

Thermal Shock Chamber

TSE-11-A



ESPEC offers a compact, but high performance thermal shock chamber ideal for the requirements of test standards of small and low-volume specimen.

Equipped with superior temperature recovery performance capable of answering the requirements of severe test specifications, this thermal shock model offers a wide test area in a compact, slim design.



*The paperless recorder and additional overheat protector are optional.

User-friendly

A high performance compact package to meet severe test requirements.

- **A temperature recovery time of less than 5 minutes is achieved in 2 zones (+ 150 and - 65) without auxiliary cooling.**

By realizing a temperature recovery time of less than 5 minutes for the upstream air in the 2 zones (+ 150 and - 65), we have achieved performance equivalent to that of a large thermal shock chamber without having to use auxiliary cooling by means of liquid carbon dioxide, which was required in previous compact thermal shock chamber.

- **Complies with MIL-STD-883E and other test standards.**

This compact thermal shock chamber satisfies the temperature cycle test requirements of MIL-STD-883E and other test standard (see page 5).

- **Vibration shock to samples is minimized during movement of the test area.**

The soft-move mode is used to reduce vibration shock when specimens are moving from the high-temperature chamber to the low-temperature chamber in the test area.

- **Uniform temperature distribution across specimens.**

High temperature uniformity performance ensures consistent stress on specimens.



High-temperature exposure



Low-temperature exposure

■ Examples of temperature uniformity

• Test conditions

High temperature exposure	+ 150	30 min
Low temperature exposure	- 65	30 min
Specimen	Plastic molded IC 2kg	

• Temperature uniformity measurement method

Thermocouples were embedded in 10 plastic molded ICs (16 pin DIPs), which were then placed on two levels in each of the corners and in the center of a specimen basket.



Utility

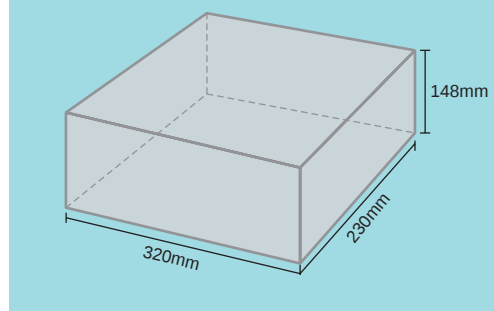


Control panel

Instrument specification

Setting	Interactive key input by touch panel
Display	TFT Color LCD
Number of test patterns	RAM (selected entry): a maximum of 20 patterns can be entered ROM (built-in): contains 10 test standard patterns
Auxiliary functions	• Test continuity selection • Overheat/overcool protection • Stable time control • Automatic defrost • Test halt preset • Automatic power shut-off • Trend graph display • Time signal • RS-485 • Timer preset • Sensor traceability • Power failure/recovery operation selection • Programmed time display • Test completion mode selection • Exposure time reduction • Alarm history display • Program memory

• Test area



Cable port (50mm, shown with cap installed)

● Uses a color LCD interactive touch-screen system employed throughout the Thermal Shock Chamber Series.

A color LCD panel design is employed that allows easy settings by just touching the screen in accordance with the display. The test pattern, test area temperature, number of temperature cycles, upstream/downstream control, trend graph display are all displayed on the visible screen.

● Large 10.9-liter-capacity test area

Features a 10.9-liter test area, twice that of our previous model. The volume that can be processed is greatly increased, and a 210 × 297mm printed circuit board can be tested in the horizontal position.

● A mechanism to prevent specimen from dropping.

In addition to the drive unit brake, there is other protection mechanism to prevent specimens from dropping in the test area when the chamber stops operation.

● Easy wiring for applying power or measuring specimens.

A cable port is provided on the side to allow easy wiring of specimens for measurement during high and low-temperature cycle tests.

● Total safety measures.

Test area drive is automatically halted when door is opened, and it is automatically locked during operation. Other redundant safety mechanisms are also used to ensure user safety.

● Equipped with casters for mobility

Eco-friendly

Incorporates many features for environmental protection (energy conservation, recycling, ozone layer protection)

● Reduced power consumption

Reduced power consumption is an important issue for our customers. This compact thermal shock chamber employs number of measures such as refrigeration capacity variable control by electronic auto-expansion valve and the use of a titanium interior material aimed specifically at energy savings.

● Small footprint

Vertical design saves space. Required installation space is only 26 inch.

● Material indication for recycling

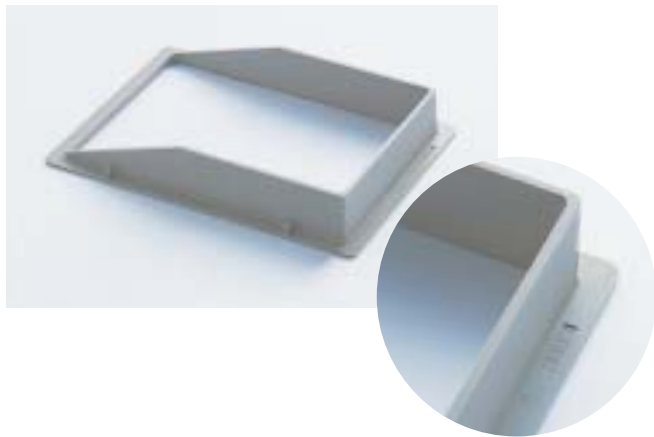
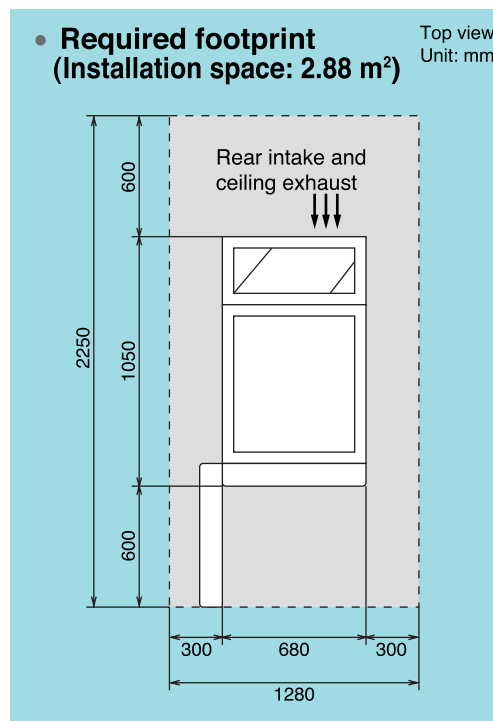
Environmental protection measures have been taken such as indicating materials on plastic molded parts and employing a structure that makes it easy to remove recyclable parts to accommodate future recycling of the unit.

● Uses HFC to protect the global environment

The refrigerant used for the refrigerator is an HFC which causes no damage to the ozone layer, and thus complies with the measures for ozone layer protection specified by the Montreal Protocol.

● 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).



Paperless recorder (optional)

TEST STANDARD (TSE-11-A compliant)

Test standard		Exposure temperature			Exposure time		Temp. recovery time	Number of cycles	Test starting point		
		High temp.	Ambient temp.*	Low temp.	High/ low temp.	Ambient temp.*					
MIL-STD-883E (Method No. 1010.7)	A	+ 85	+ 10 0	—	- 55	0 - 10	more than 10 min.	—	Specimen temp within 15 min. at worst condition	Minimum 10 cycles	Low or high temp.
	B	+ 125	+ 15 0								
	C	+ 150	+ 15 0								
	D	+ 200	+ 15 0		- 65	0 - 10					
	F	+ 175	+ 15 0								
JIS C 0025		+ 70 ±2 + 85 ±2 + 100 ±2 + 125 ±2 + 155 ±2 + 175 ±2 + 200 ±2	Ambient temp.	- 5 ±3 - 10 ±3 - 25 ±3 - 40 ±3 - 55 ±3 - 65 ±3	3 hours 2 hours 1 hour 0.5 hour 3 hours if not specified	less than 10 sec.	less than 10% of exposure time	5 cycles if not specified	Low temp.		
JASO D 001	1	+ 85	Ambient temp.	- 40	Less than 0.2 kg 1 hour + 15 min. 0 0.2 ~ 0.8 kg 2 hours + 15 min. 0 0.8 ~ 1.5 kg 3 hours + 15 min. 0 More than 1.5 kg 4 hours + 15 min. 0	Short exposure is recommendable	Upstream of specimen within 5 min.	6 cycles	High temp.		
	2	+ 75									
	3	+ 120									
EIAJ ED-2531A		+ 60 ±2 + 65 ±2 + 70 ±2 + 75 ±2 + 80 ±2 + 85 ±2 + 90 ±2 + 95 ±2 + 100 ±2	Ambient temp.	0 ±3 - 5 ±3 - 10 ±3 - 15 ±3 - 20 ±3 - 25 ±3 - 30 ±3 - 35 ±3 - 40 ±3 - 45 ±3 - 50 ±3	3 hours 2 hours 1 hour 0.5 hour 3 hours if not specified	less than 10 sec.	less than 10% of exposure time	5 or 10 cycles	Low temp.		

■ The noted specification tests include only those tests applicable to TSE-11-A. For further information, please contact us.

* Ambient temperature at exposure temperature and exposure time represent the temperature and time when moving from high temperature chamber to low temperature chamber.

SPECIFICATIONS

Model			TSE-11-A					
System			2-zone system by means of vertical movement of specimen					
Operation temperature			0 ~ + 40 (+ 32 to + 104° F)					
Performance *3	Test area	High temp. exposure range	+ 60 ~ + 200 (+ 140 to + 392° F)					
		Low temp. exposure range	- 65 ~ 0 (- 85 to + 32° F)					
		Temperature fluctuation *1	± 0.5 (± 0.9° F)					
	High temp. chamber	Pre-heat upper limit	+ 200 (+ 392° F)					
		Temp. heat-up rate *2	Within 30 min from ambient temp. to + 200 (+ 392° F)					
	Low temp. chamber	Pre-cool lower limit	- 80 (- 112° F)					
		Temp. pull-down rate *2	Within 90 min from ambient temp. to - 80 (- 112° F)					
	Temperature recovery performance	Recovery conditions	• 2 zones High temperature exposure : + 150 (+ 302° F), 30min. Low temperature exposure : - 65 (- 85° F), 30 min. • Sensor position : Upstream of specimen • Specimens: plastic molded IC 2kg					
		Recovery time	within 5 min.					
Construction	Outer shell		Painted steel					
	Interior		18-8 Cr-Ni stainless steel plate (SUS 304), titanium plate					
	Insulation		Glass wool, foamed polyurethane					
Heater			Stripped wire heater					
Cooler			Plate fin cooler, cold accumulator					
Air circulator			Sirocco fan					
Refrigerator unit	Refrigeration sytem		Mechanical cascade refrigeration system					
	Compressor		Rotary 1.5 kW					
	Refrigerant		R508A R404A					
	Condenser		Air-cooled condenser					
Fittings			Specimen power supply control terminal, Integrating hour meter without reset, Time signal (2), Cable port (1pc, inside diameter 50mm, on right side of chamber), Casters with adjusters (4), Power cord					
Test area load capacity			8kg					
Specimen basket load capacity			2kg (equally distributed load)					
Inside dimensions (W×H×D)			320×148×230mm (12.6×5.8×9 inch)					
Outside dimensions (W×H×D) *4			680×1625×1050mm (26.8×64×41.3 inch)					
Weight			approximately 390kg					
Power supply (Power supply deviation: rating ± 10%)			200V AC 3φ 3W 50/60Hz	220V AC 3φ 3W 60Hz	380V AC 3φ 4W 50Hz	400/415V AC 3φ 4W 50Hz	400V AC *5 3φ 4W 50Hz	
Maximun current			26A	25A	17A	17A	17A	
Exhaust heat quantity *3			17,585kJ/h					
Noise			60dB or less (At 1m from front of chamber, 1.2m from floor. (A-characteristic) depending on environment)					

*1 Performance indicators conform to JTM K01-1998 of Japan Testing Machinery Association.

*2 Temperature heat-up/pull-down rate imply performance of each temperature chamber.

*3 At ambient temperature + 23 . *4 Excluding protrusions. *5 Compliance with CE Marking.



- Do not use specimens which are explosive or inflammable, or which contain such substances. To do so could be hazardous, as this may lead to fire or explosion.
- Do not place corrosive materials in the chamber. If corrosive substances or humidifying water is used, the life of the unit may be significantly shortened.
- Do not place life forms or substances that exceed allowable heat generation.



Be sure to read the instruction manual before operation.

SAFETY DEVICES

- Leakage breaker (200, 220, 380, 400/ 415V AC)
- Circuit breaker (400V AC)
- Electric parts compartment door switch
- Temperature switch for overheat protection of high-temperature chamber
- Temperature switch for overheat protection of low-temperature chamber
- Overheat protector for high-temp. chamber (Built-in controller)
- Overheat/ overcool protectors for low temp. chamber. (Built-in controller)
- Test area overheat and overcool protectors (Built-in controller)
- Test area overheat / overcool protectors
- Refrigerator high pressure switch
- Thermal relay for compressor
- Compressor temperature switch
- Air circulator temperature switch
- Thermal relay for air circulator
- Motor inverter
- Motor reverse prevention relay
- High-temperature chamber door switch
- Low-temperature chamber door switch
- Test area hold
- Door lock mechanism
- Fuse
- Specimen power supply control terminal

ACCESSORIES

- Specimen basket (18-8 Cr-Ni stainless steel, 5 mesh metal basket)
W320 × H35 × D230mm
Withstand load: 2kg (equally distributed) 2
- Cartridge fuse (5 A) 1each
- Cable port rubber plug 2
- Wirefisher 1
- User's manual 1

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 (32 MB)

Language support : ENG, JPN, CHN



Temperature recorder (digital)

- 100 to + 220 /100mm

RK-61: 1pen

RK-63: 3 pens

RK-64: 6 dots



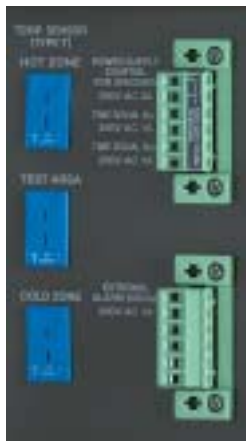
Temperature recorder for future installation

Preparation of a power cable, temperature sensor, and a grounding wire for additional installation in the future.

OPTIONS

Terminal for recorder

Serves to output temperature within test area, high temp chamber, low temp chamber.



Specimen power supply control terminal

Time signal

External alarm signal (option)

Thermocouple

Thermocouple measures the temperature of specimens.

- T JIS C 1602 with ball attached

Auxiliary cooling injector (LCO₂)

Used to reduce the temperature recovery time of low temperature exposure by injecting liquefied carbon dioxide at beginning of exposure.

Auxiliary cooling injector (LN₂)

Used to reduce the temperature recovery time of low temperature exposure by injecting liquefied nitrogen at beginning of exposure.

Total cycle counter

Indicates cycle counts.

- Display range: 1~99999999 (with resetting function)



Additional overhear protector

Additional preventive measures can be taken for excessive temperature rise in the chamber, in addition to the standard double equipped overhear protector.

External alarm terminal

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

Emergency stop switch

Stops the chamber immediately.



Cable port rubber plug

Prevents air leakage from the cable port.

Specimen basket

Equivalent to standard accessory.

- Material: stainless steel (5 mesh)



Fixture for securing body

Used to bolt the chamber to the floor.

Power cord

Used to connect to the primary power source.

- 5, 10m

Color specifications

Chamber can be painted to a desired color according to a color sample.

Communication functions

Computer interface

- GPIB
- RS-232C
- E-BUS

*Select one other than standard RS-485.

Communication cable

- RS-485 5, 10m
- GPIB 2, 4m
- RS-232C 1.5, 3, 5m
- E-BUS 1.5, 3, 5m for extension
- E-BUS 5, 10m

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ISO 14001 (JIS Q 14001)
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