Quality is more than a word

ESPEC

Air to Air

Thermal Shock Chambers

TSA Series

3 year warranty

CAT.NO.E14138-Y1811

A Wide Variety of TSA Series Thermal Shock Chambers

For achieving compliance with the ISO 26262 Road vehicles - Functional safety, IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety - related Systems rapid temperature change testing is required to increase the reliability of automotive components. We offer a wide selection of models with larger capacity, higher temperature or humidity operation to meet various requirements.

Thermal Shock Chambers P.3～P.20

3 year warranty

+300°C

TSA-73ES-W　TSA-203ES-W　TSA-303EL-W

+300°C High temperature P.6

3 year warranty

+200°C

200L type

Thermal Shock Chamber with Humidity P.21

200L type

Test area capacity

40L　70L　110L　200L　300L

Large Capacity Thermal Shock Chambers P.21

TSA-12000H-W

TSA-3300H-W

TSA-1100H-W

TSA-603EL-W

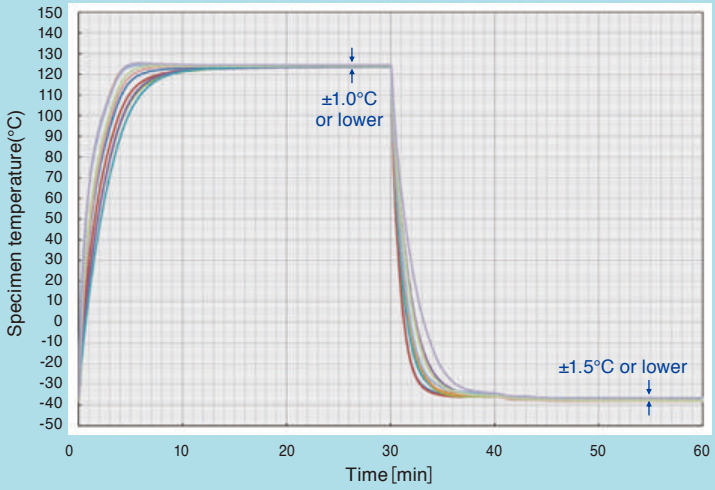
600L 1000L 3000L 12000L

Characteristics

For High Performance, High Accuracy and Reliability

Temperature uniformity

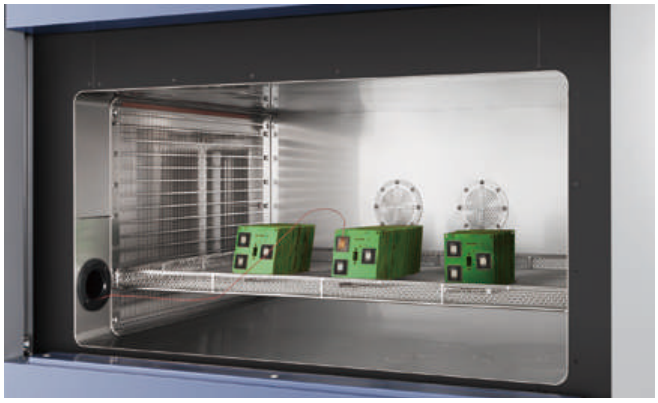
TSA–203ES–W measurement example



Test conditions

High-temp. exposure: +125°C, 30 min.
Pre-heating temperature: +145°C
Low-temp. exposure: –40°C, 30 min.
Pre-cooling temperature:–55°C

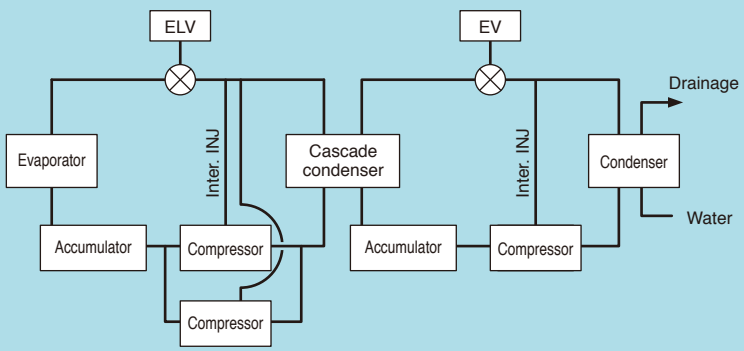
Specimen: Printed circuit boards
Measuring points: 10



Product temperature control (example)

Refrigeration circuit

(Parallel refrigeration system:[patent 5487167])



Quick temperature recovery

Dampers with integrated rectifying function minimize variation in exposure conditions due to specimen position within the test area. This reduces the overall test time and shortens temperature recovery time, especially during low-temperature exposure. The uniformity in test conditions brought by this innovation also contributes to improved test reproducibility and reliability.

Accurate and dependable test result

(option: product temperature control*)

The product temperature control is the function of chamber to be controlled by a temperature sensor is attached to the product.
This option is capable of accurate test securing product exposure to the set temperature. Because there is great difference between air temperature inside of test area and actual product temperature.

* The function is not applicable Eco operation mode.

Monitoring product temperature

(option: product temperature monitor with trigger function)

Two temperature sensors on products in the test area for monitoring product temperatures during test.
The exposure time is only counted by the trigger temperatures are achieved set temperature.

3 year warranty

Characteristics

1000 cycles continuous operation (option: defrost-free operation)

Minimizing defrosting burden with defrost-free operation
(option: defrost-free operation)

Defrost-free operation is provided as an option so 500-hour continuous operation can be performed without interruption (if test conditions are set for 15-minute exposure). Defrosting during cycle tests is then unnecessary, thus reducing defrosting time and the power consumed for this operation. [Japanese patent 3514735]

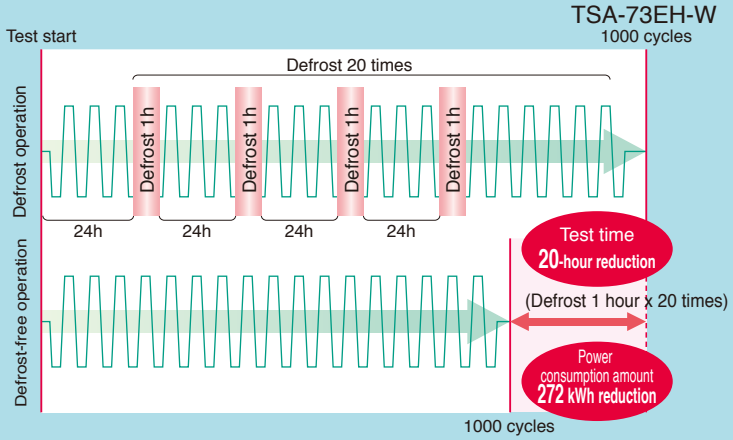
Automatic setting of pre-cooling and pre-heating in energy saving, Eco operation mode
[Japanese patent 5204808]

This feature can further reduce power consumption and remove the inaccuracies and hassles caused by adjustments based on preliminary experiments. Tests operation achieves both energy savings and reproducibility/reliability.

Parallel refrigerator control system for energy-saving control [Japanese patent 5487167]

To optimize further the power consumption, the chamber features a parallel control system that connects two small refrigerators in parallel to the secondary side of the refrigeration circuit. The chamber can operate at the optimal refrigeration capacity based on the controlled temperature, by switching operation between two refrigerators simultaneously or a single refrigerator. At stable low-temperature exposures, power consumption is also reduced by limiting refrigeration capacity with an electronic expansion valve.

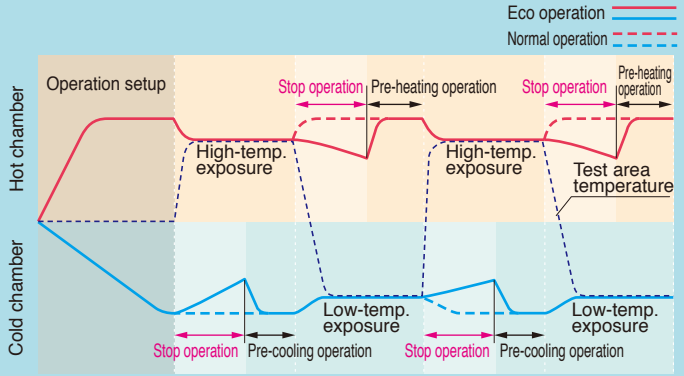
1000 cycles test time comparison example



Test conditions (Two-zone, No test halt)
High-temp. exposure : +150°C 15 min.
Low-temp. exposure : –65°C 15 min.
Outside conditions : +23°C/60% rh

Cooling water temp. : +25°C
Specimen : No specimen

Temperature changes under Eco operation (example)

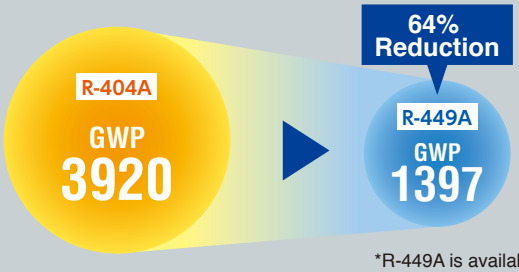


TSA-73EH-W
Max. 50% reduction in power cunsumption

*Compared to previous model TSA-71H-W

To minimize our chambers potential environmental impact

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



*R-449A is available on request

Characteristics

Designed for Ease of Operation and Global Safety Standards

Product temperature control (example)

Vertically sliding door

Automatic door (option)

Conductor Resistance Evaluation System AMR with TSA

Usability

A standard equipped ø50 mm cable port is capable of cables with terminal connectors and plugs can be easily connected to specimen. An optional flat cable port is available.

Space-saving sliding door

Equipped with a manual vertical sliding door activated by the unlock button. The sliding door maximizes limited space without being concerned with the door opening and closing space. As an option, the door can be automatically opened/closed at the touch of a button for ease of operations even when carrying specimens.

System integration with ESPEC evaluation system

The ESPEC Conductor Resistance Evaluation System AMR (Sold separately) and TSA series are interlocked as evaluation system.
The system continuously measures the micro resistance in solder joints and the conductive resistance of connectors during thermal cycle test.

International Standards

The TSA series supports the following safety 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.
(Only models with power supply voltage of 400 V/415 V are PED-compliant.)

Special Specifications

For more information, please contact us or our local partners.

Easy wiring for measurement and supply power

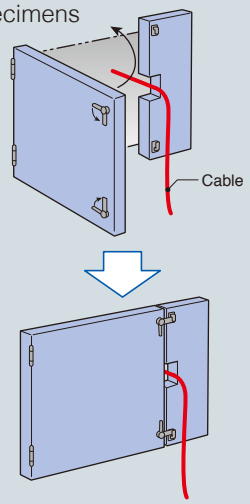
\NEW/

● Large cable port

Size: W65×H125mm
Easily feed ϕ50 connectors and connectors that cannot be fed through flat cable ports.

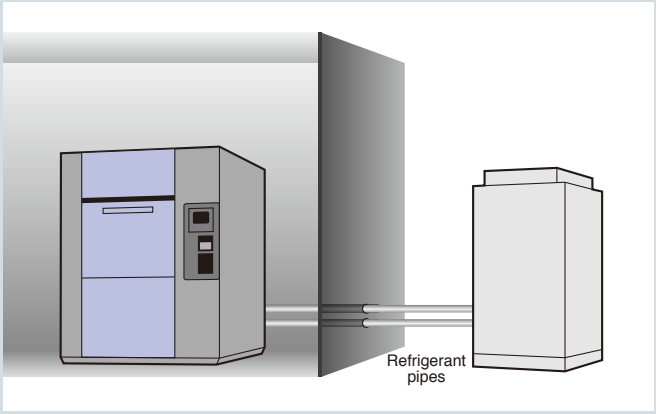
● Door notch

The new door notch allows specimens to be mounted in the test area while connected to power.



Remote Cooling Modification

Condenser for high temp. chamber changes to remote cooling system which is placed outdoors.



+300°C High temperature

High-temp. exposure range	+60 to +300°C
Low-temp. exposure range	-70 to 0°C
Temperature recovery performance	Recovery time: Within 20 min. <Recovery Conditions> High-temp. exposure: +250°C/60 min. Low-temp. exposure: -40°C/60 min. Sensor position: Upstream
Test area dimensions (mm)	W650 x H460 x D670

TEST STANDARD AND COMPATIBLE MODELS

Test standard		Exposure temperature			Exposure time		Temperature recovery time	Number of test cycles	Test starting point	Model*1		
		High temp.	Ambient temp.	Low temp.	High/low temp.	Ambient temp.				EL type	ES type	EH type
MIL–STD–883H (Method No. 1010.8)	A	+85°C $^{+10}_{0}$	—	–55°C $^{0}_{-10}$	10 min. or longer	—	Worst case specimen temp. Within 15 min.	Minimum 10	Low temp. or High temp.	—	○	○
	B	+125°C $^{+15}_{0}$								—	○	○
	C	+150°C $^{+15}_{0}$		–65°C $^{0}_{-10}$						—	—	○
	D	+200°C $^{+15}_{0}$								—	—	—
	E	+300°C $^{+15}_{0}$								—	—	—
	F	+175°C $^{+15}_{0}$								—	—	○
MIL–STD–202G (Method No. 107G)	A	+85°C $^{+3}_{0}$	+25°C $^{+10}_{-5}$	–55°C $^{0}_{-3}$	Differs according to specimen weight 28 g or lower, 15 min. or 30 min. 28 g to 136 g, 30 min. 136 g to 1.36 kg, 60 min. 1.36 to 13.6 kg, 120 min. 13.6 to 136 kg, 240 min.	Max 5 min.	Up–stream Within 5 min.	5 cycles 25 cycles 50 cycles 100 cycles	Low temp.	○*2*3	○*2	○
	B	+125°C $^{+3}_{0}$		–65°C $^{0}_{-5}$						—	○*2	○
	C	+200°C $^{+5}_{0}$								—	—	○
	D	+350°C $^{+5}_{0}$								—	—	—
	E	+500°C $^{+5}_{0}$								—	—	—
	F	+150°C $^{+3}_{0}$								—	○*2	○
IEC 60068–2–14 Na (JIS C 60068–2–14 Na)		+70°C ±2 +85°C ±2 +100°C ±2 +125°C ±2 +155°C ±2 +175°C ±2 +200°C ±2	—	–5°C ±3 –10°C ±3 –25°C ±3 –40°C ±3 –55°C ±3 –65°C ±3	3 hrs. 2 hrs. 1 hrs. If not specified: 3 hrs.	—	Exposure time Within 10%	If not specified 5 cycles	Low temp.	○*2	○*2	○
JASO D 014–4		+65°C ±2 +70°C ±2 +80°C ±2 +85°C ±2 +90°C ±2 +100°C ±2 +110°C ±2 +120°C ±2 +125°C ±2 +130°C ±2 +140°C ±2 +150°C ±2 +155°C ±2 +160°C ±2	—	–20°C ±3 –40°C ±3	20 min. 40 min. 60 min. 90 min.	—	Exposure time Within 10%	If not specified 5 cycles	Low temp.	○*2	○*2	○
EIAJ ED-2531B Na		+60°C ±2 +65°C ±2 +70°C ±2 +75°C ±2 +80°C ±2 +85°C ±2 +90°C ±2 +95°C ±2 +100°C ±2	Ambient temp.	0°C ±3 -5°C ±3 -10°C ±3 -15°C ±3 -20°C ±3 -25°C ±3 -30°C ±3 -35°C ±3 -40°C ±3 -45°C ±3 -50°C ±3	3 hrs. 2 hrs. 1 hrs. 30 min. 10 min. If not specified: 3 hrs.	2 to 3 min.	Exposure time Within 10%	5 or 10 cycles	Low temp.	○*2*3	○	○

*1 The test results may not meet specifications depending on the quantity of specimens or the setting method.
*2 Some models do not conform to the standard depending on test conditions. For further information, please contact ESPEC.
*3 Applicable when equipped with the ambient-temperature exposure option.

Network

* Requires an intranet Supported browser: Internet Explorer 10, 11

Chambers can be operated from PCs and Tablet Terminals

Remote Monitoring and Control (Ethernet Connection)

The chambers are equipped with unique web applications that enable chamber status to be confirmed and operated from a web browser screen (PC or tablet terminal). It is also possible to start operations with a PC or other device from a remote location.

Editing programs with a Browser

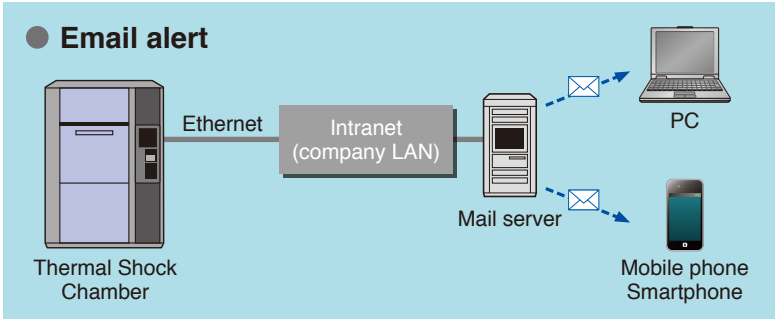
It is possible to edit the program patterns registered in the testing chamber with a web browser.

Email alert

When an alarm is triggered, an e-mail is sent to the registered PC or mobile address. A notification can also be sent at the time of test completion. Set the recipient mail address from the Maintenance setting screen.

*Requires an intranet environment capable of sending emails.

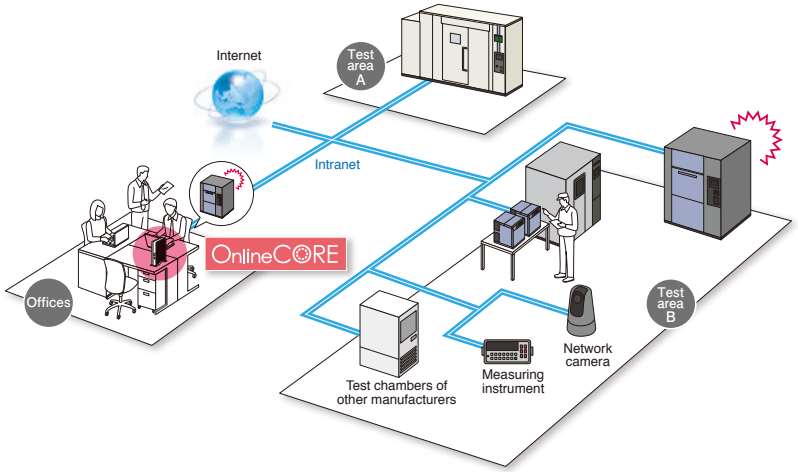
Remote monitoring and control



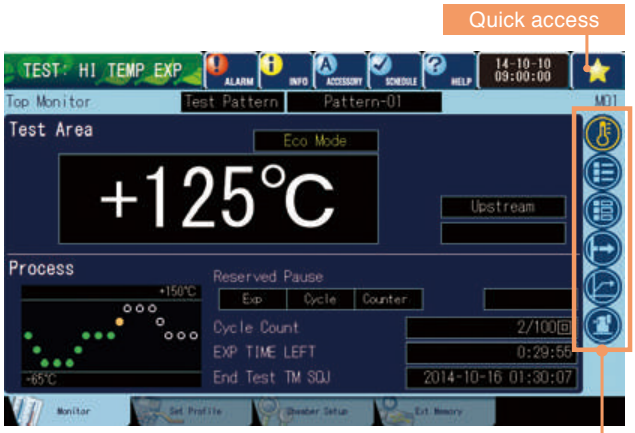
ESPEC OnlineCore

OnlineCORE (Sold separately)

The centralized control system, which is recommended for multiple test chambers users.



Making Operations More User-friendly



Color LCD touch panel

Wide 9-inch screen with LED backlight is clearer and provides faster display speed.

Quick access button

The star mark (★) on the right top corner of the controller can be set to have instant access to any page you often need, either registered test program start, on else.

Test Data Records

Temperature setting and measurement values can be recorded on the internal memory and external memories.

Test half preset

Enhanced test halt preset function [patent 5456600]

It is now possible to program tests to halt after cycle or exposure completion. Six cycle counters are also built-in to the instrumentation so a test halt preset can be programmed for each counter. The function can be used to multiple ends such as removing specimens to the chamber.

Maintenance \NEW/

Check the equipment on the monitor screen

You can check the pressure of the refrigeration system and the temperature of the cooling water on the screen or PC connected to the network.

Registering Test Patterns

40 patterns (9999 cycles)

Multilingual display

A simple operation changes display text to Japanese, Chinese (simplified, traditional), or Korean. Select the language that suits your needs.

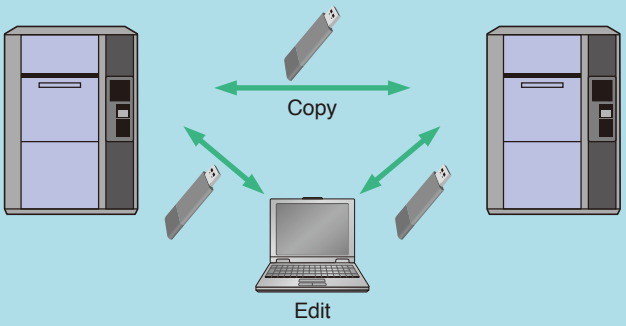
Copy of test program patterns

Transfer test programs between chambers without the need of a PC, via USB stick.
* The USB memory is not included.

Trend graph output on USB memory

Trend graphs can be displayed on the web application or downloaded on a USB memory. It is also possible to continuously register data on the USB memory if numerous data records are needed.

Program copy and computer editing



USB memory port

Download edit programs online

Via the Pattern Manager Lite software installed on your PC, edit programs according to your testing needs, and upload them with a USB.

The Pattern Manager Lite software allows you to edit programs for your chamber, view and edit data as graph, etc.
The software can be downloaded from the Test Navi website.

Test Navi

(http://www.test-navi.com/eng/index.html)

This website provides practical knowledge on environmental testing that ESPEC has acquired through years of experience, as well as covering everything from the fundamentals to the latest information on environmental and reliability testing.

・Updates for chamber controller software
・Search for environmental test standards

・Download test profiles from a list of environmental test standards

CHAMBER AND UTILITY REQUIREMENTS

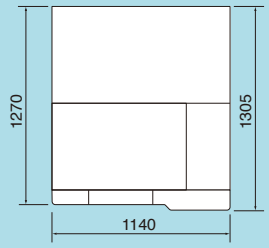
Model		EL type					ES type				EH type
		43EL–A	73EL–A	103EL–A	203EL–W	303EL–W	73ES–A	73ES–W	103ES–W	203ES–W	73EH–W
		Air-cooled			Water-cooled		Air-cooled	Water-cooled			Water-cooled
Test area capacity		40L	70L	110L	200L	300L	70L		110L	200L	70L
Power supply	200V AC	49A	70A	70A	110A	120A	78A			120A	112A
	220V AC	47A	70A	70A	110A	120A	75A			120A	108A
	380/400/415V AC	27A	45A	45A	65A	70A	50A			70A	60A
Air		0.4 to 0.7 MPa (4 to 7 kg/cm²G)									
Condensation load (KJ/h)*1	50Hz	—			95700		—	59700		95700	95700
	60Hz	—			96100		—	64800		104600	96100
Cooling water supply rate (at reference water temp.+32°C)*1*2		—			4.6 m³/h		—	3.1 m³/h		4.6 m³/h	
Water pressure		—			0.2 to 0.5 MPa (2 to 5 kg/cm²)		—	0.2 to 0.5 MPa (2 to 5 kg/cm²)			
Piping connection size		32A									
Outside dimensions mm		W 1140 H 1900 D 1270 [1305]	W 1310 H 1900 D 1470 [1505]	W 1550 H 1900 D 1470 [1505]	W 1550 H 1900 D 1770 [1805]	W 1870 H 1900 D 1770 [1805]	W 1310 H 1900 D 1470 [1505]		W 1550 H 1900 D 1470 [1505]	W 1550 H 1900 D 1770 [1805]	W 1310 H 1900 D 1770 [1805]

*1 Maximum possible value during temperature recovery.
*2 Rate depends on the cleanliness of the heat exchanger.
*3 Excluding protrusions. Dimensions in brackets include the instrument panel.

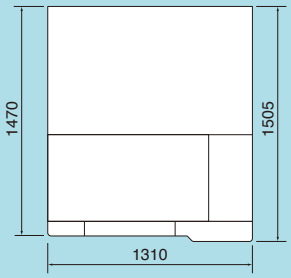
DIMENSIONS (example)

(Unit: mm)

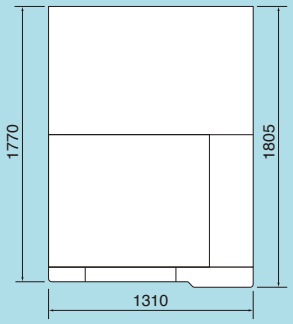
TSA-43EL-A



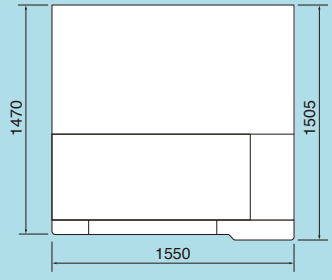
TSA-73EL-A·73ES-A/W



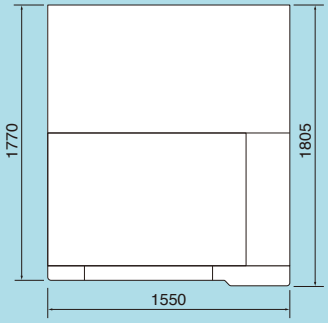
TSA-73EH-W



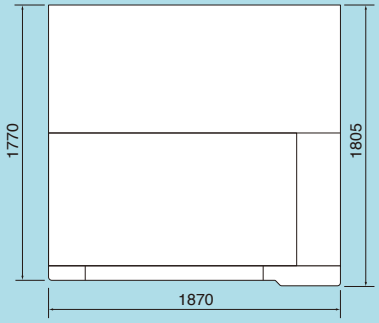
TSA-103EL-A·103ES-W



TSA-203EL-W·203ES-W



TSA-303EL-W



EL Type

Model			TSA–43EL–A	TSA–73EL–A	TSA–103EL–A	TSA–203EL–W	TSA–303EL–W
System			Two-zone test by means of damper switching				
Performance*1	Test area	High temp. exposure range*2	Ambient temp. +50 to +200°C (+122 to +392°F)				
		Low temp. exposure range	–65 to 0°C (–85 to +32°F)				
		Temp. fluctuation	±0.5°C (±0.9°F)				
	Hot chamber	Pre-heat upper limit	+205°C (+401°F)				
		Temp. heat up time*3	Ambient temp. to +200°C (+392°F)				
			Within 10 min.	Within 15 min.			
	Cold chamber	Pre-cool lower limit	–75°C (–103°F)				
		Temp. pull down time*3	Ambient temp. to –70°C (–94°F)				
			Within 70 min.	Within 40 min.	Within 60 min.	Within 70 min.	Within 40 min.
	Temp. recovery	Recovery conditions	Two-zone: High temp. exposure: +125°C 30 min. Low temp. exposure: –40°C 30 min. Power supply voltage: Rated voltage Sensor position: Upstream				
			Specimen 3.5 kg (Plastic molded ICs, 2.5 kg, specimen basket/brackets 1 kg)	Specimen 6.5 kg (Plastic molded ICs, 5 kg, specimen basket/brackets 1.5 kg)	Specimen 7.5 kg (Plastic molded ICs, 5 kg, specimen basket/brackets 2.5 kg)	Specimen 16 kg (Plastic molded ICs, 10 kg, specimen basket/brackets 6 kg)	Specimen 17 kg (Plastic molded ICs, 10 kg, specimen basket/brackets 7 kg)
		Temp. recovery time*4	Within 15 min.	Within 5 min.			Within 10 min.
Construction	Interior material		Stainless steel plate				
	Door		Manually operated sliding door with unlock button				
	Heater		Stripped wire heater				
	Refrigerator unit	System	Mechanical cascade refrigeration system				
			Air-cooled condenser			Water-cooled condenser	
		Compressor	Hermetically sealed rotary compressor	Hermetically sealed scroll compressor			
		Refrigerant \NEW/	High temp. side: R404A Low temp. side: R508A	High temp. side: R404A [R449A is available on request (Water-cooled)] Low temp. side: R23			
	Cooler		Plate fin cooler, cold accumulator				
	Air circulator		Sirocco fan				
	Damper driving unit		Air cylinder				
Inside dimensions (W x H x D mm)			240 x 460 x 370	410 x 460 x 370	650 x 460 x 370	650 x 460 x 670	970 x 460 x 670
Test area load resistance			30 kg (Equally distributed load)		50 kg (Equally distributed load)		
Outside dimensions (W x H x D mm)*5			1140 x 1900 x 1270 [1305]	1310 x 1900 x 1470 [1505]	1550 x 1900 x 1470 [1505]	1550 x 1900 x 1770 [1805]	1870 x 1900 x 1770 [1805]
Weight			Approx. 730 kg	Approx. 900 kg	Approx. 1050 kg	Approx. 1200 kg	Approx. 1420 kg
Utility requirements	Allowable ambient conditions		0 to 40°C (+32 to +104°F)				
	Power supply*6	200V AC 3ø 50/60Hz	49A	70A	70A	110A	120A
		220V AC 3ø 60Hz	47A	70A	70A	110A	120A
		380/400/415V AC 3ø 50Hz	27A	45A	45A	65A	70A
	Cooling water supply pressure		—			0.2 to 0.5 MPa (2 to 5 kg/cm²)	
	Cooling water supply rate*7		—			4.6 m³/h (ref. water temp.: +32°C)	
	Operating cooling water temp. range		—			+5 to +38°C (+41 to +100°F)	
	Maximum noise level*8		65 dB			62 dB	65 dB

*1 Air-cooled: Ambient temperature of +23°C, relative humidity 65%rh and no specimens.
Water-cooled: Ambient temperature of +23°C, relative humidity 65%rh, no specimens and a cooling water temperature of +25°C
Performance shown above conforms to IEC 60068-3-5: 2001

*2 If the high-temperature exposure range lower limit +60°C is required, select the “ambient-temperature exposure” option

*3 Temperature heat-up/pull-down time are applicable only during when one unit of chamber operated.

*4 Tolerance in temperature recovery time is based on IEC60068-2-1 and IEC60068-2-2

*5 Excluding protrusions. Dimensions in brackets include the instrument panel.

*6 400/415V AC models comply with CE marking.
220V AC is available with or without CE marking.

*7 Rate depends on the cleanliness of the heat exchanger

*8 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). Actual noise emissions may increase because of surrounding reverberations in the place of installation, therefore use caution in selecting a place of use.

ES Type

Model			TSA–73ES–A/W	TSA–103ES–W	TSA–203ES–W
System			Two-zone or three-zone test by means of damper switching		
Performance*1	Test area	High temp. exposure range*2	+60 to +200°C (+140 to +392°F)		
		Low temp. exposure range	–70 to 0°C (–94 to +32°F)		
		Temp. fluctuation	±0.5°C (±0.9°F)		
	Hot chamber	Pre-heat upper limit	+205°C (+401°F)		
		Temp. heat up time*3	Ambient temp. to +200°C (+392°F) Within 15 min.		
	Cold chamber	Pre-cool lower limit	–75°C (–103°F)		
		Temp. pull down time*3	Ambient temp. to –75°C (–103°F)		
			Within 40 min.	Within 50 min.	Within 45 min.
	Temp. recovery	Recovery conditions	· Three-zone High-temp. exposure: +150°C, 30 min. Ambient-temperature exposure: Ambient temperature, 5 min. Low-temp. exposure: –65°C, 30 min. · Power supply voltage: Rated voltage · Sensor position: Upstream		· Three-zone High-temp. exposure: +150°C, 30 min. Ambient-temperature exposure: Ambient temperature, 10 min. Low-temp. exposure: –65°C, 30 min. · Power supply voltage: Rated voltage · Sensor position: Upstream
			· Specimen 6.5 kg Plastic molded ICs: 5 kg Specimen basket/brackets: 1.5 kg	· Specimen 7.5 kg Plastic molded ICs: 5 kg Specimen basket/brackets: 2.5 kg	· Specimen 26 kg Plastic molded ICs: 20 kg Specimen basket/brackets: 6 kg
		Temp. recovery time*4	Within 5 min.		Within 10 min.
Construction	Interior material		Stainless steel plate		
	Door		Manually operated sliding door with unlock button		
	Heater		Stripped wire heater		
	Refrigerator unit	System	Mechanical cascade refrigeration system		
			Air-cooled condenser or water-cooled condenser	Water-cooled condenser	
		Compressor	Hermetically sealed scroll compressor		
		Refrigerant \NEW/	High temp. side: R404A [R449A is available on request (Water-cooled)] Low temp. side: R23		
	Cooler		Plate fin cooler, cold accumulator		
	Air circulator		Sirocco fan		
	Damper driving unit		Air cylinder		
Inside dimensions (W x H x D mm)			410 x 460 x 370	650 x 460 x 370	650 x 460 x 670
Test area load resistance			30 kg (Equally distributed load)	50 kg (Equally distributed load)	
Outside dimensions (W x H x D mm)*5			1310 x 1900 x 1470 [1505]	1550 x 1900 x 1470 [1505]	1550 x 1900 x 1770 [1805]
Weight			Approx. 1050 kg	Approx. 1150 kg	Approx. 1400 kg
Utility requirements	Allowable ambient conditions		0 to +40°C (+32 to +104°F)		
	Power supply*6	200V AC 3ø 50/60Hz	78A		120A
		220V AC 3ø 60Hz	75A		120A
		380/400/415V AC 3ø 50Hz	50A		70A
	Cooling water supply pressure		0.2 to 0.5 MPa (2 to 5 kg/cm²) (water-cooled specification)		0.2 to 0.5 MPa (2 to 5 kg/cm²)
	Cooling water supply rate*7		3.1 m³/h (reference water temp: +32°C) (water-cooled specification)		4.6 m³/h (reference water temp: +32°C)
	Operating cooling water temp. range		+5 to +38°C (water-cooled specification)		
	Maximum noise level*8		65 dB		

*1 Air-cooled: Ambient temperature of +23°C, relative humidity 65%rh and no specimens.
Water-cooled: Ambient temperature of +23°C, relative humidity 65%rh, no specimens and a cooling water temperature of +25°C
Performance shown above conforms to IEC 60068-3-5: 2001

*2 If the high-temperature exposure range lower limit +60°C is required, select the "ambient-temperature exposure" option

*3 Temperature heat-up/pull-down time are applicable only during when one unit of chamber operated.

*4 Tolerance in temperature recovery time is based on IEC60068-2-1 and IEC60068-2-2

*5 Excluding protrusions. Dimensions in brackets include the instrument panel.

*6 400/415V AC models comply with CE marking.
220V AC is available with or without CE marking.

*7 Rate depends on the cleanliness of the heat exchanger

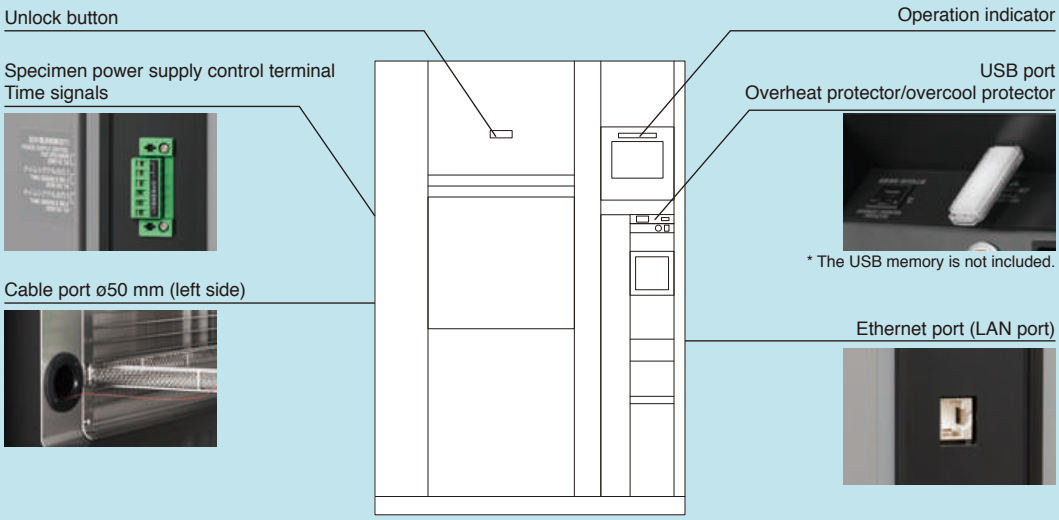
*8 Noise level was measured in an anechoic room at a height of 1.2 m from the floor and a distance of 1 m from the chamber front panel (ISO 1996-1:2003 A-weighted sound pressure level). Actual noise emissions may increase because of surrounding reverberations in the place of installation, therefore use caution in selecting a place of use.

EH Type

Model			TSA–73EH–W
System			Two-zone or three-zone test by means of damper switching
Performance*1	Test area	High temp. exposure range*2	+60 to +200°C (+140 to +392°F)
		Low temp. exposure range	–70 to 0°C (–94 to +32°F)
		Temp. fluctuation	±0.5°C (±0.9°F)
	Hot chamber	Pre-heat upper limit	+205°C (+401°F)
		Temp. heat up time*3	Ambient temp. to +200°C (+392°F) Within 15 min.
	Cold chamber	Pre-cool lower limit	–77°C (–106.6°F)
		Temp. pull down time*3	Ambient temp. to –75°C (–103°F) Within 50 min.
	Temp. recovery	Recovery conditions	· Two-zone High-temp. exposure: +150°C, 15 min. Low-temp. exposure: –65°C, 15 min. · Power supply voltage: Rated voltage · Sensor position: Downstream · Specimen 5 kg Plastic molded ICs: 3.5 kg Specimen basket/brackets: 1.5 kg
		Temp. recovery time*4	Within 5 min.
Construction	Interior material		Stainless steel plate
	Door		Manually operated sliding door with unlock button
	Heater		Stripped wire heater
	Refrigerator unit	System	Mechanical cascade refrigeration system Water-cooled condenser
		Compressor	Hermetically sealed scroll compressor
		Expansion mechanism	Electronic expansion valve, other
		Refrigerant \NEW/	High temp. side: R404A [R449A is available on request (Water-cooled)] Low temp. side: R23
	Cooler		Plate fin cooler, cold accumulator
	Air circulator		Sirocco fan
	Damper driving unit		Air cylinder
Inside dimensions (W x H x D mm)			410 x 460 x 370
Test area load resistance			30 kg (Equally distributed load)
Outside dimensions (W x H x D mm)*5			1310 x 1900 x 1770 [1805]
Weight			Approx. 1250 kg
Utility requirements	Allowable ambient conditions		0 to +40°C (+32 to +104°F)
	Power supply*6	200V AC 3ø 50/60Hz	112 A
		220V AC 3ø 60Hz	108 A
		380/400/415V AC 3ø 50Hz	60 A
	Cooling water supply pressure		0.2 to 0.5 MPa (2 to 5 kg/cm^2)
	Cooling water supply rate*7		4.6 m^3/h (reference water temp: +32°C)
	Operating cooling water temp. range		+5 to +38°C
	Maximum noise level*8		65 dB

*1 Air-cooled: Ambient temperature of +23°C, relative humidity 65%rh and no specimens.
Water-cooled: Ambient temperature of +23°C, relative humidity 65%rh, no specimens and a cooling water temperature of +25°C
Performance shown above conforms to IEC 60068-3-5: 2001
*2 If the high-temperature exposure range lower limit +60°C is required, select the “ambient-temperature exposure” option
*3 Temperature heat-up/pull-down time are applicable only during when one unit of chamber operated.
*4 Tolerance in temperature recovery time is based on IEC60068-2-1 and IEC60068-2-2
*5 Excluding protrusions. Dimensions in brackets include the instrument panel.
*6 400/415V AC models comply with CE marking.
220V AC is available with or without CE marking.
*7 Rate depends on the cleanliness of the heat exchanger
*8 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). Actual noise emissions may increase because of surrounding reverberations in the place of installation, therefore use caution in selecting a place of use.

FITTINGS



ACCESSORIES

- Specimen basket (18-8 Cr-Ni stainless steel/5 mesh metal basket)

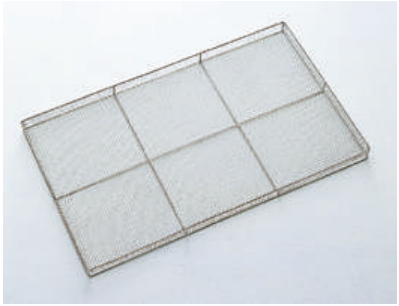
  TSA-43
  (W230 x H40 x D356 mm/load capacity up to 2.5 kg) ····· 2

  TSA-73
  (W400 x H40 x D356 mm/load capacity up to 5 kg) ····· 2

  TSA-103
  (W640 x H40 x D356 mm/load capacity up to 5 kg) ····· 2

  TSA-203
  (W640 x H40 x D656 mm/load capacity up to 17 kg) ····· 2

  TSA-303
  (W960 x H40 x D656 mm/load capacity up to 17 kg) ····· 2



- Shelf brackets
  (shelf attachment pitch 60 mm, adjustable in 7 levels) ···· 2 sets
- Cartridge fuse
  5A (200V AC specification) ····· 2
  10A (220/380/400/415V AC specification) ····· 1
- Cable port rubber plug ····· 1
- Nipple (water-cooled specification only) ····· 1
- Strainer (water-cooled specification only) ····· 1
- Strainer element (water-cooled specification only) ····· 1
- Operation manual ····· 1

SAFETY DEVICES

- Leakage breaker (200, 220V AC specifications)
- Circuit breaker (380, 400/415V AC specifications)
- Electrical compartment door switch
- Test area door switch
- Hot chamber overheat protection switch
- Cold chamber overheat protection switch
- Hot chamber overheat protector (controller)
- Cold chamber overheat protector (controller)
- Air circulator overload relay
- Refrigerator high/low pressure switches
- Compressor built-in protector (except TSA–43EL)
- Compressor temperature switch
- Thermal relay for compressor (TSA–43EL only)
- Water suspension relay (water-cooled specification only)
- Air circulator thermal relay
- Motor reverse prevention relay
- Air pressure switch
- Fuse
- Cooling tower interlock terminal (water-cooled specification only)
- Compressor circuit breaker
- Heater circuit breaker
- Test area overheat protector (controller)
- Test area overcool protector (controller)
- Overheat protector/overcool protector
- Air purge valve
- Specimen power supply control terminal

Options

UTILITY

Power cable

· 5 m
· 10 m
* The chamber does not come with a power cable.

Plug socket

To supply power to external equipment
· 2 plug sockets
· Rated capacity 100V AC 3A
(Total capacity)

Built-in air compressor

This option is useful in case sufficient external primary air supply cannot be secured.
Air is required to air cylinders that drive dampers and the test area door.

Casters

Installed for mobility.
· 6 casters (4 for TSA–43EL)
· 4 leveling feet

TEST SAMPLE SETTING

Automatic door

Automatic sliding door (vertical) operated by single-touch button. Equipped with 2 safety mechanisms: a photoelectric sensor, and a touch sensor. A door stop switch is also set.

Door open/ close switch

Additional cable port

Provided in addition / replacement of the standard cable port (left side)
· φ50 mm round
· Flat cable port (25 x 100 mm slot)

ø50 mm

Flat cable port

Cable port rubber plug

Prevents air leakage from the cable port.
· φ50 mm for round port
· For flat cables
· Spiral-wrapped plug(2m)

ϕ50 mm for round port

For flat cables

Spiral-wrapped plug

Specimen basket/shelf brackets

Equivalent to standard accessory.
· Material: stainless steel (5 mesh)

Heavy-duty shelf

Use to hold heavy specimens exceeding the load capacity of the standard specimen basket.
· Load capacity: 30 kg

NETWORK

I/O interface

Communication ports to connect the chamber to a PC.
· RS-485
· RS-232C
· GPIB

Communication cable

· RS-485	5 m/10 m/30 m
· GPIB	2 m/4 m

Options

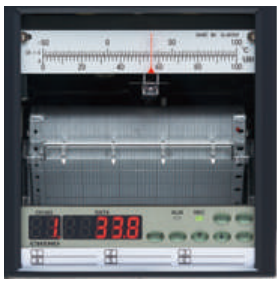
LOGGING

Paperless recorder

Records the temperature of each section such as the temperature inside the chamber.
Display: 5.7 inch color touch panel
Inputs: 6 channels
Temperature range: –100 to +220°C
Internal recording media:
Flash memory 8MB
External memory
CF memory card port
(Includes a 256 MB CF card)
USB memory port

Chart recorder

RK–61 1 pen
RK–63 3 pens
RK–64 6 dots
· Temperature range: –100 to +220°C
· Effective recording chart width 100 mm



Recorder wiring

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

Recorder terminal

Used to output the temperature Within test area, hot chamber, and cold chamber.

Thermocouple

Attached to specimen to measure specimen temperature.
Thermocouple with a brass ball tip
Thermocouple type T (Copper/ Copper-Nickel)
· 2 m
· 4 m
· 6 m

Exposure signal output terminal

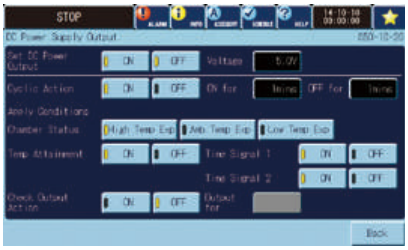
A signal is output via a contact switch when test area temperature is Within the user-selected range. This signal can be used to control peripheral instruments, like applying a voltage to specimens only during high temperature exposure, or monitoring test operation from a remote point.

Power meter

Accumulates the amount of power the chamber uses.

Applying DC power supply

Capable of applying voltage to the specimen, used for bias testing.
· 5V
· 12V
· 15V
· 24V
· 48V



Total cycle counter

Indicates cycle counts.
· With reset function
· Display range: 1 to 99999999

Options

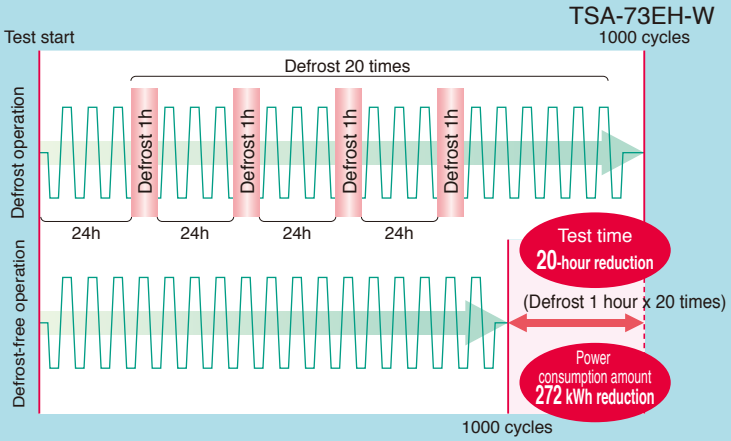
EASY OPERATION

Defrost-free operation

For two-zone tests, enables continuous tests without requiring defrosting for up to 500 hours max.
ESPEC has developed a unique structure (patent: 3514735) that prevents the penetration of outside air and uses recirculated air during testing to stop frosting on the low-temperature side.
This enables continuous tests up to 500 hours, so around 20 defrost cycles during this period can be eliminated.
This option can reduce both the test time in the amount of the defrosting time (approx. 60 minutes each time) and the power consumption required for defrosting (13.6 kWh each time).

* The TSA–43EL–A, 73EL-A, 73ES-A and 103EL–A have a 300-mm protrusion on the top.

● 1000 cycles test time comparison example



Consumed power amount to defrost once : 13.6 kWh
Consumed power amount to defrost (20 times) : 272 kWh

Test conditions (Two-zone, No test halt)
High-temp. exposure : +150°C 15 min.
Low-temp. exposure : –65°C 15 min.
Outside conditions : +23°C/60% rh
Cooling water temp. : +25°C
Specimen : No specimen

Model	TSA-43EL	TSA-73EL, ES	TSA-103EL, ES	TSA-203EL, ES	TSA-303EL	TSA-73EH
Number of cycles	Maximum 500 cycles (Maximum 500-hour)					Maximum 1000 cycles (Maximum 500-hour)
High-temp. exposure/ time	+125°C/30 min.					+150°C/ 15 min.
Low-temp. exposure/ time	–40°C/30 min.					–65°C/ 15 min.
Outside conditions	+23°C/60% rh or less					
Cooling water temp.	+25°C					
Power supply voltage	Rated voltage					
Sensor position	Upstream					Downstream
Specimen	1.5 kg (Plastic molded ICs 1.0 kg Specimen basket/shelf brackets 0.5 kg)	5.0 kg (Plastic molded ICs 3.5 kg Specimen basket/shelf brackets 1.5 kg)	6.0 kg (Plastic molded ICs 3.5 kg Specimen basket/shelf brackets 2.5 kg)	10.0 kg (Plastic molded ICs 7 kg Specimen basket/shelf brackets 3 kg)	10.5 kg (Plastic molded ICs 7 kg Specimen basket/shelf brackets 3.5 kg)	5.0 kg (Plastic molded ICs 3.5 kg Specimen basket/shelf brackets 1.5 kg)
Temp. recovery time	Within 15 min.	Within 5 min.			Within 10 min.	Within 5 min.

Ambient-temperature exposure (EL type only)

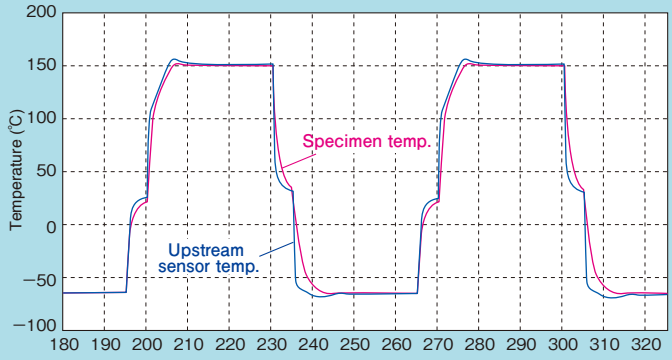
Enables three-zone tests by adding a damper mechanism and an air circulator.
· High temp. exposure range: +60 to +200°C

Options

EASY OPERATION

Product temperature control

Measurement example TSA-73ES-A



Test conditions

High temp. exposure	+150°C	30 min.	Specimen	Plastic molded ICs (3.5 kg)
Ambient temp. exposure		5 min.	Specimen baskets	2nd and 6th level from top
Low temp. exposure	−65°C	30 min.	Control points	28-pin QFP (quad flat package) with sensor installed at center of 6th level

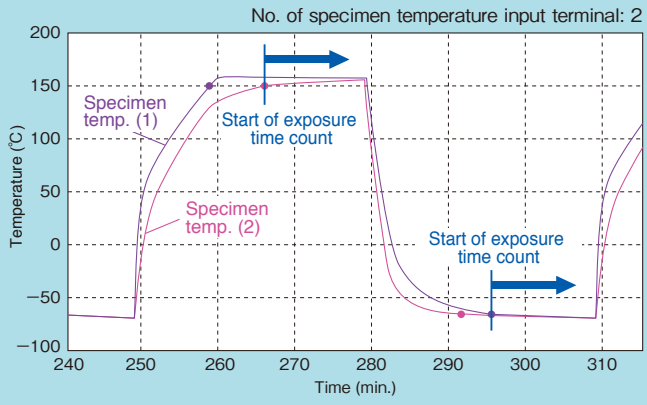
A sensor is attached to the product to control the chamber based on the product temperature. The product temperature reaches and maintains the temperature setting as fast and accurately as possible.
(Cannot be combined with Eco operation mode.)

- Number of measuring points: 1
- Location: Chamber front, left-side panel
- Accessory: Thermocouple type T (copper, copper-nickel) x1*

* 2 when simultaneously equipped with a recorder

Product temperature monitor with trigger function

Measurement example



Two sensors are attached to the specimen and the temperature of the specimen displayed on the instrumentation is monitored. The option has a trigger function that switches to the exposure test after the specimen temperatures reach the temperature setting, so even more precise tests can be run. It can also record the temperatures of the specimen and the test area when connected to a temperature recorder.

- Number of measuring points: 2
- Location: Chamber front, left-side panel
- Accessory: Thermocouple type T (copper, copper-nickel) x2*

* 4 when simultaneously equipped with a recorder

Options

SAFETY

Additional overheat protector

Additional preventive measure can be taken for excessive temperature rise in the chamber, in addition to the standard equipped overheat protector.

External alarm terminal

If the safety device of the chamber is activated, the external alarm terminal will notify it to a remote point.

Status indicator light

Select light color, lighting, and blinking or buzzer sound.
Pole length: 285mm
The length can be reduced by 10mm (up to 55mm) if so requested.
Height from the ceiling of the chamber when the pole length is 285mm.
· Level 1, 438 mm
· Level 2, 478 mm
· Level 3, 518 mm
· Level 4, 558 mm
Height from the ceiling of the chamber when the pole length is 80mm.
· 5 colors, 393 mm

*In case of 5 colors, the light color, lighting, blinking and buzzer sound patterns are fixed.

Emergency stop pushbutton

Stops the chamber immediately.

With guard

With cover

Anchoring fixtures

Used to bolt the chamber to the floor.

Chamber dew tray

Prevents water leaks from the chamber onto the floor.
*The use of casters is recommended to facilitate operation.

*To prevent damage in the event of water leakage, other preventive measures are also available.

DOCUMENTS

Operation manual

· CD
· Booklet

Reports & certificates

· Testing and inspection report
· Test data
· Temperature uniformity measurement
· Calibration report
· Calibration certificate
· Traceability system chart
· Traceability certificate

Safety precautions

- 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 substances in the chamber.
  If corrosive substances are generated by the specimen, the life of the chamber may be significantly shortened specifically because of the corrosion of stainless steel
  and copper and because of the deterioration of resin
  and silicon.
- Do not place life forms or substances that exceed allowable heat generation.
- Be sure to read the operation manual before operation.

600L and larger capacities

Type	TSA-603EL-W	TSA-1100H-W	TSA-3300H-W	TSA-12000H-W	TSA-202D-W
Test area capacity	603L	1100L	3300L	11625L	200L
System	Two-zone or three-zone test by means of damper switching				
High temp. exposure range*2	+65 to +150°C	+65 to +180°C	+65 to +180°C	+65 to +130°C	For Dewcycle test −10 to +100°C
Low temp. exposure range	−50 to 0°C	−60 to −10°C	−60 to −10°C	−60 to 0°C	For Dewcycle test −40 to +10°C
Temp. recovery	Recovery time: Within 10min. <Conditions> High-temp. exposure: +65°C/40min. Low-temp. exposure: −35°C/30min. Sensor position: Upstream	Recovery time: Within 10min. <Conditions> High-temp. exposure: +150°C/60min. Low-temp. exposure: −50°C/60min. Sensor position: Upstream	Recovery time: Within 10min. <Conditions> 2 zone High-temp. exposure: +85°C/60min. Low-temp. exposure: −40°C/60min. Sensor position: Upstream	Recovery time: Within 15min. <Conditions> High-temp. exposure: +85°C/480min. Low-temp. exposure: −40°C/480min. Sensor position: Upstream	Recovery time: Within 5min. <Conditions> High-temp. with humid. exposure: +25°C 95%rh/60min. Low-temp. with humid. exposure: −35°C/60min. Sensor position: Upstream
Inside dimensions (W×H×D mm)	1200×670×750	1000×11010×1000	2000×1100×1500	3100×1500×2500	650×460×670

TSA-603EL-W

TSA-1100H-W

TSA-202D-W

TSA-3300H-W

TSA-12000H-W

Various Thermal Shock Chambers

In addition to the lineup of thermal shock chambers below, our products can be tailored to your application.

Air to Air Thermal Shock Chamber TSD

The two-zone thermal shock chambers have been developed to meet major International standards for thermal shock testing.

System	Two-zone transition by vertical transfer of specimens
Exposure	+205°C/–77°C
Capacity / Inside dimension (mm)	100L / W710 x H345 x D410

* Also compatible with 200-liter and larger capacities.

TSD-101-W

Air to Air Thermal Shock Chamber TSE

Meets standard tests for a temperature recovery time for 2-zone (+150°C, –65°C) up-stream air of 5 minutes or less. This air-cooled thermal shock chamber has a compact design but the same performance of large equipment.

System	Two-zone transition by vertical transfer of specimens
Exposure	+200°C/–65°C
Capacity / Specimen basket dimension (mm)	10.9L / W320 x H148 x D230

* 300°C spec. is also available.

TSE-12-A

Liquid to Liquid Thermal Shock Chamber TSB

The "liquid to liquid" thermal shock testing draw more and more attention for its ability to impose higher stress on specimens than the classic "air to air" thermal shock tests, but also for delivering quicker test results.

System	Two-liquid bath system with specimen basket transfer
Exposure	+200°C/–65°C
Capacity / Specimen basket dimension (mm)	約2.1L / W150 x H150 x D200

* Also compatible with 4.5-, 10-, 15- 30-liter and larger capacities.

TSB-21

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Tel : 66-3-810-9353 Fax : 66-3-810-9356

JSA QMS JIS Q 9001 JSAQ 004

MS JAB CM001

MS JAB CM021

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

ESPEC CORP.
(Overseas subsidiaries not included)

TS12B30C05 (The contents of this catalog is as of November, 2018.)