



TESTING CERT #1136.04

# Chemitox

## TEST REPORT

Report Number: 240210-1

Date of Issue: February 26, 2024

Report to:

**Hanwha Vision Co., Ltd.**

6, Pangyo-ro 319beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, 13488, Korea

Reported by:

**Chemitox, Inc., Yamanashi Testing Center KAI**

18349, Egusa, Sutama-cho, Hokuto-shi, Yamanashi 408-0103, Japan

A handwritten signature in blue ink, appearing to read 'K. Sakamoto'.

Responsible Officer  
Kiyohiko Sakamoto  
Vice President, Director  
CTO

A handwritten signature in blue ink, appearing to read 'Mitsuya Mochizuki'.

Authorized  
Mitsuya Mochizuki  
Manager

- (1) Chemitox is accredited by the following agency to ISO/IEC 17025:2017.  
American Association for Laboratory Accreditation (A2LA) — Certificated No: 1136.04
- (2) This TEST REPORT refers only to the sample tested, unless stated otherwise.

## Hanwha Vision Co., Ltd.

6, Pangyo-ro 319beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, 13488, Korea

# Glow-wire Flammability Test for End Products (GWEPT) Test Report

## 1. Objective

As per client's request, Glow-wire flammability test for end products (GWEPT) is conducted in accordance with BS EN IEC 60695-2-11:2021 "Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end products (GWEPT)".

## 2. Date of Test

February 21, 2024

## 3. Test Environment

See individual data sheet.

## 4. Description of Test Specimens

The description of the specimens given in **Table 1** has been prepared from information provided by Hanwha Vision Co., Ltd. This information has not been independently verified by Chemitox. All values quoted are nominal, unless specified:

**Table 1** Description of Specimens

Received on		January 31, 2024			
Generic description	PCB Name	PCB Vendor	PCB Type	Layer	Nominal thickness (mm)
PCB	IR LED PCB	EXPRESS	94V-0	2	1.6
	Sensor PCB	APCB	CK 77-1 3 94V-0	6	1.6
	Network PCB	KIJOO	KJ4-V-0-2	6	1.6

## 5. Sampling

The specimens were supplied by the client. Chemitox was not involved in any sampling procedure. The results stated in this report apply to the specimens as received from the client.

Note: Sampling means the prescribed procedure for extracting a part of a substance, material, or product to provide a representative specimen for testing.

## 6. Test Method and Conditioning

Test Method and Conditioning is indicated in **Table 2**.

**Table 2** Test Method and Conditioning

<b>Test name</b>	Glow-wire flammability test for end-products (GWEPT)
<b>Test method</b>	BS EN IEC 60695-2-11: 2021 (See Appendix)
<b>Sample conditioning</b>	Specimens were conditioned for at least 24 hours at a temperature of $(25 \pm 10) ^\circ\text{C}$ and a relative humidity of $(60 \pm 15) \%$
<b>Glow-wire temperature</b>	850°C (as stipulated in BS EN 45545-2:2020+A1:2023, R25)
<b>Glow-wire point of contact</b>	See Appendix

## 7. Test Results

Summarized test results are shown in **Table 3**. See Appendix for details.

**Table 3** Summarized test results

Generic description	Product name	Contact point *	Test result (°C) **
PCB	IR LED PCB	1	GWEPT : 850
		2	GWEPT : 850
	Sensor PCB	1	GWEPT : 850
		2	GWEPT : 850
	Network PCB	1	GWEPT : 850
		2	GWEPT : 850
		3	GWEPT : 850
		4	GWEPT : 850

\*: The application points were determined by the instruction of the client, with taking into consideration of the requirement in Clause 8.1, BS EN IEC 60695-2-11. See photographs in Appendix for the actual points on the specimens.

\* \*:When performing a measurement and subsequently making a statement of conformity, for example Pass/Fail to a particular requirement, Simple Acceptance Rule is used which is same as Upper/Lower Specification . (Please see “Guidance for decision rule” in detail.)



## 8. Test Location

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Chemitox, Inc., Yamanashi Testing Center KAI  
18349, Egusa, Sutama-cho, Hokuto-shi, Yamanashi 408-0103

## 9. Performed by

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Takuya Hayashida, Senior Engineer (Level 1)

Witnessed by Mitsuya Mochizuki, Manager (Level 3)

## 10. Reviewed by

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Mitsuya Mochizuki, Manager

*Note: This report shall not be reproduced except in full without approval of Chemitox, Inc.*

## Guidance for decision rule

Issued: 2021-11-29

Revised: 0000-00-00

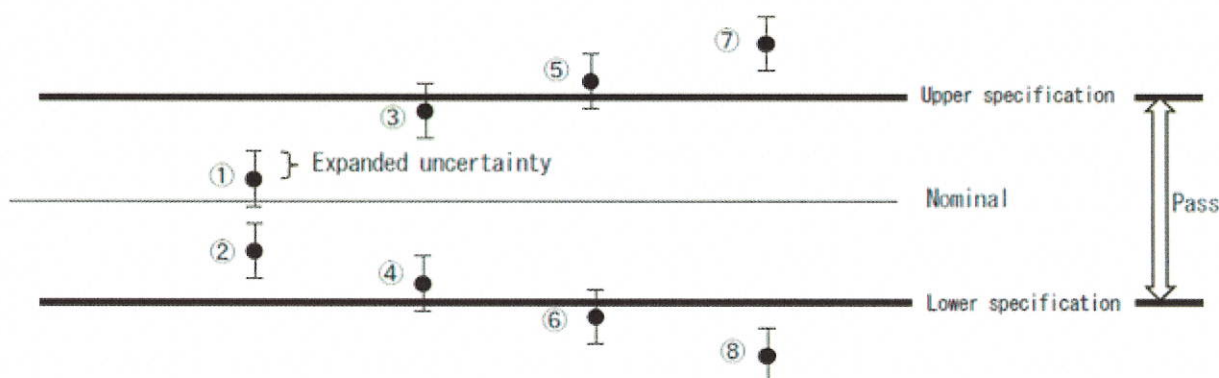
When performing a measurement and subsequently making a statement of conformity, for example Pass/Fail to a particular requirement, decision rule should be made to make a correct decision regarding conformance to specification or requirement.

In case of Chemitox, we use Simple Acceptance Rule, unless customers request or test standard specifically requests otherwise. Simple Acceptance Rule is the acceptance limit is the same as Upper/Lower Specification.

This means the guard band is zero.

### What means the guard and is zero

Since no adjustment is made to make a decision, decision for conformance or classification is made using the measured test value. In the figure below, uncertainty is indicated, but not uncertainty is considered when making a judgement.



In this case, the result will be

	①, ②	③, ④	⑤, ⑥	⑦, ⑧
<b>Simple Acceptance</b>	<b>Pass</b>	<b>Pass</b>	<b>Fail</b>	<b>Fail</b>

Reference: ILAC G8: Guidelines on Decision Rules and Statements of Conformity

## Appendix

(10 Pages)

- Detailed Test Results (GWEPT)
- Photographs of the specimens (GWEPT)
- Test Method (GWEPT)

Project No. - File -Tested by: Takuya Hayashida Date 2024-02-21  
Print Name SignatureReference: 240210-1

GLOW WIRE Flammability Test for End-Product Test

☐ IEC 60695-2-11 (\_\_\_\_) Ed. (Rev.\_\_\_\_)☒ BS EN IEC 60695-2-11 (\_\_\_\_) Ed. (Rev. 2021)Set#: - Material: IR LED PCB Color: BlackThk: - [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Start Date &amp; time: 2024-01-31 at 16:00

Conditioning

End Date &amp; time: 2024-02-21 at 14:10

#	Thk (mm)	T <sub>GW</sub> °C	T <sub>I</sub> (s)	T <sub>E</sub> (s)	T <sub>R</sub> (s)	X <sub>1</sub>
1 *	1.61	850	-	-	0.0	( #,1 )
2 *	1.64	850	-	-	0.0	( #,1 )
						( )
						( )
						( )
						( )

\* Contact points #1, 2 see page 10.

2024-02-21 TH

GWEPT= 850 °C

T<sub>GW</sub> = Glow Wire Tip TemperatureT<sub>I</sub> = the duration from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites.T<sub>E</sub> = The time of extinguishmentT<sub>R</sub> = Total Flaming and Glowing Time After Glow Wire Tip RemovalObservations (X<sub>1</sub>)

( # ) No ignition after 30 second application

(1) Specimen did not drip.

(2) Specimen dripped particles which did not ignite tissue paper.

(3) Specimen dripped particles which ignited tissue paper.

(4) Tip penetrated sample.

(5) Passed by virtue of most of the flaming material being withdrawn with glow wire

(6) Misc: \_\_\_\_\_

Micrometer No.: M-299 Equipment No.: Q-7 Temp. Indicator: M-15-2Lab Ambient: 25 °C (25±10 °C) and 47 %RH (60±15%RH)

Issued: 2002-12-05

Revised: 2023-08-04

Project No. - File -

Tested by: Takuya Hayashida Date 2024-02-21

Print Name

Signature

Reference: 240210-1

GLOW WIRE Flammability Test for End-Product Test

☐ IEC 60695-2-11 (\_\_\_\_) Ed. (Rev.\_\_\_\_)

☒ BS EN IEC 60695-2-11 (\_\_\_\_) Ed. (Rev. 2021)

Set#: - Material: Sensor PCB Color: Black

Thk: - [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Start Date & time: 2024-01-31 at 16:00

Conditioning

End Date & time: 2024-02-21 at 14:40

#	Thk (mm)	T <sub>GW</sub> °C	T <sub>I</sub> (s)	T <sub>E</sub> (s)	T <sub>R</sub> (s)	X <sub>1</sub>
1 *	1.59	850	-	-	0.0	( #,1 )
2 *	1.59	850	-	-	0.0	( #,1 )
						( )
						( )
						( )
						( )

\* Contact points #1, 2 see page 11.

2024-02-21 TH

GWEPT= 850 °C

T<sub>GW</sub> = Glow Wire Tip Temperature

T<sub>I</sub> = the duration from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites.

T<sub>E</sub> = The time of extinguishment

T<sub>R</sub> = Total Flaming and Glowing Time After Glow Wire Tip Removal

Observations (X<sub>1</sub>)

(#) No ignition after 30 second application

(1) Specimen did not drip.

(2) Specimen dripped particles which did not ignite tissue paper.

(3) Specimen dripped particles which ignited tissue paper.

(4) Tip penetrated sample.

(5) Passed by virtue of most of the flaming material being withdrawn with glow wire

(6) Misc: \_\_\_\_\_

Micrometer No.: M-299 Equipment No.: Q-7 Temp. Indicator: M-15-2

Lab Ambient: 25 °C (25±10 °C) and 47 %RH (60±15%RH)



Issued: 2002-12-05

Revised: 2023-08-04

Project No. - File -

Tested by: Takuya Hayashida Date 2024-02-21  
Print Name Signature

Reference: 240210-1

GLOW WIRE Flammability Test for End-Product Test

☐ IEC 60695-2-11 (\_\_\_\_) Ed. (Rev.\_\_\_\_)

☒ BS EN IEC 60695-2-11 (\_\_\_\_) Ed. (Rev. 2021)

Set#: - Material: Network PCB Color: Green

Thk: - [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Start Date & time: 2024-01-31 at 16:00

Conditioning

End Date & time: 2024-02-21 at 15:15

#	Thk (mm)	T <sub>GW</sub> °C	T <sub>I</sub> (s)	T <sub>E</sub> (s)	T <sub>R</sub> (s)	X <sub>1</sub>
1 *	1.58	850	-	-	0.0	( #,1 )
2 *	1.57	850	-	-	0.0	( #,1 )
3 *	1.53	850	-	-	0.0	( #,1 )
4 *	1.48	850	-	-	0.0	( #,1 )
						( )
						( )

\* Contact points #1, 2, 3, 4 see page 12, 13.

2024-02-21 TH

GWEPT= 850 °C

T<sub>GW</sub> = Glow Wire Tip Temperature

T<sub>I</sub> = the duration from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites.

T<sub>E</sub> = The time of extinguishment

T<sub>R</sub> = Total Flaming and Glowing Time After Glow Wire Tip Removal

Observations (X<sub>1</sub>)

(#) No ignition after 30 second application

(1) Specimen did not drip.

(2) Specimen dripped particles which did not ignite tissue paper.

(3) Specimen dripped particles which ignited tissue paper.

(4) Tip penetrated sample.

(5) Passed by virtue of most of the flaming material being withdrawn with glow wire

(6) Misc: \_\_\_\_\_

Micrometer No.: M-299 Equipment No.: Q-7 Temp. Indicator: M-15-2

Lab Ambient: 25 °C (25±10 °C) and 47 %RH (60±15%RH)

Reference: 240210-1    Material: IR LED PCB

Contact points (IR LED PCB)

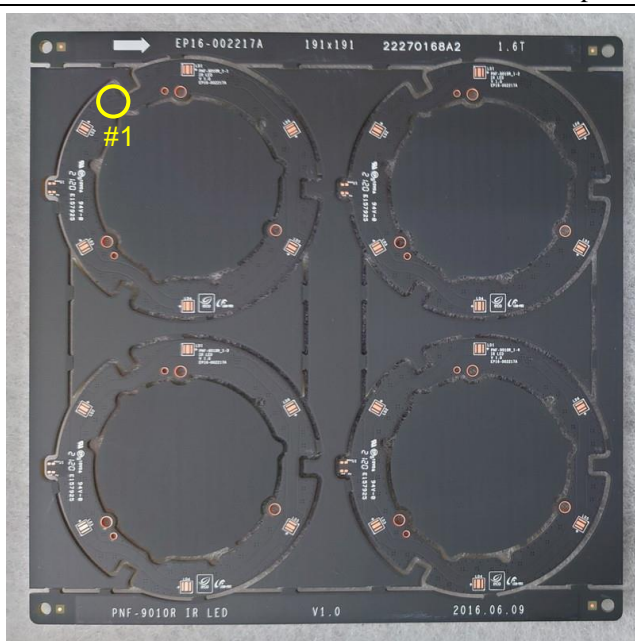


Figure 1 Front side

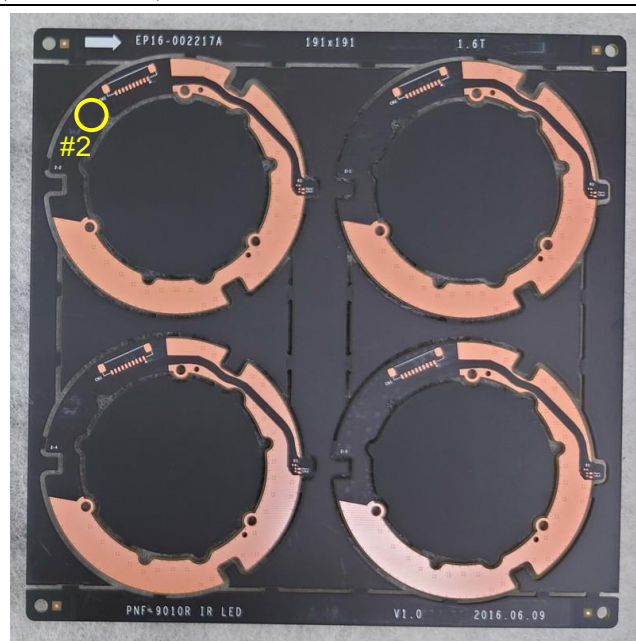


Figure 2 Back side

Specimens after test (IR LED PCB)



Figure 3 Contact point #1



Figure 4 Contact point #2

Reference: 240210-1    Material: Sensor PCB

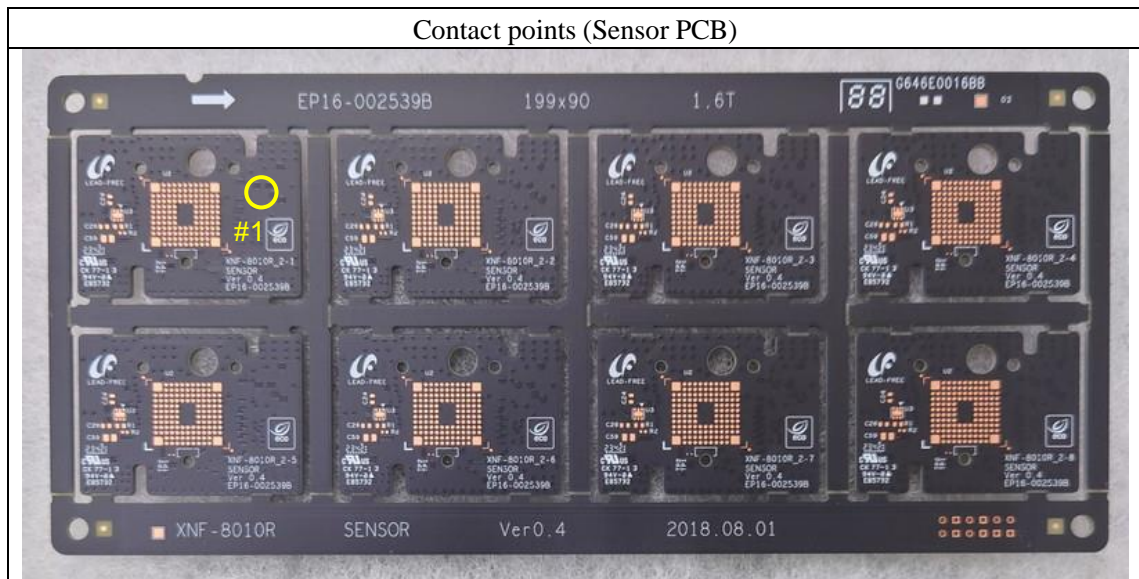


Figure 5 Front side

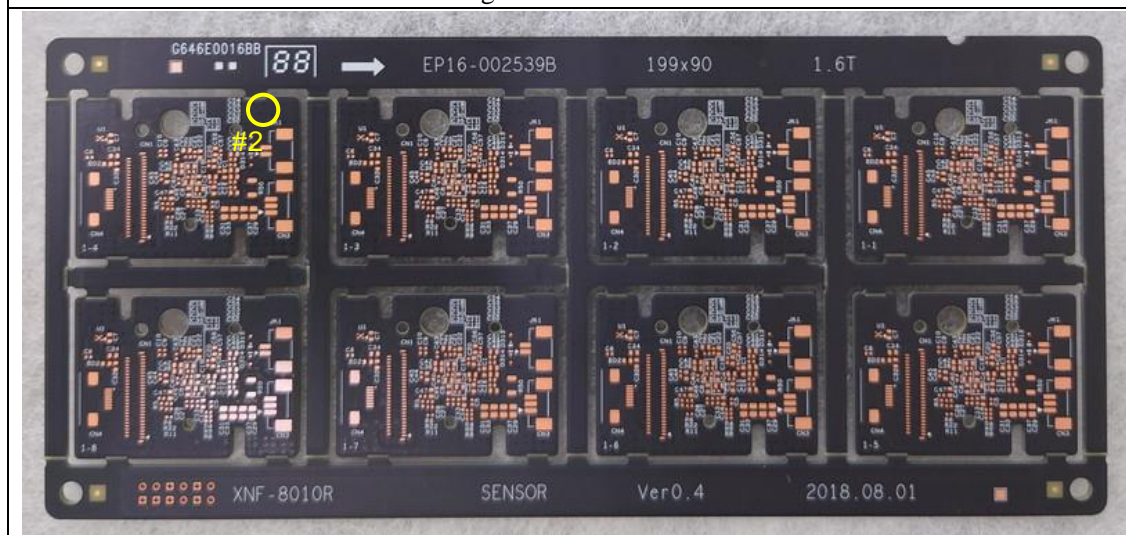
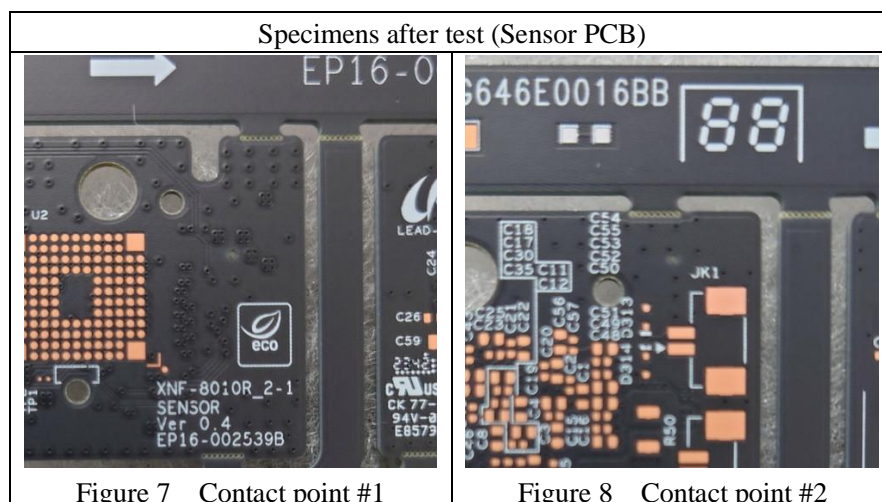


Figure 6 Back side





Reference: 240210-1 Material: Network PCB

Contact points (Network PCB)

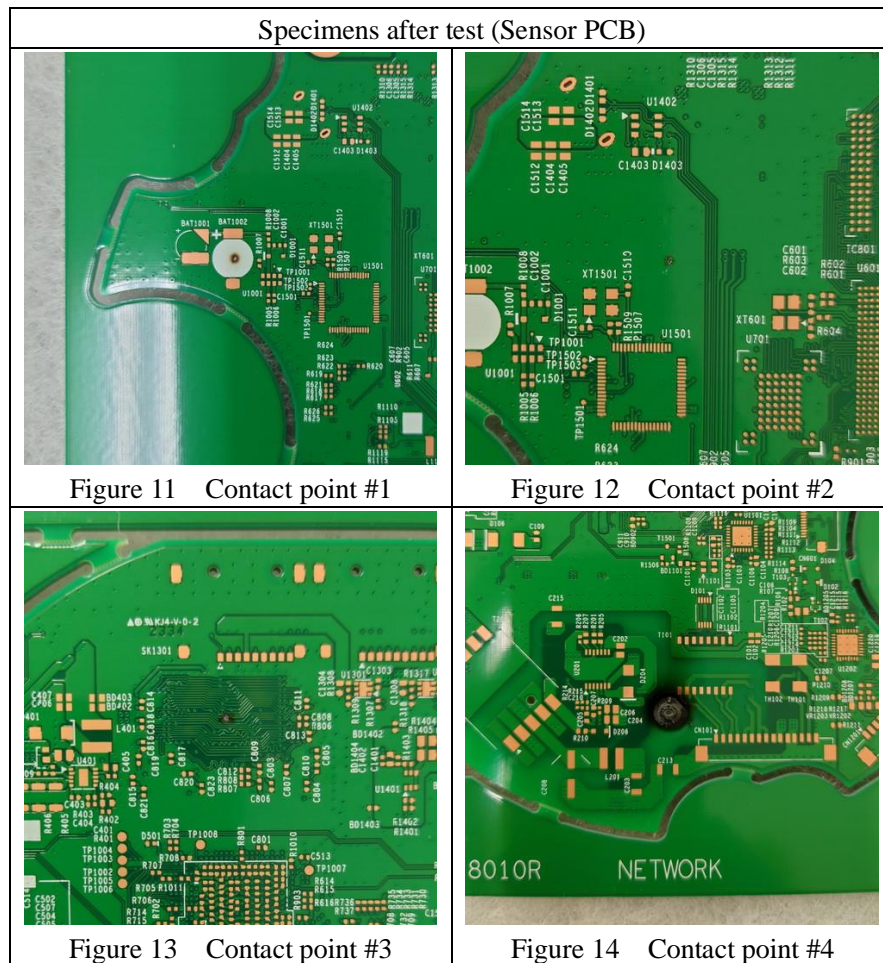


Figure 9 Front side



Figure 10 Back side

Reference: 240210-1      Material: Network PCB





## Appendix

### Glow-Wire Test Method for End-Product

1. Applicable standard: BS EN IEC 60695-2-11 "Glowing/hot-wire based test methods – Glow-wire flammability test method for end products (GWEPT)"

2. Sample:

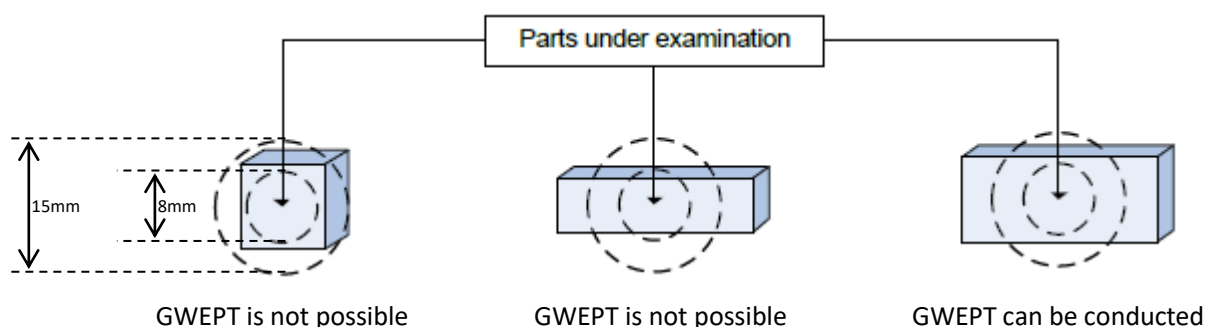
It is preferred that the test specimen should be a complete end product.

If the test cannot be made on a complete end product then, unless otherwise specified by the relevant product standard, it is acceptable to

- a) cut a piece containing the part under examination from a complete and assembled end product, or
- b) cut an aperture in the complete end product to allow the glow-wire access, or
- c) remove the part under examination in its entirety and test it separately.

*note: The glow-wire flammability test method for end products shall not be used for testing small parts. The following are considered to be small parts:*

- a) where each surface lies completely within a circle of 15 mm in diameter; or
- b) where it is not possible to fit a circle of 8 mm in diameter completely on at least one of the surfaces while, at least one part dimension is > 15 mm.



**Figure 1 Definition of small parts**

3. Conditioning: Conditioned for 24 hours in an atmosphere having a temperature at  $25 \pm 10^\circ\text{C}$  and relative humidity  $60 \pm 15\%$ .

#### 4. Test:

##### A. Test equipment:

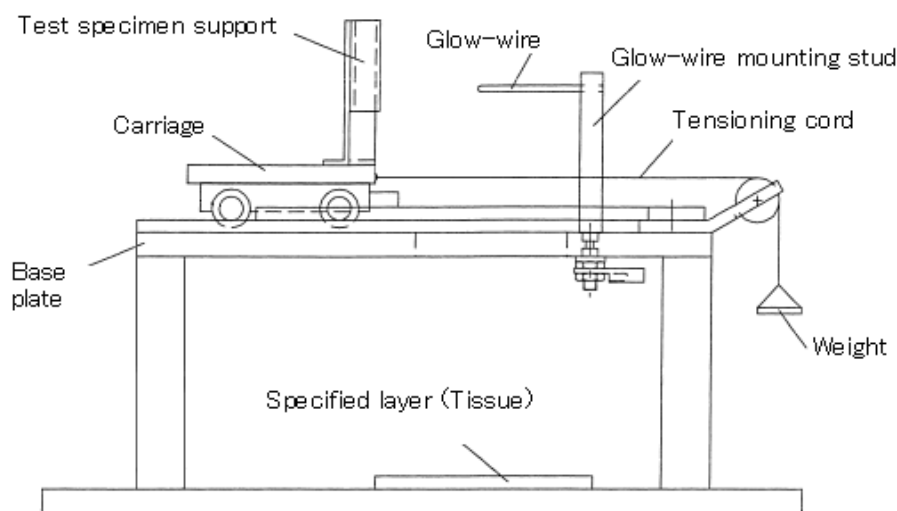
###### Glow-wire:

Nichrome wire (nominal >77% nickel/ 20% chromium) with a nominal 4.0mm diameter formed not to break on the tip

###### Thermocouples to measure the temperature:

A sheathed fine-wire thermocouple, having an overall nominal diameter of 1.0mm and Type K wire of NiCr and NiAl.

Applying force:  $0.95 \pm 0.10\text{N}$



**Figure 2 Image of testing apparatus**

##### B. Procedure:

The tip of glow-wire is applied to the sample with a force of  $0.95 \pm 0.10\text{N}$  for 30 seconds.

Test Temperature (°C)	Tolerances (°C)	Test Temperature (°C)	Tolerances (°C)
550	$\pm 10$	800	$\pm 15$
600	$\pm 10$	850	$\pm 15$
650	$\pm 10$	900	$\pm 15$
700	$\pm 10$	960	$\pm 15$
750	$\pm 10$		

The test temperature shall be chosen from the values indicated in table above.

## C. Observation:

- $T_I$ : The duration from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites.
- $T_E$ : The duration from tip application up to the time when all flames extinguish, during or after the period of application
- $T_R$ : Total flaming and glowing time after glow wire tip removal

### Note of Datasheet:

# No ignition after 30 second application

- (1) Specimen did not drip.
- (2) Specimen dripped particles which did not ignite paper.
- (3) Specimen dripped particles which ignited tissue paper.
- (4) Tip penetrated sample.
- (5) Passed by virtue of most of the flaming material being withdrawn with glow wire.

5. Criteria: The test specimen is considered to have a GWEPT of  $T$  if at a test temperature of  $T$  °C,

a) there is no ignition, or

b) all of the following situations apply when ignition has occurred:

- i) flames or glowing combustion of the test specimen extinguish within 30 s after removal of the glow wire, i.e.  $T_R \leq 30$  s; and
- ii) the specified layer placed underneath the test specimen does not ignite.