

**Assessment Report on
Compliance with EN 45545-2
for Model “XNV-6022RM”**

Certificate Number: IB19030

Date Issued: February 7, 2019

Date Revised: April 1, 2019

Issued for:

HANWHA TECHWIN CO., LTD.

6, Pangyo-ro 319 beon-gil, Bundang-gu, Seongnam-si,

Gyeonggi-do, 13488, Korea



Reported by:

Chemitox, Inc.

1-14-18 Kamiikedai, Ohta-ku, Tokyo 145-0064 Japan

A handwritten signature in black ink, appearing to read "Hiroaki Fujioka". The signature is fluid and cursive, with a horizontal line underneath it.

Hiroaki Fujioka / Vice President

1. Objective

To assess the compliance with the series of standards EN 45545-2 for a product designed by the manufacturer, **HANWHA TECHWIN CO., LTD.** The assessment was conducted based on the information provided by the manufacturer.

2. Client Information

Company Name:	HANWHA TECHWIN CO., LTD.
Company Address:	6, Pangyo-ro 319 beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, 13488, Korea

3. Reference Standard

EN 45545-1 – Railway applications. Fire protection on railway vehicles. General

EN 45545-2 – Railway applications. Fire protection on railway vehicles. Requirements for fire behaviour of materials and components

EN 60695-2-11 – Fire hazard testing. Glowing/hot-wire based test methods. Glow-wire flammability test method for end-products (GWEPT)

4. Product Information

The product under assessment is a network camera designated “**XNV-6022RM**”. This product is made by **HANWHA TECHWIN CO., LTD.**

These products are developed and designed for application in rolling stock. The enclosure (top and bottom cover) is made of aluminum parts. The dome cover consists of a transparent polycarbonate. The products contain the functional components including printed circuit boards, and other miscellaneous materials inside the enclosure. They also have one cable assembly for communication.

The overall dimension of the products is **100mm x 98.9mm with 52mm height**.

The total mass of the products is **299.9g**.

This products will be installed on the ceiling of rolling stocks. Only the front face will be exposed to a passenger area. While multiple number of the products can be used in one vehicle, each product will be installed separately.

The diagram of “**XNV-6022RM**” is shown in **Figure 1**. The breakdown structure of the product with the part list is shown in **Figure 2**. The part list with the information of each mass is shown in **Table 1**.

This parts should not contain any substances which are specified in AH60-0033K

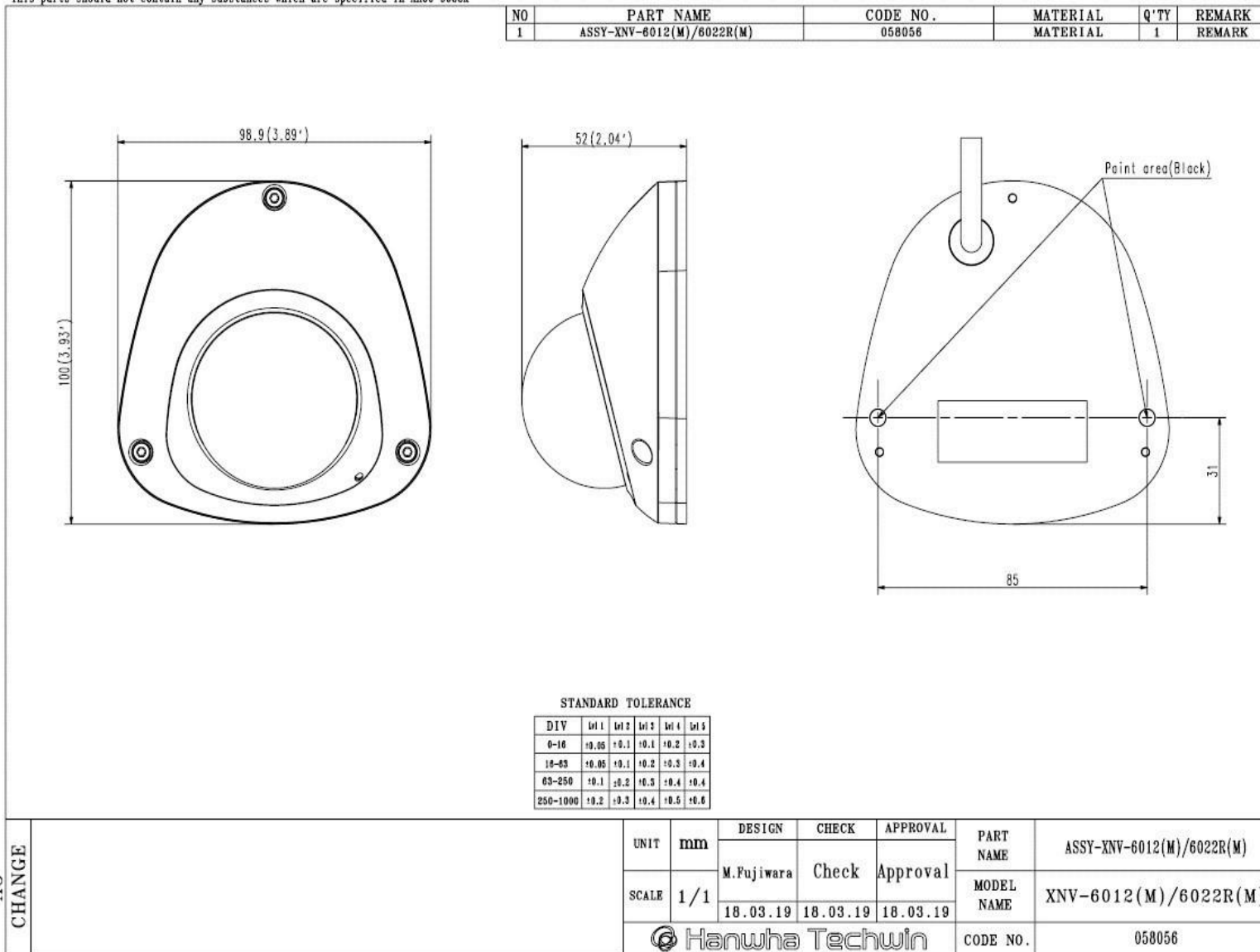
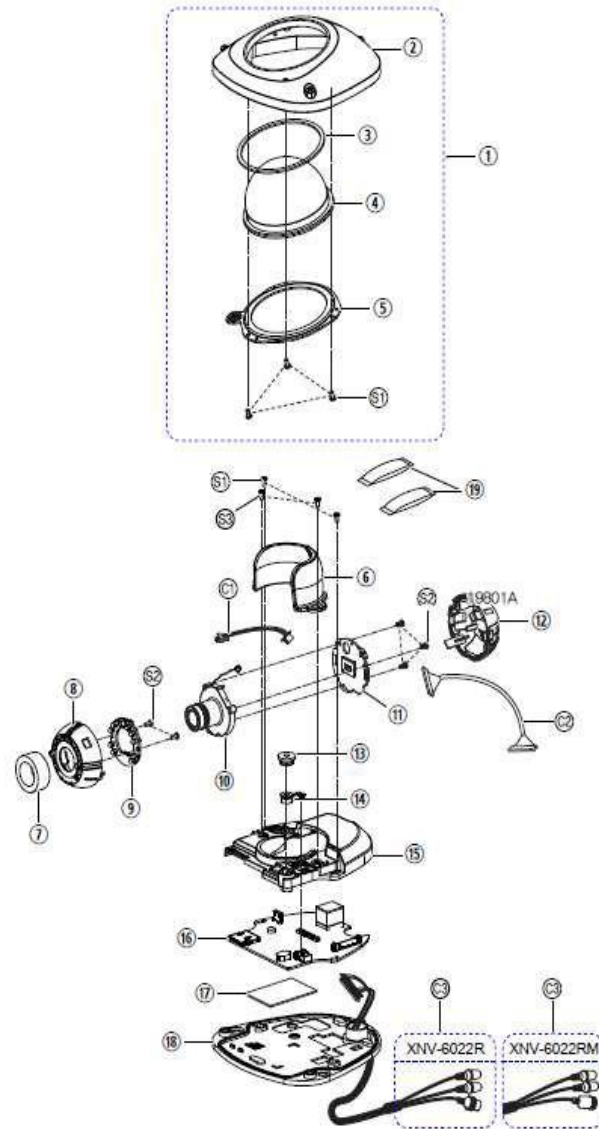


Figure 1: Diagram of "XNV-6022RM"

5-3 XNV-6022R/6022RM



Loc. No	Parts No.	Description	Specification	Q' ty	Availability	Remark
1	AM07-007538D	ASSY,CASE-TOP-WISENET,SNV-L8014RM	Logo: WISENET	1	SA	
2	FC29-007848D	CASE-TOP-WISENET,SNV-L8014RM;ADC12	Logo: WISENET	1	SA	
3	HP07-000254A	GASKET-DOME;SILICON,SNV-8013,GRAY		1	SA	
4	FC15-002780B	COVER-DOME;PC V2,MIGRATION,TRP,OD52		1	SA	
5	FC09-007358A	BRACKET-DOME,SNV-L8014RM;SECC		1	SA	
6	FC09-007359B	BRACKET-MODULE-FIXED		1	SA	
7	FC29-007845A	HOOD-IR-SNV-L8014RM		1	SA	
8	FC29-007844A	HOLDER-MODULE-TOP;SNV-L8014RM		1	SA	
9	AM08-008919A	ASSY,PCB-SNV-L8013R/L8014RM_LED_CYBRIGH		1	SA	
10	AM07-008140A	ASSY,DN MODULE-DC,SNV-L8014RM,EXPORT		1	SA	
11	AM08-007803A	ASSY,PCB-XNV-8013M(SENSOR)		1	SA	
12	FC29-007845A	HOLDER-MODULE-BOTTOM,SNV-L8014RM		1	SA	
13	FC15-005001A	COVER-MIC-RUBBER;SILICON RUBBER		1	SA	
14	EP10-001083A	MODULE,ELECTRON-IC-WHO6035CW-R50-A28J-510		1	SA	
15	FC39-003801A	FRAME-MAIN,SNV-L8014RM		1	SA	
16	AM08-007805A	ASSY,PCB-XNV-8012M(MAIN, INDOOR)		1	SA	
17	FC28-000731B	PAD-THERMAL;SILICON RUBBER,45*30*1.0		1	SA	
18	AM07-007881B	ASSY,CASE BOTTOM-XNV-8012		1	SA	XNV-6022R
	AM07-007537C	ASSY,CASE-BOTTOM,XNV-8012M		1	SA	XNV-6022RM
19	PM02-001973A	DESIPAK-1G;DESIPAK		2	SA	
C1	EP02-004376A	HARNESS-XNV-8013M;WIRE,4P-4P,55MM		1	SA	
C2	EP02-004377A	HARNESS-XNV-8013M;MCX,40P-40P,80MM		1	SA	
C3	EP02-004388A	HARNESS-XNV-8012;WIRE,14P-14P,580MM	RJ45	1	SA	XNV-6022R
	EP02-004380A	HARNESS-XNV-8013M;WIRE,14P-10P,580MM	M12	1	SA	XNV-6022RM
S1	Z8001055101A	SCREW-MACHINE	BH,+M2,L4,ZP	5	SA	
S2	Z8003019801A	SCREW-TAPTYPE	BH,+B,M2,L4	5	SA	
S3	Z8001042201A	MACHINE SCREW	WASHER HEAD,M2.6xL4	2	SA	

Figure 2: Breakdown Structure of “XNV-6022RM” with Part List

Part Number	Part Name	ea	Unit wt	Total wt	Material Type
(Part No.)	(Part Name)	(개)	(g)	(g)	
AM07-010924A	ASSY,FINAL-XNV-6012M	1		299.9	
AM06-007805A	ASSY,PCB-XNV-6012M(MAIN, INDOOR)	1	26.37	26.37	PCB
FC28-000731B	PAD-THERMAL;SILICON RUBBER,45*30*1.0	1	2.4	2.40	Rubber
AM07-007537C	ASSY,CASE-BOTTOM,XNV-6012M	1		103	Aluminum units(REF)
FC29-007843C	CASE-BOTTOM,XNV-6012M;ADC12	1	46		Aluminum
EP02-004380A	HARNESS-XNV-6013M;WIRE,14P-10P,580MM	1	57		cable(assembly)
FC39-003801A	FRAME-MAIN,SNV-L6014RM	1	14	14.00	PC
Z6001055101A	SCREW-MACHINE;6001-001707,BH,+,M2,L4,ZP	2	0.1	0.20	Steel-screw
FC29-007844A	HOLDER-MODULE-TOP,SNV-L6014RM	1	4	4.00	PC
EP02-003864A	CABLE-SNV-L6013R/L6014RM LED CABLE;4P,30	1	0.6	0.60	cable(inside)
AM06-006106A	ASSY,PCB-SNV-L6013R/L6014RM_LED	1	2.4	2.40	PCB
Z6003019801A	SCREW-TAPTYPE;6003-001440,BH,+,B,M2,L4,	2	0.1	0.20	Steel-screw
FC29-007845A	HOLDER-MODULE-BOTTOM,SNV-L6014RM	1	5	5.00	PC
Z6003019801A	SCREW-TAPTYPE;6003-001440,BH,+,B,M2,L4,	5	0.1	0.50	Steel-screw
Z6031007302A	WAVE_WASHER_H3	1	0.1	0.10	Stainless steel
FC29-007945A	HOOD-IR-SNV-L6014RM	1	0.2	0.20	PE
AM07-007678A	ASSY,DN MODULE-DC,SNV-L6014RM	1	6	6.00	Plastics(mixed)
EP14-001066	LENS SET-2M_3.6MM_CHIOPT;FIXED	1	4.9	4.90	Glass
AM06-007803A	ASSY,PCB-XNV-6013M(SENSOR)	1	4.1	4.10	PCB
EP02-004377A	HARNESS-XNV-6013M;MCX,40P-40P,80MM	1	1.2	1.20	cable(inside)
EP10-001083A	MODULE,ELECTRONIC-WHO6035CW-R50-A28J-510	1	0.3	0.30	Steel-speaker
FC15-005001A	COVER-MIC-RUBBER;SILICON RUBBER	1	0.2	0.20	Rubber
FC09-007359B	BRACKET-MODULE-FIXED,XNV-6013M;PC	1	5.6	5.60	PC
Z6001042201A	MACHINE SCREW(이볼트) WASHER HEAD,M2.6xL4)	2	0.3	0.60	Steel-screw
AM07-007536D	ASSY,CASE-TOP-WISENET,SNV-L6014RM	1		114.9	Aluminum
FC29-007846A	CASE-TOP,SNV-L6014RM;ADC12	1	90		Aluminum
FC15-002790B	COVER-DOME;PC V2,MIGRATION,TRP,OD52	1	14		PC
HP07-000254A	GASKET-DOME;SILICON,SNV-6013,GRAY	1	0		Rubber
FC09-007358A	BRACKET-DOME,SNV-L6014RM;SECC	1	9.8		Steel
FC36-001063A	SHEET-GORE-VE90308-3.6X7.6	1	0.1		Tape
Z6001055101A	SCREW-MACHINE;6001-001707,BH,+,M2,L4,ZP	3	0.1		Steel-screw
FC18-001418A	SCREW-SPECIAL_TORX10_M3_L8;TORX,BH,FP,M3	3	0.2		Steel-screw
HP07-001123A	GASKET-TOP,SNV-L6014RM;SILICON RUBBER	1	0.1		Rubber
PM02-001973A	DESIPAK-1G;DESIPAK	2	1.4	2.80	
Z6803211501A	TAPE_1425	2	0.1	0.20	Tape
PT03-000147J	LABEL-RATING,NW3,UL-A130	1	0.1	0.10	Label

Table 1: Part List of “XNV-6022RM” with Information of Each Mass

5. Assessment

5.1 Specifying Target Hazard Level

The product “XNV-6022RM” is to be used in vehicles of all design categories and for operations corresponding to operation categories 1 to 4 specified in Section 5 of EN 45545-1. According to Clause 4.1 of EN 45545-2, the targeted Hazard Level will be “HL3”.

5.2 Evaluation of Each Material

1) Printed Circuit Board (PCB)

In accordance with Table 2 and Table 5 of EN 45545-2, PCBs are classified as “EL9” in Listed Products, then required to comply with either of Requirement Set “R24” or “R25”. In this project, “R25” was selected. The test result is summarized in **Table 2**, which demonstrated the compliance with the requirement. For more detail, refer to the test report (190047) issued by **Chemitox** which is ISO 17025 accredited for the relevant testing (**Appendix 1**).

Table 2: Test result of EN 60695-2-11 for PCB

Test Parameter	Results
Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant

2) Dome Cover:

Dome cover is made of polycarbonate, which is combustible, and therefore should be assessed.

Although this part is exposed to a passenger area in the way that it is installed on the ceiling, the exposed area is limited to approx. 4,247mm², which is less than 0.2m². See **Figure 3** for the calculation of the exposed area.

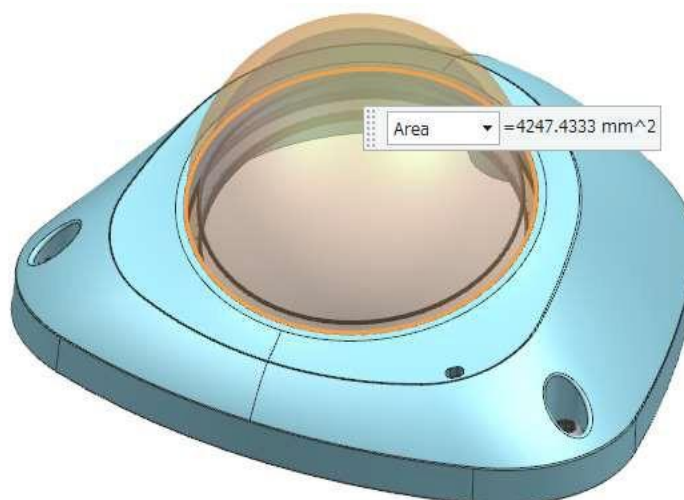


Figure 3: Calculated Result of Exposed Area of Dome Cover

According to **Table 1**, the mass of this part is 14g, which is less than 100g.

With the above information, and based on the requirement specified in Clause 4.3 and Figure 1 of EN 45545-2 (Grouping Rules), this material is considered as unclassified, and no additional testing will be required.

3) Coating of Aluminum Enclosure:

The outer enclosure parts are coated with certain organic painting.

Although this part is exposed to a passenger area in the way that it is installed on the ceiling, the exposed area is limited to approx. 9,513mm², which is less than 0.2m². See **Figure 4** for the calculation of the exposed area.

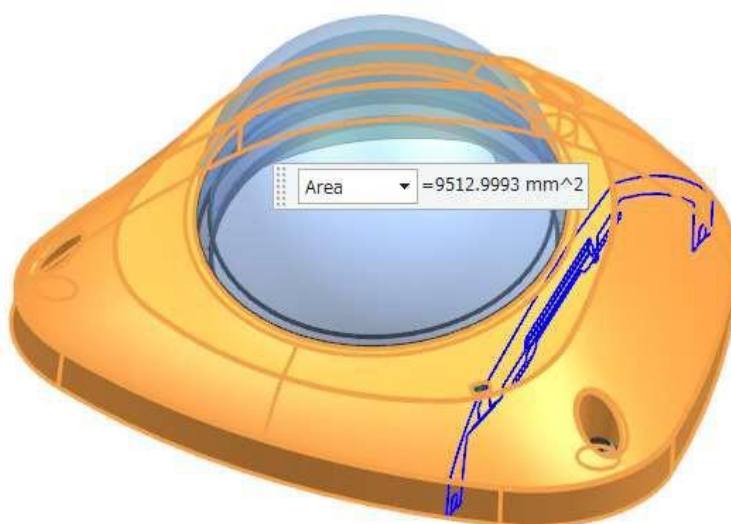


Figure 4: Calculated Result of Exposed Area of Enclosure

The mass of coating only is not specified, but the client has confirmed that it is not more than 10g.

With the above information, and based on the requirement specified in Clause 4.3 and Figure 1 of EN 45545-2 (Grouping Rules), this material is considered as unclassified, and no additional testing will be required.

4) Other miscellaneous combustible materials:

There are other miscellaneous materials, part of which are combustible. However, all those materials are very small (i.e. exposed area less than 0.2m²). Also, according to **Table 1**, total mass of these parts is less

than 100g. The total mass is still less than 100g even though the mass of Dome Cover (14g) and Coating of Enclosure (less than 10g) is added.

With the above information, and based on the requirement specified in Clause 4.3 and Figure 1 of EN 45545-2 (Grouping Rules), this material is considered as unclassified, and no additional testing will be required.

6. Verification of compliance with EN 45545-2

The assessment result detailed in Section 5 has demonstrated that the product “XNV-6022RM” meets the requirements of the following classification;

EN 45545-2 Hazard Levels HL1 to HL 3

IMPORTANT NOTE: The assessment result in this document is based on the assumption that no other non-compliant products are adjacent to the product (i.e. within 20mm horizontally, and 200mm vertically) in the end use application of railway vehicles. Depending on installation condition, additional testing may be required according to Grouping Rules specified in Clause 4.3 and Figure 1 of EN 45545-2.

7. Assessment conducted by

Hiroaki Fujioka (Mr.) – Vice President of International Business Department
Chemitox Inc.

8. Revision History

Revision date: April 1, 2019

Content of revision: “for Model “XNV-6022RM “” has been added to the title of the report on Page 1.

Validity of this assessment report:

This assessment is based on the information provided by the manufacturer at the time of work. If any of the information is changed, or there is any additional information to be assessed, re-assessment may be required.

This assessment is based on the requirements of reference standards at the date of the contract. If any parts in the standard are revised or amended in any way subsequent to that date, care must be taken to ensure that this assessment is not invalidated by those revisions or amendments.

The result of this assessment depends on the precision of the information provided by the manufacturer. If there is anything incorrect and / or insufficient in terms of the information which is critical for the evaluation, this assessment may be invalid.

This assessment is intended only to check the compliance with the standards for the design of the vehicles. Chemitox, Inc. shall not be liable for any

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Appendix 1

Test Report for Printed Circuit Board



TESTING CERT #1136.04

Chemitox

TEST REPORT

Report Number: 190047

Date of Issue: January 25, 2019

Issued for:

Hanwha Techwin CO., LTD.

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

Prepared by:

Chemitox, Inc., Yamanashi Testing Center

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

A handwritten signature in black ink, reading 'Mitsuya Mochizuki'.

Mitsuya Mochizuki

Corporate Officer

Technical Sales General Manager

PV Testing & Evaluation Div.

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

Hanwha Techwin

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

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

1. Objective

To conduct Glow-wire flammability test for end-products based on EN60695-2-11 for the samples described in Item 3 to confirm that the samples comply with requirement of EN 45545-2 R25.

2. Test Date

January 20, 2019

3. Test Specimen(s)

The description of the specimens is shown in Table 1.

Table 1 Description of test specimens

Product Name	Color	Size (mm)	Qty.	Received on
PCB	Green	78 × 75 × 1.2	2	January 15, 2019

4. Test Conditions

Lab Ambient:

Temperature: 23 °C

Relative Humidity: 44 %RH

5. Test Method and Conditioning

Test and Classification method:

EN 60695-2-11: 2014

“Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products (GWEPT)”

EN 45545-2: 2013+A1: 2015

“Railway applications — Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components”

Glow wire temperature:

850°C (as stipulated in EN 45545-2, R25)

Conditioning:

The test specimen was conditioned for at least 24 hours in an atmosphere having a temperature between 15°C and 35°C and a relative humidity between 45% and 75%

6. Test Results

Summarized test results are shown in Table 2. See Appendix for details.

According to EN 60695-2-11 Clause 10, the test specimen is considered to have a GWEPT of 850 because there is no ignition at test temperature of 850°C.

Table 2 Summarized test results

Product Name	Test Result (°C)
PCB	GWEPT: 850

*: The application points were determined by the instruction of the client, with taking the requirement of EN 60695-2-11 Clause 8.1 into consideration. See Photos of Setting status in Appendix for the actual location on the specimen.

7. Conclusion

Material requirement set for EN 45545-2 is shown in Table 3.

Table 3 Material requirement set

Requirement Set	Test Method Reference	Parameter and Unit	Maximum or Minimum	HL1	HL2	HL3
R25	EN 60695-2-11	Glow Wire Temperature °C	Minimum	850	850	850

The glow wire temperatures of tested specimen were 850°C and therefore satisfies the requirement given in EN 45545-2 Table 5 R25 for HL1, HL2 and HL 3.

8. Test Location

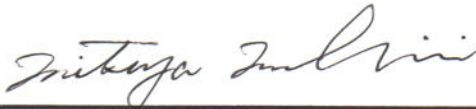
Chemitox, Inc., Yamanashi Testing Center
18349 Egusa, Sutama-cho, Hokuto-shi, Yamanashi-ken 408-0103

9. Performed by



Masaru Sakamoto, Engineer (Level 2)

10. Reviewed by



Mitsuya Mochizuki,
Corporate Officer
Technical Sales General Manager
PV Testing & Evaluation Div.

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Appendix

(5 Pages)

- Detailed Test Results
 - Test Method

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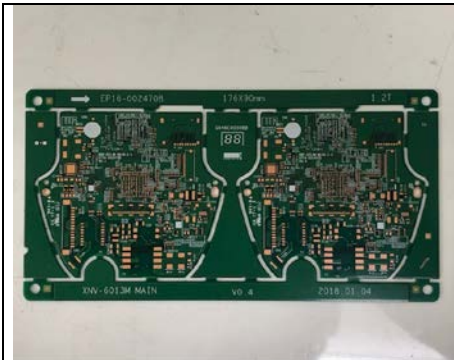


Photo 1 Specimen before testing

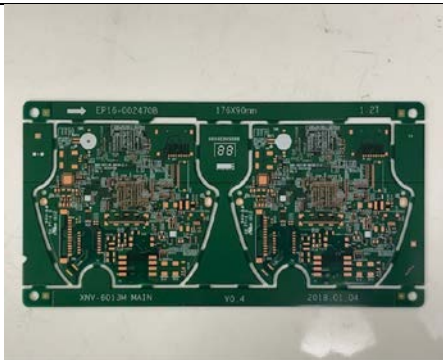


Photo 2 Specimen after testing

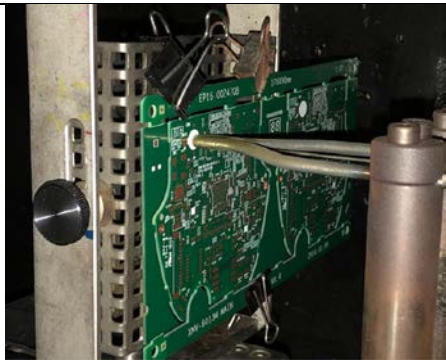


Photo 3 Setting status

Photo 1 to 3 PCB (Contact point 1)

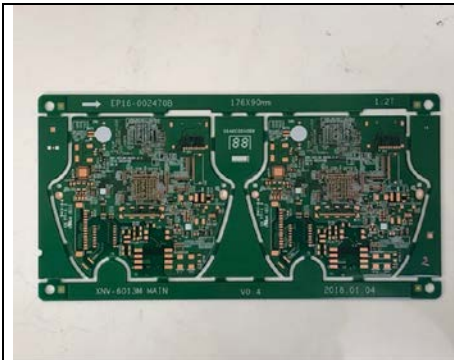


Photo 4 Specimen before testing

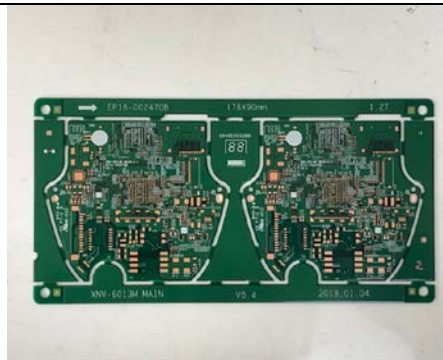


Photo 5 Specimen after testing

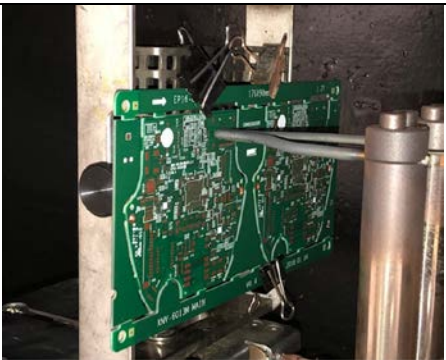


Photo 6 Setting status

Photo 4 to 6 PCB (Contact point 2)

Test MethodGlow-Wire Test Method for End-Product

1. Applicable standard: EN 60695-2-11 "Glow Wire Flammability Test for End-Product Test"

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.*

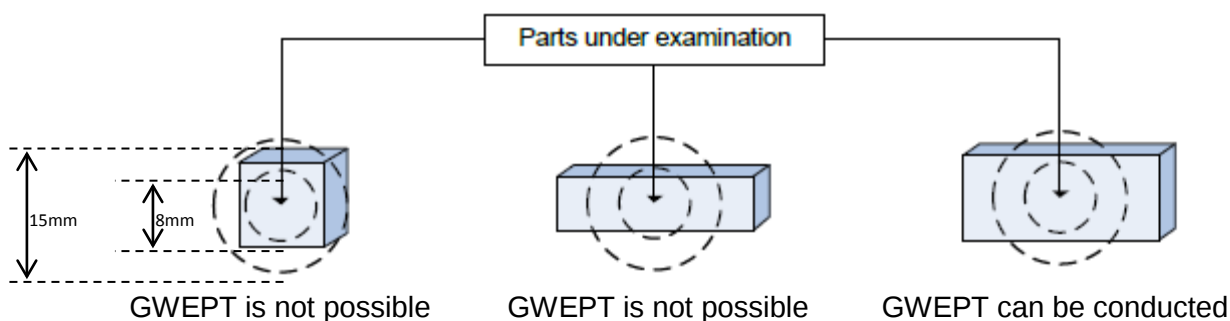


Figure 1 Definition of small parts

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

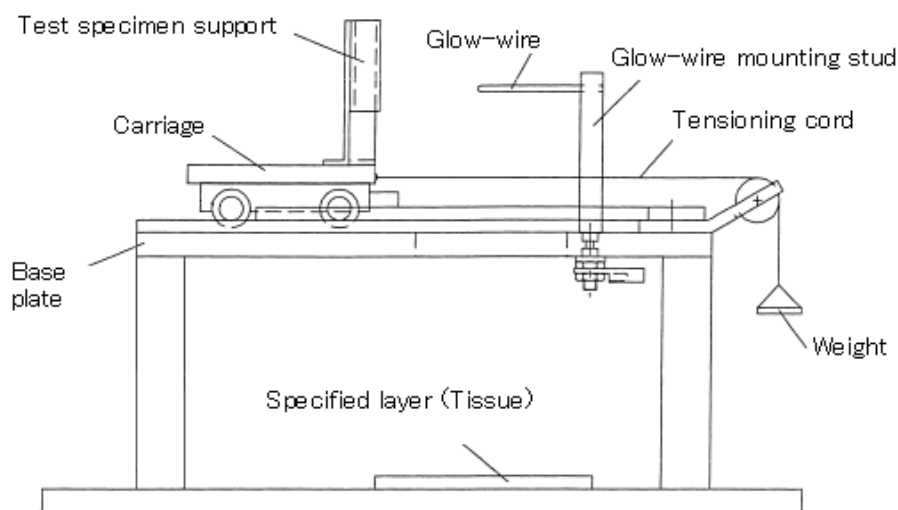


Figure 2 Image of testing apparatus

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	± 10	800	± 15
600	± 10	850	± 15
650	± 10	900	± 15
700	± 10	960	± 15
750	± 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

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) if flames or glowing combustion of the test specimen extinguish within 30 s after removal of the glow wire, i.e. $T_E - 30 \leq 30$ s; and

ii) the specified layer placed underneath the test specimen does not ignite.