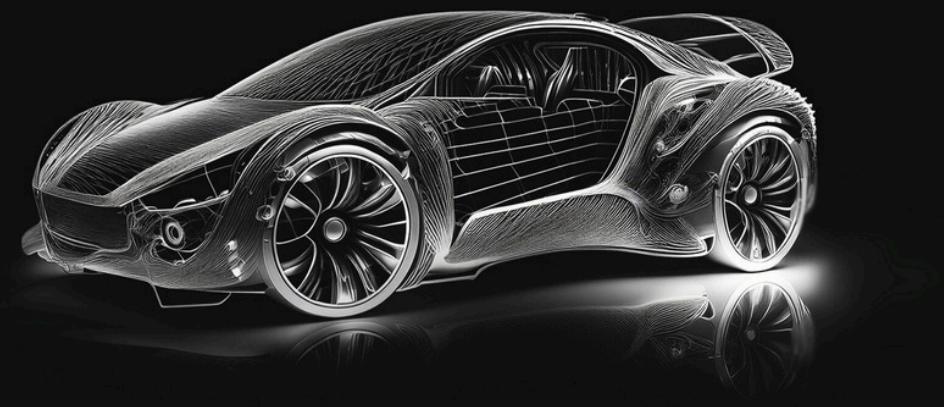
Łukasiewicz
PIMOT

EV BATTERY TESTING



ABOUT US

We are an R&D centre with over 50 years' experience in the automotive industry. Since 2019, we have been part of the Łukasiewicz Research Network.

We are a Type-Approval Service authorised to conduct tests of components, vehicle equipment and the whole vehicle across all categories in accordance with framework regulations: EU 2018/858, 167/2013 and 168/2013, as well as other UN and implementing regulations.

AREAS OF EXPERTISE

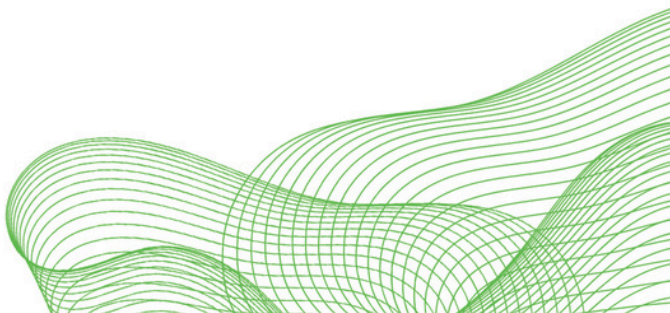
- Type Approval/Certification
- Mechanical Testing
- Electromobility
- Road Infrastructure Testing
- Vehicle Dynamics Testing
- Defense and Security
- Vehicle Structural Integrity Testing
- Braking System Testing
- Electromagnetic Compatibility
- Environmental Testing
- Special-purpose Vehicle Testing
- Transport Automation
- Construction and Numerical Analyses
- Bioeconomy/ Circular Economy

VIBRATION TESTING

UN Regulation No. 100 Rev.3 Annex 9A

Testing Capabilities:

- maximum dynamic force for sinus excitation: 111 kN,
  maximum force for shock excitation: 298 kN (pulse duration: 6 ms)
- shaker head diameter: 445 mm / usable frequency range: 3 – 3000 Hz
- horizontal slip table: 2000 x 2000 mm / usable frequency range: 5 – 1000 Hz
- vertical head expander: 2000 x 1500 mm with support structures / usable frequency range: 5 – 200 Hz
- additional horizontal table: 800 x 1000 mm / usable frequency range: 5 – 2000 Hz
- maximum head displacement: 76 mm (5-12 Hz)
- maximum head speed:
  - 2.0 m/s (sine)
  - 4.5 m/s (shock)
- maximum acceleration (sinus / random):
  - 220 g / 160 g
- maximum acceleration (half-sine shock):
  - 60 g, 11 ms – maximum specimen mass: 432 kg
  - 100 g, 11 ms – maximum specimen mass: 205 kg
  - 330 g, 4 ms – maximum specimen mass: 10 kg
- 16-channel vibration controller
- 16-channel test object monitoring system
  (8 temperature measurement channels, 8 voltage measurement channels up to ±1200 V)
- quick-release specimen fixture + automatic evacuation system
  (including liquid fire suppression)

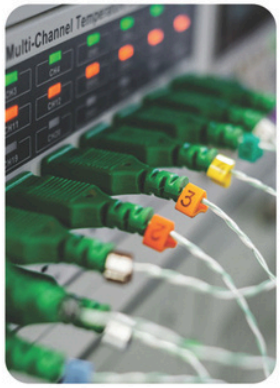


THERMAL SHOCK AND CYCLING TESTING

UN Regulation No. 100 Rev.3 Annex 9B

Testing Capabilities:

- chamber internal dimensions: 2300 x 2300 x 1500 mm
- temperature range: -55 °C to +120 °C with ±1.5 °C accuracy
- temperature change rate: 4.5 K/min within the -40 °C to +80 °C range
- compatible with vibration shaker integration
- resistance to high and low temperatures, as well as temperature shock
- testing in accordance with other standards, including ISO 12405, UN 38.3



MECHANICAL SHOCK TESTING

UN Regulation No. 100 Rev.3 Annex 9C

Testing Capabilities:

- maximum object dimensions: 2000 x 2000 x 1000 mm
- maximum object mass: 800 kg
- generating deceleration characteristics in accordance with the requirements of UN Regulation No. 100 and its modifications for customer needs
- system registering deceleration at selected points of the object
- precise recording of the test process (up to 7 high-speed cameras)
- system monitoring temperature on the surface of the test object
- ability to extinguish batteries with an object evacuation system

MECHANICAL INTEGRITY TESTING

UN Regulation No. 100 Rev.3 Annex 9D

Testing Capabilities:

- maximum object dimensions: 2000 x 2000 x 1000 mm
- maximum object mass: 800 kg
- crush plate with dimensions of 600 x 600 mm, adaptable to individual needs
- system monitoring the temperature on the surface of the test object
- recording of the test process using high-speed cameras
- real-time recording of force and displacement
- adjustable crush force: 4 to 105 kN
- adjustable force ramp-up time
- ability to extinguish batteries with an object evacuation system

FIRE RESISTANCE TESTING

UN Regulation No. 100 Rev.3 Annex 9E

Testing Capabilities:

- maximum object dimensions: 2000 x 2000 x 1000 mm
- maximum object mass: 800 kg
- possibility of dividing fuel pans into sections
- system monitoring the temperature on the surface of the test object
- camera system recording in real time, including high-speed cameras
- ability to extinguish batteries with an object evacuation system

EXTERNAL SHORT CIRCUIT PROTECTION TESTING

UN Regulation No. 100 Rev. Annex 9F

Testing Capabilities:

- test voltages: 50 – 5000 V
- measured insulation resistance: 0 – 20 TΩ
- measured capacitance: 0 – 49.99 µF
- measured temperature: -40 – 99.99 °C
- current measurement: up to 2 kA
- operating voltages: 1000 V
- insulation resistance measurement
- short-circuit test

ELECTRICAL TESTING

UN Regulation No. 100 Rev.3 Annex 9G, 9H, 9I, 9J

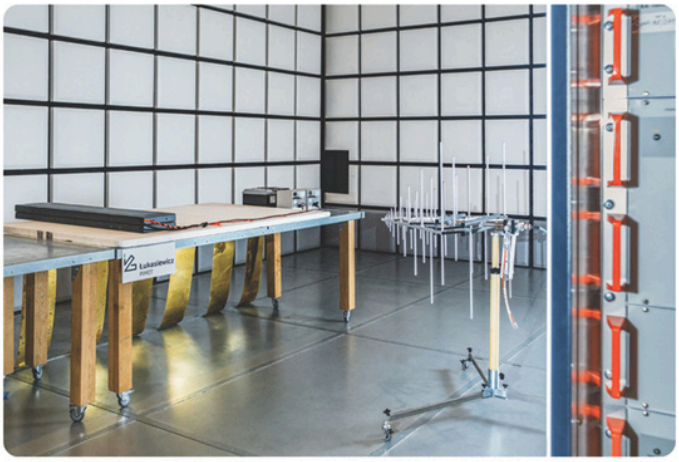
Testing Capabilities:

- voltage range: 80 V / 800 V / 1500 V
- parameter recording: voltage, current, temperature, internal resistance
- battery cooling: support for liquid cooling systems
- HIL (Hardware-In-the-Loop) test bench for BMS testing
- simulation of operating cycles and driving profiles (with the ability to import real-world data)
- functional and durability testing of cells, modules, and packs
- verification of protection mechanisms: OVP, UVP, OCP, OTP)
- battery module testing in climate chambers from –40 °C to +180 °C
- calibration and testing of BMS systems on the HIL test bench
- testing in accordance with international standards, including UN 38.3, IEC 62660, ISO 12405, SAE J2464, J2929 and J1797

ELECTROMAGNETIC COMPATIBILITY (EMC)

Testing Capabilities:

- emission of continuous and transient electromagnetic phenomena (radiated and conducted):
  - continuous radiated disturbances: 9 kHz – 18 GHz; continuous conducted disturbances: 9 kHz – 108 MHz
  - harmonics and flicker (for battery charging systems)
  - transient disturbances in low-voltage installations (e.g., for BMS)
- immunity to continuous and transient electromagnetic phenomena (radiated and conducted):
  - radiated, modulated electromagnetic fields: 2 MHz – 18 GHz
  - pulsed electromagnetic fields (S and L bands)
  - induced magnetic fields: 9 kHz – 1 GHz
  - BURST and SURGE transients (for battery charging systems)
  - voltage dips, fluctuations, and interruptions
  - transients in low-voltage vehicle networks (e.g. 12/24/48 V systems, for BMS)



Standards compliance:

- UN Regulation No. 10
- CISPR, IEC 61000, ISO 16750, ISO 7637 series
- NO-06-A200/A500, MIL-STD 461
- OEM standards, including VW 80000, TL 81000, LV 124, LV 123, LV 148

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