

SRB CRITICAL ITEMS LIST

SUBSYSTEM: ET TPS Observation Camera System

ITEM NAME: Window Assembly and
TPS close out material

PART NO.: 10399-0084-101 (Window Assembly) FM CODE: A01
10121-0007-208 (FEC-A-00757R1)

ITEM CODE: 95-01-02 REVISION: Basic

CRITICALITY CATEGORY: 1 REACTION TIME: Seconds

NO. REQUIRED: 1 DATE: March 1, 2001

CRITICAL PHASE: Boost and Separation SUPERCEDES: March 31, 2000

FMEA PAGE NO.: 4-5 ANALYST: MacInnis/J. McFarland

SHEET 1 OF 2

APPROVED: S. Parvathaneni

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FAILURE MODE AND CAUSES: Loss of cover plate, window, and/or its associated part(s) including the TPS
close out material caused by:

- o Material defect
- o Manufacturing defect
- o Improper Assembly
- o Improper Installation

FAILURE EFFECT SUMMARY: Loss of mission, vehicle and crew caused by generated debris contacting ET or
Orbiter.

RATIONALE FOR RETENTION:

A. DESIGN

- o The Window is made from high purity fused silica in accordance with Corning code 7940 or 7980 and MC332-0006 (BNA Orbiter window specification). The exposed window surface is inside the air flow envelope of the forward skirt and protected by the window cover plate. (Material and Manufacturing defect)
- o Cover plate is made from 6061-T651 Aluminum alloy plate per QQ-A-250/11. (Material defect)
- o The Window Assembly is assembled and secured to the camera canister using MS24693 or NAS1972 flat head screws engaging MS21209 locking inserts and sealed with temperature resistant sealing compound PR-1422. (Improper Assembly and Improper Installation)
- o The fasteners are installed in accordance with MSFC-STD-486. The 12 fasteners will be sharing the shear loads, individual fastener shear loading is negligible per strength analysis report number USA SRBE-AM-98-0438. (Improper Installation)

- o TPS close out is thermal ablative compound BTA or K5NA. BTA is applied in accordance with 10PRC-0546 or K5NA is applied in accordance with MSFC-SPEC-1919 using standard ramp profiles consistent with other areas on the forward assembly. (Improper Installation)
- o Window Assembly is qualified for use on the Shuttle program by test and analysis, as documented in the Certificate of Qualification A-STR-7113-13.

The following Certificates of Qualification are applicable to the TPS materials required:

BTA	-	COQ A-TPS-8120
K5NA	-	COQ A-TPS-8108

B. TESTING

- o Leak test is performed on each canister assembly per USA SRBE Drawing 10399-0080 and FEC-A-00757R1 to verify proper assembly prior to installation in the forward skirt. (Improper Assembly and Improper Installation)

C. INSPECTION

VENDOR RELATED INSPECTION

- o The Window is received from the Corning Glass with the required certification per USA SRBE Purchase Order Number 302203. (Material and Manufacturing defect)
- o Materials are accepted on the basis of supplier certification. Certifications are verified by USA SRBE Receiving Inspection per Purchase Order requirements. (Material defect)

Critical Processes/Inspections/Operations:

- o BTA application per 10PRC-0546
- o K5NA application per MSFC-SPEC-1919

ASSEMBLY/CHECKOUT RELATED INSPECTIONS

- o The TPS close out inspection and acceptance is performed in accordance with 10PRC-0546 and 10753-0032. (Improper Installation)

PRELAUNCH CHECKOUT RELATED INSPECTIONS

- o None

D. FAILURE HISTORY

- o Failure histories may be obtained from the PRACA data base.

E. OPERATIONAL USE

- o Not applicable to this failure mode.

F. WAIVER/DAR

o BI-1999 08/25/98

- Specified Requirement:

10CEI-0001, Rev. N. DCN 286, Paragraph 3.3.5.1.1B "Electromagnetic Compatibility" Subsystems and/or Individual equipment shall meet the requirements of the following documents: SL-E-0002, Paragraph 6.11.1 and 6.11.2.

- Departure:

The ET Camera System Generated broad and narrowband exceedances during EMI testing, based on the SL-E-0002 Requirements.

- Justification:

Review and analysis indicate that the ET TPS Observation Camera System exceeded the narrowband radiated emission limits of SL-E-0002 by as much as 26.8 dB between 85MHZ and 260MHZ. The highest level was at 199.1 MHZ (70.6 dB Microvolts/Meter). All critical or important equipment within the Forward Skirt has met the radiated susceptibility test of 1 Volt/Meter (120dB/Microvolt), leaving a safety margin of 49.4 dB. The shielding effectiveness of the SRB skin will reduce the external radiation to acceptable levels. These EMI exceedances do not have an adverse effect on the SRB Flight Avionics and are not a flight safety concern.

There is no complementary susceptibility test for broadband, E-Field emissions. The radiated emissions were all narrowband by definition. Broadband signals would not show up, or would be very low, on narrowband tests. Since the signals are narrowband, only the narrowband limit is applicable.

The effectivity of this DAR is BI096 through BI098

o BI-1999A 08/18/99

The specified Requirement, Departure and Justification remain the same as BI-1999 (as stated above) except for the effectivity as mentioned below.

The DAR supplements BI-1999 to extend the effectivity to BI099, BI101 and subsequent.

o BI-1999B

The specified Requirement remains the same as BI-1999A (as stated above) except for Departure, Justification and effectivity as mentioned below.

- Departure:

The splash data acquisition system generated broad and narrow band exceedances during EMI testing, based on SL-E-002 requirements.

- Justification:

Review and analysis indicate that the splash DAS exceeded the narrow band radiated emission limits of SL-E-0002 between 14KHz to 10 GHz. The splash DAS inside the Forward Skirt has met the radiated susceptibility test of 1 Volt/Meter (120 dB/Micro volt) leaving a safety margin of 49.2 dB. A new digital recorder and camera timer switch for the DAS extends the effectivity to BI 102 and Subs. The splash DAS effectivity is BI 103, BI 105 and Subs.

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