



No. L0222



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No. WB-111(7)-2006

国家绝缘子避雷器质量监督检验中心

CHINA NATIONAL CENTRE FOR QUALITY SUPERVISION
AND TEST OF INSULATORS AND SURGE ARRESTERS

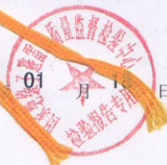
检 验 报 告 TEST REPORT

Object YH10W-9/28 Polymeric housed metal
产 品 名 称 oxide surge arrester without gaps

Client Wenzhou Yikun Electric Co., Ltd.
客 户 名 称

Classification Type Test
检 验 类 别

中国西安 2007
XIAN P.R CHINA

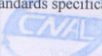


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Name	Polymeric housed metal oxide surge arrester without gaps	Type	YH10W-9/28
		Trade Mark	Yi kun
Consignor	Wenzhou Yikun Electrical Apparatus Co.,Ltd	Manufacturer	Wenzhou Yikun Electrical Apparatus Co.,Ltd
Representative	Wang Tu Qiu	Classification	Type Test
Address And Post Code	Hexiang road, Aojiang, Pingyang, Zhejiang, China 325401	Telephone	0577-63654819
		Fax.	0577-63654833
Quantity of Samples	Arrester:3; Housing:1.	Samples Received Date	2006.10.30
		Test Date	2006.10.30~2007.01.08
Serial Number	Arrester:1~3; Housing:W.		
Test Judge	IEC 60099-4:2004-5 Metal-oxide surge arresters without gaps for a.c. systems GB11032-2000 Metal oxide surge arresters without gaps for a.c. systems GB/T 19519-2004 Composite insulators for a.c. overhead lines with a nominal voltddge greater than 1000V - Definitions, test methods and acceptance criteria.		
Test Items	All test items see page 2 of this report.		
Test Conclusion	This surge arresters passed all 12 items of type test and is deemed satisfactory to meet standards specifications.  (Official sign) Confirmed on: 2007-01-18		
Remarks	1. The arrester height is : 345 mm,its housing is gray;its diameter is 58mm; diameter of 5 sheds is 106mm. 2. The size of resistors is $\Phi 41 \times 23$ mm.		

Approved:

李凡

Checked:



Editor:



Test-leader: 安利

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Type Test Items

No.	Test Items	Req.	Test Data	Result
1	Power frequency reference voltage test	Voltage at $I_r=1\text{mA}$ $\geq 9\text{ kV}$ ($\text{peak}/\sqrt{2}$)	(11~12) kV	passed
2	Flammability Test	Meeting requirement of Flammability test	passed	passed
3	Partial discharge test	$\leq 10\text{ pC}$	2 pC	passed
4	Residual voltage test	$8/20\mu\text{s } U_{10\text{kA}} \leq 28\text{ kV}$	27 kV	passed
		$1/10\mu\text{s } U_{10\text{kA}} \leq 31.7\text{ kV}$	29.2 kV	
		$30/60\mu\text{s } U_{500\text{A}} \leq 21.2\text{ kV}$	20.1kV	
5	Long duration current impulse withstand test	Line discharge class 1	passed	passed
6	Bending load test	147N, 10s	147N, 10s	passed
7	High current impulse operating duty test	100kA high current operating duty	passed	passed
8	Insulation withstand test	Lightning impulse withstand 95 kV, 15 times positive and negative; power frequency voltage withstand: dry 40 kV, wet 30 kV, each 1 min	passed	passed
9	Environment test	Meeting requirement of environment test	passed	passed
10	Moisture ingress test	Withstand $60^\circ\text{C} \pm 5\text{K} \rightarrow 35^\circ\text{C} \pm 5\text{K}$ heat-cool cycle, twice; boiling 42h in boiled 0.1%NaCl water; test within 8h after take out	passed	passed
11	Weather ageing test	Applied U_c 1000 hours in salt fog	passed	passed
12	Time versus current curve test	20A, 200A, 800A	passed	passed

Test Conclusion: Satisfied.

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1 Power Frequency Reference Voltage Test

No.	1	2	3	Req.
A.C. Reference voltage at 1mA kV (peak/ $\sqrt{2}$)	12	12	11	≥ 9

Test Conclusion: Satisfied.

2 Flammability Test

$t_0=20.0^{\circ}\text{C}$, RH=70%, P=97kPa, Method FV.

No.	Y1	Y2	Y3	Y4	Y5	FVO
Length mm	130	130	130	130	130	130 $\pm$ 3
Width mm	13.0	13.0	13.0	13.0	13.0	13.0 $\pm$ 0.3
Thickness mm	3.0	3.0	3.0	3.0	3.0	3.0 $\pm$ 0.3
Flammability combustion time after the first application s	2.96	2.45	2.69	2.74	2.65	≤ 10
Flammability combustion time after the second application s	4.31	3.98	4.25	3.92	4.16	≤ 10
The totaling time s	9.79	9.21	9.88	9.36	9.94	≤ 30
Glowing combustion time after the second removal of the test flame s	34.11					≤ 50
Up to the holding clamp	NO	NO	NO	NO	NO	NO
Dripping flaming	NO	NO	NO	NO	NO	NO

Test Conclusion: Satisfied. (Test date see WB-111 (1) -2006 please)

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3 Partial Discharge Test

No.	Applied voltage kV(r.m.s)	P.D. Value pC
1	8	2
2	8	2
3	8	2
Req.	8	≤ 10

Test Conclusion: Satisfied.

4 Residual Voltage Test

n = 3

4.1 8/20μs lightning impulse current residual voltage

No.	Residual voltage of sections kV			Equivalent residual voltage of arresters at 10 kA kV	Req. kV
	5 kA	10 kA	20 kA		
B1	8.27	8.94	10.06	27	≤ 28
B2	8.26	8.94	10.07		
B3	8.26	8.93	10.06		

4.2 1/10μs steep impulse current residual voltage

No.	Residual voltage of sections at 10kA kV	Equivalent residual voltage of arresters at 10 kA kV	Req. kV
B1	9.74	29.2	≤ 31.7
B2	9.74		
B3	9.72		

4.3 30/60μs switching impulse current residual voltage

No.	Residual voltage of sections at 500A kV	Equivalent residual voltage of arresters at 500A kV	Req. kV
B1	6.70	20.1	≤ 21.2
B2	6.69		
B3	6.69		

Test Conclusion: Satisfied. (Test date see WB-111 (1) -2006 please)

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4 Long Duration Current Impulse Withstand Test

No.		B4+T4	B5+T5	B6+T6	Req.
U _{10kA} , before	kV	8.94	8.93	8.94	/
U _r	kV	3.00	3.00	3.00	3~6
U _{125A}	kV	6.40	6.38	6.40	/
Time	μs	2080	2080	2080	2000
1st.	Current A	230	221	221	/
	Voltage kV	6.40	6.40	6.40	/
	Energy kJ	3.07	2.94	2.94	2.80
2nd.	Current A	221	221	221	/
	Voltage kV	6.40	6.40	6.40	/
	Energy kJ	2.94	2.94	2.94	2.80
18th.	Current A	221	221	221	/
	Voltage kV	6.40	6.40	6.40	/
	Energy kJ	2.94	2.94	2.94	2.80
Checking samples		all right	all right	all right	all right
U _{10kA} , after	kV	8.96	8.97	8.96	/
Variety of U _{10kA}	%	0.2	0.3	0.2	≤5

Test Conclusion: Satisfied. (Test date see WB-111 (1) -2006 please)

6 Bending Load Test

F₁=147N (Required by consignor)

NO.	Load N	Time s	Result
4	147	10	passed

NO.		Partial discharge value pC	Water immersion				Result
			Temperature of water °C	Temperature of environment °C	Difference in temperature °C	Dipping time min	
4	before	5	55.0	10	45	11	passed
	after	5	55.0	10	45	11	passed
Req.		≤10	/		40°C±5K	≥10	passed

Test Conclusion: Satisfied.. (Test date see WB-111 (1) -2006 please)

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7 High current impulse operating duty test

Kct < 1.0 (Given by consignor)

No.		B7+T7	B8+T8	B9+T9
8/20 μ s, U _{10kA} , before	kV	8.93	8.94	8.94
Ur (Ur*)	kV	3.00	3.00	3.00
Uc (Uc*)	kV	2.55	2.55	2.55
Condition test	Applied 1.2Uc=3.06 kV, 8/20 μ s, In=10 kA, 45 °before peak			
	Times	20	20	20
4/10 μ s high current impulse	1st. current	kA	100.8	98.4
	Preheated to 60.0 °C			
	2nd. Current	kA	98.8	97.6
Applied power frequency voltage within 40 ms				
Ur*	kV	3.00	3.00	3.00
Power losses (max) at Ur*	W	8.78	9.65	8.86
Applied Uc*	kV	2.55	2.55	2.55
Power losses at Uc* W	1 min	1.954	1.977	1.944
	15 min	1.158	1.186	1.175
	30 min	0.642	0.684	0.668
Checking samples		all right	all right	all right
8/20 μ s, U _{10kA} , after	kV	8.98	8.96	8.96
Variety of U _{10kA}	%	0.6	0.2	0.2

Test Conclusion: Satisfied. (Test date see WB-111 (1) -2006 please)

8 Housing Insulation Withstand Test

8.1 Lightning impulse voltage withstand test

t_{dry}=22.0 °C t_{wet}=18.0 °C P=970×10² Pa

Req.=95kV K=0.9163

No.	Test value kV		Adj. kV	Withstand times	Result
W	(+)	93~96	101~104	15	passed
	(-)	93~96	101~104	15	passed

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8.2 Power frequency insulation withstand test

$P=970 \times 10^2 \text{ Pa}$ $t_{\text{dry}}=22.0^\circ\text{C}$ $t_{\text{wet}}=18.0^\circ\text{C}$ $t_{\text{water}}=16.0^\circ\text{C}$

$\rho_{16.0}=125 \Omega \cdot \text{m}$ specific resistance of rain $\rho_{20}=105 \Omega \cdot \text{m}$

rainfall: horizon=1.1mm/min verticality=1.2mm/min

Req.=40 kV $K_{\text{dry}}=0.9905$

Req.=30 kV $K_{\text{wet}}=0.9950$

No.	Test value kV	Adj. kV	Keeping time min	Result
W	40(dry)	40	1	passed
	30(wet)	30	1	passed

Test Conclusion: Satisfied.

9 Environment test

9.1 Check of sealing (before test)

No.	P.D. Value pC	Water immersion				Result
		Temperature of water $^\circ\text{C}$	Temperature of environment $^\circ\text{C}$	Difference in temperature $^\circ\text{C}$	Dipping time min	
5	5	60.0	15.0	45.0	15	passed
Req.	≤ 10	/		$40^\circ\text{C} \pm 5\text{K}$	≥ 10	passed

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9.2 Temperature cycling test

No.	Testing time	Temperature ℃	Testing time	Tempera-ture ℃
5	11.06 09:00~12:00	-25	11.11 09:00~12:00	-25
	11.06 13:30~16:30	65	11.11 13:30~16:30	65
	11.07 09:00~12:00	-25	11.12 09:00~12:00	-25
	11.07 13:30~16:30	65	11.12 13:30~16:30	65
	11.08 09:00~12:00	-25	11.13 09:00~12:00	-25
	11.08 13:30~16:40	65	11.13 13:30~16:30	65
	11.09 09:00~12:00	-25	11.14 09:00~12:00	-25
	11.09 13:30~16:30	65	11.14 13:30~16:30	65
	11.10 09:00~12:00	-25	11.15 09:00~12:00	-25
	11.10 13:30~16:30	65	11.15 13:30~16:30	65
Req.	3h	heat: 40~70 cool: ≥ -50	3h	heat: 40~70 cool: ≥ -50

9.3 Sulphur dioxide test

Testing time:2006.11.17~2006.12.07

No.	Testing time	Content of SO ₂	Humid ity %	Tempera ture ℃	Testing time	Content of SO ₂	Humi dity %	Tempera ture ℃
5	2006.11.17	23×10^{-6}	73	24	2006.11.25	22×10^{-6}	75	24
	2006.11.18	23×10^{-6}	73	24	2006.11.26	22×10^{-6}	73	25
	2006.11.19	22×10^{-6}	72	23	2006.11.29	23×10^{-6}	73	25
	2006.11.20	24×10^{-6}	75	25	2006.12.01	24×10^{-6}	75	25
	2006.11.21	22×10^{-6}	75	25	2006.12.03	24×10^{-6}	73	24
	2006.11.22	24×10^{-6}	73	24	2006.12.04	24×10^{-6}	75	24
	2006.11.23	24×10^{-6}	73	23	2006.12.06	23×10^{-6}	73	24
	2006.11.24	23×10^{-6}	73	24	2006.12.07	22×10^{-6}	73	25
Req.	21×24h	$(25 \pm 5) \times 10^{-6}$	75±5	25±2	21×24h	$(25 \pm 5) \times 10^{-6}$	75±5	25±2

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9.4 Salt mist test

Level area: 21904cm², High: 2m, density of salt: 5%.

Testing time: 2006.12.08~2006.12.12

Time		Temperature ℃	Humidity %	PH value	Speed of water L/m ³ ·h
2006.12.8	09:00	36	88	6.8	0.88
2006.12.9	10:00	36	88	6.8	1.00
2006.12.10	09:00	36	88	7.0	1.00
2006.12.11	09:00	37	88	7.0	0.88
2006.12.12	09:00	36	88	6.8	1.00
Req.	96h	35±3	>85	6.5~7.2	0.548~1.095

9.5 Check of seal(after test)

No.	P.D. Value pC	Water immersion				Result
		Temperature of water ℃	Temperature of environment ℃	Difference in temperature ℃	Dipping time min	
5	6	56	11	45	15	passed
Req.	≤10	/		40℃±5K	≥10	passed

Test Conclusion: Satisfied. (Test date see WB-111 (1) -2006 please)

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10 Moisture Ingress Test

10.1 Terminal torque test

M=30 N·m time:30s

10.2 Thermomechanical test

F=147N (Required by consignor)

No.	Test time	Temperature ℃	Applied angle degrees °	Keeping times h	Bend load N
6	2006.12.16 08:00~2006.12.17 01:00	59.0~61.0	0	16	147
	2006.12.17 09:00~2006.12.18 01:00	-24.0~-26.0	180	16	
	2006.12.18 09:00~2006.12.19 01:00	44.0~46.0	270	16	
	2006.12.19 09:00~2006.12.20 01:00	-39.0~-41.0	90	16	
Req.	24h×4	60℃→-25℃ → 45℃→-40℃	0~360	≥16	147

10.3 Water immersion test

No.	Boiling time h	Partial discharge value pC			Power losses W			Residual voltage of complete arresters at 10kA kV		
		before	after	var.	before	after	var. %	before	after	var. %
6	42	4	4	0	3.48	3.96	14	109	109	0
Req.	42	≤10			/			≤20	≤110	≤5

Test Conclusion: Satisfied. (Test date see WB-111 (1) -2006 please)

11 Weather Ageing Test

fog room: 10.83 m³ temperature of fog room: 21.0℃~24.0℃

water speed: (0.41~0.49)L/m³·h NaCl in water: 9.8kg/m³

date of test: 2006.11.19~2006.12.31

No.	Uc kV	Creep distance mm	Arc distance mm	Uc keeping time h	P.D. Value pC			A.C. reference voltage at 1mA kV		
					before	after	var.	before	after	var. %
BL1	15.3	391	217	1008	7	7	0	18.4	18.4	0
Req.	/	/	/	≥1000	≤10			/		

Test Conclusion: Satisfied. (Test date see WB-111 (1) -2006 please)

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12 Time versus current curve test

No.	Current A	Time s	No.	Current A	Time s	No.	Current A	Time s
T1	20.9	0.760	T12	205	0.079	T17	785	0.01
T2	21.1	0.476	T13	213	0.063	T18	825	0.01
T3	20.5	0.650	T14	211	0.058	T19	845	0.01
T10	20.7	0.710	T15	202	0.074	T20	863	0.01
T11	21.2	0.590	T16	208	0.062	T21	833	0.01
Req.	20	≤ 2	Req.	200	≤ 0.1	Req.	800	≤ 0.03

Test Conclusion: Satisfied. (Test date see WB-111 (1) -2006 please)

Testor: An Li, Su Miao, Sang Jian-ping