

**Łukasiewicz**  
Instytut Technik  
Innowacyjnych  
EMAG



AB 261



**Centrum Badań i Certyfikacji  
Zespół Laboratoriów Badawczych**

www.cbc.ibemag.pl, e-mail: cbc@emag.lukasiewicz.gov.pl, tel. 32 2007 512

CBC-RU-501-250/21/1073

Katowice, 2021-07-02

**001513**

**2021-07-02**

**ZESPÓŁ LABORATORIÓW  
BADAWCZYCH**

Świadczy usługi  
w zakresie badań:

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- środowiskowych
- elektrycznych
- mechanicznych
- trudności materiałowych
- funkcjonalności
- iskrobezpieczeństwa
- stopnia ochrony IP
- UN DOT 38.3

- ♦ aparatury rozdzielczej
- ♦ stacji transformatorowych
- ♦ akumulatorów
- ♦ kabli i przewodów
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- ♦ podzespołów stosowanych w kolejnictwie, branży automotive i siłach zbrojnych RP
- ♦ pozostałych urządzeń elektrycznych i elektronicznych

**FRISTOM Spółka z ograniczoną odpowiedzialnością Sp.k.**  
**ul. Przemysłowa 5**  
**86-014 Sicienka**

**Adres do korespondencji:**  
**FRISTOM Spółka z ograniczoną odpowiedzialnością Sp. k.**  
**ul. Grunwaldzka 207A**  
**85-451 Bydgoszcz**

*Dotyczy: Przekazania wyników pracy nr 6649/2021*

W załączeniu przekazujemy wyniki pracy pt.:

**Wykonanie badań stopnia ochrony IP68 zgodnie z ofertą nr FH/AB-501-266/21.  
Opracowanie sprawozdania z tych badań.**

wykonanej na Wasze zamówienie **nr 12/21 z dnia 21.06.2021 r.**

Z poważaniem

Sieć Badawcza ŁUKASIEWICZ  
Instytut Technik Innowacyjnych  
EMAG  
DYREKTOR  
dr inż. Artur Kozłowski

*Załączniki:*

- TEST REPORT No. 6649-ZLK/2021 – 1 egz.

*Kopia:*

- CBC



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## LABORATORY OF CABLE TESTING AND ENVIRONMENTAL TESTS

### TEST REPORT No

**6649-ZLK/2021**

#### IP68 tests of object:

**FT-700 LED lamp, FT-146 LED lamp, 2-pin Fristom connector**

Customer: Fristom Sp. z o.o. Sp. k.  
ul. Przemysłowa 5  
86-014 Sicienko

Order: 12/2021 of 21 June 2021

Test report prepared by:

Robert Ulfing

Test report reviewed by:

Arkadiusz Szweda

Test report authorized by:

Robert Ulfing

Technical Manager

Katowice, 02 July 2021

Report contains pages:	12	Version of the form PL-1/11-ZLK/1-en w.5	Copy No.	1
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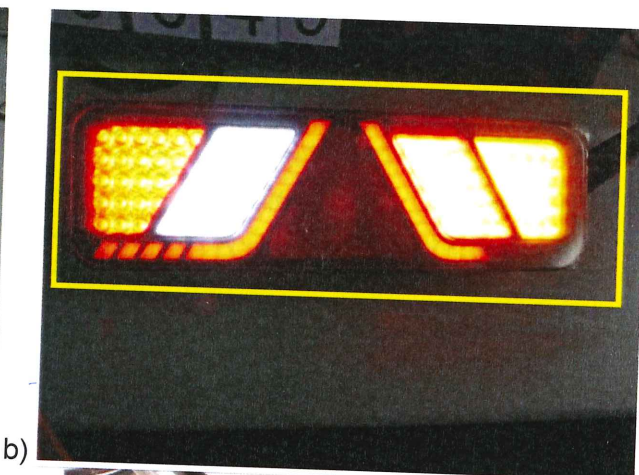
**1. Equipment under test (EUT):**

Table 1. EUT data

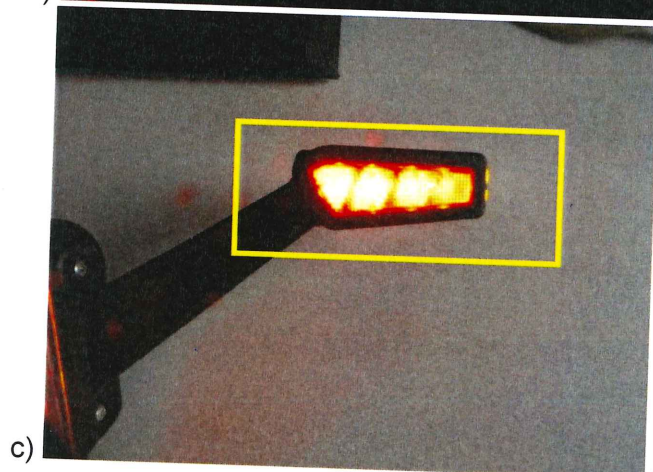
No.	Name	Serial number/ Manufacturer mark	Date of delivery	Producer	Laboratory code
1	FT-700 LED lamp (a part of FT-700-146 LED lamp)	-	17.06.2021	Fristom Sp. z o.o.	6649.01
2	FT-146 LED lamp (a part of FT-700-146 LED lamp)	-	17.06.2021	Fristom Sp. z o.o.	6649.02
3	2-pin Fristom connector (a part of FT-700-146 LED lamp)	-	17.06.2021	Fristom Sp. z o.o.	6649.03



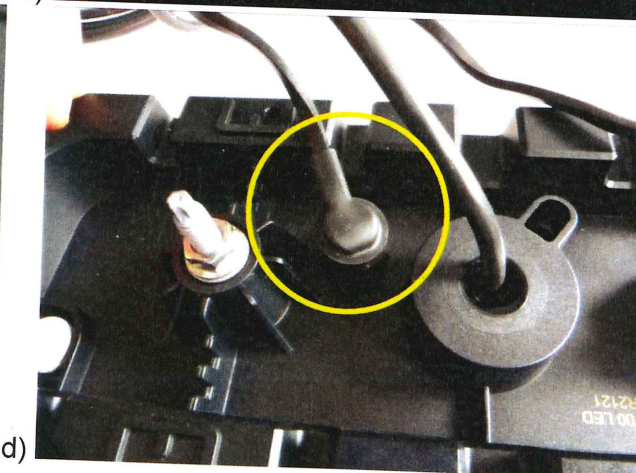
a)



b)




c)



d)

Photo. 1. a) General view of FT-700-146 LED, EUT, b) EUT 6649.01, c) EUT 6649.02, d) EUT 6649.03



	<b>TESTING LABORATORY UNIT</b>		
	LABORATORY OF CABLE TESTING AND ENVIRONMENTAL TESTS		
	<b>TEST REPORT No.</b>	<b>6649-ZLK/2021</b>	<b>Page 4 / 12</b>

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## 2. Test plan

**Table 2. Scope of tests**

No.	Tested feature / Test method	Remarks	A <sup>1)</sup>
1.	Test of protection from long-term immersion in water according to PN-EN 60529:2003+A2:2014-07+AC:2017-12, p. 14.2.8 - IPX8.	Test duration agreed with producer: 3 h.	A
2.	Test of protection from dust with underpressure according to PN-EN 60529:2003+A2:2014-07+AC:2017-12, p. 13.4 - IP6X.		A

"A" means the accredited testing;

"-" means the non-accredited testing;

### 2.1. Way of evaluation

For IP6X test: Visual inspection of dust penetration into the housing.

For IPX8 test: Visual inspection of water penetration into the housing, functional and HV test.

### 2.2. Evaluation criteria

For IP6X test according to PN-EN 60529:2003 + A2:2014-07 + AC:2017-12 p. 13.6.

For IPX8 test according to PN-EN 60529:2003 + A2:2014-07 + AC:2017-12 p. 14.3.

## 3. Description and results of tests

### 3.1. Protection against long-term immersion in water, IPX8 test.

#### 3.1.1. Test procedure

Test was performed in accordance with recommendations of standard PN-EN 60529:2003+A2:2014-07+AC:2017-12, clause 14.2.8 – IPX8 test. The test was carried out in 24 June 2021.

Test parameters:

- Temperature of water: 25,1°C,
- Temperature of object: 24,8°C,
- Test duration: 3 h.

Before the test, the sample was mounted on the support (as shown in photography 2) and immersed in water for time 3 h (as shown in photography 3). All EUTs were tested simultaneously. After 180 min of immersion were performed:

- the HV test between all wires connected together and water (EUTs immersed, the test voltage was 500 V 50 Hz for 1 min),
- visual inspection,
- functional test for EUT 6649.01 and 6649.02 (supply voltage 24 V dc).

The voltage of HV test determined according to PN-EN 60598-1:2015-04 table 10.2.

*All results of tests and measurements presented in this test report refer only to items tested.  
This test report should not be reproduced except in full, without written approval of Laboratory Manager*

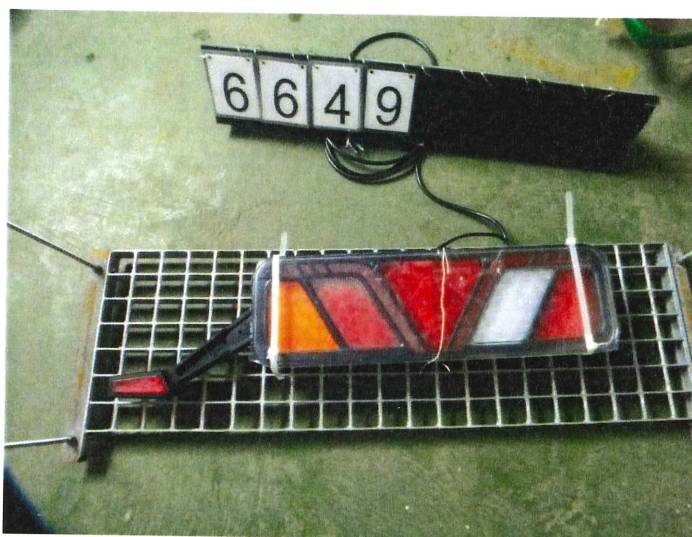


Photo. 2. EUT mounted on support before IPX8 test



Photo. 3. EUT immersed in water

### 3.1.2. Test equipment

- |                                     |            |
|-------------------------------------|------------|
| – Thermo-hygro-meter LB-701H/LB-706 | ZL/0454/A, |
| – Thermometer TM-917                | ZL/1152/A, |
| – Multisensor LB-717TWP             | ZL/1514/A, |
| – Stopwatch JS-6618                 | ZL/1102/A, |
| – Ruler 1 m                         | ZL/0223/A, |
| – Insulation tester GPT-9903        | ZL/1151/A. |

### 3.1.3. Test results

After the test:



- During visual inspection no water inside objects 6649.01 and 6649.02 was found (as shown in photo. 4a and 4b),
- A small amount of water drops was found under the cover of EUT 6649.03 (as shown in photo. 4c). Water probably got there during removing the rubber cover of connector.
- Functional test result was positive (as shown in photo. 5),
- HV test result was positive, no breakdown of insulation occurred.

Summary: Test result positive. Acceptance criteria are met.



Photo. 4. Visual inspection after IPX8 test



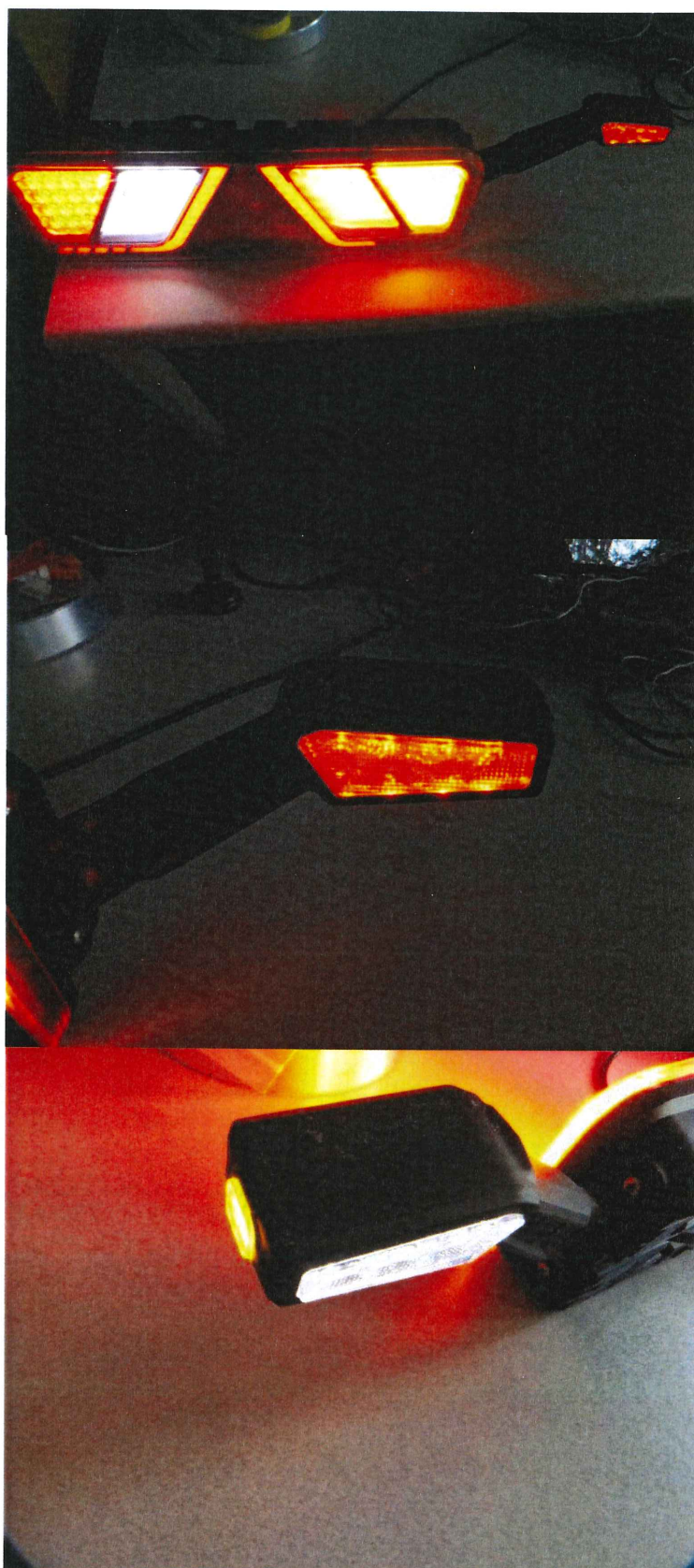


Photo. 5. Functional test after IPX8 test

**3.2. Protection against penetration of dust: IP6X test.****3.2.1. Test procedure**

Test was performed in accordance with recommendations of standard PN-EN 60529:2003+A2:2014-07+AC:2017-12, clause 13.4 - IP6X. The test was carried out in 24-28 June 2021. The test was carried out with underpressure, three times - for each EUT separately.

Test parameters (EUT 6649.01):

- Type of dust: talcum powder,
- Rate of airflow: 20 l/min,
- Underpressure:  $\leq 1675$  Pa
- Test duration: 8 h.

Test parameters (EUT 6649.02):

- Type of dust: talcum powder,
- Rate of airflow: 0 l/min,
- Underpressure:  $\leq 1856$  Pa
- Test duration: 8 h.

Test parameters (EUT 6649.03):

- Type of dust: talcum powder,
- Rate of airflow: 0 l/min,
- Underpressure:  $\leq 1956$  Pa
- Test duration: 8 h.

Before the test, the sample was placed in the dust chamber and connected to a vacuum generating system as shown in photo. 6. Places, where vacuum generating system was connected to EUT is marked.

Photo. 7 shows EUTs after test.



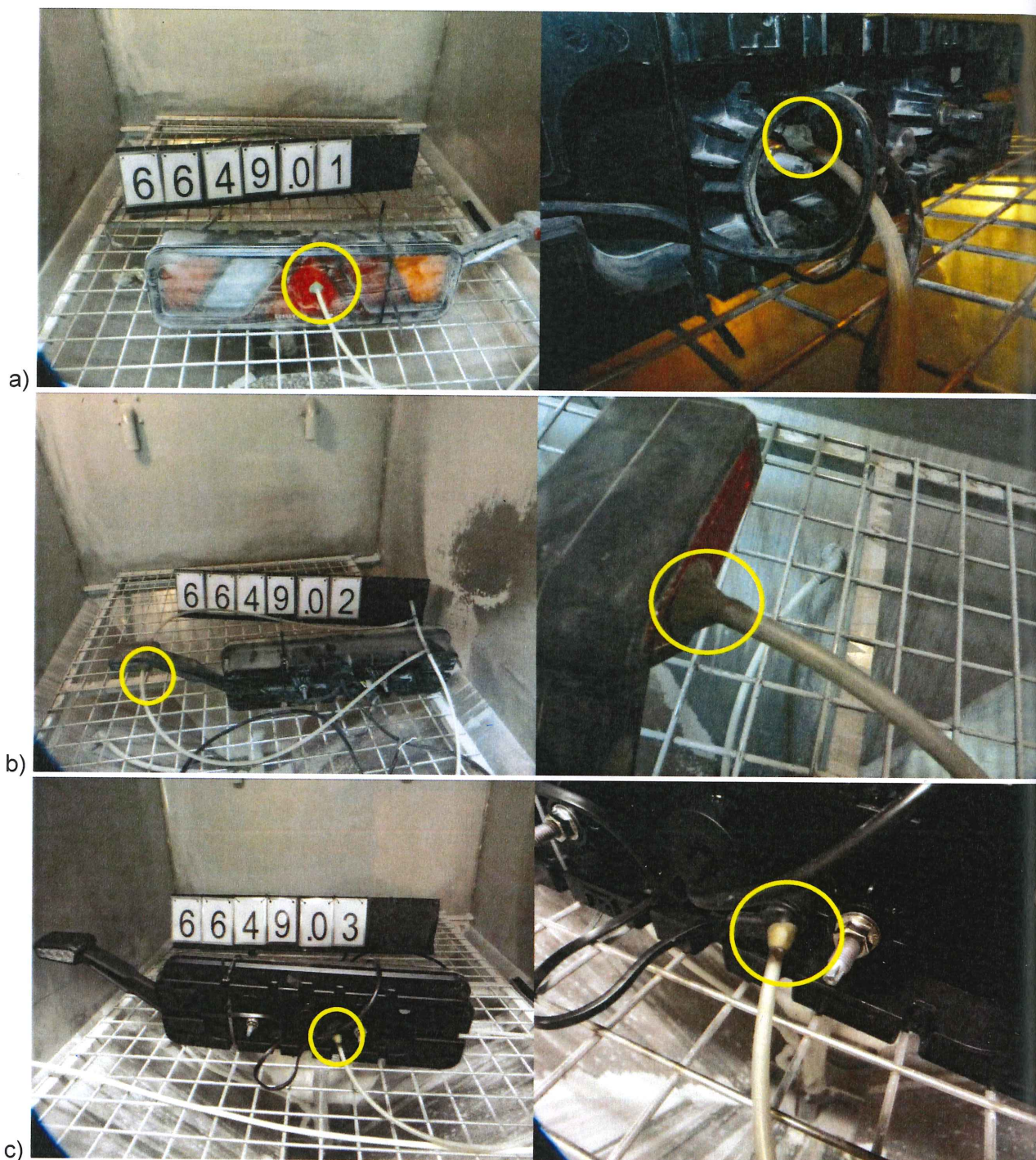


Photo. 6. EUT before IP6X test



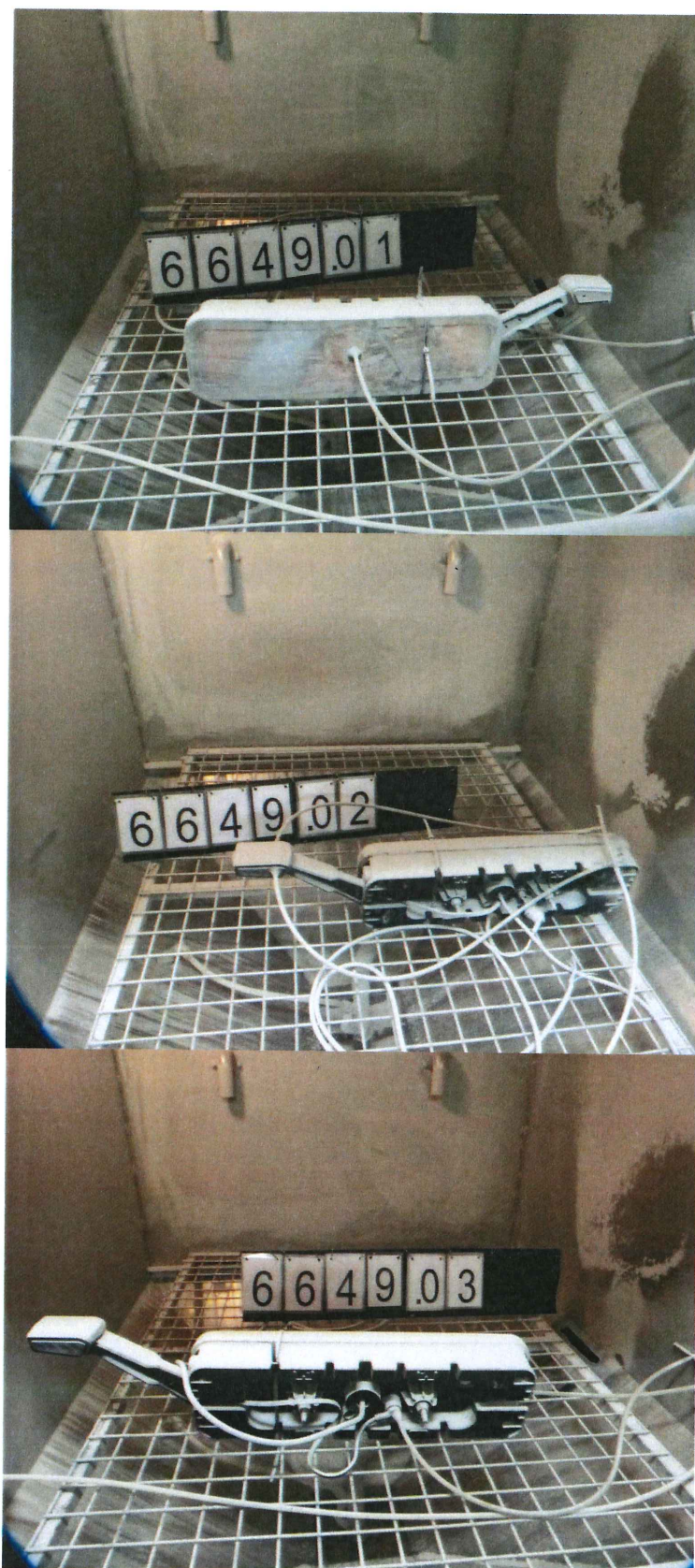


Photo. 7. EUT after IP6X test



## 3.2.2. Test equipment

- |                                    |            |
|------------------------------------|------------|
| – Dust chamber SD1000 S            | ZL/1160/P, |
| – Multisensor LB-717TWP            | ZL/1514/A, |
| – Thermo-hygrometer LB-701H/LB-706 | ZL/0454/A, |
| – Pressure sensor MRC              | ZL/1161/A, |
| – Rotameter ROS-06                 | ZL/0993/A. |

## 3.2.3. Test results

After the test, the objects were inspected (photography 8-10).

No signs of dust penetration into the housing were found.

Summary: Test result positive. Acceptance criteria are met.

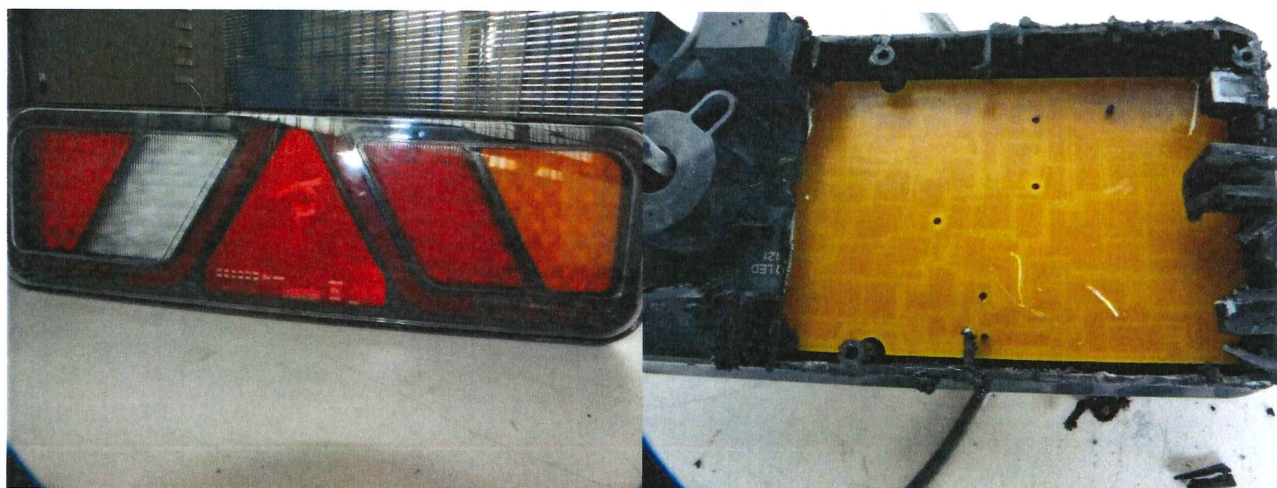


Photo. 8. Inspection of EUT 6649.01 after IP6X test

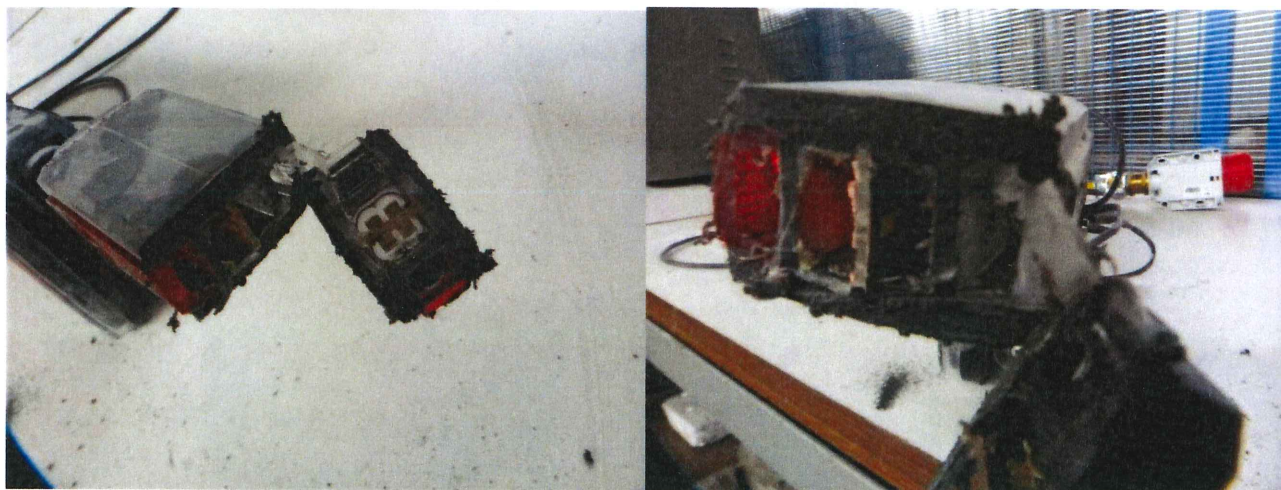


Photo. 9. Inspection of EUT 6649.02 after IP6X test

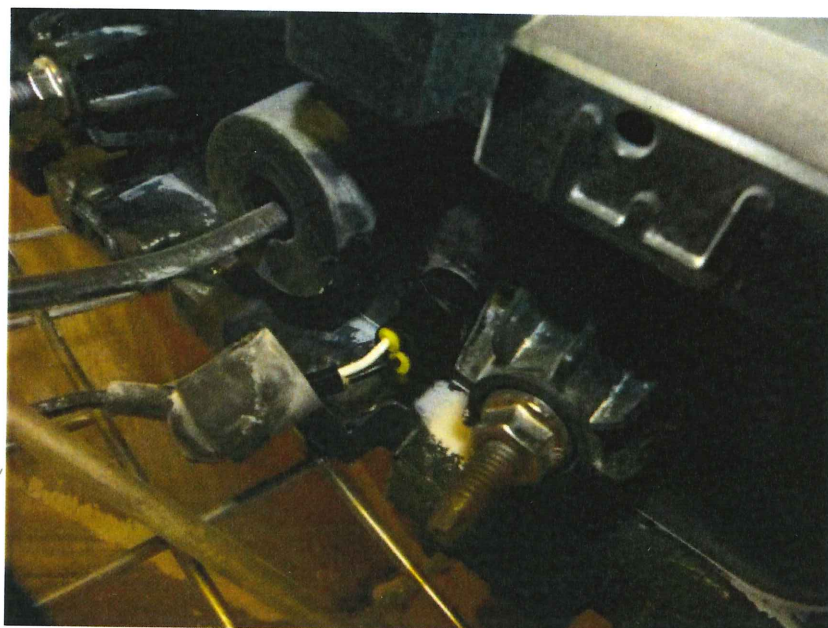


Photo. 10. Inspection of EUT 6649.03 after IP6X test

#### 4. Tested by:

Robert Ulfig in days 24-28 June 2021.

#### 5. Distribution list of test reports:

Copy No.	Recipients
1	Fristom Sp. z o.o. Sp. k. Ul. Przemysłowa 5, 86-014 Sicienko
2	Sieć Badawcza Łukasiewicz – Instytut Techniki Innowacyjnych EMAG Laboratorium Badań Kabli i Badań Środowiskowych

**E N D O F R E P O R T**