



**SPIRE & PACS
Sorptions Coolers
Declared Material List**

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

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

SBT internal ref : SBT/CT/2001-19

	Name & Function	Date	Signature
Prepared	P. Dupont – Cooler PA manager		
SBT PA Check	P. Dupont – Cooler PA manager		
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List of Acronyms

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



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RFA	Request For Approval		
SAP	Service d'Astrophysique		
SBT	Service des Basses Températures		
SCO	Sorption Cooler (full unit)		
S/C	SpaceCraft		
SP	Sorption pump		
SPIRE	Spectral & Photometric Imaging Receiver		
TRR	Test Readiness Review	Bilan Technique	BT



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1. SCOPE OF THE DOCUMENT

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



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2. DOCUMENTS

2.1 Applicable documents

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

2.2 Reference documents

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



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3. DECLARED MATERIAL LIST

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

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

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



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Group 1 – Aluminum & Aluminum Alloys

1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1- Manuf / Supplier 2- Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
1-1	2017-A T451	Cu: 4.35 % Mg: 0.80 % Mn: 0.75 % Si: 0.51% Fe: 0.21% Zn: 0.23% Al: rem.	1- ANFI 2- EN 485-2	Machined	Evaporator cover (137) Pump cover (124)		V	1	W2						ESA PSS-01 701		Coulée # 4-01-5664
1-2	2017-A	Cu: 4.20 % Mg: 0.66 % Mn: 0.85 % Si: 0.60% Fe: 0.40% Zn: 0.01% Al: rem.	1- KUMW 2- EN 755-1,2,3	Machined	Guiding tubes (136)		V	1	W2						ESA PSS-01 701		



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Group 2 – Copper & Copper alloys

1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
2-1	High purity electrolytic copper CuC1	Cu: 99.99% O < 0.0005%	1 – OUTOKUMPU/SISO 2 - 3090 1A 201210	<ul style="list-style-type: none"> • Machined • Gold plated 	Strap (138) Strap ends (531, 532, 541, 542) 1/2 female (203) & 1/2 male (204) evaporator cups Shunt (210) Charcoal casing (212) Evaporator (219) & Pump (220) Cold Tips Switch Heads (301) & Bases (302)		V	1	W3						ESA PSS-01-701		FI 007



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Group 4 – Titanium & Titanium alloys																	
1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
4-1	Ti-6Al-4V ELI, Diam. 200 mm	Al: 6.09 % V: 3.82 % C: 80 ppm Fe: 1402 ppm N: 20 ppm O2: 1095 ppm H2: 60 ppm	1 - FORTECH/TIMET 2 - ELI 200 (30/09/98) ABM 8-4062/2 DQG 06-01 F/A0	<ul style="list-style-type: none"> Machined EB welding 	Structural parts (401 to 407) Miscellaneous components Pump-tubing- Evaporator parts Heat Switches parts		V	1	W4						ESA PSS-01-701		Coulée # 293147C Lot # T03290
4-2	Ti-6Al-4V ELI, diam. 10 & 20 mm	Al: 5.9 % V: 3.8 % C: 0.029% Fe: 0.18 % H: 0.0016% N: 0.010 % O: 0.12% Y: <0.005%	1 - TIMET UK 2 - ASTM F 136 Iss 98 ISO 5832-3 (ELI) Iss 3	<ul style="list-style-type: none"> Machined EB Welding 	Structural parts + EB Welding samples										ESA PSS-01-701		Coulée # CU67913 Lot # SC1513 (10 mm) Lot # SC1421 (20 mm)
4-3	Ti-6Al-4V ELI, Diam. 65 mm	Al: 6.0 % V: 3.95 % C: 0.008% Fe: 0.135 % N: 0.005 % O: 0.110%	1 - TIMET UK 2 - MAG 426, Iss 0	<ul style="list-style-type: none"> Machined EB welding 	EB Welding samples										ESA PSS-01-701		Coulée # AV6549 Lot # 9749.31



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Group 6 – Stainless Steels																	
1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	R	A	T	Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification							Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
6-1	AISI 304L	Ni: 8.51% Cr: 18.29% C: 0.018% Mn: 1.87% Si: 0.44% S: 0.025%	1 – IMCO 2 – EN 10088-3	Machined	Minipump (306), Minipump tube (305) & cap (307) Grid Mesh (218)		V	1	W1								Lot # 12470
6-2					Screws, nuts, washers, spring		V	1									



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Group 7 – Filler Metals & Solders

1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
7-1	Tin		1 – SBT/ 2 – Specification	HSO-SBT-PR-034			V	1	W1								
7-2	ARGECO 1441	Silver alloy Ag: 72% Cu: 28%	1 – PROTECHNO 2 – AFNOR A81362 / ISO 3677	Subcontractor procedure			V	1	W1								



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Group 10 – Adhesives, Coatings & Varnishes

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



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Group 19 – Wires & Cables

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



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Group 20 – Miscellaneous Nonmetallic Materials																	
1	2	3	4	5	6	7			8	9					10		
Item #	Commercial Id.	Chemical Nature	Procurement Information	Summary of Processing Parameters	Use & Location	Environment Code			Size Code	9.1					9.2	9.3	Comment
		1- Chemical Products 2- Type of Product	1 - Manuf / Supplier 2 - Specification			R	A	T		Outg	Flam	Offg	SCC	Corr	Justification for Approval	Approval Status	
20-1	Kevlar cord 11T28 & 34T28		1- DuPONT/COUSIN 2- 3090 1A 155370	HSO-SBT-PR-xxx	Suspension wires		V	1	W1								FI 005
20-2	Procelit P160	Al2O3: 91% SiO2: 9% impurities <0.1%	3- KAPYROK 4-	Bakeout before use HSO-SBT-PR-xxx	Evaporator Retention of liquid He by capillary attraction		V	1	W1						Located into sealed cooler heart		
20-3	Vegetal Charcoal	C	1- PROLABO 2-	Bakeout before use HSO-SBT-PR-xxx	Pump Adsorption of gaseous He		V	1	W1						Located into sealed cooler heart		Lot # 97037
20-4	³ He	3He: 99.9965% 4He: 0.0035% N2, CO2, H2 < 1Vpm	1- EURISO-TOP 2-	HSO-SBT-PR-xxx	Filling of Cooler		V	1									Batch # AA-97084
20-5	PTFE housing		1 - TECHNOFLUOR 2 - Specification				V	1	W1								