

SRB CRITICAL ITEMS LIST

SUBSYSTEM: THRUST VECTOR CONTROL

ITEM NAME: Check Valve and Filter
Assembly (CVFA)

PART NO.: 10201-0047-802, FM CODE: A04
10201-0047-803 (Alt)

Includes

Filter Element Check Valve,
Inlet Shutoff Valve Assembly
Plug (Indicator Port)
Fittings, Connector
10209-0038-801 (4)
10209-0106-801
10209-0157-801 (Alt)
10209-0105-801
10209-0067-801 or
10209-0132-801 (Alt)
7583008
O-rings
Type M83248/1

ITEM CODE: 20-01-30

REVISION: Basic

CRITICALITY CATEGORY: 1R

REACTION TIME: Seconds

NO. REQUIRED: 2

DATE: March 1, 2001

CRITICAL PHASES: Boost

SUPERCEDES: March 31, 2000

FMEA PAGE NO.: A-117

ANALYST: B. Snook/S. Parvathaneni

SHEET 1 OF 4

APPROVED: S. Parvathaneni

FAILURE MODE AND CAUSES: Filter clogs (System A and B) caused by:

- o Contamination

FAILURE EFFECT SUMMARY: Loss of TVC will lead to 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 - Filter assembly refurbished and filter replaced during turnaround.
- 2) Pass - Hydraulic pressure measurement B58P1303C and B58P1304C
- 3) Fail - Contamination

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RATIONALE FOR RETENTION:

A. DESIGN

- o The Check Valve and Filter Assembly is designed and qualified in accordance with end item specification 10SPC-0048. (All failure causes)
- o Hydraulic fluid is per MIL-H-83282 or MIL-PRF-83282. (Contamination)
- o Filter is 5 micron absolute. (Contamination)
- o Filter element is capable of collecting 13 grams of AC fine dust when at 80 psid and 100 degrees F. at 55 GPM. Filter element is replaced after each flight per 10SPC-0131. (Contamination)
- o Fluid procurement is controlled per SE-S-0073. (Contamination)
- o Filter can withstand a 4875 psi pressure differential. (Contamination)
- o Component design handling, testing and cleanliness are per 10SPC-0048. (Contamination)
- o Qualification testing verified design requirements as reported in Purolator Technologies Qualification Test Report No. 11362. (Contamination)

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B. TESTING

- o Acceptance testing is performed per PTI PAT No. 7588778 on each new flight unit. This includes visual examination and cleanliness verification. (Contamination)
- o Acceptance testing of the filter element is performed per PTI PAT 7583008. This includes bubble testing and cleanliness testing. (Contamination)
- o During refurbishment and prior to reuse, CVFA is reworked per 10SPC-0131 and acceptance tested by USA SRBE/TBE Florida operations per the criteria of 10SPC-0048. This includes visual examination and cleanliness verification. (Contamination)
- o Hydraulic fluid is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board Hydraulic circuits per 10REQ-0021, para. 2.3.2.6. (Contamination)
- o 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)
- o Effluent hydraulic fluid is verified for moisture content and cleanliness (water content and particulate count) from the rock actuator, the tilt reservoir, the rock reservoir and the tilt actuator per 10REQ-0021, para. 2.3.12.3. (Contamination)
- o Helium leak test to less than 1×10^{-4} sccs is performed per 10REQ-0021, para. 2.3.3.3. (All Failure Causes)

- o Hydraulic fluid is verified for cleanliness and composition (purity and particulate count) prior to introduction to on-board Hydraulic circuits during prelaunch operations per OMRSD File V, Vol. 1, Requirement Number B42HP0.010. (Contamination)
- o Hydraulic fluid is verified for content of moisture per OMRSD File V, Vol. 1, Requirement Number B42HP0.011. (Contamination)
- o CVFA is exposed to operating pressure during hotfire operations per 10REQ-0021, para. 2.3.15 and 2.3.16 respectively for: (Contamination)
 - High speed GN2 spin
 - Hotfire

The above referenced OMRSD testing is performed every flight.

C. INSPECTION

I. VENDOR RELATED INSPECTIONS

- o Verification of material certification is performed by USA SRBE PQAR per SIP 1264. (Contamination)
- o Verification of cleanliness is performed by USA SRBE PQAR per SIP 1264. (Contamination)
- o Critical Processes/Inspections:
 - None

II. KSC RELATED RELATED REFURBISHMENT INSPECTION

- o Visual inspection of CVFA will be performed per 10SPC-0131, para. II. (All Failure Causes)
- o Functional testing of CVFA 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 Proper function of TVC system is demonstrated during hotfire operations per criteria of 10SPC-0021, para. 2.3.15 and 2.3.16 respectively for: (All Failure Causes)
 - High Speed GN2 spin
 - Hotfire
- o Hydraulic fluid cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board Hydraulic circuits per 10REQ-0021, para. 2.3.2.6. (Contamination)

- o The moisture content and cleanliness (water content and particulate count) of the effluent hydraulic fluid from the rock actuator, the tilt reservoir, the rock reservoir and the tilt actuator are verified per 10REQ-0021, para. 2.3.12.3. (Contamination)
- o Verification of hydraulic fluid (effluent) sampled for moisture per OMRSD File V, Vol. 1, requirement number B42HPO.011. (Contamination)
- o Hydraulic fluid cleanliness and composition (purity and particulate count) are verified prior to introduction to on-board Hydraulic circuits during prelaunch operations per OMRSD File V, Vol. 1, Requirement Number B42HP0.010. (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)

D. FAILURE HISTORY

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

E. OPERATIONAL USE

- o Not applicable to this failure mode.