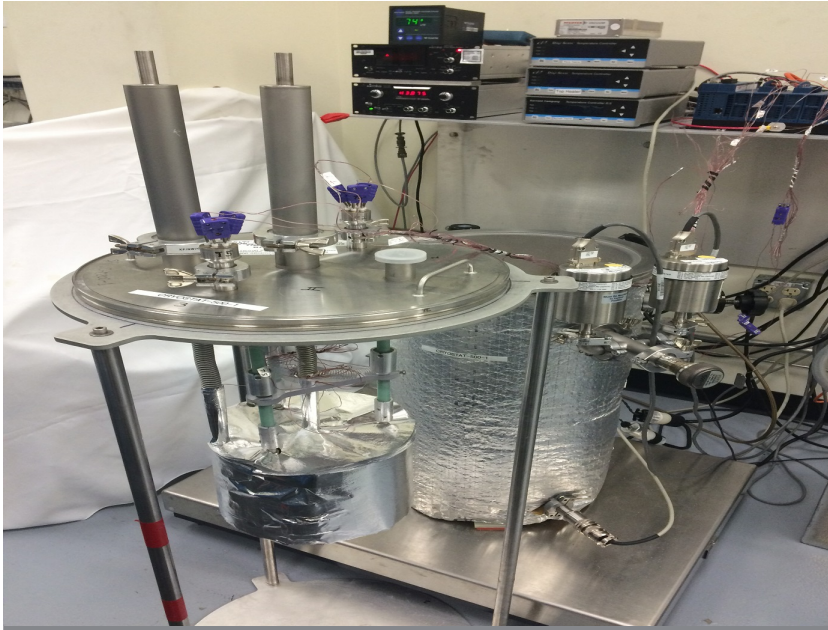


TECHNOLOGY SOLUTION

Instrumentation



Cryostat-500

Thermal Insulation Test Apparatus

NASA Kennedy Space Center seeks partners interested in the guarded flat plate insulation test cryostat (Cryostat-500), a boil-off calorimeter comprised of a flat bottom test apparatus for measuring the absolute thermal performance of an insulation test specimen. This instrument provides convenient testing of many sizes and shapes of materials, enhanced automation, and a direct route for obtaining reliable thermal performance data. Testing under conditions representative of actual-use environments including large temperature differences is also provided. The test data are presented in terms of effective thermal conductivity and heat flux.

In today's world, efficient, low-maintenance, low-temperature refrigeration is taking a more significant role, from the food industry, transportation, and medical applications to commercial buildings, energy, and space exploration. Worldwide, various regulations require that commercially available insulation materials are tested and evaluated by an accepted methodology. The new Cryostat-500 method goes beyond the prior capabilities of consensus technical standards to provide testing for real systems and materials operating below ambient temperature. The Cryostat-500 covers a wide range of test environments including full-temperature differences plus full-range vacuum conditions.

BENEFITS

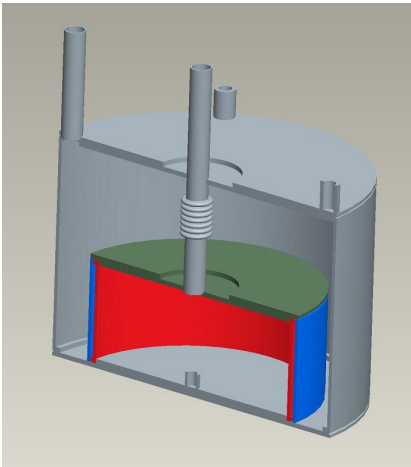
- Provides a wider range of heat flux performance
- Allows testing over the full range of environmental conditions
- Proven through extensive testing of hundreds of insulation systems and materials
- Increased quality and quantity of thermal performance data
- Cost effective and time efficient



THE TECHNOLOGY

The Cryostat-500 provides laboratory measurement of the steady-state thermal transmission properties of thermal insulation systems under conditions below ambient temperature. Liquid nitrogen is used as a direct measure of the energy going through the test specimen. Thermal insulation systems may be composed of one or more materials that may be homogeneous or non-homogeneous at boundary conditions from 77 K to 373 K and in environments from high vacuum ($10E-7$ torr) to ambient pressure ($10E+3$ torr).

The Cryostat-500 provides a much wider range of thermal performance and covers the full range of environmental conditions for applications below ambient temperature. The instrument has been proven through extensive testing of foams, composite panels, multilayer insulation (MLI) systems, aerogel blankets, fiberglass, and many other types of materials. Both the quality and quantity of the thermal performance data for insulation materials and systems have increased even as the process and method has become more time efficient and cost effective. Further guidelines on the test method and equipment for the Cryostat-500 are given in ASTM C1774, Annex A3.



Cryostat-500 interior illustration

APPLICATIONS

The technology has several potential applications:

- Electrical power generation and transmission
- Refrigeration and HVAC
- Ground and air transportation (e.g., refrigerated transport)
- Medical equipment
- Food processing
- Electronics manufacturing
- Aerospace
- Architecture and construction
- Multiple energy-related industries and sectors
- Cryogenic storage, transport, and distribution, including LNG and LH2

PUBLICATIONS

Patent No: 9,678,025