

SRB CRITICAL ITEMS LIST

SUBSYSTEM: SEPARATION

ITEM NAME: Aeroheat Shield (AHS)

PART NO.: 10317-0003-801 (AHS)
10317-0009-801 (Cover Seal)

FM CODE: A03

ITEM CODE: 30-01-08

REVISION: Basic

CRITICALITY CATEGORY: 1

REACTION TIME: Immediate

NO. REQUIRED: 4 required per SRB

DATE: March 31, 1999

CRITICAL PHASES: Boost, Separation

SUPERCEDES: March 31, 1998

FMEA PAGE NO.: B-27

ANALYST: D. Wilson/V. Patel

SHEET 1 OF 4

APPROVED: P. Kalia

CN 035

CN 035

CN 035

FAILURE MODE AND CAUSES: Structural failure (one AHS) caused by:

- o Improper welds
- o Material defects
- o Improper torque
- o Improper safety wire
- o Improper heat treatment
- o Aerodynamic loading

FAILURE EFFECT SUMMARY: Structural failure and resultant loss of aeroheat shield will lead to premature firing of one BSM. Loss of mission, vehicle and crew will result during boost and separation from aeroheat shield debris impacting the Orbiter/ET.

RATIONALE FOR RETENTION:

A. DESIGN

Design Specification is USBI 10SPC-0067.

- o Welds per MIL-STD-2219 or MSFC-SPEC-560. Weld filler metal per MSFC-STD-655. (Improper Welds) CN 035
- o Material and heat treatment.
 - Cover and Ring: 304L and 321 SST Condition A sheet. (Material Defects)
 - Ratchet: 321 SST Condition A bar stock. (Material Defects)
 - Pawl: 17-4PH sheet steel with heat treat per MIL-H-6875 Condition H1025. (Material Defects)

- Hinge Pin: 304L SST bar with each bar independently certified to a yield strength of 66.6 to 72.5 ksi and to an ultimate strength which is within +/-10% of the average ultimate strength of all bars in the lot. (Material Defects)
- o Fasteners: Tether inverted fasteners to AHS cover, to avoid debris during boost and separation phases. (Improper Safety Wire)
- o Torque requirements established for all AHS fasteners. (Improper Torque)
- o Safety wire requirements established for AHS assembly and installation. (Improper Safety Wire)
- o Qualification tests of design are documented in CSD Report 5180-79-109.
- o Stress analysis per USBI document BPC-ANAL-003-87, shows that an ultimate factor of safety of 1.86 exists for the acroheat shield due to maximum loading during ascent. (Aerodynamic Loading)

B. TESTING:

- o All listed vendor related tests are witnessed or monitored by vendor (or sub-tier vendor) QA personnel. When no designated QA organization exists at vendor, tests are witnessed/monitored by CSD QA personnel or tests are evaluated for compliance with specification requirements by CSD personnel.
- o Hinge Pin - A tensile coupon test is performed per ASTM-E8 on each bar of stock used. Any bar in a lot with ultimate tensile strength in excess of +/-10% of lot average is rejected. (Material Defects)
- o All KSC related tests are witnessed or monitored by USBI or SPC personnel.

C. INSPECTION:

- o All listed vendor related inspections are conducted 100% by vendor (or sub-tier vendor) QA personnel. Where no designated QA organization exists at a vendor, inspections are witnessed/monitored by CSD QA personnel or inspection records are evaluated for compliance with quality system requirements by CSD QA personnel.
- o All KSC related inspections are conducted 100% by USBI or SPC personnel.

VENDOR RELATED INSPECTIONS

- o Heat Treatment and Welds:

Heat treat data, welding and weld filler metal control is verified. (Improper Welds and Improper Heat Treat)

- o Material

Material certifications and actual chemical analysis and physical properties are verified. (Material Defects)

Penetrant inspection of AHS piece parts and welds is verified.

o Torque and Safety Wire

Torque of hinge pin set screws and cap screw safety wire are verified. (Improper Torque and Improper Safety Wire)

KSC RELATED INSPECTION

o Receiving Inspection (All Failure Causes)

- Verify for each AHS received there is no evidence of damage, corrosion, misalignment or moisture per OMRSD File V, Vol. I requirement number B000FL.005.

o Verify proper installation of aeroheat shield per 10REQ-0021 para. 1.1.3. (Improper Torque, Improper Safety Wire)

o Installation of aeroheat shield attach screws lockwire is verified per 10REQ-0021, para. 1.1.3. (Improper Safety Wire)

D. FAILURE HISTORY:

o Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

o Not applicable to this failure mode.