



**COMBINED DECLARED
MECHANICAL PARTS LIST**

**PRODUCT ASSURANCE
Space Science and
Technology Department**

Spacecraft/Project:	HERSCHEL	Document No:	SPIRE RAL PRJ 001094		
Instrument/Model:	SPIRE	Issue No:	3	REV:	0
Subsystem:	FPU	Date:	06 November 2004		

SUBJECT:	COMBINED DECLARED MECHANICAL PARTS LIST	
PREPARED BY:	E A Clark	
DOCUMENT No:	SPIRE-RAL-PRJ-0001094	
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DOCUMENT LIST

Note 1


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. Only the applicable pages are included in this document.

Note 2

The IFSI combined List DPU: "DCL + DML+ DPL" updated to SPIRE-IFS-DOC-001031 Iss 2: has been sent to ESA for approval, however CGS have subsequently issued these as individual documents, and it is this Declared List that replace the IFSI one in this document

Sub-System	Document		
	Institute	Title	Number
ATC		DECLARED MECHANICAL PARTS LIST BSM	SPIRE-ATC-PRJ-000710 Iss 1.5
CEA/SAp		DECLARED MECHANICAL PARTS LIST DRCU. SPIRE- SAp-NC-0100-03 Iss 1.0	SPIRE-SAP-DOC-001610 Iss 1.0
CEA/SBT		DECLARED MECHANICAL PARTS LIST	Not Applicable
CGS (IFSI)		DECLARED MECHANICAL PARTS DMPL	SPIRE-CGS-DOC-002199 Iss Draft
CSA/USK		Not Applicable	Not Applicable
JPL		DECLARED MECHANICAL PARTS LIST	SPIRE-JPL-DOC-00xxxx Iss
LAM (LAS)		DECLARED MECHANICAL PARTS LIST SMEC	SPIRE-LAM-DOC-00xxxx Iss
		DECLARED MECHANICAL PARTS LIST FTS	SPIRE-LAM-DOC-000xxx Iss
MSSL		DECLARED MECHANICAL PARTS LIST	Not Applicable
UCF		DECLARED MECHANICAL PARTS LIST	SPIRE-UCF-PRJ-002152 Iss 1.0

Document numbers (No's not allocated) in bold text have not been supplied at the time of issuing this combined List

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INTRODUCTION


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

SCOPE

This document lists the “Declared Mechanical Parts” used in the provision of the supplied parts of **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
UCF (CDF)	Department of Physics and Astronomy, University of Wales, Cardiff,	YES
CEA/SAp	CEA, Service d'Astrophysique Saclay	YES
CEA/SBT	(CEA) Service du Basse Temperatures Grenoble	No
CSA/USK	Canadian Space Agency (CSA) University of Saskatchewan Canada	N/A
CGS (IFSI)	Instituto di Fisica dello spazio Interplanetario, Rome	YES
JPL	JPL/Caltech, Pasadena	No
LAM (LAS)	Laboratoire d'Astronomie Spatiale, Marseille	No
MSSL	Mullard Space Science Lab Surrey	N/A

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Appendix A to this document is a printout from that spreadsheet showing the mechanical parts 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 mechanical part has an individual identification number, the first digit being the group type as follows.

51. Spacing Parts (Washers, Spacers,....)
52. Connecting Parts (Bolts, Nuts, Rivets, Inserts, Clips,....)
53. Bearing Parts (Ball-Bearings, Needle Bearings,....)
54. Separating Parts (Pyrotechnics, Springs, Cutters,....)
55. Control (Gears,....)
56. Fluid Handling Parts (Diffusers,....)
57. Heating Parts
58. Measuring Instruments (Gauges, Thermocouples,....)
59. Optical Passive Equipment
60. Magnetic Parts
61. Other Parts

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CONTENT OF THE MECHANICAL PARTS LIST

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

The mechanical Parts list consists of 10 columns, which shall be completed as indicated below. If a particular item does not apply, write N.A. (Not Applicable).

COLUMN 1 : Item Number

Sequential item number in each group of the list. One only per mechanical part type. Does not change during the life of the mechanical parts list.

COLUMN 2 : Commercial Identification

As required :

- type and number
- specification number (whether national, ESA, company in-house, etc.) and issue status. This document must be available for sending to ESA on request.
- materials

COLUMN 3 : Type of Part

Use a standard nomenclature, in order to ensure correct grouping of similar parts, e.g.: Value, one way
Value , two ways
and not one-way value or two-way value.

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 issue and revision. It may be replaced by a national specification number if this exists and makes source of procurement irrelevant.

COLUMN 5 : Elementary Function, Main Characteristics

- function to be ensured by the mechanical part
- main characteristics: e.g. number of revolutions per minute for a ball bearing

COLUMN 6 : Use and Location

indicate in which subsystem, equipment or box the mechanical part is used + subcontractor's name/abbreviation.

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- **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 parts inside the spacecraft, choose a letter from the left-hand side column.

For parts 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).


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

- **COLUMN 8 : Criticality & Hazards**

Mark here all parts participating in a safety-critical and/or reliability-critical function

- **SUBCOLUMN 9.1 : 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.

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SUBCOLUMN 9.2 : Approval Status of the Contractor

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

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

W - Approved with a waiver = These Mechanical Parts 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 = Mechanical Parts for which an evaluation report or a waiver is awaiting the contractor's provisional or definitive approval.

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

D - Deleted = This clarification is used for a Mechanical Part, 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.



**COMBINED DECLARED
MACHANICAL PARTS LIST**

**PRODUCT ASSURANCE
Space Science and
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APPENDIX A

DECLARED COMPONENT LIST		ORIGINATOR: UK ATC	
SPACECRAFT / PROJECT:	Herschel	Doc. Number	SPIRE-ATC-PRJ-000709
SYSTEM / EXPERIMENT:	SPIRE	Sheet No	Page 1 of 3
SUB-SYSTEM:	BSM	Issue:	1.1
		Date:	12.Aug.02

Declared Part ID No.	Description	Manufacturer/ Supplier	Country	Specification	Quality	Notes
1.	DISC-SPRING-ID-3.2mm stainless steel	Reliance Gear Co.Ltd	E.U	Austenitic, DIN A2, Grade 70	ISO 9002, COC, BATCH TRACEABLE	
2.	CERNOX-THERMISTOR COPPER-CANISTER	Lakeshore	U.S	CX-1030-CU	TBD	Supplied via SPIRE Project office
3.	CAP-HD-SCREW-SS-M2-5X12	Reliance Gear Co.Ltd	E.U	Austenitic, DIN A2, Grade 70	ISO 9002, COC, BATCH TRACEABLE	
4.	CAP-HD-SCREW-SS-M2-5X21_8					Probably will use 22 or 24mm long - TBC
5.	CAP-HD-SCREW-SS-M2-5X24					
6.	CAP-HD-SCREW-SS-M2-5X6					
7.	CAP-HD-SCREW-SS-M2-5X7					
8.	CAP-HD-SCREW-SS-M2-5X7_75					Probably will use 8mm long - TBC
9.	CAP-HD-SCREW-SS-M2X10					
10.	CAP-HD-SCREW-SS-M4X10					MSSL to supply flight screws for BSM-Strucyre interface
11.	CSK-HD-SCREW-SS-M2-5X5					

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Declared Part ID No.	Description	Manufacturer/ Supplier	Country	Specification	Quality	Notes
12.	CAP-HD-SCREW-SS-M2-5x7					
13.	CAP-HD-SCREW-SS-M2-5x6	Reliance Gear Co.Ltd	E.U	Austenitic, DIN A2, Grade 70	ISO 9002	
14.	CAP-HD-SCREW-SS-M2-5x12					
15.	P-CLIPS BRASS (TBC)	TBD	E.U	TBD	TBD	
16.	P-CLIP FASTENERS	Reliance Gear Co.Ltd	E.U	Austenitic, DIN A2, Grade 70	ISO 9002, , COC, BATCH TRACEABLE	Probably M2.5
17.	LOCKING INSERTS	WTI Fasteners Inc	E.U	Austenitic, DIN A2, Grade 70	ISO 9002, , COC, BATCH TRACEABLE	
18.	DOWEL pins 2mm dia 8mm long	TBC	E.U	Austenitic, DIN A2, Grade 70	TBC	
19.	LACING TAPE, BRAIDED DACRON 22DPTH	TBC	E.U	Gude-Space PT/MIL-T-43435B	TBD	RAL PREVIOUS USE
20.	Flex Pivot : LUCAS 5010-600	Lucas TRW	U.S.	5010-600, Stainless steel, brazed	COTS, COC, BATCH TRACEABLE	upscreened by UK ATC
21.	Flex Pivot : LUCAS 5010-800	Lucas TRW	U.S.	5010-600, Stainless steel, brazed	COTS, COC, BATCH TRACEABLE	upscreened by UK ATC

DECLARED COMPONENT LIST		ORIGINATOR: UK ATC	
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Declared Part ID No.	Description	Manufacturer/ Supplier	Country	Specification	Quality	Notes
22.	ALTERNATE Flex Pivot	C-Flex	U.S.	E-10 CuBe brazed	COTS, COC, BATCH TRACEABLE	upscreened by UK ATC
23.	ALTERNATE Flex Pivot	C-Flex	U.S.	E-20 CuBe brazed	COTS, COC, BATCH TRACEABLE	upscreened by UK ATC
24.	TERMINAL_PIN_571-4015	LOGIC ELECTRONIC COMPONENTS INC	E.U.	CAMBION 571-4015-01-0519	COTS, COC, BATCH TRACEABLE	MATERIALS : BRASS, PTFE, SILVER
25.	PACS type slim magnet	Magnet Sales and Service Limited Unit 31, Blackworth Industrial Estate Highworth Swindon SN6 7NA	E.U.	N42 disc dia 10mm +/- 0.1 x 2.0 +/- 0.1 mm (A), Nickel coated ON ALL FACES.	COTS, COC, BATCH TRACEABLE	Upscreened by UK ATC Materials: NdFeB to DIN 388/111. Data sheet stored as SPI-BSM-NOT-0020

Note: EEE parts covered by separate document.



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HERSCHEL DPU_s/ICU

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Applicazione autorizzata da: <i>Application authorized by:</i>							
Customer / Higher Level Contractor				Esterna / <i>External</i>			
Accettato da: <i>Accepted by:</i>							
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DRAFT			



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1. SCOPE

The scope of this document is to define all mechanical parts to be used in the SPIRE DPU Unit for HERSCHEL DPUs/ICU Program.

This document is based on the SPIRE DPU Unit architecture defined for the Critical Design Review.


2. APPLICABLE & REFERENCE DOCUMENTS

2.1 APPLICABLE DOCUMENTS

AD	DOC. N.	ISSUE	TITLE
1	HERS-GEN-PL-CGS-002	DRAFT	HERSCHEL DPUs/ICU Product Assurance Plan

2.2 REFERENCE DOCUMENTS

RD	DOC. N.	ISSUE	TITLE
1	ESA PSS-01-700	2	The technical reporting and approval procedure for materials, mechanical parts and processes

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3. RESPONSIBILITY

CGS shall be responsible where applicable for the selection, procurement and acceptance of mechanical parts which are in accordance with contractual specification.

4. METHODOLOGY FOR THE COMPILATION OF THE DMPL

The mechanical parts list consist of 11 columns which shall be completed as indicated below. Furthermore, mechanical shall be classified as specified in table:

GROUP	MECHANICAL PARTS
51	Spacing parts (washers, spacers, etc.)
52	Connecting parts (bolts, nuts, rivets, inserts, clips, etc.)
53	Bearing parts (ball-bearings, needle bearings, etc.)
54	Separating parts (pyrotechnics, springs, cutters, etc.)
55	Control parts (gears, etc.)
56	Fluid handling parts (diffusers, etc.)
57	Heating parts
58	Measuring instruments (gauges, Thermocouples, etc.)
59	Optical passive equipment
60	Magnetic parts
61	Other parts

Column 1:Group number/Item number

Identified number relevant to each group and sequential item number in each group of the list (one only per mechanical part type).

Column 2:Commercial identification

As follow:

- type and number.
- specification number.
- material.

Column 3:Type of part

Indicate a standard nomenclature.

Column 4:Procurement information

Manufacturer/supplier:this identifies the abbreviated name of the manufacturer and name of the supplier if different.

Proc. Spec.:reference of the procurement specification with issue and revision.

Column 5:Elementary function/Main characteristics

Function to be ensured by the mechanical part and relevant main characteristics.

Column 6:Use/location

Indicate in which subsystems, equipment or box the mechanical part is used.

Column 7:Environmental code

Radiation/UV/ATOX(1)		Ambiance	Temperature
G=Geostationary	S=Outside shadow	V=Vacuum	1=0 to 100 K
L=Low orbit	L=Outside light	H=Hermetic	2=101 to 200 K
B=Radiation belts		M=Manned	3=201 to 300 K
I=Interplanetary		E=Elevated pressure	etc.



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HERSCHEL DPUs/ICU

HERSCHEL SPIRE DPU UNIT DECLARED MECHANICAL
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(1) For parts inside the spacecraft, choose a letter from the left-hand column.
For parts on the surface of the spacecraft, combine this letter with “L” or “S”.

Column 8:Criticality and hazards

Indicate all parts participating in a safety-critical and/or reliability-critical function.

Column 9:Justification for approval and Prime comments

The purpose of this column is to enter any additional information that may be necessary in order to achieve customer’s approval. This information is reference and issue of the Requests For Approval, reference of justificatory file for parts approved for other space or aeronautical programmes meeting the specific needs of the programme and waivers, reference NASA/MSFC MAPTIS databases codes, etc..

Column 10:Contractor’s approval (Prime App.)

A=Approved. All mechanical parts classified A may be used without restriction.

W=Approved with a waiver. The use of such mechanical parts shall be reduced to a minimum. These mechanical parts do not meet the requirements but are used for functional reasons. The waiver number shall be entered in column 9.

P=Pending a decision. Mechanical parts for which an evaluation report or a waiver is awaiting the Contractor’s provisional or definitive approval.

O=Open. New mechanical parts or mechanical parts for which investigations and qualification are in progress.

D=Deleted. This classification is used for a mechanical part which is no longer used in the spacecraft.

Column 11:Customer approval and comments (Customer App)

This column will be completed by Customer in accordance with the standard comments listed in [RD 1] annex F.

5. DECLARED MECHANICAL PARTS LIST

In the following pages (ANNEX A) are listed the mechanical parts envisaged during the manufacturing phase.

Declared Mechanical Parts List

1	2	3	4	5	6	7	8	9	10	11
Group No / Item No:	Commercial identification	Type of part	Procurement Info: 1) Manufacturer 2) Supplier 3) Proc. Spec. Issue/Rev	1) Elementary function 2) Main characteristics	1) Use 2) Location	Environment. Code 1) Radiation 2) Ambiance 3) Temp.	Criticality and hazards	Justification for approval and Prime comments	Prime App.	Customer App.
Group 51: SPACING PARTS										
51/01	Washer DIN 125A 1.4401	See column 2	CNR-IFSI, CGS / Bossard Switzerland / DIN125A	Assembly of mechanical parts	Assembly of mechanical parts	I V 3, 4		NASA/MSFC MAPTIS: 10370		
51/02	Washer DIN 433 1.4401	See column 2	CNR-IFSI, CGS / Bossard Switzerland / DIN433	Assembly of mechanical parts	Assembly of mechanical parts	I V 3, 4		NASA/MSFC MAPTIS: 10370		
51/03	Spring Washer DIN 127B 1.4401	See column 2	CNR-IFSI, CGS / Bossard Switzerland / DIN127B	Assembly of mechanical parts	Assembly of mechanical parts	I V 3, 4		NASA/MSFC MAPTIS: 10370		
Group 52: CONNECTING PARTS										
52/01	Hex nut DIN 439B 1.4401	See column 2	CNR-IFSI, CGS / Bossard Switzerland / DIN439B	Assembly of mechanical parts	Assembly of mechanical parts	I V 3, 4		NASA/MSFC MAPTIS: 10370		
52/02	Screw DIN 912 1.4401	See column 2	CNR-IFSI, CGS / Bossard Switzerland / DIN912 - ISO 4762	Assembly of mechanical parts	Assembly of mechanical parts	I V 3, 4		NASA/MSFC MAPTIS: 10370		

Declared Mechanical Parts List

1	2	3	4	5	6	7	8	9	10	11
Group No / Item No:	Commercial identification	Type of part	Procurement Info: 1) Manufacturer 2) Supplier 3) Proc. Spec. Issue/Rev	1) Elementary function 2) Main characteristics	1) Use 2) Location	Environment. Code 1) Radiation 2) Ambiance 3) Temp.	Criticality and hazards	Justification for approval and Prime comments	Prime App.	Customer App.
52/03	Screw DIN 965A 1.4401	See column 2	CNR-IFSI, CGS / Bossard Switzerland / DIN965A	Assembly of mechanical parts	Assembly of mechanical parts	I V 3, 4		NASA/MSFC MAPTIS: 10370		
52/04	Screw DIN 85A 1.4401	See column 2	CNR-IFSI, CGS / Bossard Switzerland / DIN85A - ISO 1580	Assembly of mechanical parts	Assembly of mechanical parts	I V 3, 4		NASA/MSFC MAPTIS: 10370		
52/05	Card-lok retainer MHA260-4.80 ETM2L rev.:N/C	See column 2	CALMARK CORP. CA- USA / ASTM-B221	Blocking of PCBs in the box	Mechanical assembly of PCBs in the box	I V 3, 4		NASA/MSFC MAPTIS: 50643		
52/06	Elastic Pin DIN 1481 1.4301	See column 2	CNR-IFSI, CGS / Bossard Switzerland / DIN1481 (Passivation treatment as per QQ-P-35)	Blocking of Bonding Stud	Assembly of Bonding Stud	I V 3, 4		NASA/MSFC MAPTIS: 10351		
52/07	Heli-Coil self locking LN 9499 1,4301	See column 2	CNR-IFSI, CGS / Bolhoff Germany / LN9499 DIN29782	Assembly of mechanical parts	Assembly of mechanical parts	I V 3, 4		NASA/MSFC MAPTIS: 10351		
52/08	Heli-Coil LN 9039 1,4301	See column 2	CNR-IFSI, CGS / Bolhoff Germany / LN9039	Assembly of mechanical parts	Assembly of mechanical parts	I V 3, 4		NASA/MSFC MAPTIS: 10351		

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HERSCHEL/SPIRE

DRCU Declared Material List (DML)

Reference: SAp-SPIRE-NC-0060-02
Issue: 1.0
Date: 13/02/03

	Function	Name	Date	Visa
Prepared by	Mechanics Product Assurance	Nathalie Colombel	13/02/03	
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	<p>5 Purpose</p> <p>9 Material groups Group 2 “Copper and copper alloys” used</p> <p>10 Column 8 filled</p> <p> Addition of item 1-3</p> <p>11 Group 2 table</p>

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
		SCU	Subsystems Control Unit
		PSU	Power Supply Unit
	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

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 3. 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	Aluminium alloy Cu rem Be 1,8-2,0 Al 0,20 Si 0,20 Co 0,20	1. TBD 2. APITEC 4. 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 5. TBC 6. TBC	1. TBC 2. TBC 3.	O	

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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



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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



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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 ¹ 2. Justification 3. Subcontractor comments	Approval status	Comments ESA Approval
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		



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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

 		Ref.:SPIRE Issue: 1.0 Date:19 October 2004 Page 1 of 14
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Declared Mechanical Parts List Cardiff Deliverables for SPIRE-PFM

SPIRE Ref.: SPIRE-UCF-PRJ-002152

Cardiff Ref.: HSO-CDF-LI-075

Issue: 1.0

19 October 2004

Prepared by:-	Peter Hargrave – Cardiff SPIRE technical manager		14 th September 2004
Approved by:-	Ian Walker – Cardiff AIG programme manager		

Astronomy Instrumentation Group, Department of Physics & Astronomy, University of Wales, Cardiff, 5 The Parade, Cardiff CF24 3YB +44 (0)2920 876682	K:\Product Assurance\Declared Lists\CDF\HSO-CDF-LI-075-DMPLa.doc
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Update history

Date	Version	Remarks
20 th September 2004	1.0	First issue of Cardiff combined list

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SCOPE

This document lists the “Declared Mechanical Parts” used in the provision of the deliverables for the **SPIRE-PFM and FS** instrument from Cardiff University

INTRODUCTION

Mechanical Parts used by Cardiff University are listed in the accompanying tables, which are compliant with ESA: PSS-01-700 Issue 2. Each mechanical part has an individual identification number, the first digit being the group type as follows:-

51. Spacing Parts (Washers, Spacers,.....)
52. Connecting Parts (Bolts, Nuts, Rivets, Inserts, Clips,.....)
53. Bearing Parts (Ball-Bearings, Needle Bearings,.....)
54. Separating Parts (Pyrotechnics, Springs, Cutters,.....)
55. Control (Gears,.....)
56. Fluid Handling Parts (Diffusers,.....)
57. Heating Parts
58. Measuring Instruments (Gauges, Thermocouples,.....)
59. Optical Passive Equipment
60. Magnetic Parts
61. Other Parts - Note: "EEE Parts are included in this Section"

CONTENT OF THE MECHANICAL PARTS LIST

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

The mechanical Parts list consists of 12 columns, which shall be completed as indicated below. If a particular item does not apply, write N.A. (Not Applicable).

COLUMN 1 : Item Number

Sequential item number in each group of the list. One only per mechanical part type. Does not change during the life of the mechanical parts list.

COLUMN 2 : Commercial Identification

As required :

- type and number
- specification number (whether national, ESA, company in-house, etc.) and issue status. This document must be available for sending to ESA on request.
- materials

COLUMN 3 : Type of Part

Use a standard nomenclature, in order to ensure correct grouping of similar parts,

e.g.: Value, one way

Value , two ways

and not one-way value or two-way value.

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 issue and revision. It may be replaced by a national specification number if this exists and makes source of procurement irrelevant.

COLUMN 5 : Elementary Function, Main Characteristics

- function to be ensured by the mechanical part

- main characteristics: e.g. number of revolutions per minute for a ball bearing

COLUMN 6 : Use and Location

Indicate in which subsystem, equipment or box the mechanical part is used + subcontractor's name/abbreviation.

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 parts inside the spacecraft, choose a letter from the left-hand side column. For parts 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).

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

COLUMN 8 : Criticality & Hazards

Mark here all parts participating in a safety-critical and/or reliability-critical function

SUBCOLUMN 9.1 : 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 9.2 : Approval Status of the Contractor

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

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

W - Approved with a waiver = These Mechanical Parts 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 = Mechanical Parts for which an evaluation report or a waiver is awaiting the contractor's provisional or definitive approval.

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

D - Deleted = This clarification is used for a Mechanical Part, 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.

COLUMN 11 : ESA sign-off

COLUMN 12 : Project sign-off

Issue # 1		DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075			
Project:		Herschel-SPIRE													
Institute:		Cardiff University													
Prepared by:		Peter Hargrave													
Category:		51	Spacing parts												
Item #	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign	
						R	A	T		Justification	Status of contractor				
51-1	S105204	Stainless steel Belleville spring washer	Precision Technology Supplies LTD, The Birches industrial estate, Imberhorne Lane, East Grinstead, West Sussex. RH19 1XZ. Batch # 19135	Spring-loading Kevlar-suspended hub. Maintenance of Kevlar tension.	300mK Photometer bus-bar supports. (LTS-PFM-100, LTS-PFM-200) 300mK light baffles (LTS-PFM-300, LTS-PFM-400)	I	V	1	Not critical	Common use	ISO 9002				
51-2	D6-20	Stainless steel Belleville spring washer	Unimatic Linear, 130 Granville road, London NW2 2LN Trace # 7197-36813-1-040902	Maintenance of bolt torque upon cooling – compensation for difference in thermal expansion coefficients	300mK Photometer bus-bar supports. (LTS-PFM-100, LTS-PFM-200) 300mK light baffles (LTS-PFM-300, LTS-PFM-400) Spectrometer calibration source SCAL-PFM-000 Photometer calibration source PCAL-PFM-000	I	V	1	Not critical	Common use	ISO 9002				
51-3	D6-21	Stainless steel Belleville spring washer	Unimatic Linear, 130 Granville road, London NW2 2LN Trace # 7197-32925-2-02210	Maintenance of bolt torque upon cooling – compensation for difference in thermal expansion coefficients	Spectrometer calibration source SCAL-PFM-000	I	V	1	Not critical	Common use	ISO 9002				

Issue # 1		DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075		
Project:		Herschel-SPIRE												
Institute:		Cardiff University												
Prepared by:		Peter Hargrave												
Category:		52 Connecting parts (sheet 1)												
Item #	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
52-1	3585-02CNX.129	Helicoil screwlock insert 2-56 x 1.5D (stainless steel)	Armstrong fastening systems, Foster St., Hull. HU8 8BT Lot# 158398	Thread liner for tapped holes in Aluminium. Provides screw locking.	300mK Photometer bus-bar supports. (LTS-PFM-100, LTS-PFM-200) 300mK light baffles (LTS-PFM-300, LTS-PFM-400) Spectrometer calibration source SCAL-PFM-000	I	V	1	Not critical	Common use	ISO 9001			
52-2	3585-02CNX.172	Helicoil screwlock insert 2-56 x 2D (stainless steel)	As above. Lot# 152509	Thread liner for tapped holes in Aluminium. Provides screw locking.	Spectrometer calibration source SCAL-PFM-000 Photometer calibration source PCAL-PFM-000	I	V	1	Not critical	Common use	ISO9001			
52-3	MRM5254 Hexagonal jackpost assembly	2-56 UNC Jacking screw for MDM connector	Glenair PO Box 37 Mansfield Nottinghamshire UK	Fixing of MDM37SSB connectors to SCal body. Provision of cable attachment jack-posts	Spectrometer calibration source SCAL-PFM-000	I	V	1	Not critical	Common use	ISO9001			
52-4	Screw 2-56UNC x 3/16 cap HD	Stainless steel cap head bolt	Precision Technology Supplies LTD, The Birches industrial estate, Imberhorne Lane, East Grinstead, West Sussex. RH19 1XZ. Batch # 18338	General assembly	Spectrometer calibration source SCAL-PFM-000	I	V	1	Not critical	Common use	ISO 9002			

Issue # 1		DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075			
Project:		Herschel-SPIRE													
Institute:		Cardiff University													
Prepared by:		Peter Hargrave													
Category:		52 Connecting parts (sheet 2)													
Item #	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign	
						R	A	T		Justification	Status of contractor				
52-5	Screw 2-56UNC x 1/4 cap HD	Stainless steel cap head bolt Batch # 17953	Precision Technology Supplies LTD, The Birches industrial estate, Imberhorne Lane, East Grinstead, West Sussex. RH19 1XZ.	General assembly	300mK Photometer bus-bar supports. (LTS-PFM-100, LTS-PFM- 200) 300mK light baffles (LTS-PFM-300, LTS-PFM- 400) Spectrometer calibration source SCAL-PFM-000	I	V	1	Not critical	Common use	ISO 9002				
52-6	Screw 2-56UNC x 3/8 cap HD	Stainless steel cap head bolt Batch # 17010		PCal source mounting & cable clamp	Photometer calibration source PCAL-PFM-000	I	V	1	Not critical	Common use					
52-7	2.0mm x 16mm dowel pins (stainless steel)	Stainless steel dowel pin Batch # 19607		Fixed capstan retention	300mK Photometer bus-bar supports. (LTS-PFM-100, LTS-PFM- 200)	I	V	1	Not critical	Common use					
52-8	Screw M1.6 x 6 Pozi csk	Stainless steel CSK head bolt Batch # 17398		Assembly of 300mK filter clamp rings (photometer side)	Photometer detector filter clamps FILT-PFM-230, FILT-PFM-240, FILT-PFM-250	I	V	1	Not critical	Common use					
52-9	Screw M1.6 x 8 Pozi csk	Stainless steel CSK head bolt Batch # 17398		Assembly of 300mK filter clamp rings (spectrometer side)	Spectrometer detector filter clamps FILT-PFM-210, FILT-PFM-220	I	V	1	Not critical	Common use					
52-10	Screw 2-56unc x 1/4 csk	Stainless steel CSK head bolt Batch # 26469		PCal source mounting	PCAL-PFM-000	I	V	1	Not critical	Common use					

Issue # 1	DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075			
Project:	Herschel-SPIRE													
Institute:	Cardiff University													
Prepared by:	Peter Hargrave													
Category:	53		Bearing parts											
Item#	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
					NONE									

Issue # 1	DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075			
Project:	Herschel-SPIRE													
Institute:	Cardiff University													
Prepared by:	Peter Hargrave													
Category:	54		Separating parts											
Item#	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
					NONE									

Issue # 1	DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075			
Project:	Herschel-SPIRE													
Institute:	Cardiff University													
Prepared by:	Peter Hargrave													
Category:	55		Control parts											
Item#	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
					NONE									

Issue # 1		DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075		
Project:		Herschel-SPIRE												
Institute:		Cardiff University												
Prepared by:		Peter Hargrave												
Category:		56		Fluid handling parts										
Item#	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
					NONE									

Issue # 1		DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075		
Project:		Herschel-SPIRE												
Institute:		Cardiff University												
Prepared by:		Peter Hargrave												
Category:		57		Heating parts										
Item #	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
57-1	Vishay-Sfernice High precision resistor PHR0805Y5000BB +/- 0.1% Screened to ESA Level C Variant 03	500 Ω chip resistor	Charcroft Electronics, Dol-y-Coed, Llanwrtyd Wells, Powys, LD5 4TH Lot# 00020037 / 5541P7 C of C# 03181	Heating SCal sources from 4K to ~100K. Maximum power dissipation <5mW (rated 100mW)	SCal heated sources SCAL-PFM-000	I	V	1	Not critical	ESA approved part	ISO 9002			

Issue # 1	DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075			
Project:	Herschel-SPIRE													
Institute:	Cardiff University													
Prepared by:	Peter Hargrave													
Category:	58	Measuring instruments												
Item#	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
					NONE									

Issue # 1	DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075			
Project:	Herschel-SPIRE													
Institute:	Cardiff University													
Prepared by:	Peter Hargrave													
Category:	59	Optical passive equipment												
Item#	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
					NONE									

Issue # 1	DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075			
Project:	Herschel-SPIRE													
Institute:	Cardiff University													
Prepared by:	Peter Hargrave													
Category:	60	Magnetic parts												
Item#	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
					NONE									

Issue # 1		DECLARED MECHANICAL PARTS LIST										HSO-CDF-LI-075		
Project:		Herschel-SPIRE												
Institute:		Cardiff University												
Prepared by:		Peter Hargrave												
Category:		61		Other parts										
Item #	Commercial ID	Type of part	Procurement information	Elementary function. Main characteristics.	Use & location	Environment code			Criticality & hazards	Approval status		ESA approval & comments	Project sign	ESA sign
						R	A	T		Justification	Status of contractor			
61-1	Space Grade Micro-D Socket Connector GS83513/02-FN-429B	37 socket Micro-D connector (solder bucket) MDM37SSB	Glenair UK Ltd 40 Lower Oakham way Oakham business park Mansfield Nottinghamshire NG18 5BY C of C# 676521	SCal prime & redundant electrical connectors	SCal assembly SCAL-PFM-000	I	V	1	Not critical	Certified to NASA 311-INST-001 Level 1	ISO9001			
61-2	Custom-built sapphire sheet Al ₂ O ₃ 99.9% 2.0mm x 4.0mm x 0.25mm	Insulator plate (custom made)	Goodfellow Cambridge Ltd, Huntingdon, PE29 6WR C of C# LS 236675/1	Electrical isolation of SCal heaters and thermometers from source body	SCal source assemblies SCAL-PFM-200, SCAL-PFM-300, SCAL-PFM-400, SCAL-PFM-500	I	V	1	Not critical	Approved material	ISO9001			
61-3	Lakeshore Cryotronics Cernox thermometer CX-1030-SD-HT-4L	Cernox resistance thermometer sensor (high temperature annealed)	Elliot Scientific, 3 Allied business centre, Coldharbour lane, Harpenden, Herts AL5 4UT C of C# 14200, 14119	Monitoring of SCal source and body temperatures	SCal assembly SCAL-PFM-000	I	V	1	Not critical	Common part used for general SPIRE thermometry	ISO9001			
61-4	PCal thermal source HBI-6	Custom made thermal emitter	Haller-Beeman Associates, 5020 Santa-Rita road, El Sobrante, CA 94803 USA	Thermal source (prime and redundant) for PCal Heated Nichrome film on Sapphire	PCal assembly PCAL-PFM-000	I	V	1	Not critical	Similar device flown on Spitzer-MIPS. Qualified at unit and system level. Refs.				
61-5	Solder terminals 572-4882-01-05-16	Insulated solder turret. Insulator - diallyl phthalate (blue) C fo C# 0240025	Wearnes Cambion Ltd, Peveril House, Mill bridge, Castleton, Hope Valley. S33 8WR	Termination / connection of PCal source leads	PCal assembly PCAL-PFM-000	I	V	1	Not critical		ISO9001			

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