

Quality is more than a word

ESPEC

World's Largest HALT/HASS Provider

Advanced Accelerated Testing Solutions



 **Qualmark**
a Product Line of ESPEC North America

www.qualmark.com
www.espec.com

ESPEC NORTH AMERICA, INC.

World's Largest HALT/HASS Provider

ESPEC North America is the largest manufacturer of AST (Accelerated Stress Testing) equipment worldwide. The Qualmark brand HALT (Highly Accelerated Life Test) and HASS (Highly Accelerated Stress Screen) testing technology has been recognized as one of the fastest and most effective disciplines for design reliability testing and production screening for electronics and electromechanical devices.

Innovative System Technology

The Qualmark brand pioneered accelerated stress test technology in the early 1990s and has since consistently led the market in technology innovation. In 2009 the brand introduced the next generation vibration table – the xLF2™. The xLF2 provides the first and only “field maintainable” PSD (Power Spectral Density) table, allowing for simple maintenance procedure to restore the table to Factory PSD.

Accelerated Testing Knowledge Leader

The Qualmark brand offers a wide range of Applications support, Skills, and Knowledge (ASK) specifically designed so that best practices are applied to HALT/HASS system use for maximum returns. The ESPEC Solutions Group adds to the value derived from accelerated testing by customizing services to target customer specific program optimization. The educational value of the ESPEC Solutions Group can dramatically improve reliability program outcomes and deliver faster product profitability. It's never too early or late to “ASK” the ESPEC Solutions Group for the expert support you need.

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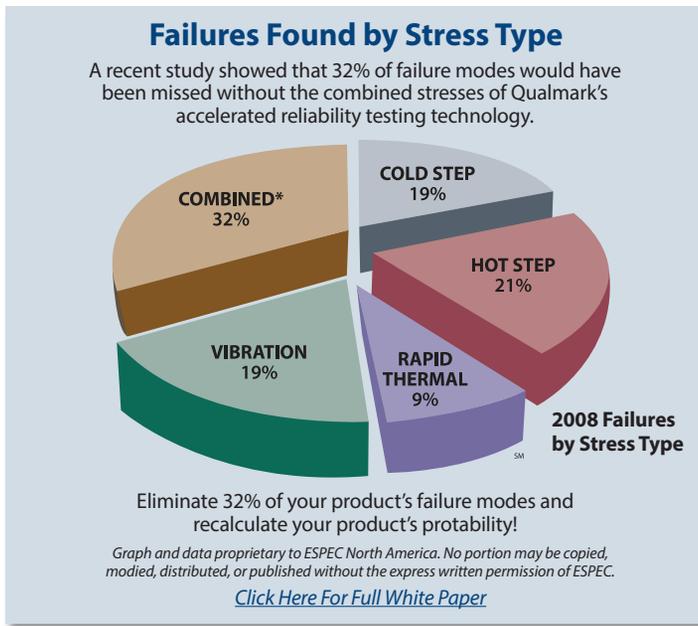
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Advanced Technology . . . Faster Testing

HALT – Highly Accelerated Life Test

HASS – Highly Accelerated Stress Screen

HALT and HASS, collectively referred to as Accelerated Stress Testing (AST), subject a product to a series of stresses, effectively forcing product weak links to emerge by accelerating fatigue. Unlike traditional single axis vibration test methods or thermal only methods, an AST program requires specialized HALT/HASS equipment to render the required stresses – random six-degree-of-freedom vibration and rapid thermal change rates – in the combined environment necessary to drive out latent failure modes.



In HALT and HASS, stresses are applied in a controlled, incremental fashion while the unit under test is continuously monitored for failures. Once the weaknesses of the product are uncovered and corrective actions taken, the limits of the product are clearly understood and the operating margins have been extended as far as possible. The result? A more mature product can be introduced much more quickly with a higher degree of reliability.

ESPEC – Accelerating Product Reliability

Because we focus on the way rapid shock technology can be utilized to support business goals, ESPEC forms strategic partnerships, provides expert services, and offers professional programs designed to deliver maximum value delivery. Starting with client needs, ESPEC envisions the entire product testing life cycle and then offers a solution to deliver maximum tangible return on investment (ROI). ESPEC's product design and process management solutions help increase productivity, stimulate growth and build competitive advantages – measurable business values for your enterprise.

Qualmark Testing Technology –

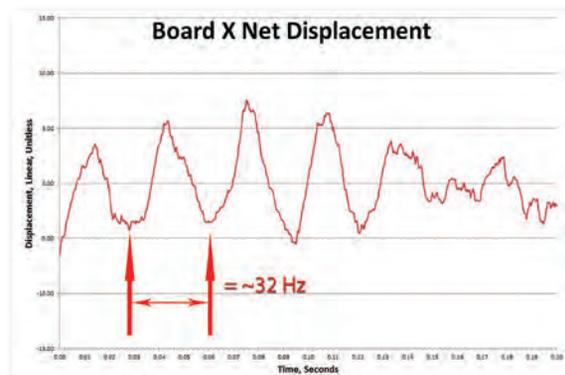
An Advanced System For Accelerated Testing

Qualmark testing technology is specifically engineered to reduce the total cost of developing and supporting product throughout its lifecycle – from prototype testing, through production, and during warranty. Since pioneering the technology, the Qualmark brand has been the market leader in delivering accelerated stress test technology for performing HALT (Highly Accelerated Life Tests) and HASS (Highly Accelerated Stress Screens) that:

- Shorten (DVT) Design Verification Time and expense
- Remove costly manufacturing defects
- Boost product reliability
- Reduce warranty costs
- Increase brand quality recognition

Qualmark Brand Provides	Customer Benefit
Faster Time to Market • Shorter DVT and expense	Increase Revenues • Beat competition to market
Reduced Product Failures • More rugged design	Reduced Costs • Fewer service & warranty claims
Improved Customer Satisfaction • Dependable product	Protect Brand Value • Extends to other offerings

Qualmark Brand accelerated stress test systems, with their powerful thermal performance and six-degree-of-freedom (6DoF) repetitive-shock vibration, drives out design flaws fast while conserving energy consumption. Our vibration system delivers low frequency energy for penetrating complex products, while retaining the high frequency energy that is so effective at exposing weak solder joints and surface mount weaknesses. The advanced engineering that goes into the Qualmark Typhoon series leads the industry in fulfilling the complex task of providing effective excitation of high and low frequency modes while simultaneously delivering rotation (roll, pitch and yaw) around three axes (X, Y and Z) vibration. The system's air flow technology delivers superior rapid temperature cycling – reaching set points faster and delivering stability during cold/hot dwells and ramps that out-perform other systems.



The Elements of a Successful Accelerated Stress Test (AST) Program

Successful implementation of an Accelerated Stress Testing (AST) system will yield a significant and continued Return on Investment (ROI) from HALT/HASS equipment and services. Goals, budgets, and ROI of the program can be realized with the right equipment, training, and support. Only ESPEC has developed the complete package of tools and resources you need – from RFQ tools to best practices training and guidelines – to help you realize your program goals with the fastest possible Return on Investment.

New Analysis Techniques for Repetitive Shock Vibration

<https://youtu.be/l4Jcf3YbaoA>

Goals, Budgets, and ROI

HALT/HASS programs involve multiple business groups, varying resource requirements, and an atypical approach to product testing methodology that can affect the ROI. ESPEC works closely with your cross functional teams to align program outcomes with business goals.

Testing and Technology

Qualmark testing technology is designed with the purpose of increasing the effectiveness of HALT and HASS.

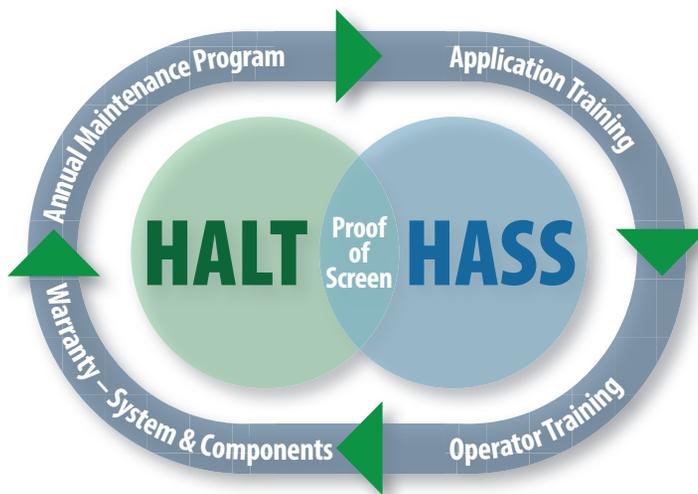
The Qualmark Typhoon series provides turbulent air flow to extract the greatest BTU change rate on a product utilizing low LN₂ and electricity. The result? A 20-40% utility cost savings compared to previous generation that will deliver years of ongoing savings.

The Qualmark Brand introduction of the xLF2 vibration table in 2009 provided another breakthrough in technology with the introduction of Power Spectral Density (PSD) management.

Knowledge Support for AST Program Success

With more than 1,500 systems deployed and over 5,000 HALT and HASS performed by ESPEC in our own labs, we understand the mission critical need to educate, train, and support HALT/HASS program management, engineers, and equipment technicians. Since HALT and HASS can represent a paradigm shift in traditional reliability testing and processes are tailored product by product, the ESPEC Solutions Group is structured to impart the knowledge necessary for customers to quickly gain a thorough understanding of HALT and HASS best practices to maximize ROI.

A HALT/HASS implementation is a success when the customer achieves a significant quality/reliability improvement and the maximum Return on Investment. Contact ESPEC to start your successful Accelerated Stress Testing program implementation to improve product reliability.



ESPEC provides the essential HALT/HASS education, training, support, and services necessary for successful accelerated stress testing programs. In the last 19 years we have performed over 5,000 HALT/HASS tests and manufactured over 1,500 systems.

Visit the ESPEC website to learn more about Accelerated Stress Testing (AST) Programs, and how they can help you complete testing in 1/5 th the time!

ESPEC Solutions Group - Applications, Skills, Knowledge (ASK)

HALT and HASS: From Theory to Practice



ESPEC offers a wide range of services specifically designed to ensure best practices are applied to HALT/HASS system use for maximum returns. The objective of the ESPEC Solutions Group is to add to the value derived from

accelerated testing by tailoring services to deliver customer-specific program optimization. The educational value of the ESPEC Solutions Group can dramatically improve reliability program outcomes that will quickly drive increases in product profitability.

Contact the ESPEC Solutions Group for help in keeping accelerated stress test programs on track.

Services include:

- HALT/HASS Training
- HASS Implementation
- Proof of Concept Projects
- Customized Training Solutions

Fixture Design

Repetitive shock fixturing design is critical and can drive the success or failure of testing protocols. A good fixture can establish a level of consistency and repeatability in production screening. In a factory environment, a good fixture enables any manufacturing team member to load, unload, and maximize throughput with ease and little to no error.

ESPEC delivers experience, knowledge of the process, and knowledge of how the vibration table interact within the technology frame work.

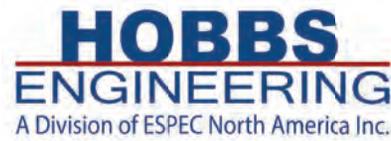
ESPEC has been at the forefront of delivering Repetitive Shock fixturing design and training worldwide for over 20 years.

Testing Services – ESPEC Labs

Services available:

- HALT (Highly Accelerated Life Test)
- Production HASS (Highly Accelerated Stress Screen)
- Production HASA (Highly Accelerated Stress Audit)
- Customer Defined Test Services

Hobbs Engineering



Hobbs Engineering Knowledge

Hobbs Engineering is an independent Knowledge and Education division of ESPEC North America. They deliver renowned How-to seminars and webinars on Accelerated Reliability to companies and individuals around the world. For more than 30 years, Hobbs has gathered a select group of specialists in the various fields of study in Accelerated Reliability, who provide training opportunities for manufacturers in industries such as, from Avionics, Computers, Consumer electronics, Telecommunications, Defense, Medical, Oil and Gas, and many more. These instructors extend education and training in the form of seminars, webinars, and consulting in the field of reliability improvement. There are new learning opportunities offered every month. You can learn about, register for, and follow all upcoming opportunities by navigating to the Hobbs calendar of events. You can also contact Hobbs for customized on-site or virtual training for your team.

<https://hobbsegr.com/events/category/events/learn@hobbsegr.com>

Overview

Qualmark Brand HALT (Highly Accelerated Life Test) and HASS (Highly Accelerated Stress Screen) chamber systems are designed and manufactured by ESPEC specifically to provide the industry with accelerated reliability testing capabilities. The technology has matured from a thermal chamber and a vibration table with independent controls to an integrated HALT/HASS system. The Qualmark Typhoon series is the most energy efficient on the market. Now in its 18th year of production, the Typhoon provides the extreme stresses necessary to rapidly find design flaws missed by traditional methods.

The Qualmark Brand has consistently been the market leader since introducing our HALT/HASS technology in the early 1990s. Today, the Qualmark testing technology continues to reflect the best design in advanced HALT/HASS engineering to deliver optimum test performance for the lowest total cost of ownership in the industry.

The QFusion System

The Qualmark Brand's 2011 introduction of the QFusion provided ground breaking technology in the reliability test equipment industry by offering, for the first time, a practical solution for integrating HASS (Highly Accelerated Stress Screening)/ HASA (Highly Accelerated Stress Auditing) into a high volume-production facility. Qfusion's 6-chamber, 6-table configuration unbridles the previously limited throughput of a typical HALT/ HASS system while delivering the superior 6 degree of freedom, random shock vibration and thermal ramps necessary to detect process induced flaws in today's sophisticated electronics.

QFusion - the Industry's FIRST HASS/HASA Dedicated System https://youtu.be/w_kgiBQRW_k

The Typhoon Series

The Qualmark Typhoon systems are dual-purpose designed for performing HALT or HASS with energy efficiencies that expedite return on investment. The Typhoon's Omni-Axial six degree of freedom, random, broadband excitation (10 Hz to above 5,000Hz) delivers a consistent power spectral density profile that eliminates picket fencing. Picket fence refers only to discrete transforms (DFT, etc.) It means the frequency information is only accurate at specific, regular intervals (sometimes called bins) and if you take the DFT of an impulse, you'll see equal components at each frequency interval and it will look like a picket fence. The thermal system features vacuum jacketed liquid nitrogen injection cooling, open element nichrome heating, and offers temperature ranges of +200°C to -100°C with ramp rates of 60°C

per minute. The Typhoon comes equipped with ESPEC's powerful custom control system designed for both lab and production environments.

The Inferno System

The Qualmark Inferno amplifies the Typhoon platform with extended capabilities specifically designed for testing the durability of instrumentation, tools and electronics that will face harsh environments. With its vibration system capable of delivering in excess of 60 gRMS and extended thermal range of +250°C to -100°C, the Inferno provides the extreme stimulation necessary to analyze design weaknesses and extend operational margins for devices destined for use in hostile conditions.

HawQ

Thousands of companies embrace Highly Accelerated Life Testing (HALT) to rapidly improve the reliability of their electronic product designs. Conducting HALT tests early in the product development process is most beneficial, as reliability can most easily be improved early in the development process. The Qualmark HawQ is a cost effective, portable HALT System that is available for purchase or lease to utilize in, or near, product development groups. The HawQ provides an easy to use solution with Ethernet/WiFi options to allow for remote monitoring by development teams. This entry-level HALT System features a quiet, vibration-isolated, and easy to use system for virtually all development teams, University, R&D, and Reliability Labs

Watch the 3 minute HawQ video by [Clicking Here NOW!!](#)

The OVTT Series

The Qualmark OVTT (Omni Axial Vibration Table Top) system provides a versatile repetitive shock vibration system that can be utilized for quick field evaluations, in-house design verification and in-line process testing. The system can be easily configured for placement inside a thermal chamber for combined stress tests.

Mechanical HALT

ESPEC's newest addition to the Qualmark Product line features a compressor based HALT system, bringing a whole new level of accessibility and capabilities to customers and locations where traditional HALT systems just aren't feasible. Whether LN2 is difficult or too costly to attain and maintain, or the infrastructure just doesn't allow for LN2, this is your answer.

QFusion300



Part Number: 971-7000

Standard Features

High Rate, High Flow
Thermal System
xLF2 Vibration Tables
Vacuum Jacketed Manifold
PLC Control
Desktop PC with Monitor
QF Manager Software

See Configuration Options on page 22 and
Accessories on page 24

FUSING BURN-IN AND HASS/HASA – A MULTI-CAPABLE SYSTEM

The Qualmark QFusion represents the latest in accelerated stress test technology – specifically addressing the reliability testing needs during production. This system is designed to perform HASS/HASA (Highly Accelerated Stress Screen/Highly Accelerated Stress Audit) and/or Burn-In on product to locate failure modes that may have been inadvertently introduced during manufacturing. QFusion technology provides maximum performance for driving out process-induced faults and detecting inferior component substitutions that could otherwise turn up in the field as costly failures. QFusion’s combined environment (thermal and random shock vibration) and 6 table configuration accelerates process verification and for less cost than with traditional equipment.

Work Space	6 tables; Work space per table 27”w x 19.2”d x 11.3”h (686 mm x 486 mm x 286 mm)
Outer Dimensions	81.5”w x 38.4”d x 102.3”h (2070 mm x 976 mm x 2598 mm)
Table Size (Quantity-6)	23.6” x 15.6” / table (599 mm x 396 mm)
Actuators	12 Actuators; 2/table Lubricant-free
Table Capacity	6 tables; 100 lb (45 kg)/table
Acceleration¹	5 – 40 gRMS
Temp Range	+120°C to -60°C
Thermal Ramp Rate²	60°C/min
Power Requirements	380V, 400V 3Φ 50/60Hz 100A (Service Rating) 440V, 480V 3Φ 50/60Hz 100A (Service Rating)

1. Measured on bare table.

2. Measured as the average rate between -40°C and 80°C in open air 3” above table center (in an empty chamber); levels vary by make and model.



Typhoon 8.0+

The Qualmark Typhoon 8.0+ doubles the table size of our popular Typhoon 4.0+ chamber. The thermal system in the Typhoon series has been carefully engineered to have superior thermal efficiency. Key design elements such as our patented blower technology, highly efficient air flow characteristics and careful choice of materials have combined to keep liquid nitrogen and electricity costs down without compromising our industry standard thermal performance. The Typhoon 8.0+ has the largest vibration table available in a HALT/HASS chamber.

Part Number: 971-4008

Standard Features

High Rate, High Flow
Typhoon Thermal System
xLF2 Vibration Table with
PSD Management
(2x) Vacuum Jacketed Manifold
PLC Control
Desktop PC with Monitor
Typhoon Manager Software

See Configuration Options on page 22 and
Accessories on page 24

Work Space	Lower Table Position
	108.7" w x 54.0" d x 53.6" h (2761 mm x 1372 mm x 1362 mm)
	Upper Table Position
	108.7" w x 54.0" d x 34.6" h (2761 mm x 1372 mm x 879 mm)

Outer Dimensions	123.7" w x 79.1" d x 108.4" h (3143 mm x 2009 mm x 2753 mm)
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Table Size	100" x 48" (2540 mm x 1219 mm)
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Actuators	24 Actuators Lubricant-free
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Table Capacity¹	1200 lb (544 kg)
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Acceleration²	5 – 75 gRMS
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Temp Range	+200°C to -100°C
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Thermal Ramp Rate³	70°C/min
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Power Requirements	380V, 400V, 440V, 480V 3Φ 50/60Hz, 200A (Service Rating)
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1. Greater load capacities can be designed; contact ESPEC for custom options.
2. Measured on bare table; maximum gRMS level dependent on table configuration.
3. Measured as the average rate between -65°C and 85°C in open air 3" above table center (in an empty chamber); levels vary by make and model



Part Number: 971-4006

Standard Features

- High Rate, High Flow Typhoon Thermal System
- xLF2 Vibration Table with PSD Management
- Vacuum Jacketed Manifold
- PLC Control
- Desktop PC with Monitor
- Typhoon Manager Software

See Configuration Options on page 22 and Accessories on page 26

Typhoon 4.0+

This system is designed specifically for the task of performing Highly Accelerated Stress Screening (HASS) and Highly Accelerated Life Test (HALT) on large products. Its 48" x 48" vibration table is capable of supporting hundreds of pounds of products, fixturing and mounts at two different heights. The Qualmark Typhoon 4.0+ provides optimal thermal and vibration performance to drive out failures fast, yet is amazingly quiet.

Work Space	Lower Table Position 53.8" w x 54.0" d x 53.6" h (1367 mm x 1372 mm x 1362 mm) Upper Table Position 53.8" w x 54.0" d x 34.6" h (1367 mm x 1372 mm x 879 mm)
Outer Dimensions	69.8" w x 78.3" d x 108.4" h (1772 mm x 1989 mm x 2753 mm)
Table Size	48" x 48" (1219 mm x 1219 mm)
Actuators	12 Actuators Lubricant-free
Table Capacity¹	600 lb (272 kg)
Acceleration²	5 – 75 gRMS
Temp Range	+200°C to -100°C
Thermal Ramp Rate³	70°C/min
Power Requirements	380V, 400V, 440V, 480V 3Φ 50/60Hz, 100A (Service Rating)

1. Greater load capacities can be designed; contact ESPEC for custom options.
2. Measured on bare table; maximum gRMS level dependent on table configuration.
3. Measured as the average rate between -65°C and 85°C in open air 3" above table center (in an empty chamber); levels vary by make and model



Part Number: 971-4030

Standard Features

High Rate, High Flow
 Typhoon Thermal System
 xLF2 Vibration Table with
 PSD Management
 Vacuum Jacketed Manifold
 PLC Control
 Desktop PC with Monitor
 Typhoon Manager Software

See Configuration Options on page 22
 and Accessories on page 24. The optional Elevation
 Stand is highly recommended for this system.

Typhoon 3.0

The Qualmark Typhoon 3.0 is specifically designed to help the customer who is performing low volume Highly Accelerated Stress Screens (HASS) and needs a chamber with a 36" x 36" vibration table. It is also ideal for performing Highly Accelerated Life Tests (HALT) on mid-sized and larger products. The Typhoon 3.0 vibration table mounts at two different heights, so the interior chamber volume can be adjusted for the needs of the product.

Work Space	Lower Table Position 44.0" w x 45.0" d x 35.0" h (1118 mm x 1143 mm x 889 mm) Upper Table Position 44.0" w x 45.0" d x 25.0" h (1118 mm x 1143 mm x 635 mm)
Outer Dimensions	56.1" w x 69.6" d x 88.1" h (1425 mm x 1768 mm x 2237 mm)
Table Size	36" x 36" (914 mm x 914 mm)
Actuators	10 Actuators Lubricant-free
Table Capacity¹	450 lb (204 kg)
Acceleration²	5 – 70 gRMS
Temp Range	+200°C to -100°C
Thermal Ramp Rate³	70°C/min
Power Requirements	380V, 400V, 440V, 480V 3Φ 50/60Hz, 80A (Service Rating)

1. Greater load capacities can be designed; contact ESPEC for custom options.
 2. Measured on bare table; maximum gRMS level dependent on table configuration.
 3. Measured as the average rate between -65°C and 85°C in open air 3" above table center (in an empty chamber); levels vary by make and model.



Part Number: 971-4200

Standard Features

High Rate, High Flow

Typhoon Thermal System

xLF2 Vibration Table with
PSD Management

Vacuum Jacketed Manifold

PLC Control

Desktop PC with Monitor

Typhoon Manager Software

**See Configuration Options on page 22
and Accessories on page 24. The optional Elevation
Stand is highly recommended for this system.**

Typhoon 2.5+

The Qualmark Typhoon 2.5+ is a popular chamber with a 30" x 30" vibration table. This table size is a good size for Highly Accelerated Life Testing (HALT) applications and many Highly Accelerated Stress Screening (HASS) applications. The table can be mounted in an upper or lower position, to suit different product and ergonomic requirements.

Work Space	Lower Table Position 35.0" w x 35.0" d x 35.0" h (889 mm x 889 mm x 889 mm) Upper Table Position 35.0" w x 35.0" d x 25.0" h (889 mm x 889 mm x 635 mm)
Outer Dimensions	46.8" w x 61.6" d x 86.4" h (1188 mm x 1565 mm x 2193 mm)
Table Size	30" x 30" (762 mm x 762 mm)
Actuators	8 Actuators Lubricant-free
Table Capacity¹	320 lb (145 kg)
Acceleration²	5 – 75 gRMS
Temp Range	+200°C to -100°C
Thermal Ramp Rate³	70°C/min
Power Requirements	480V, 440V 3Φ 50/60Hz, 60A (Service Rating) 400V, 380V 3Φ 50/60Hz 80A (Service Rating)

1. Greater load capacities can be designed; contact ESPEC for custom options.

2. Measured on bare table; maximum gRMS level dependent on table configuration.

3. Measured as the average rate between -65°C and 85°C in open air 3" above table center (in an empty chamber); levels vary by make and model.



Typhoon 2.0

The Typhoon 2.0, with its 24" x 24" vibration table, is perfect for performing Highly Accelerated Life Testing (HALT) on small products, or where limited lab space is available. This compact system is built using Typhoon system technology which delivers impressive thermal performance and six-degree-of-freedom repetitive-shock vibration. The Typhoon 2.0 is a practical addition to any company's product reliability program.

Part Number: 971-4020 (Single Phase)
971-4022 (3 Phase)

Standard Features

High Rate, High Flow
Typhoon Thermal System

xLF2 Vibration Table with
PSD Management

PLC Control

Desktop PC with Monitor

Typhoon Manager Software

Optional: Vacuum Jacketed Manifold

See Configuration Options on page 22
and Accessories on page 24

Work Space	27.0" w x 27.0" d x 19.5" h (686 mm x 686 mm x 494 mm)
Outer Dimensions	38.8" w x 47.0" d x 80.9" h (985 mm x 1194 mm x 2055 mm)
Table Size	24" x 24" (610 mm x 610 mm)
Actuators	5 Actuators Lubricant-free
Table Capacity¹	100 lb (45 kg)
Acceleration²	5 – 75 gRMS
Temp Range	+200°C to -100°C
Thermal Ramp Rate³	60°C/min (Single Phase) 70°C/min (3 Phase)
Power Requirements	208V, 230V (1Φ), 50/60Hz, 70A (Service Rating) 380V, 400V, 440V, 480V 3Φ 50/60Hz 35A (Service Rating)

1. Greater load capacities can be designed; contact ESPEC for custom options.
2. Measured on bare table; maximum gRMS level dependent on table configuration.
3. Measured as the average rate between -65°C and 85°C in open air 3" above table center (in an empty chamber); levels vary by make and model

Typhoon 1.5

The Typhoon 1.5, with its 18" x 18" vibration table, is perfect for performing Highly Accelerated Life Testing (HALT) on small products, or where limited lab space is available. This compact system is built using Typhoon system technology which delivers impressive thermal performance and six-degree-of-freedom repetitive-shock vibration. The Typhoon 1.5 is a practical addition to any company's product reliability program.

Part Number: 971-4019 (Single Phase), 971-4021 (3 Phase)

Standard Features

- | | |
|---|------------------------------------|
| High Rate, High Flow Typhoon Thermal System | PLC Control |
| xLF2 Vibration Table with PSD Management | Desktop PC with a Monitor |
| | Typhoon Manager Software |
| | Optional: Vacuum Jacketed Manifold |



Review Configuration Options and available Accessories with your ESPEC representative

HawQ

Thousands of companies embrace Highly Accelerated Life Testing (HALT) to rapidly improve the reliability of their electronic product designs. Conducting HALTs early in the product development process are most beneficial, as reliability can most easily be improved early in the development process. ESPEC's Portable HALT System is a cost effective, portable solution that is available for purchase or lease to utilize in, or near, product development groups. ESPEC's Portable HALT System provides an easy to use solution with Ethernet/WiFi options to allow for remote monitoring by development teams. This entry-level HALT System features a quiet, vibration-isolated, and easy to use system for virtually all development teams, University, R&D, and Reliability Labs

Part Number: 1Φ System 971-7500, Part Number: 3Φ System 971-8000

Standard Features

- Entry Level HALT System provides combine Environment Accelerated Testing:
- Rapid Thermal changes from +200°C to -100°C
 - Six Degree of Freedom Repetitive Shock Vibration
- Portable for easy movement between departments Easy to use with preset programs & remote monitoring.
- xLF2 Vibration Table with PSD Management.



Review Configuration Options and available Accessories with your ESPEC representative



Part Number: 971-4250

Standard Features

- High Rate, High Flow Typhoon Thermal System
- xLF2 Vibration Table with PSD Management
- Vacuum Jacketed Manifold
- PLC Control
- Desktop PC with Monitor
- Typhoon Manager Software

Review Configuration Options and available Accessories with your ESPEC representative

Typhoon 4.0+ Inferno

The Qualmark Inferno series has been specifically designed for accelerated testing of sophisticated devices that are destined for harsh operating environments. Our Infernos combine extreme thermal capability (+250°C to -100°C) with 6 degree of freedom random vibration to provide the stimulation necessary to analyze design weaknesses and extend operational margins for mechanisms expected to withstand severe conditions.

Work Space	Lower Table Position 53.8" w x 54.0" d x 53.6" h (1367 mm x 1372 mm x 1362 mm) Upper Table Position 53.8" w x 54.0" d x 34.6" h (1367 mm x 1372 mm x 879 mm)
Outer Dimensions	69.8" w x 78.3" d x 108.4" h (1772 mm x 1989 mm x 2753 mm)
Table Size	48" x 48" (1219 mm x 1219 mm)
Actuators	12 Actuators Lubricant-free
Table Capacity¹	600 lb (272 kg)
Acceleration²	5 – 75 gRMS
Temp Range	+250°C to -100°C
Thermal Ramp Rate³	70°C/min
Power Requirements	380V, 400V, 440V 3Φ 50/60Hz, 150A (Service Rating) 480V 3Φ 50/60Hz 125A (Service Rating)

1. Greater load capacities can be designed; contact ESPEC for custom options.
2. Measured on bare table; maximum gRMS level dependent on table configuration.
3. Measured as the average rate between -65°C and 85°C in open air 3" above table center (in an empty chamber); levels vary by make and model.



Part Number: 971-4300

Standard Features

High Rate, High Flow
Typhoon Thermal System
xLF2 Vibration Table with
PSD Management
Vacuum Jacketed Manifold
PLC Control
Desktop PC with Monitor
Typhoon Manager Software
"Wall Panel" option

**Review Configuration Options and available
Accessories with your ESPEC representative**

Typhoon 2.5+ Inferno

The Qualmark Inferno series has been specifically designed for accelerated testing of sophisticated devices that are destined for harsh operating environments. Our Infernos combine extreme thermal capability (+250°C to -100°C) with 6 degree of freedom random vibration to provide the stimulation necessary to analyze design weaknesses and extend operational margins for mechanisms expected to withstand severe physical hardships.

Work Space	Lower Table Position 35.0" w x 35.0" d x 35.0" h (889 mm x 899 mm x 899 mm) Upper Table Position 35.0" w x 35.0" d x 25.0" h (889 mm x 889 mm x 635 mm)
Outer Dimensions	46.8" w x 61.6" d x 86.4" h (1188 mm x 1565 mm x 2193 mm)
Table Size	30" x 30" (762 mm x 762 mm)
Actuators	8 Actuators Lubricant-free
Table Capacity¹	320 lb (145 kg)
Acceleration²	5 – 75 gRMS
Temp Range	+250°C to -100°C
Thermal Ramp Rate³	70°C/min
Power Requirements	480V, 440V 3Φ, 50/60Hz, 100A (Service Rating) 400V, 380V 3Φ, 50/60Hz 125A (Service Rating)

1. Greater load capacities can be designed; contact ESPEC for custom options.
2. Measured on bare table; maximum gRMS level dependent on table configuration.
3. Measured as the average rate between -65°C and 85°C in open air 3" above table center (in an empty chamber); levels vary by make and model.



OVTT 18 and 24

The OVTT, OmniAxial Vibration Table Top, series introduced the first stand-alone, compact, repetitive-shock vibration system on the market and features Qualmark six-degree-of-freedom vibration technology. The OVTT 24 system provides 77% more table surface area than the OVTT 18 which makes it an ideal tool for in-production-line, broadband spectrum vibration testing of product. Both the OVTT18 and 24 are ideal for quick evaluation of field returns, repair verification and random vibration testing of multiple small products and can be configured for placement inside a thermal chamber for combined stress tests¹.

OVTT18 — Part Number: 971-5001
 OVTT24 — Part Number: 971-5200

Standard Features

OVTT18 and 24 Base Assembly
 PanelView Electronic Console with PLC Controller
 xLF2 Vibration Table with PSD Management

Review Configuration Options and available Accessories with your ESPEC representative

	OVTT 18	OVTT 24
Work Space	21.7" w x 21.7" d x 8.6" h (551 x 551 x 218mm)	29.3" w x 29.2" d x 9.4" h (744 x 742 x 239mm)
Outer Dimensions	Base 29.4" w x 34.8" d x 21.9" h (747 x 883 x 557mm)	Base 36.0" w x 35.7" d x 24.6" h (915 x 906 x 625mm)
Outer Dimensions	Console 28.2" w x 9.1" d x 8.3" h (711 x 232mm x 211mm)	Console 28.2" w x 9.1" d x 8.3" h (711 x 232mm x 211mm)
Table Size	18" x 18" (457 x 457mm)	24" x 24" (610 x 610mm)
Table Capacity²	50 lb (23 kg)	100 lb (45 kg) 200 lb (91 kg) Optional
Actuators	4 Actuators Lubricant-free	5 Actuators Lubricant-free
Acceleration³	5 – 40 gRMS	5 – 60 gRMS
Power Requirements	120/220-240VAC 1A 50/60Hz	115VAC/230VAC 3A 50/60Hz
Air Requirements	25 SCFM @ 70 psi	40 SCFM @ 80 psi

1. With cover and console removed. Controller and cover are not intended for use inside a thermal chamber.
 2. Greater load capacities can be designed, contact ESPEC for custom options



Mechanical HALT

FUSING MECHANICAL REFRIGERATION AND ACCELERATED TESTING

ESPEC announces a New Addition to the Qualmark Product line. This New compressor based HALT system, brings a whole new level of accessibility and capabilities to customers and locations where traditional HALT systems just aren't feasible. Whether LN₂ is difficult or too costly to attain and maintain, or the infrastructure just doesn't allow for LN₂, this is your answer. Likewise, this new system serves customers who want the LN₂ boost for testing and achieving rapid thermal ramps, but perhaps don't need it all the time for all testing. For those times, you have full accessibility and integration with mechanical refrigeration. The random shock vibration table provides the complete combined environment needed for full HALT testing. This is a robust system built on the proven, quality technologies from ESPEC and the Qualmark product line, so you know you are investing in the best.

Part Number: EQGNZ2.5-Rxx

Standard Features

Refrigeration

- ESPEC Cascade refrigeration
- Boost LN₂ injection - optional

Controls:

- ESPEC integrated P-300 controller with color touch screen

xLF2 Vibration Table

Safety Features for Battery Testing:

- Contact Factory

See Configuration Options on page 22 and Accessories on page 26

Work Space	39.4" w x 45.0" d x 26.1" h (1000 mm x 1143 mm x 663 mm)
Outer Dimensions¹	EQGNZ2.5-R6: 50.7" w x 98.3" d x 89.7" h (1288 mm x 2497 mm x 2278 mm) EQGNZ2.5-R12: 50.7" w x 98.3" d x 76.0" h (1288 mm x 2497 mm x 1920 mm) EQGNZ2.5-R15: 50.7" w x 134.3" d x 79.3" h (1288 mm x 3411 mm x 2014 mm)
Table Size	30.0" x 30.0" (762 mm x 762 mm)
Actuators	(8) Eight pneumatic, impulse-type Lubricant-free actuators
Table Capacity	320 lb (145 kg)
Acceleration²	5 – 75 gRMS (10 Hz to 5000 Hz) ¹
Temp Range	+180°C to -70°C
Weight	EQGNZ2.5-R6: 2900 lb (1318 kg) EQGNZ2.5-R12: 2470 lb (1120 kg) EQGNZ2.5-R15: 3970 lb (1800 kg)

Since ESPEC continually improves product and service offerings, specifications are subject to change without notice. Please check with ESPEC to ensure you have the latest specification.

1. Exterior dimensions include protrusions such as hinges and door latch
2. Measured on bare table; maximum Grms level dependent on table loading.

LN₂ Infrastructure

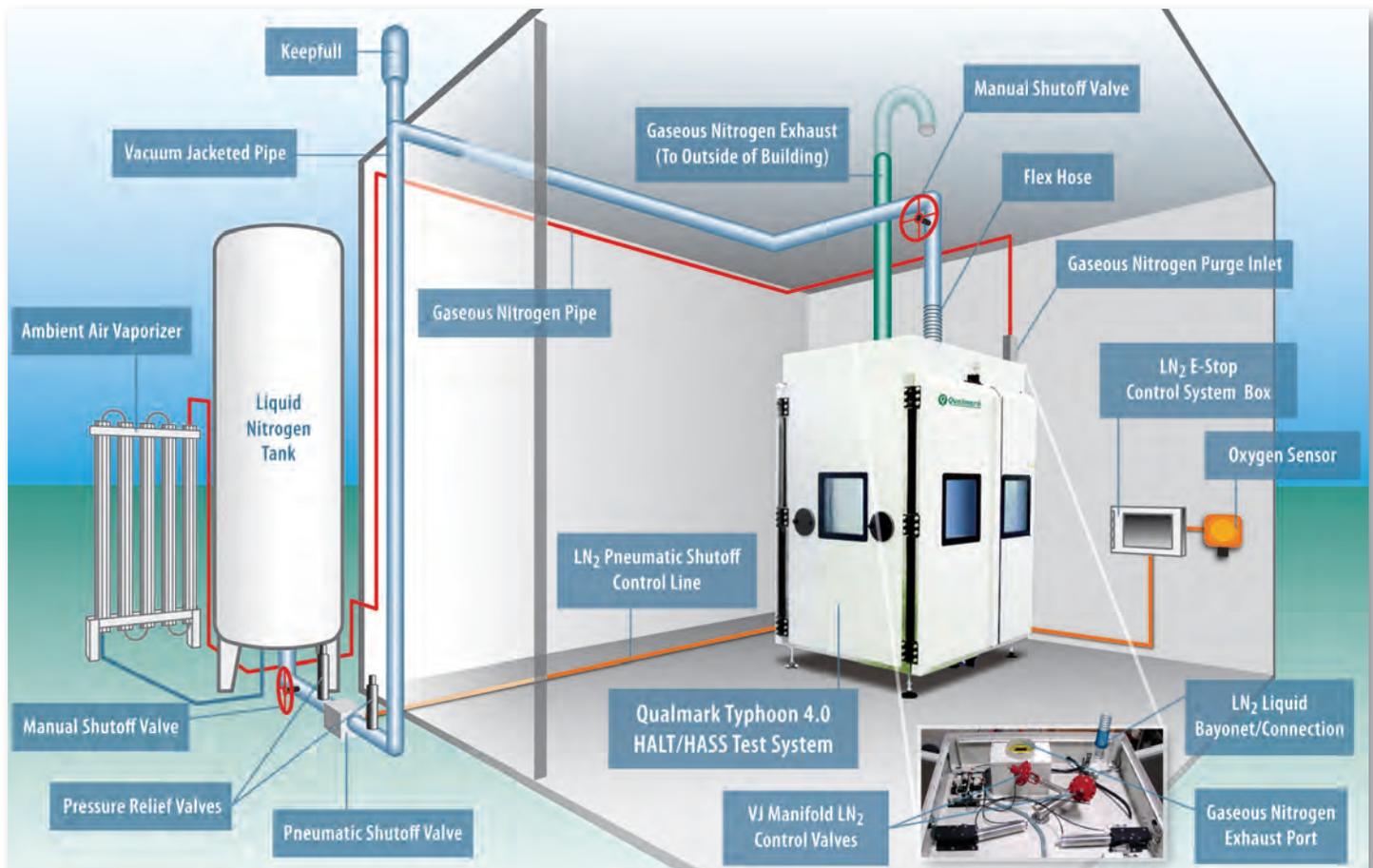
Liquid nitrogen (LN₂) is an essential element for performing HALT and HASS and its delivery method is essential for driving the outstanding rapid thermal cycling and dwell stability performance of the Qualmark Typhoon system. The quality of the liquid nitrogen supply piping for the system, therefore, is critical for proper operation. Bubbles of nitrogen vapor in the liquid supply can make the chamber cooling system difficult to control, resulting in poor cold ramp rates and temperature instability. The presence of vapor in the supply is also an indication of heat leaks in the piping that will result in wasted nitrogen, frost buildup and subsequent water drips and possible damage as the frost melts. Properly installed, high quality Vacuum Jacketed (VJ) piping dramatically reduces heat loss and the resulting vapor in the nitrogen supply. Additional 'keep cool' vapor separators can be installed as needed to further reduce vapor content.

Qualmark's static vacuum-jacketed piping can reduce thermal losses by a factor of 100 over alternative piping, representing a significant savings for our customers. The choice of static versus dynamic vacuum jacket design eliminates an additional element to the coolant supply

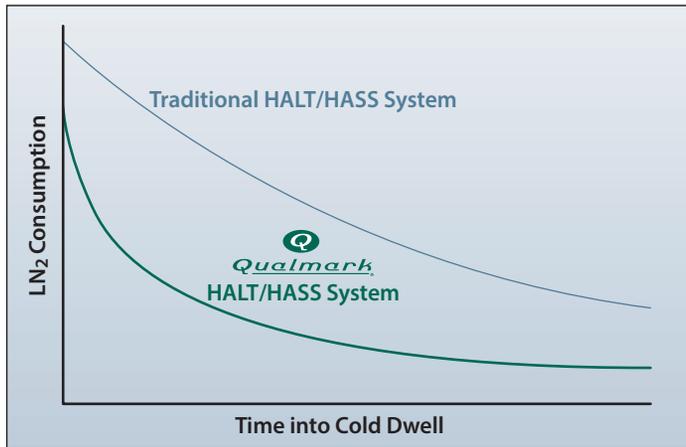
that might otherwise need maintenance or repair – another way ESPEC considers customers' Total Cost of Ownership (TCO) in its advanced systems design. Qualmark piping has double-wall construction with an inner pipe for the transfer of liquid nitrogen and an outer pipe to support and retain the vacuum insulation, both, made of stainless steel. The insulation is a low vacuum cavity with multiple layers of foil (super insulation) applied to reflect back radiant heat. Molecular sieves and getters are used with the insulation system to maintain low vacuum levels for years. All Vacuum Jacketed pipe sections are designed and built with a factory sealed vacuum and super insulation system.

ESPEC offers complete HALT/HASS system assistance – from site survey, system commissioning, installation of your cryogenic liquid piping system and LN₂ tanks, to running your first HALT test. ESPEC also offers a full line of best practice services at every step to provide the quickest ROI on your testing investment. With our high standards for performance, durability, efficiency, and overall cost savings, we make sure the job is done right.

Talk to us about all of your accelerated testing needs. We've installed more HALT/HASS equipment across the globe than any other organization.



Qualmark LN₂ Efficiency



One of the key fatigue acceleration mechanisms offered by HALT is the ability to deliver extremely rapid thermal change rates. The Qualmark liquid nitrogen (LN₂) based thermal system can achieve air change rates of 90°C to 100°C/min. Airflow rates in our Typhoons far exceed those of traditional ESS systems – allowing Qualmark brand systems to drive a typical board level product to change rates of 60°C/min. More importantly, Qualmark Typhoons are engineered for LN₂ use efficiencies which contribute to lowest Total Cost of Ownership (TCO). As this chart demonstrates, the thermal airflow technology of the Typhoon system conserves liquid nitrogen use by reaching set points faster than the typical system and consuming far less LN₂ throughout the dwell.

Thermal loss for copper insulated pipe is 300 BTU/ft versus a mere 3 BTU/ft for vacuum jacketed



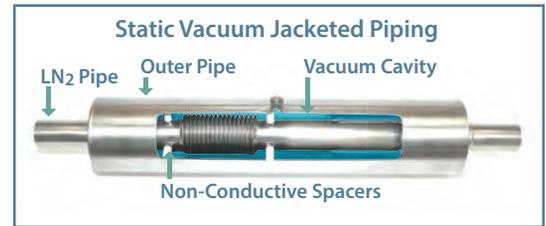
Microbulk Solution – Cost Effective Alternative



- Ideal for smaller chambers
- Microbulk can be refilled with temporary lines to nearby outside door
- Easier to install than bulk tank and VJ lines
- Lower or no capital investment
- Can be utilized instead of installing an APPS pressure reduction unit to an existing bulk tank

Liquid Nitrogen Infrastructure

Because reliable and efficient liquid nitrogen (LN₂) storage and delivery supports optimum HALT/HASS system performance and test results, ESPEC has partnered with select world class liquid nitrogen (LN₂) storage and delivery system providers. These partnerships enable turnkey provisioning of HALT lab infrastructure anywhere around the globe. Please discuss your proposed lab needs and layout options with your ESPEC representative:



ESPEC has partnered with select world class liquid nitrogen (LN₂) storage and delivery system providers. These partnerships enable turnkey provisioning of HALT lab infrastructure anywhere around the globe. Please discuss your proposed lab needs and layout options with your ESPEC representative:

Vacuum Jacketed (VJ) Piping

Qualmark’s static vacuum jacketed piping has double-wall construction with an inner pipe for the transfer of liquid nitrogen and an outer pipe to support and retain the vacuum insulation, both made of stainless steel. The insulation is a low vacuum cavity with multiple layers of foil (super insulation) applied to reflect back radiant heat. Molecular sieves and getters are used with the insulation system to maintain low vacuum levels (9 microns or less) for many years.

- VJ Piping 995-0002
- VJ Piping Installation 995-0022
- Custom Piping Contact ESPEC

LN₂ Storage

HALT/HASS test facilities typically store LN₂ in one of three ways depending on the frequency of LN₂ demand and facility size. Bulk tanks are the largest and offer efficiencies that, over time, can provide the most economical choice for storing liquid nitrogen but typically require the most up-front expense for installation. Microbulk tanks (approximately 450 - 2000 liters) offer a more flexible, yet still economical choice for LN₂ storage and can be placed inside of the facility, but with remote filling capability in most applications. Dewars are considered to be a poor option for anything other than a temporary measure. Of the 3 options, Dewars suffer the most from gas losses and do not always provide optimum LN₂ delivery for best HALT/HASS results. With Qualmark system requirements of 50psi, careful consideration must be given to the Dewar rating.

- LN₂ Storage Contact ESPEC

Typhoon MVIP™ Dewar Kits

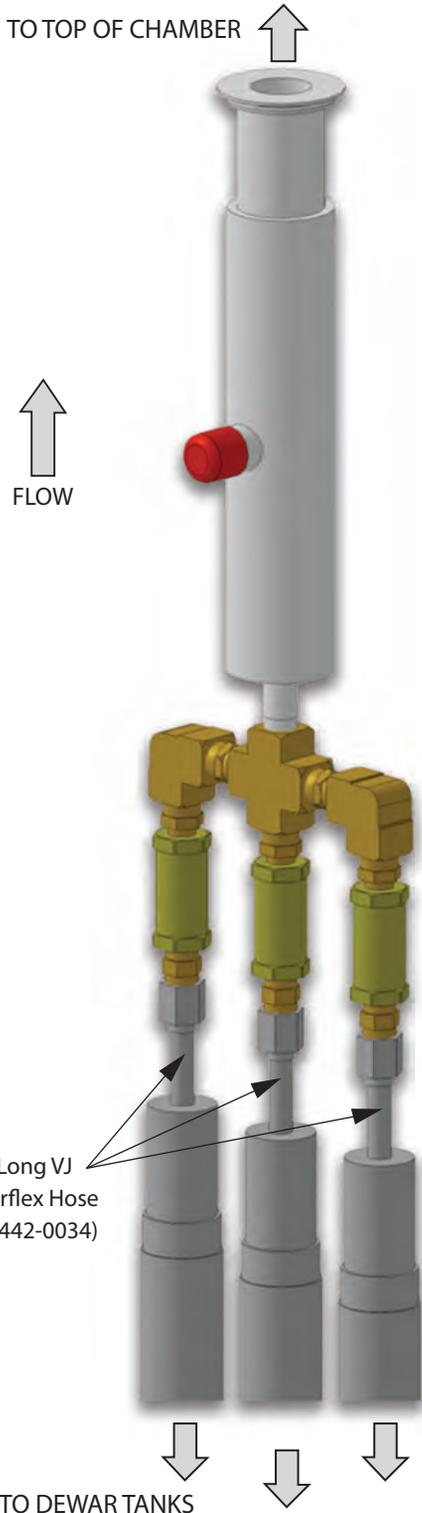
3 Dewars – Part Number: 956-0271

4 Dewars – Part Number: 956-0272

T-1.5/2.0 (without MVIP Bayonet)

2 Dewars – Part Number: 956-0267

3 Dewars – Part Number: 956-0268



Multiple Dewar Kit

- Standard for 3 Dewars, Part Number: 956-0271
- Optional for 4 Dewars, Part Number: 956-0272
- Standard with Female Bayonet, optional threaded connection

Typhoon -1.5/2.0 Dewar Kit (without MVIP Bayonet)

- 2 Dewars, Part Number: 956-0267
- 3 Dewars, Part Number: 956-0268

Hose from Chamber to Dewar Kit/Dewar

- Standard with MVIP Bayonet for new chamber and MVIP bayonet for Multiple Dewar kit connect. Various Length options. Includes Relief. (dimensions for relief above the multi dewar kit)
- Custom Options.
 - i. Connection to previous Vacuum Insulated Manifolds including CTM and VBS

Hoses from Multi Dewar Kit to Dewars

- Standard (442-0034) 6' VJ Superflex with 1/2" flare connections to Multi Dewar kit and Standard threaded Dewar Connection.
- Additional length options available.

Notes:

1. There are two recommended VJ Flex Hoses for connecting the Dewar Kit to the Chamber. Select the length required.
 - a. 442-0057 HOSE, MVIP VJ, 1/2" x 10', T-2.5/3
 - b. 442-0058 HOSE, MVIP VJ, 1/2" x 15', T-2.5/3
 - i. These VJ Hoses have a 1/2" MVIP male bayonet on each end with on relief riser (See photo). The relief riser end attaches to the female bayonet on the chamber.



2. You must order two (2) VJ Clamps and two (2) O-rings when ordering the kit. These two items are sold separately.

- a. 750-0303 Clamp, VJ, 1/2", MVIP Bayonet
- b. 760-0273 O-Ring, VJ, 1/2", MVIP Bayonet

MVIP™ – Superiority Through Experience

Chart is the world's leading designer, manufacturer and installer of standard and custom vacuum insulated pipe (VIP) systems. ESPEC is an Authorized Reseller and Distributor of Chart Products, including MVIP and other vacuum jacketed products and services to provide you with a total, state-of-the-art solution.

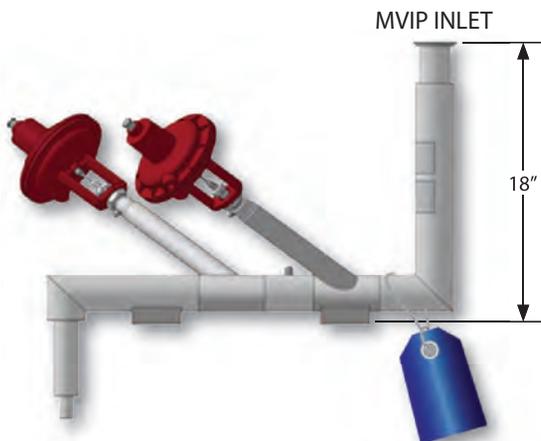
Categories	Pro
Top Three Benefits	<ol style="list-style-type: none"> 1. Easy – Use the online Modulator to configure, price and deliver your VIP modules and accessories. 2. Reliable – Long-term maintenance-free reliability that will not degrade, drip or leak with time. 3. High Performance – Reduce your LN2 losses by a factor of 10 over foam insulated copper designs.
MAWP*	150 psig
Installation Consideration	No welding or field cutting required. Reconfigurable.
Reusability	Yes. Limited cutting & welding.
Bellows to allow for up to 400°F internal / external differential	Internal for improved protection.
Design Platform	Internal Bellows
Material	<ul style="list-style-type: none"> • 304 stainless steel (rigid) • 316L or 321 stainless steel (flex) • Invar Bayonet design
Vacuum gauge and retention test prior to shipment	Yes

* MAWP = Maximum Allowable Working Pressure

VJ Manifold

VJ Manifold – Part Number: 410-0131

- Standard on all chambers except Typhoon 1.5 and 2.0.*
- Supports patented dissimilar metal (Invar 36), provides superior seal
- Supports dual seats, provides secondary sealing



* Optional Vacuum Jacketed Manifold for Typhoon 1.5 and Typhoon 2.0
 Part number:
 785-3171 factory installed
 785-3206 field retrofit

System Configuration Options

Qualmark systems encompass the very latest innovations in HALT/HASS technology based on our 20+ years of specialized research in this discipline. We make system options available that will help you select the best configuration for delivering optimum performance for your test lab environment. Please select the following configuration options for your system.

Table

Qualmark's newest table design – the xLF2 – improves Power Spectral Density (PSD) stability, providing superior consistency at higher gRMS and makes any adjustments for PSD drift easily manageable. Tables are configurable for metric (M-10) or standard (SAE 3/8 – 16 UNC) threads.

xLF2 Table Specify Metric or Standard

Voltage

Qualmark accelerated stress test systems are designed to deliver optimum power in support of the rigorous testing conditions necessary for effective HALT/HASS and for accommodating regional power supply configurations. Your ESPEC representative can help you select the correct option for your facility.

Typhoon 8.0+, Typhoon 4.0+, Typhoon 3.0, Typhoon 2.5+

480V, 50/60Hz or 400V, 50/60Hz

Typhoons 2.0, 1.5

208V, 50/60Hz or 230V, 50/60Hz or

480V 3 Phase or 400V 3 Phase

Voltage Specify System Requirement

Software

Securely access the Qualmark Typhoon Manager using one of three password protected user levels which provide protection from unauthorized users and limits access to calibration and PID tuning screens. Typhoon Manager is presented in a very easy to use “point and click” Windows® interface driving a powerful and flexible system that can be utilized by a trained technician or engineer to quickly set up the chamber for each particular requirement. The Typhoon Manager has up to twelve thermal channels and four vibration channels that can be numerically viewed, charted or data logged by a computer. A user can set up and tune a Typhoon system to run stress tests either manually or with a test profile. A separate HASS user screen is available for when the chamber operator only needs to run profiles.

Q-Link for Typhoon Manager

The Q-Link software has the capability to monitor an Internet connection and respond to control commands via

the TCP/IP protocol. To utilize this control, the user must be able to create programs that are capable of transmitting and receiving packets of information via TCP/IP protocol.

Q-Link Software 785-2026

QualView

QualView is a Qualmark driver set designed for advanced LabView® developers that enables Qualmark system controls to integrate with other test functions via the LabView control client. QualView permits single computer control for both the Qualmark system and other Automated Test Equipment. QualView is licensed individually per chamber.

QualView Software 785-2539

QualView QFusion 785-2901

QualView HawQ 785-2902

OVT Manager

OVT Manager provides the same easy to use “point and click” Windows interface, but designed specifically for use with the Qualmark Benchtop test system.

OVT Software 785-1980

Certified European (CE) Kit

The CE kit adds components to meet the European Safety Directive. The typical kit contains: CE capacitor pack assembly; pneumatics lock-out, high power filter, if required, and a CE declaration of conformance.

Typhoon: 8.0+ 785-1791

Typhoon: 4.0+ 785-1462

Typhoons: 3.0 785-1412

Typhoons: 2.0, 1.5 785-1589

Typhoon 2.5+ 785-3029

Additional Access

Qualmark Typhoon systems can be customized to meet your specific access needs. Windows can be converted into access ports or you can order your system with additional ports, windows and cable notches. Discuss your access options with your ESPEC representative so that your system can be customized to fit your needs.

Available Access options include:

- Dual Port Window Adaptor
- Additional Front Ports
- Additional Back Ports
- Additional Windows
- Additional Cable Notches

Elevation Stand

Raises system 11¾" off floor

- Typhoons 2.5+ 785-3005
- Typhoons 3.0 785-1590

Safety Enhancements

Air Purge Kit

The Qualmark air purge system safeguards operators from invisible nitrogen by providing sufficient air purge and oxygen normalization before automatically triggering the pneumatic door interlocks allowing the system doors to be opened.

- Typhoon 4.0+785-2090
- Typhoon 4.0+ Inferno785-2119
- Typhoon 8.0+785-1763

Air Purge Door Lock Kit

The Qualmark air purge door lock system safeguards operators from invisible nitrogen by establishing oxygen normalization before automatically triggering the pneumatic door interlocks and allowing the system doors to be opened.

- Typhoon 2.5+/3.0 785-1668
- QFusion 300 785-2672

Door Lock Kit (Typhoons 2.0 & 1.5)

The Qualmark door interlock system safeguards operators from being able to open the Typhoon door while the system is in operation.

- Typhoons 2.0, 1.5785-1689
- Door Override Typhoon 4.0+ 785-2418

SSR Thermal Monitoring Alarm

Available on all Typhoon models, the thermal alarm monitors the electrical panel and displays a warning light should temperature reach +60°C and shuts down the system and provides an audible alarm at +80°C.

- Thermal Monitor Alarm . . Contact ESPEC for Ordering

Liquid Nitrogen Delivery

Liquid Nitrogen (LN₂) is intrinsic to optimal HALT/HASS system performance. This section lists the options you should consider ordering as a part of your system for LN₂ management. The discussion on liquid nitrogen infrastructure on the following pages will assist you in making decisions regarding your complete LN₂ needs

Bayonet Adaptor

MVIP LN₂ Bayonet Adaptor minimizes energy losses and provides a robust connection between the LN₂ piping supply to the chamber's inlet VJ Manifold. One Adaptor is needed for every chamber installation.

- Male Bayonet Adaptor ¾" NPT 410-0132
- VJ Line Intricate Male Adaptor 410-0133

Keepfull Vacuum Insulated Liquid Level System

The Keepfull System allows the venting of vapor while maintaining the liquid level in vacuum insulated piping systems and containers. This fully mechanical system requires no electrical or pressure assistance and is designed to be installed in liquid nitrogen systems for a more efficient interface. The pipe inlet is designed for easy installation on liquid nitrogen systems. This is necessary to provide reliable cold steps and ramps.

- LN₂ Keepfull System 410-0077

E-stop System

The E-stop system is an independent control system for extra safety and peace of mind. The LN₂ E-Stop System will automatically close an actuated valve on the liquid nitrogen supply system in the event of an oxygen monitor alarm or the triggering of the chamber's E-stop button.

- E-stop System Contact ESPEC for Ordering

Accessories

Data Acquisition

QDaq

The Qualmark data acquisition system, QDaq, provides a flexible solution supporting expanded HALT and HASS data acquisition that provides dynamic charting and analysis capabilities. QDaq provides up to 32 thermal channels and up to 12 vibration channels of data acquisition in a single, modular design that can accommodate portability between all Qualmark systems. QDaq's compact chassis comes with an integrated signal conditioner for capturing vibration input. QDaq's software enables temperature and vibration data capture across corresponding time charts and plotting of Power Spectrum Density (PSD) in a tabbed, user-friendly interface with customizable configuration settings that will streamline data file management. Thermocouples and Accelerometers sold separately.



- QDaq 956-0209
- Desktop Mounting Kit 300-0208

Analyzers

Qualmark Spectrum Analyzer

Essential for monitoring the Unit Under Test (UUT), this economical unit can acquire, process and display up to six channels of vibration data in both time and frequency domains. The user interface offers intuitive menus for managing functions and data capture. User selection vibration averaging and one-click data capture can be saved as specified in user defined custom configurations. Package includes PCIe Daq card, signal conditioner, analyzer software and cable from card to signal conditioner. May be installed on a Qualmark Standard User Interface PC Control System, or on a separate PC. Accelerometers are sold separately.



- SA Kit [6 channels] 785-2534
- Software 785-2559

Data Acquisition

The Qualmark Portable Data Acquisition System comes in a compact (3.5" x 4.0" x 1.0") package with an integrated signal conditioner that captures 4 channels of vibration. This pocket-sized design permits the single user license to connect via USB with a laptop for more convenient transport between Typhoon and QFusion systems. The System supports Windows 7 and features easy setup and user-defined customizable settings with tabbed menu navigation for faster, more efficient access to information. Package includes chassis, vibration module, USB cable and software. Accelerometers and thermocouples sold separately.



- Portable Data Acquisition System 965-0263

Monitor And Control

Adhesive-Mount Accelerometer Kit

Accelerometers are essential for understanding product response to the test stress extremes. These lightweight accelerometers are easily attached directly on the product under test. Kit includes a Qualmark 10mV/G accelerometer with BNC connector.

- Accelerometer 300-0224

Auxiliary Thermocouple Channel Kit

Kit consists of a PLC thermocouple module which adds 6 thermocouple channels to the standard 4 included on the system (Total of 10 thermocouple channels). Typhoon 4.0+, Typhoon 3.0, and Typhoon 2.5+ only.

- (Typhoon 3.0) 785-1452
- (Typhoon 2.5+) 785-3078
- (Typhoon 4.0+) 785-1894
- AWG, type TT, Thermocouple 785-1537

Oxygen Sensor

An intrinsically safe 4-20mA oxygen detector. Has a single channel control panel which is an alarm only apparatus providing two independent user configurable alarm relays which can be used to control external visual or audible alarms. The models include an LCD display monitor and multiple relay outputs. The 300-0171 has a 10 year life Zirconium Oxide Sensor.

- Wall-Mount With LCD Display (Non-CE) 300-0171
- Wall-Mount With LCD Display (CE) 300-0169

Status Screen

Installations running multiple chambers will appreciate

the LCD Chamber Status Screen option which provides easier monitoring of system status of chamber during operation

Status Screen 956-0218

Redundant Vibration Kit Accelerometer

This kit contains an accelerometer and cable to monitor vibration levels. Stud-mount easily attaches to the Qualmark vibration table, providing redundant vibration control. Kit includes; BNC to BNC connection, 10 mV/G Table Control Accelerometer and 20' Accelerometer Cable.

10mV/G KIT 785-1444

Fixturing

HALT Fixture Kit

This kit includes a basic set of fixturing pieces to fixture many products for a HALT. It contains an assortment of aluminum extrusions and fasteners, all thread rods and quick-threading split nuts.



Typhoons 4.0+, 3.0, 2.5+
SAE Halt Fixture Kit 750-0116

Metric Halt Fixture Kit 750-0163

Typhoons 2.0, 1.5, OVTT
SAE Halt Fixture Kit 750-0169

Metric Halt Fixture Kit 750-0170

PCA Fixture Clamps

Quick release clamps with a 6-32 or 2.5mm mounting post, used for fixturing products in the test chambers.



PCA Quick Release Fixture:
With Clamp 785-1162

PCA Quick Release Fixture:
Without Clamp 785-1148

Metric PCA Quick Release Fixture:
With Clamp 785-1688

Metric PCA Quick Release Fixture:
Without Clamp 785-1687

Spares Kit

Spares Kits contain commonly used components such as, fuses, filters, light bulbs, heater coils, cables, contactors, etc.

KIT – A (Standard), 208V or 230V (must specify):
Request document 920-0279 for spares kits inventory.

KIT – B (Deluxe), 208V or 230V (must specify):
Request document 920-0279 for spares kits inventory.

Contact Support for more information.

Upgrades

Significant enhancements to the original Typhoon technology have been released including a platform with advanced networking and diagnostic capabilities which delivers more control options, enhanced performance, increased productivity, and improved safety features. Without the proper upgrade, equipment latency looms as a financial threat to product development and production. Sophistication of current technology may require additional enhancements to older systems. Please discuss your current system configuration with your nearest ESPEC representative for proper system upgrade recommendations.

PLC Upgrade

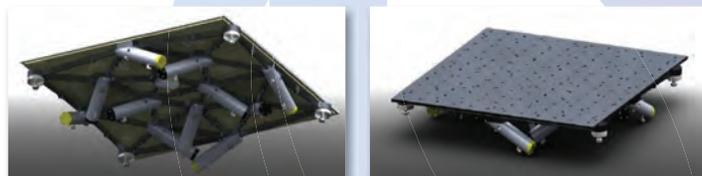
Equipment that operates on earlier platforms risk serious product development delays, production downtime, and replacement expense should the controller system fail. The latest state-of-the-art Qualmark platform is based on the Allen Bradley Compact Logix PLC series which utilizes a 14 bit A/D converter, significantly expanding capability and resulting in more precise control of both temperature and vibration, featuring:

- Programmable logic controller
- Full-support; updates and replacement parts
- Production user interface with 3 levels of password protection.
- Protection of test protocols from unauthorized people
- Allen Bradley industrial control system.
- Includes a new PC with familiar, but upgraded user interface.

Contact Support: support@espec.com

xLF2 Table

The xLF2 table introduces a new concept to the HALT/HASS industry – PSD (Power Spectral Density) management. This new Qualmark table design improves PSD stability – providing superior consistency at higher gRMS – and makes any adjustments for PSD drift easily manageable. Shipping with our top-selling Typhoon series, The new Qualmark xLF2 table helps customers achieve consistent and reliable HALT and HASS results. Upgrading to the xLF2 will most likely require an upgrade to the latest controller platform. Contact ESPEC to determine the best configuration for your system.



Post Warranty Service Programs*

Realizing the full benefits of an accelerated reliability program requires that systems operate in top condition. To help accomplish this, ESPEC offers five levels of service to keep accelerated testing and production work on track. For application support, consider ESPEC's Web Based Education, which is offered at a discount with all post-warranty service programs, or ask about ESPEC Solutions Group Programs. Five levels of post warranty coverage are available:

Annual Technical Support Program

ESPEC's Annual Technical Support Program provides 12 months of support via same or next business day email or call-back phone assistance to help diagnose equipment problems and provide remote troubleshooting. If necessary, on site repairs will be scheduled with a factory-trained technician and replacement parts will be discounted 10%. Non-equipment, application related inquiries will be provided options for assistance from the ESPEC Solutions Group.

Technical Support (All Systems)985-0041

Extended Parts Warranty Program

Protect your Accelerated Test Equipment investment by having a parts warranty in place for when untimely problems might otherwise create an unexpected strain on budgets and production. ESPEC's Extended Parts Warranty program provides the peace of mind needed to assure minimum down time by covering replacement OEM parts and subsystems for 12 months as follows:

- LN₂ System
- VJ Manifold including Primary & Redundant Bonnet, Redundant Bonnet Pressure Regulator and Valve, GN₂ Purge Solenoid and Gauge, Primary Bonnet E/P and Purge Valve, Spray Bar Assembly and Fog Nozzles
- Vibration Table
- Actuators
- Motors
- Electrical Components (PLC, Contactors, Overloads, Solid State Relays (SSR's))

Typhoon 8.0+Contact ESPEC
 Typhoon 4.0+ 960-0120
 Typhoon 3.0 960-0119
 Typhoon 2.5+ 960-0118
 Typhoon 2.0 960-0117
 Typhoon 1.5 960-0116
 QFusion300 960-0136
 HawQ 960-0141

Preventative Maintenance & Calibration Services Program

Because of the extreme stresses delivered with Qualmark Brand equipment, a twice yearly preventative maintenance and calibration regimen is recommended to help keep accelerated stress test programs delivering consistent results. Heavily used systems should be attended to more frequently. Regularly scheduled visits by an ESPEC certified technician help to keep systems running within factory specifications and can increase life expectancy of parts and components and reduce premature replacements and large-scale repairs. The Preventative Maintenance and Calibration program includes:

- 2 Preventative Maintenance visits with one calibration annually
- Calibration traceable to NIST
- Discounts for additional systems at same site
- 10% parts discount on any necessary corrective maintenance
- 10% labor discount on any necessary corrective maintenance

Typhoon 8.0+ 960-0125
 Typhoon 4.0+ 960-0099
 Typhoon 3.0 960-0098
 Typhoon 2.5+ 960-0097
 Typhoon 2.0 960-0096
 Typhoon 1.5 960-0095
 QFusion300 960-0137
 HawQ 960-0143

"It not only paid for the cost of all the equipment, it paid for the whole building!"

– HALT Payback per Reliability Manager, Fortune 100 Company

Annual Maintenance Program

This comprehensive support plan is essential for helping to keep Accelerated Stress Testing programs on track while mitigating the potential for unexpected expenses. ESPEC's Annual Maintenance Program extends the factory warranty, provides preventative maintenance and calibration, and is the only plan that covers the table and actuator performance. It is designed so that customers can focus resources on their product testing program results and leave the chamber maintenance to ESPEC. This program provides the most comprehensive coverage available from ESPEC to help maintain system performance within factory specifications. Most importantly for HASS and HASA, the Annual Maintenance Program is crucial in supporting test system compliance (thermal and vibration) with the specifications under which reliability programs have been developed. The Annual Maintenance Program includes 12 month's maintenance, service, and part replacement:

- All provisions in PM and Cal Service Program
- All provisions in Extended Parts Warranty Program
- 2 pre-scheduled PM and Cal visits per year
- Vibration table performance evaluation and maintenance. If results from the evaluation indicate more than 25% degradation from initial standard tests the table will be rebuilt or replaced at no additional charge. To measure table degradation, maximum gRMS attainable shall be measured immediately following chamber/table installation or table rebuild.
- Actuator performance evaluation and maintenance. Actuators that are determined to be worn beyond specification will be replaced.

Typhoon 8.0+	960-0115
Typhoon 4.0+	960-0114
Typhoon 3.0	960-0113
Typhoon 2.5+	960-0112
Typhoon 2.0	960-0111
Typhoon 1.5	960-0110
QFusion300	960-0135
HawQ	960-0142

Tech Enhancement and Maintenance Program

This program has been developed specifically to provide customers the ability to upgrade their systems to the latest technology, but do so within a maintenance program and avoid the need to submit a new budget line item for the upgrades. As the Qualmark HALT/HASS technology continues to evolve and as components change to meet the latest standards, it is imperative that reliability pro-

grams have the ability keep pace with new design and manufacturing platforms. This comprehensive program includes all aspects of the Annual Maintenance Program plus:

xLF2 Table Upgrade - The Qualmark table design improves PSD stability - providing superior consistency at higher gRMS - and makes any adjustments for PSD drift easily manageable.

PLC Upgrade - multi-level security is enabled with the 14-bit controller platform including: User level (HASS Screen) - limited to running and data logging profiles; Technician level - access to HASS Screen, Test Execution screen, PID's and program definition; and Administrator - access to all functions including calibration values and user manager.

Latest Revision Software - Takes advantage of xLF2 responsiveness to the PLC advanced control system - improving granular control fivefold. Precise control enables the xLF2 to deliver execution of inputs for correct excitation and thermal stress placement on the device under test while virtually eliminating overshoots. The vibration output boost setting commands immediate response from actuators, while the throttle limit setting keeps vibration from exceeding the setting. Automated maintenance prompts with time meters keep track of the system's use.*

Tech Enhancement and Maintenance Program pricing is based on current system condition and configuration. Contact ESPEC.



*Terms and conditions apply to the various Post Warranty and Service Programs. Contact ESPEC for detailed information.

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Quality is more than a word



ESPEC has the widest selection of test chambers in the industry and around the world. In addition to our Qualmark HALT/HASS line, we also offer a wide range of standard and custom Environmental Test Chambers and Ovens.

Benchtops
Reach-ins
Rental Chambers
Thermal Shock
Walk Ins
Specialty Chambers
Industrial Ovens

Contact us to discuss ALL your testing needs. The ESPEC and Qualmark brands deliver the most complete testing solutions available through single-point Sales, Support, and Service.



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.