High temperature rate of change with uniformity and reproducibility

Covering various applications from JEDEC and IEC test standards to screening, the Rapid-Rate Thermal Cycle Chamber is ideally suited for specimen test requiring quick changes of temperature. It is equipped with advanced technologies such as the specimen temperature control, that allows linear specimen temperature rates of change during rapid thermal cycling, or accurate temperature ramp control. ESPEC once again dedicates its great experience in environmental test business to fully satisfy its customers.
*The emergency stop switch, paperless recorder and casters are optional.
Uniform and reproducible temperature rate of change

Through simulation of wind volume and wind speed, the TCC-150W achieves minimum specimen temperature variations, enabling more accurate quick temperature change testing. For specimen temperature, the ramp rate is 15°C/min. For air temperature, the ramp rate is 23°C/min. (temperature heat up average)

Meets International standards

Designed to comply with major environmental test standards like IEC, JEDEC, SAE… (p.7)
**Performance**

**Temperature ramp control function**

To maintain a constant temperature rate of change for specimens testing, the TCC-150W uses a sensor (positioned by the user) for specimen temperature measurement, and a high-speed controller that enables accurate control. High-speed measurement and control processing are now possible. The TCC-150W also uses dedicated technologies for specimen temperature ramp control, such as:

- Technology to increase refrigeration capacity at low temperatures;
- Conditioning technology to minimize differences between specimen temperature and air temperature in the chamber;
- Technology to ensure airflow speed uniformity so that specimen temperature variations can be minimized.

**Specimen temperature control and air temperature control**

The TCC-150W chamber offers two temperature control modes:

- A specimen temperature control mode allowing a specimen temp. ramp rate to 15°C/min. conforms to JEDEC standard requirements;
- An air temperature control mode to be used for temperature cycling tests. This chamber supports a wide range of applications and covers various standard tests and screening.
Boast of large test area capacity
The test area large capacity allows to test up to 60 B-5 size (vertical position) printed circuit boards at once.

Easy wiring access
The chamber features free access to the test area. Cable ports are provided on both right and left sides to allow easy wiring of specimens for measurement or voltage application.

Door hinge with auto-closing prevention
The door is equipped with hinges preventing auto-closing. When the door is open or closed, the chamber temporarily stops at 60 and 120 degrees to ensure greater safety.

Comprehensive safety system
Various safety devices and functions ensure secured use of the equipment: for example, attempting to start operation without locking the door properly will result in the triggering of an alarm buzzer.

Material labeling for easy recycling
Plastic molded components are labeled and easily detachable to make recycling easier during future disposal of the equipment.

Paperless recorder (option)
A built-in paperless recorder is available to record temperatures from various sources, such as test area temperature. Recording is possible on Compact Flash Card or via USB port.
Control operation

**Color LCD interactive touch-screen system**
Operation and settings simplified by the use of a touch-screen LCD display (instructions displayed on-screen). At-a-glance confirmation of test patterns, test area temperatures, temperature cycles, upstream / downstream control, and trend graphs display.

**Three operation modes**
The TCC-150W features three operation modes: Program Operation, Constant Operation, and Cycle Operation, allowing easy operation of various test patterns.

**Door-mounted instrumentation**
Instrumentation including the touch-screen controller is incorporated into the door. It reduces the overall footprint and frees up both sides of the chamber for easy access.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Interactive key input by touch panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>TFT Color LCD (6.5 inch)</td>
</tr>
<tr>
<td>Temperature control function</td>
<td>Air temperature, Specimen temperature PID control</td>
</tr>
<tr>
<td>Setting resolution</td>
<td>Temperature: 1°C</td>
</tr>
<tr>
<td>Input</td>
<td>Thermocouple type T (Copper/ Copper-Nickel)</td>
</tr>
<tr>
<td>Operation mode</td>
<td>Program operation Constant operation Cycle operation</td>
</tr>
<tr>
<td>Setting and indication ranges</td>
<td>Constant operation Temperature: −75 to +185°C Program operation Temperature: −75 to +185°C Time: 0 to 999 hours 59 min. Cycle operation High temperature soak: +60 to +180°C Low temperature soak: −70 to 0°C Soak time: 1 min. to 99 hours 59 min. Ramp rate: 5°C/min. to 15°C/min.</td>
</tr>
<tr>
<td>Test patterns</td>
<td>Program operation User’s pattern: 10 programs Fixed pattern: 10 programs Cycle operation User’s pattern: 10 programs</td>
</tr>
<tr>
<td>Accessory functions</td>
<td>Timer preset High/Low temp. limit alarm Chamber/ specimen temp. control Soak control Quick soak Power failure/ recovery operation selection Program memory Programmed time display Test suspension Test completion mode selection Trend graph Alarm history display Sensor offset RS-485 communication</td>
</tr>
</tbody>
</table>

**Program setting**

**Test settings**

**Alarm**

**Error description**

**Service guide**
## TEST STANDARD (TCC-150W COMPATIBILITY)

<table>
<thead>
<tr>
<th>Test standard</th>
<th>Temperature setting</th>
<th>Temperature change rate</th>
<th>Soak time</th>
<th>Number of cycles</th>
</tr>
</thead>
</table>
| **IEC 60749-25**  
(JESD22-A104-D) | **G**  
+125 (+15, −0)  
−40 (+0, −10) | Specimen temperature, 15°C / min. or less | 1, 5, 10, 15 min. | Not specified |
| **IEC 60068-2-14 Nb**  
(JIS C 60068-2-14 Nb) | **I**  
+115 (+15, −0)  
−40 (+0, −10) | Specimen temperature, 15°C / min. or less | 1, 5, 10, 15 min. | Not specified |
| **IEC-61747-5**  
(EIAJ ED-2531A) | **J**  
+100 (+15, −0)  
0 (+0, −10) | Specimen temperature, 15°C / min. or less | 1, 5, 10, 15 min. | Not specified |
| **JESD22-A105-B** | **A**  
+85 (+10, −0)  
−40 (+0, −10) | Specimen temperature, 15°C / min. or less | 1, 5, 10, 15 min. | Not specified |
| **IPC-TM-650 2.6.6** | **C**  
+125 (+3, −0)  
−65 (+0, −5) | Specimen temperature, 20°C / min. or less | 10 min. | 200 500 1000 3000 6000 |
| **SAE-J1211** | **D**  
+85 ~ +150  
−40 | Specimen temperature, 20°C / min. or less | Specimen temperature, 10 min. | 200 500 1000 3000 6000 |

### Temperature Change Rate
- **IEC 60749-25**  
(JESD22-A104-D): +175 ±2  
+155 ±2  
+125 ±2  
+100 ±2  
+85 ±2  
+70 ±2  
+55 ±2  
+40 ±2  
+30 ±2  
-65 ±3  
-55 ±3  
-40 ±3  
-25 ±3  
-5 ±3  
+5 ±3  
-55 ±3  
-40 ±3  
-25 ±3  
-15 ±3  
-10 ±3  
-5 ±3  
+5 ±3  
1 ±0.2°C / min.  
3 ±0.6°C / min.  
5 ±1.0°C / min.  
(AVG)  
Average for up to five minutes  
3 hours, 2 hours, 1 hour, 30 min., 10 min.  
3 hours if not specified in product specifications  
2
- **JESD22-A105-B**: +85 (+10, −0)  
−40 (+0, −10)  
6.25°C / min.  
10 min.  
1000
- **IPC-TM-650 2.6.6**: +125 (+3, −0)  
−65 (+0, −5)  
Specimen temperature, 20°C / min. or less  
Specimen temperature, 10 min.  
200 500 1000 3000 6000
- **SAE-J1211**: +85 ~ +150  
−40  
4 to 6°C / min.  
Low temperature, 4 hours  
—
Temperature range: -45 to +155 ℃ (setting: -70 to +180 ℃)
-155 to -45 ℃ (setting: +180 to -70 ℃)
Specimen load: None
Temperature control: Chamber temperature
Ramp control: Off
Performance: Max. 9 min. (32 ℃ or more/min.)
Max. 11 min. (18 ℃ or more/min.)

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Unit</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>81.4</td>
<td>(3.2)</td>
<td></td>
</tr>
<tr>
<td>106</td>
<td>(8.6)</td>
<td></td>
</tr>
<tr>
<td>960</td>
<td>(37.8)</td>
<td></td>
</tr>
<tr>
<td>550</td>
<td>(21.6)</td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>(3.0)</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>(19.6)</td>
<td></td>
</tr>
<tr>
<td>165</td>
<td>(6.2)</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>(31.5)</td>
<td></td>
</tr>
<tr>
<td>166</td>
<td>(6.5)</td>
<td></td>
</tr>
<tr>
<td>1915</td>
<td>(75.3)</td>
<td></td>
</tr>
<tr>
<td>220</td>
<td>(8.6)</td>
<td></td>
</tr>
<tr>
<td>905</td>
<td>(39.3)</td>
<td></td>
</tr>
<tr>
<td>1808</td>
<td>(71.8)</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>(39.3)</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>(39.3)</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>(31.5)</td>
<td></td>
</tr>
<tr>
<td>905</td>
<td>(35.6)</td>
<td></td>
</tr>
</tbody>
</table>

Unit: mm (inch)
## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>TCC-150W</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System</strong></td>
<td>Balanced Temperature Control system (BTC system)</td>
</tr>
<tr>
<td><strong>Temperature range</strong></td>
<td>−70 to +180°C (−94 to +356°F)</td>
</tr>
<tr>
<td><strong>Temperature fluctuation</strong></td>
<td>±0.5°C, −70 to +180°C (−94 to +356°F), after temperature stabilization</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature change</strong></td>
<td></td>
</tr>
<tr>
<td>Specimen</td>
<td>None</td>
</tr>
<tr>
<td>Control target</td>
<td>Chamber temp.</td>
</tr>
<tr>
<td>Ramp control</td>
<td>Off</td>
</tr>
<tr>
<td>Performance</td>
<td>23°C/min.</td>
</tr>
<tr>
<td><strong>Exterior material</strong></td>
<td>Cold-rolled rust-proofed steel plate</td>
</tr>
<tr>
<td><strong>Interior material</strong></td>
<td>18-8 Cr-Ni Stainless steel plate</td>
</tr>
<tr>
<td><strong>Insulation</strong></td>
<td>Chamber body: Foamed polyurethane, glass wool Door: Glass wool, formed resin</td>
</tr>
<tr>
<td><strong>Door</strong></td>
<td>Single door (hinge on left, handle on right)</td>
</tr>
<tr>
<td><strong>Heater</strong></td>
<td>Nichrome strip wire heater</td>
</tr>
<tr>
<td><strong>Refrigeration unit</strong></td>
<td>Mechanical cascade refrigeration system (water-cooled condenser)</td>
</tr>
<tr>
<td>Compressor</td>
<td>Scroll-type</td>
</tr>
<tr>
<td>Expansion system</td>
<td>Electronic expansion valve</td>
</tr>
<tr>
<td>Refrigerant</td>
<td>R404A, R23</td>
</tr>
<tr>
<td><strong>Cooler</strong></td>
<td>Plate fin cooler</td>
</tr>
<tr>
<td><strong>Air circulator</strong></td>
<td>Sirocco fan</td>
</tr>
<tr>
<td><strong>Fittings</strong></td>
<td>Cable port φ 25 × 100mm (×2), right &amp; left side, specimen power supply control terminal, specimen temperature input terminal, time signal terminal, cooling tower interlock terminal, integrating hour-meter, RS-485 connector</td>
</tr>
<tr>
<td>Chamber total load resistance</td>
<td>50 kg</td>
</tr>
<tr>
<td>Inside dimensions</td>
<td>W800 × H500 × D400 mm (W31.50 × H19.69 × D15.75 inch)</td>
</tr>
<tr>
<td>Outside dimensions</td>
<td>W1000 × H1808 × D1915 mm (W39.37 × H71.18 × D75.39 inch)</td>
</tr>
<tr>
<td>Capacity</td>
<td>160 L</td>
</tr>
<tr>
<td>Weight</td>
<td>950 kg</td>
</tr>
</tbody>
</table>

*1 The performance values are based on IEC60068-3-5:2001/JTM K07:2007, under the conditions of a + 23°C ambient temperature, cooling water temperature +25°C, rated voltage, and no specimen.
*2 Refer to Fig on page 10.
*3 Specimen: (glass epoxy PCB) 5kg + Jig: 4kg (ESPEC standard jig)
*4 Excluding protrusions.
DANGER

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.

CAUTION

Do not place corrosive materials in the chamber. If corrosive substances or liquid is used, the life of the unit may be significantly shortened specifically because of the corrosion of stainless steel, resin and silicone materials.

Do not place life forms or substances that exceed allowable heat generation.

Be sure to read the operation manual before operation.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>TCC-150W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowable ambient conditions</td>
<td>+5 to +35°C (+41 to +95°F)</td>
</tr>
<tr>
<td>Power supply</td>
<td></td>
</tr>
<tr>
<td>200V AC 3φ 50/60Hz</td>
<td>115A</td>
</tr>
<tr>
<td>208V AC 3φ 60Hz</td>
<td>115A</td>
</tr>
<tr>
<td>220V AC 3φ 60Hz</td>
<td>111A</td>
</tr>
<tr>
<td>380V AC 3φ 50Hz</td>
<td>61A</td>
</tr>
<tr>
<td>400V AC 3φ 50Hz</td>
<td>60A</td>
</tr>
<tr>
<td>Cooling water supply pressure</td>
<td>0.2 to 0.5 Mpa (2 to 5 kg/cm²G)</td>
</tr>
<tr>
<td>Cooling water supply rate</td>
<td>4100L/h (at reference water temp. +25°C), 7850L/h (at reference water temp. +32°C)</td>
</tr>
<tr>
<td>Piping connection size</td>
<td>Carbon steel pipe, ID 32 mm (drain and supply)</td>
</tr>
<tr>
<td>Operating cooling water temp. range</td>
<td>+5 to +32°C (+41 to +89.6°F)</td>
</tr>
<tr>
<td>Noise level</td>
<td>Max. 65 dB</td>
</tr>
</tbody>
</table>

*5 In compliance with the requirements of the National Electric Code (NFPA 70) for the United States of America (NEC spec.)
*6 Rate depends on the cleanliness of the heat exchanger
*7 A pressure regulator valve is required if the pressure exceeds 0.5MPa (5kg/cm²G)
*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 (JIS-Z-8731:1999 A-weighted sound pressure level).

TEMPERATURE CHANGE GRAPH

Temperature range: −45 to +155°C (setting: −70, +180°C)
+155 to −45°C (setting: +180, −70°C)

Specimen load: None
Temperature control: Chamber temperature
Ramp control: Off
Performance: Max. 9 min. (32°C or more/min.)
Max. 11 min. (18°C or more/min.)

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 materials in the chamber. If corrosive substances or liquid is used, the life of the unit may be significantly shortened specifically because of the corrosion of stainless steel, resin and silicone materials.
• Do not place life forms or substances that exceed allowable heat generation.
• Be sure to read the operation manual before operation.
SAFETY DEVICES

- Leakage breaker (200, 220, 380V AC)
- Circuit breaker (208, 400V AC)
- Electrical compartment door switch
- Chamber door switch
- Thermal fuse
- High & low temperature limit alarm (Built into temperature controller)
- Overheat protector
- Circuit breaker
- Refrigerator thermal relay
- Refrigerator high/low pressure switch
- Temperature switch for compressor
- Cooling water pressure switch
- Thermal relay for air circulator
- Circuit breaker for heater
- Motor reverse-prevention relay
- Specimen power supply control terminal
- Cooling tower interlock terminal

ACCESSORIES

- Flat cable port rubber plug (Silicone sponge rubber) ................................. 2
- Specimen basket (18-8 Cr-Ni stainless steel: 5 mesh per inch) ..................... 2
  W700×H40×D346 mm/ load capacity 5kg
- Shelf brackets (7 positions available, pitch 60mm) .................................. 2 sets
- Cartridge fuse
  200V AC
  - Class A, 250V 3A ................................................................................. 2
  - Class A, 250V 6A ................................................................................. 1
  208V AC
  - Class A, 250V 7A ................................................................................. 2
  - Class A, 250V 6A ................................................................................. 1
  220V AC, 380V AC, 400V AC
  - Class A, 250V 4A ................................................................................. 1
  - Class A, 250V 5A ................................................................................. 1
  - Class A, 250V 6A ................................................................................. 1
- Specimen temperature measuring thermocouple ........................................ 1
- Specimen temperature input connector ..................................................... 1
- 3-pole socket (208V AC spec. only) .......................................................... 3
- Strainer R1\(^{1/4}\) in. (32mm) ..................................................................... 1
- Nipple R1\(^{1/4}\) in. (32mm) ......................................................................... 1
- Strainer element R1\(^{1/4}\) in. (32mm) .......................................................... 1
- Operation manual .................................................................................. 1 set

OPTIONS

Paperless recorder

Records temperature of each section such as the temperature inside the chamber.
Display: 5.7inch color touch panel
Number of inputs (Initial setting): 2 (4 more channels can be turned ON)
Data saving cycle: 5 seconds
Temperature range: -100 to +220°C
Internal memory: 8MB
External memory media: CF memory card (256 MB)
External memory function: USB port
Language support: ENG/ JPN

Temperature recorder (digital)

-100 to +220°C / 100 mm
- RK-63: 3 pens
- RK-64: 6 dots

Recorder wiring

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

Recorder terminal
Used to output the temperature within test area and specimen temperature.

Thermocouple
Attached to specimens to measure specimen temperature.
- Thermocouple type T without ball (Copper/ Copper-Nickel)
* Same as accessory items

Temperature attainment output
When the temperature in the chamber reaches the set values, the chamber sends out a contact signal.

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

Anchoring fixtures
Used to bolt the chamber to the floor.

Casters
Installed for mobility.
Casters: 4
Levelling-feet: 4

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

Interface
- RS-232C
- GPIB
* Select one instead of standard RS-485.

Power cable
- 5 m
- 10 m
* Not applicable for optional 208V, 220V, 380V and 400V AC power supply specification.

Communication cables
- RS-485 5m/ 10m/ 30m
- RS-232C 1.5m/ 3m/ 6m
- GPIB 2m/ 4m

Additional cable port
Provided in addition to the standard cable ports. (Right & left sides)
Location: Right & left side of the main unit
Internal diameter: $\phi 25 \times 100$ mm
* This cable port cannot be retrofitted on the field.

Emergency stop pushbutton
Stops the chamber immediately.

Specimen basket / shelf bracket
Equivalent to standard accessory.
- Material: Stainless steel (5 mesh)

Overcool protector
If the temperature inside the chamber decreases excessively, the chamber stops operating to prevent the specimens from being damaged.

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

Cable port rubber plug
Prevents air leakage from the cable port.

Some photographs presented in this catalog contain Japanese display.
Rapid-Rate Thermal Cycle Chamber

TCC-150W

Specifications are subject to change without notice due to design improvements.

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ESPEC CORP. http://www.espec.co.jp/english

Head Office
3-5-6, Tenjinbashishi, Kita-ku, Osaka 530-8550, Japan
Tel: 81-6-6358-4741 Fax: 81-6-6358-5500

ESPEC NORTH AMERICA, INC.
Tel: 1-616-896-6100 Fax: 1-616-896-6150

ESPEC EUROPE GmbH
Tel: 49-89-1893-9630 Fax: 49-89-1893-96379

ESPEC ENVIRONMENTAL EQUIPMENT (SHANGHAI) CO., LTD.
Head Office
Tel: 86-21-51036677 Fax: 86-21-63372237
BEIJING Branch
Tel: 86-10-64627025 Fax: 86-10-64627036
TIANJIN Branch
Tel: 86-22-26210366 Fax: 86-22-26282186
GUANGZHOU Branch
Tel: 86-20-83317826 Fax: 86-20-83317825
SHENZHEN Branch
Tel: 86-755-83674422 Fax: 86-755-83674228
SUZHOU Branch
Tel: 86-512-66028890 Fax: 86-512-66028860

ESPEC TEST TECHNOLOGY (SHANGHAI) CO., LTD.
Tel: 86-21-68798008 Fax: 86-21-68798088

ESPEC SOUTH EAST ASIA SDN. BHD.
Tel: 60-3-8945-1377 Fax: 60-3-8945-1287

ESPEC ENGINEERING (THAILAND) CO., LTD.
Tel: 86-0-3-810-9353 Fax: 86-0-3-810-9356

JSA MS CM001 JAB CM021 ISO 14001 (JIS Q 14001)

Environmental Management System Assessed and Registered
ESPEC CORP.
(Overseas subsidiaries not included)

ISO 9001/JIS Q 9001
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(Overseas subsidiaries not included)

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