

Quality is more than a word



Thermal Shock Chambers

Air-to-Air



ESPEC NORTH AMERICA, INC.

Two-Zone Air-to-Air Thermal Shock Chambers

Automatically moves samples between hot and cold zones with a unique direct-drive system that minimizes risk of jams



ETS Series

Rugged, industrial chambers

The ETS thermal shock series is a high-quality system proven with over 15 years of sales to major electronics, automotive, and aerospace manufacturers.

The ETS series is distinguished by its clean look, advanced touch-screen controller, and innovative hot/cold transfer system. Performance is able to meet strict Mil-Std test specifications, which require temperature recovery to be measured in the worst-case product sample.

With a temperature range of -70 to 200°C, the units are ready for the most extreme test applications. There are two size chambers available: 4 and 13 cubic feet. Typically used for testing 20-40 lbs. of integrated circuits (ICs), the transfer system can lift up to 150 lbs. if needed. One mesh basket is included, but additional baskets may be added to distribute samples for maximum exposure.

Enhanced Performance

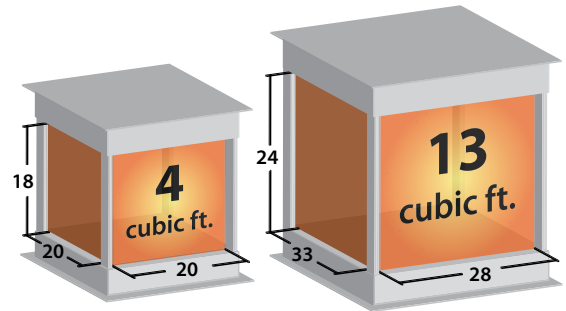
A range of heating/refrigeration systems are offered to match your test requirements. Performance is optimized by precooling the cold zone even colder than the desired condition while the carrier is in the hot zone, allowing a faster recovery when transfer back to the cold zone is initiated. An additional thermal mass is built into the cold zone to store cold energy, maximizing this precooling step.

The hot zone has a similar preheat mode while the carrier is in the cold zone. To optimize recovery performance, preheat/precool temperatures can be adjusted automatically by the controller's AI function, saving the trouble of trial and error.

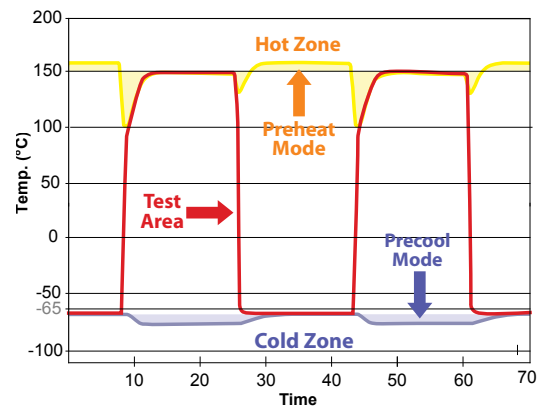
Meets Mil-Std 883

These thermal shock chambers are built to meet Mil-Std 883 method 1010.8 (version C or later), the most difficult test because it specifies the recovery of the worst case sample. Using IC chips with embedded thermocouples, ESPEC thermal shock chambers are tested at the factory for the temperature recovery of samples in multiple locations.

Beyond Mil-Std 883, these models may be used for JESD22-A104-B "Temperature Cycling", Mil-Std 202 Method 107G (version F or later), or similar tests. See page 5 for more information.



The ETS thermal shock series is available in two sizes. Different heating/cooling systems can be selected based on needed performance. See page 6 for specifications.



Hot and cold zones are preheated or pre-cooled during off-cycles to enhance thermal shock effect after transfer.



Product thermocouple can be added to monitor the samples during the test cycle.

Major Sub-systems

Mechanical/Refrigeration Cooling Method

- Non-CFC cascade refrigeration system using semi-hermetic Copeland Discus compressors
- Two ¾ hp blower motors circulate the conditioned air (one per zone)
- Cold storage mass maximizes cooling capacity.
- Standard dry air purge system extends the time between defrost cycles
- Hinged service access doors with lockable snap-action latches
- Sound levels below 70 dBa (except 30-hp models)
- Three levels of overheat protection and two levels of overcool protection
- Optional air-cooled condenser for sites where cooling water is not available.



Mylar-coated sound deadening lining is standard for the larger refrigeration systems to limit noise to the room.



Chamber safety includes an overheat/overcool to protect the chamber and test load, and an emergency stop switch.

Transfer System



Close-up of left side

For strength, the lift system uses a heavy-duty screw drive motor and is braced by an angle-iron frame.



Transfer between zones takes less than ten seconds, as required by Mil-Std methods.

An electric screw drive transfers the test area between hot and cold zones. Carrier arms extend through slots in the side wall of the hot zone, supporting the basket carrier.

This lift system provides a heavy-duty mechanism for transfer without the associated problems of cables, pneumatic cylinders, or complicated guides.

SCP Controller

Programmable instrumentation

The exclusive SCP-220TS programmer makes it a breeze to set up, run, and monitor your chamber, even for the infrequent user.

The touch-screen prompts are logical and navigation is easy. With help screens (including maintenance instructions), you rarely need to refer to the operation manual. Alarm screens diagnose the type of problem and provide troubleshooting help.

For Mil-Std 883 tests, the quick-exposure mode shortens overall test time by advancing to the next step as soon as the product has achieved the set temperature and soak time. Ten versions of Mil-Std 883 are pre-programmed, and you can add 20 more test profiles.



Additional capabilities

To accommodate a variety of test methods, performance modes allow for selection of control point to be upstream or downstream air, as well as the product itself. An energy savings setting is available, too.



Temperature limits can be set to protect test samples.



Test data is displayed as the chamber cycles.

| Test standard | | Temperature setting | | Recovery time | Soak time | Number of cycles |
|---------------------------|---|---------------------|----------------|-----------------------------|---|------------------|
| | | High temp. (°C) | Low temp. (°C) | | | |
| JESD22-A104D | A | +85 (+10, -0) | -55 (+0, -10) | Specimen 5 to 14 mins. | 1/5/10/15 mins. | Not Specified |
| | B | +125 (+15, -0) | -55 (+0, -10) | Specimen 5 to 14 mins. | | |
| | C | +150 (+15, -0) | -65 (+0, -10) | Specimen 5 to 29 mins. | | |
| MIL-202G Method 107G | A | +85 (+3, -0) | -55 (+0, -3) | Air 5 Min. | 28g and below: 15 min. 28 to 136g: 30 mins. 136g to 1.36kg: 1 hr. 1.36 to 13.6kg: 2 hrs. 13.6 to 136kg: 4 hrs. More than 136kg: 8 hrs. | 1000 |
| | B | +125 (+3, -0) | -65 (+0, -3) | | | |
| | C | +200 (+3, -0) | -65 (+0, -3) | | | |
| MIL-883H Method 1010.8 | A | +85 (+10, -0) | -55 (+0, -10) | Specimen less than 15 mins. | 10 min. or longer after transition start | At least 10 |
| | B | +125 (+15, -0) | -55 (+0, -10) | | | |
| | C | +150 (+15, -0) | -65 (+0, -10) | | | |
| | D | +200 (+15, -0) | -65 (+0, -10) | | | |
| | F | +175 (+10, -0) | -65 (+0, -10) | | | |

*Test load capacity depends on model and test setup.

Specifications

| Capabilities | ETS4-1CW | ETS4-2CW | ETS4-3CW | ETS13-3CW | ETS13-5CW |
|-------------------------|------------------------------|------------|-----------|-----------|-----------|
| Hot zone testing range | 60° to 200°C (140° to 392°F) | | | | |
| Cold zone testing range | -75° to 0°C (-103° to 32°F) | | | | |
| Temperature constancy | ±1°C (±1.8°F) after recovery | | | | |
| Refrigeration system | 5 hp x 2 | 7.5 hp x 2 | 15 hp x 2 | 15 hp x 2 | 30 hp x 2 |

| Performance (MIL-STD 883H 1010.8) | | | | | |
|-----------------------------------|-----------------------|----------------|------------|-----------|------------|
| Test Range | -55°C to 125°C | -65°C to 150°C | | | |
| Recovery time Performance | 15 min. load recovery | | | | |
| Test load | 14 kg. ICs | 9 kg. ICs | 18 kg. ICs | 9 kg. ICs | 18 kg. ICs |

| Dimensions | | |
|-----------------------|--|--|
| Capacity | 105L (4 cu. ft.) | 365L (13 cu. ft.) |
| Test Area (WxDxH) | 508mm x 508mm x 457mm (20" x 20" x 18") | 711mm x 838mm x 610mm (28" x 33" x 24") |
| Sample Basket (WxDxH) | 482mm x 482mm x 25mm (19" x 19" x 1") | 711mm x 813mm x 25mm (28" x 32" x 1") |
| Exterior (WxDxH) | 1.7m x 2.4m x 2.1m (68" x 96" x 84") | 1.9m x 2.7m x 2.4m (76" x 107" x 93") |

| Site Requirements | | | | | |
|---------------------------|---------------------------------------|-------|--------|--------|--------|
| Power Supply | 460V 3Ø 60 Hz | | | | |
| | 50A | 65A | 90A | 92A | 147A |
| Cooling Water (24°C/75°F) | 7 GPM | 9 GPM | 18 GPM | 18 GPM | 32 GPM |
| Condensate drain | Two 0.5 FPT connections to open drain | | | | |
| Compressed air | 6 SCFM, 80 to 120 psi | | | | |

Standard Accessories

- Electrical power disconnect
- One sample basket (adjustable)
- Dry air purge - extends time between defrost cycles
- Overheat / overcool protectors
- Run time meter
- Controller and operation / maintenance manuals on CD
- Silencer package (except ETS4-1CW)
- Emergency stop button
- Refrigeration gauges

Options

Cabinet Options

- Traveling cable port (2", 4")
- Additional adjustable baskets
- Heavy duty shelves



Instrumentation Options

- Computer interface IEEE-488 (GP-IB)
- Recorders



1. Yokogawa paperless recorders with optional Ethernet. (shown above)
2. Honeywell circular-chart recorders
3. Yokogawa strip-chart recorders

Operational Options

- 200/380/415/575V power supply instead of standard voltage
- Liquid nitrogen (LN₂) boost for faster cool-downs.
- Nitrogen purge- in lieu of dry air purge
- Remote air-cooled condenser in lieu of water cooling
- Spare parts kit

Other Thermal Shock Models

Visit www.espec.com to learn more about these models



TSE Small Thermal Shock

- Volume: less than 1 cu. ft. (10L)
- Meets strict Mil-Std 883 performance
- Only requires electricity
- Small, economical system



TSD Medium Thermal Shock

- Larger capacity, 4 cu. ft. (100L)
- Mil-Std 883 testing with up to 22 lbs. (10 kg)
- Requires cooling water
- 40% smaller footprint than comparable models



TSA Two/Three Zone

- Test capacity, 1 to 10 cu. ft.
- Two-zone or three-zone capability
- Thermal shock without moving test samples
- Optional 1,000 cycle testing without defrosting



TSB Liquid Thermal Shock

- Two sizes (2 & 4.5 liters)
- Only requires electricity utilities
- Extremely low fluid usage
- Cost savings payback in less than two years
- Controlled via dedicated touch-screen controller

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DANGER

Not for use with specimens which are explosive or flammable, or which contain such substances. To do so could be hazardous, as this may lead to fire or an explosion.