

1. INTRODUCTION

This document identifies the material types that will be used in the Solar B EIS instrument. The data is based on mature designs and is practically complete.

This document has been used to identify all the materials used by the project team.

2. APPLICABLE DOCUMENTS

AD1 MSSL/SLB-EIS/PA002 Product Assurance Plan

3. QUALITY LEVELS

Material selection shall be as described in AD1, paras 8.1 and 8.2.

4. TABLE DESCRIPTION FOR THE DECLARED MATERIALS

The format of the following table is broadly as follows:

4.1 Categories

Only the following categories are most likely to be applicable to EIS:-

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 materials and solders
8. Miscellaneous metallic materials
9. Optical materials
10. Adhesives, coatings and varnishes
12. Paints, primers and inks
15. Reinforced plastics
18. Thermoset plastics
19. Wires and cables
20. Miscellaneous non-metallic materials

4.2 Column Description

1. Item number
2. Commercial Identification
3. Nature and Type of Product
4. Procurement Information
5. Summary of Processing Parameters
6. Use and Location
7. Environmental Code
8. Size Code
9. Approval Status
10. ESA Comments

NOTES:

Column 7: Environmental Code

Radiation (R)		Ambiance (A)	Temperature (T)
G = Geostationary	S = Outside shadow	V = Vacuum	1 = 0 to 100K
L = Low orbit	L = Outside light	H = Hermetic	2 = 101 to 200K
B = Radiation belts		M = Manned	3 = 210 to 300K
I = Interplanetary		E = Elevated pressure	etc

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

4.3 Abbreviations

N/A = Not applicable

TBA= To be advised

Issue No 2		DECLARED MATERIALS LIST						MSSL/SLB-EIS/PA009			
PROJECT: SOLAR B EXPERIMENT: EIS EXPERIMENTERS: BIRMINGHAM UNIVERSITY (BU) NAVAL RESEARCH LABORATORY (NRL) RUTHERFORD APPLETON LABORATORY (RAL) MULLARD SPACE SCIENCE LABORATORY (MSSL) PREPARED BY: A 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 plate	Villamead Ltd Birmingham. J Smith & Sons London	Clean to spec. Alocrom 1200	CLM body Plug conduits. Electronic boxes Radiation + thermal shields.	L	V	3,4	W3		
2.	Aluminium alloy 2014	2014_A Commercial product plate	Villamead Ltd Birmingham	Clean to spec. Alocrom 1200	CLM doors	L	V	3,4	W3		
3.	Aluminium Alloy 7075	7075 Commercial product Rolled tooling plate	NRL	Clean to spec. Alocrom 1200	CLM flexures	L	V	3,4	W2		
4	Aluminium honeycomb	Perforated Aluminium honeycomb 3/16-5052-001	Hexel Composites, UK	Clean to spec.	Composite panel core	L	V,E	3,4	W2		

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CATEGORY: 1. Aluminium and Aluminium Alloys - Continued											
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			
5.	Aluminum alloy 6061	6061-T651 QQ-A-250 ASTM-B221 Sheet & Plate	Ball Brothers C-S Metals E-J Enterprises Copper & Brass Sales	Sulfuric Anodize, MIL-A-8625, TY 2, CL2 MIL-C-5541 CL3	Shutter, Mirror, Grating, Slit/Slot Assemblies	L	V	3/4	W2		
6.	Aluminum alloy 6061	6061-T6511 QQ-A- 225/8 Bar	Ball Brothers E-J Enterprises	Same	Same	L	V	3/4	W2		
7.	Aluminum alloy 6061	6061-T6511 QQ-A-200/8 Bar	E-J Enterprises Copper & Brass Sales	Same	Same	L	V	3/4	W2		
8.	Aluminum	High Purity	Alfa Aesar Type 5N	Film 1550A Thick Finish TBD	Filter Film Filter Frame	L	V	3/5	W2		

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CATEGORY: 2. Copper and Copper Alloys											
Itm 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.	Phosphor bronze	Commercial product Cast bar	Villamead Ltd Birmingham	Clean to spec.		L	V	3	W1		
2.	Phosphor bronze	Type PB102 Commercial product	Anderton, Bradford UK	N/A	Spacers for radiation shields	L	V	3,4	W1		
3.	Copper	Copper braid, oxygen-free, type OPHC6-1000		N/A	Heat conductor	L	V	3,4	W1		
4.	Beryllium Copper C172	C172, Cond A ASTM-B-194 or QQ-C-533	BrushWellman	Copper Flash MIL-C-14550 Blacken per MIL-F-495	Shutter Disk & Encoder	L	V	3,4	W1		
5.	Phosphor Bronze	BS2783 Pb103	Helicoil	Manufactures	Helicals Various	L	V	3,4	W1		

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CATEGORY: 3. Nickel and Nickel 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 R A T			Size Code	Approval Status	ESA Comments
1.	Invar	64Fe-36Ni alloy Commercial product	Imphy (UK) Ltd Bucks, UK	Selectively gold plated	CCD shield. Braid clamp bodies	L	V	3,4	W2		
2.	Mesh	Buckbee Mears 70 lpi Nickel	Stork Veco	Electro Formed Nickel	Filters	L	V	3,4	W1		

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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 R A T			Size Code	Approval Status	ESA Comments
1.	Titanium	Grade 2 Commercial product Rolled bar	Villamead Ltd Birmingham	Clean to spec. Epoxy bonded within 30 mins of machining or shot-blasting	Structure inserts	L	V	3	W3		
2.	Titanium	Type 6AL4V Commercial product			FPA for adjustment of CCD positions	L	V	3,4	W2		

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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 R A T			Size Code	Approval Status	ESA Comments
1.	Stainless Steel	316 Commercial product Rolled bar	Villamead Ltd Birmingham	Clean to spec.	Clamshell hinges	L	V	3,4	W1		
2.	Stainless Steel	Commercial product AISI 321 S12/S20	Various BS1449	N/A	Fasteners on electronics	L	V	3,4	W1		

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CATEGORY: 6. Stainless Steels - Continued											
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			
3.	Stainless Steel 303	303 Cond A ASTM-A-581	PIC (cage code 00141) P/N A2-25	Passivation QQ-P-35	Shutter Shaft	L	V	3/4	W1		
4.	Stainless Steel 304	304 Cond A QQ-S-763	Ball Brothers	Passivation QQ-P-35	Grating	L	V	3/4	W1		
5.	Stainless Steel 300 Series Shim Stock	QQ-S-766 AMS 5906	Lyon Industries	Passivation QQ-P-35	Grating	L	V	3/4	W1		
6.	1010-1026 CRS	ASTM-108	Kollmorgen	Yoke Ring	Shutter Motor	L	V	3/4	W1		
7.	440C	AISI 440C	MPB Miniature Bearings	Bearing Manufacture	Shutter	L	V	3/4	W1		
8.	A286	AMS 5737	Various Fasteners	Passivation QQ-P-35	Various Assemblies	L	V	3/4	W1		
9.	300 Series SS	QQ-S-766 MIL-S-5059 AMS 5510 or 5512	Washers	Passivation QQ-P-35	Various Assemblies	L	V	3/4	W1		
10.	410 or 420	AISI 410/420	Lucas Aerospace	Passivation	Flex Pivots Mirror	L	V	3/4	W1		

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CATEGORY: 7. Filler Materials and Solders											
Itm 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.	Solder Elsold	63/37 Sn/Pb eutectic rosin cored Commercial product Extrusion	Bleiwerk Goslar 63 tin solder eutectic a sin ESA PSS-01-708	Hand soldering of PCBs	All PCBs	L	V	3,4	W2		
2.	Solder	SM63 Type RMA	Kester 285 QQ-S-571	N/A	Shutter Motor	L	V	3,4	W1		
3.	Filler Material	Acme E-Solder # 3022	LUXEL	Plug filter pin holes	Filters	L	V	3,4	W1		
4.	Solder	Sn96Ag4	Physik Instrumente	Used by Manufacturer	Mirror LVPZT	L	V	3,4	W1		

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CATEGORY: 8. Miscellaneous 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 R A T			Size Code	Approval Status	ESA Comments
1.	Invar 36	Invar-36 ASTM B753-86	Allegheny Ludlum	Heat Treat Nickel Plate per Mil-18317	Mirror Assy.	L	V	3/4	W2		
2.	Samarium Cobalt	Series 2-17 MMPA-0100	Kollmorgen	Magnet	Shutter Motor	L	V	3/4	W2		
3.	Non-Oriented Elec. Silicon Steel	Alloy M-27 ASTM A677	Kollmorgen	Laminations	Shutter Motor	L	V	3/4	W2		
4.	Linear Actuator Rotary Actuator Resolver	DL-4-A DL-5-A DL-6-A	CDA INTERCORP	Proprietary Assemblies	Mirror/Grating Slit/Slot Mirror	L	V	3/4	W1		
5.	Thompson Super 6 Linier Bearing	Bearing Plates 8620 Chrome Steel Balls	Thompson	Bray 600EF	Mirror	L	V	3/4	W2		

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CATEGORY: 9. Optical 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 R A T			Size Code	Approval Status	ESA Comments
1.	GRA Optic	High Grade Fused Silica	TBD	NRL/SLB-EIS/SP/254.01	Grating	L	V	3/4	W3		
2.	Mirror Optic	Zeordur, Premium Grade	SSG/TINSLEY	NRL/SLB-EIS/SP/256.04	Mirror	L	V	3/4	W3		

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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			Size Code	Approval Status	ESA Comments
						R	A	T			
1.	Redux 319L	Commercial sheet adhesive	Hexel composites GEN/UB/SP/319-01	SLB/319L-001	Honeycomb to laminate bonding	L	V,E	3,4	A4		
2.	Hysol EA 9395	Commercial adhesive	Sil-Mid, UK	SLB/9395-001	CFRP and metal insert bonding.	L	V	3,4	W4		
3.	Eccobond 285/Cat 9	Commercial adhesive	Resin technical Systems, UK	SLB/285-9-001	CFRP and metal insert bonding.	L	V	3,4	W3		
4.	Eccobond 285/Cat 11	Commercial adhesive	Resin technical Systems, UK	SLB/285-11-01	CFRP and metal insert bonding.	L	V	3,4	W3		
5.	Hysol EE4215/HD35 61	Commercial adhesive	Sil-Mid, UK	E/4215-3561-001	Locking of fastners.	L	V	3,4	W3		
6.	Stycast 1090 SI	Glass micro-balloon filled epoxy	HITEC Electronics Materials Ltd, UK GEN/UB/SP/10 90-01	SLB/1090-001	Panel aperture filling.	L	V	3,4	W3		

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CATEGORY: 10. Adhesives, Coatings and Varnishes - continued(1)											
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			
7.	FM410 foam adhesive	Sheet epoxy cure by free or restrained foaming process	Cyanamid Aerospace Products GEN/UB/SPEC/ FM410-01		Shear connection at honeycomb insert interface.	L	V,E	3,4	W2		
8.	Scotch Weld 1838	Commercial product 2 part, epoxy adhesive	3M's Adhesive Supplies	Mix 1:1 by mass. Cure 4hrs @ 60°C	Staking on PCBs	L	V	3,4	W1		
9.	CV 1152	Controlled volatility RTV silicone conformal coating	Nusil Technology USA	1 part system	Coating of PCBs	L	V	3,4	W1		
10.	Apiezon AP100	Space grease, commercial product	Edwards High Vacuum	N/A	Threads	L	V	3,4	W1		

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CATEGORY: 10. Adhesives, Coatings and Varnishes - continued(2)											
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			
11.	Scotchweld 2214	Adhesive	3M Kollmorgen		Shutter Motor	L	V	3/4	W1		
12.	Bondmaster E645	Adhesive	Kollmorgen		Shutter Motor	L	V	3/4	W1		
13.	Shell Epon 828	Adhesive	Kollmorgen Read Plastics Shell		Shutter Motor Filters Grating Mirrors	L	V	3/4	W1 W1 W1 W1		
14.	Shell Epon 871	Adhesive	Kollmorgen Shell		Shutter Motor	L	V	3/4	W1		
15.	Epon Curing Agent Z	Adhesive	Kollmorgen Shell		Shutter Motor	L	V	3/4	W1		
16.	Electroless Nickel	Coating/Plating	Kollmorgen	MIL-C-26074	Shutter Motor	L	V	3/4	W1		
17.	Tra-Bond 2151	Thermal Epoxy	Tra-Con		Shutter	L	V	3/4	W1		
18.	EPO-TECH 310	Epoxy	Epoxy Technology		Shutter	L	V	3/4	W1		
19.	Black Anodize	Coating/Plating	Almag	MIL-A-8625 TYPE II, CL 2	Shutter SLA Filters Grat/Mirror	L	V	3/4	W1 W1 W1		

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CATEGORY: 10. Adhesives, Coatings and Varnishes - continued(3)											
Itm 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			
20.	Hard Anodize with PTFE	Coating/Plating	Almag	MIL-A-63576	SLA	L	V	3/4	W1		
21.	Epolite FH2180-B	Foil Adhesive	H.B. Fuller		Filters	L	V	3/5	W1		
22.	Epolite FH2409	Foil Adhesive	H.B. Fuller		Filters	L	V	3/5	W1		
23.	Versamid 125	Epoxy Catalyst	Henkel Read Plastics		Filters Grating Mirror Grating	L	V	3/5 3/4	W1 W1		
24.	MoSi	Optical Coating	TBD	NRL/SLB-EIS/SP/351.01 NRL/SLB-EIS/SP/351.01	Mirror Grating	L	V	3/4	W1		
25.	PRC PR-1564	Polyurethane Adhesive, 2 Part	PRC DeSota		Grating Mirror	L	V	3/4	W!		
26.	3M Scotchcast 5555	Epoxy Resin System IM-22297	3M		Shutter Motor	L	V	3/4	W1		
17.	Copper Flash & Blacken	Coating/Plating Coating/Plating	TBD	MIL-C-14550 MIL-F-495	Shutter Disc & Encoder	L	V	3/4	W!		
28.	RF130	Adhesive	Resin Formulator		Filters	L	V	3/5	W1		

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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 R A T			Size Code	Approval Status	ESA Comments
1.	Alocrom 1200	Chromating Commercial product	Kollmorgen	IM-8704	Electronic boxes	L	V	3,4	A2		
2.	Markem 7224	Green Ink, 497-F			Shutter Motor	L	V	3,4	A1		

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CATEGORY: 15. Reinforced 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 R A T			Size Code	Approval Status	ESA Comments
1.	M44J/RS3 carbon fibre uni-directional prepreg tape	Toray M55J carbon fibres impregnated with modified RS3 polycyanate resin	YLA Inc. California 94510 USA Spec BU/SLB-EIS/SP04	SLB/M55J-001 BU/SLB-EIS/SP04	All panel laminates	L	V,E	3,4	A4		
2.	T300/RS3 carbon fibre woven prepreg tape	Woven carbon fibre material impregnated with RS3 polycyanate resin	YLA Inc. California 94510 USA Spec BU/SLB-EIS/SP05	SLB/M55J-001 BU/SLB-EIS/SP05	All CFRP bucket and block inserts	L	V,E	3,4	A4		
3.	Mutilayer, double and single sided PCBs	Glass fibre reinforced epoxy resin	Lyncolec (UK) MSSL/EE/DS/C 001	PTH mutilayer technology	All electronics	L	V	3,4	W2		

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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.	Shrink Tubing	Kynar	3M MIL-I-23053/8	N/A	Shutter Motor Grating Mirror	L	V	3,4	W1		

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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	Internal and external harnessing	L	V	3,4	W3		
2.	Thermofoil heater	Stainless steel conductor, Kapton/FEP insulation. Commercial product	Yeovil Circuits UK	N/A	Operational heater for CCDs	L	V	3,4	W1		

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PREPARED BY:		A Dibbens									
CATEGORY: 19. Wires and Cables - Continued											
Itm 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			
3.	Magnet Wire	HGP TYPE K2,C1 200 Polyester-Amide-Imide with Polymide_Imide Overcoat	J-W-1177/14	Kollmorgen	Shutter Motor	L	L	3/4	W2		
4.	Lead Wire	Silver Coated High Strength Copper Alloy Wire with Extruded ETFE	MIL-W-22759/19 Insulation rated 600 volts @ -65C to 150C	Kollmorgen	Shutter Motor	L	L	3/4	W1		
5.	Lacing Tape	Gudebond Dacron Tape Super Gude-Space	MIL-T-43435 TYPE II	Gudebrod Inc	Shutter Motor	L	L	3/4	W1		
6.	Lacing Tape	Gude-Space DPT-H	MIL-T-43435 TYPE II	Gudebrod Inc	Shutter	L	L	3/4	W1		
7.	Cable Ties	Pan-Ty Blue Tefzel	MS3367 (MIL-S-23190)	Panduit	Shutter Grating	L	L	3/4	W1		
8.	Cable	RG 178B-U, Teflon Insulation	Physik Instrumente	Used by Manufacturer	Mirror/LVPZT	L	L	3/4	W1		
9.	Connector Assy	Potted Connector Assy with wire leads	ITT Cannon MDM-9PH003P-A141	ITT Cannon	Shutter	L	L	3/4	W1		

Issue No 2		DECLARED MATERIALS LIST							MSSL/SLB-EIS/PA009		
PROJECT:		SOLAR B									
EXPERIMENT:		EIS									
EXPERIMENTER:		BIRMINGHAM UNIVERSITY (BU) NAVAL RESEARCH LABORATORY (NRL) RUTHERFORD APPLETON LABORATORY (RAL) MULLARD SPACE SCIENCE LABORATORY (MSSL)									
PREPARED BY:		A 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.	Electrical Tape, 3M Type 62	Fluorocarbon film with a Silicon Polymer Pressure Sensitive Adhesive Rated -73C to 260C	MIL-I-23954 Type 2	Kollmorgen	Shutter Motor	L	V	3/4	W1		
2.	Teflon Tube	Etched Teflon TFE tubing		Kollmorgen	Shutter Motor	L	V	3/4	W1		
3.	Fiberglass	G10 or FR4	MIL-I-24768/2 or 28	Kollmorgen	Shutter Motor	L	V	3/4	W1		
		FR4	MIL-I-24768/28	Orbital	Shutter	L	V	3/4	W1		
4.	Braycote 815Z	Bray Oil	Castrol		Shutter	L	V	3/4	W1		
5.	Braycote 600EF	Micronic Lubrication	Castrol		Grating	L	V	3/4	W1		
6.	Silicon Wafer	TBD	Goddard Space Flight Center		SLA	L	V	3/4	W1		
7.	Thompson Super 6 Linier Bearing	Black Delrin	Thompson	Sleeve & Retainer	Mirror	L	V	3/4	W1		

Issue No 2		DECLARED MATERIALS LIST							MSSL/SLB-EIS/PA009		
<p>PROJECT: SOLAR B EXPERIMENT: EIS EXPERIMENTER: BIRMINGHAM UNIVERSITY (BU) NAVAL RESEARCH LABORATORY (NRL) RUTHERFORD APPLETON LABORATORY (RAL) MULLARD SPACE SCIENCE LABORATORY (MSSL) PREPARED BY: A Dibbens</p>											
CATEGORY: 20. Miscellaneous non-metallic materials - Continued											
Itm 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
8.	Rulon PTFE	Grade 123 black	Doriflon Ltd Co Durham	Clean to spec.	CLM Bearings	L	V	3,4	W1		
9.	Torlon	4203 Polyamide nylon	Goodfellow Cambridge	Clean to spec.	Radiator mounts	L	V	3	W1		
10.	Gudebrod 15D96	Lacing cord Natural polyester	Gudebrod Inc. USA Mil-T-43435D	N/A	Harnesses	L	V	3,4	W1		
11.	Vespel	Polyimide type SP-1 Commercial product	DuPont USA	N/A	FPA - thermal insulators, spacers	L	V	3,4	W1		