

Declaration of Compliance with EN 45545-2 for Model “SPN-10080P” and “SPN-10080PM”

Document Number: 200328

Date Issued: 2020-06-17

Reported by

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1. Objective

To declare the compliance with EN 45545-2 for a product designed by **HANWHA TECHWIN CO., LTD.**

2. 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)

3. Product Information

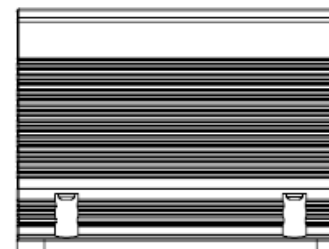
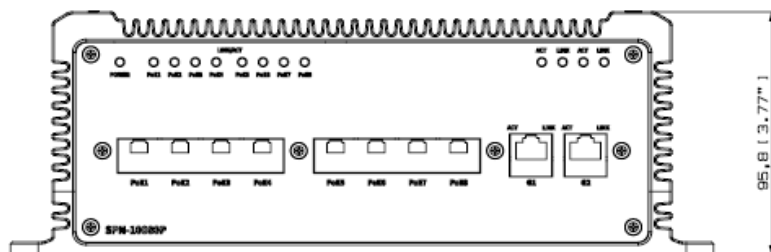
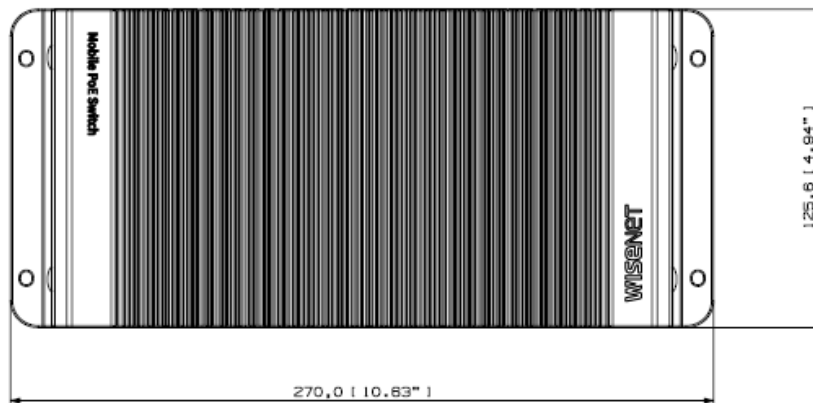
The products under assessment are PoE network switches designated **“SPN-10080P”** and **“SPN-10080PM”**. This product is made by **HANWHA TECHWIN CO., LTD.**

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

The overall dimension of the products is **270.0 x 125.6mm with 95.8mm height**. The total mass of **“SPN-10080P”** and **“SPN-10080PM”** is **2,679g** and **2,579g** respectively.

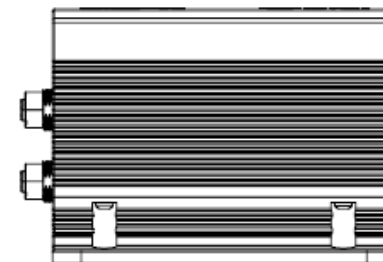
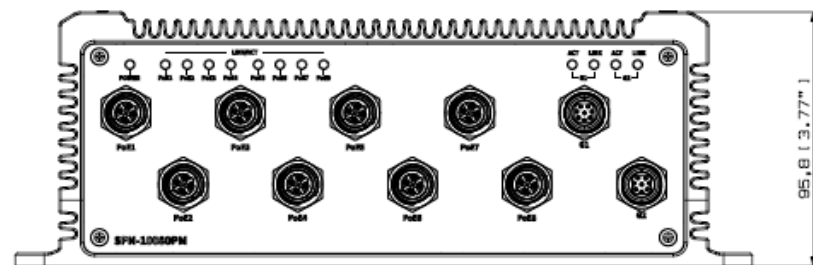
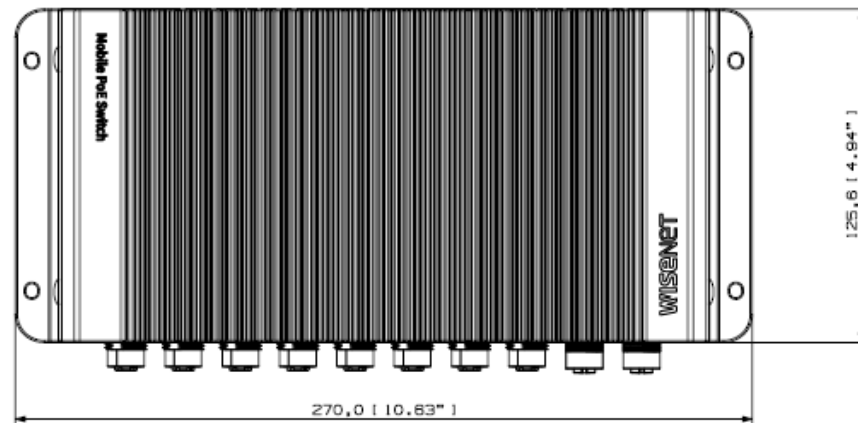
These products will be installed inside rolling stocks. The outer face will be exposed to a passenger area. While multiple number of the products can be used in one vehicle, each product will be installed separately.

The diagrams of **“SPN-10080P”** and **“SPN-10080PM”** are shown in **Figure 1** and **Figure 2** respectively. The breakdown structure of the products with the part list is shown in **Figure 3** and **Figure 4**. The part list with the information of each mass is shown in **Table 1** and **Table 2**. The difference between each model name is shown in **Figure 5**



UNIT : mm [inch]

Figure 1: Diagram of "SPN-10080P"



UNIT : mm[inch]

Figure 2: Diagram of “SPN-10080PM”

1	FC29-009728A	CASE-TOP_SPN-10080P;ALDC
2	FC28-000556A	PAD-THERMAL,W30,D45,T2;GP1500,2
3	FC28-000556A	PAD-THERMAL,W30,D45,T2;GP1500,2
4	AM06-007645A	ASSY,PCB-SPN-10080P SWITCH
5	FC15-005946A	COVER-FRONT-RJ45_10080P;SECC,-
6	AM06-007646A	ASSY,PCB-SPN-10080P POWER
7	FC15-005945A	COVER-REAR_10080P;SECC,-
8	FC28-000556A	PAD-THERMAL,W30,D45,T2;GP1500,2
9	FC29-009727A	CASE-BTM_SPN-10080P;ALDC
S	FC18-001331A	SCREW-SPECIAL;+,TH,M3,0.5,6,STEEL

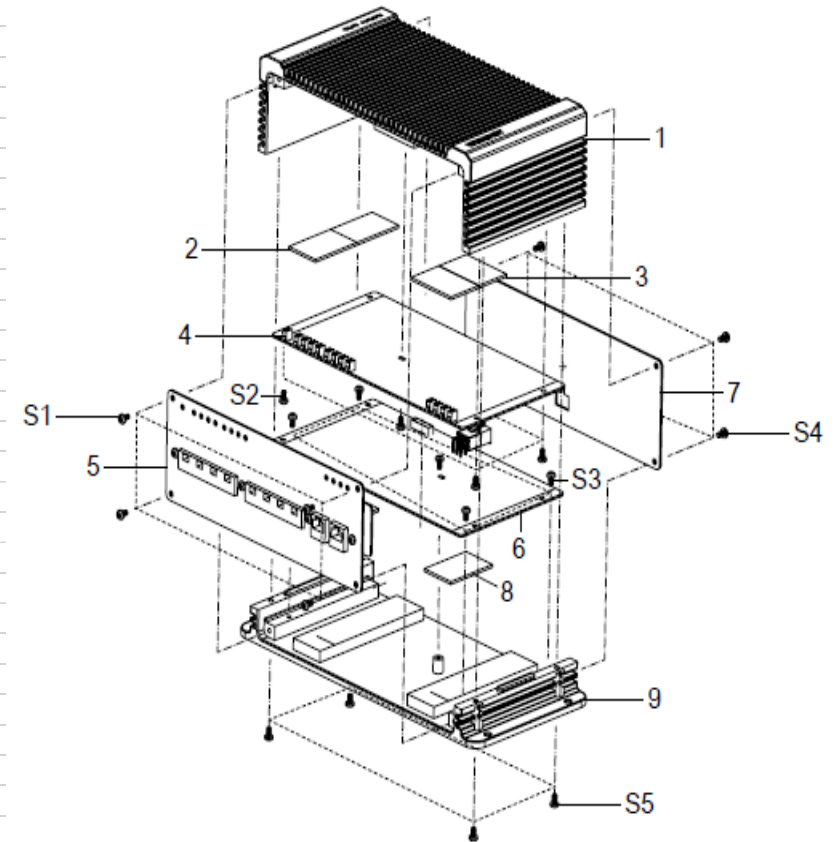


Figure 3: Breakdown Structure of "SPN-10080P" with Part List

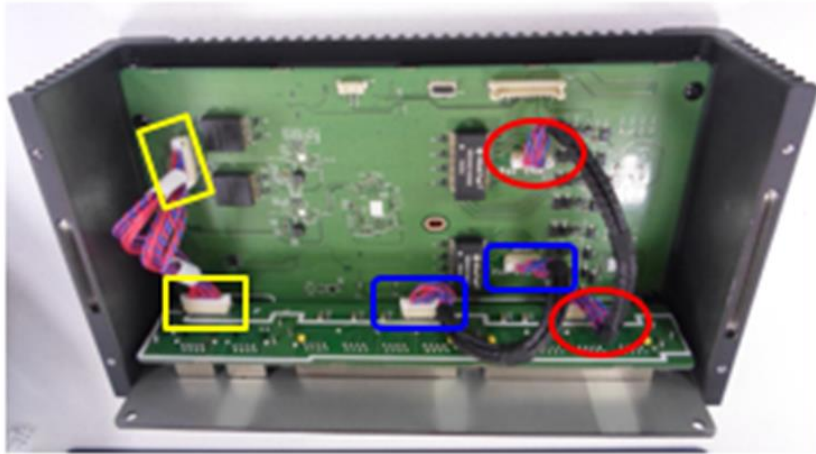
Part Code	Part name	ea	Unit weight (g)	Total weight (g)	Material type	
					Type	Details
AM07-010842A	ASSY,FINAL-SPN-10080P/KUS				complex	ASSY
FC18-001331A	SCREW-SPECIAL;+,TH,M3,0.5,6,STEEL	4	3	12	Metal	SCREW
EP02-001144	CABLE-TRM-1610S;SATA,11P,-,130MM	1	8	8	Cable	Cable
AM07-010762A	ASSY-REAR-SPN-10080P				complex	ASSY
FC15-005945A	COVER-REAR_10080P;SECC,-	1	211	211	Metal	SUS
AM07-010763A	ASSY-FRONT-SPN-10080P				complex	ASSY
AM07-010744A	ASSY,FRONT SUB-RJ45_SPN-10080P	1	100	100	PCB	PCB
EP02-001143	CABLE-TRM-1610S;ETHERNET,19P,-,130MM	2	4	8	Cable	Cable
EP02-001145	CABLE-TRM-1610S;GIGA ETH,29P,-,100MM	1	4	4	Cable	Cable
FC15-005946A	COVER-FRONT-RJ45_10080P;SECC,-	1	211	211	Metal	SUS
FC18-001331A	SCREW-SPECIAL;+,TH,M3,0.5,6,STEEL	4	1	4	Metal	SCREW
AM07-010761A	ASSY-BOTTOM-SPN-10080P				complex	ASSY
FC29-009727A	CASE-BTM_SPN-10080P;ALDC	1	765	765	Metal	SCREW
FC28-000556A	PAD-THERMAL,W30,D45,T2;GP1500,2	2	4	8	RUBBER	RUBBER
AM06-007646A	ASSY,PCB-SPN-10080P POWER	1	130	130	PCB	PCB
FC18-001331A	SCREW-SPECIAL;+,TH,M3,0.5,6,STEEL	4	3	12	Metal	SCREW
AM07-010760A	ASSY-TOP-SPN-10080P				complex	ASSY
FC28-000556A	PAD-THERMAL,W30,D45,T2;GP1500,2	3	4	12	RUBBER	RUBBER
AM06-007645A	ASSY,PCB-SPN-10080P SWITCH	1	130	130	PCB	PCB
FC18-001331A	SCREW-SPECIAL;+,TH,M3,0.5,6,STEEL	4	1	4	Metal	SCREW
FC29-009728A	CASE-TOP_SPN-10080P;ALDC	1	1060	1060	Metal	AL
			TOTAL	2679		

Table 1: Part List of “SPN-10080P” with Information of Each Mass

Part Code	Part name	ea	Unit weight (g)	Total weight (g)	Meterial type	
					Type	Details
AM07-010580A	ASSY,FINAL-SPN-10080PM/US				complex	ASSY
FC18-001331A	SCREW-SPECIAL;+,TH,M3,0.5,6,STEEL	4	3	12	Metal	SCREW
EP02-001144	CABLE-TRM-1610S;SATA,11P,-,130MM	1	8	8	Cable	Cable
AM07-010762A	ASSY-REAR-SPN-10080P				complex	ASSY
FC15-005945A	COVER-REAR_10080P;SECC,-	1	211	211	Metal	SUS
AM07-010764A	ASSY-FRONT-SPN-10080PM				complex	ASSY
EP02-001146	HARNESS-TRM-1610S;WIRE,30PIN,130MM	2	4	8	Cable	Cable
EP02-001151	HARNESS-TRM-1610S;WIRE,19PIN,205MM	1	4	4	Cable	Cable
FC15-005947A	COVER-FRONT-M12_10080P;SECC,-	1	211	211	Metal	SUS
FC18-001331A	SCREW-SPECIAL;+,TH,M3,0.5,6,STEEL	4	1	4	Metal	SCREW
AM07-010761A	ASSY-BOTTOM-SPN-10080P				complex	ASSY
FC29-009727A	CASE-BTM_SPN-10080P;ALDC	1	765	765	Metal	SCREW
FC28-000556A	PAD-THERMAL,W30,D45,T2;GP1500,2	2	4	8	RUBBER	RUBBER
AM06-007646A	ASSY,PCB-SPN-10080P POWER	1	130	130	PCB	PCB
FC18-001331A	SCREW-SPECIAL;+,TH,M3,0.5,6,STEEL	4	3	12	Metal	SCREW
AM07-010760A	ASSY-TOP-SPN-10080P				complex	ASSY
FC28-000556A	PAD-THERMAL,W30,D45,T2;GP1500,2	3	4	12	RUBBER	RUBBER
AM06-007645A	ASSY,PCB-SPN-10080P SWITCH	1	130	130	PCB	PCB
FC18-001331A	SCREW-SPECIAL;+,TH,M3,0.5,6,STEEL	4	1	4	Metal	SCREW
FC29-009728A	CASE-TOP_SPN-10080P;ALDC	1	1060	1060	Metal	AL
			TOTAL	2579		

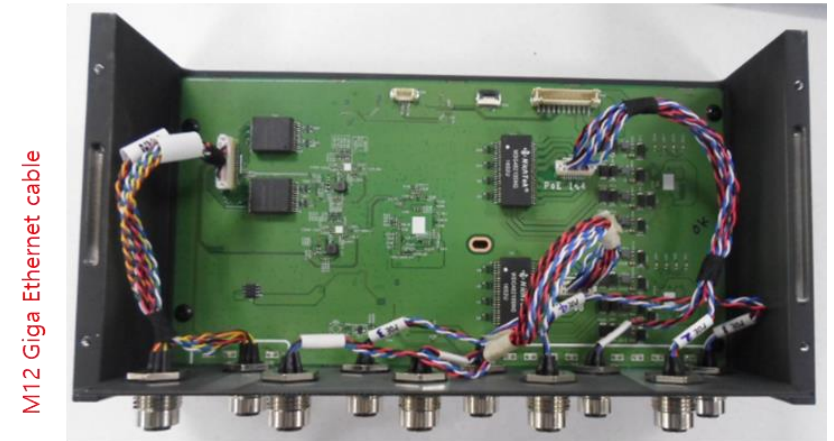
Table 2: Part List of “SPN-10080PM” with Information of Each Mass

SPN-10080P



Front PCB 1ea
+ Giga Ethernet cable 1ea
+ Ethernet cable 2ea

SPN-10080PM



No Front PCB
M12 Giga Ethernet cable 1ea
+ M12 Ethernet cable 2ea

Figure 5: Construction difference between "SPN-10080P" and "SPN-10080PM"

4. Assessment

4.1 Specifying Target Hazard Level

The product “SPN-10080P, SPN-10080PM” 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”.

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 3**, which demonstrated the compliance with the requirement of **R25/HL3**. For more detail, refer to the test report (**200328**) issued by **Chemitox** which is ISO 17025 accredited for the relevant testing (**Appendix 1**).

Table 3: Test result of EN 60695-2-11 for PCB

Part name	Test Parameter	Results
ASSY, FRONT SUBRJ45_SPN-10080P	Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant
ASSY, PCB-SPN-10080P POWER	Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant
ASSY, PCB-SPN-10080P SWITCH	Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant

2) Coating of Aluminum Enclosure:

The outer enclosure parts are coated with certain organic painting.

Although this part is exposed to a passenger area, the exposed area is limited to approx. 143,621mm², which is less than 0.2m².

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 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 those parts is less than 100g. The total mass is still less than 100g even though the mass of 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.

5. Verification of compliance with EN 45545-2

The assessment result detailed in Section 5 has demonstrated that the products “**SPN-10080P**” and “**SPN-10080PM**” meet 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.

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

No requirements apply to products with a combustible mass of < 10 g not in touching contact with another unclassified product. To assess products the following parameters have to be considered. Products shall be considered as grouped if:

- the exposed area of each product is < 0,2 m²; and
- they are not compliant to the applicable requirements of Table 2; and
- the combustible mass of each product is > 10 g or they are in touching contact to another combustible product; and
- the horizontal distance to a product non compliant to Table 2 is < 20 mm or the vertical distance to a product non compliant to Table 2 is < 200 mm; and
- they are not fully separated by a product compliant with the fire integrity requirement of 5.3.6.

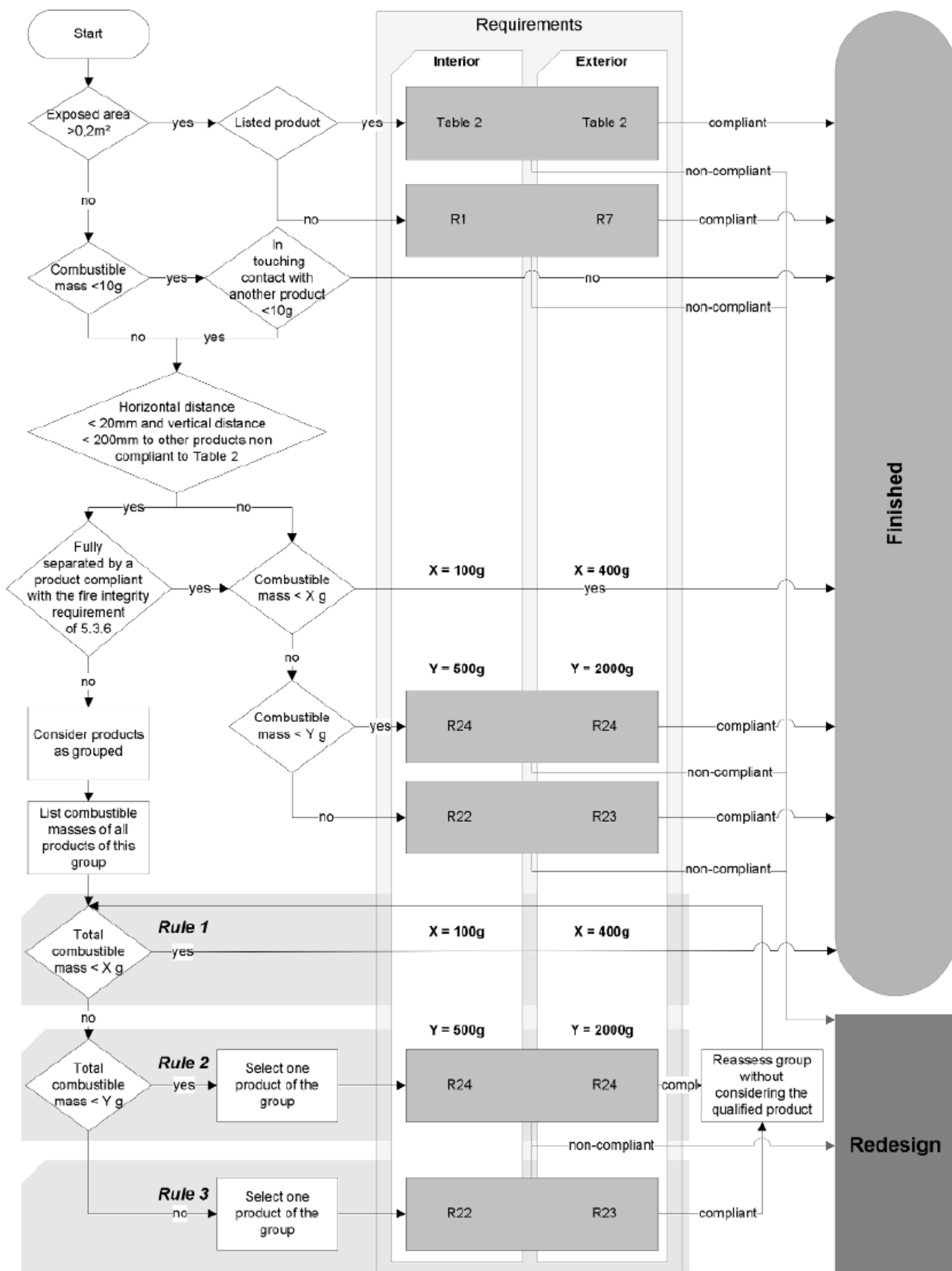
The combustible masses of the products in this group shall be summed.

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;



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

A1 EL9	Printed circuit boards	Printed circuit boards with all varnishes applied but without any attached technical equipment	R24 or R25 A1
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EN 45545-2 Table 5: Test requirement and criteria for R25

A1 Requirement set (used for) A1	Test method reference	Parameter and unit	Maximum or Minimum	HL1	HL2	HL3
	T10.03 EN ISO 5659-2: 25 kWm ⁻²	D_5 max. dimensionless	Maximum	600	300	150
	T12 NF X 70-100-1 and - 2 600 °C	CIT_{NLP} dimensionless	Maximum	1,2	0,9	0,75
R23 (EX12; EL2; EL5 EL6B; EL7B; M3)	T01 EN ISO 4589-2: OI	Oxygen content %	Minimum	28	28	32
	T10.03 EN ISO 5659-2: 25 kWm ⁻²	D_5 max. dimensionless	Maximum	–	600	300
	T12 NF X 70-100-1 and NF X 70-100-2 600 °C	CIT_{NLP} dimensionless	Maximum	–	1,8	1,5
R24	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
R26 (EL10)	T17 EN 60695-11-10	Vertical small flame test	Minimum	V0	V0	V0

Appendix 1

Test Report for Printed Circuit Board