# CRITICAL ITEMS LIST FOR VIRTIS PROGRAM

| | NAME | FUNCTION | SIGNATURE | DATE |
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## DOCUMENT CHANGE RECORD

| ISSUE | DATE | TOTAL PAGES | AFFECTED PAGES | DESCRIPTION OF MODIFICATION |
|---|---|---|---|---|
| 1 | 02/09/98 | 6 | All | First issue |
| 2 | 05/12/02 | 7 | All | Updating at the end of the program. Changes are traced with lateral bar. To be of help to understand, updating in the CIL are also indented and written in italic. |
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## 1. SCOPE

Scope of this document is to list the VIRTIS critical items, identified at the moment of the EIDR.
The CIL has been updated, at the end of the program, to assess that all critical items have been considered, verified and closed successfully.

## 2. OBJECTIVES

The first objective of this document is to allow the systematic identification and evaluation of the critical items causes and consequences prior to definition and implementation of a decision to accept, to monitor or to take action.
The second objective is to allow a systematic definition, implementation, control and verification of actions appropriate for elimination and reduction of critical items to an acceptable level..

## 3. CRITICAL ITEMS LIST

The list reports the critical items in the following order:

1. Single Point Failures,
2. Life Limited Items,
3. Hazardous Items
4. Critical Technologies,
5. Others (items which can not be verified after integration or with historical failure records).

The list is reported in the following table. On the side of each Critical Item, the classification (Major or Minor) is assigned.

# CRITICAL ITEMS LIST

## 1 Single Point Failures

See the VIRTIS Single Point Failures List attached to FMECA doc. N. VIR-GAL-TN-070

*As proved in the FMECA VIR-GAL-TN-070 is. 2, the VIRTIS instrument design is single point failure tolerant.*

## 2. Life Limited Items

2.1. VIRTIS-M Scan Mechanism Bearings (TBC) **(Major)**

Lifetime will be demonstrated by similarity with other projects

*This point is no longer applicable because no bearings are present in the final design of VIRTIS-M Scan Mechanism.*

2.2. Calibration Lamps (Minor)

A dedicated life test will be performed

*The life test has been performed successfully (ref. article on VIRTIS-M Flight Lamps which is going to be issued by IASF-CNR and GA)*

2.3. Cryocoolers **(Major)**

A dedicated confidence test campaign has been performed. Endurance testing is presently running.

*A dedicated confidence test campaign has been performed successfully. Lot also has been qualified (ref. VIR-GAL-TR-157).*

2.4. Spectral Filters and Diffuser (Minor)

Optical characteristics drifting with ageing in space have to be evaluated

*Spectral filter qualified along with the calibration lamps. Appropriate precautions in the design have been taken based on inputs provided by filters manufacturers and data available in literature.*

2.5. Covers Stepper Motors Bearings **(Major)**

Lifetime test will be performed

*Endurance test has been performed successfully (ref. VIR-GAL-TR-156).*

2.6. Shutter Assembly **(Major)**

Life testing performed on similar devices

*Additional 20.000 cycles executed during acceptance test (ref. VIR-DES-LI-1591)*

2.7. Paraffin Actuators (Minor)

Only one actuation (emergency in case of cover failure) foreseen in flight. Nevertheless a limited number of actuations are permitted during ground activities. No specific life testing is foreseen; manufacturer data are considered sufficient.

*However, Emergency Device Actuator has been successfully tested during the Cover Mechanism qualification test campaign (ref. VIR-GAL-TR-156).*

## 3. Hazardous Items

None

## 4. Critical Technologies

4.1. Focal Plane IR **(Major)**

Dedicated testing and screening planned in the frame of the relevant procurement specification.

*Tests and screening have been performed by the supplier (ref. supplier Data Package CDRL 12 / DMLN53-021 / DMLR03-021).*

4.2 Bonding for low temperatures applications (Minor)

Dedicated technological evaluation testing to be planned.

*Internal Technical Notes have proved the suitability of Armstrong and Stycast).*

4.3 Optical mirrors materials for low temperatures applications (Minor)

Dedicated analyses and technological evaluation testing are running.

*Test on Beryllium carried out successfully during the procurement. Others optics are in glass BK7.*

## 5. Other (Items which can not be verified after integration or historical failure records)

5.1. Co-Alignment of VIRTIS-M and VIRTIS-H (TBC) **(Major)**

Dedicated alignment procedures and verification programme already envisaged to assure the maintenance of the co-alignment of -M and -H channels after integration in the Spacecraft.

*OM Co-alignments Test Procedure VIR-GAL-TP-116 available since June 2001.* OM *Co-alignments Test Report VIR-GAL-TR-196 issued on November 2001*

5.2. Cover Emergency Device (TBC) (Minor)

The fact that the cover emergency device has to be manually reset will be included in the relevant integration and verification procedures.

*Superseded: no Cover Emergency Device verification foreseen at S/C integration level.*