

Declaration of Compliance with EN 45545-2 for Model “XNF-8010RVM”

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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 Standards

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

ISO 4589-2:2017-04 – Plastics — Determination of burning behavior by oxygen index — Part 2: Ambient-temperature test

3. Product Information

The product under assessment is network camera device designated **“XNF-8010RVM”**. This product is made by **Hanwha Vision Co., Ltd.**

This product is developed and designed for application in rolling stock. The enclosure (top and bottom cover) is made of aluminum parts. The products contain the functional components including printed circuit boards, and other miscellaneous materials inside the enclosure.

The overall dimension of the products is **146mm diameter with 65.8mm height**. The total mass of **“XNF-8010RVM”** is **739.3 g**.

The product will be installed inside rolling stocks. The outer 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 **“XNF-8010RVM”** 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**.

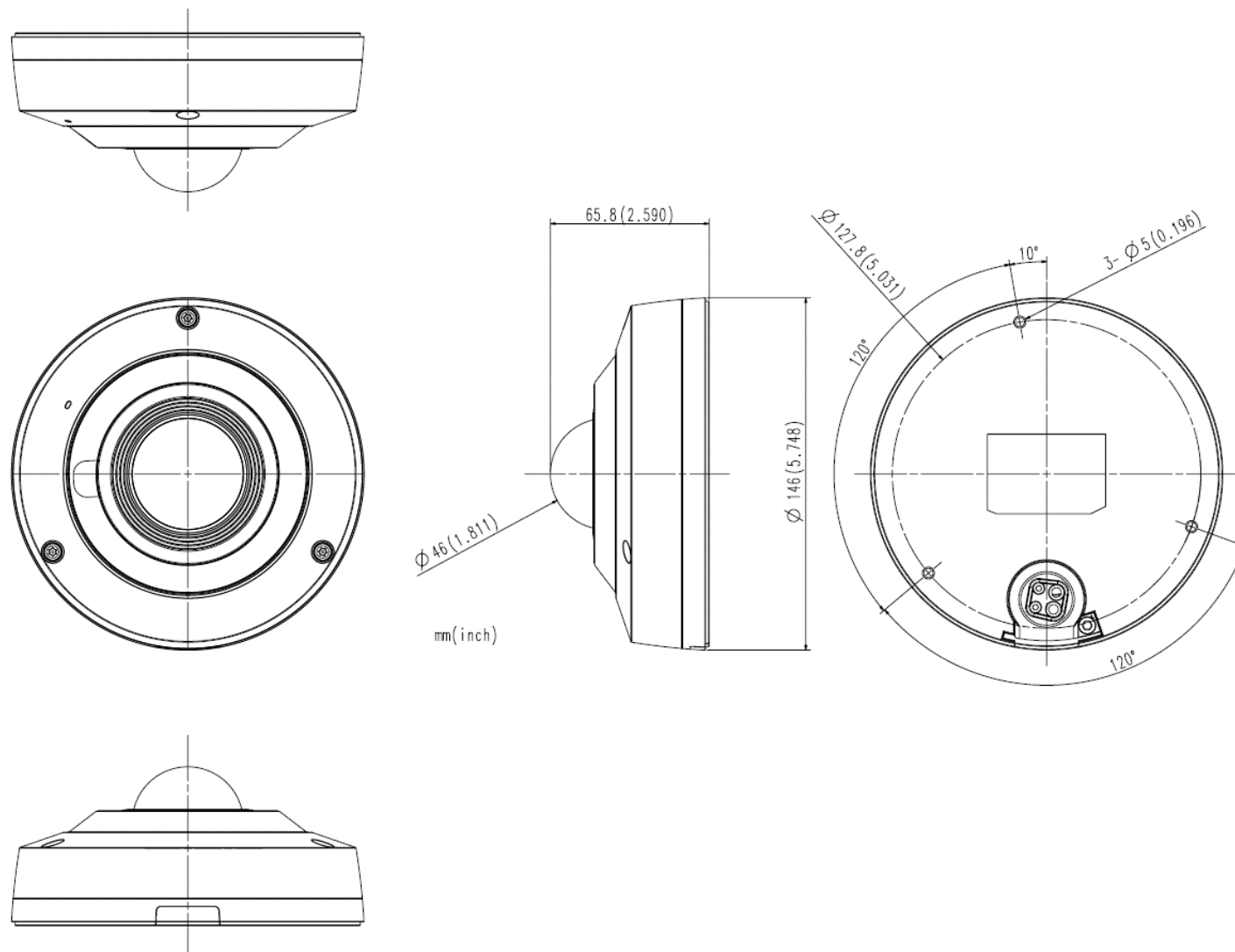
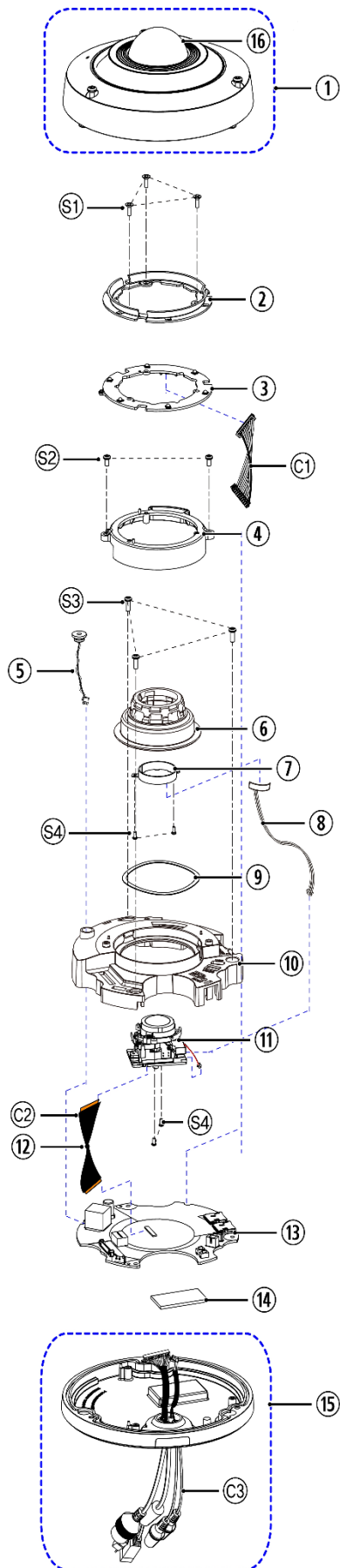


Figure 1: Diagram of “XNF-8010RVM”



No.	Part Code	Part name	ea
1	AM07-009855A	ASSY,CASE-TOP_XNF-8010RV	1
2	FC28-002335	REFLECTOR-IR_PNF-0801RVM-00;LED	1
3	AM06-006147A	ASSY,PCB-PNF-9010R IR LED	1
4	FC29-009537A	HOLDER-IR_PCB_XNF-8010RV	1
5	EP10-001089A	MODULE,ELECTRONIC	1
6	FC15-005870A	COVER-LENS_XNF-8010RV	1
7	FC09-008590A	BRACKET-HEATER_XNF-8010RV	1
8	EP07-001236A	HEATER,ELECTRIC-XNF-8010RV	1
9	FC18-004425A	WASHER,WAVE-XNF-8010RV	1
10	FC39-004398A	FRAME-BODY_XNF-8010RV	1
11	AM07-010490A	ASSY,LENS MODULE-XNF-8010RV	1
12	FC10-001094A	RUBBER,RING-FPCB	1
13	AM06-007567A	ASSY,PCB-XNF-8010R NETWORK	1
14	FC28-002427A	PAD-THERMAL	1
15	AM07-009856C	ASSY,CASE BOTTOM-XNF-8010RVM	1
16	FC15-005078A	COVER-GLASS_IR_PNF-9010RVM	1
C1	Z3900030201A	WIRE HARNESS-CCD TO POWER	1
C2	EP16-002537A	FPCB-XNV-8010RV	1
C3	EP02-004107A	CABLE-PNF-9010RVM MAIN CABLE	1
S1	Z6001047101A	SCREW	3
S2	FC18-001255A	SCREW-B1,S,M3L6	2
S3	Z9642308001	MACHINE SCREW	3
S4	Z6003019801A	SCREW-TAPTYPE	4

Figure 2: Breakdown Structure of “XNF-8010RVM” with Part List

No.	Part name	ea	Unit weight (g)	Total weight (g)	Material type	
					Type	Details
1	ASSY,FINAL-XNF-8010RVM	1	-	0.0	-	ASSY
2	ASSY,HALF-XNF-8010RVM	1	-	0.0	-	ASSY
3	WASHER,WAVE-XNF-8010RV;PANNING,65,SUS301	1	2.6	2.6	METAL	STEEL
4	FRAME-BODY_XNF-8010RV;PC	1	42.2	42.2	PLASTIC	PC NH-1035
5	HOLDER-IR_PCB_XNF-8010RV;PC	1	8.9	8.9	PLASTIC	PC NH-1035
6	COVER-LENS_XNF-8010RV;PC,PANNING	1	12.9	12.9	PLASTIC	PC NH-1035
7	REFLECTOR-IR_PNF-0801RVM-00;LED	1	5.1	5.1	PLASTIC	PC NH-1035
8	SCREW-TAPTYPE;6003-001440,BH,+,B,M2,L4,	4	0.1	0.4	METAL	SCREW
9	SCREW_FH_M3L8	3	0.4	1.2	METAL	SCREW
10	SCREW-TAPTITE;BH,M3,0.5,L6,S,1,1,BLACK	2	0.5	1.0	METAL	SCREW
11	FPCB-XNV-8010RV;2L,51PIN(0.3PITCH),E	1	0.4	0.4	PCB	FPCB
12	ASSY,PCB-PNF-9010R IR LED	1	9.2	9.2	PCB	PCB
13	ASSY-MODULE-AF_ACTUATOR_XNF-8010RV	1	24.4	24.4	COMPLEX	GLASS
			6.0	6.0		PC+Cable+FPCB
14	ASSY,PCB-MLCC XNF-8010R SENSOR	1	6.0	6.0	PCB	PCB
15	WIRE HARNESS-CCD TO POWER;AB39-00162A,S	1	1.8	1.8	CABLE	CABLE
16	MODULE,ELECTRONIC-WHO6035CW-R133-A28J-51	1	0.6	0.6	COMPLEX	CABLE + SENSOR
17	HEATER,ELECTRIC-XNF-8010RV HEATER;12V,1W	1	0.5	0.5	COMPLEX	CABLE + FPCB
18	BRACKET-HEATER_XNF-8010RV;SECC	1	3.1	3.1	METAL	STEEL
19	RUBBER,RING-FPCB;SILICON,XNV-8080R,BLK	1.2	0.5	0.6	RUBBER	RUBBER
20	ASSY-CASE TOP-XNF-8010RV_HANWHA_TEMP	1	-	0.0	-	ASSY
21	FRONT_GLASS_5010	1	8.3	8.3	PLASTIC	PC 143R
22	GLASS_ORING_5010	1	0.7	0.7	RUBBER	RUBBER
23	SCREW-BUILT-IN_TORX20;0.7,15,NO,4	3	1.5	4.4	METAL	SCREW
24	SCREW-MACHINE;6001-001785,PWH,+,M3,L4,Z	9	0.4	3.4	METAL	SCREW
25	BRACKET-DOME_PNF-0801RVM-00	1	8.6	8.6	METAL	STEEL
26	CASE-TOP_XNF-8010RV;ADC12	1	179.8	179.8	METAL	ALUMINUM
27	CASE-DOME_PNF-0801RVM-00	1	21.9	21.9	METAL	ALUMINUM
28	SHEET-GORE-VE90308-3.6X7.6	1	0.5	0.5	ETC	TAPE
29	COVER-GLASS_IR_PNF-9010RVM;COVER	1	17.8	17.8	PLASTIC	PC SC-1220UR / 143R
30	BRACKET-IR_PNF-9010RV	1	12.7	12.7	METAL	STEEL
31	BRACKET-TOP_PNF-9010RV	1	25.8	25.8	METAL	STEEL
32	GASKET-IR_PNF-9010RV	1	0.4	0.4	RUBBER	RUBBER
33	GASKET-TOP_PNF-9010RV	1	0.8	0.8	RUBBER	RUBBER
34	SHEET-PROTECT_PNF-9010RV	1	0.9	0.9	ETC	STICKER
35	ASSY-BOTTOM-XNF-8010RVM_TEMP	1	-	0.0	-	ASSY
36	COVER-BEE_XNF-8010RV;ADC12,IVORY	1	2.0	2.0	METAL	ALUMINUM
37	CASE-BOTTOM_XNF-8010RV;ADC12	1	194.8	194.8	METAL	ALUMINUM
38	SCREW-MACHINE;TORX T20,BH,M4,0.7,L6,SUS	1	1.0	1.0	METAL	SCREW
39	GASKET-BOTTOM_PNF-9010RVM;SILICON,2,2	1	2.2	2.2	RUBBER	RUBBER
40	CABLE-PNF-9010RVM MAIN CABLE - M12;15P	1	44.0	44.0	CABLE	CABLE
41	PAD-THERMAL_W38_D21_T2	1	4.3	4.3	RUBBER	ETC
42	MACHINE SCREW(M3XL8,Ni,PAN HEAD)	3	0.6	1.7	METAL	SCREW
43	ASSY,PCB-MLCC XNF-8010R NETWORK	1	61.4	61.4	PCB	PCB
44	DESIPAK-6G	2.4	6.3	15.0	ETC	MINERAL
45	TAPE_1425	2.2	0.1	0.2	ETC	TAPE
46	LABEL-RATING-CAMERA-EXPORT-BASIC	1	0.1	0.1	ETC	STICKER
			TOTAL	739.3		

Table 1: Part List of “XNF-8010RVM” with Information of Each Mass

4. Assessment

4.1 Specifying Target Hazard Level

The product “XNF-8010RVM” 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 “HL2”.

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” or “R25”. In this project, “R25” was selected.

The test results are summarized in **Table 2**, which demonstrated the compliance with the requirement of **R25/HL3**. For more detail, refer to the test report (**240210-1**) 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

Part name	Test Parameter	Results
ASSY, PCB-PNF-9010R IR LED	Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant
ASSY, PCB-MLCC XNF-8010R SENSOR	Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant
ASSY, PCB-MLCC XNF-8010R NETWORK	Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant

2) Coating of Steel 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, it is confirmed that the exposed area is limited to less than 0.2m².

The mass of coating only is not specified, but it is 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) “DESIPACK 6G”

Part No.44 “DESIPACK 6G” is made of bentonite clay, which can be considered as “expanded clay” in 96/603/EC, and no testing will be required in accordance with Clause 4.2 a) of EN 45545-2.

4) Other miscellaneous combustible materials:

There are other miscellaneous materials, part of which are combustible. While all those materials are very small (i.e. exposed area less than 0.2m²), total mass of those exceeds 100g. See the below extract from **Table 1** for the relevant materials;

No.	Part name	ea	Unit weight (g)	Total weight (g)	Material type	
					Type	Details
4	FRAME-BODY_XNF-8010RV;PC	1	42.2	42.2	PLASTIC	PC NH-1035
5	HOLDER-IR_PCB_XNF-8010RV;PC	1	8.9	8.9	PLASTIC	PC NH-1035
6	COVER-LENS_XNF-8010RV;PC,PANNING	1	12.9	12.9	PLASTIC	PC NH-1035
7	REFLECTOR-IR_PNF-0801RVM-00;LED	1	5.1	5.1	PLASTIC	PC NH-1035
11	FPCB-XNV-8010RV;2L,51PIN(0.3PITCH),E	1	0.4	0.4	PCB	FPCB
13	ASSY-MODULE-AF_ACTUATOR_XNF-8010RV	1	6.0	6.0	COMPLEX	PC+Cable+FPCB
15	WIRE HARNESS-CCD TO POWER;AB39-00162A,S	1	1.8	1.8	CABLE	CABLE
16	MODULE,ELECTRONIC-WHO6035CW-R133-A28J-51	1	0.6	0.6	COMPLEX	CABLE + SENSOR
17	HEATER,ELECTRIC-XNF-8010RV HEATER;12V,1W	1	0.5	0.5	COMPLEX	CABLE + FPCB
19	RUBBER,RING-FPCB;SILICON,XNV-8080R,BLK	1.2	0.5	0.6	RUBBER	RUBBER
21	FRONT_GLASS_5010	1	8.3	8.3	PLASTIC	PC 143R
22	GLASS_ORING_5010	1	0.7	0.7	RUBBER	RUBBER
28	SHEET-GORE-VE90308-3.6X7.6	1	0.5	0.5	ETC	TAPE
29	COVER-GLASS_IR_PNF-9010RVM;COVER	1	17.8	17.8	PLASTIC	PC SC-1220UR / 143R
32	GASKET-IR_PNF-9010RV	1	0.4	0.4	RUBBER	RUBBER
33	GASKET-TOP_PNF-9010RV	1	0.8	0.8	RUBBER	RUBBER
34	SHEET-PROTECT_PNF-9010RV	1	0.9	0.9	ETC	STICKER
39	GASKET-BOTTOM_PNF-9010RVM;SILICON,2,2	1	2.2	2.2	RUBBER	RUBBER
40	CABLE-PNF-9010RVM MAIN CABLE - M12;15P	1	44.0	44.0	CABLE	CABLE
41	PAD-THERMAL_W38_D21_T2	1	4.3	4.3	RUBBER	ETC
45	TAPE_1425	2.2	0.1	0.2	ETC	TAPE
46	LABEL-RATING-CAMERA-EXPORT-BASIC	1	0.1	0.1	ETC	STICKER

In accordance with EN 45545-2 Clause 4.3.3 (Grouping Rule 2), the following materials were selected and subject to testing for “**R24**”. Due to the limited mass of the relevant parts, the requirement “**R22**” will NOT be applied.

- **Part No.4 “FRAME-BODY_XNF-8010RV;PC”**
- **Part No.5 “HOLDER-IR_PCB_XNF-8010RV;PC”**
- **Part No.6 “COVER-LENS_XNF-8010RV;PC,PANNING”**
- **Part No.7 “REFLECTOR-IR_PNF-0801RVM-00;LED”**

These four parts are made of the same polycarbonate material designated “**NH-1035**”. The test results are summarized in **Table 3**, which demonstrated the compliance with the requirement of **R24/HL2**. For more detail, refer to the test report (**201047R**) issued by **Chemitox** which is ISO 17025 accredited for the relevant testing (**Appendix 2**).

Table 3: Test result of ISO 4589-2 for Polycarbonate Material

Material detail	Test Parameter	Results
Polycarbonate Designated “ NH-1035 ”	OI (%)	30.3% R24/HL2 Compliant

The total mass of the rest of the combustible materials is less than 100g. Based on the requirement specified in Clause 4.3.2 (Grouping Rule 1), those materials are considered as unclassified, and no additional testing will be required.

5. Verification of compliance with EN 45545-2

The assessment result detailed in Section 5 has demonstrated that the products “**XNF-8010RVM**” meet the requirements of the following classification;

EN 45545-2 Hazard Levels HL1 to HL 2

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.

6. Revision History

Revised date	Details
04 05, 2024	- Company name of the client has been updated from “HANWHA TECHWIN CO., LTD” to “Hanwha Vision Co., Ltd” based on the client’s request. - Relevant test reports for Glow Wire and Oxygen Index have been updated to 240210-1 and 201047R respectively.

Supplemental information:

Extracts from the relevant parts of EN 45545-1 and EN 45545-2

EN 45545-1 Clause 5.2.1: Operation Category

Vehicles shall be classified according to the following Operation Categories:

— Operation Category 1;

Vehicles for operation on infrastructure where railway vehicles may be stopped with minimum delay, and where a safe area can always be reached immediately.

— Operation Category 2;

Vehicles for operation on underground sections, tunnels and/or elevated structures, with side evacuation available and where there are stations or rescue stations that offer a place of safety to passengers, reachable within a short running time.

— Operation Category 3;

Vehicles for operation on underground sections, tunnels and/or elevated structures, with side evacuation available and where there are stations or rescue stations that offer a place of safety to passengers, reachable within a long running time.

— Operation Category 4.

Vehicles for operation on underground sections, tunnels and/or elevated structures, without side evacuation available and where there are stations or rescue stations that offer a place of safety to passengers, reachable within a short running time.

EN 45545-1 Clause 5.3: Design Category

Railway vehicles are additionally classified under the following Design Categories:

— A: vehicles forming part of an automatic train having no emergency trained staff on board;

— D: double decked vehicles;

— S: sleeping and couchette vehicles;

— N: all other vehicles (standard vehicles).

EN 45545-2 Table 1: Hazard level classification

Operation category	Design category			
	N: Standard vehicles	A: Vehicles forming part of an automatic train having no emergency trained staff on board	D: Double decked vehicle	S: Sleeping and couchette vehicles
1	HL1	HL1	HL1	HL2
2	HL2	HL2	HL2	HL2
3	HL2	HL2	HL2	HL3
4	HL3	HL3	HL3	HL3

EN 45545-2 Clause 4.3.1, 4.3.2 and Figure 1: Grouping rules

4.3.1 General

Products compliant to Table 2 or Table 3 are excluded from the grouping assessment.

No requirements apply to products with a combustible mass of ≤ 10 g in touching contact only with a product compliant to Table 2 and Table 3.

To assess products within the grouping rules the following parameters have to be considered.

Products shall be assessed within the grouping rules if:

- the exposed area of each product is $\leq 0,2$ m²; and
- the combustible mass of each product is > 10 g or they are in touching contact with another unclassified combustible product; and
- the horizontal distance is ≤ 20 mm and the vertical distance is ≤ 200 mm to a combustible product not assessed to Table 2, Table 3 or R24 according to rule 2; and
- they are not fully separated by a product compliant with the fire integrity requirement of 5.3.7.

The combustible masses of the products in this group shall be summed. The assessment process described in 4.3.2 to 4.3.4 is visualized in the flow chart in Figure 1.

4.3.2 Rule 1

If the total combustible mass of the grouped products is

- ≤ 100 g for interior grouped products;

or

- ≤ 400 g for exterior grouped products;

no requirements apply to the products of this group.

This principle also applies to single products that meet the requirements of 4.3.1.

4.3.3 Rule 2

If the total combustible mass of the grouped products exceeds the limits stated in Rule 1, but

- ≤ 500 g for interior grouped products;

or

- ≤ 2000 g for exterior grouped products;

one combustible product of this group shall be tested according to R24.

If this product is compliant to R24 it shall not be considered for further assessment of this group. The remaining products in this group shall be assessed starting with 4.3.1 again.

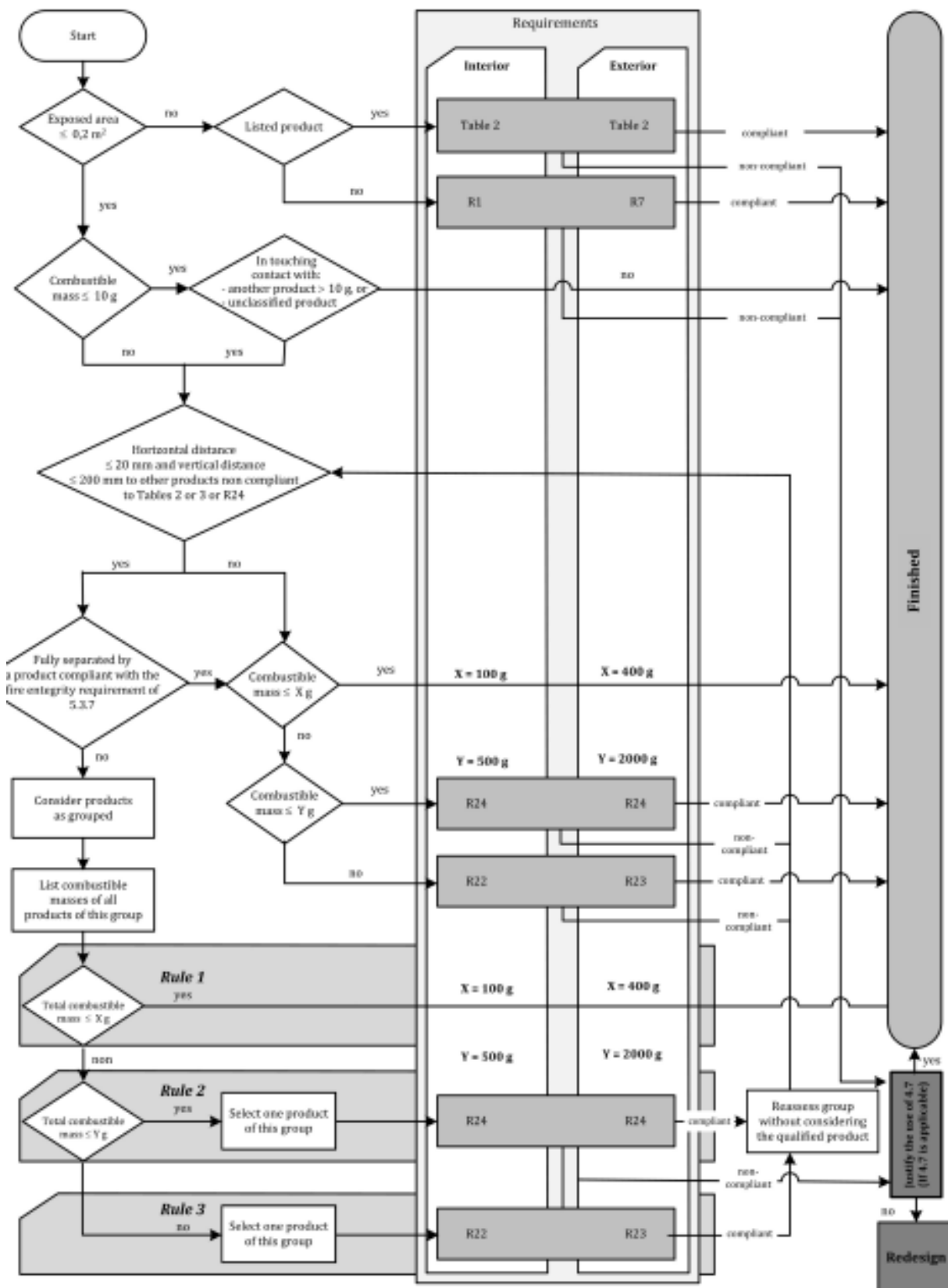
This principle also applies to single products that exceed the mass limits of Rule 1.

4.3.4 Rule 3

If the combustible mass of the grouped products exceeds the limits stated in Rule 2, one product of the group shall be tested according to the requirements of non-listed products given in 4.5, Table 3.

If this product is compliant to the requirements of Table 3 it shall not be considered for further assessment of this group. The remaining products in this group shall be assessed starting with 4.3.1.

This principle also applies to single products that exceed the mass limits of Rule 2.



EN 45545-2 Table 2: Requirement for printed circuits boards

EL9	Printed circuit boards	Printed circuit boards with all varnishes applied but without any attached technical equipment	R24 or R25 or R26
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EN 45545-2 Table 5: Test requirement and criteria for R24 and R25

Requirement set (used for)	Test method reference	Parameter and unit	Maximum or Minimum	HL1	HL2	HL3
R24 (EL9)	T01 EN ISO 4589-2: OI	Oxygen content %	Minimum	28	28	32
R25 (EL9)	T16 EN 60695-2-11	Glow Wire Temperature °C	Minimum	850	850	850

Appendix 1

Test Report for Printed Circuit Board

Appendix 2

Test Report for Polycarbonate “NH-1035”