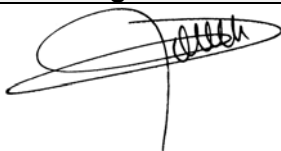






Herschel – SPIRE

Packing / unpacking procedures for the SPIRE mirrors

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| Visé par : | Signature |
| Pascal Dargent Date :28/12/2003 |  |
| For application | Signature |
| Dominique Pouliquen Date : 28/12/2003 |  |



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| RAL | King K.J. | | | | | | | | | | |
| RAL | Sawyer E. | | | | | | | | | | |
| RAL | Swinyard B.M. | | | | | | | | | | |
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| CEA | Cara C. | | | | | | | | | | |
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| | | | | | | | | | | | |
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| LAM | Blanchard P. | | X | | | | | | | | |
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| LAM | Moreaux G. | | X | | | | | | | | |
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| | | | | | | | | | | | |
| | ADP FM mirrors | | X | | | | | | | | |



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1 Introduction

The aim of this document is to give the procedure to be applied for the packing and unpacking operation of the SPIRE mirrors

2 Operator

The packing operation will be performed at LAM. A LAM operator will perform the unpacking operation at RAL.

Only one operator is requested for the packing/unpacking operation.

3 Cleanliness environment

The packing / unpacking operation must be performed in clean environment. Class 100 is requested.

4 Packing operations

4.1 Necessary tools and material

- Three plastic containers dedicated to the mirrors transportation
- Clean wipes and alcohol
- Hexagonal socket 13 mm
- One torque wrench calibrated at 2 Nm
- 1 teflon washer per mirror
- flat stainless steel washer, inner Dia 8 mm (one per mirror)
- Elastic washer inner dia 8 mm (two per mirror)
- hexagonal stainless steel nut M8 (two per mirror)
- UV lamp
- "Top gun" dry desionized N2 gun (to remove the dust on the mirrors)
- Dry N2 for the purge of the container
- Polyethylene plastic tube
- Thermal soldering machine
- Aluminium container (750x550x350)
- Foam to protect the plastic container inside the aluminium container

4.2 Location of the mirrors

The location of the mirrors is given in the following matrix:

T, are witness mirrors

| Container 1 | Container 2 | Container 3 |
|-------------|-------------|-------------|
| | | |
| SM7 - 03 | CM3 - 03 | PM7-03 |
| SM12A - 02 | CM5 - 02 | PM8-02 |
| SM12B - 02 | PM6 - 02 | PM9-01 |
| PM10 - 02 | SM6-02 | SM9A-02 |
| PM11 - 03 | SM8A-03 | SM9B-01 |
| | SM8B-03 | SM10A-03 |
| | SM11A - 03 | SM10B-02 |
| | SM11B - 02 | |
| | | |
| T 02 | T 03 | T 06 |

Tableau 1 : Location of the mirrors inside the containers

4.3 Packing procedure

The operation are performed in Class 100 environment

- 1) Clean the external surface of the containers with a clean wipe impregnated with alcohol
- 2) Open the plastic container by using the fasteners
- 3) Remove the inner parts (Plexiglas plates and column)
- 4) Clean the inside surface of the container and the inner parts of the container with a clean wipe impregnated with alcohol
- 5) Check with the UV lamp the presence of dust particles and use, if necessary, the "Top gun" to remove them
- 6) Integrate, according to the corresponding drawing, each mirror at the correct location.
- 7) Integrate the teflon washer, the two elastic washers small diameter toward the teflon, then the flat washer and the nut
- 8) Screw on the nut until the contact
- 9) Tighten the nut at the torque of 2mN, with the torque wrench
- 10) Check with the UV lamp the possible presence of dust particles and if necessary, remove them with the "Top Gun" device.
- 11) Integrate the inner parts, equipped with mirrors, inside the lower part of the plastic container
- 12) Mount the upper part and close it with the quick fasteners devices
- 13) Remove the screws located on the purge inlet and outlet
- 14) Plug the N2 purge tube
- 15) Purge the container during, at least, 10 minutes with a purge rate of about 1 l/mn
- 16) Close the purge outlet with the screw
- 17) Unplug the purge tube
- 18) Close the purge inlet with the screw
- 19) Put the container inside a polyethylene bag
- 20) Weld the two extremities of the plastic tube with the help of the thermal welding machine and let unwelded 1 small aperture on each side to allow a new N2 purge in the plastic bag
- 21) Introduce the N2 purge tube in one of the aperture and purge the plastic bag
- 22) After having inflated the plastic bag, press it to remove the N2 surplus
- 23) Remove the purge tube and weld the two remaining apertures.
- 24) Remove the container from the clean area. All the other operation will be performed in standard cleanliness environment.
- 25) Put the plastic containers inside the aluminium container and protect them with foam
- 26) Put in the container the necessary materiel to unpack the mirrors (In a welded plastic bag)
- 27) Close the aluminium container and secure the fasteners with nylon tye-wraps or equivalent devices



5 Unpacking operations

5.1 Necessary tools and material

- Cutter
- Clean wipes and alcool
- Hexagonal wrench 13 mm

5.2 Unpacking procedure

Operations to be performed in the airlock of the clean area :

- 1) Cut the tie-rop securing the fastener of the aluminium container
- 2) Open the aluminium container
- 3) Remove the 3 plastic containers from the protective foam
- 4) Clean the external plastic bags with a clean wipe impregnated with alcohol
- 5) Enter the 3 containers in the clean area

Operations to be performed in class 100

- 6) Cut one of the plastic bag extremity and take the container out of the bag
- 7) Open the container
- 8) Remove the mirror that has to be integrated by loosening the nut with the 13 mm wrench