SRB CRITICAL ITEMS LIST

SUBSYSTEM: STRUCTURES AND MISCELLANEOUS ITEMS

ITEM NAME: Debris Containment Device

PART NO.: 10171-0043 (Spring)
10171-0062 (Plunger Assembly)
10171-0063 (Guide Assembly)

FM CODE: A01

ITEM CODE: 60-04-09

REVISION: Basic

CRITICALITY CATEGORY: 1

REACTION TIME: Immediate

NO. REQUIRED: 4

DATE: March 1, 2002

CRITICAL PHASES: Boost

SUPERCEDES: March 1, 1994

FMEA PAGE NO.: E-60C

ANALYST: S. Parvathaneni

SHEET 1 OF 3

APPROVED: S. Parvathaneni

CN 044

FAILURE MODE AND CAUSES: Failure of the debris containment device to retain debris caused by:

O Debris falling out of hole in the bottom of the blast container caused by:

- Debris interfering with plunger
- Broken/weaken spring
- Plunger/spring jammed
- Plunger broken
- Plunger reaction time slower than stud ejection (friction)
- Broken Plunger Attach Stud
- Improper material

FAILURE EFFECT SUMMARY: Loss of mission, vehicle and crew due to damage to the Orbiter/ET leading to fire and explosion.

RATIONALE FOR RETENTION

A. DESIGN

O The Debris Containment Device is a formed, machined unit designed to eliminate a debris path in the holddown post blast container. The basic materials of construction are Inconel 718, Aluminum 6061 & 7075, and Lead. (Improper Material)

O The material of Frangible Attach Stud is A286 and LOC Tite 271. (Plunger reaction time slower than stud ejection, debris interfering with plunger)

- The materials used in this design were selected in accordance with 10PLN-0150 (Materials Control and Verification Program Management Plan for SS SRB Program), SE-R-0006 (Nasa JSC Requirements for Material and Processes), and MSFC-SPEC-522 (Design Criteria for Controlling Stress Corrosion Cracking). (Broken/WeakenSpring, BrokenPlunger) CN 044

O The design allowables are in compliance with MIL-HDBK-5 (Metallic Materials and Elements for Aerospace Vehicle Structures) and MSFC-HDBK-505 (Structural Strength Program Requirements). (Broken/Weaken Spring, Broken Plunger)

O The Debris Containment Device is qualified for flight by analysis and testing as documented in USA SRBE COQ A-STR-7123. (All Failure Causes)

B. TESTING

O No testing is performed during each flow applicable to this failure mode.

C. INSPECTION

VENDOR RELATED INSPECTION

O USA SRBE-SIP 1453 controls the USA SRBE QAR inspection criteria at the vendor's facility. (Broken Plunger, Broken/Weaken Spring, Plunger/Spring Jammed)

O USA SRBE QAR verifies the material certifications per SIP 1453. (Broken/Weaken Spring, Broken Plunger)

O USA SRBE QAR verifies heat treat data and charts per USA SRBE SIP 1453. (Improper Material)

O USA SRBE QAR verifies ultrasonic inspection per SIP 1453. (Improper Material)

Critical Processes

O Heat treat operations are performed in accordance with AMS 5664 and MIL-H-6875. (Improper Material)

O Heat treatment operation of Frangible attach Stud is performed in accordance with AMS 5737 (Improper Material)

O Ultrasonic inspection operations are performed in accordance with MIL-STD-2154. (Improper Material)

ASSEMBLY/CHECKOUT RELATED INSPECTIONS

O After flight the Debris Containment Devices are inspected by USA SRBE QA for damage, corrosion, cuts, dents, gouges, cracks, or other unusual conditions. The Plunger Assembly and Spring are qualified for one flight only. The acceptance criteria is contained in 10SPC-0131 (Refurbishment Engineering Specifications for Shuttle Solid Rocket Booster Assembly Project). (Debris Interfering with Plunger, BrokenPlunger, Broken/Weaken Spring, Plunger/Spring Jammed)

D. FAILURE HISTORY

O Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

- o Not applicable to this failure mode.