

Quality is more than a word

ESPEC

Walk-In Temperature (& Humidity) Chamber

E Series / High-Power Series

Total more than
11,000
chambers
shipped!



3 YEAR WARRANTY

 **LOW GWP**
REFRIGERANT

CE

Walk-In Chambers— Reborn to meet demand on a global scale

Walk-In Temperature (& Humidity) Chambers are used for testing construction materials and electronics fields as well as used in a wide range of research and development related to people and the environment.

They require high performance that can satisfy strict reliability tests for vehicles and other applications.

The High-Power Series was developed as a test chamber capable of withstanding even more demanding environmental tests.

It covers specialized automobile industry international standards for the latest technologies, including an expanded temperature control range, support for rapid temperature changes and high heat-generating loads, standards prescribed for Europe, and advance evaluations during the product development and design phase.



● Chamber construction



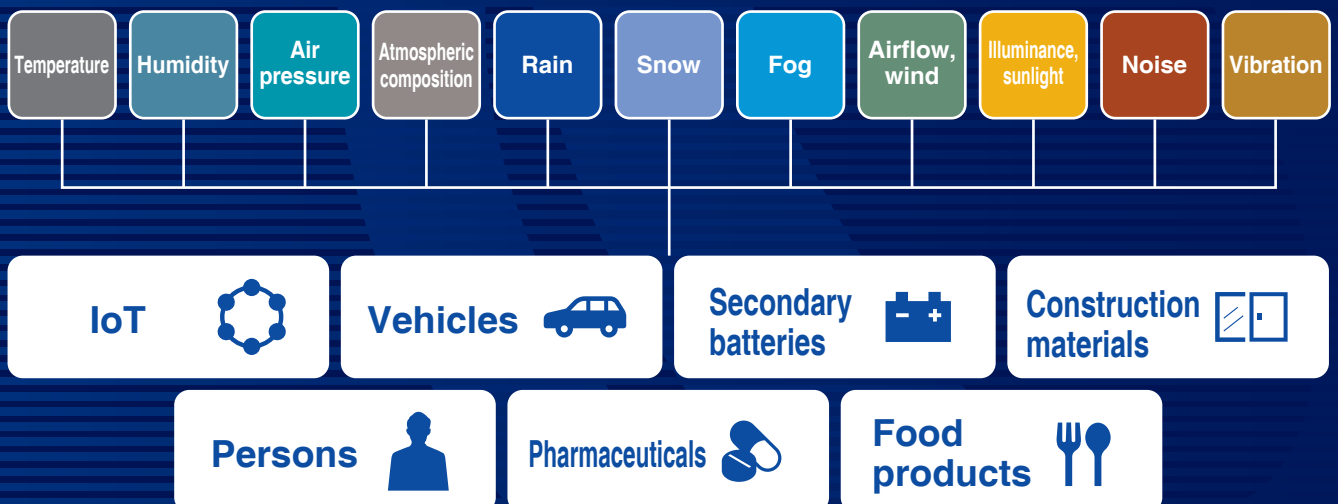
Air conditioners		Refrigerators	Test area
High-Power Series compatible	E Series compatible	For control 2.20 kW 3.70 kW	 Type 1: 4.2 m ³ Type 2: 8.1 m ³ Type 3: 12.5 m ³ Type 4: 16.8 m ³
	 ACU30E High-Power Series ACU45E High-Power Series ACU50E High-Power Series	With heat load control 5.60 kW 7.46 kW 11.19 kW	 Type 6: 25.8 m ³ Type 8: 34.8 m ³ Type 10: 43.8 m ³ Type 12: 52.7 m ³

* These are example air conditioners and test areas.

Case study

Starting from P. 13

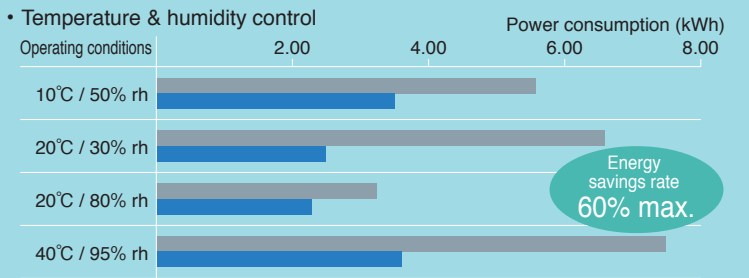
A variety of weather environment factors can be combined according to the test purpose to create the environmental conditions.



E Series

Achieving both energy savings and high accuracy

Power consumption comparison (Example) Model: EBL-4E



High-precision cooling system that induce energy-saving (Japanese patent No. 5427211)

ESPEC has developed unique control systems including a wide-range refrigeration control system composed of a DC inverter and an electronic expansion valve that minimizes the required refrigerator power, and an active map system that can control and operate multiple refrigerators with minimum power consumption. Compared to previous models, this achieves energy savings of up to 60% together with high-precision refrigeration capacity.

Reduced power supply requirement!

The cross-output control limits the maximum current of the heater and the humidifier, thereby reducing the required power supply capacity.

On-site assembling

A chamber is assembled and installed on-site from panels, air conditioning unit and relating components.

The low floor structure for easy handling heavy items

Easy to move in and out for large or heavy samples via double swing door and loading ramp.



To minimize our chambers potential environmental impact

R-449A is the best alternative to R-404A



*R-449A is available on request

Model	Temperature & humidity chambers			Temperature chambers			
	EBE	EBL	EBR	EBF	EBU	EBUU	
System	Balanced Temperature and Humidity Control system (BTHC system) Vapor pressure divide control system			Balanced Temperature Control system (BTC system)			
Refrigeration system	Single-stage refrigeration system, air-cooled condenser or water-cooled condenser						
Allowable ambient conditions	5 to 40°C / 75%rh						
Performance ^{*1}	Temp. range ^{*2}	-40 to +80°C (-40 to +176°F)	-30 to +80°C (-22 to +176°F)	-10 to +80°C (+14 to +176°F)	-40 to +80°C (-40 to +176°F)	-30 to +80°C (-22 to +176°F)	-10 to +80°C (+14 to +176°F)
	Humid. range ^{*2}	10 to 95%rh (at +10 to +80°C)			20 to 95%rh (at +20 to +80°C)		
	Temp. / Humid. fluctuation ^{*3}	±0.5°C / ±4%rh			±0.5°C		
	Temp. variation in space ^{*3}	2.5°C					
	Temperature rate of change (Pull down) ^{*3}	0.4°C/min					
	Temperature rate of change (Heat up) ^{*3}	1°C/min					
Main unit (Panel assembly)	Exterior material	Color coated steel					
	Interior material	Stainless steel					
	Floor load capacity	Equal load distribution: 6 kPa (600 kgf/m ²)					
	Door	Single door W850 x H1800 mm					
	Insulation material	Urethane foam					
Air conditioner	Air circulator, heater, humidifier, refrigerator, evaporator, temperature sensor, humidity sensor			Air circulator, heater, refrigerator, evaporator, temperature sensor			
Refrigerant	R-404A [R-449A] ^{*4}						
Fittings	Viewing window (W180 x H289 mm), Cable port (inner diameter 50 mm), Room lamp (LED), Ventilation, Ethernet port (LAN port), USB memory port, External output terminals						
Utility requirements	Power supply	200 V AC 3 φ 50/60 Hz					
		220 V AC 3 φ 50 Hz					
		380 V AC 3 φ 50/60 Hz					
		400 V AC 3 φ 50/60 Hz					

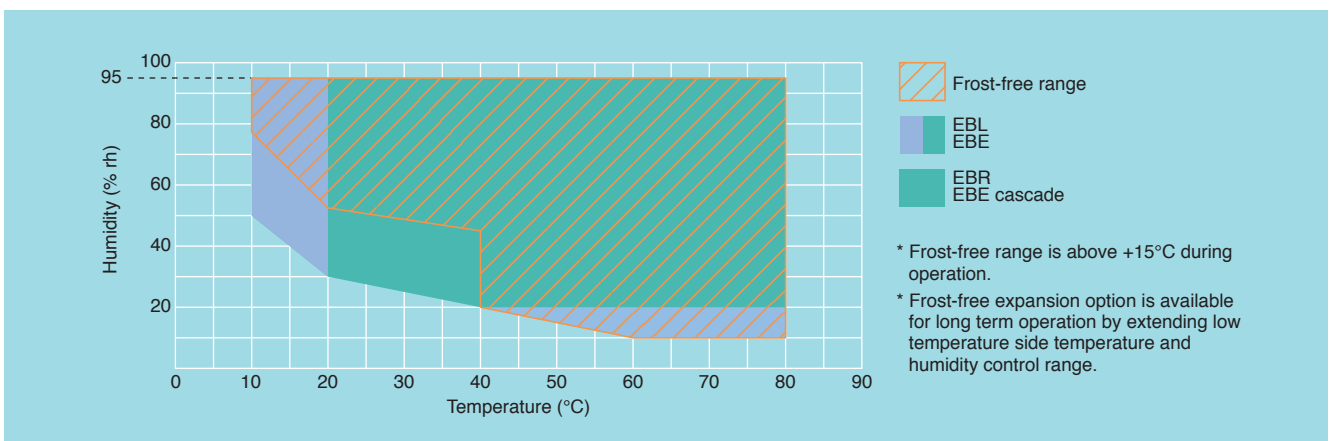
*1: Figures are for when ambient temperature is +5 to +32°C, cooling water temperature is +25 to +32°C, and there is no load and no specimen.

*2: The performance values are performances at the temperature sensor and humidity sensor (installed on the blow out of the air conditioner).

*3: The performance values are based on to IEC 60068-3-6:2001 (EBE, EBL, EBR), IEC 60068-3-5:2001 (EBF, EBU, EBUU).

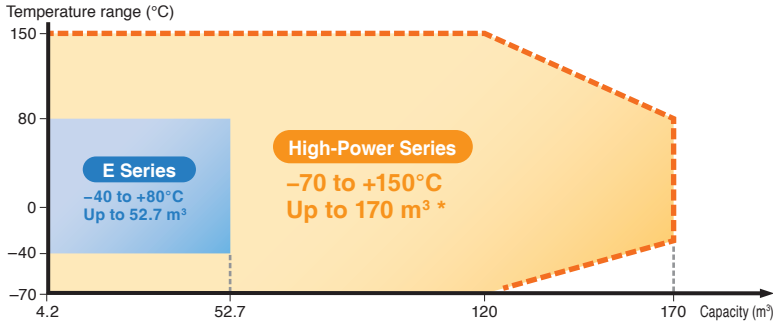
*4: Refrigerant in [] is for when the low-GWP refrigerant option is installed. With R-449A, part of the equipment capacity is changed.

Temperature and humidity control range (E Series)



High-Power Series

Support for high stress test with large capacity of chamber maximum 170 m³!



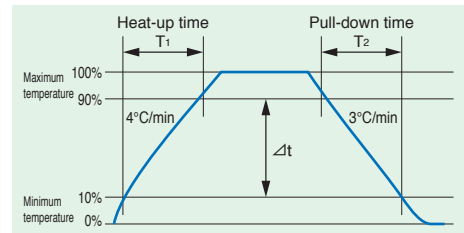
- Possible to control from ultra-low temperature -70 to +150°C

Tests can be performed to simulate everything from super-cold environments to high-temperature environments such as mid-summer car interiors and bonnet.
* Temperature control with 170 m³ is -30 to +80°C. Please contact to your sales for details of specification.

- Reducing time by rapid transition time

Even though chamber has large space 170 m³, chamber controls temperature, humidity but also rapid temperature transition.

- Temperature rate of change 3°C/min (E series: 0.4°C/min)



Conforms to IEC 60068-3-5:2001

$$\text{Temperature heat-up rate} = \frac{\Delta t}{T_1} \quad \text{Temperature pull-down rate} = \frac{\Delta t}{T_2}$$

Expressed as the rate of change (between 10% and 90%) per minute of the atmosphere at the center of the chamber.

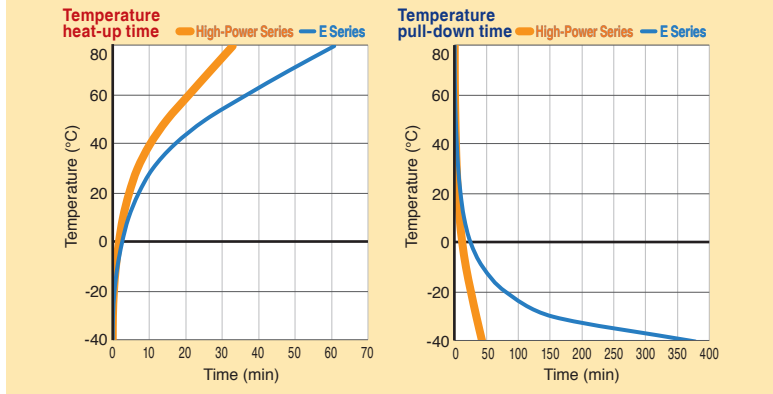
- Allowable heat load 13 kW at -40°C

It is possible to test during the electronic device or high heat-generating specimens such as automobile motors in low-temperature environments. The wide lineup of air conditioners allows for greater heat-generating loads in various applications.

- Conforms to global automobile test standards

These products conform to the ISO 16750 international standard that is widely used for global procurement of vehicle devices and components, and also to the LV 124 standard created by European automobile manufacturers.

Comparison of temperature transition times (Type 12, 52.7 m³)



Conforming test standards

Temperature		Temperature and Humidity	
IEC 60068-2-14Nb	ISO 16750-4 (5.3)	IEC 60068-2-30	ISO 16750-4 5.6.1
	LV 124 L-03		ISO 16750-4 5.6.3
LV 124 K-01			LV 124 K-08
LV 124 K-02		IEC 60068-2-38	ISO 16750-4 5.6.2
LV 124 K-04			LV 124 K-09
ISO 16750-4 5.2		PV 1200	
		PV 2005	
		PR 308.2	
		IEC 60068-2-78	
		ISO 16750-4 5.7	
		LV 124 K-14	
		TP 303.5 a, b, c, d	

High-Power Series

-70 to +150°C / 20 to 95% rh

New

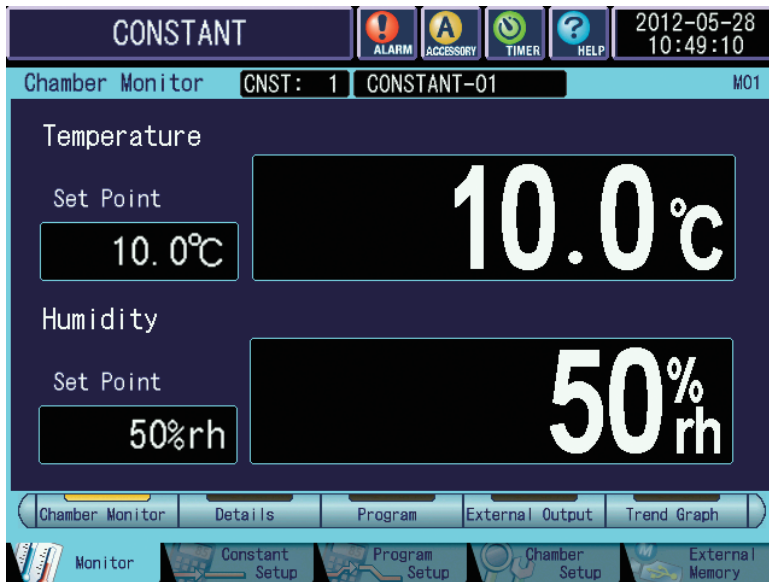
Model	Temperature & humidity chambers		Temperature chambers	
	EBE		EBF	
System	Balanced Temperature and Humidity Control system (BTHC system) Vapor pressure divide control system		Balanced Temperature Control system (BTC system)	
Refrigeration system	Water-cooled cascade refrigeration system			
Allowable ambient conditions	5 to 40°C / 75%rh			
Performance*1	Temp. range*2	-70 to +150°C		
	Humid. range*2	20 to 95%rh (at +20 to +80°C)	—	
	Temp. / Humid. fluctuation*3	±0.5°C / ±4%rh	±0.5°C	
	Temp. variation in space*3	-70 to -41°C, +81 to 150°C: 5.5°C -40 to +80°C: 2.5°C		
	Temperature rate of change (Pull down)*3	3°C/min		
	Temperature rate of change (Heat up)*3	4°C/min		
Main unit (Panel assembly)	Exterior material	Color coated steel		
	Interior material	Stainless steel		
	Floor load capacity	Equal load distribution: 6 kPa (600 kgf/m ²)		
	Door	Single door W850 x H1800 mm		
	Insulation material	Urethane foam		
Air conditioner	Air circulator, heater, humidifier, refrigerator, evaporator, temperature sensor, humidity sensor		Air circulator, heater, refrigerator, evaporator, temperature sensor	
Refrigerant	7.5 kW cascade R-449A + R-23, 15 kW cascade R-449A + R-508A			
Fittings	Viewing window (W180 x H289 mm), Cable port (inner diameter 50 mm), Room lamp (LED), Ventilation, Ethernet port (LAN port), USB memory port, External output terminals			
Utility requirements	Power supply	200 V AC 3ϕ 50/60 Hz		
		220 V AC 3ϕ 50 Hz		
		380 V AC 3ϕ 50/60 Hz		
		400 V AC 3ϕ 50/60 Hz		

*1: Figures are for when ambient temperature is +5 to +32°C, cooling water temperature is +25 to +32°C, and there is no load and no specimen.

*2: The performance values are performances at the temperature sensor and humidity sensor (installed on the blow out of the air conditioner).

*3: The performance values are based on to IEC 60068-3-6:2001 (EBE), IEC 60068-3-5:2001 (EBF).

10.4-inch large-screen touch panel that allows intuitive operation



- **A variety of program settings**

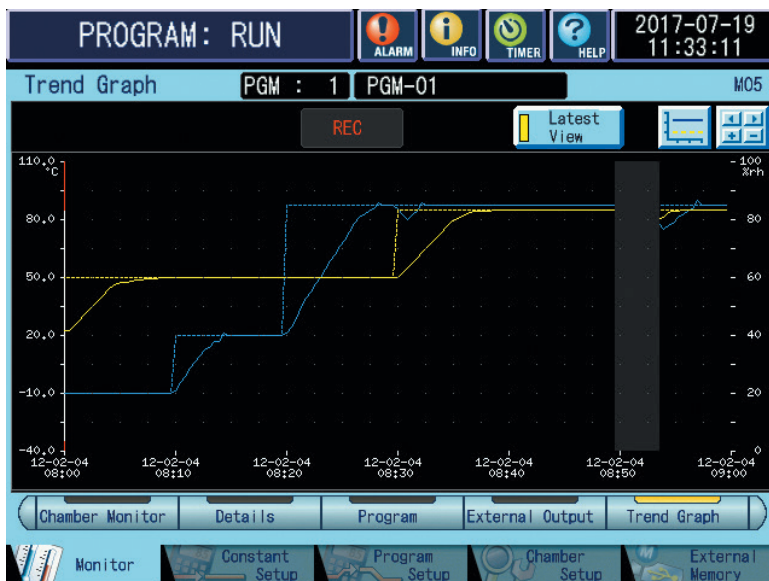
40 profiles (up to 99 steps per profile) can be registered for programmed operation, and 3 profiles for constant operation.

- **Output of trend-graph data**

The setting and measured data are shown in a graph. The data can be recorded in internal memory or recorded directly to USB memory, and backups can also be created. The scale for temperature, humidity, and time in the display can be zoomed in and out.

- **Reminder function**

The display shows chamber status, such as during defrosting or automatic humidifying water replacement is in progress. The INFO icon notifies the user of the timing for humidifier or CFC inspection. The necessary times and items can be set, improving the convenience of chamber management.



- **Function for recovery after a power failure**

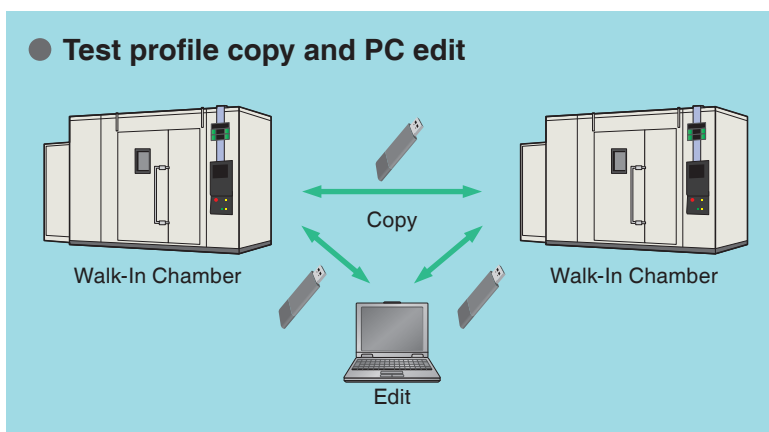
The user can select either “turn OFF power” or “continue operation” when recovery occurs after a power failure.

- **Multi-language display**

The display language can be easily changed from Japanese to English, Chinese (simplified or traditional), or Korean. Select the appropriate language for use.

- **Test profile edit and copy**

It is possible to edit the test profiles registered in the chamber using a PC web browser. They can also be copied to a different chamber using USB memory.



USB memory port

Remote monitoring improves test management efficiency and allows trouble to be identified and corrected at an early stage.

- **Editing of test profiles**
(Option: Remote control function)

It is possible to use a PC web browser to edit the test profiles registered in the chamber, start and stop operation, and perform other communication with the chamber.

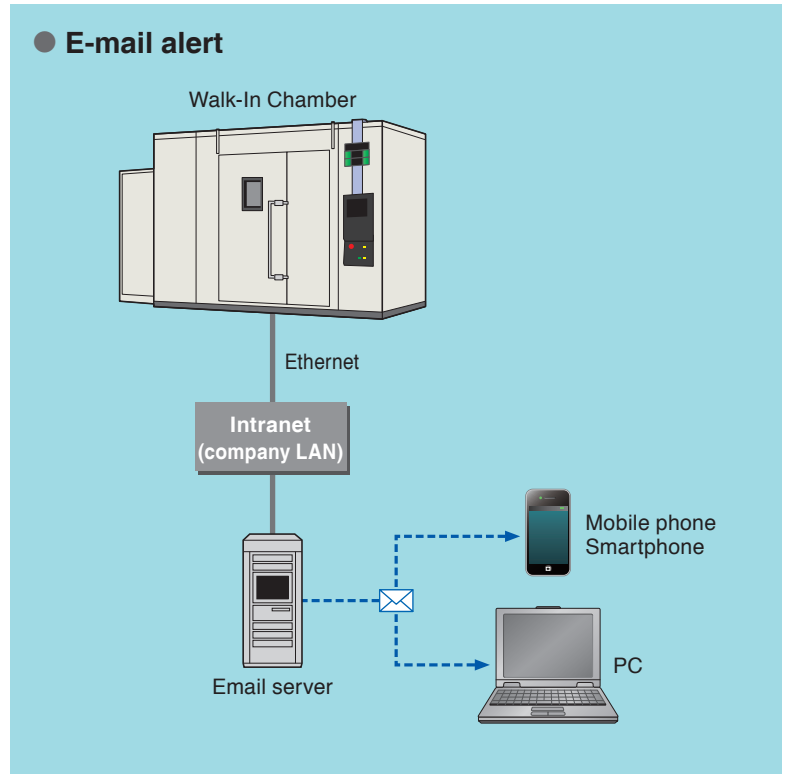
- **Recording temperature and humidity settings and measurements**

By saving data (at an approximately 30 second cycle) in internal memory and accessing it from a PC, it is possible to display a graph showing up to 100 days of data in the browser. It is also possible to download the data to the PC in CSV format (comma delimiter).

- **E-mail alert**

When an alarm is triggered, an email is sent to the registered PC or mobile address.

* Connection to a mail server is required to use e-mail alert.

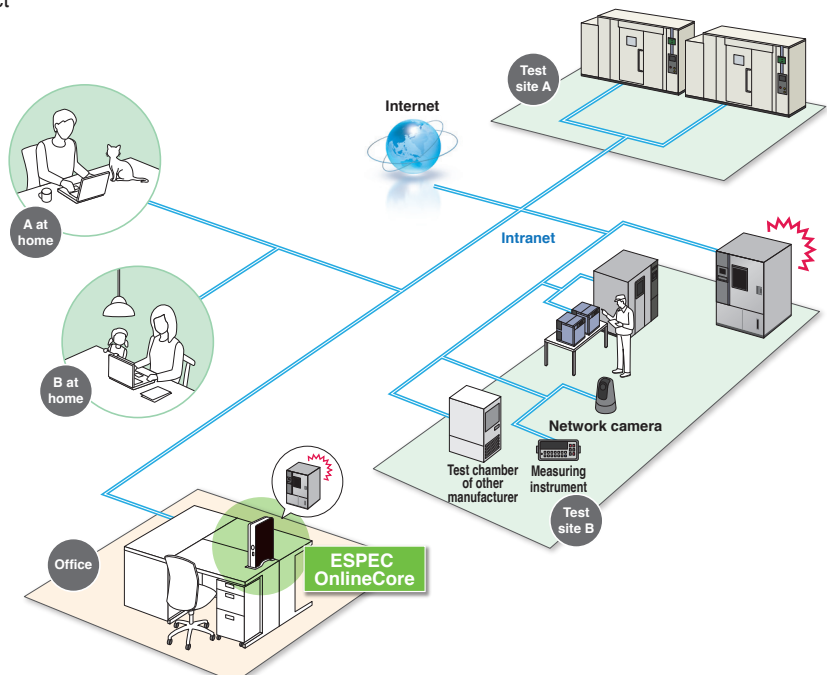


Online access from home

ESPEC provides solution that allow to conduct environmental testing operations from home, supporting remote working.

Central management system OnlineCore (monitor, data analysis)

Just by connecting to an Intranet environment, the environmental test chamber operating status can be quickly ascertained and remote operations performed from home via a web browser.



Required Equipment (Outdoor condenser Unit)

● Water-cooled type

- It has been prepared water-cooling equipment or when the air-cooling equipment in the installation location is not sufficient

● Remote air cooling

- It is difficult to prepare water-cooling equipment

* Depending on the ambient condition, it is possible to recommend indoor air-cooled condensing unit.

Safety Features (for Both E Series and High-Power Series)

- | | | | |
|--|---|---|--|
| • Control circuit overcurrent protection | • Absolute upper/lower temp. limit alarm (built-in temp./humidity controller) | • Refrigerator overcurrent protection | • Temp. upper deviation limit alarm (built-in temp./humidity controller) |
| • Cartridge fuse for control circuit short-circuit protection | • Reverse-prevention relay | • Humidifier short-circuit protection (temperature and humidity type) | • Absolute upper/lower humidity limit alarm (built-in temp./humidity controller) (temperature and humidity type) |
| • Fan motor short circuit protection | • Fan motor overcurrent protection | • Humidifier overcurrent protection (temperature and humidity type) | • Water suspension relay (except for air-cooled types) |
| • Electrical compartment door switch | • Overheat protector | • Humidifier dry heat protector (temperature and humidity type) | |
| • Specimen power supply control terminal | • Heater short-circuit protection | • Humidifier thermal fuse (temperature and humidity type) | |
| • System error (error/warning) | • Heater overcurrent protection | • Humidifier water level detection (temperature and humidity type) | |
| • Room temp. compensation disconnection detection circuit | • Refrigerator temp. sensor Disconnection detection circuit | | |
| • Dry-bulb temp. disconnection detection circuit | • Refrigerator circuit temp. outside range | | |
| • Wet-bulb temp. disconnection detection circuit (temperature and humidity type) | • Refrigerator high/low-pressure pressure switch | | |
| | • Refrigerator short-circuit protection | | |

Options

Some options cannot be installed due to the control temperature (humidity) range. Contact sales for more information.

Low-GWP refrigerant R-449A

Because R-449A has a lower Global Warming Potential (GWP), its use can contribute to reducing global warming gas emissions.

Changes the refrigerator unit refrigerant to R-449A.

Paperless recorder

A temperature & humidity recorder that utilizes a liquid-crystal display fitted with a touch-panel.

Display: 5.7 inch color touch panel
Scan interval: 5 sec. (default)

Internal recording media:

Flash memory 8 MB

External recording media:

CF memory card

(Supplies with a 256 MB CF card)

USB flash drive

< Temperature type >

No. of input channel: Temperature 1
(5 more channels can be turned ON)

< Temperature & humidity type >

No. of input channel: Temperature 1,
Humidity 1
(4 more channels can be turned ON)



Temperature (humidity) recorder

<Temperature type>

• -50 to +100°C 100 mm 6-dot system

<Temperature and humidity type>

• -50 to +100°C / 0 to 100%rh
100 mm 6-dot system

Recorder output terminal

This terminal outputs the temperature and relative humidity in the test area.

Time signal terminal

Adds 8 standard relay contacts (time signal).

Remote control function

Allows test conditions to be changed and operation to be started or stopped at a chamber which is connected via LAN.
(See P.8.)



Run/stop operation

Interface

- RS-485
- RS-232C
- GPIB

Communication cable

- RS-485 5 m/10 m/30 m
- GPIB 2 m/4 m

Additional cable port

With standard specifications, a 50 mm diameter port is provided.

- 25 mm
- 50 mm
- 100 mm
- 150 mm
- 200 mm

Enlarged viewing window

Changes from a W180 x H289 mm to a W295 x H425 mm large viewing window. The window uses heat-resistant glass that includes a heating element to prevent fogging.



Large viewing window Standard viewing window

Chamber wall viewing window

Installed on chamber wall viewing windows (reinforced heat-resistant glass with heating element) for observing the inside of the temperature (humidity) chamber are available.

- Small (W350 x H250 mm)
- Large (W600 x H400 mm)

Hands-in port (with viewing window W350 x H250 mm)

It is used for manipulating the specimen in the chamber from outside the chamber. (Inner diameter 150 mm x 2 holes)

Chamber interior lamp

- LED (Adds another lamp which is the same as the standard equipment.)
- Incandescent lamp

Interior plug socket

This socket supplies power inside the chamber. Different types of sockets are available according to the temperature and humidity in the specifications.



Safety precautions

- Do not use specimens which are explosive or inflammable, or which contain such substances. Doing so is dangerous and may lead to fire or explosion.
- Do not place corrosive substances in the chamber. If a corrosive substance is produced by the specimen, the lifetime of the unit may be significantly shortened, in particular due to corrosion of stainless steel, resin, and silicone materials.
- Do not place life forms or substances that exceed allowable heat generation.
- Be sure to read the operation manual before operation.

Options

Some options cannot be installed due to the control temperature (humidity) range. Contact sales for more information.

Floor reinforcement

Distributes the concentrated load that occurs when specimens are carried into the chamber on a trolley, preventing distortions and dents in the floor. Additional frames to support the floor panels also enhance distributed load resistance.

Protective flooring (rubber type)

Prevents operators from slipping and prevents damage and dents.

Status indicator light

Indicates three chamber states: OPERATION, PERSONNEL INSIDE, and ALARM.



Operation indicator

Indicates "OPERATION" during operation.

Personnel indicator

Indicates "PERSONNEL INSIDE" when workers have entered the temperature (humidity) chamber.

Alarm indicator

Indicates "ALARM" in red when a chamber fault occurs.

Rotating pilot lamp

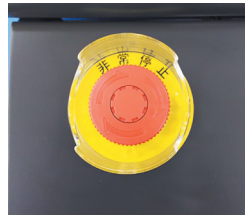
In case of malfunction, the lamp connected to the safety circuit is activated, thus attracting the operator's attention even from a distance.



Emergency stop pushbutton (turn-to-reset type)

A pushbutton is used to stop operation immediately in case of emergency.

* The breaker does not trip.



Operator safety mushroom

A mushroom-head button is installed to protect workers who enter the temperature (humidity) chamber. When pressed, chamber operation stops and the safety buzzer sounds an alarm.



Grounding terminal

The grounding terminal for use, such as measurement equipment to be brought into the chamber.



Electrical grounding in chamber

Short-circuits each insulation panels by the ground conductor, and connects them to the ground line inside the electrical compartment.

In-chamber work timer

The lamp and buzzer are activated to inform the person outside of chamber when time is passed set on timer.

Intercom

Allows to talk between personnel inside and outside the chamber.



Cold-weather suit

Cold weather protective clothing including headwear, a pair of gloves, a pair of boots and a two-piece suit. (For use in chamber at -40°C)

Water leakage detector

Alarm for detecting water leakage from chamber or air conditioning unit by leakage sensor.

Independent temperature overcooling alarm

In case of malfunction due to overcooling, operation is terminated and an alarm message is displayed, preventing freezing and damage to specimens inside the chamber.

Humidity sensor (temperature & humidity chamber only)

This eliminates the need to replace the wick, and allows the dry-bulb humidity sensor to measure low humidity ranges that it otherwise would be unable to measure.

Options

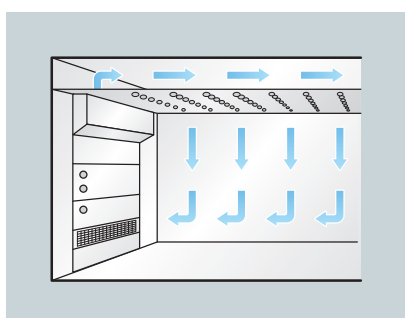
Some options cannot be installed due to the control temperature (humidity) range. Contact sales for more information.

Thermocouple

Used to measure the temperature at a desired measurement point inside the temperature (humidity) chamber, or to measure the specimen temperature.

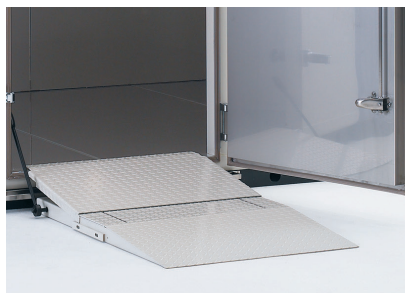
Full-ceiling air duct

Lowers and stabilizes the air circulation speed to protect the specimen.



Insertion ramp

This ramp is used to move heavy specimens into the chamber. The ramp is available in a removable type and a lever type.



Loading ramp (lever type)

Double swing door

The standard single door (W850 x H1800 mm) can be changed for a double swing door (W1400 x H1800 mm).



Additional door

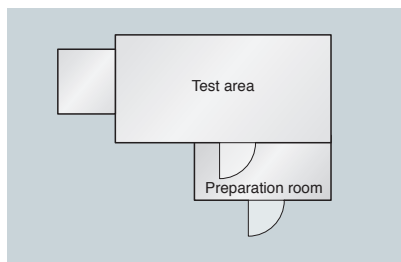
Two types are available: single-swing and double-swing doors. Both come with a viewing window (W180 x H289 mm).

Entrance curtain

Minimizes atmospheric disturbance of temperature and humidity when opening and closing the door. Also used as a measurement room for specimens.

Preparation room

Minimizes atmospheric disturbance of temperature and humidity when opening and closing the door. Also used as a measurement room for specimens.



Frost-free expansion (temperature & humidity chamber only)

This expands the temperature and humidity control range on the low temperature side, preventing the formation of frost and extending the continuous operation time. (See P.4.)

Airflow adjuster

The airflow adjuster inside the temperature (humidity) chamber can reduce the effects of wind on the specimen by adjustable in 4 steps air speed velocity.



Low humidity equipment (for temperature & humidity chambers only)

Expands the low-humidity range at low temperatures by using a dry-bulb dehumidifier.

Refrigerator for heat load

An additional refrigerator can be installed in order to permit heat generation from the specimen during operation tests.

Auxiliary humidifier (for temperature & humidity chambers only)

Effective for heat load generation and high humidity specification. Pure water is required.

Water purifier (for temperature & humidity chambers only)

Connects to the steam humidifier and optional auxiliary humidifiers. Improves the reliability of measurements over long periods of time and extends the life of the humidifiers.

- Ion-exchange water purifier



Ion-exchange water purifier

Flow switch (for water-cooled models only)

This safety switch for the refrigeration unit activates and shuts down the equipment when the cooling water level becomes too low or is cut off.

Exhaust air duct (indoor air-cooled specification)

This directs waste heat from the refrigerator to the ceiling of the test area, preventing heat from building up in the machine box.

* In chamber water leak detection system and dew tray to catch dripping water are also available to detect and prevent water damage.

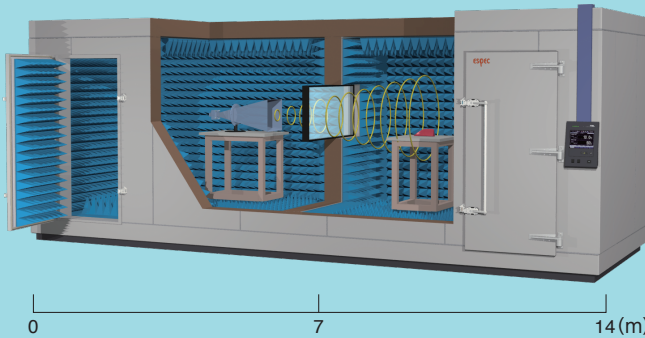
Case Study

ESPEC products can be tailored to suit your application. For details, please contact sales. 3-year warranty is not available



Shield performance / Environmental test area with radio darkroom

● Radio darkroom (2 connected chambers)



Shield performance	Frequency band 0.5 GHz to 30 GHz Attenuation rate 60 dB or more
Features	<ul style="list-style-type: none"> ● A radio wave absorber is installed in the interior. ● The 2 test areas can be controlled to different temperatures. ● Radio wave transmitting material is installed between the test areas.
Example of application	Base station with large transmission output (macrocell)



Temperature chamber with safety mechanisms



With the expansion of hybrid vehicles and EV, there is growing need to connect charging/discharging systems to secondary battery modules for testing. This temperature chamber with safety mechanisms can be customized so that there is ample room for wiring work when a large EV secondary battery is installed in the chamber. During charging/discharging evaluations and various tests, there is the risk of gas leakage from the secondary battery resulting in fire. Therefore a number of safety mechanisms have been installed so that tests can be performed safely.

Temperature range	-40 to +80°C
Interior dimensions	W3020 x H2100 x D1970 mm (Contact sales for more information.)



Low oxygen training chamber



This normal pressure, low oxygen chamber lowers the oxygen concentration while maintaining sea-level (normal) pressure. By supplying low oxygen air with a converted oxygen concentration, it is possible to reproduce a low oxygen environment similar to high elevations while remaining at sea level. In a high-elevation training gym, it is possible to monitor not only the concentration of oxygen and other gases, but also to monitor the exercise time and biometric information of the trainer and user. This product has been introduced at a large number of facilities centered on research institutions and universities.

Oxygen concentration	18.6 to 11.2% (Equivalent elevation: 1,000 to 5,000 m)
Temperature and humidity range	+22 to +26°C / 60 to 70%rh

Case Study

ESPEC products can be tailored to suit your application. For details, please contact sales. 3-year warranty is not available

Vehicles Vehicle environmental test area



Perform sunlight tests in the target temperature and humidity environment. The temperature from the sensors installed on the vehicle is sent as feedback for control of the light intensity, making it possible to maintain the vehicle at a constant heat load.

Temperature and humidity range	-40 to +80°C / 30 to 80%rh
Interior dimensions	W5000 x D8000 x H3000 mm
Sunlight chamber control temperature	+40 to +100°C

* The surface temperature of a black panel located 1,000 mm below the lamps can be raised up to +30°C from the test area temperature.

Construction materials Indoor/outdoor environmental test area



This can be used to test heat insulation and condensation of construction materials such as walls and windows. The test area is divided into Area A (indoor conditions) and Area B (outdoor conditions), thereby reproducing the indoor/outdoor environmental conditions of a building. Area B is equipped with a sunlight system and water spray system, and can also be used for weather resistance tests consisting of repeated sunlight and water spray. Area B is also moveable, allowing the construction material specimens between test areas A and B to be easily installed and removed.

Temperature and humidity range	-15 to +50°C / 30 to 95%rh (at +10 to +50°C)
Testable specimens	Max. 3,000 kg
Dimensions inside test area	W4500 x H4000 x D4100 mm
Floor load resistance	6 kPa (600 kgf/m ²) (equally distributed load) * Specimen load supported by concrete foundation

Persons Vehicles Construction materials Artificial weather chamber



The ESPEC artificial weather chamber is capable of reproducing all kinds of weather environment factors including temperature, humidity, barometric pressure, rain, fog, snow, sunlight, wind, and atmospheric composition either individually or in combinations. In addition to ordinary environments, it can reproduce burning deserts, extreme cold Antarctic conditions, high elevations, stratosphere, and other environments, producing the optimal weather environment for the research purpose and subject.

Temperature and humidity range	-40 to +80°C / 20 to 90%rh (at +20 to +60°C)
Dimensions inside test area	W6000 x H4500 x D9000 mm
Snowfall	30 mm/h
Rain	0.3 to 200 mm/h
Sunlight	400W/m ² ~1200W/m ² (metal halide lamps)
Air low equipment	0 to 20 m/s

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