QUALITEST™

Altitude Test Chamber

STANDARDS

ASTM D4169
IEC 60068
IEC 61215
MIL-STD-810
NASA-STD-5001
NF C20-713

APPLICATIONS

Altitude Test Chamber

Altitude Test Chambers deliver vital low-pressure testing for components such as electric vehicles and aircraft parts that operate in high-altitude environments. By recreating these conditions, engineers can evaluate the performance and reliability of materials under reduced air pressure. This testing plays a key role in industries including aerospace, electronics, and materials science.

Altitude Test Chamber

Application Fields of Altitude Test Chamber

The low-pressure test chamber is equipped with a specialized air pressure control system that reduces internal pressure using a vacuum pump or regulating device. These chambers play an essential role across multiple industries. Common applications of high-altitude environmental test chambers include:

- Aerospace: Testing the performance of instruments, control systems, and other components under extreme temperature and air pressure conditions.
- Electronics: Verifying the reliability of components such as mobile phones, laptops, and chipsets under low-pressure and temperature variations.
- Automotive: Evaluating the function, durability, and reliability of engines, brakes, tires, and other systems by simulating high-altitude and temperature extremes.
- Food: Assessing shelf life and storage conditions under varying temperature and pressure environments.
- Materials: Studying the physical and chemical properties of materials in different temperature and pressure conditions.
- Coatings: Testing coating performance, durability, and reliability under diverse environmental conditions.

Altitude Test Chamber

The Test Contents of Altitude test Chamber

The altitude test chamber is designed to simulate high-altitude environments, replicating a wide range of pressure and temperature conditions from sea level to tens of thousands of meters above. It enables accurate evaluation and analysis of test samples in low-pressure environments.

Common testing standards for low-pressure test chambers include:

- NF C20-713-2021: Environmental Testing Part 2-13, Method M – Low Air Pressure.
- MIL-STD-810: U.S. military standards for evaluating material and equipment reliability in low-pressure environments, covering multiple methods and conditions.
- ASTM D4169: Standards from ASTM for low-pressure testing in packaging and transportation.
- IEC 60068: International Electrotechnical Commission standards for environmental testing, including low-pressure and temperature variations.

- IEC 61215: Standards for photovoltaic modules, including evaluation under low-pressure conditions.
- NASA-STD-5001: Testing requirements for spacecraft and components in diverse environmental conditions.

Large high-altitude test chambers provide advanced testing capabilities and valuable data support for research in extreme environments.

Altitude Test Chamber

Control System of the Test Chambers

The control system of the test chamber uses advanced software and hardware to ensure operation under preset conditions, deliver accurate experimental data, and provide precise control and monitoring of various test parameters.

- Controller: Features a high-performance controller with an integrated system, and can be configured with a Siemens control platform. Equipped with RS232, RS485, and Ethernet communication ports.
- Programmable control: Allows users to set test programs such as heating, cooling, and constant temperature cycles. Supports multiple program execution and scheduled start functions.
- Multi-language support: Available in English and others.
- Remote monitoring: With EZNET remote technology, users can control and monitor the chamber anytime. Current data can be accessed through both PC and mobile devices, enhancing convenience and flexibility.

The specific control system may vary depending on the model. Always review the Environmental Test Chamber Manual before use and follow all safety procedures.

Altitude Test Chamber

Refrigeration System of the Test Chamber

The refrigeration system is a critical part of the test chamber, as its stability directly impacts the accuracy and reliability of test results.

- Hot gas defrosting technology: Uses high-temperature, high-pressure refrigerant steam to melt frost on the evaporator. This prevents frost buildup while significantly reducing energy consumption.
- High-quality components: Built with internationally recognized brands. Advanced EPV and XUP energy-saving solenoid valves were developed, offering a service life of over 15 years. A new Danfoss AKV electronic expansion valve system is also being introduced, delivering higher efficiency, energy savings, and lower noise.
- Optimized system layout: Incorporates VRF (variable refrigerant flow) technology based on the PID cold-end output principle to achieve energy-efficient low-temperature operation, reducing energy consumption by up to 30% under low-temperature conditions.
- Modular design: Features a low failure rate, fewer welding points, high cooling efficiency, reliable operation, easy maintenance, and reduced service costs.

FEATURES

Advantages of Altitude Test Chamber

The Altitude Test Chamber creates controlled low-pressure conditions, allowing engineers to accurately evaluate the performance and reliability of materials and components under reduced air pressure. This is especially important for products intended for high-altitude environments, such as aerospace systems and electric vehicle components.

- Large-capacity design: Offers more internal space than conventional chambers, accommodating larger equipment and samples.

- High-altitude simulation: Capable of replicating conditions at 5,000 meters, 8,000 meters, and beyond, with precise low-pressure and low-temperature control.
- Outstanding temperature stability and uniformity with reliable low-pressure management.
- Customizable design: Chamber volume, temperature range, and appearance can be tailored to meet specific requirements.
- On-site support: Local teams available for installation and setup.
- Programmable control: Configure fixed values or programs, define temperature and humidity curves, and set test durations with ease.

TECHNICAL SPECIFICATIONS

Altitude Test Chamber Technical Specifications

Model	QualiATC-250	QualiATC-500	QualiATC-1000	QualiATC-2000
Internal(mm)	550*600*700	700*800*900	1000*1000*1000	1400*1200*1200
Outer Size(mm)	2000*1060*1900	2500*1260*2050	2720*1460*2130	3150*1650*2050
Volume(L)	250	500	1000	2000
Voltage	380V AC 50/60Hz			
Temperature				
Temperature control range	-70℃□ +180℃ □ A: 0℃□ +180℃; B: -20℃□ +180℃□ C: -40℃□ +180℃; D: -70℃□ +180℃)			
Temperature fluctuation	±0.5℃			
Cooling rate	+180.0 ℃~-70.0 ℃ for about 120 minutes, 1.0~2.0 ℃/min			
Heating rate	-70.0℃~+180.0℃ for about 100 minutes, 2.0~3.0℃/min			

Model	QualiATC-250	QualiATC-500	QualiATC-1000	QualiATC-2000
Temperature uniformity	±1.5℃ (-40.0℃～ +100.0℃) ±2.0℃ (+100.1℃～ +180.0℃ or -40.0℃～ -70.0℃)			
Humidity				
Humidity control range	20.0% RH ～ 98.0% RH (work under atmospheric humidity)			
Humidity fluctuation	±2.0%RH			
Humidity uniformity	±5.0%RH			
Pressure				
Pressure control range	Normal pressure~0.5kpa(500pa)			
Pressure control error	±2kpa(>40kpa),±5%(2kpa~40kpa),±0.1kpa(<2kpa)			
Depressurization time	Normal pressure~1kpa,about 30 mins			
Pressure recovery time	<10kpa/min			

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