Quality is more than a word

ESPEC

Liquid to Liquid

Thermal Shock Chamber

TSB-22・TSB-52

CAT.NO.E19137

Key technology for ensuring reliability
Supports the current trend toward higher stress.

High accuracy is increasingly demanded in the pursuit of reliability
in the field of car electronics.
“Liquid-to-liquid” type thermal shock testing is now attracting attention
for its ability to impose higher thermal stress on specimens than
“air-to-air” type testing, and to deliver test results quickly.
ESPEC has successfully developed liquid-to-liquid thermal shock chambers that satisfy
the demand for lower running costs from brine and power consumption.
These thermal shock chambers also conform to EU vehicle standards that are
compliant with IEC standards.

TSB-22
2.1L

TSB-52
4.5L

TSB-10

10L

TSB-15

15L

TSB-30

30L

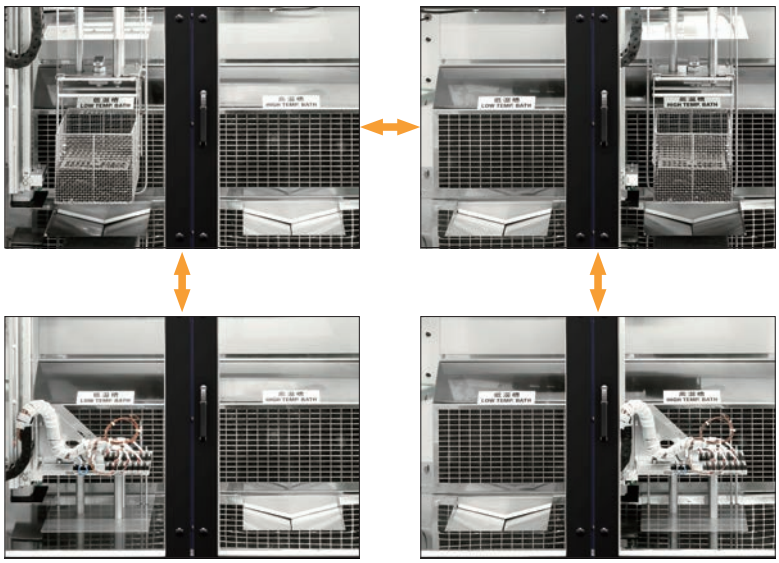
Utility

Conform to EU vehicle standards that are compliant with IEC standards.

A change of temperature test

Conform to IEC 60068-2-14 Nc Rapid change of temperature, two-fluid-bath method	Conform to IEC 60068-2-14 Na Rapid change of temperature	Conform to IEC 60068-2-14 Nb Change of temperature with specified rate of change
Liquid to Liquid Thermal Shock Chamber	Air to Air Thermal Shock Chamber	Rapid-Rate Thermal Cycle Chamber
Liquid bath system	Temperature in air (Air to air system)	
Temperature rate of change ≧ 30°C/min		Temperature rate of change < 30°C/min
High	The severity of the test	Low

Test area transfer



TestStandard Conformance

Settingsystem	Standard name
IEC 60068-2-14 Nc	Rapid change of temperature, two-fluid-bath method
MIL-STD-883J Method 1011.9	Military standard, Test methods for microcircuits - Thermal shock
MIL-STD-202 Method 107	Military standard, Test methods for electronic and electrical component parts - Thermal shock
JESD22-A106B	Thermal shock
IEC 60749-11	Semiconductor devices - Mechanical and climatic test methods - Part 11: Rapid change of temperature - Two-fluid-bath method
EIAJ ED-4701/307	Environmental and endurance test methods for semiconductor devices - Thermal shock

Test standard conformance

The ability of specimens to withstand rapid changes in temperature can be checked by dipping them alternately in high-temperature and low-temperature tanks to apply severe thermal shocks. Specimens can be evaluated faster than with air-to-air thermal shock testing because rapid temperature changes can be applied to specimens by exposing them to liquids that have already reach the testing temperature.

Test area transfer time less than 10 seconds

Conforms to MIL-STD-883J. Transfers between the hot bath and cold bath utilize an air cylinder system that suppresses the vibration of specimens.

Long-life LED lights for enhanced visibility

LED lights give you a clear view of transfer area to check specimen.

International Standards

Safety of machinery (ISO 12100), Low voltages (IEC 60204), and EMC (IEC 61000-6-2 and IEC 61000-6-4).
It is also RoHS- and Pressure Equipment Directive-compliant.

Utility

A various mechanisms to reduce brine consumptions

To reduce brine consumption, the airtightness of the test area has been enhanced to prevent vapor leakage and brine evaporation. Numerous mechanisms have also been adopted, including a water separation filter for removing brine from water for the purpose of brine recycling. As a result, these new chamber models have reduced brine consumption by approximately 65% compared to the preceding model (TSB-5).

Both single-fluid and dual-fluid brine applicable

TSB chambers guarantee a single-fluid (Galden®) as standard, and either a single-fluid brine or dual-fluid brine can be selected simply by switching the valve.

Energy savings achieved

Dramatic energy savings have been achieved through the adoption of a new refrigeration circuit, with power consumption slashed by as much as 53% (compared to former ESPEC models).

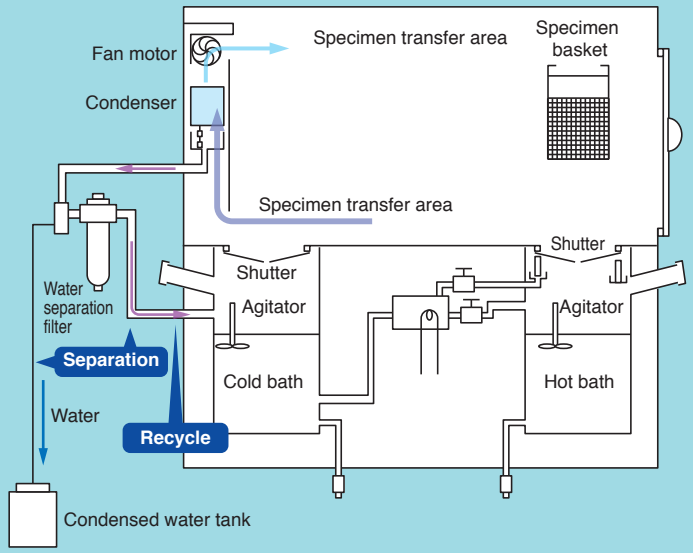
Improved noise level

The operation noise level of the chamber has been reduced to as low as 65 dB (A-characteristic) by providing sound-proofing panels for the noise-emitting machine compartment, including the refrigerator.

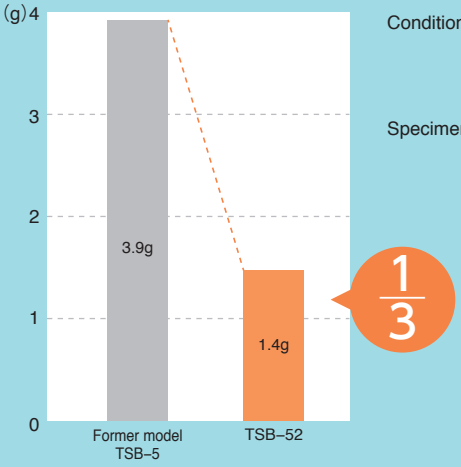
Size variations available

Spesimen baskets are available in 2.1-L, 4.5-L, 10-L, 15-L, and 30-L capacities (approximate sizes).

Brine collection circuit



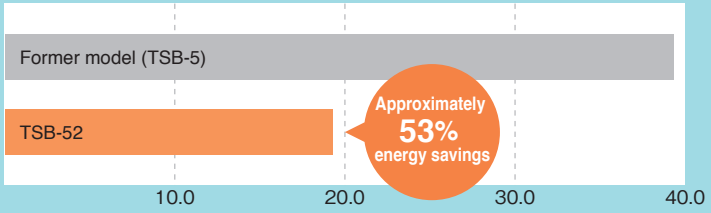
Brine Consumption (In 1 Cycle)



Conditions: Power: 200V AC 60Hz
Ambient temp.: +23℃
H +155℃: 5 minutes
L −70℃: 5 minutes
100 cycles
Specimen: TSB-52 2.0kg
Brine: Galden (D02-TS)

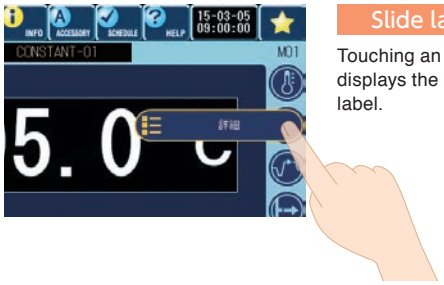
Comparison of power consumption

Conditions : 20 cycles
H : +155℃ 5 min.
L : −70℃ 5 min.
Specimen : TSB-5 1.5 kg
TSB-52 2.0 kg



*Above values are references.

An easy-to-use, easy-to-read touch panel.

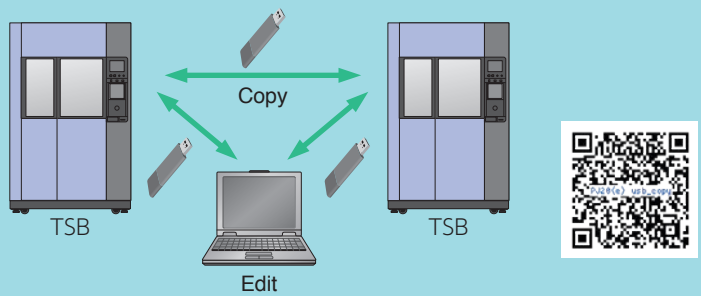


Slide label

Touching an icon displays the menu label.

USB port

Program copy and computer editing



* Some items may not be copied between different models and chambers with different options.

Tabbed interface

High resolution 7-inch LCD. Tabs at the bottom make for quick and easy flipping between screens. Touching an icon displays the menu label which, touched, makes flipping between screens easier.

Liquid level

The liquid level in each bath is displayed in seven levels.

Multilingual display

Use the language icon at the top of the display to change the display language from Japanese to English, Simplified Chinese, Traditional Chinese or Korean on any screen.

Quick access button

For added convenience, the star (★) icon can have quick access functionality assigned, such as for jumping to a certain screen or directly launching a saved test pattern.

Test data records

Temperature settings and measurements can be stored in the internal memory and exported with the use of USB flash drives. This enables them to be displayed as graphs on web browsers and stored for back-up purposes.
Test data can also be recorded in real time to a USB flash drive.
* USB flash drives not included.

Store up to 40 test program patterns

Copy and paste for editing and sharing test patterns

Program patterns can be copied between chambers without a computer, using USB flash drives.

Network

* Requires an intranet
* Supported browser: Internet Explorer 11

Remote monitor and control (Ethernet connection)

The chamber comes with an ESPEC original web application. Connecting to the chamber Ethernet port (LAN's port) makes it possible to control chamber monitoring, pattern setting, operation start/stop, and other operations from a computer web browser. Installation of special software is not required. All you need is a standard computer web browser to connect with the chamber.

Login privileges

Screen / Privileges	Chamber monitor	Pattern setting	Run/ Stop	Configuration
Administrator	✓	✓	✓	✓
Operator	✓	✓	✓	
User	✓			

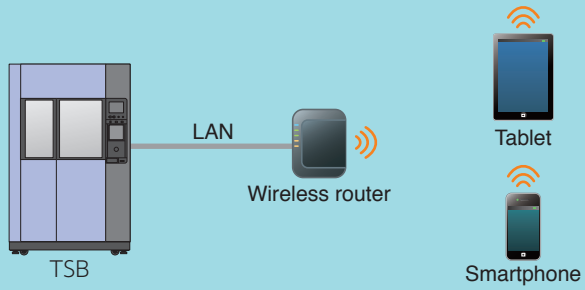
Edit test patterns through a web browser

Saved test programs can be edited on a web browser. Test programs can also be downloaded to your PC.

E-mail alert

Alerts such as for a test ending, for maintenance, and errors are e-mailed to multiple recipients.

Wireless LAN connection

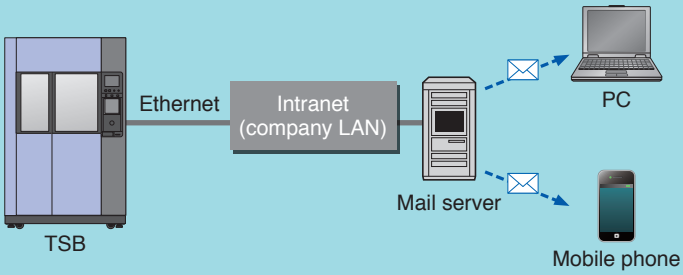


Watch the videos

▶ Remote ON/OFF Operation

▶ Connecting Easily with Ethernet (LAN)

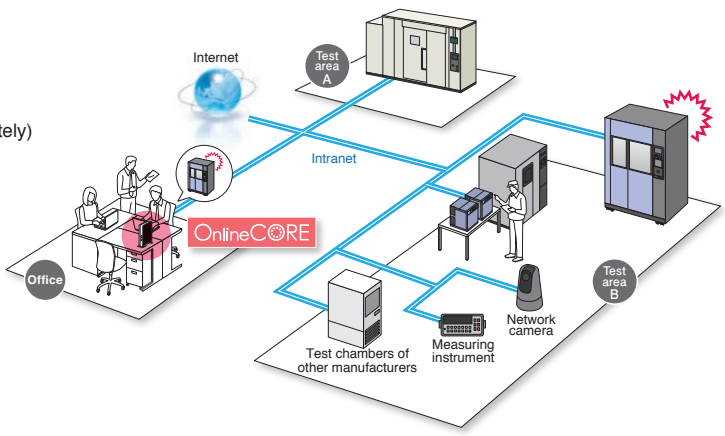
Email alert



ESPEC OnlineCore

OnlineCORE (Sold separately)

Central control system recommended for multiple environmental test chambers installations



*Please contact ESPEC for more information, about which products can be connected.

SPECIFICATIONS TSB-22/TSB-52

Model			TSB–22	TSB–52
System			2-chamber system perform transfer of basket	
Brine			Single-fluid or dual-fluid fluorine deactivated brine	
Utility requirement	Power supply	200V AC 3φ 50/60Hz	25A	43A
		220V AC 3φ 60Hz	25A	43A
		380V AC 3φ 50Hz	16A	23A
		400V AC 3φ 50Hz	16A	23A
	Ambient temperature		0 to +40℃	
	Air-source pneumatic pressure		0.4 to 0.7MPa (4 to 7kgf/ cm^2)	
	Air-source piping connection size		φ 8mm	
	Required air-flow quantity		15L/ min. (ANR) 〈3.6L/ cycle (ANR)〉	
Performance *1	Hot bath	Temp. range	+70 to +200℃ (+158 to +392°F)	
		Temp. fluctuation *2	±2℃	
		Temp. heat-up rate *3	Ambient temp. → +150℃ : within 90 min.	
		Temp. pull-down rate *3	+150 → +60℃ Within 60 min.	+150 → +60℃ Within 100 min.
	Cold bath	Temp. range	−65 → 0℃ (−85 to +32°F)	
		Temp. fluctuation *2	±2℃	
		Temp. heat-up rate *4	−65 → 0℃ Within 60 min.	−65 → 0℃ Within 65 min.
		Temp. pull-down rate *4	Ambient temp. → −65℃ Within 120 min.	Ambient temp. → −65℃ Within 90 min.
Test performance	Hot bath	Fluid temp.	$+150^{+10}_{0}$℃ (Galden D02-TS)	
	Cold bath	Fluid temp.	-65_{-10}^{0}℃ (Galden D02-TS)	
	Exposure time		High and low temperatures 5 min. each	
	Number of cycles		15 cycles	
	Specimen		Plastic molded ICs 1.0kg	Plastic molded ICs 2.0kg
Specimen transfer time			Within 10 sec. (Hot bath⇔Cold bath)	
Noise level *5			65 dB or less	
Construction	Internal tank		Stainless steel plate (18-8 Cr-Ni)	
	Insulation		Glass wool, Polyurethane foam	
	Heater		Sheathed heater	
	Cooler		Cooler coil	
	Agitator		2 units (one for each bath)	
	Refrigerator unit		Refrigeration system: Mechanical cascade (Air-cooled condenser)	
	Compressor		Rotary compressor	
	Refrigerant		R508A, R404A	
	Drive unit for specimen transfer		Horizontal and vertical air drive system	
	Fluid recovery circuit		Method: Condensed recovery through refrigerator cooling Refrigerator: Cold bath cooling refrigerator	
	Condensing circuit		Method: Condensation by refrigerator Refrigerator: Cold bath cooling refrigerator	
Test area	Specimen basket dimensions		W120×H150×D120mm (Approx. 2.1 L)	W150×H150×D200mm (Approx. 4.5 L)
	Specimen basket load capacity (evenly distributed load)		1.0 kg	2.0 kg
	Inside bath dimensions		W260×H350×D440mm (Approx. 40 L)	W290×H350×D520mm (Approx. 52 L)
Outside dimensions *6			W1140×H1785×D1240mm	W1200×H1785×D1320mm
Chamber (overall) weight *7			Approx. 650 kg	Approx. 790 kg

*1 The performance values are based on IEC 60068-3-5:2001. Performance figures are given for a at ambient temperature +23℃, relative humidity 65%rh, with rated voltage, and no specimens inside the test area.
The above temperature heat-up rate of the hot bath and the temperature pull-down rate of cold bath are performance at time of the preparation operation.
*2 Temperature fluctuation is based on JIS C60068-3-5:2006, and JTM K07:2007. (Difference between the highest temperature and the lowest temperature of the sensor unit for controlling the specimen basket due to an interval of time.)
*3 Heat-up rate: (setting: +155°C) Pull-down rate: (setting: +40°C)
*4 Heat-up rate: (setting: +30°C) Pull-down rate: (setting: −70°C)
*5 Noise level was measured in an anechoic room at a height of 1.2 m from the floor and a distance of 1 m from the chamber front panel (ISO 1996-1:2003 A-weighted sound pressure level).
*6 Excluding protrusions
*7 Excluding fluid weight

SPECIFICATIONS Large-Capacity Types

Model		TSB–10	TSB–15	TSB–30
System		2-chamber system perform transfer of basket		
Hot bath temp. range		+60 to +150°C		
Cold bath temp. range		−65 to 0°C		
Specimen transfer time (Hot bath⇔Cold bath)		within 15 sec.	within 20 sec.	within 25 sec.
Specimen basket dimensions (mm)		W175×H175×D300	W215×H195×D350	W300×H220×D450
Specimen basket load capacity (evenly distributed load)		5kg	10kg	10kg
Outside dimensions (mm)		W1410×H2100×D1520	W1610×H2310×D1520	W2871×H2185×D1846
Chamber (overall) weight		Approx. 1100kg	Approx. 1150kg	Approx. 2500kg
Cooling	Cooling water consumption (Water temp 25°C)	—		5820L/hr
	Cooling water consumption (Water temp 30°C)	—		11700L/hr
	Piping connection port size	—		50A

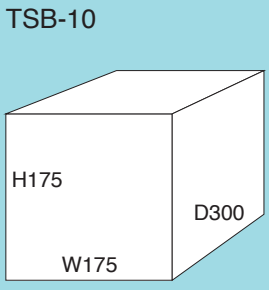
TSB-10

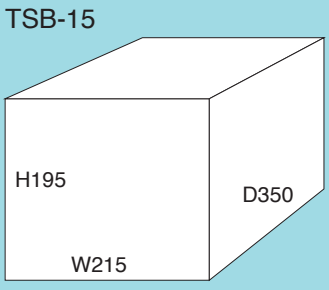
TSB-15

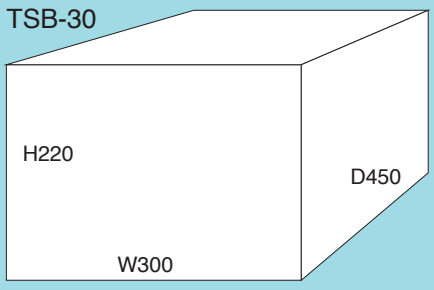
TSB-30

Specimen basket size

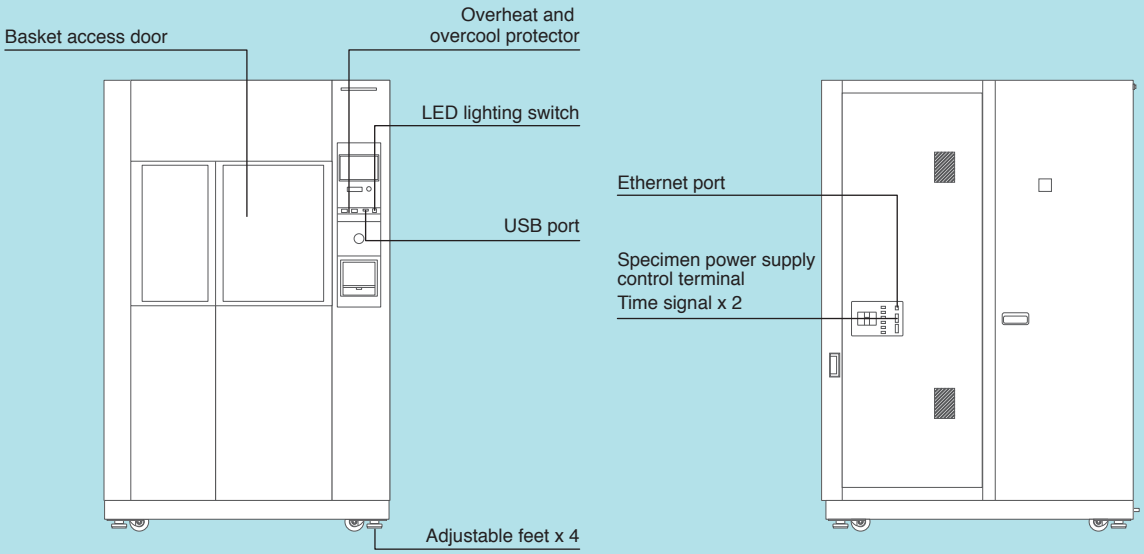
(unit:mm)







FITTINGS TSB-22/TSB-52



SAFETY DEVICES

- Leakage breaker
- Circuit breaker for wiring
- Motor reverse prevention relay
- Compressor thermal relay
- Compressor temperature switch
- Electric parts compartment door switch
- Specimen transfer area door switch
- Recycling circuit fan temperature switch
- Refrigerator high-pressure switch
- Hot bath agitator temperature switch
- Cold bath agitator temperature switch
- Air-pressure switch
- Hot bath boil-dry protector
- Cold bath boil-dry protector
- Overheat protector for hot bath
- Overcool protector for cold bath
- Overheat/ overcool protector for the hot bath (built into the controller)
- Overheat/ overcool protector for the cold bath (built into the controller)
- Drive unit transfer time (built into the controller)
- Test area overheat/overcool protector (built into the controller)
- Specimen power supply control terminal
- Fuse
- Low-liquid-level alarm
- Locking mechanism for specimen transfer area door

ACCESSORIES

- Specimen basket
  (18-8 Cr-Ni stainless steel #5 mesh basket)
  TSB-22 (W120×H150×D120mm／Approx. 1.0kg) 1
  TSB-52 (W150×H150×D200mm／Approx. 2.0kg) 1

- Specimen basket cover ..... 1 set
- Cartridge fuse (5 A) 1
- Fluid drain hose Inner dia.: 12 mm 2
  Inner dia.: 8 mm 1
- Funnel for fluid supply 1
- Fluid injection pipe (with rubber cork) 1
- Connector (Terminal for temperature recorder) 1
- Shutter open attachment 2
- Water absorption mat 1
- Thermocouple 1
- Operation manual (CD) 1

*Power cable is optional, not equipped as standard fitting.

Power cable

For supplies electricity to the chamber.
・5, 10m
* The chamber does not come with a power cable.

Built-in air compressor

Equipped when there is no air supply source.

Casters

Equivalent to the standard accessory.
・Free wheels: 4 pcs/set
* The chamber height is 1797 mm for all models when the casters are equipped to the bottom of chambers.

Specimen basket

Equivalent to standard accessory.

Computer interface

Connected to a PC directly to control the chamber.
・RS-485
・GPIB
・RS-232C

Paperless recorder

Records temperature of each section such as the temperature inside the chamber.
Display: 5.7inch color touch panel
Inputs: 6channels
Temperature range: －100 to ＋220℃
External memory:
CF memory card port (256 MB CF card)
USB port

Chart recorder

－100 to ＋220℃/100 mm
RK-61: 1-dot
RK-63: 3-dots
RK-64: 6-dots

Temperature recorder wiring

If the user elects to prepare a custom temperature recorder or plans to add one at a later date, the necessary power cable, temperature sensor, and grounding wire are available as options.

Recorder output terminal

Terminal for specimen temperature output.
・Five terminals
(six in total, incl. one for standard supply)

External alarm terminal

If the safety device of the chamber activates, the external alarm terminal will relay the alarm to distant place.

Thermocouple

Used to measure specimen temperature, etc.
・T JIS C 1602 with ball attached
・2m
・4m
・6m
・8m
・10m

Emergency stop switch

Stops the chamber immediately.

・With cover ・With guard

Anchoring fixtures

Used to bolt the chamber to the floor.
* Chamber dew tray and anchoring fixtures cannot be equipped together.

Chamber dew tray

A chamber dew tray is installed below the chamber in the unlikely case there would be water leakage.
* Chamber dew tray and anchoring fixtures cannot be equipped together.

Operation manual

・CD
・Booklet

Reports & certificates

・Testing and inspection report
・Test Data
・Calibration report
・Calibration certificate
・Traceability certificate
・Traceability chart

Safety precautions

- Do not use specimens that are explosive or inflammable, or that contain such substances. Doing so may lead to fire or explosion.
- Do not use as specimens substances or creatures that may emit inflammable or corrosive gases, or substances that may exceed permissible heating values.
- Correctly clean the brine in use. Use of the incorrect liquid will significantly reduce the service life of the chamber and may produce noxious decomposition products. Before using a brine, consult with the brine manufacturer.
- Be sure to read the user's manual before operations.

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JSA QMS JIS Q 9001 JSAQ 004

MS JAB CM001

MS JAB CM021

CERTIFICATION ORGANIZATION FOR ENVIRONMENT AND QUALITY · JAPAN · NACRI ISO 14001 JACO EC99J2046

UKAS MANAGEMENT SYSTEMS 051

ISO 9001/JIS Q 9001
Quality Management System Assessed and Registered

ESPEC CORP. has been assessed by and registered in the Quality Management System based on the International Standard ISO 9001:2015 (JIS Q 9001:2015) through the Japanese Standards Association (JSA).

＊Registration : ESPEC CORP.
(Overseas subsidiaries not included)

ISO 14001 (JIS Q 14001)
Environmental Management System Assessed and Registered

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(Overseas subsidiaries not included)