



SYSTEM SAFETY SURVEY

BUILDING/ROOM (OR ADDRESS IF NOT JPL)		FACILITY MANAGER Off Lab	DATE OF SURVEY
MODIFIED SINCE LAST SURVEY	YES NO N/A	FACILITY SECTION MANAGER Off Lab	SURVEY FACILITATOR, SSE
FACILITY EQUIPMENT UTILIZED		OPERATION START DATE	OPERATION END DATE
FACILITY PRIMARY CONTACT		COGNIZANT ENGINEER Off Lab	RESPONSIBLE QA
PROJECT		PDM Off Lab	COG E. SECTION MGR. OR PDM
COMPONENT / SUBSYSTEM / SYSTEM (DELIVERABLE PRODUCT)		PRIMARY HARDWARE CONTACT Off Lab	
ACTIVITY:			
Facility and Operations Combined (FOS) (SEC. A & B & C)	FACILITY, FSS (SEC. A & B)	OPERATIONS, OSS (SEC. B & C)	ENV. TEST (SEC. D/ E/ F/ G) <small>Note: Environmental test is either FOS, FSS or OSS but includes sections from D/E/F and/or G</small>
Action items will be created during the import process from the questions below.			
Rationale for NOs will be created during the import process from the questions below.			



SYSTEM SAFETY SURVEY

LIST OF ATTENDEES

Name	Organization/Function/Off Lab Email	Name	Organization/Function/Off Lab Email

HAZARDOUS AGENTS / CONDITIONS

TYPES*	HAZARD DESCRIPTION	QTY, VOLTAGE, PRESSURE, TEMPERATURE, ETC. (RANGE)	CONTROL MEASURES(s) (No.)**



SYSTEM SAFETY SURVEY

TYPES*	HAZARD DESCRIPTION	QTY, VOLTAGE, PRESSURE, TEMPERATURE, ETC. (RANGE)	CONTROL MEASURES(s) (No.)**

***HAZARDOUS TYPE KEY**

- | | | | | |
|--------------------------|-----------------------------|-------------------------|--------------------------------|----------------------|
| 1. Acoustics | 9. Electric Equipment | 17. Lasers | 25. Pyrophonic | 33. Water Reactives |
| 2. Biohazards | 10. ESD | 18. Lifting / Elevators | 26. Pressure / Vacuum System | 34. Vibration |
| 3. Carcinogens | 11. Explosives | 19. Loss of Power | 27. Process Tanks | 35. Battery (non-UL) |
| 4. Chemicals | 12. Flammable Gases | 20. Low Illumination | 28. Radiation (ionizing) | 36. Other: _____ |
| 5. Cryogenics | 13. Flammable Liquids | 21. Low Temperatures | 29. Radiation (non-ionizing) | 37. Other: _____ |
| 6. Confined Spaces | 14. High Voltage >600 Volts | 22. Oxidizer | 30. Reproductive Toxins | 38. Other: _____ |
| 7. Contamination | 15. High Temperature | 23. Oxygen Deficiency | 31. Toxic Materials | |
| 8. Contamination Sources | 16. Humidity / Water | 24. Physical Hazards | 32. Use Clean Agents for Fires | |

****HAZARDOUS CONTROL MEASURE KEY**

- | | | | |
|--|---------------------------|---|---|
| C1. Safety Glasses | C9. Gloves (list type) | C17. Stand-by Neutralize | C25. Conductive Transporters |
| C2. Goggles (list type) | C10. Apron | C18. Double Containment | C26. Cleanliness |
| C3. Faceshield | C11. Lab Coat / Coveralls | C19. Lock Out / Tag Out / Procedures | C27. Thermal Insulation |
| C4. Hearing Protection | C12. Bunny Suit | C20. Waste Disposal Can | C28. Automatic Fire Sprinklers |
| C5. Particulate Respirator | C13. Shielding or Barrier | C21. Satellite Waste Accumulation Point | C29. Portable Fire Extinguishers |
| C6. Chemical Respirator | C14. Oxygen Detector | C22. Wrist Straps | C30. Battery Charging, Handling & Storage Procedure |
| C7. Self-Contained Breathing Apparatus | C15. Ventilation | C23. Insulated Ground Straps | C31. Other: _____ |
| C8. Barrier Creams | C16. Chemical Fume Hood | C24. Conductive Garments | C32. Other: _____ |

Operation:	Attended	Unattended	After Hours	TV Surveillance	Buddy System	Remote
Safety warnings:	Signs	Lights	Alarms	JPL Console Alarm	Other: _____	

EMISSIONS, DISCHARGES, AND WASTES

WASTE GENERATED	RATE e.g., grams/hr	YEARLY TOTAL e.g., grams, liters	ROUTINE DISPOSAL	NON-ROUTINE DISPOSAL



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ENVIRONMENTAL COMPLIANCE CHECKLIST

It is the responsibility of the facility & operations managers to ensure that their work practices provide for compliance with JPL practices regarding environmental protection. For more information, please contact the Environmental Affairs Program Office.

Remarks:

YES NO N/A

TRAINING

1. All required Environmental Training is up to date.
Contact the Environmental Affairs Program Office (EAPO) for status of training (<https://osms.jpl.nasa.gov/503>)

HAZARDOUS WASTE – *Waste which is: ignitable, corrosive, toxic, or reactive. Also, waste contaminated with chemicals (wipes, syringes, empty bottles that held chemicals, etc.)*

2. Arrangements for all hazardous waste pick-up must be completed by EAPO (ext. 4-0635) without exception.
3. Employees handling hazardous waste are trained and training is current.
4. Each container of hazardous waste is properly labeled with a form generated by the JPL Hazardous Waste Generator Tool (<https://hazwastetracking.jpl.nasa.gov/tickets>) or JPL form 2799.
5. No hazardous waste placed in blue recycle bin, office trash can or in outside dumpster. (Hazardous waste must be stored indoors at or near point of generation.)

AIR QUALITY

6. Copy of the permit (i.e., the latest revision) for permitted equipment posted at the location of the equipment (e.g. generators, boilers, spray booths, vapor degreasers, etc.)
7. Used or contaminated rags or wipes contained in a closed container when not in use.

WASTEWATER / STORMWATER

8. Advance approval obtained from EAPO before any material is placed, dumped, or washed into the sanitary sewer system (sinks, toilets, or other drains). This includes cooling water, rinse water, steam cleaning, etc.
9. No materials of any kind will be washed into the storm drain system.



SYSTEM SAFETY SURVEY

EPA REGULATED SOLVENTS APPROVED ONLY FOR FLIGHT HARDWARE USE

NOTE: When approved by the specific project, these ozone-depleting solvents may be used for flight hardware cleaning operations in addition to the traditionally approved alcohol acetone. These solvents may **NOT** be used for non-flight hardware cleaning operations except as noted in note 1 below. Indicate below which solvents are planned to be used, if any.

USE

1,1,1 – Trichloroethane (methyl chloroform)
Trichlorofluoromethane (CFC-11)
Dichlorodifluoromethane (CFC-12)
1,1,2 – Trichloro – 1,2,2 trifluoroethane (CFC-113)
1,2 – Dichloro – 1,1,2,2 –tetrafluoroethane (CFC-114)
Chloropentafluoroethane (CFC-115)
Cyclic, branched, or linear, completed methylated siloxanes
Ethylfluoride (HCH-161)
1,1,1,3,3,3 – Hexafluoropropane (HFC-236fa)

USE

1,1,2,2,3 – Pentafluoropropane (HFC-245ca)
1,1,2,3,3 – Pentafluoropropane (HFC-245ea)
1,1,1,2,3 – Pentafluoropropane (HFC-245eb)
1,1,1,3,3 – Pentafluoropropane (HFC-245fa)
1,1,1,2,3,3 – Hexafluoropropane (HFC-236ea)
1,1,1,3,3 – Pentafluorobutane (HFC-365mfc)
Chlorofluoromethane (HCFC-31)
1,2 – Dichloro – 1,1,2 – trifluoroethane (HCFC-123a)
1 – Chloro – 1-fluoroethane (HCFC-151a)

Constraints / Notes:

1. These solvents may be used for research purposes in non-cleaning applications.
2. These are ozone-depleting compounds and should not be used for cleaning except in applications where no non-ozone depleting substance has been identified as an acceptable alternative.
3. The word “cleaning” refers to “wipe-cleaning” or “hand-held spray bottles from which solvents are applied without a propellant-induced force.”
4. For cleaning processes where a solvent-holding tank (such as ultrasonic cleaners) is used, air permits may be required before such equipment can be used. Please contact EAPO for further assistance.
5. The only solvents on this list currently used for flight hardware cleaning at JPL are 1,1,1 – Trichloroethane (Methyl Chloroform) and 1,1,2 – Trichloro – 1,2,2 – Trifluoroethane (Freon or CFC-113). Whenever possible, flight projects should also avoid using these materials and use non-ozone depleting alternatives instead, such as Brulin 815.



SYSTEM SAFETY SURVEY

A. Facility Only

The following items are addressed for Facility Safety Surveys (FSS and FOS). They do not need to be addressed for a stand-alone OSS.

Y N AI NA PLEASE NOTE THAT DEFAULTS HEREIN ARE N/A. THEY MUST BE CHANGED AS APPROPRIATE TO COMPLETE THIS SURVEY.

1. Facility security systems appropriate for protection of Critical Hardware.

2. Annual maintenance for the facility has been performed by Division 28X and has been coordinated with facility manager and scheduled facility maintenance, repair, modifications does/will not interfere with critical hardware operations.

3. Emergency lighting is installed and checked for functionality.

4. Warning placards and shielding in place for facility hazards (oxygen depletion, explosives, high pressure/voltage, radiation (ionizing, laser), sonic or audio levels, etc.)

5. The fixed fire suppression systems are currently in service.

6. Emergency Phone list of critical Facility Personnel is posted at main entrances for Fire Department communication purposes.

7. Exit signs in-place over egress doors.

8. Facility operations binder or on-line system in place containing all pertinent facility information (e.g. maintenance, surveys, training, etc.).

9. Training requirements/certifications for facilities operations are current (e.g.: environmental test equipment (chambers, dynamics), HAZ COM, Lock-out/Tag-Out, fork lift, etc.).

10. Personnel warning alarms (alarm) (Fire alarm system(s), smoke alarms, oxygen sensors, vapor detection systems/panels) are appropriately located, calibrated and functional.

11. Electrical junction boxes are fully enclosed (e.g. no open knock-outs).

12. Electrical panels (circuit breakers) are clearly marked as to function.



SYSTEM SAFETY SURVEY

B. Facility and Operations

The following items are addressed for all surveys (FOS, FSS, OSS). Items herein apply to **both** Facility and Operations and should be interpreted in this context: in some cases the responsibility is mutual, and in other cases the responsibilities/actions of either the facility personnel or the operations personnel may impact the other and need to be understood.

Y N AI NA PLEASE NOTE THAT DEFAULTS HEREIN ARE N/A. THEY MUST BE CHANGED AS APPROPRIATE TO COMPLETE THIS SURVEY.

1. Date of previous Facility Safety Survey _____. All action items are closed.
2. Area: Appropriate Extinguishing Agent available for hardware (e.g.: HALON, CO2, water, etc.) and personnel knowledgeable about where extinguisher located.
3. Area: Area has been adequately cleared to support activity (e.g. housekeeping).
- F 4. Area: Equipment, including cables, distribution plumbing, is properly rated, routed, secured and labeled as to function as appropriate. Any broken/defective tools or equipment have been identified and removed from service or repaired.
 O
- F 5. Area: Equipment/cabinets and overhead items which could be hazardous to personnel/critical hardware during an earthquake properly secured.
 O
6. Area: Flight hardware signs are posted in test areas.
7. Area: Hazardous obstructions/obstacles are removed or otherwise safed, including overhead structures/fixtures.
- F 8. Area: Hazardous/flammable materials have been identified, minimized, properly contained.
 O
9. Area: Safety Data Sheet (SDS) (a.k.a. Material Safety Data Sheet (MSDS)) current and readily available.
10. Area: Mechanical/electrical parts suitably guarded (belts, vents, gauges, rotating machinery, Ground Fault Circuit interrupters, etc.)
11. Area: Unobstructed egress/ingress paths maintained to all emergency exits (30" minimum path maintained).
12. Area: Floor loading is within acceptable limits for all facility equipment and posted where necessary.
13. Contamination controls in place and maintained at appropriate levels.



SYSTEM SAFETY SURVEY

Y N AI NA

14. Crane log-book current with all required information included (anomalies, daily/monthly check-list, inspections, etc).
15. Crane umbrella utilized for lifts involving critical hardware or alternate approved protection in place and proof tags current.
16. Crane/hoisting operations: Pre-lift briefing conducted.
17. Crane: Cranes are grounded.
18. Cranes and/or other lifting/elevating devices have a list of qualified operators posted (available) and current.
19. Cranes, hoists, slings, fixtures, portable and other lifting equipment currently certified and proof tested. Crane certs posted.
20. Cranes/hoisting equipment: All lifting elements in the dynamic load path (between hook and JCI) have been proof tested. Proof tags are in place and current.
22. Design: Critical Hardware support equipment (e.g.: stands, fixtures, etc.) are in certification per Safety Requirements for Mechanical Support Equipment for JPL Critical Items, DocID 35412.
23. Designed to “fail-safe” for personnel and critical hardware.
24. ESD precautionary measures/techniques are in place (e.g.: grounding, garments, wrist straps, insulated traveling ground straps.) and verified by QA.
25. ESD survey completed for this operation and/or facility ESD protected areas, and facility ground connection verified.
Date: _____.
26. ESD: Ground straps that could contact electrical outlets are insulated, including traveling ground straps.

F
O



SYSTEM SAFETY SURVEY

Y N AI NA

- F** 27. Mishap/Incident notification person identified.
O
28. Personnel conducting hazardous operations involving exposure (e.g. radiation, chemical exposure) included in medical surveillance program.
29. Personnel have been familiarized with alarm systems and emergency evacuation procedure.
30. Personnel understand that, in case of emergency, personnel safety takes precedence, and returning to a safe state for hardware is secondary.
31. Power cords, receptacles and power strips are not damaged and have no exposed wires/terminals.
32. Power receptacles have been checked for proper phasing and grounding (*contact Facilities Maintenance and Operations, Section 2820, if unknown*).
33. Power strip(s) have all power cord plugs fully engaged (no exposed terminals or plugs).
34. Power: All cabling, power extension cords are properly rated, sized, routed, secured, protected and labeled with no daisy-chaining.
35. Power: Appropriate lightning and isolation surge protection measures baselined / implemented.
36. Power: Electrical panels and disconnect switches are not blocked. *Minimum working space of 36" deep x 30" wide maintained.*
- F** 37. Power: Facility and/or operations Electrical Ground Support Equipment (EGSE) configurations conform to code requirements, properly labeled, protected, fused, and insulated.
O
- F** 38. Power: Hardware/ systems safe in power-off state (i.e. power is not required to remain safe).
O
39. Power: Vertically mounted power strip(s) are secured and have plugs fully engaged.



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Y N AI NA

40. PPE: PPE (protective clothing/equipment) for personnel and hardware protection available for planned and contingency conditions (e.g. smocks, bunny suits, bonnets, booties, wrist straps, etc.), and where needed verified by OSPO and training for PPE current as required.
41. PPE not provided by facility, is appropriate and JPL Forms 2693 are attached.
- F**
O 42. Pressure: GSE and facility pressure/vacuum vessels/systems conform to code requirements, components properly labeled, restrained, relieved, and tested/validated. Pressure/vacuum systems and components are in current certification under the JPL In-service Inspection Program. (Note: The Pressure Systems Support group (Section 357G) maintains the database and can provide status).
43. Procedure: Equipment maintenance manual(s) exist and maintenance records kept current.
- F**
O 44. Procedures: Emergency plan and procedures are in place covering contingencies for both facility and operation for events such as earthquake, fire, loss of power or consumables, hazardous spill, brush fire, smoke contamination, etc.
45. Security: Access control appropriate and access lists are current.
46. Security: Area secured and checked by security during non-working hours.
47. Security: Emergency access to facility is adequate. Fire lanes are not blocked.
48. Security: Fire Department and JPL Security notified about *special responses* required for hardware and personnel safety.
- F**
O 49. Software: Test Software versions and parameters are up-to-date and under configuration management.
- F**
O 50. Test: Approved written detailed test procedures(s) and/or Inspection for Build, Assembly and Test (IBAT(s)) provided.
- F**
O 51. Test levels are approved and appropriate level of test constraints/inhibits implemented to protect critical hardware from damage due to over-test conditions (see *11 Points Regarding Test Plan Guidelines* at end of survey).
- F**
O 52. Test: Communications properly coordinated and tested (i.e., test conductor, facility/hardware test personnel, emergency, etc.).



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Y N AI NA

- F**
O
53. Test: Personnel involved briefed on test objectives/conduct/procedures including potential hazards.
- F**
O
54. Test: Displays and alarms are adequate to indicate in-and-out-of-specifications conditions.
55. Test: Buddy System is in effect when critical hardware is accessible or operating.
56. Test: Full time operator coverage available when JCI is operating/powered on or in an environment (e.g. thermal chamber) that is operating/powered on. (*Note: an exception may be made under certain conditions, and with the approval of the appropriate managers*).
- F**
O
57. Test: Key test parameters (vital for flight hardware protection and verification) continuously and automatically recorded and incorporated in shut-down circuit as appropriate.
58. Test: Emergency phone list of critical test personnel is posted in the test area including Mishap notification personnel (e.g. Systems Safety, Section Manager, Project MAM)
59. Test: Operations Manual available for mechanical/electrical equipment as appropriate (eg: HVAC, chambers, UPS, generators, etc.).
60. Test: Personnel location during test or activity is safe.
61. Test: Personnel training/certification current for personnel conducting operations (both hazardous and non-hazardous operations) (e.g. critical hardware handling, ESD, mate/demate, crane, lasers, radiation, etc.)
62. Test: Personnel understand that, in case of anomaly, subsequent activities are documented in IBATS/procedures.
63. Test: Q.A. coverage in place during test setup, hardware handling, pre-test/post-test operations, and critical transitions.
64. Test: Safe to Mate verification testing implemented for EGSE and interface cabling with flight hardware.
- F**
O
65. Test: Specific personnel responsibilities and chain of command is documented and understood. A test director is designated.



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Y N AI NA

66. Test: Sufficient qualified personnel available to avoid overload or fatigue: JPL work hour policy will not be violated.
67. Test: Temperature/Humidity control and monitoring system in place and calibrated.
- F** 68. Test: Uninterruptible power supply (UPS) available/maintained/verified for hardware protection and/or emergency situations.
O
69. Test: Occupational Safety Program Office (OSPO) Pre-OSR conducted. Number
70. Test. There are no conflicts for space or support personnel due to other activities.
71. Previous problems/failure that could affect the test/operation have been resolved.
72. Other items that could affect personnel, facility or hardware safety.
73. Other items that could affect personnel, facility or hardware safety.
74. If there are any NOs in this survey, they have been assessed by Project and the risk accepted. This is documented in a single action item assigned to the Project.
75. Authorization to perform this work while the Laboratory is under Covid-19 restrictions has been received and documented in an approved work plan.



SYSTEM SAFETY SURVEY

C. Operations Only

The following items are addressed for surveys that encompass hardware operations (i.e. OSS and FOS). They do not need to be addressed for a stand-alone FSS.

Y N AI NA PLEASE NOTE THAT DEFAULTS HEREIN ARE N/A. THEY MUST BE CHANGED AS APPROPRIATE TO COMPLETE THIS SURVEY.

1. Previous Operations Survey has been completed for this specific test/operations (e.g. annual recertification) and all action items closed. Date of previous Operations Safety Survey _____.
2. Warning signs posted for *operations specific* hazards (oxygen depletion, high pressure/voltage, radiation, etc.)
3. Flight hardware interface to GSE has been appropriately analyzed and documented (FMECA, Fault Tree, etc.)
4. Flight hardware/test item and GSE configuration is documented/photographed.
5. Hardware protected from overhead leaks when unattended.
6. Hardware stable/secured during all phases of testing and non-test conditions, including storage.
7. Appropriate alarms exist and personnel have been briefed on operation of specific GSE/Operations alarms.
8. EGSE power supplies/sources are fully enclosed /guarded with no energized wire exposure.
9. Specific handling constraints/conditions for hardware are documented in an IBAT/Procedure



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D. Environmental Testing – Chambers

The following items are addressed for surveys that include thermal (thermal vacuum or thermal ambient) testing; they may be an FOS or an OSS. Items should be addressed by both the Test Facility personnel and the Operations personnel: some cases the responsibility is mutual, and in other cases the responsibilities/actions of either the test facility personnel or the operations personnel may impact the other and need to be understood. For operations at JPL, the Test Facility personnel are the JPL Environmental Test Laboratory (ETL) personnel. Thermal Ambient specific test questions are preceded by "TA" and Thermal Vacuum by "TV".

Y N AI NA PLEASE NOTE THAT DEFAULTS HEREIN ARE N/A. THEY MUST BE CHANGED AS APPROPRIATE TO COMPLETE THIS SURVEY.

1. An Environmental Test Authorization and Summary (ETAS) completed for this test.
2. The chamber is certified by the Environmental Test Laboratory (ETL).
3. Chamber operator(s) have been trained and certified per Section 7.2 of JPL Rules! DocID 64395 by the ETL certification and training is current.
4. There is a trained back-up operator in the event that the primary is not available.
5. Instrumentation for the facility data acquisition system has dedicated power that is not used by any other systems. Note: this ensures that power to the data acquisition system is not lost or that noise is not introduced.
6. The chamber has been thermally cycled (dry run) by the Environmental Test Laboratory (ETL) prior to the test to verify the set (temperature) limits or overrides.
7. The chamber has been thermally mapped by the ETL to indicate any hot or cold spots.
8. The independent fail-safe has its own thermocouple and the fail-safe has the ability to shut down heating and cooling independently of the primary temperature controller.
9. Thermal sensors are installed on hardware areas subject to temperature increases exceeding the chamber temperature (e.g. heat generated by hardware power supplies, or hardware that fills the chamber and is subject to chamber wall heating) so that the test requirements and Test Article safety can be verified.
10. Thermocouples are recorded to verify the chamber performance such as shroud, heat exchanger, air temperature, etc.
11. A mass simulator has been included in the chamber thermal cycling.
12. A power distribution analysis has been conducted to assure that additional powered elements, such as lamp arrays, cameras, lasers, heating or cooling coils, etc., used with the chamber will not compromise or overload the circuit limits.



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Y N AI NA

13. Chamber doors are opened only when the hardware is at room temperature to avoid condensation.
14. The LN₂ temperature control system is equipped with a fail-safe unit and redundant solenoid in series with the control solenoid to shut off the supply of LN₂ in the event that the control solenoid fails in the open position.
15. Liquid temperature control systems are alarmed to indicate loss of flow.
16. Temperature control systems are equipped with alarms to indicate the level of liquid or gas is low.
17. Pressure overrides have been set for this test and are functionally verified by the ETL.
18. Purge requirements for this test have been verified as appropriate for the chamber volume and article under test.
19. Contamination Control has been consulted regarding bake-outs and sampling requirements during the test.
20. TA: Cable runs in the chamber have been designed to prevent hardware damage from condensation, expansion, etc.
21. TA: The Chamber blower/exhaust fan does not override the GN₂ flow and introduce air into the chamber.
22. TA: All potential air holes have been plugged especially around cable pass-through.
23. TA: Purge/coolant/back-fill gases (e.g. GN₂/LN₂) are safely vented and do not present an asphyxiation hazard.
24. TA: The gaseous nitrogen purge introduced into the chamber is verified for quality and continuously monitored for flow with a flow meter.
25. TA: The chamber's nitrogen purge line been equipped with a manual valve rather than a solenoid valve so that the loss of electrical power will not result in the loss of nitrogen purge.



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Y N AI NA

26. TA: No condensation resulted during the dry run of the chamber temperature test.

27. TA: There is no risk of drippage on the test article because the chamber is equipped with wall mounted fans and radiators and not with ceiling mounted fans and radiators.

28. TV: Peripheral hardware, such as cables/connectors, etc., have been baked-out to avoid non-volatile residue (NVR).

29. TV: A leak test has been performed on all heat exchangers inside the vacuum chamber & bulkhead feed-through fittings.

30. TV: An emergency procedure in place for how to safe the chamber so that there is no hazard to the hardware under test.

31. TV: The chamber will hold vacuum in the event of a power failure with no damage to the hardware (e.g. condensation).

32. TV: Pre-test cleanliness requirements been met and the chamber has been cleaned and verified by Contamination Control.

33. TV: Witness plates or Quartz Crystal Microbalance(s) (QCM's), if required, are in place and calibrated and procedures exist for monitoring them.



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E. Environmental Testing – Dynamic

The following items are addressed for surveys that include dynamic or vibration testing; they may be an FOS or an OSS. Items should be addressed by both the Test Facility personnel and the Operations personnel: some cases the responsibility is mutual, and in other cases the responsibilities/actions of either the test facility personnel or the operations personnel may impact the other and need to be understood. For operations at JPL, the Test Facility personnel are the JPL Environmental Test Laboratory (ETL) personnel.

Y N AI NA PLEASE NOTE THAT DEFAULTS HEREIN ARE N/A. THEY MUST BE CHANGED AS APPROPRIATE TO COMPLETE THIS SURVEY.

1. An Environmental Test Authorization and Summary (ETAS) is completed for this test.
2. System safety has been informed of software updates and there are no issues/concerns that have not been resolved.
3. A fit check between the vibe plate and hardware has been conducted.
4. The dynamic spectrum that is representative of the actual test conditions is run prior to the actual test
5. The dynamic spectrum is run prior to the test with a mass simulator as required by the project dynamic environments engineer.
6. Test equipment behavior has been characterized to avoid anomalous readings not attributable to the tested hardware.
7. Critical control system response data are evaluated real-time during testing.
8. A dynamicist will be available to support the test or has reviewed the test parameters/control measures.
9. Project engineer has arranged with JPL dynamic environments engineering for a test conductor.
10. Emergency shutdown capability is in place and verified.
11. Vibration facility maintenance schedules have been adhered to.
12. Both mating surfaces of the vibration plate are clean and free of burrs, nicks and cuts.



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Y N AI NA

13. Control accelerometers are in calibration including the use of an independent monitor accelerometer.

14. The ETL communicates instrumentation setup parameters to all test operating personnel using an instrumentation checklist.

15. Force limiting is used.

16. If force or response limit profile is adjusted, the previous test level must be repeated. If no further adjustment is needed, the next test run can proceed to the next higher level.



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F. Environmental Testing – Acoustics

The following items are addressed for surveys that include acoustic chamber testing; they may be an FOS or an OSS. Items should be addressed by both the Test Facility personnel and the Operations personnel: some cases the responsibility is mutual, and in other cases the responsibilities/actions of either the test facility personnel or the operations personnel may impact the other and need to be understood. For operations at JPL, the Test Facility personnel are the JPL Environmental Test Laboratory (ETL) personnel.

Y N AI NA PLEASE NOTE THAT DEFAULTS HEREIN ARE N/A. THEY MUST BE CHANGED AS APPROPRIATE TO COMPLETE THIS SURVEY.

1. An Environmental Test Authorization and Summary (ETAS) is been completed for this test by project operations personnel.
2. The chamber is certified by the Environmental Test Laboratory (ETL) as prescribed by Acoustic Noise Chamber Certification Test Procedure, [JPL Rules! DocID 77964]).
3. System safety has been informed of software updates and there are no issues/concerns that have not been resolved.
4. The ETL calibrates control microphones with a calibrated source and sensitivity data properly input into the control system.
5. The ETL operating personnel has performed a training run of the acoustic chamber within the last 30 days.
6. The ETL performs a verification run of the test profile prior to the installation of the flight or JPL Critical Item (JCI) hardware.
7. The ETL current operating procedure reflects the configuration of the operating and control equipment.
8. The ETL compares control system parameters to the established operating procedure.
9. The ETL verifies nitrogen pressure gauge is functioning properly (visual inspection based on expected pressure value).
10. The ETL has ensured that all previously reported anomalies with the chamber, operating system, gas supply system, and gas regulation system have been mitigated and an official notation entered into the Configuration Management System.
11. Project engineer has arranged to have a test conductor from the JPL dynamic environments engineering group.
12. The ETL communicates instrumentation setup parameters to all test operating personnel using an instrumentation checklist.
13. All test participants understand that at no time shall operating parameters be changed without the removal of flight critical hardware and a chamber re-certification operation performed by ETL before the continuation of testing.
14. All participants have been informed of the possible effects of the test article “chamber fill factor” (resonances from walls, etc.) and test article “facility interaction” (resonances emanating from hardware being tested) and there are no votes of dissent to the test moving forward.



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G. Environmental Testing – EMC Test Chambers

The following items are addressed for surveys that include Electromagnetic Compatibility / Electromagnetic Interference (EMC/EMI) RS testing; they may be an FOS or an OSS. Items should be addressed by both the Test Facility personnel and the Operations personnel: some cases the responsibility is mutual, and in other cases the responsibilities/actions of either the test facility personnel or the operations personnel may impact the other and need to be understood. For operations at JPL, the Test Facility personnel are the JPL EMC/EMI personnel.

Y N AI NA PLEASE NOTE THAT DEFAULTS HEREIN ARE N/A. THEY MUST BE CHANGED AS APPROPRIATE TO COMPLETE THIS SURVEY.

1. An Environmental Test Authorization and Summary (ETAS) is been completed for this test.

2. The EMC group will ensure that all pertinent measurement equipment (electric field sensors, power meters, spectrum analyzers etc) are calibrated and have metrology stickers up to date.

3. The EMC group's operating personnel has performed a training run of an empty EMC test chamber Radiated Emissions (RE) and Radiated Susceptibility (RS) run within the last 30 days.

4. The EMC group performs a verification run of the test profile prior to the installation of the flight or JPL Critical Item (JCI) hardware.

5. The EMC group's current operating procedure reflects the configuration of the EMC test operating and control equipment.

6. The EMC group compares Radiated Susceptibility (RS) test parameters to the established operating procedure.

7. Project engineer has arranged with JPL EMC group for a test conductor.

8. The EMC group communicates instrumentation setup parameters to all test operating personnel using an instrumentation checklist.

9. All test participants understand that at no time shall RS operating parameters be changed without the removal of flight critical hardware and a chamber re-certification operation performed by the EMC group before the continuation of testing.



SYSTEM SAFETY SURVEY

Attachments will be uploaded from the TASS website.

MINUTES



SYSTEM SAFETY SURVEY

Applicability / Instructions

This survey assesses readiness for flight-critical hardware operations, such as assembly, inspection, test activities or storage and include the integrated facility / hardware hazard analysis relationship. This checklist includes areas of concern that need to be addressed, but they are not necessarily all requirements. Checklist items may be modified by crossing out or modifying as appropriate to properly convey tailored context.

- **Critical Action Items must be closed prior to the operation.**
- **Action Items MUST be closed prior to the transport unless indicated otherwise. Documentation (e.g. email) must be sent to the SSE indicating actions have been closed.**

The survey shall be conducted sufficiently in advance to allow for action item closure prior to the commencement of the activity, and annually thereafter until completion.

References to JPL documents may be satisfied by contractor/partner equivalent processes per contract.

Assembly, inspection, test, or storage facilities used for flight-critical hardware or JPL Critical Items (JCI) shall be surveyed annually. JCI is defined as critical hardware, software, test and / or handling equipment, including fixturing or ground support equipment which if damaged or lost would:

- a) Jeopardize the successful accomplishment of a Project, experiment or task;
- b) Cause embarrassment to JPL;
- c) Result in an impact of \$500k or greater to a Program or Project.

Systems Safety Surveys are conducted per the following requirements. These requirements are not intended to be inclusive for all JPL requirements; Rules! should be referenced for additional requirements.

1. *JPL Standard for Systems Safety*, JPL Rules! DocID 34880
2. ETL Chamber Certification Survey, JPL Rules! DocID 64572
3. Personal Protective Equipment Hazard Assessment, Form 2693 (available in JPL Forms)
4. Safety Requirements for Mechanical Support Equipment for JPL Critical Items, JPL D-51956 (in PDMS)
5. Acoustic Noise Chamber Certification Test Procedure Template, DoID 77964

All items in this survey shall be assessed by the Facility Manager and / or the hardware Cognizant Engineer and marked "YES", "NO", "N/A" (Not Applicable) or AI (Action Item) as appropriate for the scope of this survey. Items assessed as "NO" should include a risk assessment and/or rationale why the item is a NO in the line item comment box. This ensures that the information is brought forward in the survey for management attention for their assessment.

References to JPL documents may be satisfied by contractor/partner equivalent processes per contract. Surveys conducted for/at Contractor facilities are not intended to impact the scope of the contract. Where JPL is not directly responsible for the hardware, action items are deemed recommendations. If there is a violation of a JPL DocID 34880 requirement where DocID 34880 is contractually required, an action item may be assigned if the contractor agrees, or the item shall be marked NO and brought to the attention of the Project. If an action item is assigned, the person it is assigned to must be a JPL person who will work with the Contractor to close the action item. Deficiencies are brought to the attention of the Project Manager who will accept any increase in risk or resolve the deficiency as appropriate.



SYSTEM SAFETY SURVEY

11 Points Regarding Test Plan Guidelines

1. Purpose – Define Objectives!
2. Priorities – Is the Project/Team in synch?
3. Requirements/Constraints (H/W, S/W, Schedule, Other)
4. Configuration, Including Article Under Test, Support Equipment, Protective Devices, Other
5. Pedigree of All H/W and S/W used during the Test, including any differences from Flight (Why are differences acceptable from A Functionality and Safety Standpoint)
6. Review of All First-Time or Significantly Different use of Test Equipment, Facility Equipment, Other
7. Pass/Fail Criteria and Data Analysis Plan
8. Readiness Assessment
 - Unit under test
 - Procedure correctness
 - Quality Assurance, safety and test personnel staffing
 - Safety precautions (H/W, S/W, monitoring equipment, other)
 - Walkthrough of test plan, activities and procedures by the actual personnel doing the test, including timeline
 - Facilities
 - Contingency plans
9. Anomaly Documentation, Reporting and Closure Approach
10. Retest Plans/Approach
11. Issues/Plans

The “SHALLS” of Testing – Safety/QA

- You shall verify all personnel and test facilities are certified.
- You shall verify safety survey has been completed and all action items closed.
- You shall verify that signed-off iBAT or test procedures are available and used.
- You shall verify test procedures have clear pass/fail criteria.
- You shall verify all parties have walked thru the procedures prior to test start
- You shall verify Cog. E is present for first-time activities (e.g., power on, mech. actions) for acceptance.
- You shall verify the pedigree of the S/W and H/W under test (JCI and test equipment).
- You shall verify all equipment is calibrated.
- You shall verify all handling constraints are followed.
- You shall assure all anomalies are documented in PFRs or equivalent.
- You shall identify all hardware safety constraints associated with the operations of the test.
- You shall communicate hardware safety constraints to the test organization and verify that they are accounted for in the test procedure.