



INSPECTION REPORT

Fire Safety Assessment according to EN 45545-2

Camera SNV-L6014RM

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Content	Page
1. General.....	3
1.1. Standards	3
1.2. Abbreviations.....	3
1.3. Management system at the time of inspection	3
2. Documents.....	4
3. Equipment under inspection	5
3.1. Description of equipment.....	5
3.2. Installation Conditions	5
4. Conformity assessment acc. to EN 45545	6
4.1. Classification according to EN 45545-1	6
4.2. Assessment according to EN 45545-2	6
4.2.1. Requirements	6
4.2.2. Material verification.....	9
5. Fire risk analysis	10
6. Summary	11

Revision history

Revision	Status	Date	Author	Modified clauses	Modifications
1.0	Released	05.04.2018	Tolga Wichmann	all	Initial
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1. General

1.1. Standards

This document deals with the assessment of the HANWHA Camera SNV-L6014RM in respect to compliance with the fire safety requirements according to the following acknowledged rules of technology:

Table 1: Standards

No.	Standard	Title
[R01]	EN 45545-1 2013	Railway applications – Fire protection on rail vehicles – Part 1: General
[R02]	EN 45545-2 2013 + A1:2015	Railway applications – Fire protection on rail vehicles – Part 2: Requirements for fire behaviour of material and components
[R03]	EN 45545-5 2013 + A1:2015	Railway applications – Fire protection on rail vehicles – Part 5: Fire safety requirements for electrical equipment including that of trolley buses, track guided buses and magnetic levitation vehicles
[R04]	NFPA 130:2017	Standard for Fixed Guideway Transit and Passenger Rail Systems

1.2. Abbreviations

Table 2: Abbreviations

Abbreviation	Definition
HL	Hazard Level
OC	Operation category
PCB	Printed circuit board
N/A	Not Applicable
min.	Minimum
max.	Maximum
OI	Oxygen Index
PoE	Power-over-Ethernet

1.3. Management system at the time of inspection

The inspection was executed under application of the valid quality management system [M1] of the inspection body TÜV SÜD Rail GmbH accredited according to DIN EN ISO/IEC 17020:2012 [M2].

Table 3: Management System

Ref.	Designation	Title
[M1]	QMS	Quality management system of TÜV SÜD Rail GmbH
[M2]	D-IS-11190-01-00	Accreditation according to DIN EN ISO/IEC 17020:2012 as a Type A inspection body



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2. Documents

Table 4: Documents

ID	Document	Doc./File ID	Author	Rev.	Date
D1	Datasheet	NV-L6014RM_Datasheet_ENG	SAMSUNG	—	2016/02/26
D2	Part list	SNV-L6014RM parts listing	HANWAH	—	2018/01/09
D3	Test report reverence camera	SGS-R14-0666-EN	SGS	—	2014/06/09
D4	Datasheet reverence camera	SNF-8010V_VM_Datasheet ENG	SAMSUNG	Revised	2014/10

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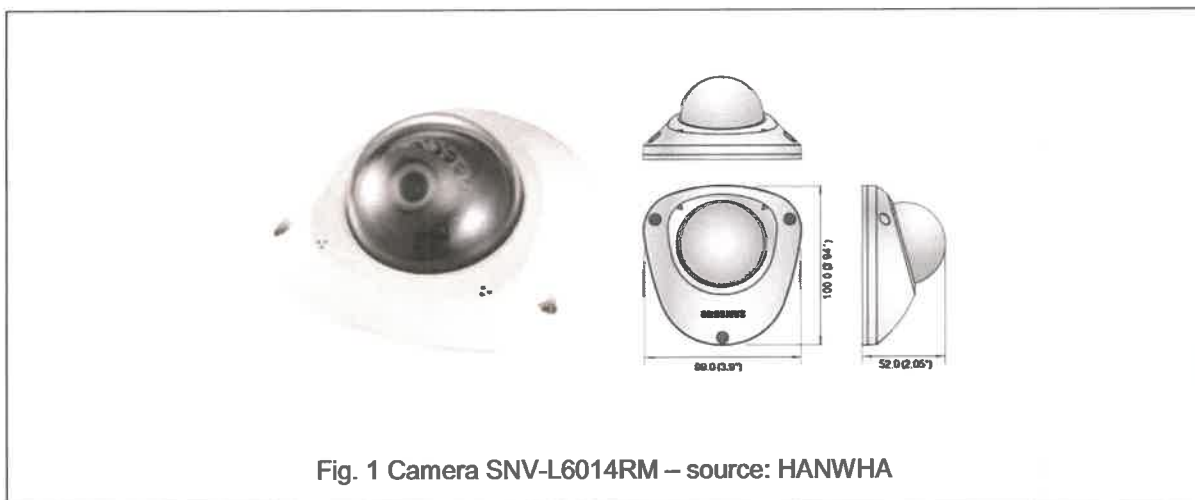
2019-02-18

3. Equipment under inspection

3.1. Description of equipment

The Camera SNV-L6014RM was developed for application in rolling stock inside the cabin compartment.

It has range of features with 2 megapixel 1080p high definition images with a 3.6mm fixed lens, 15 meter IR LEDs, and a black casing. Hallway View mode optimizes the image for portrait orientation, and also includes a built in microphone. The SNV-L6014RM has a M12 connector for secure installation in transportation applications and its vibration resistant build (EN 50155, EN 50121) ensures reliable video in any transportation environment. Rated to IP66/IK10, it can work effectively in more demanding environments that are prone to severe or varying weather conditions as well as tampering or physical damage.



The inspected system (see Fig. 1) is the maximum equipped version “SNV-L6014RM”. Any less equipped version of this Camera carrying the named equipment is compliant.

Electrical Data:

- Input Voltage / Current: PoE (IEEE802.3af, Class2)
- Max. Failure power: 5,8 Watt.

3.2. Installation Conditions

The Camera SNV-L6014RM is intended for use in technical compartments as well as in passenger compartments. Therefore it could be accessible for passengers.

2019-02-18



Rail

4. Conformity assessment acc. to EN 45545

4.1. Classification according to EN 45545-1

The Camera SNV-L6014RM is to be used in vehicles of all design categories and for operations corresponding to operating classes 1 to 4.

The safety objectives will be evaluated in a risk-oriented approach in accordance with EN 45545-1, Section 4.2 "Fire resulting from accidental ignition or arson" and Section 4.3 "Fires caused by technical defects".

The section 4.2 refers to typical ignition models involving newspaper, matches, cigarettes and gas lighters. Those will be taken into consideration for any areas that are freely accessible to passengers and staff (ignition models 1 and 2 in accordance with Annex A, EN 45545-1).

Section 4.3 refers to ignition models comparable to electrical arcing or overheating and the spread of fire by any potentially flammable gases and liquids present (ignition models 3 and 4 in accordance with Annex A, EN 45545-1).

According to section 4.4 larger ignition models (model 5 in accordance with Annex A, EN 45545-1) will be evaluated.

4.2. Assessment according to EN 45545-2

4.2.1. Requirements

Based on the classification according to EN 45545-1, the materials/components shall meet the requirements of Hazard Level 3 (HL3). The components are to be regarded as electrotechnical equipment covered by the EN 45545-2 standard. Generally, the requirement sets are listed in section 4.4 "Listed products". The applicable requirements are the following:

Table 5: Requirement sets

No.	Name	Details	Requirement
IN1E	External surfaces of enclosures containing technical equipment	Enclosures which are located inside the body shell and directly attached to passenger or staff area	R1 ISO 5658-2 CFE min. 20 kWm ⁻² ISO 5660-1: 50 kWm ⁻² MARHE max. 60 kWm ⁻² EN ISO 5659-2:50 kWm ⁻² Ds(4) max. 150 VOF ₄ max. 300 min CIT _G max. 0.75
EL9	Printed circuit boards	Printed circuit boards with all applied coatings but without any attached technical equipment	R25 EN 60695-2-11 Glow wire temperature 850 °C or R24 ISO 4589-2:OI min. 32%
EL10	Small electrotechnical products	All electrotechnical equipment, including protection against contact and similar	R26 EN 60695-11-10 min. V0

2019-02-15



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Table 5: Requirement sets

No.	Name	Details	Requirement
EL1A	Cables for interior	Cables not compliant with one of the standards referenced in 4.2c	R15 EN 60332-1-2: burned part ≤ 540mm and unburned part > 50mm EN 50305: burned part ≤ 1.5m EN 61034-2: transmission ≥ 70% EN 50305: ITC ≤ 6

Connection cables of the vehicle wiring are not part of this assessment report.

In addition to the requirements of listed products, the grouping rules according to section 4.3 for components with low combustible mass and/or surfaces are applicable:

- No requirements apply to products with a combustible mass of < 10 g not in touching contact with another unclassified product. (EN 45545-2 section 4.3.1)

Table 6: Grouping rule1

No.	Section	Requirement	Remark
1-1	4.3.2. Grouping rule 1	< 100 g for interior grouped products	No requirements
1-2	Products without requirements	< 400 g for exterior grouped products	No requirements

Table 7: Grouping rule2

No.	Section	Requirement	Remark
2-1	4.3.3. Grouping rule 2	< 500 g for interior grouped products tested according to R24	Proof R24 Oxygen index
2-2	Products tested according to R24	< 2000 g for exterior grouped products tested according to R24	Proof R24 Oxygen index

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2019-02-18



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The following general rules shall be considered:

Table 8: general requirements EN 45545-2

Section	Requirement	Remark
4.2. a) General	Products which comply with the highest level of reaction to fire performance and therefore need no further testing are - products classified as A1 according to EN 13501-1 - all products described in commission decision 96/603/EC (as amended)	---
4.2. n)	If listed products are used in an application below the mass and area thresholds given in 4.3, they may be treated as non-listed products.	---
4.7 Products to be approved on functional necessity	If it can be shown that any of the requirements specified above are not technically achievable with functionally suitable products, then existing commercially available products can be used until and unless a suitable product is developed. There shall be no requirement to consider products made available after the date after the date of the contract.	---
4.5 non-listed products	Any product not listed in EN 45545-2 section 4.4 shall be considered as a non-listed product or shall be assessed using the grouping rules. The requirements of non-listed products are the following: $> 0.2m^2$ $\leq 0.2m^2$ R1 (interior), R7 (exterior) R22 (interior), R23 (exterior)	This requirement can also be applied to any product that cannot be tested according to the requirements of listed products such as EL10-parts not made of plastic
5.3.6 Fire integrity test	There shall not be more than one hole after the test T03.01. or T03.02. This hole shall have no dimension in the plane of the test piece greater than 3mm. Alternatively the material fulfils the requirements of Conventional Classified Products acc. to EN 45545-3. Those products are considered to meet the integrity requirements.	Materials that are fully separated with those products shall be grouped separately.

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4.2.2. Material verification

According to the material listing D2 all materials can be treated by grouping rule 4.3.1 or 4.3.2 with a combustible mass of < 10 g or < 100 g and are therefore not required for verification by test.

Material treated according to the grouping rules > 10g but < 100g:

- Housing and electronics of 76,3 g, which includes the following parts
 - PCB of 24 g
 - Plastic housing, frame, holders, sealing and cables of 52,3 g

The above mentioned grouped materials needs to be considered for integration in the vehicle.

The combustible materials used for the Camera SNV-L6014RM fulfil the requirements according to EN 45545-2 for HL 3.

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5. Fire risk analysis

A) Ignition and spread of fire starting from device – material and failure analysis for the ignition source

Events of fire on electronic devices cannot be excluded. The maximum-failure power is limited to 5,8 Watt. Because of the small amount of combustible mass and the very limited failure power in normal operation an ignition and spread of fire is very unlikely.

B) Fire inclusion of devices due to external/neighbouring fire – material and constructive analysis

The combustible mass is very limited. Therefore the effect of an external fire on the device is limited.

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6. Summary

The assessments result is that the Camera SNV-L6014RM meets the requirements of the listed acknowledged rule of technology:

- EN 45545-2 hazard levels HL1 to HL 3

The groupings to be considered for installation in the vehicles are listed in section 4.2.2.

For regular (intended) operation the required level of personal safety is ensured.

The assessment is based on documents provided by the costumer (see documents table).

This inspection is also valid for any other Camera of the evaluated types as long as HANWHA confirms with manufacturer declaration that the material used did not change and the mass and surface of the material treated according to grouping rules (see section 4.2.2) is not higher than for the inspected items.

This inspection report was written under the specified accreditation without influence of third party.

TÜV SÜD Rail GmbH

Berlin, 05.04.2018

TR-RS3 / Lead Fire Safety

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