



**Advanced Test Equipment Rentals**  
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# **Thermal Shock Chambers**

**Automatic Transfer**



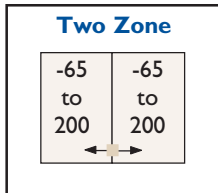
Designed primarily to meet the requirements of MIL-STD 888, method 1010 temperature cycling, and MIL-STD 202, method 107 thermal shock, these chambers test the resistance of electronic components and assemblies to sudden and severe temperature changes.

In addition to the popularly-sized 2 ft<sup>3</sup> and 8 ft<sup>3</sup> thermal shock chambers, Tenney offers the T-Shock Jr., a benchtop thermal shock chamber with ¼ ft<sup>3</sup> carriage capacity. Designed to accommodate pilot runs and the smaller production quantities of sophisticated discrete components, the T-Shock Jr is an efficient, cost-effective alternate to large capacity thermal shock chambers. Also, because the cold-zone is a full-range Tenney Jr. unit, the T-Shock Jr. doubles as a high-low temperature test chamber.



**Tenney**

# Specifications

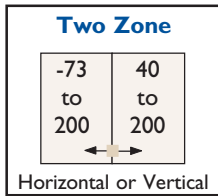


Carriage Capacity		Product Load	Refrigeration	Heat	Dimensions W x H x D		Model	WT LBS
Ft <sup>3</sup>	W x H x D	LBS	HP	KW	Horizontal Model	Vertical Model		

## TSJR MODEL (Air Cooled)

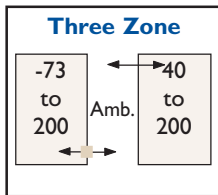
.25	10½ x 6 x 6½	3	½ + ½ + LN <sub>2</sub>	2.5/5	63 x 41 x 22	Not Avail	TSJR	700
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## TS2 MODELS - TWO ZONE: HOT/COLD (WATER COOLED)



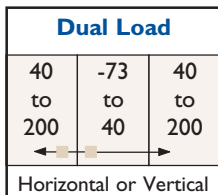
2	15 x 15 x 15	15	4 + LN <sub>2</sub>	9/2	110 x 88 x 33	89 x 72 x 58	TS2.02.04B	3700
2		11	10				TS2.02.10	4000
8	25 x 23 x 25 (V)	35	6 + LN <sub>2</sub>	21/4	127 x 88 x 72	97 x 89 x 75	TS2.08.06B	4200
8	23 x 25 x 25 (H)	35	30		Call		TS2.08.30	4700

## TS3 MODELS - THREE ZONE: COLD/AMBIENT/HOT (WATER COOLED)



2	15 x 15 x 15	16	4 + LN <sub>2</sub>	9/2	129 x 88 x 53	Not Available	TS3.02.04B	3900
2		10	11		140 x 88 x 53		TS3.02.10	4200
8	25 x 23 x 25 (V)	40	6 + LN <sub>2</sub>	21/4	156 x 88 x 72		TS3.08.06B	4400
8	23 x 25 x 25 (H)	35	30		Call		TS3.08.30	4900

## TSD MODELS - DUAL LOAD: HOT/COLD/HOT (WATER COOLED)



2	15 x 15 x 15	28	4 + LN <sub>2</sub>	18/2	129 x 88 x 53	78 x 91 x 53	TSD.02.04B	4200
2		18	10		140 x 88 x 53		TSD.02.10	4500
8	25 x 23 x 25 (V)	60	6 + LN <sub>2</sub>	42/4	156 x 88 x 72	84 x 115 x 72	TSD.08.06B	4700
8	23 x 25 x 25 (H)	56	30		Call		94 x 115 x 72	TSD.08.30

### Notes:

- Add "V" or "H" suffix to model number to designate vertical or horizontal configuration.(Ex: TS2.02.10H)
- Custom configurations, capacities, and basket and tray designs available. Please call us.
- Performance evaluation was made with a distributed product load of 16 pin dip devices. Low temperature -65°C; high temperature +150°C. Sensors embedded in load samples achieved a 15 minute recovery per MIL-STD-883C Notice 5, Method 1010.7 and air temperature recovery was 5 minutes per MIL-STD-202F, Method 107G. Performance data are based on 24°C ambient at sea level. Standard operating voltages 208, 230, or 460V; 3Ø; 60 Hz. On 50 Hz, performance may be reduced.
- TSD model capacities are for total load divided into two compartments.



▲ One of the most compact thermal shock chambers in the world, Tenney's T-Shock Jr. takes up fewer than 10-square feet of bench area but provides complete thermal shock testing while doubling as a standard test chamber.

# Standard Features

## System Configuration

Thermal shock testing is achieved by quickly and repeatedly transferring a specimen between a hot and cold station by a means of an automatic work transfer basket. The transfer method is more efficient than cooling and heating a specimen within the same compartment. Most systems are available in either a horizontal or vertical orientation.

**Thermal shock chambers are offered in three configurations:**

- Two-Zone Operation
- Three-Zone Operation
- Dual Load Operation

### Two-Zone Operation

The product is transferred, by means of a product basket transport system between hot and cold chambers

### Three-Zone Operation

In this arrangement, the cold chamber is stationary and the carriage moves in and out of the cold chamber. The hot chamber moves back and forth over the carriage, which when not covered by the hot chamber or residing in the cold chamber dwells in ambient air. The ambient-exposure can be programmed out, resulting in two-zone hot-cold operation. The chamber conditioning systems operate continuously, allowing continual production testing and maximum throughput.

### Dual Load Operation

The product is transferred horizontally between hot and cold chambers in a two-basket transfer carriage. Three chambers are used, one hot chamber at each end and a cold chamber in the center. This configuration allows uninterrupted operation of the cold zone, doubling product load handling capability for high production applications while increasing operation efficiency and decreasing operation costs.

## Construction

All models feature vapor-tight, continuously welded stainless steel interiors. Structural reinforcement is used at all critical points. Through-wall ports are continuously welded. A combination of fiberglass and polyurethane insulation surrounds the chamber to maximize insulating characteristics, thus ensuring minimal thermal transfer.

## Control System

Proprietary VersaTenn controller provides complete automatic chamber control through a user-friendly alphanumeric display. The control is bi-directional, proportional for heating and cooling. The proportional band and the reset are operator-adjustable. Logic circuits automatically select cooling and heating as required.

- 99 step programming capability with step-interval length of 99 hours.
- Ability to store up to 10 resident programs.
- Looping and nested-loop capability. Loops can be repeated up to 255 times. Infinite looping is possible.
- Time intervals are programmable in seconds, minutes, and hours.
- Time-of-day start and delayed-start functions up to two weeks.
- Guaranteed soak feature.
- Non-volatile memory for up to 5 years of power-off protection of RAM.
- Digital selection and display of actual conditions.
- Timing control cycle may be manually interrupted, and will "hold" the test until reactivated.

## Control Tolerance

$\pm 1^{\circ}\text{C}$  typical after stabilization.

## Resolution

Setpoint and chamber temperature are displayed with  $0.1^{\circ}\text{C}$  or  $0.1^{\circ}\text{F}$  resolution.

## Refrigeration System

All thermal shock chambers, with the exception of the T-Shock Jr., utilize an efficient water-cooled cascade refrigeration system designed to operate with maximum loads for continuous periods of time. The T-Shock Jr. features an air-cooled cascade system.

## Heating System

Low-mass nichrome, open wire heating elements are used to reduce thermal lag and provide rapid response to instrument demand. The heating elements are isolated from the workspace to reduce radiant influence on the test item.

## Electrical

All wiring complies with NEC. Circuit breakers are used throughout the electrical system and are located, along with other electrical components, in a readily accessible, integral control panel.

## Door

Since the unit's chamber is continuously welded, the door remains as the final sealing surface to maintain atmosphere integrity. All doors are equipped with double gaskets that trap air for the purpose of insulation. A unique, energy-efficient system circulates hot gas from the refrigeration system to provide automatic defrost for the door gaskets, thus ensuring pliable gasket conditions and extending gasket life.

## Transport System

Carriage transport is automatically controlled and positioned. The system includes a large wire mesh stainless steel product basket, which allows free circulation of conditioned air around the product load under test. The transport carriage includes rigid, insulated end plugs that seal with concentric-compression gaskets, assuring tight seals and minimal frosting.

# Tenney Environmental Quick Facts



▲ Three-zone horizontal chamber.  
Available in horizontal and vertical configurations.

## Standard Features at a Glance:

Chambers offered in three configurations: Two-Zone Operation, Three-Zone Operation, and Dual Load Operation
Most systems available in either horizontal or vertical orientation
Vapor tight interior made of 100% stainless steel
Non-settling, asbestos-free insulation
Proprietary VersaTenn control system
Control tolerance of $\pm 1^{\circ}\text{C}$
Platinum RTD temperature sensor
Low mass nichrome, open wire heating system
NEC wiring compliance
Double silicon gaskets on doors
Transport system includes large wire mesh stainless steel product basket
Water-cooled cascade refrigeration system; T-Shock Jr. uses air-cooled cascade system

In line with our policy of continual product improvement, Tenney Environmental reserves the right to incorporate and use material to conform to the latest design of our products in keeping with the specifications of this equipment. Our standard equipment uses a dewpoint coil (low surface temperature) to obtain low relative humidities. This approach can lead to time-limited performance at low relative humidities. Please discuss specific test and cycling requirements with our sales department.  
121-AP0599

## Options:

**A = All thermal shock units**

**B = All thermal shock units, excluding T-Shock Jr.**

**C = T-Shock Jr. only**

IEEE/488 interface	A
LinkTenn software for Windows that permits your computer to control up to 10 chambers	A
RS422, 423, or IEEE/485 interface assemblies	A
Viewing window, thermally insulated and heated (no manual wiper required)	B
Interior lighting	B
Automatic CO <sub>2</sub> or LN <sub>2</sub> cooling boost system. Note: standard on T-Shock Jr.	A
GN <sub>2</sub> purge system, with each chamber having an independent shut-off valve	A
Recording instruments	A
Redundant thermal protection and alarm system	A
Alternate power supply wiring	A
Chamber cart with casters	C
Chamber casters	B
Recording instruments	A
Additional stainless steel product baskets	A
Various voltage inputs	A
50 Hz operation	A
Moving cable access port	A
Auxiliary temperature sensors	A
Guaranteed specimen exposure time system	A
Air cooled refrigeration system. Note: standard on T-Shock Jr.	A
Noise reduction insulation	B
Remote refrigeration package	B

## Tenney Environmental Manufacturing:

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