Quality is more than a word

espec

Liquid to Liquid

Thermal Shock Chamber

TSB-21・TSB-51

CAT.NO.E03137-X1003

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 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 next-generation
liquid-to-liquid thermal shock chambers that satisfy the demand
for environmental conservation and lower running costs from brine and
power consumption, which have traditionally been regarded as stumbling blocks with
liquid-to-liquid thermal shock chambers.
ESPEC takes great pride in offering this cutting-edge chamber as a key technology
in ensuring higher reliability.

TSB-51

* The paperless recorder, external alarm terminal emergency stop switch and casters are optional items.

Utility

A number of mechanisms for drastically reducing brine consumption

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-liquid and double-liquid brine applicable

Either single-liquid brine or double-liquid brine can be selected simply by switching the valve.

Two models available to suit the specimen size and weight

Two different models are available: TSB-21 can hold specimens weighing up to 1.0 kg, while TSB-51 can hold specimens weighing up to 2.0 kg.
Capable of handling a wide variety of electronic parts, from ICs to printed circuit boards.

Smooth transfer of specimens realized

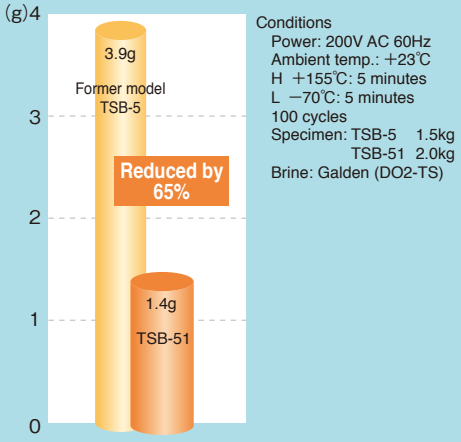
An air cylinder system that suppresses vibration of the specimens and a new specimen loading system that prevents unnecessary stress to the specimens during transfers between the hot bath and the cold bath.

Recorder terminals as the standard device

Thermal shock chamber has one piece of the recorder terminal that outputs the temperature of the specimens.*
Additionally, the thermal shock chamber has a specimen power supply control terminal and a time signal.
*Up to 5 pieces of the recorder terminals can be added as an option.

Test Area

Brine Consumption (In 1 Cycle)

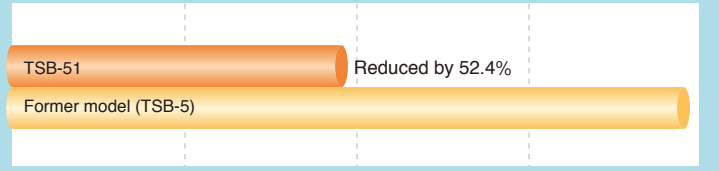


The external alarm terminal is optional.

Utility

Comparison of power consumption

Conditions : 20 cycles
H : +155℃ 5 min.
L : −70℃ 5 min.
Specimen : TSB-51 2.0 kg
TSB-5 1.5 kg



*Above values are references.

Paperless recorder (optional)

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 52% (compared to former ESPEC models).

Installation environment improved through reduced operation noise

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

Paperless recording (optional)

The paperless recorder makes it easy record the temperatures of different components, such as the chamber temperature, on a memory card (Compact Flash).

Remote control from your PC

Please contact us for details on using a PC to monitor and remotely control the equipment.

Control operation

Visibility and ease of use improved through interactive input using a touch-screen system and color LCD screen

Uses a color LCD interactive touch-panel system employed throughout the Thermal Shock Chamber Series

A color LCD panel design allows settings to be made simply by touching the screen in accordance with the display. The test pattern, test area temperature, number of temperature cycles, trend-graph display, etc., are all displayed on the screen.

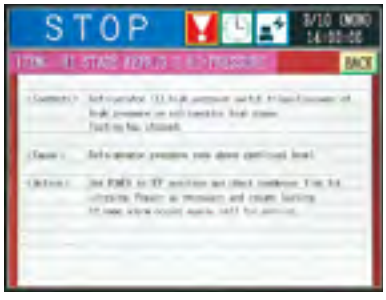
Setting system	Interactive input system using a touch panel
Display	Color TFT LCD panel (6.5 inch)
Temperature-control	• Test area exposure temperature • Hot bath preheating temperature • Cold bath precooling temperature • Liquid temperature recovery for hot bath • Liquid temperature recovery for cold bath
Temperature-setting range	High-temperature side: +60 to +200℃ Low-temperature side: −75 to 0℃
Setting resolution	1℃
Input	Thermocouple T (JIS C 1602)
Control system	PID control
Time-setting range	1 sec. to 99 min. 59 sec.
Cycle-setting range	1 to 9999 cycles
Programs	RAM mode: Max. 40 patterns (writable) ROM mode: 10 standard test patterns (registered)
Auxiliary functions	• Timer preset • Test continuity selection • Overheat/overcool protection • Stable time control • Power-saving operation • Power-failure/ recovery operation selection • Liquid temperature recovery • Recycling operation • Automatic preheating/ precooling setting • Time signal • Program memory • Automatic power shutoff • Programmed time display • Test starting point selection • Test halt preset • Test completion mode selection • Trend graph • Alarm history display • Sensor calibration • RS-485 communication

Detailed test monitoring

Selection of operating modes

Test pattern editing

Error description



SPECIFICATIONS

Model			TSB–21	TSB–51
System			Two-liquid bath system with specimen basket transfer	
Brine			Single-liquid or double-liquid fluorine deactivated brine	
Utility requirement	Power supply (within ±10% of the rated voltage)		200V AC, 3φ, 3W, 50/60Hz	
	Maximum load current		25A	43A
	Operating temperature		0 to +40℃ (+32 to +104°F)	
	Air-source pneumatic pressure		0.4 to 0.7MPa (4 to 7kgf/ cm^2)	
	Air-source piping connection size		φ8mm	
	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℃ (±3.6°F)	
		Temp. heat-up rate *3	Ambient temp. to +150℃ (+302°F): within 90 min.	
		Temp. pull-down rate *3	+150 to +60℃ (+302 to +140°F) Within 60 min.	+150 to +60℃ (+302 to +140°F) Within 100 min.
	Cold bath	Temp. range	−65 to 0℃ (−85 to +32°F)	
		Temp. fluctuation *2	±2℃ (±3.6°F)	
		Temp. heat-up rate *3	−65 to 0℃ (−85 to +32°F) Within 60 min.	−65 to 0℃ (−85 to +32°F) Within 65 min.
		Temp. pull-down rate *3	Ambient temp. to −65℃ (−85°F) Within 120 min.	Ambient temp. to −65℃ (−85°F) Within 90 min.
Test performance	Hot bath	Liquid temp.	+150 $^{+10}_{0}$℃ (+302 $^{+18}_{0}$°F) (Galden DO2-TS)	
	Cold bath	Liquid temp.	−65 $_{-10}^{0}$℃ (−85 $_{-18}^{0}$°F) (Galden DO2-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. (Time of transfer between hot and cold baths)	
Noise level *4			65 dB or less	
Construction	Exterior material		Painted steel	
	Internal tank		Stainless steel plate (18-8 Cr-Ni)	
	Insulation		Glass wool, foamed polyurethane	
	Heater		Sheathed heater	
	Cooler		Cooling-pipe coil	
	Agitator		2 units (one each for the hot and cold baths)	
	Refrigerator unit		Refrigeration system: Mechanical cascade refrigeration system (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	
	Condensation circuit		Method: Condensation by refrigerator Refrigerator: Cold bath cooling refrigerator	
	Components		Liquid-level indicator, chamber lamp, specimen transfer-area door, adjuster, specimen power-supply control terminal, time signal, recorder terminal, integrating hour meter	
Specimen basket dimensions (mm)			W120×H150×D120 (W4.7×H5.9×D4.7 in.)	W150×H150×D200 (W5.9×H5.9×D7.8 in.)
Test area loading capacity			Approx. 2.1 L	Approx. 4.5 L
Specimen basket load capacity (evenly distributed load)			1.0 kg	2.0 kg
Inside bath dimensions (W×H×D mm)			260×350×440 (10.2×13.8×17.3 in.) (Approx. 40 L)	290×350×520 (11.4×13.7×20.4 in.) (Approx. 55 L)
Outside dimensions (W×H×D mm) *5			1140×1785×1240 (44.9×70.3×48.8 in.)	1200×1785×1320 (47.2×70.3×52 in.)
Chamber (overall) weight *6			Approx. 650 kg	Approx. 790 kg

*1 Performance at an ambient temperature of +23℃
*2 Performance indications conforming to JTM K01-1998
*3 Performance when each bath is operated individually
*4 Value measured in an anechoic room at 1m from the chamber front and at a height of 1.2 m above the floor (A-characteristic: Compliant with JIS-Z-8731)
*5 Protrusions from the machine sides excluded. Leveller height not included.
*6 Weight of the liquid not included

TEST STANDARDS (satisfied by all models in the TSB Series)

Test Standard	Test Condition	Exposure Temperature			Exposure Time		Temperature Recovery Time	Number of Test Cycles	Test Starting Point
		High Temp.	Ambient Temp.	Low Temp.	High/ Low Temp.	Ambient Temp.			
MIL-STD-883E (Method No. 1011.9)	A	+100°C +10 −2	—	0°C +2 −10	Over 2 min., up to 5 min.	—	Temperature of the specimen under worst-case conditions, recovered within 5 min.	Min. 15 cycles	Low temp. or high temp.
	B	+125°C +10 0	—	−55°C 0 −10		—			
	C	+150°C +10 0	—	−65°C 0 −10		—			
MIL-STD-202G (Method No. 107G)	A	+100°C +10 −2	—	0°C +2 −10	Varies by specimen weight Less than 1.4 g: 0.5 min. 1.4 to 14 g: 2 min. Over 14 to 140 g: 5 min.	—	—	5 cycles 15 cycles 25 cycles	Low temp.
	B	+12°C +10 0	—	−65°C 0 −10		—			
	C	+150°C +10 0	—			—			
JIS C 0025	—	+100°C	—	0°C	5 min. to 20 min.	—	—	10 cycles unless otherwise specified	Low temp.

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 wire net) 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
- User's manual ..... 1 copy

DANGER

- 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.

CAUTION

- 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.

OPTIONS

Paperless recorder

Records temperature of each section such as the temperature inside the chamber.
Number of inputs:
PL1S: 1 (5 more channels can be turned ON)
Data saving cycle: 1 sec
PL3S: 3 (3 more channels can be turned ON)
Data saving cycle: 1 sec
PL3L: 3 (3 more channels can be turned ON)
Data saving cycle: 5 sec
Temperature range: −100 to +220℃
External recording media :
CF memory card (128 MB)
Language support: ENG, JPN

Temperature recorder

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

For future installation of a recorder

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.

Thermocouple

Used to measure specimen temperature, etc.
・T JIS C 1602 with ball attached

Temperature recorder 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.

Emergency stop switch

Stops the chamber immediately.

Built-in air compressor

Equipped when there is no air supply source.

Specimen basket

Equivalent to standard accessory.
・Material Stainless steel (5-mesh)

Caster

Installed for mobility.
・Free wheels: 4

Fixture for securing the body

Used to bolt the chamber to the floor.

Power cable

For supplies electricity to the chamber.
・5, 10m

Communication function

Connected to a PC directly to control the chamber (standard equipment: RS-485).
・GPIB
・RS-232C

■Some photographs listed in this catalog contain Japanese display.

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JSA QMS JIS Q 9001 JSAQ 004
MS JAB CM001
MS JAB CM021
ISO 14001 JACO EC99J2046
UKAS ENVIRONMENTAL MANAGEMENT 051

ISO 9001/JIS Q 9001
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ESPEC CORP. has been assessed by and registered in the Quality Management System based on the International Standard ISO 9001:2008 (JIS Q 9001:2008) through the Japanese Standards Association (JSA).

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

ESPEC CORP.

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