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# TEST REPORT

## No. TRBFL2525-1

**Customer:** Plumis Ltd, Unit 4, Phoenix Trading Estate Bilton Road Perivale London, United Kingdom, UB6 7DZ

**Producer:** Plumis Ltd, Unit 4, Phoenix Trading Estate Bilton Road Perivale London, United Kingdom, UB6 7DZ

**Test Method:** BS EN 14972-17:2025 ,,Fixed firefighting systems – Water mist systems – Part 17: Test protocol for residential occupancies for automatic nozzle systems''

**Date of testing & place:** 25– 27 November 2025 at Baltic Fire Laboratory, Tuchom, Poland

Test report prepared by: Magdalena Siedzielnik, Researcher (BFL)

Test report verified & authorized by: Bogdan Racięga, Fire Laboratory Director (BFL)

**Report issue date and place:**
Tuchom, March 18, 2026

# ABSTRACT

Plumis initiated a test programme to assess the performance of its residential water mist system using the fire scenarios defined in BS EN 14972-17:2025.

As electronically actuated nozzles fall outside the scope of BS EN 14972-17:2025, formal compliance with Part 17 cannot be claimed for this system configuration.

To provide a relevant performance assessment, the Part 17 fire test scenarios were applied with a defined deviation whereby activation of the water mist nozzles was initiated by a fire detector.

The system utilised sidewall nozzles installed 1.2 m above the floor, spaced 4 m apart and positioned 2 m from the wall within an enclosure measuring 8 × 4 × 2.5 m (L × W × H). The objective of the testing was to verify suppression performance under the defined fire scenarios.

The water mist nozzles were received at Baltic Fire Laboratory, Tuchom, Poland on 17 November 2025. Non-accredited R&D testing was conducted on 25– 27 November 2025 at Baltic Fire Laboratory.

The purpose of the test was to evaluate the firefighting performance of an installed water mist system:

- SH11

Six tests were performed accordance with BS EN 14972-17:2025. Three tests were carried out in a 8.0 x 4.0 [m] test enclosure with a ceiling height of 2.5 [m]. One test was performed in enclosed test enclosure with a ceiling height of 3.5 [m]. One test were performed in open space (corner test) with a ceiling height of 2.5 [m]. In all fire tests, the nozzles were installed on the wall at a height of 1.2 [m] above the floor.

The tested water mist system met the criteria of BS EN 14972-17:2025. The third nozzle, located outside the room, did not operate in any of the tests. The temperature values presented in Table 1 below were not exceeded.

Table 1. Fire test maximum temperatures.

| Thermocouple location | Maximum allowable temperature [°C] |
|---|---|
| 75 [mm] below the underside of the ceiling | 320 |
| 1.6 [m] above the floor | 95 |
| 1.6 [m] above the floor | 55* |
| *For not more than any 120s interval. | |

Specification of the nozzle supplied by Plumis is presented in Table 2.

Table 2. Water mist nozzle characteristic SH11.

| *WATER MIST NOZZLE* | |
|---|---|
| Nominal system working pressure | 90.0 [bar] |
| Nozzle k-value | 0.62 |
| Nozzle item number | SH11 |
| Enclosure size | 8.0 x 4.0 [m] |
| Tested ceiling height | 2.5 [m] |
| Nozzle flow rate at 90.0 [bar] | 5.88 [l/min] |
| Length of the supply hose (dry line) | 60.0 [m] |


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# 1. Background and Objective

Plumis initiated a test programme to assess the performance of its residential water mist system using the fire scenarios defined in BS EN 14972-17:2025.

As electronically actuated nozzles fall outside the scope of BS EN 14972-17:2025, formal compliance with Part 17 cannot be claimed for this system configuration.

To provide a relevant performance assessment, the Part 17 fire test scenarios were applied with a defined deviation whereby activation of the water mist nozzles was initiated by a fire detector.

The system utilised sidewall nozzles installed 1.2 m above the floor, spaced 4 m apart and positioned 2 m from the wall within an enclosure measuring 8 × 4 × 2.5 m (L × W × H). The objective of the testing was to verify suppression performance under the defined fire scenarios.

The water mist nozzles were received at Baltic Fire Laboratory, Tuchom, Poland on 17 November 2025. Non-accredited R&D testing was conducted on 25– 27 November 2025 at Baltic Fire Laboratory.

The purpose of the test was to evaluate the firefighting performance of an installed water mist system:

- SH11

The plywood sheets, sacrificial boards, wooden frames, polyether foam sheets BFL6F30, and wood crib sticks were conditioned at a temperature (23 ± 2)°C and a relative humidity of (50 ± 5)% in the calibrated climatic chamber BFL117. The wood cribs were conditioned before the tests in the calibrated thermostatic chamber BFL140 to a moisture content of (10 ± 2)%, measured 3 [mm] below the wood stick surface. Certificates are provided in Appendix D and Appendix E to this test report.

Six tests were performed accordance with BS EN 14972-17:2025. Three tests were carried out in a 8.0 x 4.0 [m] test enclosure with a ceiling height of 2.5 [m]. One test was performed in enclosed test enclosure with a ceiling height of 3.5 [m]. One test were performed in open space (corner test) with a ceiling height of 2.5 [m]. In all fire tests, the nozzles were installed on the wall at a height of 1.2 [m] above the floor.

The results in this report relate to the tested item ( nozzle no. SH11) and configurations only.

# 2. Material Description

The water mist nozzles were supplied by Plumis. Specification of the nozzles is presented in Table 3.

Table 3. Water mist nozzle characteristic SH11.

| *WATER MIST NOZZLE* | |
|---|---|
| Nominal system working pressure | 90.0 [bar] |
| Nozzle k-value | 0.62 |
| Nozzle item number | SH11 |
| Enclosure size | 8.0 x 4.0 [m] |
| Tested ceiling height | 2.5 [m] |
| Nozzle flow rate at 90.0 [bar] | 5.88 [l/min] |
| Length of the supply hose | 60.0 [m] |


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# 3. Test Description

## 3.1. Test Purpose

The purpose of test is to evaluate firefighting performance of Plumis high pressure system was to demonstrate the effectiveness of their water mist system in accordance with BS EN 14972-17:2025 ,,Fixed firefighting systems – Water mist systems – Part 17: Test protocol for residential occupancies for automatic nozzle systems''.

One type of the sidewall water mist nozzle has been subject to fire test performance: SH11.

## 3.2. Test Facility

Baltic Fire Laboratory is an international accredited fire testing laboratory for active fire protection systems full scale fire testing.

The fire test laboratory is accredited in accordance with PN EN ISO/IEC 17025:2018 by PCA accreditation Reg. AB1792.

In addition, Baltic Fire Laboratory is accepted as an independent 3rd part fire testing laboratory by IMO, USCG, UL, VdS.

Baltic Fire Laboratory (BFL) fire science complex consists of three buildings: laboratory office building, storage facility (conditioned building with controlled temperature and humidity) and fire laboratory hall in size 25.2 x 25.2 x 15.0 [m] (inside) equipped with the movable ceiling in dimensions 22.0 x 22.0 [m]. The movable ceiling allows to simulate celling in different heights of enclosures, to reproduce the height of the room in which the fire experiment (fire test) is performed.

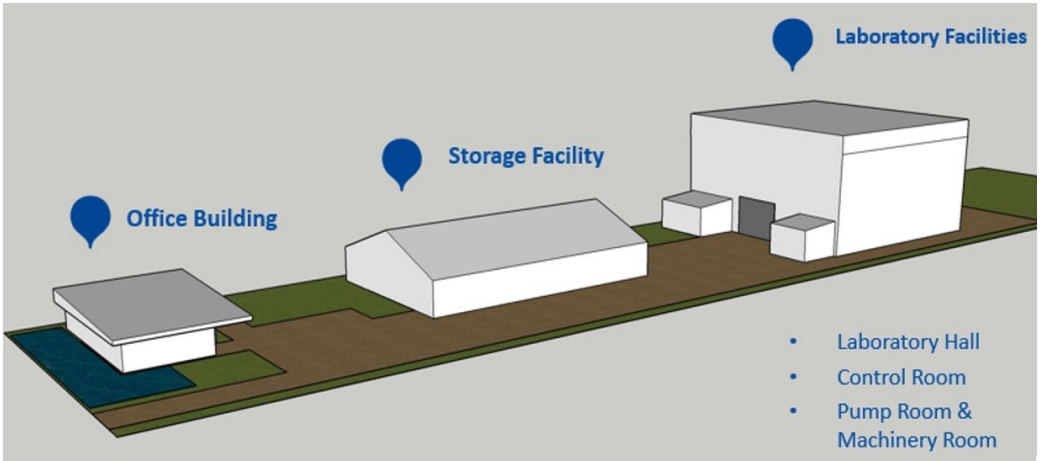


Figure 1. Baltic Fire Laboratory, fire science complex.

The movable ceiling is comprised of steel grid and non-combustible wallboard. The surface of movable ceiling is additionally cowered with 30 [mm] thick mineral wool board to insulate movable celling structure from heat created by fire experiment underneath.


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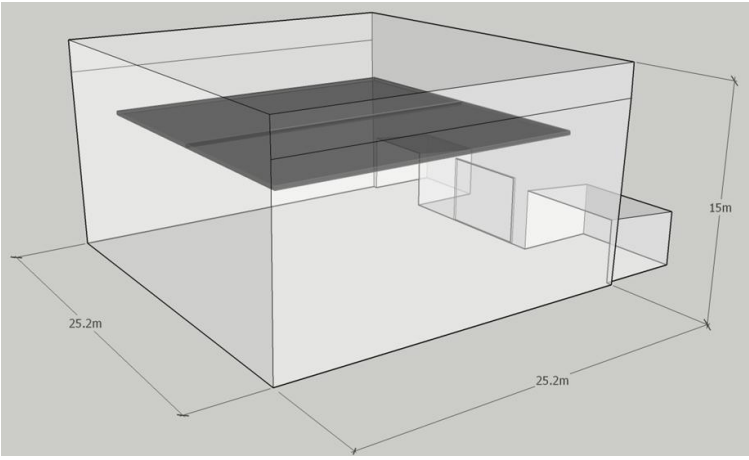


Figure 2. Fire experiments laboratory hall with 9525 [m$^3$] volume, movable celling highlighted.

Combustion air (fresh air) enters the building through 4 symmetrically placed louvers around the perimeter of the building. The exhaust fans (scrubber cleaning system) can be operated during fire test to allow for quick and efficient smoke extraction and maintain oxygen on required level by test method.

A continuous drain runs inside the perimeter of the building, leaving a 22.0 x 22.0 [m] inside inner concrete floor test area. The drain leads the waste liquid into an underground 105 [m$^3$] fire - waste water tank.

Water was supplied from a 100 [m$^3$] underground water tank via three centrifugal pumps located in laboratory pump room.

All fire test has been video recorded during all time of fire test. The control room also houses the data acquisition system, control systems for exhaust fans, and fire suppression system data.

Figure 1 & 2 shows a basic schematic of the test facility site.

## 3.3. Test Configuration

All tests were carried out in a 8.0 x 4.0 [m] test enclosure with a ceiling height of 2.5 [m] and one test in 3.5 [m]. In all fire tests, the nozzles were installed on the wall at a height of 1.2 m above the floor. The tests were conducted in accordance with BS EN 14972-17:2025. A total of six tests were performed. One corner test was conducted at height of 3.5 m and two corner tests were performed at height of 2.5 m. The remaining scenarios were performed only at a height of 2.5 m. These included one between two nozzles (B2) test, one corner test using a fan, and one corner test in an open enclosure. All tested fire scenarios are shown in Figure 3 below.


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Table 4. Fire test series.

| Fire test series | Fire tests for sidewall mounted nozzles | Test room ceiling height |
|---|---|---|
| **Room**[a] | F1 | 2.5 m and 3.5 m |
| **Open space**[b] | F2, F3, G | 2.5 m or 3.5 m |
| | H | 2.5 m or 3.5 m |
| [a] Mandatory test series<br>[b] Optional test series | | |

Table 5. Description of fire tests for sidewall mounted nozzles.

| Fire test | Description | Clause |
|---|---|---|
| F1, F2 | Corner tests | 7.3 |
| F3 | Between two nozzle test | 7.3 |
| G | Ventilation test | 7.3 |
| H | Open room test | 7.3 |


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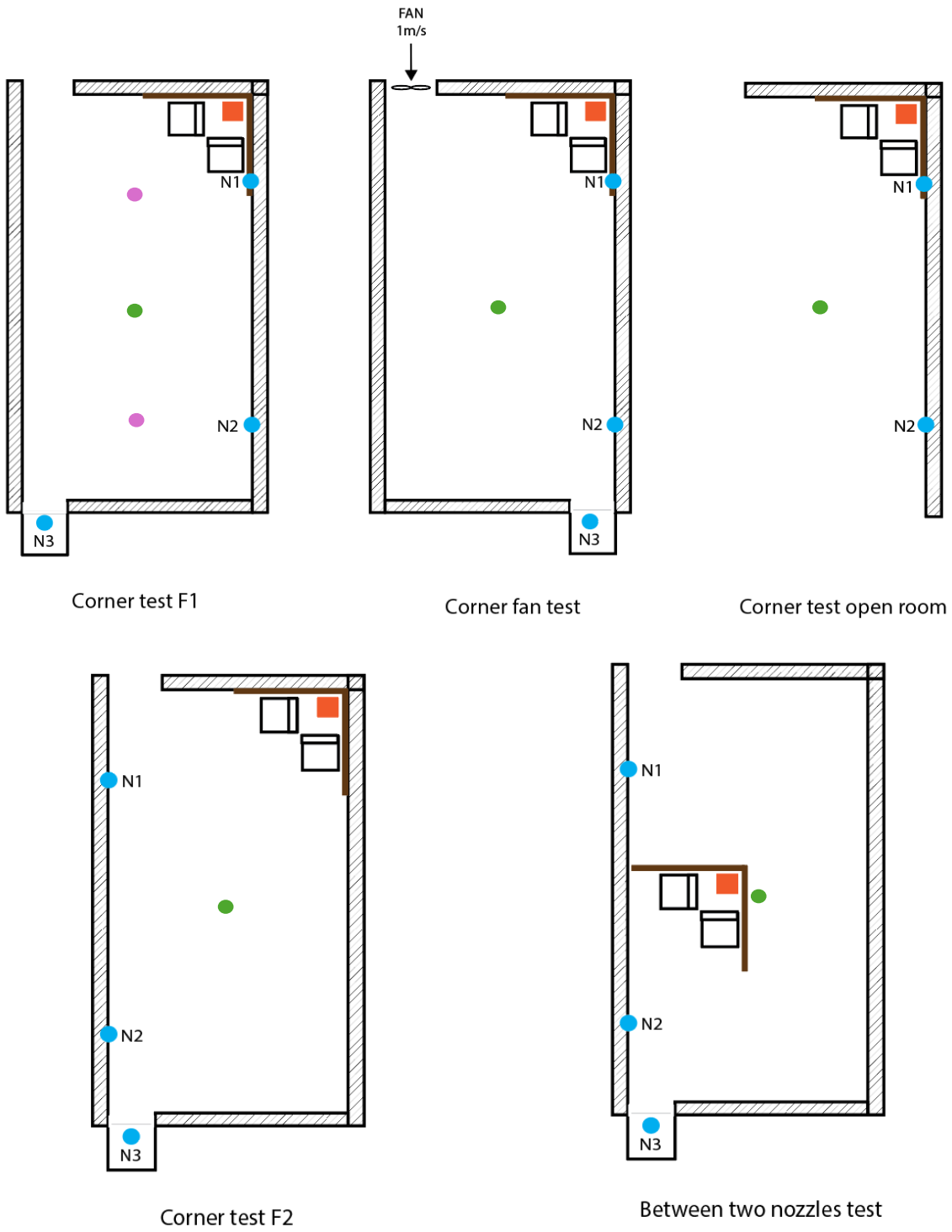


Figure 3. Tested fire scenarios. The first row from the left represents corner tests in enclosure, with fan and open room test. The second row from the left includes one corner test with nozzles on the opposite side and one test conducted between two nozzles. The orange square indicates a wood crib placed on a tray. The blue dots represent nozzles N1, N2, and N3. The plywood is marked in brown. The green dots represent detectors in 2.5 [m] heigh enclosure. The pink dots represent detectors in 3.5 [m] heigh enclosure.


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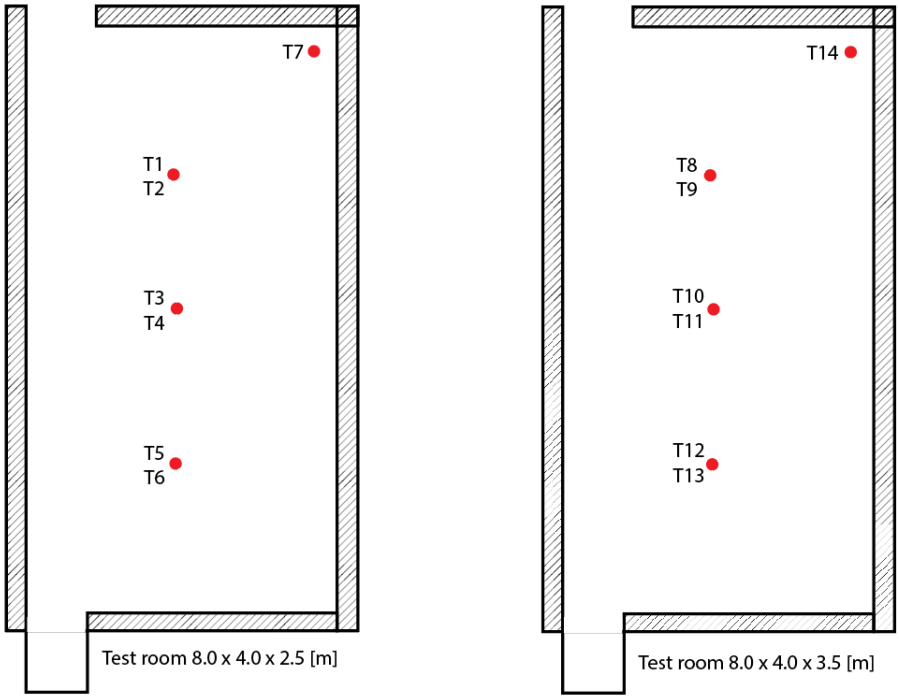


Figure 4. Thermocouples localisation.

Table 6. Thermocouple localisation.

| Thermocouple no. | Localisation |
|---|---|
| T1 | 1.6 [m] above the floor |
| T2 | 75 [mm] below the ceiling |
| T3 | 1.6 [m] above the floor |
| T4 | 75 [mm] below the ceiling |
| T5 | 1.6 [m] above the floor |
| T6 | 75 [mm] below the ceiling |
| T7 | 75 [mm] below the ceiling |
| T8 | 1.6 [m] above the floor |
| T9 | 75 [mm] below the ceiling |
| T10 | 1.6 [m] above the floor |
| T11 | 75 [mm] below the ceiling |
| T12 | 1.6 [m] above the floor |
| T13 | 75 [mm] below the ceiling |
| T14 | 75 [mm] below the ceiling |


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## 3.4. Test procedure

The test begins with the simultaneous ignition of a tray filled with heptane, and cotton wicks. From the moment the first nozzle is activated, the test should continue for another 30 minutes.

Table 7. General test procedure.

| Test Time (min:s) | Event |
|---|---|
| 0:00 | DAQ System/Cameras Rolling |
| 1:00 | Ignition of fuel sources |
| 1:00~ | Water pump activation, 1st water mist nozzle activation |
| 30:00 + Time of water pump activation | Shut off – water pump, test end |

# 4. Test Results

After igniting the wood crib and wicks, the nozzle activation was awaited. From the activation of the first nozzle, the test was conducted for another 30 minutes.

Table 8. Tested fire scenarios.

| Test no. | Scenario | Ceiling height [m] |
|---|---|---|
| 251125-2 | Corner test F1 | 3.5 |
| 251125-3 | Corner test F1 | 2.5 |
| 251125-4 | Corner F2 | 2.5 |
| 251125-5 | Between two nozzles test (B2) | 2.5 |
| 251126-1 | Corner fan test | 2.5 |
| 251127-1 | Corner test – open room | 2.5 |

Table 9. Summary of test records.

| Test no. | 251125-2 | 251125-3 | 251125-4 | 251125-5 | 251126-1 | 251127-1 |
|---|---|---|---|---|---|---|
| **Start** | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 | 0:00 |
| **Fire ignition** | 1:00 | 1:00 | 1:00 | 1:00 | 1:00 | 1:00 |
| **Pump on** | 1:40 | 2:05 | 2:26 | 1:32 | 2:27 | 2:16 |
| **Nozzle activation** | 1:57 | 2:26 | 2:43 | 1:51 | 2:46 | 2:36 |
| **Test end** | 31:40 | 32:05 | 32:26 | 31:32 | 32:27 | 32:16 |


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## 5. K- factor

K-factor measurement has been conducted for total 2 [pcs] nozzles using laboratory calibrated manometer, pressure transmitter and flow meter.

In the table 10 below, positive results considering the nozzle flow rate tolerance has been shown.

Table 10. Flow test nozzle SH11.

| Sample | K-factor | Pressure [bar] | Nominal flow [l/min] | Flow measured indirect method [l/min] | Indirect method tolerance check ±5% (5.59 – 6.17 l/min) | FINAL COMMENT |
|---|---|---|---|---|---|---|
| **N1** | 0.62 | 90.0 | 5.88 [l/min] | 5.68 | Within tolerance | Pass |
| **N2** | 0.62 | 90.0 | 5.88 [l/min] | 5.73 | Within tolerance | Pass |

## 6. Final conclusions

Six tests were performed accordance with BS EN 14972-17:2025. Three tests were carried out in a 8.0 x 4.0 [m] test enclosure with a ceiling height of 2.5 [m].

Total six fire tests has been conducted, one in 3.5 [m] and five in 2.5 [m] ceiling height enclosure.

In all fire tests, the nozzles were installed on the wall at a height of 1.2 [m] above the floor.

The tested water mist system met the criteria of BS EN 14972-17:2025.

The third nozzle, located outside the room, did not operate in any of the tests. The temperature values specified by the standard were not exceeded.

As electronically actuated nozzles fall outside the scope of BS EN 14972-17:2025, formal compliance with Part 17 cannot be claimed for this system configuration.

To provide a relevant performance assessment, the Part 17 fire test scenarios were applied with a defined deviation whereby activation of the water mist nozzles was initiated by a fire detector.

The system utilised sidewall nozzles installed 1.2 m above the floor, spaced 4 m apart and positioned 2 m from the wall within an enclosure measuring 8 × 4 × 2.5 m (L × W × H). The objective of the testing was to verify suppression performance under the defined fire scenarios.

A simple acceptance decision rule was chosen accordance with ILAC-G8:09/2019.

The results in this test report relate to the tested items and configurations only.


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## Appendix A – nozzle datasheet and drawings

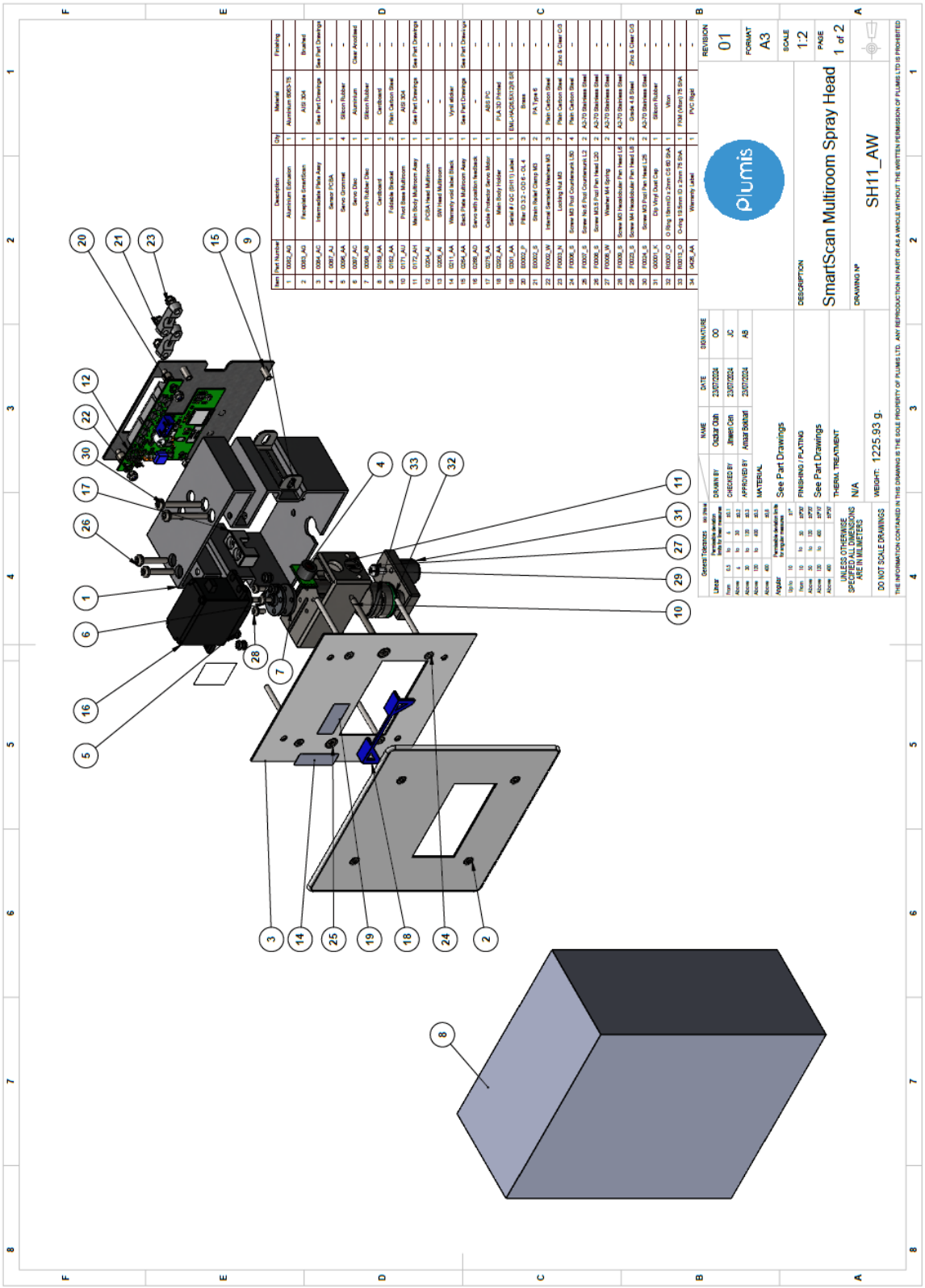


*Figure A.1. Nozzle SH11– general assembly drawing.

*Information provided by the Customer.


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## Appendix B – test photos

Photo B.1. Test no. 251125-2, corner test, 3.5m – before water mist system activation.

Photo B.2. Test no. 251125-2, corner test, 3.5m – after water mist system activation.


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Photo B.3. Test no. 251125-3, corner test, 2.5m – after water mist system activation.

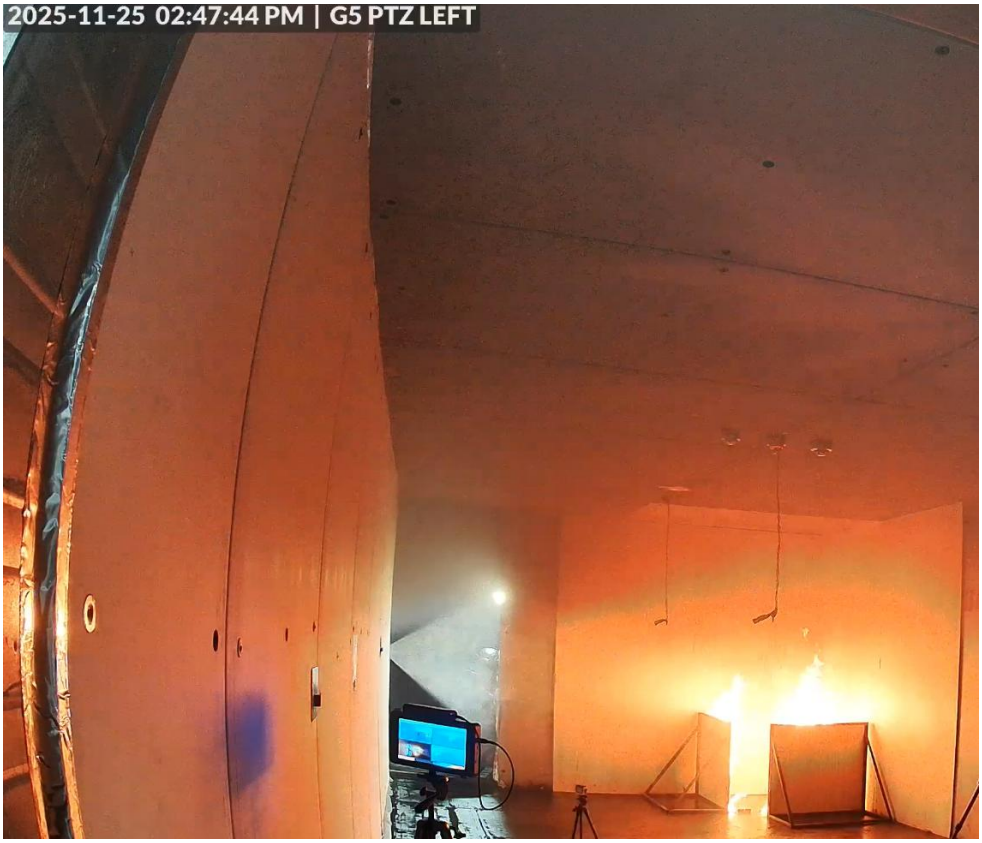


Photo B.4. Test no. 251125-4, corner test, 2.5m – after water mist system activation.


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Photo B.5. Test no. 251125-5, B2 test, 2.5m – after water mist system activation.

Photo B.6. Test no. 251126-1, corner fan test, 2.5m – after water mist system activation.


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Photo B.7. Test no. 251127-1, corner test – open room, 2.5m – after water mist system activation.


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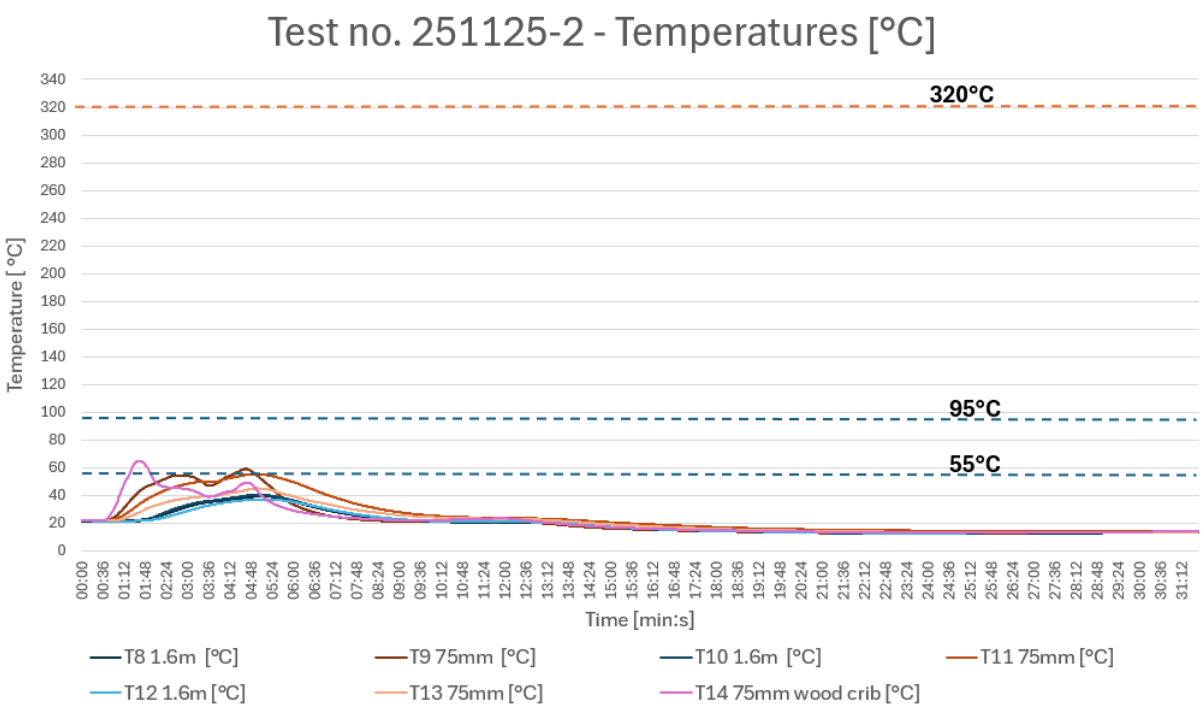
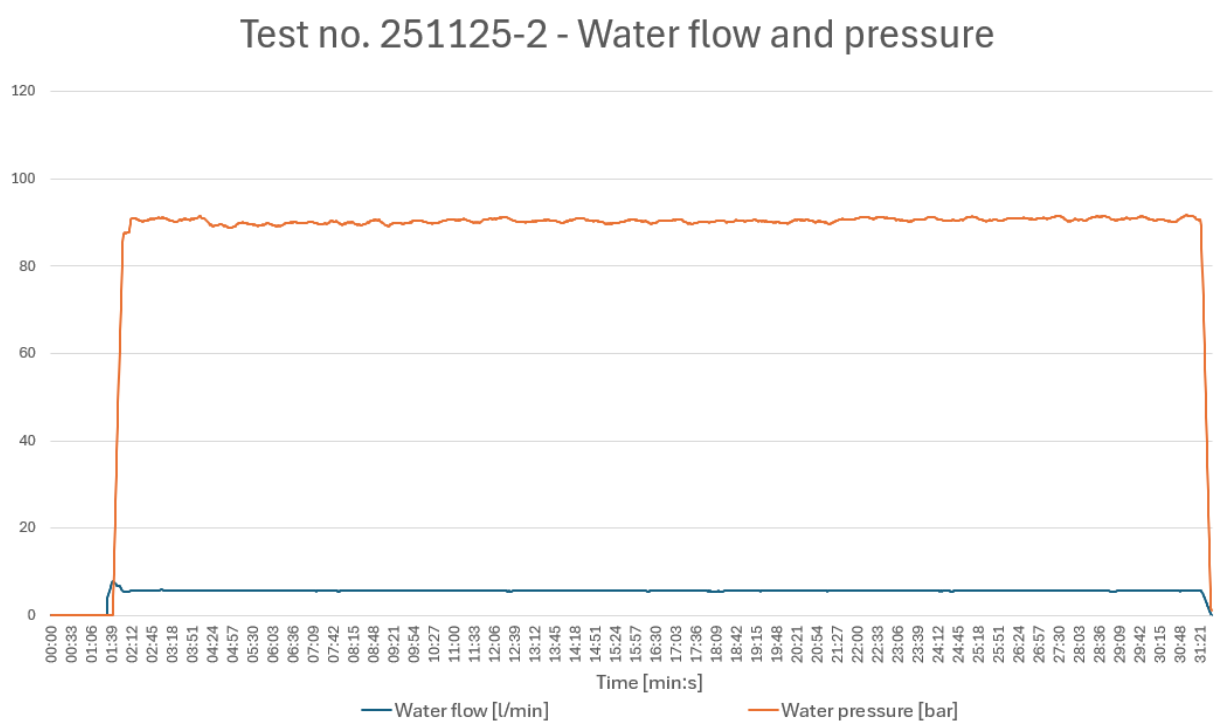
## Appendix C – test charts




Graph C.1. Test no. 251125-2 – corner test, 3.5m, 30s average temperatures.




Graph C.2. Test no. 251125-2 – corner test, 3.5m, water flow and pressure.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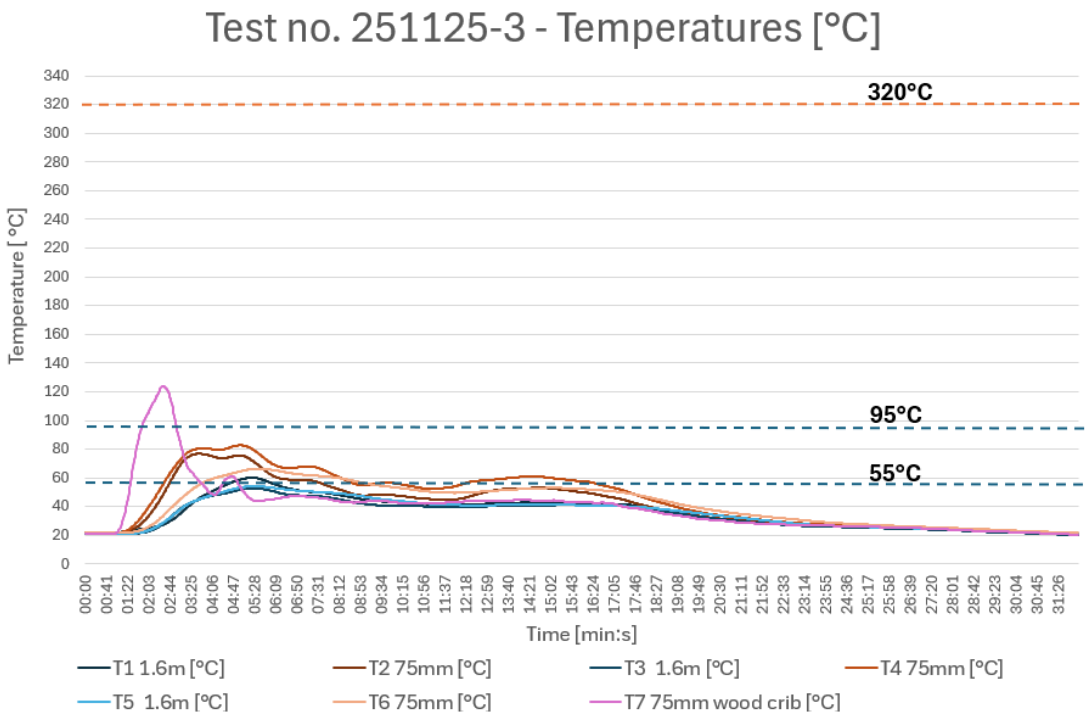
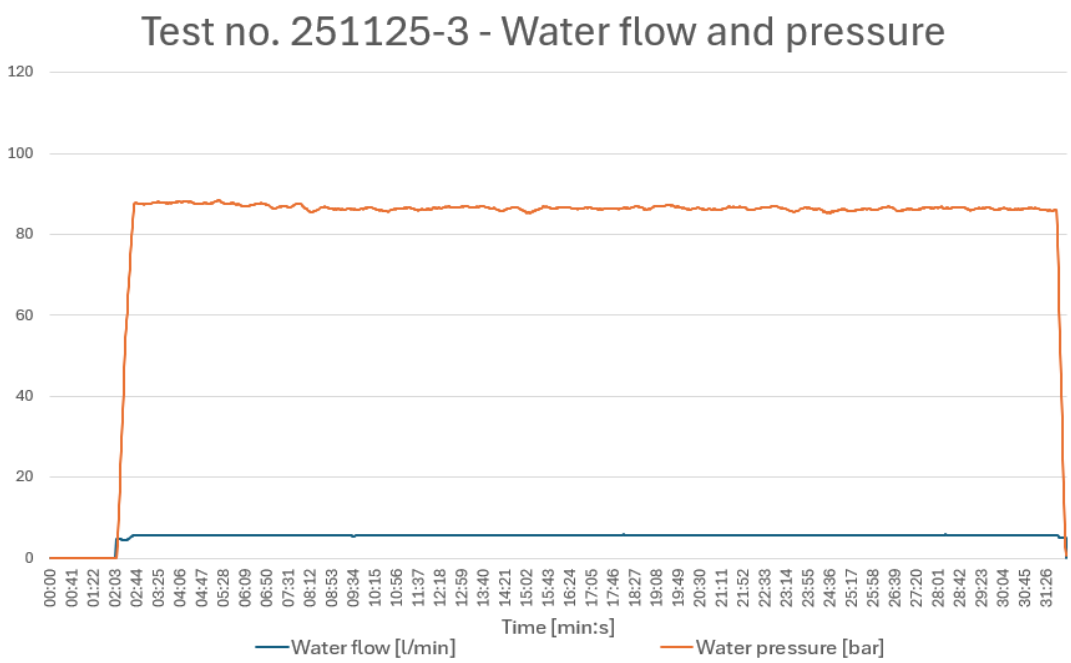



Graph C.3. Test no. 251125-3 – corner test, 2.5m, 30s average temperatures.




Graph C.4. Test no. 251125-3 – corner test, 2.5m, water flow and pressure.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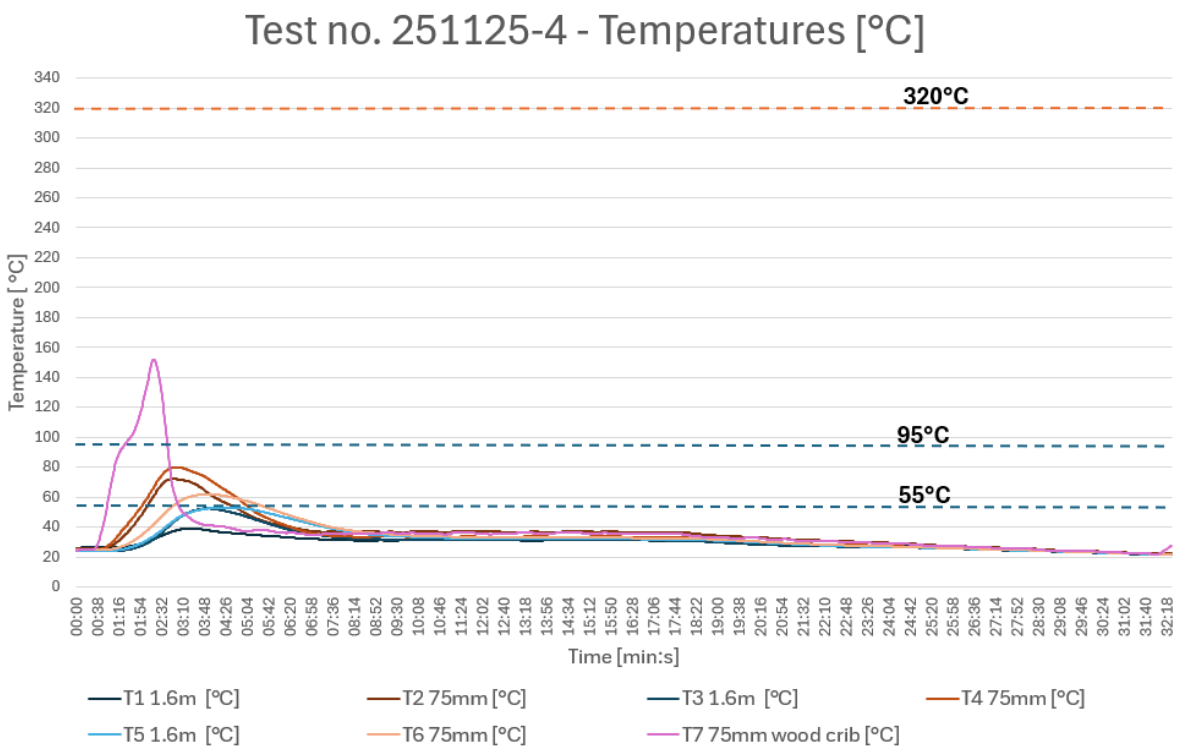
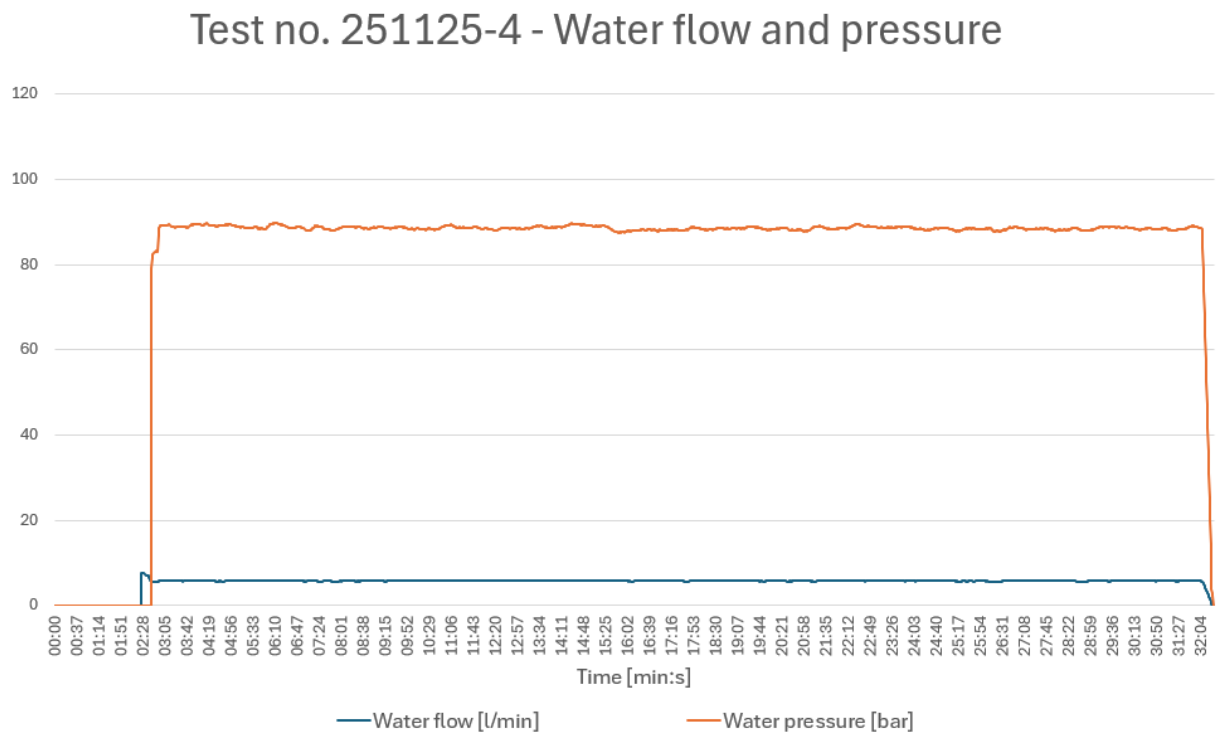



Graph C.5. Test no. 251125-4 – corner test, 2.5m, 30s average temperatures.




Graph C.6. Test no. 251125-4 – corner test, 2.5m, water flow and pressure.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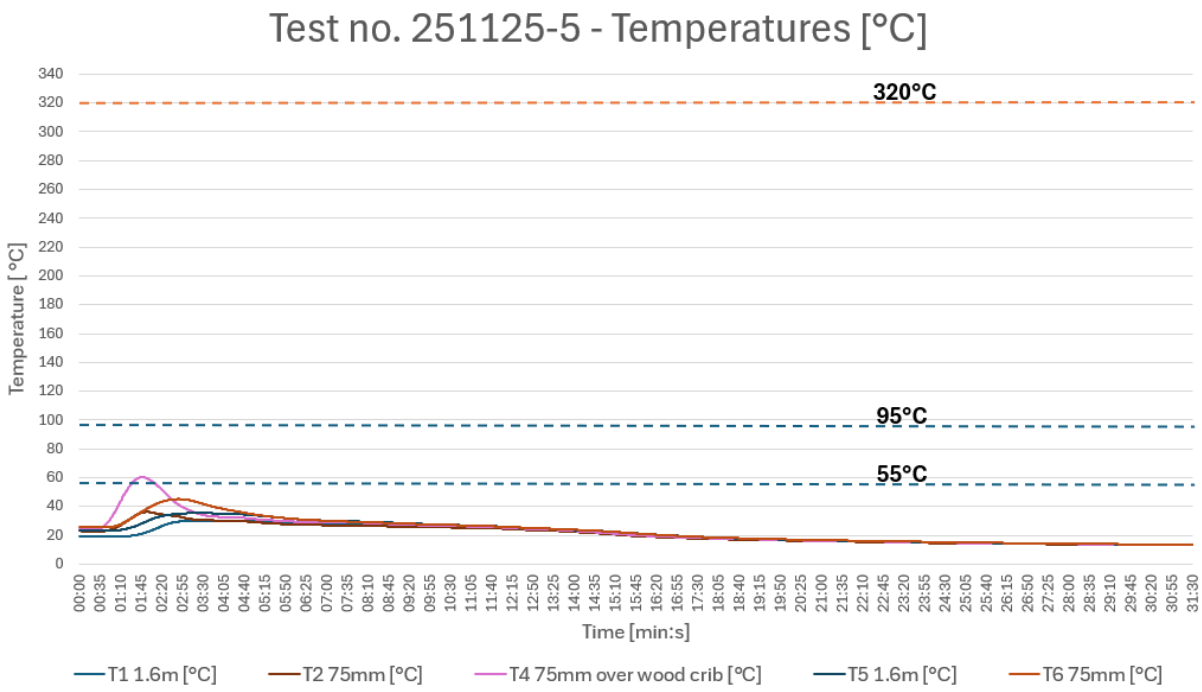
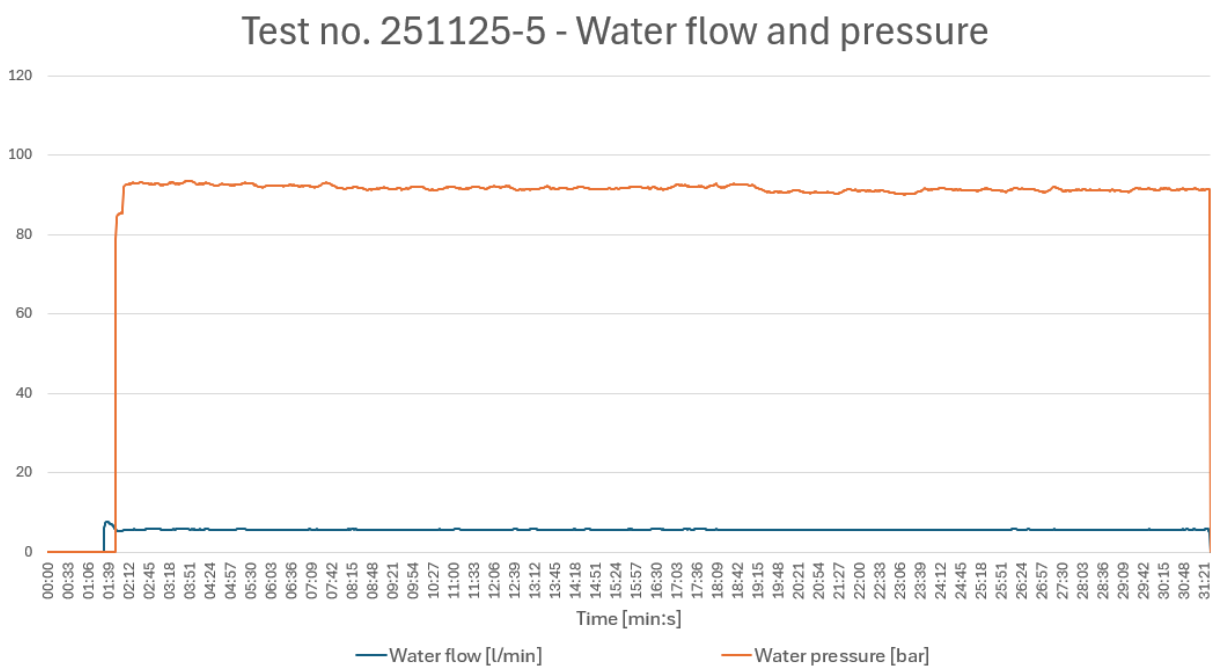



Graph C.7. Test no. 251125-5 – B2 test, 2.5m, 30s average temperatures.




Graph C.8. Test no. 251125-5 – B2 test, 2.5m, water flow and pressure.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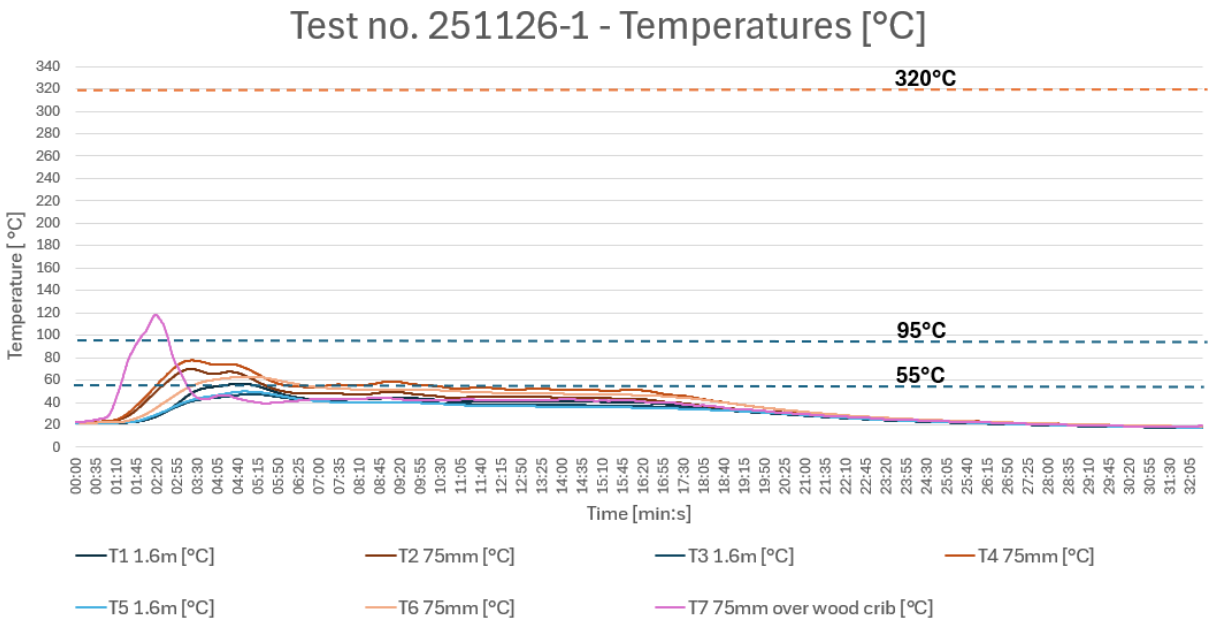
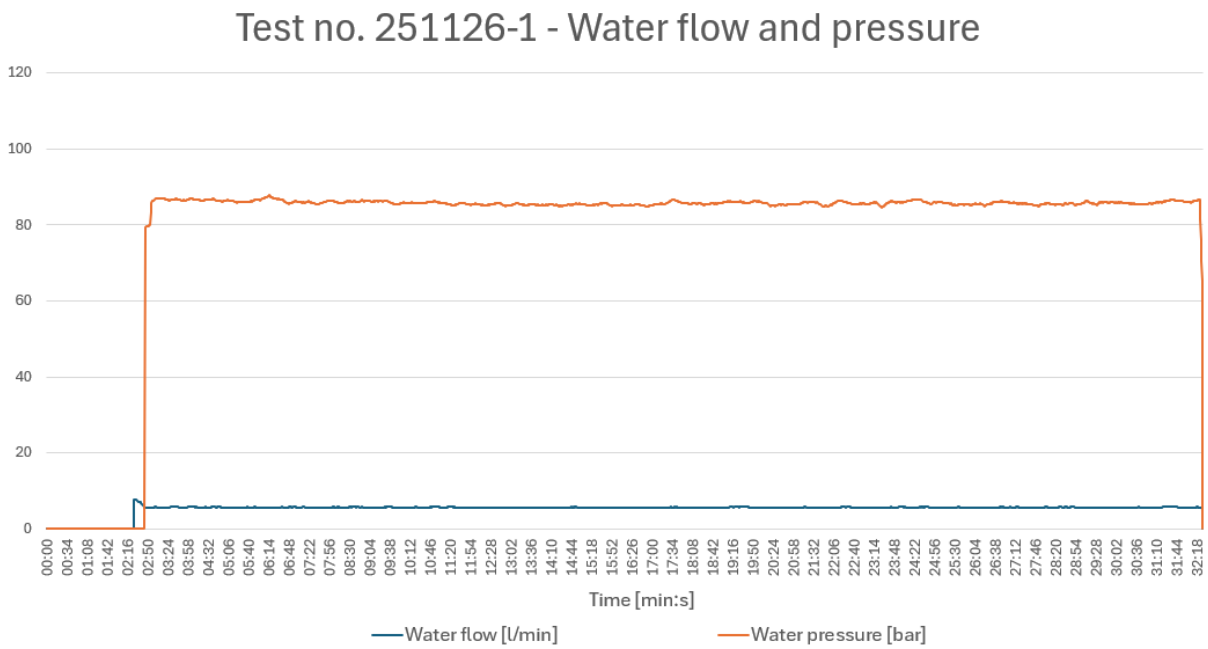



Graph C.9. Test no. 251126-1 – corner fan test, 2.5m, 30s average temperatures.




Graph C.10. Test no. 251126-1 – corner fan test, 2.5m, water flow and pressure.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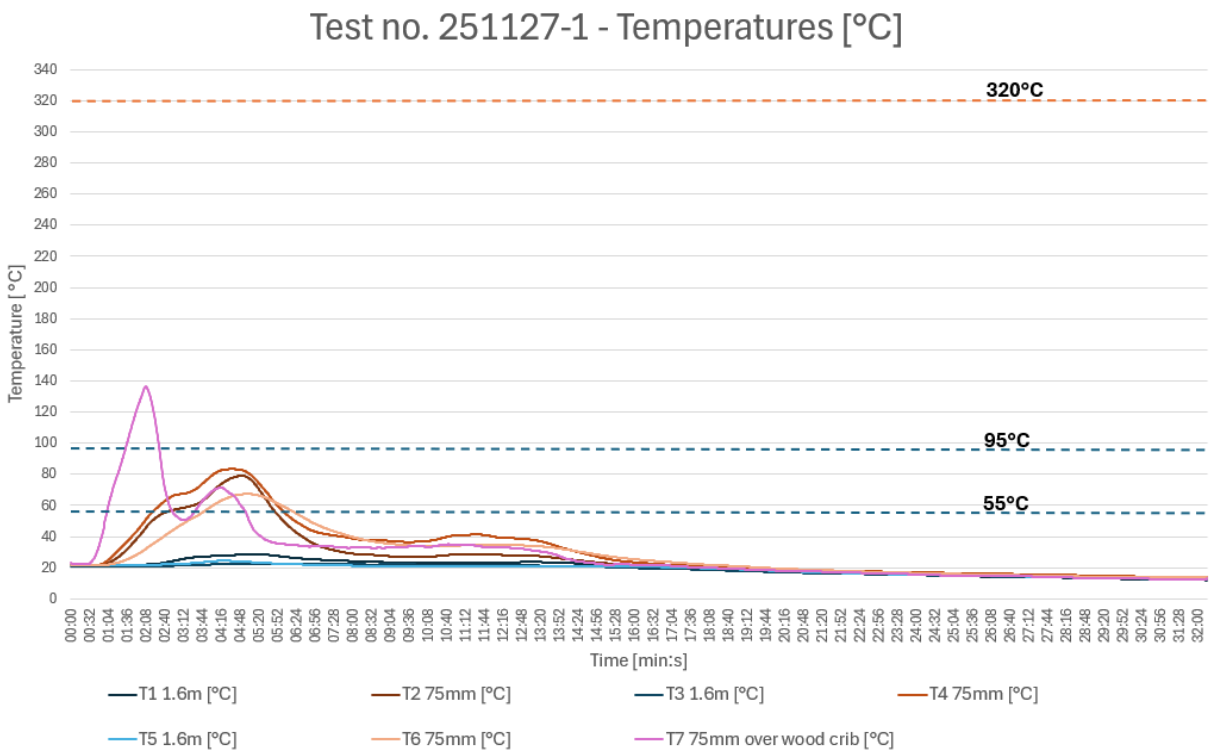
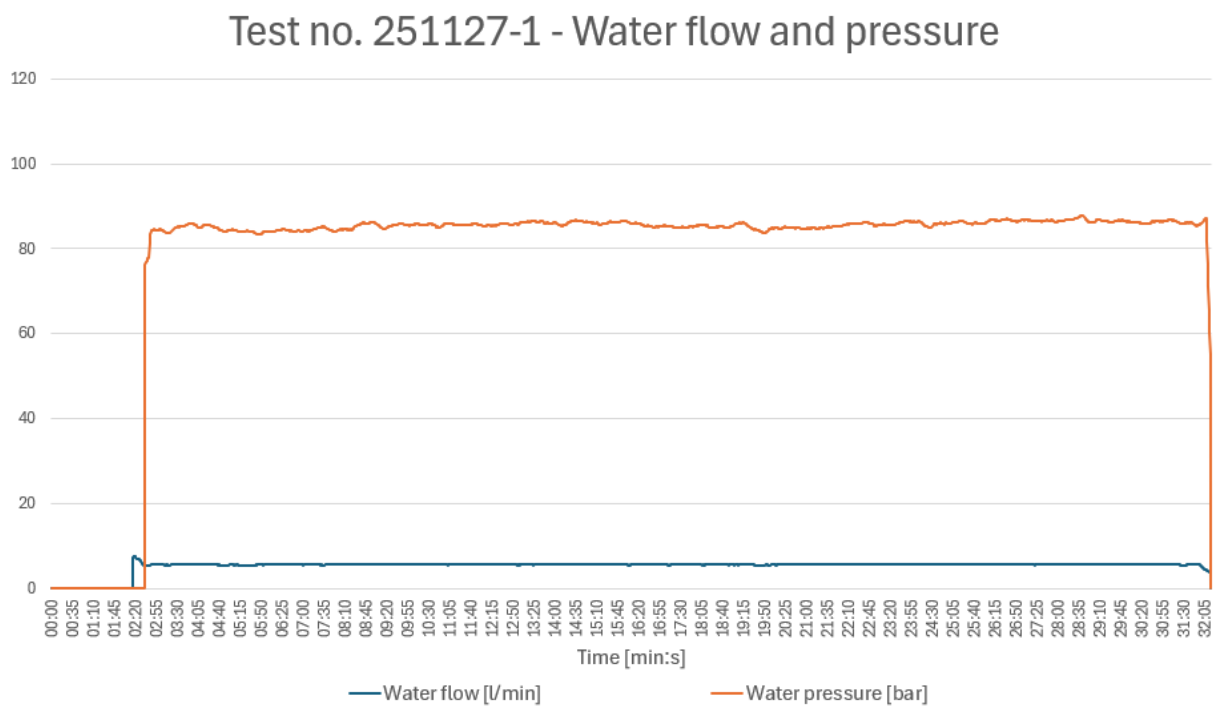



Graph C.11. Test no. 251127-1 – corner test – open room, 2.5m, 30s average temperatures.




Graph C.12. Test no. 251127-1 – corner test – open room, 2.5m, water flow and pressure.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# Appendix D – cone calorimeter test certificate for foam

**SYCHTA LABORATORIUM Sp. J.**
**Laboratorium Badań Palności Materiałów**
**ul. Ofiar Stutthofu 90**
**72-010 Police**

AB 1501

## TEST REPORT

Order no: 01.12.2025 Signature: SL/Z-1316/ISO 5660-1/1549a/2025 Police, 15.12.2025

**Test methods:**

1. ISO 5660-1:2015/Amd.1:2019. Reaction to fire tests – Heat release, smoke production and mass loss rate – Part 1: Heat release rate (cone calorimeter method)

***Content of request:*** Reaction to fire test according to ISO 5660-1. Requirements:

| | |
|---|---|
| Density (kg/m$^3$): | 27,2<…<30,4 |
| HRR Peak (kW/m$^2$): | 345 +/- 85 |
| Heat of combustion (MJ/kg): | 22 +/- 3 |

***Sponsor:*** Baltic Fire Laboratory Sp. z o.o.
St. Banińska 8
80-209 Tuchom
Poland

***Material:*** Polyurethane foam - BFL6F30

***Composition:*** Polyurethane foam with a density of 27,2-30,4 kg/m³
Thickness: 25 mm

***Manufacturer/supplier:*** Baltic Fire Laboratory Sp. z o.o.
St. Banińska 8
80-209 Tuchom
Poland

***Assessment:***

| | | |
|---|---|---|
| Density (kg/m$^3$): | 30,0 | 27,2<…<30,4 |
| HRR Peak (kW/m$^2$): | 349 | 345 +/- 85 |
| Heat of combustion (MJ/kg): | 23,2 | 22 +/- 3 |

***The reprint and the copying:*** only with the agreement of Baltic Fire Laboratory Sp. z o.o.

Without the written consent of the Sychta Laboratory the report can be copied only in one piece.

Report applies only to the sample tested and is not necessarily indicative of the qualities of apparently identical or similar products.

***Content of test report:*** five pages with signature and numbers.

VAT PL8513152392 phone +48 914210214 biuro@sychta.eu
KRS 0000387681 mobile +48 502078855 www.sychta.eu


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SYCHTA LABORATORIUM

**TEST RESULTS**

SL/Z-1316/ISO 5660-1/1549a/2025

## 1. Heat release rate of specimen according to ISO 5660-1

Test conditions:
- irradiance: 30 kW·m$^{-2}$
- horizontal position,
- sample thickness: 25,5±2 mm,
- no frame retainer shall be used.

Table 4. Heat release rate

| Name of measured quantity | Unit | Specimen | | | | | Average | Standard deviation |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | | |
| Mass of the specimen | g | 7,7 | 7,8 | 7,7 | 7,6 | 7,6 | 7,7 | 0,1 |
| Specimen thickness | mm | 25,4 | 25,6 | 25,6 | 25,6 | 25,6 | 25,6 | 0,1 |
| Density | kg·m$^{-3}$ | 30,5 | 30,3 | 29,9 | 29,8 | 29,7 | 30,0 | 0,3 |
| Ignition time | s | 2 | 4 | 2 | 2 | 2 | 2 | 1 |
| Extinction time | s | 48 | 58 | 62 | 74 | 54 | 59 | 10 |
| Duration of the test | s | 620 | 634 | 626 | 632 | 654 | 633 | 13 |
| Maximum heat release rate | kW·m$^{-2}$ | 342 | 370 | 340 | 360 | 332 | 349 | 16 |
| Total heat release | MJ·kg$^{-1}$ | 23,1 | 22,7 | 23,2 | 23,3 | 23,5 | 23,2 | 0,3 |
| Maximum average rate of heat emission MARHE | kW·m$^{-2}$ | 211,3 | 217,1 | 217,6 | 234,2 | 219,7 | 220,0 | 8,5 |

***Remarks:*** none.

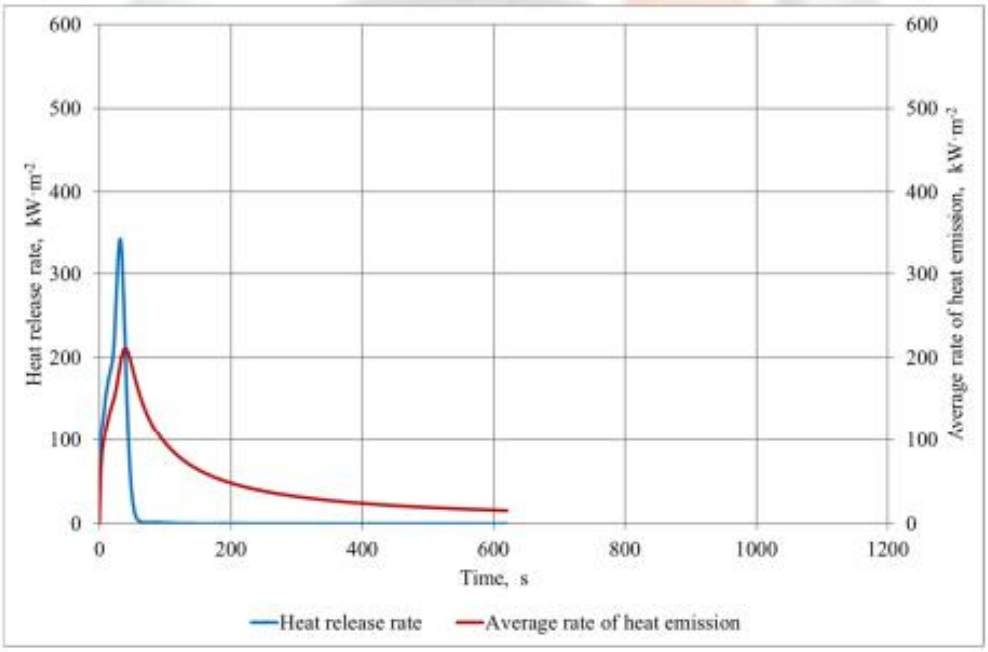


Figure 4.1. The relation of heat release rate and the time – specimen 1





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SYCHTA LABORATORIUM

**TEST RESULTS**

SL/Z-1316/ISO 5660-1/1549a/2025

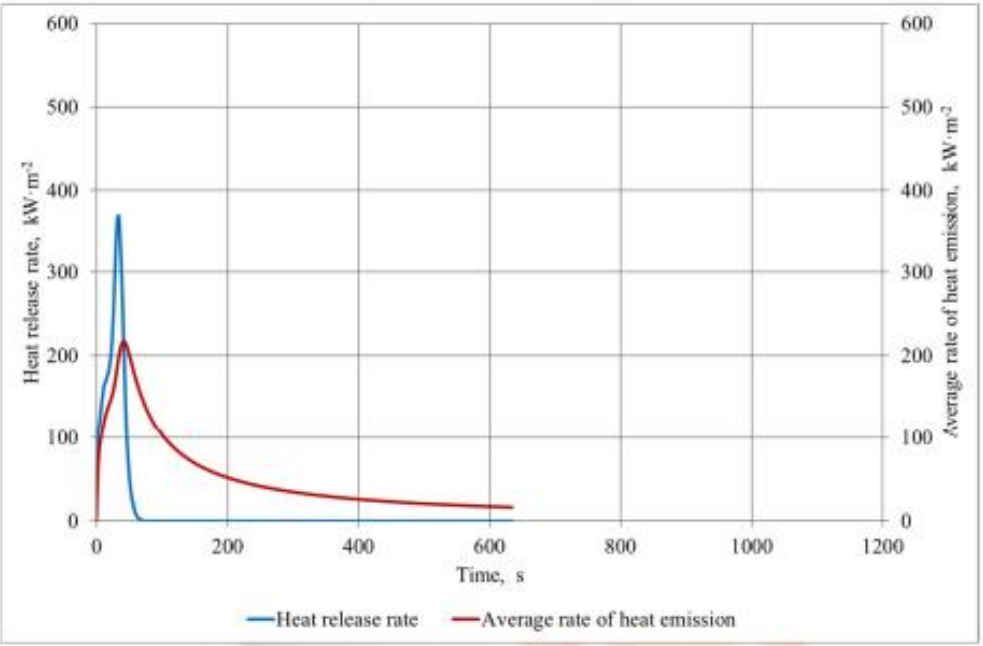


Figure 4.2. The relation of heat release rate and the time – specimen 2

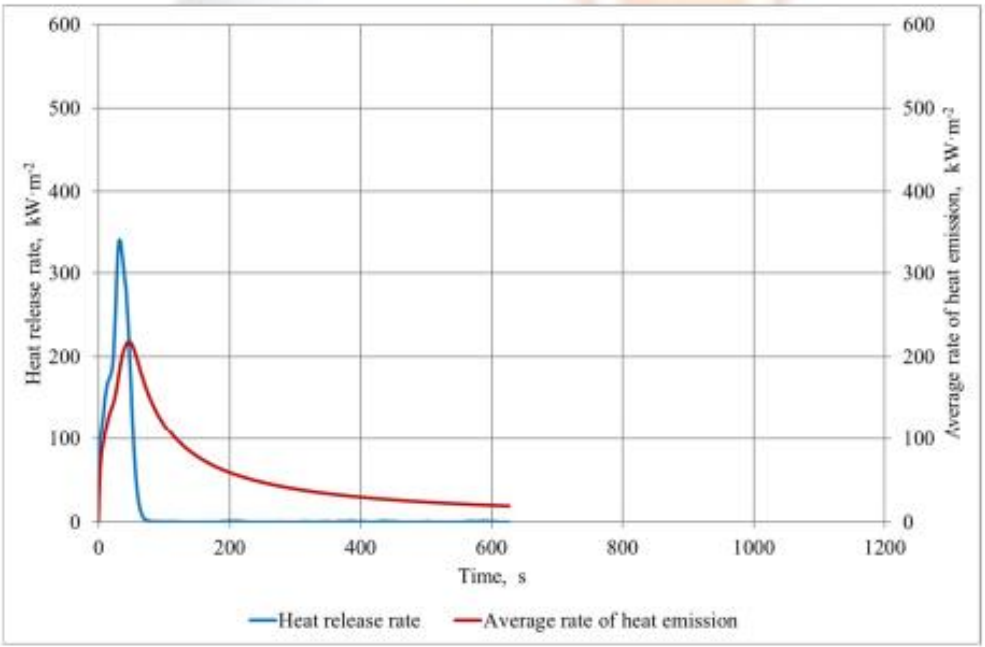


Figure 4.3. The relation of heat release rate and the time – specimen 3


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SYCHTA LABORATORIUM

**TEST RESULTS**

SL/Z-1316/ISO 5660-1/1549a/2025

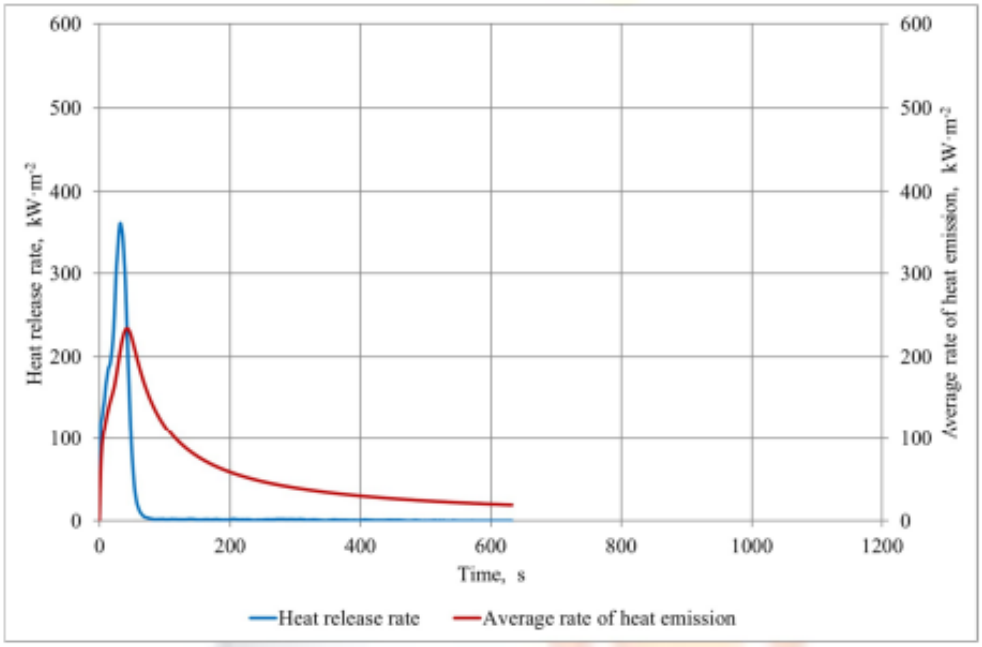


Figure 4.4. The relation of heat release rate and the time – specimen 4

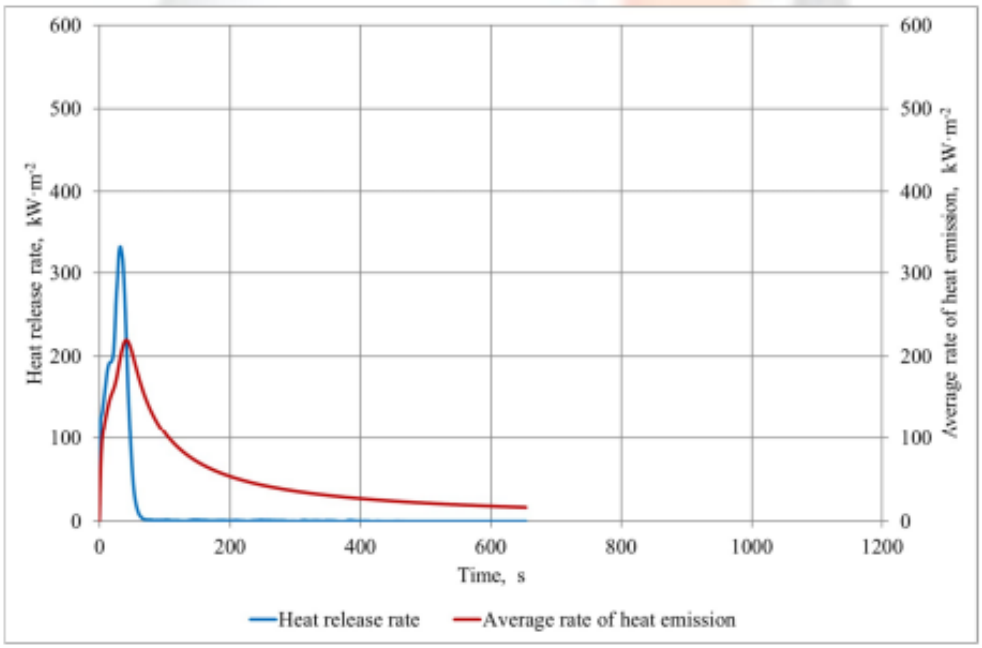


Figure 4.5. The relation of heat release rate and the time – specimen 5


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SYCHTA LABORATORIUM

**TEST RESULTS**

SL/Z-1316/ISO 5660-1/1549a/2025

## 2. Final findings

| Density 27,2<…<30,4 (kg/m³) | HRR Peak 345 +/- 85 (kW/m²) | Heat of combustion 22 +/- 3 (MJ/kg) | Fulfilling the requirements |
|---|---|---|---|
| 30,0 | 349 | 23,2 | YES/~~NO~~ |

## 3. Remaining required information

***Date of receipt of samples:*** 03.12.2025

***Sampling:*** Sponsor took and delivered samples.

***Description of the test material:*** Sponsor delivered 15 samples of white foam with description BFL6F30 with dimension of 100x100x25,3-25,7 mm and density of 29,7-30,5 kg/m².

***Conditioning of specimens:*** constant mass at a temperature of 23±2°C, and relative humidity of 50±5 %.

***Declarations:***

1. The test results relate to the behaviour of the test specimens under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the products in use.
2. The information provided on the first page of the report concerning the scope of research and identification of the tested object/objects were provided by the Sponsor.

***Operators:***

mgr inż. Andrzej Sychta

SYCHTA LABORATORIUM Sp. J.
72-010 Police, ul. Ofiar Stutthofu 90
tel./fax +48 91 4210 214, tel. 502078855
e-mail: biuro@sychta.eu www:sychta.eu
KRS 0000387681 REGON 321023120
NIP 8513152392

***Authorised by:***

KIEROWNIK TECHNICZNY
dr inż. Krzysztof Sychta

Date and place of test - 10-11.12.2025, Police





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# Appendix E – instrumentation list

| POS. | Description | Manufacturer | Model | Serial no. | Calibrated date | Cert no. |
|---|---|---|---|---|---|---|
| BFL13 | Current meter | National Instruments | NI 9203 | 1CA668F | 11.07.2024 | 2604/2024/E |
| BFL24 | Anemometer | Testo | Testo 440 | 83508081 | 03.02.2025 | 42/A/25 |
| BFL28 | Moisture meter / Hygrometer / Thermometer (wood) | Testo | Testo 606-2 | 38782986/1021 | 23.08.2024 | 5011-KL-V0042-24 |
| BFL45 | Thermohigrometer | Meraserw | CEM DT-321S | 210602678 | 07-11.03.2025 | 714/E/2025 |
| BFL71 | Pressure transmitter | Aplisens | PC-28 | 02245384 | 07.03.2024 | 0100/PCL/2024 |
| BFL77 | Manometer | Gesa | MD0906 | 2305252019852 | 10.05.2024 | 0637/2024/3 |
| BFL83 | Stopwatch | Casio | HS-80TW | K051188 | 12.06.2024 | OUM6.6W2.473.14 35.2024.2 |
| BFL85 | Meter 5m | Stanley | - | 1029/2024/1 | 12.08.2024 | SW/1029/2024/1 |
| BFL115 | Flow meter | Endress Hauser | Promass F300 | RA074602000 | 11.06.2025 | 20250611_F1_01 |
| BFL117 | Climatic chamber | - | - | - | 05-06.06.2025 | 182/6/25 |
| BFL120 | Manometer | Gesa | MD0906 | 2206201176750 | 13.06.2025 | 1061/2025/3 |
| BFL140 | Thermostatic chamber | WAMED | SUP-200G | - | 17.11.2025 | 848/11/25 |
| BFL141 | Balance | Radwag | WLC 30/F1/R | 856846 | 11.10.2025 | 13817/4771/25/E |
| BFL1002 | Thermocouple module | National Instruments | NI 9213 | 187F11C | 31.10.2024 | 4100/2024/E |
| T1 | PA2506021/10 | Guenther | TYP K | 1851220/46 | 24.06.2025 | PA2506021 |
| T2 | PA2507022/4 | Guenther | TYP K | 1851220/24 | 14.07.2025 | PA2507022 |
| T3 | PA2507023/1 | Guenther | TYP K | 1821220/17 | 14.07.2025 | PA2507023 |
| T4 | PA2506021/6 | Guenther | TYP K | 1851220/31 | 24.06.2025 | PA2506021 |
| T5 | PA2507023/3 | Guenther | TYP K | 1821220/37 | 14.07.2025 | PA2507023 |
| T6 | PA2506021/9 | Guenther | TYP K | 1851220/39 | 24.06.2025 | PA2506021 |
| T7 | PA2507022/1 | Guenther | TYP K | 1851220/13 | 14.07.2025 | PA2507022 |
| T8 | PA2507023/2 | Guenther | TYP K | 1821220/20 | 14.07.2025 | PA2507023 |
| T9 | PA2507022/6 | Guenther | TYP K | 1851220/37 | 14.07.2025 | PA2507022 |
| T10 | PA2504047/2 | Guenther | TYP K | 1831220/44 | 14.04.2025 | PA2504047/2 |
| T11 | PA2504112/4 | Guenther | TYP K | 1831220/18 | 30.04.2025 | PA2504112 |
| T12 | PA2507022/5 | Guenther | TYP K | 1851220/36 | 14.07.2025 | PA2507022 |
| T13 | PA2506021/7 | Guenther | TYP K | 1851220/33 | 24.06.2025 | PA2506021 |
| T14 | PA2504112/3 | Guenther | TYP K | 1831220/17 | 30.04.2025 | PA2504112 |


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Baltic Fire Laboratory
BFL S/N: BFL13
Calib.Date: 11.07.2024
Next Calib.: 10.07.2026

Institute of Power Engineering
Institute of Power Engineering – National Research Institute
MEASURING APPARATUS LABORATORY
02-981 Warszawa, ul. Augustówka 36
tel. (22) 34 51 438
lap@ien.com.pl www.ien.com.pl

PCA Polskie Centrum Akredytacji
AP 013

Calibration laboratory accredited by
Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA
that include recognition of calibration certificates.
Accreditation No AP 013

# CALIBRATION CERTIFICATE

Date of issue: 12 July 2024 Certificate No: 2604/2024/E Page 1/2

| | |
|---|---|
| **OBJECT OF CALIBRATION** | Current meter<br>model NI 9203, manufacturer NATIONAL INSTRUMENTS, serial number 1CA668F, 8-channel with a current measuring chain. |
| **APPLICANT** | Baltic Fire Laboratory Sp. z o.o.<br>80 – 209 Tuchom, ul. Banińska 8<br>Order No: MAP.4032.864.2024 |
| **PLACE OF CALIBRATION** | Baltic Fire Laboratory Sp. z o.o.<br>80 – 209 Tuchom, ul. Banińska 8 |
| **CALIBRATION METHOD** | Calibration was performed according to the Measurement Procedure P4/MAP „Calibration apparatus for measuring temperature, pressure, electrical quantities and humidity on objects", edition XII released on 30 May 2023. |
| **ENVIRONMENTAL CONDITIONS** | Ambient temperature (25,8 ÷ 26,4) °C<br>Relative humidity (66,2 ÷ 73,6) % |
| **DATE OF CALIBRATION** | 11 July 2024 |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). |
| **CALIBRATION RESULTS** | The results have been presented on page 2/2 of this certificate including uncertainty of measurement. The result apply to the object of calibration only. |
| **UNCERTAINTY OF MEASUREMENT** | Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor $k = 2$. |

Laboratorium Akredytowane AP 013 Wzorcowanie

Z-ca KIEROWNIKA
Laboratorium Aparatury Pomiarowej
Inż. Rafał Malinowski

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 013.

Date of issue: 12 July 2024 | Certificate No: 2604/2024/E | Page 2/2

**CALIBRATION RESULTS**

The results of the calibration are as follows:

| REFERENCE VALUE *Wp* | AVERAGE MEASURED VALUE *Ww* | | | | | | | | MEASUREMENT ERROR *Ww-Wp* | | | | | | | | MEASUREMENT UNCERTAINTY *U* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mA | mA | | | | | | | | mA | | | | | | | | mA |
| **Measuring chain →** | **1A** | **2A** | **3A** | **4A** | **5A** | **6A** | **7A** | **8A** | **1A** | **2A** | **3A** | **4A** | **5A** | **6A** | **7A** | **8A** | |
| **Mark on the card →** | **CH0** | **CH 1** | **CH 2** | **CH 3** | **CH 4** | **CH 5** | **CH 6** | **CH 7** | **CH0** | **CH 1** | **CH 2** | **CH 3** | **CH 4** | **CH 5** | **CH 6** | **CH 7** | |
| **Reading in the program → DAQ Express 4.1.0 Nr 7.1.0.50148** | CDAQ1Mod2/ai0 | CDAQ1Mod2/ai1 | CDAQ1Mod2/ai2 | CDAQ1Mod2/ai3 | CDAQ1Mod2/ai4 | CDAQ1Mod2/ai5 | CDAQ1Mod2/ai6 | CDAQ1Mod2/ai7 | CDAQ1Mod2/ai0 | CDAQ1Mod2/ai1 | CDAQ1Mod2/ai2 | CDAQ1Mod2/ai3 | CDAQ1Mod2/ai4 | CDAQ1Mod2/ai5 | CDAQ1Mod2/ai6 | CDAQ1Mod2/ai7 | |
| 4,000 | 3,993 | 3,992 | 3,990 | 4,006 | 4,000 | 3,994 | 3,998 | 4,002 | -0,007 | -0,008 | -0,010 | 0,006 | 0,000 | -0,006 | -0,002 | 0,002 | 0,030 |
| 8,000 | 8,020 | 8,015 | 7,992 | 7,988 | 8,291 | 8,006 | 8,004 | 7,996 | 0,020 | 0,015 | -0,008 | -0,012 | 0,291 | 0,006 | 0,004 | -0,004 | 0,030 |
| 12,000 | 11,990 | 12,005 | 11,998 | 12,012 | 11,995 | 12,012 | 11,995 | 12,000 | -0,010 | 0,005 | -0,002 | 0,012 | -0,005 | 0,012 | -0,005 | 0,000 | 0,030 |
| 16,000 | 16,012 | 16,000 | 15,985 | 16,004 | 16,004 | 15,980 | 15,997 | 15,979 | 0,012 | 0,000 | -0,015 | 0,004 | 0,004 | -0,020 | -0,003 | -0,021 | 0,030 |
| 20,000 | 19,998 | 19,993 | 19,985 | 19,986 | 20,003 | 19,984 | 19,992 | 19,992 | -0,002 | -0,007 | -0,015 | -0,014 | 0,003 | -0,016 | -0,008 | -0,008 | 0,030 |

Authorized by: KIEROWNIK TECHNICZNY Laboratorium Aparatury Pomiarowej
inż. Rafał Malinowski


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**LABORATORY FOR CALIBRATION**
**OF THE VENTILATION MEASURING DEVICES**
STRATA MECHANICS RESEARCH INSTITUTE of POLISH ACADEMY OF SCI.
30-059 CRACOW, POLAND Reymonta 27 Str. phone.: +48 12 6376200; fax: +48 12 6372884
www.lwwpp.imgpan.pl; lwwpp@imgpan.pl

Laboratory accredited by
Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA
that include recognition of calibration certificates.
Accreditation No AP 118.

AP 118

# CALIBRATION CERTIFICATE

**Date of issue: February 3 2025** **Certificate No: 42/A/25** **Page 1/2**

| | |
|---|---|
| **OBJECT OF CALIBRATION** | Name: Vane anemometer<br>Type: Testo 440, probe 0635 9370<br>Factory No: 83508081, probe no. 20980936<br>Range: (0,1 ÷ 15,0) m/s<br>Reading accuracy: 0,01 m/s<br>Manufacturer: Testo |
| **APPLICANT** | Baltic Fire Laboratory Sp. z o.o.<br>80-209 Tuchom, ul. Banińska 8 |
| **CALIBRATION SITE** | Laboratory for Calibration of the Ventilation Measuring Devices<br>30-059 Cracow, Poland, Reymonta 27 Str. |
| **CALIBRATION METHOD** | Anemometers calibration instruction no P/01 of 15.07.2022 r. |
| **ENVIRONMENTAL CONDITIONS** | Temperature: (19,90 ÷ 20,14) deg C<br>Barometric pressure: (1003,47 ÷ 1003,69) hPa<br>Air density: (1,18 ÷ 1,18) kg/m3 |
| **DATE OF CALIBRATION** | February 3 2025 |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). |
| **CALIBRATION RESULTS** | Printed on the second page and they concern only the calibration object. |
| **UNCERTAINTY OF MEASUREMENT** | Measurement uncertainty has been evaluated in compliance with the EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95% and the coverage factor k = 2. |

Baltic Fire Laboratory
BFL S/N: BFL24
Calib.Date: 03.02.2025
Next Calib.: 03.02.2027

Baltic Fire Laboratory
BFL S/N: BFL42
Calib.Date: 03.02.2025
Next Calib.: 03.02.2027

Acting Head of the Calibration Laboratory

Dr Eng. Jakub Janus

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**CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 118**

**Date of issue: February 3 2025** **Certificate No: 42/A/25** **Page 2/2**

**CALIBRATION RESULTS** Calibration results are the following:

| Lp. | Reference Velocity | | Velocity indicated by anemometer | | Correction | Measurement uncertainity |
|---|---|---|---|---|---|---|
| | V | | Va | | DV=V-Va | U(Dv) |
| | m/s | m/min | m/s | m/min | m/s | m/s |
| 1 | 0,15 | 9 | 0,12 | 7 | 0,03 | 0,05 |
| 2 | 1,00 | 60 | 1,04 | 62 | -0,04 | 0,05 |
| 3 | 3,00 | 180 | 3,06 | 184 | -0,06 | 0,14 |
| 4 | 5,00 | 300 | 5,15 | 309 | -0,15 | 0,11 |
| 5 | 10,00 | 600 | 10,30 | 618 | -0,30 | 0,11 |
| 6 | 15,00 | 900 | 15,27 | 916 | -0,27 | 0,16 |

Checked by

Dr Eng. Paweł Jamróz


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Český metrologický institut
Okružní 31, 638 00 Brno
tel. +420 545 555 111
www.cmi.cz

K 2202

**Calibration laboratory No. 2202 accredited by the Czech Accreditation Institute according to ISO/IEC 17025:2017**

**Laboratory:** Regional Inspectorate Pardubice, Průmyslová 455, 530 03 Pardubice
Department of moisture of solids, tel.: 466 670 696; e-mail : lpitrovanetolicka@cmi.cz

# CERTIFICATE OF CALIBRATION

## 5011-KL-V0042-24

**Date of issue:** August 23th, 2024



**Customer:** Baltic Fire Laboratory
ul. Banińska 8
80-209 Tuchom

Baltic Fire Laboratory
BFL S/N: BFL28
Calib.Date: 23.08.2024
Next Calib.: 22.08.2026

**User*:** Baltic Fire Laboratory
ul. Banińska 8
80-209 Tuchom

**Measuring instrument:** Moisture meter of wood

**Manufacturer:** TESTO

**Type:** Testo 606-2

**Serial number:** 38782986/1021

**Identific. number:** BFL 28

**Measuring range:** (7 – 78) % - for material curve 2

**Number of calibration scales:** 1 - pine

The results of the calibration have been obtained following the procedures reported in this Certificate and are related only to the calibrated measuring instrument, the date, place and conditions of the calibration.

**Date of calibration:** August 22-23th, 2024

**Calibrated by:**

Ing. Lucie Pitrová Netolická

Český metrologický institut -50/2-

**Director of the regional inspectorate:**

Ing. Zuzana Pálková, Ph.D.

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**CERTIFICATE OF CALIBRATION** **5011-KL-V0042-24** Page 2 of 2

**Metrological traceability:** During the calibration of the moisture meter was used secondary moisture standard of solid substances – wood, SEVPL-D, serial number: 001/92, range (4 ÷ 110) % [m/m] and digital thermometer - hygrometer, reference number: 970053.
The measurements are metrologically traceable to national/international standards.

**Calibration procedure:** Tests of the meter were performed according to calibration procedure No. 511-MP-C003 Calibration of moisture meters for wood. The moisture content of the wood samples used for calibration was adjusted by conditioning.
The measurement was carried out according to the working manual for the tested hygrometer.
Type of material used for calibration: wood - pine
Calibration curve set on a calibrated gauge: 2 (pine)

**Place of calibration: (complete address)** ČMI OI Pardubice - laboratoř VPL, Průmyslová 455, 530 03 Pardubice

**Ambient conditions: (nominal values)** 1) temperature: (23 ± 5)°C
2) relative humidity: max. 70 %

**Results of calibration:**

| No. sample | BO11 | BO12 | BO13 | BO21 | BO22 | BO23 | BO31 | BO32 | BO33 |
|---|---|---|---|---|---|---|---|---|---|
| $w_h$ | 7.30 | 7.65 | 7.65 | 10.80 | 10.93 | 10.55 | 17.73 | 18.05 | 18.48 |
| $w_r$ | 8.81 | 8.60 | 8.65 | 11.82 | 12.34 | 12.40 | 18.76 | 19.48 | 19.07 |
| **$s_r$** | **-1.51** | **-0.95** | **-1.00** | **-1.02** | **-1.42** | **-1.85** | **-1.04** | **-1.43** | **-0.59** |
| **$U_c$** | **0.42** | **0.54** | **0.87** | **0.89** | **0.53** | **0.95** | **0.95** | **0.91** | **0.91** |

Explanations:
line 2: $w_h$: mean of 4 moisture measurements of the sample with the tested moisture meter in % moisture
line 3: $w_r$: reference gravimetric moisture determination of the sample in % moisture
line 4: error of moisture meter $s_r = w_h - w_r$ in % humidity
line 5: uncertainty $U_c$ in % moisture for individual samples

The standard uncertainty of measurement has been determined in accordance with EA-4/02 M:2022 document. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k corresponding to a coverage probability of approximately 95 %, which for normal distribution corresponds to a coverage factor $k = 2$.

* ... data from customer

End of calibration certificate.

Český metrologický institut
Oblastní inspektorát Pardubice
Průmyslová 455
530 03 Pardubice
-6-

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IN OTHER CASE, WRITTEN APPROVAL OF THE CONTRACTOR SHALL BE GIVEN.

Institute of Power Engineering – National Research Institute
MEASURING APPARATUS LABORATORY
02-981 Warszawa, ul. Augustówka 36
tel. (22) 34 51 438
lap@ien.com.pl www.ien.com.pl

AP 013

Baltic Fire Laboratory
BFL S/N: BFL45
Calib.Date: 07–11.03.2025
Next Calib.: 11.03.2027

Calibration laboratory accredited by
Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA
that include recognition of calibration certificates.
Accreditation No AP 013

# CALIBRATION CERTIFICATE

Date of issue: 11 March, 2025 Certificate No: 714/E/2025 Page 1/2

| | |
|---|---|
| **OBJECT OF CALIBRATION** | Termohygrometer<br>model DT-321S, manufacturer CEM, serial number 210602678, inventory number BFL45 with integrated external sensor. |
| **APPLICANT** | Baltic Fire Laboratory Sp. z o.o.<br>80 - 209 Tuchom, ul. Banińska 8<br>Order No: MAP.4032.245.2025 |
| **CALIBRATION METHOD** | Calibration was performed at the premises of the LAP IEN-PIB according to the Measurement Procedure W1/MAP "Calibration of Humidity Measuring Instruments", XII edition released on 18 September 2020. |
| **ENVIRONMENTAL CONDITIONS** | Ambient temperature (22,6 ÷ 26,8) °C<br>Relative humidity (25,6 ÷ 37,9) % |
| **DATE OF CALIBRATION** | 7 March ÷ 11 March 2025 |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). |
| **CALIBRATION RESULTS** | The results have been presented on page 2/2 of this certificate including uncertainty of measurement. The results apply to the object of calibration only. |
| **UNCERTAINTY OF MEASUREMENT** | Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor $k = 2$. |

Z-ca KIEROWNIKA
Laboratorium Aparatury Pomiarowej
inż. Rafał Malinowski

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 013.

Date of issue: 11 March, 2025 Certificate No: 714/E/2025 Page 2/2

**CALIBRATION RESULTS**

Calibration results are the following:

| AVERAGE REFERENCE VALUE *Wp* | | AVERAGE MEASURED VALUE *Ww* | | MEASUREMENT ERROR *Ww-Wp* | | MEASUREMENT UNCERTAINTY *U* | |
|---|---|---|---|---|---|---|---|
| *t* | *RH* | *t* | *RH* | *t* | *RH* | *t* | *RH* |
| °C | % | °C | % | °C | % | °C | % |
| 10,08 | 49,5 | 10,09 | 49,3 | 0,01 | -0,2 | 0,15 | 0,7 |
| 19,98 | 29,6 | 19,99 | 27,3 | 0,01 | -2,3 | 0,15 | 0,6 |
| 19,95 | 49,5 | 19,96 | 44,6 | 0,01 | -4,9 | 0,15 | 0,7 |
| 19,99 | 69,5 | 20,02 | 64,0 | 0,03 | -5,5 | 0,15 | 1,0 |
| 29,92 | 50,2 | 29,91 | 46,6 | -0,01 | -3,6 | 0,15 | 0,7 |
| 49,94 | 50,3 | 49,91 | 47,1 | -0,03 | -3,2 | 0,15 | 0,8 |

Temperatures given are referred to the International Temperature Scale of 1990 (ITS-90).

Authorized by:

KIEROWNIK TECHNICZNY
Laboratorium Aparatury Pomiarowej
inż. Rafał Malinowski


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APLISENS

**APLISENS S.A.**
**LABORATORIUM WZORCUJĄCE APLISENS**
03-192 Warszawa, ul. Morelowa 7
tel.: 22 814 07 77 w. 162, faks: 22 814 07 78
e-mail: laboratorium@aplisens.pl http://www.aplisens.pl
PRACOWNIA CIŚNIEŃ
03-192 Warszawa, ul. Morelowa 7
e-mail: laboratorium@aplisens.pl

Baltic Fire Laboratory
BFL S/N: BFL71
Calib.Date: 07.03.2024
Next Calib.: 06.03.2026

PCA Polskie Centrum Akredytacji WZORCOWANIE
AP 122

Laboratorium wzorcujące akredytowane przez Polskie Centrum Akredytacji, sygnatariusza porozumień EA MLA i ILAC MRA dotyczących wzajemnego uznawania świadectw wzorcowania. Nr akredytacji AP 122.
*Calibration laboratory accredited by Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA that include recognition of calibration certificates. Accreditation No. AP 122.*

ilac-MRA

# ŚWIADECTWO WZORCOWANIA

## CALIBRATION CERTIFICATE

Data wydania: *Date of issue* 07.03.2024 | Numer świadectwa: *Certificate No.* 0100/PCL/2024 | Strona nr: 1/2 *Page*

**OBIEKT WZORCOWANIA** *OBJECT OF CALIBRATION*

Nazwa: *Name* — Przetwornik ciśnienia *Pressure transmitter*
Nr fabryczny: *Serial Number* — 02245384
Producent: *Producer* — APLISENS
Typ: *Type* — PC-28
Zakres wskazań: *Indication range* — (0÷25) MPa
Sygnał wyjściowy: *Output signal* — (4÷20) mA, charakterystyka liniowa *(4÷20) mA, with linear characteristic*

**ZGŁASZAJĄCY** *APPLICANT*
Baltic Fire Laboratory Sp. z o.o.
ul. Baniński 8
80-209 Tuchom

**MIEJSCE WZORCOWANIA** *PLACE OF CALIBRATION*
APLISENS S.A., Laboratorium Wzorcujące Aplisens - Pracownia Ciśnień
ul. Morelowa 7, 03-192 Warszawa

**METODA WZORCOWANIA** *CALIBRATION METHOD*
Zgodnie z Procedurą PR-01 "Wzorcowanie przetworników ciśnienia" wydanie B z dnia 14.11.2023 r
*According to PR-01 Procedure: Calibration of pressure transmitters, edition B from 14.11.2023*

**WARUNKI ŚRODOWISKOWE** *ENVIRONMENTAL CONDITIONS*

| Temperatura otoczenia *Environment temperature* | Wilgotność względna *Relative humidity* | Ciśnienie atmosferyczne *Atmospheric pressure* |
|---|---|---|
| (19,7÷20,4) °C | (27,9÷31,9) % | (1000,0÷1016,6) hPa |

**DATA WZORCOWANIA** *DATE OF CALIBRATION*
07.03.2024

**SPÓJNOŚĆ POMIAROWA** *TRACEBILITY*
Świadectwo jest wydane w ramach porozumienia EA MLA w zakresie wzorcowania i potwierdza spójność wyników pomiarów z jednostkami miar Międzynarodowego Układu Jednostek Miar (SI).
*This certificate is issued under the agreement EA MLA in the calibration field and provides traceability of measurement results to the International System of Units (SI).*

**WYNIKI WZORCOWANIA** *CALIBRATION RESULTS*
Podano na stronie 2 niniejszego świadectwa wraz z wartościami niepewności pomiaru i dotyczą wyłącznie obiektu wzorcowanego.
*The results have been presented on 2 page of this certificate, including the measurement uncertainty, and they apply to the calibrated object only.*

**NIEPEWNOŚC POMIARU** *UNCERTAINTY OF MEASUREMENT*
Niepewność pomiaru została określona zgodnie z dokumentem EA-4/02 M:2022. Podane wartości niepewności stanowią niepewności rozszerzone przy prawdopodobieństwie rozszerzenia ok. 95% i współczynniku rozszerzenia k=2.
*Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor k=2.*

LABORATORIUM WZORCUJĄCE APLISENS / PRACOWNIA CIŚNIEŃ
ZSW259986I80 | KCL000123 | PC24000093

Niniejsze świadectwo może być okazywane lub kopiowane tylko w całości.
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ŚWIADECTWO WZORCOWANIA wydane przez Laboratorium Wzorcujące Aplisens Nr AP 122
*CALIBRATION CERTIFICATE issued by Laboratorium Wzorcujące Aplisens No. AP 122*

Data wydania: *Date of issue* 07.03.2024 Numer świadectwa: *Certificate No.* 0100/PCL/2024 Strona nr: 2/2 *Page*

**WYNIKI WZORCOWANIA**
*CALIBRATION RESULTS*

Wyniki wzorcowania obiektu przedstawiono poniżej:
*Calibration results are the following:*

| Wartość ciśnienia odniesienia *Reference pressure value* | Wartość natężenia prądu odpowiadająca wartości ciśnienia odniesienia *Current strenght value related to reference pressure value* | Zmierzona wartość natężenia prądu *Measured current strenght value* | Wartość ciśnienia odpowiadająca zmierzonej wartości natężenia prądu *Pressure value related to measured current strenght value* | Błąd pomiaru *Measurement error* | | Niepewność pomiaru *Measurement uncertainty* | |
|---|---|---|---|---|---|---|---|
| MPa | mA | mA | MPa | mA | MPa | mA | MPa |
| 0,0000 | 4,000 | 4,000 | 0,0000 | 0,000 | 0,0000 | 0,001 | 0,0016 |
| 6,2500 | 8,000 | 7,997 | 6,2453 | -0,003 | -0,0047 | 0,001 | 0,0016 |
| 12,5001 | 12,000 | 11,995 | 12,4922 | -0,005 | -0,0079 | 0,002 | 0,0031 |
| 18,7503 | 16,000 | 15,995 | 18,7422 | -0,005 | -0,0081 | 0,003 | 0,0047 |
| 25,0005 | 20,000 | 19,998 | 24,9969 | -0,002 | -0,0036 | 0,004 | 0,0062 |

**KOMENTARZ**
*COMMENT*

Podczas wzorcowania przetwornik umieszczono w pozycji pionowej czujnikiem w dół.
*The transmitter was placed in vertical position with the sensor down during the calibration.*

mgr inż. Barbara Buczek
Kierownik Laboratorium Wzorcującego Aplisens
2024-03-07
Autoryzował(a):
*Authorized by:*

Niniejsze świadectwo może być okazywane lub kopiowane tylko w całości.
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Baltic Fire Laboratory
BFL S/N: BFL77
Calib.Date: 10.05.2024
Next Calib.: 09.05.2026

TENSLAB
Laboratorium Wzorcujące

**TENSLAB Spółka z ograniczoną odpowiedzialnością**
**LABORATORIUM WZORCUJĄCE**

| Siedziba: | Laboratorium: | Kontakt: |
|---|---|---|
| 80-554 GDAŃSK | 81-336 GDYNIA | www.tenslab.pl |
| ul. Śnieżna 5 | ul. Kadłubowców 4 | tel: +48 58 380 06 44 |

PCA Polskie Centrum Akredytacji
AP 180

Calibration laboratory accredited by Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA that include recognition of calibration certificates. Accreditation No AP 180.

# CALIBRATION CERTIFICATE

Date of issue: 10 May 2024 Certificate No: 0637/2024/3 Page 1/ 2

| | |
|---|---|
| **OBJECT OF CALIBRATION** | Digital pressure gauge, Type: MD0906, Serial number: 2305252019852, Producer: Gesa, Resolution: 0,01 bar, Measuring range: 0,0÷250,0 bar, Class: 0,2, Identification number: no data. |
| **CUSTOMER** | BALTIC FIRE LABORATORY SPÓŁKA Z O. O.<br>ul. Banińska 8<br>80-209 Tuchom |
| **PLACE OF CALIBRATION** | TENSLAB Sp. z o.o. Laboratorium Wzorcujące<br>ul. Kadłubowców 4<br>81-336 Gdynia |
| **CALIBRATION METHOD** | Procedura pomiarowa - Ciśnieniomierze elektroniczne - PP TENSLAB/CE/1/18 date of issue 20.07.2018 |
| **ENVIRONMENTAL CONDITIONS** | Ambient temperature: (21,7 ÷ 22,3) °C |
| **DATE OF CALIBRATION** | 10 May 2024 |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). |
| **CALIBRATION RESULTS** | The results have been presented on page(s) 2 of this certificate including uncertainty of measurement. The results relate only to the object of calibration. |
| **UNCERTAINTY OF MEASUREMENT** | Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor k = 2. |

Laboratorium Wzorcujące AP 180

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 180

Date of issue: 10 May 2024 Certificate No: 0637/2024/3 Page 2/ 2

**CALIBRATION RESULTS**

Calibration results are the following:

Determination of measurement error:

| No | Measured pressure value | Reference pressure value | Measurement error | Hysteresis | Measurement uncertainty |
|---|---|---|---|---|---|
| | bar | | | | |
| 1. | 0,00 | 0,00 | 0,00 | 0,00 | 0,10 |
| 2. | 5,00 | 5,01 | -0,01 | 0,04 | 0,10 |
| 3. | 16,00 | 15,97 | 0,03 | 0,07 | 0,10 |
| 4. | 25,00 | 24,90 | 0,10 | 0,14 | 0,12 |
| 5. | 50,00 | 49,79 | 0,21 | 0,16 | 0,13 |
| 6. | 75,00 | 74,76 | 0,24 | 0,16 | 0,13 |
| 7. | 100,00 | 99,75 | 0,25 | 0,15 | 0,12 |
| 8. | 150,00 | 149,75 | 0,25 | 0,19 | 0,14 |
| 9. | 200,00 | 199,70 | 0,30 | 0,15 | 0,13 |
| 10. | 225,00 | 224,72 | 0,28 | 0,10 | 0,12 |
| 11. | 250,00 | 249,76 | 0,24 | 0,10 | 0,11 |
| 12. | - | - | - | - | - |
| 13. | - | - | - | - | - |
| 14. | - | - | - | - | - |
| 15. | - | - | - | - | - |

Authorized by:

KIEROWNIK TECHNICZNY

Paula Keister-Łyko

END OF CALIBRATION CERTIFICATE


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Baltic Fire Laboratory
BFL S/N: BFL83
Calib.Date: 12.06.2024
Next Calib.: 11.06.2026

DIRECTOR
OF THE REGIONAL OFFICE OF MEASURES IN GDAŃSK

Calibration Laboratories Group
Laboratory of Electricity and Physicochemistry
Polanki 124c Str., 80-308 Gdańsk
tel.: 58-5245-200 fax: 58-5245-229 e-mail: w2@oum.gda.pl www.oum.gda.pl

# CALIBRATION CERTIFICATE

Date of issue: 12 June 2024 | Certificate No: OUM6.6W2.473.1435.2024.2.EN | Page 1/2

| | | | | |
|---|---|---|---|---|
| OBJECT OF CALIBRATION | Electronic stopwatch | | Type: | HS-80TW |
| | Manufacturer: | Casio | No: | K051188 |
| | Indicate range: | 9 h 59 min 59,999 s | Resolution: | 0,001 s |
| APPLICANT | Gdańskie Usługi Metrologiczne Sp. z o.o.<br>ul. Kręta 18<br>80-217 Gdańsk | | | |
| USER | Baltic Fire Laboratory Sp. z o.o.<br>ul. Banińska 8<br>80-209 Tuchom | | | |
| PLACE OF CALIBRATION | At the Laboratory of Electricity and Physicochemistry facility | | | |
| CALIBRATION METHOD | "Wzorcowanie stoperów elektronicznych wyzwalanych ręcznie" PP/6W2/S24/02 wydanie 6 z dnia 16 września 2020 r. | | | |
| ENVIRONMENTAL CONDITIONS | Temperature: | (23,8 ÷ 24,4) °C | | |
| DATE OF CALIBRATION | 12 June 2024 | | | |
| TRACEABILITY | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). | | | |
| CALIBRATION RESULTS | The results apply to the calibrated object only and have been presented on page 2/2 of this certificate including uncertainty of measurement. niepewności pomiaru. | | | |
| UNCERTAINTY OF MEASUREMENT | Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor k= 2. | | | |

z up. Dyrektora
Okręgowego Urzędu Miar w Gdańsku
Małgorzata Śledziowska
Główny Specjalista
Laboratorium Elektryczności i Fizykochemii

AP 086

F2/P-11/10.02.2023

Regional Office of Measures in Gdańsk

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 086

Date of issue: 12 June 2024 Certificate No: OUM6.6W2.473.1435.2024.2.EN Page 2/2

**CALIBRATION RESULTS** Calibration results are the following:

1) form time interval τ = 1h

| error for 1h time interval | uncertainty |
|---|---|
| s | s |
| 0,011 | 0,010 |

2) of any time interval τ :

$\Delta\tau = y\tau +/-$ 0,010 s

y - relative stopwatch error
Δ τ - measurement error

y in time calibration:

| y | uncertainty |
|---|---|
| $x10^{-6}$ | $x10^{-6}$ |
| 3,01 | 0,30 |

Notice
The stated measurement error does not take into account the subjective error associated with the reaction time of the person taking the measurements.

Authorized by:

STARSZY INSPEKTOR
mgr Ewa Korzeniowska

THE END OF THE CALIBRATION CERTIFICATE


THE REPRODUCING OF THE REPORT IS PERMITTED ONLY IN FULL.
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Baltic Fire Laboratory
BFL S/N: BFL85
Calib.Date: 12.08.2024
Next Calib.: 12.08.2028

LAB MESK

**"LAB MESK" EUGENIUSZ STEPNOWSKI**
01-441 Warsaw, Deotymy Street 43a apt.6

**Calibration Laboratory Lab Mesk**
Wólczyńska Street 133, building no. 5, apt no. 541, 01-919 Warsaw
tel.: 505-414-661, 500-002-611 | labmesk.pl | e-mail: laboratorium@labmesk.pl
*Provided address is permament place of laboratory activities*
Calibration laboratory accredited by
Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA
that include recognition of calibration certificates.
Accreditation No AP 171.

PCA
AP 171

# CALIBRATION CERTIFICATE

Date of issue: 12th August 2024 Certificate No: SW/1029/2024/1 Page: 1/2

| | | |
|---|---|---|
| **OBJECT OF CALIBRATION** | Measuring tape | |
| | Manufacturer: | Stanley |
| | Manufacturing number: | - |
| | Identification number: | 1029/2024/1 |
| | Range: | 5,0 m |
| | Graduation: | 1 mm |
| **APPLICANT** | Baltic Fire Laboratory Sp. z o.o.<br>Banińska 8, 80-209 Tuchom | |
| **CALIBRATION METHOD** | Calibration procedure "IW5.8.21 Przymiary" version 2 of 20th September 2022 | |
| **ENVIRONMENTAL CONDITIONS** | Temperature: | (19,3 ÷ 19,7)°C |
| **DATE OF CALIBRATION** | 12th August 2024 | |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). | |
| **CALIBRATION RESULTS** | The results have been presented on page 2 of this certificate including uncertainty of measurement<br>The results refer only to the instrument mentioned in the field "object of calibration". | |
| **UNCERTAINTY OF MEASUREMENT** | Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2022.<br>The expanded uncertainty assigned corresponds to a coverage probability of 95 %<br>and the coverage factor $k = 2$. | |

AP 171

KIEROWNIK LABORATORIUM
Marcin Tokaj

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No. AP 171

Date of issue: 12th August 2024 Certificate No: SW/1029/2024/1 Page: 2/2

**CALIBRATION RESULTS** Calibration results are the following:

| Nominal length of the calibrated section | Permissible length of the calibrated section | Measurement uncertainty |
|---|---|---|
| mm | mm | mm |
| Upper scale | | |
| 0÷100 docisk | 100,13 | 0,14 |
| 0÷100 zaczep | 100,08 | |
| 0÷1000 zaczep | 1000,02 | |
| 0÷2000 zaczep | 2000,30 | |
| 0÷3000 zaczep | 3000,36 | 0,25 |
| 0÷4000 zaczep | 4000,44 | |
| 0÷5000 zaczep | 5000,78 | |
| Lower scale | | |
| 0÷100 docisk | 100,13 | 0,14 |
| 0÷100 zaczep | 100,08 | |
| 0÷1000 zaczep | 1000,02 | |
| 0÷2000 zaczep | 2000,30 | |
| 0÷3000 zaczep | 3000,36 | 0,25 |
| 0÷4000 zaczep | 4000,44 | |
| 0÷5000 zaczep | 5000,78 | |

Authorized by:

KIEROWNIK LABORATORIUM
Mar[illegible]

End of calibration certificate.


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IN OTHER CASE, WRITTEN APPROVAL OF THE CONTRACTOR SHALL BE GIVEN.

N.o.: 20250611_F1_01

Endress+Hauser
People for Process Automation

Accredited Calibration Laboratory according to: NAH 2-0327/2021

Baltic Fire Laboratory
BFL S/N: BFL115
Calib.Date: 11.06.2025
Next Calib.: 11.06.2027

## Calibration certificate

| | |
|---|---|
| Subject: | Promass F 300 Calibration |
| Manufacturer: | Endress+Hauser |
| Type / Order code: | Promass 8F3B15-D7C4/0 |
| Serial number: / Tag number: | no. RA074602000 - BFL 115 |
| Measuring range / calibrated range | 0-108,3 kg/min / 1,66-108,3 kg/min |
| Output signal: | 4-20 mA |
| Calibration factor: | 1.9828 |
| Ordered by: | Baltic Fire Laboratory |
| Place and date of calibration: | E+H Cal. Lab. 11.06.2025 |
| Calibrated by: | Lukács László |
| Status: | OK for calibration |

| References | Order code | Serial n.: | Certificate |
|---|---|---|---|
| Promass 83F | 83F08-AD2SAMABAAAJ | 9B098002000 | N11203636 |
| Promass 83F | 83F25-AD2SAMABAAAJ | 9B097F02000 | N11203740 |
| Promass 83F | 83F50-AD2SAMABAAAJ | CB0A2C02000 | N11203392 |
| TR11-ARACARY17000 | | 9C005E142FD | WT1804393 |
| TTR31-A1A111YY2CAB | | F2004C0426E | WT1504267 |

The measurement results were traced to the national standard.

The calibration certificate contains data specific to the time and circumstances of the calibration of the instrument.

**Calibration method:**

The calibration was performed according to KE-01/2019.01.10 ver.:1

**Conditions of calibration:**

| | |
|---|---|
| Water temperature: | 21,3 °C |
| Ambient temperature: | 21,9 °C |
| Measuring fluid: | tapwater |

**Stamps:**

The calibration is certified by the 20250611_F1_01 stamp on the device.

This certificate can only be copied in its full form and scope

Endress+Hauser Magyarország
Folyamatműszerezési Kft.
1139 Budapest
Forgách u. 9/b.

1/2

Telefon +36 1 412 0421
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hungary@hu.endress.com
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N.o.: 20250611_F1_01

Endress+Hauser
People for Process Automation

Accredited Calibration Laboratory according to: NAH 2-0327/2021

**Results:**

| Set points | Set points | Reference value | Measured value | Measuring error | Measurement Uncertainty |
|---|---|---|---|---|---|
| % | kg/min | kg | kg | % | % |
| 1,55% | 1,676 | 1,677 | 1,680 | 0,18% | 0,15 |
| 23,08% | 25,003 | 25,003 | 25,011 | 0,03% | 0,15 |
| 46,19% | 50,040 | 50,041 | 50,030 | -0,02% | 0,15 |
| 70,30% | 76,152 | 75,518 | 75,496 | -0,03% | 0,15 |
| 99,21% | 107,473 | 108,371 | 108,357 | -0,01% | 0,15 |

**Measurement uncertainty:**
The uncertainty values given in the tabloids are extended ones which include uncertainties coming from the etalons, from the method of calibration and from enviromental conditions. In case of a normal (Gauss) distribution, the value multiplied by k=2 fits a 95% cover probability. The standard uncertainty was determined by the publication no. EA 4/02M of the European Accrediting Organization.

**Validity of the certificate:**
The date of a repeated inspection is to be determined by the user with regard to the operation circumstances of the measurement device

ENDRESS+HAUSER MAGYARORSZÁG KFT.
1139 Budapest, Forgách u. 9./b
Tel.: 412-0421 • Fax: 412-0424

Calibrated by
Laszlo Lukacs

Checked by
Laszlo Nemes

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Endress+Hauser Magyarország
Folyamatműszerezési Kft.
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**LABORATORIUM USŁUGOWO-BADAWCZE**
**„BIOCHEMIK" Sp. z o.o.**
**Pracownia Wzorcowania**
ul. Strefowa 15, 64 – 920 Piła
Mob. +48 727 630 955, e-mail: wzorcowanie@biochemik.pl, www.wzorcowanie.biochemik.pl

Calibration laboratory accredited by
Polish Centre of Accreditation, a signatory to EA MLA and ILAC MRA
that include recognition of calibration certificates.
Accreditation No AP 158

AP 158

# CALIBRATION CERTIFICATE

**Date of issue: 12th June 2025** **Certificate No: 182/6/25** **Page 1/4**

| | |
|---|---|
| **OBJECT OF CALIBRATION** | Climatic chamber<br>Manufacturer: -<br>Type: -<br>Serial number: -<br>User marking: BFL 117<br>Resolution: 0,1 °C, 0,1 %<br>Workspace dimensions: (width x depth x height): (2280 x 5400 x 2280) mm |
| **APPLICANT** | Baltic Fire Laboratory Sp. z o.o.<br>ul. Banińska 8<br>80-209 Tuchom, Poland |
| **PLACE OF CALIBRATION** | Baltic Fire Laboratory Sp. z o.o.<br>ul. Banińska 8<br>80-209 Tuchom, Poland |
| **CALIBRATION METHOD** | Calibration has been carried out according to the calibration procedure „Climatic and thermostatic chambers", PW-06, 7th edition of 02 January 2022. |
| **ENVIRONMENTAL CONDITIONS** | Temperature: (16,8 ÷ 19,8) °C<br>Relative humidity: (65,4 ÷ 74,6) % |
| **DATE OF CALIBRATION** | 5th June ÷ 6th June 2025 |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). |
| **CALIBRATION RESULTS** | The results have been presented on page 2/4 of this certificate including uncertainty of measurement. The results apply only to the calibration object. |
| **UNCERTAINTY OF MEASUREMENT** | Uncertainty of measurement has been evaluated in compliance EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95% and the coverage factor $k$=2. |

Baltic Fire Laboratory
BFL S/N: BFL117
Calib.Date: 05–06.06.2025
Next Calib.: 05.06.2027

Laboratorium Wzorcujące AP 158

Head of the Calibration Laboratory

M.Sc.Eng. Paweł Janik

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 158

**Date of issue: 12th June 2025** **Certificate No: 182/6/25** **Page 2/4**

**CALIBRATION RESULTS** Calibration results are the following:

| Set value of the test object | | Average measured reference value | | Average temperature indication of the test object | | Measurment error | | Measurement uncertainty [1] | |
|---|---|---|---|---|---|---|---|---|---|
| $t$ | $RH$ | $t_W$ | $RH_W$ | $t_X$ | $RH_X$ | $\Delta t$ | $\Delta RH$ | $U$ | |
| °C | % | °C | % | °C | % | °C | % | °C | % |
| Measuring location L1, Point P2 | | | | | | | | | |
| -18,0 | - | -18,6 | - | -18,6 | - | 0,0 | - | 2,2 | - |
| 19,0 | 90,0 | 19,2 | 92,5 | 19,0 | 92,6 | -0,2 | 0,1 | 0,2 | 3,5 |
| 21,0 | 90,0 | 21,2 | 90,5 | 21,0 | 91,6 | -0,2 | 1,1 | 0,3 | 6,4 |
| 25,0 | 80,0 | 25,1 | 81,3 | 25,0 | 82,0 | -0,1 | 0,7 | 0,6 | 3,5 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | | | | | | |

[1]The measurement uncertainty include into account the spatial inhomogeneity of the chamber.

**TEMPERATURE DISTRIBUTION IN THE CHAMBER (at temperature setting: -18,0 °C)**

| Measuring point | Average value reference temperature at the measuring point | Minimum value of the reference temperature at the measuring point | Maximum value of the reference temperature at the measuring point | Measurement uncertainty[3] |
|---|---|---|---|---|
| | °C | °C | °C | °C |
| L1P1 | -18,83 | -20,11 | -17,75 | 2,19 |
| **L1P2** | -18,55 | -19,65 | -17,62 | 2,06 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | |

[3]The measurement uncertainty does not include into account the spatial inhomogeneity of the chamber.

**TEMPERATURE AND RELATIVE HUMIDITY DISTRIBUTION IN THE CHAMBER (at humidity setting: 90,0 % at 19,0 °C)**

| Measuring point | Average value of reference humidity and temperature at the measuring point | | Minimum value of reference humidity and temperature at the measuring point | | Maximum value of reference humidity and temperature at the measuring point | | Measurement uncertainty[2] | |
|---|---|---|---|---|---|---|---|---|
| | °C | % RH | °C | % RH | °C | % RH | °C | % RH |
| L1P1 | 19,21 | 93,85 | 19,12 | 93,20 | 19,28 | 94,70 | 0,20 | 2,36 |
| **L1P2** | 19,20 | 92,51 | 19,12 | 91,76 | 19,28 | 93,36 | 0,20 | 3,11 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | | | | | |

[2]The measurement uncertainty does not include into account the spatial inhomogeneity of the chamber.

Authorized by:
M.Sc.Eng. Marta Piotrowska

Additional information:
Document signed with a qualified electronic signature.


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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 158

**Date of issue: 12th June 2025** **Certificate No: 182/6/25** **Page 3/4**

**TEMPERATURE AND RELATIVE HUMIDITY DISTRIBUTION IN THE CHAMBER (at humidity setting: 90,0 % at 21,0 °C)**

| Measuring point | Average value of reference humidity and temperature at the measuring point | | Minimum value of reference humidity and temperature at the measuring point | | Maximum value of reference humidity and temperature at the measuring point | | Measurement uncertainty[2)] | |
|---|---|---|---|---|---|---|---|---|
| | °C | % RH | °C | % RH | °C | % RH | °C | % RH |
| L1P1 | 21,24 | 91,90 | 21,16 | 87,87 | 21,42 | 93,27 | 0,25 | 5,94 |
| **L1P2** | 21,23 | 90,52 | 21,15 | 86,54 | 21,39 | 91,94 | 0,23 | 6,23 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | | | | | |

[2)]The measurement uncertainty does not include into account the spatial inhomogeneity of the chamber.

**TEMPERATURE AND RELATIVE HUMIDITY DISTRIBUTION IN THE CHAMBER (at humidity setting: 80,0 % at 25,0 °C)**

| Measuring point | Average value of reference humidity and temperature at the measuring point | | Minimum value of reference humidity and temperature at the measuring point | | Maximum value of reference humidity and temperature at the measuring point | | Measurement uncertainty[2)] | |
|---|---|---|---|---|---|---|---|---|
| | °C | % RH | °C | % RH | °C | % RH | °C | % RH |
| L1P1 | 25,06 | 82,76 | 24,94 | 82,32 | 25,50 | 83,72 | 0,60 | 2,31 |
| **L1P2** | 25,06 | 81,31 | 24,93 | 80,80 | 25,50 | 82,20 | 0,60 | 3,05 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | | | | | |

[2)]The measurement uncertainty does not include into account the spatial inhomogeneity of the chamber.

**PARAMETERS CHARACTERIZING THE CHAMBER (at temperature setting : -18,0 °C)**

| Reference value | Inhomogenity | Time stability[3)] | Radiation effect |
|---|---|---|---|
| °C | °C | °C | °C |
| Measuring location L2, Point P1 | | | |
| -18,55 | 0,28 | 1,10 | - |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | |

[3)]Determined within 60 minutes

**PARAMETERS CHARACTERIZING THE CHAMBER (at humidity setting: 90,0 % at 19,0 °C)**

| Reference value | | Inhomogenity | | Time stability[3)] | | Radiation effect |
|---|---|---|---|---|---|---|
| °C | % RH | °C | % RH | °C | % RH | °C |
| Measuring location L2, Point P1 | | | | | | |
| 19,20 | 92,51 | 0,01 | 1,34 | 0,08 | 0,85 | 0,02 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | | | |

[3)]Determined within 60 minutes

**PARAMETERS CHARACTERIZING THE CHAMBER (at humidity setting: 90,0 % at 21,0 °C)**

| Reference value | | Inhomogenity | | Time stability[3)] | | Radiation effect |
|---|---|---|---|---|---|---|
| °C | % RH | °C | % RH | °C | % RH | °C |
| Measuring location L2, Point P1 | | | | | | |
| 21,23 | 90,52 | 0,01 | 1,38 | 0,16 | 3,98 | 0,02 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | | | |

[3)]Determined within 60 minutes

Authorized by:
M.Sc.Eng. Marta Piotrowska

Additional information:
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**Date of issue: 12th June 2025** **Certificate No: 182/6/25** **Page 4/4**

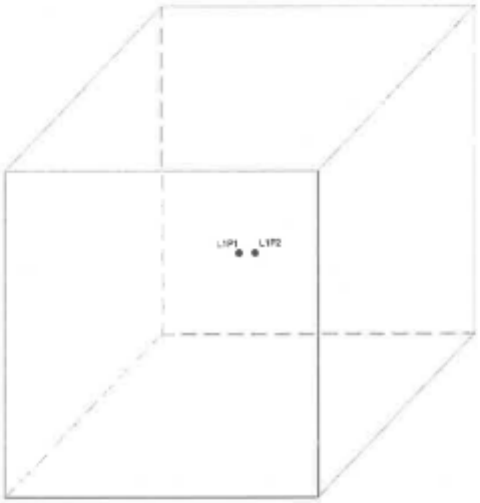
**PARAMETERS CHARACTERIZING THE CHAMBER (at humidity setting: 80,0 % at 25,0 °C)**

| Reference value | | Inhomogenity | | Time stability[3)] | | Radiation effect |
|---|---|---|---|---|---|---|
| °C | % RH | °C | % RH | °C | % RH | °C |
| Measuring location L2, Point P1 | | | | | | |
| 25,06 | 81,31 | 0,00 | 1,45 | 0,44 | 0,89 | 0,02 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | | | |

[3)]Determined within 60 minutes

**REVIEW DRAWING**

Distribution of measurement points during calibration in the temperature setting: -18,0 °C and in the relative humidity setting: 90,0 %, at temperature 19,0 °C; 90,0 % at temperature 21,0 °C; 80,0 % at 25,0 °C; The drawing does not reflect the actual proportions.




| Measuring point | Description of measurement points | Sensor No. |
|---|---|---|
| L1P1 | The sensor is placed 1100 mm from the left and 2700 mm from the back wall, at a height of 1140 mm. | B/252/W/S/PW/P<br>B/21/W/S/PW/P |
| **L1P2** | **The sensor is placed 1140 mm from the left and 2700 mm from the back wall, at a height of 1140 mm - the reference sensor.** | B/253/W/S/PW/P<br>B/16/W/S/PW/P |

Authorized by:
M.Sc.Eng. Marta Piotrowska

Additional information:
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TENSLAB Laboratorium Wzorcujące

**TENSLAB Spółka z ograniczoną odpowiedzialnością**
**LABORATORIUM WZORCUJĄCE**

| Siedziba: | Laboratorium: | Kontakt: |
|---|---|---|
| 80-554 GDAŃSK | 81-336 GDYNIA | www.tenslab.pl |
| ul. Śnieżna 5 | ul. Kadłubowców 4 | tel: +48 58 380 06 44 |

PCA Polskie Centrum Akredytacji WZORCOWANIE
AP 180

Calibration laboratory accredited by Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA that include recognition of calibration certificates. Accreditation No AP 180.

ilac-MRA

Baltic Fire Laboratory
BFL S/N: BFL120
Calib.Date: 13.06.2025
Next Calib.: 13.06.2027

# CALIBRATION CERTIFICATE

Date of issue: 13 June 2025 Certificate No: 1061/2025/3 Page 1/ 2

| | |
|---|---|
| **OBJECT OF CALIBRATION** | Digital pressure gauge, Type: MD0906, Serial number: 2206201176750, Producer: Gesa, Resolution: 0,01 bar, Measuring range: 0,0÷100,0 bar, Class: 0,1, Identification number: no data. |
| **CUSTOMER** | BALTIC FIRE LABORATORY SPÓŁKA Z O. O.<br>ul. Banińska 8<br>80-209 Tuchom |
| **PLACE OF CALIBRATION** | TENSLAB Sp. z o.o. Laboratorium Wzorcujące<br>ul. Kadłubowców 4<br>81-336 Gdynia |
| **CALIBRATION METHOD** | Procedura pomiarowa - Ciśnieniomierze elektroniczne - PP TENSLAB/CE/1/18 date of issue 20.07.2018 |
| **ENVIRONMENTAL CONDITIONS** | Ambient temperature: (21,8 ÷ 22,4) °C |
| **DATE OF CALIBRATION** | 13 June 2025 |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). |
| **CALIBRATION RESULTS** | The results have been presented on page(s) 2 of this certificate including uncertainty of measurement. The results relate only to the object of calibration. |
| **UNCERTAINTY OF MEASUREMENT** | Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor k = 2. |

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 180

Date of issue: 13 June 2025 Certificate No: 1061/2025/3 Page 2/ 2

**CALIBRATION RESULTS**

Calibration results are the following:

Determination of measurement error:

| No | Measured pressure value | Reference pressure value | Measurement error | Hysteresis | Measurement uncertainty |
|---|---|---|---|---|---|
| | bar | | | | |
| 1. | 0,00 | 0,00 | 0,00 | 0,00 | 0,04 |
| 2. | 5,00 | 5,03 | -0,03 | 0,01 | 0,04 |
| 3. | 8,00 | 8,03 | -0,03 | 0,01 | 0,04 |
| 4. | 16,00 | 16,03 | -0,03 | 0,01 | 0,04 |
| 5. | 30,00 | 30,02 | -0,02 | 0,02 | 0,04 |
| 6. | 40,00 | 40,02 | -0,02 | 0,02 | 0,04 |
| 7. | 50,00 | 50,02 | -0,02 | 0,02 | 0,04 |
| 8. | 60,00 | 60,02 | -0,02 | 0,02 | 0,04 |
| 9. | 75,00 | 75,01 | -0,01 | 0,02 | 0,04 |
| 10. | 90,00 | 90,01 | -0,01 | 0,02 | 0,04 |
| 11. | 100,00 | 100,02 | -0,02 | 0,01 | 0,04 |
| 12. | - | - | - | - | - |
| 13. | - | - | - | - | - |
| 14. | - | - | - | - | - |
| 15. | - | - | - | - | - |

Medium: oil

Authorized by:

Technical Manager
Paula Keister-Łyko

END OF CALIBRATION CERTIFICATE


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**Pracownia Wzorcowania**
ul. Strefowa 15, 64 – 920 Piła
Mob. +48 727 630 955, e-mail: wzorcowanie@biochemik.pl, www.wzorcowanie.biochemik.pl

Calibration laboratory accredited by
Polish Centre of Accreditation, a signatory to EA MLA and ILAC MRA
that include recognition of calibration certificates.
Accreditation No AP 158

AP 158

# CALIBRATION CERTIFICATE

**Date of issue: 28th November 2025** **Certificate No: 848/11/25** **Page 1/4**

| | |
|---|---|
| **OBJECT OF CALIBRATION** | Thermostatic chamber<br>Manufacturer: WAMED<br>Type: SUP-200G<br>Serial number: -<br>User marking: BFL 140<br>Resolution: 0,1 °C<br>Workspace dimensions: (width x depth x height): (550 x 400 x 1030) mm |
| **APPLICANT** | Baltic Fire Laboratory Sp. z o.o.<br>ul. Banińska 8<br>80-209 Tuchom, Poland |
| **PLACE OF CALIBRATION** | Baltic Fire Laboratory Sp. z o.o.<br>ul. Banińska 8<br>80-209 Tuchom, Poland |
| **CALIBRATION METHOD** | Calibration has been carried out according to the calibration procedure „Climatic and thermostatic chambers", PW-06, 7th edition of 02 January 2022. |
| **ENVIRONMENTAL CONDITIONS** | Temperature: (16,8 ÷ 18,3) °C<br>Relative humidity: (41,9 ÷ 44,7) % |
| **DATE OF CALIBRATION** | 17th November 2025 |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). |
| **CALIBRATION RESULTS** | The results have been presented on page 2/4 of this certificate including uncertainty of measurement. The results apply only to the calibration object. |
| **UNCERTAINTY OF MEASUREMENT** | Uncertainty of measurement has been evaluated in compliance EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95% and the coverage factor $k$=2. |

Baltic Fire Laboratory
BFL S/N: BFL140
Calib.Date: 17.11.2025
Next Calib.: 17.11.2027

Head of the Calibration Laboratory

M.Sc.Eng. Paweł Janik

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 158

**Date of issue: 28th November 2025** **Certificate No: 848/11/25** **Page 2/4**

**CALIBRATION RESULTS** Calibration results are the following:

| Set value of the test object | Average measured reference value | Average temperature indication of the test object | Measurment error | Measurement uncertainty [1)] |
|---|---|---|---|---|
| $t$ | $t_W$ | $t_X$ | $\Delta t$ | $U$ |
| °C | °C | °C | °C | °C |
| Measuring location L1, Point P2 | | | | |
| 23,0 | 22,4 | 23,0 | 0,6 | 1,1 |
| 49,0 | 50,7 | 49,1 | -1,6 | 0,9 |
| 104,0 | 105,6 | 104,0 | -1,6 | 2,1 |
| 150,0 | 146,6 | 150,1 | 3,5 | 3,2 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | |

[1)]The measurement uncertainty include into account the spatial inhomogeneity of the chamber.

**TEMPERATURE DISTRIBUTION IN THE CHAMBER (at temperature setting: 23,0 °C)**

| Measuring point | Average value reference temperature at the measuring point | Minimum value of the reference temperature at the measuring point | Maximum value of the reference temperature at the measuring point | Measurement uncertainty[3)] |
|---|---|---|---|---|
| | °C | °C | °C | °C |
| L1P1 | 22,35 | 21,85 | 22,98 | 1,01 |
| **L1P2** | 22,39 | 21,88 | 23,02 | 1,01 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | |

[2)]The measurement uncertainty does not include into account the spatial inhomogeneity of the chamber.

**TEMPERATURE DISTRIBUTION IN THE CHAMBER (at temperature setting: 49,0 °C)**

| Measuring point | Average value reference temperature at the measuring point | Minimum value of the reference temperature at the measuring point | Maximum value of the reference temperature at the measuring point | Measurement uncertainty[3)] |
|---|---|---|---|---|
| | °C | °C | °C | °C |
| L1P1 | 50,66 | 50,20 | 50,93 | 0,80 |
| **L1P2** | 50,73 | 50,20 | 51,02 | 0,86 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | |

[2)]The measurement uncertainty does not include into account the spatial inhomogeneity of the chamber.

**TEMPERATURE DISTRIBUTION IN THE CHAMBER (at temperature setting: 104,0 °C)**

| Measuring point | Average value reference temperature at the measuring point | Minimum value of the reference temperature at the measuring point | Maximum value of the reference temperature at the measuring point | Measurement uncertainty[3)] |
|---|---|---|---|---|
| | °C | °C | °C | °C |
| L1P1 | 105,23 | 104,44 | 106,42 | 2,01 |
| **L1P2** | 105,64 | 104,82 | 106,87 | 2,04 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | |

[2)]The measurement uncertainty does not include into account the spatial inhomogeneity of the chamber.

Authorized by:
M.Sc.Eng. Marta Piotrowska

Additional information:
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**Date of issue: 28th November 2025** **Certificate No: 848/11/25** **Page 3/4**

**TEMPERATURE DISTRIBUTION IN THE CHAMBER (at temperature setting: 150,0 °C)**

| Measuring point | Average value reference temperature at the measuring point | Minimum value of the reference temperature at the measuring point | Maximum value of the reference temperature at the measuring point | Measurement uncertainty[3)] |
|---|---|---|---|---|
| | °C | °C | °C | °C |
| L1P1 | 146,49 | 145,34 | 148,75 | 3,19 |
| **L1P2** | 146,58 | 145,52 | 148,82 | 3,17 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | | |

[2)]The measurement uncertainty does not include into account the spatial inhomogeneity of the chamber.

**PARAMETERS CHARACTERIZING THE CHAMBER (at temperature setting: 23,0 °C)**

| Reference value | Inhomogenity | Time stability[3)] | Radiation effect |
|---|---|---|---|
| °C | °C | °C | °C |
| Measuring location L1, Point P2 | | | |
| 22,39 | 0,04 | 0,63 | 0,00 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | |

[3)]Determined within 60 minutes

**PARAMETERS CHARACTERIZING THE CHAMBER (at temperature setting: 49,0 °C)**

| Reference value | Inhomogenity | Time stability[3)] | Radiation effect |
|---|---|---|---|
| °C | °C | °C | °C |
| Measuring location L1, Point P2 | | | |
| 50,73 | 0,07 | 0,53 | 0,00 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | |

[3)]Determined within 60 minutes

**PARAMETERS CHARACTERIZING THE CHAMBER (at temperature setting: 104,0 °C)**

| Reference value | Inhomogenity | Time stability[3)] | Radiation effect |
|---|---|---|---|
| °C | °C | °C | °C |
| Measuring location L1, Point P2 | | | |
| 105,64 | 0,41 | 1,23 | 0,00 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | |

[3)]Determined within 60 minutes

**PARAMETERS CHARACTERIZING THE CHAMBER (at temperature setting: 150,0 °C)**

| Reference value | Inhomogenity | Time stability[3)] | Radiation effect |
|---|---|---|---|
| °C | °C | °C | °C |
| Measuring location L1, Point P2 | | | |
| 146,58 | 0,09 | 2,24 | 0,00 |
| Calibration results refer to the International Temperature Scale of 1990 (ITS – 90) | | | |

[3)]Determined within 60 minutes

Authorized by:
M.Sc.Eng. Marta Piotrowska

Additional information:
Document signed with a qualified electronic signature.


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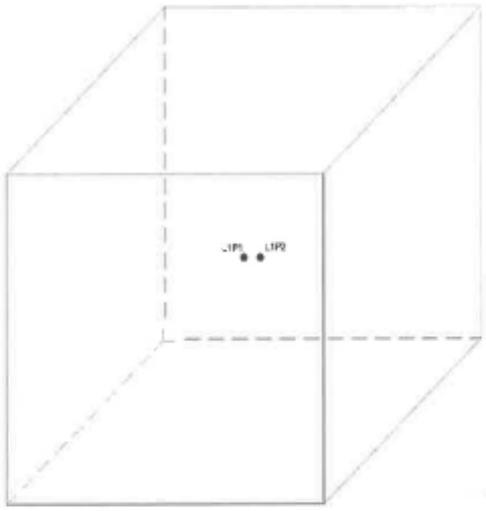
CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 158

**Date of issue: 28th November 2025** **Certificate No: 848/11/25** **Page 4/4**

**REVIEW DRAWING**

Distribution of measurement points during calibration in the temperature setting: 23,0 °C, 49,0 °C, 104,0 °C, 150,0 °C. The drawing does not reflect the actual proportions.




| Measuring point | Description of measurement points | Sensor No. |
|---|---|---|
| L1P1 | The sensor is placed 225 mm from the left and 200 mm from the back wall, at a height of 530 mm. | B/137/W/S/PW/P |
| **L1P2** | **The sensor is placed 275 mm from the right and 200 mm from the back wall, at a height of 530 mm - the reference sensor.** | B/139/W/S/PW/P |

Authorized by:
M.Sc.Eng. Marta Piotrowska

Additional information:
Document signed with a qualified electronic signature.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**RADWAG Wagi Elektroniczne Witold Lewandowski**
26-600 Radom, Toruńska 5
**METROLOGY, RESEARCH AND CERTIFICATION CENTRE - MEASURING LABORATORY**
26-600 Radom, Starowiejska 17A
tel. /48/ 386 64 70; fax.: /48/ 385 00 11

Calibration laboratory accredited by
Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA
that include recognition of calibration certificates.
Accreditation No AP 069.

AP 069

# CALIBRATION CERTIFICATE

Dispatch date: 11 October 2025 | Certificate No: 13817/4771/25/E | Page: 1 / 2

| | |
|---|---|
| **OBJECT OF CALIBRATION** | Non-automatic electronic weighing instrument - single range<br>Manufacturer: RADWAG Wagi Elektroniczne<br>Type / symbol: WLC 30/F1/R<br>Serial No: 856846<br>Capacity *Max*: 30 kg<br>Scale interval *d*: 0,5 g |
| **APPLICANT** | RADWAG Wagi Elektroniczne<br>ul. Toruńska 5, 26-600 Radom |
| **USER** | Baltic Fire Laboratory Sp. z o.o.<br>ul. Banińska 8, 80-209 Tuchom |
| **PLACE OF CALIBRATION** | RADWAG Wagi Elektroniczne<br>Centrum Metrologii, Badań i Certyfikacji - Laboratorium Pomiarowe<br>ul. Starowiejska 17 A, 26-600 Radom |
| **CALIBRATION METHOD** | Calibration Procedure PW 01 rev. XV of 2 January 2025 based on EURAMET cg-18 v. 4.0 (11/2015). |
| **ENVIRONMENTAL CONDITIONS** | Air temperature: ( 23,58 ÷ 23,62 ) ± 0,20 °C<br>Relative air humidity: ( 49,0 ÷ 49,3 ) ± 1,1 % |
| **DATE OF CALIBRATION** | 11 October 2025 |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides treaceability of measurement results to the International System of Units (SI). |
| **CALIBRATION RESULTS** | The results have been presented on page 2 of this certificate including uncertainty of measurement. |
| **UNCERTAINTY OF MEASUREMENT** | Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2022.<br>The expanded uncertainty assigned corresponds to a coverage probability of 95% and the coverage factor $k = 2$. |

Baltic Fire Laboratory
BFL S/N: BFL141
Calib.Date: 11.10.2025
Next Calib.: 11.10.2027

KIEROWNIK
Laboratorium Pomiarowego
Tomasz Jędrzejewski

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 069

Dispatch date: 11 October 2025 Certificate No: 13817/4771/25/E Page: 2 / 2

**CALIBRATION RESULTS** Calibration results presented below refer only to the calibration object described on the first page of the certificate.

Adjustment device: external
Adjustment weight: external

MEASUREMENT ERROR

| Load $L$ g | Load TARE $L_T$ g | Mass reference $m_{ref}$ g | Indication of instrument $I$ g | Measurement error $E(I)$ g | Uncertainty of measurement $U(E)$ g |
|---|---|---|---|---|---|
| 50 | | 50,00007 | 50,0 | 0,0 | 0,7 |
| 7000 | | 7000,00463 | 7000,5 | 0,5 | 0,9 |
| 15000 | | 15000,0042 | 15000,5 | 0,5 | 1,5 |
| 22000 | | 22000,00823 | 22000,0 | 0,0 | 2,0 |
| 30000 | | 30000,0078 | 30000,0 | 0,0 | 2,7 |

REPEATABILITY

| Load L g | Standard deviation $s$ g |
|---|---|
| 30000 | 0,27 |
| Standard deviation calculated for 5 series of measurement. | |

ECCENTRICITY

| Position of load | Load $L_{ecc}$ g | Area no | Indication of instrument $I_{ecc}$ g | Indication difference $\Delta I_{ecc}$ g |
|---|---|---|---|---|
| | 10000 | 1 | 10000,5 | $\lvert\Delta I_{ecc}\rvert_{max}$ 1,5 |
| | | 2 | 10001,0 | 0,5 |
| | | 3 | 9999,5 | -1,0 |
| | | 4 | 9999,0 | -1,5 |
| | | 5 | 10001,0 | 0,5 |

Authorized by: Tomasz Jędrzejewski


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Baltic Fire Laboratory
BFL S/N: BFL1002
Calib.Date: 31.10.2024
Next Calib.: 31.10.2026

Institute of Power Engineering – National Research Institute
MEASURING APPARATUS LABORATORY
02-981 Warszawa, ul. Augustówka 36
tel. (22) 34 51 438
lap@ien.com.pl www.ien.com.pl

AP 013

Calibration laboratory accredited by
Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA
that include recognition of calibration certificates.
Accreditation No AP 013

# CALIBRATION CERTIFICATE

Date of issue: 31 October 2024 Certificate No: 4100/2024/E Page 1/3

| | |
|---|---|
| **OBJECT OF CALIBRATION** | Temperature indicator model NI 9213, manufacturer NATIONAL INSTRUMENTS, serial number 187F11C, 16-channel with a temperature measuring chain cooperating with K-type thermocouples. |
| **APPLICANT** | Baltic Fire Laboratory Sp. z o.o.<br>80 – 209 Tuchom, ul. Banińska 8<br>Order No: MAP.4032.1332.2024 |
| **PLACE OF CALIBRATION** | Baltic Fire Laboratory Sp. z o.o.<br>80 – 209 Tuchom, ul. Banińska 8 |
| **CALIBRATION METHOD** | Calibration was performed according to the Measurement Procedure P4/MAP „Calibration apparatus for measuring temperature, pressure, electrical quantities and humidity on objects", edition XII released on 30 May 2023. |
| **ENVIRONMENTAL CONDITIONS** | Ambient temperature (19,6 ÷ 20,2) °C<br>Relative humidity (65,3 ÷ 72,2) % |
| **DATE OF CALIBRATION** | 22 October 2024 |
| **TRACEABILITY** | This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the International System of Units (SI). |
| **CALIBRATION RESULTS** | The results have been presented on page 2/3 ÷ 3/3 of this certificate including uncertainty of measurement. The result apply to the object of calibration only. |
| **UNCERTAINTY OF MEASUREMENT** | Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2022. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor $k = 2$. |

Akredytowane Laboratorium Wzorcujące AP 013

KIEROWNIK
Laboratorium Aparatury Pomiarowej
mgr inż. Roman Witkowski

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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 013.

Date of issue: 31 October 2024 | Certificate No: 4100/2024/E | Page 2/3

**CALIBRATION RESULTS**

The results of the calibration for compliance with the thermometric characteristics according to PN – EN 60584 – 1:2014 – 04 are as follows:

| REFERENCE TEMPERATURE *Wp* | MEASURED TEMPERATURE *Ww* | | | | | | | | | | MEASUREMENT ERROR *Ww-Wp* | | | | | | | | | | MEASUREMENT UNCERTAINTY *U* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| °C | °C | | | | | | | | | | °C | | | | | | | | | | °C |
| **Mark on the card →** | **TC0** | **TC1** | **TC2** | **TC3** | **TC4** | **TC5** | **TC6** | **TC7** | **TC8** | **TC9** | **TC0** | **TC1** | **TC2** | **TC3** | **TC4** | **TC5** | **TC6** | **TC7** | **TC8** | **TC9** | |
| **Reading in the program → DAQ Express 4.1.0 Nr 7.1.0.50148** | CDAQ1Mod8/ai0 | CDAQ1Mod8/ai1 | CDAQ1Mod8/ai2 | CDAQ1Mod8/ai3 | CDAQ1Mod8/ai4 | CDAQ1Mod8/ai5 | CDAQ1Mod8/ai6 | CDAQ1Mod8/ai7 | CDAQ1Mod8/ai8 | CDAQ1Mod8/ai9 | CDAQ1Mod8/ai0 | CDAQ1Mod8/ai1 | CDAQ1Mod8/ai2 | CDAQ1Mod8/ai3 | CDAQ1Mod8/ai4 | CDAQ1Mod8/ai5 | CDAQ1Mod8/ai6 | CDAQ1Mod8/ai7 | CDAQ1Mod8/ai8 | CDAQ1Mod8/ai9 | |
| 10,0 | 10,1 | 10,1 | 9,9 | 9,9 | 9,9 | 9,9 | 9,8 | 9,8 | 9,8 | 9,8 | 0,1 | 0,1 | -0,1 | -0,1 | -0,1 | -0,1 | -0,2 | -0,2 | -0,2 | -0,2 | 0,2 |
| 58,0 | 58,2 | 58,2 | 58,0 | 58,1 | 58,0 | 58,0 | 57,9 | 57,9 | 57,9 | 57,9 | 0,2 | 0,2 | 0,0 | 0,1 | 0,0 | 0,0 | -0,1 | -0,1 | -0,1 | -0,1 | 0,2 |
| 250,0 | 250,2 | 250,1 | 250,0 | 250,0 | 249,9 | 250,0 | 249,9 | 249,9 | 249,9 | 249,9 | 0,2 | 0,1 | 0,0 | 0,0 | -0,1 | 0,0 | -0,1 | -0,1 | -0,1 | -0,1 | 0,2 |
| 500,0 | 500,1 | 500,1 | 500,0 | 500,0 | 499,9 | 500,0 | 499,9 | 499,9 | 499,9 | 499,8 | 0,1 | 0,1 | 0,0 | 0,0 | -0,1 | 0,0 | -0,1 | -0,1 | -0,1 | -0,2 | 0,2 |
| 950,0 | 950,1 | 950,1 | 950,0 | 950,0 | 949,9 | 950,0 | 949,8 | 949,8 | 949,8 | 949,8 | 0,1 | 0,1 | 0,0 | 0,0 | -0,1 | 0,0 | -0,2 | -0,2 | -0,2 | -0,2 | 0,2 |
| 1200,0 | 1200,2 | 1200,1 | 1200,0 | 1200,0 | 1199,9 | 1200,0 | 1199,8 | 1199,9 | 1199,8 | 1199,8 | 0,2 | 0,1 | 0,0 | 0,0 | -0,1 | 0,0 | -0,2 | -0,1 | -0,2 | -0,2 | 0,2 |

Temperatures given are referred to the International Temperature Scale of 1990 (ITS-90).

Authorized by: KIEROWNIK Laboratorium Aparatury Pomiarowej mgr inż. Roman Witkowski



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CALIBRATION CERTIFICATE issued by ACCREDITED LABORATORY No AP 013.

Date of issue: 31 October 2024 | Certificate No: 4100/2024/E | Page 3/3

**CALIBRATION RESULTS**

The results of the calibration for compliance with the thermometric characteristics according to PN – EN 60584 – 1:2014 – 04 are as follows:

| REFERENCE TEMPERATURE *Wp* | MEASURED TEMPERATURE *Ww* | | | | | | MEASUREMENT ERROR *Ww-Wp* | | | | | | MEASUREMENT UNCERTAINTY *U* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| °C | °C | | | | | | °C | | | | | | °C |
| **Mark on the card →** | **TC10** | **TC11** | **TC12** | **TC13** | **TC14** | **TC15** | **TC10** | **TC11** | **TC12** | **TC13** | **TC14** | **TC15** | |
| **Reading in the program → DAQ Express 4.1.0 Nr 7.1.0.50148** | CDAQ1Mod8/ai10 | CDAQ1Mod8/ai11 | CDAQ1Mod8/ai12 | CDAQ1Mod8/ai13 | CDAQ1Mod8/ai14 | CDAQ1Mod8/ai15 | CDAQ1Mod8/ai10 | CDAQ1Mod8/ai11 | CDAQ1Mod8/ai12 | CDAQ1Mod8/ai13 | CDAQ1Mod8/ai14 | CDAQ1Mod8/ai15 | |
| 10,0 | 9,8 | 9,7 | 9,7 | 9,7 | 9,7 | 9,8 | -0,2 | -0,3 | -0,3 | -0,3 | -0,3 | -0,2 | 0,2 |
| 58,0 | 57,8 | 57,8 | 57,8 | 57,8 | 57,8 | 57,9 | -0,2 | -0,2 | -0,2 | -0,2 | -0,2 | -0,1 | 0,2 |
| 250,0 | 249,8 | 249,8 | 249,8 | 249,8 | 249,8 | 249,9 | -0,2 | -0,2 | -0,2 | -0,2 | -0,2 | -0,1 | 0,2 |
| 500,0 | 499,8 | 499,8 | 499,8 | 499,8 | 499,8 | 499,9 | -0,2 | -0,2 | -0,2 | -0,2 | -0,2 | -0,1 | 0,2 |
| 950,0 | 949,8 | 949,7 | 949,7 | 949,7 | 949,7 | 949,8 | -0,2 | -0,3 | -0,3 | -0,3 | -0,3 | -0,2 | 0,2 |
| 1200,0 | 1199,7 | 1199,7 | 1199,7 | 1199,7 | 1199,7 | 1199,9 | -0,3 | -0,3 | -0,3 | -0,3 | -0,3 | -0,1 | 0,2 |

Temperatures given are referred to the International Temperature Scale of 1990 (ITS-90).

Authorized by: KIEROWNIK Laboratorium Aparatury Pomiarowej
mgr inż. Roman Witkowski


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PCA Polskie Centrum Akredytacji WZORCOWANIE
AP 201

Guenther Polska Sp. z o.o.
ul. Wrocławska 27C 55-095 Długołęka
Laboratorium wzorcujące akredytowane
przez Polskie Centrum Akredytacji,
sygnatariusza porozumień EA MLA i ILAC MRA
dotyczących wzajemnego uznawania świadectw
Nr akredytacji AP 201
*Calibration laboratory accredited by Polish Centre for Accreditation, a signatory to EA MLA and ILAC MRA that include recognition of calibration certificates. Accreditation No. AP 201*

GUENTHER Polska
member of the GÜNTHER Group
Technologie pomiaru temperatury
Niezawodne • Dokładne • Certyfikowane

# ŚWIADECTWO WZORCOWANIA NR: PA2506021

*CALIBRATION CERTIFICATE NO.*

Data wydania: 24.06.2025
*Release date*

| | |
|---|---|
| **ZGŁASZAJĄCY** *Applicant* | **BALTIC FIRE LABORATORY Sp. z o. o.**<br>**ul. Banińska 8**<br>**80-209 Tuchom** |
| **MIEJSCE WZORCOWANIA** *Place of calibration* | **Guenther Polska Sp. z o.o.**<br>**ul. Wrocławska 27c**<br>**55-095 Długołęka** |
| **NR ZAMÓWIENIA ZEW.** *External order No.* | **zam. z dnia 04.06.2025** |
| **NR ZAMÓWIENIA WEW.** *Internal order No.* | **ZS 053/06/2025** |
| **OBIEKT WZORCOWANIA** *Calibration object* | **Nazwa:** *Name* **Czujnik termoelektryczny** *Thermocouple* **Non-expendable Ø : 1,5 mm**<br>**Typ:** *Type* **1x NiCr-NiAl/K**<br>**Kod artykułu:** *Article code* **20053110**<br>**Producent/Model:** *Manufacturer/Model* **Guenther** |
| **DATA WZORCOWANIA** *Calibration date* | 20-23.06.2025 |
| **RODZAJ WZORCOWANIA** *Calibration type* | Rekalibracja / Recalibration |

| | |
|---|---|
| **METODA WZORCOWANIA** *Calibration method* | Wzorcowanie zostało przeprowadzone zgodnie z procedurą QMV9.01.01 Wzorcowanie termoelementu metodą porównawczą wer. 3.0 z dnia 12.10.2021 (opracowanej na podstawie ASTM E220-19).<br>*The calibration has been performed in accordance with procedure QMV9.01.01 Calibration of the thermocouple by the comparison method ver.3.0 of 12.10.2021 (based on the ASTM E220-19).* |
| **SPÓJNOŚĆ POMIAROWA** *Measurement traceability* | Świadectwo potwierdza spójność wyników pomiarów z jednostkami miar Międzynarodowego Układu Jednostek Miar (SI).<br>*The certificate provides traceability of measurement results to the International System of Units (SI).* |
| **NIEPEWNOŚĆ POMIARU** *Measurement uncertainty* | Niepewność pomiaru została określona zgodnie z dokumentem EA-4/02 M:2022.<br>Podane wartości niepewności stanowią niepewności rozszerzone przy prawdopodobieństwie rozszerzenia ok. 95% i współczynniku rozszerzenia $k = 2$.<br>*The measurement uncertainty has been determined in accordance with EA-4/02 M: 2022.*<br>*The reported uncertainties of measurement are stated as the expanded uncertainties corresponded to a coverage probability of approximately 95% and a coverage factor $k = 2$.* |
| **UWAGI** *Comments* | Podane wyniki wzorcowania dotyczą wyłącznie wzorcowanego obiektu.<br>*Calibration results apply only calibrated object.*<br>W razie wątpliwości ważny jest oryginalny polski tekst.<br>*If there are any doubts, the Polish version shall prevail.*<br>Niniejsze świadectwo może być okazywane lub kopiowane tylko w całości.<br>*This certificate may be presented or copied as a whole document only.* |



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BNP PARIBAS BANK POLSKA S.A.
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EUR 61 1750 1064 0000 0000 2055 6757 Kod SWIFT/BIC: PPABPLPKXXX



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**ŚWIADECTWO WZORCOWANIA NR: PA2506021**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## UŻYTE WZORCE I URZĄDZENIA POMIAROWE
*Reference probes and measuring devices*

### WZORZEC
*Reference probes*

| | | | | |
|---|---|---|---|---|
| T≤ 250 °C | Pt100 / 4 | SW 44/35/INT/BS-LWT/2025 | L-R-0025 | 07-04-2026 |
| T> 250 °C | Pt100 / 4 | 4166/2024 | L-R-0021 | 28-10-2025 |
| T> 500 °C | PtRh10-Pt/S | PA2411069/1 | L-T-0040 | 19-11-2025 |

### URZĄDZENIE POMIAROWE
*Measuring instrument*

| | | | | |
|---|---|---|---|---|
| T≤ 58 °C | Keysight | 2672/2024 | L-M-0007 | 14-07-2025 |
| T> 58 °C | Keysight | 76/2025 | L-M-0008 | 16-01-2026 |
| T> 250 °C | Keysight | 2672/2024 | L-M-0007 | 14-07-2025 |
| T> 500 °C | Keysight | 4990/2024 | L-M-0009 | 22-12-2025 |

### ELEMENT GRZEJNY
*Temperature source*

| | | | |
|---|---|---|---|
| T≤ 58 °C | Fluke | głębokość zanurzenia = 150 mm | L-H-0002 |
| T> 58 °C | Fluke | głębokość zanurzenia = 150 mm | L-H-0003 |
| T> 500 °C | Additel | głębokość zanurzenia = 150 mm | L-H-0011 |
| | | *Immersion depth* | |

### SPOINA ODNIESIENIA 0 °C
*Cold junction*

| | | | |
|---|---|---|---|
| T≤ 58 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0002 |
| T> 58 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0004 |
| T> 250 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0002 |
| | | *Immersion depth* | |

## WARUNKI ŚRODOWISKOWE
*Environmental conditions*

Temperatura otoczenia (21,9 ÷ 24,7) °C
*Ambient temperature*
Wilgotność względna (29,9 ÷ 44,3) %
*Humidity*

Data wzorcowania: 20-23.06.2025
*Calibration date*

Strona **2 / 4**
*Page*


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Technologie pomiaru temperatury
Niezawodne . Dokładne . Certyfikowane

**ŚWIADECTWO WZORCOWANIA NR: PA2506021**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## WYNIKI WZORCOWANIA
## *Results of calibration*

| CZUJNIK TYPU *Sensor type* | TEMPERATURA *Temperature* NOMINALNA *Nominal* [°C] | TEMPERATURA *Temperature* ODNIESIENIA *Reference* [°C] | TEMPERATURA *Temperature* OBLICZONA *Calculated* [°C] | ZMIERZONE NAPIĘCIE TERMOELEKTRYCZNE *Thermovoltage* [mV] | BŁĄD POMIARU *Measurement error* [°C] | NAJWIĘKSZY BŁĄD DOPUSZCZALNY *Maximum permissible error* +/- [°C] | NIEPEWNOŚĆ POMIARU *Measurement uncertainty* +/- [°C] | UWAGI *Comments* |
|---|---|---|---|---|---|---|---|---|
| K | 10,0 | 10,0 | 9,9 | 0,394 | -0,1 | 1,5 | 0,7 | 1851220/1 PA2506021/1 |
| | 58,0 | 57,9 | 57,5 | 2,333 | -0,4 | 1,5 | 0,7 | |
| | 250,0 | 250,1 | 249,1 | 10,118 | -1,0 | 1,5 | 0,7 | |
| | 500,0 | 498,2 | 497,2 | 20,524 | -1,0 | 2,0 | 0,7 | |
| | 950,0 | 950,5 | 948,3 | 39,247 | -2,2 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,8 | 0,391 | -0,2 | 1,5 | 0,7 | 1851220/5 PA2506021/2 |
| | 58,0 | 57,9 | 57,6 | 2,338 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 250,0 | 10,153 | 0,0 | 1,5 | 0,7 | |
| | 500,0 | 498,2 | 497,8 | 20,551 | -0,4 | 2,0 | 0,7 | |
| | 950,0 | 950,0 | 949,5 | 39,295 | -0,5 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,8 | 0,391 | -0,2 | 1,5 | 0,7 | 1851220/10 PA2506021/3 |
| | 58,0 | 57,9 | 57,6 | 2,337 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 249,7 | 10,140 | -0,3 | 1,5 | 0,7 | |
| | 500,0 | 498,2 | 497,4 | 20,532 | -0,8 | 2,0 | 0,7 | |
| | 950,0 | 950,0 | 947,5 | 39,214 | -2,5 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,8 | 0,393 | -0,2 | 1,5 | 0,7 | 1851220/15 PA2506021/4 |
| | 58,0 | 57,9 | 57,6 | 2,337 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 250,4 | 10,171 | 0,4 | 1,5 | 0,7 | |
| | 500,0 | 499,5 | 499,7 | 20,632 | 0,2 | 2,0 | 0,7 | |
| | 950,0 | 950,0 | 950,3 | 39,325 | 0,3 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,9 | 0,394 | -0,1 | 1,5 | 0,7 | 1851220/22 PA2506021/5 |
| | 58,0 | 57,9 | 57,4 | 2,330 | -0,5 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 249,2 | 10,121 | -0,8 | 1,5 | 0,7 | |
| | 500,0 | 498,2 | 497,0 | 20,515 | -1,2 | 2,0 | 0,7 | |
| | 950,0 | 950,7 | 949,4 | 39,291 | -1,3 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,9 | 0,393 | -0,1 | 1,5 | 0,7 | 1851220/31 PA2506021/6 |
| | 58,0 | 57,9 | 57,5 | 2,333 | -0,4 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 249,6 | 10,138 | -0,4 | 1,5 | 0,7 | |
| | 500,0 | 498,2 | 497,5 | 20,536 | -0,7 | 2,0 | 0,7 | |
| | 950,0 | 950,0 | 949,4 | 39,289 | -0,6 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,9 | 0,395 | -0,1 | 1,5 | 0,7 | 1851220/33 PA2506021/7 |
| | 58,0 | 57,9 | 57,6 | 2,337 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 249,2 | 10,123 | -0,8 | 1,5 | 0,7 | |
| | 500,0 | 499,5 | 499,1 | 20,605 | -0,4 | 2,0 | 0,7 | |
| | 950,0 | 950,0 | 950,1 | 39,317 | 0,1 | 3,8 | 1,8 | |

Data wzorcowania: 20-23.06.2025
*Calibration date*

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NIP 895-19-06-589
REGON 020702531
KRS 0000300821
BNP PARIBAS BANK POLSKA S.A.
PLN 96 1750 1064 0000 0000 2055 6722
EUR 61 1750 1064 0000 0000 2065 6757 Kod SWIFT/BIC: PPABPLPKXXX


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**ŚWIADECTWO WZORCOWANIA NR: PA2506021**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

| CZUJNIK TYPU *Sensor type* | TEMPERATURA *Temperature* NOMINALNA *Nominal* | ODNIESIENIA *Reference* | OBLICZONA *Calculated* | ZMIERZONE NAPIĘCIE TERMOELEKTRYCZNE *Thermovoltage* | BŁĄD POMIARU *Measurement error* | NAJWIĘKSZY BŁĄD DOPUSZCZALNY *Maximum permissible error* | NIEPEWNOŚĆ POMIARU *Measurement uncertainty* | UWAGI *Comments* |
|---|---|---|---|---|---|---|---|---|
| | [°C] | | | [mV] | [°C] | +/- [°C] | +/- [°C] | |
| K | 10,0 | 10,0 | 9,9 | 0,394 | -0,1 | 1,5 | 0,7 | 185122/36 PA2506021/8 |
| | 58,0 | 57,9 | 57,4 | 2,329 | -0,5 | 1,5 | 0,7 | |
| | 250,0 | 250,1 | 248,8 | 10,106 | -1,3 | 1,5 | 0,7 | |
| | 500,0 | 498,2 | 496,8 | 20,507 | -1,4 | 2,0 | 0,7 | |
| | 950,0 | 950,5 | 948,3 | 39,245 | -2,2 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,8 | 0,391 | -0,2 | 1,5 | 0,7 | 185122/39 PA2506021/9 |
| | 58,0 | 57,9 | 57,6 | 2,338 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 250,2 | 10,162 | 0,2 | 1,5 | 0,7 | |
| | 500,0 | 499,5 | 499,6 | 20,626 | 0,1 | 2,0 | 0,7 | |
| | 950,0 | 950,0 | 949,9 | 39,309 | -0,1 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,9 | 0,395 | -0,1 | 1,5 | 0,7 | 185122/46 PA2506021/10 |
| | 58,0 | 57,9 | 57,6 | 2,334 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,1 | 249,2 | 10,121 | -0,9 | 1,5 | 0,7 | |
| | 500,0 | 498,2 | 496,8 | 20,507 | -1,4 | 2,0 | 0,7 | |
| | 950,0 | 950,5 | 948,7 | 39,264 | -1,8 | 3,8 | 1,8 | |

## UWAGI
*Comments*

- Temperatura nominalna: punkt nastawy wynikający z zamówienia.
  *Nominal temperature: set point specified in the order.*
- Temperatura odniesienia: średnia wartość z pomiarów odczytanych z wzorca.
  *Reference temperature: average value of the measurement results read from the reference standard.*
- Temperatura obliczona: wartość temperatury obliczona na podstawie normy ASTM E230M-23a z wartości zmierzonej napięcia termoelektrycznego obiektu.
  *Calculated temperature: temperature value calculated from the measured thermovoltage of the calibrated object on the basis of the ASTM E230M-23a.*
- Błąd pomiaru = Temperatura obliczona - Temperatura odniesienia
  *Measurement error = Calculated temperature - Reference temperature*
- Największy błąd dopuszczalny: dopuszczalny błąd pomiaru temperatury według klasy 1 wg PN EN 60584-1:2014 pkt 5.1.
  *Maximum permissible error: according to the Class 1 acc. to PN EN 60584-1: 2014 point 5.1.*
- Stwierdzenie zgodności z daną specyfikacją podjęto na podstawie zasady prostej akceptacji ILAC G8:09/2019 w=0 TUR>3:1.
  Ryzyko specyficzne błędnej akceptacji/ błędnego odrzucenia wynosi 50%.
- *Compliance with the principles of the simple acceptance according to the ILAC G8:09/2019 w=0 TUR >3:1. The specific risk of a false acceptance/false rejection can be up to 50%.*

## ZGODNOŚĆ Z WYMAGANIAMI
*Conformity with requirements*

Na podstawie wszystkich wyników wzorcowania stwierdzono zgodność z wymaganiami PN-EN 60584-1:2014-04 pkt 5.1 dla klasy 1. Conformance with PN-EN 60584-1:2014-04 pt 5.1 class 1 was found on the basis of all calibration results.

Wykonał: A.Grykałowska
*Made by*
Inżynier Laboratorium
*Laboratory Engineer*
dr inż. Agnieszka Grykałowska

Autoryzował:
*Approved*
Kierownik Laboratorium
*Head of Laboratory*
mgr inż. Elwira Słocka

Podpis:
*Signature*

KONIEC/ *End*

Data wzorcowania: 20-23.06.2025
*Calibration date*

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PCA Polskie Centrum Akredytacji WZORCOWANIE
AP 201

Guenther Polska Sp. z o.o.
ul. Wrocławska 27C 55-095 Długołęka
Laboratorium wzorcujące akredytowane
przez Polskie Centrum Akredytacji,
sygnatariusza porozumień EA MLA i ILAC MRA
dotyczących wzajemnego uznawania świadectw
Nr akredytacji AP 201
*Calibration laboratory accredited by*
*Polish Centre for Accreditation,*
*a signatory to EA MLA and ILAC MRA*
*that include recognition of calibration certificates.*
*Accreditation No. AP 201*

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Technologie pomiaru temperatury
Niezawodne . Dokładne . Certyfikowane

# ŚWIADECTWO WZORCOWANIA NR: PA2507022

*CALIBRATION CERTIFICATE NO.*

Data wydania: 14.07.2025
*Release date*

| | |
|---|---|
| **ZGŁASZAJĄCY** *Applicant* | **BALTIC FIRE LABORATORY Sp. z o. o.**<br>**ul. Banińska 8**<br>**80-209 Tuchom** |
| **MIEJSCE WZORCOWANIA** *Place of calibration* | **Guenther Polska Sp. z o.o.**<br>**ul. Wrocławska 27c**<br>**55-095 Długołęka** |
| **NR ZAMÓWIENIA ZEW.** *External order No.* | **zam. z dnia 02.07.25** |
| **NR ZAMÓWIENIA WEW.** *Internal order No.* | **ZS 023/07/2025** |
| **OBIEKT WZORCOWANIA** *Calibration object* | **Nazwa:** *Name* **Czujnik termoelektryczny** *Thermocouple* **Non-expendable** **Ø : 1,5 mm**<br>**Typ:** *Type* **1x NiCr-NiAl/K**<br>**Kod artykułu:** *Article code* **20053110**<br>**Nr fabryczny:** *Serial No.* **1851220/13** **1851220/17** **1851220/21** **1851220/24** **1851220/36** **1851220/37** **1851220/42**<br>**Producent/Model:** *Manufacturer/Model* **Guenther** |
| **DATA WZORCOWANIA** *Calibration date* | 11-14.07.2025 |
| **RODZAJ WZORCOWANIA** *Calibration type* | Rekalibracja / Recalibration |

| | |
|---|---|
| **METODA WZORCOWANIA** *Calibration method* | Wzorcowanie zostało przeprowadzone zgodnie z procedurą QMV9.01.01 Wzorcowanie termoelementu metodą porównawczą wer. 3.0 z dnia 12.10.2021 (opracowanej na podstawie ASTM E220-19).<br>*The calibration has been performed in accordance with procedure QMV9.01.01 Calibration of the thermocouple by the comparison method ver.3.0 of 12.10.2021 (based on the ASTM E220-19).* |
| **SPÓJNOŚĆ POMIAROWA** *Measurement traceability* | Świadectwo potwierdza spójność wyników pomiarów z jednostkami miar Międzynarodowego Układu Jednostek Miar (SI).<br>*The certificate provides traceability of measurement results to the International System of Units (SI).* |
| **NIEPEWNOŚĆ POMIARU** *Measurement uncertainty* | Niepewność pomiaru została określona zgodnie z dokumentem EA-4/02 M:2022.<br>Podane wartości niepewności stanowią niepewności rozszerzone przy prawdopodobieństwie rozszerzenia ok. 95% i współczynniku rozszerzenia $k = 2$.<br>*The measurement uncertainty has been determined in accordance with EA-4/02 M: 2022.*<br>*The reported uncertainties of measurement are stated as the expanded uncertainties corresponded to a coverage probability of approximately 95% and a coverage factor k = 2.* |
| **UWAGI** *Comments* | Podane wyniki wzorcowania dotyczą wyłącznie wzorcowanego obiektu.<br>*Calibration results apply only calibrated object.*<br>W razie wątpliwości ważny jest oryginalny polski tekst.<br>*If there are any doubts, the Polish version shall prevail.*<br>Niniejsze świadectwo może być okazywane lub kopiowane tylko w całości.<br>*This certificate may be presented or copied as a whole document only.* |




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**ŚWIADECTWO WZORCOWANIA NR: PA2507022**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## UŻYTE WZORCE I URZĄDZENIA POMIAROWE
*Reference probes and measuring devices*

### WZORZEC
*Reference probes*

| | | | | |
|---|---|---|---|---|
| T≤ 58 °C | Pt100 / 4 | SW 43/35/INTiBS-LWT/2025 | L-R-0024 | 07-04-2026 |
| T> 58 °C | Pt100 / 4 | SW 44/35/INTiBS-LWT/2025 | L-R-0025 | 07-04-2026 |
| T> 250 °C | Pt100 / 4 | 4166/2024 | L-R-0021 | 28-10-2025 |
| T> 500 °C | PtRh10-Pt/S | 1012-KL-35028-24 | L-T-0039 | 30-10-2025 |

### URZĄDZENIE POMIAROWE
*Measuring instrument*

| | | | | |
|---|---|---|---|---|
| T≤ 58 °C | Keysight | Z4.Z42.4180.124.2024.3381.1 | L-M-0013 | 20-10-2025 |
| T> 58 °C | Keysight | Z4-Z42.4180.49.2025.1433.1 | L-M-0011 | 27-04-2026 |
| T> 250 °C | Keysight | Z4.Z42.4180.124.2024.3381.1 | L-M-0013 | 20-10-2025 |
| T> 500 °C | Keysight | 76/2025 | L-M-0008 | 16-01-2026 |

### ELEMENT GRZEJNY
*Temperature source*

| | | | |
|---|---|---|---|
| T≤ 58 °C | Fluke | głębokość zanurzenia = 150 mm | L-H-0002 |
| T> 58 °C | Fluke | głębokość zanurzenia = 200 mm | L-H-0006 |
| T> 500 °C | Additel | głębokość zanurzenia = 150 mm | L-H-0011 |

*Immersion depth*

### SPOINA ODNIESIENIA 0 °C
*Cold junction*

| | | | |
|---|---|---|---|
| T≤ 500 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0003 |
| T> 500 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0004 |

*Immersion depth*

## WARUNKI ŚRODOWISKOWE
*Environmental conditions*

| | |
|---|---|
| Temperatura otoczenia<br>*Ambient temperature* | (21,9 ÷ 25,3) °C |
| Wilgotność względna<br>*Humidity* | (35,6 ÷ 53,5) % |

Data wzorcowania: 11-14.07.2025
*Calibration date*

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Technologie pomiaru temperatury
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**ŚWIADECTWO WZORCOWANIA NR: PA2507022**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## WYNIKI WZORCOWANIA
*Calibration results*

| CZUJNIK TYPU *Sensor type* | TEMPERATURA *Temperature* NOMINALNA *Nominal* | ODNIESIENIA *Reference* | OBLICZONA *Calculated* | ZMIERZONE NAPIĘCIE TERMOELEKTRYCZNE *Thermovoltage* | BŁĄD POMIARU *Measurement error* | NAJWIĘKSZY BŁĄD DOPUSZCZALNY *Maximum permissible error* | NIEPEWNOŚĆ POMIARU *Measurement uncertainty* | UWAGI *Comments* |
|---|---|---|---|---|---|---|---|---|
| | [°C] | | | [mV] | [°C] | +/- [°C] | +/- [°C] | |
| K | 10,0 | 10,1 | 10,1 | 0,403 | 0,0 | 1,5 | 0,7 | PA2507022/1 **1851220/13** |
| | 58,0 | 57,3 | 57,0 | 2,309 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 249,5 | 249,5 | 10,132 | 0,0 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 499,9 | 20,642 | 0,3 | 2,0 | 0,7 | |
| | 950,0 | 950,4 | 947,8 | 39,228 | -2,6 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,9 | 0,396 | -0,1 | 1,5 | 0,7 | PA2507022/2 **1851220/17** |
| | 58,0 | 57,7 | 57,2 | 2,320 | -0,5 | 1,5 | 0,7 | |
| | 250,0 | 249,5 | 249,5 | 10,134 | 0,0 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 498,1 | 20,562 | -1,5 | 2,0 | 0,7 | |
| | 950,0 | 950,7 | 949,6 | 39,297 | -1,1 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,9 | 0,395 | -0,1 | 1,5 | 0,7 | PA2507022/3 **1851220/21** |
| | 58,0 | 57,7 | 57,2 | 2,317 | -0,5 | 1,5 | 0,7 | |
| | 250,0 | 249,5 | 249,5 | 10,135 | 0,0 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 498,5 | 20,580 | -1,1 | 2,0 | 0,7 | |
| | 950,0 | 950,8 | 949,8 | 39,305 | -1,0 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,9 | 0,394 | -0,1 | 1,5 | 0,7 | PA2507022/4 **1851220/24** |
| | 58,0 | 57,7 | 57,4 | 2,329 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 249,5 | 248,6 | 10,096 | -0,9 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 500,2 | 20,655 | 0,6 | 2,0 | 0,7 | |
| | 950,0 | 950,7 | 950,2 | 39,322 | -0,5 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 10,0 | 0,397 | 0,0 | 1,5 | 0,7 | PA2507022/5 **1851220/36** |
| | 58,0 | 57,7 | 57,2 | 2,319 | -0,5 | 1,5 | 0,7 | |
| | 250,0 | 249,5 | 248,6 | 10,099 | -0,9 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 500,0 | 20,643 | 0,4 | 2,0 | 0,7 | |
| | 950,0 | 950,7 | 949,9 | 39,309 | -0,8 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,9 | 0,395 | -0,1 | 1,5 | 0,7 | PA2507022/6 **1851220/37** |
| | 58,0 | 57,7 | 57,1 | 2,317 | -0,6 | 1,5 | 0,7 | |
| | 250,0 | 249,5 | 249,3 | 10,125 | -0,2 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 499,9 | 20,639 | 0,3 | 2,0 | 0,7 | |
| | 950,0 | 950,4 | 949,1 | 39,278 | -1,3 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 10,0 | 0,398 | 0,0 | 1,5 | 0,7 | PA2507022/7 **1851220/42** |
| | 58,0 | 57,7 | 57,1 | 2,316 | -0,6 | 1,5 | 0,7 | |
| | 250,0 | 249,5 | 249,3 | 10,125 | -0,2 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 499,5 | 20,623 | -0,1 | 2,0 | 0,7 | |
| | 950,0 | 950,7 | 947,7 | 39,224 | -3,0 | 3,8 | 1,8 | |

Data wzorcowania: 11-14.07.2025
*Calibration date*

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*Page*

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KRS 0000300821
BNP PARIBAS BANK POLSKA S.A.
PLN 36 1750 1064 0000 0000 2055 6722
EUR 61 1750 1064 0000 0000 2055 6757 Kod SWIFT/BIC: PPABPLPKXXX



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**ŚWIADECTWO WZORCOWANIA NR: PA2507022**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## UWAGI
*Comments*

- Temperatura nominalna: punkt nastawy wynikający z zamówienia.
  *Nominal temperature: set point specified in the order.*
- Temperatura odniesienia: średnia wartość z pomiarów odczytanych z wzorca.
  *Reference temperature: average value of the measurement results read from the reference standard.*
- Temperatura obliczona: wartość temperatury obliczona na podstawie normy ASTM E230M-23a z wartości zmierzonej napięcia termoelektrycznego obiektu.
  *Calculated temperature: temperature value calculated from the measured thermovoltage of the calibrated object on the basis of the ASTM E230M-23a.*
- Błąd pomiaru = Temperatura obliczona - Temperatura odniesienia
  *Measurement error = Calculated temperature - Reference temperature*
- Największy błąd dopuszczalny: dopuszczalny błąd pomiaru temperatury według klasy 1 wg PN EN 60584-1:2014 pkt 5.1.
  *Maximum permissible error: according to the Class 1 acc. to PN EN 60584-1: 2014 point 5.1.*
- Stwierdzenie zgodności z daną specyfikacją podjęto na podstawie zasady prostej akceptacji ILAC G8:09/2019 w=0 TUR>3:1.
  Ryzyko specyficzne błędnej akceptacji/ błędnego odrzucenia wynosi 50%.
- *Compliance with the principles of the simple acceptance according to the ILAC G8:09/2019 w=0 TUR >3:1. The specific risk of a false acceptance/false rejection can be up to 50%.*

## ZGODNOŚĆ Z WYMAGANIAMI
*Conformity with requirements*

Na podstawie wszystkich wyników wzorcowania stwierdzono zgodność z wymaganiami PN-EN 60584-1:2014-04 pkt 5.1 dla klasy 1. Conformance with PN-EN 60584-1:2014-04 pt 5.1 class 1 was found on the basis of all calibration results.

| | | | |
|---|---|---|---|
| Wykonał: *Made by* | Inżynier Laboratorium *Laboratory Engineer* | Autoryzował: *Approved* | Z-ca Kierownika Laboratorium *Deputy Head of Laboratory* |
| Podpis: *Signature* | dr inż. Agnieszka Grykałowska | Podpis: *Signature* | mgr Joanna Zając |

KONIEC/ *End*

Data wzorcowania: 11-14.07.2025
*Calibration date*

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AP 201

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# ŚWIADECTWO WZORCOWANIA NR: PA2507023

*CALIBRATION CERTIFICATE NO.*

Data wydania: 14.07.2025
*Release date*

| | |
|---|---|
| **ZGŁASZAJĄCY** *Applicant* | **BALTIC FIRE LABORATORY Sp. z o. o.**<br>**ul. Banińska 8**<br>**80-209 Tuchom** |
| **MIEJSCE WZORCOWANIA** *Place of calibration* | **Guenther Polska Sp. z o.o.**<br>**ul. Wrocławska 27c**<br>**55-095 Długołęka** |
| **NR ZAMÓWIENIA ZEW.** *External order No.* | **zam. z dnia 02.07.25** |
| **NR ZAMÓWIENIA WEW.** *Internal order No.* | **ZS 023/07/2025** |

**OBIEKT WZORCOWANIA** *Calibration object*

| | | | |
|---|---|---|---|
| Nazwa: *Name* | **Czujnik termoelektryczny** *Thermocouple* **Non-expendable** **Ø : 1,5 mm** | Typ: *Type* | **1x NiCr-NiAl/K** |
| Kod artykułu: *Article code* | **20053099** | Nr fabryczny: *Serial No.* | **1821220/17**<br>**1821220/20**<br>**1821220/37** |
| | | Producent/Model: *Manufacturer/Model* | **Guenther** |

| | |
|---|---|
| **DATA WZORCOWANIA** *Calibration date* | 11-14.07.2025 |
| **RODZAJ WZORCOWANIA** *Calibration type* | Rekalibracja / Recalibration |

**METODA WZORCOWANIA** *Calibration method*

Wzorcowanie zostało przeprowadzone zgodnie z procedurą QMV9.01.01 Wzorcowanie termoelementu metodą porównawczą wer. 3.0 z dnia 12.10.2021 (opracowanej na podstawie ASTM E220-19).
*The calibration has been performed in accordance with procedure QMV9.01.01 Calibration of the thermocouple by the comparison method ver.3.0 of 12.10.2021 (based on the ASTM E220-19).*

**SPÓJNOŚĆ POMIAROWA** *Measurement traceability*

Świadectwo potwierdza spójność wyników pomiarów z jednostkami miar Międzynarodowego Układu Jednostek Miar (SI).
*The certificate provides traceability of measurement results to the International System of Units (SI).*

**NIEPEWNOŚĆ POMIARU** *Measurement uncertainty*

Niepewność pomiaru została określona zgodnie z dokumentem EA-4/02 M:2022.
Podane wartości niepewności stanowią niepewności rozszerzone przy prawdopodobieństwie rozszerzenia ok. 95% i współczynniku rozszerzenia k = 2.
*The measurement uncertainty has been determined in accordance with EA-4/02 M: 2022.*
*The reported uncertainties of measurement are stated as the expanded uncertainties corresponded to a coverage probability of approximately 95% and a coverage factor k = 2.*

**UWAGI** *Comments*

Podane wyniki wzorcowania dotyczą wyłącznie wzorcowanego obiektu.
*Calibration results apply only calibrated object.*
W razie wątpliwości ważny jest oryginalny polski tekst.
*If there are any doubts, the Polish version shall prevail.*
Niniejsze świadectwo może być okazywane lub kopiowane tylko w całości.
*This certificate may be presented or copied as a whole document only.*



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PLN 36 1750 1064 0000 0000 2055 6722
EUR 61 1750 1064 0000 0000 2065 6737 Kod SWIFT/BIC: PPABPLPKXXX



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**ŚWIADECTWO WZORCOWANIA NR: PA2507023**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## UŻYTE WZORCE I URZĄDZENIA POMIAROWE
*Reference probes and measuring devices*

### WZORZEC
*Reference probes*

| | | | | |
|---|---|---|---|---|
| T≤ 58 °C | Pt100 / 4 | SW 43/35/INTiBS-LWT/2025 | L-R-0024 | 07-04-2026 |
| T> 58 °C | Pt100 / 4 | SW 44/35/INTiBS-LWT/2025 | L-R-0025 | 07-04-2026 |
| T> 250 °C | Pt100 / 4 | 4166/2024 | L-R-0021 | 28-10-2025 |
| T> 500 °C | PtRh10-Pt/S | 1012-KL-35028-24 | L-T-0039 | 30-10-2025 |

### URZĄDZENIE POMIAROWE
*Measuring instrument*

| | | | | |
|---|---|---|---|---|
| T≤ 58 °C | Keysight | Z4.Z42.4180.124.2024.3381.1 | L-M-0013 | 20-10-2025 |
| T> 58 °C | Keysight | 4990/2024 | L-M-0009 | 22-12-2025 |
| T> 250 °C | Keysight | 76/2025 | L-M-0008 | 16-01-2026 |
| T> 500 °C | Keysight | 76/2025 | L-M-0008 | 16-01-2026 |

### ELEMENT GRZEJNY
*Temperature source*

| | | | |
|---|---|---|---|
| T≤ 58 °C | Fluke | głębokość zanurzenia = 150 mm | L-H-0002 |
| T> 58 °C | Fluke | głębokość zanurzenia = 150 mm | L-H-0003 |
| T> 250 °C | Fluke | głębokość zanurzenia = 200 mm | L-H-0006 |
| T> 500 °C | Additel | głębokość zanurzenia = 150 mm | L-H-0011 |

*Immersion depth*

### SPOINA ODNIESIENIA 0 °C
*Cold junction*

| | | | |
|---|---|---|---|
| T≤ 58 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0003 |
| T> 58 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0002 |
| T> 250 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0003 |
| T> 500 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0002 |

*Immersion depth*

## WARUNKI ŚRODOWISKOWE
*Environmental conditions*

| | |
|---|---|
| Temperatura otoczenia<br>*Ambient temperature* | (21,9 ÷ 25,3) °C |
| Wilgotność względna<br>*Humidity* | (35,6 ÷ 53,5) % |

Data wzorcowania: 11-14.07.2025
*Calibration date*

Strona **2 / 3**
*Page*


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Technologie pomiaru temperatury
Niezawodne . Dokładne . Certyfikowane

**ŚWIADECTWO WZORCOWANIA NR: PA2507023**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## WYNIKI WZORCOWANIA
*Calibration results*

| CZUJNIK TYPU *Sensor type* | TEMPERATURA *Temperature* NOMINALNA *Nominal* | ODNIESIENIA *Reference* | OBLICZONA *Calculated* | ZMIERZONE NAPIĘCIE TERMOELEKTRYCZNE *Thermovoltage* | BŁĄD POMIARU *Measurement error* | NAJWIĘKSZY BŁĄD DOPUSZCZALNY *Maximum permissible error* | NIEPEWNOŚĆ POMIARU *Measurement uncertainty* | UWAGI *Comments* |
|---|---|---|---|---|---|---|---|---|
| | [°C] | | | [mV] | [°C] | +/- [°C] | +/- [°C] | |
| K | 10,0 | 10,0 | 10,0 | 0,398 | 0,0 | 1,5 | 0,7 | PA2507023/1 **1821220/17** |
| | 58,0 | 57,7 | 57,4 | 2,329 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,7 | 250,1 | 10,157 | -0,6 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 499,6 | 20,627 | 0,0 | 2,0 | 0,7 | |
| | 950,0 | 950,8 | 949,9 | 39,312 | -0,9 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 10,0 | 0,397 | 0,0 | 1,5 | 0,7 | PA2507023/2 **1821220/20** |
| | 58,0 | 57,7 | 57,4 | 2,330 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,7 | 250,3 | 10,166 | -0,4 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 499,2 | 20,612 | -0,4 | 2,0 | 0,7 | |
| | 950,0 | 950,8 | 949,0 | 39,276 | -1,8 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 10,1 | 0,402 | 0,1 | 1,5 | 0,7 | PA2507023/3 **1821220/37** |
| | 58,0 | 57,7 | 57,3 | 2,322 | -0,4 | 1,5 | 0,7 | |
| | 250,0 | 249,5 | 248,4 | 10,088 | -1,1 | 1,5 | 0,7 | |
| | 500,0 | 499,6 | 497,6 | 20,541 | -2,0 | 2,0 | 0,7 | |
| | 950,0 | 950,8 | 947,7 | 39,224 | -3,1 | 3,8 | 1,8 | |

## UWAGI
*Comments*

- Temperatura nominalna: punkt nastawy wynikający z zamówienia.
  *Nominal temperature: set point specified in the order.*
- Temperatura odniesienia: średnia wartość z pomiarów odczytanych z wzorca.
  *Reference temperature: average value of the measurement results read from the reference standard.*
- Temperatura obliczona: wartość temperatury obliczona na podstawie normy ASTM E230M-23a z wartości zmierzonej napięcia termoelektrycznego obiektu.
  *Calculated temperature: temperature value calculated from the measured thermovoltage of the calibrated object on the basis of the ASTM E230M-23a.*
- Błąd pomiaru = Temperatura obliczona - Temperatura odniesienia
  *Measurement error = Calculated temperature - Reference temperature*
- Największy błąd dopuszczalny: dopuszczalny błąd pomiaru temperatury według klasy 1 wg PN EN 60584-1:2014 pkt 5.1.
  *Maximum permissible error: according to the Class 1 acc. to PN EN 60584-1: 2014 point 5.1.*
- Stwierdzenie zgodności z daną specyfikacją podjęto na podstawie zasady prostej akceptacji ILAC G8:09/2019 w=0 TUR>3:1.
  Ryzyko specyficzne błędnej akceptacji/ błędnego odrzucenia wynosi 50%.
- *Compliance with the principles of the simple acceptance according to the ILAC G8:09/2019 w=0 TUR >3:1. The specific risk of a false acceptance/false rejection can be up to 50%.*

## ZGODNOŚĆ Z WYMAGANIAMI
*Conformity with requirements*

Na podstawie wszystkich wyników wzorcowania stwierdzono zgodność z wymaganiami PN-EN 60584-1:2014-04 pkt 5.1 dla klasy 1. Conformance with PN-EN 60584-1:2014-04 pt 5.1 class 1 was found on the basis of all calibration results.

Wykonał: *Made by* — Inżynier Laboratorium *Laboratory Engineer*
Podpis: *Signature* — dr inż. Agnieszka Grykałowska

Autoryzował: *Approved* — Z-ca Kierownika Laboratorium *Deputy Head of Laboratory*
Podpis: *Signature* — mgr Joanna Zając

KONIEC/ *End*

Data wzorcowania: 11-14.07.2025
*Calibration date*

Strona 3 / 3
*Page*

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AP 201

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*Polish Centre for Accreditation,*
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*that include recognition of calibration certificates.*
*Accreditation No. AP 201*

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Technologie pomiaru temperatury
Niezawodne , Dokładne , Certyfikowane

# ŚWIADECTWO WZORCOWANIA NR: PA2504047/2

*CALIBRATION CERTIFICATE NO.*

Data wydania: 14.04.2025
*Release date*

| | |
|---|---|
| **ZGŁASZAJĄCY** *Applicant* | **BALTIC FIRE LABORATORY Sp. z o. o.**<br>**ul. Banińska 8**<br>**80-209 Tuchom** |
| **MIEJSCE WZORCOWANIA** *Place of calibration* | **Guenther Polska Sp. z o.o.**<br>**ul. Wrocławska 27C**<br>**55-095 Długołęka** |
| **NR ZAMÓWIENIA ZEW.** *External order No.* | **Zam. z dnia 04.04.2025** |
| **NR ZAMÓWIENIA WEW.** *Internal order No.* | **ZS 080/04/2025** |

**OBIEKT WZORCOWANIA** *Calibration object*

| | | | |
|---|---|---|---|
| **Nazwa:** *Name* | **Czujnik termoelektryczny** *Thermocouple* **Non-expendable Ø : 1,5 mm** | **Typ:** *Type* | **1 x NiCr-NiAl/K** |
| **Kod artykułu:** *Article code* | **20053105** | **Nr fabryczny:** *Serial No.* | **1831220/44** |
| **Szarża:** *Batch No.* | **126896** | **Producent/Model:** *Manufacturer/Model* | **Guenther** |

| | |
|---|---|
| **DATA WZORCOWANIA** *Calibration date* | 09.04.2025 |
| **RODZAJ WZORCOWANIA** *Calibration type* | Rekalibracja / Recalibration |

**METODA WZORCOWANIA** *Calibration method*

Wzorcowanie zostało przeprowadzone zgodnie z procedurą QMV9.01.01 Wzorcowanie termoelementu metodą porównawczą wer. 3.0 z dnia 12.10.2021 (opracowanej na podstawie ASTM E220-19).
*The calibration has been performed in accordance with procedure QMV9.01.01 Calibration of the thermocouple by the comparison method ver.3.0 of 12.10.2021 (based on the ASTM E220-19).*

**SPÓJNOŚĆ POMIAROWA** *Measurement traceability*

Świadectwo potwierdza spójność wyników pomiarów z jednostkami miar Międzynarodowego Układu Jednostek Miar (SI).
*The certificate provides traceability of measurement results to the International System of Units (SI).*

**NIEPEWNOŚĆ POMIARU** *Measurement uncertainty*

Niepewność pomiaru została określona zgodnie z dokumentem EA-4/02 M:2022.
Podane wartości niepewności stanowią niepewności rozszerzone przy prawdopodobieństwie rozszerzenia ok. 95% i współczynniku rozszerzenia $k = 2$.
*The measurement uncertainty has been determined in accordance with EA-4/02 M: 2022.*
*The reported uncertainties of measurement are stated as the expanded uncertainties corresponded to a coverage probability of approximately 95% and a coverage factor $k = 2$.*

**UWAGI** *Comments*

Podane wyniki wzorcowania dotyczą wyłącznie wzorcowanego obiektu.
*Calibration results apply only calibrated object.*
W razie wątpliwości ważny jest oryginalny polski tekst.
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*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## UŻYTE WZORCE I URZĄDZENIA POMIAROWE
*Reference probes and measuring devices*

**WZORZEC**
*Reference probes*

| | | | | |
|---|---|---|---|---|
| T≤ 58 °C | Pt100 / 4 | Z2-Z21.4180.74.2023.2539.1 | L-R-0004 | 06-09-2025 |
| T> 58 °C | PtRh10-Pt/S | PA2411069/1 | L-T-0040 | 19-11-2025 |

**URZĄDZENIE POMIAROWE**
*Measuring instrument*

| | | | |
|---|---|---|---|
| Keysight | Z4.Z42.4180.124.2024.3381.1 | L-M-0013 | 20-10-2025 |

**ELEMENT GRZEJNY**
*Temperature source*

| | | | |
|---|---|---|---|
| T≤ 58 °C | Fluke | głębokość zanurzenia = 150 mm *Immersion depth* | L-H-0002 |
| T> 58 °C | Additel | głębokość zanurzenia = 150 mm *Immersion depth* | L-H-0011 |

**SPOINA ODNIESIENIA 0 °C**
*Cold junction*

| | | |
|---|---|---|
| WIKA | głębokość zanurzenia = 150 mm *Immersion depth* | L-Z-0005 |

## WARUNKI ŚRODOWISKOWE
*Environmental conditions*

| | |
|---|---|
| Temperatura otoczenia *Ambient temperature* | (21,2 ÷ 23,5) °C |
| Wilgotność względna *Humidity* | (50,1 ÷ 58,7) % |

Data wzorcowania: 12.04.2025
*Calibration date*

Strona **2 / 3**
*Page*


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**ŚWIADECTWO WZORCOWANIA NR: PA2504047/2**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## WYNIKI WZORCOWANIA
*Calibration results*

| CZUJNIK TYPU *Sensor type* | NOMINALNA *Nominal* | TEMPERATURA *Temperature* ODNIESIENIA *Reference* | OBLICZONA *Calculated* | ZMIERZONE NAPIĘCIE TERMOELEKTRYCZNE *Thermovoltage* | BŁĄD POMIARU *Measurement error* | NAJWIĘKSZY BŁĄD DOPUSZCZALNY *Maximum permissible error* | NIEPEWNOŚĆ POMIARU *Measurement uncertainty* | UWAGI *Comments* |
|---|---|---|---|---|---|---|---|---|
| | [°C] | | | [mV] | [°C] | +/- [°C] | +/- [°C] | |
| K | 10,0 | 10,0 | 10,0 | 0,398 | 0,0 | 1,5 | 0,7 | |
| | 58,0 | 57,8 | 57,4 | 2,326 | -0,4 | 1,5 | 0,7 | |
| | 250,0 | 248,8 | 248,7 | 10,099 | -0,1 | 1,5 | 1,2 | |
| | 500,0 | 499,5 | 499,5 | 20,624 | 0,0 | 2,0 | 1,2 | |
| | 950,0 | 949,9 | 948,8 | 39,268 | -1,1 | 3,8 | 1,7 | |

## UWAGI
*Comments*

- Temperatura nominalna: punkt nastawy wynikający z zamówienia.
  *Nominal temperature: set point specified in the order.*
- Temperatura odniesienia: średnia wartość z pomiarów odczytanych z wzorca.
  *Reference temperature: average value of the measurement results read from the reference standard.*
- Temperatura obliczona: wartość temperatury obliczona na podstawie normy ASTM E230M-23a z wartości zmierzonej napięcia termoelektrycznego obiektu.
  *Calculated temperature: temperature value calculated from the measured thermovoltage of the calibrated object on the basis of the ASTM E230M-23a.*
- Błąd pomiaru = Temperatura obliczona - Temperatura odniesienia
  *Measurement error = Calculated temperature - Reference temperature*
- Największy błąd dopuszczalny: dopuszczalny błąd pomiaru temperatury według normy klasy 1 wg PN EN 60584-1:2014 pkt 5.1.
  *Maximum permissible error: according to the Class 1 acc. to PN EN 60584-1: 2014 point 5.1.*
- Stwierdzenie zgodności z daną specyfikacją podjęto na podstawie zasady prostej akceptacji ILAC G8:09/2019 w=0 TUR>3:1.
  Ryzyko specyficzne błędnej akceptacji/ błędnego odrzucenia wynosi 50%.
- *Compliance with the principles of the simple acceptance according to the ILAC G8:09/2019 w=0 TUR >3:1. The specific risk of a false acceptance/false rejection can be up to 50%.*

## ZGODNOŚĆ Z WYMAGANIAMI
*Conformity with requirements*

Na podstawie wszystkich wyników wzorcowania stwierdzono zgodność z wymaganiami PN-EN 60584-1:2014-04 pkt 5.1 dla klasy 1. Conformance with PN-EN 60584-1:2014-04 pt 5.1 class 1 was found on the basis of all calibration results.

| | | | |
|---|---|---|---|
| Wykonał: *Made by* | Pracownik Techniczny Laboratorium *Laboratory Technician* | Autoryzował: *Approved* | Z-ca Kierownika Laboratorium *Deputy Head of Laboratory* |
| Podpis: *Signature* | Paweł Krzysztofik | Podpis: *Signature* | mgr Joanna Zając |

KONIEC/ *End*

Data wzorcowania: 12.04.2025
*Calibration date*

Strona 3 / 3
*Page*

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EUR 61 1750 1064 0000 0000 2055 6757 Kod SWIFT/BIC: PPABPLPKXXX


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PCA Polskie Centrum Akredytacji – Wzorcowanie
AP 201

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GUENTHER Polska
Technologie pomiaru temperatury
Niezawodne . Dokładne . Certyfikowane

# ŚWIADECTWO WZORCOWANIA NR: PA2504112

*CALIBRATION CERTIFICATE NO.*

Data wydania: 30.04.2025
*Release date*

| | |
|---|---|
| **ZGŁASZAJĄCY** *Applicant* | **BALTIC FIRE LABORATORY Sp. z o. o.**<br>**ul. Banińska 8**<br>**80-209 Tuchom** |
| **MIEJSCE WZORCOWANIA** *Place of calibration* | **Guenther Polska Sp. z o.o.**<br>**ul. Wrocławska 27c**<br>**55-095 Długołęka** |
| **NR ZAMÓWIENIA ZEW.** *External order No.* | **zam. z dnia 17.04.25** |
| **NR ZAMÓWIENIA WEW.** *Internal order No.* | **ZS 233/04/2025** |
| **OBIEKT WZORCOWANIA** *Calibration object* | **Nazwa:** *Name* **Czujnik termoelektryczny** *Thermocouple* **Non-expendable Ø : 1,5 mm**<br>**Typ:** *Type* **1x NiCr-NiAl/K**<br>**Kod artykułu:** *Article code* **20053105**<br>**Producent/Model:** *Manufacturer/Model* **Guenther**<br>**Szarża:** *Batch No.* **126896** |
| **DATA WZORCOWANIA** *Calibration date* | 29-30.04.2025 |
| **RODZAJ WZORCOWANIA** *Calibration type* | Rekalibracja / Recalibration |

| | |
|---|---|
| **METODA WZORCOWANIA** *Calibration method* | Wzorcowanie zostało przeprowadzone zgodnie z procedurą QMV9.01.01 Wzorcowanie termoelementu metodą porównawczą wer. 3.0 z dnia 12.10.2021 (opracowanej na podstawie ASTM E220-19).<br>*The calibration has been performed in accordance with procedure QMV9.01.01 Calibration of the thermocouple by the comparison method ver.3.0 of 12.10.2021 (based on the ASTM E220-19).* |
| **SPÓJNOŚĆ POMIAROWA** *Measurement traceability* | Świadectwo potwierdza spójność wyników pomiarów z jednostkami miar Międzynarodowego Układu Jednostek Miar (SI).<br>*The certificate provides traceability of measurement results to the International System of Units (SI).* |
| **NIEPEWNOŚĆ POMIARU** *Measurement uncertainty* | Niepewność pomiaru została określona zgodnie z dokumentem EA-4/02 M:2022.<br>Podane wartości niepewności stanowią niepewności rozszerzone przy prawdopodobieństwie rozszerzenia ok. 95% i współczynniku rozszerzenia $k = 2$.<br>*The measurement uncertainty has been determined in accordance with EA-4/02 M: 2022.*<br>*The reported uncertainties of measurement are stated as the expanded uncertainties corresponded to a coverage probability of approximately 95% and a coverage factor $k = 2$.* |
| **UWAGI** *Comments* | Podane wyniki wzorcowania dotyczą wyłącznie wzorcowanego obiektu.<br>*Calibration results apply only calibrated object.*<br>W razie wątpliwości ważny jest oryginalny polski tekst.<br>*If there are any doubts, the Polish version shall prevail.*<br>Niniejsze świadectwo może być okazywane lub kopiowane tylko w całości.<br>*This certificate may be presented or copied as a whole document only.* |



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BNP PARIBAS BANK POLSKA S.A.
PLN 36 1750 1064 0000 0000 2055 6722
EUR 61 1750 1064 0000 0000 2055 6757 Kod SWIFT/BIC: PPABPLPKXXX



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**ŚWIADECTWO WZORCOWANIA NR: PA2504112**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## UŻYTE WZORCE I URZĄDZENIA POMIAROWE
*Reference probes and measuring devices*

### WZORZEC
*Reference probes*

| | | | | |
|---|---|---|---|---|
| T≤ 250 °C | Pt100 / 4 | SW 45/35/INTiBS-LWT/2025 | L-R-0026 | 07-04-2026 |
| T> 250 °C | Pt100 / 4 | 4166/2024 | L-R-0021 | 28-10-2025 |
| T> 500 °C | PtRh10-Pt/S | PA2411069/1 | L-T-0040 | 19-11-2025 |

### URZĄDZENIE POMIAROWE
*Measuring instrument*

| | | | | |
|---|---|---|---|---|
| T≤ 58 °C | Keysight | 2672/2024 | L-M-0007 | 14-07-2025 |
| T> 58 °C | Keysight | 4990/2024 | L-M-0009 | 22-12-2025 |
| T> 500 °C | Keysight | 76/2025 | L-M-0008 | 16-01-2026 |

### ELEMENT GRZEJNY
*Temperature source*

| | | | |
|---|---|---|---|
| T≤ 58 °C | Fluke | głębokość zanurzenia = 150 mm | L-H-0002 |
| T> 58 °C | Fluke | głębokość zanurzenia = 150 mm | L-H-0003 |
| T> 500 °C | Additel | głębokość zanurzenia = 150 mm | L-H-0011 |
| | | *Immersion depth* | |

### SPOINA ODNIESIENIA 0 °C
*Cold junction*

| | | | |
|---|---|---|---|
| T≤ 500 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0002 |
| T> 500 °C | WIKA | głębokość zanurzenia = 150 mm | L-Z-0006 |
| | | *Immersion depth* | |

## WARUNKI ŚRODOWISKOWE
*Environmental conditions*

| | |
|---|---|
| Temperatura otoczenia<br>*Ambient temperature* | (22,4 ÷ 24,7) °C |
| Wilgotność względna<br>*Humidity* | (28,2 ÷ 30,5) % |

Data wzorcowania: 29-30.04.2025
*Calibration date*

Strona **2 / 5**
*Page*


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GUENTHER Polska
member of the GÜNTHER Group
Technologie pomiaru temperatury
Niezawodne . Dokładne . Certyfikowane

**ŚWIADECTWO WZORCOWANIA NR: PA2504112**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

## WYNIKI WZORCOWANIA
## *Results of calibration*

| CZUJNIK TYPU *Sensor type* | TEMPERATURA *Temperature* NOMINALNA *Nominal* | TEMPERATURA *Temperature* ODNIESIENIA *Reference* | TEMPERATURA *Temperature* OBLICZONA *Calculated* | ZMIERZONE NAPIĘCIE TERMOELEKTRYCZNE *Thermovoltage* | BŁĄD POMIARU *Measurement error* | NAJWIĘKSZY BŁĄD DOPUSZCZALNY *Maximum permissible error* | NIEPEWNOŚĆ POMIARU *Measurement uncertainty* | UWAGI *Comments* |
|---|---|---|---|---|---|---|---|---|
| | [°C] | | | [mV] | [°C] | +/- [°C] | +/- [°C] | |
| K | 10,0 | 10,1 | 9,9 | 0,396 | -0,2 | 1,5 | 0,7 | 1831220/1 PA2504112/1 |
| | 58,0 | 57,9 | 57,6 | 2,338 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 249,8 | 10,144 | -0,2 | 1,5 | 0,7 | |
| | 500,0 | 500,4 | 500,2 | 20,655 | -0,2 | 2,0 | 0,7 | |
| | 950,0 | 950,2 | 950,2 | 39,323 | 0,0 | 3,8 | 1,8 | |
| K | 10,0 | 10,1 | 9,9 | 0,395 | -0,2 | 1,5 | 0,7 | 1831220/14 PA2504112/2 |
| | 58,0 | 57,9 | 57,7 | 2,340 | -0,2 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 249,8 | 10,146 | -0,2 | 1,5 | 0,7 | |
| | 500,0 | 500,4 | 499,9 | 20,642 | -0,5 | 2,0 | 0,7 | |
| | 950,0 | 950,1 | 950,2 | 39,323 | 0,1 | 3,8 | 1,8 | |
| K | 10,0 | 10,1 | 9,9 | 0,396 | -0,2 | 1,5 | 0,7 | 1831220/17 PA2504112/3 |
| | 58,0 | 57,9 | 57,6 | 2,336 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 249,4 | 10,129 | -0,6 | 1,5 | 0,7 | |
| | 500,0 | 500,4 | 499,5 | 20,624 | -0,9 | 2,0 | 0,7 | |
| | 950,0 | 950,2 | 949,3 | 39,286 | -0,9 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,8 | 0,391 | -0,2 | 1,5 | 0,7 | 1831220/18 PA2504112/4 |
| | 58,0 | 57,9 | 57,6 | 2,337 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,1 | 249,5 | 10,131 | -0,6 | 1,5 | 0,7 | |
| | 500,0 | 500,3 | 499,6 | 20,626 | -0,7 | 2,0 | 0,7 | |
| | 950,0 | 950,2 | 949,8 | 39,304 | -0,4 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,9 | 0,396 | -0,1 | 1,5 | 0,7 | 1831220/25 PA2504112/5 |
| | 58,0 | 57,9 | 57,5 | 2,331 | -0,4 | 1,5 | 0,7 | |
| | 250,0 | 250,1 | 248,4 | 10,089 | -1,7 | 1,5 | 0,7 | |
| | 500,0 | 500,5 | 497,5 | 20,536 | -3,0 | 2,0 | 0,7 | |
| | 950,0 | 950,0 | 947,4 | 39,210 | -2,6 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,8 | 0,392 | -0,2 | 1,5 | 0,7 | 1831220/28 PA2504112/6 |
| | 58,0 | 57,9 | 57,6 | 2,337 | -0,3 | 1,5 | 0,7 | |
| | 250,0 | 250,1 | 249,6 | 10,137 | -0,5 | 1,5 | 0,7 | |
| | 500,0 | 500,3 | 499,4 | 20,618 | -0,9 | 2,0 | 0,7 | |
| | 950,0 | 950,0 | 950,1 | 39,320 | 0,1 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,8 | 0,390 | -0,2 | 1,5 | 0,7 | 1831220/32 PA2504112/7 |
| | 58,0 | 57,9 | 57,8 | 2,343 | -0,1 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 250,3 | 10,166 | 0,3 | 1,5 | 0,7 | |
| | 500,0 | 500,6 | 500,9 | 20,686 | 0,3 | 2,0 | 0,7 | |
| | 950,0 | 950,0 | 950,5 | 39,333 | 0,5 | 3,8 | 1,8 | |

Data wzorcowania: 29-30.04.2025
*Calibration date*

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EUR 81 1750 1064 0000 0000 2055 6757 Kod SWIFT/BIC: PPABPLPKXXX



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**ŚWIADECTWO WZORCOWANIA NR: PA2504112**
*CALIBRATION CERTIFICATE NO.*
Wydane przez LABORATORIUM AKREDYTOWANE Nr AP 201
*Released by Accredited Laboratory No. AP 201*

| CZUJNIK TYPU *Sensor type* | TEMPERATURA *Temperature* NOMINALNA *Nominal* | ODNIESIENIA *Reference* | OBLICZONA *Calculated* | ZMIERZONE NAPIĘCIE TERMOELEKTRYCZNE *Thermovoltage* | BŁĄD POMIARU *Measurement error* | NAJWIĘKSZY BŁĄD DOPUSZCZALNY *Maximum permissible error* | NIEPEWNOŚĆ POMIARU *Measurement uncertainty* | UWAGI *Comments* |
|---|---|---|---|---|---|---|---|---|
| | [°C] | | | [mV] | [°C] | +/- [°C] | +/- [°C] | |
| K | 10,0 | 10,1 | 9,9 | 0,394 | -0,2 | 1,5 | 0,7 | 1831220/35 PA2504112/8 |
| | 58,0 | 57,9 | 57,7 | 2,339 | -0,2 | 1,5 | 0,7 | |
| | 250,0 | 250,0 | 249,8 | 10,145 | -0,2 | 1,5 | 0,7 | |
| | 500,0 | 500,4 | 500,0 | 20,646 | -0,4 | 2,0 | 0,7 | |
| | 950,0 | 950,2 | 950,0 | 39,313 | -0,2 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,8 | 0,392 | -0,2 | 1,5 | 0,7 | 1831220/36 PA2504112/9 |
| | 58,0 | 57,9 | 57,7 | 2,338 | -0,2 | 1,5 | 0,7 | |
| | 250,0 | 250,1 | 249,5 | 10,135 | -0,6 | 1,5 | 0,7 | |
| | 500,0 | 500,3 | 499,3 | 20,617 | -1,0 | 2,0 | 0,7 | |
| | 950,0 | 950,2 | 949,8 | 39,306 | -0,4 | 3,8 | 1,8 | |
| K | 10,0 | 10,0 | 9,8 | 0,390 | -0,2 | 1,5 | 0,7 | 1831220/39 PA2504112/10 |
| | 58,0 | 57,9 | 57,7 | 2,342 | -0,2 | 1,5 | 0,7 | |
| | 250,0 | 250,1 | 250,2 | 10,162 | 0,1 | 1,5 | 0,7 | |
| | 500,0 | 500,3 | 500,3 | 20,658 | 0,0 | 2,0 | 0,7 | |
| | 950,0 | 950,1 | 950,8 | 39,344 | 0,7 | 3,8 | 1,8 | |

## UWAGI
*Comments*

- Temperatura nominalna: punkt nastawy wynikający z zamówienia.
  *Nominal temperature: set point specified in the order.*
- Temperatura odniesienia: średnia wartość z pomiarów odczytanych z wzorca.
  *Reference temperature: average value of the measurement results read from the reference standard.*
- Temperatura obliczona: wartość temperatury obliczona na podstawie normy ASTM E230M-23a z wartości zmierzonej napięcia termoelektrycznego obiektu.
  *Calculated temperature: temperature value calculated from the measured thermovoltage of the calibrated object on the basis of the ASTM E230M-23a.*
- Błąd pomiaru = Temperatura obliczona - Temperatura odniesienia
  *Measurement error = Calculated temperature - Reference temperature*
- Największy błąd dopuszczalny: dopuszczalny błąd pomiaru temperatury według normy klasy 1 wg PN EN 60584-1:2014 pkt 5.1.
  *Maximum permissible error: according to the Class 1 acc. to PN EN 60584-1: 2014 point 5.1.*
- Stwierdzenie zgodności z daną specyfikacją podjęto na podstawie zasady prostej akceptacji ILAC G8:09/2019 w=0 TUR>3:1.
  Ryzyko specyficzne błędnej akceptacji/ błędnego odrzucenia wynosi 50%.
- *Compliance with the principles of the simple acceptance according to the ILAC G8:09/2019 w=0 TUR >3:1. The specific risk of a false acceptance/false rejection can be up to 50%.*

Data wzorcowania: 29-30.04.2025
*Calibration date*

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**ŚWIADECTWO WZORCOWANIA NR: PA2504112**
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GUENTHER Polska
member of the GÜNTHER Group
Technologie pomiaru temperatury
Niezawodne . Dokładne . Certyfikowane

## ZGODNOŚĆ Z WYMAGANIAMI
*Conformity with requirements*

Na podstawie wszystkich wyników wzorcowania dla czujników o numerach 1831220/1, 1831220/14, 1831220/17, 1831220/18, 1831220/28, 1831220/32, 1831220/35, 1831220/36, 1831220/39 stwierdzono zgodność z wymaganiami PN-EN 60584-1:2014-04 pkt 5.1 dla klasy 1. Conformance with PN-EN 60584-1:2014-04 pt 5.1 class 1 was found on the basis of all calibration results for thermocouples No. 1831220/1, 1831220/14, 1831220/17, 1831220/18, 1831220/28, 1831220/32, 1831220/35, 1831220/36, 1831220/39.

Na podstawie wyników wzorcowania dla czujnika o numerze 1831220/25 w zakresie <10 °C ; 58 °C > oraz w punkcie pomiarowym 950 °C stwierdzono zgodność z wymaganiami PN-EN 60584-1:2014-04 pkt 5.1. Natomiast w zakresie < 250 °C ; 500 °C > stwierdzono brak zgodności z wymaganiami PN-EN 60584-1:2014-04 pkt 5.1. dla tego czujnika.
Conformance with PN-EN 60584-1:2014-04 was found on the basis of calibration results for thermocouple No. 1831220/25 in the range < 10 °C ; 58 °C > and at calibration point 950 °C. Nonconformance with PN-EN 60584-1:2014-04 pt 5.1 was found for this thermocouple on the basis of calibration results range < 250 °C ; 500 °C>.

| | | | |
|---|---|---|---|
| Wykonał: A.Grykałowska<br>*Made by* | Inżynier Laboratorium<br>*Laboratory Engineer*<br>dr inż. Agnieszka Grykałowska | Autoryzował:<br>*Approved*<br>Podpis:<br>*Signature* | Z-ca Kierownika Laboratorium<br>*Deputy Head of Laboratory*<br>mgr Joanna Zając |

KONIEC/ *End*

Data wzorcowania: 29-30.04.2025
*Calibration date*

Strona **5 / 5**
*Page*

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# Appendix F – laboratory certificates

**POLSKIE CENTRUM AKREDYTACJI**
**POLISH CENTRE FOR ACCREDITATION**

PCA POLSKIE CENTRUM AKREDYTACJI

Sygnatariusz EA MLA
EA MLA Signatory

## CERTYFIKAT AKREDYTACJI
## LABORATORIUM BADAWCZEGO
**ACCREDITATION CERTIFICATE OF TESTING LABORATORY**
## Nr AB 1792

Potwierdza się, że: / This is to confirm that:

**BALTIC FIRE LABORATORY Sp. z o.o.**
**BFL FIRE TESTING LABORATORY**
**ul. Banińska 8**
**80-209 Tuchom**

spełnia wymagania normy PN-EN ISO/IEC 17025:2018-02
meets requirements of the PN-EN ISO/IEC 17025:2018-02 standard

Akredytowana działalność jest określona w Zakresie Akredytacji Nr AB 1792
Accredited activity is defined in the Scope of Accreditation No AB 1792

Akredytacja pozostaje w mocy pod warunkiem przestrzegania wymagań jednostki akredytującej określonych w kontrakcie Nr AB 1792
This accreditation remains in force provided the Laboratory observes the requirements of Accreditation Body defined in the Contract No AB 1792

POLSKIE CENTRUM AKREDYTACJI * 1 *

DYREKTOR
POLSKIEGO CENTRUM AKREDYTACJI
LUCYNA OLBORSKA

Warszawa, 9 lutego 2022 roku


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PCA

Zakres akredytacji Nr AB 1792
Scope of accreditation No AB 1792

# ZAKRES AKREDYTACJI LABORATORIUM BADAWCZEGO
## SCOPE OF ACCREDITATION FOR TESTING LABORATORY
## Nr/No AB 1792

**wydany przez / issued by**
**POLSKIE CENTRUM AKREDYTACJI**
**01-382 Warszawa, ul. Szczotkarska 42**

Wydanie/Issue 7 z/of 05.09.2025

| | Nazwa i adres / Name and address |
|---|---|
| PCA Polskie Centrum Akredytacji Badania<br>AB 1792 | **BALTIC FIRE LABORATORY Sp. z o.o.**<br>**BFL FIRE TESTING LABORATORY**<br>**ul. Banińska 8**<br>**80-209 Tuchom** |
| **Kod identyfikacyjny / Identification code** [2] | **Dziedzina i przedmiot badań / Field of testing and item:** |
| - H/17 | - Badania ogniowe wyrobów innych / Fire tests of other products |

Wersja strony/Page version: A

[2] Kod identyfikacyjny zgodnie z załącznikiem do dokumentu DAB-07 dostępnym na stronie internetowej www.pca.gov.pl / The identification code according to the Annex to document DAB-07, available at PCA website www.pca.gov.pl

POLSKIE CENTRUM AKREDYTACJI *1*

KIEROWNIK DZIAŁU AKREDYTACJI
BADAŃ MECHANICZNYCH I FIZYCZNYCH

MARIA SZAFRAN

**Niniejszy dokument jest załącznikiem do Certyfikatu Akredytacji Nr AB 1792 z dnia 09.02.2022 r.**
**Cykl akredytacji od 11.07.2025 r. do 18.07.2029 r.**
**Status akredytacji oraz aktualność zakresu akredytacji można potwierdzić na stronie internetowej PCA *www.pca.gov.pl***

This document is an annex to accreditation certificate No AB 1792 of 09.02.2022
Accreditation cycle from 11.07.2025 to 18.07.2029
The status of accreditation and validity of the scope of accreditation can be confirmed at PCA website www.pca.gov.pl

Wydanie nr / Issue No 7, 05.09.2025 1/7


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| BFL Fire Testing Laboratory<br>ul. Banińska 8, 80-209 Tuchom | | |
|---|---|---|
| **Przedmiot badań/wyrób** | **Rodzaj działalności/badane cechy/metoda** | **Dokumenty odniesienia** |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia i tłumienia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas<br>Obszar uszkodzenia, % | IMO Res. A.800(19) ze zmianami w IMO MSC.265(84) Appendix 2<br>PN-EN 14972-1:2021, Annex A<br>PN-EN 14972-3:2022-01<br>PN EN 14972-4:2024<br>PN-EN 14972-10:2022-09<br><br>UL 2167 (2021)<br>pkt 44, 45, 46, 48, 49, 50<br><br>VdS 3883-1:2020-06<br>VdS 3883-2:2020-06<br>VdS 3883-5:2020-06<br><br>FM Approval Standard Class 5560:2021 Appendix P |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas | IMO MSC/Circ.1165 Appendix B ze zmianami w IMO MSC.1/Circ.1269 oraz IMO MSC.1/Circ.1386<br>UL 2167 (2021) pkt 43<br>FM Approval Standard Class 5560:2021 Appendix E<br>FM Approval Standard Class 5560:2021 Appendix F<br>PN-EN 14972-8:2020-06<br>PN-EN 14972-14:2022-02<br>PN-EN 14972-15:2022-02<br>PN-EN 14972-9:2020-06 |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia i tłumienia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Stężenie (CO)<br>Stężenie ($CO_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas<br>Obszar uszkodzenia, % | PN EN 14972-7:2024 |

Wersja strony: A




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| Przedmiot badań/wyrób | Rodzaj działalności/badane cechy/metoda | Dokumenty odniesienia |
|---|---|---|
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia i tłumienia ognia<br>Rozprzestrzeniane się płomienia<br>Temperatura<br>Stężenie ($O_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas | IMO MSC.1/Circ.1268 |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia ognia<br>Rozprzestrzeniane się płomienia<br>Temperatura<br>Stężenie ($O_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas<br>Zakres: t > 1 s | IMO MSC.1/Circ.1387 Appendix |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność tłumienia ognia<br>Rozprzestrzeniane się płomienia<br>Temperatura<br>Stężenie tlenu<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas<br>Obszar uszkodzenia, % | IMO MSC.1/Circ.1430/Rev.03 Appendix<br><br>VdS 3883-4:2020-06<br><br>PN-EN 14972-5:2024 |
| **Wodne systemy przeciwpożarowe Materiały instalacyjne** | Rozprzestrzeniane się płomienia<br>Temperatura<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas | A.753(18) GUIDELINES FOR THE APPLICATION OF PLASTIC PIPES ON SHIPS |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia ognia<br>Rozprzestrzeniane się płomienia<br>Temperatura<br>Stężenie tlenu<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas | FM Approval Standard Class 5560:2021 Appendix M<br><br>FM Approval Standard Class 5560:2021 Appendix N |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia i tłumienia ognia<br>Temperatura<br>Stężenie tlenu<br>Objętościowe natężenie przepływu (metoda wagowa, metoda bezpośrednia)<br>Ciśnienie<br>Czas<br>Obszar uszkodzenia, % | VdS 3883-3:2020-06<br><br>PN-EN 14972-6:2023-10 |

Wersja strony: A





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| Przedmiot badań/wyrób | Rodzaj działalności/badane cechy/metoda | Dokumenty odniesienia |
|---|---|---|
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia i tłumienia ognia<br>Temperatura<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas | VdS 3883-6:2020-06<br>BS EN 14972-17:2025<br>UL 2167 (2021) pkt 47<br>UL 2167A (2024) pkt 23 |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia i tłumienia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas<br>Obszar uszkodzenia, % | VdS 3883-7:2020-06 |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia i tłumienia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas<br>Obszar uszkodzenia, % | VdS 3883-8:2020-06<br>PN EN 14972-11:2023-10 |
| **Aerosolowe systemy przeciwpożarowe Generatory aerosolu** | Skuteczność gaszenia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Stężenie (CO)<br>Stężenie ($CO_2$)<br>Ciśnienie (Pa)<br>Pomiar masy<br>Czas | IMO MSC.1/Circ.1270<br>ISO 15779 Annex D |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność gaszenia i tłumienia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Stężenie (CO)<br>Stężenie ($CO_2$)<br>Stężenie (HCN)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas | ARGE Guideline - Part 2:2018 Rev. 4.1 pkt. 3.2, 3.3<br>UNI 11565:2021 Appendix B |
| **Wodne systemy przeciwpożarowe Dysze tryskaczowe** | Skuteczność tłumienia ognia<br>Temperatura<br>Stężenie tlenu Stężenie ($O_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas<br>Stopień uszkodzenia, % | Procedura badawcza BFL TP-02 ver. 4 z 13.08.2021<br>PN-EN 14972-1:2021, Annex A |

Wersja strony: A





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|---|---|---|
| **Gazowe systemy przeciwpożarowe** | Skuteczność gaszenia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Stężenie (CO)<br>Stężenie ($CO_2$)<br>Ciśnienie (Pa)<br>Pomiar masy<br>Czas | NCC71 - 1.1.2021 Chapter 2 |
| **Gazowe systemy przeciwpożarowe** | Skuteczność gaszenia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Ciśnienie (Pa)<br>Pomiar masy<br>Czas | ISO 14520-1:2023 Annex C<br>UL2166 (2021) pkt 35, 36 ,37<br>FM Approval Standard Class 5600:2023 Chapter 4.1 |
| **Pianowe systemy przeciwpożarowe**<br>**Koncentraty pianowe** | Skuteczność gaszenia ognia<br>Temperatura<br>Czas | MSC.1/Circ.1312 pkt 3.9<br>UL 162 (2021) pkt 11, 12<br>FM Approval Standard Class 5130:2021 chapter 4.2, 4.3, 4.7 |
| **Wodne systemy przeciwpożarowe**<br>**Dysze tryskaczowe** | Skuteczność gaszenia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas | EN 14972-12:2023 |
| **Wodne systemy przeciwpożarowe**<br>**Dysze tryskaczowe** | Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Temperatura<br>Ciśnienie | IMO MSC/Circ.1165 pkt 4.10 |
| **Wodne systemy przeciwpożarowe**<br>**Dysze tryskaczowe** | Skuteczność gaszenia ognia<br>Temperatura<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas | ISO 15371:2015<br>PN-EN 17446:2021 |
| **Wodne systemy przeciwpożarowe**<br>**Dysze tryskaczowe** | Skuteczność gaszenia ognia<br>Temperatura<br>Stężenie ($O_2$)<br>Stężenie (CO)<br>Stężenie ($CO_2$)<br>Objętościowe natężenie przepływu (metoda bezpośrednia, metoda wagowa)<br>Ciśnienie<br>Czas | FM Approval Standard Class 5560:2021 Appendix A<br>FM Approval Standard Class 5560:2021 Appendix B<br>FM Approval Standard Class 5560:2021 Appendix C<br>FM Approval Standard Class 5560:2021 Appendix D<br>FM Approval Standard Class 5560:2021 Appendix I<br>JH-C077-E-RP-001 |
| **Gaśnice przenośne** | Minimalna skuteczność gaśnicza – ocena pożaru testowego grupy A,<br><br>Minimalna skuteczność gaśnicza – ocena pożaru testowego grupy B | PN-EN 3-7:2008 ( Appendix I) |

Wersja strony: A





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|---|---|---|
| **Gaśnice przewoźne** | Minimalna skuteczność gaśnicza – ocena pożaru testowego grupy A<br><br>Minimalna skuteczność gaśnicza – ocena pożaru testowego grupy B | PN-EN 1866-1:2010 (chapter 8) |

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## Wykaz zmian
## Zakresu Akredytacji Nr AB 1792

**Status zmian: wersja pierwotna - A**

POLSKIE CENTRUM AKREDYTACJI * 1 *

**Zatwierdzam status zmian**

**KIEROWNIK DZIAŁU AKREDYTACJI BADAŃ MECHANICZNYCH I FIZYCZNYCH**

**MARIA SZAFRAN**
dnia: 05.09.2025 r.



# TEST REPORT END


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