 kV
Cấp điện áp vầng quang tối thiểu	31.2 kV < 10 pC

DÒNG ĐỊNH MỨC

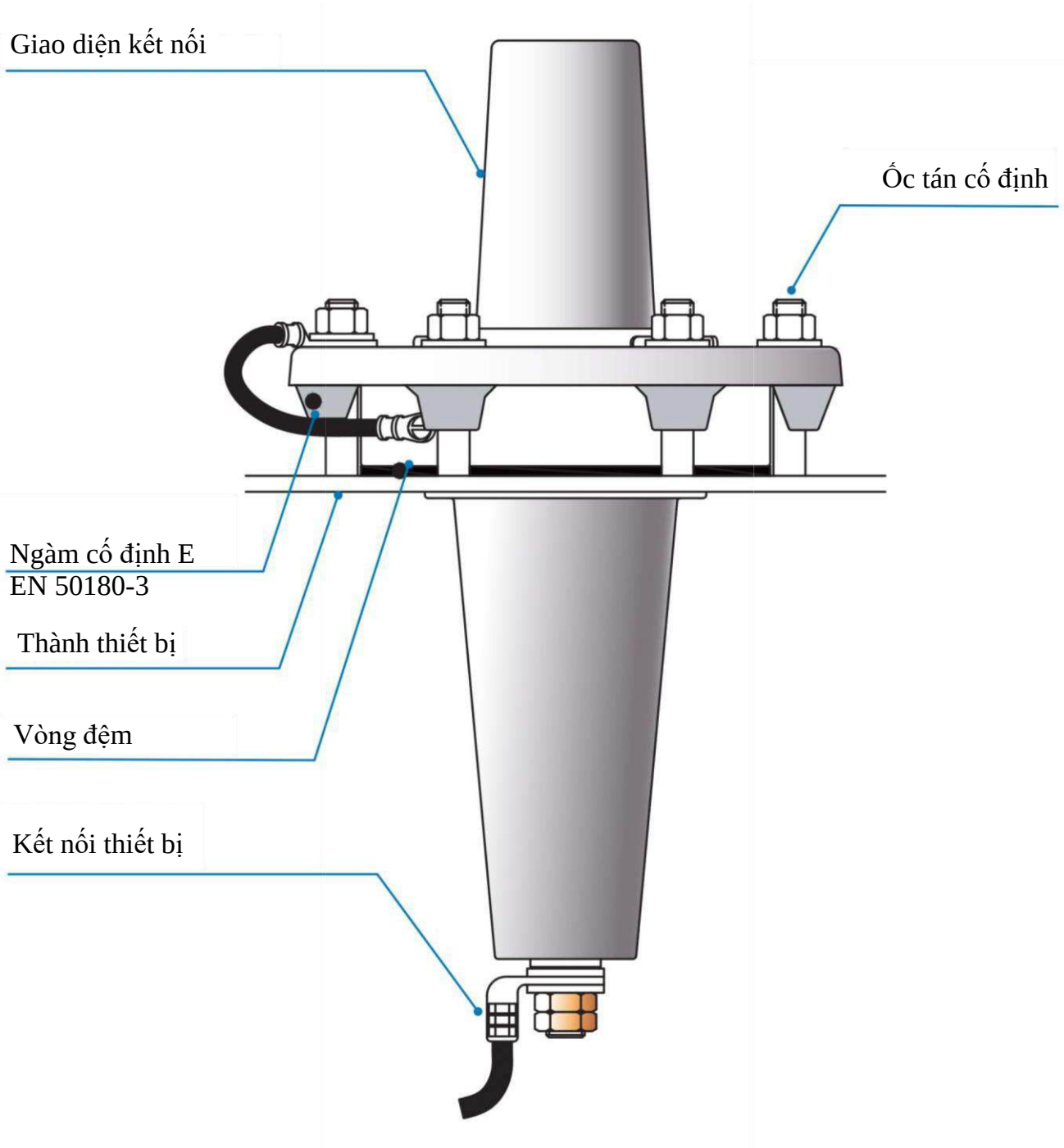
Dòng liên tục	400 A

THÔNG TIN ĐẶT HÀNG



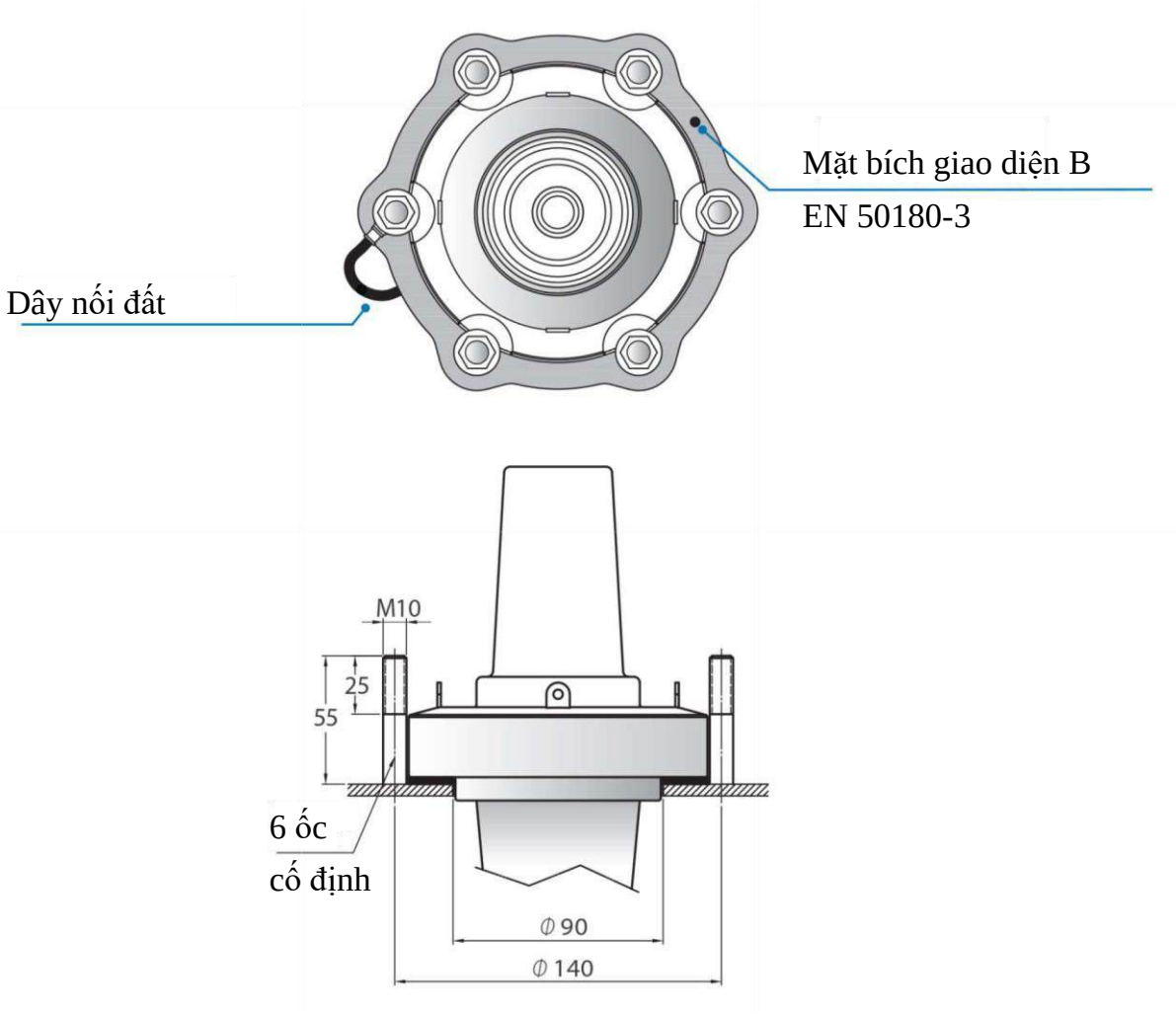
Mã hàng Chardon	Kích thước	
Trong nhà	A	B
36-DIB400-1-I	380	213
36-DIB400-2-I	310	144

THÔNG TIN ĐẶT HÀNG



Cố định đầu nối kết nối thiết bị giao diện B2	EN 50180-3 và DIN 42 538

THÔNG TIN ĐẶT HÀNG



Ghi chú:
Để đặt hàng phụ kiện kèm theo đầu nối kết nối thiết bị xin vui lòng xem bảng dưới đây

Dây tiếp địa	Số mã hàng + EL
Miếng tiếp địa	Số mã hàng + EP
Mặt bích (tùy chọn)	Số mã hàng + EL hoặc EP + FL

Ví dụ đặt hàng:

Để đặt hàng đầu nối kết nối thiết bị giao diện B2, với miếng tiếp địa và mặt bích, mã là**: 36-DIB400-1-I-EP-FL**

Để đặt hàng đầu nối kết nối thiết bị giao diện B2, chỉ với dây tiếp địa, mã là: **36-DIB400-1-I-EL**

CHARDON GROUP

36-DIB630

ĐẦU NỐI KẾT NỐI THIẾT BỊ
(EQUIPMENT BUSHING)
GIAO DIỆN C1, LOẠI 36kV 630A

www.chardongroup.com

ỨNG DỤNG

Đầu nối kết nối thiết bị giao diện C1 36kV đáp ứng toàn bộ các yêu cầu theo tiêu chuẩn CENELEC EN 50180 và IEC 60137, cung cấp dạng kết nối bằng bu lông được chế tạo bằng ê-pô-xi chất lượng. Bộ phận này thiết kế để sử dụng trong thiết bị được cách điện bằng dầu, thường được sử dụng trong máy biến áp, thiết bị đóng cắt và tụ điện.

THỬ NGHIỆM SẢN PHẨM

Thử nghiệm sản phẩm được thực hiện phù hợp với tiêu chuẩn IEC 60137

- Cấp điện áp vầng quang tối thiểu: 31.2 kV
- Điện áp AC chịu đựng trong 1 phút: 77 kV

Thử nghiệm sản phẩm được thực hiện phù hợp với yêu cầu về quy trình sản xuất của Chardon:

- Kiểm tra vật lý
- Kiểm tra định kỳ
- Kiểm tra phân tích X quang định kỳ

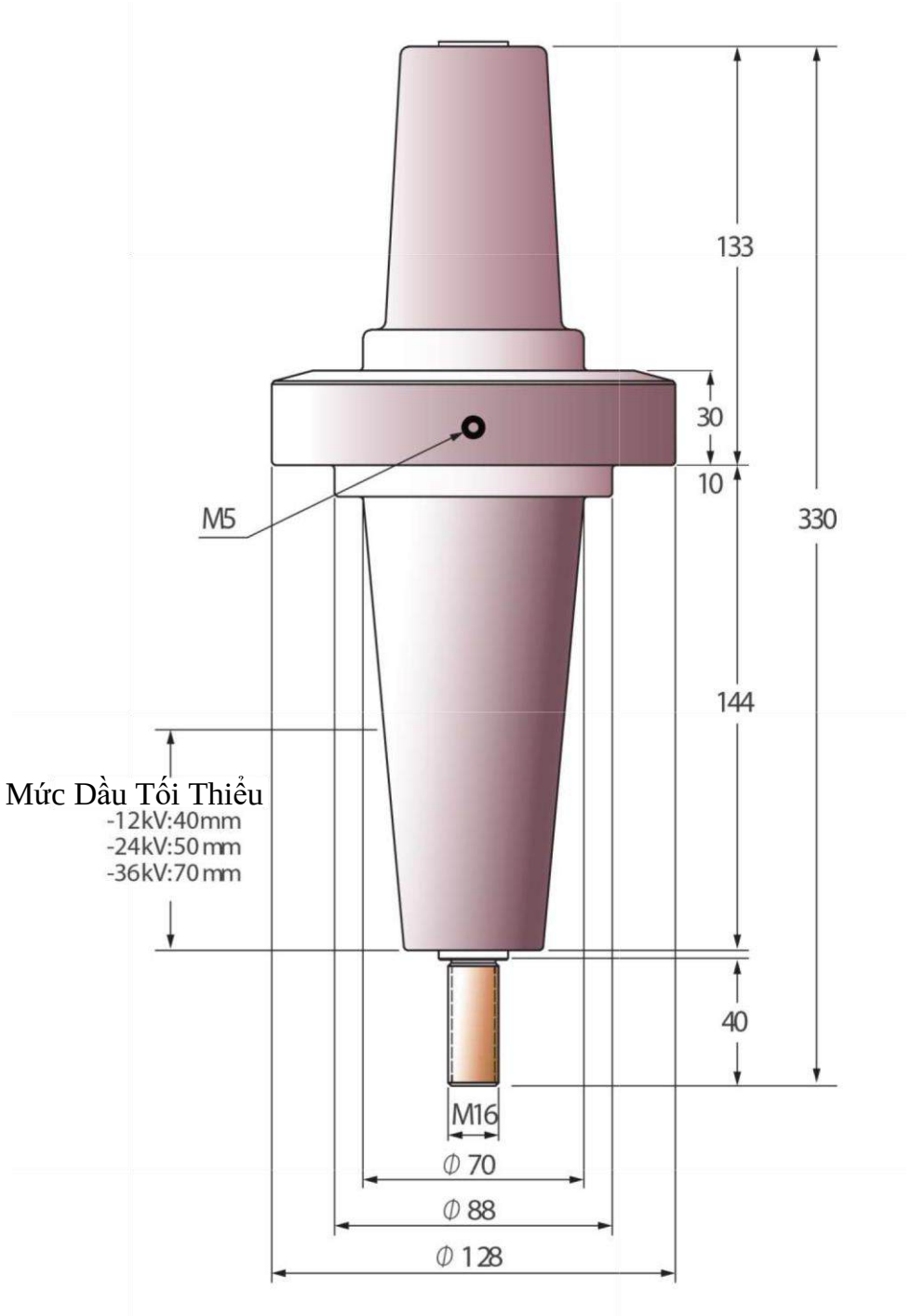
ĐIỆN ÁP ĐỊNH MỨC

Loại điện áp (Um)	36 kV
Điện áp AC chịu đựng trong 1 phút	77 kV
Tỷ số sóng BIL và FWC	170 kV
Cấp điện áp vầng quang tối thiểu	31.2 kV < 10 pC

DÒNG ĐỊNH MỨC

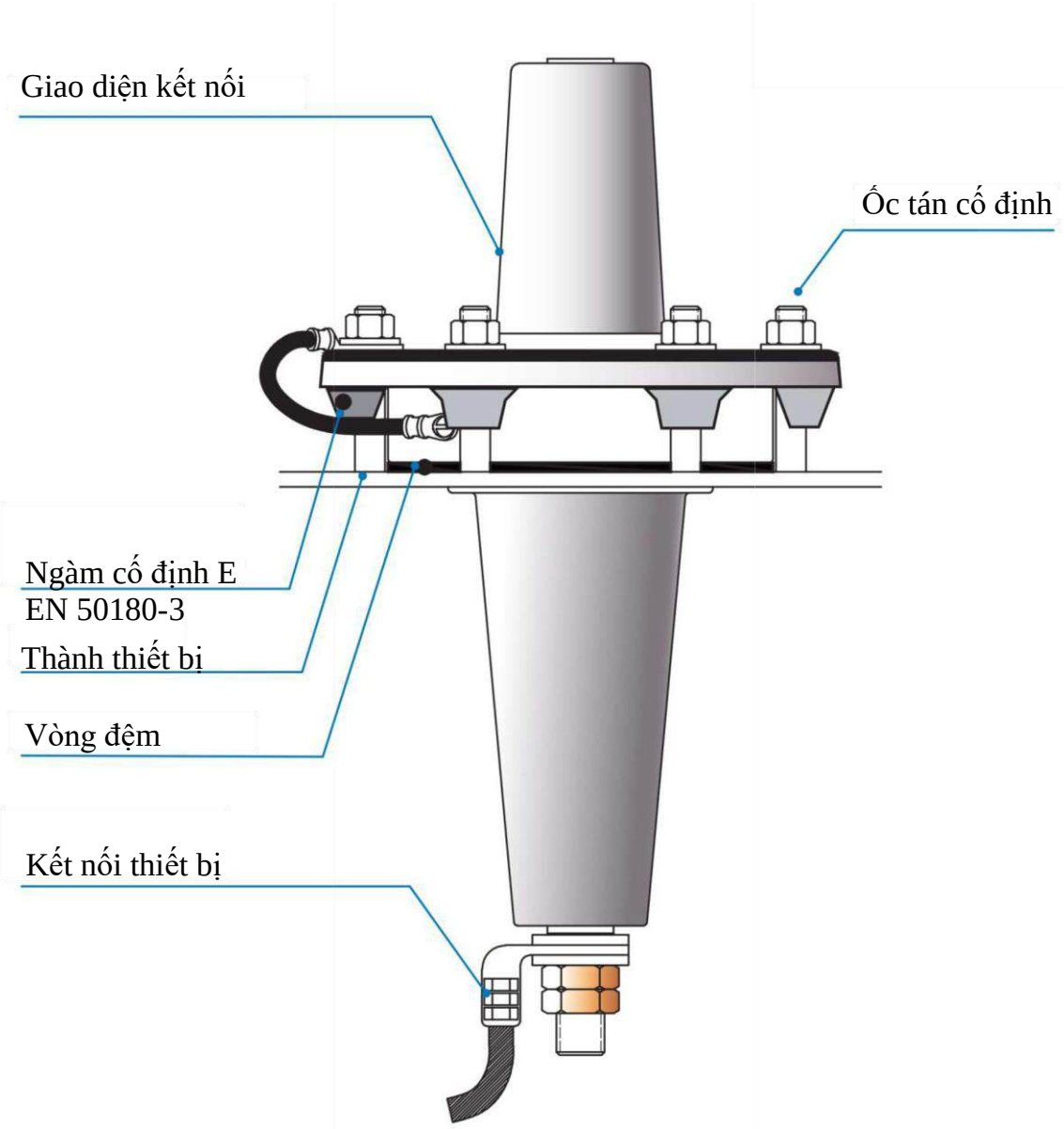
Dòng liên tục	630 A

THÔNG TIN ĐẶT HÀNG



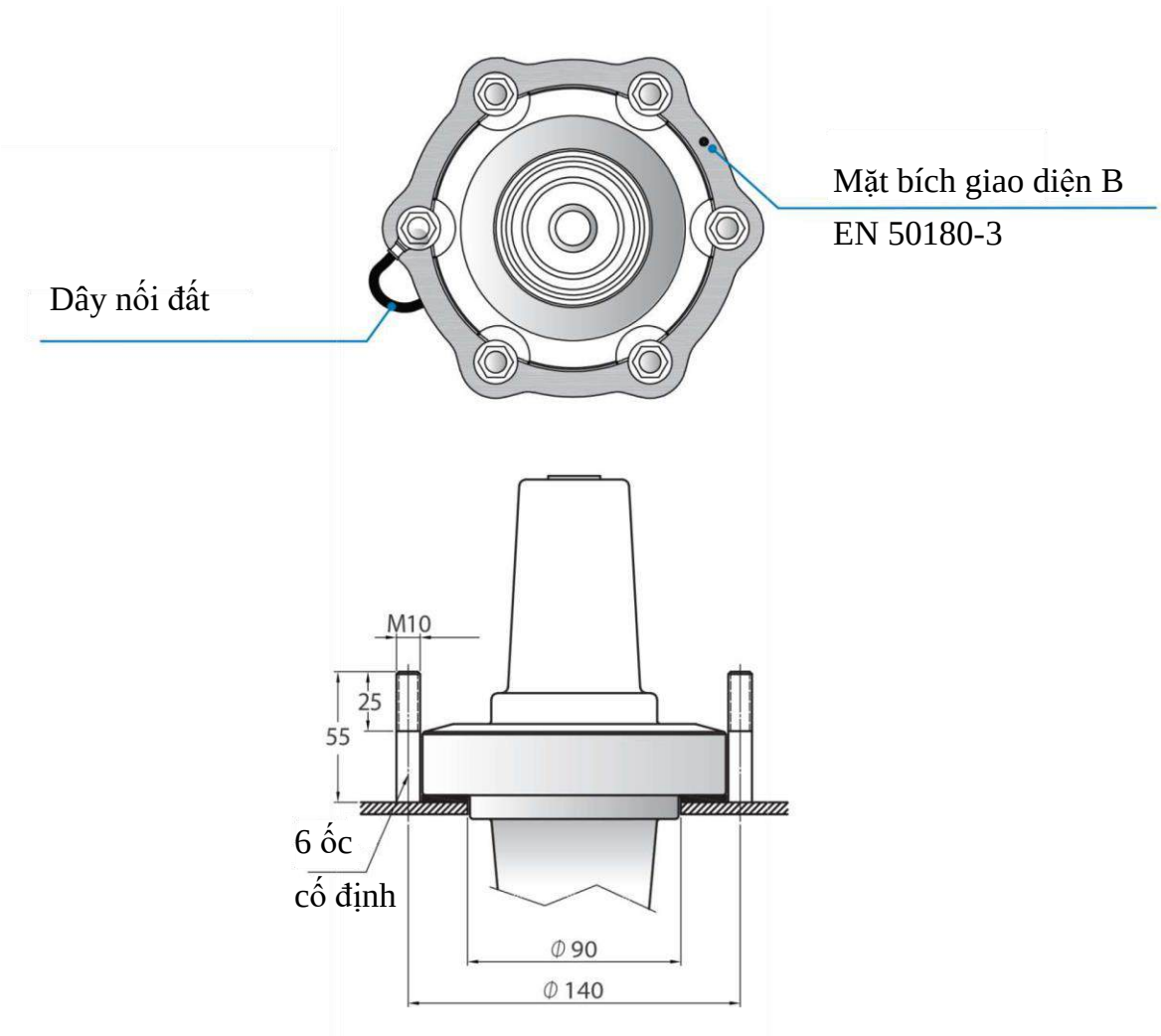
Mã hàng Chardon	Kích thước	
Trong nhà	A	B
36-DIB630-1-I	398	213
36-DIB630-2-I	330	144

THÔNG TIN ĐẶT HÀNG



Cố định đầu nối kết nối thiết bị giao diện C1	EN 50180-3 và DIN 42 538

THÔNG TIN ĐẶT HÀNG



Ghi chú:
Để đặt hàng phụ kiện kèm theo đầu nối kết nối thiết bị xin vui lòng xem bảng dưới đây

Dây tiếp địa	Số mã hàng + EL
Miếng tiếp địa	Số mã hàng + EP
Mặt bích (tùy chọn)	Số mã hàng + EL hoặc EP + FL

Ví dụ đặt hàng:

Để đặt hàng đầu nối kết nối thiết bị giao diện C1, với miếng tiếp địa và mặt bích, mã là**: 36-DIB630-1-I-EP-FL**

Để đặt hàng đầu nối kết nối thiết bị giao diện C1, chỉ với dây tiếp địa, mã là: **36-DIB630-1-I-EL**

CNAS 中国认可 国际互认 检测 TESTING CNAS L0699

CEPRI

TEST REPORT

CEPRI-EETC09-2023-0817 (E)

Client: ANHUI CHARDON ELECTRIC LTD.

Object: 24kV 250A Resin-insulated Bushing

Type: 24-DIB250-3

Test Category: Routine Tests /Type Tests

CHINA ELECTRIC POWER RESEARCH INSTITUTE

NOTICE

1. This report will enter into effect with seals of test center.
2. This report is legally made available accompany with tested, checked, verified and approved signatures.
3. Alter the report is invalid.
4. This report only takes responsibility to the test object.
5. Part of copy is invalid.
6. Any objections in the report should be posed within 15 days once the report is received.
7. The inspection and testing management system of China Electric Power Research Institute includes the following institutes:

National Wind Power Integration Research and Test Center

Power Industry Quality Inspection and Test Center for Electric Equipment

Power Industry Quality Inspection & Test Center for Electric Power Equipment and Instruments

Power Industry Quality Inspection & Test Center for Electrical Material and Components

Power Industry Quality Inspection & Test Center for Automation Equipment

Power Industry Quality Inspection & Test Center for Communication Equipment

Power Industry Quality Inspection & Test Center for Concrete Power and Communication Poles

Power System Electromagnetic Compatibility and Electromagnetic Environmental Research and Monitoring Center

Address: NO.143, Luoyu Road, Hongshan District, Wuhan City, Hubei Province, 430074.

Fax: 86-27-5937-8488 Service line: 027-59258069 Supervision hotline: 010-82813496

E-mail: eetc@epri.sgcc.com.cn Website: http://www.epri.sgcc.com.cn

Catalogue

Test Report	China Electric Power Research Institute		CEPRI-EETC09-2023-0817 (E) Total 20 Page 2
Client	ANHUI CHARDON ELECTRIC LTD.	Manufacturer	ANHUI CHARDON ELECTRIC LTD.
Object	24kV 250A Resin-insulated Bushing	Type	24-DIB250-3
Sampling procedure	By the Client	Serial No.	2303011010
Test Category	Routine Tests /Type Tests	Date	2023.04.10~2023.04.29
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 24-DIB250-3 24kV 250A Resin-insulated Bushing which was provided by ANHUI CHARDON ELECTRIC LTD. All the results were in accordance with the requirements.		
Note	/		

Tested by: 邬文亮 刘西超

Checked by: 肖忠明 **Verified by:** 刘勇

Approved by: 叶国雄 **Date of issue:** 2023-06-25

Test Results

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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.688% Cx: 15.9pF 15kV *tanδ*: 0.693% Cx: 15.9pF	Pass
2	Dry power-frequency voltage withstand test	The withstand voltage of 61kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.	61kV/50Hz/60s No flashover or puncture occurred.	Pass
3	Measurement of partial discharge quantity	Pre-stress voltage: 61kV/60s Test voltage: 24kV Permissible PD level: 10pC Test voltage: 21kV Permissible PD level: 10pC Test voltage: 15kV Permissible PD level: 5pC	Pre-stress voltage: 61kV/60s Test voltage: 24kV PD level: 5pC Test voltage: 21kV PD level: 3pC Test voltage: 15kV PD level: 3pC	Pass
4	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.677% Cx: 15.6pF 15kV *tanδ*: 0.689% Cx: 15.9pF	Pass
5	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, $C_x \leqslant 10000pF$, *tanδ*≤5%.	Test tap: 2kV/50Hz/60s No flashover or puncture occurred. Before the voltage withstand test 1kV *tanδ*: 1.048% Cx: 30.9pF After the voltage withstand test 1kV *tanδ*: 1.056% Cx: 30.9pF	Pass

No.	Item	Requirements	Results	Evaluation
		Type Tests		
6	Dry lightning impulse voltage withstand test	100% Rated lightning impulse: 125kV/+15 110% Rated lightning impulse: 138kV/-15 Waveform: 1.2/50μs 121% Rated chopped lightning impulse: 152kV/-5 Chopped time: (2～6)μs No flashover or puncture occurs.	Lightning impulse: 123kV～126kV +15 134kV～140kV -15 chopped lightning impulse 153kV～155kV -5 No flashover or puncture occurred. Note: The test object is inserted-connected structure used with transformer/cable accessory, without external insulation such as air.	Pass
7	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.681% Cx: 15.8pF 15kV *tanδ*: 0.692% Cx: 15.9pF	Pass
8	Temperature rise test	The test shall be carried out at I_r（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: 60K/90℃	Details are shown in content 8.	Pass
9	Verification of thermal short-time current withstand	The bushing shall be considered to be able to withstand the standard value of I_{th} if θ_f does not exceed 180℃.	The calculated final temperature of the conductor(θ_f): 112℃	Pass
10	Verification of dimensions	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.	Creepage distance(External/Oil side): 66/92 mm Arcing distance (External/Oil side): 61/86 mm Total length: 172mm The dimensions of the busing were in accordance with the relevant drawings.	Pass

No.	Item	Requirements	Results	Evaluation
		Routine tests		
11	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.683% Cx: 15.7pF 15kV *tanδ*: 0.691% Cx: 15.9pF	Pass
12	Dry power-frequency voltage withstand test	The withstand voltage of 61kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.	61kV/50Hz/60s No flashover or puncture occurred.	Pass
13	Measurement of partial discharge quantity	Pre-stress voltage: 61kV/60s Test voltage: 24kV Permissible PD level: 10pC Test voltage: 21kV Permissible PD level: 10pC Test voltage: 15kV Permissible PD level: 5pC	Pre-stress voltage: 61kV/60s Test voltage: 24kV PD level: 4pC Test voltage: 21kV PD level: 3pC Test voltage: 15kV PD level: 3pC	Pass
14	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.698% Cx: 15.9pF 15kV *tanδ*: 0.710% Cx: 16.0pF	Pass
15	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≤10000pF, *tanδ*≤5%.	Test tap: 2kV/50Hz/60s No flashover or puncture occurred. Before the voltage withstand test 1kV *tanδ*: 1.168% Cx: 31.2pF After the voltage withstand test 1kV *tanδ*: 1.177% Cx: 31.4pF	Pass

No.	Item	Requirements	Results	Evaluation
16	Tightness test at the flange or other fixing device	For liquid-immersed bushings, the tank shall be filled with air or any suitable gas at a relative pressure of 0.15MPa±0.01MPa and maintained for 15min, or oil at a relative pressure of 0.15MPa±0.01MPa and maintained for 12h, there shall be no leakage.	Test pressure: 0.15MPa (SF_6) Duration: 15min No evidence of leakage.	Pass
17	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

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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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.

1.2 Data

Ambient temperature: 18℃ Relative humidity: 77%

Modality of application	Test voltage(kV)	*tan δ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.688	15.9
	15	0.693	15.9

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 61kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.

2.2 Data

Ambient temperature: 18℃ Relative humidity: 77% Ambient air pressure: 101.0kPa

Modality of application	Test voltage/Frequency/Duration
Between high voltage terminal and earth	61kV/50Hz/60s

2.3 Test result

The test object passed the tests.

3. Measurement of partial discharge quantity

3.1 Reference standard requirement

Pre-stress voltage: 61kV Test frequency: 50Hz

Test voltage: 24kV Permissible PD level: 10pC

Test voltage: 21kV Permissible PD level: 10pC

Test voltage: 15kV Permissible PD level: 5pC

3.2 Data

Ambient temperature: 18℃ Relative humidity: 77%

Pre-stress voltage (kV)	61		
Test voltage (kV)	24	21	15
PD level (pC)	5	3	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, $1.05U_m / \sqrt{3}$ and U_m shall not exceed 0.7%.

4.2 Data

Ambient temperature: 19℃ Relative humidity: 68%

Modality of application	Test voltage(kV)	*tan δ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.677	15.6
	15	0.689	15.9

4.3 Test result

The test object passed the tests.

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, $C_x \leqslant 10000$pF, *tanδ*$\leqslant$5%.

5.2 Data

Ambient temperature: 18℃ Relative humidity: 77%

Test voltage(kV)	Duration(s)	*tanδ* (%)	C_x(pF)
1	/	1.048	30.9
2	60	Voltage withstand test between test tap and earth, no flashover or puncture occurred.	
1	/	1.056	30.9

5.3 Test result

The test object passed the tests.

6. Dry lightning impulse voltage withstand test

6.1 Reference standard requirement

The test object shall be subjected to 15 full lightning impulses of positive polarity at 125kV(peak value),15 full lightning of negative polarity at 138kV, 5 chopped lightning impulses of negative polarity at 152kV(peak value).

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

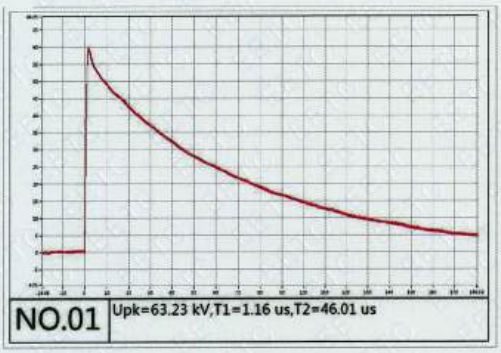
6.2 Data

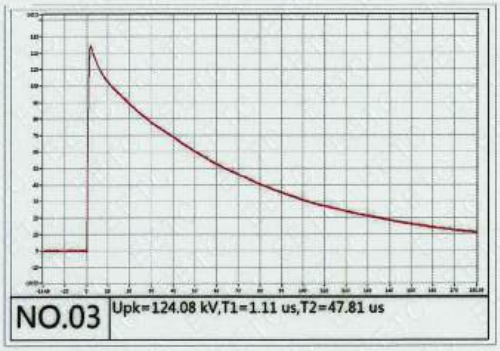
Ambient temperature:18℃ Relative humidity:77% Ambient air pressure：101.0kPa

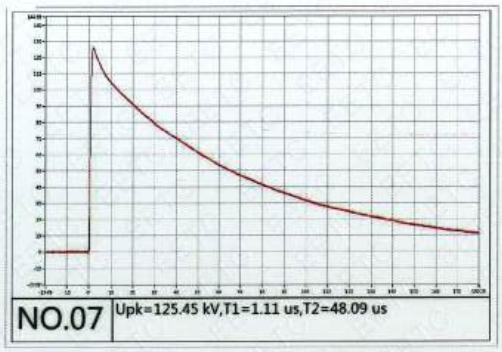
No.	Voltage polarity	Test voltage (peak) (kV)	Chopped time (μs)	Waveform No.	Result
1	Positive lightning impulse	63	/	1	Pass
2	Positive lightning impulse	123	/	2	Pass
3	Positive lightning impulse	124	/	3	Pass
4	Positive lightning impulse	124	/	4	Pass
5	Positive lightning impulse	124	/	5	Pass
6	Positive lightning impulse	126	/	6	Pass
7	Positive lightning impulse	125	/	7	Pass
8	Positive lightning impulse	125	/	8	Pass
9	Positive lightning impulse	126	/	9	Pass
10	Positive lightning impulse	126	/	10	Pass
11	Positive lightning impulse	126	/	11	Pass
12	Positive lightning impulse	126	/	12	Pass
13	Positive lightning impulse	125	/	13	Pass
14	Positive lightning impulse	125	/	14	Pass
15	Positive lightning impulse	125	/	15	Pass
16	Positive lightning impulse	125	/	16	Pass
17	Negative lightning impulse	69	/	17	Pass
18	Negative lightning impulse	138	/	18	Pass
19	Negative chopped impulse	87	2.2	19	Pass
20	Negative chopped impulse	155	3.4	20	Pass

No.	Voltage polarity	Test voltage (peak) (kV)	Chopped time (μs)	Waveform No.	Result
21	Negative chopped impulse	155	3.3	21	Pass
15	Negative chopped impulse	153	3.5	15	Pass
23	Negative chopped impulse	154	3.3	23	Pass
24	Negative chopped impulse	154	3.2	24	Pass
25	Negative lightning impulse	134	/	25	Pass
26	Negative lightning impulse	136	/	26	Pass
27	Negative lightning impulse	136	/	27	Pass
28	Negative lightning impulse	140	/	28	Pass
29	Negative lightning impulse	139	/	29	Pass
30	Negative lightning impulse	139	/	30	Pass
21	Negative lightning impulse	139	/	21	Pass
32	Negative lightning impulse	138	/	32	Pass
33	Negative lightning impulse	138	/	33	Pass
34	Negative lightning impulse	138	/	34	Pass
35	Negative lightning impulse	139	/	35	Pass
24	Negative lightning impulse	138	/	24	Pass
37	Negative lightning impulse	139	/	37	Pass
38	Negative lightning impulse	138	/	38	Pass

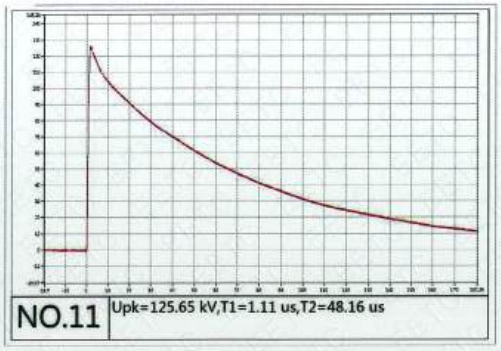
Classical test waveforms:



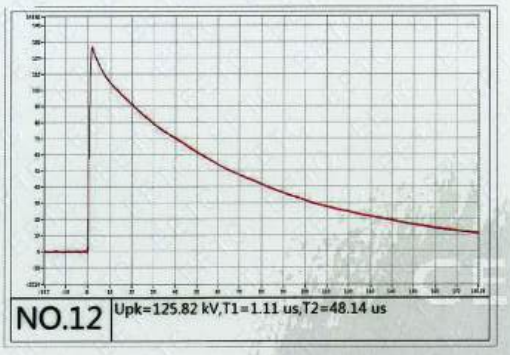




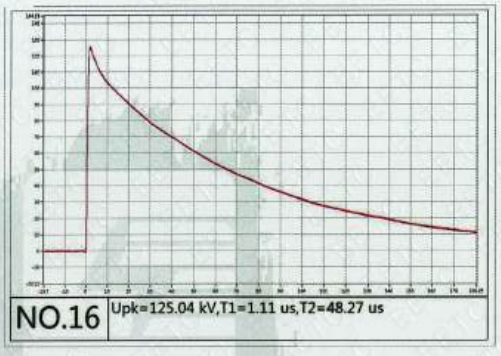
NO.07 Upk=125.45 kV,T1=1.11 us,T2=48.09 us



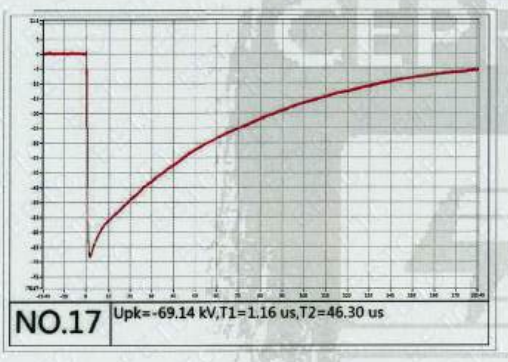
NO.11 Upk=125.65 kV,T1=1.11 us,T2=48.16 us



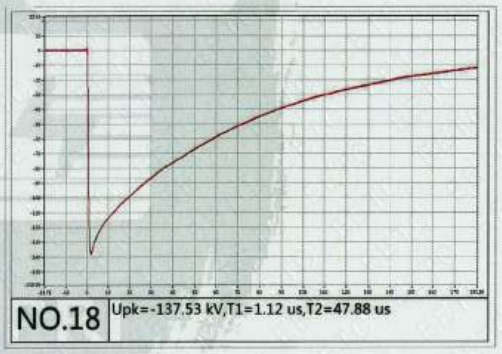
NO.12 Upk=125.82 kV,T1=1.11 us,T2=48.14 us



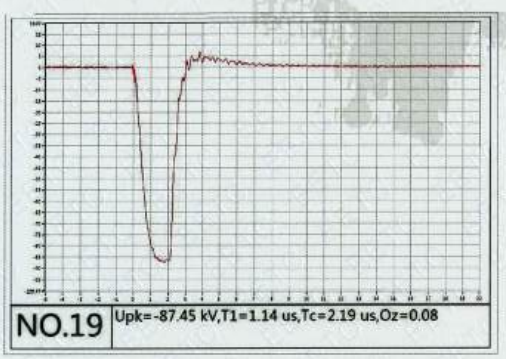
NO.16 Upk=125.04 kV,T1=1.11 us,T2=48.27 us



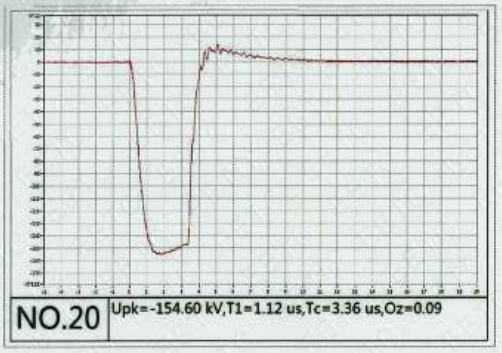
NO.17 Upk=-69.14 kV,T1=1.16 us,T2=46.30 us



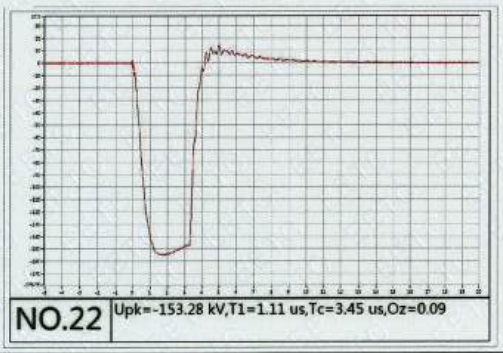
NO.18 Upk=-137.53 kV,T1=1.12 us,T2=47.88 us



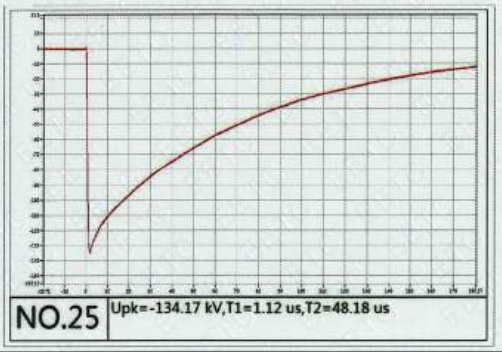
NO.19 Upk=-87.45 kV,T1=1.14 us,Tc=2.19 us,Oz=0.08



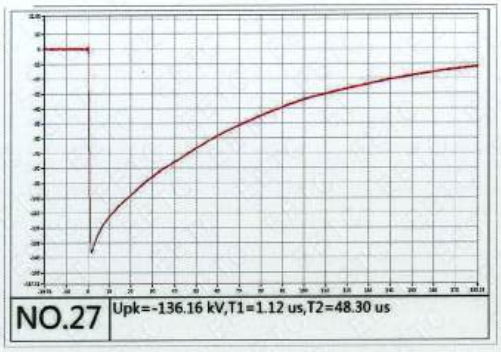
NO.20 Upk=-154.60 kV,T1=1.12 us,Tc=3.36 us,Oz=0.09

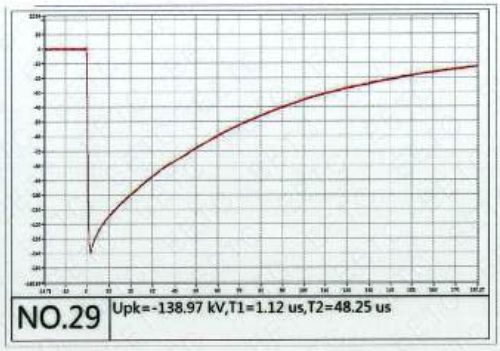


NO.22 Upk=-153.28 kV,T1=1.11 us,Tc=3.45 us,Oz=0.09



NO.25 Upk=-134.17 kV,T1=1.12 us,T2=48.18 us





6.3 Test result

The test object passed the tests.

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

7.1 Reference standard requirement

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

7.2 Data

Ambient temperature: 21℃ Relative humidity: 69%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.681	15.8
	15	0.692	15.9

7.3 Test result

The test object passed the tests.

8. Temperature rise test

8.1 Reference standard requirement

The test shall be carried out at I_r（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:

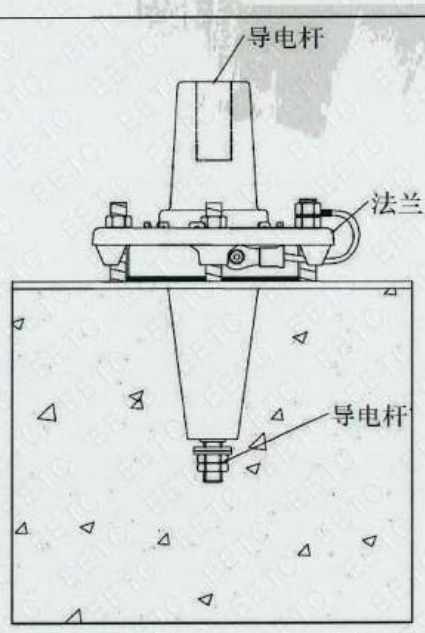
Terminals to be connected to exterior conductors by screws or bolts: 90K /120℃

Current carrying and non-current carrying metal parts in contact with insulation: 60K /90℃

8.2 Data

Test current：250A　　Ambient temperature: 23℃　　Relative humidity: 70%

Thermocouple No.	Location		Description of component	Temperature rise/temperature (K/℃)	Maximum temperature rise/temperature (K/℃)
1	External	Conductive rod	Terminals to be connected to exterior conductors by screws or bolts（Copper, non-coated）	32/55	60/90
2		Flange	Current carrying and non-current carrying metal parts in contact with insulation (Non-current carrying, 304 stainless steel)	23/46	90/120
3	Oil side	Conductive rod	Terminals to be connected to exterior conductors by screws or bolts（Copper, non-coated）	57/80	60/90



Name of measuring point/material

1、Conductive rod(External, copper, non-coated)
2、Flange (External, 304 stainless steel)
3、Conductive rod(Oil side, copper, non-coated)

8.3 Test result

The test object passed the tests.

9. Verification of thermal short-time current withstand

9.1 Reference standard requirement

According to clause 8.9 of GB/T 4109-2015 and IEC 60137:2017 "Verification of thermal short-time current withstand", the bushing shall be considered to be able to withstand the standard value of I_{th} if θ_f does not exceed 180℃.

9.2 Data

θ_0 (℃)	α	I_{th}(kA)	t_{th}(s)	S_t(cm²)	S_e(cm²)
97	0.8	4.5	2	1.11	1.95
$\theta_f = \theta_0 + \alpha \times I_{th}^2 \times t_{th} / (S_t \times S_e) = 112$ (℃)					

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/cm^2) 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.

9.3 Test result

The test object passed the tests.

10. Verification of dimensions

10.1 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.

10.2 Data

Ambient temperature: 19℃ Relative humidity: 73%

Test object	Item	Nominal value (mm)	Measured value (mm)
Resin	Creepage distance (External/Oil side)	—/84	66/92
	Arcing distance (External/Oil side)	—/84	61/86
	Total length	171	172
	Dimensions of parts for assembling and/or interconnection are in accordance with the relevant drawings		

10.3 Test result

The test object passed the tests.

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

11.1 Reference standard requirement

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

11.2 Data

Ambient temperature: 21℃ Relative humidity: 69%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.683	15.7
	15	0.691	15.9

11.3 Test result

The test object passed the tests.

12. Dry power-frequency voltage withstand test

12.1 Reference standard requirement

The withstand voltage of 61kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.

12.2 Data

Ambient temperature: 21℃ Relative humidity: 78% Ambient air pressure: 100.2kPa

Modality of application	Test voltage/Frequency/Duration
Between high voltage terminal and earth	61kV/50Hz/60s

12.3 Test result

The test object passed the tests.

13. Measurement of partial discharge quantity

13.1 Reference standard requirement

Pre-stress voltage: 61kV Test frequency: 50Hz

Test voltage: 24kV Permissible PD level: 10pC

Test voltage: 21kV Permissible PD level: 10pC

Test voltage: 15kV Permissible PD level: 5pC

13.2 Data

Ambient temperature: 21℃ Relative humidity: 78%

Pre-stress voltage (kV)	61		
Test voltage (kV)	24	21	15
PD level (pC)	4	3	3

13.3 Test 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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.

14.2 Data

Ambient temperature: 21℃ Relative humidity: 77%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.698	15.9
	15	0.710	16.0

14.3 Test result

The test object passed the tests.

15. Tests of tap insulation

15.1 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, $C_x \leqslant 10000$pF, *tanδ* $\leqslant 5\%$.

15.2 Data

Ambient temperature: 21℃ Relative humidity: 77%

Test voltage(kV)	Duration(s)	*tanδ* (%)	C_x(pF)
1	/	1.168	31.2
2	60	Voltage withstand test between test tap and earth, no flashover or puncture occurred.	
1	/	1.177	31.4

15.3 Test result

The test object passed the tests.

16. Tightness test at the flange or other fixing device

16.1 Reference standard requirement

For liquid-immersed bushings, the tank shall be filled with air or any suitable gas at a relative pressure of 0.15MPa±0.01MPa and maintained for 15min, or oil at a relative pressure of 0.15MPa±0.01MPa and maintained for 12h, there shall be no leakage.

16.2 Data

Ambient temperature: 21℃ Relative humidity: 61%

Test pressure（MPa）	Duration（min）	Result
0.15（SF_6）	15	No evidence of leakage

16.3 Test result

The test object passed the tests.

17. Visual inspection and dimensional check

17.1 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.

17.2 Data

Visual inspection	No surface defects were detected.
Dimensional check	In accordance with the relevant draws.

17.3 Test result

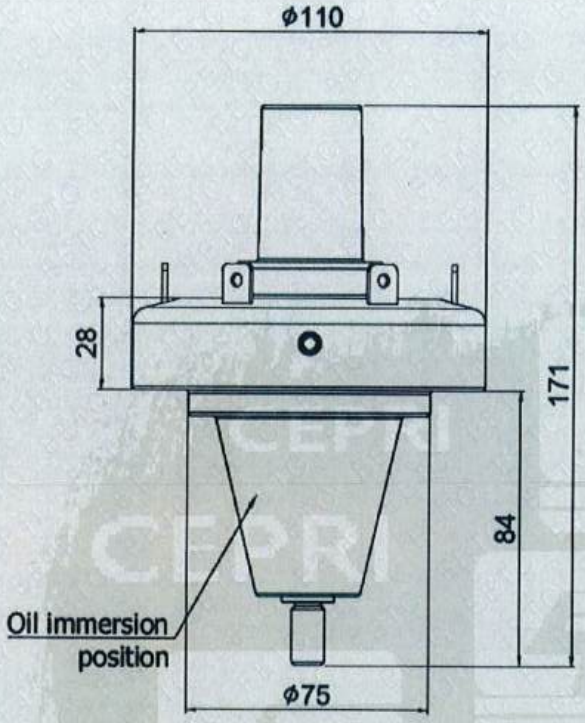
The test object passed the tests.

Appendix A Object Parameters

A.1 Parameters

Highest voltage for equipment(U_m)	24kV	Rated current(I_r)	250A
Altitude	≤1000m	Rated frequency	50Hz
Rated insulation level	24/61/125 kV	Rated short-time thermal current (r.m.s.)	4.5kA/2s
Insulating material	Casting resin	Temperature range	-40℃～40℃

A.2 Drawings



NO.	Item	Parameter	Unit	Remark
A	Height of connector	171	mm	
B	Width of connector	110	mm	
C	Oil immersion level	<84	mm	
D	Rated current	250	A	
E	Maximum Value of The Highest System Voltage (Um)	24	kV	
F	Environment temperature	-40~40		
G	Application Environment Altitude	≤1800	m	
Product Name	24kV 250A Resin insulated Bushing			
Product Model	24-DB250-3			
Manufacturer	ANHUI CHARDON ELECTRIC LTD.			

A.3 Photographs of test object

Name: 24kV 250A Resin-insulated Bushing
Part Number: 24-DIB250-3
Maximum Value of The Highest System Voltage: 24 kV
Rated Current: 250A
AC withstand: 61kV/1min
Lightning Impulse withstand: 125kV/BIL
Manufacturing Number: 2303011010
Date of Production: 2023 / 03 / 01
Manufacturer: ANHUI CHARDON ELECTRIC LTD.
Address: No.808 Taiji Avenue, Economic Development Zone, Guangde City, Anhui Province

A.4 Statement

A.4.1 The test object offered by the client is a new, clean 24kV 250A Resin-insulated Bushing(guide rod current-carrying structure), including mounting flange and all the other parts in normal operation. The test object is inserted-connected structure used with transformer/cable accessory.

A.4.2 The client declares that the straight-through current-carrying conductor is of copper and the sectional area is 153mm^2.

A.4.3 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 B Main Test 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	#2009 EETC09-1011	(50-500)kV	3	National Center for High Voltage Measurement	2024.03.23
3	Partial discharge detector	#20071203 EETC09-1046	0-500pC	10	National Center for High Voltage Measurement	2024.01.29
4	Standard capacitor	#12001 EETC09-1033	(10-550)kV	C:50pF±1pF tgδ:1×10^{-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	2024.10.26
6	Multi-channel thermometer	#TPV91986 EETC09-1024	（0-100）℃	±2℃	GRG Metrology & Test Co., Ltd.	2024.03.16
7	Weight indicator	#1610099647 EETC09-1052	(50-1000)kg	5	GRG Metrology & Test Co., Ltd.	2024.02.01
8	Digital conductivity meter	#722014072713 EETC09-1043	（50-150）μs/cm	±5%	GRG Metrology & Test Co., Ltd.	2024.02.01

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CEPRI

TEST REPORT

CEPRI-EETC09-2023-0816(E)

Client: ANHUI CHARDON ELECTRIC LTD.

Object: 36kV 400A Resin-insulated Bushing

Type: 36-DIB400-3

Test Category: Routine Tests /Type Tests

CHINA ELECTRIC POWER RESEARCH INSTITUTE

NOTICE

1. This report will enter into effect with seals of test center.
2. This report is legally made available accompany with tested, checked, verified and approved signatures.
3. Alter the report is invalid.
4. This report only takes responsibility to the test object.
5. Part of copy is invalid.
6. Any objections in the report should be posed within 15 days once the report is received.
7. The inspection and testing management system of China Electric Power Research Institute includes the following institutes:

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Power Industry Quality Inspection and Test Center for Electric Equipment

Power Industry Quality Inspection & Test Center for Electric Power Equipment and Instruments

Power Industry Quality Inspection & Test Center for Electrical Material and Components

Power Industry Quality Inspection & Test Center for Automation Equipment

Power Industry Quality Inspection & Test Center for Communication Equipment

Power Industry Quality Inspection & Test Center for Concrete Power and Communication Poles

Power System Electromagnetic Compatibility and Electromagnetic Environmental Research and Monitoring Center

Address: NO.143, Luoyu Road, Hongshan District, Wuhan City, Hubei Province, 430074.

Fax: 86-27-5937-8488 Service line: 027-59258069 Supervision hotline: 010-82813496

E-mail: eetc@epri.sgcc.com.cn Website: http://www.epri.sgcc.com.cn

Catalogue

Test Report	China Electric Power Research Institute		CEPRI-EETC09-2023-0816 (E) Total 20 Page 2
Client	ANHUI CHARDON ELECTRIC LTD.	Manufacturer	ANHUI CHARDON ELECTRIC LTD.
Object	36kV 400A Resin-insulated Bushing	Type	36-DIB400-3
Sampling procedure	By the Client	Serial No.	2303011010
Test Category	Routine Tests /Type Tests	Date	2023.04.10~2023.04.29
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 36-DIB400-3 36kV 400A Resin-insulated Bushing which was provided by ANHUI CHARDON ELECTRIC LTD. All the results were in accordance with the requirements.		
Note	/		

Tested by: 邬文亮 刘西超

Checked by: 肖忠明 **Verified by:** 刘勇

Approved by: 叶国雄 **Date of issue:** 2023-06-25

Test Results

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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.598% Cx: 12.9pF 22kV *tanδ*: 0.612% Cx: 12.9pF	Pass
2	Dry power-frequency voltage withstand test	The withstand voltage of 77kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.	77kV/50Hz /60s No flashover or puncture occurred.	Pass
3	Measurement of partial discharge quantity	Pre-stress voltage: 77kV/60s Test voltage: 36kV Permissible PD level: 10pC Test voltage: 31kV Permissible PD level: 10pC Test voltage: 22kV Permissible PD level: 5pC	Pre-stress voltage: 77kV/60s Test voltage: 36kV PD level: 4pC Test voltage: 31kV PD level: 4pC Test voltage: 22kV PD level: 3pC	Pass
4	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.601% Cx: 13.0pF 22kV *tanδ*: 0.617% Cx: 13.0pF	Pass
5	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, $C_x \leqslant 10000pF$, *tanδ*≤5%.	Test tap: 2kV/50Hz/60s No flashover or puncture occurred. Before the voltage withstand test 1kV *tanδ*: 1.238% Cx: 44.0pF After the voltage withstand test 1kV *tanδ*: 1.258% Cx: 44.0pF	Pass

No.	Item	Requirements	Results	Evaluation
		Type Tests		
6	Dry lightning impulse voltage withstand test	100% Rated lightning impulse: 170kV/+15 110% Rated lightning impulse: 187kV/-15 Waveform: 1.2/50μs 121% Rated chopped lightning impulse: 206kV/-5 Chopped time: (2～6)μs No flashover or puncture occurs.	Lightning impulse: 171kV～173kV +15 186kV～188kV -15 chopped lightning impulse 204kV～208kV -5 No flashover or puncture occurred. Note: The test object is inserted-connected structure used with transformer/cable accessory, without external insulation such as air.	Pass
7	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.612% Cx: 12.9pF 22kV *tanδ*: 0.623% Cx: 13.0pF	Pass
8	Temperature rise test	The test shall be carried out at I_r（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: 60K/90℃	Details are shown in content 8.	Pass
9	Verification of thermal short-time current withstand	The bushing shall be considered to be able to withstand the standard value of I_{th} if θ_f does not exceed 180℃.	The calculated final temperature of the conductor(θ_f): 125℃	Pass
10	Verification of dimensions	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.	Creepage distance(External/Oil side): 119/183 mm Arcing distance (External/Oil side): 109/179 mm Total length: 310mm The dimensions of the busing were in accordance with the relevant drawings.	Pass

No.	Item	Requirements	Results	Evaluation
		Routine tests		
11	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%..	10kV *tanδ*: 0.607% Cx: 12.9pF 22kV *tanδ*: 0.611% Cx: 12.9pF	Pass
12	Dry power-frequency voltage withstand test	The withstand voltage of 77kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.	77kV/50Hz/60s No flashover or puncture occurred.	Pass
13	Measurement of partial discharge quantity	Pre-stress voltage: 77kV/60s Test voltage: 36kV Permissible PD level: 10pC Test voltage: 31kV Permissible PD level: 10pC Test voltage: 22kV Permissible PD level: 5pC	Pre-stress voltage: 77kV/60s Test voltage: 36kV PD level: 5pC Test voltage: 31kV PD level: 4pC Test voltage: 22kV PD level: 3pC	Pass
14	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.588% Cx: 12.9pF 22kV *tanδ*: 0.597% Cx: 13.0pF	Pass
15	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≤10000pF, *tanδ*≤5%.	Test tap: 2kV/50Hz/60s No flashover or puncture occurred. Before the voltage withstand test 1kV *tanδ*: 1.247% Cx: 44.0pF After the voltage withstand test 1kV *tanδ*: 1.249% Cx: 44.1pF	Pass

No.	Item	Requirements	Results	Evaluation
16	Tightness test at the flange or other fixing device	For liquid-immersed bushings, the tank shall be filled with air or any suitable gas at a relative pressure of 0.15MPa±0.01MPa and maintained for 15min, or oil at a relative pressure of 0.15MPa±0.01MPa and maintained for 12h, there shall be no leakage.	Test pressure: 0.15MPa (SF_6) Duration: 15min No evidence of leakage.	Pass
17	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

(Blank below)

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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.

1.2 Data

Ambient temperature: 18℃ Relative humidity: 77%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.598	12.9
	22	0.612	12.9

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 77kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.

2.2 Data

Ambient temperature: 18℃ Relative humidity: 77% Ambient air pressure: 101.0kPa

Modality of application	Test voltage/Frequency/Duration
Between high voltage terminal and earth	77kV/50Hz/60s

2.3 Test result

The test object passed the tests.

3. Measurement of partial discharge quantity

3.1 Reference standard requirement

Pre-stress voltage: 77kV Test frequency: 50Hz

Test voltage: 36kV Permissible PD level: 10pC

Test voltage: 31kV Permissible PD level: 10pC

Test voltage: 22kV Permissible PD level: 5pC

3.2 Data

Ambient temperature: 18℃ Relative humidity: 77%

Pre-stress voltage (kV)	77		
Test voltage (kV)	36	31	22
PD level (pC)	4	4	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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.

4.2 Data

Ambient temperature: 19℃ Relative humidity: 68%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.601	13.0
	22	0.617	13.0

4.3 Test result

The test object passed the tests.

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, $C_x \leqslant 10000$pF, *tanδ*$\leqslant$5%.

5.2 Data

Ambient temperature: 18℃ Relative humidity: 77%

Test voltage(kV)	Duration(s)	*tanδ* (%)	C_x(pF)
1	/	1.238	44.0
2	60	Voltage withstand test between test tap and earth, no flashover or puncture occurred.	
1	/	1.258	44.0

5.3 Test result

The test object passed the tests.

6. Dry lightning impulse voltage withstand test

6.1 Reference standard requirement

The test object shall be subjected to 15 full lightning impulses of positive polarity at 170kV(peak value), 15 full lightning of negative polarity at 187kV, 5 chopped lightning impulses of negative polarity at 206kV (peak value).

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

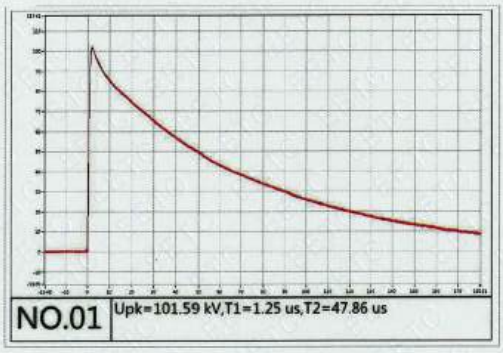
6.2 Data

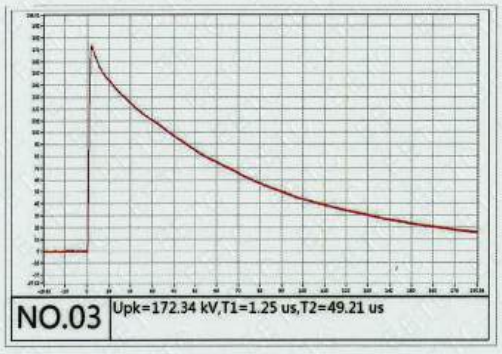
Ambient temperature:18℃ Relative humidity:77% Ambient air pressure: 101.0kPa

No.	Voltage polarity	Test voltage (peak) (kV)	Chopped time (μs)	Waveform No.	Result
1	Positive lightning impulse	102	/	1	Pass
2	Positive lightning impulse	171	/	2	Pass
3	Positive lightning impulse	172	/	3	Pass
4	Positive lightning impulse	171	/	4	Pass
5	Positive lightning impulse	171	/	5	Pass
6	Positive lightning impulse	172	/	6	Pass
7	Positive lightning impulse	172	/	7	Pass
8	Positive lightning impulse	171	/	8	Pass
9	Positive lightning impulse	172	/	9	Pass
10	Positive lightning impulse	172	/	10	Pass
11	Positive lightning impulse	173	/	11	Pass
12	Positive lightning impulse	172	/	12	Pass
13	Positive lightning impulse	172	/	13	Pass
14	Positive lightning impulse	172	/	14	Pass
15	Positive lightning impulse	171	/	15	Pass
16	Positive lightning impulse	172	/	16	Pass
17	Negative lightning impulse	116	/	17	Pass
18	Negative lightning impulse	186	/	18	Pass
19	Negative chopped impulse	130	2.7	19	Pass
20	Negative chopped impulse	207	3.3	20	Pass

No.	Voltage polarity	Test voltage (peak) (kV)	Chopped time (μs)	Waveform No.	Result
21	Negative chopped impulse	204	2.3	21	Pass
22	Negative chopped impulse	208	3.3	22	Pass
23	Negative chopped impulse	208	3.3	23	Pass
24	Negative chopped impulse	208	3.5	24	Pass
25	Negative lightning impulse	187	/	25	Pass
26	Negative lightning impulse	187	/	26	Pass
27	Negative lightning impulse	187	/	27	Pass
28	Negative lightning impulse	188	/	28	Pass
29	Negative lightning impulse	187	/	29	Pass
30	Negative lightning impulse	187	/	30	Pass
31	Negative lightning impulse	187	/	31	Pass
32	Negative lightning impulse	188	/	32	Pass
33	Negative lightning impulse	187	/	33	Pass
34	Negative lightning impulse	187	/	34	Pass
35	Negative lightning impulse	188	/	35	Pass
36	Negative lightning impulse	187	/	36	Pass
37	Negative lightning impulse	187	/	37	Pass
38	Negative lightning impulse	188	/	38	Pass

Classical test waveforms:

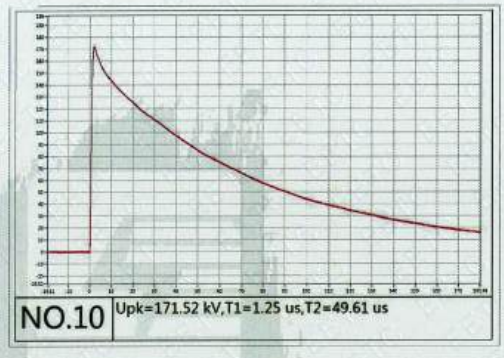




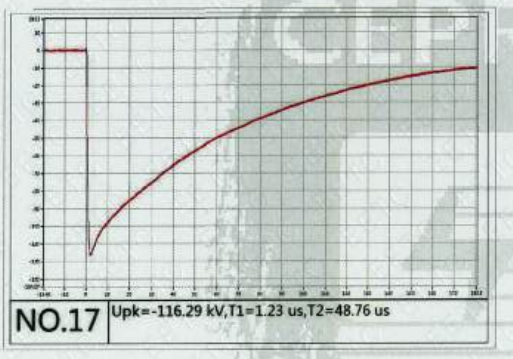
NO.05 Upk=171.29 kV,T1=1.25 us,T2=49.25 us

NO.07 Upk=171.83 kV,T1=1.25 us,T2=49.29 us

NO.09 Upk=171.95 kV,T1=1.25 us,T2=49.60 us

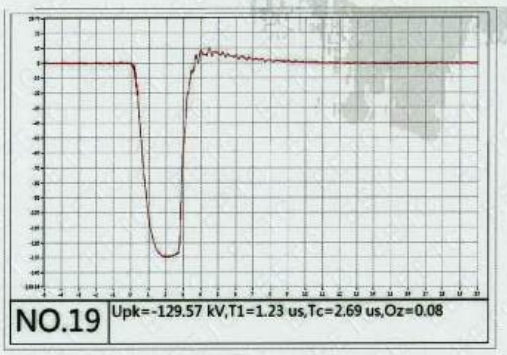


NO.10 Upk=171.52 kV,T1=1.25 us,T2=49.61 us

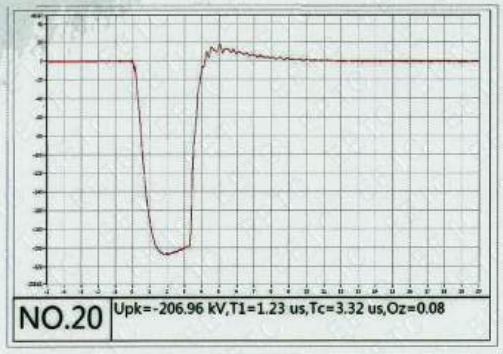


NO.17 Upk=-116.29 kV,T1=1.23 us,T2=48.76 us

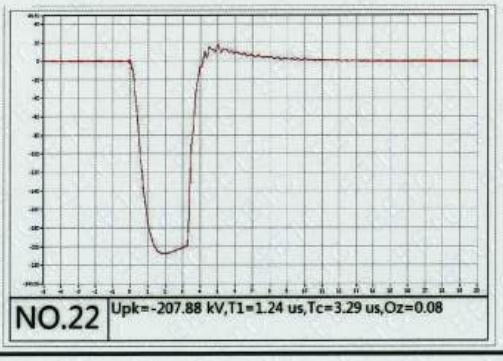
NO.18 Upk=-186.40 kV,T1=1.25 us,T2=49.28 us



NO.19 Upk=-129.57 kV,T1=1.23 us,Tc=2.69 us,Oz=0.08

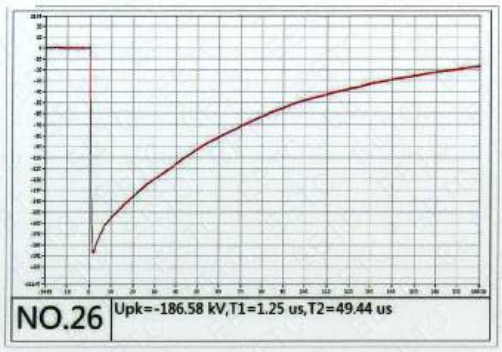


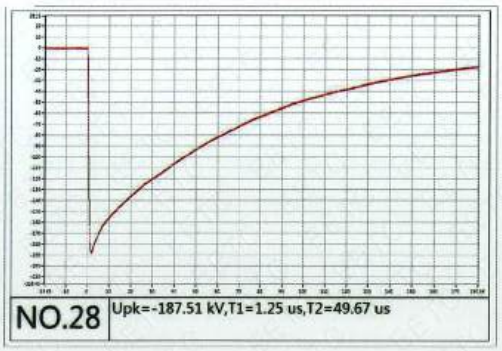
NO.20 Upk=-206.96 kV,T1=1.23 us,Tc=3.32 us,Oz=0.08

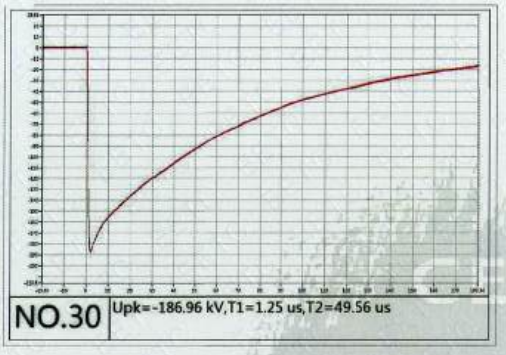


NO.22 Upk=-207.88 kV,T1=1.24 us,Tc=3.29 us,Oz=0.08

NO.25 Upk=-187.27 kV,T1=1.25 us,T2=49.47 us







6.3 Test result

The test object passed the tests.

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

7.1 Reference standard requirement

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

7.2 Data

Ambient temperature: 19℃ Relative humidity: 68%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.612	12.9
	22	0.623	13.0

7.3 Test result

The test object passed the tests.

8. Temperature rise test

8.1 Reference standard requirement

The test shall be carried out at I_r（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:

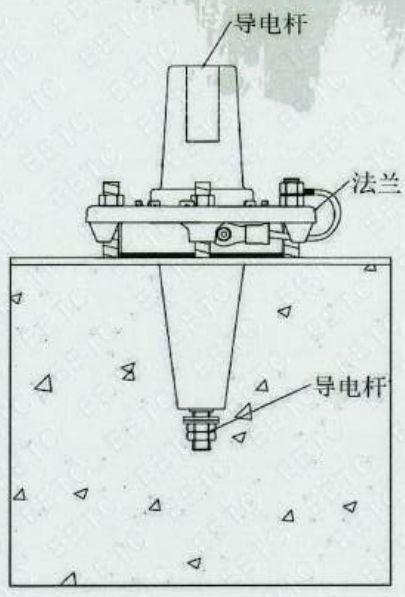
Terminals to be connected to exterior conductors by screws or bolts: 90K /120℃

Current carrying and non-current carrying metal parts in contact with insulation: 60K /90℃

8.2 Data

Test current：400A　　Ambient temperature: 23℃　　Relative humidity: 70%

Thermocouple No.	Location		Description of component	Temperature rise/temperature (K/℃)	Maximum temperature rise/temperature (K/℃)
1	External	Conductive rod	Terminals to be connected to exterior conductors by screws or bolts（Copper, non-coated）	43/66	60/90
2		Flange	Current carrying and non-current carrying metal parts in contact with insulation (Non-current carrying, 304 stainless steel)	25/48	90/120
3	Oil side	Conductive rod	Terminals to be connected to exterior conductors by screws or bolts（Copper, non-coated）	58/81	60/90



Name of measuring point/material

1、Conductive rod(External, copper, non-coated)

2、Flange(External, 304 stainless steel)

3、Conductive rod(Oil side, copper, non-coated)

8.3 Test result

The test object passed the tests.

9. Verification of thermal short-time current withstand

9.1 Reference standard requirement

According to clause 8.9 of GB/T 4109-2022 and IEC 60137:2017 "Verification of thermal short-time current withstand", the bushing shall be considered to be able to withstand the standard value of I_{th} if θ_f does not exceed 180℃.

9.2 Data

θ_0 (℃)	α	I_{th}(kA)	t_{th}(s)	S_t(cm²)	S_e(cm²)
98	0.8	7.1	2	1.5307	1.95
$\theta_f = \theta_0 + \alpha \times I_{th}^2 \times t_{th} / (S_t \times S_e)$ =125 (℃)					

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/cm$^{2)}$ 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.

9.3 Test result

The test object passed the tests.

10. Verification of dimensions

10.1 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.

10.2 Data

Ambient temperature: 19℃ Relative humidity: 73%

Test object	Item	Nominal value (mm)	Measured value (mm)
Resin	Creepage distance (External/Oil side)	—/177	119/183
	Arcing distance (External/Oil side)	—/177	109/179
	Total length	310	310
	Dimensions of parts for assembling and/or interconnection are in accordance with the relevant drawings		

10.3 Test result

The test object passed the tests.

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

11.1 Reference standard requirement

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

11.2 Data

Ambient temperature: 21℃ Relative humidity: 69%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.607	12.9
	22	0.611	12.9

11.3 Test result

The test object passed the tests.

12. Dry power-frequency voltage withstand test

12.1 Reference standard requirement

The withstand voltage of 77kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.

12.2 Data

Ambient temperature: 21℃ Relative humidity: 78% Ambient air pressure: 100. 2kPa

Modality of application	Test voltage/Frequency/Duration
Between high voltage terminal and earth	77kV/50Hz/60s

12.3 Test result

The test object passed the tests.

13. Measurement of partial discharge quantity

13.1 Reference standard requirement

Pre-stress voltage: 77kV Test frequency: 50Hz

Test voltage: 36kV Permissible PD level: 10pC

Test voltage: 31kV Permissible PD level: 10pC

Test voltage: 22kV Permissible PD level: 5pC

13.2 Data

Ambient temperature: 21℃ Relative humidity: 78%

Pre-stress voltage (kV)	77		
Test voltage (kV)	36	31	22
PD level (pC)	4	4	3

13.3 Test 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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.

14.2 Data

Ambient temperature: 21℃ Relative humidity: 78%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.588	12.9
	22	0.597	13.0

14.3 Test result

The test object passed the tests.

15. Tests of tap insulation

15.1 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, $C_x \leqslant 10000$pF, *tanδ*≤5%.

15.2 Data

Ambient temperature: 21℃ Relative humidity: 78%

Test voltage(kV)	Duration(s)	*tan δ* (%)	C_x(pF)
1	/	1.247	44.0
2	60	Voltage withstand test between test tap and earth, no flashover or puncture occurred.	
1	/	1.249	44.1

15.3 Test result

The test object passed the tests.

16. Tightness test at the flange or other fixing device

16.1 Reference standard requirement

For liquid-immersed bushings, the tank shall be filled with air or any suitable gas at a relative pressure of 0.15MPa±0.01MPa and maintained for 15min, or oil at a relative pressure of 0.15MPa±0.01MPa and maintained for 12h, there shall be no leakage.

16.2 Data

Ambient temperature: 21℃ Relative humidity: 77%

Test pressure（MPa）	Duration（min）	Result
0.15（SF_6）	15	No evidence of leakage

16.3 Test result

The test object passed the tests.

17. Visual inspection and dimensional check

17.1 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.

17.2 Data

Visual inspection	No surface defects were detected.
Dimensional check	In accordance with the relevant draws.

17.3 Test result

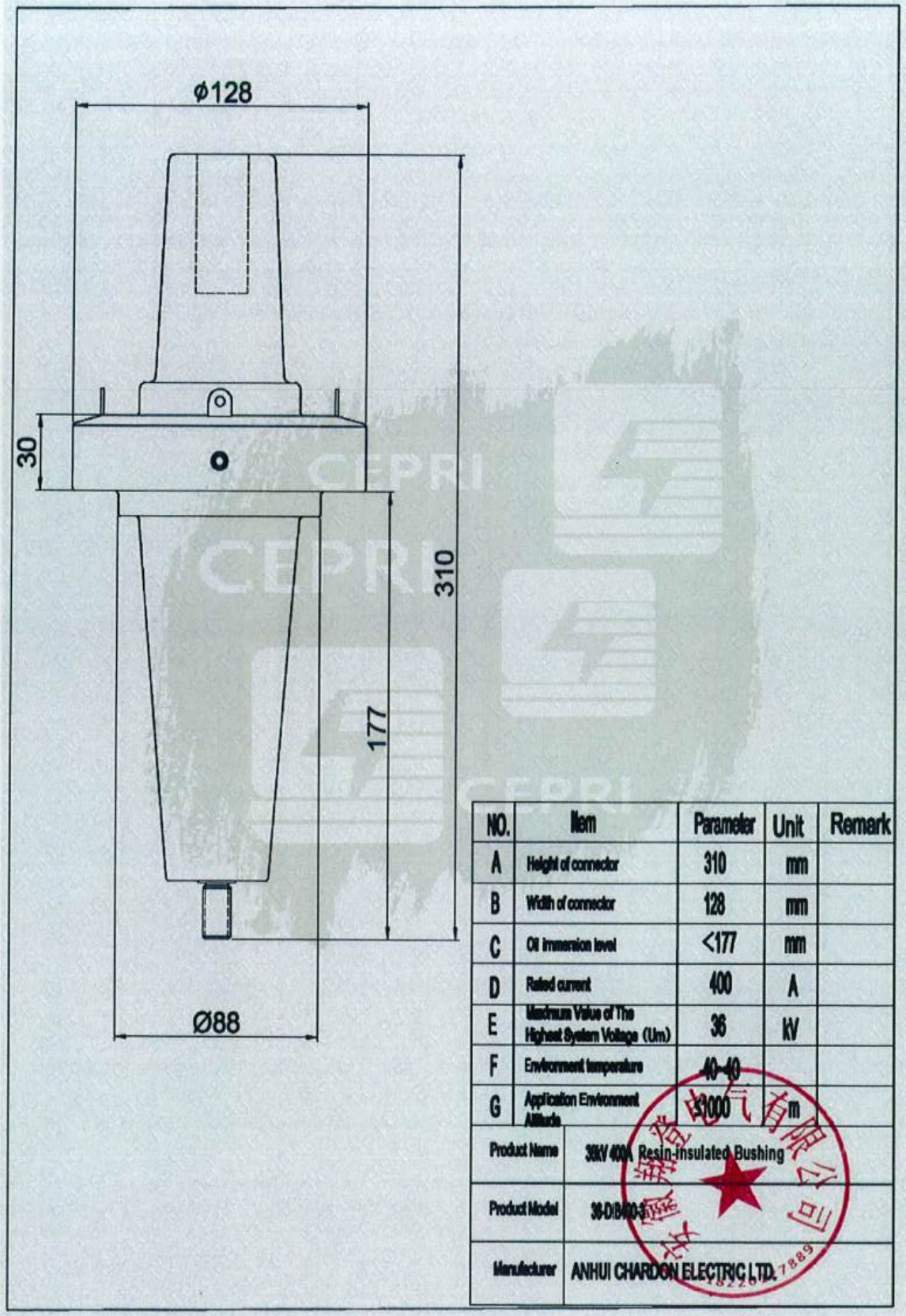
The test object passed the tests.

Appendix A Object Parameters

A.1 Parameters

Highest voltage for equipment(U_m)	36kV	Rated current(I_r)	400A
Altitude	≤1000m	Rated frequency	50Hz
Rated insulation level	36/77/170 kV	Rated short-time thermal current (r.m.s.)	7.1kA/2s
Insulating material	Casting resin	Temperature range	-40℃～40℃

A.2 Drawings



NO.	Item	Parameter	Unit	Remark
A	Height of connector	310	mm	
B	Width of connector	128	mm	
C	Oil immersion level	<177	mm	
D	Rated current	400	A	
E	Maximum Value of The Highest System Voltage (Um)	36	kV	
F	Environment temperature	-40~40		
G	Application Environment Altitude	≤1000	m	
Product Name	36kV 400A Resin-insulated Bushing			
Product Model	36/D400-3			
Manufacturer	ANHUI CHARDON ELECTRIC LTD.			

A.3 Photographs of test object

Name: 36kV 400A Resin-insulated Bushing
Part Number: 36-DIB400-3
Maximum Value of The Highest System Voltage: 36 kV
Rated Current: 400A
AC withstand: 77kV/1min
Lightning Impulse withstand: 170kV/BIL
Manufacturing Number: 2303011010
Date of Production: 2023 / 03 / 01
Manufacturer: ANHUI CHARDON ELECTRIC LTD.
Address: No.808 Taiji Avenue, Economic Development Zone, Guangde City, Anhui Province

A.4 Statement

A.4.1 The test object offered by the client is a new, clean 36kV 400A Resin-insulated Bushing(guide rod current-carrying structure), including mounting flange and all the other parts in normal operation. The test object is inserted-connected structure used with transformer/cable accessory.

A.4.2 The client declares that the straight-through current-carrying conductor is of copper and the minimum sectional area is 153mm^2.

A.4.3 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 B Main Test 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	2024.03.23
3	Partial discharge detector	#20071203 EETC09-1046	0-500pC	10	National Center for High Voltage Measurement	2024.01.29
4	Standard capacitor	#12001 EETC09-1033	(10-550)kV	C:50pF±1pF tgδ:1×10^{-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	2024.10.26
6	Multi-channel thermometer	#TPV91986 EETC09-1024	（0-100）℃	±2℃	GRG Metrology & Test Co., Ltd.	2024.03.16
7	Weight indicator	#1610099647 EETC09-1052	(50-1000)kg	5	GRG Metrology & Test Co., Ltd.	2024.02.01
8	Digital conductivity meter	#722014072713 EETC09-1043	（50-150）μs/cm	±5%	GRG Metrology & Test Co., Ltd.	2024.02.01

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检测
TESTING
CNAS L0699

CEPRI

TEST REPORT

CEPRI-EETC09-2023-0815(E)

Client: ANHUI CHARDON ELECTRIC LTD.

Object: 36kV 630A Resin-insulated Bushing

Type: 36-DIB630-1

Test Category: Routine Tests /Type Tests

EETC

CHINA ELECTRIC POWER RESEARCH INSTITUTE

NOTICE

1. This report will enter into effect with seals of test center.
2. This report is legally made available accompany with tested, checked, verified and approved signatures.
3. Alter the report is invalid.
4. This report only takes responsibility to the test object.
5. Part of copy is invalid.
6. Any objections in the report should be posed within 15 days once the report is received.
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Power Industry Quality Inspection and Test Center for Electric Equipment

Power Industry Quality Inspection & Test Center for Electric Power Equipment and Instruments

Power Industry Quality Inspection & Test Center for Electrical Material and Components

Power Industry Quality Inspection & Test Center for Automation Equipment

Power Industry Quality Inspection & Test Center for Communication Equipment

Power Industry Quality Inspection & Test Center for Concrete Power and Communication Poles

Power System Electromagnetic Compatibility and Electromagnetic Environmental Research and Monitoring Center

Address: NO.143, Luoyu Road, Hongshan District, Wuhan City, Hubei Province, 430074.

Fax: 86-27-5937-8488 Service line: 027-59258069 Supervision hotline: 010-82813496

E-mail: eetc@epri.sgcc.com.cn Website: http://www.epri.sgcc.com.cn

Catalogue

Test Report	China Electric Power Research Institute		CEPRI-EETC09-2023-0815 (E) Total 20 Page 2
Client	ANHUI CHARDON ELECTRIC LTD.	Manufacturer	ANHUI CHARDON ELECTRIC LTD.
Object	36kV 630A Resin-insulated Bushing	Type	36-DIB630-1
Sampling procedure	By the Client	Serial No.	2303011010
Test Category	Routine Tests /Type Tests	Date	2023.04.10~2023.04.29
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 36-DIB630-1 36kV 630A Resin-insulated Bushing which was provided by ANHUI CHARDON ELECTRIC LTD. All the results were in accordance with the requirements.		
Note	/		

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Checked by: 肖忠明 **Verified by:** 刘勇

Approved by: 叶国雄 **Date of issue:** 2023-06-25

Test Results

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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tan δ*: 0.378% Cx: 16.6pF 22kV *tan δ*: 0.387% Cx: 16.7pF	Pass
2	Dry power-frequency voltage withstand test	The withstand voltage of 77kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.	77kV/50Hz/60s No flashover or puncture occurred.	Pass
3	Measurement of partial discharge quantity	Pre-stress voltage: 77kV/60s Test voltage: 36kV Permissible PD level: 10pC Test voltage: 31kV Permissible PD level: 10pC Test voltage: 22kV Permissible PD level: 5pC	Pre-stress voltage: 77kV/60s Test voltage: 36kV PD level: 5pC Test voltage: 31kV PD level: 4pC Test voltage: 22kV PD level: 3pC	Pass
4	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.381% Cx: 16.6pF 22kV *tanδ*: 0.388% Cx: 16.8pF	Pass
5	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, $C_x \leqslant 10000$ pF, *tanδ*≤5%.	Test tap: 2kV/50Hz/60s No flashover or puncture occurred. Before the voltage withstand test 1kV *tanδ*: 0.689% Cx: 44.1pF After the voltage withstand test 1kV *tanδ*: 0.698% Cx: 44.1pF	Pass

No.	Item	Requirements	Results	Evaluation
		Type Tests		
6	Dry lightning impulse voltage withstand test	100% Rated lightning impulse: 170kV/+15 110% Rated lightning impulse: 187kV/-15 Waveform: 1.2/50μs 121% Rated chopped lightning impulse: 206kV/-5 Chopped time: (2～6)μs No flashover or puncture occurs.	Lightning impulse: 170kV～173kV +15 186kV～188kV -15 chopped lightning impulse 205kV～207kV -5 No flashover or puncture occurred. Note: The test object is inserted-connected structure used with transformer/cable accessory, without external insulation such as air.	Pass
7	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.374% Cx: 16.6pF 22kV *tanδ*: 0.387% Cx: 16.8pF	Pass
8	Temperature rise test	The test shall be carried out at I_r（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: 60K/90℃	Details are shown in content 8.	Pass
9	Verification of thermal short-time current withstand	The bushing shall be considered to be able to withstand the standard value of I_{th} if θ_f does not exceed 180℃.	The calculated final temperature of the conductor(θ_f): 129℃	Pass
10	Verification of dimensions	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.	Creepage distance(External/Oil side): 117/274 mm Arcing distance (External/Oil side): 103/267 mm Total length: 399mm The dimensions of the busing were in accordance with the relevant drawings.	Pass

No.	Item	Requirements	Results	Evaluation
		Routine tests		
11	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%..	10kV *tanδ*: 0.373% Cx: 16.5pF 22kV *tanδ*: 0.381% Cx: 16.7pF	Pass
12	Dry power-frequency voltage withstand test	The withstand voltage of 77kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.	77kV/50Hz/60s No flashover or puncture occurred.	Pass
13	Measurement of partial discharge quantity	Pre-stress voltage: 77kV/60s Test voltage: 36kV Permissible PD level: 10pC Test voltage: 31kV Permissible PD level: 10pC Test voltage: 22kV Permissible PD level: 5pC	Pre-stress voltage: 77kV/60s Test voltage: 36kV PD level: 5pC Test voltage: 31kV PD level: 4pC Test voltage: 22kV PD level: 3pC	Pass
14	Measurement of dielectric dissipation factor(*tanδ*) and capacitance at ambient temperature	The measured *tanδ* at the test voltage of 10kV, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.	10kV *tanδ*: 0.387% Cx: 16.7pF 22kV *tanδ*: 0.393% Cx: 16.9pF	Pass
15	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≤10000pF, *tanδ*≤5%.	Test tap: 2kV/50Hz/60s No flashover or puncture occurred. Before the voltage withstand test 1kV *tanδ*: 0.697% Cx: 44.1pF After the voltage withstand test 1kV *tanδ*: 0.699% Cx: 44.2pF	Pass

No.	Item	Requirements	Results	Evaluation
16	Tightness test at the flange or other fixing device	For liquid-immersed bushings, the tank shall be filled with air or any suitable gas at a relative pressure of 0.15MPa±0.01MPa and maintained for 15min, or oil at a relative pressure of 0.15MPa±0.01MPa and maintained for 12h, there shall be no leakage.	Test pressure: 0.15MPa (SF_6) Duration: 15 min No evidence of leakage.	Pass
17	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

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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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.

1.2 Data

Ambient temperature:18℃ Relative humidity:77%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.378	16.6
	22	0.387	16.7

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 77kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.

2.2 Data

Ambient temperature: 18℃ Relative humidity: 77% Ambient air pressure: 101.0kPa

Modality of application	Test voltage/Frequency/Duration
Between high voltage terminal and earth	77kV/50Hz/60s

2.3 Test result

The test object passed the tests.

3. Measurement of partial discharge quantity

3.1 Reference standard requirement

Pre-stress voltage: 77kV Test frequency: 50Hz

Test voltage: 36kV Permissible PD level: 10pC

Test voltage: 31kV Permissible PD level: 10pC

Test voltage: 22kV Permissible PD level: 5pC

3.2 Data

Ambient temperature: 18℃ Relative humidity: 77%

Pre-stress voltage (kV)	77		
Test voltage (kV)	36	31	22
PD level (pC)	5	4	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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.

4.2 Data

Ambient temperature: 19℃ Relative humidity: 68%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.381	16.6
	22	0.388	16.8

4.3 Test result

The test object passed the tests.

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, $C_x \leqslant 10000$pF, *tanδ*$\leqslant$5%.

5.2 Data

Ambient temperature: 18℃ Relative humidity: 77%

Test voltage(kV)	Duration(s)	*tanδ* (%)	C_x(pF)
1	/	0.689	44.1
2	60	Voltage withstand test between test tap and earth, no flashover or puncture occurred.	
1	/	0.698	44.1

5.3 Test result

The test object passed the tests.

6. Dry lightning impulse voltage withstand test

6.1 Reference standard requirement

The test object shall be subjected to 15 full lightning impulses of positive polarity at 170kV(peak value), 15 full lightning of negative polarity at 187kV, 5 chopped lightning impulses of negative polarity at 206kV (peak value).

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

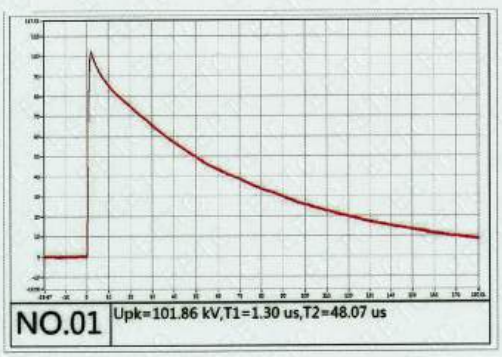
6.2 Data

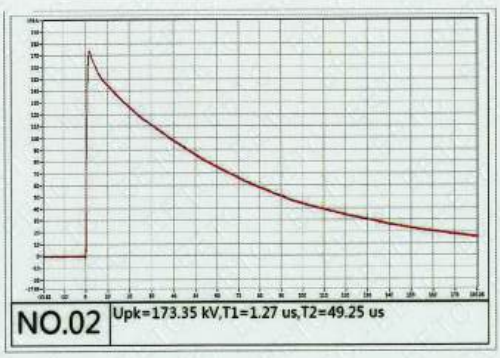
Ambient temperature:18℃ Relative humidity:77% Ambient air pressure: 101.0kPa

No.	Voltage polarity	Test voltage (peak) (kV)	Chopped time (μs)	Waveform No.	Result
1	Positive lightning impulse	102	/	1	Pass
2	Positive lightning impulse	173	/	2	Pass
3	Positive lightning impulse	172	/	3	Pass
4	Positive lightning impulse	170	/	4	Pass
5	Positive lightning impulse	170	/	5	Pass
6	Positive lightning impulse	171	/	6	Pass
7	Positive lightning impulse	171	/	7	Pass
8	Positive lightning impulse	171	/	8	Pass
9	Positive lightning impulse	171	/	9	Pass
10	Positive lightning impulse	172	/	10	Pass
11	Positive lightning impulse	171	/	11	Pass
12	Positive lightning impulse	171	/	12	Pass
13	Positive lightning impulse	171	/	13	Pass
14	Positive lightning impulse	171	/	14	Pass
15	Positive lightning impulse	172	/	15	Pass
16	Positive lightning impulse	173	/	16	Pass
17	Negative lightning impulse	116	/	17	Pass
18	Negative lightning impulse	186	/	18	Pass
19	Negative chopped impulse	130	3.4	19	Pass
20	Negative chopped impulse	206	3.3	20	Pass

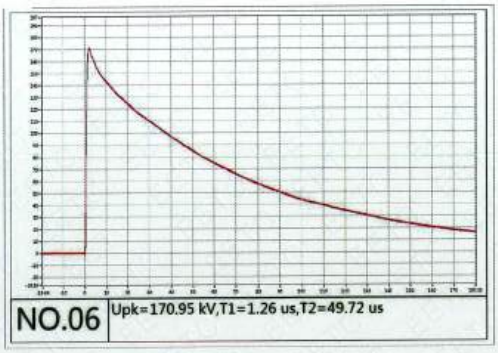
No.	Voltage polarity	Test voltage (peak) (kV)	Chopped time (μs)	Waveform No.	Result
21	Negative chopped impulse	206	3.3	21	Pass
22	Negative chopped impulse	206	3.3	22	Pass
23	Negative chopped impulse	207	3.4	23	Pass
24	Negative chopped impulse	205	3.4	24	Pass
25	Negative lightning impulse	187	/	25	Pass
26	Negative lightning impulse	187	/	26	Pass
27	Negative lightning impulse	187	/	27	Pass
28	Negative lightning impulse	187	/	28	Pass
29	Negative lightning impulse	187	/	29	Pass
30	Negative lightning impulse	188	/	30	Pass
31	Negative lightning impulse	188	/	31	Pass
32	Negative lightning impulse	188	/	32	Pass
33	Negative lightning impulse	188	/	33	Pass
34	Negative lightning impulse	187	/	34	Pass
35	Negative lightning impulse	188	/	35	Pass
36	Negative lightning impulse	188	/	36	Pass
37	Negative lightning impulse	187	/	37	Pass
38	Negative lightning impulse	188	/	38	Pass

Classical test waveforms:

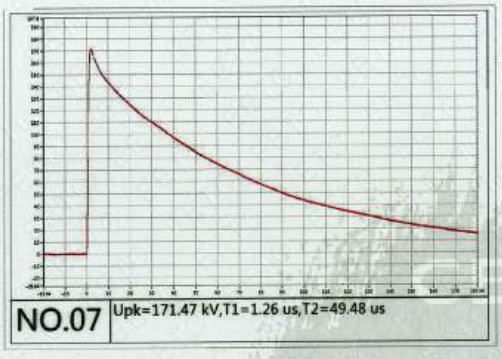




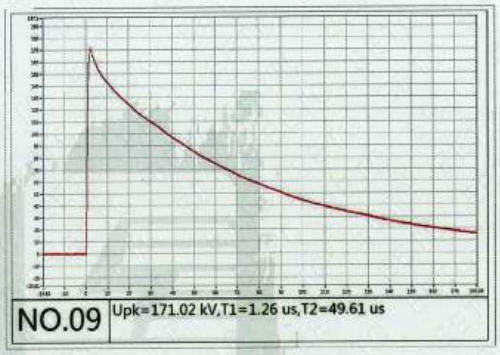
NO.05 Upk=169.61 kV,T1=1.26 us,T2=49.58 us



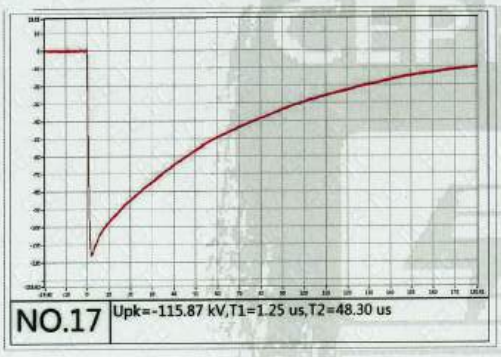
NO.06 Upk=170.95 kV,T1=1.26 us,T2=49.72 us



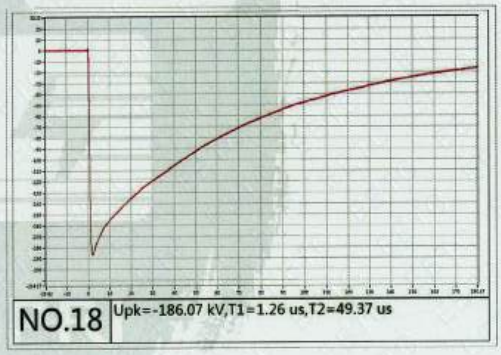
NO.07 Upk=171.47 kV,T1=1.26 us,T2=49.48 us



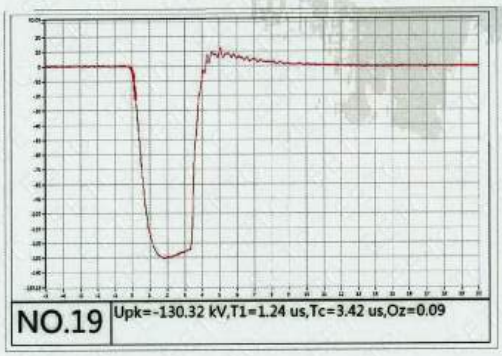
NO.09 Upk=171.02 kV,T1=1.26 us,T2=49.61 us



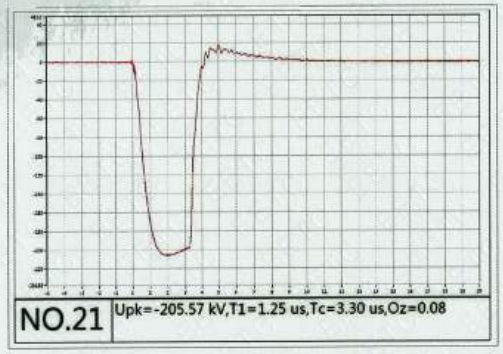
NO.17 Upk=-115.87 kV,T1=1.25 us,T2=48.30 us



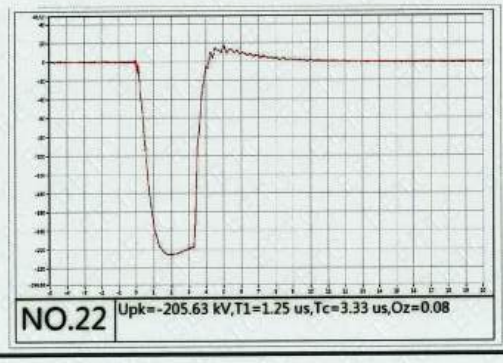
NO.18 Upk=-186.07 kV,T1=1.26 us,T2=49.37 us



NO.19 Upk=-130.32 kV,T1=1.24 us,Tc=3.42 us,Oz=0.09

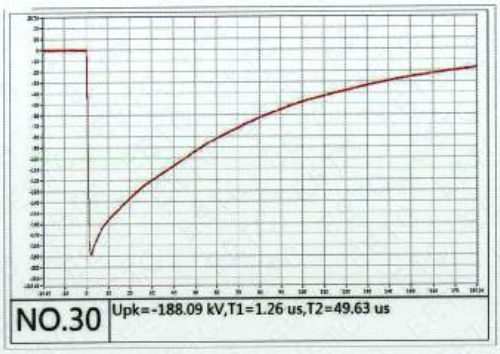


NO.21 Upk=-205.57 kV,T1=1.25 us,Tc=3.30 us,Oz=0.08



NO.22 Upk=-205.63 kV,T1=1.25 us,Tc=3.33 us,Oz=0.08

NO.28 Upk=-187.46 kV,T1=1.26 us,T2=49.51 us



6.3 Test result

The test object passed the tests.

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

7.1 Reference standard requirement

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

7.2 Data

Ambient temperature: 21℃ Relative humidity: 69%

Modality of application	Test voltage(kV)	*tanδ*（%）	C_x(pF)
Between high voltage terminal and test tap	10	0.374	16.6
	22	0.387	16.8

7.3 Test result

The test object passed the tests.

8. Temperature rise test

8.1 Reference standard requirement

The test shall be carried out at I_r（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:

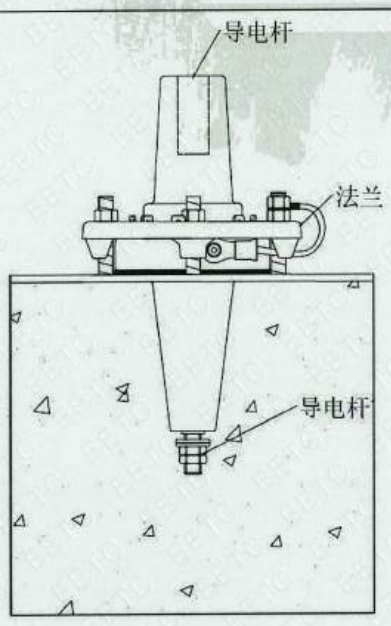
Terminals to be connected to exterior conductors by screws or bolts: 90K /120℃

Current carrying and non-current carrying metal parts in contact with insulation: 60K /90℃

8.2 Data

Test current: 630A　　Ambient temperature: 23℃　　Relative humidity: 70%

Thermocouple No.	Location		Description of component	Temperature rise/temperature (K/℃)	Maximum temperature rise/temperature (K/℃)
1	External	Conductive rod	Terminals to be connected to exterior conductors by screws or bolts（Copper, non-coated）	46/69	60/90
2		Flange	Current carrying and non-current carrying metal parts in contact with insulation (Non-current carrying, 304 stainless steel)	26/49	90/120
3	Oil side	Conductive rod	Terminals to be connected to exterior conductors by screws or bolts（Copper, non-coated）	59/82	60/90



Name of measuring point/material

1、Conductive rod (External, copper, non-coated)

2、Flange (External, 304 stainless steel)

3、Conductive rod (Oil side, copper, non-coated)

8.3 Test result

The test object passed the tests.

9. Verification of thermal short-time current withstand

9.1 Reference standard requirement

According to clause 8.9 of GB/T 4109-2022 and IEC 60137:2017 "Verification of thermal short-time current withstand", the bushing shall be considered to be able to withstand the standard value of I_{th} if θ_f does not exceed 180℃.

9.2 Data

θ_0 (℃)	α	I_{th}(kA)	t_{th}(s)	S_t(cm²)	S_e(cm²)
99	0.8	11.2	2	1.7898	3.72
$\theta_f = \theta_0 + \alpha \times I_{th}^2 \times t_{th} / (S_t \times S_e)$ =129 (℃)					

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/cm$^{2)}$ 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.

9.3 Test result

The test object passed the tests.

10. Verification of dimensions

10.1 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.

10.2 Data

Ambient temperature: 19℃ Relative humidity: 73%

Test object	Item	Nominal value (mm)	Measured value (mm)
Resin	Creepage distance (External/Oil side)	—/177	119/183
	Arcing distance (External/Oil side)	—/177	109/179
	Total length	310	310
	Dimensions of parts for assembling and/or interconnection are in accordance with the relevant drawings		

10.3 Test result

The test object passed the tests.

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

11.1 Reference standard requirement

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

11.2 Data

Ambient temperature: 21℃ Relative humidity: 69%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.373	16.5
	22	0.381	16.7

11.3 Test result

The test object passed the tests.

12. Dry power-frequency voltage withstand test

12.1 Reference standard requirement

The withstand voltage of 77kV is applied for 60s between the high voltage terminal of bushing and earth. No flashover or puncture occurs.

12.2 Data

Ambient temperature: 21℃ Relative humidity: 78% Ambient air pressure: 100.2kPa

Modality of application	Test voltage/Frequency/Duration
Between high voltage terminal and earth	77kV/50Hz/60s

12.3 Test result

The test object passed the tests.

13. Measurement of partial discharge quantity

13.1 Reference standard requirement

Pre-stress voltage: 77kV Test frequency: 50Hz

Test voltage: 36kV Permissible PD level: 10pC

Test voltage: 31kV Permissible PD level: 10pC

Test voltage: 22kV Permissible PD level: 5pC

13.2 Data

Ambient temperature: 21℃ Relative humidity: 78%

Pre-stress voltage (kV)	77		
Test voltage (kV)	36	31	22
PD level (pC)	5	4	3

13.3 Test 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, $1.05U_m/\sqrt{3}$ and U_m shall not exceed 0.7%.

14.2 Data

Ambient temperature: 21℃ Relative humidity: 77%

Modality of application	Test voltage(kV)	*tanδ* (%)	C_x(pF)
Between high voltage terminal and test tap	10	0.387	16.7
	22	0.393	16.9

14.3 Test result

The test object passed the tests.

15. Tests of tap insulation

15.1 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, $C_x \leqslant 10000$pF, *tanδ*$\leqslant$5%.

15.2 Data

Ambient temperature: 21℃ Relative humidity: 77%

Test voltage(kV)	Duration(s)	*tan δ* (%)	C_x(pF)
1	/	0.697	44.1
2	60	Voltage withstand test between test tap and earth, no flashover or puncture occurred.	
1	/	0.699	44.2

15.3 Test result

The test object passed the tests.

16. Tightness test at the flange or other fixing device

16.1 Reference standard requirement

For liquid-immersed bushings, the tank shall be filled with air or any suitable gas at a relative pressure of 0.15MPa±0.01MPa and maintained for 15 min, or oil at a relative pressure of 0.15MPa±0.01MPa and maintained for 12h, there shall be no leakage.

16.2 Data

Ambient temperature: 21℃ Relative humidity: 77%

Test pressure（MPa）	Duration（min）	Result
0.15（SF_6）	15	No evidence of leakage

16.3 Test result

The test object passed the tests.

17. Visual inspection and dimensional check

17.1 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.

17.2 Data

Visual inspection	No surface defects were detected.
Dimensional check	In accordance with the relevant draws.

17.3 Test result

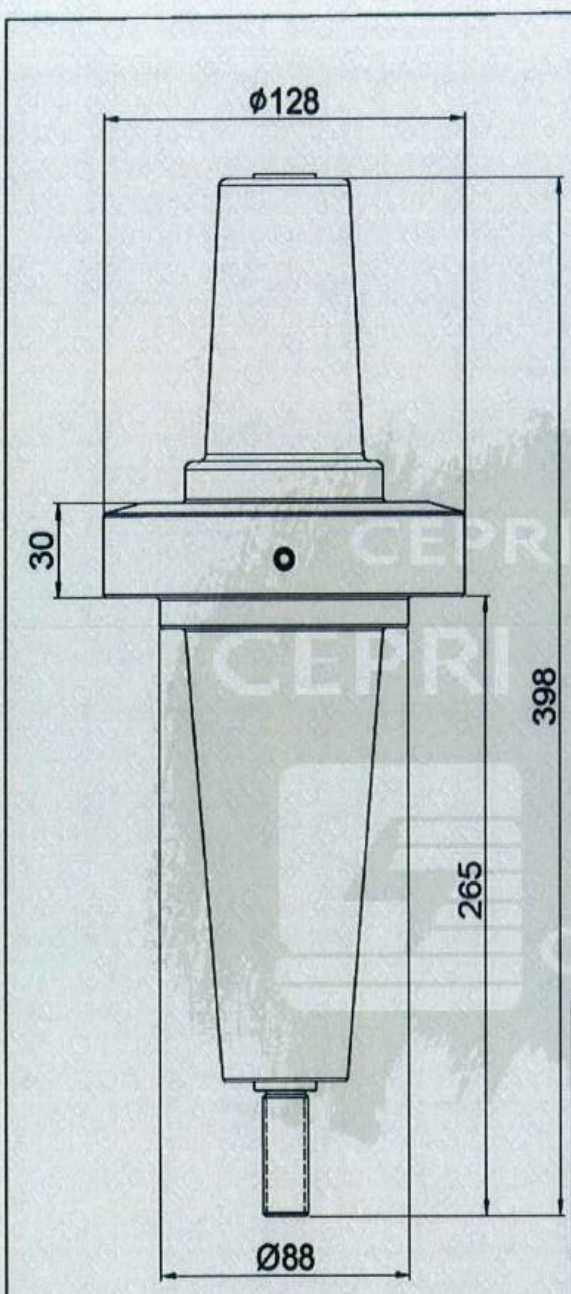
The test object passed the tests.

Appendix A Object Parameters

A.1 Parameters

Highest voltage for equipment(U_m)	36kV	Rated current(I_r)	630A
Altitude	≤1000m	Rated frequency	50Hz
Rated insulation level	36/77/170 kV	Rated short-time thermal current (r.m.s.)	11.2kA/2s
Insulating material	Casting resin	Temperature range	-40℃～40℃

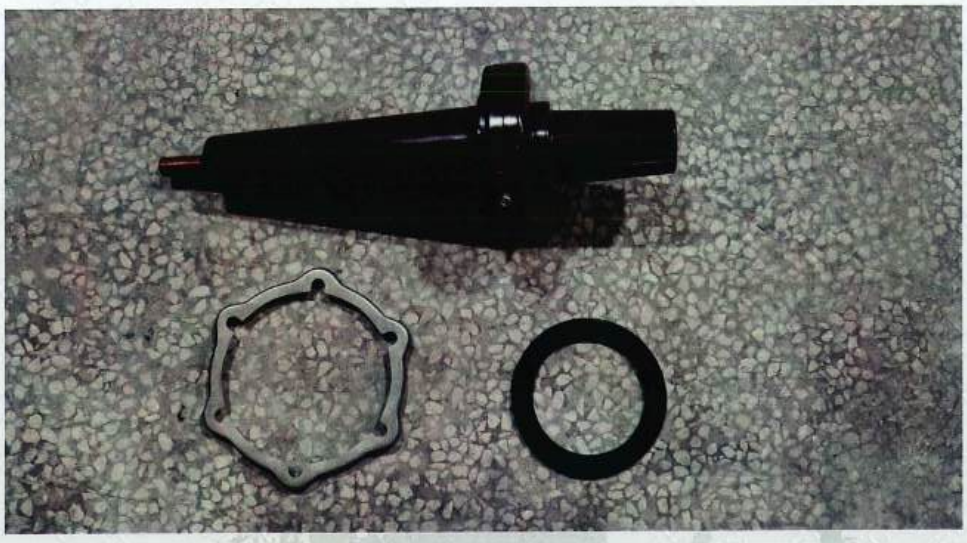
A.2 Drawings



NO.	Item	Parameter	Unit	Remark
A	Height of connector	398	mm	
B	Width of connector	128	mm	
C	Oil immersion level	<265	mm	
D	Rated current	630	A	
E	Maximum Value of The Highest System Voltage (Um)	36	kV	
F	Environment temperature	-40~40		
G	Application Environment Altitude	≤1000	m	

Product Name	36kV 630A Resin-insulated Bushing
Product Model	36-DBB630-[illegible]
Manufacturer	ANHUI CHARBON ELECTRIC LTD.

A.3 Photographs of test object



Name: 36kV 630A Resin-insulated Bushing
Part Number: 36-DIB630-1
Maximum Value of The Highest System Voltage: 36 kV
Rated Current: 630A
AC withstand: 77kV/1min
Lightning Impulse withstand: 170kV/BIL
Manufacturing Number: 2303011010
Date of Production: 2023 / 03 / 01
Manufacturer: ANHUI CHARDON ELECTRIC LTD.
Address: No.808 Taiji Avenue, Economic Development Zone, Guangde City, Anhui Province

A.4 Statement

A.4.1 The test object offered by the client is a new, clean 36kV 630A Resin-insulated Bushing(guide rod current-carrying structure), including mounting flange and all the other parts in normal operation. The test object is inserted-connected structure used with transformer/cable accessory.

A.4.2 The client declares that the guide rod current-carrying conductor is of copper and the minimum sectional area is 179mm^2.

A.4.3 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 B Main Test 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	2024.03.23
3	Partial discharge detector	#20071203 EETC09-1046	0-500pC	10	National Center for High Voltage Measurement	2024.01.29
4	Standard capacitor	#12001 EETC09-1033	(10-550)kV	C:50pF±1pF tgδ:1×10^{-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	2024.10.26
6	Multi-channel thermometer	#TPV91986 EETC09-1024	（0-100）℃	±2℃	GRG Metrology & Test Co., Ltd.	2024.03.16
7	Weight indicator	#1610099647 EETC09-1052	(50-1000)kg	5	GRG Metrology & Test Co., Ltd.	2024.02.01
8	Digital conductivity meter	#722014072713 EETC09-1043	（50-150）μs/cm	±5%	GRG Metrology & Test Co., Ltd.	2024.02.01

———————

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24kV 250A Equipment Bushing (Indoor)

24-DIB250-3

Thermal Cycle Withstand Test Report

CHARDON GROUP
INSPECTION
DEPT

Approved by: Massimo.Liu

Checked by: Jason-Lee

Tested by: Hedong Zhang

Date of issue: May 26, 2021

No. 808, TaiJi Road, EDZ Guangde City,
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No. 808, TaiJi Road, EDZ Guangde City,
Anhui Province, CHINA
Tel: +86-0563-2216688
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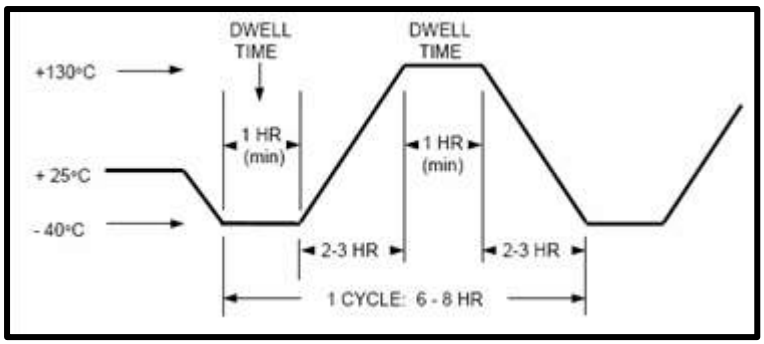
1. Test purpose：

In order to confirm if the product meet the thermal cycle withstand test requirement.

2. Test standard and test record：

2.1 According to IEEE Std., 386-2016 7.20，the test procedure as below：

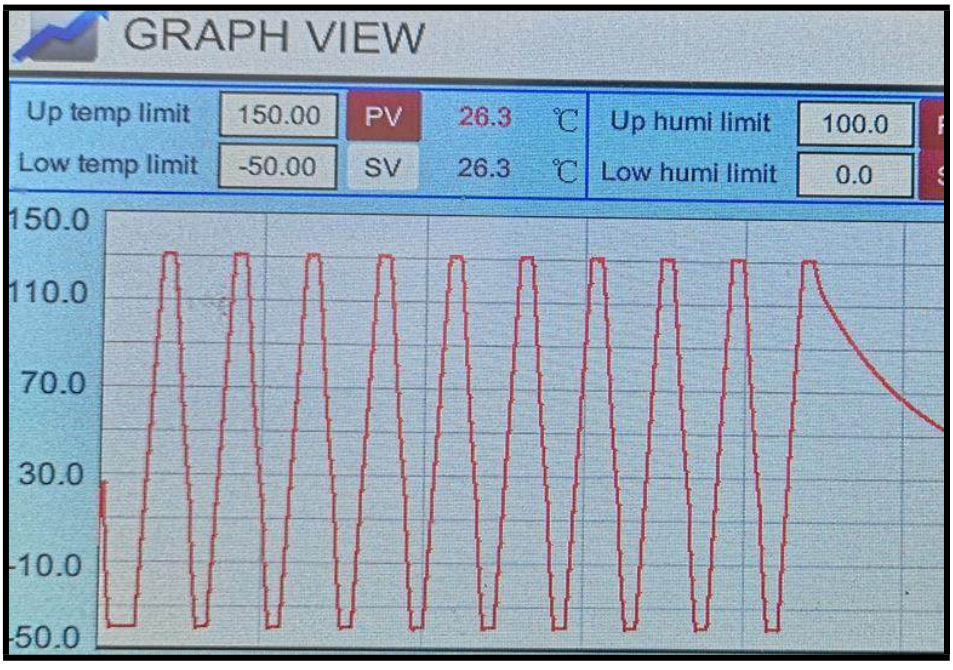


2.1.1 Step 1. After keeping the temperature at -40℃±2℃ for 1 hour, increase the temperature to 130℃±2℃ within 2 to 3 hours.

2.1.2 Step 2. After keeping the temperature at 130℃±2℃ for 1 hour, reduce the temperature to -40℃±2℃ within 2 to 3 hours.

2.1.3 Step 1&2 as one cycle to carry out the test for 10 cycles.

2.2 Test record as below:



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Note: After the test, the appearance, X-ray, partial discharge, AC withstand and Impulse were examined, and the date of before and after the test were compared.

3. Appearance :

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	210415107-1	OK	OK	
2	210415136-3	OK	OK	
3	210415143-4	OK	OK	
4	210415154-4	OK	OK	
5	210415126-2	OK	OK	
6	210415124-2	OK	OK	
7	210415125-2	OK	OK	
8	210415152-4	OK	OK	
9	210415144-4	OK	OK	
10	210415106-1	OK	OK	

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Before thermal cycle test	After thermal cycle test

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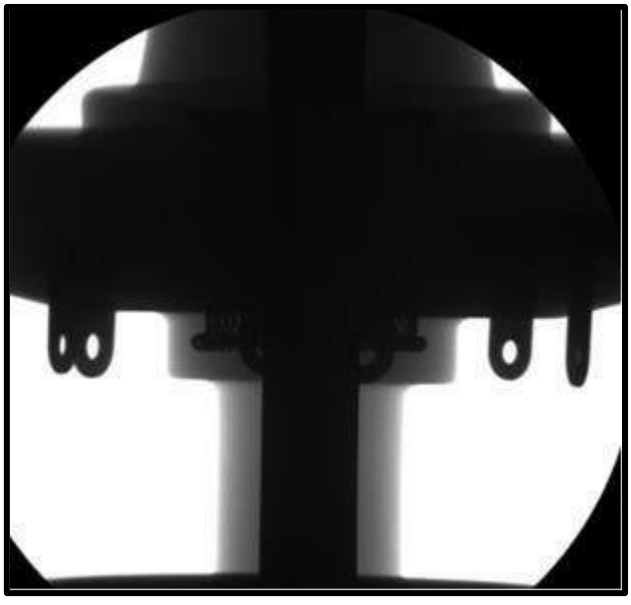
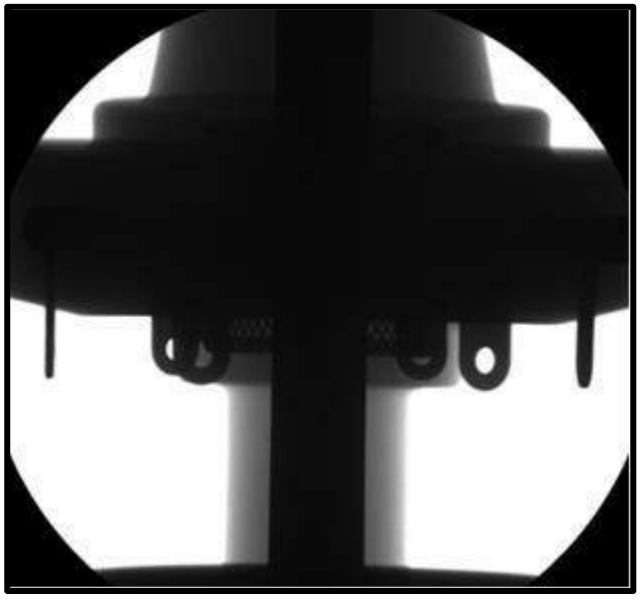
4. X-ray

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	210415107-1	OK	OK	
2	210415136-3	OK	OK	
3	210415143-4	OK	OK	
4	210415154-4	OK	OK	
5	210415126-2	OK	OK	
6	210415124-2	OK	OK	
7	210415125-2	OK	OK	
8	210415152-4	OK	OK	
9	210415144-4	OK	OK	
10	210415106-1	OK	OK	



Before thermal cycle test



After thermal cycle test

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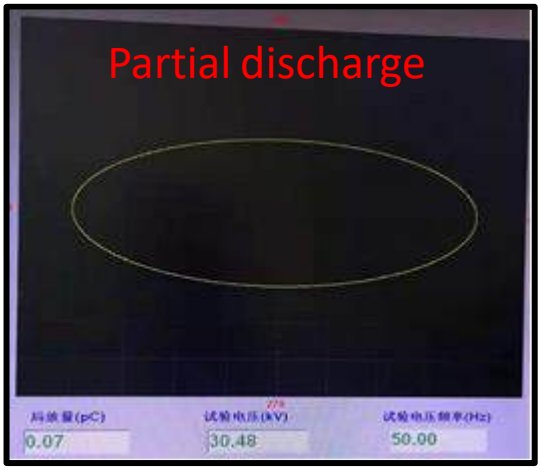
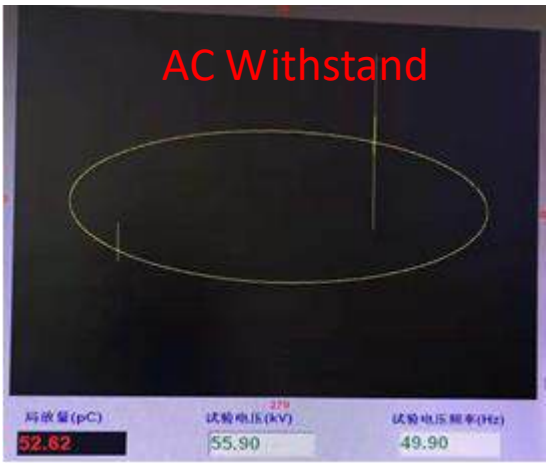
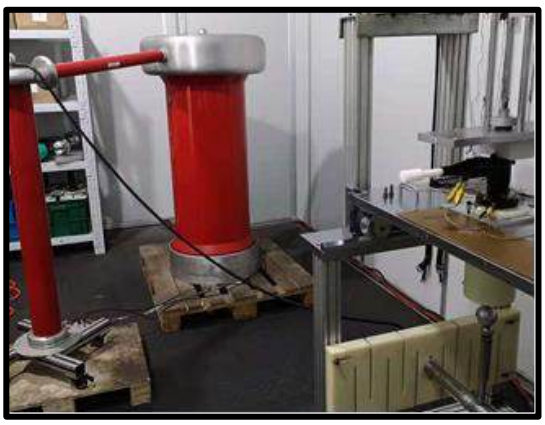
5. Partial discharge and AC withstand voltage

No.	Batch number	Before thermal cycle test		After thermal cycle test		Note
		Partial discharge 20.8kV<3pC	AC Withstand 55kV/1min	Partial discharge 20.8kV<3pC	AC Withstand 55kV/1min	
1	210415107-1	34/31	OK	36/34	OK	
2	210415136-3	35/32	OK	32/30	OK	
3	210415143-4	31/28	OK	30/28	OK	
4	210415154-4	32/29	OK	32/30	OK	
5	210415126-2	34/31	OK	31/29	OK	
6	210415124-2	36/33	OK	32/29	OK	
7	210415125-2	32/29	OK	34/32	OK	
8	210415152-4	32/29	OK	33/30	OK	
9	210415144-4	34/31	OK	31/29	OK	
10	210415106-1	30/27	OK	34/32	OK	







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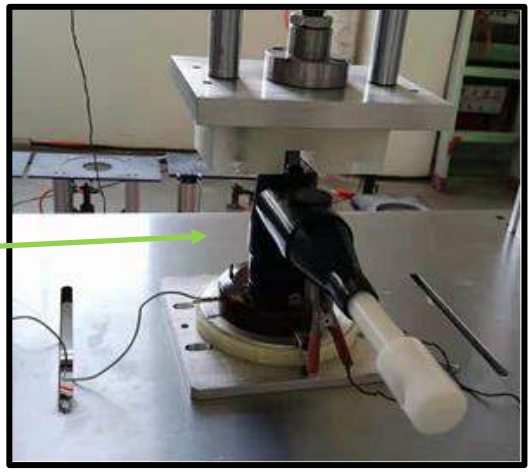
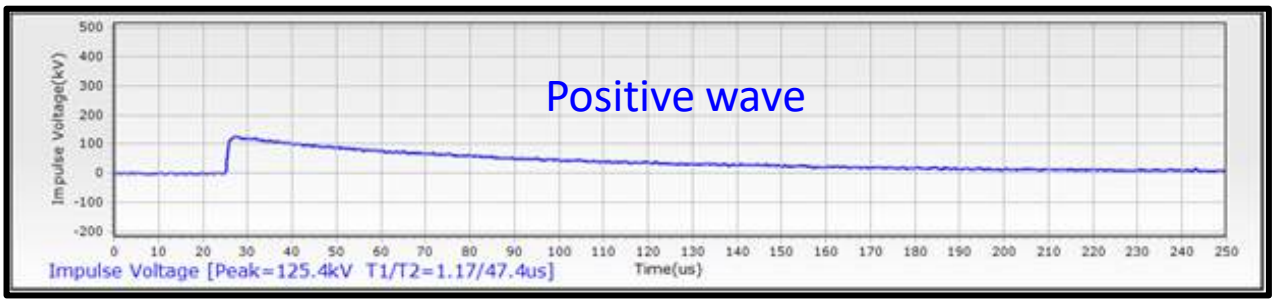
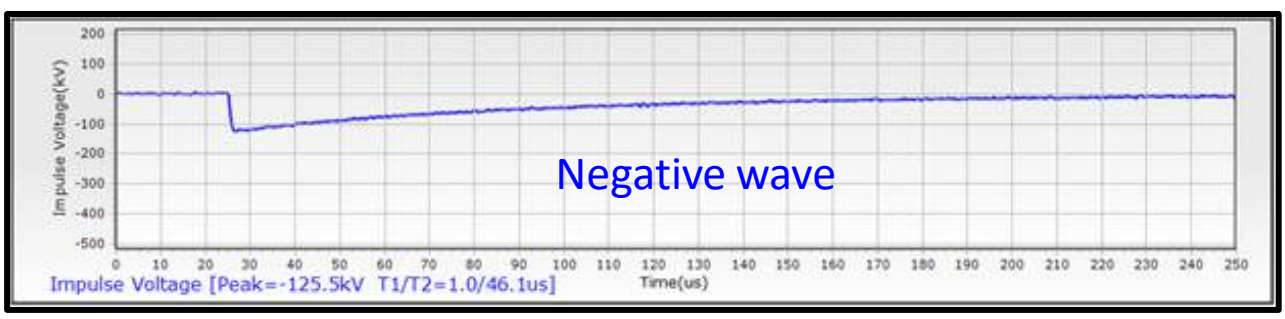
6. Impulse voltage

No.	Batch number	Impulse voltage ±125kV		Note
		Before thermal cycle test	After thermal cycle test	
1	210415107-1	OK	OK	
2	210415136-3	OK	OK	
3	210415143-4	OK	OK	
4	210415154-4	OK	OK	
5	210415126-2	OK	OK	
6	210415124-2	OK	OK	
7	210415125-2	OK	OK	
8	210415152-4	OK	OK	
9	210415144-4	OK	OK	
10	210415106-1	OK	OK	







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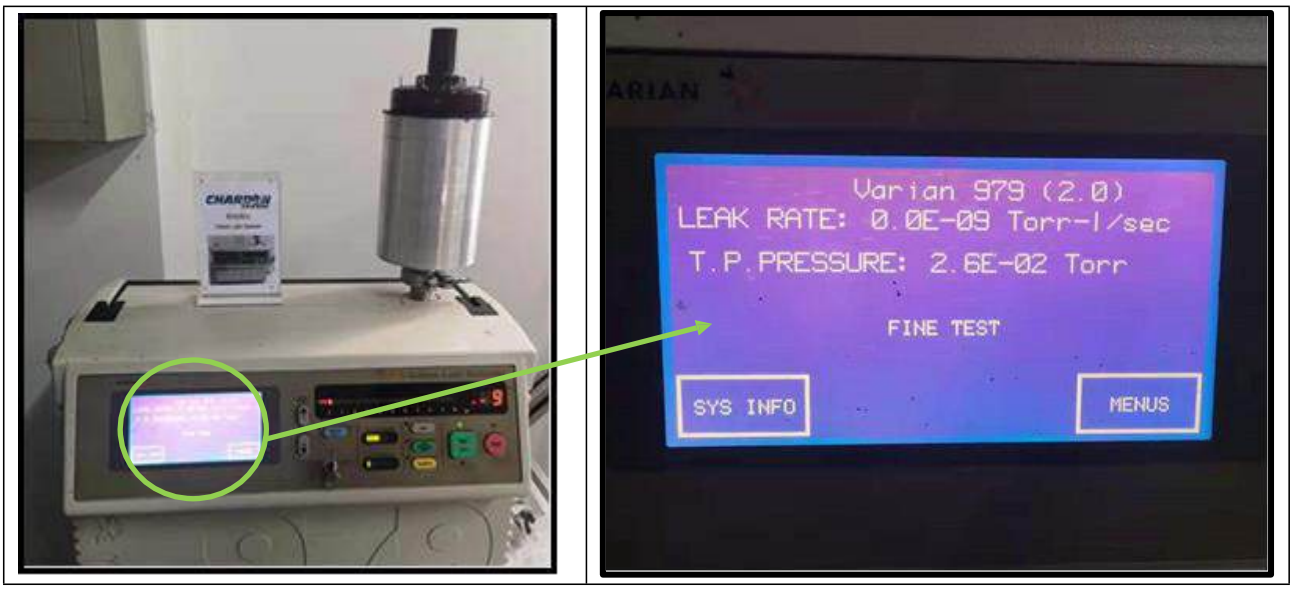
7. Helium leakage test

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	210415107-1	OK	OK	
2	210415136-3	OK	OK	
3	210415143-4	OK	OK	
4	210415154-4	OK	OK	
5	210415126-2	OK	OK	
6	210415124-2	OK	OK	
7	210415125-2	OK	OK	
8	210415152-4	OK	OK	
9	210415144-4	OK	OK	
10	210415106-1	OK	OK	



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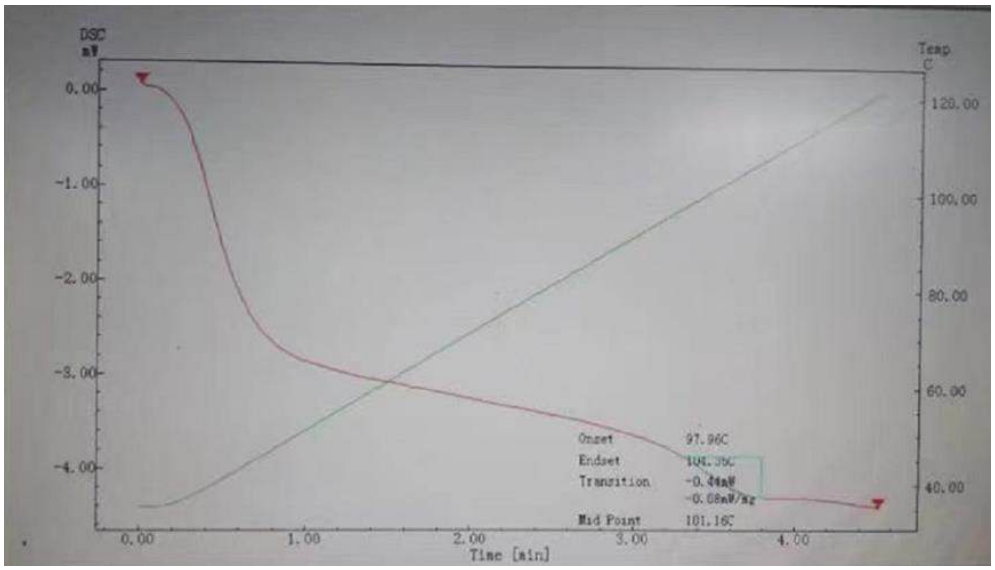
8. Tg test: 101.16℃



9. Conclusion：

9.1 All the above test items were carried out in accordance with IEEE Std., 386-2016 7.20 for thermal cycle withstand test. According to the result of the comparison test, there was no obvious difference between the data of before and after the test, so it was determined that the product is in accordance with IEEE Std., 386-2016 7.20.

9.2 The following table shows IEEE Std., 386-2016 7.20 and BS 2562-1979 12.3 standard.

Standard	Requirement	Note
IEEE Std.386-2016 7.20	-40~130℃	10 cycles
BS 2562-1979 12.3	-10~105℃	10 cycles

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24kV 250A Equipment Bushing (Indoor)

24-DIB250-2

Thermal Cycle Withstand Test Report

CHARDON GROUP
INSPECTION
DEPT

Approved by: Massimo.Liu

Checked by: Jason-Lee

Tested by: Hedong Zhang

Date of issue: May 26, 2021

No. 808, TaiJi Road, EDZ Guangde City,
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No. 808, TaiJi Road, EDZ Guangde City,
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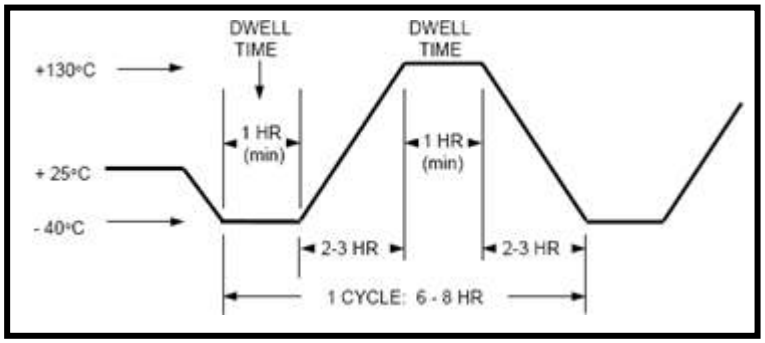
1. Test purpose：

In order to confirm if the product meet the thermal cycle withstand test requirement.

2. Test standard and test record：

2.1 According to IEEE Std., 386-2016 7.20，the test procedure as below：

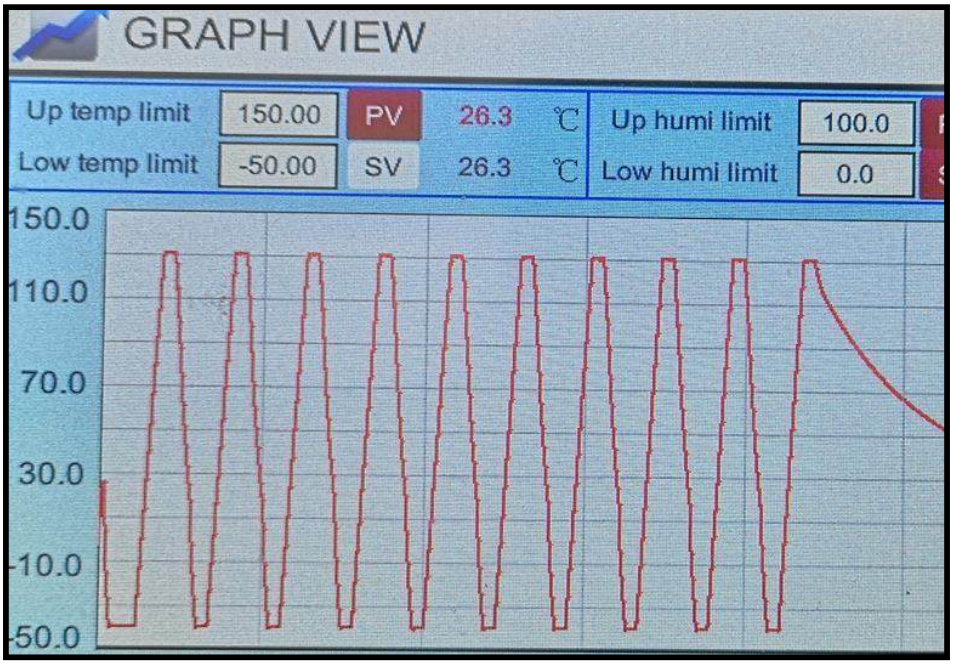


2.1.1 Step 1. After keeping the temperature at -40℃±2℃ for 1 hour, increase the temperature to 130℃±2℃ within 2 to 3 hours.

2.1.2 Step 2. After keeping the temperature at 130℃±2℃ for 1 hour, reduce the temperature to -40℃±2℃ within 2 to 3 hours.

2.1.3 Step 1&2 as one cycle to carry out the test for 10 cycles.

2.2 Test record as below:



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Note: After the test, the appearance, X-ray, partial discharge, AC withstand and Impulse were examined, and the date of before and after the test were compared.

3. Appearance：

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2104182-08	OK	OK	
2	2104182-17	OK	OK	
3	2104182-19	OK	OK	
4	2104182-18	OK	OK	
5	2104182-01	OK	OK	
6	2104182-03	OK	OK	
7	2104182-12	OK	OK	
8	2104182-14	OK	OK	
9	2104182-11	OK	OK	
10	2104182-04	OK	OK	

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Before thermal cycle test	After thermal cycle test

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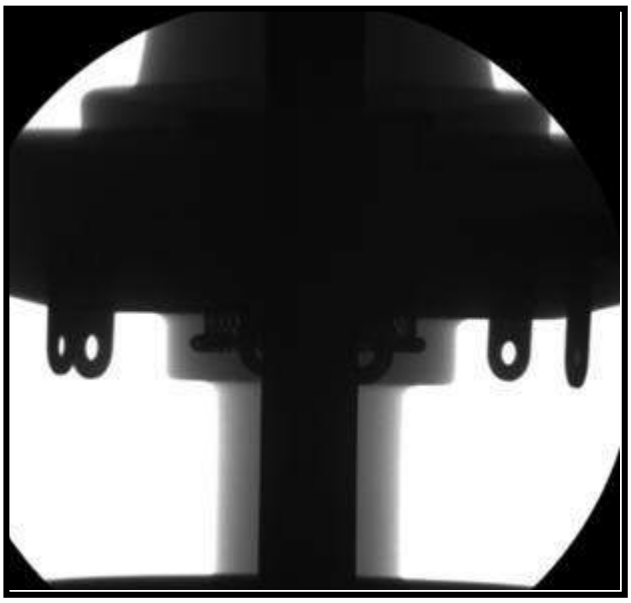
4. X-ray

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2104182-08	OK	OK	
2	2104182-17	OK	OK	
3	2104182-19	OK	OK	
4	2104182-18	OK	OK	
5	2104182-01	OK	OK	
6	2104182-03	OK	OK	
7	2104182-12	OK	OK	
8	2104182-14	OK	OK	
9	2104182-11	OK	OK	
10	2104182-04	OK	OK	



Before thermal cycle test

After thermal cycle test

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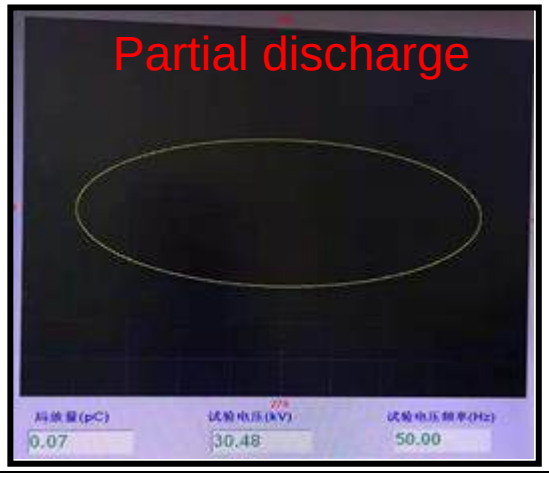
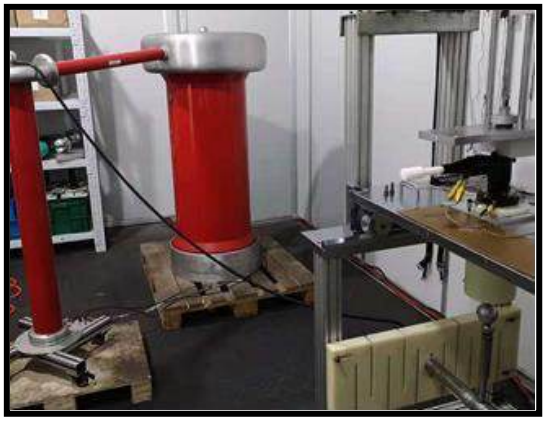
5. Partial discharge and AC withstand voltage

No.	Batch number	Before thermal cycle test		After thermal cycle test		Note
		Partial discharge 20.8kV<3pC	AC Withstand 55kV/1min	Partial discharge 20.8kV<3pC	AC Withstand 55kV/1min	
1	2104182-08	36/33	OK	29/27	OK	
2	2104182-17	34/31	OK	32/30	OK	
3	2104182-19	35/32	OK	34/31	OK	
4	2104182-18	36/33	OK	35/33	OK	
5	2104182-01	31/28	OK	34/31	OK	
6	2104182-03	34/31	OK	32/30	OK	
7	2104182-12	36/33	OK	29/27	OK	
8	2104182-14	35/32	OK	30/27	OK	
9	2104182-11	35/33	OK	31/28	OK	
10	2104182-04	32/31	OK	30/28	OK	





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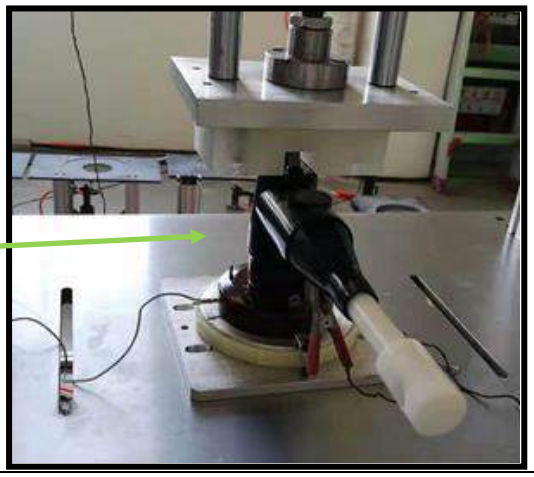
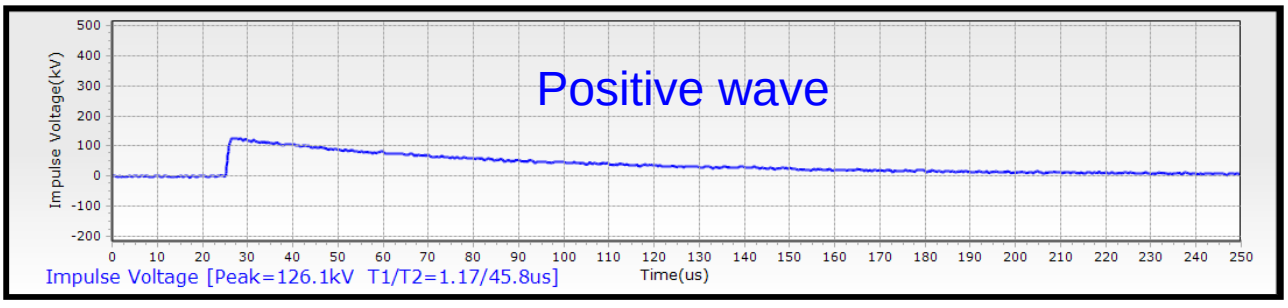
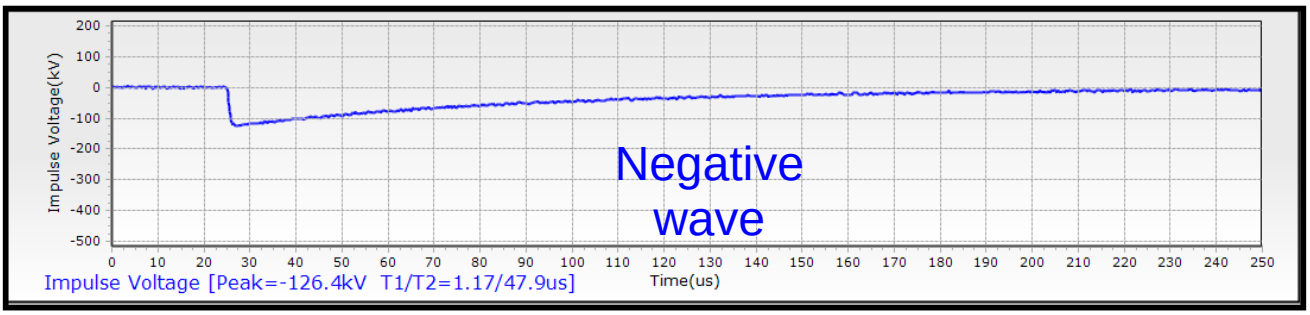
6. Impulse voltage

No.	Batch number	Impulse voltage ±125kV		Note
		Before thermal cycle test	After thermal cycle test	
1	2104182-08	OK	OK	
2	2104182-17	OK	OK	
3	2104182-19	OK	OK	
4	2104182-18	OK	OK	
5	2104182-01	OK	OK	
6	2104182-03	OK	OK	
7	2104182-12	OK	OK	
8	2104182-14	OK	OK	
9	2104182-11	OK	OK	
10	2104182-04	OK	OK	







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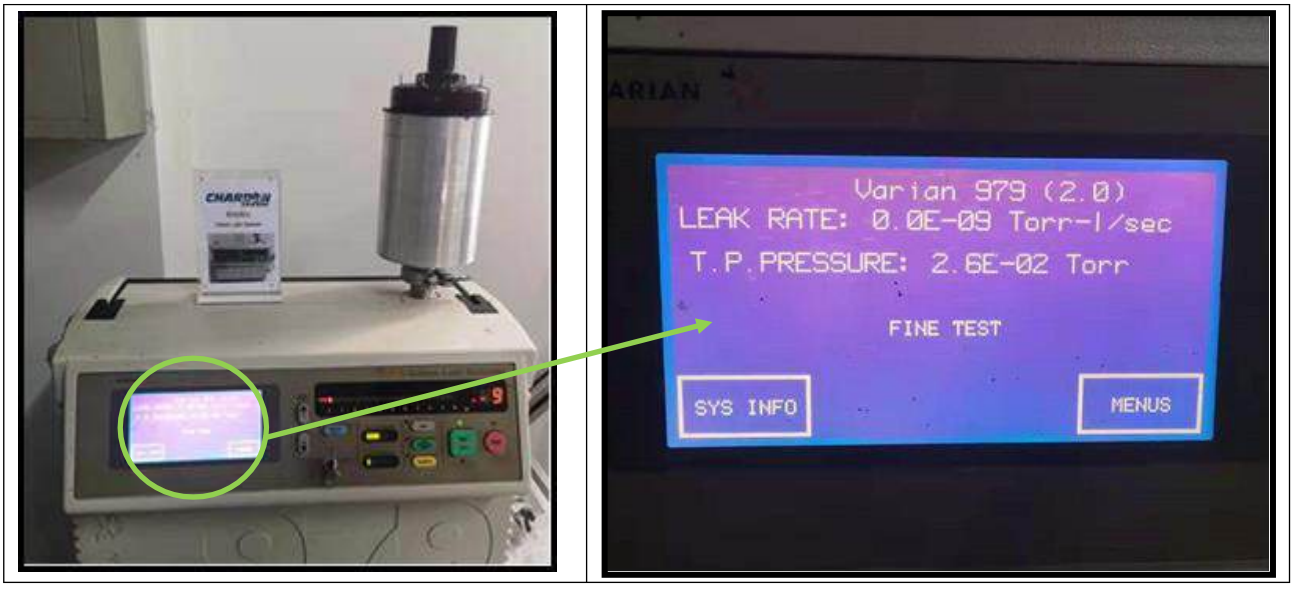
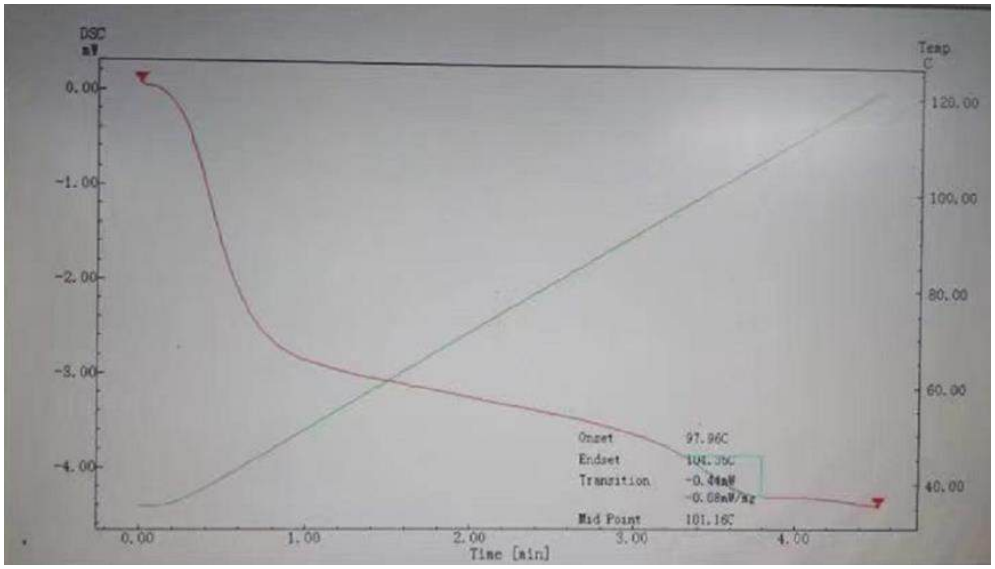
Fax:+86-0563-2251805

7. Helium leakage test

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2104182-08	OK	OK	
2	2104182-17	OK	OK	
3	2104182-19	OK	OK	
4	2104182-18	OK	OK	
5	2104182-01	OK	OK	
6	2104182-03	OK	OK	
7	2104182-12	OK	OK	
8	2104182-14	OK	OK	
9	2104182-11	OK	OK	
10	2104182-04	OK	OK	



8. Tg test: 101.16℃



9. Conclusion：

9.1 All the above test items were carried out in accordance with IEEE Std., 386-2016 7.20 for thermal cycle withstand test. According to the result of the comparison test, there was no obvious difference between the data of before and after the test, so it was determined that the product is in accordance with IEEE Std., 386-2016 7.20.

9.2 The following table shows IEEE Std., 386-2016 7.20 and BS 2562-1979 12.3 standard.

Standard	Requirement	Note
IEEE Std.386-2016 7.20	-40~130℃	10 cycles
BS 2562-1979 12.3	-10~105℃	10 cycles

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24kV 250A Equipment Bushing (Indoor)

24-DIB250-1

Thermal Cycle Withstand Test Report

CHARDON GROUP
INSPECTION
DEPT

Approved by: Massimo.Liu

Checked by: Jason-Lee

Tested by: Hedong Zhang

Date of issue: May 26, 2021

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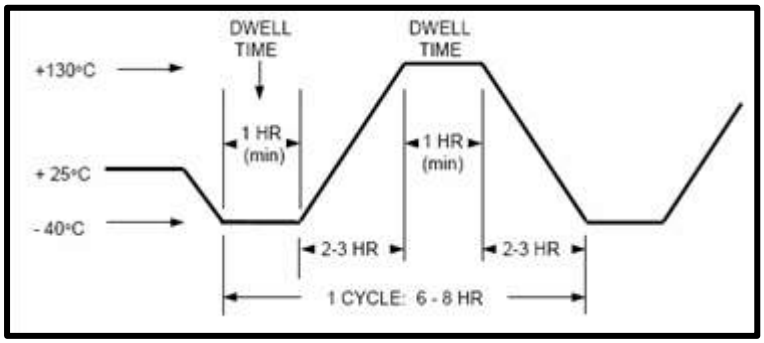
In order to confirm if the product meet the thermal cycle withstand test requirement.

2. Test standard and test record：

2.1 According to IEEE Std., 386-2016 7.20，the test procedure as below：

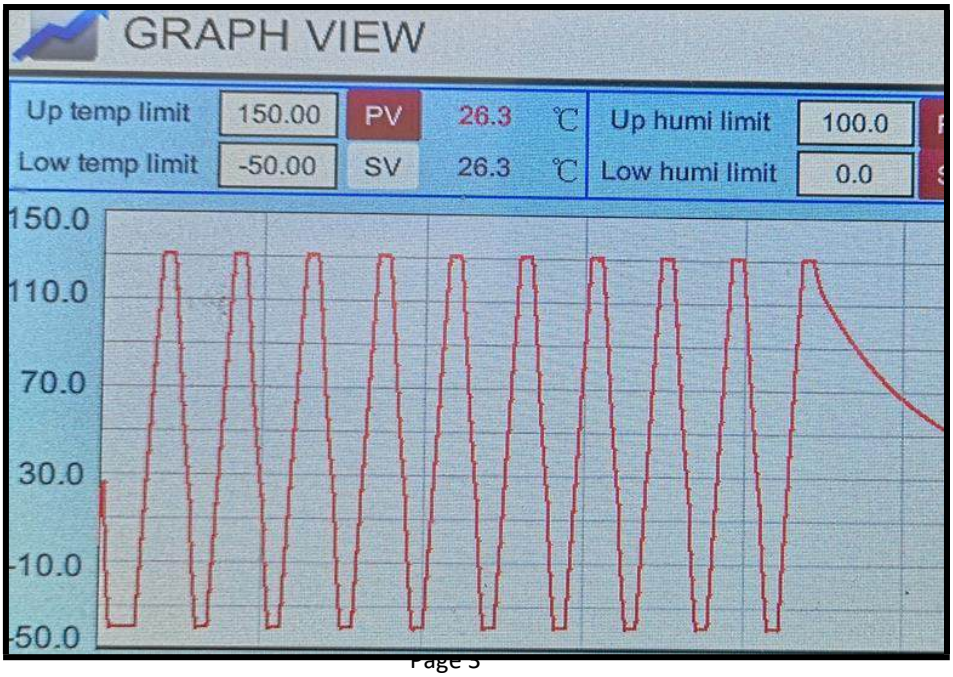


2.1.1 Step 1. After keeping the temperature at -40℃±2℃ for 1 hour, increase the temperature to 130℃±2℃ within 2 to 3 hours.

2.1.2 Step 2. After keeping the temperature at 130℃±2℃ for 1 hour, reduce the temperature to -40℃±2℃ within 2 to 3 hours.

2.1.3 Step 1&2 as one cycle to carry out the test for 10 cycles.

2.2 Test record as below:



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Note: After the test, the appearance, X-ray, partial discharge, AC withstand and Impulse were examined, and the date of before and after the test were compared.

3. Appearance :

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2104222-44	OK	OK	
2	2104222-41	OK	OK	
3	2104222-34	OK	OK	
4	2104222-36	OK	OK	
5	2104222-18	OK	OK	
6	2104222-39	OK	OK	
7	2104222-35	OK	OK	
8	2104222-21	OK	OK	
9	2104222-20	OK	OK	
10	2104222-31	OK	OK	

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Before thermal cycle test	After thermal cycle test

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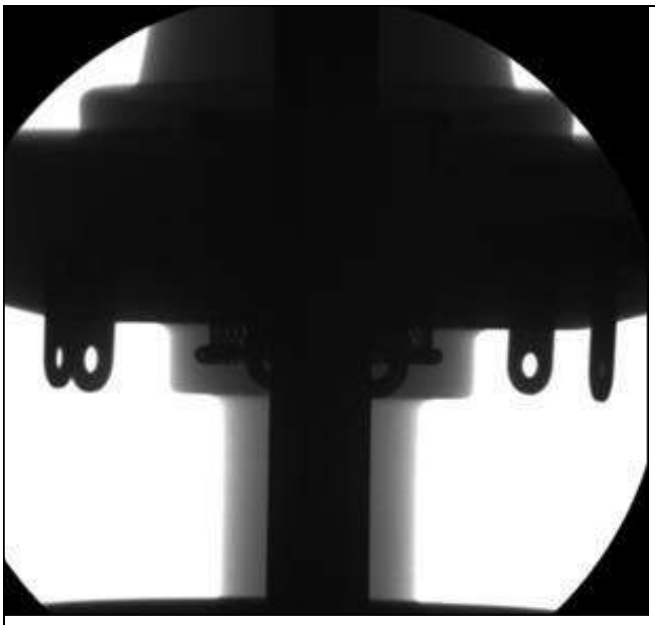
Fax:+86-0563-2251805

4. X-ray

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2104222-44	OK	OK	
2	2104222-41	OK	OK	
3	2104222-34	OK	OK	
4	2104222-36	OK	OK	
5	2104222-18	OK	OK	
6	2104222-39	OK	OK	
7	2104222-35	OK	OK	
8	2104222-21	OK	OK	
9	2104222-20	OK	OK	
10	2104222-31	OK	OK	



Before thermal cycle test

After thermal cycle test

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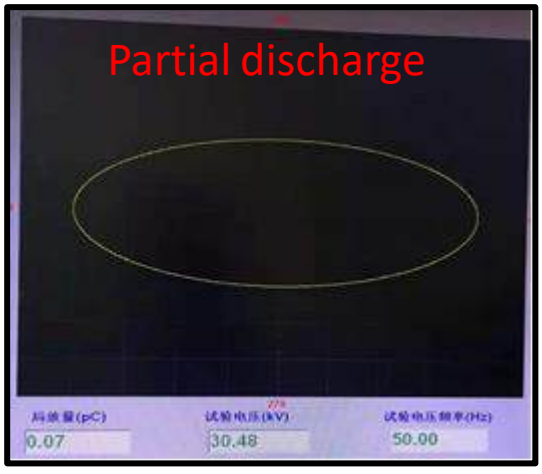
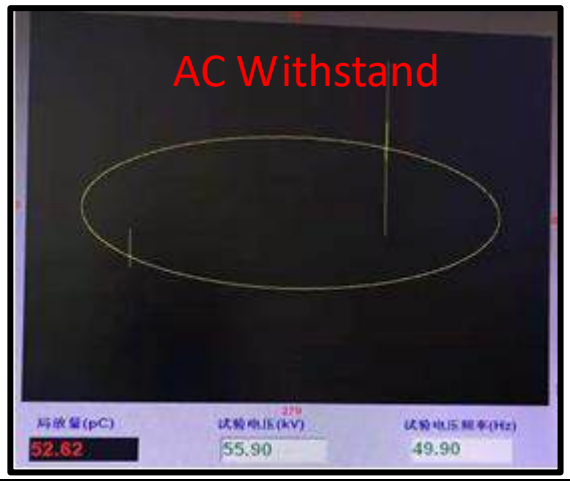
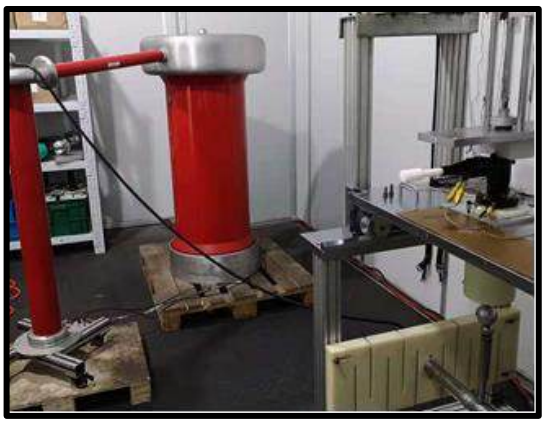
Fax:+86-0563-2251805

5. Partial discharge and AC withstand voltage

No.	Batch number	Before thermal cycle test		After thermal cycle test		Note
		Partial discharge 20.8kV<3pC	AC Withstand 55kV/1min	Partial discharge 20.8kV<3pC	AC Withstand 55kV/1min	
1	2104222-44	36/33	OK	29/27	OK	
2	2104222-41	34/31	OK	32/30	OK	
3	2104222-34	35/32	OK	34/31	OK	
4	2104222-36	36/33	OK	35/33	OK	
5	2104222-18	31/28	OK	34/31	OK	
6	2104222-39	34/31	OK	32/30	OK	
7	2104222-35	36/33	OK	29/27	OK	
8	2104222-21	35/32	OK	30/27	OK	
9	2104222-20	35/33	OK	31/28	OK	
10	2104222-31	32/31	OK	30/28	OK	







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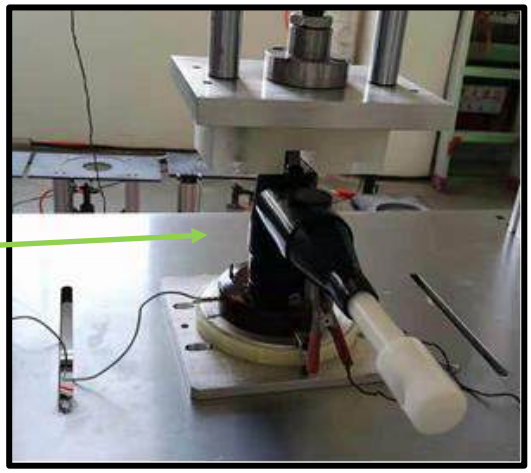
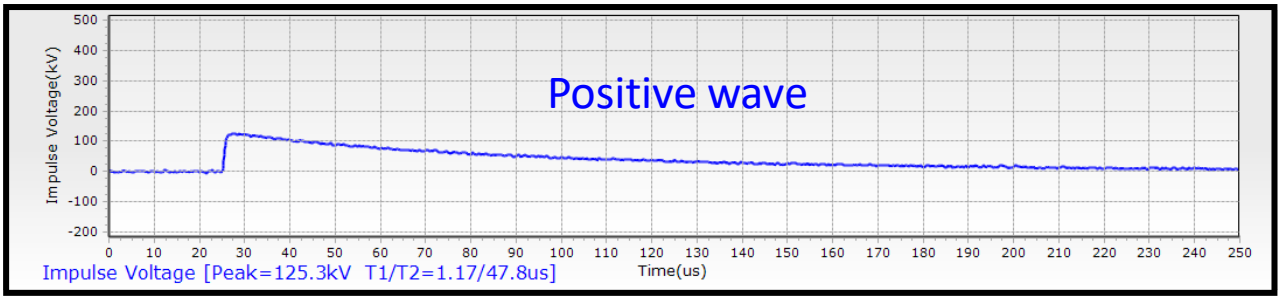
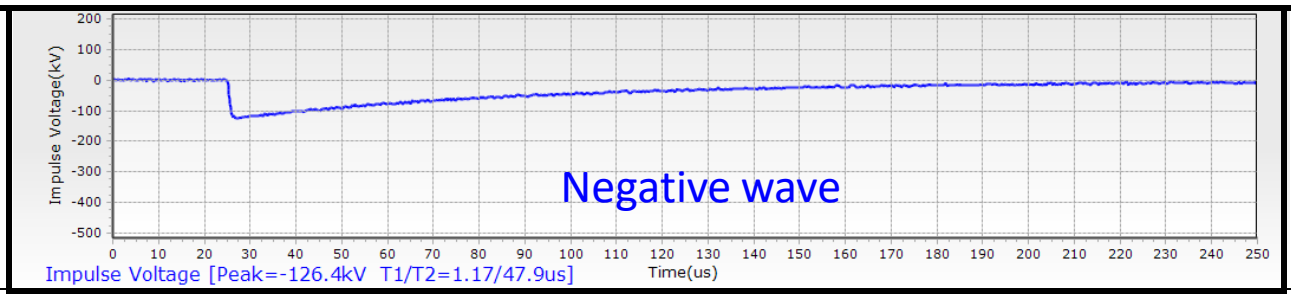
6. Impulse voltage

No.	Batch number	Impulse voltage ±125kV		Note
		Before thermal cycle test	After thermal cycle test	
1	2104222-44	OK	OK	
2	2104222-41	OK	OK	
3	2104222-34	OK	OK	
4	2104222-36	OK	OK	
5	2104222-18	OK	OK	
6	2104222-39	OK	OK	
7	2104222-35	OK	OK	
8	2104222-21	OK	OK	
9	2104222-20	OK	OK	
10	2104222-31	OK	OK	







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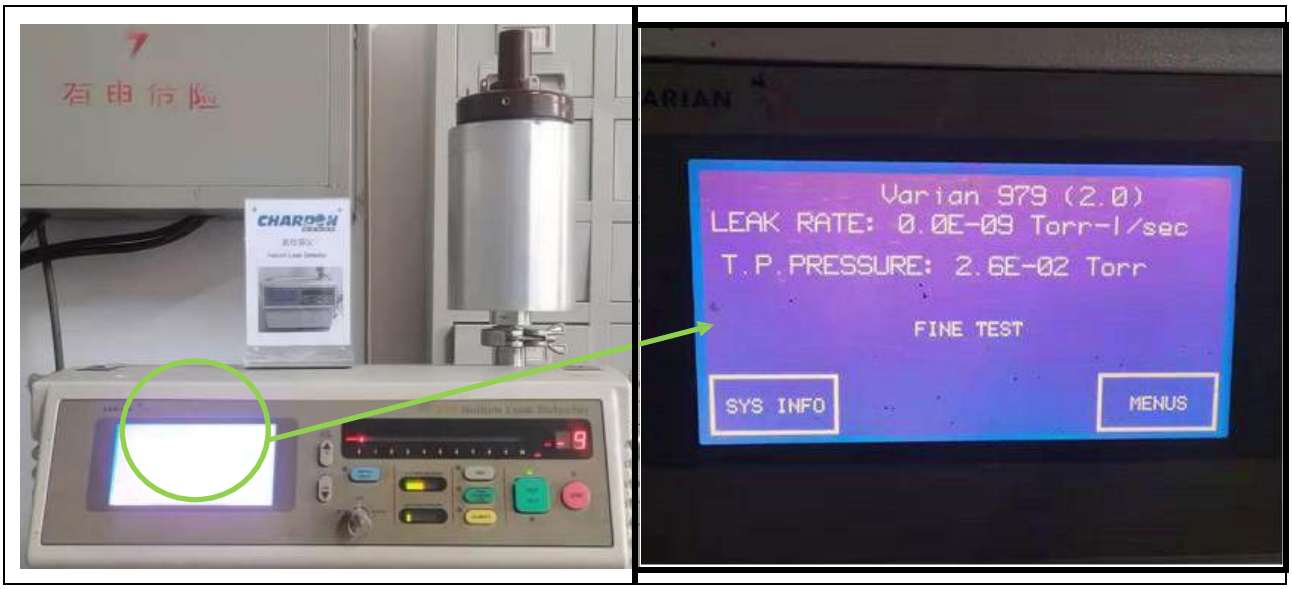
7. Helium leakage test

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2104222-44	OK	OK	
2	2104222-41	OK	OK	
3	2104222-34	OK	OK	
4	2104222-36	OK	OK	
5	2104222-18	OK	OK	
6	2104222-39	OK	OK	
7	2104222-35	OK	OK	
8	2104222-21	OK	OK	
9	2104222-20	OK	OK	
10	2104222-31	OK	OK	



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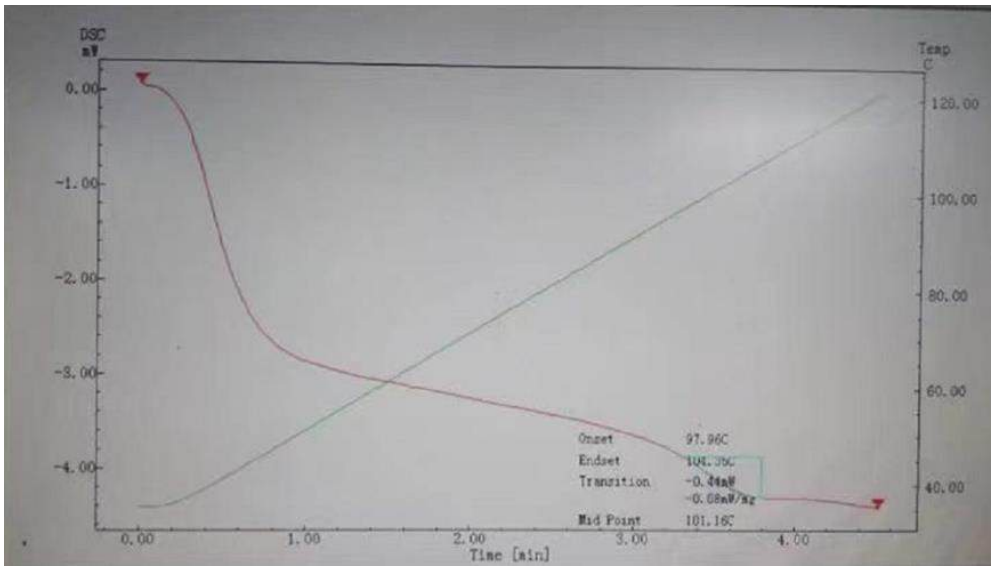
8. Tg test: 101.16℃



9. Conclusion：

9.1 All the above test items were carried out in accordance with IEEE Std., 386-2016 7.20 for thermal cycle withstand test. According to the result of the comparison test, there was no obvious difference between the data of before and after the test, so it was determined that the product is in accordance with IEEE Std., 386-2016 7.20.

9.2 The following table shows IEEE Std., 386-2016 7.20 and BS 2562-1979 12.3 standard.

Standard	Requirement	Note
IEEE Std.386-2016 7.20	-40~130℃	10 cycles
BS 2562-1979 12.3	-10~105℃	10 cycles

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36kV 400A Equipment Bushing (Indoor)

36-DIB400-3

Thermal Cycle Withstand Test Report

CHARDON GROUP
INSPECTION
DEPT

Approved by: Massimo.Liu

Checked by: Jason-Lee

Tested by: Hedong Zhang

Date of issue: Jun 12, 2021

No. 808, TaiJi Road, EDZ Guangde City,
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No. 808, TaiJi Road, EDZ Guangde City,
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Tel: +86-0563-2216688
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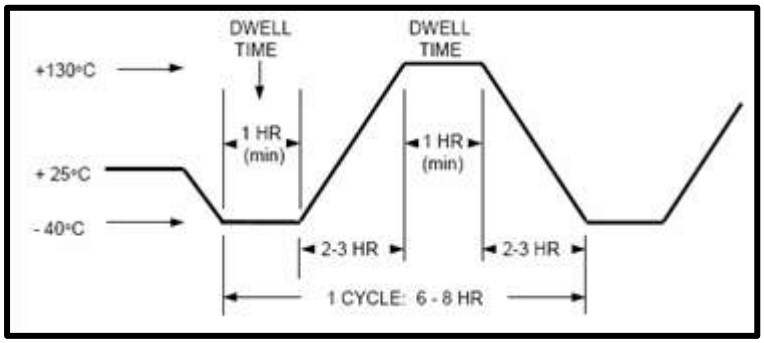
1. Test purpose：

In order to confirm if the product meet the thermal cycle withstand test requirement.

2. Test standard and test record：

2.1 According to IEEE Std., 386-2016 7.20，the test procedure as below：

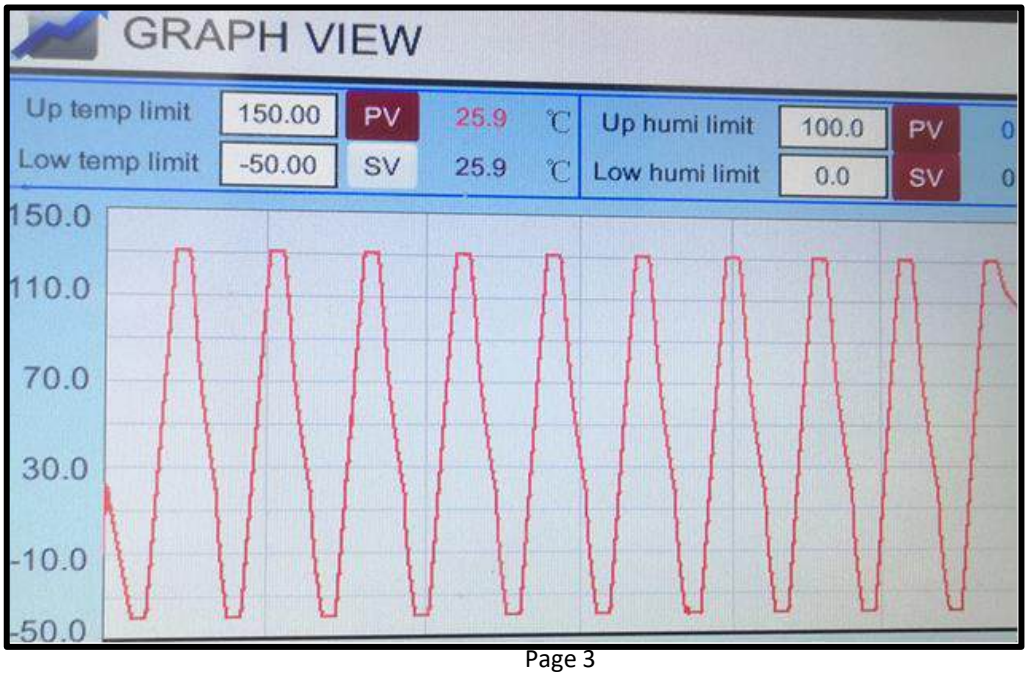


2.1.1 Step 1. After keeping the temperature at -40℃±2℃ for 1 hour, increase the temperature to 130℃±2℃ within 2 to 3 hours.

2.1.2 Step 2. After keeping the temperature at 130℃±2℃ for 1 hour, reduce the temperature to -40℃±2℃ within 2 to 3 hours.

2.1.3 Step 1&2 as one cycle to carry out the test for 10 cycles.

2.2 Test record as below:



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Note: After the test, the appearance, X-ray, partial discharge, AC withstand and Impulse were examined, and the date of before and after the test were compared.

3. Appearance :

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2105202024	OK	OK	
2	2105202011	OK	OK	
3	2105202005	OK	OK	
4	2105202023	OK	OK	
5	2105202021	OK	OK	
6	2104231-01	OK	OK	
7	2104231-02	OK	OK	
8	2104231-03	OK	OK	
9	2104231-04	OK	OK	
10	2104231-05	OK	OK	

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Before thermal cycle test	After thermal cycle test

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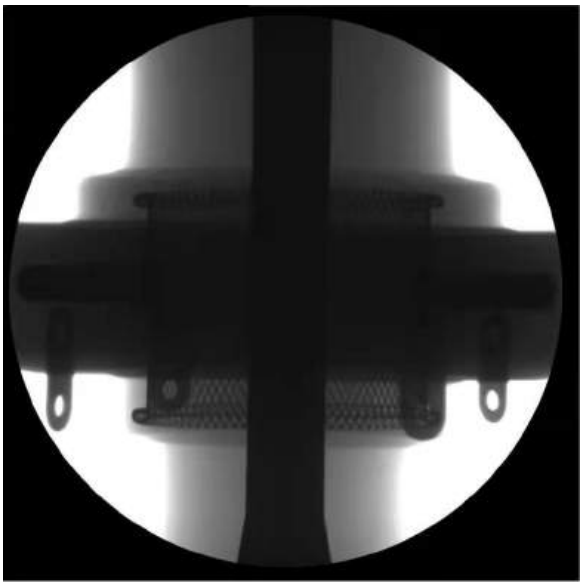
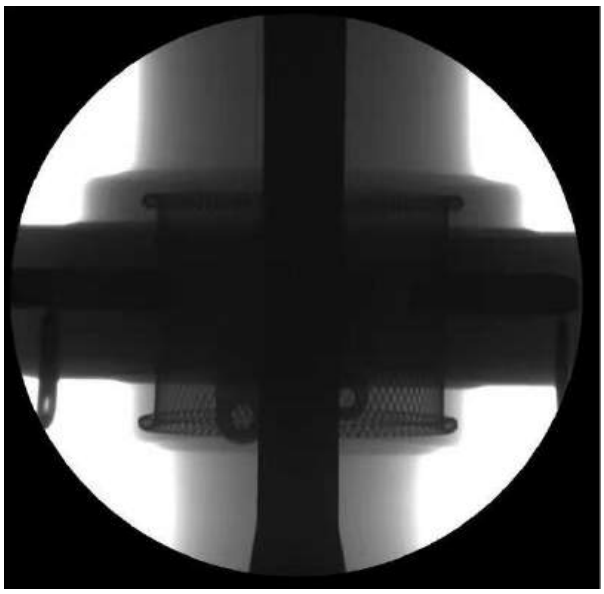
4. X-ray

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2105202024	OK	OK	
2	2105202011	OK	OK	
3	2105202005	OK	OK	
4	2105202023	OK	OK	
5	2105202021	OK	OK	
6	2104231-01	OK	OK	
7	2104231-02	OK	OK	
8	2104231-03	OK	OK	
9	2104231-04	OK	OK	
10	2104231-05	OK	OK	

	
Before thermal cycle test	After thermal cycle test

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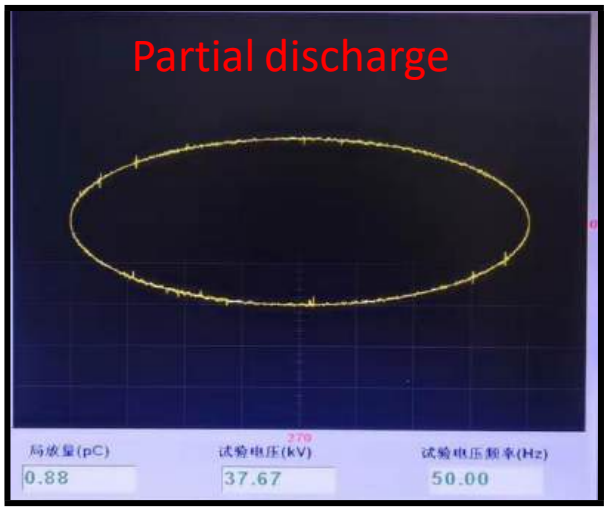
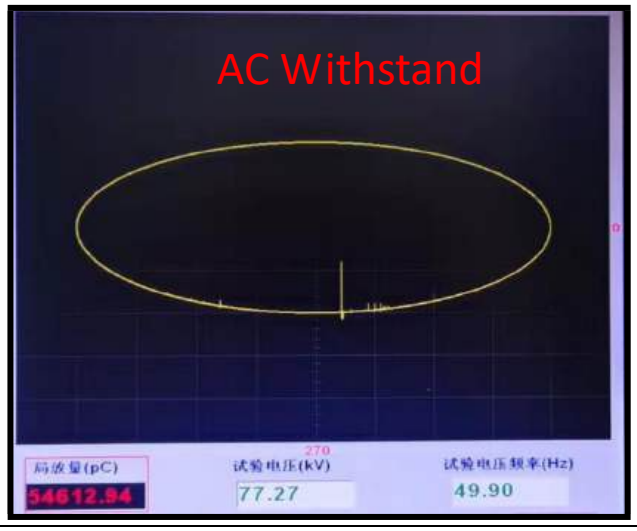
5. Partial discharge and AC withstand voltage

No.	Batch number	Before thermal cycle test		After thermal cycle test		Note
		Partial discharge 31.2kV<3pC	AC Withstand 77kV/1min	Partial discharge 31.2kV<3pC	AC Withstand 77kV/1min	
1	2105202024	36/34	OK	35/33	OK	
2	2105202011	34/33	OK	34/33	OK	
3	2105202005	35/33	OK	34/33	OK	
4	2105202023	36/35	OK	35/34	OK	
5	2105202021	35/33	OK	34/33	OK	
6	2104231-01	34/33	OK	35/33	OK	
7	2104231-02	36/34	OK	35/33	OK	
8	2104231-03	35/33	OK	34/33	OK	
9	2104231-04	37/35	OK	35/34	OK	
10	2104231-05	35/33	OK	35/33	OK	





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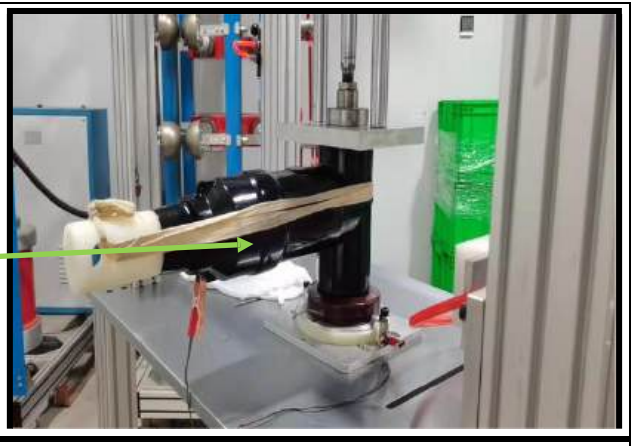
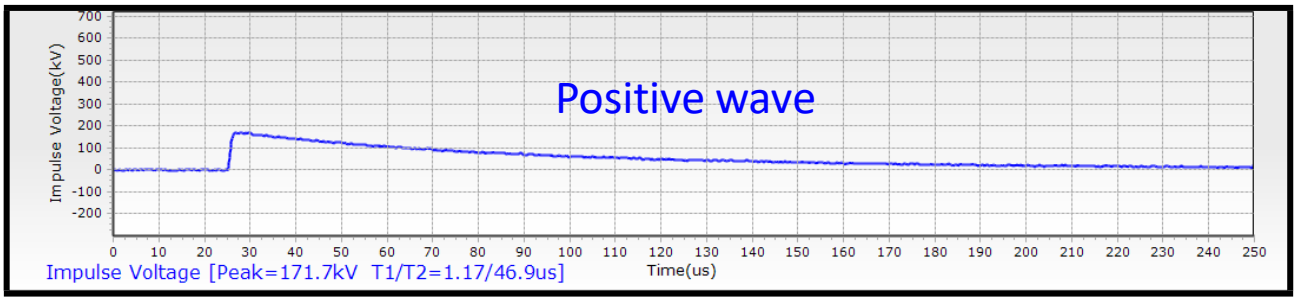
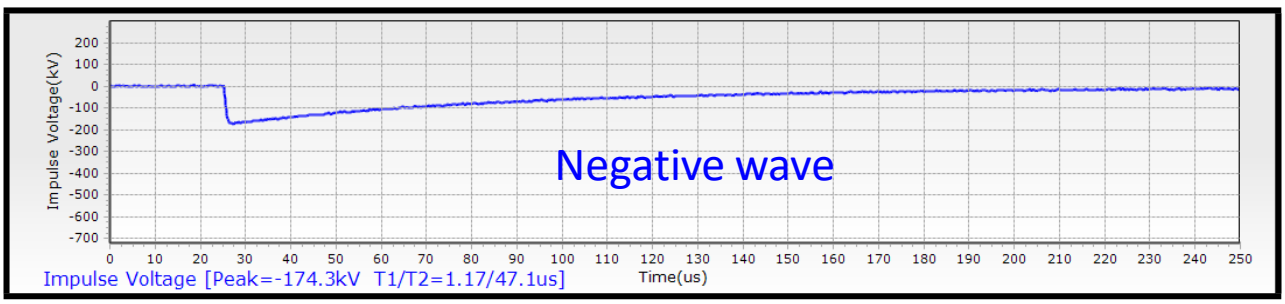
6. Impulse voltage

No.	Batch number	Impulse voltage ±1170kV		Note
		Before thermal cycle test	After thermal cycle test	
1	2105202024	OK	OK	
2	2105202011	OK	OK	
3	2105202005	OK	OK	
4	2105202023	OK	OK	
5	2105202021	OK	OK	
6	2104231-01	OK	OK	
7	2104231-02	OK	OK	
8	2104231-03	OK	OK	
9	2104231-04	OK	OK	
10	2104231-05	OK	OK	







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Fax:+86-0563-2251805

7. Helium leakage test

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2105202024	OK	OK	
2	2105202011	OK	OK	
3	2105202005	OK	OK	
4	2105202023	OK	OK	
5	2105202021	OK	OK	
6	2104231-01	OK	OK	
7	2104231-02	OK	OK	
8	2104231-03	OK	OK	
9	2104231-04	OK	OK	
10	2104231-05	OK	OK	

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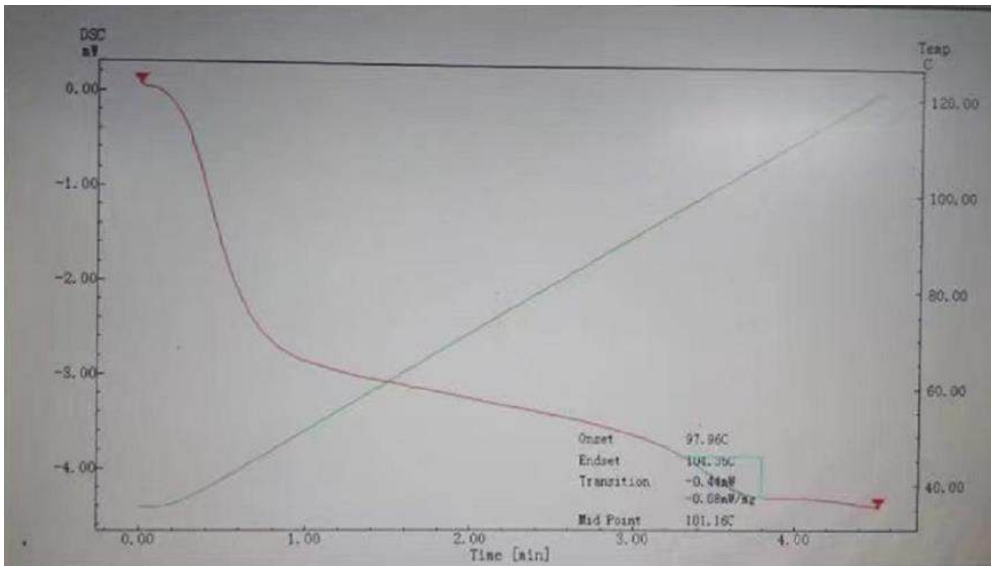
8. Tg test: 101.16℃



9. Conclusion：

9.1 All the above test items were carried out in accordance with IEEE Std., 386-2016 7.20 for thermal cycle withstand test. According to the result of the comparison test, there was no obvious difference between the data of before and after the test, so it was determined that the product is in accordance with IEEE Std., 386-2016 7.20.

9.2 The following table shows IEEE Std., 386-2016 7.20 and BS 2562-1979 12.3 standard.

Standard	Requirement	Note
IEEE Std.386-2016 7.20	-40~130℃	10 cycles
BS 2562-1979 12.3	-10~105℃	10 cycles

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36kV 630A Equipment Bushing (Indoor)

36-DIB630-2

Thermal Cycle Withstand Test Report

CHARDON GROUP
INSPECTION
DEPT

Approved by: Massimo.Liu

Checked by: Jason-Lee

Tested by: Hedong Zhang

Date of issue: Jun 12, 2021

No. 808, TaiJi Road, EDZ Guangde City,
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No. 808, TaiJi Road, EDZ Guangde City,
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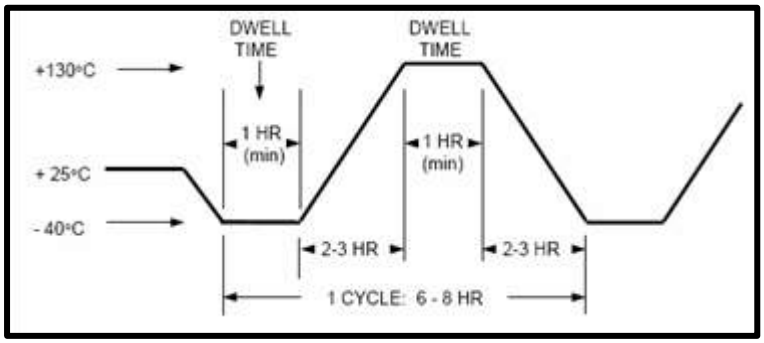
1. Test purpose：

In order to confirm if the product meet the thermal cycle withstand test requirement.

2. Test standard and test record：

2.1 According to IEEE Std., 386-2016 7.20，the test procedure as below：

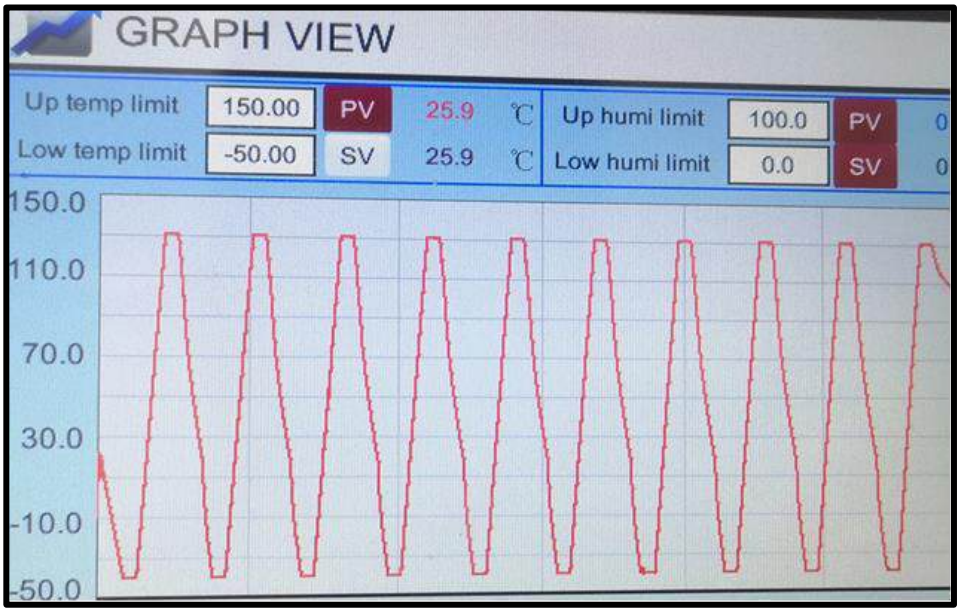


2.1.1 Step 1. After keeping the temperature at -40℃±2℃ for 1 hour, increase the temperature to 130℃±2℃ within 2 to 3 hours.

2.1.2 Step 2. After keeping the temperature at 130℃±2℃ for 1 hour, reduce the temperature to -40℃±2℃ within 2 to 3 hours.

2.1.3 Step 1&2 as one cycle to carry out the test for 10 cycles.

2.2 Test record as below:



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Note: After the test, the appearance, X-ray, partial discharge, AC withstand and Impulse were examined, and the date of before and after the test were compared.

3. Appearance :

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2104251-08	OK	OK	
2	2104251-05	OK	OK	
3	2104242-12	OK	OK	
4	2104251-18	OK	OK	
5	2104251-07	OK	OK	
6	2104242-11	OK	OK	
7	2104242-21	OK	OK	
8	2104251-01	OK	OK	
9	2104242-07	OK	OK	
10	2104242-19	OK	OK	

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Before thermal cycle test	After thermal cycle test

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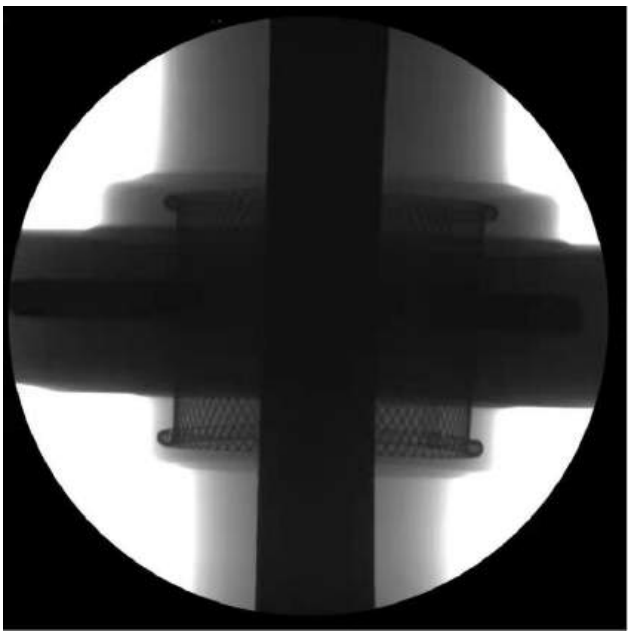
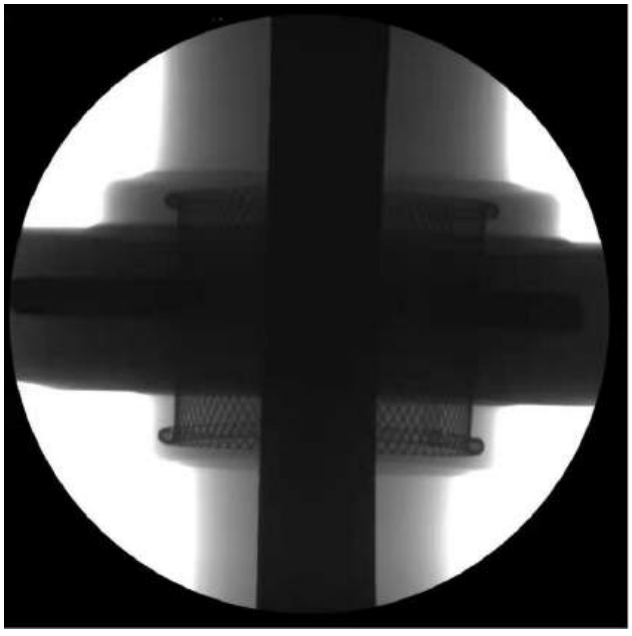
4. X-ray

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2104251-08	OK	OK	
2	2104251-05	OK	OK	
3	2104242-12	OK	OK	
4	2104251-18	OK	OK	
5	2104251-07	OK	OK	
6	2104242-11	OK	OK	
7	2104242-21	OK	OK	
8	2104251-01	OK	OK	
9	2104242-07	OK	OK	
10	2104242-19	OK	OK	



Before thermal cycle test



After thermal cycle test

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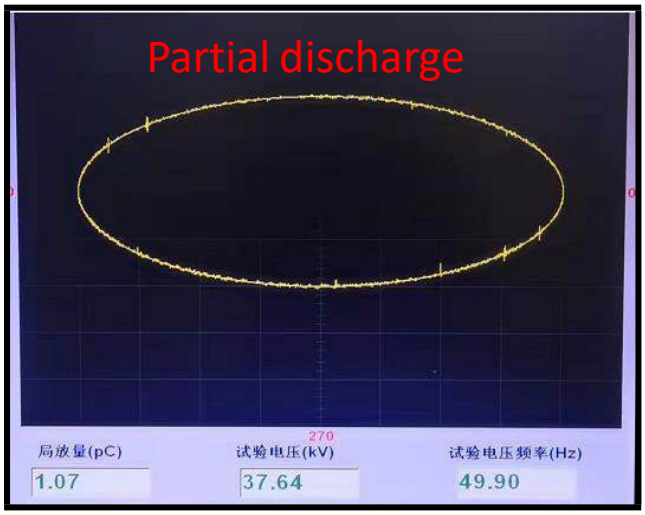
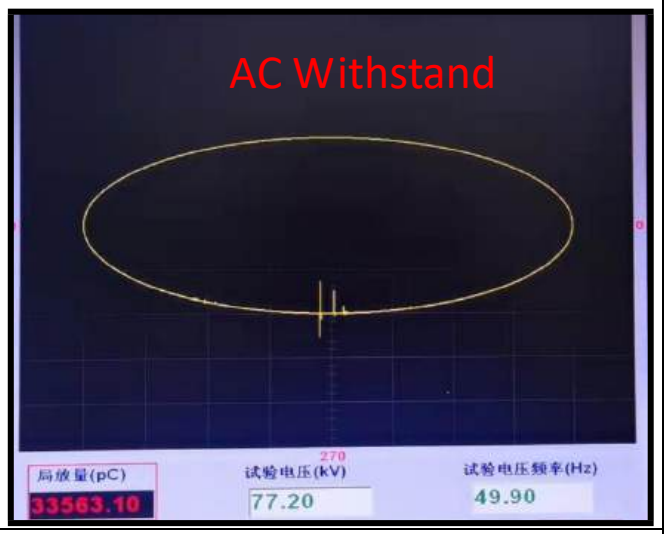
Fax:+86-0563-2251805

5. Partial discharge and AC withstand voltage

No.	Batch number	Before thermal cycle test		After thermal cycle test		Note
		Partial discharge 31.2kV<3pC	AC Withstand 77kV/1min	Partial discharge 31.2kV<3pC	AC Withstand 77kV/1min	
1	2104251-08	36/35	OK	35/34	OK	
2	2104251-05	35/34	OK	35/33	OK	
3	2104242-12	35/33	OK	34/33	OK	
4	2104251-18	36/33	OK	35/34	OK	
5	2104251-07	35/34	OK	34/33	OK	
6	2104242-11	36/35	OK	35/35	OK	
7	2104242-21	36/34	OK	35/33	OK	
8	2104251-01	35/34	OK	34/33	OK	
9	2104242-07	36/35	OK	35/34	OK	
10	2104242-19	36/34	OK	35/33	OK	





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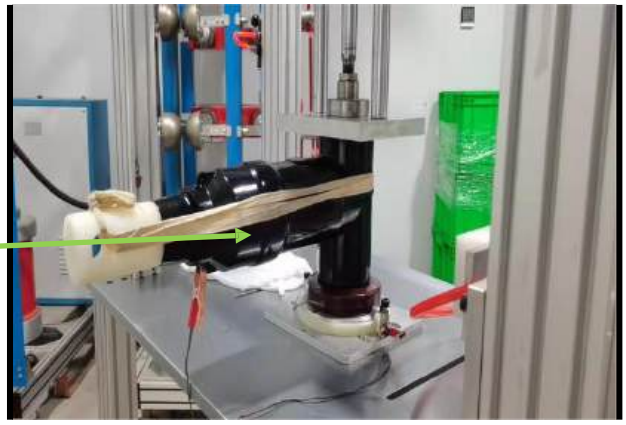
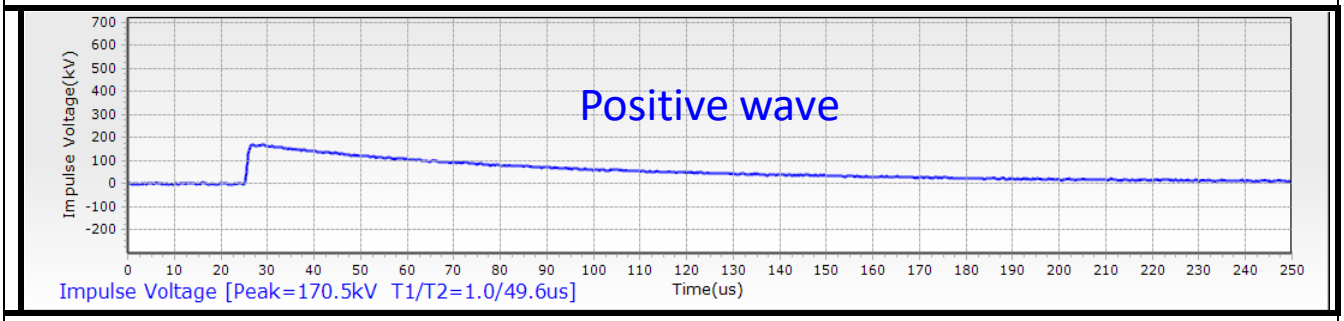
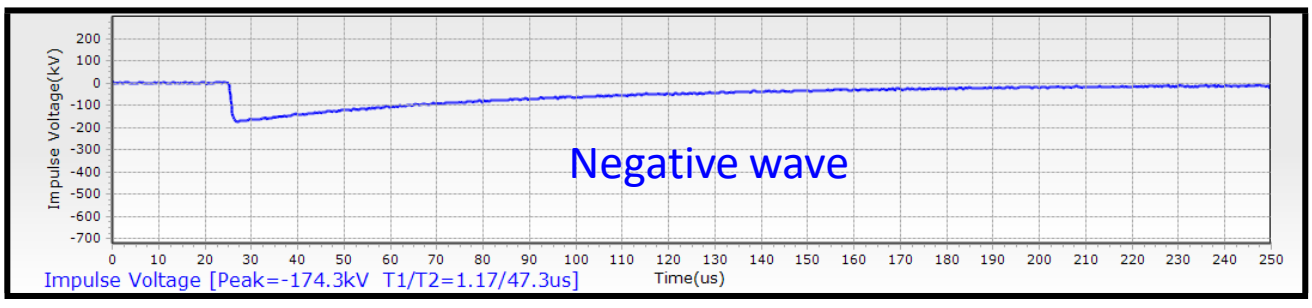
Fax:+86-0563-2251805

6. Impulse voltage

No.	Batch number	Impulse voltage ±170kV		Note
		Before thermal cycle test	After thermal cycle test	
1	2104251-08	OK	OK	
2	2104251-05	OK	OK	
3	2104242-12	OK	OK	
4	2104251-18	OK	OK	
5	2104251-07	OK	OK	
6	2104242-11	OK	OK	
7	2104242-21	OK	OK	
8	2104251-01	OK	OK	
9	2104242-07	OK	OK	
10	2104242-19	OK	OK	







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7. Helium leakage test

No.	Batch number	Before thermal cycle test	After thermal cycle test	Note
1	2104251-08	OK	OK	
2	2104251-05	OK	OK	
3	2104242-12	OK	OK	
4	2104251-18	OK	OK	
5	2104251-07	OK	OK	
6	2104242-11	OK	OK	
7	2104242-21	OK	OK	
8	2104251-01	OK	OK	
9	2104242-07	OK	OK	
10	2104242-19	OK	OK	

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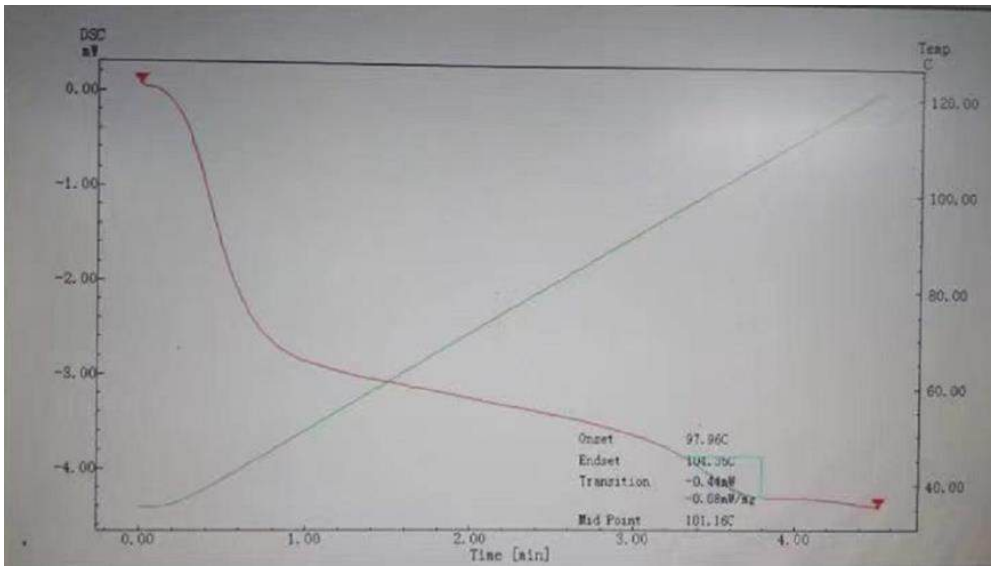
8. Tg test: 101.16℃



9. Conclusion：

9.1 All the above test items were carried out in accordance with IEEE Std., 386-2016 7.20 for thermal cycle withstand test. According to the result of the comparison test, there was no obvious difference between the data of before and after the test, so it was determined that the product is in accordance with IEEE Std., 386-2016 7.20.

9.2 The following table shows IEEE Std., 386-2016 7.20 and BS 2562-1979 12.3 standard.

Standard	Requirement	Note
IEEE Std.386-2016 7.20	-40~130℃	10 cycles
BS 2562-1979 12.3	-10~105℃	10 cycles

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TỔNG CÔNG TY ĐIỆN LỰC THÀNH PHỐ HỒ CHÍ MINH
CÔNG TY THÍ NGHIỆM ĐIỆN LỰC THÀNH PHỐ HỒ CHÍ MINH

VILAS 812 ISO 9001:2015

Số:605181/BBTN-ETC-TB

BIÊN BẢN THỬ NGHIỆM

Tân Sơn Hòa, ngày 06/08/2025

BIÊN BẢN THỬ NGHIỆM ĐỘ TĂNG NHIỆT

I. LÝ LỊCH THIẾT BỊ:

- Hiệu : CHARDON
- Loại : 24-DIB250-2-1
- Tên khách hàng : CÔNG TY TNHH NGUYÊN VĨNH TIẾN
- Lý do thử nghiệm : Thử nghiệm (Theo yêu cầu khách hàng).
- Tên công trình : Theo yêu cầu khách hàng
- Thử nghiệm tại : Công ty Thí Nghiệm Điện Lực TP Hồ Chí Minh.
- Ngày thử nghiệm: 04/08/2025
- Căn cứ thực hiện: 25006455/PYC-ETC

II. QUY CÁCH KỸ THUẬT :

- Dòng điện định mức: 250 A
- Điện áp định mức : 24 kV
- Vật liệu cách điện : Epoxy
- Số tem : **25T29933**

III. KẾT QUẢ THỬ NGHIỆM :

Điểm đo nhiệt độ	Độ tăng nhiệt cho phép	Giá trị đo nhiệt độ trên các pha (^{0}C) (Nhiệt độ môi trường 31.0^{0}C)
		Pha A
1	90	85
2	120	107
3	90	88
4	120	109
Độ tăng nhiệt tối đa		78
Kết quả		Đạt

IV. ĐIỀU KIỆN THỬ NGHIỆM :

- Dòng điện thử nghiệm: 250A.
- Thử nghiệm ở 2 đầu cực của sứ.
- Tần số dòng điện 50Hz, tốc độ gió của môi trường xung quanh ≤ 0.15m/s.
- Kết nối 2 đầu cực bằng cáp đồng 150mm^2.
- **Tiêu chuẩn thử nghiệm:** Thử nghiệm theo tiêu chuẩn IEC 60137
- **Thiết bị thử nghiệm:** Máy tạo dòng AVO DDA-6000, máy đo nhiệt độ tiếp xúc 4 kênh SDL200.
- **Ghi chú:** Biên bản này chỉ có giá trị đối với mẫu thử trên tại thời điểm thử nghiệm .

V. NHẬN XÉT : Sứ đạt yêu cầu thử nghiệm độ tăng nhiệt theo tiêu chuẩn IEC 60137.

KT.GIÁM ĐỐC PHÓ GIÁM ĐỐC	PHÂN XƯỞNG TB QUẢN ĐỐC	NHÂN VIÊN THỬ NGHIỆM
Trịnh Ngọc Tuấn	Hình Hữu Trí	Nguyễn Hồng Sơn Trần Thành Hưng

CÔNG TY THÍ NGHIỆM ĐIỆN LỰC THÀNH PHỐ HỒ CHÍ MINH

Địa chỉ: B84A Bạch Đằng, Phường 2, Quận Tân Bình, Thành phố Hồ Chí Minh, Việt Nam
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Email: cttnd@hcmpc.com.vn

605178/BBTN-ETC-TB

BIÊN BẢN THỬ NGHIỆM

Tân Sơn Hoà, ngày 01/08/2025

I. ĐỐI TƯỢNG THỬ NGHIỆM: SỨ XUYÊN

II. KHÁCH HÀNG:

- Tên khách hàng : CÔNG TY TNHH NGUYÊN VĨNH TIẾN
- Địa chỉ : Số B11, khu dân cư Tân Phong, KP 7, Phường Tân Triều, Tỉnh Đồng Nai, Việt Nam
- Tên công trình : **Theo yêu cầu khách hàng**
- Lý do thử nghiệm : **Thử nghiệm (Theo yêu cầu khách hàng)**
- Nơi thử nghiệm : Công ty THí Nghiệm Điện Lực
- Ngày thử nghiệm : 01/08/2025
- Căn cứ thực hiện : 25006455/PYC-ETC

III. THÔNG SỐ KỸ THUẬT:

- Hiệu: CHARDON
- Kiểu: 24-DIB250-2-1
- Điện áp định mức: 24 kV
- Vật liệu cách điện: Epoxy

IV. KẾT QUẢ THỬ NGHIỆM:

- Nhiệt độ: 32 °C

1. Kiểm tra bên ngoài: Bình thường

2. Đo điện trở cách điện (MΩ) và thử điện áp tăng cao tần số 50 Hz/ 1 phút:

STT	Số tem	Rcđ (MΩ)	Uthử (kV)	
			Khô (1 phút)	Ướt (10 giây)
1	25T29933	50.000	61	-

(*) Tiêu chuẩn áp dụng: IEC 60137

(**) Thiết bị thử nghiệm: KYORITSU - SN: E0053656; BIDDLE - SN: 1437

(***) Các kết quả thử nghiệm chỉ có giá trị đối với mẫu thử.

V. NHẬN XÉT:

Sứ trên đạt yêu cầu thử nghiệm theo tiêu chuẩn áp dụng tại mục (*).

Ghi chú:

Địa chỉ: B84A Bạch Đằng, Phường 2, Quận Tân Bình, Thành phố Hồ Chí Minh, Việt Nam
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Website: https://etc.hcmpc.com.vn
Email: cttnd@hcmpc.com.vn

KT. GIÁM ĐỐC PHÓ GIÁM ĐỐC	PHÂN XƯỞNG THIẾT BỊ QUẢN ĐỐC	Nhân viên thử nghiệm - Long Quốc Chung - Nguyễn Hồng Sơn
Trịnh Ngọc Tuấn	Hình Hữu Trí	

CÔNG TY THÍ NGHIỆM ĐIỆN LỰC THÀNH PHỐ HỒ CHÍ MINH
CHI NHÁNH TỔNG CÔNG TY ĐIỆN LỰC THÀNH PHỐ HỒ CHÍ MINH
MSCN: 0300951119-016

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CÔNG TY THÍ NGHIỆM ĐIỆN LỰC THÀNH PHỐ HỒ CHÍ MINH

VILAS 812 | ISO 9001:2015

Số:605182/BBTN-ETC-TB

BIÊN BẢN THỬ NGHIỆM

Tân Sơn Hòa, ngày 06/08/2025

BIÊN BẢN THỬ NGHIỆM ĐỘ TĂNG NHIỆT

I. LÝ LỊCH THIẾT BỊ:

- Hiệu : CHARDON
- Loại : 36-DIB400-2-1
- Tên khách hàng : CÔNG TY TNHH NGUYÊN VĨNH TIẾN
- Lý do thử nghiệm : Thử nghiệm (Theo yêu cầu khách hàng).
- Tên công trình : Theo yêu cầu khách hàng
- Thử nghiệm tại : Công ty Thí Nghiệm Điện Lực TP Hồ Chí Minh.
- Ngày thử nghiệm: 04/08/2025
- Căn cứ thực hiện: 25006455/PYC-ETC

II. QUY CÁCH KỸ THUẬT :

- Dòng điện định mức: 400 A
- Điện áp định mức : 36 kV
- Vật liệu cách điện : Epoxy
- Số tem : **25T29934**

III. KẾT QUẢ THỬ NGHIỆM :

Điểm đo nhiệt độ	Độ tăng nhiệt cho phép	Giá trị đo nhiệt độ trên các pha (^{0}C) (Nhiệt độ môi trường 31.0^{0}C)
		Pha A
1	90	86
2	120	112
3	90	84
4	120	111
Độ tăng nhiệt tối đa		81
Kết quả		Đạt

IV. ĐIỀU KIỆN THỬ NGHIỆM :

- Dòng điện thử nghiệm: 400A.
- Thử nghiệm ở 2 đầu cực của sứ.
- Tần số dòng điện 50Hz, tốc độ gió của môi trường xung quanh ≤ 0.15m/s.
- Kết nối 2 đầu cực bằng cáp đồng 240mm^2.
- **Tiêu chuẩn thử nghiệm:** Thử nghiệm theo tiêu chuẩn IEC 60137
- **Thiết bị thử nghiệm:** Máy tạo dòng AVO DDA-6000, máy đo nhiệt độ tiếp xúc 4 kênh SDL200.
- **Ghi chú:** Biên bản này chỉ có giá trị đối với mẫu thử trên tại thời điểm thử nghiệm .

V. NHẬN XÉT : Sứ đạt yêu cầu thử nghiệm độ tăng nhiệt theo tiêu chuẩn IEC 60137.

KT GIÁM ĐỐC PHÓ GIÁM ĐỐC	PHÂN XƯỞNG TB QUẢN ĐỐC	NHÂN VIÊN THỬ NGHIỆM
Trịnh Ngọc Tuấn	Hình Hữu Trí	Nguyễn Hồng Sơn Trần Thành Hưng

Địa chỉ: B84A Bạch Đằng, Phường 2, Quận Tân Bình, Thành phố Hồ Chí Minh, Việt Nam
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605179/BBTN-ETC-TB

BIÊN BẢN THỬ NGHIỆM

Tân Sơn Hoà, ngày 01/08/2025

I. ĐỐI TƯỢNG THỬ NGHIỆM: SỨ XUYÊN

II. KHÁCH HÀNG:

- Tên khách hàng : CÔNG TY TNHH NGUYÊN VĨNH TIẾN
- Địa chỉ : Số B11, khu dân cư Tân Phong, KP 7, Phường Tân Triều, Tỉnh Đồng Nai, Việt Nam
- Tên công trình : **Theo yêu cầu khách hàng**
- Lý do thử nghiệm : **Thử nghiệm (Theo yêu cầu khách hàng)**
- Nơi thử nghiệm : Công ty THí Nghiệm Điện Lực
- Ngày thử nghiệm : 01/08/2025
- Căn cứ thực hiện : 25006455/PYC-ETC

III. THÔNG SỐ KỸ THUẬT:

- Hiệu: CHARDON
- Kiểu: 36-DIB400-2-1
- Điện áp định mức: 36 kV
- Vật liệu cách điện: Epoxy

IV. KẾT QUẢ THỬ NGHIỆM:

- Nhiệt độ: 32 °C

1. Kiểm tra bên ngoài: Bình thường

2. Đo điện trở cách điện (MΩ) và thử điện áp tăng cao tần số 50 Hz/ 1 phút:

STT	Số tem	Rcđ (MΩ)	Uthử (kV)	
			Khô (1 phút)	Ướt (10 giây)
1	25T29934	50.000	77	-

(*) Tiêu chuẩn áp dụng: IEC 60137

(**) Thiết bị thử nghiệm: KYORITSU - SN: E0053656; BIDDLE - SN: 1437

(***) Các kết quả thử nghiệm chỉ có giá trị đối với mẫu thử.

V. NHẬN XÉT:

Sứ trên đạt yêu cầu thử nghiệm theo tiêu chuẩn áp dụng tại mục (*).

Ghi chú:

Địa chỉ: B84A Bạch Đằng, Phường 2, Quận Tân Bình, Thành phố Hồ Chí Minh, Việt Nam
Điện thoại: (028) 3845 5168 - 2229 8682
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KT. GIÁM ĐỐC
PHÓ GIÁM ĐỐC

CÔNG TY THÍ NGHIỆM ĐIỆN LỰC THÀNH PHỐ HỒ CHÍ MINH

Trịnh Ngọc Tuấn

PHÂN XƯỞNG THIẾT BỊ
QUẢN ĐỐC

Hình Hữu Trí

Nhân viên thử nghiệm

- **Long Quốc Chung**
- **Nguyễn Hồng Sơn**

Địa chỉ: B84A Bạch Đằng, Phường 2, Quận Tân Bình, Thành phố Hồ Chí Minh, Việt Nam
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TỔNG CÔNG TY ĐIỆN LỰC THÀNH PHỐ HỒ CHÍ MINH
CÔNG TY THÍ NGHIỆM ĐIỆN LỰC THÀNH PHỐ HỒ CHÍ MINH

VILAS 812 | ISO 9001 : 2015

Số:605183/BBTN-ETC-TB

BIÊN BẢN THỬ NGHIỆM

Tân Sơn Hòa, ngày 06/08/2025

BIÊN BẢN THỬ NGHIỆM ĐỘ TĂNG NHIỆT

I. LÝ LỊCH THIẾT BỊ:

- Hiệu : CHARDON
- Loại : 36-DIB630-2-1
- Tên khách hàng : CÔNG TY TNHH NGUYÊN VĨNH TIẾN
- Lý do thử nghiệm : Thử nghiệm (Theo yêu cầu khách hàng).
- Tên công trình : Theo yêu cầu khách hàng
- Thử nghiệm tại : Công ty Thí Nghiệm Điện Lực TP Hồ Chí Minh.
- Ngày thử nghiệm: 04/08/2025
- Căn cứ thực hiện: 25006455/PYC-ETC

II. QUY CÁCH KỸ THUẬT :

- Dòng điện định mức: 630 A
- Điện áp định mức : 36 kV
- Vật liệu cách điện : Epoxy
- Số tem : **25T29935**

III. KẾT QUẢ THỬ NGHIỆM :

Điểm đo nhiệt độ	Độ tăng nhiệt cho phép	Giá trị đo nhiệt độ trên các pha (^{0}C) (Nhiệt độ môi trường 31.0^{0}C)
		Pha A
1	90	88
2	120	115
3	90	87
4	120	114
Độ tăng nhiệt tối đa		84
Kết quả		Đạt

IV. ĐIỀU KIỆN THỬ NGHIỆM :

- Dòng điện thử nghiệm: 630A.
- Thử nghiệm ở 2 đầu cực của sứ.
- Tần số dòng điện 50Hz, tốc độ gió của môi trường xung quanh ≤ 0.15m/s.
- Kết nối 2 đầu cực bằng cáp đồng 240mm^2.
- **Tiêu chuẩn thử nghiệm:** Thử nghiệm theo tiêu chuẩn IEC 60137
- **Thiết bị thử nghiệm:** Máy tạo dòng AVO DDA-6000, máy đo nhiệt độ tiếp xúc 4 kênh SDL200.
- **Ghi chú:** Biên bản này chỉ có giá trị đối với mẫu thử trên tại thời điểm thử nghiệm .

V. NHẬN XÉT :Sứ đạt yêu cầu thử nghiệm độ tăng nhiệt theo tiêu chuẩn IEC 60137.

KT.GIÁM ĐỐC PHÓ GIÁM ĐỐC	PHÂN XƯỞNG TB QUẢN ĐỐC	NHÂN VIÊN THỬ NGHIỆM
Trần Ngọc Tuấn	Hình Hữu Trí	Nguyễn Hồng Sơn Trần Thành Hưng

Địa chỉ: B84A Bạch Đằng, Phường 2, Quận Tân Bình, Thành phố Hồ Chí Minh, Việt Nam
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605180/BBTN-ETC-TB

BIÊN BẢN THỬ NGHIỆM

Tân Sơn Hoà, ngày 01/08/2025

I. ĐỐI TƯỢNG THỬ NGHIỆM: SỨ XUYÊN

II. KHÁCH HÀNG:

- Tên khách hàng : CÔNG TY TNHH NGUYÊN VĨNH TIẾN
- Địa chỉ : Số B11, khu dân cư Tân Phong, KP 7, Phường Tân Triều, Tỉnh Đồng Nai, Việt Nam
- Tên công trình : **Theo yêu cầu khách hàng**
- Lý do thử nghiệm : **Thử nghiệm (Theo yêu cầu khách hàng)**
- Nơi thử nghiệm : Công ty THí Nghiệm Điện Lực
- Ngày thử nghiệm : 01/08/2025
- Căn cứ thực hiện : 25006455/PYC-ETC

III. THÔNG SỐ KỸ THUẬT:

- Hiệu: CHARDON
- Kiểu: 36-DIB630-2-1
- Điện áp định mức: 36 kV
- Vật liệu cách điện: Epoxy

IV. KẾT QUẢ THỬ NGHIỆM:

- Nhiệt độ: 32 °C

1. Kiểm tra bên ngoài: Bình thường

2. Đo điện trở cách điện (MΩ) và thử điện áp tăng cao tần số 50 Hz/ 1 phút:

STT	Số tem	Rcđ (MΩ)	Uthử (kV)	
			Khô (1 phút)	Ướt (10 giây)
1	25T29935	50.000	77	-

(*) Tiêu chuẩn áp dụng: IEC 60137

(**) Thiết bị thử nghiệm: KYORITSU - SN: E0053656; BIDDLE - SN: 1437

(***) Các kết quả thử nghiệm chỉ có giá trị đối với mẫu thử.

V. NHẬN XÉT:

Sứ trên đạt yêu cầu thử nghiệm theo tiêu chuẩn áp dụng tại mục (*).

Ghi chú:

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Email: cttnd@hcmpc.com.vn

KT. GIÁM ĐỐC PHÓ GIÁM ĐỐC	PHÂN XƯỞNG THIẾT BỊ QUẢN ĐỐC	Nhân viên thử nghiệm - Long Quốc Chung - Nguyễn Hồng Sơn
Trịnh Ngọc Tuấn	Hình Hữu Trí	

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ĐẠI DIỆN PHÂN PHỐI TẠI VIỆT NAM

CÔNG TY TNHH NGUYÊN VĨNH TIẾN

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