



## Perform aviation testing (using UN testing criteria) of lithium ion batteries

Lithium ion batteries are defined as hazardous materials under the UN Restriction of Hazardous Substances\*1 and must comply with these restrictions for transportation.

They must pass the UN Manual of Test and Criteria, which includes low-pressure (high-altitude), thermal cycle, vibration, and shock criteria. This chamber can be used to perform low-pressure (high-altitude) testing in accordance with the UN Manual of Test and Criteria for air transport.



\*1 UN standard (Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals Orange Book III) defines safety standards for international transportations of a wide variety of hazard objects and these objects are classified into 9 classes (Class 1 to Class 9). UN numbers relating to the lithium ion batteries are following;

- UN3480: Lithium ion batteries (including lithium polymer batteries)
- UN3481: Lithium ion batteries incorporated to the device (including lithium polymer batteries)


Lithium ion batteries are classified into a non hazardous objects transport with toxic substances (Class 9) or a hazardous objects transport depending on the amount of Wh. In both cases, the batteries have to be passed the test of UN (UN Manual of Test and Criteria , PartIII, Subsection 38.3).

- Single cell battery: Lower than 20Wh, Battery module: Lower than 100Wh  
⇒ These batteries are considered non hazardous objects and can be transported as non hazardous objects.
- Single cell battery: More than 20Wh, Battery module: More than 100Wh  
⇒ These batteries are classified as Class 9 and must be handled as hazardous objects.

### Test contents

- T1: Low pressure      ... Test which is assumed a low pressure condition during air transport.
- T2: Temperature      ... Test which is assumed drastic temperature      ⇒TSA series

	changes.	
T3: Vibration	... Test which is assumed vibrations during transport.	⇒ Combined Temperature & humidity chamber
T4: Impact	... Test which is assumed a impact during transportation.	
T5: External short circuit	... Test which is assumed a external short circuit.	
T6: Collision	... Test which is assumed a colision by heavy objects.	
T7: Overcharge	... Evaluation of duration of an over charged battery. This test is for a battery pack.	
T8: Forced discharge	... Test which is assumed a reversal of an over discharged battery. This test is for a single cell battery.	

This is an article relating to Test Navi case study. 

### Operation is easy because of the same instrumentation as a Standard chamber.

Operability is consistent by adopting the operation panel which is based on the functions of the vacuum oven.

Constant operation ... Number of settings 3 patterns

Functions: Start conditions setting, Temperature and pressure control switch off setting, Time signal, Max Min absolute limit alarm setting, Max min variation alarm setting, Name setting

Program operation ... Number of settings 40 patterns (Max. 99 steps per 1 pattern)

Functions: Start conditions setting, Temperature and pressure control switch off setting, Time signal, Max min absolute limit alarm setting, Max min variation alarm setting, Name setting, Pressure gradient setting, Gas replacement setting, Exposure time setting, Pause setting, Counter setting (A,B<sup>\*2</sup>), End conditions setting (Program chain is possible)

\*2 2 system counter is set. Many kinds of cycle tests can be done by combining the settings.

### Features

- Testing that complies with JIS C8712 and UN Manual of Test and Criteria<sup>\*3</sup> (20°C±5°C, 11.6 kPa or less for at least 6 hours)
- Support for use in a clean room when installed in a clean room
- Magnetic coupling air circulator<sup>\*4</sup>
- Safety devices for protecting the specimen temperature and refrigeration circuit

\*3 UN Manual of Test and Criteria, Part III, 38.3.4.1 Test T.1, JIS C8712 (Safety requirements for portable sealed secondary cells)

\*4 Adjust to a move in route, an air bower can be removed from a chamber before transportation. After we check the move in route, we will make a suggestion. Please contact our local sales for more details.

### Specifications

Model	VLC-201PD	VLC-301PD
Temperature Controll range	-20 to +80 °C	
Temperature Constancy	±0.5 °C at Ambient	
Temperature Heat up	+25 → +80°C within 60 min	+25 → +80°C within 60 min

Temperature Cool down	+ 25 → -20°C within 60 min	+ 25 → -20°C within 90 min
Pressure Controll range	93.3 ~ 9.1kPa	
Pressure Lowest	Lower than 9.0kPa	
Interior Dimension (mm)	W560×H560×D509	W800×H800×D696
Volume (L)	160	445
Cooling system	Mechanical single stage (Air cooled)	
Vacuum system	Dry pump (Air cooled)	

### Option

- Internal voltage application terminal
- Cleanroom-Ready
- Machinery stand separate adjuster
- Frost free circuit
- Viewing window
- Heavy duty shelf and shelf brackets
- Internal ground terminal
- Dry pump (Vacuum pump)
- Low Out-Gassing Sealant (Silicone)
- Inert Gas Purge Function

### Recommended products for customers viewing this product

Altitude Chamber



Air to Air Thermal Shock Chambers



Large Capacity Thermal Shock Chamber



Combined Temperature &amp; Humidity Chamber

