SRB CRITICAL ITEMS LIST

SUBSYSTEM: THRUST VECTOR CONTROL

ITEM NAME: Relief Valve

PART NO.: 57926 (Part of 740412/ 734579(ALT.))

FM CODE: A03

ITEM CODE: 20-01-12A

REVISION: Basic

CRITICALITY CATEGORY: 1R

REACTION TIME: Seconds

NO. REQUIRED: 2

DATE: March 31, 2000 CN 038

CRITICAL PHASES: Final Countdown, Boost

SUPERCEDES: March 31, 1997 CN 038

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ANALYST: R. Imre/S. Parvathaneni CN 038

SHEET 1 OF 4

APPROVED: S. Parvathaneni CN 038

FAILURE MODE AND CAUSES: Fails to Open in conjunction with fuel pump overpressurization (Systems A and/or B) caused by:

- o Spring guide/poppet stem galling
- o Contamination

FAILURE EFFECT SUMMARY: Fire and explosion will lead to loss of mission, vehicle and crew.

REDUNDANCY SCREENS AND MEASUREMENTS:

1. Pass - Fuel pump and relief valve operation verified during fuel pump assembly ATP.
2. Fail - Not readily detectable by flight or ground crew.
3. Fail - Contamination.

RATIONALE FOR RETENTION: See fuel pump assembly 20-01-11-A02 for fuel pump assembly retention rationale.

A. DESIGN

- o The Relief Valve is designed and qualified in accordance with end item specification 10SPC-0050. (All failure causes)
- o Valve cracking pressure is 1750 $\pm$ 50 psig. Normal fuel pump operating pressure is 1500 psig. (All Failure Causes)
- o Poppet stem material is 304 Cres with redundant EPR O-rings which seal and maintain a standoff. (Spring Guide/Poppet Stem Galling)

- Spring material is 316 Cres. (Spring Guide/Poppet Stem Galling)
- Hydrazine is filtered through a 25 micron filter upstream of the fuel pump. (Contamination)
- APU surfaces exposed to hydrazine, except gas generator, are cleaned per 10PRC-0339. (Contamination)
- Fluid procurement is controlled per SE-S-0073. (Contamination)
- Qualification testing verified design requirements as reported in Sundstrand Qualification Test Report AER-1539-6 Rev. B. (All Failure Causes)

B. TESTING

- Acceptance testing is performed per Sundstrand ATP TS 2409 on new units. This includes decontamination and precision cleaning of the fuel system. (Contamination)
- During refurbishment and prior to reuse, the relief valve is subjected to acceptance testing just as new units per Sundstrand ATP TS 2409. (Contamination)
- Hydrazine is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board hydrazine circuits per 10REQ-0021, para. 2.3.2.1 and OMRSD File V, Vol. 1 Requirement Number B42AP0.010. (Contamination)
- GN2 is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board hydrazine circuits per 10REQ-0021, para. 2.3.2.2 and OMRSD File V, Vol. 1 Requirement Number B42AP0.012. (Contamination)
- Proper relief valve operation is tested per Sundstrand fuel pump ATP TS 2535. Valve is shimmed to proper cracking pressure and functionally verified. This is the last check of proper relief valve operation. (All Failure Causes)
- Helium (Influent) is verified for cleanliness and composition (purity and particulate count) prior to fuel pump shaft seal leak check per AM B8510. (Contamination)
- Helium is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board circuits per 10REQ-0021, para. 2.3.2.5. (Contamination)
- GN2 (from MLP portable panels) is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board hydrazine circuits per OMRSD File V, Vol. 1 Requirement Number B42AP0.012.

The above referenced OMRSD testing is performed every flight.

C. INSPECTION

VENDOR RELATED INSPECTIONS

- o All material certifications are verified per SIP 1128 by vendor and USA SRBE. (Poppet/Poppet Stem Galling, Poppet/ Poppet Stem Breakage and Spring Failure)
- o Vendor (Circle Seal) test data is verified per SIP 1128 by USA SRBE PQAR. (All Failure Causes)
- o Sundstrand receiving inspection records are verified per SIP 1128 by USA SRBE PQAR. (All Failure Causes)
- o Verifications that are required on new units are performed on refurbished units per SIP 1128 by USA SRBE PQAR. (All Failure Causes)
- o Vendor inspection and test records are verified per SIP 1128 by USA SRBE PQAR. (All Failure Causes)
- o Acceptance tests are witnessed per SIP 1128 by vendor and USA SRBE. (Contamination)
- o Critical Processes/Inspections:
  - Passivation (Circle Seal Controls) per MPB 56:00

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KSC RELATED INSPECTIONS

- o Precision cleaning of tubes/hoses is verified by USA SRBE 10REQ-0021, para. 2.3.0. (Contamination)
- o Helium cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board circuits per 10REQ-0021, para. 2.3.2.5. (Contamination)
- o Hydrazine cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board hydrazine circuits per 10REQ-0021, para. 2.3.2.1 and OMRSD File V, Vol. 1 Requirement Number B42AP0.010. (Contamination)
- o Helium (Influent) cleanliness and composition (purity and particulate count) are verified prior to fuel pump shaft seal leak check per 10REQ-0021, para. 2.3.2.5. (Contamination)
- o GN2 is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board hydrazine circuits per 10REQ-0021, para. 2.3.2.2 and OMRSD File V, Vol. 1 Requirement Number B42AP0.012. (Contamination)
- o GN2 (from MLP portable panels) cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board hydrazine circuits per OMRSD File V, Vol. 1 Requirement Number B42AP0.012. (Contamination)

- TVC Couplings (Both SRB and GSE) are inspected each time prior to mating per 10REQ-0021 para. 2.3. After transfer to SPC they are inspected prior to mating per File V, Vol. I, requirement number B42GEN.070. (Contamination).

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- GN2 (from servicing cart) cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board hydrazine circuits per OMRSD File V, Vol. 1 Requirement Number B42AP0.012. (Contamination)

- Hydrazine (from servicing cart) cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board hydrazine circuits per OMRSD File V, Vol. 1 Requirement Number B42AP0.010. (Contamination)

D. FAILURE HISTORY

- Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

- Not applicable to this failure mode.