Environmental Stress, Test, Simulation and Screening Solutions

THERMOTRON®

Product Directory

It Begins With You, Our Customers

Our customers make us better. At Thermotron, this simple truth is at the heart of everything we do. As industries evolve and specifications change, our customers face new challenges. Through helping customers meet those challenges, we grow. And what does that mean for you?

Faster Tests, Fewer Steps

By designing, manufacturing and maintaining total systems, we help you maximize your investment, and simplify testing while maintaining the integrity of your test results. From integrated test systems to highly customized chambers, we bring it all together. Our engineering staff is an integral part of these solutions. As the industry leader, Thermotron provides you with both the largest and the most experienced staff of engineers in the field. Their collective experience in solving problems and designing solutions for a broad range of customer applications is unsurpassed. Individual backgrounds combined with the latest technology create a synergy that constantly powers the development of new and expanding capabilities for our customers.

THERMOTRON: A Single-Source Partner

Our capabilities as a single-source systems supplier have proven beneficial to customers in many industries. Our turnkey systems approach offers advantages—both technical and financial—that you just don't get when dealing with multiple vendors.

- You speak directly to the people who design, build, and warranty your product should you have a question or problem. One call helps eliminate confusion.
- Quality issues are easier to resolve. Because we design and build your product, we know best how to correct any problem. This means shorter downtime for you.
- Compatibility between system components is ensured from the start. No costly adjustments are necessary to integrate the system. Everything is designed to fit together from the beginning.
- By closely monitoring which equipment and parts are most often requested, we are able to maintain an inventory of highly specialized components including electronics, for faster turnarounds.

Everything You Need

Since shipping our first chambers in 1962, Thermotron has evolved a line of environmental test systems that is one of the industry's most comprehensive. Again, we owe our breadth of product to companies around the world who have put us to the test—companies from a range of industries that includes:

- Electronics
- Automotive
- Telecommunications
- Computers & Related Equipment
- Environmental Compliance
- Academics & Industrial Research
- Aerospace & Avionics
- Defense
- Appliance
- Semiconductor

From our labs to your facility, generations of knowledge propel us toward new solutions. This directory showcases some of those solutions. We hope it indicates not only what's been done, but what's possible when you partner with Thermotron.

SE-Series Chambers: Making The Best Value Better

Engineered to provide accurate and reliable test results, SE-Series Chambers extend our reputation for excellent reliability and long life. Including more features as standard equipment than any other chamber in the marketplace, Thermotron SE-Series Chambers provide exceptional performance and value.

The design of our SE-Series combines aesthetics with advanced testing. Not only does it feature our most innovative technology, but the chamber's clean, high-tech appearance will add a showcase look to your testing lab. And as with most Thermotron chambers, if your test specifications exceed the capabilities of a standard SE configuration, we'll gladly customize a model to fit your specific needs.

Applications

Design Verification

SE-Series chambers can perform rapid product temperature change rates to locate design problems prior to manufacturing.

Climatic Testing

The humidity module option allows programmable humidity for product or packaging testing. Explore your product's reaction to temperature and relative humidity and the long-term effects these conditions have on its ability to function in its intended use environment.

Production Screening

Temperature and humidity cycle capabilities let you detect latent manufacturing defects prior to shipping products, improving product quality and reliability.

Versatile, high-performance SE-Series Temperature & Humidity Chambers lend a showcase appearance to any lab.

Features & Benefits

Innovative Universal Port (*optional*)

A universal port located in the sidewall interfaces with slide-up modules expanding the ability to perform thermal shock tests, HALT and HASS, product test system integration and remote conditioning applications.

8800 Programmer Controller

A 12" color touch screen display makes operation and data collection easier and more reliable than ever before. Our controller has a Windows look and feel to support familiar and robust operations. The 8800 is ethernet-compatible and web-enabled with an Internet-ready front end for virtual anytime/anywhere access. Multi-level, password-based security protects sensitive data. An external USB flash drive provides convenient transfer of massive files.

Modular Humidity System

Our patented modular humidity system can be added later to adapt to your changing test needs. Reliable built-in electronic humidity sensors reduce maintenance and increase accuracy. Incorporating a self-contained water supply eliminates the need for plumbing-in an outside water source.

Optimized Air Flow

Supplying conditioning in the center of the workspace where you need it the most, the optimized airflow system provides more consistently repeatable test results.

Range of Compressor Sizes

These chambers incorporate a wide range of application-specific compressor selections ranging from 3 to 15 HP. With a top end of 180°C, SE-Series Chambers are capable of providing very rapid product temperature change rates.

Sleek Styling

The ergonomic design features sleek front and sides wtih full visibility and non-condensing window. Left or right-hand door hinge adapts to a wide variety to lab layouts, maximizing floor space, while casters add mobility and convenience. A stainless steel door is optional at no additional charge.

Accelerated Stress Test System Shortens Development Time & Improves Reliability

Using a step-stress method, Thermotron's AST System accelerates fatigue in products to reveal design defects. In short, you test a product to fail, not to pass. Forcing failures lets you evaluate the what, where, and why of every failure and make corrective measures. You can reduce product development time and improve product quality before going to market. Under normal operating conditions, it might take years to gather this information—with Accelerated Stress Testing it takes just hours.

Accelerated Stress Testing has become an integral part of product testing in a diverse range of markets. Whatever you are testing, be it motherboards or computer peripherals, engine or air bag controllers, wireless or telecommunications electronics, AST offers a variety of testing options.

Applications

Design Validation Testing

Using extreme temperature change rates and repetitive shock vibration, you can determine your product's design and operating limits. It not only performs aggressive step-stressing, but can also apply stresses with extreme precision.

The Accelerated Stress Test System provides a comfortable workstation for monitoring and controlling test profiles.

Product Ruggedization

The AST System provides severe stresses that can quickly identify a product's weaknesses. Results provide useful information about your product that aids in determining how to change its design and increase reliability. Product monitoring sensors indicate when the product failed and under what conditions.

Multiple Test Options

Because AST employs the latest in aggressive temperature change rate and repetitive shock technology, the system is capable of running a variety of stress testing techniques: ART, AST, DV, EST, FAST, HALT, HASS, PV, SMART, STRIFE, STEP STRESSING, and many more.

AST quickly forces failures through rapid product temperature change rates and aggressive repetitive shock vibration. AST chambers are available in various sizes, including AST-8(pictured above), AST-35 and AST-70.

The AST-20R uses mechanical refrigeration instead of liquid nitrogen to achieve rapid cooling rates required for HALT and HASS testing. By using mechanical refrigeration, installation and operating costs are reduced.

Features & Benefits

Liquid Nitrogen Cooled Chamber With Extremely High-Volume Airflow

Creates very aggressive thermal stress. Related failures are quickly precipitated.

Multi-Axis Repetitive Shock Vibration System

Vibration in all 6 axes identifies vibration related failures without moving the product.

Windows™ Based AST Control System

Up to 16 vibration, and up to 8 thermocouple inputs, visually demonstrate which stresses are actually being applied and where.

System Is Ergonomically Designed

Convenient computer workstation, comfortable working height, double doors and lift-off access panels make the system easy to use and exceptionally easy to maintain.

Teflon-Coated Impactors

Longer-lasting. Reduces maintenance downtime allowing more time for testing.

Standoff Product Mounting

Maximizes vibration transmissibility, subjecting the product to more realistic levels of excitation.

Mechanical Door Interlocks

Extra level of security and operator safety during chamber use.

Electrodynamic Vibration Testing

During transport to customers, and when operating in its intended use environment, a product experiences vibration at different frequencies and force levels. With an Electrodynamic Vibration Test System from Thermotron you can recreate these harsh conditions and verify a product's ability to withstand them.

Electrodynamic Vibration Systems can be used for standalone testing or can be integrated with a chamber for combined environment testing.

In addition to transportation and life testing, electrodynamic vibration has also proven to be an effective screening method for forcing product defects into failures. Thermotron Electrodynamic Vibration Systems let you eliminate defective products before they reach customers, and also pinpoint weaknesses in the manufacturing process.

Thermotron Electrodynamic Shakers can be programmed to accurately simulate and control random, sine and shock profiles at regular intervals. They can be used for standalone vibration testing, or they can be integrated with a temperature or temperature/humidity chamber for combined environment testing. Our shakers are completely air-cooled and available in a wide range of force capacities.

A Turnkey System

Thermotron is the only company in our industry that manufacturers all of the components needed to create a combined environment test facility: the chamber, shaker, amplifier, and all of the integrated control systems and software. Just tell us what you need and we'll take full responsbility for integrating the entire test facility. We provide experienced attention to detail and customer peace of mind not available from any other source.

Applications

Aerospace and Avionics Electronics

Components mounted in or on aircraft are subjected to all sorts of vibration from jet engine noise, propeller rotation and air turbulence. Electrodynamic vibration systems can recreate these dynamic environments.

Automotive Vibration Testing

Whether playing back vibration levels measured at the test track, squeak and rattle testing, or noise and vibration harshness, our shakers are capable of providing the required vibration to accurately test automotive components and assemblies.

Package Testing

Products shipped by land, sea, or air can experience severe shock and vibration transients. Electrodynamic Vibration Systems provide a versatile means to ensure that product designs will withstand these extremes.

Military Applications

Electrodynamic Vibration is required by many military specifications and standards for design verification, life-cycle profile testing and reliability assessment.

Features & Benefits

Pneumatic Isolation

Pneumatic vibration isolation minimizes the irritating effect of vibration transmissions being felt through the facility floor.

Sliptable

Thermotron Electrodynamic Vibration Systems can be constructed with a sliptable base assembly that permits the shaker to be rotated for testing in all three axes.

Dynamic Centering

The Dynamic Centering System (DCS) uses optical sensors to protect against overtravel situations, compensate for off-center or unevenly distributed product loads, and oversee that the armature remains centered in its travel.

Multiple Armature Sizes

Shakers are available with a weight-saving 16" diameter armature or a 24" diameter armature that accommodates larger products.

The horizontal sliptable assembly allows the shaker to be rotated for three axes vibration testing.

Air-Cooled Amplifier

Space-saving, air-cooled amplifiers provide high power output. The modular design permits field upgrade and expansion when additional force is required to meet future requirements.

Amplifier Sharing

The optional amplifier switcher assembly allows two shakers to be cost-effectively operated with a single amplifier.

PC-Based Vibration Control System

The VCS-3200-PC-Based Vibration Control System uses up-to-date software to conveniently program and control random, sine, and shock profiles. Level scheduling and profile sequencing provide time-saving automation features. Programmable over and under stress limits add product and system protection. Real world vibration testing can be reproduced on your shaker in the test lab using Real Data Analysis and Playback (RDAP) control software.

Fixturing And Head Adapters

Shakers can be equipped with standard or custom fixtures, head expanders or head plates to improve test accuracy and throughput.

Transport Mobility

The effortless air-glide system or power tow transport options make the shaker easy to move.

AGREE Temperature and Vibration Test

One of Thermotron's most flexible testing solutions, the AGREE chamber was originally designed to perform specific temperature, humidity, and vibration MIL-SPEC tests. But when a chamber is designed with flexibility in mind, good things are bound to happen. Today, our AGREE chamber is used for a diverse range of reliability, qualification, and ESS testing that requires rapid temperature change rates or combined environment settings. The removable chamber floor and high performance machinery make it easy to reconfigure for different uses.

Applications

Combined Environment Reliability Testing

AGREE chambers combine thermal and humidity stresses with vibration, to create a synergistic testing environment that helps identify potential product failures.

Reliability Development Growth Test (RDG)

During the design phase, AGREE chambers can be used to create multi-condition testing environments that expose design problems.

Alternative Applications

Because of the flexibility and versatility of AGREE chambers, they are used for Reliability Qualification Tests (RQT), Production Reliability Acceptance Tests (PRAT) as well as general testing and Environmental Stress Screening (ESS).

The AGREE chamber is available in a wide variety of configurations for single or multiple product testing. To ensure performance quality, Thermotron designs and manufactures all AGREE system components—the chamber, the shaker, the controller, accompanying software, and product fixturing.

Thermotron is the only manufacturer capable of manufacturing all of the components that comprise a combined environment test facility.

Features & Benefits

Thermotron-Designed Cascade Refrigeration System

Simplifies chamber maintenance and maximizes performance.

Microprocessor-Based Dynamic System Monitor

Actively monitors the chamber's operating systems, and automatically restarts the chamber after power failures which means less downtime.

5°C/Min To 40°C/Min Thermal Change Rates

Provides a high stress environment to help identify potential product weaknesses.

8800 Programmer Controller

Provides the latest in chamber control technology which allows the user to program all the test profiles they use today, with the capability of programming what they will need tomorrow.

Full Range Humidity Capability

(20% - 95% RH) allows testing which can identify corrosion, contamination and moisture susceptibility of products.

Removable Chamber Floor Design

Allows for interface with electrodynamic, pneumatic or mechanical vibration system as well as roll-in carts.

UL Listed Power Panel

Ensures high-quality design and peace of mind.

Lighted, Heat-Tempered, Multi-Pane Window

Ergonomic location provides high visibility of products being tested.

The model SA-36 AGREE Chamber is capable of temperature change rates exceeding 30° C/min.

Environmental Stress Screening (ESS) Systems

Environmental Stress Screening is an effective way for any manufacturer to keep warranty costs down, and customer satisfaction up. The ESS process finds latent defects that will cause failures early in the product's life. These defects are forced into failures by applying temperature, vibration, humidity, shock, or electrical stresses. However, fast product temperature change rates are widely recognized to be the most effective.

ESS Chambers expose product flaws and eliminate infancy failures.

Thermotron offers a line of chambers specially designed for ESS processes. Thermotron's Environmental Stress Screening Systems provide superior screening solutions by generating fast product temperature change rates with high velocity and uniform airflow.

While the ESS process is used prominently by a wide variety of industries, the electronic and electrical hardware industries are by far the largest.

Applications

Electronic Assemblies

ESS is used widely in the electronic assembly industry. With today's complex electronic devices, the possibility exists for a single circuit board to contain thousands of latent defects. In high volume assembly operations, there are millions of opportunities for defects to enter your products in a single day. ESS helps you find product failures before they reach the customer.

Mechanical Systems

ESS is sometimes used on mechanical systems. When structural weaknesses are a concern, ESS provides fast temperature change rates that accelerate the fatigue caused by expansion and contraction. ESS can also be a valuable tool in finding problems where close tolerances are affected by expansion and contraction. Many products such as disk drives, audio players, video players, printers, etc., contain both electronic and mechanical weakness that can result in product failure.

Qualification Testing

ESS chambers can be used for design and manufacturing qualification testing. With a standard temperature range of +177°C to -73°C (+350°F to -100°F), proper product operation can be verified over the specified operating, storage, and transportation limits of the product design. Also, process weaknesses can be found quicker with faster temperature change rates.

Advanced Instrumentation Simplifies Operation

Thermotron's 8800 Programmer Controller uses a brilliant 12" color touch screen display, capturing more data on one screen. The 8800 has a Windows look and feel to support robust operations. Ethernet compatibility provides network-wide accessibility and is web-enabled with an internet-ready front end. USB memory devices support fast and convenient data storage and transfer. A resident hard drive provides additional data storage. ThermoTrak II™ software allows multiple chambers to be linked to a central computer, allowing several tests to be run simultaneously. ThermAlarm™ provides over & under temperature alarm for test system and product under test protection. System status displays refrigeration system parameters. Operating system schematics screen displays actual system temperature and pressure, simplifying trouble shooting and maintenance.

Features & Benefits

High Velocity Airflow

Thermotron's ESS chamber maximizes the amount of airflow over the greatest area of product surface, providing faster heat exchange rates on the products. This creates the maximum stress conditions needed for available equipment capacities.

Uniform Airflow

Whenever multiple products are subjected to stress screening or test environments, it is very important that each individual product be exposed to the same conditions. Thermotron's ESS chambers are designed to provide a uniform airflow throughout the workspace. Just prior to entering the workspace, the air is passed through the evaporator coil which also acts as a distributor to even out the airflow across the products.

Heavy Duty Construction

Fast temperature change rates not only stress products, but also the test chamber. Thermotron chambers are designed to withstand this repeated stress and provide you with many years of reliable operation.

Rear Access Area

Many ESS processes involve power-up and testing of the products while they are in the chamber. Thermotron ESS chambers are designed with a lockable enclosed cabinet behind the chamber workspace. Product interconnect can be routed through connectors or cable access ports in the rear wall, and then into the enclosed cabinet.

Safety Interlocks

Main power disconnect interlocks are provided on front, rear, and console doors to shut down the equipment upon unauthorized entry. In addition, Emergency Power Off (EPO) palm button switches are provided on the front and rear of the chamber system.

Attached Console

To increase operational flexibility, the instrument console can accommodate product power supplies and test equipment. By attaching the console to the chamber, you create an open area between the console and the rear access area. Using this space to route cabling between the chamber and the console provides a safer, more reliable, and aesthetically acceptable means of distributing interconnect.

HFC Refrigerants

Thermotron's refrigeration systems do not contain any ozone depleting refrigerants that are scheduled for discontinuation. No CFC or HCFC refrigerants are used.

Product Fixtures & Test Equipment

Thermotron can provide turnkey ESS systems, including chambers, product fixtures, product interconnect, product power, and product test equipment. Turnkey systems provide customers with a single point for engineering communication, system integration, and system support responsibility. Standard and custom sizes and configurations are available.

Custom Designed & Engineered Test Equipment

Although we've showcased many test systems in this directory, you might not see a system that fits your needs exactly. Perhaps your requirements exceed the size or performance characteristics shown, or it could be that your product requires a special combination of testing capabilities. If our standard equipment does not address your testing needs, we can create a custom test facility that is sure to meet them.

This 33,600 cubic foot Psychrometric Test Facility was developed for a major HVAC manufacturer of air conditioners and heat pumps. It supports 24 hour per day automatic operation, reduced set-up time, and improved accuracy and test repeatability.

Customized Solutions

Whether your product test facility requires thousands of engineering hours to create, or just a minor modification to an existing design, Thermotron has the experience and knowledge to get the job done. Our dedicated, factory-direct sales professionals, coupled with the industry's most experienced engineers, combine their efforts to create a solution for your testing challenge.

When creating and manufacturing customized solutions for customers, we draw on our core competencies in:

- ultra-low temperature refrigeration
- environmental simulation and control
- dedicated software
- application specific instrumentation

In addition, our cabinet design and fabrication experience gives Thermotron the ability to address unique and demanding test needs for almost any industry. If you need to achieve 60°C/min temperature change rates, Thermotron can meet the challenge. When your product loads are large, we can confidently design and build equipment capable of accommodating and accurately testing them. Even if it is an exotic or harsh environment, chances are good that we can design and build equipment to recreate it.

Applications

The applications and industries where our environmental test equipment is used are as varied as our custom test facility designs. From chambers to test dog food packaging or the safety and durability of children's toys, to equipment that verifies the design and reliability of space shuttle components or wireless communication devices, we've done it all.

Over the years, our custom engineered test equipment has been commissioned in the automotive and electronics industries, aerospace and defense, and by appliance and computer manufacturers. Thermotron has supplied custom test configurations to the makers of tennis shoes and in-line skates, automotive airbags and anti-lock braking systems, cordless phones, palm-top computers, pacemakers and patient monitoring equipment.

Innovation at Work: Custom Projects

Liquid Chillers

Temperature conditioning of liquid cooled electronic equipment.

Appliance Test Rooms

Environmental test of small and large appliances.

Combined Temperature, Humidity And Salt Spray Tests

Test a product's longevity in very harsh, corrosive environments.

Engine Air Conditioners

Conditioned combustion air for automotive and other engines.

Psychrometric Test Cells

The cell features a two compartment over/under configuration that simulates indoor and outdoor environments with a product load of 1 to 30 tons. This equipment is designed to perform fast transitions between test conditions and rock solid stability at test conditions. Customers are able to bring new products to the market in a shorter time-frame.

SPECIALTY CHAMBER PERFORMANCE SPECIFICATIONS

Dust Chamber	Test a product's resistance to extremely dusty surroundings found off-road or in the desert by blowing compressed air up through fine powdered dust and letting the dust settle back down and cover the product.
Tensile Test Chamber	Temperature chamber designed to accept and be used in conjunction with a tensile tester load frame.
Moisture Test Chamber	Designed to subject sealed components (like head and tail lights) to a rainy environment, and determine whether or not the part is water tight.
Automated Corrosion	Accurately simulates corrosive conditions on products or standard test panels, providing results that correlate very well with actual outdoor exposure test results.
Sun Load Enclosure	Designed to simulate the effects of blinding hot sunlight on products and materials (i.e., dashboards, steering wheels, plastics and fabrics).

Walk-in Chambers

When testing specifications demand large capacity chambers, Thermotron has the solution. Actually, dozens of solutions. Choose from over 30 standard room configurations and 15 types of conditioning equipment to create the walk-in, high-capacity test chamber that will meet your needs. And if that's not enough, we will build a custom walk-in chamber that handles your product's specific requirements.

Walk-in Chambers of the solid, welded construction variety can withstand elevated temperature and humidity ranges as well as faster temperature transitions.

Using pre-fabricated panels or one-piece welded steel construction, our Walk-in chambers are built to last. They are also versatile. Thermotron's Walk-in chambers can be used for testing or storage, or as a laboratory environment for conducting steady-state or shelf-life testing in food processing, pharmaceutical and scientific areas. Our customers use them to test multiple components, assemblies, and large finished products, from computers and copiers to automobiles and satellites.

Panel Walk-in Chambers featuring modular construction are easier to ship and move into a facility.

Applications

Temperature Cycling

Walk-in chambers can be designed to meet rapid temperature change rate test specifications which provide solutions for environmental stress and screening requirements.

Packaging/Shipping Testing

Subject your product and packaging to the environmental conditions it may encounter during shipment or while sitting in a warehouse, and evaluate the effects on its designed capabilities.

Electronic Testing

Observe the effects of extreme environments on your product's electrical design. This could include low-humidity conditions which affect static electricity, or high humidity conditions where the electronics may potentially short out.

Automotive Testing

Our Walk-in chambers allow testing of an entire automobile, or simply the electronic dashboard or an interior seat. The extreme conditions will help you determine the effects of various real life conditions in a controlled, simulated environment.

Features & Benefits

Modular Prefabricated Panelized Construction

The chamber is constructed of individualized modular panels. This makes move-in and installation easy. The design incorporates steel strapping between locks in side walls which helps increase the chamber's overall strength.

Welded Steel One-Piece Construction

Offers wider, more demanding performance ranges (temperature range, change rates, humidity ranges) than our modular, pre-fabricated panel construction.

Pre-Packaged Standard Conditioning Modules

These modules provide the flexibility to maintain a constant condition such as low temperature or humidity, or you can create a dynamic, controlled environment where products are tested through multiple cycles of temperature and/or humidity changes.

Multiple Standardized Options

Pre-designed optional accessories include remote refrigeration, ramps, air-cooled refrigeration, dry air purge, windows, doors, access ports, and air distribution systems.

Optional Low Humidity System

Allows testing below the standard 5°C minimum dewpoint.

Your Chamber Is Tested For Efficiency Prior To Shipping

Whether you choose panel or solid construction, every Walk-in chamber is assembled at our facility in Holland, Michigan. The construction of your chamber, and the design and assembly of your conditioning equipment are closely supervised. For added peace of mind, we run operation verification tests as well as compliance tests prior to shipping your chamber.

RECOMMENDED CONSTRUCTION BY APPLICATION

Type of Use	Welded Construction Walk-in	Modular Panel Walk-in	Steady State Panel Walk-in
Temperature cycling	■	■	
Temperature/humidity cycling	■	■	
Constant temperature testing	■	■	■
Constant temperature/humidity testing	■	■	■
Altitude testing	■		
High temperature testing	■		
Storage testing	■		

Thermal Shock Chambers

When your testing requirements demand rapid and extreme temperature changes, a Thermotron Thermal Shock chamber is just the answer. Inside each Thermal Shock chamber are two or three separately controlled temperature zones. As the chamber automatically shuttles your product between these zones via a pneumatically controlled transfer basket, it is subjected to extreme temperature fluctuations.

This space-saving ATSS-80 model thermal shock chamber is designed to automatically transfer products between extreme hot and cold environments.

Thermal shock is an effective method to test and screen for defects at the component level, particularly integrated circuit (IC) devices which require a high degree of stress to force latent defects into failure.

Vertical Chambers

The vertical chamber has two zones, a hot and cold, and as the single basket product carrier moves back and forth between them, your product is subjected to dramatic temperature shifts. Both zones can be controlled independently, providing the flexibility of operating as a stand-alone temperature cycling chamber.

Horizontal Chambers

The horizontal chamber has three zones that can be heated, cooled, or kept at ambient temperature. With this unit, the basket transfers your product from the ambient to either the hot or cold zone. This chamber also allows for a "dwell period" in the ambient zone where products experience less shock, and are subjected to condensation. When just two zones are used, products can be immediately shuttled between hot and cold.

Double Duty Chambers

This chamber lets you test more products in less time. The double duty unit has three zones—a cold middle unit that is positioned between two hot zones. Using its two-product carrier baskets, you can move products from hot to cold and cold to hot simultaneously.

Automated Thermal Stress System

ATSS models facilitate extremely rapid product temperature change rate performance in a space-saving, self-contained design while meeting the latest MIL-STD 883 & 202 thermal shock specs. Heating and cooling capabilities in both the hot and cold zones enhance performance and control.

Applications

Originally performed in accordance with MIL-SPEC standards on electronic chips and PC boards, rapid and extreme temperature change testing is now a part of most commercial reliability and quality control programs.

Safety Testing

A variety of industries, including automotive, electronics and telecommunications, use Thermal Shock units to see if their products operate safely after sudden and dramatic temperature change.

Reliability Testing

From IC's to cell phones and air fuel handling devices, Thermotron Thermal Shock chambers are used to forecast the life expectancy of your product by revealing its aging properties.

Product Validation Testing

In addition to their Research and Development functions, our Thermal Shock chambers can also perform ESS applications. You can test your whole product, or a cross section for final validation.

A Double Duty Thermal Shock increases throughput by making double use of the center cold zone. A two-tiered transfer basket shifts one product load from hot to cold while the other product load shifts from cold to hot.

Advanced Instrumentation For Easy Programming

All Thermal Shock chambers are controlled by the Thermotron 8825 microprocessor-based Programmer Controller. Designed specifically for use in thermal shock testing, the 8825 offers you an impressive list of features that improves your Thermal Shock testing capabilities.

- Hold mode feature lets you place a running program on hold and enter temporary values into the current interval. Once the interval is run and complete, the temporary values are discarded.
- The transfer cooling and purge times, auxiliary cooling parameters and defrost parameters can be automatically adjusted from the setup screen.
- To produce set-points the 8825 will add an offset value to the temperature value. The offset is used to compensate for the temperature change that occurs during basket transfer.
- 3 Soak Methods — Time Only, Time And Temperature, or Temperature and Time — give you the flexibility to change soak parameters to meet individual test demands.
- The 8825 has provisions for programmed automatic defrost cycles either at the end of a test or every 'nth' cycle.

Features & Benefits

Reliable Transfer Mechanism

Proven Air-Over-Oil transfer system provides smooth movement of basket without jams.

Independent Cold Zone Control

Adds versatility by providing either temperature cycling or thermal shock tests.

Guaranteed Soak Cycles

Assures product temperature recovery after transfer by locating a thermocouple on the product. Both thermocouple temperature and timing cycle must be satisfied before transfer can occur.

Door, Transfer And Fan Interlock

For operator protection, the doors are electronically interconnected to the transfer mechanism and the circulation fans. When a chamber door is opened, transfer stops and the circulation fan shuts off.

2" Traveling Port

A 2" traveling port is standard on vertical units and optional on horizontal units. This stainless steel tube lets you attach electrical cables, thermocouples and miscellaneous wiring to the product as the basket travels.

Double Doors

Allow access to either zone without affecting the other zone's temperature.

Heavy Duty Latches And Hinges

Hardware is adjustable and provides positive sealing of the hot and cold chambers.

Electrical Compartment Door Interlock

When the electrical compartment door is opened, all electrical power to the system is interrupted. This ensures operator safety.

Altitude/Vacuum Test Chambers

In nature, environmental conditions change rapidly, often dramatically. Thermotron's Altitude/Vacuum Test Chambers let you combine temperature, humidity, and altitude/vacuum variables to accurately recreate these environments. In combination, these elements give you the versatility to simulate more precise, real-life conditions, and perform a wider range of test profiles.

Applications

A diverse group of industries rely on Thermotron's Altitude/Vacuum Test Chambers to meet a variety of test applications that include:

Qualification

With a standard test range of 100,000 feet, Thermotron's Altitude/Vacuum Test Chambers are especially popular with military research and development experts for qualification testing of sub-assemblies and finished products.

Environmental Simulation

Thermotron's Altitude/Vacuum Test Chambers enable you to examine the effects of altitude, temperature, and humidity changes on products such as electronic assemblies, hard-drives, and LCD displays. The automotive industry, for example, tests pressure-sensitive components against an extreme range of simulated driving conditions, from mountain top to sea-level.

Accelerated Life Testing

When using Thermotron's Altitude/Vacuum Test Chambers to perform Accelerated Life Tests, a single component, such as a composite material for a supersonic aircraft, can undergo hours of tests that are equivalent to years of field operation. In fact, most every component used in aerospace/avionics can be tested in this manner.

Advanced Instrumentation For Easy Programming

When it comes to programming an altitude chamber, the 8800 Programmer Controller simplifies the process. There are no bulky, hard-to-follow user manuals. Our software offers easy-to-follow prompts throughout the programming process. In short, the test profiles may be complex, but programming them will be easy.

Simply program the chamber to create a desired condition for test profiles of any duration and hit "run" to begin testing. The computer's three-channel control automatically manages all variables: temperature, humidity, and altitude/vacuum. This eliminates the need for manual adjustments and assures a more accurate repetition of tests.

Creating Multi-Condition Environments

Altitude/Vacuum Test Chambers are usually designed for reach-in access, but as an industry leader, we have developed walk-in chambers for even greater testing capacities.

Altitude/Vacuum Chambers incorporate special reinforcing to attain test levels up to 100,000 feet (8.3 mm of Mercury).

Features & Benefits

Ease of operation

Simple programming automates chamber operation and control.

Safety

Interlocked heaters prevent burn-out conditions in vacuum. Small viewing window is protected by an external guard, and has an extra thick inner pane. Manual dive-valve protects both system and user from potential malfunctions.

HFC Refrigerants

Provide time-tested, high performance and comply with environmental regulations.

High Quality Construction

Enhances reliability and durability. Interior pressure member keeps moisture out of the insulation space.

High Volume Circulation Fan

Assures that temperature, altitude, and humidity conditions are uniform and accurate.

Conditioned Air & Equipment Cooling Sources

While Thermotron is probably best known for its test chambers, the same caliber of expertise helped shape and build our highly versatile forced-air cooling units.

Equipment Cooling Air (ECA) Units

Equipment Cooling Air units are used to simulate conditions a product may encounter in actual service. Using insulated ducts, Thermotron's ECA Units force air, precisely conditioned to a specific temperature and flow rate, through your product.

ECA Units provide forced-air cooling to high density electronic equipment, particularly airborne electronics. Even though compressed air designs have become the industry standard, your individual test requirements may vary. When they do, Thermotron can provide traditional blower style ECA's that are engineered for open or closed-loop cooling procedures.

The versatile Portable Conditioner supplies conditioned air to a product or enclosure through insulated ducts.

Applications

Aerospace Electronics Testing

Control air flow, temperature and volume with precision, and accurately recreate the environmental conditions a product will encounter during use.

Combined Environment Test Facilities

Thermotron's ECA unit can supply prescribed cooling air to a product that is undergoing a functional verification test inside an AGREE Chamber.

Portable Conditioners

When product size makes chamber testing impossible at your facility, our P-CH or PR-CH units keep your operation running smoothly by providing conditioned air to remote locations through insulated duct work.

To increase operational flexibility, Portable Conditioners will supply conditioned air to a remote test enclosure, which can alter or condition the air around a product within a test enclosure.

The P-CH-200 and P-CH-810 portable temperature conditioners are self-contained units used to provide conditioned air to a remote test enclosure through connecting ducts. Both of these models are LN_2 or CO_2 cooled. Thermotron's PR-CH-5-5-AC portable temperature conditioner has capabilities similar to those of the P-CH models. However, it incorporates a cascade refrigeration system for cooling in lieu of customer supplied LN_2.

Applications

Remote Conditioner

Allows for remote, insulated enclosure conditioning, regardless of whether the enclosure is customer supplied or built by Thermotron.

Automotive Testing

Provide precisely conditioned air to vehicle components such carburetors, air conditioning, and heating systems.

All-Around Flexible Test Equipment

Handy for research and development labs that test many new and different products with atypical configurations and sizes.

Test An Entire Automobile

Ducts can be attached through the windows of a vehicle, cycling the whole interior to required temperature extremes.

Thermotron's Product Test Solutions: Satisfying Demanding Testing Situations

Thermotron provides an impressive line of test instrumentation systems to run and monitor your products. Every system integrates easily with a test chamber and provides effortless user interface, accurate data acquisition, and easy report generation. Our experienced staff will develop a custom or off-the-shelf solution that fits your test needs. Our customer base, including Ford, IBM, GM, Motorola, Chrysler, Sun Micro Systems, Intel, Frigidaire and others is testament to our strength in providing total solutions for complex product test requirements.

Applications

Thermotron's Product Test Solutions Group can provide solutions for testing requirements in a variety of applications, including:

Semiconductor Testing

- Accelerated Stress Testing
- System Integration
- VXI Instrumentation

Automotive Testing

- Design Validation
- Product Validation
- Continuous Conformance

Appliance Validation

- Data Acquisition
- Report Generation
- Design Verification
- Stress Screening

Computer And Peripheral Applications

- Functional Testing
- Monitoring
- Life Testing
- Stress Screening

Telecommunication Applications

- Specialized Test Systems
- Life Testing
- Stress Screening

PC Board Screening Applications

- Design Validation
- Product Validation
- Stress Screening
- Repair Station Testing

Three Approaches To Test Requirement Solutions

Our product testing solutions are designed around your application. The Product Test Solutions Group utilizes three general approaches to providing appropriate solutions: System Integration, Total Custom System, and the Product Test System.

System Integration

Typically, this approach involves the acquisition and integration of equipment, materials and other products from a variety of sources. Your requirements are studied and analyzed and available industry sources are researched. A project is then defined, and a team is assigned to design, build, verify and test your system. Complete documentation and training is provided and in-house testing is performed before delivery.

Total Custom System

Sometimes you will find that no commercially available hardware or software exists for a particular testing requirement. In these situations, we may recommend a Total Custom approach. Special test requirements or techniques may also dictate this approach. Surprisingly, this can often be a cost effective approach, since a better fit between requirements and solutions can be provided.

This Product Test Solution performs complete functional testing on Ground Fault Interrupters.

Product Test System (PTS)

The need to detect potential field failures in-house has become vital to profitable electronic product manufacturing. You can start building-in reliability with the PTS, a modular unit that can automatically stimulate and monitor multiple products for failure detection. The most advanced system of its kind, the PTS is a wise choice for functional product testing.

Product Test System Features & Benefits

The Product Test System (PTS) is an economical way to develop an accountable reliability network. Its simple, straightforward operation includes user-friendly software that minimizes implementation time and enhances flexibility. This results in a reduced learning curve and assures greater control of all system variables.

Modular Design For Simplified System Adaptability

Modular board interface system integrates controls and instrumentation with a host computer. Each function module is an intelligent, interactive, easily accessible system peripheral. Complex measurements are reduced to simple, automatic tasks carried out by menu-driven software and simple keystroke commands.

Run Multiple Tests On Multiple Products Automatically

The PTS provides immediate economies of scale. Test profiles for multiple products can be quickly programmed and sequenced with the stress screening profile. This permits faster product throughput and contributes to a significantly more efficient operation.

Low Cost, Real-Time Monitoring

As an integrated system, the PTS answers the need for full-functional testing with real-time monitoring, and eliminates the difficulty of establishing dedicated independent monitoring systems.

Powerful Integrated System Software To Start With

Computer control of the PTS is placed immediately at your fingertips, through user-friendly modular software packages written exclusively for product testing and screening applications. This provides a significant advantage in reducing testing and personnel time.

Flexible Design For A Variety Of Applications

The PTS can be used as a stand-alone test system or rack mounted into the console of a Thermotron test chamber to provide product operation verification during stress screening.

Custom and standard fixturing can be integrated to optimize test space and productivity. Choose from a variety of drawers, racks, roll-in carts, shelves and product carriers that simplify material handling and maximize test effectiveness.

Turnkey Operation— Just Plug It In And Go

The PTS configuration includes a base unit, system software, a choice of test modules, computer interface cabling, and an easy-to-follow operations manual.

Full Networking Capability For Enhanced Central Control

The PTS design allows for networking with other PTS units, as well as creating a test network using multiple test chambers and central, remote control. The PTS has an IEEE-488 interface that permits the use of a wide-range of input/output configurations.

Design Simplifies Gathering Of Failure Data

The system can provide a variety of reports that record precise information about the type of failure and the test conditions at the time of occurrence. This data can be saved for future reference, uploaded into a spreadsheet or printed directly form the screen, giving you an accurate product history for correcting product flaws.

Product Test Solutions Fixture Features

Proper fixturing of devices can increase throughput, provide consistency and increase product connection reliability. From drawers, racks and shelves, to a complex, fully-powered cart with actuators, Thermotron has valuable expertise in producing fixturing that withstands the rigors and stresses of environmental testing.

- designs based on experience assure proper test performance.
- innovative approaches enable unique test performance while satisfying product handling and protection demands.
- the selection of materials for fixturing construction is based on test conditions and reliability concerns.
- interchangeable fixtures, storage racks and carts can be rotated for faster product set-up and increased throughput.
- custom-designed fixturing reduces product handling, improves throughput, and contributes to test accuracy.

Instrumentation, Controls & Software

Since 1977, Thermotron has been the technology leader in computerized control of environmental testing and simulation equipment. Thermotron is a dedicated manufacturer and supplier of environmental test equipment, operating instrumentation and control software. This totally integrated approach provides the kind of turnkey support customers want. Because our instruments are specifically designed for environmental testing, they are more integrated and powerful than off-the-shelf options.

With more features than any other controller, user-friendly interface, unparalleled performance and support, the 8800 is the industry's best value. The 8800 is available as an upgrade to existing Thermotron equipment.

8800 Programmer Controller

The 8800 Programmer Controller is a notable advance in instrumentation technology. Incorporating color touch screen technology, the 8800 makes operation and data collection easier and more reliable than ever before.

Features & Benefits

Simple To Operate

A 12" color touch screen display captures more data on one screen. Quik Nav buttons provide time-saving shortcuts. Quick-step wizards make profile generation a breeze. Online help screens are standard for novice-mode operation.

Easy Access and Interface

Ethernet compatiblity provides network-wide accessibility. Computer interface and USB connectors are located on the front of the chamber for easy access. USB memory devices support fast and convenient data storage and transfer. A resident hard drive provides additional data storage.

Increased Productivity

ThermoTrak II™ software allows multiple chambers to be linked to a central computer, allowing several tests to be run simultaneously. Thermotron's product temperature control software optimizes chamber performance based upon the actual conditions the product is experiencing.

Security

An extensive multi-level, password-based security system protects senstitive data. A true paperless recorder, the 8800 generates tamper-proof data print outs. Therm-Alarm™ provides over & under temperature alarm for test system and product under test protection.

Accurate

Digital Refrigeration Control provides consistently repeatable test results. Improved gradient control for tighter uniformity means greater accuracy.

Built-In System Monitor

System status displays refrigeration system parameters. Operating system schematics screen displays actual system temperature and pressure, simplifying trouble shooting and maintenance.

The 3800 Programmer Controller is standard on S-Series Chambers.

3800 Programmer Controller

The 3800's interactive touch sensitive keypad and informative four line display with 20 characters per line, makes program entry and monitoring a breeze. The high quality, digital keypad sensors offer the next degree of reliability over conventional electromechanical switches. On-board calibration procedures are executed through the keypad.

Features & Benefits

Easy To Operate

Help instructions guide first-time users and eliminate programming and editing frustration. Operation can be program or manual, Celsius or Fahrenheit, and control and system parameters can be adjusted.

Electronic Access and Interface

A built-in Ethernet connection provides network-wide accessibility and is web-enabled for anytime/anywhere access. Network and computer I/O setup is through the keypad. Optional GPIB or RS-232/485 interface is available.

Increase Productivity

ThermoTrak II™ software increases productivity by allowing multiple chambers to be linked to a central computer, allowing several tests to be run simultaneously. The 3800 offers up to three channels of control, expandable to four.

Programmable Maintenance

Programmable service reminders and our preventive maintenance programs prevent problems before they occur.

ThermoTrak II

Use ThermoTrak software to automate and simplify your testing process. Link multiple chamber controllers to a single PC and run tests simultaneously. It is designed to be compatible with controllers made by Thermotron and runs on Windows 98/NT/2000/XP™. ThermoTrak simplifies lab management and improves performance by saving time, increasing productivity and cutting costs.

Features & Benefits

Controller View

Gives a specific view of an individual controller.

Provides detailed status reports on active chambers.

Includes easy-to-follow graphs that chart real-time test performance and a data log to track test development utilizing minute-by-minute intervals.

Controller Status

Monitors the operation of individual controllers.

Lets you know when a test is running.

Shows you how much of the test is complete.

Network Status Display

Gives an instant overview of tests in progress.

Its spreadsheet format lists controllers, the type of test profile each is running, a test's status, and its process variables and set points.

Profile Editor

Saves previous test profiles as records, eliminating re-entry time.

Data Log/Graphs

Records and displays data in spreadsheets and graphs and shows a test's real-time performance and its programmer profile.

Delayed Start

Allows you to launch tests at any time—day or night.

Zoom Detail

Magnifies portions of test profile graphs allowing for precise review and analysis of available data.

Produces Better Data

Non-stop test control, tracking and recording features reduce errors and improve accuracy, enabling you to generate the best data possible.

Performs More Work In Less Time

Easy to install and use, ThermoTrak is designed to improve the accuracy, speed and quality of your test results. Its advanced automated feature allows you to eliminate manual tasks and improve your lab's testing capabilities.

Improves Lab Management

Simplifies lab management by reducing excess efforts and boosting production.

Remote Notification

Email / page capabilities notify user of abnormal chamber shutdown.

Remote Connectivity

Monitor and control chambers from anywhere in the world.

S-Series Environmental Test Chambers

In an era of global competition, high quality and affordable products are the name of the game. Thermotron's answer to this high quality, low cost equation is the S-Series temperature and temperature/humidity environmental test chamber.

S-Series Chambers provide an economical environmental testing solution in sizes ranging from the 1.0 cubic foot benchtop to the 32 cubic foot upright.

S-Series Chambers are designed to be cost-effective, yet provide superior performance over a wide range of applications. Thermotron's engineering and test chamber expertise assures optimum temperature change rates and long-term reliability. Years of design experience guarantee that S-Series Chambers meet critical quality standards, while offering flexibility, uniformity, and control accuracy required for cost-effective testing of all types of products.

Applications

Used by industry leaders in almost every product category, Thermotron's S-Series Chambers are the units of choice for testing products against temperature and humidity extremes. S-Series Chambers are available in a variety of sizes to accommodate almost any product testing requirement and are available in temperature only and temperature/humidity models.

Bench Top Units

Ideal for testing smaller products such as computer components, automobile sensors or cellular phones. This unit is especially useful when space for testing equipment is limited.

Floor Models

Useful in larger areas and ideal for testing large products such as desktop computers, fiber optic wiring or several car batteries at once. These models have casters for easy roll-in and roll around mobility.

Features & Benefits

3800 Programmer Controller

Interactive touch-sensitive keypad and informative four line display. Built-in Ethernet connection and web-enabled for anytime/anywhere access. The 3800 is conveniently located on the door to free access space on both sides of the chamber.

Multipane Windows And Internal Light With External Switch

Illuminates work space making visual product monitoring convenient.

Two Access Ports

One port on each side of the chamber; size and location are user selectable.

Hermetically Sealed Compressors

Provide moderate temperature change rates while consuming less power.

Self-Contained Refrigeration System

Requires no cooling water and installation and facilities are simplified.

Refrigeration Gauges

Monitor suction and discharge pressure of the refrigeration system, providing vital information on system operation, helpful for trouble shooting.

Electrical Disconnect Switch

Provides for safer operation and installation.

Thermotron: The Industry Standard for Service & Support

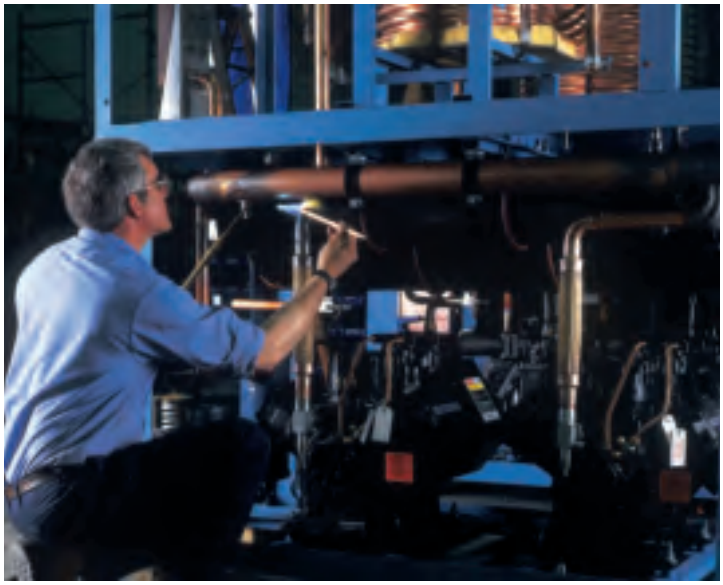
Every product we build is backed by our reputation for long life and exceptional reliability. An important part of that reputation is the extensive service and support program that keeps you up-and-running long after the initial sale.

Easy Installation

To ensure product reliability and performance, Thermotron's technicians and engineering staff support your installation, on-call or on site. Through a combination of training, technical support and installation follow-up, Thermotron gets you up-and-running wherever your facility is located.

Worldwide Support

Thermotron's worldwide service centers and technical support staff provide expert assistance throughout the life of your equipment. From preventive maintenance and customer service seminars to our late-night parts Hotline, we do what's necessary to keep your system operating smoothly. With factory-direct assistance and a complete inventory of standard parts and accessory components, most problems can be solved over the phone. We also provide overnight delivery or emergency parts when timing is critical.



Comprehensive Commitment To Training

Thermotron's sales and engineering technicians review operating procedures with your staff and provide ongoing support to assure your system maintains superior testing reliability. We also hold annual customer training sessions at our Holland, Michigan facility.

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