



Electric Propulsion Laboratory at NASA Glenn Research Center

The **Electric Propulsion Laboratory (EPL)** supports research of spacecraft power and electric propulsion systems. The EPL can support all phases of a propulsion or power system testing of flight-ready hardware from Technology Readiness Levels (TRLs) 2 to 7.

Facility Description

EPL features space simulation chambers that have been enhanced to support the unique requirements of space flight, electric propulsion and power system testing. The Vacuum Facility 5 (VF-5) cryopumps 3.5 million liters of air per sec with its 33.5 sq m of 12 K helium cryopanel. The VF-6 offers thermal conditions via an LN₂ cold wall and a solar simulator providing 1.2 solar constants on a 5-m-diameter target or 11 solar constants on a 30-cm target. Several of the chambers have multiple air-locked access ports. These ports allow several tests to be conducted simultaneously in each chamber without cycling the chamber back to atmospheric pressure during introduction or removal of test hardware. Conditioned direct current (dc) power is supplied to VF-5, VF-6, and VF-12 for powering ion, hall, and magnetoplasmadynamic (MPD) thrusters.

Facility Benefits

Vacuum facilities

- Two world-class facilities (VF-5 and VF-6)
- Four midsize facilities (VF-8, VF-12, VF-13, and VF-67)
- In-house and private industry research programs
- Educated staff of technicians, engineers, researchers, and operators

Building features

- 50,000 sq ft of laboratory and buildup area
- 340 sq ft of class 1,000 cleanroom
- 15 experimental labs
- Machine shop

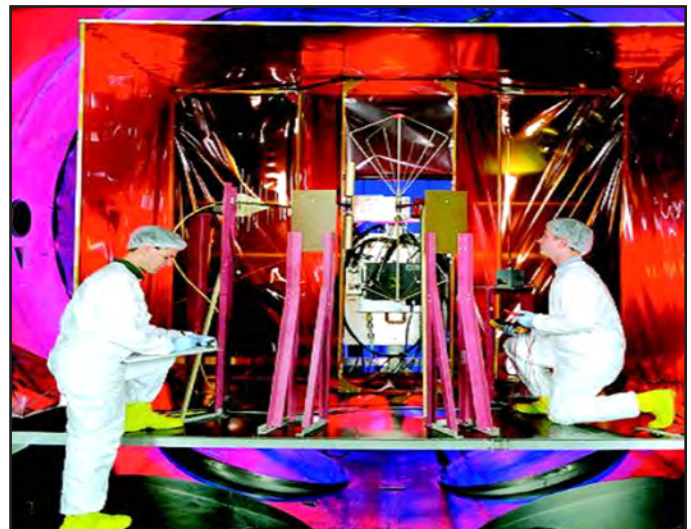
Shared facility systems

- LN₂ supplied by a 55,000-gallon dewar

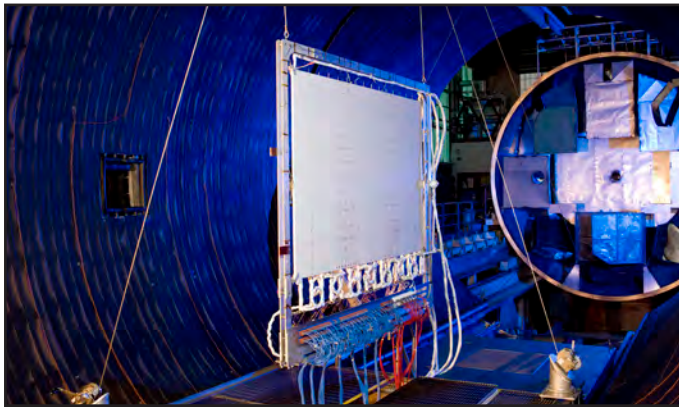
- Closed-loop 45 °C refrigeration 16 tons
- Distributed dc power for electrophysiology testing
- 200 kW (2,000 V, 100 A)
- 40 kW (2,000 V, 20 A)
- 500 kW (200 V, 2,500 A)

Programs and Projects Supported

- In-Space Propulsion
- Fission Power Systems
- Communications, Navigation and Networking Reconfigurable Testbed (CoNNeCT)
- International Space Station
- Department of Defense (DoD) and Defense Advanced Research Projects Agency (DARPA)



Electromagnetic Interference (EMI) testing of a Hall Thruster System in VF-5.



Fission Power Systems Radiator Demonstration Unit (RDU) thermal vacuum testing in VF-6.

Facility Testing Information

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

Contact

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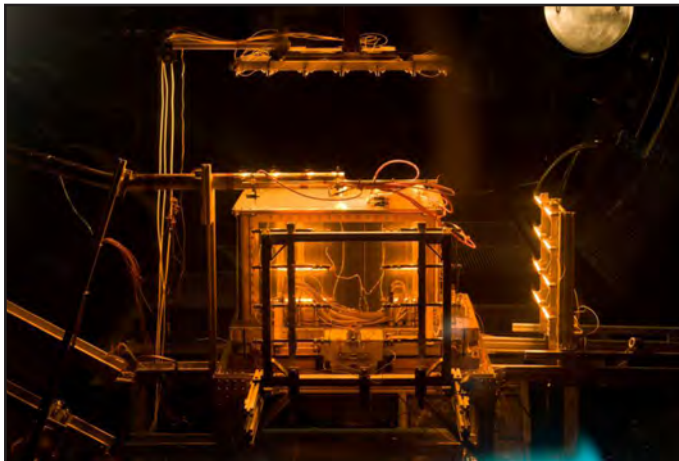
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Capabilities

Space Simulation Facilities—Electric Propulsion Laboratory

Vacuum facility	Dimensions (diam by length)	Vacuum system	No load pressure, torr	Pumping speed liter/sec, air	Features
VF-5	15 by 60 ft long Access: 13 by 30 ft long	<u>Cryopanel</u> 750 W at 20 K, 33.5 m ² of He surface <u>Diffusion Pumps</u> (20) 32-in. pumps, -50 °F traps	1×10 ⁻⁷	3,500,000 (cryo) measured capacity 250,000 ODP	Leading testbed for Electric Propulsion thrusters, portable LN ₂ cold wall, multiple test ports including 6-ft bell jar, and flight/qualification testing
VF-6	25 by 70 ft long	(12) 54-in. nude cryopump	5×10 ⁻⁷	900,000	Multirole facility supporting space power and propulsion testing large scale thermal capabilities include LN ₂ , cold and solar simulator (1 sun on 5-m target and multiple suns on smaller target), and 10-ft test port.
VF-8	5 by 15 ft long	(4) 35-in. oil diffuser pump (ODP)	4×10 ⁻⁷	120,000	Portable cold wall for thrusters, multiple test ports, gaseous feed systems H ₂ , N ₂ , and NH ₃
VF-12	10 by 30 ft Access: 10 by 16 ft	<u>Cryopanel</u> s 350 W at 20 K panel temperatures	8×10 ⁻⁸	1,000,000	
VF-13	5 by 11.5 ft	20-in. cryopump and turbopump	4×10 ⁻⁷	10,500	Rapid turnaround with valved pumping system
VF-54	18 by 36 in.	10-in. diffusion pump	1×10 ⁻⁶	1,200	
VF-56	18 by 36 in.	10-in. cryopump	5×10 ⁻⁶	400	
VF-67	3.33 by 10 ft	20-in. cryopump	9×10 ⁻⁷	10,000	Stirling testbed full LN ₂ flooded thermal shroud



CoNNeCT flight hardware testing in VF-6.



VF-6 Solar Simulator.