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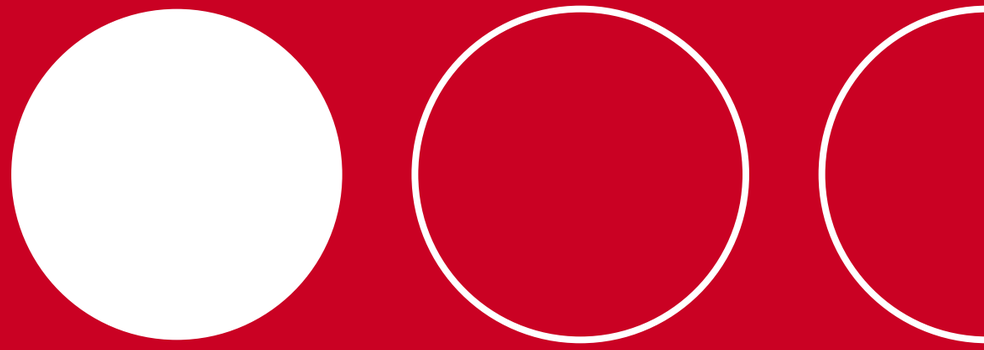
North America Advanced Battery Laboratory Equipment List



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Let's go

UL Solutions North America Advanced Battery Laboratory

Driving trust in innovative battery and energy storage technology

Explore the tabs to see what equipment and capabilities our North America Advanced Battery Laboratory has to offer.

- Performance Laboratory
- Ingress Protection
- Mechanical Laboratory
- Abuse Test Cells

UL Solutions North America Advanced Battery Laboratory is one of the most extensive battery testing and engineering laboratories on the continent.

At our 89,000-square-foot facility, our team of specialized engineers and technicians will use cutting-edge equipment and methodologies to deliver comprehensive battery safety testing, performance testing and validation services for automotive and industrial manufacturers and suppliers, all under one roof. At this facility, we can:

- Test and certify electric vehicle (EV) batteries for compliance with standards, regulatory requirements and OEM specifications
- Test and certify lead-acid, lithium and other forms of electrical, electrochemical, thermal and mechanical energy used in industrial stationary batteries, uninterrupted power supply (UPS) and energy storage devices to North American, European and Asian standards and requirements
- Create customized testing service packages to meet our customers' specific needs

Equipment List

Performance Laboratory

Module/Pack Temperature Cycling

Module/Pack Temperature Cycling High Performance

Cell/Module Temperature Cycling

Altitude Simulation/Vacuum Chamber

Mechanical Laboratory

Large Vibration Table With Chamber (K350)

Vibration Table With Chamber (K200)

Ingress Protection

Water Ingress Test

Abuse Test Cells

Drop Tester

Crush Tester

Nail Tester — Cell

Nail Tester — Module/Pack

Short Circuit Tester

UN ECE R100 testing

Cycler

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Performance Laboratory

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Module/Pack Temperature Cycling

Test Area: General Test

Equipment	Manufacturer	Quantity	Specs				
Chamber	Weiss	4	**Max Sample Dimensions:** 3.1 m x 2.2 m x 2.3 m (10.2 ft x 7.2 ft x 7.5 ft)	**Ramp/Temp Change Rate:** >2°C/min (3.6 °F/min)	**Temp Range:** -40°C~130°C (-40°F~266°F)	**Humidity Range:** 10%-95%	
Cycler	ZF	8	**Voltage Range:** 0 V~1200 V (source), <20 V-1200 V (sink)	**Power Range:** 0~250 kW	**Current Range:** -1000 A~+1000 A	**Channel per Cycler:** 1	
Cooling System	Regloplas	4	**Temp Range:** -30°C~90°C (-22°F~194°F)	**Cooling Power:** 18.5 kW (at 25°C/77°F) 5 kW (at -30°C/-22°F)	**Heating Power:** 12 kW	**Volume Flow Range:** 1 L/min~40 L/min	**Pressure control range:** 0.1 bar~5 bar

Module/Pack Temperature Cycling High Performance

Test Area: General Test

Equipment	Manufacturer	Quantity	Specs				
Chamber	Weiss	2	**Max Sample Dimensions:** 3.1 m x 2.2 m x 2.3 m (10.2 ft x 7.2 ft x 7.5 ft)	**Ramp/Temp Change Rate:** >4.5°C/min (8.1 °F/min)	**Temp Range:** -40°C~130°C (-40°F~266°F)	**Humidity Range:** 10%-95%	
Cycler	ZF	2	**Voltage Range:** 0 V~1500 V (source), 30 V-1500 V (sink)	**Power Range:** 0~500 kW	**Current Range:** -800 A~+800 A	**Channel per Cycler:** 1	
Cooling System	Regloplas	2	**Temp Range:** -30°C~90°C (-22°F~194°F)	**Cooling Power:** 18.5 kW (at 25°C/77°F) 5 kW (at -30°C/-22°F)	**Heating Power:** 12 kW	**Volume Flow Range:** 1 L/min~40 L/min	**Pressure control range:** 0.1 bar~5 bar

Cell/Module Temperature Cycling

Test Area: General Test

Equipment	Manufacturer	Quantity	Specs			
Chamber	Weiss	1	**Max Sample Dimensions:** 0.8 m x 1.1 m x 0.9 m (2.6 ft x 3.6 ft x 3 ft)	**Ramp/Temp Change Rate:** >10°C/min (18 °F/min)	**Temp Range:** -70°C~180°C (-94°F~356°F)	**Humidity Range:** 10%-98%
Cycler	ZF	8	**Voltage Range:** 0 V~8 V	**Power Range:** 0~2.4 kW	**Current Range:** -300 A~+300 A	**Channel per Cycler:** 1
Cycler	ZF	4	**Voltage Range:** 0 V~8 V	**Power Range:** 0~4 kW	**Current Range:** -500 A~+500 A	**Channel per Cycler:** 1
Cycler	ZF	1	**Voltage Range:** 0 V~200 V	**Power Range:** 0~40 kW	**Current Range:** -300 A~+300 A	**Channel per Cycler:** 1

Altitude Simulation/Vacuum Chamber

Test Area: General Test

Equipment	Manufacturer	Quantity	Specs			
Chamber	Weiss	1	**Max Sample Dimensions:** 1 m x 1.5 m x 1 m (3.3 ft x 4.9 ft x 3.3 ft)	**Pressure Change Rate (-):** 25 mbar/min	**Pressure Change Rate (+):** 100 mbar/min	**Humidity Range:** 10%-98%
Cycler	ZF	6	**Voltage Range:** 0 V~8 V	**Power Range:** 0~2.4 kW	**Current Range:** -300 A~+300 A	**Channel per Cycler:** 1
Cycler	ZF	3	**Voltage Range:** 0 V~8 V	**Power Range:** 0~4 kW	**Current Range:** -500 A~+500 A	**Channel per Cycler:** 1

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Mechanical Laboratory

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Large Vibration Table With Chamber (K350)

Test Area: Vibration

Equipment	Manufacturer	Quantity	Specs						
Shaker	IMV	1	**Max Sample Dimensions:** 2.7 m x 2.7 m x 1.5 m (8.9 ft x 8.9 ft x 4.9 ft)	**Max Load:** 3000 kg (6614 lb)	**Acceleration Amplitude:** 1000 (m/s^2) Sine, 700 (m/s^2 rms) Random	**Frequency:** 1 Hz~2000 Hz	**Displacement Amplitude:** 1 mm~76 mm	**Shock Acceleration:** 2000 (m/s2)	**General Size:** 70K
Chamber	Weiss	1	**Ramp/Temp Change Rate:** >5°C/min (9°F/min)	**Temp Range:** -55°C~90°C (-67°F~194°F)					
Cycler	ZF	1	**Voltage Range:** 0 V~1200 V (source), 20 V-1200 V (sink)	**Power Range:** 0~250 kW	**Current Range:** -1000 A~+1000 A	**Channel per Cycler:** 1			
Cooling system	Regloplas	1	**Temp range:** -30°C to 90°C	**Cooling power:** 18.5 kW	**Heating power:** 12 kW	**Volume flow rate:** 1 - 40 L/min	**Pressure control range:** 0.1 to 5 bar		

Vibration Table With Chamber (K200)

Test Area: Vibration

Equipment	Manufacturer	Quantity	Specs						
Shaker	IMV	2	**Max Sample Dimensions:** 2.7 m x 2.7 m x 1.5 m (8.9 ft x 8.9 ft x 4.9 ft)	**Max Load:** 2000 kg (4409 lb)	**Acceleration Amplitude:** 1000 (m/s^2) Sine, 700 (m/s^2 rms) Random	**Frequency:** 5 Hz~2000 Hz	**Displacement Amplitude:** 1 mm~76 mm	**Shock Acceleration:** 2000 (m/s2)	**General Size:** 40K
Chamber	Weiss	2	**Ramp/Temp Change Rate:** >5°C/min (9 °F/min)	**Temp Range:** -55°C~90°C (-67°F~194°F)					
Cycler	Regloplas	2	**Voltage Range:** 0 V~1200 V (source), 20 V-1200 V (sink)	**Power Range:** 0~250 kW	**Current Range:** -1000 A~+1000 A	**Channel per Cycler:** 1			
Cooling system	Regloplas	2	**Temp range:** -30 to 90	**Cooling power:** 18.5 kW	**Heating power:** 12 kW	**Volume flow rate:** 1 - 40 L/min	**Pressure control range:** 0.1 to 5 bar		

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Ingress Protection

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Water Ingress

Test Area: Environmental

IP Rating	Manufacturer	Quantity	Specs				
IPX1/2	Weiss	1	**Max Sample Dimensions:** 2.5 m x 1.7 m (~3 m max diagonal) (8.2 ft x 5.6 ft (~9.8 ft max diagonal))	**Rotating Platform:** 1-5 rpm	**Pressure Change Rate (+):** 100 bar/min		
IPX3/4	Weiss	1	**Max Sample Dimensions:** N/A	**Flow Rate:** 10 L/min (+/- 5%)	**Water Pressure:** ~50-150 kPa (0.5/1.5 bar)	**Distance of Nozzle:** 300-500 mm	
IPX5/6	Weiss	1	**Max Sample Dimensions:** 2.5 m x 1.7 m x 0.75 m (8.2 ft x 5.6 ft x 2.5 ft)	**Flow Rate:** 12.5/100/75 L/min (+/- 5%)	**Water Pressure:** ~30/100/1000 kPa (0.3/1/10 bar)	**Distance of Nozzle:** 2.5-3 m	
IPX7/8	Weiss	1	**Max Sample Dimensions:** 2.5 m x 1.7 m x 0.75 m (8.2 ft x 5.6 ft x 2.5 ft)	**Max Weight:** 1300 kg (2866 lb)	**Chamber Temperature Range:** 60°C-90°C (140°F-194°F)	**Chamber Heating Rate:** 2°C/min (35.6°F/min)	**Water Temperature:** 0°C (+/-2°C) (32°F (+/28.4°F))
IPX9	Weiss	1	**Max Sample Dimensions:** 2.5 m x 1.7 m (~3 m max diagonal) (8.2 ft x 5.6 ft (~9.8 ft max diagonal))	**Flow Rate:** 14-16 L/min	**Water Pressure:** ~80-100 bar	**Temperature Rate** 80°C (176°F)	**Rotating Platform** 1-5 rpm
Rain Test	Weiss	1	**Max Sample Dimensions:** N/A	**Height:** Adjustable	**Water Pressure:** 34.5 kPa (0.345 bar)	**Distance of Nozzle:** 1.4 m (4.6 ft)	

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Abuse Test Cells

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Drop Tester

Test Area: Test Cell 2

Manufacturer	Quantity	Specs		
ZF	1	**Max Sample Dimensions:** N/A	**Max Load:** 1500 kg (3307 lb)	**Height:** Adjustable up to 2 m (6.6 ft)

Crush Tester

Test Area: Test Cell 3

Manufacturer	Quantity	Specs		
ZF	1	**Max Sample Dimensions:** 2.8 m (9.2 ft)	**Max Force:** 300 kN	**Speed:** 0.1-10 mm/second

Nail Tester – Cell

Test Area: Test Cell 3

Manufacturer	Quantity	Specs		
ZF	1	**Max Sample Dimensions:** 300 mm x 300 mm x 200 mm (11.8 in x 11.8 in x 7.9 in)*	**Max Force:** 5 kN	**Speed:** 0.1-80 mm/second

*We may be able to accommodate larger cells depending on their exact dimensions and the test plan.

Nail Tester – Module/Pack

Test Area: Test Cell 3

Manufacturer	Quantity	Specs		
ZF	1	**Max Sample Dimensions:** 2.5 m x 1.7 m x 0.75 m (8.2 ft x 5.6 ft x 2.5 ft)	**Max Force:** 5 kN	**Speed:** 0.1-80 mm/second

Short Circuit Tester

Test Area: Test Cell 3

Manufacturer	Quantity	Specs			
ZF	1	**Max Sample Dimensions:** N/A (without chamber) 610 mm x 760 mm x 550 mm (with chamber) (2 ft x 2.5 ft 1.8 ft (with chamber))	**Voltage:** 1000 V	**Current:** 4000 A continuous	**Resistance:** 10 mΩ~100 mΩ

UN ECE R100 Fire Resistance Tester

Test Area: Test Cell 1

Manufacturer	Quantity	Specs	
ZF	1	**Max Sample Dimensions:** 2.8 m x 1.8 m x 0.75 m (9.2 ft x 5.9 ft x 2.5 ft)	**Max Weight:** 1500 kg (3307 lb)

Cycler

Test Area: Can be moved between cells

Manufacturer	Quantity	Specs			
ZF	16	**Voltage Range:** 0 V~8 V	**Power Range:** 0~2.4 kW	**Current Range:** -300 A~+300 A	**Channel per Cycler** 1
ZF	8	**Voltage Range:** 0 V~8 V	**Power Range:** 0~4 kW	**Current Range:** -500 A~+500 A	**Channel per Cycler** 1
ZF	2	**Voltage Range:** 0 V~200 V	**Power Range:** 0~40 kW	**Current Range:** -300 A~+300 A	**Channel per Cycler** 1
ZF	2	**Voltage Range:** 0 V~1500 V (source), 30 V-1500 V (sink)	**Power Range:** 0~500 kW	**Current Range:** -800 A~+800 A	**Channel per Cycler** 1

Choose a dedicated partner, committed to supporting the future of mobility and electrification

UL Solutions helps OEMs, battery manufacturers and suppliers differentiate their EV and industrial batteries from competitors and boost end consumers' confidence in the value of their products. By partnering with us, you can validate your batteries' critical safety, reliability and performance characteristics and test against key regulations, standards and requirements — all with one testing services provider. With more than a century of fire and electrical safety science leadership and over 30 years of experience in battery safety testing, we stand committed to helping OEMs, battery manufacturers and suppliers seize the opportunities and overcome the challenges of the energy transition.

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