



Test Procedure

Herschel

Title: **SPIRE IST Specific Performance Test**

CI-No: 125200

Prepared by:	A. Koppe <i>A. Koppe</i>	Date:	<i>22.04.08</i>
Checked by:	S. Idler <i>S. Idler</i>		<i>24.04.08</i>
Checked by:	J. Kroeker <i>J. Kroeker</i>		<i>24.01.08</i>
Product Assurance:	R. Stritter <i>R. Stritter</i>		<i>26.06.07</i>
Configuration Control:	W. Wietbrock <i>W. Wietbrock</i>		<i>29.04.08</i>
Project Management:	Dr. W. Fricke <i>W. Fricke</i>		<i>25/04/2008</i>
Approved by			
TAS-F:	D. Montet		

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APPENDIX 4

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**Accelerometer Measurement & ACMS Reaction Wheel Profile for
Microphonics Test**

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1 Scope

This test procedure defines the instructions for the conducting of the SPIRE Specific Performance Test (SPT) to be performed in He II conditions. The corresponding as-run procedure will become part of the test report.

This procedure covers only operational aspects, as e.g. commanding and monitoring of the instrument and science data acquisition. The real time analysis of the acquired science data concerning performance aspects will be done by RAL using separate procedures and tools (e.g. on the I-EGSE) in parallel.

This procedure is based on the requirements of the Test Specification for HERSCHEL Instruments FM tests performed at satellite level (AD6). The EMC tests run overnight require a specific test set-up which will be covered by a separate procedure.

Major input to this test procedure is the SPIRE IST Specific Performance Test Procedure from RAL. The relevant test steps of the RAL procedure (AD9, attached as ANNEX 2) are called up in section 7 (step-by-step procedure). No redundancies are tested within this sequence.

The following tests from the SPIRE procedure (AD9) are not included:

Tests not included in schedule	Reason
SPEC high resolution mode SOF1	Cannot be done with cryostat vertical
Spectrometer Mechanism Microvibration Test	Cannot be done with cryostat vertical
EMC - Photometer most sensitive mode	N/A - to be used during EMC testing
EMC – Spectrometer most sensitive mode	N/A - to be used during EMC testing
EMC – SPIRE most Emissive mode	N/A - to be used during EMC testing
300mk Stage Decontamination	No time
Photometer noise stability versus bias frequency under flight ambient condition	No time
Phot scan mode POF5	No time

Constraints

- This procedure requires the presence of SPIRE personnel as the I-EGSE will be required to assess the results online as part of the pass/fail criteria.
- Before carrying out the next procedure within the test sequence, always ask for the go ahead by the RAL staff.

- Chapter 4 of this document specifies the sequence to be executed. Each of the steps in the sequence corresponds to procedures in section 7.5.
- The procedure tables in section 7.5 include blank boxes where the actual values of parameters can be noted. Based on the comparison with the expected values the success or failure of a step should be recorded in the final column of the table.
- The last two columns in a procedure table shall be used to record the overall Pass/Fail result of each test.
- Any text in boldface in the procedural steps generally indicates an action which may have to be performed manually by the CCS staff.
- The total available test duration are 3 days for SPT and 2 nights for EMC testing?
- For the micro-vibration test the accelerometer acquisition needs to be activated and the test coordinated with the ETS team.
- To perform the overnight EMC tests, the test adapter for the noise injection must have been installed between the PCDU and the SPIRE FCU.

1.1 Objective

The objective of the SPIRE SPT is:

- Verification of the correct performance of the SPIRE instrument and the compatibility with the spacecraft and
- Verification of operation procedures which will be executed during the mission

1.2 Test Flow

This test flow is structured to reflect nominal operations of the FM SPIRE.

The flow is as follows:

1. Power ON and configure SPIRE I-EGSE for test
2. Power ON SPIRE Prime and enable Mil1553B-bus interface
3. Run test sequence according to AD6, chapter 4.7.3.3

SPIRE SPT Day 1

Step	Test Name	Description/Purpose	Time Required (nominal)	Start Mode	End Mode	Lid Temp
1	Cooler recycle (manual)	First time the cooler is recycled we take it one step at a time	2	REDY	REDY	<15 K
2	Switch to PHOT STBY	Switch the instrument on in photometer mode using ILT settings and Vss from CFT DCU-07P	0,25	REDY	PHOT STBY	<15 K
3	Wait for stabilisation	Need to wait until 300 mK stage is drifting slowly enough to allow detector characterisation	0	PHOT STBY	PHOT STBY	<15 K
4	BSM Control Loop Setting	Sets up the parameters of the BSM control loop - can be carried out during stabilisation	1	PHOT STBY	PHOT STBY	<15 K
5	Photometer bias phase optimisation	Sets up a grid of phase versus bias frequency for photometer BDAs	2	PHOT STBY	PHOT STBY	<15 K
SHIFT 1 CONTINGENCY		END OF SHIFT TIDY UP READY FOR HANDOVER	1			
6	Photometer noise stability versus bias frequency	Determination of the noise spectrum versus bias frequency under dark conditions	2	PHOT STBY	PHOT STBY	<15 K
7	Photometer bias noise optimisation	Sets up the optimum bias setting for lowest noise in the photometer	2	PHOT STBY	PHOT STBY	<15 K

BDAs

8	Photometer Ambient Background Verification	First loadcurve to determine straylight environment under standard ground conditions	1	PHOT STBY	PHOT STBY	<15 K
9	PTC Headroom Characterisation	Provides data necessary for evaluation of PTC operations	3	PHOT STBY	PHOT STBY	<15 K
10	PCAL Photometer Characterisation	Verification that PCAL illumination levels are as expected compared to EQM and ILT	0,5	PHOT STBY	PHOT STBY	<15 K

SHIFT 2 CONTINGENCY	END OF SHIFT TIDY UP READY FOR OVERNIGHT	1	TBD
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11	Overnight Hold on Test Activities		7,25	PHOT STBY	PHOT OBSV	TBD
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SPIRE SPT Day 2
Step Test Name

Step	Test Name	Description/Purpose	Time Required (nominal)	Start Mode	End Mode	Lid Temp
	Test preparation	Get cryostat into correct state for continuation of SPIRE testing. Low drifts and lid <15 K	2	PHOT STBY	PHOT STBY	TBC
12	PCAL Flash	Standard PCAL flash sequence to check detector operation	0,25	PHOT STBY	PHOT STBY	<15 K
13	Photometer thermal stability versus bias amplitude	Determine thermal response of the detectors to a step change bias	3	PHOT STBY	PHOT STBY	<15 K
14	Change lid temperature	Move lid to nominal telescope flight temperature	2	PHOT STBY	PHOT STBY	Variable
15	Photometer Thermal Control Verification	First test of PTC VM using predetermined parameters from Day 1	0	PHOT STBY	PHOT STBY	Variable

SHIFT 1 CONTINGENCY	END OF SHIFT TIDY UP READY FOR HANDOVER	1
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16	Photometer bias phase optimisation	Sets up a grid of phase versus bias frequency for photometer BDAs under flight conditions	1	PHOT STBY	PHOT STBY	70<T<90K
17	Photometer Ambient Background Verification	Loadcurve to determine environment under close to flight conditions	1	PHOT STBY	PHOT STBY	70<T<90K
18	SPIRE to REDY Mode	Switches off spectrometer mode and switches to REDY	0,25	PHOT STBY	REDY	70<T<90K
19	Switch to SPEC STBY	Switch the instrument to in spectrometer mode (sans SMEC) using ILT settings and Vss from CFT DCU-07P	0,25	REDY	SPEC STBY	70<T<90K

20	Spectrometer bias phase optimisation	Sets up a grid of phase versus bias frequency for spectrometer BDAs under flight conditions	1	SPEC STBY	SPEC STBY	70<T<90K
21	Spectrometer bias noise optimisation	Sets up the optimum bias setting for lowest noise in the spectrometer BDAs under flight conditions	1	SPEC STBY	SPEC STBY	70<T<90K
22	Spectrometer noise stability versus bias frequency	Determination of the noise spectrum versus bias frequency close to flight conditions	1	SPEC STBY	SPEC STBY	70<T<90K
23	Spectrometer Ambient Background Verification	Loadcurve to determine environment under close to flight conditions	1	SPEC STBY	SPEC STBY	70<T<90K
24	PCAL Spectrometer Characterisation	Verification that PCAL illumination levels are as expected compared to ILT	0,5	SPEC STBY	SPEC STBY	70<T<90K
SHIFT 2 CONTINGENCY		END OF SHIFT TIDY UP READY FOR OVERNIGHT	1	SPEC STBY	SPEC STBY	TBD
25	Overnight Hold on Test Activities		7,75	SPEC STBY	SPEC STBY	TBD

SPIRE SPT Day 3
Step Test Name

Step	Test Name	Description/Purpose	Time Required (nominal)	Start Mode	End Mode	Lid Temp
	Test preparation	Get cryostat into correct state for continuation of SPIRE testing. Low drifts and lid <15 K	0	SPEC STBY	SPEC STBY	TBC
	Switch to REDY	Switch from SPEC STBY (assumed overnight status) to REDY mode in prep for cooler recycle	0,25	PHOT STBY	REDY	<15 K
26	Cooler recycle (automatic)	First automatic cooler recycle	2	REDY	REDY	<15 K
	Wait for stabilisation	Need to wait until 300 mK stage is drifting slowly enough to allow detector characterisation	1	SPEC STBY	SPEC STBY	<15 K
28						
29	Spectrometer bias phase optimisation	Sets up a grid of phase versus bias frequency for spectrometer BDAs	1	SPEC STBY	SPEC STBY	<15 K
	Spectrometer bias noise optimisation	Sets up the optimum bias setting for lowest noise in the spectrometer BDAs	1	SPEC STBY	SPEC STBY	<15 K
30						
31	Spectrometer noise stability versus bias frequency	Determination of the noise spectrum versus bias frequency under dark conditions	2	SPEC STBY	SPEC STBY	<15 K
SHIFT 1 CONTINGENCY		END OF SHIFT TIDY UP READY FOR HANDOVER	1			

32	SCAL Characterisation	Check of SCAL operation and illumination	2	SPEC STBY	SPEC STBY	<15 K
33	Microphonics Prep	Switch ON ACMS, RWLs and initiate ETS recording of accelerometers	0.5			
34	Spectrometer Detector Microphonics Test	Not fully defined - requires discussion with S/C operators	1,5	SPEC STBY	SPEC STBY	<15 K
35	SPIRE to REDY Mode	Switches off spectrometer mode and switches to REDY	0,25	SPEC STBY	REDY	<15 K
36	SPIRE to PHOT STBY Mode	Switches on photometer	0,25	REDY	PHOT STBY	<15 K
37	Photometer Detector Microphonics Test	Not fully defined - requires discussion with S/C operators	1,5	PHOT STBY	PHOT STBY	<15 K
38	Microphonics De-Prep	Stop ACMS and stop ETS accelerometer recording	0.5			
	SHIFT 2 CONTINGENCY	END OF SHIFT TIDY UP READY FOR OVERNIGHT	2			
39	Switch SPIRE to OFF	Switch the instrument off and go home	0,5	SPEC STBY	OFF	

4. Power OFF SPIRE Prime and disable Mil1553B-bus interface
5. Power OFF SPIRE I-EGSE

2 Documents/Drawings

2.1 Applicable Documents

AD 1	FM SPIRE PFM Final Electrical Integration Procedure	HP-2-ASED-TP-0166
AD 2	Herschel PCDU & CDMS Nominal Switch On/Off Procedure	HP-2-ASED-PR-0070
AD 3	Herschel SAT Emergency Switch Off Procedure	HP-2-ASED-PR-0071
AD 4	PA Plan	HP-2-ASED-PL-0007
AD 5	SPIRE I-EGSE Set-Up	SPIRE-RAL-DOC-002841, iss. 2.2
AD 6	Test Specification for Herschel Instrument AVM & FM Tests Performed at Satellite Level	H-P-2-ASP-TS-1083, issue 2
AD 7	H-P GDIR	H-P-1-ASPI-SP-0027
AD 8	HERSCHEL Instrument Power ON-OFF and Mode Switching Procedure for Functional Testing	HP-2-ASED-TP-0206, Iss.1
AD 9	SPIRE IST Specific Performance Test Procedures	SPIRE-RAL-PRC-2704, iss. 3.1
AD 10	SPIRE System Level CS Test Procedure	SPIRE-RAL-PRC-003040, iss. 1.0

2.2 Reference Documents

RD 1	Herschel Planck Central Checkout System System User Manual	H-P-4-TE-MA-0010
RD 2	Herschel CDMU ASW S/W Interface Control Document	H-P-4-SSF-IC-0001
RD 3	Herschel CDMU BSW S/W Interface Control Document	H-P-4-SES-NT-0076
RD 4	SPIRE IID-B	SCI-PT-IIDB/SPIRE-02124
RD 5	SPIRE Functional Test Specification Iss. 1.4	SPIRE-RAL-DOC-001652
RD 6	SPIRE Instrument User Manual Iss. 1.0	SPIRE-RAL-PRJ-002395
RD 7	H/P OBT-UTC Time Synchronisation Technical Note Iss. 1.3	PT-CMOC-OPS-TN-6604-OPS-OGH
RD8	HERSCHEL FM Micro-vibration Test Specification	H-P-2-ASP-SP-1280, iss. 1

2.3 Other Documents

None

2.4 Acronyms & Abbreviations

1553	MIL-STD-1553B conform communication interface
AAD	Attitude Anomaly Detector
ACC	ACMS Control Computer
ACMS	Attitude Control and Measurement Subsystem
AD	Applicable Document
AIR	ACC In Reconfiguration
AIT	Assembly, Integration and Test
AIV	Assembly, Integration and Verification
APID	Application Process ID
ASW	Application Software
AVM	Avionics Model
BOLC	BOLometer Control unit (PACS)
BSW	Basic Software
CBH	Catalyst Bed Heater
CCS	Central Check-out System
CCSDS	Consultative Committee for Space Data Systems
CDMU	Control and Data Management Unit
CDMS	Control and Data Management Sub-system
CIR	CDMU In Reconfiguration
CLCW	Command Link Control Word
CLTU	Command Link Transmission Unit
CPDU	Command Pulse Distribution Unit
CRS	Coarse Rate Sensor
CTR	Central on board Reference Time
DCU	Detector Control Unit (SPIRE)
DEC	Detectors Electronics Control unit (PACS)

DMC	Detector and Mechanism Control unit (PACS)
DPU	Digital Processing Unit
DRCU	Detector Readout & Control Unit (SPIRE)
EEPROM	Electrically Erasable PROM
EGSE	Electrical Ground Support Equipment
FCL	Fold-back Current Limiter
FCU	FPU Control Unit (Spire)
FCV	Flow Control Valves
FDIR	Failure Detection, Isolation, and Recovery
FPU	Focal Plane Unit
GDIR	General Design and Interface Requirement
GRP	Group Heaters Switch
HBR	High Bit Rate
HL/HLC	High Level command
HP/HPC	High Priority commands
HPLM	Herschel PayLoad Module
HPSDB	Herschel Planck System Data Base
HW	Hardware
i.a.w.	In accordance with
I/F	InterFace
I/O	Input/Output
ICD	Interface Control Document
IST	Integrated System Test
LCL	Latching Current Limiter
LV	Latching Valves
LBR	Low Bit Rate
MAP	Multiplexed Access Point
MBR	Medium Bit Rate
MCU	Mechanisms Control Unit (SPIRE)
MEC	Mechanisms Electronics Control unit (PACS)
ML 16	Memory Load command (ML 16)
MM	Memory Module

MOIS	Mission Operations Information System
MTL	Mission Timeline
NRZ-L	Non Return to Zero – Litton
OBCP	On-Board Control Procedure
OBDAH	On-Board Data Handling
OBFM	On-Board Monitoring Function
OBRT/OBT	On-Board Reference Time
OIRD	Operation Interface Requirement Document
PACS	Photodetector Array Camera & Spectrometer
P/L	Payload
PCDU/PCS	Power Control Distribution Unit/Power Control Subsystem
PM	Processor Module
PROM	Programmable Read Only Memory
PSK	Phase Shift Keying
RA	Rate Anomaly
RAM	Random Access Memory
RCS	Reaction Control Subsystem
RD	Reference Document
RF	Radio Frequency
RM	Reconfiguration Module
RT	1553 Remote Terminal
RTU	RT Unit
RTA	RTU
RWL	Reaction Wheel Assembly
SA	1553 Remote Terminal Sub Address
SAS	Sun Acquisition Sensor
SCOE	Special Check-out Equipment
SCU	Subsystems Control Unit (SPIRE)
SIR	S/C In Reconfiguration
SIT	Subsystem Integrated Test
SP	Sun Pointing
SPIRE	Spectral & Photometric Imaging Receiver

SPU	Signal Processing Unit (PACS)
SSMM	Solid State Mass Memory
STR	Star Tracker
SVM	Service Module
SW	Software
TAI	International Atomic Time
TC	TeleCommand
TFG	Transfer Frame Generator
TM	TeleMetry
TTC	Telemetry Tracking & Command subsystem
TTR	Telemetry Telecommand and Reconfiguration
UFT	Unit Functional Test
VC	Virtual Channel
WD	Watchdog

3 Configuration

3.1 Satellite Configuration

The test requires use of the HERSCHEL S/C integrated with HSS and telescope, powered on in its basic test mode (i.e. quick switch on (PCDU & CDMS), in accordance with AD 2. SPIRE FM units will be powered ON as per this procedure on the basis that the FPU has already been successfully integrated and tested including the warm units.

The test shall be executed at He-II conditions and its duration shall not exceed three days of testing.

3.2 EGSE Configuration

This test requires the EGSE to be configured and elements powered on in accordance with AD 2.

I-EGSE shall be configured and connected to the HPCCS in accordance with AD5.

3.3 Set-up

SPIRE Test Scripts for the test must be loaded on to the HPCCS and checked in prior to start of test.

4 Test Sequence

4.1 Test Flow

The SPIRE Special Performance Test sequence during IST 1 including EMC CS shall be executed following chapter 4.7.3.2 of AD6, recalled hereafter:

SPIRE Special Performance Test (SPT/MT) during IST1 (3 days) + EMC CS		69:15:00	SPIRE-RAL-PRC-002704_2.4 - SPIRE_SPT_Procedures	section
SPIRE SPT Day 1		24:00:00		
	SVM and SPIRE Switch ON	1:00:00		
D1	1 Cooler recycle (manual)	2:00:00	Procedure: Cooler recycle (manual)	2.2
D1	2 Switch to PHOT STBY	0:15:00		
D1	3 Wait for stabilisation	0:00:00		
D1	4 BSM Control Loop Setting	1:00:00	Procedure: BSM Control Loop Setting	2.1
D1	5 Photometer bias phase optimisation	2:00:00	Procedure: Photometer bias phase optimisation	2.4
D1	SHIFT 1 CONTINGENCY	1:00:00		
D1	6 Photometer noise stability versus bias frequency	2:00:00	Procedure: Photometer noise stability versus bias frequency	2.6
D1	7 Photometer bias noise optimisation	2:00:00	Procedure: Photometer bias noise optimisation	2.5
D1	8 Photometer Ambient Background Verification	1:00:00	Procedure: Photometer Ambient Background Verification	2.8
D1	9 PTC Headroom Characterisation	3:00:00	Procedure: PTC Headroom Characterisation	2.9
D1	10 PCAL Photometer Characterisation	0:30:00	Procedure: PCAL Photometer Characterisation	2.11
D1	SHIFT 2 CONTINGENCY	1:00:00		
D1	11 Overnight EMC CS test (frequency search)	8:15:00		
SPIRE SPT Day 2		22:00:00		
D2	Test preparation	0:00:00		
D2	12 PCAL Flash	0:15:00		
D2	13 Photometer thermal stability versus bias amplitude	3:00:00	Procedure: Photometer thermal stability versus bias amplitude	2.7
D2	14 Change lid temperature	2:00:00		
D2	15 Photometer Thermal Control Verification	0:00:00	Procedure: Photometer Thermal Control Verification	2.10
D2	SHIFT 1 CONTINGENCY	1:00:00		
D2	16 Photometer bias phase optimisation	1:00:00	Procedure: Photometer bias phase optimisation	2.4
D2	17 Photometer Ambient Background Verification	1:00:00	Procedure: Photometer Ambient Background Verification	2.8
D2	18 SPIRE to REDY Mode	0:15:00		
D2	19 Switch to SPEC STBY	0:15:00		
D2	20 Spectrometer bias phase optimisation	1:00:00	Procedure: Spectrometer bias phase optimisation	2.12
D2	21 Spectrometer bias noise optimisation	1:00:00	Procedure: Spectrometer bias noise optimisation	2.13
D2	22 Spectrometer noise stability versus bias frequency	1:00:00	Procedure: Spectrometer noise stability versus bias frequency	2.14
D2	23 Spectrometer Ambient Background Verification	1:00:00	Procedure: Spectrometer Ambient Background Verification	2.15
D2	24 PCAL Spectrometer Characterisation	0:30:00	Procedure: PCAL Spectrometer Characterisation	2.16
D2	SHIFT 2 CONTINGENCY	1:00:00		
D2	25 Overnight Hold on Test Activities	7:45:00		
SPIRE SPT Day 3		22:15:00		
D3	Test preparation	0:00:00		
D3	26 Switch to REDY	0:15:00		
D3	27 Cooler recycle (automatic)	2:00:00	Procedure: Cooler recycle (automatic)	2.3
D3	28 Wait for stabilisation	1:00:00		
D3	29 Spectrometer bias phase optimisation	1:00:00	Procedure: Spectrometer bias phase optimisation	2.12
D3	30 Spectrometer bias noise optimisation	1:00:00	Procedure: Spectrometer bias noise optimisation	2.13
D3	31 Spectrometer noise stability versus bias frequency	2:00:00	Procedure: Spectrometer noise stability versus bias frequency	2.14
D3	SHIFT 1 CONTINGENCY	1:00:00		
D3	32 SCAL Characterisation	2:00:00		
D3	33 Spectrometer Detector Microphonics Test	1:30:00	Procedure: Spectrometer Detector Microphonics Test	2.21
D3	34 SPIRE to REDY Mode	0:15:00		
D3	35 SPIRE to PHOT STBY Mode	0:15:00		
D3	36 Photometer Detector Microphonics Test	1:30:00	Procedure: Photometer Detector Microphonics Test	2.20
D3	SHIFT 2 CONTINGENCY	2:00:00		
D3	Overnight EMC CS test (susceptibility level at spot	6:00:00		
D3	37 Switch SPIRE to OFF	0:30:00		

The HPCSS must also have the following MIB files for SPIRE loaded:

HPCSS Software	Version	Comment	Confirmed Installed
SPIRE MIB version			

The SPIRE I-EGSE will be running the following software for the test:

I-EGSE Software	Version	Comment
SPIRE MIB version		
SCOS version		

5 Conditions

5.1 Personnel

Responsibility	Name / Organisation
Test Director	
Test Conductor	
EGSE Operator	
PA Responsible	
Instrument Representative	
Customer Representative	
ESA Representative	

5.2 Environmental

The actual clean room environmental conditions for the test shall be recorded below.

Environmental	Nominal	Actual
Clean Room Class	class 100 000 or better	
Temperature	22°C ± 3°C	
Rel. Humidity	40 % - 60 %	
Pressure	Ambient	

5.3 Cryostat

During the SPT the HTT shall be closed (i.e. V102/V104 closed), and the cooling of the OBA and shields shall be provided by an external Dewar (baseline) or HOT (optional), with Helium flow rate adjusted to about 100 mg/s to 1 g/s.

The test will be performed on the MPT with the S/C vertical and tilted by 20° from z-axis and +y-axis down.

The cryo-cover mirror shall be cooled down to < 20 K by He flushing from an external Dewar. The cryo-cover temperature shall be controlled by adjusting the He flow with valves at the Dewar and the transfer line.

The relevant parameters shall be adjusted such that the following conditions are achieved for the duration of a day shift:

Level	Requirements acc. to IID-A, Table 7.3.5-1 [K]	Test Specification (AD6) [K]	Temperature Sensors	Actual Values		
				Day 1	Day 2	Day 3
SPIRE L0	T < 2.0 K	T < 1.9	T225, T226, T227			
SPIRE L1	T < 6.2 K	4.3 < T < 4.5	T235, T236			
SPIRE L2	T < 12 K	T < 6.0	T254, T256, T258			
SPIRE L3	T < 15 K	10 < T < 15 *)	T246, T247			

*) will be adjusted for JFET switch ON only

5.4 Operational

The SPIRE commanding shall be performed using the delivered and released set of scripts which are generated from the SPIRE database. The instrument HK telemetry packets shall be received and visualized on the instrument SCOS 2000 monitors. Real time analysis shall be performed by means of IEGSE by RAL. The entire related TC and TM of each test step shall be stored and made available for further analysis within a few minutes after the end of the particular test step.

All SCOS 2000 displays are defined as part of the SPIRE MIB, which will be delivered via the HPSDB. All TC's which are send during the execution of the TOPE-Tcl scripts are defined in this database as well.

- **Note:** FDIR is not required for this SPIRE test.

5.5 General Precautions and Safety

Non-test specific precautions and safety considerations are detailed in section 5.3 of AD 2. Specific safety issues and general precautions for the tests to be performed are detailed in the following sections.

5.5.1 General Safety Requirements, Precautions

In the event of unrecoverable anomaly requiring emergency switch off of the satellite, the switch off shall be performed in accordance with AD 3.

5.5.2 ESD constraints

Normal ESD constraints are to be observed during the test.

5.5.3 Special QA Requirements

None.

5.6 GSE

Non-test specific GSE details are provided in section 5.4 of AD 2. Specific GSE needs for the tests to performed are detailed in the following sections.

5.6.1 MGSE

S/C on MPT

5.6.2 CVSE

Dewar to flush shield and cover

5.6.3 EGSE/Software

The I-EGSE is required for this test and shall be connected to the HPCCS in accordance with AD 5.

The SPIRE IEGSE shall be running with the following software version for the test:

- MIB version on IEGSE: 2.2.G7
- SPIRE MIB loaded in HPSDB: version FM2.2.H1_PR
- Scripts: SPIRE-FM-SPT-.....with release note.....
- SPIRE merged MIB: Release note H-P-2-ASP-LI-1424_4, "SPIRE –cryo- Merged Database"

On-Board S/W:

CDMS ASW: Version 3.1.3

SPIRE OBS version:

Version DPU 2.2.H Partition 1 ; main and redundant

Version DPU 2.2.G partition 2 ; main and redundant

5.6.4 OGSE

None.

5.6.5 Special Equipment

For the EMC tests overnight specific equipment is required which is, however, detailed in the respective EMC procedure.

6 Requirements to be verified and Test Criteria

This is a performance check of the SPIRE FM under He II conditions.

This test is a specific performance test (SPT) of the SPIRE PFM instrument integrated on the HERSCHEL spacecraft under He II conditions. The instrument performance requirements to be verified by this test are specified by ESA versus RAL. Specific restrictions for this test are highlighted in chapter 7.4 of this procedure.

This test procedure covers the operational aspect of the SPT only. The related pass/fail criteria is to compare for each test step the actual (achieved) results with the nominal (expected) results, as defined in chapter 7 (step-by-step procedure).

The real time analysis of the acquired science data concerning performance aspects will be done by RAL. Also the evaluation of the scientific data and reporting of the evaluation results will be done by RAL. RAL will finally assess the achieved performance versus the requirements.

Typically, the Post Test Review (PTR) will be held before the completion of the scientific data evaluation and, therefore, only a preliminary assessment of the test success can be made at the PTR.

The test is considered as preliminary successful if all steps defined in the step-by-step procedure (chapter 7) reveal compliant results. If all commands have been successfully executed and the housekeeping data have not indicated any anomalies or faults, the science data could be correctly downloaded and the real time analyses performed by RAL have not revealed any degradation of the instrument performance.

The final conclusion of the test will be drawn after the completion of the post processing of the SPIRE science data and comparison of the results with the predictions.

It should be noted that the EMC CS procedures according to AD10 are attached (ANNEX 3). These allow the instrument been set up in the correct mode at the end of each test day for the overnight EMC test activities. The EMC test activities are described in a dedicated separate ASSED procedure.

7 Test Procedure

7.1 Initial EGSE and Satellite Configuration for the Test

The Spire FM Final Integration according to the Test Procedure ref. AD 1 must be successfully completed before the execution of this procedure. The EGSE and Satellite must be configured according to AD 2 prior to start of test. Before executing any of the procedures, please, always check with the Instrument-EGSE staff.

In the event of emergency the Satellite SHALL be switched down according to AD 3.

The CCS is only required to check changes in instrument configuration related HK parameters. For each test the instrument will be in a pre-defined mode as listed in the IUM (RD07).

For the SPIRE Cooler recycle it is assumed that the Herschel cryostat will be tilted about the z-axis $\geq +20$ degrees (such that the plane of the SOB is at least 20 degrees from the vertical with the +Y Spacecraft axis downwards).

The procedures should be suitable for operation of the Prime side of the instrument.

Several manual procedures are present in this document for which TCL scripts are used for command sequence generation. The procedures require minimal action from the CCS operator and will be clearly explained within this document.

The converted TM parameter values are extracted from the MIB in use for PFM ILT. These values are subject to change for both prime and redundant operations.

7.2 Open Issues

- The ability to operate the PTC control loop is not yet confirmed – some extra interactive testing may be required to allow this to happen
- The sequencing of the tests and under which phase of the test plan they are to be done is not implied by the order of the procedures in this note.

7.3 Duration

The allocated duration for executing the entire sequence of procedures, including switch off of the SPIRE instrument afterwards is 3 days according to AD6.

7.4 Operational Constraints for Procedures

The table given here lists the requirements for the cryo-operational conditions that must be met in order to carry out the SPT procedures listed in this document.

Colour coding

No restriction
Some Restriction
Very Restricted

Procedure	Description	Type	Hel	Hell	Orient	Cover	Notes
SPIRE-FM-DPU-ON-P	DPU PRIME Power up and OBS start	IST-FT	YES	YES	Any	Any	
SPIRE-FM-DRCU-ON-P	DRCU PRIME Power up	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-SCU-02-P	SCU Nom. Science Contents check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-SCU-03-P	SCU DC Thermometry check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-SCU-06-P	SCU AC Thermometry check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-SCU-07-P	Sorption Cooler Heaters Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-PCAL-01-P	PCAL Characterisation Test PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-SCAL-01-P	SCAL Characterisation Test PRIME	IST-FT	YES	YES	Any	Any	

Procedure	Description	Type	Hel	Hell	Orient	Cover	Notes
SPIRE-FM-FUNC-SCAL-02-P (TBC)	SCAL PID Check PRIME (TBC)	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-MCU-01-P	MCU Boot Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-MCU-03-P	MCU Nom. Science Contents Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-BSM-01-P	BSM Chop/Jiggle Sensors check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-BSM-03-P	BSM Open Loop Dynamics Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-BSM-05A-P	BSM Open Loop Chop Test PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-BSM-05B-P	BSM Close Loop Chop Test PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-BSM-OFF-P	BSM switch OFF	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-SMEC-02A-P	Unlatch the SMEC	IST-FT	YES	YES	Y vertical	Any	
SPIRE-FM-FUNC-SMEC-03-P	SMEC Encoder Levels Check PRIME	IST-FT	YES	YES	Y vertical	Any	
SPIRE-FM-FUNC-SMEC-01-P	SMEC Encoder and LVDT check PRIME	IST-FT	YES	YES	Y vertical	Any	
SPIRE-FM-FUNC-SMEC-04A-P	SMEC Open Loop Position check PRIME	IST-FT	YES	YES	Y vertical	Any	
SPIRE-FM-FUNC-SMEC-09-P	SMEC Open Loop Scan check PRIME	IST-FT	YES	YES	Y vertical	Any	
SPIRE-FM-FUNC-SMEC-04B-P	SMEC Close Loop Position check PRIME	IST-FT	YES	YES	Y vertical	Any	

Procedure	Description	Type	Hel	Hell	Orient	Cover	Notes
SPIRE-FM-FUNC-SMEC-07-P	SMEC Close Loop Scan check PRIME	IST-FT	YES	YES	Y vertical	Any	
SPIRE-FM-SMEC-OFF-P	SMEC switch OFF	IST-FT	YES	YES	Y vertical	Any	
SPIRE-FM-FUNC-SMEC-02B-P	Latch the SMEC	IST-FT	YES	YES	Y vertical	Any	
SPIRE-FM-FUNC-DCU-02-P	DCU Nominal Sci. Contents Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-DCU-11-PHOT-P	Phot. BDAs Switch ON Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-DCU-13-PHOT-P	Phot. BDAs Integrity Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-DCU-14-PHOT-P	Phot. BDAs Noise Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-DCU-11-SPEC-P	Spec. BDAs Integrity Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-DCU-13-SPEC-P	Spec. BDAs Integrity Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-FUNC-DCU-14-SPEC-P	Spec. BDAs Noise Check PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-SDET-OFF-P	Spec. BDAs switch OFF	IST-FT	YES	YES	Any	Any	
SPIRE-FM-MCU-OFF-P	MCU switch OFF PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-SCU-OFF-P	SCU switch OFF PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-DRCU-OFF-P	DRCU power OFF PRIME	IST-FT	YES	YES	Any	Any	
SPIRE-FM-DPU-OFF-P	DPU power OFF PRIME	IST-FT	YES	YES	Any	Any	

SPT Procedures from HERE							
BSM Control Loop Setting	SPT	YES	YES	Any	Any		
Cooler recycle (manual)	SPT	NO	YES	Y +20 to 30	Any	Orientation is minimum - can also be done with Y horizontal	
Cooler recycle (automatic)	SPT	NO	YES	Y +20 to 30	Any	Orientation is minimum - can also be done with Y horizontal	
Photometer bias optimisation	SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal	
Photometer noise stability versus bias frequency	SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal	
Photometer thermal stability versus bias amplitude	SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal	
Photometer Ambient Background Verification	SPT	NO	YES	Y +20 to 30	Variable	Orientation is minimum - can also be done with Y horizontal	
PTC Headroom Characterisation	SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal	
Photometer Thermal Control Verification	SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal	
PCAL Photometer Characterisation	SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal	
Spectrometer bias optimisation	SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal	
Spectrometer noise stability versus bias frequency	SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal	
Spectrometer Ambient Background Verification	SPT	NO	YES	Y +20 to 30	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures	
PCAL Spectrometer Characterisation	SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation requirement is only for cooler recycle - once completed can be any orientation	
Photometer scan mode POF5	SPT	NO	YES	Y +20 to 30	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures	

SPT Procedures from HERE							
Photometer chop/jiggle mode POF2		SPT	NO	YES	Y +20 to 30	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures
SPEC high resolution mode SOF1		SPT	NO	YES	Y vertical	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures
Photometer Detector Microphonics Test		SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal
Spectrometer Detector Microphonics Test		SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is maximum - SMEC should be against end stop for this test
Spectrometer Mechanism Microvibration Test		SPT	NO	YES	Y vertical	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures
Spectrometer SCAL check		SPT	NO	YES	Y vertical	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures
EMC - Photometer most sensitive mode		SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal
EMC – Spectrometer most sensitive mode		SPT	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal
EMC – SPIRE most Emissive mode		SPT	NO	YES	Y vertical	Any	Cryostat lid can be at any temperature
300mk Stage Decontamination		SPT	NO	YES	Y +20 to 30	Any	Cryostat lid can be at any temperature

7.5 Step by Step Procedure

Any text in **boldface** in the procedural steps generally indicates an action which has to be performed manually by the I-EGSE staff.

The last row in a procedure table should be used to record the overall Pass/Fail result of each test.

7.5.1 SPIRE I-EGSE Configuration/Connection

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE I-EGSE Configuration/Connection						
7.5.1.1	Confirm I-EGSE physically connected to HPCCS	OK					
7.5.1.2	If not already ON, switch ON HPCCS, SCOEs and Satellite/SVM and configure into basic test mode i.a.w. AD2 chapt. 7.1 to 7.5						
7.5.1.3	Confirm that EGSE and Satellite are in correct configuration	OK					
7.5.1.4	From HPCCS power ON CCU A & CCU B by executing the test script: K102999ECVT001_ASDGENCCU_ABPWRON	OK					
7.5.1.5	From HPCCS enable monitoring mode 1 (512 sec cycle) for CCU A & B by executing test script: K102999ECVT001_ASDGENCCU_MnEBOTH1	OK					
7.5.1.6	Switch ON & configure SPIRE-IEGSE						
7.5.1.7	Confirm SPIRE I-EGSE is in correct configuration						
7.5.1.8	From HPCCS Test Conductor console issue command to connect to SPIRE I-EGSE: connect HSPIREEGSE	OK					
7.5.1.9	Confirm that from HPCCS and I-EGSE that the connection has been	YZS29940=					

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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	established.	CONNECTED					
7.5.1.10	Verify that I-EGSE is receiving CCU Cryo-Packets						
7.5.1.11	On HPCCS start the following test script: ALL_SubscribeParams.tcl	OK					
7.5.1.12	Verify HPCCS-IEGSE connection by sending test command: YC00X066 From the manual command stack (repeater value of "0")	OK					
7.5.1.13	If required load Synoptics INSTRUMENTS on HPCCS to display SPIRE status overview						
SPIRE I-EGSE connected and ready for start of SPT							

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7.5.2 SPIRE PRIME OFF to Standby (REDY)

During Power ON of SPIRE a number of soft/hard OOLs are reported due to the sequential switch ON of the units. This is expected and will clear when SPIRE is in REDY mode. When in REDY mode one parameter remains OOL (soft), namely SMD2V505, which is also expected.

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
1.	On HPCCS start Packet History displays for the following APIDs:1280,1282	OK				
2.	From the HPCCS test conductor console start the test script to power on SPIRE Prime: S102999SCVT027_ASPTSPTSPIR_PWR_ON_P	OK		AND: ZAD07999, ZAD14999 MIM: LCL_HERSHEL		
3.	On HPCCS when prompted: "SPIRE Switch ON for SPTs in Hel/Hell conditions ONLY - Select NO to abort TS if not correct" Select YES	YES				
	The test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW and configure the instrument to Standby mode. Reply to prompts as indicated below.					

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Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
4.	On HPCCS when prompted: "Check Telemetry Updating Correctly and OBT is Consistent with CDMU - OK to continue" Select OK	OK		AND: SA_1_559		
5.	If I-EGSE connected when prompted on HPCCS, perform check requested then select OK : "Check IEGSE Time Consistent - OK to continue when RAL confirm"	OK				
6.	On HPCCS when prompted: "Check Telemetry No Longer Updating - OK to continue" Check that parameters: THSK Not refreshing TM2N Not incrementing Select OK to continue	OK				
7.	On HPCCS when prompted: "Check Telemetry Updating Correctly - OK to continue" Check that parameters:			AND: SA_1_559		

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
	<p>THSK Refreshing @ 1Hz</p> <p>TM2N Incrementing by 1 @ 1Hz</p> <p>Select OK to continue</p>	OK				
8.	<p>On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT027_AS DSPTSPIR_PWR_ON_P it will prompt:</p> <p>"Set Bus Profile Back to Original Setting?"</p> <p>Select NO</p>	NO				
9.	<p>At the prompt:</p> <p>"Bus Profile left unchanged"</p> <p>Select OK to continue</p>	OK				
10.	<p>Verify HK TM packets are being received on APIDs 1280 & 1282</p>	OK				
	<p>SPIRE DPU & DRCU powered and in REDY mode</p>					

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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7.5.3 Integrated System Tests – SPIRE SPT Day 1

Test Preparation:

Get confirmation by cryo-operator that the cryostat is in correct configuration for SPIRE test continuation and that the lid temperature is < 15K.

7.5.3.1 Cooler Recycle (manual)

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	Prime DPU and DRCU ON						
	Initial Conditions: DPU-A & DRCU A ON						
7.5.3.1.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-SCU-07 has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-SCU-07</p>						
7.5.3.1.2	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.2 Procedure: Cooler Recycle (manual)</p>						
	SPIRE in REDY mode with cooler recycled and detectors at <= 300 mK						

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7.5.3.2 Switch from REDY to Photometer STBY Mode

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in REDY mode with cooler recycled and detectors at <= 300 mK						
7.5.3.2.1	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.2 Procedure: REDY to PHOTSTBY mode						
7.5.3.2.2	Wait for stabilisation (confirmation to proceed with next test step will be given by SPIRE)	T <= 300 mK					
	SPIRE in Photometer STBY						

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7.5.3.3 BSM Control Loop Setting

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in REDY or PHOTSTBY						
7.5.3.3.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-BSM-01 has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-BSM-01</p>						
7.5.3.3.2	<p>Check with SPIRE that the script SPIRE-IST-CPLD-FUNC-BSM-02 has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-BSM-02</p>						

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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.3.3.3	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-BSM-03 has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-BSM-03</p>						
7.5.3.3.4	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.1 Procedure: BSM Control Loop Setting</p>						
	SPIRE in REDY or PHOTSTBY						

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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7.5.3.4 Photometer Bias Phase Optimisation

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in REDY						
7.5.3.4.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04-P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04P</p>						
7.5.3.4.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13-P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST- COLD-FUNC-DCU-13P</p>						
7.5.3.4.3	<p>Check with SPIRE that the script SPIRE-IST-COLD-PHOT-VSS has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST- COLD-PHOT-VSS</p>						

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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.3.4.4	Confirm that SPIRE is in PHOTSTBY mode						
7.5.3.4.5	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.4 Procedure: Photometer Bias Phase Optimisation						
	SPIRE in PHOTSTBY mode with bias set to ILT nominal values						

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7.5.3.5 Photometer Noise Stability versus Bias Frequency

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.3.5.1	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.6 Procedure: Photometer Noise Stability versus Bias Frequency						
	SPIRE in PHOTSTBY mode with bias set to nominal values						

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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7.5.3.6 Photometer Bias Noise Optimisation

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.3.6.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04-P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04P</p>						
7.5.3.6.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13-P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST- COLD-FUNC-DCU-13P</p>						
7.5.3.6.3	<p>Check with SPIRE that the script SPIRE-IST-COLD-PHOT-VSS has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST- COLD-PHOT-VSS</p>						

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.3.6.4	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.5 Procedure: Photometer Bias Noise optimisation						
	SPIRE in PHOTSTBY mode with bias set to ILT nominal values						

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7.5.3.7 Photometer Ambient Background Verification

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.3.7.1	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.8 Procedure: Ambient Background Verification						
	SPIRE in PHOTSTBY mode with bias set to IST Ground Nominal values						

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7.5.3.8 PTC Headroom Characterisation

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.3.8.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13-P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13P</p>						
7.5.3.8.2	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.9 Procedure: PTC Headroom Characterisation</p>						
	SPIRE in PHOTSTBY mode with bias set to IST Ground Nominal values – detector temperatures will drift downwards						

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7.5.3.9 PCAL Photometer Characterisation

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.3.9.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-PCAL-01 has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-PCAL-01</p>						
7.5.3.9.2	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.11 Procedure: PCAL Photometer Characterisation</p>						
	SPIRE in PHOTSTBY mode with bias set to IST Ground Nominal values						

End of SPIRE SPT Day 1

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7.5.3.10 Overnight (Day 1 – Day 2) EMC CS Test - Photometer

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.3.10. 1	For the execution of the RAL EMC procedure, SPIRE-RALPRC-003040 (ANNEX 3), the SPIRE instrument will be switched to the most sensitive Photometer mode by execution of the following test scripts on HPCCS in accordance to the ANNEX 2 of this procedure: 2.25 Procedure: Photometer most sensitive mode						
7.5.3.10. 2	Perform detailed step-by-step procedure according to SPIRE-RALPRC-003040, chapter 6.1.2 (ANNEX 3), for differential and common mode CS measurements						
7.5.3.10. 3	Check that after exit of SPIRE script SPIRE-IST-EMC-SPOT.tcl the instrument is left in PHOTSTBY mode	Mode: PHOTSTBY					
	SPIRE is in PHOTSTBY						

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7.5.4 Integrated System Tests – SPIRE SPT Day 2

Test Preparation:

Get confirmation by cryo-operator that the cryostat is in correct configuration for SPIRE test continuation and that the lid temperature is < 15K.

7.5.4.1 PCAL Flash

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.4.1.1	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: Procedure: SPIRE-IST-SPT-PHOT-PCAL-FLASH						
	SPIRE in PHOTSTBY mode with bias set to nominal values						

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7.5.4.2 Photometer Thermal Stability versus Bias Amplitude

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.4.2.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04P</p>						
7.5.4.2.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13P</p>						
7.5.4.2.3	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.7 Procedure: Photometer Thermal Stability versus Bias Amplitude</p>						
	SPIRE in PHOTSTBY mode with bias set to nominal values						

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7.5.4.3 Change of LID temperature

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	Change of LID Temperature						
7.5.4.3.1	Inform Thermal Responsible that the LID temperature shall be changed to 70 K < T < 90 K						
7.5.4.3.2	Confirmation by Thermal responsible that LID temperature range has been reached and note actual value	70 K < T < 90 K					
	LID temperature 70 K < T < 90 K						

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7.5.4.4 Photometer Thermal Control Verification

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.4.4.1	Check with test conductor that lid the temperature has been changed and is in the correct range	TBD	TBD				
7.5.4.4.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13P</p>						
7.5.4.4.3	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure:</p> <p>2.10 Procedure: Photometer Thermal Control Verification</p>						
	SPIRE in PHOTSTBY mode with bias set to IST Ground Nominal						

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7.5.4.5 Photometer Bias Phase Optimisation

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.4.5.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04-P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04P</p>						
7.5.4.5.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13-P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST- COLD-FUNC-DCU-13P</p>						
7.5.4.5.3	<p>Check with SPIRE that the script SPIRE-IST-COLD-PHOT-VSS has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST- COLD-PHOT-VSS</p>						

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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.4.5.5	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.4 Procedure: Photometer Bias Phase Optimisation						
	SPIRE in PHOTSTBY mode with bias set to ILT nominal values						

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7.5.4.6 Photometer Ambient Background

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.4.6.1	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.8 Procedure: Photometer Ambient Background						
	SPIRE in PHOTSTBY mode with bias set to IST Ground Nominal values						

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7.5.4.7 Spectrometer Bias Phase Optimisation

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.4.7.1	Switch SPIRE from PHOTSTBY to REDY mode On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.3 Procedure: PHOTSTBY to REDY mode						
7.5.4.7.2	Switch SPIRE from REDY to IST-SPECSTB mode On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.4 Procedure: REDY mode to IST-SPECSTBY						
7.5.4.7.3	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.12 Procedure: Spectrometer Bias Phase Optimisation						
	SPIRE in IST-SPECSTBY mode with bias set to ILT nominal values						

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7.5.4.8 Spectrometer Bias Noise Optimisation

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY						
7.5.4.8.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04S has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04S</p>						
7.5.4.8.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13S has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13S</p>						
7.5.4.8.3	<p>Check with SPIRE that the script SPIRE-IST-COLD-SPEC-VSS has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD- SPEC-VSS</p>						

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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.4.8.4	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.13 Procedure: Spectrometer Bias Noise Optimisation						
	SPIRE in IST-SPECSTBY mode with bias set to ILT nominal values						

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7.5.4.9 Spectrometer Noise Stability versus Bias Frequency

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY						
7.5.4.9.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04S has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04S</p>						
7.5.4.9.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13S has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13S</p>						
7.5.4.9.3	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.14 Procedure: Spectrometer Noise Stability versus Bias Frequency</p>						
	SPIRE in IST-SPECSTBY mode with bias set to nominal values						

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7.5.4.10 Spectrometer Ambient Background Verification

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY						
7.5.4.10. 1	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.15 Procedure: Spectrometer Ambient Background Verification						
	SPIRE in IST-SPECSTBY mode with bias set to IST Ground Nominal values						

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7.5.4.11 PCAL Spectrometer Characterisation

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY						
7.5.4.11. 1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-PCAL-01 has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC- PCAL-01</p>						
7.5.4.11. 2	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.17 Procedure: PCAL Spectrometer Characterisation</p>						
	SPIRE in IST-SPECSTBY mode with bias set to IST Ground Nominal values						

End of SPIRE SPT Day 2

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7.5.4.12 Overnight Hold on Test Activities

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY						
7.5.4.12. 1	SPIRE stays in Spectrometer Standby						
	SPIRE in IST-SPECSTBY mode						

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7.5.5 Integrated System Tests – SPIRE SPT Day 3

Test Preparation:

Get confirmation by cryo-operator that the cryostat is in correct configuration for SPIRE test continuation and that the lid temperature is < 15K.

7.5.5.1 Change of LID temperature

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	Change of LID Temperature						
7.5.5.1.1	Inform Thermal Responsible that the LID temperature shall be changed to T < 15 K						
7.5.5.1.2	Confirmation by Thermal responsible that LID temperature range has been reached and note actual value	T < 15 K					
	LID temperature T < 15 K						

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7.5.5.2 Cooler Recycle (automatic)

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY						
7.5.5.2.1	Switch SPIRE from IST-SPECSTBY to REDY mode On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.5 Procedure: IST-SPECSTBY to REDY mode						
7.5.5.2.2	Check with SPIRE that the script SPIRE-IST-COLD-FUNC-SCU-07 has been executed already and the results are known. If answer is YES : proceed with next test step If answer is NO : On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-SCU-07						
7.5.5.2.3	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.3 Procedure: Cooler Recycle (automatic)						
	SPIRE in REDY mode with cooler recycled and detectors at <= 300 mK						

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7.5.5.3 Spectrometer Bias Phase Optimisation

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in REDY						
7.5.5.3.1	Check with SPIRE that stabilisation has reached						
7.5.5.3.2	Switch SPIRE from REDY to IST-SPECSTBY mode On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.4 Procedure: REDY to IST-SPECSTBY mode						
7.5.5.3.3	Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04S has been executed already and the results are known. If answer is YES : proceed with next test step If answer is NO : On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04S						
7.5.5.3.4	Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13S has been executed already and the results are known. If answer is YES : proceed with next test step If answer is NO : On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13S						

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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.5.3.5	<p>Check with SPIRE that the script SPIRE-IST-COLD-SPEC-VSS has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD- SPEC-VSS</p>						
7.5.5.3.6	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.12 Procedure: Spectrometer Bias Phase Optimisation</p>						
	SPIRE in IST-SPECSTBY mode with bias set to ILT nominal values						

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7.5.5.4 Spectrometer Bias Noise Optimisation

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY mode						
7.5.5.4.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04S has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04S</p>						
7.5.5.4.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13S has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13S</p>						

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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.5.4.3	<p>Check with SPIRE that the script SPIRE-IST-COLD-SPEC-VSS has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-SPEC-VSS</p>						
7.5.5.4.4	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.13 Procedure: Spectrometer Bias Noise Optimisation</p>						
	SPIRE in IST-SPECSTBY mode with bias set to ILT nominal values						

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7.5.5.5 Spectrometer Noise Stability versus Bias Frequency

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY mode						
7.5.5.5.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04S has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04S</p>						
7.5.5.5.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13S has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13S</p>						
7.5.5.5.3	<p>Check with SPIRE that the script SPIRE-IST-COLD-SPEC-VSS has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-SPEC-VSS</p>						

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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.5.5.4	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.14 Procedure: Spectrometer Noise Stability versus Bias Frequency						
	SPIRE in IST-SPECSTBY mode with bias set to ILT nominal values						

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7.5.5.6 SCAL Characterisation

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in SPECSTBY mode						
7.5.5.6.1	On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: Procedure: SPIRE-IST-SPT-PHOT-SCAL-FLASH						
	SPIRE in SPECSTBY mode with bias set to ILT nominal values						

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7.5.5.7 Microphonics Pre-Test Configuration

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	ACMS Switch ON						
7.5.5.7.1	From Test Conductor Console, execute script: 'A102109SPVT003_ACMS_CONFIG25'	OK					
7.5.5.7.2	<p>At the following main menu: HERSCHEL/PLANCK - MAIN MENU 1.0 - INIT PHASE</p> <p>=====</p> <ol style="list-style-type: none"> 1. Select/Load ACMS_CONFIG Input File 2. Perform LAUNCH CONFIGURATION 3. On Board SW Updates 4. ACMS Power ON (in Pre-Sep configuration) 5. Modify ACC SGM/RM CONTENT (Enter sub-menu 1.1) 6. ACMS SCOE Configuration <p>77. JUMP to another Entry Point</p> <p>88. Continue ACMS_CONFIG to menu 2.0 STBY/PRE-SEP</p> <p>99. Terminate ACMS_CONFIG</p> <p>select the point number 1 and press the relevant</p>	Continue					

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Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	button: "CONTINUE".						
7.5.5.7.3	Sequence pops-up asking for the input file. Write SPIRE_UV and press OK	Write "SPIRE_UV" and press OK					
7.5.5.7.4	At sequence completion, the same main menu appears. <i>Select point number 6 to switch on the ACMS SCOE then click OK, Continue</i>	Select Option 6 and click OK, Continue			ACMS SCOE is switched-on in 'executing' mode. Note: Until ACC is not fully powered-on, some WARNING ALARMS might come down in the On-Board Event History.		
7.5.5.7.5	On AND YA001939 'AMCS SCOE - AS_PSEUDO 1 of 1' check that parameters: YMACT939 (ACMS SCOE state) YMASE939 (Simulator stata) YMAMS939 (MILFE state) YMAUS939 (UIFE state) Turned to: 'executing'	Parameters set to 'executing'					

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Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.5.7.6	At sequence completion, the same main menu appears. <i>Select point number 4 to switch on the ACC then click OK, Continue</i>	Select Option 4 and click OK, Continue			Expected Out of Limit of AEYYY109 (synchronisation). ACC may become INVALID for a short time. SPR 245: Out of Limit of HKA_ANTHx_Data		
7.5.5.7.7	From a Packet History tool, select filter 'APID 512' and check that ACMS HK and ETM is correctly flowing down.	OK					
7.5.5.7.8	From On-Board Event History Display check that no 'NO-GO' are present.	OK					
7.5.5.7.9	From ACMS MASTER (ACMS_CONFIG25) sequence, move to Menu 3 (if not already there) with option 88. Click OK and then Confirm	OK					
7.5.5.7.10	From ACMS_CONFIG25, Menu 3, select option 1: 'Override Separation Flag' then Click button OK and then Confirm	Select 1, then OK and Continue			ACC goes in SAM Mode		

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.5.7.11	Sequence A102109SPVT034_ACMS_SAM_MON shall pop-up following the opening of separation straps, at prompt: 'Do you want to continue to monitor Sam Sun Pointing mode ? Enter your choice: no Then click OK	no			ACMS SAM Point Coarse is reached		
7.5.5.7.12	From ACMS_CONFIG25 Master Sequence, Menu 4.0, select option 6 'Transition to OCM' Click OK and then Confirm	Select 6, then OK and Continue					
7.5.5.7.13	Sequence 'A102109SPVT036_ACMS_STR_ON' shall pop-up. At prompt: 'Do You want to change current Str in Use' check if STR already selected is the correct one and answer 'no'	No			STR-1 is switched ON and put in ATFAD mode		
7.5.5.7.14	When scripts are completed, From ACMS synoptic check that ACC Mode is turned to: 'OCM pnt coarse'	OK					
	Synchronise CCS Time With ETS for Accelerometer Measurement Timing						
7.5.5.7.21	For correlation of test results, record time of ETS Accelerometer Test Equipment and at the same time record the CCS time:						
Enter Date / Time:		Location:		Sign OFF: TD:		PA:	



Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	ETS Time (Accelerometer Measurement T.E. Clock):						
	CCS Time:						
7.5.5.7.22	If not already active request ETS to start accelerometer acquisitions as per Appendix 4						

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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7.5.5.8 Reaction Wheel Operation for Spectrometer

This section should be performed in parallel with section 7.5.5.9 and takes approximately 40 mins to run.

Step	Reaction Wheel Activation	Nominal Value	Tolerance	Actual Value	Remark	P	N
7.5.5.8.1	From Test Conductor Console, execute script: 'A102109SPVT208_ACMS_RWL_SPIRE_uVIB.tcl'	OK					
7.5.5.8.2	At the following prompt: 'Positive Spin. Click OK' Check from ACMS Synoptic that RWL 1-2-3-4 are ON. Then Click OK to start positive spinning	Click OK					
7.5.5.8.3	From a 'TM Plotting Tool' follow RWL spinning, monitoring parameters: AEWR1002 AEWR2002 AEWR3002 AEWR4002	OK					
7.5.5.8.4	At the following prompt: 'Negative Spin. Click OK' Click OK to start negative spinning	Click OK					
7.5.5.8.5	From 'TM Plotting Tool' (above step) follow RWL negative spinning	OK					

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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Step	Reaction Wheel Activation	Nominal Value	Tolerance	Actual Value	Remark	P	N
7.5.5.8.6	At the following prompt: 'Click OK to spin-down RWL to 0 [Nms]' Click OK to bring RWLs to 0 [Nms]	Click OK					

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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7.5.5.9 Spectrometer Detector Microphonics Test

The previous section (7.5.5.8) must be performed in parallel with this section step 7.5.5.8.3, which is assumed to take around 40 mins to run. Make sure that for this micro-vibration test the accelerometer acquisition has been activated before continuing.

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY mode						
7.5.5.9.1	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04P</p>						
7.5.5.9.2	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13P</p>						
7.5.5.9.3	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.22 Procedure: Spectrometer Detector Microphonics Test</p>						
	SPIRE in IST-SPECSTBY mode with bias set to nominal values						

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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7.5.5.10 Reaction Wheel Operation for Photometer

This section should be performed in parallel with section 7.5.5.11 and takes approximately 40 mins to run.

Step	Reaction Wheel Activation	Nominal Value	Tolerance	Actual Value	Remark	P	N
7.5.5.10.1	From Test Conductor Console, execute script: 'A102109SPVT208_ACMS_RWL_SPIRE_uVIB.tcl'	OK					
7.5.5.10.2	At the following prompt: 'Positive Spin. Click OK' Check from ACMS Synoptic that RWL 1-2-3-4 are ON. Then Click OK to start positive spinning	Click OK					
7.5.5.10.3	From a 'TM Plotting Tool' follow RWL spinning, monitoring parameters: AEWR1002 AEWR2002 AEWR3002 AEWR4002	OK					
7.5.5.10.4	At the following prompt: 'Negative Spin. Click OK' Click OK to start negative spinning	Click OK					
7.5.5.10.5	From 'TM Plotting Tool' (above step) follow RWL negative spinning	OK					

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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Step	Reaction Wheel Activation	Nominal Value	Tolerance	Actual Value	Remark	P	N
7.5.5.10.6	At the following prompt: 'Click OK to spin-down RWL to 0 [Nms]' Click OK to bring RWLs to 0 [Nms]	Click OK					

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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7.5.5.11 Photometer Detector Microphonics Test

Make sure that for this micro-vibration test the accelerometer acquisition has been activated before continuing.

The previous section (7.5.5.10) must be performed in parallel with this section step 7.5.5.9.5, which is assumed to take around 40 mins to run.

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in IST-SPECSTBY mode						
7.5.5.9.1	Switch SPIRE from SPECSTBY to REDY mode On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.5 Procedure: IST-SPECSTBY to REDY mode						
7.5.5.9.2	Switch SPIRE REDY to PHOTSTBY mode On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.2 Procedure: REDY mode to PHOTSTBY						
7.5.5.9.3	Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-04P has been executed already and the results are known. If answer is YES : proceed with next test step If answer is NO : On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-04P						

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.5.9.4	<p>Check with SPIRE that the script SPIRE-IST-COLD-FUNC-DCU-13P has been executed already and the results are known.</p> <p>If answer is YES: proceed with next test step</p> <p>If answer is NO: On HPCCS execute the following test script: SPIRE-IST-COLD-FUNC-DCU-13P</p>						
7.5.5.9.5	<p>On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 2.21 Procedure: Photometer Detector Microphonics Test</p>						
	SPIRE in PHOTSTBY mode with bias set to ILT nominal values						

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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7.5.5.12 Microphonics Post-Test Configuration

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	ACMS Switch OFF						
7.5.5.12.1	Ensure RWLs have spun down before switching OFF						
7.5.5.12.2	From ACMS_CONFIG25 main menu: <ul style="list-style-type: none"> • Select the point number 99 and confirm the selection pressing the relevant button "CONTINUE".	Continue					
7.5.5.12.3	The following menu will appear: HERSCHEL/PLANCK - MAIN MENU 9.0 - ACMS OFF PHASE ===== <u>select the point number 1</u> 'Switch Off ACMS' and confirm the selection pressing the relevant button "CONTINUE".	Continue					
7.5.5.12.4	Check the "ACMS_OFF" Test Sequence has been successfully ended.	OK					
7.5.5.12.5	By the same above menu, <u>select the point number 99</u> to end the ACMS_CONFIG25 Master Sequence". Click OK to Confirm	OK					

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	Re-Synchronise Time With ETS for Accelerometer Measurement Timing						
7.5.5.12.6	For correlation of test results re-record time of ETS Accelerometer Test Equipment and at the same time record the CCS time:						
	ETS Time (Accelerometer Measurement T.E. Clock):						
	CCS Time:						
7.5.5.12.7	Notify ETS that accelerometer acquisitions can be stopped						

End of SPIRE SPT day 3

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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7.5.5.13 Overnight (Day 3 – Day 4) EMC CS Test - Spectrometer

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE in PHOTSTBY						
7.5.5.13.1	Switch SPIRE from PHOTSTBY to REDY mode On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.3 Procedure: IST-PHOTSTBY to REDY mode	Mode: REDY					
7.5.5.13.2	Switch SPIRE REDY to SPECSTBY mode On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.4 Procedure: REDY mode to SPECSTBY	Mode: SPECSTBY					
7.5.5.13.3	For the execution of the RAL EMC procedure, SPIRE-RALPRC-003040 (ANNEX 3), the SPIRE instrument will be switched to the most sensitive Spectrometer mode by execution of the following test scripts on HPCCS in accordance to the ANNEX 2 of this procedure: 2.27 Procedure: Spectrometer most sensitive mode						
7.5.5.13.4	Perform detailed step-by-step procedure according to SPIRE-RALPRC-003040, chapter 6.1.2 (ANNEX 3), for differential and common mode CS measurements						
7.5.5.13.5	Check that after exit of SPIRE script SPIRE-IST-EMC-SPOT.tcl the instrument is left in SPECSTBY mode	Mode: SPECSTBY					

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
7.5.5.13.6	Switch SPIRE from SPECSTBY to REDY mode On HPCCS execute the following test scripts for the SPIRE SPT in accordance to the ANNEX 2 of this procedure: 4.5 Procedure: SPECSTBY to REDY mode	Mode: REDY					
	SPIRE in SPECSTBY mode						

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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7.5.6 SPIRE Prime Standby (REDY) to OFF

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
7.5.6.1.	From the HPCCS test conductor console start the test script to power OFF SPIRE Prime: S102999SCVT028_ASDSPTSPIR_PWR_OFF_P	OK				
7.5.6.2.	On HPCCS when prompted: "SPIRE Switch OFF for SPTs in Hel/Hell conditions ONLY - Select NO to abort TS if not correct" Select YES	YES				
	If YES is selected the test script will go on to automatically power off all SPIRE warm units.					
	During Switch OFF of SPIRE the following (5,2) and (5,4) event messages on APID 1280 may be expected and do not indicate a problem: EVID 1313 No_MCU_Response_Error EVID 21773 ALARM_LSMCU_DEAD					

Enter Date / Time:		Location:		Sign OFF:	TD:	PA:
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Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
7.5.6.3.	<p>On HPCCS when prompted: "Check Telemetry No Longer Updating - OK to continue"</p> <p>Check that parameters:</p> <p style="text-align: right;">THSK Not refreshing TM2N Not incrementing</p>			AND: SA_1_559		
7.5.6.4.	Select OK to continue	OK				
7.5.6.5.	<p>On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT028_ASPTSPTSPIR_PWR_OFF_P it will prompt:</p> <p>"Bus profile left as SPIRE PRIME, change manually after if required - OK to continue"</p>					
7.5.6.6.	Select OK to continue	OK				
7.5.6.7.	On HPCCS stop Packet History displays for the following APIDs:1280,1282	OK				
	SPIRE PRIME OFF					

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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7.5.7 SPIRE I-EGSE Disconnection

Step- No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
	Satellite & EGSE Switch Off						
	Initial Conditions: Nominal & Redundant SPIRE warm units OFF						
7.5.7.1	On HPCSS terminate ALL_SubscribeParams.tcl test script.	OK					
7.5.7.2	Perform SPIRE I-EGSE switch OFF according to procedure 7.2.6 of AD8 as attached.						
7.5.7.3	Confirm from HPCSS and SPIRE I-EGSE that the disconnection was successful	OK					
7.5.7.4	Switch OFF I-EGSE i.a.w. AD 5 if required						
7.5.7.5	Switch OFF Satellite/SVM, HPCSS and SCOE's i.a.w. procedure AD 2 Sections 7.7 to 7.11 if required	OK					
7.5.7.6	Confirm both Satellite and EGSE powered down if applicable	OK					
	End Conditions: Satellite and EGSE OFF						
	END OF TEST						

Enter Date / Time:			Location:		Sign OFF:	TD:	PA:
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8 Summary Sheets

8.1 Procedure Variation Summary

	Test Change	Curr. No.:	
		Date	
		Page	of
Test designation	Test Procedure	Issue	Rev.
Test step changed	Reason for Change		
Prepared by:	Resp. Test Leader	Project Engineer	
PA/QA	Prime	Customer	

Table 8.1-1: Procedure Variation Sheet

8.2 Non Conformance Report (NCR) Summary

NCR - No.	NCR - Title	Date	Open Closed	PA sig.

Table 8.2-1: Non-Conformance Record Sheet

8.3 Sign-off Sheet

	Date	Signature
Test Director		
Test Conductor		
Operator		
PA Responsible		
ESA Representative		

APPENDIX 1

Actual SCOE cable connection (to be confirmed by AIT)

SCOE CABLES CONNECTION to HERSCHEL S/C					
SKIN-01	PWR Panel (PCDU)				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
	BS Nom Power	SK01BJ09	PCDU	BS SCOE Cable Plugged	
	BS Red Power	SK01BJ10	PCDU	BS SCOE Cable Plugged	
	BDR1 AIT	SK01BJ11	PCDU	LPS SCOE Cable Plugged	
	BDR2 AIT	SK01BJ12	PCDU	LPS SCOE Cable Plugged	
	SA Nom Power	SK01AJ01	PCDU	POWER SCOE Cable Plugged	
	SA Nom Power	SK01AJ02	PCDU	POWER SCOE Cable Plugged	
	SA Nom Power	SK01AJ03	PCDU	POWER SCOE Cable Plugged	
	SA Nom Power	SK01AJ04	Battery	EMC Dust Cap	
	SA Red Power	SK01AJ05	PCDU	POWER SCOE Cable Plugged	
	SA Red Power	SK01AJ06	PCDU	POWER SCOE Cable Plugged	
	SA Red Power	SK01AJ07	PCDU	POWER SCOE Cable Plugged	
	SKIN-02	PWR Panel (ACC, CDMU, RCS, 1553 & Thruster)			
Connector Function		Skin Connector	S/C unit	SCOE CABLE	Flight Connector
DMS 1553 Bus_A		J01	CDMU	Bus Monitor Cable Plugged	
DMS 1553 Bus_B		J02	CDMU	Bus Monitor Cable Plugged	
ACMS 1553 Bus_A		J03	ACC	ACMS SCOE Cable Plugged	
ACMS 1553 Bus_B		J04	ACC	ACMS SCOE Cable Plugged	
LV1/FCV 20N CMD S/A M		J05	ACC/RCS	ACMS SCOE	

				Cable Plugged	
SKIN-02	LV2/FCV 20N CMD S/A R	J06	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	RCS Press/Tank Temp/PT Pwr	J07	ACC/PT&TH	ACMS SCOE Cable Plugged	
SKIN-02	Thruster Temp M/LV1 Sts	J08	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	CDMU and ACC EEPROM reprogramming input	J09	ACC/CDMU		Flight Plug SK02P09 Plugged
SKIN-02	CDMU and ACC EEPROM reprogramming input	J10	ACC/CDMU		Flight Plug SK02P10 Plugged
SKIN-02	Thruster Temp R/LV2 Sts	J11	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	Thruster C/B Heaters M	J12	ACC/CBH	ACMS SCOE Cable Plugged	
SKIN-02	Thruster C/B Heaters R	J13	ACC/CBH	ACMS SCOE Cable Plugged	
SKIN-02	Str1/2 On/Off Cmd M/Str1 Sts	J14	ACC/STR-1		ACMS Flight Plug SK02P14 Plugged
SKIN-02	Str1/2 On/Off Cmd R/Str2 Sts	J15	ACC/STR-2		ACMS Flight Plug SK02P15 Plugged
SKIN-02	Gyro A On/Off Cmd	J16	ACC/GYRO-E1		ACMS Flight Plug SK02P16 Plugged
SKIN-02	Gyro B On/Off Cmd	J17	ACC/GYRO-E2		ACMS Flight Plug SK02P17 Plugged
SKIN-03	TTC Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-03	Test point TC + protection jumper EPC1	SK03J01	XPND1/EPC1		Plastic cap
SKIN-03	Test point TC + protection jumper EPC2	SK03J02	XPND2/EPC2		Plastic cap
	RF LINK				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
	RF link for antenna LGA1	N/A	LGA1	RF SCOE LGA1 Plugged	LGA1 Anechoic Cap
	RF link for antenna LGA2	N/A	LGA2	RF SCOE LGA2 Plugged	LGA2 Anechoic Cap
	RF link for antenna MGA	N/A	MGA	RF SCOE MGA Plugged	MGA Anechoic Cap
SKIN-04	ACMS Panel (RWE)				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-04	RWL1 Sgn	J01	ACC/RWL-1		ACMS Flight Plug SK04P01 Plugged
SKIN-04	RWL2 Sgn	J02	ACC/RWL-2		ACMS Flight Plug

SKIN-04					SK04P02 Plugged
SKIN-04	RWL3 Sgn	J03	ACC/RWL-3		ACMS Flight Plug SK04P03 Plugged
SKIN-04	RWL4 Sgn	J04	ACC/RWL-4		ACMS Flight Plug SK04P04 Plugged
SKIN-05	GYR/QRS Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-05	CRS1 AOCS Sgn	J01	CRS-1/ACC		ACMS Flight Plug
SKIN-05	CRS2 AOCS Sgn	J02	CRS-2/ACC		ACMS Flight Plug
SKIN-05	GYRO RS422 / Test	J03	GYRO	ACMS SCOE Cable Plugged	
SKIN-05	CRS 1/2 Stimuli	J04	CRS-1,2	ACMS SCOE Cable Plugged	
SKIN-05	AAD Sgn M	J05	AAD/ACC	ACMS SCOE Cable Plugged	
SKIN-05	SAS1/2 Sgn M	J06	SAS/ACC	ACMS SCOE Cable Plugged	
SKIN-05	SAS1/2 Sgn R	J07	SAS/ACC	ACMS SCOE Cable Plugged	
SKIN-05	AAD Sgn R	J08	AAD/ACC	ACMS SCOE Cable Plugged	
SKIN-06	STR Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-06	STR1 Stimuli	J01	STR1	ACMS SCOE Cable Plugged	
SKIN-06	STR2 Stimuli	J02	STR2	ACMS SCOE Cable Plugged	
	UMBILICAL				
	Connector Function	Connector	S/C unit	SCOE CABLE	
	Power/Data	HU1J01	SYSTEM	SCOE's cable Plugged	
	Power/Data	HU2J01	SYSTEM	SCOE's cable Plugged	

APPENDIX 2

SPIRE CFT Procedure ref. SPIRE-RAL-PRC-002704, issue 3.1

Procedures 2.1 to 2.29

and

Appendix 1: Switch-On/Off Sequence And Mode Transitions For SPT

Procedures 4.1 to 4.6

and

Appendix 2: Auxiliary Scripts To Be Run During SPT



Test Procedure

Herschel

APPENDIX 3

SPIRE CS Test Procedure, ref. SPIRE-RAL-PRC-003040, issue 1.0



Test Procedure

Herschel

APPENDIX 4

Accelerometer Measurement & ACMS Reaction Wheel Profile for Microphonics Test

During reaction wheel activation the accelerometers on OBA and reaction wheel panel according to the Table A4-1 below shall be read.

ZONE	CHANNELS ID	DESCRIPTION
OPTICAL BENCH	PACRYO201X	OBA
	PACRYO202Y	OBA
	PACRYO203Z	OBA
	PACRYO204X	OBA
	PACRYO205Z	OBA
	PACRYO206Y	OBA
-Y + Z PANEL	381X	RWL#4 to bracket I/F
	381Y	RWL#4 to bracket I/F
	381Z	RWL#4 to bracket I/F
	382X	RWL#4/RWL#2 to bracket I/F
	382Y	RWL#4/RWL#2 to bracket I/F
	382Z	RWL#4/RWL#2 to bracket I/F
	386X	RWL#3 to bracket I/F
	386Y	RWL#3 to bracket I/F
	386Z	RWL#3 to bracket I/F
	384X	RWL#1 to bracket I/F
	384Y	RWL#1 to bracket I/F
	384Z	RWL#1 to bracket I/F
	383X	RWL#2 to bracket I/F
	383Y	RWL#2 to bracket I/F
	383Z	RWL#2 to bracket I/F

Table A4--1: Measurement Channels for Micro-vibration Test (RD8)

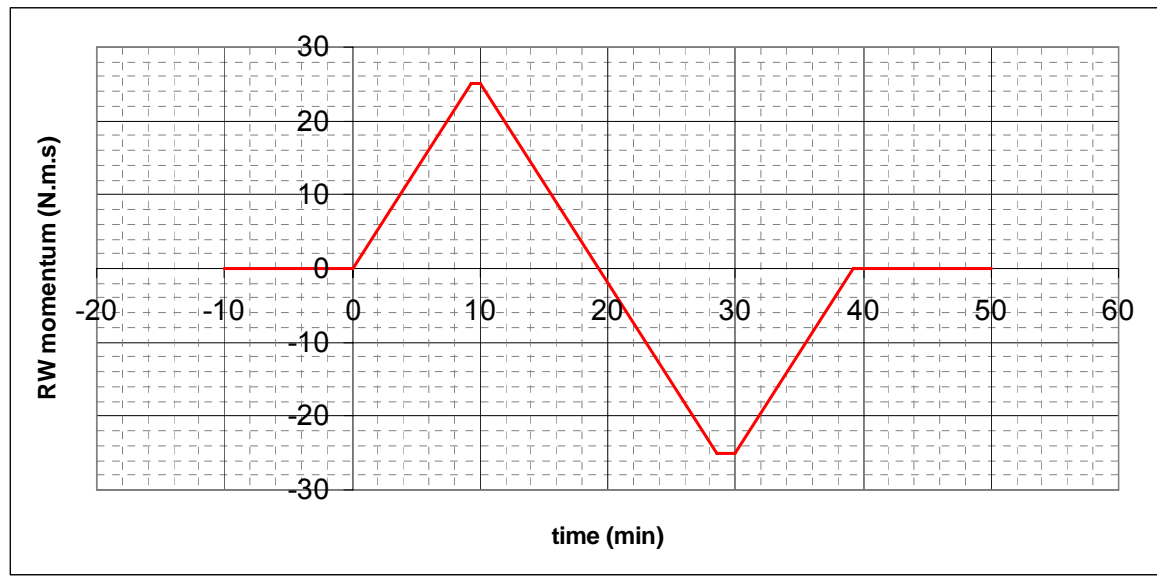
Table A4-2: Reaction Wheel Profile

It should be noted that the test configuration, as required in chapter 4.1 of RD8, can not be achieved and the test has to be performed under the conditions of this procedure.

Hmax	25	N.m.s
Tmax	0,05	N.m
Friction	0,005	N.m
DT	10	Min

time (min)	H (N.m.s)
-10	0
0	0
9,25925926	25
10	25
28,5185185	-25
30	-25
39,2592593	0
50	0

Figure A4-1: Reaction Wheel Profile Graphically



END OF DOCUMENT

	Name	Dep./Comp.		Name	Dep./Comp.
	Alberti von Mathias Dr.	ASG22		Schweickert Gunn	ASG22
	Baldock Richard	FAE12	X	Sonn Nico	ASG51
	Barlage Bernhard	AED13		Steininger Eric	AED32
	Bayer Thomas	ASA42	X	Stritter Rene	AED11
	Brune Holger	ASA45		Suess Rudi	OTN/ASA44
	Edelhoff Dirk	AED2		Wagner Klaus	ASG22
	Fehringer Alexander	ASG13	X	Wietbrock Walter	AET12
X	Fricke Wolfgang Dr.	AED 65		Wöhler Hans	ASG22
	Geiger Hermann	ASA42		Wössner Ulrich	ASE252
	Grasl Andreas	OTN/ASA44	X	Theunissen Martijn/Dutch Space	ASA43
	Grasshoff Brigitte	AET12	X	Martin Olivier	ASA43
X	Hamer Simon	Terma			
X	Hendry David	Terma			
	Hengstler Reinhold	ASA42			
	Hinger Jürgen	ASG22			
X	Hohn Rüdiger	AED65			
	Hölzle Edgar Dr.	AED32			
	Huber Johann	ASA42			
	Hund Walter	ASE252			
	Idler Siegmund	AED312			
	Ivány von András	FAE12			
	Jahn Gerd Dr.	ASG22			
	Kalde Clemens	ASM2			
	Kameter Rudolf	OTN/ASA42			
	Kettner Bernhard	AET42			
	Knoblauch August	AET32	X	Alcatel Alenia Space Cannes	AAS-F
X	Koelle Markus	ASA43		Alcatel Alenia Space Torino	AAS-I
X	Koppe Axel	AED312	X	ESA/ESTEC	ESA
X	Kroeker Jürgen	AED65			
X	La Gioia Valentina	Terma		Instruments:	
	Lang Jürgen	ASE252		MPE (PACS)	MPE
	Langenstein Rolf	AED15	X	RAL (SPIRE)	RAL
	Langfermann Michael	ASA41		SRON (HIFI)	SRON
X	Maukisch Jan	ASA43			
X	Much Christoph	ASA43			
	Müller Jörg	ASA42		Subcontractors:	
X	Müller Martin	ASA43		Alcatel Alenia Space Antwerp	ABSP
	Peltz Heinz-Willi	ASG13		Austrian Aerospace	AAE
	Pietroboni Karin	AED65		Austrian Aerospace	AAEM
	Platzer Wilhelm	AED2		BOC Edwards	BOCE
	Reichle Konrad	ASA42		Dutch Space Solar Arrays	DSSA
	Runge Axel	OTN/ASA44		EADS Astrium Sub-Subsyst. & Equipment	ASSE
	Schink Dietmar	AED32		EADS CASA Espacio	CASA
	Schlosser Christian	OTN/ASA44		EADS CASA Espacio	ECAS
	Schmidt Rudolf	FAE12		European Test Services	ETS
	Schmidt Thomas	ASA42		Patria New Technologies Oy	PANT
	Schuler Günter	ASA42		SENER Ingenieria SA	SEN