Thermal Vacuum Chamber
Cleaning and Cleanliness Certification
Procedure

IMAGE -FUV Project

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Revision History:

A	4/13/98	Initial Release, assign IMAGE-FUV dwg. # to existing, fully applicable FUSE procedure	JMS/HDH

1. GENERAL

1.1 Scope

This procedure is intended to prepare the UCB/SSL Thermal Vacuum Chamber for use with IMAGE non-optical flight equipment. Prior to beginning this procedure the chamber should be working properly, free of gross contaminants and have minimal air leaks. The goals of the procedure are to reduce molecular and particulate contamination to a level that is sufficient for the bakeout of flight hardware.

1.2 Safety

Some steps of this procedure require the use of solvents in closed spaces with poor ventilation, presenting the hazard of asphyxiation (passing out). Operators performing this procedure should observe the following guidelines:

1. Read about the hazards associated with the solvents being used in the Material Safety Data Sheets (MSDS) located in room 20.
2. Always have a fitted respirator available at arm's reach in case it is needed.
3. Never work alone when working in a poorly ventilated area, even if you are wearing a respirator.

1.3 Clean Room Operations

This procedure involves operations in class 10,000 cleanrooms. All personnel requirements for the facility (gowning, materials, etc.) must be met.

1.4 Acronyms and Definitions

NVR	Non-volatile residue; molecular contamination occupying a volume of air or vacuum in a gaseous or liquid-droplet state, which can precipitate onto surfaces
RGA	Residual Gas Analyser; A laboratory instrument designed to evaluate partial pressures of residual gasses in vacuum, and which is able to resolve partial pressures to less than 1 amu (atomic mass unit)
TQCM	Thermally Controlled Quartz Crystal Microbalance; A laboratory instrument designed to detect changes in the amount of molecular surface contamination on a thermally controlled surface

2. CLEANING AND BAKEOUT PROCEDURE OF T/V CHAMBER

2.1 Cleaning

1. Clean the chamber surfaces with lint-free clean wipes dampened with reagent grade ethyl alcohol. Discard wipes with visible residue. Continue cleaning surfaces until no visible residue appears on the wipes. Be careful not to allow solvent to become trapped in areas such as blind holes, o-ring grooves, etc.

2. Vacuum out the chamber (using a cleanroom compatible vacuum) to remove particulates.

3. Check that o-rings on the system are free of grease and dirt. Where possible, remove o-rings and clean the o-rings and o-ring grooves with reagent grade ethyl alcohol.

2.2 Bakeout

1. Bake the chamber at high vacuum by operating the shroud and baseplate at 80˚C for 24 hours. Make sure that the TQCM and RGA are not in the chamber during this bakeout.

2. After bakeout is complete, allow the system to cool to below 40˚C before proceeding with further chamber operations.

3. CERTIFICATION OF THE T/V CHAMBER

3.1 Procedure

1. Install a TQCM in the T/V chamber.
   Install an RGA head on the chamber with a hand-operated isolation valve between the RGA head and the chamber. Set the valve to the open position.

   ** In the following steps, record applicable data on the Chamber Cleanliness Certification (CCC) form in the Appendix. **

2. Start tank pumpdown and record the time.

3 Record the following: (a) time to rough to 30 microns (3.0 x 10e-2 Torr)
(b) time to pump from 30 microns to high vacuum of 2.0 x 10e-5 Torr

4. Close the isolation valve to the RGA head.

5. Set the shroud and baseplate temperature to 80˚C and bake for at least 48 hours.

6. Reduce the shroud and baseplate temperature to +40C.

6. Turn on the TQCM and set the TQCM temperature to -20˚C (or ambient if TQCM has no temperature capability). Allow the frequency to stabilize, then begin recording at 1 hour intervals.

7. Continue bakeout at +40˚C until the TQCM frequency changes less than 500 Hz in 1 hour (i.e. < 5 Hz/hr/cm2).

8. Record the base pressure of the chamber at 40˚C (should be < 1.0 x 10e-5 torr)

9. Open the RGA isolation valve and turn on the RGA head. Perform an degas cycle, allow it to stabilize, then take a scan of residual gasses in the range of 2-100 amu. Attach a copy of the scan to the Chamber Cleanliness Certification.

10. Turn off the RGA head and close the isolation valve.

11. Set the TQCM temperature to 25˚C and allow the temperature to stabilize.

12. Set chamber temperature to 25˚C.

13. Turn off the TQCM.

14. When chamber temperature has reached 25˚C, vent the chamber.

15. Chamber is now ready for use.

Chamber Cleanliness Certification
UCB/SSL Thermal Vacuum Chamber

Date:_____ Performed by:_____

Begin pumpdown time:_____

Time to reach 30 microns:_____

Time from 30 microns to 2.0 x 10e-5 Torr:_____

TQCM Data: (note - 1.56 x 10-9 g/cm2/Hz)

Time	TQCM Temperature	TQCM Frequency

** Continue recording data on back of sheet if necessary

Chamber base pressure at 70˚C:_____

RGA Partial Pressure Summary:

Water (18 amu):_____

Air (Nitrogen 28 amu):_____ Total hydrocarbons:_____

(Oxygen 32 amu):_____ HC mass numbers:_____

Other:_____

Cryopump regenerated by:_____ Date:_____

Certification Passed by:_____

(J. Stock or S. Jelinsky)