



George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

EM50-OWI-007
Revision H
April 27, 2005

ORGANIZATIONAL WORK INSTRUCTION

EM50

Outgassing Test for Materials Associated with Sensitive Surfaces in an Ambient Environment (Test per MSFC-SPEC-2223)

APPROVING
AUTHORITY

NAME

TITLE

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DATE

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EM50

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CHECK THE MASTER LIST—
VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		6-1-97	Initial release.
Revision	A	10-14-97	Revision to incorporate SOP approach.
Revision	B	2-5-98	Revision to modify documents referenced in 4.3 Test Facility Calibration paragraph.
Revision	C	6-1-99	Revision to incorporate re-organizational changes
Revision	D	02-22-00	Change QMS documents to directives
Revision	E	06-28-02	Changes made to incorporate new document requirements and updates to reference test standards.
Revision	F	02-3-04	Changes made to update applicable documents section and correct formatting errors.
Revision	G	8-31-04	Revision to meet HQ mandates
Revision	H	04-27-05	Changes made due to reorganization

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Material Outgassing Test for Ambient Environment Applications

1. SCOPE

1.1 Scope

This document establishes the test procedure evaluating materials for ambient environment applications, e.g. clean rooms, shipping containers, etc.

1.2 Purpose

The purpose of this document is to outline the approach necessary for material outgassing testing for ambient environment applications per MSFC-SPEC-2223 "Material Outgassing Testing for Ambient Environment Applications."

1.3 Applicability

This document only applies to the test facilities in Bldg. 4711, Room E112. This operating procedure is not a substitute for formal training.

2. APPLICABLE DOCUMENTS

MSFC-SPEC-2223 - Outgassing Test for Materials Associated With Sensitive Surfaces Used In An Ambient Environment

EM50-OWI-002 - Work Request Process

EM50-OWI-003 - Control of Quality Records

EM50-OWI-004 - Control of Customer-Supplied Product

EM50-OWI-012 - Operation of Arc VUV Reflectometer (With Cams Software)

MPR 8730.5 - Control of Inspection, Measuring, and Test Equipment

3. DEFINITIONS

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3.1 contamination witness sample (CWS) - a test specimen, e.g. OWS, which represents contamination sensitive elements critical to performance of flight instrumentation. The CWS must be defined to accurately represent contamination critical elements or components.

3.2 optical witness sample (OWS) - a CWS which represents the contamination sensitive optical elements critical to instrument performance. In the standard test the OWS is a one inch diameter, 1/8 inch thick fused silica substrate polished to at least 0.1 wave at 546.1 nm. Substrates are coated with aluminum then a protective magnesium fluoride (MgF₂) overcoat to optimize reflectance at 121.6 nm. Minimum reflectance is required to be 70% from 120.0 nm to 200.0 nm.

4. INSTRUCTIONS

Note - Prior to starting the bakeout record all background information, e.g. program being supported; a contact and phone number; material/hardware description, use and cure conditions (if applicable); bakeout conditions (if applicable); date and time; etc. in the laboratory notebook.

Note - Clean room gloves shall be used for handling all components and test samples going inside the test chamber.

4.1 Material Sample Submittal

Materials submitted for testing shall be provided with product data sheets, material safety data sheets (MSDS), and test request forms when submittals are routed through Materials, Processes and Manufacturing Department's ED36 Group. A Work Request form shall be generated per EM50-OWI-002.

4.2 Material Testing

All facility certification, material testing, and facility cleaning shall be accomplished per MSFC-SPEC-2223.

4.3 Test Facility Calibration

Calibration shall be maintained as described in MPG 8730.5, Control of Inspection, Measuring, and Test Equipment.

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Verify all instrumentation associated with test facility which requires calibration have current calibration stickers. If any instrument calibration is out of date, refer to MPG 8730.5 on how to address out of calibration equipment.

5. NOTES

Unless otherwise noted, tolerance for test temperatures is $\pm 5^{\circ}\text{C}$.

Purge / Re-press gas shall be certified missile grade air, nitrogen of 99.999 % purity, or equivalent.

6. SAFETY PRECAUTIONS AND WARNING NOTES

Warning - Warnings are used when failure to observe instructions or precautions could result in injury to personnel.

Caution - Cautions are used when failure to observe instructions could result in damage to equipment.

Note - Information to help clarify multi-person procedures or simultaneous multiple operations.

6.1 General Safety Concerns

Proper safety procedures shall be followed for all operations. Personnel safety provisions shall include as a minimum safety glasses worn during filling of cryogenic traps and cleaning operations with solvents or liquids which might splash into the users eyes; proper gloves and laboratory coats worn during cleaning operations; safety shoes required during facility build-up or modifications when system components are handled; all mechanical connections for coolant, compressed gas, and liquid nitrogen verified as leak free; and, electrical cords inspected to insure all safety requirements, i.e. cord strain relief, frayed insulation, etc. are met. Any unacceptable conditions shall be corrected immediately.

Gages shall be placed on systems which use compressed gases to re-press to allow monitoring of vacuum / pressure level during chamber re-pressurization. The system pressure shall not be allowed to exceed atmospheric pressure. Additional provisions shall be taken when deemed appropriate to ensure systems do not become pressurized.

6.2 Pre-Test Checkout

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Prior to initiating any test all components shall be visually inspected for signs of stress, i.e. cracks. Components to be inspected include but are not limited to view ports, glass components, tubing, etc. If any defects are noted the component shall be taken out of service immediately.

If component defects become apparent during a test the system shall be shut down immediately and the component taken out of service.

7. APPENDICES, FORMS, AND REPORTS

7.1 Appendices

None

7.2 Work Requests

An EM50 specific work request shall be generated, tracked, and documented per EM50-OWI-002 - Work Request Process.

7.3 Test Reports

Reports documenting test results shall be written, provided, and maintained per EM50-OWI-003 - Control of Quality Records.

All sample information provided by the requester shall be included in a memo reporting test results. Sample weights if requested shall be recorded in the laboratory notebook. Reflectance data shall be provided on a reflectance data summary sheet. All forms shall be included with a memo to the requesting office.

The report of results from each test shall include the following:

- (1) Sample mass loss if requested
- (2) Reflectance data, $\Delta R/R_0$, tabulated results
- (3) Sample test temperature
- (4) Contamination witness sample (CWS) test temperature
- (5) Sample cure conditions if applicable
- (6) Sample cleaning procedure if applicable
- (7) Length of edge exposure for tape samples
- (8) Material acceptability determination
- (9) Plans for further testing if applicable, and
- (10) A statement of any other relevant items which might be deemed important.

8. QUALITY RECORDS

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Quality records required supporting testing per this OWI and records of test results will be maintained in accordance with OWI EM50-OWI-003 - Control of Quality Records. Laboratory notebooks kept beside the test facility, work request forms, and the test results / memos shall be considered quality records.

9. TEST EQUIPMENT

Test equipment and fixtures shall be defined in MSFC-SPEC-2223.

10. PERSONNEL TRAINING AND CERTIFICATION

A qualified user in all aspects of system use and operation as defined in this OWI must train personnel conducting tests. The user shall be approved by the Group Lead before being allowed to conduct testing. Training shall be per OWI EM50-OWI-001 - Personnel Training. Untrained personnel should not attempt to use the facility unless supervised by trained, experienced personnel.