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Plum Brook Station
Work Instruction No.

GRC-W7030.016

Revision

A1

Plum Brook Station Work Instruction

Assembly, Disassembly and Maintenance of Clean Systems

APPROVED

Approved by Plum Brook Management/7030:

NASA - Glenn Research Center
Cleveland, OH 44135

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Change Record

| Rev. | Effective Date | Description |
|-------------------|----------------|--|
| Initial | 1/13/99 | Initial Release |
| Initial Release 1 | 7/12/99 | CR 1999-50, multiple formatting & editorial changes |
| A | 8/11/00 | CR 2000-54, in Section 2.0, change the document number for the Glenn Research Center (GRC) Safety Manual from "LeR-M0530.001" to "LeR-P0530.001" |
| <u>A1</u> | <u>11/9/00</u> | <u>CR 2000-116, update Point of Contact</u> |
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1.0 PURPOSE

To provide a procedure for maintaining cleanliness during assembly, disassembly, and maintenance of cleaned systems.

2.0 REFERENCES

| Document Number | Document Title |
|-----------------|---|
| LeR-P0530.001 | GRC Safety Manual |
| GRC-P7030.042 | Plum Brook Cleaning Facility Operations |

3.0 SAFETY PRECAUTIONS

- 3.1 Potential for asphyxiation, working with nitrogen gas.
- 3.2 Potential exposure to high pressure gas sources.
- 3.3 Proper Personal Protective Equipment in accordance with applicable Material Safety Data Sheets

4.0 TOOLS, EQUIPMENT AND MATERIALS

4.1 Required Equipment (This will depend on job)

Clean hand tools.
 Clean plastic sheeting and bags.
 Lint free gloves.
 Clean room coveralls, boots, etc.
 Dry nitrogen.
 Miscellaneous clean parts for capping, plugging, etc.
 Oxygen compatible leak-tec.
 Teflon tape - Krytox.
 Filtered 1,1,1 Trichloroethane
 Low Oxygen Detector

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4.2 Recommended Materials for Oxygen Service^a

| <u>Application</u> | <u>Low Pressure^b</u> | <u>High Pressure^c</u> |
|---------------------------|--|---|
| Tubing and fittings | Copper Stainless Steel Steel Aluminum Aluminum Alloys | Monel Inconel 718 |
| Lubricants | Everlube 812 Microseal 100-1 and 200-1 Triolube 1175 Krytox 240AB and 240AC Braycote 3L-38RP | Batch / lot-tested Braycote 3L-38RP |
| O-Seals and backup | TFE, Halon TFE Teflon Kel F Viton | Batch / lot-tested Viton Batch / lot-tested Teflon |

^a This table lists materials for conservative design standards. Materials listed in the “Low Pressure” column and other materials that are not listed may be suitable for more extreme environment oxygen service. Careful engineering analysis and rationale shall be used to select alternate materials.

^b Nominally less than 1000 psi

^c Nominally greater than 1000 psi

5.0 PERSONNEL TRAINING AND/OR CERTIFICATION

Must be a qualified technician trained on oxygen system operations and maintenance or a supervised trainee.

6.0 INSTRUCTIONS

- 6.1 Clean component connections and adjacent interface surfaces. Remove all debris and contamination accumulation by brushing, wiping, and/or solvent flushing.
- 6.2 Isolate, insofar as possible, the portion of the system to be entered. Verify that the system is drained and depressurized.

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- 6.3 Confirm that the entire system is at ambient temperature to keep contaminated air from being cryopumped into the system. This is particularly important if a part of the system is liquid nitrogen jacketed. "Breathing" may also be caused by barometric pressure variations or temperature changes. A slight positive pressure or purge is advisable to keep the system from "breathing".
- 6.4 Establish positive purge with dry filtered nitrogen where system configuration permits. Where purging is not possible, detailed instructions shall be prepared by the performing organization.
- 6.5 Provide shelters or enclosure when required as follows:

Caution: Due to oxygen displacement by purge gas, monitoring for a low oxygen environment may be required when working in a tented area on a purged system.

 - 6.5.1 Shelters to form a polyethylene shield against falling and/or traversing particles with top and/or sides as is necessary under field environment encountered. Breathing apparatus may be required.
 - 6.5.2 Slit-bag shield, made of taped polyethylene to enclose the component and/or connections to be broken. Cut minimum slits to allow work entry as required.
 - 6.5.3 Enclosure made of visually clean materials as required to house component and/or connections to be broken, and task personnel. Make safety openings to ensure proper ventilation and allow for exit. Supplied air or SCBA breathing apparatus shall be used where nitrogen or helium is escaping in the enclosure.
- 6.6 Lint-free gloves shall be worn by task performing personnel when packaging or system seals are broken, clean components are handled, and when system is resealed. Clean room coveralls, headcover, boots, and lint-free gloves shall be worn by personnel working inside an enclosure.
- 6.7 When delays in installation or removal are encountered, the system shall be secured with a suitable protective cover to seal critical points which are exposed to the environment.
- 6.8 Maintain tool cleanliness by solvent flush, as required.
- 6.9 Visually inspect exposed system connections for damage and wipe clean with cleaning solvent.
- 6.10 Immediately before installation of a clean packaged component (seals, O-rings, etc., included), unpackage the item and visually inspect for visible contamination. Use only oxygen clean parts and components.
- 6.11 The cleanliness levels shall be inspected in the field, during and after maintenance, repair, or modification for compliance with media and system cleanliness.
- 6.12 End of Procedure.