





## HERSCHEL/SPIRE

### DRCU Declared Material List (DML)

**Reference:** SAP-SPIRE-NC-0060-02  
**Issue:** 3.0  
**Date:** 10/05/06

	Function	Name	Date	Visa
<b>Prepared by</b>	Mechanical Quality Engineer	I. LE MER	31/07/06	
<b>Verified by</b>	Mechanical architect	T. TOURRETTE	31/07/06	
<b>Verified by</b>	Electro technical Quality	L. DUMAYE		
<b>Verified by</b>	Manufacturing Responsible of electronic boards	C. CLOUE		
<b>Approved by</b>	PA Manager	J. FONTIGNIE	01/08/06	
<b>Authorized by</b>	Project Manager	J-L. AUGUERES	01/08/06	

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### 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
21/03/05	2.0	Complete update of document Updated items: 1-1 / 1-2 / 1-3 / 2-1 / 7-1 / 7-3 / 7-4 / 10-1 / 10-2 / 10-3 / 19-3 Items N/A: 7-2 / 10-4 / 19-1 / 19-2 / Added items : 6-1 / 6-2 / 10-5 / 15-1 / 20-1 / 20-2
10/05/06	3.0	Updated items: 2-1 / 7-3 / 7-4 / 10-1 / 10-2 / 10-5 / 15-1 / Items N/A on FM : Added items :

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## List of acronyms

AD/RD	Applicable / Reference Document
ADP	Acceptance Data Package
BOLC	Bolometer & Cooler Control Unit
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 Marseille
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
PhFPU	Photometer Focal Plane Unit
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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 The logo for SPIRE, with the word 'SPIRE' in large, bold, orange letters with a slight shadow effect. To the left of the letters, the word 'SPIRE' is written vertically in a smaller, blue font.	<b>DRCU</b> <b>Declared Material List (DML)</b>	 The logo for DSM-DAPNIA SAp, featuring the letters 'DSM-DAPNIA' in blue and 'SAp' in a larger, grey font. Below the logo, the following text is displayed: SAp-SPIRE-NC-0060-02 Issue: 3.0 Date: 10/05/06 Page: 6/17
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## 1 Purpose

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

The DRCU is composed of:

- FCU
  - o MCU (under LAM responsibility)
  - o SCU
  - o PSU (under Astrium responsibility)
  - o Harness between PSU &SCU (under Astrium responsibility)
- DCU

This document does not take into account the following elements which are described in dedicated lists:

- PSU (under Astrium responsibility) : HSPiR.PSU.LI.00003.V.ASTR
- Harness between PSU &SCU/MCU (under Astrium responsibility): DML-635/03/CAM/ST
- MCU (under LAM responsibility): SE-SPIRE-MCU-Q-LIMAT

This issue does not take into account the warm harnesses interconnect, which are not yet manufactured.

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## 2 Documentation

### 2.1 Applicable documents

	<i>Title</i>	<i>Reference</i>	<i>Iss</i>	<i>Rev</i>	<i>Date</i>
AD01	PA Requirements for FIRST Scientific Instruments	PT-RQ-04410	2	0	01/08/00
AD02	Standard Product Assurance Plan	SAP-GERES-FL0-436-00	1	0	07/11/00

### 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	ECSS -Q-70-71A	A	1	18/06/04
RD02	Materials, Mechanical Parts & Processes	ECSS-Q-70B			14/12/04
RD03	The technical reporting and approval procedure for materials and processes	PSS-01-700	2	2	
RD04	Materials selection for controlling stress-corrosion cracking	ECSS-Q-70-36-A			
RD05	CNES Guide for science projects				
RD06	DCRU DPL	SAP-SPIRE-NC-0061-02	3	0	10/05/06
RD07	DRCU DMPL	SAP-SPIRE-NC-0382-06	1	0	10/05/06
RD08	DML - HSPSU	HSPIR/PSU.LI.00003.V. ASTR			
RD09	DPL - HSPSU	HSPIR/PSU.LI.00002.V. ASTR			
RD10	DML - Câblage PSU harnais SPIRE	DPL-635/03/CAM/ST			
RD11	DPL - Câblage PSU harnais SPIRE	DPL-636/03/CAM/ST			
RD12	DML - MCU	SE-SPIRE-MCU-Q- LIMAT			
RD13	DPL - MCU	SE-SPIRE-MCU-Q- LIPRO			



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### 3 Declared Material List

The DRCU Declared Material List, completed as indicated in doc. ref. [RD02] & [RD03], is presented herebelow. Similar materials are grouped together, according to the following group definition. If a particular item does not apply, N/A (Not Applicable) is written.

	<i>Group Type</i>	<i>Used</i>	<i>Item Id.</i>
1	Aluminum & Aluminum alloys	✓	2618-A T851, 6082-T6, 6061-T6
2	Copper & Copper alloys	✓	C17200 (copper beryllium alloy)
3	Nickel & Nickel alloys	N/A	
4	Titanium & Titanium alloys	N/A	
5	Steels	N/A	
6	Stainless Steels	✓	304-L, 316-L
7	Filler metals & solders	✓	Sn62Pb36Ag2, Sn63Pb37, EN AW-4047A
8	Miscellaneous metallic materials	N/A	
9	Optical materials	N/A	
10	Adhesives, coatings & varnishes	✓	STYCAST 2850/FT9, EC 2216, NUSIL CV-1152, Nusil with Al <sub>2</sub> O <sub>3</sub> load
11	Adhesive Tapes	N/A	
12	Paints, primer & inks	N/A	
13	Lubricants	N/A	
14	Potting Compounds	N/A	
15	Reinforced Plastics	✓	Glass+polyimide
16	Rubbers & Elastomers	N/A	
17	Thermoplastics	N/A	
18	Thermosets Plastics	N/A	
19	Wires & Cables	✓	BTV 1/26 AQ
20	Miscellaneous nonmetallic materials	N/A	Kynar, Dacron

**DRCU**  
**Declared Material List (DML)**

Group 1 – Aluminum & Aluminum Alloys

1	2	3	4	5	6		7		9					10			
					Summary of Processing Parameters	Use & Location	R	A	T	Size Code	Outg	Flam	Offg		SCC	Corr	Justification for Approval
1-1	EN AW-2618A T851	1- Chemical Nature 2- Type of Product 1- AlCu2Mg1.5Ni 2- Bar	1- AML 2- EN 573	Machined Anti corrosion treatment (Alodine 1200) Black anodizing with inorganic dyes following PSS-01-703, Iss 1	Structural parts (cover)	I	V	3/4	M4	N/A	N/A	N/A	A	B	ECSS-Q-70-71A (C.1.6)		
1-2	EN AW-6082 T6	1- AlSi1MgMn 2-	1- AML 2- EN 573	Machined Anti corrosion treatment (Alodine 1200)	Structural parts (rack)	I	V	3/4	M4	N/A	N/A	N/A	A	B	ECSS-Q-70-71A (C.1.6)		
1-3	EN AW-6061 T6	1- AlMg1SiCu 2-	1- SERTIP 2- EN 573	Machined Black anodizing Glued with EC 2216	Salt bath brazed structures of electronic boxes Identification labels	I	V	3/4	M1	N/A	N/A	N/A	A	B			

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Group 2 – Copper & Copper Alloys																				
1 Item #	2 Commercial Id.	3 Chemical Nature		4 Procurement Information		5 Summary of Processing Parameters	6 Use & Location		7 Environment Code		8 Size Code	9				10				
		1- Chemical Nature	2- Type of Product	1- Manuf / Supplier	2- Specification		R	A	T	Outg		Flam	Offg	SCC	Corr		9.1	9.2	9.3	
2-1	C17200	1- Copper beryllium alloy	2-	1- - / APITEC 2- ASTM # B194 C17200 C17000 ASTM # B534 C17500 C17510	1- Manuf / Supplier 2- Specification	Satin tin finish following ASTM B-545 Glued with Nusil with Al2O3 load	Copper beryllium finger strips used for thermal contact between the front panel of the electronic boards & top box	I	V	3/4	M2	N/A	N/A	N/A	A	B	used on Integral ECSS-Q-70-71A (C.2.2)	Justification for Approval	Prime Approval	ESA Approval

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Group 6 – Stainless Steels																	
1 Item #	2 Commercial Id.	3 Chemical Nature	4 Procurement Information	5 Summary of Processing Parameters	6 Use & Location	7 Environment Code		8 Size Code	9				10				
						R	A		T	Outg	Flam	Offg		SCC	Corr	9.1	9.2
6-1	304-L	1- Cr: 17 to 19% Ni: 9 to 11% C: 0.02 % 2-	1- TDI (groupe vulcain) 2- EN 10088-1-2:1995	Machined	washers	I	V	3/4	M2	N/A	N/A	N/A	A	A	ECSS-Q-70-71A (C.6.2)	Prime Approval	ESA Approval
6-2	316-L	1- Cr: 17-18% Ni: 12-13% Mo: 2% 2-	1- TDI (groupe vulcain) 2- EN 10088-1-2:1995 1- FILA 2- EN 10088-1-2:1995	Machined Machined	Fixation screws -M3 to M8- (certified quality A4-80: BUMAX 88) Fixation screw	I	V	3/4	M2	N/A	N/A	N/A	A	A	ECSS-Q-70-71A (C.6.3)		

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Group 7 – Filler metals & Solders																		
1 Item #	2 Commercial Id.	3 Chemical Nature		4 Procurement Information 1- Manuf / Supplier 2- Specification	5 Summary of Processing Parameters	6 Use & Location		7 Environment Code		8 Size Code	9				10			
		1- Chemical Nature	2- Type of Product			R	A	T	Outg		Flam	Offg	SCC	Corr		9.1	9.2	9.3
7-1	EN AW-4047A	1- Aluminum alloy	2-	1- AML 2- EN 573		Salt bath brazing of item 1-2	I	V	3/4	M1	N/A	N/A	N/A		B	used for SOHO, GOLF, XMM, EPIC, INTEGRA L		
7-2	Soft solder Sn60Pb40	1- Sn: 60% Pb: 40%	2-	1- 2- ISO 9453	RMA Flux Protected with conformal coating	Soldering of electronic components on PCB	I	V	3/4	M3	N/A	N/A	N/A			ECSS-Q-70-71A (C.7.1)		
7-3	Soft solder Sn63Pb37	1- Sn: 63% Pb: 37%	2- Solder	1- JL GOSLAR / RESA 2- ECSS-Q-70-08A	RMA Flux Protected with conformal coating	Soldering of electronic components on PCB	I	V	3/4	M3	N/A	N/A	N/A			ECSS-Q-70-71A (C.7.2) CNES accreditation of Subco: ASF ST 16 ASF ST 18		
7-4	Soft solder Sn62Pb36Ag2	1- Sn: 62% Pb: 36% Ag: 2%	2- Solder paste	1- EFD / RESA 2- ISO 9453 Sn62-211-A	RMA Flux Protected with conformal coating	Soldering of SMC on PCB	I	V	3/4	M3	N/A	N/A	N/A			ECSS-Q-70-71A (C.7.3) CNES accreditation of Subco: ASF ST 16 ASF ST 18		

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Group 10 – Adhesives, Coating & Varnishes																		
1 Item #	2 Commercial Id.	3 Chemical Nature		4 Procurement Information	5 Summary of Processing Parameters	6 Use & Location		7 Environment Code		8 Size Code	9					10		
											9.1						9.2 Justification for Approval	9.3 Prime Approval
R	A	T	Outg	Flam	Offg	SCC	Corr											
10-1	STYCAST 2850/FT9	1- Epoxy 2- Two-part potting resin	1- Emerson & Cuming / RESA 2-	Mixture resin/catalyst : 100/3 Polymerization : 2H/65°C	Reinforcement of the soldered joint of thermistance	I	V	3/4	M1	P	N/A	N/A	N/A	N/A	N/A	ECSS-Q-70-71A (C.14.12)		
10-2	SCOTCHWELD EC 2216 B/A	1- Modified epoxy 2- Two-part structural adhesive	1- 3M / RESA & SAP 2-	Mixture resin/catalyst : 100/140 Polymerization : 24h at ambient	Sealing of fasteners	I	V	3/4	M1	P	N/A	N/A	N/A	N/A	N/A	ECSS-Q-70-71A (C.10.13)		
10-3	NUSIL CV-1152	1- Dimethyl-diphenyl silicone polymer 2- Conformal coating	1- McGhan-Nusil Corp. 2-	Cure times at 25°C and 50% RH: - Tack-free time – 1 hour - Set-up – 24 hours - Time to handling – 7 days	Conformal coating on electronic board To avoid contact between board and connector	I	V	3/4	M2	P	N/A	N/A	N/A	N/A	N/A	ECSS-Q-70-71A (C.10.3)		
10-4	SOLIFHANE-113	1- Polyurethane 2- Two-part coating resin	1- Unroyal Chemical Company Inc. 2-	Solifhane-113C-300: 100/100 for thin layer 100/74 for thick layer Curing time: 6 hours @ 60°C	Conformal coating on electronic board	I	V	3/4	W2	P	N/A	N/A	N/A	N/A	N/A	ECSS-Q-70-71A (C.14.10)		

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10-5	NUSIL with Al2O3 load	1- Dimethyl- diphenyl silicone polymer & Al2O3 powder 2- Conformal coating	1-McGhan-Nusil Corp. 2-	Mixture nusil/Al2O3 : 100/100 Cure times at 25°C and 50% RH: - Tack-free time – 1 hour - Set-up – 24 hours - Time to handling – 7 days Manual deposit with dispenser	Structural gluing of heavy components on printed wiring assembly	I	V	3/4	M2	P	N/A	N/A	N/A	N/A	ECSS-Q- 70-71A (C.10.03)
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Group 15 – Reinforced Plastics

1 Item #	2 Commercial Id.	3 Chemical Nature 1- Chemical Nature 2- Type of Product	4 Procurement Information 1- Manuf / Supplier 2- Specification	5 Summary of Processing Parameters	6 Use & Location		7 Environment Code		8 Size Code	9					10			
					9.1		9.2			9.3		9.1 Outg Flam Offg SCC Corr	9.2 Justification for Approval	9.3 Prime Approval		9.3 ESA Approval		
15-1	Glass+polyimide	1- Glass & Polyimide resin 2-	1- CIREP 2-	CIREP confidential process	PCB	I	V	3/4	M3	U	N/A				N/A		N/A	N/A



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Group 19 – Wires & Cables

1 Item #	2 Commercial Id.	3 Chemical Nature	4 Procurement Information	5 Summary of Processing Parameters	7 Environment Code			8 Size Code	9 9.1				9.2 Justification for Approval	9.3 Prime Approval	10 ESA Approval	
					R	A	T		Outg	Fiam	Offg	SCC				Corr
19-1	KF-26	1- High purity copper-silver-plated + PTFE-insulation 2-	1- FIL-ECA 2-			I	V	3/4		N/A	N/A	N/A	N/A			
19-2	MTV	1- High purity copper-silver-plated 2-	1- FILOTEX 2-			I	V	3/4		N/A	N/A	N/A	N/A			
19-3	BTV 1/26 AQ	1- copper silver alloys 2-	1- FILOTEX 2- ESA/SCC 3901 Issue 5 Rev A 12/00 ESA/SCC N°3901/013 Issue 2 Rev A	Connector Wiring		I	V	3/4	M2	N/A	N/A	N/A	N/A			

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Group 20 – Miscellaneous Nonmetallic Materials

1 Item #	2 Commercial Id.	3 Chemical Nature	4 Procurement Information	5 Summary of Processing Parameters	6 Use & Location	7 Environment Code		8 Size Code	9					10				
						R	A		T	Outg	Flam	Offg	SCC		Corr	9.1	9.2	9.3
20-1	KYNAR	1- Chemical Nature 2- Type of Product	1- Manuf / Supplier 2- Specification				I	V	3/4	W1	P	U	N/A	N/A	N/A	NASA outgassing Data	Prime Approval	ESA Approval
20-2	Dacron	1- Polyester 2-	1- Gudebrod / MOTEX 2-Type II-DACRON-A-A52081 (MIL T 43435) 20 DPTH finish C		Wire to attach the harness		I	V	3/4	W0	P	N/A	N/A	N/A	N/A	Approved NASA Very low quantity		