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**300mK Strap Supports & Light Baffles -
Declared Processes List**

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Declared Processes List

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List of Acronyms

Term	Meaning	Term	Meaning
AD	Applicable Document	IR	Infrared
ADC	Analogue to Digital Converter	IRD	Instrument Requirements Document
AIV	Assembly, Integration and Verification	IRTS	Infrared Telescope in Space
AME	Absolute Measurement Error	ISM	Interstellar Medium
AOCS	Attitude and Orbit Control System	JFET	Junction Field Effect Transistor
APART	Arizona's Program for the Analysis of Radiation Transfer	ISO	Infrared Space Observatory
APE	Absolute Pointing Error	LCL	Latching Current Limiter
ASAP	Advanced Systems Analysis Program	LIA	Lock-In Amplifier
ATC	Astronomy Technology Centre, Edinburgh	LVDT	Linear Variable Differential Transformer
AVM	Avionics Model	LWS	Long Wave Spectrometer (an instrument used on ISO)
BDA	Bolometer Detector Array	MAC	Multi Axis Controller
BFL	Back Focal Length	MAIV	Manufacturing, Assembly, Integration and Verification
BRO	Breault Research Organization	MCU	Mechanism Control Unit = HSMCU
BSM	Beam Steering Mirror	MGSE	Mechanical Ground Support Equipment
CBB	Cryogenic Black Body	M-P	Martin-Puplett
CDF	Cardiff, Department of Physics & Astronomy	NEP	Noise Equivalent Power
CDMS	Command and Data Management System	NTD	Neutron Transmutation Doped
CDMU	Command and Data Management Unit	OBS	On-Board Software
CDR	Critical Design Review	OGSE	Optical Ground Support Equipment
CEA	Commissariat a l'Energie Atomique	OMD	Observing Modes Document
CMOS	Complimentary Metal Oxide Silicon	OPD	Optical Path Difference
CoG	Centre of Gravity	PACS	Photodetector Array Camera and Spectrometer
CPU	Central Processing Unit	PCAL	Photometer Calibration source
CQM	Cryogenic Qualification Model	PFM	Proto-Flight Model
CVV	Cryostat Vacuum Vessel	PID	Proportional, Integral and Differential (used in the context of feedback control loop architecture)
DAC	Digital to Analogue Converter	PLW	Photometer, Long Wavelength
DAQ	Data Acquisition	PMW	Photometer, Medium Wavelength
DCU	Detector Control Unit = HSDCU	POF	Photometer Observatory Function
DDR	Detailed Design Review	PROM	Programmable Read Only Memory
DM	Development Model	PSW	Photometer, Short Wavelength
DPU	Digital Processing Unit = HSDPU	PUS	Packet Utilisation Standard
DSP	Digital Signal Processor	RAL	Rutherford Appleton Laboratory,
DQE	Detective Quantum Efficiency	RD	Reference Document
EDAC	Error Detection and Correction	RMS	Root Mean Squared
EGSE	Electrical Ground Support Equipment	SCAL	Spectrometer Calibration Source
EM	Engineering Model	SCUBA	Submillimetre Common User Bolometer Array
EMC	Electro-magnetic Compatibility	SED	Spectral Energy Distribution
EMI	Electro-magnetic Interference	SMEC	Spectrometer Mechanics
ESA	European Space Agency	SMPS	Switch Mode Power Supply
FCU	FCU Control Unit = HSFUCU	SOB	SPIRE Optical Bench
FIR	Far Infrared	SOF	Spectrometer Observatory Function
FIRST	Far Infra-Red and Submillimetre Telescope	SPIRE	Spectral and Photometric Imaging Receiver
FOV	Field of View	SRAM	Static Random Access Memory
F-P	Fabry-Perot	SSSD	SubSystem Specification Document
FPGA	Field Programmable Gate Array	STP	Standard Temperature and Pressure
FPU	Focal Plane Unit	SVM	Service Module
FS	Flight Spare	TBC	To Be Confirmed
FTS	Fourier Transform Spectrometer	TBD	To Be Determined
FWHM	Full Width Half maximum	TC	Telecommand
GSFC	Goddard Space Flight Center	URD	User Requirements Document
HK	House Keeping	UV	Ultra Violet
HOB	Herschel Optical Bench	WE	Warm Electronics
HPDU	Herschel Power Distribution Unit	ZPD	Zero Path Difference
HSDCU	Herschel-SPIRE Detector Control Unit		
HSDPU	Herschel-SPIRE Digital Processing Unit		
HSFCU	Herschel-SPIRE FPU Control Unit		
HSO	Herschel Space Observatory		
IF	Interface		
IID-A	Instrument Interface Document - Part A		
IID-B	Instrument Interface Document - Part B		
IMF	Initial Mass Function		

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1. Scope

This document presents the processes used during the manufacture and assembly of the 300mK thermal strap supports and light baffles.

2. Documents

2.1. *Applicable documents*

All applicable documents are listed in the AD chapter of the CIDL (HSO-CDF-LI-029).

2.2. *Reference documents*

RD1 ECSS-Q-70A Materials Mechanical Parts and Processes
RD2 ESA PSS-01-700 The Technical Reporting and Approval Procedure for Materials and Processes

3. Declared processes list

Processes should be grouped in the table below:

<i>Group Type</i>	<i>Used</i>
1. Adhesive Bonding	✓
2. Composite Manufacturing	N/A
3. Encapsulation/Molding	N/A
4. Painting/Coating	✓
5. Cleaning	✓
6. Welding/Brazing	N/A
7. Crimping/Stripping/Wire Wrapping	N/A
8. Soldering	N/A
9. Surface Treatment	✓
10. Plating	N/A
11. Machining	✓
12. Forming	N/A
13. Heat Treatment	N/A
14. Special Fabrication	N/A
15. Marking	✓
16. Miscellaneous Processes	✓
17. Inspection Procedure	✓

Issue No 1		DECLARED PROCESSES LIST					HSO-CDF-LI-043-1.0				
PROJECT:		HERSCHEL SPACE OBSERVATORY					Group 1 – Adhesive Bonding				
EXPERIMENT:		SPIRE									
EXPERIMENTERS:		Cardiff University									
PREPARED BY:		P.Hargrave									
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments	
								Justif. for approval	Status		
1-1	Use of Epotek 920	1.Cardiff University 2.HSO-CDF-PR-xxx	Bonding / containment of free ends of Kevlar cords	1.Kevlar cords 2.		1. 2.10-2	Not critical	Common practice @ UWC			

Issue No 1		<u>DECLARED PROCESSES LIST</u>								
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 2- Composite Manufacturing				
EXPERIMENT:		SPIRE								
EXPERIMENTERS:		Cardiff University								
PREPARED BY:		P.Hargrave								
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Status	

Issue No 1		<u>DECLARED PROCESSES LIST</u>								
PROJECT: HERSCHEL SPACE OBSERVATORY		Group 3 Encapsulation/Molding								
EXPERIMENT: SPIRE										
EXPERIMENTERS: Cardiff University										
PREPARED BY: P.Hargrave										
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Status	

Issue No 1		DECLARED PROCESSES LIST											
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 4 Painting/Coating							
EXPERIMENT:		SPIRE											
EXPERIMENTERS:		Cardiff University											
PREPARED BY:		P.Hargrave											
Itm No	Process	Specification		Description/identification	Use and location		User code	Associated DML items		Criticality of process	Approval Status		Comments
		1.Manufacturer	2.Specification		1.Part	2.Use		1.Part	2.Material		Justif. for approval	Status	
4-1	Coating of light baffle components	1.Cardiff University	2.HSO-CDF-PR-xxx	Application of black coating to light baffle components	1.LB immer hub B			1.	2.10-1	Critical			

Issue No 1		DECLARED PROCESSES LIST								
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 5 Cleaning				
EXPERIMENT:		SPIRE								
EXPERIMENTERS:		Cardiff University								
PREPARED BY:		P.Hargrave								
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Statu s	
5-1	Cleaning of individual items	1.Cardiff University 2.HSO-CDF-PR-xxx	Cleaning of individual items before assembly / integration	1.All items		1.N/A 2.	Not critical			
5-2	Cleaning of final assemblies	1.Cardiff University 2.HSO-CDF-PR-xxx	Cleaning of complete photometer support and light baffle assemblies to remove particular and molecular contaminants	1.Photometer support, Light baffle			Critical	Cleanliness & contamination monitoring		

Issue No 1		<u>DECLARED PROCESSES LIST</u>								
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 6 Welding & Brazing				
EXPERIMENT:		SPIRE								
EXPERIMENTERS:		Cardiff University								
PREPARED BY:		P.Hargrave								
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Status	

Issue No		1		<u>DECLARED PROCESSES LIST</u>									
PROJECT:		HERSCHEL SPACE OBSERVATORY			Group 7 Crimping/Stripping/Wire Wrapping								
EXPERIMENT:		SPIRE											
EXPERIMENTERS:		Cardiff University											
PREPARED BY:		P.Hargrave											
Itm No	Process	Specification		Description/identification	Use and location		User code	Associated DML items		Criticality of process	Approval Status		Comments
		1.Manufacturer	2.Specification		1.Part	2.Use		1.Part	2.Material		Justif. for approval	Status	

Issue No 1		<u>DECLARED PROCESSES LIST</u>								
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 8 Soldering				
EXPERIMENT:		SPIRE								
EXPERIMENTERS:		Cardiff University								
PREPARED BY:		P.Hargrave								
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Status	

Issue No 1		DECLARED PROCESSES LIST								
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 9 Surface Treatment				
EXPERIMENT:		SPIRE								
EXPERIMENTERS:		Cardiff University								
PREPARED BY:		P.Hargrave								
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Status	
9-1	Aluchrom 1200	1.Walton Plating LTD 2.TBD	Aluchrom 1200 surface treatment of aluminium components	1.Photometer support base, light baffle base, light baffle cover	WPL	1. Photometer support base, light baffle base, light baffle cover 2.N/A	Not critical			
9-2	Electropolishing	1.Ashton & Moore Ltd, Birmingham, UK 2.TBD	Electropolish stainless steel components to smooth Kevlar guide holes	1.All stainless steel components, except capstans	AML	1. 2.5-1	Critical	Inspection report. Certificates of conformance		

Issue No 1		<u>DECLARED PROCESSES LIST</u>								
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 10 Plating				
EXPERIMENT:		SPIRE								
EXPERIMENTERS:		Cardiff University								
PREPARED BY:		P.Hargrave								
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Status	

Issue No 1		DECLARED PROCESSES LIST											
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 11 Machining							
EXPERIMENT:		SPIRE											
EXPERIMENTERS:		Cardiff University											
PREPARED BY:		P.Hargrave											
Itm No	Process	Specification		Description/identification	Use and location		User code	Associated DML items		Criticality of process	Approval Status		Comments
		1.Manufacturer	2.Specification		1.Part	2.Use		1.Part	2.Material		Justif. for approval	Status	
11-1	Machining of mechanical parts	1.The Machining Centre, Abingdon, Oxon, UK 2.HSO-CDF-SP-xxx		Machining of stainless steel, aluminium & Torlon parts	See drawing list		TMC			Critical	Dimensional check & certificates of conformance		

Issue No		1		<u>DECLARED PROCESSES LIST</u>									
PROJECT:		HERSCHEL SPACE OBSERVATORY			Group 12 Forming								
EXPERIMENT:		SPIRE											
EXPERIMENTERS:		Cardiff University											
PREPARED BY:		P.Hargrave											
Itm No	Process	Specification		Description/identification	Use and location		User code	Associated DML items		Criticality of process	Approval Status		Comments
		1.Manufacturer	2.Specification		1.Part	2.Use		1.Part	2.Material		Justif. for approval	Status	

Issue No 1		DECLARED PROCESSES LIST								
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 13 Heat Treatment				
EXPERIMENT:		SPIRE								
EXPERIMENTERS:		Cardiff University								
PREPARED BY:		P.Hargrave								
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Status	
13-1	Pre-conditioning of Kevlar	1.Cardiff University 2.HSO-CDF-PR-xxx	Kevlar pre-conditioning – bake @ 80 C under moderate tension in complete assembly	1.Photometer support & light baffle assemblies, prior to final tensioning			Not critical			
13-2	Baking of assemblies under vacuum	1.Cardiff University 2.HSO-CDF-PR-xxx	Final bake-out. Removal of water & contaminants.	1.Photometer support & light baffle assemblies			Critical			

Issue No 1		<u>DECLARED PROCESSES LIST</u>								
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 14 Special Fabrication				
EXPERIMENT:		SPIRE								
EXPERIMENTERS:		Cardiff University								
PREPARED BY:		P.Hargrave								
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Status	

Issue No 1		DECLARED PROCESSES LIST								
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 15 Marking				
EXPERIMENT:		SPIRE								
EXPERIMENTERS:		Cardiff University								
PREPARED BY:		P.Hargrave								
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status		Comments
		1.Manufacturer 2.Specification		1.Part 2.Use		1.Part 2.Material		Justif. for approval	Status	
15-1	Marking of individual items	1.TMC 2.As per drawings	Marking of individual items	All items			Not critical			

Issue No 1		DECLARED PROCESSES LIST											
PROJECT:		HERSCHEL SPACE OBSERVATORY				Group 16 Miscellaneous Processes							
EXPERIMENT:		SPIRE											
EXPERIMENTERS:		Cardiff University											
PREPARED BY:		P.Hargrave											
Itm No	Process	Specification		Description/identification	Use and location		User code	Associated DML items		Criticality of process	Approval Status		Comments
		1.Manufacturer	2.Specification		1.Part	2.Use		1.Part	2.Material		Justif. for approval	Status	
16-1	Verification of tension in Kevlar cords	1.Cardiff University	2.HSO-CDF-PR-xxx	To verify tension on Kevlar cords	1.Kevlar cords & inner hubs					Not critical			

Issue No		1		<u>DECLARED PROCESSES LIST</u>									
PROJECT:		HERSCHEL SPACE OBSERVATORY			Group 17 Inspection Procedure								
EXPERIMENT:		SPIRE											
EXPERIMENTERS:		Cardiff University											
PREPARED BY:		P.Hargrave											
Itm No	Process	Specification		Description/identification	Use and location		User code	Associated DML items		Criticality of process	Approval Status		Comments
		1.Manufacturer	2.Specification		1.Part	2.Use		1.Part	2.Material		Justif. for approval	Status	
17-1	Kevlar inspection	1.Cardiff University	2.HSO-CDF-PR-xxx	Inspection of Kevlar routing and integrity	1.Photometer support assembly, light baffle assembly			1.2.20-1	Critical	Inspection report			