Report No. **TC.16.09.002078**

Date of Issue **10/21/2016**

Applicant: **Caledonian Cables Limited**

Applicant address: **NORTHWEST PLANT, INSIDE OF DIANLIU INDUSTRIAL PARK, SHIZI PARK, DONGJIA TOWN LICHENG DISTRICT, JINAN CITY, SHANDONG PROVINCE, CHINA**

Description of the test subject:

Sample	Description	Photo
001	Name: CALEDONIAN 2 CORE 1.0 MMSQ 600/1000V FRL-PW-2C01-0 POWER CABLE LSOH 1881563B	

Receipt Date of Sample: **09/30/2016**

Date of Testing: **From 09/30/2016 to 10/21/2016**

Sample submitted: **The sample(s) was (were) submitted by applicant and identified.**

Conclusion:

Test Items			Result					
			R15			R16		
No.	Items	Test method	HL1	HL2	HL3	HL1	HL2	HL3
1	single wire or cable burn testing	EN 45545-2:2013 EN 60332-1-2:2004	Pass	Pass	Pass	Pass	Pass	Pass
2	vertically-mounted bunched wires or cables burn testing	EN 45545-2:2013 EN 50305 :2002	Pass	Pass	Pass	Pass	Pass	Pass
3	Smoke density testing	EN 45545-2:2013 EN 61034-2:2005	Pass	Pass	Pass	*	Pass	Pass
4	Smoke toxicity testing	EN 45545-2:2013 EN 50305 :2002	Pass	Pass	Pass	Pass	Pass	Pass

Remark: Pass=Meet Standard's Requirement
Fail= Below Standard's Requirement
* = No Specified Requirement.

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ORIGINAL

Test Results

EN 45545-2:2013 Railway applications-Fire protection on railway vehiclesPart2: Requirements for fire behaviour of materials and components

1. EN 60332-1-2-2004 Tests on electric and optical fiber 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

1.1 Sample details

Diameter	8.0mm
Specimen size	600mm

	Temperature (℃)	Humidity (%)	Duration(h)
Precondition	23±5	50±20	16

1.2 Test results

Measurements/ observation	1st Test
The distance between the lower edge of the top support and the onset of charring (mm)	435
The distance between the lower edge of the top support and the charring downwards (mm)	495
Burned part(mm)	60

Note: If a failure is recorded, two more tests shall be carried out. If both tests result in passes, the single insulated conductor or cable shall be deemed to have passed the test.

2. EN 50305:2002 Railway applications —Railway rolling stock cables having special fire performance — Test methods

2.1 Sample details

Specimen size	3.5m
Cable diameter	8.0mm
Conductor diameter	3.9mm

	Temperature (℃)	Humidity (%)	Duration(h)
Precondition	20±10	50±20	16

2.2 Test results

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Measurements/ observation	Result
The extent of damage	1.83m

3. EN 61034-2:2005 Measurement of smoke density of cables burning under defined conditions Part 2: Test procedure and requirements

3.1 Sample details

Diameter	8.0mm

Pre-conditioning	Indoor		Min. 72 h
	Temp : 23±2℃	Humidity : 50±5%	16 h
Ignition Source	Fire source 1		

3.2 Test Result

The minimum light transmittance within 40 minutes; (%)	91.05%

4. EN 50305:2002 Railway applications — Railway rolling stock cables having special fire performance — Test methods

4.1 Sample details

Weight (g)	0.999		
Conditioning	Temperature (℃)	Humidity (%)	Duration (h)
	23±2	50±5	At least 48h

4.2 Test results

Gas	1	2	3	Average
Carbon Monoxide (CO)	36.2	37.7	36.5	36.8
Carbon Dioxide (CO_2)	888.8	905.0	891.9	895.2
Sulphur Dioxide (SO_2)	0	0	0	0
Nitrogen Dioxide (NO_2)	0.1	0.1	0.1	0.1
Hydrogen Cyanide (HCN)	0	0	0	0

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Gas	CCz; mg/m^3
Carbon Monoxide (CO)	1750
Carbon Dioxide (CO_2)	90000
Sulphur Dioxide (SO_2)	260
Nitrogen Dioxide (NO_2)	90
Hydrogen Cyanide (HCN)	55

The toxicity index (ITC) shall be calculated using the following formula:

$$ITC = \frac{100}{\mathrm{m}} \sum \frac{Mz}{CCz}$$

Where,

M = weight of the sample, g;

Mz = weight of gas Z produced by the sample combustion, mg;

CCz = critical concentration for a 30 min exposure for gas z, mg/m^3.

The ITC Value determined was 3.21.

Comprehensive:

No.	Items	Parameter	Record	R15			R16		
				HL1	HL2	HL3	HL1	HL2	HL3
1	single wire or cable burn testing	Burned length, mm	60mm	Pass	Pass	Pass	Pass	Pass	Pass
2	vertically-mounted bunched wires or cables burn testing	Burned length, m	1.83m	Pass	Pass	Pass	Pass	Pass	Pass
3	Smoke density testing	Transmission , %	91.05%	Pass	Pass	Pass	--	Pass	Pass
4	Smoke toxicity testing	ITC	3.21	Pass	Pass	Pass	Pass	Pass	Pass

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Requirement (EN 45545-2:2013):

	Items	Test method	Parameter	HL1	HL2	HL3
R15 cables for interior	single wire or cable burn testing	EN 45545-2:2013 EN 60332-1-2:2004	Unburned length, mm	Burned part ≤540 and unburned part >50	Burned part ≤540 and unburned part >50	Burned part ≤540 and unburned part >50
	vertically-mounted bunched wires or cables burn testing	EN 45545-2:2013 EN 60332-3-24:2009 (d ≥12mm)	Burned length, m	2.5	2.5	2.5
		EN 50305:2002 (6mm <d <12mm)		2.5	2.5	2.5
		EN 50305:2002 (d ≤ 6 mm)		1.5	1.5	1.5
	Smoke density testing	EN 45545-2:2013 EN 61034-2:2005	Transmission, %	25	50	70
	Smoke toxicity testing	EN 45545-2:2013 EN 50305:2002	ITC	10	10	6

	Items	Test method	Parameter	HL1	HL2	HL3
R16 cables for exterior	single wire or cable burn testing	EN 45545-2:2013 EN 60332-1-2:2004	Unburned length, mm	Burned part ≤540 and unburned part >50	Burned part ≤540 and unburned part >50	Burned part ≤540 and unburned part >50
	vertically-mounted bunched wires or cables burn testing	EN 45545-2:2013 EN 60332-3-24:2009 (d ≥12mm)	Burned length, m	2.5	2.5	2.5
		EN 50305:2002 (6mm <d <12mm)		2.5	2.5	2.5
		EN 50305:2002 (d ≤ 6 mm)		1.5	1.5	1.5
	Smoke density testing	EN 45545-2:2013 EN 61034-2:2005	Transmission, %	-	25	50

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	Smoke toxicity testing	EN 45545-2:2013 EN 50305:2002	ITC	10	10	6

Statement：The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to the sole criterion for assessing the potential smoke and toxicity hazard of the product in use

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by:

Lynn liu

Approved by:

Shen hui

-End of Report-

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