



Small Multi-Purpose Research Facility at NASA Glenn Research Center

The **Small Multi-Purpose Research Facility (SMiRF)** evaluates the performance of the thermal protection systems required to provide long-term storage (up to 10 years) of cryogenic propellants in space. The SMiRF provides the ability to simulate space, high altitudes, and launch pressure environments; conduct calorimetry tests on prototype insulation systems; and safely handle gaseous and cryogenic propellants. The SMiRF features a 72- by 100-in. diffusion-pumped high-vacuum chamber with a cold wall capable of simulating the thermal cycle of a lunar day. The facility's pumping system is augmented with mechanical pumps that are capable of matching a launch pressure profile.

Facility Benefits

- Calibrated and documented test section conditions
- Real-time data acquisition and display in both alphanumeric and graphical format
- Offers tailored test conditions for concept screenings and component testing
- Offers cryogenic fluid handling
- Provides simulated shuttle ascent pressure profile
- Accommodates in-house and private industry research programs
- Experienced staff of technicians, operations engineers, and research scientists

Commercial Applications

- Cryogenic storage
- Insulation and transfer technologies for cryogenic fluids
- Mass gauging

Programs and Projects Supported

- Insulation performance tests for the X-33 vehicle
- Rapid chill and fill of a subscale propellant tank for the High Energy Upper Stage program
- Demonstration of a zero boiloff long-term cryogenic storage concept for Moon and Mars Exploration Program



Exterior views of the SMiRF Building.



Capabilities

SMIRF	
Dimensions (diameter by length)	72 by 100 in.
Vacuum system	(Three) 10-in. ODP
No load pressure (torr)	8.5×10^{-6}
Pumping speed liter/sec (air)	7,000
Features	<ul style="list-style-type: none"> • Hazardous test capability • Thermal shroud • Launch pressure profile • In situ gas supply • Boiloff measurement • Fluid conditioning

Facility Testing Information

<http://facilities.grc.nasa.gov>

Contact

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Exterior view of the SMIRF.



LOx high-flow Liquid Acquisition Devices (LADS) test in SMIRF.



Test tank being lowered into vacuum chamber in SMIRF.