

Declaration of Compliance with EN 45545-2 for Model “TNV-C8034RM”and” TNV-C8014RM”

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Reported by

Hanwha Vision Co., Ltd

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

1. Objective

To declare the compliance with EN 45545-2 for a product designed by **Hanwha Vision Co., Ltd.**

2. Reference Standard

EN 45545-1:2013 – Railway applications. Fire protection on railway vehicles. General

EN 45545-2:2020+A1:2023 – Railway applications. Fire protection on railway vehicles. Requirements for fire behavior of materials and components

EN 60695-2-11:2021 – Fire hazard testing. Glowing/hot-wire based test methods. Glow-wire flammability test method for end-products (GWEPT)

EN ISO 4589-2:2017 – Determination of burning behavior by oxygen index Part 2: Ambient-temperature test

3. Product Information

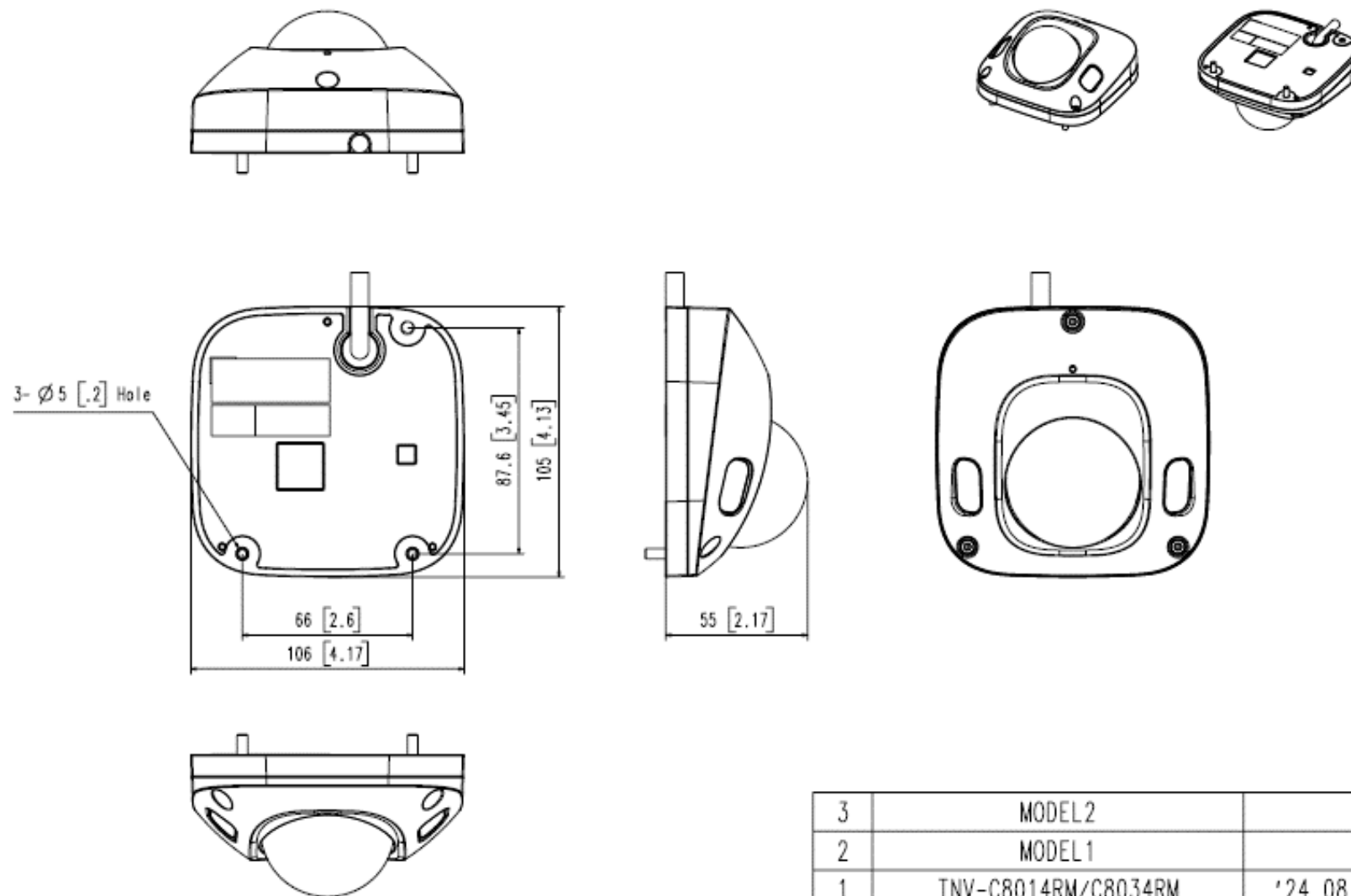
The product under assessment is a network camera designated **“TNV-C8034RM”** and **“TNV-C8014RM”**. These products are made by **Hanwha Vision Co., Ltd.**

The product is developed and designed for application in rolling stock. The enclosure (top and bottom cover) is made of aluminum parts. The dome cover consists of transparent polycarbonate. The product contains the functional components including printed circuit boards, and other miscellaneous materials inside the enclosure. The difference between **“TNV-C8034RM”** and **“TNV-C8014RM”** is only the lens specification.

The overall dimension of the products is **106mm length by 105mm width by 55mm height**. The total mass of **“TNV-C8034RM”** and **“TNV-C8014RM”** is **522.1g** and **522.68g** respectively.

The product will be installed on the ceiling and wall 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 **“TNV-C8034RM”** and **“TNV-C8014RM”** is shown in **Figure 1**. The breakdown structure of both product with the part list is shown in **Figure 2**. The part list of both products with the information of each mass is shown in **Table1**.



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3	MODEL2	
2	MODEL1	
1	TNV-C8014RM/C8034RM	'24.08.22
No.	MODEL NAME	DATE
Unit:mm[inch] SCALE:1/1		© Hanwha Vision

Figure 1: Diagram of “TNV-C8034RM” and “TNV-C8014RM”

No.	Part Code	Part name	ea
1	FC29-017623A	CASE-TOP_TNV-C8014RM;ADC12,WHT	1
2	HP07-001972A	GASKET-WINDOW-IR_TNV-C8014RM;SILICONE RU	2
3	FC37-001141A	WINDOW-IR-LED_TNV-C8014RM;PC	2
4	FC36-001015	SHEET-GORE-ACOUSTIC-GAW3250408P	1
5	FC15-011181A	COVER-MIC-RUBBER_TNV-C8014RM;SILICONE..	1
6	EP10-001423A	MODULE,ELECTRONIC-A UGH0B6035CW R8 0 P 5	1
7	FC09-017518A	BRACKET-MIC_TNV-C8014RM;PC	1
8	HP07-000254B	GASKET-DOME;SILICONE;XNV-6011,BLK	1
9	FC15-002790B	COVER-DOME;PC V2,MIGRATION,TRP,OD52	1
10	FC09-017517A	BRACKET-DOME-TNV-C8014RM;SECC,T1.0	1
11	AM06-011585A	ASSY,PCB-TNV-C8014RM MIC	1
12	HP07-001971A	GASKET-TOP_TNV-C8014RM;SILICONE	1
13	RM04-000145A	TAPE-DOUBLE SIDED;3M 6408,T0.1,V25,L25	1
14	PM02-006674A	SILICAGEL-DESIKHAN-1G	1
15	FC09-017519A	BRACKET-MODULE-FIX-TNV-C8014RM;PC	1
16	FC15-011167A	COVER-HEATER_TNV-8014RM;ADC12,BLK	1
17	FC29-017628A	HOLDER-LENS-FRONT_TNV-C8014RM;PC	1
18	AM06-011579A	ASSY,PCB-TNV-C8014RM HEATER	1
19	EP14-001319	LENS SET-C7340E-28H;3.06MM_5M	1
19*	EP14-001318	LENS-T3123-A51;FIXED,5M,6MM	1
20	AM06-011575A	ASSY,PCB-TNV-C8014RM SENSOR	1
21	FC28-002489A	PAD-THERMAL_1014T2_V6430BNH	1
22	FC29-017625A	HOLDER-LENS-REAR_TNV-C8014RM;BLK,ADC12	1
23	AM06-011573A	ASSY,PCB-TNV-C8014RM IR	2
24	FC39-007861A	FRAME-MAIN_TNV-C8014RM;ADC12,BLK	1
25	AM06-011581A	ASSY,PCB-TNV-C8014RM NETWORK	1
26	Z6209004001A	3080_HEAT_PAD	1
27	FC28-003715A	PAD-THERMAL_21*21,K=7W/M-K,2.0T	1
28	FC29-017624A	CASE-BOTTOM_TNV-C8014RM;ADC12,WHT	1
C1	EP02-005134A	CABLE-XNV-9083RZ;FFC,10P,-,40MM,0.5PITCH	1
C2	EP02-004377A	HARNESS-XNV-6013M;MCX,40P-40P,80MM	1
C3	EP02-005243A	HARNESS-PNM-C34404RQPZ;WIRE,2P-2P,40MM	2
C4	EP02-004693A	HARNESS-QNV-6024RM;14P-(2P+3P+5P),580MM	1
S1	FC18-005354B	SCREW-MACHINE_BH,FP,0.5,10,-,2.6,5.35,2	3
S2	FC18-005178A	SCREW-MACHINE;BH,M2,L4,BLK,NYLOCK	11
S3	Z6001053501A	SCREW-MACHINE;6001-001476,BH,+,M3,L6,Ni	2
S4	Z9761204007	SCREW-TAPTITE;CH,+,M2,L4,BLK,B-TYPE	2
S5	Z6003019801A	SCREW-TAPTITE;PL,+,M2,L4,WHT,B-TYPE	8
S6	Z9642206007	SCREW-MACHINE;BH,+,M2,L6,BLK,FP	4

TNV-C8014RM
TNV-C8034RM

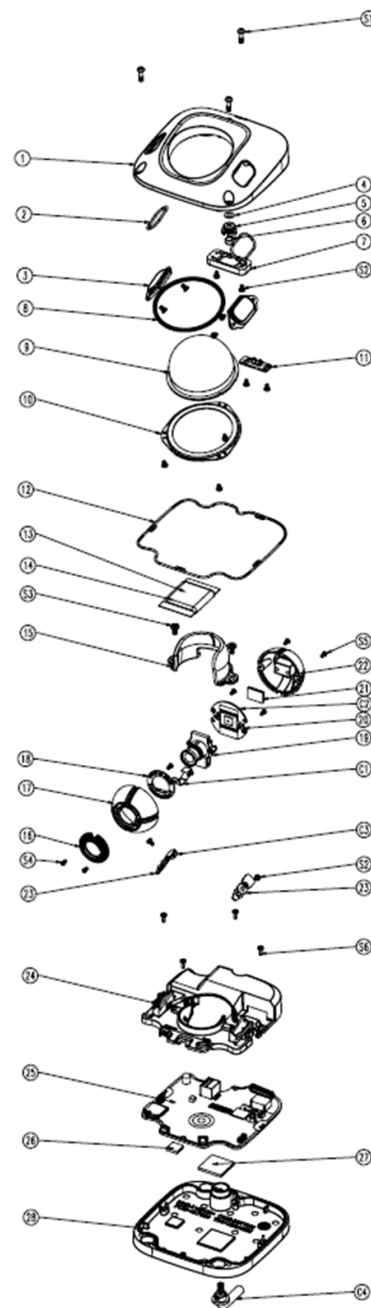


Figure 2: Breakdown Structure of “TNV-C8034RM” and “TNV-C8014RM”

									TNV-C8034RM TNV-C8014RM						
No.	Level						Part Code	Part name	ea	Unit weight (g)	Total weight (g)	Material type		Remark	
	1	2	3	4	5	6						Type	Details		
1	O						AM07-017452A	ASSY,FINAL-TNV-C8014RM	1			-	ASSY		
2		O					AM07-017455A	ASSY,LENS MODULE-TNV-C8014RM	1			-	ASSY		
3			O				FC29-017628A	HOLDER-LENS-FRONT_TNV-C8014RM;PC	1	5.3	5.30	PLASTIC	PC		
4			O				FC29-017625A	HOLDER-LENS-REAR_TNV-C8014RM;BLK,ADC12	1	12.6	12.60	METAL	ALUMINUM		
5			O				EP02-004377A	HARNESS-XNV-6013M;MCX,40P-40P,80MM	1	1.25	1.25	CABLE	CABLE		
6			O				EP02-005134A	CABLE-XNV-9083RZ;FFC,10P,-,40MM,0.5PITCH	1	0.07	0.07	CABLE	CABLE		
7			O				AM06-011579A	ASSY,PCB-TNV-C8014RM HEATER	1	0.97	0.97	PCB	PCB		
8			O				AM06-011575A	ASSY,PCB-TNV-C8014RM SENSOR	1	3.92	3.92	PCB	PCB		
9			O				Z6003019801A	SCREW-TAPTITE:PL,+,M2,L4,WHT,B-TYPE	8	0.1	0.80	METAL	SCREW		
10			O				Z9761204007	SCREW-TAPTITE:CH,+,M2,L4,BLK,B-TYPE	2	0.1	0.20	METAL	SCREW		
11			O				FC28-002489A	PAD-THERMAL_1014T2_V6430BNH	1	0.45	0.45	RUBBER	SILICONE		
12			O				FC15-011167A	COVER-HEATER_TNV-8014RM;ADC12,BLK	1	2.2	2.20	METAL	ALUMINUM		
13			O				EP14-001319	LENS SET-C7340E-28H;3.06MM,5M	1	5.01	5.01	COMPLEX(ELECTRIC)	COMPLEX(ELECTRIC)	TNV-C8034RM : Part Code [EP14-001318], Part name [LENS-T3123-A51;FIXED,5M,6MM], Unit weight [4.43g]	
14	O						AM07-017444A	ASSY,CASE BOTTOM-TNV-C8014RM	1			ASSY			
15			O				FC29-017624A	CASE-BOTTOM_TNV-C8014RM;ADC12,WHT	1	110	110.00	METAL	ALUMINUM		
16			O				EP02-004693A	HARNESS-QNV-6024RM;14P-(2P+3P+5P),580MM	1	56.93	56.93	CABLE	CABLE		
17	O						AM07-017458A	ASSY-CASE TOP-TNV-C8014RM	1			ASSY			
18			O				FC29-017623A	CASE-TOP_TNV-C8014RM;ADC12,WHT	1	145	145.00	METAL	ALUMINUM		
19			O				AM06-011585A	ASSY,PCB-TNV-C8014RM MIC	1	0.92	0.92	PCB	PCB		
20			O				EP10-001423A	MODULE-ELECTRONIC-A UGH086035CW R8 0 P 5	1	0.83	0.83	PCB	PCB		
21			O				FC36-001015	SHEET-GORE-ACOUSTIC-GAW3250408P	1	0.1	0.10	ETC			
22			O				FC15-011181A	COVER-MIC-RUBBER_TNV-C8014RM;SILICONE,	1	0.4	0.40	RUBBER	SILICONE		
23			O				FC09-017518A	BRACKET-MIC_TNV-C8014RM;PC	1	1.93	1.93	PLASTIC	PC		
24			O				FC37-001141A	WINDOW-IR-LED_TNV-C8014RM;PC	2	1.76	3.52	PLASTIC	PC		
25			O				HP07-001972A	GASKET-WINDOW-IR_TNV-C8014RM;SILICONE RU	2	0.16	0.32	RUBBER	SILICONE		
26			O				HP07-000254B	GASKET-DOME;SILICONE,XNV-6011,BLK	1	0.7	0.70	RUBBER	SILICONE		
27			O				FC15-002790B	COVER-DOME;PC V2,MIGRATION,TRP,ODS2	1	12.8	12.80	PLASTIC	PC		
28			O				FC09-017517A	BRACKET-DOME-TNV-C8014RM;SECC,T1.0	1	9.41	9.41	METAL	SECC		
29			O				FC18-005354B	SCREW-MACHINE ;BH,FP,0.5,10,-,2.6,5.35,2	3	0.57	1.71	METAL	SCREW		
30			O				FC18-005178A	SCREW-MACHINE;BH,M2,L4,BLK,NYLOCK	11	0.13	1.43	METAL	SCREW		
31			O				HP07-001971A	GASKET-TOP_TNV-C8014RM;SILICONE	1	0.77	0.77	RUBBER	SILICONE		
32	O						FC09-017519A	BRACKET-MODULE-FIX-TNV-C8014RM;PC	1	5.4	5.40	PLASTIC	PC		
33			O				FC39-007861A	FRAME-MAIN_TNV-C8014RM;ADC12,BLK	1	60	60.00	METAL	ALUMINUM		
34	O						Z6001053501A	SCREW-MACHINE;6001-001476,BH,+,M3,L6,Ni	2	0.54	1.08	METAL	SCREW		
35	O						Z9642206007	SCREW-MACHINE;BH,+,M2,L6,BLK,FP	4	0.2	0.80	METAL	SCREW		
36			O				FC18-005178A	SCREW-MACHINE;BH,M2,L4,BLK,NYLOCK	2	0.13	0.26	METAL	SCREW		
37	O						Z6209004001A	3080_HEAT_PAD	1	0.35	0.35	RUBBER	SILICONE		
38	O						FC28-003715A	PAD-THERMAL 21*21;K=7W/M-K,2.0T	1	29	29.00	RUBBER	SILICONE		
39	O						EP02-005243A	HARNESS-PNM-C34404RQPZ;WIRE,2P-2P,40MM	2	0.22	0.44	CABLE	CABLE		
40	O						AM06-011573A	ASSY,PCB-TNV-C8014RM IR	2	0.7	1.40	PCB	PCB		
41	O						AM06-011581A	ASSY,PCB-TNV-C8014RM NETWORK	1	42.31	42.31	PCB	PCB		
42	O						PM02-006674A	SILICAGEL-DESIKHAN-1G	1	2	2.00	ETC			
43	O						RM04-000145A	TAPE-DOUBLE SIDED;3M 6408,T0.1,W25,L25	1	0.1	0.10	PLASTIC	TAPE		
44	O						PT03-003217C	LABEL-RATING-CAM-S-QR-CEEAC,UL,WHITE,YU	1	0.1	0.10	PLASTIC	TAPE		
45	O						PT03-000153V	LABEL-PACKING-UL,FCC,CEEAC,KC,CM	1	0.1	0.10	PLASTIC	TAPE		

Table 1: Part List of “TNV-C8034RM” and “TNV-C8014RM” with Information of Each Mass

4. Assessment

4.1 Specifying Target Hazard Level

The product “**TNV-C8034RM**” and “**TNV-C8014RM**” are 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**”.

4.2 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**”, “**R25**” or “**R26**”. In this project, “**R25**” was selected.

The test result is summarized in **Table 2**, which demonstrated the compliance with the requirement of **R25/HL3**. For more detail, refer to the test reports (**241820**, and **240210-1**) issued by **Chemitox** which is ISO/IEC 17025 accredited for the relevant testing (**Appendix 1 and 2**).

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

Part No.	Part name	Test Parameter	Results	Test Report No.
7	ASSY,PCB-TNV-C8014RM HEATER	Glow Wire Temperature	GWEPT: 850 C R25/HL3 Compliant	241820 Appendix 1
8	ASSY,PCB-TNV-C8014RM SENSOR			
40	ASSY,PCB-TNV-C8014RM IR			
41	ASSY,PCB-TNV-C8014RM NETWORK			
19	ASSY,PCB-TNV-C8014RM MIC *	Glow Wire Temperature	GWEPT: 850 C R25/HL3 Compliant	240210-1 Appendix 2

*: The materials used and construction for the PCB “**ASSY,PCB-TNV-C8014RM MIC**” is exactly same as “**IR LED PCB**” tested in Report #240210-1, and therefore can be represented by the test result therein.

2) 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 and wall, the exposed area is limited to approx. **31152.3788mm²**, which is less than 0.2m². See **Figure 3** for the calculation of the exposed area.

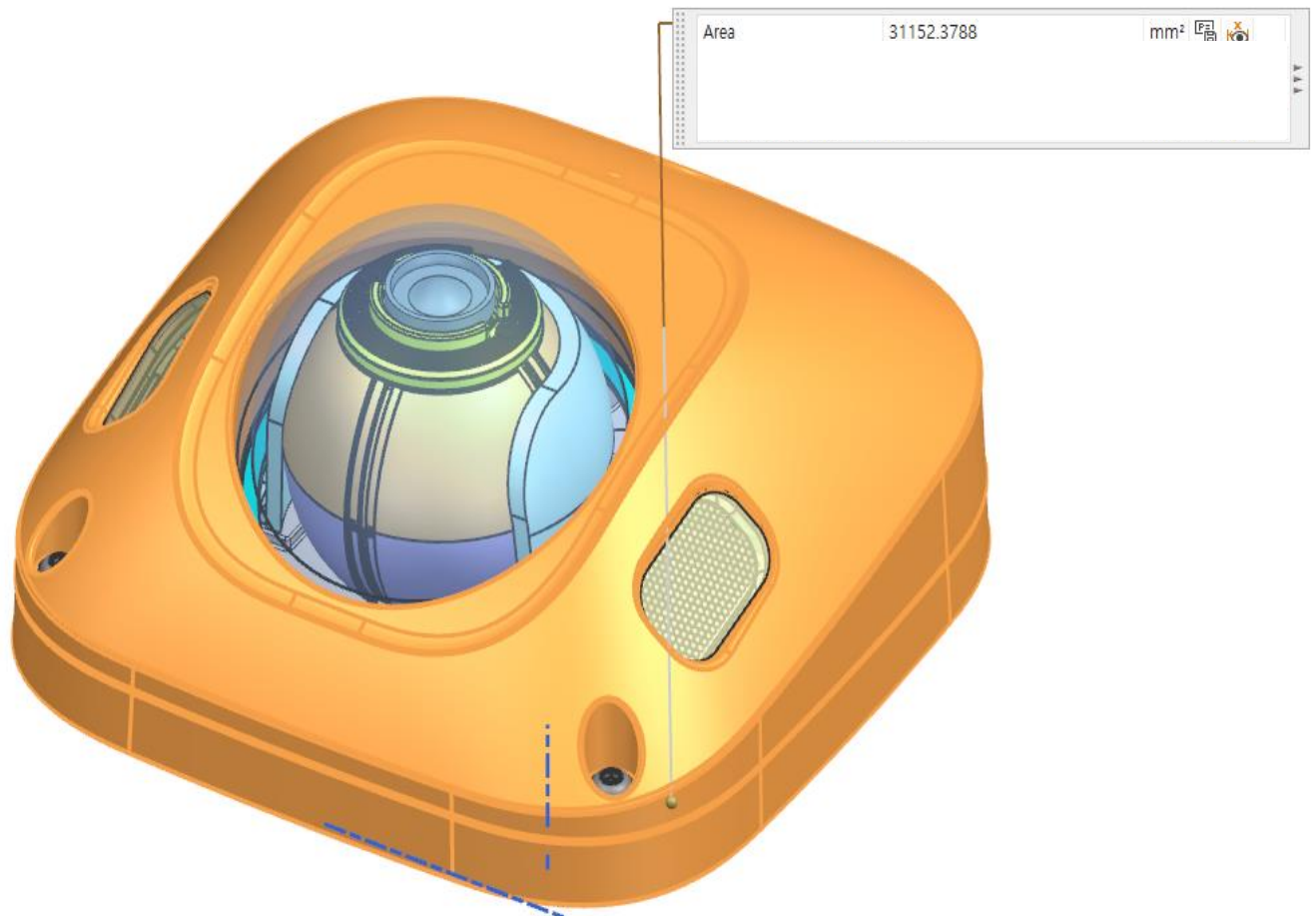


Figure 3: Calculated Result of Exposed Area of Enclosure

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.

3) Other combustible materials:

All other combustible materials are very small (i.e. exposed area less than 0.2m²). In accordance with the requirement specified in Clause 4.3 and Figure 1 of EN 45545-2 (Grouping Rules), these combustible materials are considered as group and assessed based on the total combustible mass, which is **127.67g** as shown in **Table 3**. Subsequent calculations are based on the weight of Model “**TNV-C8014RM**”, given that “**TNV-C8014RM**” is heavier than “**TNV-C8014RM**”.

Table 3: Other materials combustible mass

Material Type*	Combustible Mass
Plastic	29.25g
Complex	5.01g
PCB	0.63g
Cable	58.69g
Rubber	31.99g
Other	2.1g
Total	127.67g

*: Refer to **Table 1** for the classification of material type.

With the above information, and based on the requirement specified in Clause 4.3.3 Rule 2, some of the materials included in **Table 3** shall be tested according to Requirement Set “**R24**” until untested materials’ total weight becomes less than 100g. Evaluation was conducted on the material below:

- Part No.38: PAD-THERMAL_21*21;K=7W/M-K,2.0T (Combustible mass: 29.0g)

The test result is summarized in **Table 4**, which demonstrated the compliance with the requirement of **R24/HL3**. For more detail, refer to the test reports issued by Chemitox which is ISO/IEC 17025 accredited for the relevant testing (**Appendix 3**).

Table 4: Test result of ISO 4589-2 for other combustible materials

Material Name	Test Parameter	Results	Test Report No.
Thermal PAD	Oxygen Index	OI: >80.0 % R24/HL3 Compliant	241592

With those test results, remaining combustible mass is total **98.67g**, which is less than

100g as shown in **Table 5**.

Table 5: Combustible mass of untested materials

Material Type	Weight
Plastic	29.25g
Complex	5.01g
PCB	0.63g
Cable	58.69g
Rubber	2.99g
Other	2.1g
Total	98.67g

In accordance with Clause 4.3.2 Rule 1, no additional testing will be required to the combustible materials of this group.

5. Verification of compliance with EN 45545-2

The assessment result detailed in Section 4 has demonstrated that the product “**TNV-C8034RM**” and “**TNV-C8014RM**” meets the requirements of the following classification;

EN 45545-2 Hazard Levels HL1 to HL3

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.

Appendix 1
Test Report for Printed Circuit Board
"ASSY,PCB-TNV-C8014RM HEATER",
"ASSY,PCB-TNV-C8014RM SENSOR", "ASSY,PCB-TNV-C8014RM IR"
and "ASSY,PCB-TNV-C8014RM NETWORK"

Appendix 2
Test Report for Printed Circuit Board
" ASSY,PCB-TNV-C8014RM MIC"

Appendix 3
Test Report for Other Combustible Material
“Thermal PAD”,