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Declared Materials List Cardiff Deliverables for SPIRE-PFM

Declared Materials List Cardiff Deliverables for SPIRE-PFM

SPIRE-UCF-PRJ-002153

SPIRE Ref.: SPIRE-UCF-PRJ-002153

Cardiff Ref.: HSO-CDF-LI-074

Issue: 1.0

1 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,	K:\Product Assurance\Declared Lists\CDF\HSO-CDF-LI-074-DML.doc
Department of Physics & Astronomy,	
University of Wales, Cardiff,	
5 The Parade,	
Cardiff	
CF24 3YB	
+44 (0)2920 876682	

Update history

Date	Version	Remarks
20 th September 2004	1.0	

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SCOPE

This document lists the declared materials used in the provision of the deliverables for the SPIRE-PFM and FS instrument from Cardiff University

INTRODUCTION

Materials used by Cardiff University are listed in the accompanying tables, which are 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....)

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. If a particular item does not apply, write N.A (Not Applicable).

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.

COLUMN 7: Environmental Code

Radiation /UV/ATAXIA (R)	(1)	Ambience (A)	Temperature (2) (T)
G = Geostationnary 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

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 <u>ECSS-Q-70-02A</u>. 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 <u>ECSS-Q-70-21A</u>.
- 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.

Offgassing (OFF) (if applicable):

- P The material passes the requirements of document <u>ECSS-Q-70-29A</u>.
- 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.

COLUMN 11: ESA sign-off

COLUMN 12: Project sign-off

Issue	e # 1			DE	CLARED MATERIALS	LIST									HSO-CD	F-LI-074	
Proje	ct: Hersche	el-SPIRE															
Instit	ute: Cardiff	University															
Prep	ared by: Peter Ha	argrave															
Cate	gory:	1	Aluminium & alu	minium alloy	/s												
Item #	Commercial ID	Chemical nature and	Procurement information	Processing parameter	Use & location		ironr/	nent	Size code			A	Approval status		ESA approval &	Project sign	ESA sign
		type of product				R	A	Т		SCC	CORR	OFF	Justification	Status of contractor	comments	-	
1-1	Aluminium alloy 6082	6082-T6 Commercial product. Extrusion / plate / rod	Metalfast Ltd, Swindon www.metalfast.co.uk C of C# 187636 / 1 / 672545 187824 / 1 / 672972	Aluchrom 1200	300mK Photometer bus-bar supports. (LTS-PFM-100, LTS- PFM-200) 300mK light baffles (LTS-PFM-300, LTS- PFM-400)	I	V	1	W2					ISO9002			
			Orchard Materials Ltd, Unit 20, Cooper road, Thornbury industrial estate, Thornbury, Bristol BS35 3UW		Spectrometer calibration source SCAL-PFM-000 300mK filter clamps FILT-PFM-210, FILT-PFM-220, FILT-PFM-230, FILT-PFM-240, FILT-PFM-250	I	V	1	W3, W2					ISO9002			
			Aalco, test lane, Nursling, Southampton, SO16 9TA C of C# 0747194		Photometer calibration source PCAL-PFM-000	ı	V	1	W1					ISO9000			

Issue	e # 1					HSO-CDF-LI-074										
Proje		schel-SPIRE														
Instit		diff University														
		r Hargrave	T .													
Cate	gory:	2	Copper	& copper alloys												
Item	Commercial ID	Chemical	Procurement	Processing	Use & location		/ironn		Size		A	Approval status		ESA	Project	ESA sign
#		nature and type of product	information	parameter		R	code	Т	code	-		lugtification	Status of	approval & comments	sign	
		type of product				K	A	ı		SCC	OFF FLAMM CORR	Justification	contractor	Comments		
2-1	OFHC Copper 99.99%	1" diameter copper bar BS3839 C110 C of C# L.41568	Columbia metals Ltd, Titley Bawk Avenue, Wellingborough road, Earls barton, Northampton, NN6 0LA	Machined, Gold plated In-house process E-59.	PCal source assembly PCAL-PFM-100	I	V	1	W1				ISO9002			

Issue #	<i>‡</i> 1					DECLARED MATERIALS	LIST							HSO-CD	F-LI-074	
Project	t: H	-lersche	I-SPIRE													
Institut	te: C	Cardiff U	Iniversity													
Prepar	ed by: P	Peter Ha	rgrave													
Catego	ory:		3	Nickel &	nickel alloys											
_					_											
Item#	Commerc	cial ID	Chemical nature and	Procurement information	Processing parameter	Use & location	Env	/ironment code	Size code		,	Approval status		ESA approval &	Project sign	ESA sign
			type of product		·		R	AT		CORR SCC	OFF	Justification	Status of contractor	comments	Ü	
						NONE										

Issue #	# 1					DECLARED MATERIALS	LIST							HSO-CD	F-LI-074	
Project	t:	Hersche	I-SPIRE													
Institut	te:	Cardiff U	Jniversity													
Prepar	ed by:	Peter Ha	argrave													
Catego	ory:		4	Titanium	& titanium allo	oys										
Item#	Comme	ercial ID	Chemical nature and type of	Procurement information	Processing parameter	Use & location		vironment code	Size code			oproval status Justification	Status of	ESA approval & comments	Project sign	ESA sign
			product					A	OUT	CORR SCC	FF I	Justinication	contractor	Comments		
						NONE										

Issue	# 1			DEC	CLARED MATERIALS	LIST							HSO-CD	F-LI-074	
Projec	ct:	Herschel-SPIRE													
Institu	ute:	Cardiff University													
Prepa	ared by:	Peter Hargrave													
Categ		5	Steels									1			
	-														
Item	Commerci		Procurement	Processing	Use & location	En۱	/ironment	Size			Approval status		ESA	Project	ESA sign
#	ID	and type of	information	parameter			code	code					approval &	sign	
		product				R	A T		တ္က င္က	무요	Justification	Status of	comments		
									CORR SCC	₽₩		contractor			
									7	\geq					
					NONE										

Issu	e # 1			DECL	ARED MATERIALS	LIST									HSO-CDI	F-LI-074	
Proje		Herschel-SPIRI	E														
Insti	tute:	Cardiff Univers	ity														
Prep	ared by:	Peter Hargrave															
Cate	gory:	6	Stainless steels														
Item #	Commercia ID	I Chemical nature and	Procurement information	Processing parameter	Use & location	Env	vironr code		Size code			F	Approval status		ESA approval &	Project sign	ESA sign
		type of product		·		R	A	Т		OUT	CORR	OFF	Justification	Status of contractor	comments	Ü	
6-1	Stainless steel 304L	Commercial product. Extrusion / plate / rod	Durbin metal industries Ltd, Unit 0, Lawrence drive, Stover trading estate, Yate, Bristol BS37 5PG	Machined	300mK Photometer bus-bar supports. (LTS-PFM-100, LTS-PFM-200)	I	V	1	W3					ISO9000			
		ļ	Metalfast Ltd, Swindon www.metalfast.co.uk		300mK light baffles (LTS-PFM-300, LTS-PFM-400)									ISO9002			
			Orchard Materials Ltd, Unit 20, Cooper road, Thornbury industrial estate, Thornbury, Bristol BS35 3UW		,									ISO9002			
6-2	Sandvik SANMAC 304L	Hot finished Stainless steel 304L tube	TW Metals Ltd, Majestic road, Nursling Estate, Nursling, Southampton, SO16 0AF Cert. # A/02-124674 A/01-926414 A/02-950954	Machined	Dichroics FILT-PFM-310, FILT-PFM-320 Beam dividers FILT-PFM-410, FILT-PFM-420	I	V	1	W2					ISO9002			

Issue					DE	CLARED MATERIALS	LIST								HSO-CD	F-LI-074	
Proje			hel-SPIRE														
Instit			ff University														
	ared by:	Peter	Hargrave	T =													
Cate	gory:		7	Filler metals:	Welding, brazii	ng & soldering											
Item #	Commerc	cial ID	Chemical nature and type of	Procurement information	Processing parameter	Use & location	En	vironr code		Size		A	Approval status		ESA approval &	Project sign	ESA sign
			product		1		R	A	Т	1	 FLAMM	OFF	Justification	Status of contractor	comments	3	
7-1			Tin/lead alloy Multicore rosin flux	RS components Ltd, PO box 99 Corby Northants NN17 9RS Part# 561-123		Soldering manganin wires into connectors - Spectrometer calibration source SCAL-PFM-000 Soldering copper source wires to insulated turret terminals - PCal source assembly PCAL-PFM-100	ı	V	1	WO				ISO9001			
																	+
																	+
																	+

Issue #	# 1					DECLARED MATERIALS	LIST						HSO-CD	F-LI-074	
Projec	t:	Hersch	nel-SPIRE												
Institu	te:	Cardiff	University												
Prepar	red by:	Peter F													
Catego	ory:		8	Miscellar	neous metallic	materials									
Item#	Commer	cial ID	Chemical nature and	Procurement information	Processing parameter	Use & location		rironment code	Size code	Д	approval status		ESA approval &	Project sign	ESA sign
			type of product		·		R	AT		OFF	Justification	Status of contractor	comments	•	
						NONE									

Issue #	# 1					DECLARED MATERIALS	LIST							HSO-CD	F-LI-074	
Projec	t:	Hersch	nel-SPIRE													
Institu	te:	Cardiff	f University													
Prepar	red by:	Peter I	Hargrave													
Catego	ory:		9	Optical m	aterials											
Item#	Comme	rcial ID	Chemical nature and type of product	Procurement information	Processing parameter	Use & location	Environ cod R A	le T	Size code	SCC	FLAMM CORR	Approval status Justification	Status of contractor	ESA approval & comments	Project sign	ESA sign
						NONE										

Issu	e # 1			DE	CLARED MATERIALS	LIST									HSO-CD	F-LI-074	
Proje		Herschel-SPIRE															
Insti		Cardiff University Peter Hargrave															
Prep	ared by:	•															
	gory:	10	10 Adhesives, coatings, varnishes														
	_			1			ı						T				
Item	Commercia										Approval status		ESA	Project	ESA sign		
#	ID	type of product								luctification	Status of	approval & comments	sign				
						K	A	'		OUT	CORR	OFF FLAMM	Justilication	contractor	comments		
10-1	Epotek- 920FL	Two-part loaded thermally conductive epoxy. Cert. of analysis#90- 3421/67-3421	Promatech Ltd, 2 Wilkinson Road, Cirencester, Gloucestershire, GL7 1YT	Mixed as per manufacturer s instructions. Cured at 80°C for 4 Hours.	Component of black coating BG1 and BG7B (see below) Encapsulation of Kevlar cord ends – 300mK photometer bus-bar supports & light baffles	I	V	1	W1				ESA approved epoxy				
10-2	Epotek-920	Two-part loaded thermally conductive epoxy. Cert. of analysis#45-3421/67-3421			SCal assembly (bonding heaters and thermometers to sources)	I	V	1	WO				ESA approved epoxy				
10-3	Cardiff black coating – BG1	High emissivity coating for stray light & thermal control. Based on Epotek- 920FL with carbon loading.	In-house process	HSO-CDF- PR-050	SCal assembly. SCAL-PFM-000 PCal assembly. PCAL-PFM-000. General SPIRE use – ref. SPIRE-RAL-NOT- 001816 300mK light baffles (LTS-PFM-300, LTS- PFM-400)	I	V	1	W2				Fully flight qualified Get qual report from RAL				
10-4	Cardiff black coating – BG7B	High emissivity coating for stray light & thermal control. Based on Epotek- 920FL with carbon and SiC loading.	In-house process	HSO-CDF- PR-049	SCal assembly. SCAL-PFM-000 General SPIRE use – ref. SPIRE-RAL-NOT- 001816	I	V	1	W3				Fully flight qualified Get qual report from RAL				

Issue #	ŧ 1					DECLARED MATERIALS	LIST								HSO-CD	F-LI-074	
Project	t:	Herschel-S	SPIRE														
Institut	e:	Cardiff Un	iversity														
Prepar	ed by:	Peter Harg	rave														
Catego	ry:		11	Adhesive	tapes												
Item#	Comm	ercial ID		Procurement information	Processing parameter	Use & location		ronme code A	ent T	Size code	CORR SCC OUT	- 1 - 1	Approval status Justification	Status of contractor	ESA approval & comments	Project sign	ESA sign
						NONE											

Issue #	1				DECLARED MATERIAL	S LIST					HSO-CD	F-LI-074	
Project:	Hersch	el-SPIRE											
Institute	: Cardiff	University											
Prepare	d by: Peter F	largrave											
Categor	y:	12	Paint & in	ıks									
Item#	Commercial ID	Chemical nature and	Procurement information	Processing parameter	Use & location	Environme	nt Size code	,	Approval status		ESA approval &	Project sign	ESA sign
		type of product	miomaion	parameter		RA	- 1	FLAMM CORR SCC	Justification	Status of contractor	comments	Sign	
					NONE								

Issue #	# 1					DECLARED MATERIALS	LIST							HSO-CD	F-LI-074	
Project	t:	Hersche	I-SPIRE													
Institut	te:	Cardiff L	Jniversity													
Prepar	ed by:	Peter Ha	rgrave													
Catego	ory:		13	Lubrican	ts											
	-															
Item#	Comme	rcial ID	Chemical	Procurement	Processing	Use & location	Env	vironment	Size			Approval status		ESA	Project	ESA sign
			nature and	information	parameter			code	code					approval &	sign	
			type of				R	A T	0	SC		Justification	Status of	comments		
			product						OUI.	C)C	OFF FLAMI		contractor			
											\leq					
						NONE										

Issue #	# 1					DECLARED MATERIALS	LIST						HSO-CD	F-LI-074	
Project	t:	Hersch	el-SPIRE												
Institut	te:	Cardiff	University												
Prepar	ed by:	Peter H	argrave												
Catego	ory:		14	Potting c	ompounds, se	alants, foams									
_	_				-										
Item#	Comme	rcial ID	Chemical nature and	Procurement information	Processing parameter	Use & location	En	vironment code	Size code		Approval statu	3	ESA approval &	Project sign	ESA sign
			type of product		·		R	A T	OUT	CORR SCC	TT	Status of contractor	comments	Ü	
						NONE									

Issue #	# 1					DECLARED MATERIALS	LIST							HSO-CD	F-LI-074	
Project	t:	Hersch	el-SPIRE													
Institut	te:	Cardiff	University													
Prepar	ed by:	Peter H	largrave													
Catego	ory:		15	Reinforc	ed plastics											
						,	1									
Item#	Comme	rcial ID	Chemical nature and	Procurement information	Processing parameter	Use & location		vironment code	Size code		,	Approval status		ESA approval &	Project sign	ESA sign
			type of product		·		R	AT		SCC	OFF FLAMM	Justification	Status of contractor	comments		
						NONE										

Issue #	# 1					DECLARED MATERIALS I	_IST								HSO-CD	F-LI-074	
Project	t:	Hersche	el-SPIRE														
Institut	te:	Cardiff	University														
Prepar	ed by:	Peter Ha	argrave														
Catego	ory: 16 Rubbers & elastor																
_																	
Item#	Comme	rcial ID	Chemical	Procurement	Processing	Use & location	Env	rironment	Size			Α	Approval status		ESA	Project	ESA sign
			nature and	information	parameter			code	code						approval &	sign	
			type of				R	A T		00	0 1	1 0	Justification	Status of	comments		
			product								OR ≜	ì E		contractor			
						NONE											

Issue #	# 1					DECLARED MATERIALS	LIST					HSO-CD	F-LI-074	
Projec	:t:	Hersche	I-SPIRE											
Institu	te:	Cardiff U	Jniversity											
Prepar	red by:	Peter Ha	argrave											
Catego	ory:		17	Thermopl	astics (non-adl	hesive tapes, foils (MLI))							
Item#	Comme	ercial ID	Chemical nature and	Procurement information	Processing parameter	Use & location	Environmer code	nt Size code		Approval status		ESA approval &	Project sign	ESA sign
			type of product				RA	-	OFF FLAMM CORR SCC	Justification	Status of contractor	comments	3	
						NONE								

Issue	e # 1				DECLAR	RED MATERIALS	LIST									HSO-CDI	F-LI-074	
Proje	ect:	Herso	chel-SPIRE															
Instit		Cardi	ardiff University eter Hargrave															
Prep	ared by:		eter Hargrave 18 Thermoset plastics															
	gory:			Thermoset plast	ics													
Item #	Commerci		Chemical nature and type of product	Procurement information	Processing parameter	Use & location		vironr code		Size code			,	Approval status		ESA approval &	Project sign	ESA sign
			,, .		·		R	A	Т		OUT	CORR	OFF	Justification	Status of contractor	comments	Ü	
18-1	Torlon	1	Polyamide-imide	Amide-imide						Flight qualified / approved Check	ISO9001							
18-2	Polypropy film	lene	Polypropylene "PHD" material various thicknesses in range 3.7µm to 15µm "GND" material - 15µm to 50µm	Hoechst Trespaphan	TO79 LTS-PFM-400) St Copper Instrument filters, I V 1 W2 Flip qual evaporation. Photolithography Hot-pressed. In-house process.			Flight qualified. Heritage from ISO, Cassini, Spitzer										
18-3	Polypropy sheet																	

Issue # 1 Project: Institute:				HSO-CDF-LI-074											
		Herschel-SPIRE													
		Cardiff University	1												
Prep	ared by:	Peter Hargrave													
Cate		19	Wires and cable	Wires and cables											
Item #	Commercia	Chemical nature and type of product	Procurement information	Processing parameter	Use & location	Environment code		Size code			Approval status	i	ESA approval &	Project sign	ESA sign
						RA	Т		SCC	FLAMM CORR	Justification	Status of contractor	comments	_	
19-1	42 SWG Manganir wire (enamelled	n Polyimide insulation.	Scientific Wire Co., 18 Raven Road South Woodford London E18 1HW	As received	SCal assembly SCAL-PFM-000	I V	1				Flight qualified / approved				

Issue # 1		DECLARED MATERIALS LIST													HSO-CDF-LI-074			
	Project: Institute:		Herschel-SPIRE Cardiff University															
		Pete	r Hargrave		_													
Cate	gory:		20	Miscellaneous	non-metallic m	aterials (ceramics	.)											
Item	Commerci	al ID	Chemical	Procurement	Processing	Use & location	Environment Size			Approval status				ES	ESA	Project	ESA sign	
#			nature and type of product	information	parameter		code code								approval &	sign		
		R					A	Т		SCC	FLAMM	OFF	Justification	Status of contractor	comments			
20-1	Kevlar 1 K ^c -tech 0		100% para- aramide (Kevlar) fibres, formed into "ropes"	Cousin filterie, 8 rue Abbé Bonpain, BP 6 Wervicq Sud, 59558 Comines Cedex Part# 0816-1000 Lot# K0971	As received. Free ends potted with Epotek-920FL epoxy.	300mK Photometer bus-bar supports. (LTS-PFM-100, LTS- PFM-200) 300mK light baffles (LTS-PFM-300, LTS- PFM-400)	I	V	1	W1				Flight qualified	ISO9001 ISO TS 16949			
						,												