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TEST REPORT

CEPRI-EETC02-2017-0073

Client: SHANGHAI CHARDON ELECTRIC LTD.

Object: Separable Connectors 17kV/45kV (17-RDTA50/17-FDTA50)

Coupling(Rear)T-Body Surge Arrester

Type: 17-RDTA45/17-FDTA45

(17-RDTA50/17-FDTA50)

Test Category: Type Test



POWER INDUSTRY QUALITY INSPECTION AND TEST
CENTER FOR ELECTRIC EQUIPMENT

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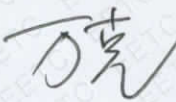
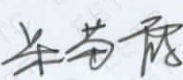
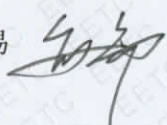
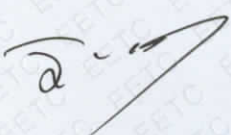
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Client	SHANGHAI CHARDON ELECTRIC LTD.	Manufacturer	SHANGHAI CHARDON ELECTRIC LTD.
Object	Separable Connectors 17kV/45kV(17kV/50kV) Coupling(Rear)T-Body Surge Arrester	Type	17-RDTA45/17-FDTA45 (17-RDTA50/17-FDTA50) Φ31mm×31mm
Sampling procedure	Delivered by the client	Serial No.	3 arrester (001~003), 3 housing(401~403), 9 resistors (301~309), 6 thermally prorated sections (201~206)
Test Category	Type Test	Date	2017.06.06~2017.08.25
Requirements	GB/T 11032-2010 Metal-oxide surge arresters without gaps for a.c. systems		
Conclusion	The Separable Connectors 17kV/45kV(17kV/50kV) Coupling(Rear)T-Body Surge Arrester of 17-RDTA45/17-FDTA45 (17-RDTA50/17-FDTA50) have successfully passed the type test specified in GB/T 11032-2010		
Note	Note 1: In the event of any difference in meanings of the text, the Chinese report shall take precedence over the English version. Note 2: Since the date of issuance, the routine test which concerns about the related content must be done every three years in order to extend the validity of this report.		
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Approved by: 王保山  Date of issue: 2017.11.17			

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Test Results					
No.	Item	Requirements	Results	Evaluation	
1	D.C. reference voltage test	$24.0\text{kV} \leq U_{1\text{mA DC}} \leq 26.2\text{kV}$	$25.8\text{kV} \sim 25.9\text{kV}$	Passed	
2	Leakage current test at 0.75 times D.C. reference voltage	$I_L(0.75U_{1\text{mA DC}}) \leq 50\mu\text{A}$	$2.0\mu\text{A} \sim 3.0\mu\text{A}$	Passed	
3	Continuous operating current test	total current $I_x \leq 500\mu\text{A}$ resistive current $I_R \leq 200\mu\text{A}$	$I_x = 303\mu\text{A} \sim 307\mu\text{A}$ $I_R = 62\mu\text{A} \sim 67\mu\text{A}$	Passed	
4	A.C. reference voltage test	$U_{1\text{mA AC}} \geq 17.0\text{kV}$	$19.0\text{kV} \sim 19.1\text{kV}$	Passed	
5	Partial discharge test	$1.05U_c$ 下, $PD \leq 10\text{ pC}$	$PD = 1.0\text{pC} \sim 2.0\text{pC}$	Passed	
6	Seal leak rate test	Put the samples into the boiling water with 0.1%NaCl for 42 h: change rate of $U_{1\text{mA DC}} \leq 5\%$ change of leakage current $I_L \leq 20\mu\text{A}$ partial discharge $PD \leq 10\text{ pC}$	$\Delta U_{1\text{mA DC}} = -1.16\% \sim -0.39\%$ $\Delta I_L = +1.0\mu\text{A} \sim +2.0\mu\text{A}$ $PD = 3.0\text{ pC} \sim 4.0\text{ pC}$	Passed	
7	Bending load test	Bending load $\geq 382\text{N}$ for 60s ~ 90s, the surge arrester should not be injured	385N, 60s	Passed	
8	Insulation withstand test	Power-frequency voltage: $\text{Dry} \geq 42\text{kVr.m.s}$ for 1min. lightning impulse voltage: 95kV_p , the positive and negative 15 times respectively.	Power-frequency voltage (dry) 42.3kVr.m.s. , 1min. Lightning impulse voltage $95.5\text{kV}_p \sim 96.8\text{kV}_p$, the positive and negative 15 times respectively.	Passed	

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9	Residual voltage test	Lightning impulse current	$\leq 45.0\text{kV}_P$	44.5kV _P	Passed	
		Steep impulse current	$\leq 38.3.0\text{kV}_P$	35.0kV _P		
		Switching impulse current	$\leq 51.8\text{kV}_P$	51.0kV _P		
10	Long duration current impulse withstand test		2000 μs 、150A、18 times	2024 μs 、152A ~159A	Passed	
11	Operating duty test	Accelerated ageing test	115℃、1000h	$P_{2ct} < 1.1P_{3ct}$, $P_{2ct} < P_{1ct}$	Passed	
		High-current impulse operating duty test	4/10 μs 、65kA high-current impulse , 2 times	65.2 kA ~65.7kA		
12	Power-frequency voltage versus time characteristics test		Supply the Power-frequency voltage versus time characteristics for the range of voltage from $1.10U_R$ to $0.85U_R$, the range of time from 10s to 24h; for $1.10U_R$, the time is 10s; for $0.85U_R$, the time is 24h.	$1.10U_R$ 10s $1.00U_R$ 2h $0.85U_R$ 24h	Passed	

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Content:

1~2 DC reference voltage test and leakage current at 0.75 DC reference voltage test

Environment temperature: 25.5°C humidity: 82%

Samples	measured value kV	specified value kV	0.75 DC reference voltage kV		leakage current μA	
			measured value	specified value	measured value	specified value
001	25.8	$24.0 \leq U_{1mA DC} \leq 26.2$	19.4	$0.75 U_{1mA DC} \pm 1\%$	3.0	≤ 50
002	25.9		19.4		2.0	
003	25.8		19.4		2.0	

Note: The standards formulate the lower limits of DC reference voltage only, the upper limits were declared by the manufacturer to confirm the scale factor and protection level of the arrester.

Fulfilled the requirements.

3~4 Power-frequency reference voltage test and Continuous current test

Environment temperature: 25.5°C humidity: 82%

Samples	The power-frequency reference voltage $U_{1mA AC}$ kV (Peak value/ $\sqrt{2}$)		I_R μA (Peak value)		I_x μA (r.m.s)	
	measured value	specified value	measured value	specified value	measured value	specified value
001	19.0	≥ 17	62	≤ 200	303	≤ 500
002	19.1		66		307	
003	19.1		67		306	

Note: The standard stipulates that the continuous current of arrester under the continuous operating voltage declared by manufacturer.

Fulfilled the requirements.

5 Partial discharge test

Samples	U_r	U_r duration time	$1.05 U_c$	$1.05 U_c$ duration time	partial discharge
	kV r.m.s.	s	kV r.m.s.	s	pC
001	17	10	14.3	60	2.0
002	17	10	14.3	60	2.0
003	17	10	14.3	60	1.0
specified value	17	2~10	14.3	60	≤ 10

Fulfilled the requirements.

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6 Sealing test

6 Sealing test											
Samples	Boiling time	Cooling time in air	DC reference voltage			leakage current at 0.75U _{ImA.DC}			Partial discharge		Surface check after test
			Before	After	change rate	Before	After	change rate	Before	After	
	h	kV	%	μA			pC				
001	42	5	25.8	25.6	-0.78	3.0	4.0	+1.0	2.0	3.0	No visible mechanical damage
002	42	5	25.9	25.6	-1.16	2.0	4.0	+2.0	2.0	4.0	No visible mechanical damage
003	42	5	25.8	25.7	-0.39	2.0	3.0	+1.0	1.0	3.0	No visible mechanical damage
specified value	42	8	≥24		≤5	≤50		≤20	≤10		Should not have visible mechanical damage

Note 1: NaCl concentration in water for 1 kg/m³.

Note 2: The sample 001 has passed the bending moment test.

Fulfilled the requirements.

7 Mechanical performance test

7.1 Bending moment

$$F_1=147N \quad S=0.019m^2 \quad F_2=11.4N$$

$$MPSL=2.5 \times (F_1+F_2/2) = 382N$$

Samples	Actual loading	Time	Maximum deflection	Residual deflection	Housing height	deflection rate	force / deflection curve	Sample check
	N	s	mm	mm	mm	%	-	-
001	385	60	8.6	4.6	280	1.64	No mutation	No mechanical damage
specified value	382	60~90	/	/	/	≤5	Should not have mutation	Should not have mechanical damage

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7.2 Data comparison before and after test

Samples	U _{1mA DC}			leakage current			Partial discharge	
	kV			μA			pC	
	Before	After	change rate %	Before	After	change rate	Before	After
001	25.8	25.6	-0.78	3	4	+1	2.0	3.0
specified value	≥24		≤5	≤50		≤20	≤10	

Fulfilled the requirements.

8 Insulation withstand test

8.1 Power-frequency voltage withstand test.

Altitude: ≤1000m

Sample	specified value	atmospheric correction factor	altitude correction factor	corrected value	applied voltage	Withstand time	Test result
	kV _{r.m.s.}	K _t	K _a	kV _{r.m.s.}	kV _{r.m.s.}	s	
401~403	42 (dry)	1.000	1.000	42.3	42	60	No flashover

Note: The test samples are indoor products, don't make humidity correction.

8.2 Lightning impulse voltage withstand test

Altitude: ≤1000m

Sample	specified value		atmospheric correction factor	altitude correction factor	corrected value	applied voltage	Withstand time	Test result
		kV	K _t	K _a	kV _p	kV _p		
401~403	(+)	95	1.000	1.000	95.6~96.2	95.5~96.8	15	No breakdown, no flashover
	(-)	95	1.000	1.000	95.5~96.4	95.7~96.6	15	No breakdown, no flashover

Note: The test samples are indoor products, don't need humidity correction.

Fulfilled the requirements.

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9 Residual voltage test

9.1 Lighting impulse residual voltage test

Samples			301	302	303
Resistor	$U_{1mA,DC}$	kV	6.69	6.69	6.69
	2.5kA	kV_p	10.71	10.7	10.72
	5kA	kV_p	11.34	11.35	11.35
	10kA	kV_p	12.84	12.86	12.84
	$U_{5kA}/U_{1mA,DC}$		1.70	1.57	1.58
Complete arrester	$U_{1mA,DC}$	kV	$24.0 \leq U_{1mA,DC} \leq 26.2$		
	ratio	-	3.92	3.92	3.92
	measured value	kV_p	44.5		
	specified value	kV_p	≤ 45.0		

Note 1: Current measuring coil output 0.025V/A, divider ratio $K_d=206.1$.

Note 2: The maximum residual voltage should be drawn on voltage-current curve, the residual voltage in the curve in correspondence with the nominal discharge current is defined as the lighting impulse protection level.

9.2 Switching impulse residual voltage test

Samples			301	302	303
Resistor	Residual voltage 250A	kV_p	8.90	8.91	8.93
complete arresters	ratio	-	3.92	3.92	3.92
	measured value	kV_p	34.9	34.9	35.0
	specified value	kV_p	≤ 38.3		

Note : Current measuring coil output 0.025V/A, divider ratio $K_d=206.1$.

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9.3 Steep current impulse residual voltage test

Samples			301	302	303
Resistor	5 kA ,residual voltage U_{res1}	kV _p	13.16	13.12	13.11
	5 kA ,residual voltage of metal block U_{res2}	kV _p	0.33		
	Ratio, U_{res2}/U_{res1}	%	2.51	2.52	2.52
	5kA ,residual voltage after correction	kV _p	12.83	12.79	12.78
Complete arrester	Ratio	-	3.92	3.92	3.92
	Residual voltage	kV _p	50.3	50.1	50.1
	Inductance per unit length	μH/m	1		
	Length without resistors	m	$0.28 - (0.031 \times 4) = 0.156$		
	inductive voltage drop	kV _p	$1 \times 0.156 \times 5 = 0.78$		
	After correction	kV _p	51.0	50.9	50.8
	specified value	kV _p	≤51.8		

Note1 : Current measuring coil output 0.001V/A, divider ratio $K_d=61.8$

Note 2: if U_{res2}/U_{res1} less than 2%, inductive voltage drop is needless.

Fulfilled the requirements. Test waveform is shown in figure A.1 ~ figure A.3.

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10 Rectangular current impulse withstand test						
Environment temperature:32.0℃ Humidity: 63%						
Samples		R4	R5	R6	specified value	
8/20μs I _n Residual voltage	kV _p	11.33	11.31	11.33	/	
Virtual duration of the peak, T _{0.9} , μs		2024			2000μs(100%~120%)	
Virtual total duration T _{0.1} , μs		2316			≤1.5T _{0.9}	
Current	The 1 st impulse	A	155	152	152	150A(90%~110%)
	The 2 nd impulse	A	152	152	155	150A(100%~110%)
	The 3 rd impulse	A	155	152	155	
	The 4 th impulse	A	155	152	152	
	The 5 th impulse	A	152	152	155	
	The 6 th impulse	A	152	155	152	
	The 7 th impulse	A	152	155	159	
	The 8 th impulse	A	159	155	159	
	The 9 th impulse	A	152	155	159	
	The 10 th impulse	A	152	159	152	
	The 11 th impulse	A	152	159	152	
	The 12 th impulse	A	155	152	152	
	The 13 th impulse	A	155	152	152	
	The 14 th impulse	A	155	152	152	
	The 15 th impulse	A	152	152	155	
	The 16 th impulse	A	152	152	155	
	The 17 th impulse	A	152	152	155	
	The 18 th impulse	A	155	155	159	
8/20μs I _n Residual voltage , after test		kV _p	11.33	11.31	7.98	/
Change rate of Residual voltage of the resistors		%	+0.49	+0.37	+0.38	≤5
Test result		No breakdown, no flashover, no breakage			No breakdown, no flashover, no breakage	
Note : Current measuring coil output 0.01V/A.						
Fulfilled the requirements. Test waveform is shown in figure A.4.						

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11 Operating duty test

11.1 Accelerated ageing test

Items	Unit	Samples		
		307	308	309
DC reference voltage U_{1mADC}	kV	6.67	6.66	6.66
applying power frequency voltage	kV _{r.m.s.}	4.01	4.01	4.01
chargeability	%	85.1	85.0	85.0
Power loss at 2 hour P_{1ct}	W	0.74	0.77	0.69
Power loss at 1008 hour P_{2ct}	W	0.58	0.57	0.55
Minimum power loss P_{3ct}	W	0.57	0.56	0.54
$P_{2ct}/1.1P_{3ct}$	-	0.93	0.93	0.93
P_{2ct}/P_{1ct}	-	0.78	0.74	0.80

Note1: Because $P_{2ct} < 1.1P_{3ct}$ and $P_{2ct} < P_{1ct}$, the samples of thermally prorated sections which made of new resistors without aging and apply voltage would be U_{sr} and U_{sc} in operating duty test.

Note 2: Resistor temperature: $115 \pm 4^\circ\text{C}$.

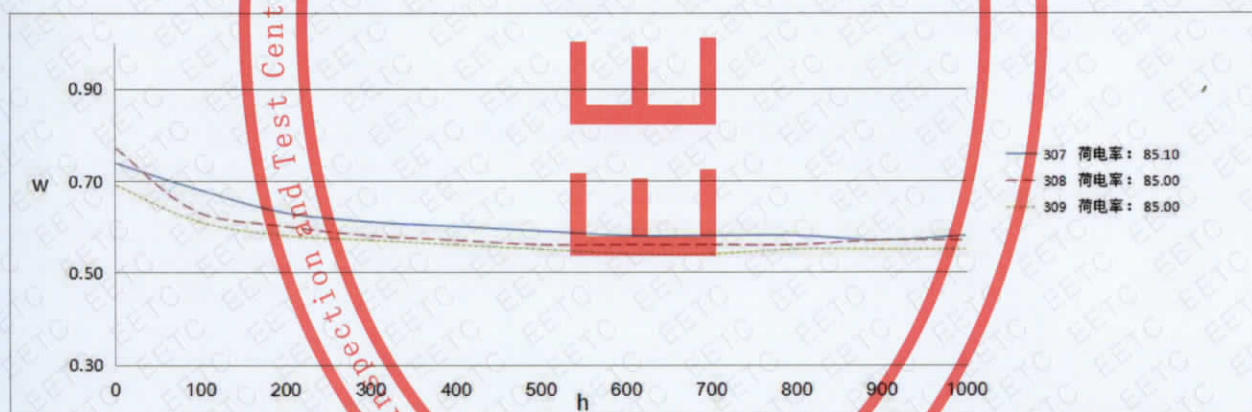


Figure 3 Accelerated ageing test curve

11.2 High-current impulse operating duty test data

Samples		201	202	203
U_{1mADC}	kV	6.68	6.68	6.68
U_r	kV _{r.m.s.}	4.73	4.73	4.73
U_c	kV _{r.m.s.}	3.79	3.79	3.79
K_{ct}	-	1.0	1.0	1.0
U_r^*	kV _{r.m.s.}	4.73	4.73	4.73
U_c^*	kV _{r.m.s.}	3.79	3.79	3.79
$1.20 \times U_c^*$	kV _{r.m.s.}	4.54	4.54	4.54

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11.3 High-current impulse operating duty test						
Environment temperature:32.5℃ humidity: 56%						
Samples			201	202	203	specified value
8/20μs U _{5kA} before test		kV _p	11.32	11.33	11.32	/
Conditioning test	1.20×U _c *	kV _{r.m.s}	4.54	4.54	4.54	1.20×U _c *
	Trigger degree	°	54.0			60°±15°(before peak value)
	The 1 st group	kA	4.9~5.1	4.9~5.1	4.9~5.1	20 times of 5kA, 8/20μs 4 groups of 5 times
	The 2 nd group		4.9~5.1	4.9~5.1	4.9~5.1	
	The 3 rd group		4.9~5.1	4.9~5.1	4.9~5.1	
	The 4 th group		4.9~5.1	4.9~5.1	4.9~5.1	
High-current impulse	1 st impulse	kA	65.7	65.2	65.3	Between two impulse, cooled samples to ambient temperature
	2 nd impulse	kA	65.5	65.4	65.4	
Applied voltage after 2 nd impulse	Time	ms	88	82	85	within 100ms
	U _r *	kV _{r.m.s}	4.73	4.73	4.73	peak/√2
	U _r * Duration	s	10	10	10	10
	U _c *	kV _{r.m.s}	3.79	3.79	3.79	-
	U _c * Duration	min	30	30	30	30
Power loss within 30 min, U _c *	0min	W	4.56	4.83	4.88	In the last 15 min power loss should reduce steadily
	5min		3.77	3.82	3.76	
	10min		2.96	3.22	3.15	
	15min		2.65	2.74	2.71	
	20min		1.88	2.25	2.09	
	25min		1.36	1.19	1.08	
	30min		1.08	0.98	0.96	
8/20μs U _{5kA} after		kV _p	11.27	11.25	11.25	-
8/20μs U _{5kA} change rate		%	-0.44	-0.71	-0.62	≤5
Visual inspection		-	No breakdown, flashover, cracking or other significant damage			No breakdown, flashover, cracking or other significant damage
Fulfilled the requirements.						

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12 Power frequency voltage versus time characteristics test						
12.1 Power frequency voltage versus time characteristics test data						
Samples		204	205	206		
$U_{1mA,DC}$	kV	6.67	6.67	6.67		
U_r	kV_{rms}	4.72	4.72	4.72		
U_c	kV_{rms}	3.78	3.78	3.78		
K_{ct}		1.00	1.00	1.0		
U_r^*	kV_{rms}	4.72	4.72	4.72		
U_c^*	kV_{rms}	3.78	3.78	3.78		
12.2 Power frequency voltage versus time characteristics test						
Environment temperature:32.0℃ humidity: 63%						
Samples		204	205	206	specified value	
8/20μs U_{5kA} before	kV	11.30	11.31	11.31	/	
High-current impulse	kA	65.6	65.6	65.7	preheated samples to 60℃±3℃	
Applied voltage after high-current impulse	Time	ms	83	88	83	within 100ms
	U_r^*	kV_{rms}	4.02	4.72	5.20	peak/√2
	Times of U_r^*	-	0.85	1.00	1.10	-
	U_r^* Duration	s	24 h	2 h	10 s	-
	U_c^*	kV_{rms}	3.78	3.78	3.78	-
	U_c^* Duration	min	30	30	30	30
	Power loss within 30 min	0min	W	3.23	4.75	5.53
5min		2.25		3.68	4.35	
10min		1.53		2.23	3.58	
15min		1.34		1.93	2.78	
20min		1.12		1.52	2.56	
25min		1.03		1.12	1.85	
30min		0.91		0.97	1.36	
8/20μs U_{5kA} after	kV_P	11.30	11.31	11.31	-	
8/20μs U_{5kA} change rate	%	-0.27	-0.44	-0.62	≤5	
Visual inspection	-	No breakdown, flashover, cracking or other significant damage			No breakdown, flashover, cracking or other significant damage	
Fulfilled the requirements.						
(No content below this page)						

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Appendix A: Object Parameters

Rated voltage U_r : 17kV

Continuous operating voltage U_c : 13.6kV_{r.m.s}

Nominal discharge current I_n : 5kA

Lightning impulse residual voltage: U_{res} : $\leq 45kV_p$

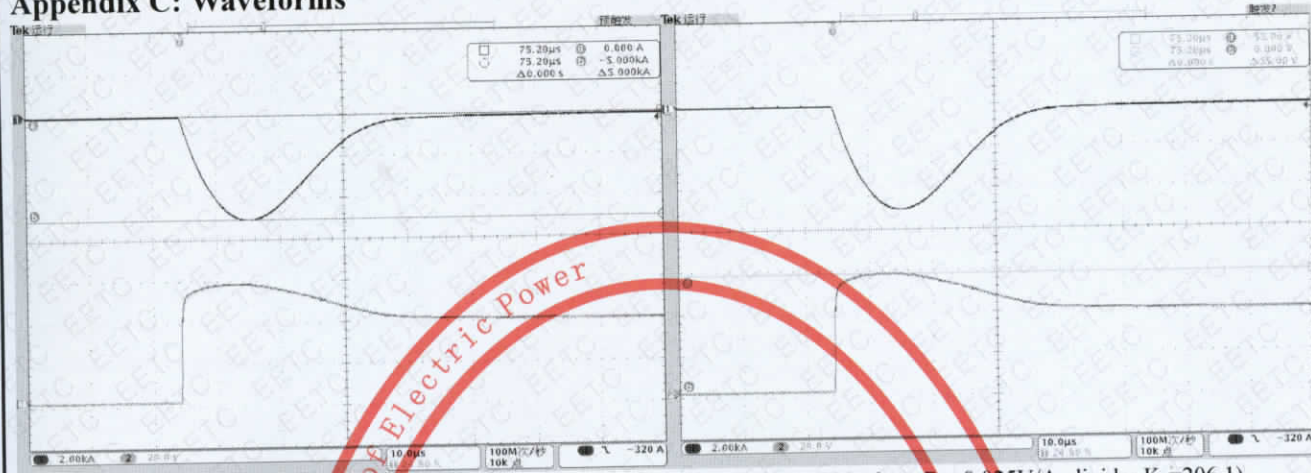
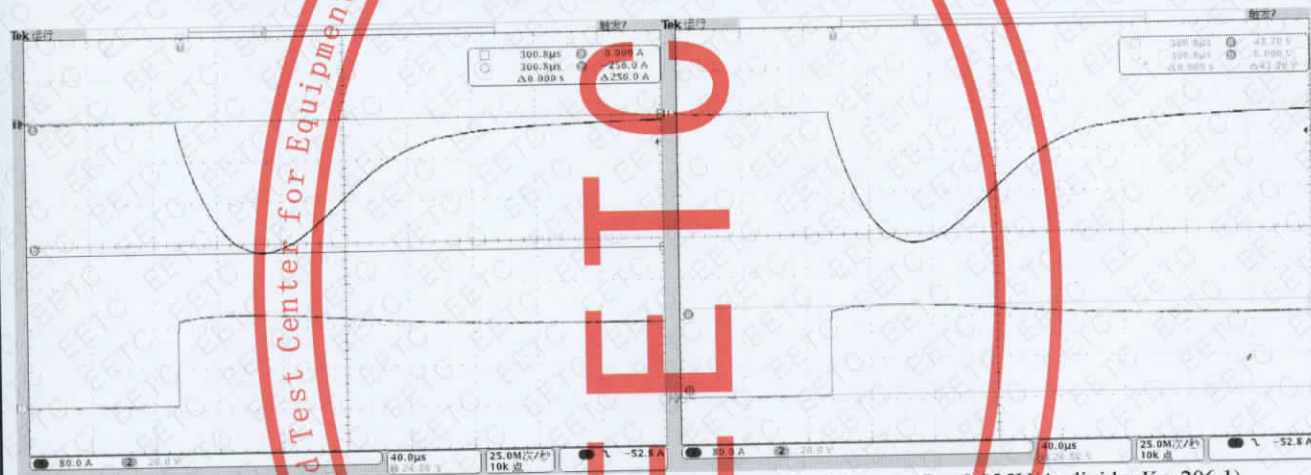
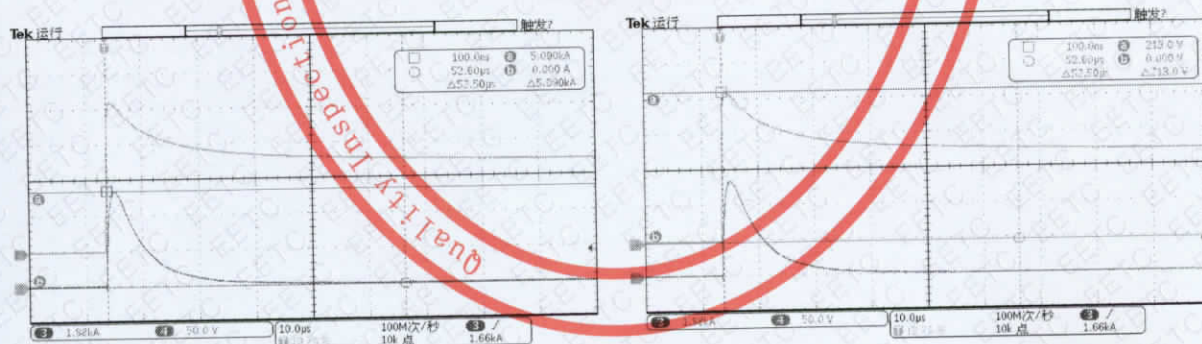
Sample description:

① 3 arresters, the number of these 3 arresters are from EETC02-170308-073-001 to EETC02-170308-073-003, in the report which referred as 001 to 003; ② 6 thermally prorated sections, the number of these 6 thermally prorated sections are from EETC02-170308-073-201 to EETC02-170308-073-206, in the report which referred as 201 to 206; ③ 9 resistors, the number of these 9 resistors are from EETC02-170308-073-301 to EETC02-170308-073-309, in the report which referred as 301 to 309. ④ 3 housings, the number of these 3 housings are from EETC02-170308-073-401 to EETC02-170308-073-403, in the report which referred as 401 to 403.

Appendix B: Main test device

NO	Device name	Device NO.	Measurement	Uncertainty /Accuracy	Calibration institution	Expiration date
1	400kV DC high voltage generator	EETC02-0008	0~400 kV	Urel=0.012 k=2	National center for high voltage measurement	2018-05-03
2	impulse current generator	EETC02-0003	8/20 μ s 100 kA, 20kV 4/10 μ s 150 kA, 20kV 30/80 μ s 50 kA, 20kV	Urel=0.0056 k=2 Urel=0.0064 k=2	National center for high voltage measurement	2018-06-04
3	impulse current generator	EETC02-0005	8/20 μ s 50 kA, 20kV 30/80 μ s 10 kA, 20kV	Urel=0.0056 k=2 Urel=0.0064 k=2	National center for high voltage measurement	2018-06-04
4	1/5 μ s Steep impulse wave current generator	EETC02-0004	1/5 μ s 20kA, 20kV	Urel=0.0056 k=2 Urel=0.0064 k=2	National center for high voltage measurement	2018-06-04
5	Long duration (rectangular)current impulse generator	EETC02-0001	2ms 10 kA, 20kV	Urel=0.0056 k=2 Urel=0.0064 k=2	National center for high voltage measurement	2018-06-04
6	Long duration (rectangular)current impulse generator	EETC02-0002	2ms 1 kA, 20kV	Urel=0.0056 k=2 Urel=0.0064 k=2	National center for high voltage measurement	2018-06-04
7	300 kV AC High Voltage generator	EETC02-0011	0~300 kV	/	/	/
	Digital high-voltage table	EETC02-0077	0~300 kV	1%	National center for high voltage measurement	2017-09-24
8	MOA-II DC reference voltage detector	EETC02-0048	0~9kV	Urel=0.0024 k=2	National center for high voltage measurement	2018-03-09
9	JFD-251 partial discharge test device	EETC02-0043	/	0.5pC	National center for high voltage measurement	2018-06-06

Appendix C: Waveforms

Fig.C.1 Lightning impulse current and residual voltage waveform (sample 301, shunt $R_s=0.025V/A$, divider $K_d=206.1$)Fig.C.2 Switching impulse current and residual voltage waveform (sample 301, shunt $R_s=0.025V/A$, divider $K_d=206.1$)Fig.C.3 Steep impulse current and residual voltage waveform (sample301, shunt $R_s=0.026V/A$, divider $K_d=61.8$)

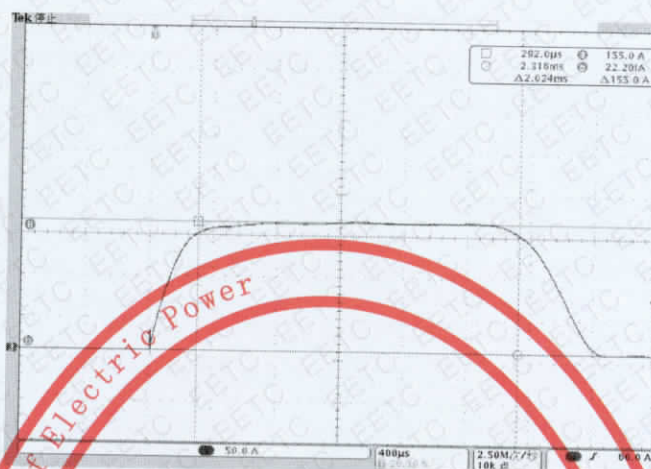


Fig C4 Sample 304, the 1st time, Rectangular current impulse test curve
Current measuring coil output 0.01V/A

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Appendix D: Visual and dimensional check

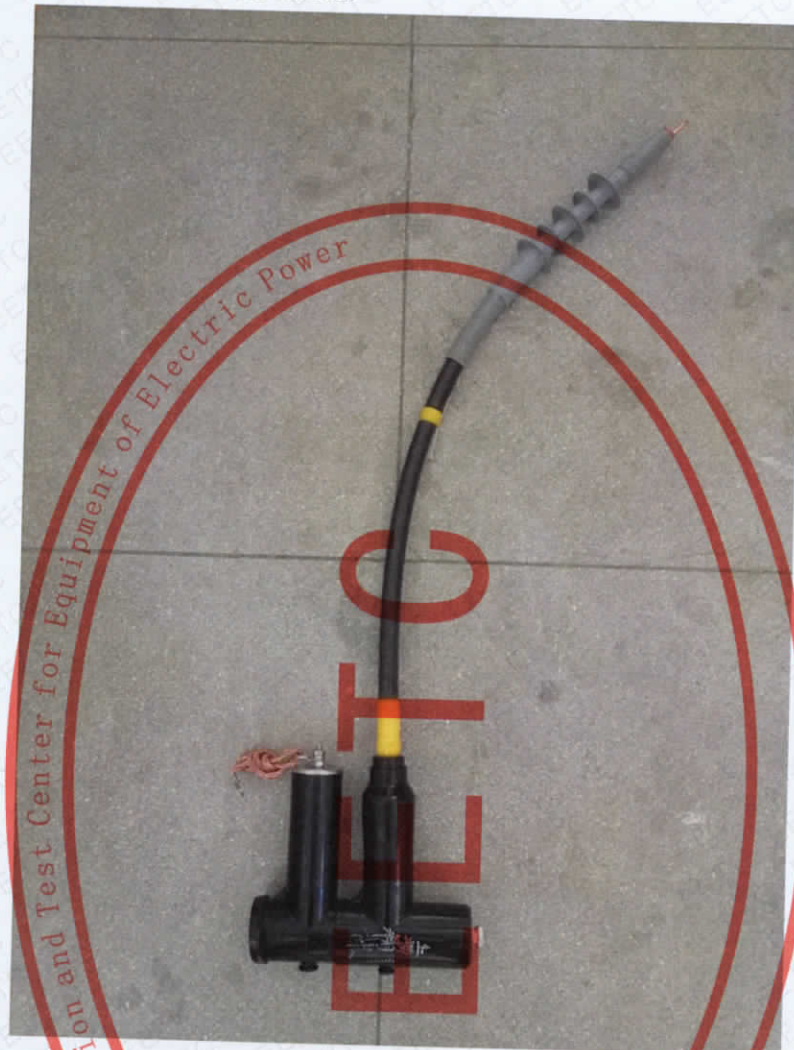


Fig.D1 17-RDTA45/17-FDTA45 (17-RDTA50/17-FDTA50) arrester

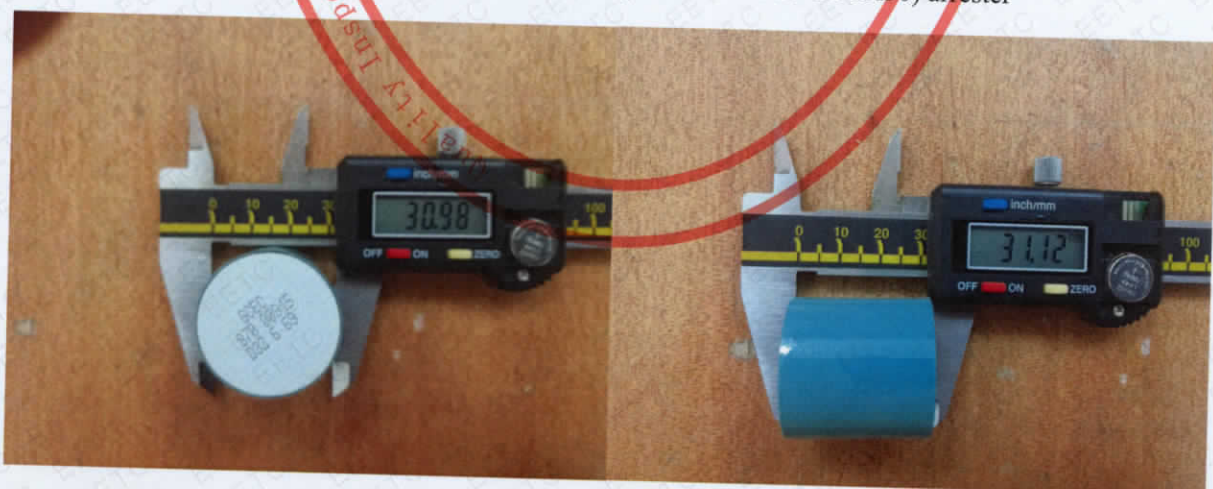
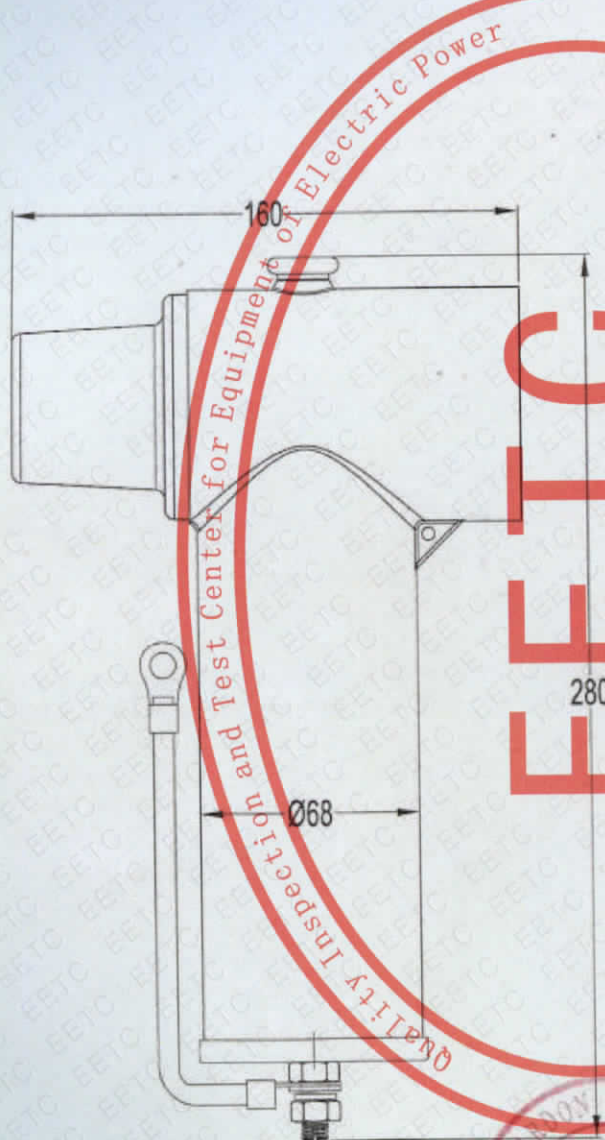


Fig.D2 Resistor used in 17-RDTA45/17-FDTA45 (17-RDTA50/17-FDTA50) arrester

The arrester technical parameter table



No.	Item	Parameter	Unit	Remark
A	Height of Arrester	280	mm	
B	Width of Arrester	160	mm	
C	The Inner Diameter of EPDM Housing	/	mm	
D	The Outside Diameter of EPDM Housing	Ø68	mm	
E	Creep Distance	/	mm	
F	MOV Disks Diameter	Ø32	mm	Quantity:4 pieces
G	Rating Voltage	17	kV	
1	MCOV Rating	13.6	kV	
2	Nominal Discharge Current of Arrester	5	kA	
3	Minimum Corona Voltage Level(15kV)	≤10	pC	
4	Bending Strength	180	N	
5	Reference Voltage	Power-frequency Reference Voltage	≥17	kV
		DC Reference Voltage	≥25	kV 1mA
6	Residual Voltage	Steep Current Impulse	≤51.8	kV
		Lightning Current Impulse	≤45	kV
		Switching Current Impulse	≤38.3	kV
7	Long Duration Current	Rectangular Current Impulse	150	A
		Line Discharge Class	/	Level
8	Withstand Voltage of EPDM Housing	Power Frequency Withstand Voltage	42	kV
		Lightning Impulse Withstand Voltage	95	kV
		Operation Impulse Withstand Voltage	/	kV
9	Application Environment Altitude	≤1000	m	
Product Name		Separable Connectors 17kV/45kV(17kV/50kV) Coupling(Rear) T-Body Surge Arrester		
Product Model		17-RDTA45/17-FDTA45/17-RDTA50/17-FDTA50		
Manufacturer		SHANGHAI CHARDON ELECTRIC LTD.		

Fig D3 : Dimensional drawing of 17-RDTA45/17-FDTA45 (17-RDTA50/17-FDTA50)