

SRB CRITICAL ITEMS LIST

SUBSYSTEM: THRUST VECTOR CONTROL

ITEM NAME: Fuel Filter

PART NO.: 10203-0016-801  
10209-0015-802 (K-Seal)  
10209-0042-801 (Connector)

FM CODE: A02

ITEM CODE: 20-01-08

REVISION: Basic

CRITICALITY CATEGORY: 1R

REACTION TIME: Seconds

NO. REQUIRED: 2

DATE: March 31, 2000

CRITICAL PHASES: Boost

SUPERCEDES: March 31, 1997

FMEA PAGE NO.: A-12

ANALYST: B. Snook/S. Parvathaneni

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APPROVED: S. Parvathaneni

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FAILURE MODE AND CAUSES: Clogged (Systems A and B) caused by:

- o Loading of contaminated hydrazine
- o Contamination of FSM and supply lines
- o Improper cleaning of FSM and supply lines
- o Loading of contaminated GN2
- o Manufacturing defect

FAILURE EFFECT SUMMARY: Loss of TVC will lead to vehicle break up and loss of mission, vehicle and crew. One success path remains after the first failure. Operation is not affected until both paths are lost.

REDUNDANCY SCREENS AND MEASUREMENTS:

- 1) Pass - Wintec ATP 15228-591 at Vendor's place and refurbishment acceptance tested per the criteria of 10SPC-0049 and also 10SPC-0131 at USA SRBE/TBE Florida operations. GN2 and Hydrazine verification done per OMRSD.
- 2) Pass - APU Turbine Speed Measurement - B46R1406C, B46R1407C, B46R1408C, B46R1409C,
- 3) Fail - Contamination

RATIONALE FOR RETENTION:

A. DESIGN

- o The Fuel Filter is designed per Source Control Drawing 10203-0016 and is qualified in accordance with end item specification 10SPC-0049. (All failure causes)

- o The Fuel Filter is designed to filter out particulate matter of 25 microns and greater. (All Failure Causes)
- o Fluid procurement is controlled by SE-S-0073. (Loading of Contaminated Hydrazine)
- o Filter media is 340L CRES wire cloth 165 X 1400 twilled dutch doubleweave. (Manufacturing Defect)
- o Qualification testing verified design requirements, as reported in ARDE Qualification Test Report QA41006-19. (All Failure Causes)

#### B. TESTING

- o Acceptance testing is performed per Wintec ATP 15228-591 on each new flight article. This includes Bubble Point Test, Visual Examination, Proof Pressure Test to 800 psig, Leakage Test to  $\leq 1 \times 10^{-6}$  sccs of helium, Flow Test and Cleanliness Verification. (All Failure Causes)
- o During refurbishment and prior to reuse the fuel filter is reworked per 10SPC-0131 and acceptance tested by USA SRBE/TBE Florida operations per the criteria of 10SPC-0049. This includes visual examination, Bubble point test, proof pressure test to  $825 \pm 25$  psig for 5 minutes with no evidence of external leakage or failure or permanent deformation, external leakage  $\leq 1 \times 10^{-6}$  SCCS of helium when pressurized to  $825 \pm 25$  psig for 5 minutes, Flow test and Cleanliness Verification. (All Failure Causes)
- o Hydrazine is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board hydrazine circuit per 10REQ-0021 para. 2.3.2.1 and OMRSD File V, Vol. 1 Requirement Number B42AP0.010. (Loading Contaminated Hydrazine)
- 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. (Loading Contaminated GN2)
- o 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. (Loading Contaminated GN2)
- o The Filter , filter attach tubing and FSM are precision cleaned by USA SRBE per 10PRC-0339. (Improper Cleaning of FSM and Supply Lines Contamination of FSM and Supply Lines)
- o Verification of FSM bottle pressure for hydrazine system pressure check per File V, Vol. I, requirement number B42AP0.025. (All Failure Causes)
- o TVC system functional test is performed during hotfire operations per 10REQ-0021, para. 2.3.16. (All Failure Causes)
- o Helium leak test to less than  $1 \times 10^{-6}$  sccs is performed per 10REQ-0021, para. 2.3.3.1. (All Failure Causes)

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## C. INSPECTION

## I. VENDOR RELATED INSPECTIONS

- o Manufacturing is monitored per SIP 1213. (Manufacturing Defect)
- o Filter dimensions are verified by USA SRBE PQAR per SIP 1213. (Manufacturing Defect)
- o Cleanliness requirements verified by USA SRBE PQAR per SIP 1213. (All Failure Causes)
- o Acceptance testing is witnessed by USA SRBE PQAR per SIP 1213. (All Failure Causes)
- o Final inspection per drawing requirements by USA SRBE PQAR per SIP 1213. (Manufacturing Defect)

NOTE: Inspections per SIP 1213 are performed on USA SRBE procured filters only. Filters procured by ARDE undergo verification by USA SRBE that all tests and inspections were performed, per SIP 1110.

- o Critical Processes/Inspections:
  - None

## II. KSC RELATED REFURBISHMENT INSPECTION

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

## III. KSC RELATED ASSEMBLY AND OPERATIONS INSPECTIONS

- o Cleanliness of filter and filter attach tubing is verified by USA SRBE per 10PRC-0339. (Improper Cleaning of FSM and Supply Lines Contamination of FSM and Supply Lines)
- 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. (Loading of Contaminated Hydrazine)
- o GN2 cleanliness and composition (purity and particulate count) are verified 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. (Loading of Contaminated GN2)
- 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)

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- o Proper function of TVC system is demonstrated during Hotfire test per 10REQ-0021, para. 2.3.16. (All Failure Causes)
- 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. (Loading Contaminated GN2)

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- o 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. (Loading Contaminated GN2)
- o 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. (Loading Contaminated Hydrazine)

D. FAILURE HISTORY

- o Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

- O Not applicable to this failure mode.