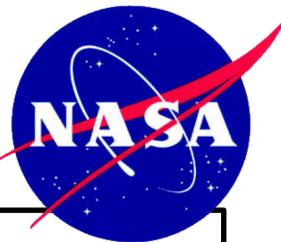


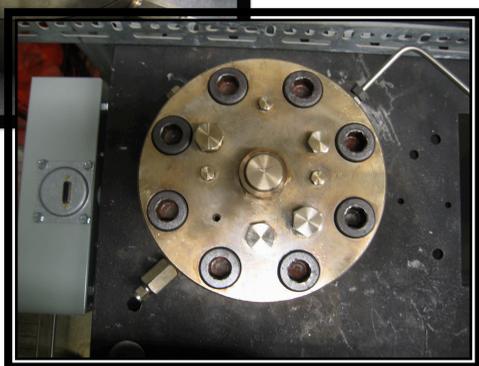
# VICI (Venus In-Situ Chamber Investigations): A Small Venus Simulation Chamber



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## Background

- ✓ Relatively few missions to Venus, even fewer landers
- ✓ Workability/survivability of instruments and equipment in Venus' harsh environment is the largest challenge
- ✓ Venus Science and Technology Definition Team (VSTDT) stated, "[The] key to enabling a Venus Flagship mission is the ability to conduct investigations and tests in Venus simulation chambers."
- ✓ VICI (Venus In-Situ Chamber Investigations) is available for use at NASA Goddard Space Flight Center in Maryland
  - ✓ Available for testing of small flight components/instruments and short-term experiments that require Venus-like high temperatures and pressures

**VENUS PRESSURE TEST CHAMBER**  
SMALL IN STATURE, BIG IN POSSIBILITIES

**A bit of background.**  
As noted in a presentation to the scientific community by the VSTDT, "[The] key to enabling a Venus Flagship mission is the ability to conduct investigations and tests in Venus simulation chambers." (LPSF 40). It was noted that "pressure and temperature mitigation technologies, whether high temperature electronics or efficient cooling mechanisms, must also be developed to a high level of readiness. Sensors and transducers that operate for long periods under ambient Venus conditions will also be required."

**The Essentials:**

- Stainless Steel 316 Pressure Vessel
- Operates at max 95.6 bar (1,387 psi)
- Cylindrical Volume: Internal Dimensions (w/thermocouple well)
- Diameter: 12.7 cm (5 inches)
- Depth: 30.5 cm (12 inches)
- Computer monitored using NI LabView 2009, automated data logging

**Operational Conditions:**

- Pressure range (bars): 1 - 95.6
- Temperature range (K): 298 - 740
- Gases: pure CO<sub>2</sub> or N<sub>2</sub> or mixture (not include SO<sub>2</sub> at ppm levels)
- Maintains high P/T for a minimum of 48 hrs

**Options:**

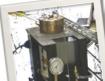
- Feedthroughs for data/power/RF
- Configure as desired
- Sapphire viewports

*Adjoining figures clockwise from top left:*  
Top of chamber - note optional inlets  
Data throughput with a SS16 leads  
Electrical side of chamber  
Mechanical side of chamber

**Questions, comments, availability?**  
Email: [Natasha.M.Johnson@nasa.gov](mailto:Natasha.M.Johnson@nasa.gov)  
Phone: 301-286-3919

**Acknowledgments:** The availability of this chamber would not be possible without the support of NASA and the Goddard Space Flight Center. Thanks are extended to Dr. William Strydom who originally built the chamber.





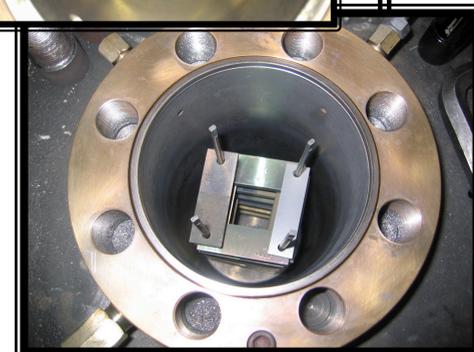
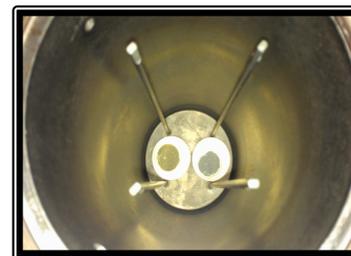
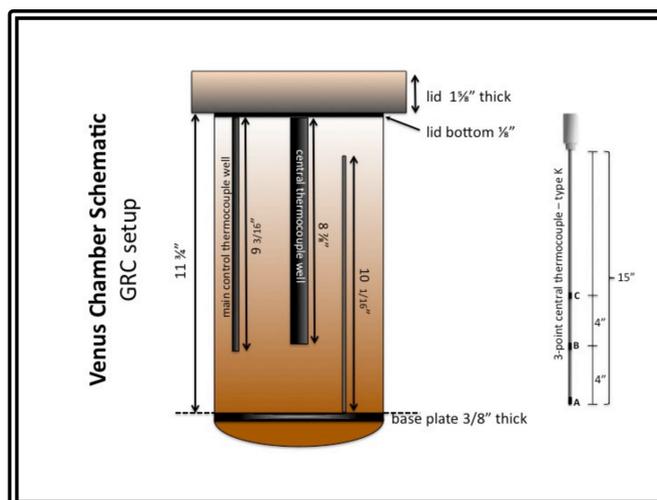




**Chamber Specifications:**  
 stainless steel 316  
 interior dimensions 12" x 5" (cylindrical)  
 Pressure range: 1- 96 bars  
 Temperature range: 22 - 500 °C  
 Gases: pure CO<sub>2</sub> or N<sub>2</sub>  
 (may include SO<sub>2</sub> at ppm levels)  
 LabView records and maintains chamber conditions



**Options:**  
 feedthroughs for data/power/RF  
 sapphire viewports (~1/4" diameter)



**Want to use the chamber?**

Contact: Natasha Johnson  
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 301-286-3919

Brainstorm? Feasibility? Time?...  
 All can be discussed.

*Excerpts from the RESEARCH OPPORTUNITIES IN SPACE AND EARTH SCIENCES - 2016 (ROSES-2016)*

NASA RESEARCH ANNOUNCEMENT (NRA)  
 SOLICITING BASIC AND APPLIED RESEARCH PROPOSALS  
 NNH16ZDA001N

C.1 PLANETARY SCIENCE RESEARCH PROGRAM OVERVIEW

4. RESEARCH FACILITIES

NASA Venus In Situ Chamber (VICI)

The Venus Pressure Test Chamber is a NASA facility that enables testing of components and small instruments under temperatures and pressures that simulate Venus surface conditions. Lower temperatures and pressures may also be accommodated. Exploratory or proof-of-concept programs requiring a limited number of experiments/tests can be accommodated at minimal cost. Extensive use of the chamber should be described in the proposal and is subject to review by VICI personnel to assess feasibility and cost effectiveness. Any use of the chamber and its corresponding costs should be included in the proposal budget. A letter of support from the VICI facility is required.

For additional information, please contact Natasha Johnson ([natasha.m.johnson@nasa.gov](mailto:natasha.m.johnson@nasa.gov)).