SRB CRITICAL ITEMS LIST

SUBSYSTEM: THRUST VECTOR CONTROL

ITEM NAME: Fuel Isolation Valve

PART NO.: 10201-0052-802

FM CODE: A09

ITEM CODE: 20-01-10

REVISION: Basic

CRITICALITY CATEGORY: 1R

REACTION TIME: Seconds

NO. REQUIRED: 2

DATE: March 31, 2000

CN 038

CRITICAL PHASES: Boost

SUPERCEDES: October 6, 1996

CN 038

FMEA PAGE NO.: A-20E

ANALYST: S. Gordon/S. Parvathaneni

CN 038

SHEET 1 OF 3

APPROVED: S. Parvathaneni

CN 038

FAILURE MODE AND CAUSES: Insufficient fuel flow due to obstruction (System A and B) caused by :

- o Contamination of fuel
- o Clogged filter Screen
- o Obstruction of flow passage

FAILURE EFFECT SUMMARY: Failure of valve to allow sufficient fuel flow during boost will result in loss of TVC which leads to vehicle break up and loss of mission, vehicle and crew.

REDUNDANCY SCREENS AND MEASUREMENTS:

1) Pass - ATP-74740 ATP1 at vendor's plant and per 10SPC-0056 at USA SRBE/TBE Florida Operations.
2) Pass - APU turbine speed B46R1406C, B46R1407C, B46R1408C, and B46R1409C ; Hydraulic Pressure Measurement B58P1303C and B58P1304C
3) Fail - Contamination

RATIONALE FOR RETENTION:

A. DESIGN

- o The Fuel Isolation Valve is designed and qualified in accordance with end item specification 10SPC-0056. (All failure causes)
- o Qualification testing verified design requirements as reported in Consolidated Controls Qualification Test Report 74740 QTR-1, Rev. A. (All failure causes)
- o Material selections are per MSFC-SPEC-522A. (All failure causes)
- o Operational and test fluids meet purity and particulate requirements of SE-S-0073. (All failure causes)
- o TVC system includes 25 micron (absolute) filter upstream of Fuel Isolation Valve. (Contamination of fuel)

B. TESTING

o Acceptance testing is performed per EVAD ATP 74740 ATP 1 on each flight article at the vendor's plant. This includes Visual Examination, Electrical Tests, Performance Checks (including flow ΔP Test), and Cleanliness Verification. (All failure causes)

o During refurbishment and prior to reuse, Fuel Isolation Valves are reworked per 10SPC-0131 and acceptance tested per criteria in 10SPC-0056 by USA SRBE/TBE Florida operations. This includes visual examination, cleanliness verification, electrical tests, and performance checks (including flow ΔP Test). (All failure causes)

- Nitrogen is verified for cleanliness and composition (purity and particulate count) prior to introduction to on board flight hardware per 10REQ-0021 Para 2.3.2.2 and OMRSD File V Vol 1, Requirement Number B42APO.012. (All failure causes)

- Hydrazine is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board flight hardware per 10REQ-0021, para. 2.3.2.1 and OMRSD File V, Vol. 1, Requirement Number B42APO.010. (All failure causes)

- Helium is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board flight hardware per 10REQ- 0021, para. 2.3.2.5. (All failure causes)

- Electrical and functional tests are performed per 10REQ-0021, para. 2.3.4.3 and 2.3.15.2. (All failure causes)

- TVC system functional test is performed during Hot Fire operations per 10REQ-0021, para. 2.3.16. (All failure causes)

The above referenced OMRSD testing is performed every flight.

C. INSPECTION

I. VENDOR RELATED INSPECTION

- Verification that all parts are inspected for surface finish, burrs, damage and contamination by USA SRBE PQAR per SIP 1204. (All failure causes)

- All material certifications are verified by USA SRBE PQAR per SIP 1204. (All failure causes)

- Witness assembly and verify operation of valve by USA SRBE PQAR SIP 1204. (All failure causes)

- Perform final inspection to drawing requirements by USA SRBE PQAR per SIP 1204. (All failure causes)

- Perform post ATP inspection of sealing surfaces to the inlet and outlet ports prior to packaging by USA SRBE PQAR per SIP 1204. (All failure causes)

- CRITICAL PROCESSES/INSPECTIONS:
  - Weld per MIL-W-6858

II. KSC RELATED REFURBISHMENT INSPECTIONS

CN 038

o Visual inspection of FIV will be performed per 10SPC-0131, para. II. (All Failure Causes)

o Functional testing of FIV will be performed per 10SPC-0131, paragraph IV.

All manual tests will be witnessed by Quality or verified for those instances when controlled software is utilized and a test report is generated. (All Failure Causes)

CN 038

III. KSC RELATED ASSEMBLY AND OPERATIONS INSPECTIONS

- Proper function of TVC system is demonstrated during hotfire per 10REQ- 0021, para. 2.3.16. (All failure causes)
- Helium cleanliness and composition (purity and particulate count) are verified prior to introduction to on board flight hardware per 10REQ- 0021, para. 2.3.2.5. (All failure causes)
- Nitrogen is verified for cleanliness and composition (purity and particulate count) prior to introduction to on board flight hardware per 10REQ-0021 Para 2.3.2.2 and OMRSD File V Vol 1, Requirement Number B42APO.012. (All failure causes)
- Hydrazine cleanliness and composition (purity and particulate count) are verified prior to introduction to on board flight hardware per 10REQ- 0021, para. 2.3.2.1 and OMRSD File V, Vol. 1, Requirement Number B42APO.010. (All failure causes)
- Verification of proper valve operation during BITE per OMRSD File V, Vol. 1, Requirement Number B42AP0.050. (All failure causes)
- Verification of proper APU start condition per File II, Vol. 1, Requirement Number SOOFRO.070 (All failure causes)

o System pressure decay test is monitored per 10REQ-0021 para. 2.3.3.1.b for the fuel system prior to hot fire. (All failure causes)

CN 038

o Fuel system leak test is performed per 10REQ-0021, para 2.3.6 (All failure causes)

CN 038

D. FAILURE HISTORY

- Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

- Not applicable.

F. WAIVERS

- None