TÜV NORD Systems GmbH & Co. KG
ISGRF / Inspection Body SEELAB

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Inspection Report

on the evaluation of the fire protection properties of the LTE Modems "PEMG2-V2" of the company Prolan according EN 45545-2:2013+A1:2015

Fig. 1: LTE Modem "PEMG2-V2" [2]

Report-No.: **1436.GR.20200316.091408**
Version 1.0

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Created by order of

Prolan Zrt. / Prolan Co.
Szentendrei út 1-3.
2011 Budakalász,
Hungary

by
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Inspection Body SEELAB
Große Bahnstraße 31, 22525 Hamburg, Germany

Hamburg, 05.07.2021

DAkkS Deutsche Akkreditierungsstelle D-IS-11074-03-00

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1 General

1.1 Revision History

Revision	Date	Remark
1.0	05.07.2021	First Revision

1.2 Abbreviations

Abbreviation	Meaning
HL	Hazard Level
Prolan	Prolan Co.
QA	Quality Assurance
TÜV Nord	TÜV Nord Systems GmbH & Co. KG

1.3 Evaluation Criteria

This inspection report is based on the following evaluation criteria:

Abkürzung im Bericht	Dokument
/EN 45545-1/	Railway applications – Fire protection on railway vehicles – Part 1: General requirements; German version EN 45545-1:2013
/EN 45545-2/	Railway applications – Fire protection on railway vehicles – Part 2: Requirements for fire behaviour of materials and components; German version EN 45545-2:2013+A1:2015
/96/603/EG/	Commission Decision 96/603/EC of 4 October 1996 establishing the list of products belonging to Classes A 'No contribution to fire' provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products

2 Customer

Prolan Zrt. / Prolan Co.
Szentendrei út 1-3.
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3 Contract

The company Prolan commissioned TÜV NORD Systems GmbH & Co. KG with its letter dated 29.03.2021 to prepare an evaluation of the fire protection properties of the LTE modem "PEMG2-V2", according to the requirements of standard part /EN 45545-2/.

4 Circumstances

The Prolan Company has been active in the assembly, soldering and testing of printed circuit boards for 25 years. Together with housing production, modules for data loggers and remote monitoring systems for industry are manufactured and distributed (see also [7]).

The LTE modem "PEMG2-V2" has now been developed as the successor to the “PEMG2”.

The use of such components in rail vehicles requires, among other things, the consider ation of the fire protection requirements of the standard part /EN 45545-2/ in the relevant hazard level (HL).

The Co. Prolan strives to ensure that this component complies with hazard level 2 (HL2 → covering operating class 3 in accordance with /EN 45545-1/) for indoor use, taking into account the applicable sets of requirements of the standards part /EN 45545-2/.

5 Inspection Item

Subject to the inspection is the LTE modem “PEMG2-V2” (barcode: "ESON50017") (see [3]) of the company Prolan, with the components listed in the material list [1] and the housing made of unpainted steel (see [1] + [4]), which is described in more detail below.

The LTE modem mainly consists of the following assemblies/ components:

- Housing
- Printed circuit board (PCB)
- Connection plugs
- Cables

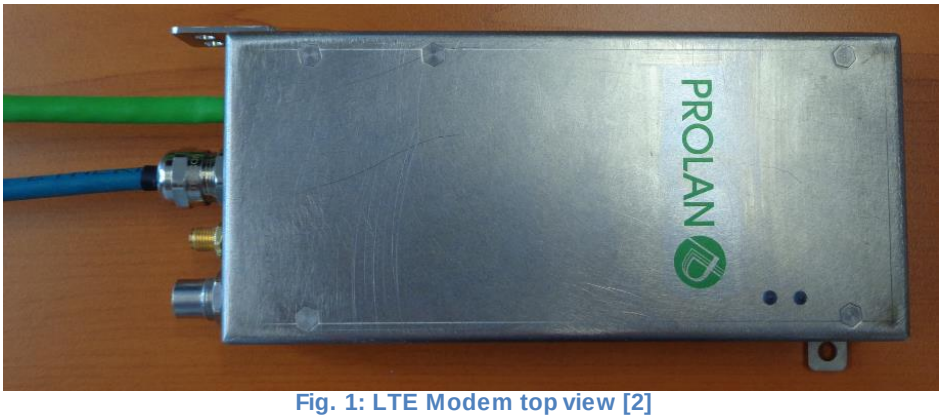

Fig. 1: LTE Modem top view [2]

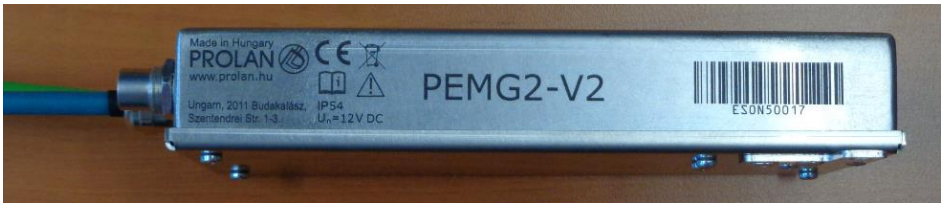

Fig. 2: LTE Modem side view [3]

According to the specifications (see [6]), the LTE modem is intended for use in the interior and exterior of rail vehicles (not accessible to passengers). The installation position is not specified and can be freely selected. Therefore, the normative evaluation is based on the installation location: inside and the installation position: variable.

6 Inspection Procedure

The evaluation is based on the requirement criteria according to the hazard level and normative possibilities that arise for the components to be considered here according to the part of the standard to be taken into account /EN 45545-2/.

The verification of the assemblies according to chapter 5 is carried out as “electro technical equipment” with enclosure, so that the verification and evaluation is based on the following principles of /EN 45545-2/:

- exposed surface,
- classified materials according section 4.2 a),
- material certificates according table 2 and 3,
- Grouping rules according section 4.3

For the evaluation of the components, the documents provided such as part list, images, descriptions and verifications (see [1] - [6]) are used. The results are summarised in the final evaluation in chapter 9.

7 Limitations of the Inspection

The evaluation is carried out as a component approach.

The fire protection evaluation refers exclusively to the inspection item described in chapter 5 with the materials and components specified in the material list [1]. It is not possible to transfer the evaluation results to other design variants of the LTE Modem.

8 Inspection Results

Within the scope of the assessment, an evaluation of the documents provided by Co. Prolan (material list, pictures and descriptions of the components, see [1] - [6]) was carried out for the LTE modem, which is based on the evaluation principles of chapter 6. These documents list the essential fire protection-relevant information (including material, mass, surface coating, fire behaviour) on the components (housing, PCB, cable and connector).

The following chapters present the results of the evaluation of the submitted documents on the LTE modem and its components.

8.1 Components According Section 4.2 a) /EN 45545-2/

Components according to section 4.2 a) meet the highest requirements and are classified as non-flammable according to /96/603/EC/.

The following components (extract from [1]) meets the requirements according section 4.2 a) /EN 45545-2/:

Position	Bauteil	Material
1	Schraube Deckel DIN EN ISO 7045 M2,5 x 4mm	Edelstahl A2
2	Deckel PEMG Rostfrei	WNr.1.4301
3	Schraube ELP DIN EN ISO 7380 M3x5mm	Edelstahl A2
5	Gehäuse PEMG Rostrfei	WNr.1.4301
7	Schraube Kühler DIN EN ISO 7045 M2,5x4	Edelstahl A2
8	Kühler	AlSi 1 MgMn EN AW 6082 T6
9c	Aderendhülse	Phosphor Bronze
11a	SMA Flanschkupplung	Messing
11d	IPEX MHF Stecker	Messing
12a	FME Flanschkupplung	Messing
14	Befestigungselement I Rostfrei	WNr.1.4301
15	Befestigungselement II Rostfrei	WNr.1.4301
16b	Aderendhülse	Phosphor Bronze
17	EMV Kabelverschraubung für 4 polige Ethernet kabel	Messing vernickelt

The housing of the LTE Modems (Pos. 2 + 5) is installed in an unpainted state (see [4]).

➔ The specified components are standard-compliant without further proof.

8.2 Listed Products According Table 2 /EN 45545-2/

a) Printed circuit boards (PCB) shall be verified according /EN 45545-2/ Table 2 → EL9: R24 or R25.

No evidence was submitted for the PCB (extract from [1]) of the LTE Modem.

Position	Bauteil	Material
4	Platine voll bestückt PEMG	diverse

➔ The PCB is grouped and considered under chapter 8.4.

b) Cables shall be verified according /EN 45545-2/ table 2 → EL1A/ EL1B: R15/R16.

No evidence was provided for the cables used (extract from [1]).

Position	Bauteil	Material
9a	Kabel Data, Power supply 7 polig mit Schrumpfschlauch	
11b	Kabel 100 mm	PE
12b	Kabel	PE
16a	Kabel Data Ethernet 4 polig mit Schrumpfschlauch	

➔ The cables are grouped and considered under chapter 8.4.

8.3 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 according to section 4.3.1 “General” /EN 45545-2/.

Due to the installation situation not being described in more detail, the combustible masses <10 g are considered in chapter 8.4 in a covering manner.

➔ Small parts <10 g are considered under chapter 8.4.

8.4 Grouping Rules - 4.3.2 Rule 1

If the total combustible mass of the grouped products is < 100 g for interior according section 4.3.2 /EN 45545-2/ no requirements apply to the products of this group.

The LTE modem has a steel housing without ventilation holes, with 4 openings for cables and plugs. These four openings are closed again with a cable gland, a cable seal and housing screw connectors (see [2] + [3]).

Because of this constructive situation:

- small volume,
- closed housing design with resealed openings and
- enclosure material (stainless steel) in accordance with the requirement for fire integrity section 5.3.6 /EN 45545-2/,

the combustible masses inside the metal enclosure are considered as a separate group.

Group 1 (extract from [1]) of the combustible masses inside the enclosure corresponds to 88.5 g.

Position	Bauteil	Material	Gesamt-Gewicht (g)
4	Platine voll bestückt PEMG	diverse	83
6	LED Lichtleiter	Polycarbonat	0,4
10	Kabelzugentlastung	Polyvinylcloride, Flame retardant	0,1
11b	Kabel 100 mm	PE	0,5
11c	Schrumpfschlauch	Polyolefin	0,5
12b	Kabel	PE	1
12c	Schrumpfschlauch	Polyolefin	0,5
12d	IPEX MHF Stecker	Messing	0,5
13	Thermal Interface		2
		Gesamtmasse Gruppe 1	88,5

Group 2 (extract from [1]) of the combustible masses outside the enclosure corresponds to 18,2 g.

Position	Bauteil	Material	Gesamt-Gewicht (g)
9a	Kabel Data, Power supply 7 polig mit Schrumpfschlauch		15,8
9b	Stecker 7 polig	Nylon	0,1
16a	Kabel Data Ethernet 4 polig mit Schrumpfschlauch		1,2
16c	Stecker 4 pol.	Nylon	0,1
18	Dichtung	EPDM ShA30	1
		Gesamtmasse Gruppe 2	18,2

The non-proven residual combustible masses of:

- Group 1 (inside) → 88,5 g
- Group 2 (outside) → 18,2 g

are sufficiently separated from each other by the enclosure (in accordance with section 5.3.6 /EN 45545-2/) so that the respective combustible mass is below the limit of grouping rule 1 for inside use of <100g.

➔ These components are standard-compliant without further proof.

Group 2 with 18.2 g outside the housing must be taken into account when installing the LTE modem in rail vehicles.

➔ When installing the LTE modem, an unproven combustible residual mass of 18.2 g must be taken into account.

8.5 Conclusion

Due to the unproven combustible residual mass of 18.2 g (<100 g) and the unpainted stainless steel housing, the LTE Modem "PEMG2-V2" from Co. Prolan conforms to /EN 45545-2/.

The rated LTE Modem fulfils the requirements according to HL1 to HL3 for indoor and outdoor use and can therefore be used for all design and operating classes according to /EN 45545-1/ for indoor and outdoor use.

When using the LTE Modems in the vehicle, unproven residual combustible masses of 18.2 g must be taken into account.

9 Summarising Evaluation

The LTE Modem "PEMG2-V2" of the company Prolan was evaluated with regard to compliance with the standard part /EN 45545-2/ on the basis of the submitted documents.

As result of the evaluation, on the basis of the available documentation and taking into account the condition mentioned in chapter 7, there are no fire protection concerns aga inst the planned installation of the energy meter assembly (indoors as well as outdoors) in vehicles of hazard level 1-3 (HL1-3) according to /EN 45545-2/.

When installing the LTE Modems in rail vehicles, an existing unproven residual combustible mass of 18.2 g shall be taken into account.

10 Completion of the Inspection

Herewith we confirm the completion of the inspection. The inspection took place in the period March until June 2021.

Hamburg, 05.07.2021

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Note: The results exclusively apply to the inspection item which is stated in this inspection report. This inspection report may only be duplicated in its full wording.

11 Documentation

[1] Material list PEMG2-V2
Sent: 28.05.2021, János Krucsay, Prolan
File: “Materialliste PEMG II.xls”

[2] Top view PEMG2-V2
Sent: 25.05.2021, János Krucsay, Prolan
File: “DSC00020.JPG”

[3] Side view PEMG2-V2
Sent: 25.05.2021, János Krucsay, Prolan
File: “DSC00026.JPG”

[4] E-Mail about housing
Sent: 19.05.2021, János Krucsay, Prolan
File: “RE Brandschutzgutachten EN 45545-2 PEMG II 210519.msg”

[5] E-Mail about housing
Sent: 21.05.2021, János Krucsay, Prolan
File: “RE Brandschutzgutachten EN 45545-2 PEMG II 210521.msg”

[6] E-Mail about the use of the device
Sent: 23.02.2021, Eckard Simon, EMH
File: “RE Brandschutzgutachten EN 45545-2 PEMG II 210521.msg”

[7] Homepage of Co. Prolan
Stand: 28.05.2021
Web address: “https://www.prolanelektronika.hu/index.php?lang=de”