

Climate chambers series KB with package P for lithium-ion energy storage system tests

KB-P

The test chambers for energy storage systems from BINDER for carrying out aging and performance tests (package P) offer maximum user convenience and comply with **EUCAR Hazard Level 4**. Within a manufacturing process, the KB series climatic chamber is perfectly suited for **forming of the cells**.

FORMING IN CLIMATE CHAMBERS SERIES KB

An important and final production step in the manufacture of a lithium-ion cell is formation. At this point the cell is charging and discharging for the first time and boundary layers there are inside the cell between the electrolyte and the active material. In addition, a quality control step can be performed simultaneously by a further charging and discharging process. The forming process can take up to 2 days.

PERFORMANCE AND AGING TESTS

Calendar and cyclic aging tests are carried out. With calendar aging, the behavior of the energy storage system e.g. with different capacities across some or all of the lifetime of the energy storage system at different temperatures. During cyclic aging, the lifetime is determined in relation to the charging and discharging process of the energy storage system.

THE POWERFUL ALLROUNDER IN CLIMATE CHAMBERS

Important features of the KB series with package P:

- Perfectly suited for temperature tests between 0°C and 100°C
- Best price-performance ratio
- Compact dimensions compared to other models
- Solution request via BINDER INDIVIDUAL
- Small footprint - for small setup area
- Space-saving solution possible

Model KB 400 with package P



YOUR ADVANTAGES AT A GLANCE



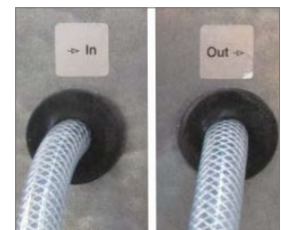
Class 2 independent temperature safety device when temperature is set to 120°C.



Door-locking mechanism with strong closing brackets on the side



Pressure relief flap with an additional relieving spring as a safety measure in the event of faults



Inert gas connections for flushing (e.g., for nitrogen)

TEST CHAMBER FOR ENERGY STORAGE SYSTEMS SERIES KB - MODEL SELECTION AND TECHNICAL DATA

Model	KB 53	KB 115	KB 240	KB 400	KB 720
Housing dimensions not including attachments and connections <i>Width x Height x Depth [mm]</i>	635 x 835 x 580	835 x 1025 x 650	925 x 1465 x 800	925 x 1950 x 805	1250x 1952 x 885
Internal Dimensions <i>Width x Height x Depth [mm]</i>	400 x 400 x 330	600 x 480 x 400	650 x 785 x 485	650 x 1270 x 485	970 x 1250 x 576
Interior volume [L]	53	115	247	400	698
Footprint [m²]	0,13	0,54	0,74	0,74	1,10
Temperature range	-5...100	--5...100	-5...100	-5...100	-5...100
Humidity range	-	-	-	-	-
Number of shelves (Std./max.)	2/4	2/5	2/9	2/15	2/15
Load per rack [kg]	15	20	30	30	45
Permitted load [kg]	40	50	100	100	100
Heat compensation at 40°C [W]	100	150	300	500	500

- not available

ACCESS PORTS SERIES KB

Model	Top possible size [mm]	At side (left/right) possible size [mm]	At back possible size [mm]
KB 53	-	-	10, 30, 50
KB 115	-	-	10, 30, 50
KB 240	10, 30, 50	10, 30, 50	-
KB 400	10, 30, 50	10, 30, 50	-
KB 720	10, 30, 50	10, 30, 50	-



Access ports for cables and power cables.

Precise positioning in almost all sizes and locations is possible in consultation with our BINDER INDIVIDUAL department. Access ports available in silicone or stainless steel.

FURTHER ADAPTATIONS SERIES KB



Program sequence display using indicator lamps



Electromechanical door lock mechanism controlled in a program and/or manually



Additional access ports available in almost all sizes and locations



Telescopic rails for easier loading of the chamber

STANDARDS

UN 38.3 | IEC 62660-1 | IEC 62660-2 | IEC 62660-3 | IEC 61960 | IEC 62133 | UL 1642 | UL 2054 | SAE J2464

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OTHER BINDER MODELS FOR LITHIUM-ION TESTS

1. Aging and performance tests

BINDER offers test chambers for aging tests with a standardized package A and a more advanced package P for Performance and aging tests. The following models can be equipped by our BINDER INDIVIDUAL department with package A and P:

Series	56	115	240	400	720	1020
MK	•	•	•	-	•	-
MKF	•	•	•	-	•	-
MKT	-	•	•	-	•	-
MKFT	-	•	•	-	•	-
KB	•	•	•	•	•	-
KBF	-	•	•	-	•	•
KMF	-	•	•	-	•	•
KBF-S	-	-	•	-	•	•

* Available – not available

2. Drying & vacuum drying in the manufacturing process

In the manufacturing process of the lithium-ion cell, components are dried. Our **vacuum drying ovens series VD and series VDL** as well as our **drying oven Series FED** are suitable for this.



Model MK 240 with package P

EXPLANATION EUCAR HAZARD LEVEL

The failures which result from the cell or module are classified in hazard levels. The hazard levels according to EUCAR (European Council for Automotive R&D) offer an orientation. Operators define the hazard classification for the risk of their test objects and the test system/test equipment is then designed in the appropriate safety class.

Hazard classification	Description	Classification Criteria & Effect	
0	No effect	No effect. No loss of functionality	Paket A
1	Passive protection activated	No defect; no leakage; no venting, fire, or flame; no rupture; no explosion; no exothermic reaction or thermal runaway. Cell reversibly damaged. Repair of protection device needed	
2	Defect/Damage	Same as Hazard classification 1; however, the cell is damaged irreversibly and it must be replaced	Paket P
3	Leakage mass < 50 %	No venting, fire, or flame; no rupture; no explosion. Weight loss < 50 % of electrolyte weight (electrolyte = solvent + salt)	
4	Venting mass > 50%	No venting, fire, or flame; no rupture; no explosion. Weight loss > 50 % of electrolyte weight (electrolyte = solvent + salt)	
5	Fire or Flame	No rupture; no explosion (i.e., no flying parts)	
6	Rupture	No explosion, but flying parts of the active mass	
7	Explosion	Explosion (i.e., disintegration of the cell)	

Operator is responsible for ultimate safety measures

EXPLANATION PACKAGE A

FOR AGING TESTS

Solution:

Cells and modules are tested at different temperatures always without a current supply in order to assess Aging during storage.

EXPLANATION PACKAGE P

FOR AGING AND PERFORMANCE TESTS

Solution:

Cells and modules are tested at different temperatures with and without a current supply to measure performance.

TIPS AND TRICKS AND EXAMPLE OF APPLICATION

Aging and performance test for cells and modules for lithium batteries (TÜV SÜD, Germany)

Extensive performance tests are carried out in order to determine the performance of the cells and modules (safety package P). The components are therefore brought to the limits of their performance and load capacities by exposing them to constantly changing temperatures, with and without a current. The test object is exposed, for example, to temperatures of -10 °C to 55 °C in the cooling incubator under continuous temperature changes.

Read more

go2binder.com/en-TUEV-SUED-Battery-Testing



Source: TÜV SÜD

Battery research (Car manufacturer, Germany)

The University of Warwick in the UK is successfully using BINDER simulation chambers from Tuttlingen in its research work. The newly founded Energy Innovation Centre, part of the International Automotive Research Centre (IARC), is working on the development of batteries for hybrid and electric vehicles. The aim is for batteries to be made more efficient in the near future, and for this reason scientists also need ever better climate chambers. So, with BINDER chambers, they have most likely found exactly the product they need, "Because the more powerful the batteries become, the more dangerous the tests in the laboratory. The scientists therefore need absolute safety," says Mark Amor-Segan, engineer at the new test center. In the new video interview on the "Select Science" website, the scientist emphasizes that safety will become even more important in the context of battery tests over the next few years.

See more:

<https://youtu.be/a9nr-l8snBg>



Source: TÜV SÜD



Source: University Warwick

Forming (WWU/MEET, Germany)

In use are climatic chambers of the KB series, which are used for forming. Drying ovens of the FED series are also used to dry components of the lithium-ion cell as well as accessories like gloves, for example.



Source: © WWU/MEET

Further interesting user examples go2binder.com/en-Case-Studies