ESPEC

# ESPEC **PRODUCT DIGEST**

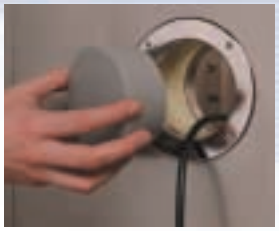
## ENVIRONMENTAL **TEST CHAMBERS**

# ESPEC Offers: >> The Widest Selection of Test Chambers

Contents



*Details set ESPEC chambers apart. One example is our thermal break designs for cable ports and doorframes. They minimize thermal creep and the potential for frost or condensation on the exterior.*



Regardless of the scale of your testing requirements, ESPEC offers the size and performance you need, from the world's smallest humidity chamber to custom drive-in systems. You can select from over 100 standard models featured in this catalog, including **18 different benchtop chambers.** For larger or more demanding applications, you can work with us on custom engineered systems such as Agree, ESS, walk-in, and even integrate other test systems like shakers.

## The world's largest manufacturer of test chambers

ESPEC NORTH AMERICA has been building test chambers in the United States for over twenty years. We are part of the ESPEC Group, which is the largest organization solely dedicated to the manufacture of environmental test systems, allowing us to concentrate on quality construction and innovative designs. The ESPEC Group includes manufacturing facilities in Japan and China, as well as sales and service support around the world. Both our U.S. and Japanese manufacturing operations are **ISO-9001 registered.**

## Designing chambers for enhanced performance and reliability

ESPEC's attention to detail shows in our equipment's eye-pleasing looks. But more than just beautiful, our equipment is made to be reliable and easy to use. Standardized subsystems and manufacturing processes assure high quality and easy maintenance, even for custom-built equipment.

*ESPEC is one of the few companies that manufactures Highly Accelerated Stress Test (HAST) chambers, which can accelerate typical humidity tests for ICs by a factor of 50.*

- To assure high quality, custom components are designed and manufactured exclusively for ESPEC; we avoid short cuts that can compromise performance and reliability.
- Our refrigeration systems are engineered with rigid attention to details that assure optimum performance and easy maintenance.
- ESPEC's easy-to-use controller systems integrate hardware and exclusive software that enhance your chamber's testing capabilities.
- Long-lasting external finishes of stainless steel or high-performance coatings protect performance and appearance for years to come.
- We include comprehensive warranties and have top-notch, factory-trained technicians.

*From benchtop chambers to walk-in systems, ESPEC offers an extremely wide range of chamber models with capabilities to meet almost any test requirement.*

# An ESPEC Exclusive: >> SCP-220 Programmer

## Brings a High-End User Interface to Everyone… Without a Premium Price

| SCP-220 PROGRAMMER/CONTROLLER | |
|---|---|
| Display | Color TFT (Active Matrix), 640x480 resolution (6.5 inch) |
| Control Method | PID (Proportional, Integral, Derivative) |
| Communications (optional) | GP-IB, RS-485 or RS-232 |
| Operating Modes (as indicated in upper left of the display) | STOP chamber off, programmer on<br>PGM: RUN running selected test profile<br>CONSTANT running at set value continually |
| Program Capacity | • 20 programs, 99 steps per program<br>• 10 pre-programmed tests stored in ROM<br>• Linking between programs possible |
| Programming Capabilities | • Copy programs, even from ROM<br>• Copy, edit, insert, and delete steps<br>• Two nested loops to repeat steps 99 times<br>• Selectable end-of-test modes<br>• Create pause steps within programs<br>• Soak control delays timer until setpoint is reached |
| Additional Functions | • Alarm report lists last 100 alarms and time occurred<br>• Time signal relay control<br>• High and low limit alarm functions<br>• Audible alarm with on-screen explanation<br>• Selectable restart modes after power failure<br>• Calendar timer for automatic start and stop<br>• Keylock protection and configuration lock out<br>• Service guide and help screens<br>• Adjustable trend graph display with up to 15 day history |

***SCP-220TS version for thermal shock models has similar, but different screens and capabilities than shown here.***

### Remarkably simple to use and understand

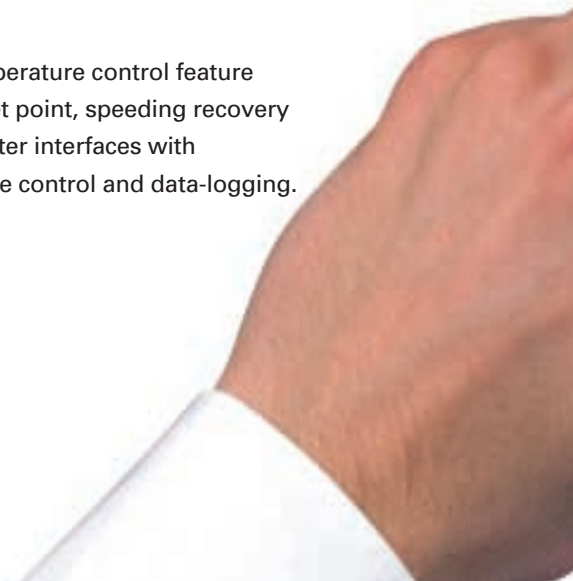
Imagine walking up to your new chamber and immediately being able to get your test running. It was revolutionary when computers became easy to use—now ESPEC does the same for environmental testing. The SCP-220 makes it a breeze to set up, run, and monitor your chamber, even for the infrequent user. You won't find a controller from any other chamber manufacturer that's as easy to use.

Our active-matrix LCD display is easy to check at a glance. The touch-screen prompts are logical and navigation is easy. When data entry is required, a numeric or alphanumeric keypad is displayed. With 150 help screens (including maintenance instructions), you may rarely need to refer to your manual. Alarm screens diagnose the type of problem and provide troubleshooting help.

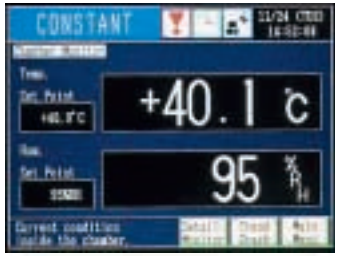
The SCP-220 comes preprogrammed with 10 standard tests, but you can add 20 more. For easy recall, you can store each program with a 16 character name. Even complex programs with pauses and loops are easy to set. The display automatically draws your test profile as you enter it, reducing the chance of programming errors.

For improved performance, an optional product temperature control feature is available that drives air beyond the temperature set point, speeding recovery of the product temperature. Also optional are computer interfaces with downloadable software or LabView drivers for remote control and data-logging.


*Look for this icon indicating products equipped with the SCP-220 programmer*



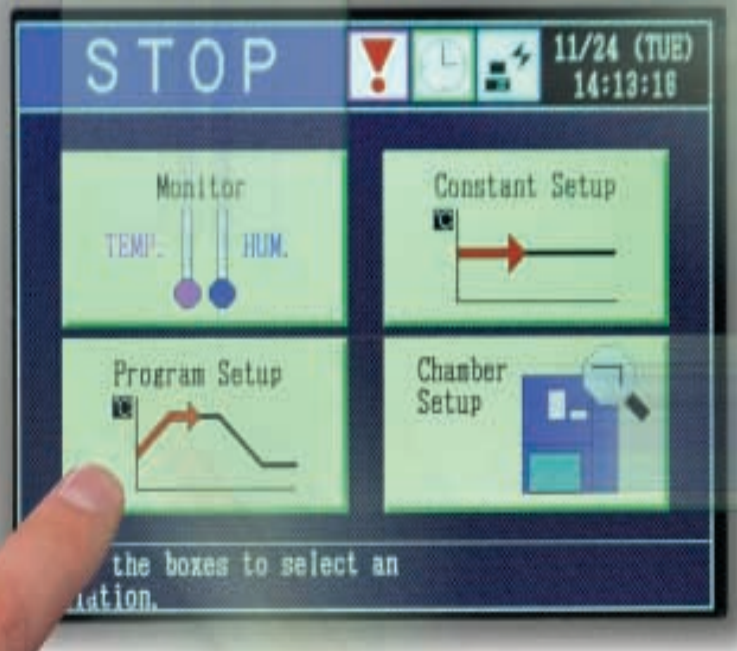
*Main monitor screen displays current temperature and humidity*





*Trend graph screen could eliminate the need for a chart recorder*


*One brief screen allows quick set-up of a constant condition test*

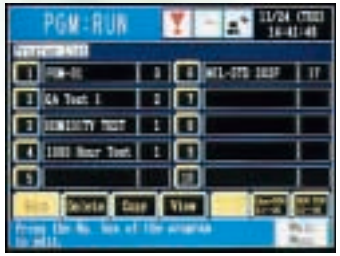




*A clear list is provided for available controller functions and settings*


*The configuration screen allows easy access to universal settings such as "recovery setup" for power failures*

*Select one of your programs, or modify a preprogrammed one*





*Pressing a step number brings up a screen to change the values for that step*

# Platinous

| Model | Interior Volume | Temperature Range* | Humidity Range* |
|---|---|---|---|
| ESU-2CA<br>ESU-3CA<br>ESU-4CA | 225 L (8 cu. ft.)<br>408 L (14 cu. ft.)<br>900 L (32 cu. ft.) | -35 to 150°C<br>(-31 to 302°F) | none |
| ESZ-2CA<br>ESZ-3CA<br>ESZ-4CA | 225 L (8 cu. ft.)<br>408 L (14 cu. ft.)<br>900 L (32 cu. ft.) | -70 to 150°C<br>(-94 to 302°F) | |
| ESL-2CA<br>ESL-3CA<br>ESL-4CA | 225 L (8 cu. ft.)<br>408 L (14 cu. ft.)<br>900 L (32 cu. ft.) | -35 to 150°C<br>(-31 to 302°F) | 10 to<br>98%RH |
| ESX-2CA<br>ESX-3CA<br>ESX-4CA | 225 L (8 cu. ft.)<br>408 L (14 cu. ft.)<br>900 L (32 cu. ft.) | -70 to 150°C<br>(-94 to 302°F) | |
| PCR-3KP<br>Clean room | 312 L (11 cu. ft.) | -20 to 100°C<br>(-4 to 212°F) | 30 to 90%RH |

* Optional extended ranges available: 180°C, 5% RH

**Interior Dimensions**

| Interior Volume | WxDxH |
|---|---|
| 225 L (8 cu. ft.) | 50x60x75 cm (19.7x23.6x29.5 in) |
| 408 L (14 cu. ft.) | 60x80x85 cm (23.6x31.5x33.5 in) |
| 900 L (32 cu. ft.) | 100x90x100 cm (39.4x35.5x39.4 in) |

• Catalog available

ESX-3CA (41"w x 56"d x 80"h exterior)

## Our most popular temperature and humidity chambers

### *Top quality and reliability*

ESPEC Platinous models are a great choice for basic temperature or temperature/humidity testing, either steady-state or cycling conditions.

These units are extremely accurate, very reliable, and have many features you will appreciate. They are the embodiment of our dedication to "quality and innovation".

- Stainless steel exterior construction for long life
- Energy-efficient electronic adjusting refrigeration control
- Custom-molded thermal breaks for thermal integrity
- Standard features: clear-view window, cable port, adjustable shelf, casters
- Special Class 100 clean-room model with HEPA filter

# Platinum

## Platinous quality with premium performance and two larger sizes

***Change rates to 15°C/m.***

Platinum chambers provide greater performance capabilities, while incorporating the features of our Platinous line. Two larger sizes, 42 and 60 cubic feet, are available for larger test loads, as well. The refrigeration systems on most of these models utilize modern, high performance scroll compressors that allow a small footprint and fast temperature changes, even with significant test loads.


ENX42-7.5CWL (5.5'w x 6'd x 8.5'h exterior)

| Temperature-Only Model | Temperature-Humidity Model | Interior volume | Temperature range* | Temperature change rate with 50 lbs. load |
|---|---|---|---|---|
| ENZ12-4CAL<br>ENZ12-4CWL | ENX12-4CAL<br>ENX12-4CWL | 370 L<br>(13 cu. ft.) | -70 to 150°C<br>(-94 to 302°F) | 4.5°C/min.<br>5°C/min. |
| ENZ12-6CWL | ENX12-6CWL | | | 10°C/min. |
| ENZ28-4CAL<br>ENZ28-4CWL | ENX28-4CAL<br>ENX28-4CWL | 800 L<br>(28 cu. ft.) | | 2.7°C/min.<br>3°C/min. |
| ENZ28-6CAL<br>ENZ28-6CWL | ENX28-6CAL<br>ENX28-6CWL | | | 4.3°C/min.<br>5°C/min. |
| ENZ28-12CWL | ENX28-12CWL | | | 10°C/min. |
| ENZ28-15CW | ENX28-15CW | | | 15°C/min. |
| ENZ42-7.5CWL | ENX42-7.5CWL | 1200 L<br>(42 cu. ft.) | | 5°C/min. |
| ENZ42-15CWL | ENX42-15CWL | | | 10°C/min. |
| ENZ42-15CW | ENX42-15CW | | | 15°C/min. |
| ENZ60-6CAL<br>ENZ60-6CWL | ENX60-6CAL<br>ENX60-6CWL | 1700 L<br>(60 cu. ft.) | | 2.2°C/min.<br>2.5°C/min. |
| ENZ60-12CWL | ENX60-12CWL | | | 5°C/min. |
| ENZ60-15CW | ENX60-15CW | | | 13°C/min. |
| ENZ60-30CW | ENX60-30CW | | | 10°C/min.<br>with 300 lbs. load |
| ENU12-4CAL<br>ENU12-4CWL | ENL12-4CAL<br>ENL12-4CWL | 370 L<br>(13 cu. ft.) | -40 to 150°C<br>(-40 to 302°F) | 4.5°C/min.<br>5°C/min. |
| ENU12-6CWL | ENL12-6CWL | | | 10°C/min. |
| ENU28-4CAL<br>ENL28-4CWL | ENL28-4CAL<br>ENL28-4CWL | 800 L<br>(28 cu. ft.) | | 2.7°C/min.<br>3°C/min. |
| ENU28-6CAL<br>ENU28-6CWL | ENL28-6CAL<br>ENL28-6CWL | | | 4.3°C/min.<br>5°C/min. |
| ENU28-12CWL | ENL28-12CWL | | | 10°C/min. |
| ENU28-15CW | ENL28-15CW | | | 15°C/min. |
| ENU42-7.5CWL | ENL42-7.5CWL | 1200 L<br>(42 cu. ft.) | | 5°C/min. |
| ENU42-15CWL | ENL42-15CWL | | | 10°C/min. |
| ENU42-15CW | ENL42-15CW | | | 15°C/min. |
| ENU60-6CAL<br>ENU60-6CWL | ENL60-6CAL<br>ENL60-6CWL | 1700 L<br>(60 cu. ft.) | | 2.2°C/min.<br>2.5°C/min. |
| ENU60-12CWL | ENL60-12CWL | | | 5°C/min. |
| ENU60-15CW | ENL60-15CW | | | 13°C/min. |
| ENU60-30CW | ENL60-30CW | | | 10°C/min.<br>with 300 lbs. load |

| Interior Volume | Interior Dimensions WxDxH | |
|---|---|---|
| 370 L (13 cu. ft.) | 60x74x85 cm | (23.6x29.25x33.5 in) |
| 800 L (28 cu. ft.) | 100x80x100 cm | (39.4x31.5x39.4 in) |
| 1200 L (42 cu. ft.) | 112x91x117 cm | (44x36x46 in) |
| 1700 L (60 cu. ft.) | 132x112x117 cm | (52x44x46 in) |

# SH Series

## Our smallest temperature and humidity chambers provide the performance of larger chambers

The SU and SH series benchtop temperature and humidity chambers are extremely compact, run on standard power, and feature an easy-to-fill water tank. They make it possible for smaller companies and laboratories to perform environmental testing without compromises.

The five SH chambers are capable of temperature and humidity testing, while the corresponding SU models perform temperature-only testing. The units come in two interior volumes and three different temperature ranges, allowing you to select the model that best suits your applications.

The SH humidity chambers feature a water tank that is removable for easy filling, so no plumbing connection is required. The units can operate for over a week with a single filling of water, and refilling can be done while a test is still in process.

SH-241 (17.5"w x 25"d x 28"h)

A programmable controller allows cycling between different conditions or continuous operation at a single setting. An RS-485 communications port is standard for remote operation and data logging, but optional RS-232C and GP-IB ports are also available, with software.

SH and SU series chambers are extremely energy efficient, reducing energy consumption up to 55% compared to older models. Operation is quiet, allowing installation in quiet labs or offices.

- One inch diameter cable port on the right and left sides
- One adjustable stainless steel shelf included
- Optional viewing window or inner glass door
- Optional cart with casters for easy access and portability

| Model | Temperature Range | Humidity Range | Interior Volume | Interior Dimensions (WxDxH) |
|---|---|---|---|---|
| SU-221 | -20 to 150°C (-4 to 302°F) | none | 22.5 L (0.79 cu. ft.) | 30x25x30 cm (11.8x9.8x11.8 in) |
| SU-241 | -40 to 150°C (-40 to 302°F) | | | |
| SU-261 | -60 to 150°C (-76 to 302°F) | | | |
| SU-641 | -40 to 150°C (-40 to 302°F) | | 64 L (2.2 cu. ft.) | 40x40x40 cm (15.7x15.7x15.7 in) |
| SU-661 | -60 to 150°C (-76 to 302°F) | | | |
| SH-221 | -20 to 150°C (-4 to 302°F) | 30 to 95% | 22.5 L (0.79 cu. ft.) | 30x25x30 cm (11.8x9.8x11.8 in) |
| SH-241 | -40 to 150°C (-40 to 302°F) | | | |
| SH-261 | -60 to 150°C (-76 to 302°F) | | | |
| SH-641 | -40 to 150°C (-40 to 302°F) | | 64 L (2.2 cu. ft.) | 40x40x40 cm (15.7x15.7x15.7 in) |
| SH-661 | -60 to 150°C (-76 to 302°F) | | | |

• Catalog available

SU model

Standard removable water tank for humidity models

# Lab Series

| Model | Interior Volume | Interior Dimensions WxDxH | Temperature Range | Humidity Range |
|---|---|---|---|---|
| LU-113 | 105 L (3.7 cu. ft.) | 50 x 39 x 60 cm (19.7x15.4x23.6 in) | -20 to 85°C (-4 to 185°F) | none |
| LH-113 | | | 45 to 85°C (110 to 185°F) | 45 to 95%RH |
| LHL-113 | | | 5 to 85°C (41 to 185°F) | 40 to 95%RH |
| LHU-113 | | | -20 to 85°C (-4 to 185°F) | |

• Catalog available

## A terrific choice for small temperature and humidity applications

***Ergonomics are much like a small refrigerator***

The ESPEC Lab Series is a compact, reliable test chamber suitable for a wide variety of applications. Pharmaceutical, automotive, materials, and electronic industries have all found these models to be useful for temperature/humidity testing.

This model series runs directly off of 115V power, meaning no special power hook-ups. Humidity models feature a built-in water tank to eliminate the need for plumbing, as well.

To ensure a controlled environment, these models are available with an inner glass door, allowing door openings without disrupting the conditions. A one inch diameter cable port in the left side allows wires and cables to be run to your samples.

The controller is programmable with up to nine steps to allow controlled ramps of temperature and humidity. Repetition of the program can be done up to 999 times. The controller can also be easily set at a single setting for constant operation.

LHU-113 (26"w x 32"d x 43"h exterior)

# Criterion

ECT-3 (37"w x 21"d x 25"h exterior)

| Model | Interior Volume | Interior Dimensions WxDxH | Temperature Range |
|---|---|---|---|
| ECT-3 | 34 L (1.2 cu. ft.) | 40x28x30 cm (16x11x12 in) | -68 to 180°C (-90 to 356°F) |

## A wide range and small size for flexibility

***-68 to 180°C standard range***

The ESPEC Criterion benchtop chamber provides a simple and economical solution for a variety of temperature testing requirements. The 1.2 cu. ft. interior size is popular for component level tests. The system runs directly off of 115V power, meaning no special power hook-ups.

A four inch diameter cable port in the left side allows wires and cables to be run to your samples, if needed. A viewing window and light are available as options.

The programmer allows up to 256 cycling steps to be entered, including controlled ramps with guaranteed soak. A computer interface is included for remote operation.

A temperature deviation display with alarm is just one part of a three-tier overheat protection system—a thermal fuse and a user-set independent temperature limit are also included.

# Walk-in


| Model | Temperature Range | Humidity Range |
|---|---|---|
| EWP (modular construction) | -35 to 85°C (-31 to 185°F) or -65 to 85°C (-85 to 185°F) | None or 20 to 95%RH or 10 to 95%RH |
| EWS (solid construction) | -35 to 177°C (-31 to 350°F) or -65 to 177°C (-85 to 350°F) | |

**Standard size chart for EWP models**

| | Width | | | |
|---|---|---|---|---|
| **Depth** | **2.1m (7')** | **2.7m (9')** | **3.3m (11')** | **4m (13')** |
| **1.5m (5')** | 286 | 364 | 442 | 520 |
| **1.8m (6')** | 339 | 432 | 525 | 618 |
| **2.1m (7')** | 393 | 501 | 608 | 716 |
| **2.4m (8')** | 447 | 569 | 691 | 813 |
| **2.7m (9')** | 501 | 637 | 774 | 911 |
| **3m (10')** | 554 | 706 | 858 | 1009 |
| **3.3m (11')** | 608 | 774 | 941 | 1107 |
| **3.7m (12')** | 662 | 843 | 1024 | 1205 |
| **4m (13')** | 716 | 911 | 1107 | 1303 |
| **4.3m (14')** | 769 | 980 | 1190 | 1401 |
| **4.6m (15')** | 823 | 1048 | 1273 | 1498 |
| **4.9m (16')** | 877 | 1117 | 1356 | 1596 |

Volume in cubic feet*

*Dimensions listed are ±7cm (±3")
Interior volume calculated using standard 2.4m (7'10") interior height
This chart is just a representative sample of sizes possible

• Catalog available

## Comprehensive standard features and flexible design

***Built to your specifications***

Walk-in chambers have a wide range of applications including environmental testing, stress screening, meteorological simulation, aging, and burn-in, making them indispensable in almost every field of research or development where large quantities or large samples must be tested.

Modular panel construction (EWP) is cost-effective and allows easy installation in areas with limited access. A wide range of standard sizes is available, as well as special sizes or configurations as you may require. Customized systems are available with low humidity, multiple rooms, air distribution systems, and more.

Solid construction units (EWS) can be built to your exact requirements. They are desirable for their extra-wide temperature ranges and capability to withstand fast temperature changes.

# Integrated Systems

## Testing more than temperature and humidity

For twenty years ESPEC has been providing custom-designed test chambers for companies worldwide. This experience, combined with our standardized sub-assemblies, provides quick, reasonably priced, and high quality custom equipment.

In addition to temperature and humidity control, custom chambers often need to be integrated with other equipment to provide real-world simulation, especially for automotive applications.

For example, ESPEC designed a unique insulated floor system that allows a road vibration simulator to integrate with a drive-in chamber. This floor moves to allow the simulator to adjust for vehicles with different wheelbases, from sub-compact cars to extended-cab pick-ups.

In another case, ESPEC created a drive-in chamber out of special fiberglass for corrosion testing with road salt. The system included undercarriage salt spray capability and an easy-maintenance brine tank made by ESPEC.

**Chamber Integration with:**

- Single and multi-axis vibration systems
- Road vibration simulators
- Salt or rain spray
- Dynamometers
- Emissions test stands
- Test-buck fixtures
- Light simulation (infrared, UV, sunlight)
- Video recording (for airbag testing)
- Measurement and data acquisition systems

# TSE-11 Thermal Shock

## Simple to install and operate

Get a thermal shock chamber without the hassles. Our TSE-11-A is compact and easy to operate, while still meeting industry test standards. Only 26 inches wide, the TSE-11 transfers product loads between cold and hot zones with a temperature range of -65°C to 200°C.

- **Meets strict Mil-Std 883** thermal cycling requirement for product-temperature recovery.
- Touch-screen operation is very easy, yet full-featured.
- Diagnostic alarms with on-screen help make troubleshooting quick and easy.
- The cold zone is cooled by refrigeration. No need for tanks of liquid nitrogen (or cooling water either).

| | | Performance Example | | |
|---|---|---|---|---|
| **Model** | **Temperature Range** | **Temperature Range** | **Temperature Recovery Time** | **Test Load** |
| TSE-11-A | Hot zone: 60 to 200°C (140 to 392°F)<br>Cold zone: -65 to 0°C (-85 to 32°F) | -65°C to 150°C<br>Mil-Std 883E method 1010.7 Method C | 5 minute supply air<br>*or*<br>15 minute worst case product, per 1010.7 | 4 kg (8 lb.) plastic ICs |

• Catalog available

| **Interior Volume** | **Interior Dimensions WxDxH** |
|---|---|
| 11 L (.4 cu. ft.) | 32x23x15 cm (12.5x9.1x5.8 in) |


TSE-11 (26"w x 42"d x 64"h exterior)

# ETS Thermal Shock

## Transfer from hot to cold to thermally stress samples

The ETS thermal shock chamber is a high quality design with an advanced touch-screen controller and an innovative hot/cold transfer system. It is designed to meet strict Mil-Std test specifications, which require temperature recovery to be measured inside the worst-case product sample.

The touch-screen controller is user-friendly and designed especially for thermal shock. For Mil-Std 883 testing, the controller actually speeds up test time by detecting when the product has achieved temperature and can go to the next step.

ESPEC's exclusive electric screw-drive lift automatically moves the samples between hot and cold zones. This direct drive method eliminates the problems associated with cables, pneumatic cylinders, or other complicated mechanisms.


ETS4-3CW (5.5'w x 8'd x 7'h exterior)

| | | Performance example | | | | |
|---|---|---|---|---|---|---|
| **Model** | **Range** | **Temperature Range** | **Temperature Recovery Time** | **Test Load IC Chips** | **Interior Volume** | **Interior Dimensions WxDxH** |
| ETS4-1CW | Hot zone: 60 to 200°C (140 to 392°F) Cold zone: -75 to 0°C (-103 to 32°F) | -55 to 125°C Mil-Std 883 1010.7 B | 15 min. worst-case product recovery | 13 kg (30 lb.) | 105 L (4 cu. ft.) | 50x50x40 cm (20x20x16 in) |
| ETS4-2CW | | -65 to 150°C Mil-Std 883 1010.7 C | | 9 kg (20 lb.) | | |
| ETS4-3CW | | | | 18 kg (40 lb.) | | |
| ETS13-3CW | | | | 9 kg (20 lb.) | 365 L (13 cu. ft.) | 71x83x61 cm (28x33x24 in) |
| ETS13-5CW | | | | 18 kg (40 lb.) | | |

- Liquid nitrogen cooled systems available, too
- Additional resources (including links to test standards) online at www.espec.com/shock

# Two/Three Zone Thermal Shock

## Hot/cold or hot/ambient/cold tests possible

***Small footprint and large workspace***

Traditional three zone thermal shock chambers can be quite large, as three separate chambers are used. The TSA series has just one chamber, circulating cold, hot, or ambient air, as needed.

The conditioned air can be pre-cooled or pre-heated beyond the setpoint, allowing quicker recovery of the desired condition after transfer.

- Test samples don't move.
- Horizontal airflow design assures uniform results
- Extremely compact systems with a vertical sliding door for added space savings
- The touch-screen controller is specifically designed for thermal shock testing


TSA-71S-W (4.3'w x 4.5'd x 6.3'h exterior)

| Model | Range | Performance example: Temperature Range | Performance example: Temperature Recovery Time | Performance example: Test Load IC Chips | Interior Volume |
|---|---|---|---|---|---|
| TSA-71H-W | Hot exposure: 60 to 200°C (140 to 392°F) Ambient exposure Cold exposure -75 to 0°C (-103 to 32°F) | Two zone -65 to 150°C Mil-Std 883 1010.7 C | 15 min. worst-case product recovery | 10 kg (22 lb.) | 70 L (2.5 cu. ft.) |
| TSA-71S-A | | Three zone -65 to ambient to 150°C | 5 min. upstream air | 5 kg (11 lb.) | 70 L (2.5 cu. ft.) |
| TSA-71S-W | | | | | |
| TSA-101S-W | | | | | 110 L (3.9 cu. ft.) |
| TSA-201S-W | | | 10 min. upstream air | 20 kg (44 lb.) | 200 L (7.1 cu. ft.) |
| TSA-41L-A | Hot exposure: 60 to 200°C (140 to 392°F) Ambient exposure Cold exposure: -65 to 0°C (-85 to 32°F) | Three zone -55 to ambient to 150°C | 5 min. upstream air | 2.5 kg (5.5 lb.) | 40 L (1.4 cu. ft.) |
| TSA-71L-A | | | | | 70 L (2.5 cu. ft.) |
| TSA-101L-A | | | 10 min. upstream air | 20 kg (44 lb.) | 110 L (3.9 cu. ft.) |
| TSA-301L-W | | | | 24 kg (53 lb.) | 300 L (10.6 cu. ft.) |

• Catalog available

# Agree

## Systems for fast change rates and vibration integration

***Change rates to 40°C/m.***

For years Agree chambers have been the workhorses of the environmental test chamber industry. Originally created to meet military test standards, their flexible design has made them suitable for a wide variety of applications. Fast temperature changes of 5 to 40°C/m. are possible, even with significant loads. The chambers have a removable floor, allowing integration with vibration test systems. Custom designs are common, allowing configuration to meet your exact requirements.

For shaker systems that can operate in horizontal and vertical modes, ESPEC's innovative Combo-Agree chamber solves the problem of two different operating heights. A special floor for the horizontal mode drops down to the proper height instead of more complicated lift systems that move the entire chamber up and down.

Combo-Agree with removable floor on cart

| | | Performance example† | |
|---|---|---|---|
| **Temperature Range** | **Humidity Range** | **Temperature Range** | **Temperature Change Rate** |
| -73 to 177°C (-100 to 350°F) | Optional 20 to 95%RH | -54 to 71°C | 5°C/min. |
| | | | 10°C/min. |
| | | | 15°C/min. to 40°C/min. |

† Consult with factory for the best system to meet your change rate requirements

| Model Size | Interior Volume | Interior Dimensions WxDxH |
|---|---|---|
| ET15 | 425 L (15 cu. ft.) | 76x76x76 cm (30x30x30 in) |
| ET34 | 950 L (34 cu. ft.) | 99x99x99 cm (39x39x39 in) |
| ET46 | 1300 L (46 cu. ft.) | 109x109x109 cm (43x43x43 in) |
| ET64 | 1800 L (64 cu. ft.) | 121x121x121 cm (48x48x48 in) |
| ET84 | 2300 L (84 cu. ft.) | 140x140x121 cm (55x55x48 in) |
| ET114 | 3200 L (114 cu. ft.) | 162x162x121 cm (64x64x48 in) |

ET46-2CW (6.6'w x 10.6'd x 7.8'h exterior)

# Environmental Stress Screening

ESS85 (9'w x 5'd x 8.5'h exterior plus refrigeration)

## Fast temperature changes find latent defects in electronics

***Dense loading using standardized fixtures***

Environmental Stress Screening (ESS) validates product quality by subjecting products to the stress of repeated rapid thermal changes. Typical screening profiles include thermal cycling of 5 to 20°C per minute over a 100°C span (e.g. 85 to -20°C). ESS chambers allow for dense loading of products such as PC boards and provide excellent stress on each unit.

Our ESS85 models have set the industry standard for performance, throughput, and flexibility. This cart-based system allows faster loading/unloading and inexpensive changeover to new products. The high-volume, horizontal airflow provides maximum product change rates. These models are commonly found at major electronic contract manufacturers.

ESPEC offers smaller systems for applications such as pre-qualification, troubleshooting, and small-scale ESS programs. These models accommodate the same fixturing trays from our standard ESS systems.

- Less products per pass of air, for better product uniformity
- Programmable control for product-change or air-change available
- Automatic coupling of product power speeds loading
- Liquid nitrogen cooling is available for even faster change rates
- Custom systems to meet exact needs are also possible

| Model | Interior Volume | Interior Dimensions WxDxH | Typical Loading |
|---|---|---|---|
| ESS5 | 140 L (5 cu. ft.) | 56x68x38 cm (22x27x15 in) | 10 kg (25 lb.) |
| ESS11 | 310 L (11 cu. ft.) | 56x68x76 cm (22x27x30 in) | 40 kg (90 lb.) |
| ESS22 | 620 L (22 cu. ft.) | 61x81x122 cm (24x32x48 in) | 90 kg (200 lb.) |
| ESS35 | 990 L (35 cu. ft.) | 61x132x122 cm (24x52x48 in) | 180 kg (400 lb.) |
| ESS85 | 2400 L (85 cu. ft.) | 122x127x152 cm (48x50x60 in) | 220 kg (500 lb.) |

Typical change rates of 5 to 20°C/min. depend on the cooling and heating sub-systems selected, as well as the specific product and fixturing. Contact ESPEC to discuss options for your load and desired performance.
• Catalog available

Custom model for ESS of telecom rack systems

# Specialized Products

Dust chamber

## Dust

ESPEC dust chambers provide a ready-made solution to common dust tests for automotive and electronic-cabinet requirements.

## Altitude

ESPEC can provide custom-built chambers for simultaneous testing of temperature and altitude conditions. Two common applications are:

- Testing of avionics or other aerospace equipment to simulate actual conditions it might experience.
- Simulation of high-altitude conditions found in mountainous regions.

## Environmentally Conditioned Air

Some test applications defy conventional test chamber configurations. For these situations, ESPEC provides an Environmentally Conditioned Air (ECA) unit that can provide pre-conditioned air to a customized enclosure via flexible ducting.

## Rain/Spray

Automotive applications sometimes require testing to ensure operability under rain or power-spray conditions. Our rain/spray chambers can do these tests, including control of the air or water temperatures, if required.

## Dew Cycle

By quickly transferring a test sample from a cold environment to a hot, humid condition, dew (condensation) can be formed on the sample. As the dew evaporates, potentially harmful ions are left behind that can quickly damage the sample. This chamber can also be used as a standard thermal shock test chamber.

Rain/Spray

Dew Cycle

# HAST

## Highly Accelerated Stress Test chambers reduce humidity test times

**Reduce test time by a factor of 50!**

One of the most common tests for IC chips, 85°C/85%, has become less useful in recent years due to increased packaging quality. Today, reliability tests can run thousands of hours in order to get useful results.

The Highly Accelerated Stress Test (HAST) was devised to decrease the test time needed to get useful results. This test uses high temperature (over 100°C) with high humidity and high pressure conditions. It has also become known as the Autoclave or Pressure Cooker test. By using extreme conditions, old test requirements can be accelerated by a factor of 50 or more.

Each system includes specimen power terminals that allow easy wiring to test samples despite the pressurized chamber design. Ten programs can be stored in memory, allowing full control of the test profile, especially the critical cool-down phase.

These systems are capable of two different operation modes: saturated humidity and unsaturated humidity. With our M-instrumentation option, you can control humidity via a wet-bulb sensor, eliminating the risk of condensation on samples over the entire test, in full compliance with published industry standards.

Systems with two bays allow twice as much testing with the same footprint.

| Model | Interior Volume | Nominal Interior WxDxH | Temperature, Humidity, and Pressure Range |
|---|---|---|---|
| EHS-211 | 18 L (0.64 cu. ft.) | 25x32x25 cm (10x12.5x10 in) | Temperature: 105 to 162°C (221 to 324°F) Humidity: 75 to 100%RH Pressure: 0.2 to 2.0 kg/cm²G (0.19 to 1.94 atm) |
| EHS-211D Two bays | 18 L each (0.64 cu. ft.) | 25x32x25 cm each (10x12.5x10 in) | |
| EHS-221 | 46 L (1.62 cu. ft.) | 35x43x35 cm (14x16.8x14 in) | |
| EHS-221D Two bays | 46 L each (1.62 cu. ft.) | 35x43x35 cm each (14x16.8x14 in) | |
| EHS-411 | 18 L (0.64 cu. ft.) | 25x32x25 cm (10x12.5x10 in) | Temperature: 105 to 143°C (221 to 289°F) Humidity: 75 to 100%RH Pressure: 0.2 to 4.0 kg/cm²G (0.19 to 3.87 atm) |
| EHS-411D Two bays | 18 L each (0.64 cu. ft.) | 25x32x25 cm each (10x12.5x10 in) | |
| TPC-432ZM | 130 L (4.6 cu. ft.) | 55x55 cm (22x22 in) diameter x depth | |

- See our website for articles and links on HAST testing
- Catalog available

# Liquid Thermal Shock

## Liquid immersion—the ultimate in thermal shock testing

***Robotic transfer from hot to cold***

Our liquid-to-liquid chambers are excellent for imposing extreme thermal stresses on specimens. An air-tight workspace and multiple recovery systems limit the loss of expensive test fluids, making liquid thermal shock a much more economical choice than in the past. The controller makes operating the system simple, and the robotic transfer mechanism is durable and reliable.


TSB-5 (4.5'w x 4.3'd x 5.8'h exterior)

| Model | Range | Performance Example: Temperature Range | Performance Example: Test Load IC Chips | Interior Volume | Interior Dimensions WxDxH |
|---|---|---|---|---|---|
| TSB-2 | Hot bath: 70 to 200°C (158 to 392°F) | -65 to 85°C Mil-Std 883 method 1011.9 | 0.75 kg (1.6 lb.) | 2 L (0.07 cu. ft.) | 12x12x15 cm (4.7x4.7x5.9 in) |
| TSB-5 | Cold bath: -65 to 0°C (-85 to 32°F) | | 1.5 kg (3.3 lb.) | 5 L (0.18 cu. ft.) | 15x20x15 cm (5.9x7.9x5.9 in) |
| TSB-20 | | | 7.2 kg (16 lb.) | 20 L (0.7 cu. ft.) | 27x28x29 cm (10.6x11x11.4 in) |

• Catalog available

# Industrial Ovens

| Model | Interior Volume | Temperature Range |
|---|---|---|
| PH-101 | 91 L (3.2 cu. ft.) | 45 to 200°C (110 to 392°F) Optional extended range to 300°C (572°F) |
| PH-201 | 216 L (7.6 cu. ft.) | |
| PH-301 | 512 L (18.1 cu. ft.) | |
| PH-401 | 1000 L (35.3 cu. ft.) | |
| PV-211 | 216 L (7.6 cu. ft.) | |
| PV-221 | 324 L (11.4 cu. ft.) | |
| PV-231 | 432 L (15.3 cu. ft.) | |
| PV-331 | 768 L (27.1 cu. ft.) | |
| STPH-101 | 91 L (3.2 cu. ft.) | 45 to 500°C (110 to 932°F) |
| STPH-201 | 216 L (7.6 cu. ft.) | |
| SSPH-101 | 91 L (3.2 cu. ft.) | 45 to 700°C (110 to 1292°F) |
| SSPH-201 | 216 L (7.6 cu. ft.) | |

• Catalog available

| Interior Volume | Interior Dimensions WxDxH |
|---|---|
| 91 L (3.2 cu. ft.) | 45x45x45 cm (17.7x17.7x17.7 in) |
| 216 L (7.6 cu. ft.) | 60x60x60 cm (23.6x23.6x23.6 in) |
| 512 L (18.1 cu. ft.) | 80x80x80 cm (31.5x31.5x31.5 in) |
| 1000 L (35.3 cu. ft.) | 100x100x100 cm (39.4x39.4x39.4 in) |
| 324 L (11.4 cu. ft.) | 60x60x90 cm (23.6x23.6x35.4 in) |
| 432 L (15.3 cu. ft.) | 60x60x120 cm (23.6x23.6x47.2 in) |
| 768 L (27.1 cu. ft.) | 80x80x120 cm (31.5x31.5x47.2 in) |

## A wide variety of accurate, high quality ovens

***Vertical and horizontal configurations***

ESPEC's precision industrial ovens are used for high-temperature testing, as well as heat treatment and drying during manufacturing. Over 60,000 units have been sold worldwide.

There are two types of models: the space-saving PV vertical oven and the PH horizontal oven. Both provide horizontal airflow for even exposure to all samples. Control constancy as low as ±0.1°C and uniformity as low as 0.5°C ensure accurate operation. An exhaust damper is included to ventilate the oven and allow quick cool-down.

The standard controller offers two-step programming for simple heat-up or shut-down steps. An inexpensive upgrade provides programmed operation of up to 18 steps for full cycling applications. The large display is easy to use and read. Four levels of overheat protection are included for safety.

A wide variety of options are also available.

# Special Oven Models

## These ovens meet specialized applications

The quality and performance of our standard ovens are found in these specialized ovens.

### IPH-Anaerobic oven

For anaerobic heat treatment or temperature testing, these ovens can be filled with a non-oxidizing gas, such as $CO_2$ or $N_2$. The hermetically sealed chamber prevents ingress of the external atmosphere, assuring very low oxygen levels.

### GPH-Rotating specimen rack

These models incorporate a rotating specimen rack and are especially designed for accelerated heat deterioration testing of rubbers and plastics. By removing the rack, this unit may also be operated as a normal oven. A viewing window is included standard.

### SPH-Oven with explosion vent

These models are equipped with an explosion vent and a safety door for security in case an explosion occurs. They are suitable for flammable synthetic resins and volatile solvents. Low surface-temperature heaters help prevent ignition. If an explosion occurs, a blow-out panel allows the gases to escape, and the safety door is locked to keep from bursting open.

### PVC-Class 100 clean ovens

Equipped with a hermetically sealed chamber and HEPA filter, these clean ovens maintain a class-100 clean atmosphere. They are ideal for baking, heat treatment, or drying of samples that require an extremely clean environment.

| Model | Interior Volume | Temperature Range |
|---|---|---|
| SPH-101 | 91 L (3.2 cu. ft.) | 45 to 200°C (110 to 392°F) Optional extended range to 300°C (572°F) |
| SPH-201 | 216 L (7.6 cu. ft.) | |
| SPH-301 | 512 L (18.1 cu. ft.) | |
| SPH-401 | 1000 L (35.3 cu. ft.) | |
| GPH-101 | 91 L (3.2 cu. ft.) | |
| GPH-201 | 216 L (7.6 cu. ft.) | |
| IPH-201 | 216 L (7.6 cu. ft.) | |

| Model | Interior Volume | Temperature Range |
|---|---|---|
| PVC-211 | 161 L (5.7 cu. ft.) | 85 to 200°C (185 to 392°F) Optional extended range to 350°C (662°F) |
| PVC-231 | 368 L (13 cu. ft.) | |
| PVC-331 | 648 L (22.9 cu. ft.) | |

**PVC-331**

**GPH-201**

ESPEC Certified Service Offices

ESPEC Sales Offices

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