 Rutherford Appleton Laboratory	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department			
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
	Instrument/Model:	SPIRE	Issue No:	2	REV:	0
	Subsystem:		Date:	15 May 2003		

SUBJECT: COMBINED DECLARED MATERIALS LIST

PREPARED BY: E A Clark

DOCUMENT No: SPIRE-RAL-PRJ-001092

ISSUE: Issue 2 Date: 15 May 2003

APPROVED BY:	Name	Date:	Signature
Project Manager	K.J. King		

**Instrument Development
Manager E. Sawyer**

**Product Assurance Eric Clark
Manager**

DISTRIBUTION

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Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
Instrument/Model:	SPIRE	Issue No:	2	REV:	0
Subsystem:		Date:	15 May 2003		


CHANGE RECORD

ISSUE	DATE	CHANGE
1	25 Jan 2002	First Issue
2	15 May 2003	Updated for the IHDR

 Rutherford Appleton Laboratory	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department		
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092	
Instrument/Model:	SPIRE	Issue No:	2	REV:	0
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	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
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	Instrument/Model:	SPIRE	Issue No:	2 REV: 0
	Subsystem:		Date:	15 May 2003

DOCUMENT LIST

Note

Where a Sub-Systems / Institutes has combined some or all of their Declared lists and / or EEE parts etc into one document, that documents details are recorded below. However only the applicable pages are included in this document .

Sub-System	Document		
	Institute	Title	Number
ATC		DECLARED MATERIALS LIST	SPIRE-ATC-PRJ-0000710 iss 1.2
CDF (QMW)			
CEA/Sap		DRCU DECLARED MATERIALS LIST	SPIRE-SAP-PRJ-001608 Iss 1.1
CEA/SBT		SPIRE & PACS Sorption Coolers Declared Materials List	
CSA/USK			
IFS (IFSI)		DPU DCL + DML+ DPL	SPIRE-IFS-Doc-001031 Iss 1
JPL			
LAM (LAS)		DECLARED PROCESS LIST SMEC SPI.PFM.00.LM.01.A	SPIRE-LAM-PRJ-000939
LAM (LAS)		DECLARED PROCESS LIST LAM/ELE/FTS/011008.01	SPIRE-LAM-PRJ-000918
MSSL		SPIRE – DECLARED MATERIALS MSSL/SPIRE/PA 002.1	SPIRE-MSS-PRJ-001129 Iss 1.0

 Rutherford Appleton Laboratory		COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
Instrument/Model:	SPIRE	Issue No:	2	REV:	0
Subsystem:		Date:	15 May 2003		

INTRODUCTION


Materials used by RAL Space Science Technical Department (SSTD) and co-producers / sub-system suppliers are listed on spreadsheets,

SCOPE

This document lists the “Declared Materials” used in the provision of the supplied parts of the **Spire** Instrument from the following sub system suppliers. See Table 1.

Table 1


Sub-System / Institute		List Supplied
Acronym	Name	Yes / No / NA
ATC	Astronomy Technology Centre	Yes
CDF (QMW)	Department of Physics and Astronomy, University of Wales, Cardiff,	No
CEA/SAp	CEA, Service d'Astrophysique Saclay	No
CEA/SBT	(CEA) Service du Basse Temperatures Grenoble	Yes
CSA/USK	Canadian Space Agency (CSA) University of Saskatchewan Canada	No
IFS (IFSI)	Instituto di Fisica dello spazio Interplanetario, Rome	Yes
JPL	JPL/Caltech, Pasadena	No
LAM (LAS)	Laboratoire d'Astronomie Spatiale, Marseille	Yes
MSSL	Mullard Space Science Lab Surrey	Yes

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department		
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092	
Instrument/Model:	SPIRE	Issue No:	2	REV:	0
Subsystem:		Date:	15 May 2003		

Appendix A to this document is a printout from that spreadsheet showing the materials used on the hardware provided for **Spire** by the above sub-system suppliers

The spreadsheet printout is compliant with **ESA: PSS-01-700 Issue 2**, each material has an individual identification number, the first digit being the group type as follows.

1. Aluminium and Aluminium Alloys
2. Copper and Copper Alloys
3. Nickel and Nickel Alloys
4. Titanium and Titanium Alloys
5. Steels
6. Stainless Steels
7. Filler Metals: Welding, Brazing, and Soldering
8. Miscellaneous Metallic Materials
9. Optical Materials
10. Adhesives, Coatings, Varnishes
11. Adhesive Tapes
12. Paints and Inks
13. Lubricants
14. Potting Compounds, Sealants, Foams
15. Reinforced Plastics
16. Rubbers and Elastomers
17. Thermoplastics (Non Adhesive Tapes, Foils (MLI)....)
18. Thermoset Plastics
19. Wires and Cables (For Materials Aspects Only)
20. Miscellaneous Non-Metallic Materials (Ceramics....)

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092
	Instrument/Model:	SPIRE	Issue No:	2 REV: 0
	Subsystem:		Date:	15 May 2003

CONTENT OF THE DECLARED MATERIALS LIST

Extract from **ESA PSS -01-700 Issue 2 (August 1993) ANNEX B**

The materials list consists of 10 columns, which shall be completed as indicated below. Furthermore, similar materials shall be grouped together as specified above.

- **COLUMN 1 :** Item Number

Identification number in each group. One only per material type. Does not change during the life of the material list (sub-items permitted when deemed necessary).

- **COLUMN 2 :** Commercial Identification

Trade name and number (to be completed in full) e.g. "ARALDITE AV 100". Correct and standard designation.

ESA has chosen:

- Trade name + number. For example "ARALDITE AY 105"
- If no trade name exists, then the manufacture's name plus number are entered: e.g. "SCHOTT BK7"
- In the case of the AISI system for steel: for other metals or alloys, the main consistent will be entered first except in the case of a traditional name (e.g. brass or bronze).
- For each material as designated above, a unique item number shall be given. If several lines are used for different applications and /or processing, sub item numbers shall be added.

- **COLUMN 3 :** Chemical Nature And Type Of Product

Example: epoxy resin, polyurethane adhesive, or Ti, 6Al, 4 alloy.

- **COLUMN 4 :** Procurement Information

Manufacturer/supplier: name of the manufacture and the name of the supplier if different. Specification: reference of the procurement specification with, if considered useful, issue and revision. It may be replaced by a national specification number if it exists and make source of procurement irrelevant.


- **COLUMN 5 :** Processing Parameters (Summary):

Give as relevant: mixture proportions, cure temperature, special-cleaning agents, surface treatment, thermal treatment, temperature, etc.

NOTE: Specification number is required, but not sufficient for ESA purposes.

- **COLUMN 6 :** Use and Location

Indicate in what subsystem, box or item the material is used and whether it acts as structural element, thermal control, electrical insulation etc. as relevant.

		COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
Instrument/Model:	SPIRE	Issue No:	2	REV:	0
Subsystem:		Date:	15 May 2003		

- **COLUMN 7 : Environmental Code**

Radiation /UV/ATAXIA (1) (R)		Ambience (A)	Temperature (2) (T)
G = Geostationary L = Low Orbit B = Radiation Belts I = Interplanetary	S = Outside Shadow L = Outside Light	V = Vacuum H = Hermetic M = Manned E = Elevated Pressure	1 = 0 to 100 2 = 101 to 200K 3 = 201 to 300 K “ etc.

(1) For materials inside the spacecraft, choose a letter from the left-hand side column. For materials on the surface of the spacecraft, combined this letter with “L” or “S”.

(2) Thermal cycle to be indicated by two values, e.g. 3/5.


(3) “RT” can be accepted as a code between 238 K (10°C) and 313 K (40°C).

Materials which are at a boundary between environments shall be described by two sets of codes.

- **COLUMN 8 : Size Code**

AREA	A (cm ²)	0 = 0 < 1
VOLUME	V (cm ³)	1 = 1 < 10
MASS	W (g)	2 = 10 < 100
		3 = 100 < 1000
		etc.....

Choose an alphanumeric combination from the above mentioned table, e.g. A5 or V2 or W3

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092
	Instrument/Model:	SPIRE	Issue No:	2 REV: 0
	Subsystem:		Date:	15 May 2003

- **COLUMN 9** : All the codes of Column 9 shall be relevant for the project concerned, which implies that they refer to validated data applicable to this project (not too old, same processing, same composition, QC tests run on the same procured lot, etc.).

Reference of test report and relevant test result code to be given in Subcolumn 9.1

- **SUBCOLUMN 9.1** :

Outgassing (OUT):

P - The material passed the Outgassing test detailed in [ECSS-Q-70-02A](#). Reference of test report to be given in Subcolumn 9.2.

F - The material failed. Waiver reference in Subcolumn 9.2.

U - Materials of which Outgassing characteristics are unknown.

Stress Corrosion Cracking (SCC):

A - The material is known to have a high resistance to SCC. (Table I document [ECSS-Q-70-36A](#)).

B - Table II and III document [ECSS-Q-70-36A](#).

Justification for approval (test reference) stated in Subcolumn 9.2 (generally making reference to [ECSS-Q-70-36A](#)).

U - Materials and / or *weldments* for which SCC characteristics are unknown: A SCC evaluation form is required, based if necessary on tests (see [ECSS-Q-70-37A](#)).

Corrosion (Corr.):

A - The material does not require a surface treatment or coating for its intended application, otherwise it shall be rated B.


B - Details of the surface treatment to be given in Column 5.

Flammability (Flamm.) (If applicable):

P - The material passes the requirements of document [ECSS-Q-70-21A](#).

F - The material failed the test of document [ECSS-Q-70-21A](#) in the applicable atmosphere. Waiver reference in Subcolumn 9.2.

U - Materials of which offgassing characteristics are unknown.

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department			
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
	Instrument/Model:	SPIRE	Issue No:	2	REV:	0
	Subsystem:		Date:	15 May 2003		

Offgassing (OFF) (if applicable):

P - The material passes the requirements of document [ECSS-Q-70-29A](#).

F - The material failed: waiver reference in Subcolumn 9.2

U - Materials of which offgassing characteristics are unknown.

- **SUBCOLUMN 9.2** : Justification for Approval

The purpose of this sub column is to enter any additional information that may be necessary in order to achieve customer approval. This information is reference of the Requests For Approval; reference of justificatory file for materials approved for other space or aeronautical programmes meeting the specific needs of the programme, reference of the evaluation report or waivers etc. These documents must be made available to ESA on request.

- **SUBCOLUMN 9.3** : Approval Status of the Contractor

A - Approved = All materials classified "A" may be used without restriction.

Y - Approved with restriction = These materials require the preparation of QC test specimens or a treatment before use: potting, coating, test specimens...

W - Approved with a waiver = These materials do not meet the requirements but are used for functional reasons. The use of such materials shall be reduced to a minimum. All the waivers shall be approved by ESA. The waiver number shall be entered in Subcolumn 9.2.

P - Pending a decision = Materials for which an evaluation report or a waiver is awaiting the contractor's provisional or definitive approval.

O - Open = New materials or materials for which investigations and qualification are in progress.

D - Deleted = This clarification is used for a material, which is no longer used.


- **COLUMN 10** : ESA approval and comments

This column will be completed by ESA in accordance with the standard comments list in Annex E.



Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
Instrument/Model:	SPIRE	Issue No:	2	REV:	0
Subsystem:		Date:	15 May 2003		

APPENDIX A

 Rutherford Appleton Laboratory	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department			
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
	Instrument/Model:	SPIRE	Issue No:	2	REV:	0
	Subsystem:		Date:	15 May 2003		

SUBJECT: COMBINED DECLARED MATERIALS LIST

PREPARED BY: E A Clark

DOCUMENT No: SPIRE-RAL-PRJ-001092

ISSUE: Issue 2 Date: 15 May 2003

APPROVED BY:	Name	Date:	Signature
Project Manager	K.J. King		

Instrument E. Sawyer
Development
Manager

Product Assurance Eric Clark
Manager

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Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
Instrument/Model:	SPIRE	Issue No:	2	REV:	0
Subsystem:		Date:	15 May 2003		

CHANGE RECORD

ISSUE	DATE	CHANGE
1	25 Jan 2002	First Issue
2	15 May 2003	Updated for the IHDR

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092
	Instrument/Model:	SPIRE	Issue No:	2 REV: 0
	Subsystem:		Date:	15 May 2003

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DOCUMENT LIST

Note

Where a Sub-Systems / Institutes has combined some or all of their Declared lists and / or EEE parts etc into one document, that documents details are recorded below. However only the applicable pages are included in this document .

Sub-System	Document	
Institute	Title	Number
ATC	DECLARED MATERIALS LIST	SPIRE-ATC-PRJ-0000710
CDF (QMW)		
CEA/Sap	DRCU DECLARED MATERIALS LIST	SPIRE-SAP-PRJ-001609 Iss 1.1
CEA/SBT	SPIRE & PACS Sorption Coolers Declared Materials List	
CSA/USK		
IFS (IFSI)	DPU DCL + DML+ DPL	SPIRE-IFS-Doc-001031 Iss 1
JPL		
LAM (LAS)	Materials List SPI.PFM.00.LM.01A	
MSSL	SPIRE – DECLARED MATERIALS MSSL/SPIRE/PA 002.1	SPIRE-MSS-PRJ-001129 Iss 1.0

 Rutherford Appleton Laboratory		COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
Instrument/Model:	SPIRE	Issue No:	2	REV:	0
Subsystem:		Date:	15 May 2003		

INTRODUCTION


Materials used by RAL Space Science Technical Department (SSTD) and co-producers / sub-system suppliers are listed on spreadsheets,

SCOPE

This document lists the “Declared Materials” used in the provision of the supplied parts of the **Spire** Instrument from the following sub system suppliers. See Table 1.

Table 1


Sub-System / Institute		List Supplied
Acronym	Name	Yes / No / NA
ATC	Astronomy Technology Centre	Yes
CDF (QMW)	Department of Physics and Astronomy, University of Wales, Cardiff,	No
CEA/SAp	CEA, Service d'Astrophysique Saclay	No
CEA/SBT	(CEA) Service du Basse Temperatures Grenoble	Yes
CSA/USK	Canadian Space Agency (CSA) University of Saskatchewan Canada	No
IFS (IFSI)	Instituto di Fisica dello spazio Interplanetario, Rome	Yes
JPL	JPL/Caltech, Pasadena	No
LAM (LAS)	Laboratoire d'Astronomie Spatiale, Marseille	Yes
MSSL	Mullard Space Science Lab Surrey	Yes

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department			
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
	Instrument/Model:	SPIRE	Issue No:	2	REV:	0
	Subsystem:		Date:	15 May 2003		

Appendix A to this document is a printout from that spreadsheet showing the materials used on the hardware provided for **Spire** by the above sub-system suppliers

The spreadsheet printout is compliant with **ESA: PSS-01-700 Issue 2**, each material has an individual identification number, the first digit being the group type as follows.

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2. Copper and Copper Alloys
3. Nickel and Nickel Alloys
4. Titanium and Titanium Alloys
5. Steels
6. Stainless Steels
7. Filler Metals: Welding, Brazing, and Soldering
8. Miscellaneous Metallic Materials
9. Optical Materials
10. Adhesives, Coatings, Varnishes
11. Adhesive Tapes
12. Paints and Inks
13. Lubricants
14. Potting Compounds, Sealants, Foams
15. Reinforced Plastics
16. Rubbers and Elastomers
17. Thermoplastics (Non Adhesive Tapes, Foils (MLI)....)
18. Thermoset Plastics
19. Wires and Cables (For Materials Aspects Only)
20. Miscellaneous Non-Metallic Materials (Ceramics....)

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092
Instrument/Model:	SPIRE	Issue No:	2	REV: 0
Subsystem:		Date:	15 May 2003	

CONTENT OF THE DECLARED MATERIALS LIST

Extract from **ESA PSS -01-700 Issue 2 (August 1993) ANNEX B**

The materials list consists of 10 columns, which shall be completed as indicated below. Furthermore, similar materials shall be grouped together as specified above.

- **COLUMN 1** : Item Number

Identification number in each group. One only per material type. Does not change during the life of the material list (sub-items permitted when deemed necessary).

- **COLUMN 2** : Commercial Identification

Trade name and number (to be completed in full) e.g. "ARALDITE AV 100". Correct and standard designation.

ESA has chosen:

- Trade name + number. For example "ARALDITE AY 105"
- If no trade name exists, then the manufacture's name plus number are entered: e.g. "SCHOTT BK7"
- In the case of the AISI system for steel: for other metals or alloys, the main consistent will be entered first except in the case of a traditional name (e.g. brass or bronze).
- For each material as designated above, a unique item number shall be given. If several lines are used for different applications and /or processing, sub item numbers shall be added.

- **COLUMN 3** : Chemical Nature And Type Of Product

Example: epoxy resin, polyurethane adhesive, or Ti, 6Al, 4 alloy.

- **COLUMN 4** : Procurement Information

Manufacturer/supplier: name of the manufacture and the name of the supplier if different. Specification: reference of the procurement specification with, if considered useful, issue and revision. It may be replaced by a national specification number if it exists and make source of procurement irrelevant.


- **COLUMN 5** : Processing Parameters (Summary):

Give as relevant: mixture proportions, cure temperature, special-cleaning agents, surface treatment, thermal treatment, temperature, etc.

NOTE: Specification number is required, but not sufficient for ESA purposes.

- **COLUMN 6** : Use and Location

Indicate in what subsystem, box or item the material is used and whether it acts as structural element, thermal control, electrical insulation etc. as relevant.

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092
	Instrument/Model:	SPIRE	Issue No:	2 REV: 0
	Subsystem:		Date:	15 May 2003

- **COLUMN 7 : Environmental Code**

Radiation /UV/ATAXIA (1) (R)		Ambience (A)	Temperature (2) (T)
G = Geostationary L = Low Orbit B = Radiation Belts I = Interplanetary	S = Outside Shadow L = Outside Light	V = Vacuum H = Hermetic M = Manned E = Elevated Pressure	1 = 0 to 100 2 = 101 to 200K 3 = 201 to 300 K “ etc.

(1) For materials inside the spacecraft, choose a letter from the left-hand side column. For materials on the surface of the spacecraft, combined this letter with “L” or “S”.

(2) Thermal cycle to be indicated by two values, e.g. 3/5.


(3) “RT” can be accepted as a code between 238 K (10°C) and 313 K (40°C).

Materials which are at a boundary between environments shall be described by two sets of codes.

- **COLUMN 8 : Size Code**

AREA	A (cm ²)	0 = 0 < 1
VOLUME	V (cm ³)	1 = 1 < 10
MASS	W (g)	2 = 10 < 100
		3 = 100 < 1000
		etc.....

Choose an alphanumeric combination from the above mentioned table, e.g. A5 or V2 or W3

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department	
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092
	Instrument/Model:	SPIRE	Issue No:	2 REV: 0
	Subsystem:		Date:	15 May 2003

- **COLUMN 9** : All the codes of Column 9 shall be relevant for the project concerned, which implies that they refer to validated data applicable to this project (not too old, same processing, same composition, QC tests run on the same procured lot, etc.).

Reference of test report and relevant test result code to be given in Subcolumn 9.1

- **SUBCOLUMN 9.1** :

Outgassing (OUT):

P - The material passed the Outgassing test detailed in [ECSS-Q-70-02A](#). Reference of test report to be given in Subcolumn 9.2.

F - The material failed. Waiver reference in Subcolumn 9.2.

U - Materials of which Outgassing characteristics are unknown.

Stress Corrosion Cracking (SCC):

A - The material is known to have a high resistance to SCC. (Table I document [ECSS-Q-70-36A](#)).

B - Table II and III document [ECSS-Q-70-36A](#).

Justification for approval (test reference) stated in Subcolumn 9.2 (generally making reference to [ECSS-Q-70-36A](#)).

U - Materials and / or *weldments* for which SCC characteristics are unknown: A SCC evaluation form is required, based if necessary on tests (see [ECSS-Q-70-37A](#)).

Corrosion (Corr.):

A - The material does not require a surface treatment or coating for its intended application, otherwise it shall be rated B.


B - Details of the surface treatment to be given in Column 5.

Flammability (Flamm.) (If applicable):

P - The material passes the requirements of document [ECSS-Q-70-21A](#).

F - The material failed the test of document [ECSS-Q-70-21A](#) in the applicable atmosphere. Waiver reference in Subcolumn 9.2.

U - Materials of which offgassing characteristics are unknown.

	COMBINED DECLARED MATERIALS LIST		PRODUCT ASSURANCE Space Science and Technology Department			
	Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
	Instrument/Model:	SPIRE	Issue No:	2	REV:	0
	Subsystem:		Date:	15 May 2003		

Offgassing (OFF) (if applicable):

P - The material passes the requirements of document [ECSS-Q-70-29A](#).

F - The material failed: waiver reference in Subcolumn 9.2

U - Materials of which offgassing characteristics are unknown.

- **SUBCOLUMN 9.2** : Justification for Approval

The purpose of this sub column is to enter any additional information that may be necessary in order to achieve customer approval. This information is reference of the Requests For Approval; reference of justificatory file for materials approved for other space or aeronautical programmes meeting the specific needs of the programme, reference of the evaluation report or waivers etc. These documents must be made available to ESA on request.

- **SUBCOLUMN 9.3** : Approval Status of the Contractor

A - Approved = All materials classified "A" may be used without restriction.

Y - Approved with restriction = These materials require the preparation of QC test specimens or a treatment before use: potting, coating, test specimens...

W - Approved with a waiver = These materials do not meet the requirements but are used for functional reasons. The use of such materials shall be reduced to a minimum. All the waivers shall be approved by ESA. The waiver number shall be entered in Subcolumn 9.2.

P - Pending a decision = Materials for which an evaluation report or a waiver is awaiting the contractor's provisional or definitive approval.

O - Open = New materials or materials for which investigations and qualification are in progress.

D - Deleted = This clarification is used for a material, which is no longer used.

- **COLUMN 10** : ESA approval and comments

This column will be completed by ESA in accordance with the standard comments list in Annex E.



Rutherford
Appleton
Laboratory

COMBINED DECLARED MATERIALS
LIST

PRODUCT ASSURANCE
Space Science and
Technology Department

Spacecraft/Project:	HERSHCEL	Document No:	SPIRE RAL PRJ 001092		
Instrument/Model:	SPIRE	Issue No:	2	REV:	0
Subsystem:		Date:	15 May 2003		

APPENDIX A

DECLARED MATERIALS LIST				ORIGINATOR:				UK ATC							
SPACECRAFT / PROJECT				Herschel				Doc. Number:				SPIRE-ATC-PRJ-710			
								Sheet No:				Page 1 of 6			
SYSTEM / EXPERIMENT				SPIRE				Issue/Rev: (last CTD #01-66)				1.2			
SUB-SYSTEM:				BSM				Date:				21.Oct.02			

BSM MatL ID	Part ID	Name & Type of Product, Form & Condition	Spec	Size Code	Processing Parameters	Corr	SCC	Flamm	Off-gas	Out-gas	OK to bake at 80°C ?	Thermal & Vacuum stable?	OK at 4°K?	Manufacturer	Remarks, Approval Reference
1.	Structure, Jiggle frame, Interface shoe, baffle	Aluminium SQUARE BAR	6082	To suit manuf	T6 BS L111 T6 Bar /BSL113 T6 Sheet / BS L114 T6 Tube / BSL 115 T6 Sheet	B	A	N/A	N/A	N/A	Y	Y	Y	ALCOA Extrusions	RAL DML list 1.01 composition Si 0.7-1.3, Fe 0.5, Cu 0.1, Mn 0.4-1, Mg 0.5-1.2, Cr 0.25, Ni 0.1, Zn 0.2, Ti 0.2
2.	Baffle	Aluminium Sheet, welded.	6082	N/A	T6	B	A	N/A	N/A	N/A	Y	Y	Y	N/A	NOT USED : Baffle now machined as per material ID 1
3.	Mirror	Aluminium, Bar	6061	To suit manuf	-T651	B	A	N/A	N/A	N/A	Y	Y	Y	British Al. Extrusions	Intermediate cycling per ATC Spec to provide stability. MSFC-HDBK-527F p88 ASTMB211 or ISO/UK equivalent
4.	Fasteners	stainless steel, austenitic	A2-70 to DIN 267	N/A	clean	A	A	A	N/A	N/A	Y	Y	Y	Reliance	Exact material within A2-70 per varies : ATC batch is traceable as AISI type 321 MAPTIS code: (10351, 10334, 10098) CRES 321)
5.	Locking inserts	stainless steel,	A2-70 to DIN 267	N/A	clean	A	A	A (GOX 500psi)	N/A	N/A	Y	Y	Y	Reliance	Exact material within A2-70 per varies : will be AISI type 304, 305 or 321. MAPTIS code: (10351, 10334, 10098) CRES 304, 321)

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SPACECRAFT / PROJECT				Herschel				Doc. Number:				SPIRE-ATC-PRJ-710			
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SYSTEM / EXPERIMENT				SPIRE				Issue/Rev: (last CTD #01-66)				1.2			
SUB-SYSTEM:				BSM				Date:				21.Oct.02			

BSM MatL ID	Part ID	Name & Type of Product, Form & Condition	Spec	Size Code	Processing Parameters	Corr	SCC	Flamm	Off-gas	Out-gas	OK to bake at 80°C ?	Thermal & Vacuum stable?	OK at 4°K?	Manufacturer	Remarks, Approval Reference
6.	Deleted	INCONEL	718	To suit manuf	TBD	A	A	A	N/A	N/A	Y	Y	Y	SPECIAL METALS CORP / INCO ALLOYS INTL	Inconel not baselined - see material 4, 28, 29 for replacement. MAPTIS 55750, 10406 REFERS
7.	Flex pivot sleeves	Aluminum plate, cold rolled. bar	6082	To suit manuf	T6 BS L111 T6 Bar /BSL113 T6 Sheet / BS L114 T6 Tube / BSL 115 T6 Sheet	B	A	N/A	U	N/A	Y	Y	Y	ALCOA or British Al. Extrusions	Baseline is Al 6082. As an option, may use matched grade material to flex pivots.
8.	Sensor targets	Soft iron	R Fe 120 TO DIN 17405	To suit manuf	ANNEAL	B?	B?	N/A	N/A	N/A	Y	Y	Y	VACUUMS CHMELZE GmbH	USED ON ISOPHOT CHOPPER Corrosion protection GOLD PLATING,
9.	Sensor mount, motor housing	Glass fibre epoxy	G10/40	Sheet, 1/4" thick	Machined	N/A	N/A	A	A	A	Y	Y	Y	TUFNOL	MAPTIS 02776 TML 0.51, CVCM 0.015 Note: A cryogenic grade material consisting of 7628 fabric woven with continuous e-glass fiber in an amine-cure
10. a	Potting compound / Adhesive	Stycast	2850FT	N/A	with Catalyst 11	N/A	N/A	A	A TML <0.5	A cvcm <0.02	Y	Y	Y	Emerson & Cuming	Various grades in MAPTIS, MSFC-HDBK. Select correct one , EG 06451 NB - LIMITED LIFE MATERIAL

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BSM MatL ID	Part ID	Name & Type of Product, Form & Condition	Spec	Size Code	Processing Parameters	Corr	SCC	Flamm	Off-gas	Out-gas	OK to bake at 80°C ?	Thermal & Vacuum stable?	OK at 4°K?	Manufacturer	Remarks, Approval Reference
10. b	Potting compound	Stycast	2850FT	N/A	with Catalyst 9	N/A	N/A	A	A TML <0.5	A cvcm <0.02	Y	Y	Y	Via TekData	Used in BSM cryoharness, supplied via RAL
11.	Adhesive, cable run	Eccobond	285	N/A	with catalyst 11	N/A	N/A	A	A TML <0.3	A cvcm <0.03	Y	Y	Y	Emerson & Cuming	MAPTIS 05475 NB - LIMITED LIFE MATERIAL
12.	Deleted	Mu-metal, sheet 0.125mm thick	N/A	N/A	N/A	A	A	N/A	N/A	N/A	TBC	Y	TBC	Goodfellow	Deleted from Baseline design - MAPTIS code 10118 MSFC-HDBK-527F p181 (spec AMS 7701) Corrosion rating 'B'
13.	Harness - wire core	Copper Alloy wire	ESA/SCC No.3901/013	21, 46	See spec	N/A	N/A	See spec			Y	Y	Y	TekData	Supply via RAL, dpec SPIRE-RAL DOC-001362
14.	Harness - insulation	PTFE insulated wire	ESA/SCC No.3901/013	21, 46	See spec	N/A	N/A				Y	Y	Y		
15. a	Harness P-Clips, Motor shims	Brass shim,	CZ108 to BS2870, BSEN 1652:1998 CW508L	Sheet,	rotary sheared.	A	A	N/A	N/A	N/A	Y	Y	Y	RS Components	MAPTIS 10234
15.b	Jiggle frame Ballast mass,	Bar stock	CZ108 to BS2870, BSEN 1652:1998 CW508L	Bar	Annealed state	B	B	N/A	N/A	N/A	Y	Y	Y	TBC (via distributor)	MAPTIS 10321
16.	Solder	66 Tin Solder, 96 tin solder (eutectic)	ECSS-Q-70-08A	N/A	N/A	TBC	TBC	TBC	TBC	TBC	Y	Y	Y	TBD	ESA Space rated soldering certification available. Option will be RAL solder (RAL DML 7.03) Multicore Alloy SN63 TIN/LEAD 22 SWG

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BSM MatL ID	Part ID	Name & Type of Product, Form & Condition	Spec	Size Code	Processing Parameters	Corr	SCC	Flamm	Off-gas	Out-gas	OK to bake at 80°C ?	Thermal & Vacuum stable?	OK at 4°K?	Manufacturer	Remarks, Approval Reference
17.	Motor Core	NiFe Soft magnetics Laminated sheets	ULTRA PERM 250 or CryoPerm 10	Sheet	Annealed	A	U	N/A	N/A	TBD	Y	Y	Y	Zeiss	All details with Zeiss/ PACS programme. DML V1.2: CryoPerm10 confirmed as selected. MAPTIS 10118 refers to similar material
18.	Motor Winding	Aluminium, high purity	5N	TBD	TBD	TBC	TBC	TBC	TBC	TBD	Y	Y	Y	California Fine Wires	All details with Zeiss/ PACS programme.
19.	Motor insulation	Polyimid (sic) : Polyimide insulation	Per Zeiss/ PACS processes	N/A	Per Zeiss/PACS processes	TBC	TBC	TBC	TBC	TBD	Y	Y	Y	Zeiss (may be Dupont Kapton ?)	Grade and application technique not known (see Zeiss, PACS QA documents).
20.	Motor winding frames	Vespel	SP-1	TBD	TBD	TBC	TBC	TBC	TBC	TBD	Y	Y	Y	Zeiss, DuPont	Weight loss <10e-10 gm/cm ² /s in -vacuum <500°F
21.	Motor Permanent Magnet	NdFeB Permanent magnets	Grade 42	10mm dia	Ni Coated all faces					TBD	80°C MAX	Y	Y	Magnet Sales UK	Ni plate for corrosion resistance, 15 microns thick all sides. Handle with care - powerful magnet.
22.	deleted	QMW Black	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not used
23.	deleted	Anodize	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Alochrom added to DPL, deleted from DML
24.	Thermal end stops	Copper	OHFC	N/A	Sheet BS 2875 C 103	A	U	N/A	N/A	TBC	Y	Y	Y	TBC	TBC if required. MAPTIS 50836. RAL MATERIAL 2.06
25.	Surface plating	Copper flashing, Nickel Plate,	See DPL	N/A	See DPL	A	U	TBC	N/A	N/A	Y	Y	Y	MB Aerospace	SEE DECLARED PROCESS LISTS.

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BSM MatL ID	Part ID	Name & Type of Product, Form & Condition	Spec	Size Code	Processing Parameters	Corr	SCC	Flamm	Off-gas	Out-gas	OK to bake at 80°C ?	Thermal & Vacuum stable?	OK at 4°K?	Manufacturer	Remarks, Approval Reference
															MAPTIS 50141, 10311, 10328
26.	Motor Thermal shields	Copper	TBD	N/A	Electroformed	A	U	N/A	N/A	TBD	Y	Y	Y	Waveform Electro-forming	MAPTIS 10311.
27.	Deleted	Niobium plate	N/A	N/A	plating	A	U	N/A	N/A	N/A	TBC	Y	Y	TBD	not baseline Potential use as superconducting magnetic shield, only if required by subsequent test . MAPTIS 50701 (wire)
28.	Flex Pivots Jiggle (baseline)	Martensitic Stainless Steel	AISI 420 & 429	To suit manufacture	TBC	B	U	A (GOX 750psi)	N/A	N/A	Y	Y	TBD	TBD	Included in Flex pivots (standard Lucas parts) - see Declared Component List. MAPTIS code 30136 (CRES 420)
29.	Flex Pivots Chop (baseline)	Beryllium Copper	Uns 17200	Various bar, sheet	Induction brazed, heat treated 600°F	A	U	N/A	N/A	N/A	Y	Y	Y	C-FLEX	Included in flex pivots (special C-Flex parts). MAPTIS 10271
30.	Plating, misc	Gold	See DPL	N/A	SEE DPL	A	A	N/A	N/A	N/A	Y	Y	Y	MB Aerosace. UK	MAPTIS 10328. SEE DPL FOR PLATING SPEC
31.	Washer, Thermal compensation	INVAR 36, BAR (UNS K93601)	ASTM B753 Alloy T36	1/2" bar	Obtain in annealed state.	B	A	N/A	N/A	N/A	Y	Y	Y	Carpenter Techn. Corp. or Equiv	MAPTIS 10314. Gold plate for corrosion resistance
32.	Grease	Apiezon Grease	Grade N	25g tube	N/A	N/A	N/A	TBC	Vapour pressure <10 ⁻⁹ mbar a		TBC	TBC	Y	Oxford Instruments or equiv.	Melt point 43°C, quantity small (screw threads on Cernox thermistor) and no running expected.

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BSM MatL ID	Part ID	Name & Type of Product, Form & Condition	Spec	Size Code	Processing Parameters	Corr	SCC	Flamm	Off-gas	Out-gas	OK to bake at 80°C ?	Thermal & Vacuum stable?	OK at 4°K?	Manufacturer	Remarks, Approval Reference
33.	Motor lamination end terminations	Titanium	TBC	TBC	TBC	A	A	TBC	TBC		Y	Y	Y	Zeiss	All details with Zeiss/ PACS programme.
34.	Lacing Tape	Dacron (unwaxed)	TBC	TBC	Clean before use	A	N/A	U	CVCM 0.02%	TML 0.35%	Y	Y	Y	Gudebrod Inc. 22DPTH NATURAL GUDE-SPACE PT Or equiv.	RAL DML ITEM 20.24 ESA-RD: 01 REV. 1

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HERSCHEL/SPIRE

DRCU Declared Material List (DML)

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	Function	Name	Date	Visa
Prepared by	Mechanics Product Assurance	Nathalie Colombel	24/03/03	
Verified by	Mechanical Engineer	Thierry Tourrette		
Approved by	PA Manager			
Authorized by	Project Manager	Jean-Louis Auguères		

DOCUMENT STATUS and CHANGE RECORD

Date	Issue	Affected pages
26/10/01	0.0	Draft
14/11/01	0.1	Released for comments and verification
13/02/03	1.0	5 Purpose 9 Material groups Group 2 “Copper and copper alloys” used 10 Column 8 filled Addition of item 1-3 11 Group 2 table
24/03/03	1.1	11 Justification, approval status of item 2-1

List of acronyms

AD / RD	Applicable / Reference Document
ADP	Acceptance Data Package
CDR	Critical Design Review
CEA	Commissariat à l'Energie Atomique
DCU	Detector Control Unit
DML	Declared Material List
DMPL	Declared Mechanical Part List
DPL	Declared Processes List
DRCU	Detector Readout and Control Unit
EIDP	End Item Data Package
FCU	FPU Control Unit
FIRST	Far InfraRed and Sub millimeter Telescope
FM	Flight Model
FMECA	Failures Modes Effects & Criticality Analysis
FPU	Focal Plane Unit
FS	Flight Spare
GSE	Ground Support Equipment
HIFI	Heterodyne Instrument for First
ICD	Interface Control Document
LAM	Laboratoire d'Astrophysique de Marseilles
MAIV	Manufacturing, Assembly, Integration Verification
MCU	Mechanisms Control Unit
MGSE	Mechanical Ground Support Equipment
N/A	Not Applicable
PA / QA	Product / Quality Assurance
PACS	Photoconductor Array Camera & Spectrometer
PCB	Printed Circuit Board
PDR	Preliminary Design Review
PSU	Power Supply Unit
QM	Qualification Model
RFA	Request For Approval
RT	Room Temperature
S/C	SpaceCraft
SAP	Service d'Astrophysique
SCU	Subsystems Control Unit
SPIRE	Spectral & Photometric Imaging Receiver
TBC	To Be Confirmed
TBD	To Be Defined

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1 Purpose

This document lists the materials expecting to be used in the SPIRE/DRCU QM2, FM, FS.

2 Documentation

2.1 Applicable documents

The following documents will describe subsystems physically contained in the DRCU. These documents are to be written.

MCU DML	Subsystem under LAM responsibility but physically contained in the FCU box.
PSU DML	Subsystem to be furnished by a subcontractor (with spatial experience) under SAP responsibility

2.2 Reference documents

ECSS-Q-70A	Materials, mechanical parts and processes
PSS-01-700 2.0	The technical reporting and approval procedure for materials and processes
PSS-01-701 1.3	Data for selection of space materials
PSS-01-703 1.0	The black-anodising of aluminium with inorganic dyes
ECSS-Q-70-36A	Material selection for controlling stress-corrosion cracking

CNES Guide for science projects EEE, Materials, and Processes Lists

3 Subassembly and equipment codes

Subassembly codes		Names	Responsibility	
DRCU		Detector Readout and Control Unit	SAP	
	FCU	FPU (Focal Plane Unit) Control Unit	SAP	
		MCU	Mechanisms Control Unit	LAM
		SCU	Subsystems Control Unit	SAP
		PSU	Power Supply Unit	SAP
	DCU	Detector Control Unit	SAP	

4 Codes used in the list

4.1 Environment codes

These codes are used to indicate the type of environment to which the material is subjected.

'Radiation' Code	
Code	Meaning
G	Geostationary orbit
L	Low Earth orbit
B	Radiation belt
I	Interplanetary
P	Planetary

For components, which are attached outside the satellite, 'S' is added for Shadow if the material is in the shade or 'L' for Light if the material is in the illuminated area.

'Environment' Code	
Code	Meaning
V	Vacuum
H	Hermetic
M	Manned
E	High pressure

'Temperature' Code	
Code	Meaning
1	$0 \leq 100$ K
2	$101 \leq 200$ K
3	$201 \leq 300$ K
etc.	etc.

The given temperature code correspond to the operating temperature. If needed, the thermal cycle is described by two values, e.g.: 3/5.

4.2 'Size' code

'Size' Code	
Code	Meaning
0	$0 \leq 1$
1	$1 \leq 10$
2	$10 \leq 100$
3	$100 \leq 1000$
4	$1000 \leq 10000$

The 'Size' code represents:

Surface area	A in cm ²
Volume	V in cm ³
Mass	W in (g)

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4.3 Test Code

'Outgassing' Code	
Code	Meaning
P	Material which has undergone the outgassing tests described in document ESA.ECSS-Q-70-02A
F	Material not included in specifications
U	Unknown characteristics

'Inflammability' Code	
Code	Meaning
P	Material which has undergone the inflammability tests described in document ESA.PSS.01.721
F	Material not included in specifications
U	Unknown characteristics

'Toxicity' Code	
Code	Meaning
P	Material which has undergone the toxicity tests described in document ESA.PSS.01.729
F	Material not included in specifications
U	Unknown characteristics

'Stress corrosion' Code	
Code	Meaning
1	The material is included in table I of document ESA.ECSS-Q-70-36A
2	The material is included in table II of document ESA.ECSS-Q-70-36A
3	The material is included in table III of document ESA.ECSS-Q-70-36A
P	Material complying with project requirements but not mentioned in the PSS (test ref. mandatory)
F	Material not included in specifications
U	Unknown characteristics

'Corrosion' Code	
Code	Meaning
P	Material complying with project requirements
F	Material not included in specifications
U	Unknown characteristics



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4.4 Approval codes

These codes refer to:

- Comments made by the user or sub-contractor laboratory on use of the material in question;
- Comments from the 'higher level' (the instrument manager in charge of drawing up the list).

'Approval' Code	
Code	Meaning
A	Approved: use without restriction.
Y	Approved with restriction: the material requires special treatment before use (protection, coating, etc.)
D	Approved with waiver: the material does not comply with requirements but no replacement is possible. Its use should be limited.
P	Decision pending: material for which an evaluation report or waiver is necessary.
O	Open: new material for which an examination or evaluation is under way.
C	Eliminated: material which is no longer used.

5 Material groups

Code	Group	Used
1	Aluminium and aluminium alloys	<input checked="" type="checkbox"/>
2	Copper and copper alloys	<input checked="" type="checkbox"/>
3	Nickel and nickel alloys	<input type="checkbox"/>
4	Titanium and titanium alloys	<input type="checkbox"/>
5	Steels	<input type="checkbox"/>
6	Stainless steels	<input type="checkbox"/>
7	Metals for soldering	<input checked="" type="checkbox"/>
8	Miscellaneous metallic material	<input type="checkbox"/>
9	Optical materials	<input type="checkbox"/>
10	Adhesives, coatings, varnishes	<input checked="" type="checkbox"/>
11	Adhesive tapes	<input type="checkbox"/>
12	Paints, primers and inks	<input type="checkbox"/>
13	Lubricants	<input type="checkbox"/>
14	Coating resins and foam	<input type="checkbox"/>
15	Reinforced plastic	<input type="checkbox"/>
16	Rubber and elastomers	<input type="checkbox"/>
17	Thermoplastic resins	<input type="checkbox"/>
18	Duroplastic resins	<input type="checkbox"/>
19	Wires and cables	<input checked="" type="checkbox"/>
20	Sundry non-metallic materials	<input type="checkbox"/>

Group 1 - Aluminium and aluminium alloys

1	2	3	4	5	6	7	8	9			10
								9.1	9.2	9.3	
Item no.	Trade identification or standard description	Chemical nature and type of product	1. Manufacturer 2. Distributor 3. Proc. Spec. no. Issue / Revision	Process parameters	1. Sub-system code 2. Equipment code 3. Use	1. Rad 2. Env 3. Temp	1. A 2. V 3. W	1. Outgassing 2. Inflammability 3. Toxicity 4. Stress corrosion 5. Corrosion	1. Criticality ¹ 2. Justification 3. Subcontractor comments	Approval status	Comments ESA Approval
1-1	EN AW-6082-T6	Aluminium alloy Al rem Si 0,7-1,3 Mg 0,6-1,2 Mn 0,40-1,0 Fe <0,50 Cr <0,25 Zn <0,20 Ti <0,10 Cu <0,10 Others <0,15	1. TBD 2. TBD 3. EN 573-1,3 EN 515	o Alodine 1200 o Black-anodising with inorganic dyes following PSS-01-703 issue 1	1. DRCU 2. DCU, FCU/(MCU+SCU) 3. Salt bath brazed structures of electronic boxes	R I A E V V T 3/4 W4		1. N/A 2. N/A 3. N/A 4. 1 High resistance ECSS-Q-70-36A 5. P	1. Not critical 2. PSS-01-703 1.0 ECSS-Q-70-36A 3.	A	
1-2	EN AW-2618A-T851	Aluminium Alloy Al rem Cu 1,8-2,7 Mg 1,2-1,8 Fe 0,9-1,4 Ni 0,8-1,4 Si 0,15-0,25 Mn <0,25 Ti <0,2 Zn <0,15 Others <0,15	1. TBD 2. TBD 3. EN 573-1,3 EN 515	o Alodine 1200 o Black-anodising with inorganic dyes following PSS-01-703 issue 1	1. DRCU 2. DCU, FCU/(MCU+SCU) 3. Support structures and front panel of electronic board Screwed cover and base of the electronic box	R I A E V V T 3/4 W4		1. N/A 2. N/A 3. N/A 4. 1 High resistance ECSS-Q-70-36A 5. P	1. Not critical 2. PSS-01-703 1.0 ECSS-Q-70-36A 3.	A	
1-3	EN AW-6061	Aluminium alloy Al rem Mg 0,8-1,2 Si 0,40-0,8 Cu 0,15-0,40 Cr 0,04-0,35 Fe <0,7 Mn <0,15 Zn <0,25 Ti <0,15 Others <0,15	1. TBD 2. TBD 4. EN 573-1,3 EN 515	o Black-anodising o Glued with Scotchweld EC 2216 B/A Gray (10-2)	1. DRCU 2. DCU, FCU/(MCU+SCU) 3. Identification labels	R I A E V V T 3/4 W1		1. N/A 5. N/A 6. N/A 7. 1 High resistance ECSS-Q-70-36A 5. P	1. Not critical 2. PSS-01-703 1.0 ECSS-Q-70-36A 3.	A	

¹ As defined in ECSS-Q-70A §3.1.4 Criticality analysis



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Group 2 – Copper and copper alloys

1	2	3	4	5	6	7	8	9			10
								9.1	9.2	9.3	
Item no.	Trade identification or standard description	Chemical nature and type of product	1. Manufacturer 2. Distributor 3. Proc. Spec. no. Issue / Revision	Process parameters	1. Sub-system code 2. Equipment code 3. Use	1. Rad 2. Env 3. Temp	1. A 2. V 3. W	1. Outgassing 2. Inflammability 3. Toxicity 4. Stress corrosion 5. Corrosion	1. Criticality ¹ 2. Justification 3. Subcontractor comments	Approval status	Comments ESA Approval
2-1	Beryllium copper alloy C17200	Copper alloy Cu rem Be 1,8-2,0 Al 0,20 Si 0,20 Co 0,20	1. TBD 2. APITEC 3. ASTM B 194 QQ-C-533 SAE J463 AMS 4530,4532	<ul style="list-style-type: none"> o Satin Tin finish following ASTM B-545 o Glued STYCAST 2850 FT / catalyst9 (10-1) 	1. DRCU 2. DCU, FCU/(MCU+SCU) 3. Copper beryllium finger strips used for thermal contact between the front panel of the electronic boards and the box top	R I A E V V T 3/4 W2		1. N/A 2. N/A 3. N/A 6. 1 High resistance ECSS-Q-70-36A 4. P	1. Not critical 2. Used for Integral ECSS-Q-70-36A 3.	A	

¹ As defined in ECSS-Q-70A §3.1.4 Criticality analysis



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Group 7 – Metals for soldering

1	2	3	4	5	6	7	8	9			10
								9.1	9.2	9.3	
Item no.	Trade identification or standard description	Chemical nature and type of product	1. Manufacturer 2. Distributor 3. Proc. Spec. no. Issue / Revision	Process parameters	1. Sub-system code 2. Equipment code 3. Use	1. Rad 2. Env 3. Temp	1. A 2. V 3. W	1. Outgassing 2. Inflammability 3. Toxicity 4. Stress corrosion 5. Corrosion	1. Criticality ¹ 2. Justification 3. Subcontractor comments	Approval status	Comments ESA Approval
7-1	EN AW-4047A	Aluminium alloy Al rem Si 11-13 Fe <0,6 Cu <0,30 Zn <0,20 Mn <0,15 Mg <0,10 Ti <0,15 Others <0,15	1. TBD 2. TBD 3. EN 573	o Alodine 1200 o Black-anodising with inorganic dyes following PSS-01-703 issue 1	1. DRCU 2. DCU FCU/(MCU+SCU) 3. Salt bath brazing of EN AW-6082-T6 (Item 1-1)	R I A E V V T 3/4 W		1. N/A 2. N/A 3. N/A 4. U 5. P	1. Not critical 2. Used for SOHO/GOLF XMM/EPIC 3. The surface treatment (column 5) is done on the brazed structures.	A	
7-2	S-Sn60Pb40E	Brazing alloy Sn 59,5-60,5 Pb rem	1. TBD 2. TBD 3. ISO 9453	o RMA Flux (precise type TBD) o Protected by conformal coating	1. DRCU 2. DCU, SCU 3. Soldering of electronic components on PCB	R I A E V V T 3/4 W		1. N/A 2. N/A 3. N/A 4. N/A 5. P	1. Not critical 2. ESA PSS-01-701 1.3 S-12 3. Could be used at SAP for corrective action.	A	
7-3	S-Sn62Pb36Ag2	Brazing alloy Sn 61,5-62,5 Pb rem Ag 1,8-2,2	1. TBD 2. TBD 3. ISO 9453	o RMA Flux (precise type TBD) o Protected by conformal coating	1. DRCU 2. DCU, SCU 3. Soldering of SMC on PCB	R I A E V V T 3/4 W		1. N/A 2. N/A 3. N/A 4. N/A 5. P	1. Not critical 2. ESA PSS-01-701 1.3 S-14 3.	A	
7-4	S-Sn63Pb37E	Brazing alloy Sn 62,5-63,5 Pb rem	1. TBD 2. TBD 3. ISO 9453	o RMA Flux (precise type TBD) o Protected by conformal coating	1. DRCU 2. DCU, SCU 3. Soldering of electronic components on PCB	R I A E V V T 3/4 W		1. N/A 2. N/A 3. N/A 4. N/A 5. P	1. Not critical 2. ESA PSS-01-701 1.3 S-13 3.	A	

¹ As defined in ECSS-Q-70A §3.1.4 Criticality analysis



DRCU
Declared Material List (DML)



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Group 10 – Adhesives, coatings, varnishes

1	2	3	4	5	6	7	8	9			10
								9.1	9.2	9.3	
Item no.	Trade identification or standard description	Chemical nature and type of product	1. Manufacturer 2. Distributor 3. Proc. Spec. no. Issue / Revision	Process parameters	1. Sub-system code 2. Equipment code 3. Use	1. Rad 2. Env 3. Temp	1. A 2. V 3. W	1. Outgassing 2. Inflammability 3. Toxicity 4. Stress corrosion 5. Corrosion	1. Criticality ⁱ 2. Justification 3. Subcontractor comments	Approval status	Comments ESA Approval
10-1	STYCAST 2850 FT / catalyst9	Two-part epoxy encapsulant	1. Emerson & Cuming	<ul style="list-style-type: none"> o Base 100 o Catalyst 9 3 o 16 hours at 25°C 	1. DRCU 2. DCU FCU/(MCU+SCU) 3. Reinforcement of the soldered joint of heavy components	R I A E V V T 3/4 W		1. P 2. N/A 3. N/A 4. N/A 5. N/A	1. Not critical 2. ESA PSS-01-701 1.3 S-19 3.	A	
10-2	Scotchweld EC 2216 B/A Gray	Two-part epoxy structural adhesive	1. Minnesota Mining & Manufacturing (3M)	<ul style="list-style-type: none"> o Base 100 o Accelerator Gray 140 o 24 hours at RT 	1. DRCU 2. DCU, FCU 3. Component sticking Seals ⁱⁱ on fasteners	R I A E V V T 3/4 W		1. P 2. N/A 3. N/A 4. N/A 5. N/A	1. Not critical 2. ESA PSS-01-701 1.3 S-7 3.	A	
10-3	Nusil CV-1152	Dimethyl diphenyl silicone polymer	1. McGhan-Nusil Corp	<ul style="list-style-type: none"> o 7 days at RT 	1. DRCU 2. DCU FCU/(MCU+SCU) 3. Thin & Thick layer conformal coating on electronic board	R I A E V V T 3/4 W		1. P 2. N/A 3. N/A 4. N/A 5. N/A	1. Not critical 2. ESA PSS-01-701 1.3 C-10 3.	A	
10-4 (1)	Solithane 113	Polyurethane two part coating resin	1. Uniroyal Chemical Company Inc	<ul style="list-style-type: none"> o Solithane 113 100 o C 300 100 o 6 hours at 60°C o Thin layer 	1. DRCU 2. DCU FCU/(MCU+SCU) 3. Thin layer conformal coating on electronic board	R I A E V V T 3/4 W		1. P 2. N/A 3. N/A 4. N/A 5. N/A	1. Not critical 2. ESA PSS-01-701 1.3 S-16 3. Traditionally used by Sap but should be replaced by item 10-3 TBC	A	

ⁱ As defined in ECSS-Q-70A §3.1.4 Criticality analysis
ⁱⁱ Used to identify the element tightened with defined torque



DRCU
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Group 10 – Adhesives, coatings, varnishes

1	2	3	4	5	6	7	8	9			10
Item no.	Trade identification or standard description	Chemical nature and type of product	1. Manufacturer 2. Distributor 3. Proc. Spec. no. Issue / Revision	Process parameters	1. Sub-system code 2. Equipment code 3. Use	1. Rad 2. Env 3. Temp	1. A 2. V 3. W	9.1	9.2	9.3	Comments ESA Approval
								1. Outgassing 2. Inflammability 3. Toxicity 4. Stress corrosion 5. Corrosion	1. Criticality ¹ 2. Justification 3. Subcontractor comments	Approval status	
10-4 (2)	Solithane 113	Polyurethane two part coating resin	1. Uniroyal Chemical Company Inc	<ul style="list-style-type: none"> o Solithane 113 100 o C 300 74 o 6 hours at 60°C o Thick layer 	1. 2. 3. Thick layer conformal coating on electronic board	R I E V T 3/4	A V W	1. P 2. N/A 3. N/A 4. N/A 5. N/A	1. Not critical 2. ESA PSS-01-701 1.3 S-16 3. Traditionally used by Sap but should be replaced by item 10-3 TBC		



DRCU
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Group 19 – Wires and cables

1	2	3	4	5	6	7	8	9			10
								9.1	9.2	9.3	
Item no.	Trade identification or standard description	Chemical nature and type of product	1. Manufacturer 2. Distributor 3. Proc. Spec. no. Issue / Revision	Process parameters	1. Sub-system code 2. Equipment code 3. Use	1. Rad 2. Env 3. Temp	1. A 2. V 3. W	1. Outgassing 2. Inflammability 3. Toxicity 4. Stress corrosion 5. Corrosion	1. Criticality ¹ 2. Justification 3. Subcontractor comments	Approval status	Comments ESA Approval
19-1	KT 26	High purity copper silver plated + PTFE insulation	1. FILECA TBC 2. TBD 3.	°	1. 2. 3.	R I E V T 3/4	A V W	1. 2. 3. 4. 5.	1. 2. 3.		
19-2	MTV	High purity copper silver plated	1.FILOTEX TBC 2. TBD 3.	°	1. 2. 3.	R I E V T 3/4	A V W	1. 2. 3. 4. 5.	1. 2. 3.		
19-3	BTV 1/26 AQ	High purity copper silver plated	1.FILOTEX TBC 2. TBD 3.	°	1. 2. 3.	R I E V T 3/4	A V W	1. 2. 3. 4. 5.	1. 2. 3.		

The choice of the type of wire used for the QM2, FM, FS is depending on the choice of the subcontractor cabling the electronic boards (not done yet).

¹ As defined in ECSS-Q-70A §3.1.4 Criticality analysis



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Document Status

Issue	Revision	Date	Nb of Pages	Modifications
Draft		April 4 th , 2001		First draft – released for comments
0	0	April 25 th , 2001	16	First Issue
1	0	October 29 th , 2001	16	Update of the document (see marking bar on the right)
1	1	December 12 th , 2001	16	Update of the document (released after SAp comments)



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

List of Acronyms

AD / RD	Applicable / Reference Document		
ADP (EIDP)	Acceptance (End Item) Data Package		
AIT / (M)AIV	(Manufacturing,) Assembly, Integration & Test / Verification		
CADM	Configuration and Data Management		
CDR (DDR)	Critical (Detailed) Design Review	Revue de conception détaillée	RCD
CEA	Commissariat à l' Energie Atomique		
CIDL / ABCL	(As Built) Configuration Items Data List		
CN	Change Notice	Demande de Modification	DM
CQM	Cryogenic Qualification Model		
DML / DPL	Declared Material / Process List		
DRB	Delivery Review Board	Revue de Qualification	RQ
EM / (P)FM / FS	Engineering / (Proto)Flight / Spare Model		
ETF	Environmental Test Facility		
EV	Evaporator		
FI	Fiche d'Inspection		
FIRST	Far Infrared and Submillimetre Telescope		
FMECA	Failure Mode Effects and Criticity Analysis		AMDEC
(M)GSE	(Mechanical) Ground Support Equipment		
H/W	Hardware		
HIFI	Heterodyne Instrument for First		
HSE	Heat Switch (on evaporator)		
HSP	Heat Switch (on sorption pump)		
ICD	Interface Control Document	Dossier de Contrôle des Interfaces	DCI
KIP / MIP	Key / Mandatory Inspection Point		
MRB	Material Review Board		
N/A	Not Applicable		
NCR	Non Conformance Report	Fiche d'Anomalie	FA
PACS	Photoconductor. Array Camera and Spectrometer		
PDR	Preliminary Design Review	Revue de Définition Préliminaire	RDP
PTR	Post Test Review	Comité de Revue et d'essai	CRE
PFM	ProtoFlight Model		



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

QA / PA	Quality / Product Assurance	Assurance Qualité / Produit	AQ / AP
RFA	Request For Approval		
SAP	Service d'Astrophysique		
SBT	Service des Basses Températures		
SCO	Sorption Cooler (full unit)		
S/C	SpaceCraft		
SNLS	Subcontractor for TiG welding & brazing		
SP	Sorption pump		
SPIRE	Spectral & Photometric Imaging Receiver		
TRR	Test Readiness Review	Bilan Technique	BT



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

1. SCOPE OF THE DOCUMENT

This document lists all the materials (machined items, end items) used on the SBT Sorption Coolers Project for the following models: CQM, FM & FS.



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Sorption Coolers

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2. DOCUMENTS

2.1 Applicable documents

All Applicable Documents are listed in the AD chapter of the CIDL (HSO-SBT-LI-010).

2.2 Reference documents

	<i>Title</i>	<i>Reference</i>	<i>Iss</i>	<i>Rev</i>	<i>Date</i>
RD01	Data for Selection of Space Materials	ESA PSS-01-701	1	3	January 94
RD02	Materials, Mechanical Parts & Processes	ECSS-Q-70A			19/04/96
RD03	Guide pour les Projets Scientifiques				
RD04	Materials selection for controlling stress-corrosion cracking	ECSS-Q-70-36-A			



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3. DECLARED MATERIAL LIST

The SCO Declared Material List, which consists of several arrays of 10 columns that shall be completed as indicated in doc. Ref. [RD02] & [RD03], is presented herebelow.

Furthermore, similar materials shall be grouped together, according to the following group definition:

<i>Group Type</i>	<i>Used</i>	<i>Item Id.</i>
1. Aluminum & Aluminum alloys,	✓	2017-A
2. Copper & Copper alloys,	✓	CuC1, Cu A1
3. Nickel & Nickel alloys,	N/A	
4. Titanium & Titanium alloys,	✓	TA6V-ELI
5. Steels,	N/A	
6. Stainless Steels,	✓	AISI 304L
7. Filler metals & solders,	✓	Tin, Silver
8. Miscellaneous metallic materials,	N/A	
9. Optical materials,	N/A	
10. Adhesives, coatings & varnishes,	✓	STYCAST 2850/FT9
11. Adhesive Tapes,	N/A	
12. Paints, primer & inks,	N/A	
13. Lubricants,	N/A	
14. Potting Compounds,	N/A	
15. Reinforced Plastics,	N/A	
16. Rubbers & Elastomers,	N/A	
17. Thermoplastics,	N/A	
18. Thermosets Plastics,	N/A	
19. Wires & Cables,	✓	Manganin Wires
20. Miscellaneous nonmetallic materials.	✓	Kevlar, Procelit P160, Vegetal Charcoal, He3, PTFE Housing



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 1 – Aluminum & Aluminum Alloys

1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1- Manuf / Supplier 2- Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
1-1	EN-AW 2017A T451	Cu: 4.35 % Mg: 0.80 % Mn: 0.75 % Si: 0.51% Fe: 0.21% Zn: 0.23% Al: rem.	1- ANFI 2-	Machined Anti corrosion treatment (Alodine 1200)	Evaporator cover (137) Pump cover (124)		V	1	W2	N/A	N/A	N/A	3	P	ESA PSS-01 701		Coulée # 4-01-5664
1-2	EN-AW 2017A	Cu: 4.20 % Mg: 0.66 % Mn: 0.85 % Si: 0.60% Fe: 0.40% Zn: 0.01% Al: rem.	1- KUMW 2-	Machined Anti corrosion treatment (Alodine 1200)	Guiding tubes (136)		V	1	W2	N/A	N/A	N/A	3	P	ESA PSS-01 701		



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 2 – Copper & Copper alloys

1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
2-1	High purity electrolytic copper CuC1	Cu: 99.99% O < 0.0005%	1 – OUTOKUMPU/SISO 2 -	1- Machined 2- Gold plated	Strap (138) Strap ends (531, 532, 541, 542) 1/2 female (203) & 1/2 male (204) evaporator cups Shunt (210) Charcoal casing (212) Evaporator (219) & Pump (220) Cold Tips Switch Heads (301) & Bases (302)		V	1	W3	N/A	N/A	N/A	NA	P	ESA PSS-01-701		FI 007
2-2	CuA1	Copper alloy															



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 4 – Titanium & Titanium alloys

1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
4-1	Ti-6Al-4V ELI, Diam. 200 mm	Al: 6.09 % V: 3.82 % C: 80 ppm Fe: 1402 ppm N: 20 ppm O2: 1095 ppm H2: 60 ppm	1 - FORTECH/TIMET 2 -	1- Machined 2- EB welding	Structural parts (401 to 407) Miscellaneous components Pump-tubing-Evaporator parts Heat Switches parts		V	1	W4	N/A	N/A	N/A	1	P	ESA PSS-01-701		Coulée # 293147C Lot # T03290
4-2	Ti-6Al-4V ELI, diam. 10 & 20 mm	Al: 5.9 % V: 3.8 % C: 0.029% Fe: 0.18 % H: 0.0016% N: 0.010 % O: 0.12% Y: <0.005%	1 - TIMET UK 2	1- Machined 2- EB Welding	Structural parts		V	1	W4	N/A	N/A	N/A	1	P	ESA PSS-01-701		Coulée # CU67913 Lot # SC1513 (10 mm) Lot # SC1421 (20 mm)



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Group 6 – Stainless Steels																	
1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
6-1	AISI 304L	Ni: 8.51% Cr: 18.29% C: 0.018% Mn: 1.87% Si: 0.44% S: 0.025%	1 – IMCO 2 –	Machined	Minipump (306), Minipump tube (305) & cap (307) Grid Mesh (218)		V	1	W1	N/A	N/A	N/A	1	P			Lot # 12470
6-2					Screws, nuts, washers, spring, helicoil		V	1		N/A	N/A	N/A					



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Group 7 – Filler Metals & Solders

1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
7-1	Tin		1 – SBT/ 2	HSO-SBT-PR-034	Soldering of manganin wires into connectors		V	1	W1								
7-2	ARGECO 1441	Silver alloy Ag: 72% Cu: 28%	1 – SNLS/PROTECHNO 2 –	Subcontractor procedure CI-92.01	Brazing		V	1	W1								



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 10 – Adhesives, Coatings & Varnishes

1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
10-1	Stycast 2850/FT9	Epoxy resin	1 – EMERSON & CUMING 2 -	HSO-SBT-PR-024 HSO-SBT-PR-033	Gluing of charcoal onto/into housing Gluing of heaters & thermometers		V	1	W1						ESA-PSS-01-701		



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 19 – Wires & Cables

1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	R	A	T	Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification							Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
19-1	Manganin Wires 2.1362	Cu: 86% Mn: 12% Ni: 2% Varnish insulator	1 – ISABELLENHUTTE/ TECHNICOME 2	HSO-SBT-PR-034	Heaters & thermometers wires		V	1	W1								



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SPIRE & PACS Sorption Coolers
DECLARED MATERIAL LIST
(D.M.L.)

SBT internal ref : SBT/CT/2001-19

	Name & Function	Date	Signature
Prepared	P. Dupont – Cooler PA manager		
SBT PA Check	P. Dupont – Cooler PA manager		
SPIRE Approval			
PACS Approval			
PA Approval	F. Loubere – PA manager		
Project Approval	J.L Augueres - SAp HSO project manager		
Project Approval	L. Duband - Cooler project manager		

Service des Basses Températures (SBT)
Département de Recherche Fondamentale sur la Matière Condensée (DRFMC)
COMMISSARIAT A L'ENERGIE ATOMIQUE - GRENOBLE (CEA-Grenoble)
17, rue des Martyrs 38054 GRENOBLE Cédex 9, France.



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Group 20 – Miscellaneous Nonmetallic Materials																	
1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1- Manuf / Supplier 2- Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
20-1	Kevlar cord 11T28 & 34T28		1- DuPONT/COUSIN 2-	HSO-SBT-PR-028	Suspension wires		V	1	W1								FI 005
20-2	Procelit P160	Al2O3: 91% SiO2: 9% impurities <0.1%	1- KAPYROK 2-		Evaporator Retention of liquid He by capillary attraction		V	1	W1						Located into sealed cooler heart		
20-3	Vegetal Charcoal	C	1- PROLABO 2-	HSO-SBT-PR-024	Pump Adsorption of gaseous He		V	1	W1						Located into sealed cooler heart		Lot # 97037
20-4	³ He	3He: 99.9965% 4He: 0.0035% N2, CO2, H2 < 1Vpm	1- EURISO-TOP 2-	HSO-SBT-PR-029	Filling of Cooler		V	1									Batch # AA-97084
20-5	PTFE housing		1- TECHNOFLUOR 2-				V	1	W1								

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NOTE
DCL & DPL SECTIONS HAVE BEEN
DELETED TO LEAVE THE DML.

Prepared by: **R. Orfei**

Date: 21 February 2002



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Distribution List:

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Document Status Sheet:

Document Title: Herschel DPU Declared Components List Materials List Processes List			
Issue	Revision	Date	Reason for Change
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1 INTRODUCTION


1.1 Scope of the document

This document is the preliminary Declared Components List, Materials List and Processes List in terms of selection and approval for the SPIRE-DPU subsystem. It has to be noted that all DPU electronic components will be purchased through the Coordinated Parts Procurement Agency set up by ESA and contracted to Tecnologica (Sevilla, Spain) and TOP-REL (Rome, Italy).

Acronyms and Abbreviations

1.1.1 Acronyms

AD	Architectural Design
ATP	Acceptance Test Plan
AVM	Avionic Model
CIDL	Configuration Identification Document List
CSL	Configuration Status List
CNR	Consiglio Nazionale delle Ricerche
CPP	Coordinated Parts Procurement
CPP	Coordinated Parts Procurement Board
CPU	Control Processing Unit
CDMS	Central Data Management System
CDMU	Central Data Management Unit
CQM	Cryogenic Qualification Model
DCU	Detector Control Unit
DDD	Detailed Design Document
DPU	Digital Processing Unit
EEPROM	Electrically Erasable Programmable Read Only Memory
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
ESA	European Space Agency
FIRST	Far InfraRed and Submillimeter Telescope
HK	HouseKeeping
HW	HardWare
IBDR	Instrument Baseline Design Review
ICD	Interface Control Document
ICDR	Instrument Critical Design Review
ICU	Instrument Control Unit
IHDR	Instrument Hardware Design Review

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IFSI Istituto di Fisica dello Spazio Interplanetario


ISVR Instrument Science Verification Review
MCU Mechanism Control Unit
NA Not Applicable
OBS On-Board Software
PA Product Assurance
PDU Power Distribution Unit
PROM Programmable Read Only Memory
S/C SpaceCraft
SCC SpaceCraft Components
SCU S..... Control Unit
SEU Single Event Upset
SPIRE Spectral and Photometric Imaging Receiver
S/S SubSystem
SVM Service Module
SW Software
TBC To Be Confirmed
TBD To Be Defined
TBW To Be Written

TV Thermal Vacuum
WBS Work Breakdown Structure

1.2 References

1.2.1 Applicable Documents

Document Reference	Name
AD1	SPIRE Instrument Specification
AD2	FIRST/Planck Instrument Interface Document Part A
AD3	FIRST/Planck Instrument Interface Document Part B Instrument "SPIRE"
AD4	Product Assurance Plan for the FIRST-SPIRE Instrument
AD5	SPIRE Product Tree

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AD6	FIRST SPIRE DPU Subsystem Specification Document
AD7	ESA Preferred Parts List. ESA PSS-01-603

1.2.2 Reference Documents

Document Reference	Name
RD1	SPIRE Design Description
RD2	SPIRE Preliminary EEE Parts List
RD3	Carlo Gavazzi Space: DPU Preliminary Declared Components List

2 Status of the lists

This is the first issue of the DPU Declared Components List, Materials List and Processes List prepared for the DDR.

The electronic components list presented (taken from RD3) has already been subjected to scrutiny by the Coordinated Parts Procurement Boards (CPPB) and it is still subject to be updated in just a few items, mainly for standardisation of packages and types.


2.1 Overview of the DPU

The DPU is the only subsystem that interfaces electrically with the spacecraft for telemetry and telecommand. It takes care of the command execution and synchronisation, it controls all the subsystems, packages the telemetry and takes care of the health-autonomous mode.

The DPU electronics will consist of a single box, positioned in the warm part of the S/C and as close as possible to the DCU, the MCU and SCU sub-systems.

3 Notes on Components Criticality

With the present EEE lists there are no criticalities implied.

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4 Introduction to the Components and Materials Lists

It has to be stressed the point that IFSI is involved in the design and manufacturing of the DPU/ICU of the three Herschel instruments, so the lists will be nearly the same for the three instruments. In the following pages the components and Bill of Materials are reported. The components are corresponding to the ones actually shown in the electrical schematics and soldered in the related printed boards and are reported for each printed board:

- CPU,
- CPU PIGGY-BACK;
- PL-IF,
- DC/DC Converter and Motherboard.



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6 Preliminary Materials List

6.1 GROUP 1 - Paints and Adhesives

PART/DWG NUMBER	QTY	ITEM N°	NOMENCLATURE	MATERIAL IDENTIFICATION					NON METALLIC MATERIAL			USAGE EVAL.						MUA STAT	REMARKS (SPECIAL CURE, ETC)	
				MAT'L CODE	MATERIAL DESCRIPTION	MATERIAL MFR	MATERIAL SPEC	PROCESS SPECIF.	WT (g)	THK (mm)	AREA (mm ²)	F L M	A G E	S C C	C O R	T V S	T O X			
Conformal Coating of PCBs	9	1	PCBs Conformal Coating	89131	SILICON POLYMER CV 1152	Mc GHAN NUSIL CORP.	Tech. Bulletin of Manufact.	GROUP :4 ITEM N°1 GROUP :16 N°3 GROUP :17 N°1	1000	1	110	A					A	K		ESA-PSS-01-701 GD-PR-CGS-033
Potting of electrical components	10	2	Potting Compound	03484	RTV 566A/B	GENERAL ELECTRIC	MB0130-85 STM0706-02 STM0051-02	GROUP : 3 ITEM N°1 GROUP :16 N°3 GROUP :17 N°1	2	10	100	A					A	K		MSFC-HDBK-527F ESA-PSS-01-701 GD-PR-CGS-011
Adhesion of identification label	10	3	General purpose glue	05475	ECCOBOND 285 cat. 11	EMERSON & CUMING	Tech. Bulletin of manufacturer	GROUP : 1 ITEM N°1 GROUP :16 N°3 GROUP :17 N°1	1	1	10	A					A	K		MSFC-HDBK-527F PA 072
Adhesion of non structural parts	15	4	General purpose glue	05066	SCOTCH WELD 2216 B/A	3M	MB-0120-086 MIL-A-46864	GROUP : 1 ITEM N°2 GROUP :16 N°3 GROUP :17 N°1	4	0,01	10	A					B	K		MSFC-HDBK-527F ESA-PSS-01-701 Tech. Bulletin of manufacturer
Adhesion of non structural parts	70	5	Screw locking compound	06354	Loctite 222	LOCTITE	MIL-S-46163A. Tech. Bulletin of Manufact.	GROUP: 1 ITEM N° 3 GROUP :16 N°3 GROUP :17 N°1	<5	<0.1	NA	C					A			MAPTIS . Use for thread locking only.
Electrical isolation of connection	12	6	Heat shrinkable insulant sleeve	20021	THERMOFIT RT876	RAYCHEM	MIL-I-23053/5 MIL-R-46846	GROUP: 16 ITEM N° 4 GROUP :16 N°3 GROUP :17 N°1	15	0,41min 0,89max	1000	X					A	K		MSFC-HDBK-527F ESA-PSS-01-701



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6.2 GROUP 4 - Non-metallic Materials

PART/DWG NUMBER	QTY	ITEM N°	NOMENCLATURE	MATERIAL IDENTIFICATION					NON METALLIC MATERIAL			USAGE EVAL.						MUA STAT	REMARKS (SPECIAL CURE, ETC)
				MAT'L CODE	MATERIAL DESCRIPTION	MATERIAL MFGR	MATERIAL SPEC	PROCESS SPECIF.	WT (g)	THK (mm)	AREA (mm ²)	F L M	A G E	S C C	C O R	T V S	T O X		
PCBs	9	1	Printed Circuit Boards	05543	FR4	- VIASYSTEMS division C.S.I. PRINTCA	MIL-P-18177 MC8024-1	GROUP : 5 N°1 GROUP : 8 N°1,2 GROUP:16 N°1,2,3 GROUP:17 N°1,2,3	1000	1.6	110	A					A	K	MSFC-HDBK-527F ESA-PSS-01-710 CNES/QFT/SP-0117 NASA Ref. Pub. 1124 rev.2
PCBs	9	2	Printed wiring board rigid	00153 MAPTIS	Polymide impregnated woven fiberglass fabric, heat resistant (GI), base material: GIN0016CH/CHB2X	- ISOLA - VIASYSTEMS division C.S.I. - PRINTCA	MIL-P-13949G/10 CANCELLED ref. only	GROUP: 5 N°1 GROUP: 8 N°1,2 GROUP:16 N°1,2,3 GROUP:17 N°1,2,3	1000	1.6	110	A					A	K	ESA PSS-01-710 CNES/QFT/SP.0117
Thermal interface for electronic components	200	3	Thermal interface material	64178	Cho-Therm 1671	CHOMERICS	Tech. Bulletin of Manufact.	GROUP :16 N°3 GROUP :17 N°1	1	0.3	100	A					A	K	MSFC-HDBK-527F Tech. Bulletin of Manufact.
Thermal interface filler		4	THERM-A-GAP A274	04617 MAPTIS	Silicone rubber with aluminum oxide filler on aluminum carrier adhered to substrate with acrylic adhesive	CHOMERICS	Tech. Bulletin of Manufact.	GROUP: 5 N°4 GROUP :16 N°3 GROUP :17 N°1	132	2,54	22,7K	A						K	Maptis
Mechanical parts		5	PEEK	02166	Polyetheretherketone	POLYPENCO / FURON / LNP Eng.	MIL-P-46183	GROUP :16 N°3 GROUP :17 N°1	10	3	200	A					A	K	ESA tests 718, M205 NASA REF. PUB. 1124 rev.2 (GSC14250)
Mechanical parts		12	PTFE	00016	Polytetrafluoroethylene	DUPONT / FURON	AMS 3651	GROUP :16 N°3 GROUP :17 N°1	90	5	100	A					A	K	Maptis



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6.3 GROUP 5 - Metallic Materials
6.3.1 Aluminum Materials

PART/DWG NUMBER	QTY	ITEM N°	NOMENCLATURE	MATERIAL IDENTIFICATION					NON METALLIC MATERIAL			USAGE EVAL.						MUA STAT	REMARKS (SPECIAL CURE, ETC)			
				MAT'L CODE	MATERIAL DESCRIPTION	MATERIAL MFGR	MATERIAL SPEC	PROCESS SPECIF.	WT (g)	THK (mm)	AREA (mm ²)	F L M	A G E	S C C	C O R	T V S	T O X					
Board Stiffener	25	1	Aluminum Alloy	50669	AL-7075-T7351 PLATE	COPPER & BRASS / BENJAMIN	QQ-A-250/12 AMS4078 ASTMB209 MB0170-078	GROUP 9 N° 1,2 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	3000							A	B					MSFC-HDBK-527F ESA-PSS-01-701 coated in according to MIL-C-5541C and/or MIL-A-8625
Mechanical parts		2	Aluminum Alloy	10047	AL-7075-T7351 BAR	COPPER & BRASS / BENJAMIN	QQ-A-225/9 AMS4124 ASTM B211	GROUP 9 N° 1,2 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	3000							A	B					Maptis coated in according to MIL-C-5541C and/or MIL-A-8625
Mechanical parts		3	Aluminum Alloy	50669	AL-3.4364-T7351 PLATE	ALIMEX	DIN 29546 LN 9073 DAN 26 DAN 422 EN 10204/3.1B	GROUP 9 N° 1,2 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	3000							A	B					Maptis coated in according to MIL-C-5541C and/or MIL-A-8625
Mechanical parts		4	Aluminum Alloy	10047	AL-3.4364-T7351 ROUND BAR	ALIMEX	DIN 65113 LN 1799 LN 29765/A EN 10204/3.1B	GROUP 9 N° 1,2 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	3000							A	B					Maptis coated in according to MIL-C-5541C and/or MIL-A-8625
Mechanical parts		5	Aluminum Alloy	50646	AL-6061-T651 PLATE	COPPER & BRASS / BENJAMIN	QQ-A-250/11 ASTM B209	GROUP 9 N° 1,2 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	3000							A	B					Maptis coated in according to MIL-C-5541C and/or MIL-A-8625



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Mechanical parts		6	Aluminum Alloy	50648	AL-6061-T6511 ROD EXTRUDED	COPPER & BRASS / BENJAMIN	QQ-A-200/8 ASTM B221 AMS 4173	GROUP 9 N° 1,2 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	3000							A	B				Maptis coated in according to MIL-C-5541C and/or MIL-A-8625
Mechanical parts		7	Aluminum Alloy	50646	AL-3.3214-T651 PLATE	COPPER & BRASS / BENJAMIN	DIN 29546 LN 9073 DAN 26 DAN 422 EN 10204/3.1B	GROUP 9 N° 1,2 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	3000							A	B				Maptis coated in according to MIL-C-5541C and/or MIL-A-8625
Mechanical parts		8	Aluminum Alloy	50648	AL-3.3214- T6511 ROD EXTRUDED	COPPER & BRASS / BENJAMIN	DIN 65113 LN 1799 EN 10204/3.1B	GROUP 9 N° 1,2 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	3000							A	B				Maptis coated in according to MIL-C-5541C and/or MIL-A-8625



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6.3.2 Stainless Steels Materials

PART/DWG NUMBER	QTY	ITEM N°	NOMENCLATURE	MATERIAL IDENTIFICATION					NON METALLIC MATERIAL			USAGE EVAL.						MUA STAT	REMARKS (SPECIAL CURE, ETC)			
				MAT'L CODE	MATERIAL DESCRIPTION	MATERIAL MFGR	MATERIAL SPEC	PROCESS SPECIF.	WT (g)	THK (mm)	AREA (mm ²)	F L M	A G E	S C C	C O R	T V S	T O X					
Mechanical parts		9	Stainless Steels	10370	AISI 316 PLATE, BAR	COPPER & BRASS / BENJAMIN	QQ-S-763 AMS 5524 MIL-S-5059 ASTM A182 ASTM A276 ASTM A479	GROUP 9 N° 3 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	2000						A	A						Maptis Surface passivation treatment in according to QQ-P-35



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6.3.3 Copper Alloy Materials

PART/DWG NUMBER	QTY	ITEM N°	NOMENCLATURE	MATERIAL IDENTIFICATION					NON METALLIC MATERIAL			USAGE EVAL.						MUA STAT	REMARKS (SPECIAL CURE, ETC)		
				MAT'L CODE	MATERIAL DESCRIPTION	MATERIAL MFGR	MATERIAL SPEC	PROCESS SPECIF.	WT (g)	THK (mm)	AREA (mm ²)	F L M	A G E	S C C	C O R	T V S	T O X				
Thermal dissipaters		10	Oxygen-Free Copper Alloy	10354	Cu 99,99% min. PLATE	COPPER & BRASS	ASTM B-170 ASTM B-179-93 ASTM F-68-93	GROUP 9 N° 4 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	2000						A	A					Maptis ESA-PSS-01-701(C-5) coated in according to QQ-N-290A (nickel plating)
Thermal dissipaters		11	Electrolytic Touch-Pitch (ETP) Copper Alloy	50827	Cu+Ag 99,90% min. PLATE	MIORINI	ASTM B5 ASTM B152	GROUP 9 N° 4 GROUP 11 N° 1 GROUP :16 N°3 GROUP :17 N°1	2000						A	A					Maptis coated in according to QQ-N-290A (nickel plating)



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6.3.4 Miscellaneous Metallic Materials

PART/DWG NUMBER	QTY	ITEM N°	NOMENCLATURE	MATERIAL IDENTIFICATION					NON METALLIC MATERIAL			USAGE EVAL.						MUA STAT	REMARKS (SPECIAL CURE, ETC)			
				MAT'L CODE	MATERIAL DESCRIPTION	MATERIAL MFGR	MATERIAL SPEC	PROCESS SPECIF.	WT (g)	THK (mm)	AREA (mm ²)	F L M	A G E	S C C	C O R	T V S	T O X					
Inductor core	4	12	Magnetic core ferrites: B64290-K45-X38 B64290-K632-X35	50864	Ni-Fe alloy	SIEMENS	Tech. Bulletin of Manufact.		200							A	A					Maptis
Inductor core	4	13	Magnetic EFD core ferrite: B66417-160-K187	50864	Ni-Fe alloy	SIEMENS	Tech. Bulletin of Manufact.		300							A	A					Maptis
Transformer core	4	14	Magnetic EFD core ferrite: B66421-G-X187	50864	Ni-Fe alloy	SIEMENS	Tech. Bulletin of Manufact.		300							A	A					Maptis
Transformer core	4	15	Magnetic core ferrite: B64290-K44-X38	50864	Ni-Fe alloy	SIEMENS	Tech. Bulletin of Manufact.		200							A	A					Maptis

6.4 GROUP 6 - Mechanical Parts



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6.4.1 Semi-finished or Finished Mechanical Components

PART/DWG NUMBER	QTY	ITEM N°	NOMENCLATURE	MATERIAL IDENTIFICATION					NON METALLIC MATERIAL			USAGE EVAL.						MUA STAT	REMARKS (SPECIAL CURE, ETC)		
				MAT'L CODE	MATERIAL DESCRIPTION	MATERIAL MFGR	MATERIAL SPEC	PROCESS SPECIF.	WT (g)	THK (mm)	AREA (mm ²)	F L M	A G E	S C C	C O R	T V S	T O X				
Card-lock Retainer	42	1	PCBs Locking Retainer MHA260-4.80ETM2 (black anodize per MIL-A-8625 type III class 2)	10024	AL6061-T6	CALMARK	QQ-A-200/8	GROUP :9 ITEM N° 2 GROUP :16 N°3 GROUP :17 N°1	15	NA	NA				A	B					MSFC-HDBK-527F Housing: coated per MIL-A-8625 type III class 2



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6.4.2 GROUP 7 – Fasteners

PART/DWG NUMBER	QTY	ITEM N°	NOMENCLATURE	MATERIAL IDENTIFICATION					NON METALLIC MATERIAL			USAGE EVAL.						MUA STAT	REMARKS (SPECIAL CURE, ETC)
				MAT'L CODE	MATERIAL DESCRIPTION	MATERIAL MFGR	MATERIAL SPEC	PROCESS SPECIF.	WT (g)	THK (mm)	AREA (mm ²)	F L M	A G E	S C C	C O R	T V S	T O X		

Fastener		1	Helicoil	10268	AISI 304	BOLLHOFF	LN 9499	GROUP :16 N°3 GROUP :17 N°1										A	A							MAPTIS	
Fastener		2	Helicoil	10268	AISI 304	BOLLHOFF	LN 9039	GROUP :16 N°3 GROUP :17 N°1											A	A							MAPTIS
Fastener		3	Grower	10268	AISI 316	BOSSARD	DIN 7991	GROUP :16 N°3 GROUP :17 N°1											A	A							MAPTIS
Fastener		4	Cylinder head screw	10268	AISI 316	BOSSARD	DIN 912	GROUP 1 N°2,3 GROUP :16 N°3 GROUP :17 N°1											A	A							MAPTIS
Fastener		5	Flat washer	10268	AISI 316	BOSSARD	DIN 433	GROUP :16 N°3 GROUP :17 N°1											A	A							MAPTIS
Fastener		6	Nut	10268	AISI 316	BOSSARD	DIN 439B	GROUP :16 N°3 GROUP :17 N°1											A	A							MAPTIS
Fastener		7	Countersunk screw	10268	AISI 316	BOSSARD	DIN 965A	GROUP 1 N°2,3 GROUP :16 N°3 GROUP :17 N°1											A	A							MAPTIS
Fastener		8	Countersunk screw	10268	AISI 316	BOSSARD	DIN 7991	GROUP 1 N°2,3 GROUP :16 N°3 GROUP :17 N°1											A	A							MAPTIS
Fastener		9	Low profile cylinder head screw	10268	AISI 316	BOSSARD	DIN 6912	GROUP 1 N°2,3 GROUP :16 N°3 GROUP :17 N°1											A	A							MAPTIS



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6.4.3 GROUP 8 – Wires

PART/DWG NUMBER	QTY	ITEM N°	NOMENCLATURE	MATERIAL IDENTIFICATION					NON METALLIC MATERIAL			USAGE EVAL.						MUA STAT	REMARKS (SPECIAL CURE, ETC)	
				MAT'L CODE	MATERIAL DESCRIPTION	MATERIAL MFGR	MATERIAL SPEC	PROCESS SPECIF.	WT (g)	THK (mm)	AREA (mm ²)	F L M	A G E	S C C	C O R	T V S	T O X			
Electrical connections		1	Wires for cables	01188	Wires AWG , 22,24, 24 tws, 26	GORE	ESA/SCC/3901/018	GROUP : 7 ITEM N° 1 GROUP : 8 ITEM N° 1				A					A	K		MAPTIS ESA SCC QPL
Inductor and Transformer		2	Copper wire for winding type (0.4 mm, 0.25 mm): Tenvex H	50827	Round copper wire (Cu ETP) enamelled with modified polyesterimide resins overcoated with amide-imide resins	INVEX (ITALY)	MIL-W-583C type H	GROUP : 8 ITEM N° 1						A	A					MAPTIS

LAM □
DECLARED MATERIALS LISTS

SMEC □
SPIRE-LAM-PRJ-000939

FTS □
SPIRE-LAM-PRJ-000918

L.A.M.	HERSCHEL	Ref : SPI.PFM.00.LM.01.A	Page : 1 / 3
UMR 6110	SPIRE	Author : P. Dargent	Date : 03 October 2001
	SMECm		
Liste des Matériaux			
Materials List			

Distribution List :

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	Pascal Dargent	X	Michel Jevaud	
	Didier Ferrand	X	Patrick Levacher	
	Dominique Pouliquen	X		

<i>Material</i>	<i>Constitution (%)</i>	<i>Density (kg / m³)</i>	<i>Modulus of Elasticity at 4K (Gpa)</i>	<i>Proof Strength (0.2%) at 4K (Mpa)</i>	<i>Mean C.T.E. [293K / 4K] (10⁻⁶/K)</i>	<i>Main Use</i>	<i>Supplier</i>
6061 - annealed	Al (98) Mg (0,8-1,2) Si (0,4-0,8) Fe (<0,7) Cu (0,15-0,4) Cr (0,04-0,35) Zn (<0,25) Mn (<0,15) Ti (<0,15)	2700	76	70	18	Structure	
2017	Al (94,2) Cu (3,5-4,5) Mn (0,4-1) Mg(0,4-0,8) Si (0,2-0,8) Fe (<0,7) Zn (<0,25) Cr (<0,1)	2790	81	370	18	Shim (TBC)	
7075 – T6	Al (90) Zn (5,1-6,1) Mg (2,1-2,9) Cu (1,2-2) Fe (<0,5) Si (<0,4) Mn (<0,3) Cr (0,18-0,28) Ti (<0,2)	2810	80	600	(18)	Belts	
AISI 304 - annealed	Fe (66,345-74) Cr (18-20) Ni (8-10,5) Mn (<2) Si (<1) C (<0,08) P (<0,045) S (<0,03)	8000	201	340	10,24	Washers	
AISI 321	Fe (68) Cr (18) Ni (11) Mn (2) Si (1) Ti (0,15) P (0,045) C (0,08) S (0,03)	8000			(10,2)	Nuts and Screws	
AISI 316L	Fe (65) Cr (17) Ni (12) Mo (2,5) Mn (2) Si (1) P (<0,045) S (<0,03) C (<0,03)	8000			10,27	Flex-pivots structure	
AISI 431	Fe (82) Cr (15-17) Ni (1,25-2,5) Mn (<1) Si (<1)C (<0,2) P (<0,04) S (<0,03)					(magnetic cores ?)	
CuBe ₂	Cu (97,9) Be (1,9) Co (0,2)	8250	135	1000	10,9	Flex-pivot blades Spring washers	
TA5E (ILE)	Ti (92,5) Al (5) Sn (2,5) Fe (<0,25) O (<0,12)	4480	130	1550	6,6	Screws	
Invar 36	Fe (63) Ni (36) Mn (0,35) Si (0,2) C (0,02)	8120		850	(2,4)	Actuator clamp	Imphy S.A.


Material	Constitution (%)	Density (kg / m³)	Modulus of Elasticity at 4K (Gpa)	Proof Strength (0.2%) at 4K (Mpa)	Mean C.T.E. [293K / 4K] (10⁻⁶/K)	Main Use	Supplier
2V - Permendur	Fe (49,) Co (48,75) Va (1,9) Si (0,05) Mn (0,05) C (0,01)	8120	(200)	(1200)	(9,5 @ 293K)	(magnetic cores ?)	(Carpenter)
SmCo	Sm ₂ Co ₁₇	8400	(150)		(10 @ 293K)	Magnets	(VacuumSchmelze – VACOMAX 240 HR))
Zerodur		2530	(90)		(-0,2)	Optical sensor rules	Schott
P.T.F.E.	PolyTetraFluoroEthyl ene :	2160			73	Actuator holds	
Silver						Nuts and Screws coating	
Parylene C	C ₈ H ₇ Cl polymer	1289	(3,2)	(70)	(35 @ 293K)	Tight coating	(Nova Tran / Comelec / Union Carbide)

SPIRE – STRUCTURE DECLARED MATERIALS

Document Number: MSSL/SPIRE/PA002.1 29 November 2001

Distribution:


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Author:	C Brockley-Blatt	Date:
Checked:	B Winter	Date:
Approved:	T Dibbens	Date:

	SPIRE	Project Document	Ref: MSSL/SPIRE/PA002.01
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Change Record

ISSUE	Date	Brief description of change
0.1	September 2001	New document
1.0	November 2001	Issued and Updated

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2. Reference documents

3. The Declared Materials Tables

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1. INTRODUCTION

This document identifies the material types that will be used in the SPIRE structure, as designed and built by MSSL. The data is based on mature designs and is practically complete. This document has been used to identify all the materials used by MSSL only.


2. REFERENCE DOCUMENTS

All documents are listed in Figure 3.2 of the CIDL.

3. THE DECLARED MATERIALS LISTS


	SPIRE	Project Document	Ref: MSSL/SPIRE/PA002.01
		Declared Materials List	Issue : 1.0
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Issue No 1		DECLARED MATERIALS LIST						MSSL/SPIRE/PA002.1			
PROJECT: Herschel/SPIRE EXPERIMENT: EXPERIMENTER: MULLARD SPACE SCIENCE LABORATORY (MSSL)											
PREPARED BY: A P Dibbens											
CATEGORY: 1. Aluminium and Aluminium Alloys											
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code			Size Code	Approval Status	ESA Comments
						R	A	T			
1.	Aluminium alloy 6082	6082-T6 Commercial product Extrusion/plate & rod	J Smith & Sons London UK BS 1470/1474	Alocrom 1200 Chemglaze-Z306 Anodised-chromic acid		B	V	3/4	W4		

	SPIRE	Project Document	Ref: MSSL/SPIRE/PA002.01
		Declared Materials List	Issue : 1.0
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Issue No 1		DECLARED MATERIALS LIST						MSSL/SPIRE/PA002			
PROJECT: Herschel/SPIRE EXPERIMENT: EXPERIMENTER: MULLARD SPACE SCIENCE LABORATORY (MSSL)											
PREPARED BY: A P Dibbens											
CATEGORY: 2. Copper and copper alloys											
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code			Size Code	Approval Status	ESA Comments
						R	A	T			
1.	Beryllium copper	Commercial product	Anderton Bradford, UK N 1400-0018	N/A		B	V	3/4	W0		


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Issue No 1		DECLARED MATERIALS LIST						MSSL/SPIRE/PA002			
PROJECT: Herschel/SPIRE EXPERIMENT: EXPERIMENTER: MULLARD SPACE SCIENCE LABORATORY (MSSL)											
PREPARED BY: A P Dibbens											
CATEGORY: 4. Titanium and titanium alloys											
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code			Size Code	Approval Status	ESA Comments
						R	A	T			
1.	Titanium TI-6Al-4V	TI-6Al-4V, Ti alloy Commercial product 6STA Rod	Dornier			B	V	3/4	W2		

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Issue No 1		DECLARED MATERIALS LIST						MSSL/SPIRE/PA002			
PROJECT: Herschel/SPIRE EXPERIMENT: EXPERIMENTER: MULLARD SPACE SCIENCE LABORATORY (MSSL)											
PREPARED BY: A P Dibbens											
CATEGORY: 6. Stainless steels											
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code			Size Code	Approval Status	ESA Comments
						R	A	T			
1.	Stainless steel AISI 321	Commercial product AISI 321 S12/S20	Various BS 1449 Barden Corp, Plymouth Devon, UK	N/A		B	V	3/4	W2		


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Issue No 1		DECLARED MATERIALS LIST						MSSL/SPIRE/PA002			
PROJECT: Herschel/SPIRE EXPERIMENT: EXPERIMENTER: MULLARD SPACE SCIENCE LABORATORY (MSSL)											
PREPARED BY: A P Dibbens											
CATEGORY: 7. Filler metals and solders											
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code			Size Code	Approval Status	ESA Comments
						R	A	T			
1.	Solder, Elsold	63/37 Sn/Pb eutectic Rosin cored Commercial product Extrusion	Bleiwerk Goslar 63 tin solder eutectic as in ESA PSS-01-708	Hand soldering of PCB's	All PCB's	B	V	3/4	W2		


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Issue No 1		<u>DECLARED MATERIALS LIST</u>					MSSL/SWT-UVOT/PA003		
PROJECT: SWIFT EXPERIMENT: UVOT EXPERIMENTER: MULLARD SPACE SCIENCE LABORATORY (MSSL)									
PREPARED BY: A P Dibbens									
CATEGORY: 10. Adhesives, coatings and varnishes									
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code R A T	Size Code	Approval Status	ESA Comments


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1.	Scotch Weld 1838	Commercial product 2 part, epoxy adhesive	3 M's Adhesive Supplies	Mix 1:1 by mass Cure 4hrs @ 60°C	Secure magnets in dichroic assembly,	B	V	3/4	W1		
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Issue No 1		DECLARED MATERIALS LIST						MSSL/SPIRE/PA002			
PROJECT: Herschel/SPIRE EXPERIMENT: EXPERIMENTER: MULLARD SPACE SCIENCE LABORATORY (MSSL) PREPARED BY: A P Dibbens											
CATEGORY: 12. Paints, primers and inks											
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code			Size Code	Approval Status	ESA Comments
						R	A	T			
2.	Anodising	Commercial product Chromic acid process	Ingram & Glass, Godalming, UK DEF STN 0324	N/A		B	V	3/4	A3		
3.	Alocrom 1200	Chromating Commercial product	MSSL	N/A		B	V	3/4	A3		
4.	Chemglaze 9924	Polyvinyl butyral resin - Primer	Hughson Chemicals US	N/A		B	V	3/4	A4		
						BB	V	3/4			

	SPIRE	Project Document	Ref: MSSL/SPIRE/PA002.01
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Issue No 1		DECLARED MATERIALS LIST						MSSL/SPIRE/PA002			
PROJECT: Herschel/SPIRE EXPERIMENT: EXPERIMENTER: MULLARD SPACE SCIENCE LABORATORY (MSSL)											
PREPARED BY: A P Dibbens											
CATEGORY: 18. Thermoset plastics											
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code			Size Code	Approval Status	ESA Comments
						R	A	T			
1.	Vespel SP 1	Polyimide Commercial product Unfilled base resin Bar	Du Pont USA Vespel SP 1	N/A	High voltage xformer in Blue Module	B	V	3/4	W2		
2.	Kapton	Polyimide tape Y966 acrylic adhesive coated. Commercial product	Du Pont USA (HPC Stevenage, UK)	N/A	Over heaters for thermal control etc	B	V	3/4	W1		
3.	PTFE	PTFE Commercial product Plate	Du Pont USA	N/A	Spacers	B	V	3/4	W1		

	SPIRE	Project Document	Ref: MSSL/SPIRE/PA002.01
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4.	Kapton H	Polyimide adhesive coated film	Du Pont	N/A	Xformer insulation in TMPSU	B	V	3/4	W0		
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Issue No 1		DECLARED MATERIALS LIST							MSSL/SPIRE/PA002		
PROJECT: Herschel/SPIRE EXPERIMENT: EXPERIMENTER: MULLARD SPACE SCIENCE LABORATORY (MSSL)											
PREPARED BY: A P Dibbens											
CATEGORY: 19. Wires and cables											
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code R A T			Size Code	Approval Status	ESA Comments
1.	PTFE insulated copper wire	Pure PTFE coated, tin plated copper wire. Commercial product Single strand, shielded and twisted	Cabletec UK Filotex France ESA/SCC 3901/013	Hand soldering Crimping		B	V	3/4	W4		

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2.	Enamelled conductor	Polyurethane coated copper wire	BICC Connollys UK BICOSOL, grade 2 also Alcatel-Copper	Fabrication of high voltage transformers & inductors		B	V	3/4	W2		
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Issue No 1		DECLARED MATERIALS LIST							MSSL/SPIRE/PA002		
PROJECT:		Herschel/SPIRE									
EXPERIMENT:											
EXPERIMENTER:		MULLARD SPACE SCIENCE LABORATORY (MSSL)									
PREPARED BY:		A P Dibbens									
CATEGORY: 20. Miscellaneous non-metallic materials											
Item No	Commercial Identification	Chemical Nature Type of Product Form & Condition	Procurement Info., Supplier Spec. Issue	Summary of Processing Parameters	Use & Location	Environmental Code			Size Code	Approval Status	ESA Comments
						R	A	T			
1.	Barden patented matl. Bartemp Bearings	Teflon coated glass fibres impregnated with MoS ₂	Barden Corp Plymouth Devon UK	N/A		B	V	3/4	W1		

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2.	Duroid material	Duroid	SNFA Bearings, Glos. UK	N/A		B	V	3/4	W1		
3.	Gudebrod 450X	Lacing cord	Gudebrod Inc US	N/A		B	V	3/4	W1		