



中国认可
国际互认
检测
TESTING
CNAS L6069



Test Report

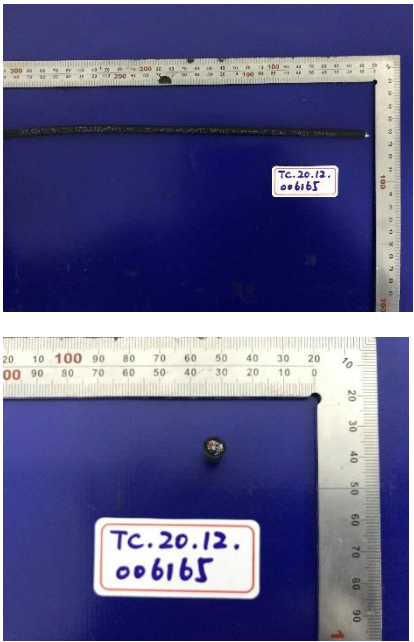
Report No. TC.20.12.006165

Date of Issue 12/18/2020

Applicant: Caledonian Cables Limited

Applicant address: 1/F., CMA Building, 64-66 Connaught Road Central, Hong kong

Description of the test subject:

Sample	Description	Photo
001	Sample Description: Rolling stock cables Style No.: 3×(1P28AWG+D+AL/MY) +2C×24AWG+AL+D+TC USB 3.0 CABLE	

Receipt Date of Sample: 12/07/2020

Date of Testing: From 12/07/2020 to 12/17/2020

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

Note: (1) General Terms & Conditions as mentioned overleaf. (2) The results relate only to the items tested. (3) The test report shall not be reproduced except in full without the written approval of the company. (4) Samples are tested as received.

Laboratory:
TÜV SÜD Rail Transportation
Technology (Jiangsu) Co., Ltd.



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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+A1:2015 EN 60332-1-2:2004+A1:2015	Pass	Pass	Pass	Pass	Pass	Pass
2	Vertically-mounted bunched wires or cables burn testing	EN 45545-2:2013+A1:2015 EN 50305:2002	Pass	Pass	Pass	Pass	Pass	Pass
3	Smoke density testing	EN 45545-2:2013+A1:2015 EN 61034-2:2005	Pass	Pass	Pass	*	Pass	Pass
4	Smoke toxicity testing	EN 45545-2:2013+A1:2015 EN 50305:2002	Pass	Pass	Pass	Pass	Pass	Pass

Remark: *=Standards are not required

Test Results

EN 45545-2:2013+A1:2015 Railway applications-Fire protection on railway vehiclesPart2: Requirements for fire behaviour of materials and components

1. EN 60332-1-2:2004+A1:2015 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	5.5mm
Specimen size	600mm
Time for flame application	60s

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

1.2 Test results

Measurements/ observation	1 st Test
The distance between the lower edge of the top support and the onset of charring (mm)	405
The distance between the lower edge of the top support and the charring downwards (mm)	495

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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	2.5m
Cable diameter	5.5mm
Conductor diameter	0.6mm×8
Number of bundles	2
Number of strands in the bundle	12
The method of mounting	Spaced

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

2.2 Test results

Measurements/ observation	Result
The extent of damage	0.30m

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	5.5mm
Number of bundles	8
Number of strands in the bundle	1

Pre-conditioning	Indoor		Duration
	Temp: 23±2°C	Humidity: 50±5%	16 h
Ignition Source	Fire source 1		

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3.2 Test Result

The minimum light transmittance within 40 minutes; (%)	85.34
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4. EN 50305:2002 Railway applications — Railway rolling stock cables having special fire performance — Test methods

4.1 Sample details

Weight	Sheath: S1: 1.0042 g; S2: 1.0038 g; S3: 1.0054 g Insulation: S1: 1.0014 g; S2: 1.0021 g; S3: 1.0019 g		
Conditioning	Temperature (°C)	Humidity (%)	Duration (h)
	23±2	50±5	At least 48

4.2 Test results

Sheath	MDL	1	2	3	Average
Carbon Monoxide (CO)	5	19.2	18.6	19.4	19.1
Carbon Dioxide (CO ₂)	40	255.3	248.7	260.1	254.7
Sulphur Dioxide (SO ₂)	0.1	ND	ND	ND	ND
Nitrogen Dioxide (NO ₂)	0.5	ND	ND	ND	ND
Hydrogen Cyanide (HCN)	0.3	0.3	0.4	0.4	0.4

Sheath	CCz; mg/m ³	Mz; mg	$\frac{Mz}{CCz}$
Carbon Monoxide (CO)	1750	19.1	0.011
Carbon Dioxide (CO ₂)	90000	254.7	0.003
Sulphur Dioxide (SO ₂)	260	0	0
Nitrogen Dioxide (NO ₂)	90	0	0
Hydrogen Cyanide (HCN)	55	0.4	0.007
ITC			2.03

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Insulation	MDL	1	2	3	Average
Carbon Monoxide (CO)	5	17.3	17.7	18.1	17.7
Carbon Dioxide (CO ₂)	40	223.6	231.4	233.7	229.6
Sulphur Dioxide (SO ₂)	0.1	ND	ND	ND	ND
Nitrogen Dioxide (NO ₂)	0.5	ND	ND	ND	ND
Hydrogen Cyanide (HCN)	0.3	ND	ND	ND	ND

Insulation	CCz; mg/m ³	Mz; mg	$\frac{Mz}{CCz}$
Carbon Monoxide (CO)	1750	17.7	0.010
Carbon Dioxide (CO ₂)	90000	229.6	0.003
Sulphur Dioxide (SO ₂)	260	0	0
Nitrogen Dioxide (NO ₂)	90	0	0
Hydrogen Cyanide (HCN)	55	0	0
ITC			1.26

Remark: Where ND indicates Non-detected.
Where MDL indicates Method Detection Limit.

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

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

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/m³.

The determined Value: Sheath: ITC= 2.03.

Insulation: ITC= 1.26.

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Requirement (EN 45545-2:2013+A1:2015):

	Items	Test method	Parameter	HL1	HL2	HL3
R15 cables for interior	single wire or cable burn testing	EN 45545-2:2013+A1:2015 EN 60332-1- 2:2004+A1:2015	Unburned length, mm (Min.)	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+A1:2015 EN 60332-3-24:2009 (d ≥12mm)	Burned length, m (Max.)	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+A1:2015 EN 61034-2:2005	Transmission % (Min.)	25	50	70
	Smoke toxicity testing	EN 45545-2:2013+A1:2015 EN 50305:2002	ITC (Max.)	10	10	6

	Items	Test method	Parameter	HL1	HL2	HL3
R16 cables for exterior	single wire or cable burn testing	EN 45545-2:2013+A1:2015 EN 60332-1- 2:2004+A1:2015	Unburned length, mm (Min.)	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+A1:2015 EN 60332-3-24:2009 (d ≥12mm)	Burned length, m (Max.)	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+A1:2015 EN 61034-2:2005	Transmission % (Min.)	-	25	50
	Smoke toxicity testing	EN 45545-2:2013+A1:2015 EN 50305:2002	ITC (Max.)	10	10	6

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Comprehensive:

No.	Items	Parameter	Record	R15			R16		
				HL1	HL2	HL3	HL1	HL2	HL3
1	single wire or cable burn testing	Unburned length, mm	405	Pass	Pass	Pass	Pass	Pass	Pass
2	vertically-mounted bunched wires or cables burn testing	Burned length, m	0.30	Pass	Pass	Pass	Pass	Pass	Pass
3	Smoke density testing	Transmission %	85.34	Pass	Pass	Pass	*	Pass	Pass
4	Smoke toxicity testing	ITC	Sheath:2.03	Pass	Pass	Pass	Pass	Pass	Pass
			Insulation:1.26						

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 be the sole criterion for assessing the potential smoke and toxicity hazard of the product in use. Test results are just for internal reference.

TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd.

Drafted by:

wayne

Wayne Wang

Approved by:

Shen hui

Shen hui

-End of Report-

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