

TOPTESTER OY

TEST REPORT

IPX9

Customer: Handshake Finland Oy
Device name (& version): Lumonite Compass (V7)

Customer: Handshake Finland Oy
Test name: IPX9
EUT: Lumonite Compass (V7)

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1. TEST INFORMATION

CUSTOMER: Handshake Finland Oy
TEST NAME: IPX9
TEST DATE: 19. August 2022
TEST SITE: Toptester Oy, Rovaniemi

EQUIPMENT UNDER TEST

DEVICE NAME: Lumonite Compass
VERSION NR.: V7
DEVICE ID: LC001168

Test ID: IPX9_Handshake_Lumonite_Compass_220817
Report version: 1.0
Class: Cust

Persons in charge of the test

Customer: Niko Peltoniemi
Toptester: Arttu Tervo
Test ordered by: Niko Peltoniemi
Test order date: June 2022

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2. TEST REPORT HISTORY

Version	Date	Change description	Changes made by
1.0	29.8.2022	First version of the report is 1.0. If no changes are necessary, it will be also the final version.	Arttu Tervo

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4. TEST SUMMARY

Used standard or test method summary

The IPX9 test was performed according to IEC 60529 standard, Degrees of protection provided by enclosures (IP code), Edition 2.2 (2013).

Description of equipment under test

Lumonite Compass (V7)

Sn: LC001168

Test result summary

After the test, functionality of the EUT was normal, no water was found inside the battery case and no damage was detected on the EUT's surface.

IPX9 test result is **pass**.

Signatures

Test performed and reported by:



Date: 29.8.2022

Arttu Tervo

Customer: Handshake Finland Oy
Test name: IPX9
EUT: Lumonite Compass (V7)

5. INTRODUCTION

5.1. Background

Test was ordered by Handshake Finland as a part of product testing program.

5.2. Equipment under test

Lumonite Compass (V7)

Sn: LC001168

5.3. Goals of the test

The test was a verification test for the product. The goal was to verify the properties of the product against the defined stress. A pass / fail statement was given according to acceptance criteria.

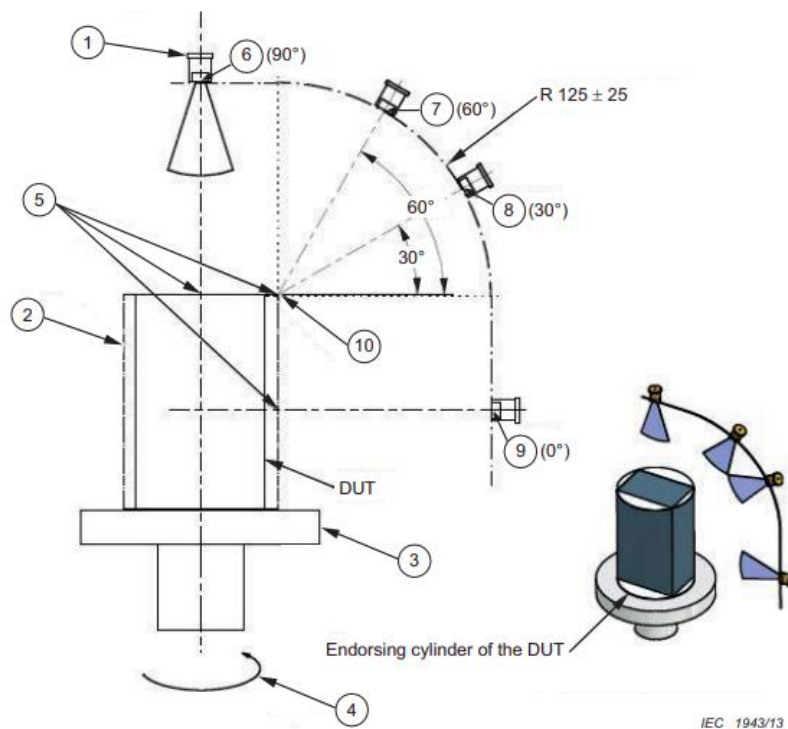
6. TEST METHOD AND MEASUREMENT DESCRIPTION

6.1. Test Method

The IPX9 test was performed according to IEC 60529 standard, Degrees of protection provided by enclosures (IP code), Edition 2.2 (2013).

Testing conditions were following:

- DUT was placed on turntable that rotates 5 ± 1 r/min
- DUT was sprayed from 4 directions: 0° , 30° , 60° and 90°
- Spraying time: 30 s / direction
- Water flow: 15 ± 1 l/min
- Water temperature: 80 ± 5 °C
- The test setup is shown in Figure 1



Key

- | | | | |
|---|---|----|--|
| 1 | fan jet nozzle | 6 | position 1 of the nozzle (90°) |
| 2 | endorsing cylinder for DUT | 7 | position 2 of the nozzle (60°) |
| 3 | holder (rotating table) | 8 | position 3 of the nozzle (30°) |
| 4 | swivel axis (axis of rotation) | 9 | position 4 of the nozzle (0°) |
| 5 | reference point for 0° , for 30° and 60° , then for 90° versus the endorsing cylinder for DUT | 10 | centre point of circle R125 mm to locate nozzles |

Figure 1. IPX9 test setup.

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6.2. Analyses

EUT's functionality was tested before and after the test.
After test outer surfaces of the EUT were dried and battery case was opened to inspect water ingress.

6.3. Acceptance criteria

Acceptance criteria are according to IEC 60529 standard, chapter 14.3:

After testing in accordance with the appropriate requirements of 14.2.1 to 14.2.8 the enclosure shall be inspected for ingress of water.

It is the responsibility of the relevant technical committee to specify the amount of water which may be allowed to enter the enclosure and the details of a dielectric strength test, if any.

- *In general, if any water has entered, it shall not:*
- *be sufficient to interfere with the correct operation of the equipment or impair safety;*
- *deposit on insulation parts where it could lead to tracking along the creepage distances;*
- *reach live parts or windings not designed to operate when wet;*
- *accumulate near the cable end or enter the cable if any.*

If the enclosure is provided with drain-holes, it should be proved by inspection that any water which enters does not accumulate and that it drains away without doing any harm to the equipment.

For enclosures without drain-holes, the relevant product standard shall specify the acceptance conditions if water can accumulate to reach live parts."

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6.4. Test Equipment, Reliability Control and Measurement

The IPX9 test equipment are presented in Table 1:

Table 1. IPX9 test equipment.

Device	Type	Serial number	Date of calibration	Due to
Pressure washer	Kärcher Professional HDS 12/18-4S	N/A	No calibration needed	
Nozzles	B1/4MEG-4007S	N/A	14.4.2021	14.10.2022
Water flow sensor	Kobold DPL-1P25	241215	15.3.2022	14.9.2023
Water temperature sensor	Bosch Rexroth 0 538 009 252	00442032	9.4.2021	9.10.2022
Water pressure sensor	Bosch Rexroth PR3-200GJ12	000004 117346	No calibration needed	
National instruments	cDAQ-9174	1D13656	21.8.2021	20.2.2023
National instruments	NI9207	199272A-06L (1D5E826)	23.8.2021	22.2.2023
National instruments	NI9219	198848F-06L (1ECD3BC)	21.8.2021	20.2.2023
National instruments	NI9485	151231C-01L (1ED3286)	No calibration needed	

Hardware control and data collection was done by using Toptester IPX9 v1.0 LabVIEW – software.

6.5. EUT functional Control and Measurement

The EUT was non-functional during the test.
Functionality was verified before and after the test by testing all functions.

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7. TEST PROCESS

Water flow was maintained between 14-16 l/min and water temperature was maintained between 75-85 °C. Rotating table speed was adjusted to 4-6 r/min. The EUT was assembled on a rotating table and the test was started.

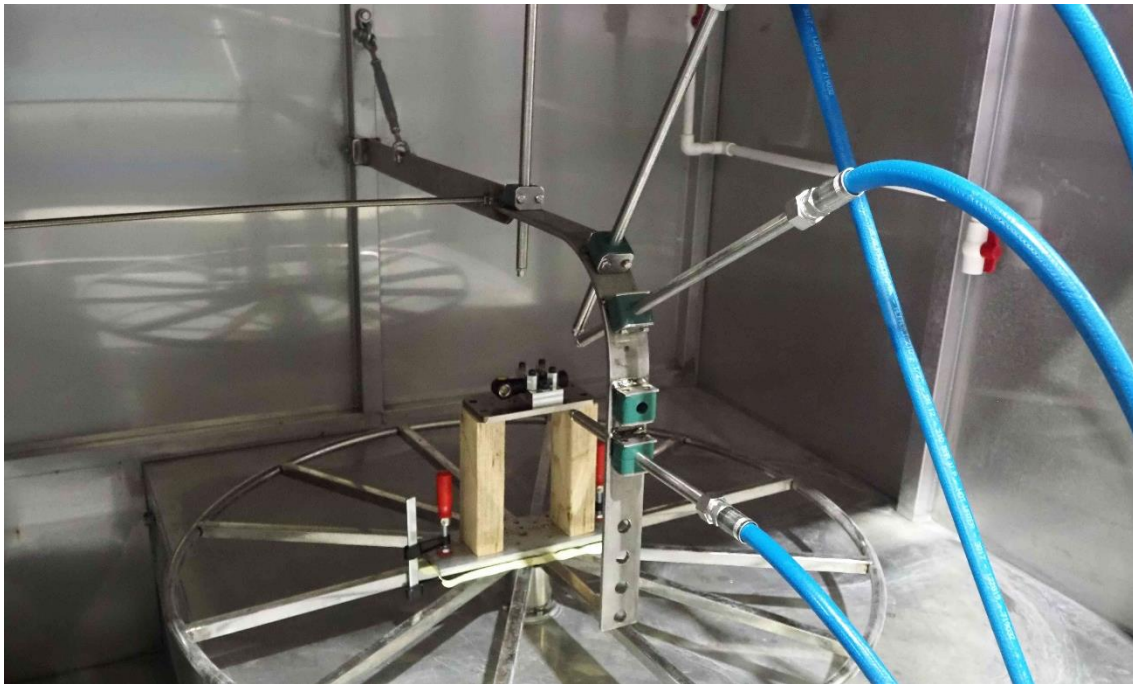


Figure 2. IPX9 test setup.



Figure 3. Ongoing IPX9 test.

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After the test, functionality of the EUT was normal, no water was found inside the battery case and no damage was detected on the EUT's surface.



Figure 4. EUT after the test. No damage was detected.



Figure 5. Battery case opened after test. No water was found inside.

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8. RESULTS AND CONCLUSIONS

After the test, functionality of the EUT was normal, no water was found inside the battery case and no damage was detected on the EUT's surface.

IPX9 test result is **pass**.

9. EXCEPTIONS

Due to momentary malfunction of the water heater, the water temperature was below the specified temperature (75 – 85 °C) for a 19 second period. At lowest the water temperature was 69,6 °C.

In Toptester's point of view, this had no effect to the test result because the drop in the water temperature was relatively small and the period when the temperature was out of the range was only short-term.

10. ATTACHMENTS

Water pressure, water temperature and water flow measurements are presented in Figure 6.

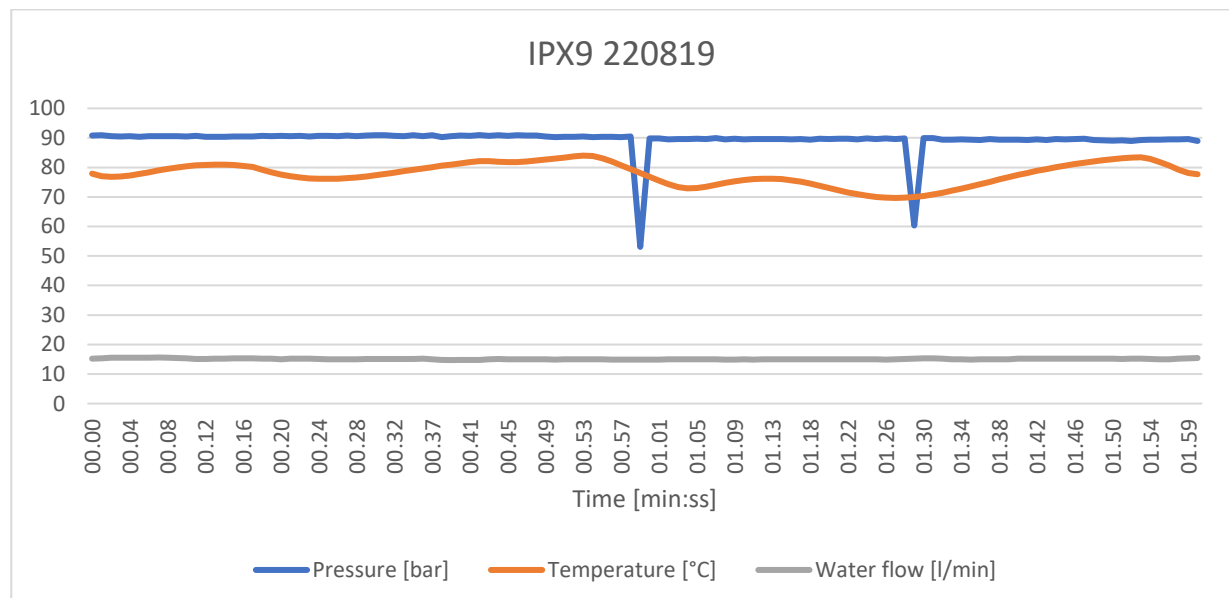


Figure 6. Measurements during the test.

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11. QUALITY CONTROL



Toptester is an ISO 9001
certified organisation



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