缆慧检测 ISTCW

中国认可
国际互认
检测
TESTING
CNAS L9930

Report No.: TN22-1122E Sample No.: CN22-0713

Contract No.: ISTCW22-0330

Test Report

Consigner	Caledonian Cables Limited 1/F, CMA Building,64-66 Connaught Road Central, Hong Kong
Sample Name	1800V DC Traction Cable
Type and Size	RF6883-DZ1-U-1800P CU/EPR/LSZH 1X150
Kind of test	Commission test
Sample Received Date	February 24, 2022
Test Duration	February 24, 2022 – April 8, 2022
Test Conclusion	1. The test items comply with the requirements of technical specification provided by consigner. 2. Termite test (Knockdown method) comply with the requirement of LSZH sheath in JB/T 10696.9—2011.

Authorized by
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RF6883-DZ1-U-1800P CU/EPR/LSZH 1X150

1 Sample Description

Manufacturer	Caledonian Cables Limited 1/F, CMA Building,64-66 Connaught Road Central, Hong Kong
Type and Size	RF6883-DZ1-U-1800P CU/EPR/LSZH 1X150
Quantity	130m
Marking	/
Color	Black
Source	Sent by the consigner
Status	Normal appearance

2 Testing and Verdict Standards

2.1 Testing Standards

IEC 60811-501: 2012 +A1: 2018	Electric and optical fibre cables – Test methods for non – metallic materials – Part 501: Mechanical tests – Tests for determining the mechanical properties of insulating and sheathing compounds
IEC 60811-401:2012 +A1:2017	Electric and optical fibre cables – Test methods for non-metallic materials – Part 401: Miscellaneous tests – Thermal ageing methods – Ageing in an air oven
IEC 60811-403: 2012	Electric and optical fibre cables – Test methods for non-metallic materials – Part 403: Miscellaneous tests – Ozone resistance test on cross-linked compounds
IEC 60811-404: 2012	Electric and optical fibre cables – Test methods for non-metallic materials – Part 404: Miscellaneous tests – Mineral oil immersion tests for sheaths
IEC 60811-507: 2012	Electric and optical fibre cables – Test methods for non-metallic materials – Part 507: Mechanical tests – Hot set test for cross-linked materials
IEC 60332-1-2: 2004 +A1: 2015	Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame
IEC 60332-3-22: 2018	Tests on electric and optical fibre cables under fire conditions – Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A
IEC 61034-2: 2005+ A1:2013+A2:2019	Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements
IEC 60754-1: 2011+ A1: 2019	Test on gases evolved during combustion of materials from cables – Part 1: Determination of the halogen acid gas content
IEC 60754-2: 2011 +A1: 2019	Test on gases evolved during combustion of materials from cables – Part 2: Determination of acidity (by pH measurement) and conductivity
JB/T 10696.9—2011	Test methods for determining mechanical, physical and chemical properties of electric cables and wires- Part 9: Termite test
ISO 4589-2: 2017	Plastics-Determination of burning behavior by oxygen index Part 2: Ambient-temperature test

ISO 4589-3: 2017 Plastics-Determination of burning behavior by oxygen index Part 3: Elevated-temperature test

2.2 Verdict Standards

Technical specification provided by consigner.

3 Other Information

3.1 Information from the test laboratory

1) The sample's name, type and size and information of manufacturer are provided by the consigner.
2) Termite test (Knockdown method) is subcontracted and not within the accredited scopes of CNAS.
3) Consigner request to note: Cable marking: CALEDONIAN TRACTION CABLE 1800V DC CU/EPR/LSZH 1X150 ADAPTED TO NR-PS-ELP-21101 IEC 60332-3-22 RF6883-DZ1-U-1800P-F-1G150 2021******M

3.2 Testing site

The following test items were conducted at no.458 Haixiang Road, Fengxian District, Shanghai:

- Test for vertical flame spread of vertically-mounted bunched cables – Category A
- Smoke density test

3.3 Symbol Definition

P=Complying with requirement/Pass;

F=Not complying with requirement/Fail;

N=Not required.

4 Mechanical tests without and after ageing in air oven of insulation

Test method: IEC 60811-401:2012+A1:2017, IEC 60811-501:2012+A1:2018.

Test parameters:

Ageing temperature 135 ℃

Ageing duration 168 h

Test Item	Unit	Requirement	Test Result	Verdict
Without ageing				
- Tensile strength	N/mm^2	≥6.5	18.3	P
- Elongation at rupture	%	≥200	540	P
After ageing				
- Tensile strength	N/mm^2	/	19.1	P
- Percentage of value found in the unaged specimens	%	≤±30	+4	P
- Elongation at rupture	%	/	510	P
- Percentage of value found in the unaged specimens	%	≤±30	-6	P

5 Hot set test for insulations

Test method: IEC 60811-507:2012.

Test parameters:

Temperature 250 ℃

Mechanical stress 20 N/cm^2

Item	Unit	Requirement	Test Result	Verdict
Elongation under load	%	≤175	23	P
Permanent elongation after cooling	%	≤15	0	P

6 Properties after ageing in air bomb of insulation

Test method: IEC 60811-401:2012+A1:2017, IEC 60811-501:2012+A1:2018.

Test parameters:

Ageing temperature 127 ℃

Ageing duration 42 h

Test Item	Unit	Requirement	Test Result	Verdict
After ageing				
- Tensile strength	N/mm^2	/	19.1	P
- Percentage of value found in the unaged specimens	%	≤±40	+4	P
- Elongation at rupture	%	/	470	P
- Percentage of value found in the unaged specimens	%	≤±40	-13	P

7 Ozone resistance test of insulation

Test method: IEC 60811-403:2012.

Test parameters:

Temperature 25 ℃

Duration 24 h

Ozone concentration 0.025～0.030 %

Test Item	Unit	Requirement	Test Result	Verdict
Check on surface		No cracks	No cracks	P

8 Mechanical tests without and after ageing in air oven of sheath

Test method: IEC 60811-401:2012+A1:2017, IEC 60811-501:2012+A1:2018.
Test parameters:
Ageing temperature 120 ℃
Ageing duration 168 h

Test Item	Unit	Requirement	Test Result	Verdict
Without ageing				
- Tensile strength	N/mm^2	≥8	13.1	P
- Elongation at rupture	%	≥150	230	P
After ageing				
- Tensile strength	N/mm^2	/	16.6	N
- Percentage of value found in the unaged specimens	%	≤±30	+27	P
- Elongation at rupture	%	/	180	N
- Percentage of value found in the unaged specimens	%	≤±30	-22	P

9 Properties after ageing in air bomb of sheath

Test method: IEC 60811-401:2012+A1:2017, IEC 60811-501:2012+A1:2018.
Test parameters:
Ageing temperature 127 ℃
Ageing duration 40 h

Test Item	Unit	Requirement	Test Result	Verdict
After ageing				
- Tensile strength	N/mm^2	/	15.9	N
- Percentage of value found in the unaged specimens	%	≤±50	+21	P
- Elongation at rupture	%	/	190	N
- Percentage of value found in the unaged specimens	%	≤±50	-17	P

10 Hot set test for sheath

Test method: IEC 60811-507:2012.
Test parameters:
Temperature 200 ℃
Mechanical stress 20 N/cm^2

Item	Unit	Requirement	Test Result	Verdict
Elongation under load	%	≤100	10	P
Permanent elongation after cooling	%	≤25	0	P

11 Mineral oil immersion test of sheath

Test method: IEC 60811-404: 2012.
Test parameters:
Ageing temperature 100 ℃
Ageing duration 24 h

Test Item	Unit	Requirement	Test Result	Verdict
After ageing				
- Tensile strength	N/mm^2	/	8.2	N
- Percentage of value found in the unaged specimens	%	≤±40	-37	P
- Elongation at rupture	%	/	170	N
- Percentage of value found in the unaged specimens	%	≤±40	-26	P

12 Flame propagation test

12.1 Flame propagation test for a single cable

Test method: IEC 60332-1-2:2004+A1:2015.
Test parameters
Ambient temperature 23 °C
Relative humidity 50 %
Time of pre-conditioning 16 h
Time of flame application 60 s

Test Item	Unit	Requirement	Test Result	Verdict
- Distance between the lower edge of the top support and the onset of charring	mm	>50	402	P
- The point of charring extending downwards from the lower edge of the top support	mm	≤540	504	P

12.2 Test for vertical flame spread of vertically-mounted bunched cables – Category A

Test method: IEC 60332-3-22: 2018.

Test parameters:

Number of test pieces	16	
Number of layers	1	
Mounting method	Spaced	
Number of burners	2	(Wide ladder)
Flame application time	40	min

Test Item	Unit	Requirement	Test Result	Verdict
The maximum extent height above the bottom edge of the burner	m	≤2.5	1.8	P
The time to extinction of all burning or glowing	min	/	<1	N

12.3 Smoke density test

Test method: IEC 61034-2: 2005+A1: 2013+A2: 2019.

Test parameters:

Pre-conditioning temperature	20	℃
Pre-conditioning duration	24	h
Test duration	40	min
Number of test pieces	2	

Test Item	Unit	Requirement	Test Result	Verdict
Light transmittance $_{norm}$	%	≥60	70	P

12.4 The determination of halogen acid gas content, pH value and conductivity

Test method: IEC 60754-1: 2011+A1: 2019, IEC 60754-2: 2011+A1: 2019.

Test Item	Unit	Requirement	Test Result	Verdict
HCl content				
- Sheath	%	≤0.5	<0.5	P
- Insulation	%	≤0.5	<0.5	P
pH value				
- Sheath		≥4.3	5.2	P
- Insulation		≥4.3	4.8	P
Conductivity				
- Sheath	μS/mm	≤10	0.86	P
- Insulation	μS/mm	≤10	0.75	P

12.5 Oxygen index at ambient temperature

Test method: ISO 4589-2: 2017。

Test parameter:

Test temperature 23 ℃

Test Item	Unit	Requirement	Test Result	Verdict
Oxygen index (sheath)	%	≥36	36	P

12.6 Temperature index

Test method: ISO 4589-3: 2017。

Test Item	Unit	Requirement	Test Result	Verdict
Temperature index (sheath)	℃	≥280	280	P

13 Termite test (Knockdown method)

Test method: JB/T 10696.9—2011.

Item	Termite test (Knockdown method)
Test result	Kt50 is 31min.
requirement	Kt50≤85min
Verdict	Complied

- The End. -