Technology.
Science.
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Telstar.
A SYNTEGON COMPANY

Thermal Vacuum Chamber

VACUUM EQUIPMENT

Thermal Vacuum Chamber

Space Simulation

Spacecrafts orbiting the earth are subject to very extreme conditions due to the high vacuum environment and sudden temperature changes and gradients.

To ensure that space hardware lasts for its specified life time, thorough testing needs to be performed, so every decisive design factor that cannot be simulated is mesuared. Telstar provides systems to conduct tests related with vacuum and temperature:

- Thermal Vacuum Tests for space hardware qualification and acceptance:
  - Components and complete satellites need to go through a series of thermal cycling stress under vacuum in order to ensure they will function properly in real operating conditions.
- Thermal equilibrium testing for space simulation.
- Material Research and Qualification: outgassing effects need to be investigated due to the fact that outgassed material can affect the spacecraft itself or its instrumentation.

480m^3 Space Simulator

Telstar Thermal Vacuum Chambers

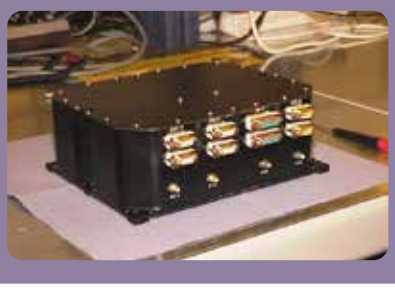
Telstar background expertise in vacuum and thermal control relies on over 50 years experience. We have designed, supplied and serviced Thermal Vacuum Chambers to test from complete satellites to small electronic components. Our chambers are able to cover the most demanding temperature ranges and heating / cooling speeds, as well as taking into account the flexibility needed for each customer's particular application:

- Ultimate Vacuum: down to 10-7 mbar
- Temperature range: from -196°C to +200°C
- Heating/cooling rates up to 10°C / min
- Thermal baseplate (fixed, movable)
- Active radiative shrouds
- Independent temperature control for baseplate and shrouds and different temperature zoning of the shrouds
- Different chamber shapes (horizontal cylinder, vertical cylinder, mailbox, etc)
- Specific monitoring instrumentation: RGA, QCM…
- Rotatable DUT support
- Vibration isolation
- Optical windows
- RF & Microwave transmitting windows
- Imaging
- Solar collimated lamps, infrared lamps

Applications

Our thermal vacuum test systems are designed and manufactured for cleanroom compatibility. They are designed for testing a wide variety of space hardware types:

- Components and subassemblies
- Antennas
- Electronic equipment and subsystems
- Optical systems
- Solar Panels
- Complete satellites



Vacuum System

The vacuum pumpset is designed according to chamber dimensions, pumpdown speed and ultimate pressure requirements. In most cases an operating pressure in the range of 10-6 mbar is sufficient. Roughing vacuum pumpsets are typically based on rotary vane vacuum pumps with roots blowers in series (complete dry pumpsets as an option). High vacuum pumpsets are based on turbomolecular pumps and/or large cryogenic vacuum pumps. Scavenger (cold) panels can be optionally proposed. Vacuum measurement is done with compact pressure transducers incorporating capacitance, pirani and ionization gages.

Telstar Thermal Vacuum Chambers

Telstar provides different thermal control systems depending on the chamber requirements for both the base plate and the shrouds:

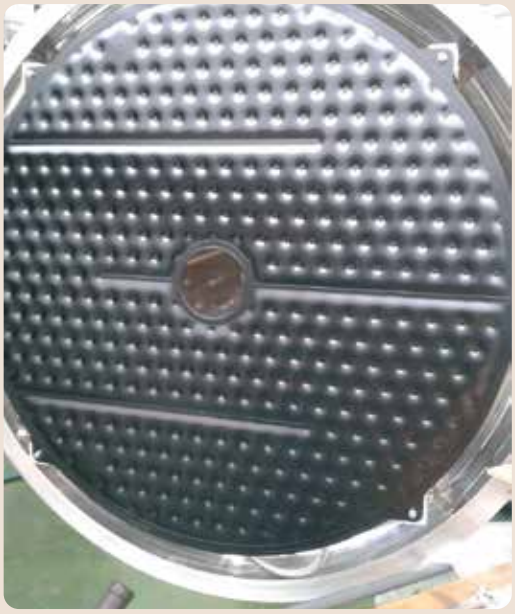
Our silicon oil based Thermal Control Units (mechanically cooled or LN2 cooled) are a cost effective solution for thermal ranges from -90°C to 150°C.

When the required temperature range is wider, low cost solutions based in open loop LN2 (once through) or the more performing compact design of dense GN2 recirculation Thermal Control Unit are the best options. Open loop LN2 inject controlled amounts of LN2 to the thermal panel for cooling and heating can be done by means of electrical heaters and/or lamps. GN2 TCUs work recirculating GN2 at constant density, providing tight temperature uniformity both during steady state and also in the heating/cooling ramps.

Thermal control unit

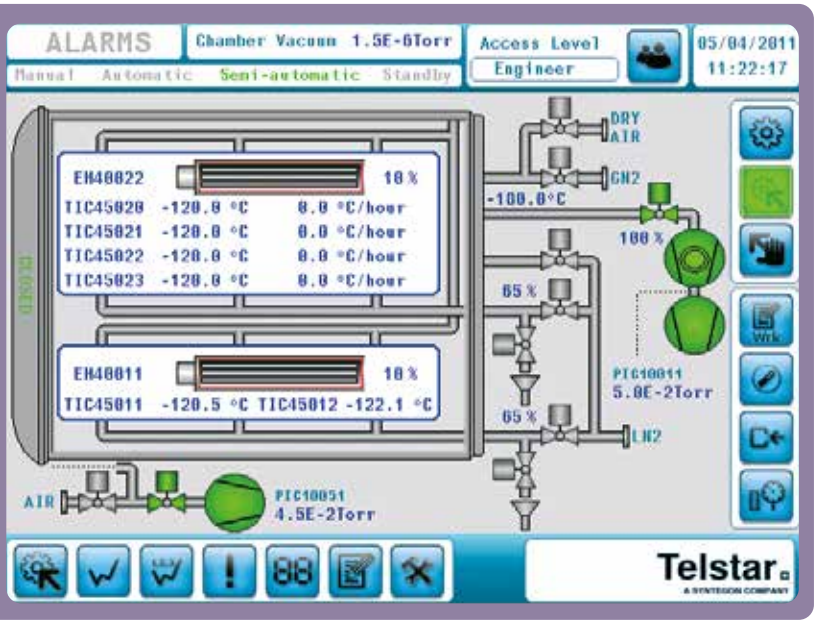
Thermal Shrouds

In order to adapt to different chamber geometries and sizes, Telstar provides a number of thermal shroud designs ensuring high conductance and optical opacity. The inner surface of the shrouds is painted with high absorptivity black paint (emissivity 0.9). The external surface of the shroud is polished and has a typical emissivity of 0.1. Telstar can provide both extruded aluminum alloy with vented profiles shrouds or double-embossed stainless steel shrouds.



Control Systems

Our Thermal Vacuum Chambers are controlled by state of the art PLC especially configured to comply with the highest quality control requirements. The PLC allows automatic operation including visual and audio signs, alarms, emergency buttons and automatic data storage. It also allows manual control of the system and modification of process parameters and recipes through the touchscreen. An optional SCADA system uses a computer to monitor and store the various parameters and events arising during operation.



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Encuentre la oficina de Telstar más cercana en www.telstar.com/international

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Telstar reserves the right to improvements and specifications changes without notice