



Material & Engineering Laboratory-Taipei

TEST REPORT



REPORT NO. : HV-17-05658

PAGE : 1 OF 5

REPORT DATE : Nov. 09, 2017

SUNELITE TECHNOLOGY CO.,LTD

The following merchandise was submitted and identified by the vendor as :

Product Name : PCB
Product Type : FR4-86
Product Color : Green
Manufacturer : SUNELITE TECHNOLOGY CO.,LTD

We have tested the submitted sample(s) as requested and the following results were obtained :

Test Required : (According to client's test specification, please see following sheets in detail.)

Fire Protection Testing

Test Result :

-PLEASE SEE ATTACHED SHEETS-

Date of Receive : SEPTEMBER 28, 2017

Date of Testing : SEPTEMBER 28, 2017 ~ NOVEMBER 09, 2017

Signed for and on behalf of
SGS Taiwan Ltd.

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TEST REPORT



REPORT NO. : HV-17-05658

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REPORT DATE : Nov. 09, 2017

Test Requested:

EN 45545-2:2013+A1:2015 Railway applications — Fire protection on railway vehicles Part 2: Requirements for fire behaviour of materials and components, and testing according to Table 5 — Material requirement sets (R24) & (R25)

I. Description of Test specimens

Sample Description	PCB (FR4-86)
Color	Green
Size of sample	141.4mm×10.5mm×1.5mm (T01 EN ISO 4589-2) 60mm×60mm×1.5mm (T16 EN 60695-2-11)

II. Summary of test results

Short name of requirement set (used for)	Test method reference	Parameter Unit	Test results *
R24	T01 EN ISO 4589-2 OI	Oxygen content %	>60
R25 (EL9)	T16 EN 60695-2-11	Glow Wire Temperature, °C	850

* For the test details, please see the appendix of this test report.

III. Conclusion

According to the test results, the submitted sample **meets** the requirement of **R24 & R25** (detailed in Table 5 of EN 45545-2:2013+A1:2015) for a **HL3** Hazard Level Classification.

Test Criteria, EN 45545-2:2013+A1:2015, Table 5, Material requirement sets, R24

Short name of requirement set (used for)	Test method reference	Parameter Unit	Requirement Definition	HL1	HL2	HL3
R24	T01 EN ISO 4589-2 OI	Oxygen content %	Minimum	28	28	32

Test Criteria, EN 45545-2:2013+A1:2015, Table 5, Material requirement sets, R25

Short name of requirement set (used for)	Test method reference	Parameter Unit	Requirement Definition	HL1	HL2	HL3
R25 (EL9)	T16 EN 60695-2-11	Glow Wire Temperature °C	Minimum	850	850	850

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REPORT DATE : Nov. 09, 2017

APPENDIX 1: T01 EN ISO 4589-2:1999+A1:2006 Determination of burning behaviour by oxygen Index Part 2: Ambient temperature test

1. Conditioning

T: 23±2°C, R.H: 50±5%, at least 88 h.

2. Test results

- 1) Select initial oxygen concentration(in accordance with 8.1.3): 32%
- 2) Determining the Preliminary Oxygen Concentration(Till pair of oxygen concentrations which gives opposite response differs by ≤1%, in accordance with 8.5)

Oxygen concentration, % (V/V)	32	40	50	60	61			
Burnt length, (mm)	<50	<50	<50	<50	<50			
Response, ("X" or "O")	O	O	O	O	O			

- 3) In our opinion, the OI is >60%(V/V).

TEST REPORT



REPORT NO. : HV-17-05658

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REPORT DATE : Nov. 09, 2017

APPENDIX 2: T16 EN 60695-2-11 Fire hazard testing—Part 2-11: Glowing/hot-wire based test methods Glow-wire flammability test method for end-products

1. Conditioning

Prior to testing, the sample was conditioned 24 hours at temperatures of 15~35°C and at a relative humidity of 45~75%.

At time to testing, Temperature between 15°C ~ 35°C and Relative humidity less than or equal to 75 %.

2. Test results

Temperature of the glow-wire (°C)	650	700	750	800	850
Duration (t _i) from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites (s)	NI	NI	NI	NI	NI
Duration (t _e) from the beginning of tip application up to the time when flames extinguish during or after the period of application (s)	NI	NI	NI	NI	NI
Whether the test specimen extinguishes by virtue of most of the flaming material being withdrawn with the glow-wire	NA	NA	NA	NA	NA
Whether ignite the specified layer placed underneath the test specimen or not	No	No	No	No	No
Whether the test specimen is totally burned	No	No	No	No	No
Observations: None					

Remark: NI--- Not ignition; NA---Not applicable

3. Conclusion

In accordance with test results, the submitted sample: **GWEPT: 850**

TEST REPORT

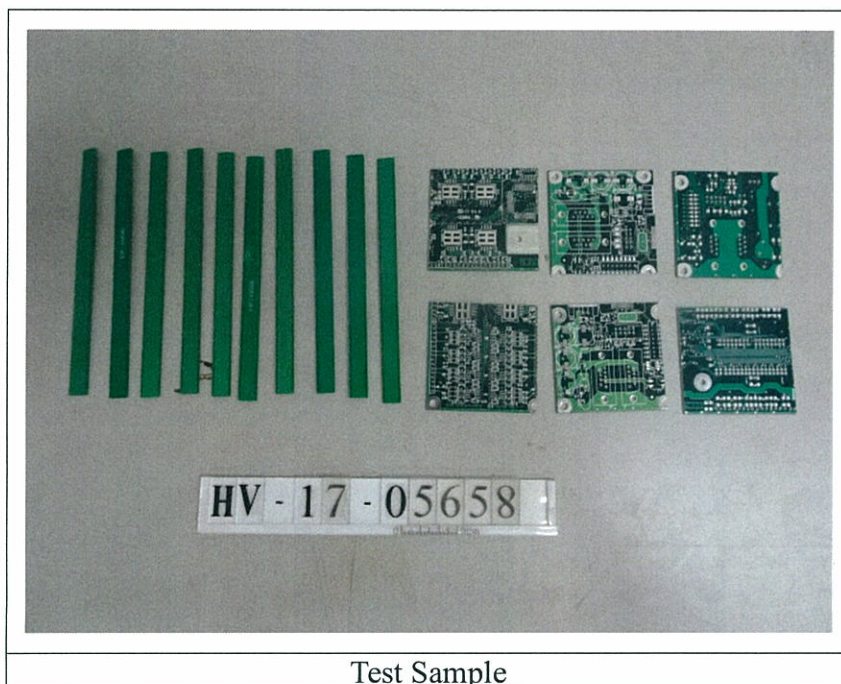


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REPORT DATE : Nov. 09, 2017

Test Photo :



Test Sample

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TEST REPORT



REPORT NO. : HV-17-05659

PAGE : 1 OF 5

REPORT DATE : Nov. 09, 2017

SUNELITE TECHNOLOGY CO., LTD.

The following merchandise was submitted and identified by the vendor as :

Product Name : PCB
Product Type : FR4-NP155F
Product Color : Green
Manufacturer/Vendor : SUNELITE TECHNOLOGY CO., LTD

We have tested the submitted sample(s) as requested and the following results were obtained :

Test Required : (According to client's test specification, please see following sheets in detail.)

Fire Protection Testing

Test Result :

-PLEASE SEE ATTACHED SHEETS-

Date of Receive : SEPTEMBER 28, 2017

Date of Testing : SEPTEMBER 28, 2017 ~ NOVEMBER 09, 2017

Signed for and on behalf of
SGS Taiwan Ltd.

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REPORT NO. : HV-17-05659

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REPORT DATE : Nov. 09, 2017

Test Requested:

EN 45545-2:2013+A1:2015 Railway applications — Fire protection on railway vehicles Part 2: Requirements for fire behaviour of materials and components, and testing according to Table 5 — Material requirement sets (R24) & (R25)

I. Description of Test specimens

Sample Description	PCB (FR4-155F)		
Color	Green		
Size of sample	142.2mm×10.1mm×1.6mm	(T01 EN ISO 4589-2)	
	60mm×60mm×1.6mm	(T16 EN 60695-2-11)	

II. Summary of test results

Short name of requirement set (used for)	Test method reference	Parameter Unit	Test results *
R24	T01 EN ISO 4589-2 OI	Oxygen content %	>60
R25 (EL9)	T16 EN 60695-2-11	Glow Wire Temperature, °C	850

* For the test details, please see the appendix of this test report.

III. Conclusion

According to the test results, the submitted sample **meets** the requirement of **R24 & R25** (detailed in Table 5 of EN 45545-2:2013+A1:2015) for a **HL3** Hazard Level Classification.

Test Criteria, EN 45545-2:2013+A1:2015, Table 5, Material requirement sets, R24

Short name of requirement set (used for)	Test method reference	Parameter Unit	Requirement Definition	HL1	HL2	HL3
R24	T01 EN ISO 4589-2 OI	Oxygen content %	Minimum	28	28	32

Test Criteria, EN 45545-2:2013+A1:2015, Table 5, Material requirement sets, R25

Short name of requirement set (used for)	Test method reference	Parameter Unit	Requirement Definition	HL1	HL2	HL3
R25 (EL9)	T16 EN 60695-2-11	Glow Wire Temperature °C	Minimum	850	850	850

TEST REPORT



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REPORT DATE : Nov. 09, 2017

APPENDIX 1: T01 EN ISO 4589-2:1999+A1:2006 Determination of burning behaviour by oxygen Index Part 2: Ambient temperature test

1. Conditioning

T: 23±2°C, R.H: 50±5%, at least 88 h.

2. Test results

- 1) Select initial oxygen concentration(in accordance with 8.1.3): 32%
- 2) Determining the Preliminary Oxygen Concentration(Till pair of oxygen concentrations which gives opposite response differs by ≤1%, in accordance with 8.5)

Oxygen concentration, % (V/V)	32	40	50	60	61			
Burnt length, (mm)	<50	<50	<50	<50	<50			
Response, ("X" or "O")	O	O	O	O	O			

- 3) In our opinion, the OI is >60%(V/V).

TEST REPORT



REPORT NO. : HV-17-05659

PAGE : 4 OF 5

REPORT DATE : Nov. 09, 2017

APPENDIX 2: T16 EN 60695-2-11 Fire hazard testing—Part 2-11: Glowing/hot-wire based test methods Glow-wire flammability test method for end-products

1. Conditioning

Prior to testing, the sample was conditioned 24 hours at temperatures of 15~35°C and at a relative humidity of 45~75%.

At time to testing, Temperature between 15°C ~ 35°C and Relative humidity less than or equal to 75 %.

2. Test results

Temperature of the glow-wire (°C)	650	700	750	800	850
Duration (t _i) from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites (s)	NI	NI	NI	NI	NI
Duration (t _e) from the beginning of tip application up to the time when flames extinguish during or after the period of application (s)	NI	NI	NI	NI	NI
Whether the test specimen extinguishes by virtue of most of the flaming material being withdrawn with the glow-wire	NA	NA	NA	NA	NA
Whether ignite the specified layer placed underneath the test specimen or not	No	No	No	No	No
Whether the test specimen is totally burned	No	No	No	No	No
Observations: None					

Remark: NI--- Not ignition; NA---Not applicable

3. Conclusion

In accordance with test results, the submitted sample: **GWEPT: 850**

TEST REPORT

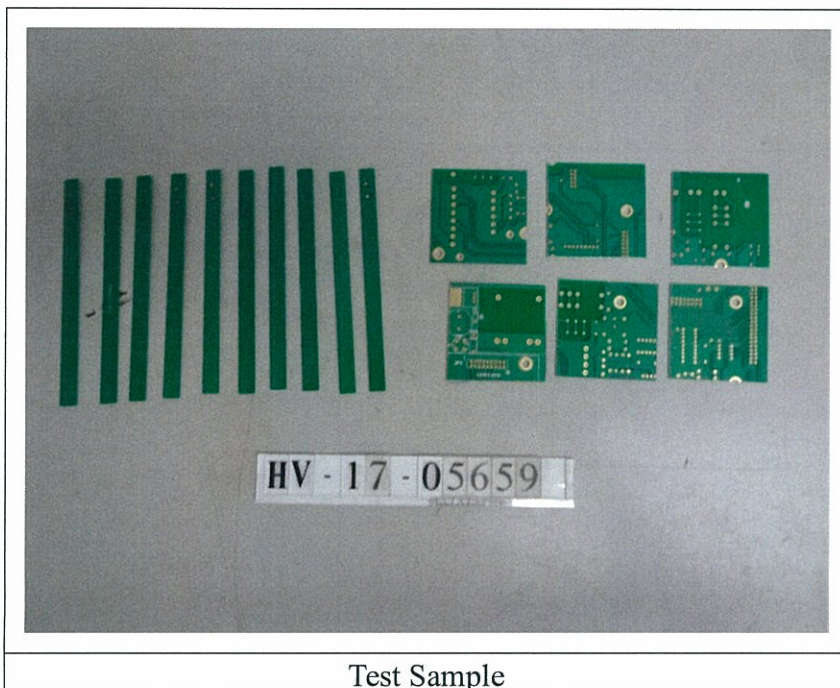


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REPORT DATE : Nov. 09, 2017

Test Photo :



Test Sample

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Material & Engineering Laboratory-Taipei

TEST REPORT



REPORT NO. : HV-17-05660

PAGE : 1 OF 5

REPORT DATE : Nov. 09, 2017

SUNELITE TECHNOLOGY CO.,LTD

The following merchandise was submitted and identified by the vendor as :

Product Name : PCB
Product Type : FR4-NP175F
Product Color : Green
Manufacturer/Vendor : SUNELITE TECHNOLOGY CO.,LTD

We have tested the submitted sample(s) as requested and the following results were obtained :

Test Required : (According to client's test specification, please see following sheets in detail.)

Fire Protection Testing

Test Result :

-PLEASE SEE ATTACHED SHEETS-

Date of Receive : SEPTEMBER 28, 2017

Date of Testing : SEPTEMBER 28, 2017 ~ NOVEMBER 09, 2017

Signed for and on behalf of
SGS Taiwan Ltd.

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TEST REPORT



REPORT NO. : HV-17-05660

PAGE : 2 OF 5

REPORT DATE : Nov. 09, 2017

Test Requested:

EN 45545-2:2013+A1:2015 Railway applications — Fire protection on railway vehicles Part 2: Requirements for fire behaviour of materials and components, and testing according to Table 5 — Material requirement sets (R24) & (R25)

I. Description of Test specimens

Sample Description	PCB (FR4-175F)		
Color	Green		
Size of sample	125.5mm×10.4mm×1.9mm	(T01 EN ISO 4589-2)	
	60mm×60mm×1.9mm	(T16 EN 60695-2-11)	

II. Summary of test results

Short name of requirement set (used for)	Test method reference	Parameter Unit	Test results *
R24	T01 EN ISO 4589-2 OI	Oxygen content %	>60
R25 (EL9)	T16 EN 60695-2-11	Glow Wire Temperature, °C	850

* For the test details, please see the appendix of this test report.

III. Conclusion

According to the test results, the submitted sample **meets** the requirement of **R24 & R25** (detailed in Table 5 of EN 45545-2:2013+A1:2015) for a **HL3** Hazard Level Classification.

Test Criteria, EN 45545-2:2013+A1:2015, Table 5, Material requirement sets, R24

Short name of requirement set (used for)	Test method reference	Parameter Unit	Requirement Definition	HL1	HL2	HL3
R24	T01 EN ISO 4589-2 OI	Oxygen content %	Minimum	28	28	32

Test Criteria, EN 45545-2:2013+A1:2015, Table 5, Material requirement sets, R25

Short name of requirement set (used for)	Test method reference	Parameter Unit	Requirement Definition	HL1	HL2	HL3
R25 (EL9)	T16 EN 60695-2-11	Glow Wire Temperature °C	Minimum	850	850	850

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TEST REPORT



REPORT NO. : HV-17-05660

PAGE : 3 OF 5

REPORT DATE : Nov. 09, 2017

APPENDIX 1: T01 EN ISO 4589-2:1999+A1:2006 Determination of burning behaviour by oxygen Index Part 2: Ambient temperature test

1. Conditioning

T: 23±2°C, R.H: 50±5%, at least 88 h.

2. Test results

- 1) Select initial oxygen concentration(in accordance with 8.1.3): 32%
- 2) Determining the Preliminary Oxygen Concentration(Till pair of oxygen concentrations which gives opposite response differs by ≤1%, in accordance with 8.5)

Oxygen concentration, % (V/V)	32	40	50	60	61			
Burnt length, (mm)	<50	<50	<50	<50	<50			
Response, ("X" or "O")	O	O	O	O	O			

- 3) In our opinion, the OI is >60% (V/V).

TEST REPORT



REPORT NO. : HV-17-05660

PAGE : 4 OF 5

REPORT DATE : Nov. 09, 2017

APPENDIX 2: T16 EN 60695-2-11 Fire hazard testing—Part 2-11: Glowing/hot-wire based test methods Glow-wire flammability test method for end-products

1. Conditioning

Prior to testing, the sample was conditioned 24 hours at temperatures of 15~35°C and at a relative humidity of 45~75%.

At time to testing, Temperature between 15°C ~ 35°C and Relative humidity less than or equal to 75 %.

2. Test results

Temperature of the glow-wire (°C)	650	700	750	800	850
Duration (t _i) from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites (s)	NI	NI	NI	NI	NI
Duration (t _e) from the beginning of tip application up to the time when flames extinguish during or after the period of application (s)	NI	NI	NI	NI	NI
Whether the test specimen extinguishes by virtue of most of the flaming material being withdrawn with the glow-wire	NA	NA	NA	NA	NA
Whether ignite the specified layer placed underneath the test specimen or not	No	No	No	No	No
Whether the test specimen is totally burned	No	No	No	No	No
Observations: None					

Remark: NI--- Not ignition; NA---Not applicable

3. Conclusion

In accordance with test results, the submitted sample: **GWEPT: 850**

TEST REPORT

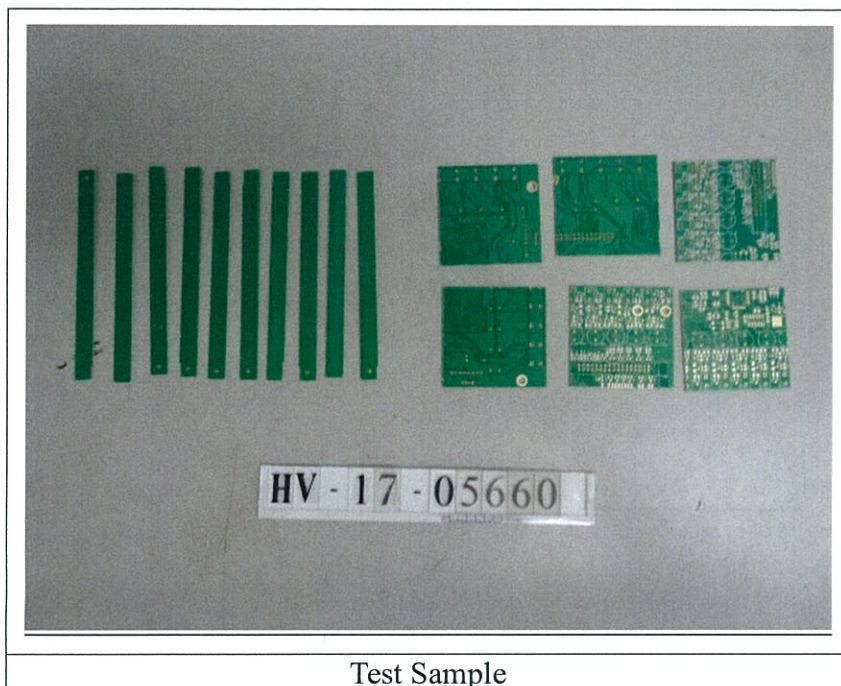


REPORT NO. : HV-17-05660

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REPORT DATE : Nov. 09, 2017

Test Photo :



Test Sample

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