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SPIRE-ESA-COM-000793

Please find below comments and recommendations on **SPIRE Product Assurance Plan, SPIRE-RAL-PRJ-000017 issue 1.0** (marked "not approved")

General: TBDs and TBCs must be replaced by valid data urgently.

#### Section 1.1.1

Add PA requirements for First/PLANCK scientific instruments, PT-RQ-04410, to the applicable documents list and complete the list according to applicable documents as shown in PT-RQ-04410.

#### Section 1.1.2

"RD5 ESA PSS-01-303".

The applicable document is ECSS-Q-30-02 Failure modes, effects and criticality analysis (FMECA).

#### Section 2.1 table 1

Column GSE line 2.8.7 should read P3

#### Section 2.8

"'extremely' critical' needs to be defined

#### Section 4.3.2 Radiation sensitive components

"Parts which are radiation hard to above 20 Krad..... will not require Lot testing, but radiation data shall be available".

Does Lot testing refer to radiation testing, or Lot Acceptance testing? The radiation hardness of the component does not imply that Lot Acceptance Testing is not needed. All components shall be subjected to LAT as defined in the related specification of the item under procurement (PA requirements for First/PLANCK scientific instruments, PT-RQ-04410).

#### Section 4.5.2 Component quality level.

"Where possible interface parts shall be selected from the MSG PPL".

The ESA PPL and the ESA/SCC QPL shall be the primary basis for component selection (PA requirements for First/PLANCK scientific instruments, PT-RQ-04410).

#### Table 3

The quality level for components is recommended to be in general ESA SCCG level B for active parts.

#### Section 6.1

It is recommended that the FMECA is performed on the component level also for switch-over logics between redundant sub-units, to ensure that no single point failure will disable the switch-over function.

#### Section 6.2 FMECA

Severity categories for the FMECA are according to ECSS-Q-30-02:

Severity category	Severity	Failure effect
1	Catastrophic	Propagation of failure to other subsystems/assemblies/equipment.
2	Critical	Loss of functionality, but the failure is confined to the instrument
3	Major	Degradation of functionality
4	Negligible	Minor internal unit failure that has no effect on the overall performance of the system

A distinction has been made between the degradation and the loss of the instrument. This standard also contains a reference sheet for the FMECA.

## Section 6.2 FMECA

### Printed circuit boards

It is recommended to use ESA qualified manufacturer for PCBs.

### section 7.1

If safety assurance tasks are to be shared between ESA and PI this must be detailed. ESA will contribute only as interface with launch authority.

## Section 8.3

Photographs should be taken of the PCBs after assembly so that the polarity of components is clearly visible and the correct alignment can be seen.

## Section 8.4

Test procedures content is not covered. Please add provision to that effect.

### section 8.4.2

Test reviews **must** be held as required by PT-RQ-04410.

## Section 8.6.3 and 8.6.4 NCRs

All major NCRs need ESA approval before they can be closed-out

### Fig 3

FMECA , WCA and HSIA are part of the design phase

During all AIT the fill-up of the verification matrix is part of the PA activity

### Fig 4

This flow chart does not show responsibility for approval/rejection and flow in case of rejection. Why is the cooler singled out?

## Cleanliness plan

### Section 3.2

PCBs would also be a possible candidate for bakeout.

## Appendix C

### NCR Form

A field with the Prime/ESA approval should be added to the form. See ECSS-Q-20-09A Annex B Generic NCR form and NCR data requirements.