



中国认可
国际互认
检测
TESTING
CNAS L6069




Report No. TC.19.07.004914

Date of Issue 07/25/2019

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 | Name: Cable Structure: RS485 1X2X22AWG+1X22AWG |  |

Receipt Date of Sample: 07/16/2018

Date of Testing: From 07/16/2019 to 07/25/2019

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+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 |

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.

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1 of 7
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| | | | | | | | | |
|---|------------------------|--|------|------|------|------|------|------|
| 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 |

Note: *=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 | 6.8mm |
| 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) | 400 |
| The distance between the lower edge of the top support and the charring downwards (mm) | 490 |

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 | 6.8mm |

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2 of 7

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| | |
|---------------------------------|-----------|
| Conductor diameter | 0.16mm×19 |
| Number of bundles | 14 |
| Number of strands in the bundle | 1 |
| The method of mounting | Touching |

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

2.2 Test results

| Measurements/ observation | Result |
|---------------------------|--------|
| The extent of damage | 1.30m |

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 | 6.8mm |
| Number of bundles | 7 |
| Number of strands in the bundle | 1 |

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

3.2 Test Result

| | |
|--|------|
| The minimum light transmittance within 40 minutes; (%) | 88.3 |
|--|------|

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3 of 7





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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 (g) | Sheath: S1: 1.0103 g; S2: 1.0127 g; S3: 1.0166 g Insulation: S1: 1.0132 g; S2: 1.0173 g; S3: 1.0116 g | | |
| Conditioning | Temperature (°C) | Humidity (%) | Duration (h) |
| | 23±2 | 50±5 | At least 48 |

4.2 Test results

| Gas (sheath) | 1 | 2 | 3 | Average |
|-------------------------------------|-------|-------|-------|---------|
| Carbon Monoxide (CO) | 21.4 | 23.2 | 21.9 | 22.2 |
| Carbon Dioxide (CO ₂) | 327.9 | 326.4 | 325.7 | 326.7 |
| Sulphur Dioxide (SO ₂) | ND | ND | ND | ND |
| Nitrogen Dioxide (NO ₂) | ND | ND | ND | ND |
| Hydrogen Cyanide (HCN) | ND | ND | ND | ND |

| Gas (sheath) | CCz; mg/m ³ | Mz; mg | $\frac{Mz}{CCz}$ |
|-------------------------------------|------------------------|--------|------------------|
| Carbon Monoxide (CO) | 1750 | 22.2 | 0.013 |
| Carbon Dioxide (CO ₂) | 90000 | 326.7 | 0.004 |
| Sulphur Dioxide (SO ₂) | 260 | 0 | 0 |
| Nitrogen Dioxide (NO ₂) | 90 | 0 | 0 |
| Hydrogen Cyanide (HCN) | 55 | 0 | 0 |
| ITC | | | 1.610 |

| Gas (insulation) | 1 | 2 | 3 | Average |
|-----------------------------------|-------|-------|-------|---------|
| Carbon Monoxide (CO) | 19.4 | 18.7 | 19.2 | 19.1 |
| Carbon Dioxide (CO ₂) | 287.4 | 289.6 | 284.6 | 287.2 |

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| | | | | |
|-------------------------------------|----|----|----|----|
| Sulphur Dioxide (SO ₂) | ND | ND | ND | ND |
| Nitrogen Dioxide (NO ₂) | ND | ND | ND | ND |
| Hydrogen Cyanide (HCN) | ND | ND | ND | ND |

| Gas (insulation) | CCz; mg/m ³ | Mz; mg | $\frac{Mz}{CCz}$ |
|-------------------------------------|------------------------|--------|------------------|
| Carbon Monoxide (CO) | 1750 | 19.1 | 0.011 |
| Carbon Dioxide (CO ₂) | 90000 | 287.2 | 0.003 |
| Sulphur Dioxide (SO ₂) | 260 | 0 | 0 |
| Nitrogen Dioxide (NO ₂) | 90 | 0 | 0 |
| Hydrogen Cyanide (HCN) | 55 | 0 | 0 |
| ITC | | | 1.391 |

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 ITC Value (sheath) determined was 1.610.

The ITC Value (insulation) determined was 1.391.

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5 of 7





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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 | 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 | 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 |

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6 of 7





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| | | | | | | |
|--|------------------------|--|---------------------------|-----|-----|-----|
| | | 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 |

Comprehensive:

| No. | Items | Parameter | Record | R15 | | | R16 | | |
|-----|---|---------------------|-------------------|------|------|------|------|------|------|
| | | | | HL1 | HL2 | HL3 | HL1 | HL2 | HL3 |
| 1 | single wire or cable burn testing | Unburned length, mm | 400 | Pass | Pass | Pass | Pass | Pass | Pass |
| 2 | vertically-mounted bunched wires or cables burn testing | Burned length, m | 1.30 | Pass | Pass | Pass | Pass | Pass | Pass |
| 3 | Smoke density testing | Transmission % | 88.3 | Pass | Pass | Pass | * | Pass | Pass |
| 4 | Smoke toxicity testing | ITC | Sheath: 1.610 | Pass | Pass | Pass | Pass | Pass | Pass |
| | | | Insulation: 1.391 | | | | | | |

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

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by:

Lynn liu

Approved by:

Shen hui

-End of Report-

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7 of 7

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