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检测
TESTING
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报 告 编 号
Reference№ CT18-01638

检 测 报 告
Test Report

样 品 名 称
Name of sample Medium Voltage Power Cable

样 品 型 号
Type of sample CU/XLPE/SCT/PVC/DSTA/FRPVC

委 托 方
Consigner Hangzhou Easy Electric Wire and Cable Co.,LTD

试 验 类 型
Kind of test Type test

国家电线电缆质量监督检验中心
CHINA NATIONAL CENTRE FOR QUALITY
SUPERVISION AND TEST OF ELECTRIC WIRE AND CABLE

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China National Centre for Quality Supervision and Test of Electric Wire and Cable
Test Report

Kind of test	Type test			Reference No.	CT18-01638
Name of sample	Medium Voltage Power Cable				
Type and Size	CU/XLPE/SCT/PVC/DSTA/FRPVC 3C185mm² 18/30kV			Date of test	2018-03-29 ～ 2018-05-02
Consigner	Name	Hangzhou Easy Electric Wire and Cable Co.,LTD			
	Address	No.7 Long Tan Road Future Technology Park – Hangzhou – China			
	Tel.	0571-86160530	P.C.	/	Unit No. 201134
Manufacturer	Name	Hangzhou Easy Electric Wire and Cable Co.,LTD			
	Address	No.7 Long Tan Road Future Technology Park – Hangzhou – China			
	Tel.	0571-86160530	P.C.	/	Unit No. 201134
Delivering mode	Supplied by consigner	Sample state at receiving	Normal	Receiving date	2018-03-26
Test standard	1. IEC 60502-2: 2014 Power cables with extruded insulation and their accessories for rated voltages from 1kV(U_m =1.2kV) up to 30kV (U_m =36kV) Part 2: Cables for rated voltages from 6kV(U_m =7.2kV) up to 30kV (U_m =36kV) 2. IEC60332-3-24:2009 Tests on electric and optical fibre cables under fire conditions —Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables — Category C				
Verdict standard	Same as test standard				
Conclusion	1. All items for the sample have been carried out according to IEC 60502-2:2014, and the sample is qualified for the requirements of IEC 60502-2:2014. 2. Flame spread test on bunched cables (Category C) of the maximum extent of damage from the bottom edge of the burner for the sample complies with the requirement of IEC 60332-3-24: 2009.				
Note	1. Flame spread test on bunched cables (Category C) has been carried out at No. 233, Zhenkang Road, Zhangyan Town, Jinshan District, Shanghai. 2. The name and type of the sample is provided by the consigner.				
Tested by	贺金红 He Jinhong	Checked by	李闯 Li Chuang	Approved by	毛阿兴 Mao Axing
Date	2018.05.07	Date	2018.5.7	Date	2018.5.8

Type and size	CU/XLPE/SCT/PVC/DSTA/FRPVC 3C185mm² 18/30kV	Reference No.	CT18-01638

No.	Test Items	Unit	Requirements	Test Results			Verdict
1	Inspected cores identification		/	Red	Yellow	Blue	N
1	Construction						
1.1	Conductor						
	—Material		Copper	Copper for all cores			P
	—Number of wires		≥30	37	37	37	P
1.2	Conductor screen						
	—Average thickness	mm	/	0.9	0.8	0.8	N
	—Minimum thickness	mm	/	0.75	0.76	0.75	N
1.3	Insulation						
	—Average thickness	mm	/	8.0	8.0	8.3	N
	—Minimum thickness	mm	≥7.10	7.76	7.83	8.03	P
	—Eccentricity		≤0.15	0.04	0.04	0.05	P
1.4	Insulation screen						
	—Average thickness	mm	/	1.0	1.0	1.0	N
	—Minimum thickness	mm	/	0.89	0.90	0.92	N
1.5	Metal screen		/	1 layer copper tape for every core			N
	—Minimum overlap of tape	%	/	20	20	20	N
	—Thickness	mm	/	0.10	0.10	0.10	N
1.6	Separation sheath						
	—Minimum thickness	mm	≥1.48	2.22			P
1.7	Metallic armor		Steel tape	Steel tape			P
	—Number of steel tapes		2	2			P
	—Thickness of steel tapes	mm	≥0.72	0.81			P
	—Width of steel tapes	mm	/	60			N
	—Gap between adjacent turns of each tape divided by the width of the tape	%	≤50	43			P
1.8	Sheath						
	—Average thickness	mm	/	4.5			N
	—Minimum thickness	mm	≥2.92	4.01			P
1.9	Overall diameter of cable	mm	/	95.0			N

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No.	Test Items	Unit	Requirements	Test Results	Verdict
2	Electrical properties				
2.1	DC conductor resistance(20℃)	Ω/km	≤0.0991	0.0976 0.0980 0.0978	P
2.2	Bending test followed by a partial discharge test				
	—Bending test ≤(15(d+D) +5%)	times	3	3 times of bending test completed	P
	—Partial discharge test(1.73 U_0)		No detectable discharge exceeding the declared sensitivity (5pC or better)	No detectable discharge exceeding the declared sensitivity for all cores (Sensitivity is 1.0pC)	P
2.3	tanδ measurement(95℃～100℃, 2kV)	$\times 10^{-4}$	≤40	2.5 2.5 2.5	P
2.4	Heating cycle test followed by a partial discharge test				
	—Heating cycle test (heating cycle for 8 h, 95 ℃ ~ 100℃ for 2 h, natural cooling 3 h)	times	20	20 times of heating cycling test completed	P
	—Partial discharge test(1.73 U_0)		No detectable discharge exceeding the declared sensitivity (5pC or better)	No detectable discharge exceeding the declared sensitivity for all cores (Sensitivity is 1.0pC)	P
2.5	Impulse voltage test followed by a power frequency voltage test				
	—Impulse voltage test (95℃～100℃, 170kV , 10 times each polarity)		No breakdown	No breakdown for all cores	P
	—Power frequency voltage test (63kV, 15min)		No breakdown	No breakdown for all cores	P
2.6	Voltage test for 4h (4U_0)		No breakdown	No breakdown for all cores	P
2.7	Resistivity of semi-conducting screens (90℃)				
	Without ageing				
	—Conductor screen	Ω·m	≤1000	23.14 19.55 17.18	P
	—Insulation screen	Ω·m	≤500	4.83 4.03 4.83	P

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No.	Test Items	Unit	Requirements	Test Results			Verdict
	After additional ageing test on pieces of completed cable (100℃,7d)						
	—Conductor screen	Ω·m	≤1000	12.76	9.510	9.930	P
	—Insulation screen	Ω·m	≤500	6.93	6.16	6.89	P
3	Mechanical properties of insulation						
3.1	Without ageing						
	—Tensile strength	N/mm²	≥12.5	19.7	21.2	20.3	P
	—Elongation at break	%	≥200	520	550	520	P
3.2	After ageing in air oven(135℃,7d)						
	—Variation of tensile strength	%	≤±25	16	15	15	P
	—Variation of elongation at break	%	≤±25	12	9	13	P
3.3	After additional ageing test on pieces of completed cable(100℃,7d)						
	—Variation of tensile strength	%	≤±25	5	4	-4	P
	—Variation of elongation at break	%	≤±25	4	-5	-2	P
3.4	Hot set test(200℃,15min,20N/cm²)						
	—Elongation under load	%	≤175	88	98	83	P
	—Permanent elongation after cooling	%	≤15	-5	-5	-5	P
3.5	Shrinkage test (130℃,1h)						
	—Shrinkage	%	≤4	2	1	1	P
3.6	Water absorption(85℃,14d)						
	—Increase of mass	mg/cm²	≤1	0.04	0.03	0.03	P
4	Strippability test for insulation screen						
	Without ageing						
	—Stripping force	N	Not exceeding 4～45	29～31	28～30	29～32	P
	—Examination for insulation surface		No damage and no trace of the semi-conducting screen shall remain on the insulation	Passed	Passed	Passed	P

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No.	Test Items	Unit	Requirements	Test Results			Verdict
	After additional ageing test on pieces of completed cable (100℃,7d)						
	—Stripping force	N	Not exceeding 4～45	23～24	22～23	22～24	P
	—Examination for insulation surface		No damage and no trace of the semi-conducting screen shall remain on the insulation	Passed	Passed	Passed	P
5	Mechanical properties of separation sheath						
5.1	Without ageing						
	—Tensile strength	N/mm²	≥12.5		18.1		P
	—Elongation at break	%	≥150		320		P
5.2	After ageing in air oven (100℃,7d)						
	—Tensile strength	N/mm²	≥12.5		19.1		P
	—Elongation at break	%	≥150		300		P
	—Variation of tensile strength	%	≤±25		6		P
	—Variation of elongation at break	%	≤±25		-6		P
5.3	After additional ageing test on pieces of completed cable(100℃,7d)						
	—Variation of tensile strength	%	≤±25		-4		P
	—Variation of elongation at break	%	≤±25		-3		P
5.4	Loss of mass in air oven(100℃,7d)						
	—Loss of mass	mg/cm²	≤1.5		1.1		P
5.5	Pressure test at high temperature (90℃)						
	—Depth of indentation/average thickness	%	≤50		23		P
5.6	Heat shock test(150℃,1h)		No cracks		No cracks		P
5.7	Cold elongation test(-15℃)						
	—Elongation at break	%	≥20		113		P
5.8	Cold impact test (-15℃)		No cracks		No cracks		P

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No.	Test Items	Unit	Requirements	Test Results	Verdict
6	Mechanical properties of sheath				
6.1	Without ageing				
	—Tensile strength	N/mm²	≥12.5	18.2	P
	—Elongation at break	%	≥150	330	P
6.2	After ageing in air oven (100℃,7d)				
	—Tensile strength	N/mm²	≥12.5	19.6	P
	—Elongation at break	%	≥150	310	P
	—Variation of tensile strength	%	≤±25	8	P
	—Variation of elongation at break	%	≤±25	-6	P
6.3	After additional ageing test on pieces of completed cable(100℃,7d)				
	—Variation of tensile strength	%	≤±25	-3	P
	—Variation of elongation at break	%	≤±25	-3	P
6.4	Loss of mass in air oven(100℃,7d)				
	—Loss of mass	mg/cm²	≤1.5	1.1	P
6.5	Pressure test at high temperature (90℃)				
	—Depth of indentation/average thickness	%	≤50	20	P
6.6	Heat shock test(150℃,1h)		No cracks	No cracks	P
6.7	Cold elongation test(-15℃)				
	—Elongation at break	%	≥20	123	P
6.8	Cold impact test for completed cable (-15℃)		No cracks	No cracks	P
7	Test on single vertical cable under fire conditions				
	—The distance between the lower edge of the top support and the upper onset of charring	mm	>50	322	P
	—The distance between the lower edge of the top support and the lower onset of charring	mm	≤540	513	P

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No.	Test Items	Unit	Requirements	Test Results	Verdict
8	Test for vertical flame spread of vertically-mounted bunched cables-Category C				
	—The maximum extent of the charred portion	m	≤2.5	0.75	P
	—The time to extinction of all burning or glowing	h	/	0.07	N

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