STANFORD UNIVERSITY
W.W. HANSEN EXPERIMENTAL PHYSICS LABORATORY
GRAVITY PROBE B, RELATIVITY GYROSCOPE EXPERIMENT
STANFORD, CALIFORNIA 94305-4085

PERMEATION TEST OF 2.5" VATTERFLY VALVE AFTER INSTALLATION OF VULCANIZED BUTYL SEAL PLATES

GPB ENGINEERING PROCEDURE

P0725 Rev. -

2 August, 2000

PREPARED _____ _____
R. Stephenson, GMA Engineer Date

APPROVED _____ _____
C. Warren, Test Engineer Date

APPROVED _____ _____
R. Singley, Vatterfly REE Date

APPROVED _____ _____
D. Ross, Quality Assurance Date

APPROVED _____ _____
B. Muhlfelder, Hardware Manager Date

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1. SCOPE

This procedure describes the permeation test of the 2.5 inch Vatterfly valve S/N 0002 (V3) after installing the new vulcanized butyl seal plate. This test will run overnight with an additional 5 hours worth of data taken the next day. This should allow the establishment of a steady state permeation rate.

2. TEST INFORMATION

- Proper care should be taken in handling the valves. Cleanliness must be preserved. Do not disturb the motorized mechanism or the sealing plate.
- Temperature: 15-30 ° C
- Humidity: not critical

2.2 Cleanliness

2.2.1 Normal lab environment when valves are capped and bagged

2.2.2 Class 1000 Clean room when valves are open to atmosphere (use clean bench)

2.3 ESD precautions

2.3.1 None required.

ONR representative, and QA to be notified prior to beginning this procedure

2.4 Personnel, QA, and Documentation

2.4.1 Personnel Integration and Test Director

2.4.2 The Integration and Test Director (ITD) shall be Ron Singley or an alternate that he shall designate. The ITD has overall responsibility for the implementation of this procedure and shall sign off the completed procedure and relevant sections within it. The Vatterfly Manager shall also sign off the completed "As-Built" procedure.

2.4.3 Integration Engineers and other personnel. All engineers and technicians participating in this procedure shall work under the direction of the ITD who shall determine personnel that are qualified to participate in this procedure. Participants in this procedure are to be A. Halevy, R Stephenson, and Chuck Warren.

2.4.4 The test shall be conducted on a formal basis to approved and released procedures. The QA program office shall be notified of the start of this procedure. A Quality Assurance

Representative, designated by D. Ross shall be present during the procedure (if deemed necessary) and shall review any discrepancies noted and approve their disposition. Upon completion of this procedure, the QA Manager, D. Ross or her designate, shall certify their concurrence that the effort was performed and accomplished in accordance with the prescribed instructions by signing and dating in the designated place(s) in this document. Discrepancies will be recorded in a D-log or as a DR per Quality Plan P0108. If a re-test of any or all of the hardware is necessary, the ITD will determine the appropriate changes in the procedure, with the QA and Integration Manager's approval.

2.5 Red-line Authority

2.5.1 Authority to red-line (make minor changes during execution) this procedure is given solely to the ITD or his designate, or the GMA Manager, and shall be approved by QA. Additionally, approval by the Hardware Manager shall be required, if in the judgment of the ITD or QA Representative, experiment functionality may be affected.

2.5.2 To conveniently record data directly into the procedure thus generating the "as-built" document, the procedure will be handled, if possible, in a paperless fashion until completed. A Laptop computer containing an electronic version of this procedure will be operated by the ITD or QA Representative and data shall be recorded by typing directly into the electronic file. Alternatively, an "As-Built" may be created after-the-fact from hand written notes in the approved procedure.

2.5.3 Following completion of the procedure and the creation of an edited electronic copy, a hard copy of the "As-Built" procedure shall be printed and ***signed off by all the designated parties.*** It shall then be filed, including an electronic copy into the data base.

2.6.4 The electronic editing of this document shall be as follows:

- Data will be inserted into the document using normal font, i.e. non-bold, non-italic
- "Signatures" shall be designated by **BLACK CAPITAL BOLD LETTERS**.
- "Redlines" shall be in ***RED BOLD ITALICS*** to make them distinguishable in computer and on the hard copy printout.
- If available, digital pictures shall be inserted into the document where appropriate.

3. DOCUMENTS AND EQUIPMENT

3.1 Applicable Documents

Document number	Rev	Description
HFS 3179	B	Valve, Vacuum, 2.5”
210127-01	–	2.5 “ Vatterfly Valve,
210125	A	2.5” Pump Valve Cover
210124	A	2.5” Pump Valve Cover Seal Side

3.2 Test Equipment

Equipment	Model and Serial Number	Calibration Date	Calibration
Helium Leak Detector			Internal leak
Pressure Gage	PGT-45L-30v/30	N/A	For indication only
Standard Leak			Leak Rate=

3.3 Flight Parts

Description	HFS Model	S/N	Comments
2.5 in. Vat Valve	3179	**0002 (V3)**	**Flight Unit**

4 PERMEATION TEST OF 0002 (V3)

Started on: _____

4.1 Experiment Setup

4.1.1 QA Representative to attend testing on a spot check basis.

4.1.2 Testing will be done at Stanford. Assembly will be done on a class 100 clean bench.

4.1.3 Attach the probe side pump valve cover to valve using proper o-rings. A GSE cover used for backfill should already be installed on space side of valve. If not, install appropriate cover on the space side of the valve.

4.1.4 Attach the probe side of valve to the leak detector port of the manifold and space side of the valve to the Helium/Evacuation port.

4.1.5 Evacuate probe side of valve and leak check all plumbing.

4.1.6 Evacuate space side of valve and leak check plumbing.

4.1.7 Close the manual valve to the space side of the Vatterfly valve.

4.1.8 Measure the background leak rate.

4.1.9 Inject space side of valve with 1 ATM (absolute) helium.

4.1.10 Record leak data in Table 1 every 30 sec for the first 5 minutes and every 5 minutes thereafter for 60 minutes. Then take data every 60 minutes for another 3 hours (three more data points). Record this data in Table 2.

4.1.11 Allow the valve to sit overnight.

4.1.12 Take data again every 60 minutes for 5 hours. Record data in Table 2.

Table1
2.5" Valve Permeation

	S/N: 0002 (V3)
Date:	
t_0 + (min)	**Leak Rate (sccs)**
Background	$\times 10^{-}$
0.5	$\times 10^{-}$
1.0	$\times 10^{-}$
1.5	$\times 10^{-}$
2.0	$\times 10^{-}$
2.5	$\times 10^{-}$
3.0	$\times 10^{-}$
3.5	$\times 10^{-}$
4.0	$\times 10^{-}$
4.5	$\times 10^{-}$
5.0	$\times 10^{-}$
10.0	$\times 10^{-}$
15.0	$\times 10^{-}$
20.0	$\times 10^{-}$
25.0	$\times 10^{-}$
30.0	$\times 10^{-}$
35.0	$\times 10^{-}$
40.0	$\times 10^{-}$
45.0	$\times 10^{-}$
50.0	$\times 10^{-}$
55.0	$\times 10^{-}$

60.0	$\times 10^{-}$

Table 2: Extended permeation Test of V3 (0002)

120	$\times 10^{-}$
180	$\times 10^{-}$
240	$\times 10^{-}$
Wait Overnight	
Morning Time =	$\times 10^{-}$
1 hour Time=	$\times 10^{-}$
2 hours Time =	$\times 10^{-}$
3 hours Time =	$\times 10^{-}$
4 hours Time =	$\times 10^{-}$
5 hours Time =	$\times 10^{-}$

5 PROCEDURE COMPLETION

The results obtained in the performance of this procedure are acceptable:

_____ date: _____
Test Engineer

Discrepancies if any:

Approved: _____ date: _____
Vatterfly REE

Approved: _____ date: _____
QA Representative

Approved: _____ date: _____
QA Manager

6. DATA BASE ENTRY

The following data shall be entered into the GP-B Data Base:

- Name, number and revision of this procedure
- Date of successful completion of procedure.

- Part numbers and serial numbers of Caging Units and their components