



DELTI-Vac MIL DIGITAL VACUUM STABILITY TESTER

DELTI-Vac MIL is a modern system for professional stability testing of energetic materials. It is designed concerning excellent precision, safety and versatility which is required in QC or R&D applications.

DELTI-Vac MIL is unique by its smooth operation and efficiency.

APPLICATION

Vacuum stability testing (VST) is widely used for reliable risk and safety management of single based (NC) or double based (NC/NG) gun powders, rocket fuels and other propellants, pyrotechnic mixtures, explosives, hazardous chemicals, energetic polymers, binders and others. An integral part of this monitoring is also testing of substances compatibility. Vacuum conditions provide the highest sensitivity for evolved gas quantification but testing conditions can be widely extended.

Stability and compatibility monitoring is deeply incorporated in the quality and safety management of production, transportation and warehousing. All kinds of ammunition require safety inspections during their lifecycle. The latest accidents of automotive parts containing energetic materials triggered VST implementation into R&D and QC of civilian production. These new applications require significantly better performance.

PRINCIPLE

The unstable behaviour of explosives and other hazardous materials is associated with the liberation of decomposition products which are continuously monitored as a volume of evolved gas. VST methods were standardized and testing conditions are united to provide globally comparable results. The result of the VST is the absolute volume of evolved gas. Additionally, DELTI-Vac provides also time dependence of pressure (vacuum) and gas liberation rate.

COMPLIANCE

VST standards

STANAG 4556, 4147, 4022/4, 4023, 4230, 4284, 4566,
MIL-STD-650

Other stability testing standards

MIL-STD-286C, STANAG 4178, AOP-48



Energetic Materials
Stability & Compatibility
Heating Blocks



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DELTIMA

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HEATING BLOCK SPECIFICATIONS

No. of holes for test tubes	12
Hole diameter / depth	19 / 160 mm
Block temperature limit (MIL/MIL+)	200 / 250 °C
Block temperature resolution	0.1
Tube temperature stability	±0.05 °C
Oil reservoir connected with each hole	Standard
Mains supply	110V/230V 50-60 Hz
Power rating	1000/1600W
Dimensions - WxDxH	30.5 x 31 x 36 cm
Weight	33 kg

INTERFACE SPECIFICATIONS

LCD user interface	4.3" touch screen
Pressure sensor ports	12
Data storage	SD&FD (optional)
LED light indicators	2
External sensor ports	3
CAN bus ports	2
USB port for PC connection	1
LAN port	1
External Heating Lock	1 (optional)

DAQ SPECIFICATIONS

Pressure signal channels	12
Voltage input	0 - 10 V
DAQ resolution	600 nV
Volume resolution	0.01 ml
Ambient temperature resolution	0.005 °C
Ambient pressure and humidity	Optional
Sampling rate	1 sample/min
Precision of calibrated vacuum sensors	0.15% RSD

TEST TUBES

Borosilicate tube BSG50	
Temperature limit	130 °C
Diameter / Wall thickness	19 / 1.8 mm
ISO 383 ground joint length	50 mm
Displacement hole in joint	Standard
Permanent marking	Standard
Vacuum valve	Conical insert
Air displacement	Sealing collar

DELTI-Vac can be alternatively used as / for

- vacuum drying chamber / humidity and VOC content
- monitoring of sample weight during heat treatment
- volume of combustion gases and their water content
- alternative ageing procedures
- detection of runaway tendencies
- oxygen resistance of polymers
- induction period / explosion temperature
- large scale DTA



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DESCRIPTION

- Apparatus **DELTI-Vac MIL** is a compact apparatus with inbuilt
- aluminium heating block homogeneous heat distribution
 - precise temperature controller with independent sensor
 - overheating protection with independent sensor
 - microprocessor based controlling unit
 - 12 channel DAQ unit with RJ45 connector interface
 - 4.3" colour LCD touch screen interface with 2 LED indicators
 - SD card & USB slots
 - ports for external environmental sensors and external heating lock
 - CAN bus connectors for external units (tube lift, block chiller)

DELTI-Vac MIL allows operation with heat conductive oil and has inbuilt an oil tank connected with all holes. This assures the same level in all holes.

The **DELTI-Vac MIL** is a standalone device operated by means of instruction on SD card. Additionally, it can be connected to the computer. The larger screen of PC is beneficial for experiment configuration, real-time data evaluation and final data processing but the PC is not necessary for device operation. The PC can be connected or disconnected at any moment of the measurement.

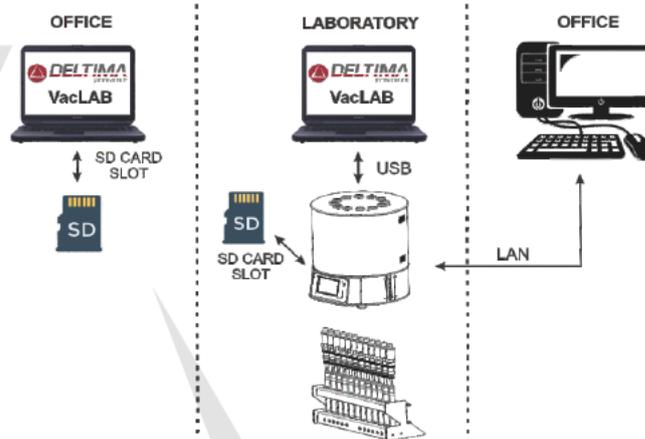
ADVANTAGEOUS FEATURES

- A standalone device with a touchscreen interface
- Alternative PC based operation
- Clustering of several units into one interface
- Unique test tubes with 50 mm long ground joint
- Easy disassembling of tube set for cleaning
- Easy replacement of broken glassware
- Oil reservoir with central filling hole
- Precise test tube temperature controlling
- Independent overheating protection (temperature limiting)
- High-resolution vacuum data acquisition
- Additional stainless steel heat protection head plate
- Active air cooling of inner sandwich structure with aerogel insulation
- External sensors for ambient temperature, pressure and humidity
- Connecting of external units (block chiller, tube lift)
- Remote firmware updates for smart support and customization
- Optimized for smooth and easy operation

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MODES OF OPERATION



The unique interface of **VacLAB** software supports **clustering of multiple units**. Connecting of more devices to one PC via USB creates **cluster** which appears as a **single device** with ultimate variability of testing temperature and time for each of the connected unit. There is no software limit for the number of connected blocks.

A cluster of multiple devices substitutes the outdated concept of controlling unit with connected heating blocks or a master block with connected slave blocks.



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