

Test systems for
electrical energy storage.

A full load of know-how for battery testing.

Maximum performance and safety go hand in hand.



The age of energy storage.

In a world that is becoming increasingly dependent on electrical energy storage, the safety, reliability and performance of batteries play a crucial role. The industry needs increasingly dense lithium-ion packs, modules and cells to store more power. However, increasing storage capacity also increases the risk of potential malfunctions and hazards during testing. The safety in the laboratory, especially personal protection, is therefore a top priority.

Your perfect partner for battery tests.

We specialise in battery testing and safety solutions. As a competent partner with many years of experience, we provide you with optimised and highly reliable all-in-one solutions. These are capable of simulating a wide range of thermal, climatic and mechanical environmental influences – TÜV-tested and in accordance with EUCAR Hazard Standards and ATEX guidelines for hazard assessment. Whatever you need – cells, modules or complete packs – we always offer the customised solutions.

Charged and secured.

Our expertise covers a wide range of battery technologies. From lithium-ion batteries to fuel cells and solid-state batteries. No matter what type of battery you are developing or testing, our product range offers reliable and safe solutions for a wide range of testing applications. Test us.

Every dimension of testing technology.

A wide range of test procedures is required to ensure the safety and optimum performance of energy storage systems. That's why we offer a comprehensive basic range of test equipment and systems for conducting state-of-charge, temperature and climate tests. We can also design and realise tailor-made test chambers and test spaces:

- ▮ Dust and corrosion tests
- ▮ Thermal shock tests
- ▮ Spray tests
- ▮ Splash water tests
- ▮ Destruction tests
- ▮ Immersion tests
- ▮ Steam heat tests
- ▮ Vibration tests
- ▮ Multi-axis combination tests



Better test safely.

Hazards in the laboratory.

Testing lithium-ion packs, modules and cells with their increasing energy density is a sensitive issue. During testing, overload conditions or malfunctions can occur, even leading to the destruction of the batteries. With growing storage size, the impacts increase in the event of a possible malfunction and the potential danger when testing lithium-ion batteries rises. Therefore, safety in the laboratory, especially personal protection, has the highest priority during such tests.

Conditions for energy storage testing.

Although there are binding specifications for testing batteries for electric vehicles, it is essential to have an experienced partner at your side who is familiar with the test requirements which need to be met.

Testing under the influence of temperature		
External influences, e.g. <ul style="list-style-type: none">HeatingOverchargingDeep dischargingCharging current too highShort circuit		Internal events, e.g. <ul style="list-style-type: none">Electrode-electrolyte reactionElectrochemical reaction
Impact on the lithium-ion battery		
Hazard Level	Description	Classification and impact
0	No impact	No impact, no function restriction.
1	Passive protection system responds	No damage, no leakage, no gas leakage, no fire, no rupture, no explosion, no exothermic reaction, no thermal runaway. Cell reversibly damaged. Repair of the protection system necessary.
2	Damage	No leakage, no gas leakage, no fire, no rupture, no explosion, no exothermic reaction, no thermal runaway. Cell irreversibly damaged. Repair necessary.
3	Leakage (mass loss <50%)	No gas leakage, no fire, no rupture, no explosion. Leakage of electrolyte < 50%.
4	Gas leakage (mass loss ≥50%)	No fire, no rupture, no explosion. Leakage of electrolyte ≥ 50%.
5	Fire	No rupture, no explosion, no flying parts.
6	Rupture	No explosion, but flying parts of the active mass.
7	Explosion	Explosive decomposition of the cell.

Correctly assessing hazards.

How much protection is required?

As a TÜV-certified specialist for battery testing technology, we follow the Machinery Directive and the requirements of the CE Declaration of Conformity. We also take into account the EUCAR Hazard Standards and the ATEX guidelines for hazard assessment. We provide our customers with detailed advice on which safety standards are relevant for their individual testing tasks and which safety equipment is necessary for their testing systems.

Safety equipment	EUCAR Hazard Levels				ATEX Zone 2
	0-3	4	5	6/7	
Visual and audible alarms	✓	✓	✓	✓	
Electric door lock	✓	✓	✓	✓	
Pressure relief flap (lower pressure level)		✓	✓	✓	
Mechanical door lock and retaining brack		✓	✓	✓	
Particle trap		✓	✓	✓	
Fire detection via CO gas or temperature measurement			✓	✓	
Flushing unit with N ₂ or with CO ₂			✓	✓	
Water flushing or high-pressure water mist system (optional)			✓	✓	
Rupture disc (higher pressure level)				✓	
Pressure-resistant inner tank (optional)				✓	
N ₂ permanent inertisation					✓
O ₂ measuring unit (optional)					✓
Various gas sensors, e.g. H ₂ , HC (optional)					✓

Excellent in performance, equipment and design.

weisstechnik sets standards in environmental simulation.

E-mobility is an automotive mega trend worldwide, lithium-ion batteries have successfully established themselves as energy storage medium in the field of mobile systems. Ever larger applications, especially for electric vehicles, require storage systems that not only have a very high energy content, but can also deliver high output. For exactly that, Weiss Technik offers reliable and safe solutions for a wide range of testing tasks. Test us.

Precisely engineered.

We know what matters to you during testing: reliable, precise and reproducible results.

Perfectly manufactured.

We only use high-quality materials and manufacture most of the components for our test chambers in-house.

Instantly ready.

We ensure intelligent and intuitive operation: simply set up, connect and start.

Individually configurable.

Our test chambers can be individually expanded with numerous options. Fully according to your needs.

Extensive range of safety accessories as standard and various modifications:

- | | | | |
|----|-----------------------------------|----|---|
| 1 | Visual status display | 6 | Fire detection via temperature measurement |
| 2 | Electric door lock | 7 | Flushing unit for inertisation in the event of fire |
| 3 | Reversible pressure relief flap | 8 | Pressure relief device including rupture disc |
| 4a | Mechanical door lock | 9 | N ₂ permanent inertisation |
| 4b | Plug safeguarding | 10 | O ₂ measuring unit |
| 5 | Fire detection via CO measurement | 11 | High-pressure water mist (HPWM) system |



Extensive safety equipment and accessories.



1 Visual status display

The signal lamp can be positioned variably on the device by a magnetic adjustable foot. When a fault occurs, the red signal lamp flashes. An acoustic signal is also possible.



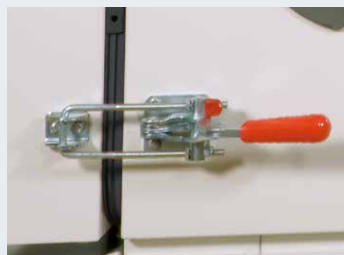
2 Electric door lock

The electric door lock locks the test chamber door during automatic and manual testing. In automatic mode, the entire test system can be switched off during an interruption to unlock the door.



3 Reversible pressure relief flap

The pressure equalisation or exhaust port is equipped with a mechanical, weighted pressure relief flap. Depending on the expected gas discharge volume, this is dimensioned with 80 to 200 mm diameter.



4a Mechanical door lock

With the reversible pressure relief flap, 2 toggle clamp latches are also fitted to the test chamber door to mechanically hold the door shut.



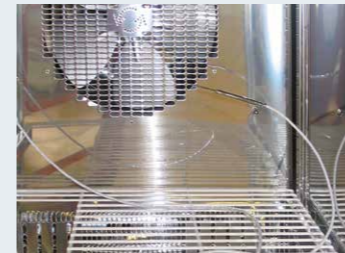
4b Plug safeguarding

The access ports will be equipped with retaining clamps to secure the plugs.



5 Fire detection via CO measurement

An electrochemical sensor measures the CO concentration in the air with a sample gas pump and tempering of the sample gas, contacts on the test cabinet give an alarm. H₂ monitoring is also possible.



6 Fire detection via temperature measurement

The independent, freely movable Pt 100 temperature sensor detects the temperature increase in the test chamber in the possible event of a fire.



7 Flushing device for inertisation in case of fire

In case of fire detection, flooding of the test chamber with N₂ or CO₂ can be initiated. This inertises the test chamber, in the case of liquid CO₂, a slight cooling effect is also produced.



8 Pressure relief device including bursting disc

In the event of a battery rupture, large quantities of gas can be released abruptly into the test chamber. A more pressure-resistant design of the test chamber including a certified bursting disc relieves the pressure, an exhaust duct with service access quickly removes the gas.



9 N₂ permanent inertisation

For permanent inertisation of the test chamber with nitrogen (N₂) or argon (Ar), the door interlock is activated. A large flushing quantity reduces the O₂ concentration to ≤ 5 %. After the minimum purging time, test release and process-oriented small flushing quantity take place.



10 O₂ measuring unit

In combination with N₂ or Ar permanent inertisation, the O₂ concentration in the test chamber is measured and monitored. This ensures a controlled supply of nitrogen or argon.



11 High-pressure water mist (HDWM) system

Finely atomised water-air mixture displaces ambient air/oxygen and thus smothers the flame. The large water-mist surface area makes optimum use of the evaporation enthalpy and cools the test space considerably. The resulting aerosol reaches every area in the test space.

Looking for something special?

Impressive test systems for extreme conditions.

Always the right solution.

If the basic test chambers are not large enough, or if the test requirements call for a customised solution, we offer almost unlimited options.

As a single-source supplier, we design and build test chambers and test spaces for modules, packs and complete drive units, with or without BMS.

You can choose from walk-in test chambers to full vehicle drive-in test spaces.



Thermal testing

Electronic components need to be tested under real-life conditions in order to identify potential weak points or age-related damage in advance. Battery cells can be tested simultaneously on several levels in this space winner with a particularly small footprint.



Constant climate test

Sometimes a climate test is as simple as keeping the temperature and humidity constant over time. This process is used, for example, for materials that do not require special air guidance. ClimeEvent M is the simple and economical solution for this, designed for chambers from 6 m³ to 50 m³.



Battery-abuse test

Environmental regulations and a growing awareness of occupational safety mean that tests are no longer carried out in open environments or empty buildings. ExtremeEvent is designed with a reinforced frame and innovative damper mechanism and guarantees the safe and sustainable performance of mechanical, thermal and electrical abuse tests.



Vibration test

Vibration tests combine mechanical and thermal loads with a chamber volume of up to 21 m³ and for up to 3,000 litres of test material. In this case, the temperature range is between -40 and +100 °C. This exceptional performance guarantees the testing of complete battery packs including battery management systems (BMS).



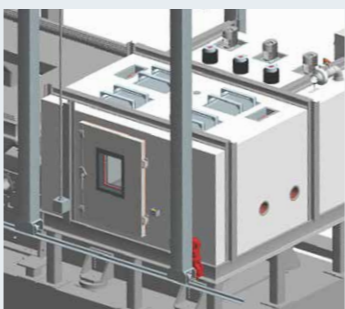
Dust test

We have developed whole-vehicle dusting systems to test the effects of dust on batteries in different climates and to identify potential weaknesses.



Climate change corrosion test

The batteries are successively subjected to salt spray tests, condensation tests and climate tests with changing or constant temperatures. The test chambers are made of corrosion-resistant stainless steel (V5A) to withstand the high stresses caused by climatic changes and salt solutions.



Air ice water shock test

In this demanding shock test, the test material is heated and then cooled shock-like in a series of 20 test cycles. The system is corrosion-resistant and offers a 10 m³ sized air-conditioning area with fan and ice water basin. The system can test complete battery packs weighing up to 800 kg.

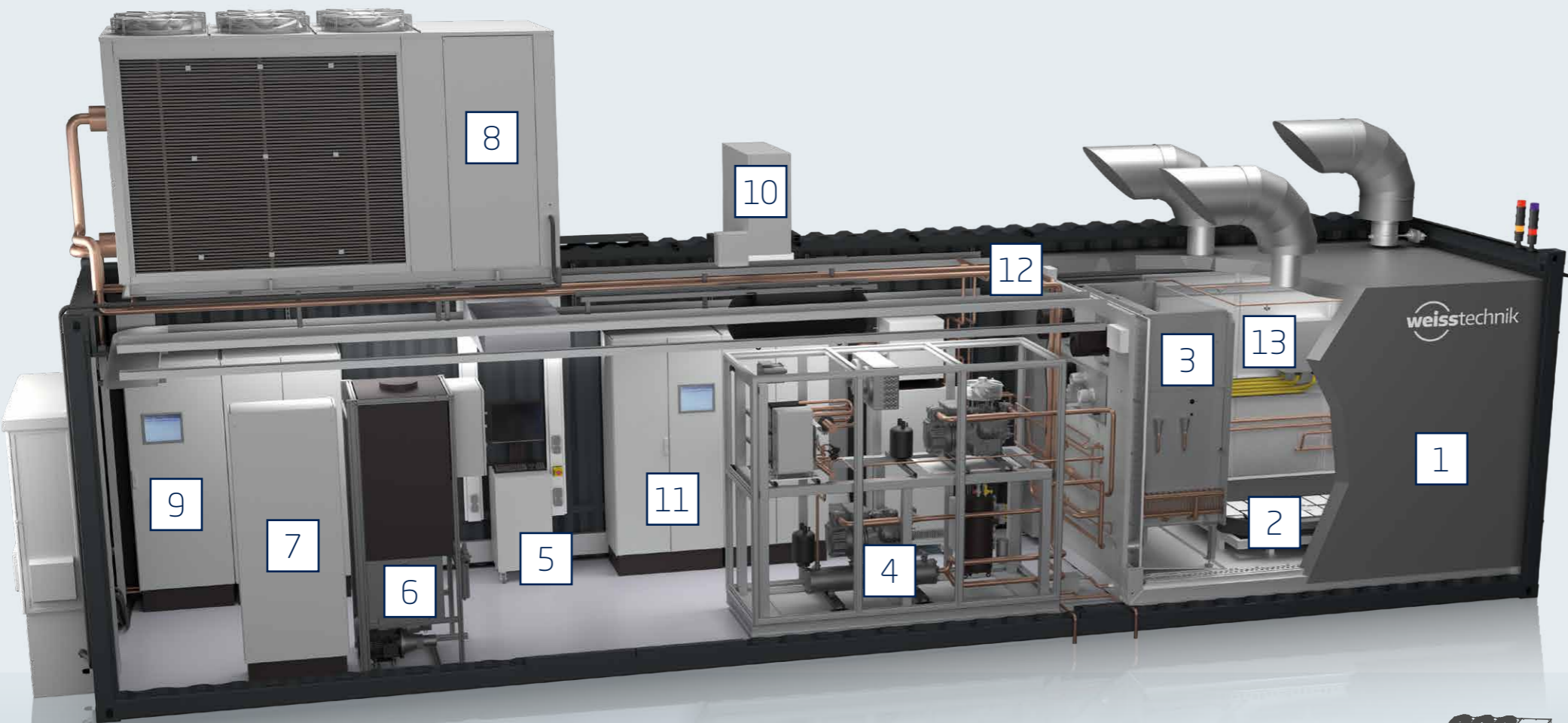


Multi-axis combination test

The high-performance battery test bench, consisting of a multi-axial shaker table (MAST) that can be moved around 3 spatial axes and a climatic chamber, is unique in its design and equipment. With this system, combined tests for motion, vibration and various climatic influences can be carried out under realistic conditions and can be reproduced at any time.

weisstechnik presents an integrative test system.

Plug&Test Lab for testing vehicle batteries.



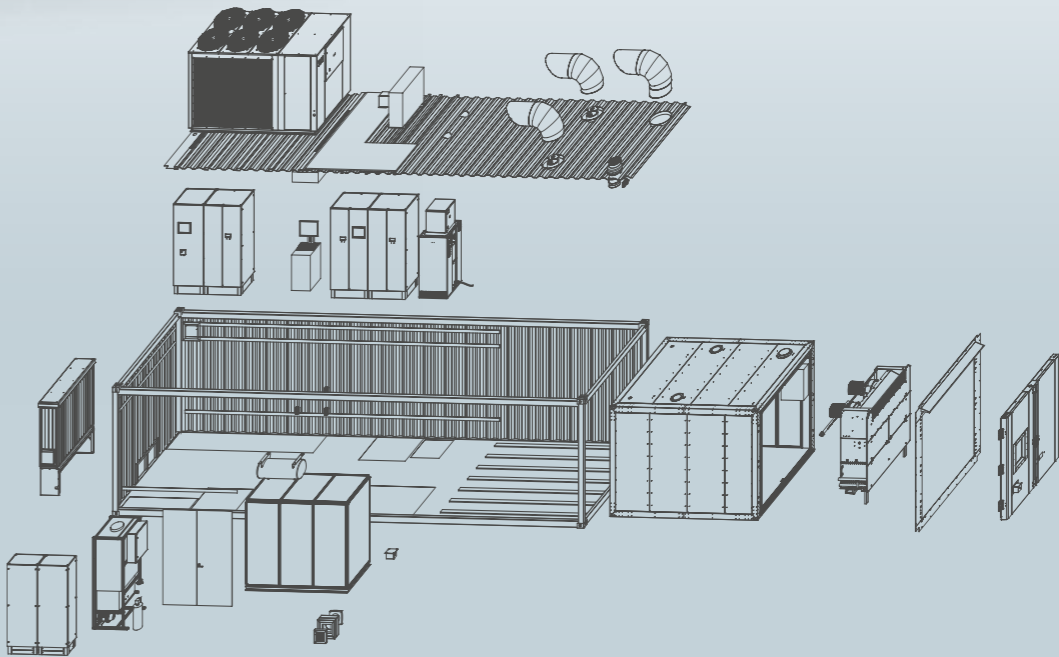
- | | |
|---|----------------------------------|
| 1 Test chamber | 8 External liquifier |
| 2 Test specimen (battery pack) | 9 Charging/discharging station |
| 3 Air-treatment system | 10 Split air-conditioning unit |
| 4 Cooling machines | 11 Centralised automation system |
| 5 Operating station | 12 Media conditioning system |
| 6 Extinguishing system | 13 Decentral automation system |
| 7 Switch cabinet refrigeration technology | |

Start testing immediately!

As the market for electric vehicles continues to grow and the pressure to develop innovative electromobility solutions increases, the need for reliable temperature and climate testing solutions for lithium-ion automotive batteries is growing rapidly. The mobile, container-based plug & test solution from **weisstechnik** fulfils these requirements in full and offers standard-compliant testing as well as all the necessary safety specifications for electrical energy storage systems.

Stand-alone or separate - your choice!

Highly flexible concept with maximum safety: use as a complete stand-alone test laboratory, but also available as modules. All components included in the container offer a wide range of applications and can also be purchased and installed separately. This gives you the freedom to customise your test system.



Reliable, safe and high quality.

No challenge is out of standards for us.

Testing to standards.

The test systems from **weisstechnik** fulfil the entire market-relevant standards to ensure reliable battery testing. We fully cover the following relevant automotive test standards and many more with our test systems – without ifs and buts.



Standard	Description
UL 2580	Standard for energy storage systems for use in electric vehicles
UL 2271	Safety standard for energy storage systems in light electric vehicles
UL 1973	Standard for energy storage systems for use in stationary applications, vehicle auxiliary power systems and light electric rail vehicles (LER)
IEC 62619	Requirements and tests for the safe operation of secondary lithium cells and energy storage systems used in industrial applications, including stationary applications
ECE R100	Safety requirements for the electric drive system of road vehicles including rechargeable energy storage systems
UN 38.3	Safety of lithium-ion and lithium-metal energy storage systems during transport
GB 38031	Safety requirements for traction batteries for electric vehicles
KMVSS TP48	Drive battery test
SAE J2464	Misuse testing of energy storage systems for electric or hybrid electric vehicles
IEC 63056	Requirements and tests for the product safety of secondary lithium cells and batteries used in electrical energy storage systems
IEC 63057	Safety tests and requirements for secondary lithium batteries permanently installed in road vehicles, excluding drive train
IEC 62933-5-2	Safety requirements for mains-integrated ESS systems (energy storage systems)
VDE-AR E2510-50	Safety requirements for stationary battery energy storage systems with lithium batteries
VDA AK 5.21 Thermal Vibration	Environmental simulation tests on batteries
LV 124-2	Environmental requirements and tests
PTCE Lifecycle (LV 124 L-03)	Thermal shock test

We measure ourselves by our service.

We think and act collaboratively service-oriented.



- Our services – lots of good reasons:
- ▮ Global service network
 - ▮ Wide range of preventive maintenance
 - ▮ Reliable spare part supply
 - ▮ Special deployments available any time
 - ▮ Certified proper disposal of outdated devices

Our Service Experts are always near you.

24/7-Service-Helpline:
+49 1805 666 556

With our service teams, we offer sustainable solutions for a long-term, safe system operation.

Expert advice.

Our experienced experts are ready to support you from the first idea to after-sales service in every step of your project, by telephone or on site.

Maintenance and service.

We offer different service levels and guaranteed reaction times after the receipt of the fault report. Our full maintenance service provides additional safety with calculable costs.

Spare part management.

Many spare and wearing parts are directly available in our warehouse. To further increase operational reliability, selected spare parts can additionally be stocked on site. We would be pleased to advise you further.

Instruction and training.

We provide regular trainings covering the application, operation and software of the units. We also offer customer-specific workshops at your location on request.

Passionately innovative.

We work in partnership to support companies in research,
development, production and quality assurance.
With 22 companies in 15 countries at 40 locations.

weisstechnik
For a safe future.



Environmental Simulation

The first choice for engineers and researchers for innovative, safe environmental simulation facilities. In fast motion, our test systems can simulate all the influences in the world as well as for instance in space. In temperature, climate, corrosion, dust or combined stress tests. With a very high degree of reproducibility and precision.



Air Solutions

As the leading provider of clean rooms, climate technology and air dehumidification, we consistently ensure optimal climatic conditions for people and machines. For industrial production processes, in hospitals, mobile operation tents or in the field of information and telecommunications technology. From project planning to implementation.



Heat Technology

Experienced engineers and designers develop, plan and produce high-quality, reliable heat technology systems for a broad range of applications from heating and drying cabinets to microwave systems and industrial furnaces.



Pharmaceutical Technology

With decades of experience and know-how, we guarantee the most sophisticated clean air and containment solutions. Our comprehensive and innovative range of products includes barrier systems, laminar flow systems, safety workbenches, isolators, airlocks and stability test systems.

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learn more.



Test it. Heat it. Cool it.