

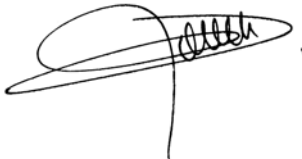





**Herschel – SPIRE**

**Acceptance Data Package**

**Flight Model Mirrors**

Fichier: LAM.QUA.SPI.ADP.030040\_10\_1.1\_ADP FM mirrors .doc

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### Distribution List

Institut	Name	Issue/Revision									
		D-	1/0	1/1							
CNES	Blanc Y.										
CNES	Lorigny E										
RAL	Griffin M.J.										
RAL	King K.J.										
RAL	Sawyer E.		X	X							
RAL	Swinyard B.M.										
CEA	Auguères J.L.										
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LAM	Malina R.										
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LAM	Origné A.										
LAM	Pouliquen D.		X	X							
LAM	Rousset G.		X	X							
LAM	Travers B.										



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## 1 Shipping Documents

The delivered parts are the mirrors for the FM model of the spectrographic and photometric channels of the SPIRE instrument.

The mirrors are delivered in 3 containers:

- Container 1 contains the following mirrors :

Mirrors	Id Number	Used for
SM7	03	Spectrometer
SM12A	02	Spectrometer
SM12B	02	Spectrometer
PM10	02	Photometer
PM11	03	Photometer
TM	02	Witness mirror

**Table 1: Container 1 - mirror list**

- Container 2 contains the following mirrors :

Mirrors	Id Number	Used for
CM3	03	Photometer
CM5	02	Photometer
PM6	02	Photometer
SM6	02	Spectrometer
SM8A	03	Spectrometer
SM8B	03	Spectrometer
SM11A	03	Spectrometer
SM11B	02	Spectrometer
TM	03	Witness mirror

**Table 2: Container 2 - mirror list**

- Container 3 Contains the following mirrors :

Mirrors	Id Number	Used for
PM7	03	Photometer
PM8	02	Photometer
PM9	01	Photometer
SM9A	02	Spectrometer
SM9B	01	Spectrometer
SM10A	03	Spectrometer
SM10B	02	Spectrometer
TM	06	Witness mirror

**Table 3 : Container 3 – mirror list**

The identification number is engraved on the rear part of the mirrors

A picture of the containers is given here after

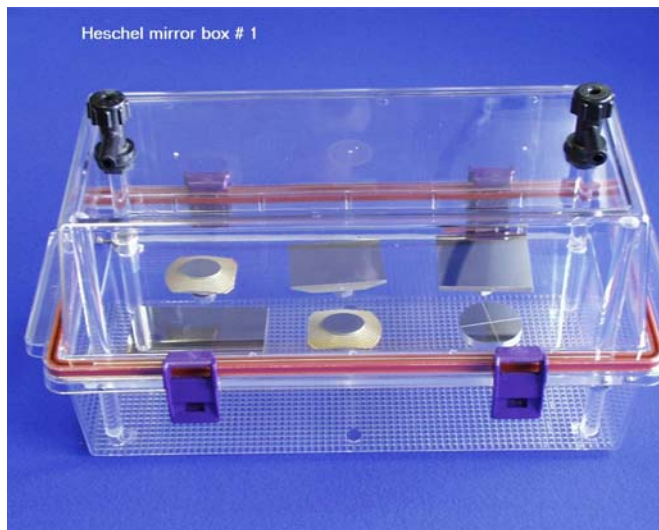


Figure 1 Container 1

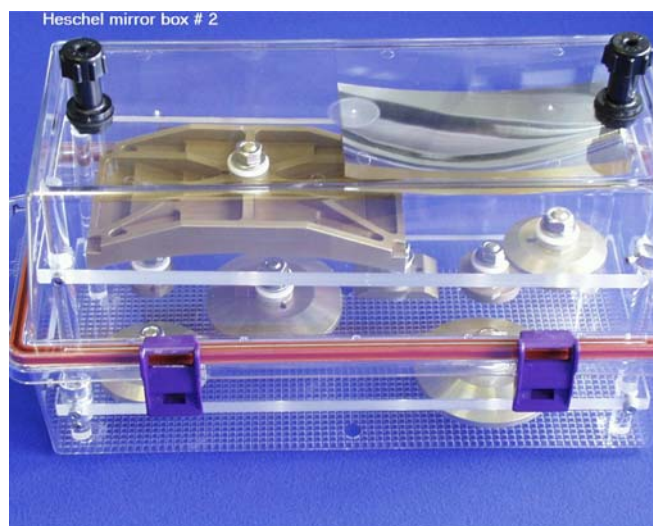


Figure 2 : Container 2

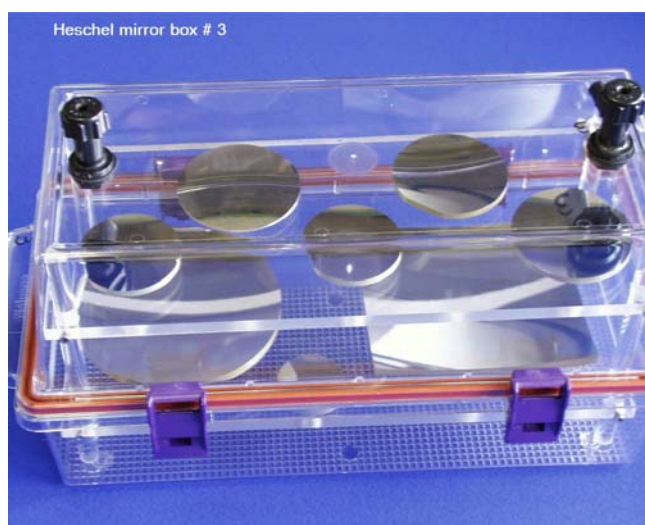
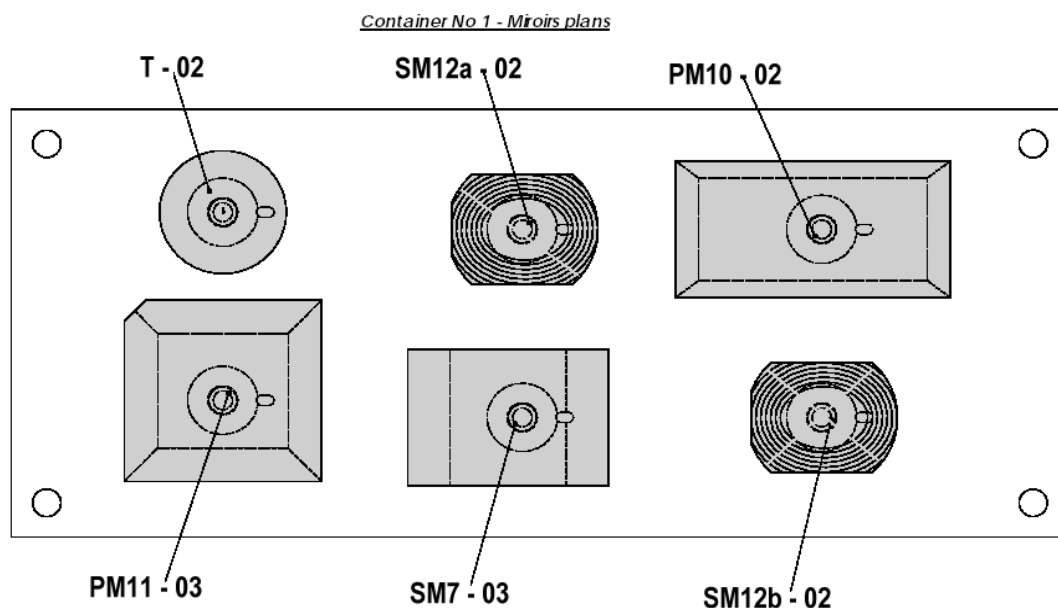
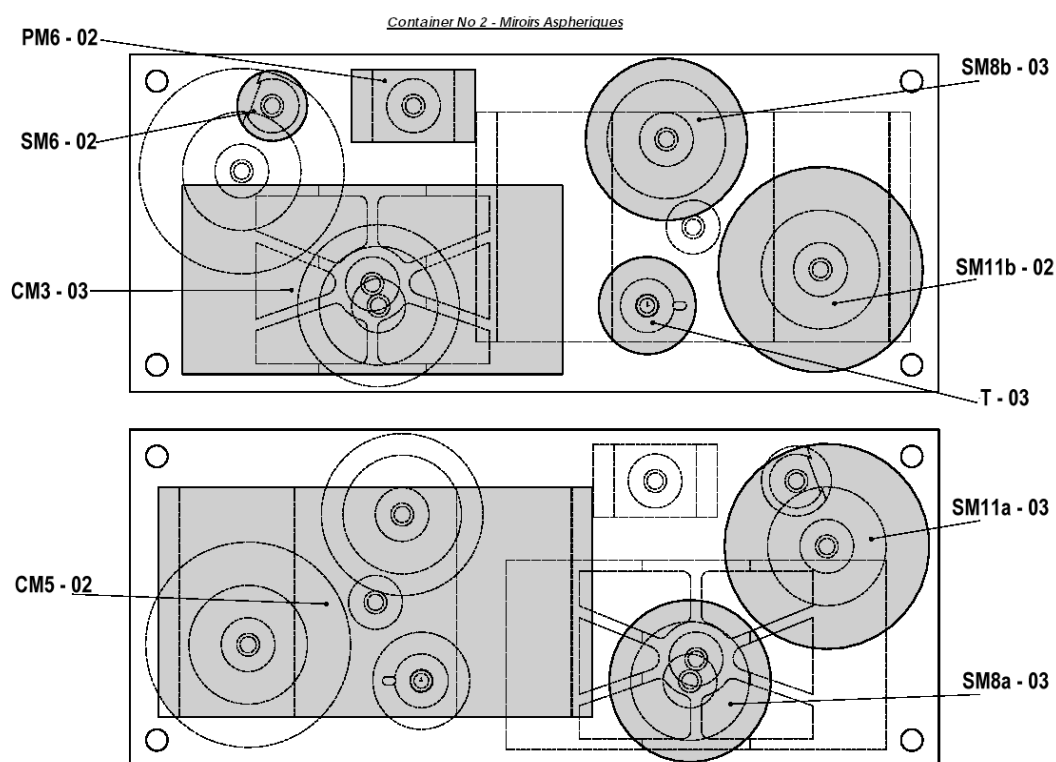


Figure 3 : Container 3

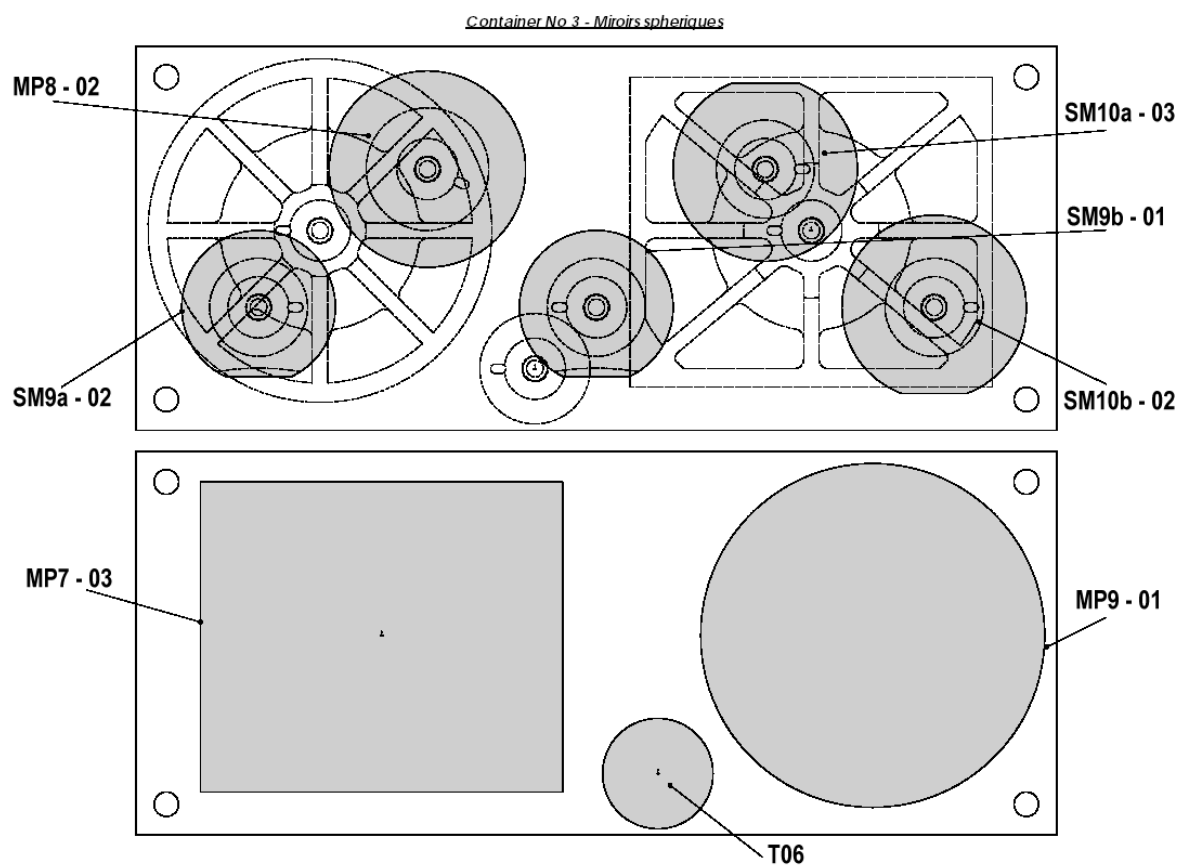
The disposition of the mirrors inside the container are given in the following figures :



**Figure 4 : Mirrors disposition inside the container 1**



**Figure 5 : Mirror disposition inside the container 2**



**Figure 6 : Mirror disposition inside the container 3**





## **2 Transportation, Handling and Installation Procedures**

List of provided procedures:

- ✓ Packing / Unpacking procedure ref : LAM.QUA.SPI.PRC.031228\_01\_10
- ✓ SPIRE Mirrors - Mechanical mounting procedure : LAM.QUA.SPI.PRC.030015\_10



### 3 Certificate of Conformance / Delivery review board MoM / AI list

Item : SPIRE Mirrors	<b>CONFORMANCE</b>	Doc. No :
Model : FM		

#### CERTIFICATE OF CONFORMANCE

Herewith is certified that the delivered mirrors that will be used for the FM model of the SPIRE instrument and whose list is given in the section 1 of the present Acceptance Data Package, complies with the following documents :

- Spire Mirrors specification ref : LAM.PJT.SPI.SPT.200007 Ind 9
- Definition drawings whose list is given in section 7 of this document.

With the exception of the agreed ECR listed in the Section 16 of this ADP

SPIRE Project Manager at LAM

\_\_\_\_\_  
 D. Pouliquen

SPIRE Product Assurance at LAM

\_\_\_\_\_  
 G. Rousset



## 4 Qualification status list / Test matrix

Not Applicable



## 5 Interface Drawings

For all the mirrors, the interface definition is given in the drawing : SPI.MIR.00.DI.01.A

## 6 Mechanical drawings

List of provided drawings :

<b>Fore optics</b>		<b>Drawing ref:</b>
	CM3	SPI-MIR-11-DD-01-A
	CM5	SPI-MIR-12-DD-01-A
<b>Photometer Channel</b>		<b>Drawing ref:</b>
	PM6	SPI-MIR-21-DD-01-A
	PM7	SPI-MIR-22-DD-01-A
	PM8	SPI-MIR-23-DD-01-A
	PM9	SPI-MIR-24-DD-01-A
	PM10	SPI-MIR-25-DD-01-A
	PM11	SPI-MIR-26-DD-01-A
<b>Spectrometer Channel</b>		
	SM6	SPI-MIR-31-DD-01-A
	SM7	SPI-MIR-32-DD-01-A
	SM8A	SPI-MIR-33-DD-01-A
	SM8B	SPI-MIR-33-DD-02-A
	SM9A	SPI-MIR-34-DD-01-A
	SM9B	SPI-MIR-34-DD-02-A
	SM10A	SPI-MIR-36-DD-01-A
	SM10B	SPI-MIR-36-DD-02-A
	SM11A	SPI-MIR-37-DD-01-A
	SM11B	SPI-MIR-37-DD-01-A
	SM12A	SPI-MIR-38-DD-01-A
	SM12B	SPI-MIR-38-DD-01-A

**Table 4: List of mechanical drawings**

## 7 As built configuration list

The as built configuration list is given here after:

Document	Doc reference
SPIRE Mirror Specification	LAM.PJT.SPI.SPT.200007 Ind 9
ICD structure mechanical I/F	SPIRE-MSS-PRJ-000 Iss1-0
I/F de montage des miroirs à 293K (Mirror mechanical I/F definition)	SPI.MIR.00.DI.01.A (Given in section 5)

<b>Drawings</b>	
<b>Fore optics</b>	
	<b>Drawing ref:</b>
CM3	SPI-MIR-11-DD-01-A
CM5	SPI-MIR-12-DD-01-A
<b>Photometer Channel</b>	
	<b>Drawing ref:</b>
PM6	SPI-MIR-21-DD-01-A
PM7	SPI-MIR-22-DD-01-A
PM8	SPI-MIR-23-DD-01-A
PM9	SPI-MIR-24-DD-01-A
PM10	SPI-MIR-25-DD-01-A
PM11	SPI-MIR-26-DD-01-A
<b>Spectrometer Channel</b>	
	<b>Drawing ref:</b>
SM6	SPI-MIR-31-DD-01-A
SM7	SPI-MIR-32-DD-01-A
SM8A	SPI-MIR-33-DD-01-A
SM8B	SPI-MIR-33-DD-02-A
SM9A	SPI-MIR-34-DD-01-A
SM9B	SPI-MIR-34-DD-02-A
SM10A	SPI-MIR-36-DD-01-A
SM10B	SPI-MIR-36-DD-02-A
SM11A	SPI-MIR-37-DD-01-A
SM11B	SPI-MIR-37-DD-01-A
SM12A	SPI-MIR-38-DD-01-A
SM12B	SPI-MIR-38-DD-01-A

**Table 5 : As built configuration list**

## 8 Serialised components list

Serial number of the delivered FM components:

Mirrors	Id Number
CM3	03
CM5	02
PM10	02
PM11	03
PM6	02
PM7	03
PM8	02
PM9	01
SM10A	03
SM10B	02
SM11A	03
SM11B	02
SM12A	02
SM12B	02
SM6	02
SM7	03
SM8A	03
SM8B	03
SM9A	02
SM9B	01
TM <sup>(1)</sup>	02
TM <sup>(1)</sup>	03
TM <sup>(1)</sup>	06

**Table 6: Serial number of the FM mirrors**

(1) Witness mirror (one per container)



## 9 List of Waivers

No RFW issued





## 10 Copies of waivers

**Not applicable**



## 11 User manual

The mirrors will be aligned with the help of the document " SPIRE Optical alignment plan ref: LAM.OPT.SPI.PRC.030023\_10.

This documents is given here after



## 12 Historical record

The overall operations implemented on the mirrors, from the material incoming inspection to the packing, are traced in the "manufacture sheets" which are not provided in this document, but available at LAM on request.

However, the main steps of the mirror manufacture are given here after:

1. Rough machining of the blanks
2. Thermal cycling for material relaxation
3. Final machining of the blanks
4. Metrology of the blanks
5. Surface treatment (Alodine 1200)
6. Optical surface manufacture by diamond turning
7. Metrology of the optical surface
8. Cleaning
9. Optical verification of the optical surface (Interferograms, roughness)
10. Bake out



## 13 Logbook / diary of events

The deliverables being individual parts, there is no logbook. For each mirror, the traceability is given in the "manufacture sheets" which are not deliverables but available at LAM on request.



## **14 Age sensitive Item record**

**Not applicable**



## **15 Open Work / Deferred Work / Open tests**

**No Open work, deferred work, open tests**



## **16 List of Non Conformance report**

The list of non conformances is given in the table at the following sheet:

DATE	NCR ref	MIN/MAJ	Parts designation	Reference document	NCR Title	STATUS C/O
21/08/2002	LAM.QUA.SPI.NCR.020016	MIN	SM12 b # 02	SPI-MIR-37-DD-01-A	Thermal treatment postponed after the finishing	C
21/08/2002	LAM.QUA.SPI.NCR.020022	MIN	SM12 a # 02	SPI-MIR-37-DD-01-A	Thermal treatment postponed after the finishing	C
21/08/2002	LAM.QUA.SPI.NCR.020030	MIN	SM8 b # 03	SPI-MIR-33-DD-02-A	Thermal treatment postponed after the finishing	C
21/08/2002	LAM.QUA.SPI.NCR.020032	MIN	CM5 # 02	SPI-MIR-12-DD-01-A	Thermal treatment postponed after the finishing	C
21/08/2002	LAM.QUA.SPI.NCR.020036	MIN	PM7 # 03	SPI-MIR-22-DD-01-A	Thermal treatment postponed after the finishing	C
25/11/2002	LAM.QUA.SPI.NCR.020068	MAJ	CM5 #1,2,3	SPI-MIR-12-DD-01-A	Width of the mirror is too short by 1 mm ( 160 instead of 161)	C
25/11/2002	LAM.QUA.SPI.NCR.020074	MIN	CM5 #1,2,3	SPI-MIR-12-DD-01-A	New alodine treatment after repair and striping of the first treatment	C
25/11/2002	LAM.QUA.SPI.NCR.020076	MIN	SM11 A et SM 11 B # 1,2,3	SPI-MIR-37-DD-01-A	New alodine treatment after repair and striping of the first treatment	C
17/01/2004	LAM.QUA.SPI.NCR.040117_01	MAJ	PM6 # 02	SPI-MIR-21-DD-01-A	Default on radius of curvature	C
17/01/2004	LAM.QUA.SPI.NCR.040117_02	MAJ	SM6 # 02	SPI-MIR-31-DD-01-A	Default on radius of curvature	C
17/01/2004	LAM.QUA.SPI.NCR.040117_03	MAJ	SM8A # 03	SPI-MIR-33-DD-01-A	Default on radius of curvature	C
17/01/2004	LAM.QUA.SPI.NCR.040117_04	MAJ	SM8B # 03	SPI-MIR-33-DD-02-A	Default on radius of curvature	C
23/01/2004	LAM.QUA.SPI.NCR.040123_01	MAJ	PM6 # 02	SPI-MIR-21-DD-01-A	Default on radius + shift of the centre of curvature	C
23/01/2004	LAM.QUA.SPI.NCR.040123_02	MAJ	SM6 # 02	SPI-MIR-31-DD-01-A	Default on radius + shift of the centre of curvature	C
23/01/2004	LAM.QUA.SPI.NCR.040123_03	MAJ	SM8A # 03	SPI-MIR-33-DD-01-A	Default on radius + shift of the centre of curvature	C
23/01/2004	LAM.QUA.SPI.NCR.040123_04	MAJ	SM8B # 03	SPI-MIR-33-DD-02-A	Default on radius + shift 3Zof the centre of curvature	C
23/01/2004	LAM.QUA.SPI.NCR.040123_05	MAJ	SM11A # 03	SPI-MIR-37-DD-01-A	Shift of the centre of curvature	C
23/01/2004	LAM.QUA.SPI.NCR.040123_06	MAJ	SM11B # 02	SPI-MIR-37-DD-01-A	Shift of the centre of curvature	C
18/02/2004	LAM.QUA.SPI.NCR.040218_01	MAJ	SM9A # 02	SPI-MIR-34-DD-01-A	Default on radius of curvature	C
18/02/2004	LAM.QUA.SPI.NCR.040218_02	MAJ	SM9B # 01	SPI-MIR-34-DD-02-A	Default on radius of curvature	C
18/02/2004	LAM.QUA.SPI.NCR.040218_03	MAJ	SM10A # 03	SPI-MIR-36-DD-01-A	Default on radius of curvature	C
18/02/2004	LAM.QUA.SPI.NCR.040218_04	MAJ	SM10B # 02	SPI-MIR-36-DD-02-A	Default on radius of curvature	C
10/03/2004	LAM.MEC.SPI.NCR.040319_01	MAJ	All the PFM Mirrors	LAM.PJT.SPI.SPT.200007 Ind 9	Roughness of the optical surface of the mirrors	C
25/05/2004	LAM.QUA.SPI.NCR.040525_01	MAJ	CM5_02	SPI-MIR-12-DD-01-A	Shift of the centre of curvature	C
25/05/2004	LAM.QUA.SPI.NCR.040528_01	MAJ	CM5_02	SPI-MIR-11-DD-01-A	Thickness of the mirror	C
25/05/2004	LAM.QUA.SPI.NCR.040528_02	MAJ	CM3_03	SPI-MIR-11-DD-01-A	Thickness of the mirror	C

Table 7 : List of the Non-Conformances





## **17 Copies of Non Conformance report**

See the Non Conformance Report at the following sheet



## 18 Test reports

The test report list is given in the table here after:

Document title	Document reference	Status
Mass measurement report	LAM.QUA.SPI.PRIV.040116_01_10	Delivered (See Doc in Section 20)
SPIRE FM mirrors - Optical measurement report	LAM.QUA.SPI.PRIV.040118_01_10	Delivered
SPIRE FM mirrors – Mechanical I/F measurement report	LAM.QUA.SPI.PRIV.040117_01_10	Delivered

**Table 8 : List of test reports**



## **19 Reference list of EIDP's**

**Not applicable**



## 20 Mass records

The mass and CdG measurement report is given in the document. " SPIRE Mirrors, Mass and CoG measurement report " ref : LAM.QUA.SPI.PR.V.040116\_01 Ed1 Rev 0 .



## 21 Cleanliness statement

The delivered mirrors have been cleaned according to the procedure LAM.QUA.SPI.PRC.020047\_10, they have been baked out at 75° during 48h at a pressure of 10-5 Torr, according to the procedure LAM.QUA.SPI.PRC.030010\_10.