

Critical Item List

Subsystem: HPOTP B500 - 4750000-700
 Functional Assy: Structural Section B50004

Prepared by: M.T. Spencer
 Approved by: R.L. Pugh
 CIL Item: 040402

Page: 119
 Issue Date: December 23, 1993
 Rev. Date: December 08, 1995

CIL Item Code: 040402
 PMEA Item Code: 040402
 Function: Fritting of Internal Parts
 System/Subsystem: HPOTP B500 - 4750000-700

Analyst: M.T. Spencer
 Approved by: R.L. Pugh
 Rev. No.: _____
 Rev. Date: December 08, 1995
 Effectivity: _____
 Hazard Ref.: See Listings Below

Operating Phase	Failure Mode, Description and Effect	Criticality
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Operating Phase:
s,m,c

Failure Mode:
Loss of restraint resulting in relative motion.

Criticality:

1

Failure Cause(s):

- A. Internal fritting of:
 Prebm diach heg in 232
 Bolt in 134
 Impeller in 017
 Inducer in 018
 Inducer in 019
 Cover in 247
 Plug in 146
 Seal in 020
 Counterweight in 021
 Left inducer shroud in 023C
 Right inducer shroud in 023B
 Gasket in 025
 Spacer in 228
 Seal in 024B
 Seal in 023A
 Washer in 027
 Nut in 026
 Preburner inner heg. in 234
 Tie rod in 035
 Lock in 036
 Counterweight in 288
 Lock in 038
 Ball brg. in 207
 Seal in 230
 Ring in 22-24
 Seal in 22-05
 Ring in 053
 Spacer in 054
 Nut in 055
 Nut in 235
 Bolt in 134
 Bolt in 127
 Bolt in 128

Hazard Ref:

A) C1S/AM/C (AT) 2A1.3

D E N T

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Washer l/n 057
Washer l/n 238
Washer l/n 74
Lock l/n 86
Converter l/n 061
Nut l/n 062
Spacer l/n 069
Key washer l/n 071
Deflector l/n 073
Cover l/n 153
Seal l/n 154
Sleeve l/n 156
Nut l/n 091
Washer l/n 092
Tube cooling l/n 093
Seal l/n 094
Preburner impeller l/n 029
Shell l/n 090
Retainer l/n 199
Bolt l/n 136
Seal l/n 197
Housing l/n 022
Housing l/n 081
Washer l/n 136
Gasket l/n 125
Gasket l/n 147
Gasket l/n 233
Support P/B brg l/n 244-03
Pin l/n 248

Failure Effect:

A. Fire from ignition of rubbing parts.

System:

Uncontained engine damage

Mission/Vehicle:

Loss of vehicle

Redundancy Screens:

Does not apply since it is a single point failure

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Rev. Date: December 08, 1985

Part Name/No.	Design Considerations	Document Ref
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In Listed LOX wetted parts

FAILURE CAUSE A. LOX compatibility Tests per NHB 8060.1B, Test 13 were conducted to substantiate the selection of materials for use in the Alternate Turbopump. This program is required to meet NHB 8060.1B requirements for the materials in LOX/GOX.

Both metallic and non-metallic materials were evaluated for the HPOTP under the worst case pump operating conditions. Promoted combustion tests will provide basic information, and frictional heating tests will be performed to provide data for design substantiation. These tests are performed by NASA/MSFC Materials Lab.

Promoted combustion tests will be performed with oxygen gas pressure raised from 1000 psig to 10,000 psig, in accordance with NHB 8060.1C for each successive test. Three tests will be performed at each pressure to establish repeatability and measure propagation rate on a 0.250-inch or 0.125-inch specimen.

Frictional heating tests will be conducted in two phases. In Phase 1, metallic material will be tested in contact with itself at standard conditions. In Phase 2, various material combinations will be tested to evaluate their reaction at standard test condition as well as expected operating conditions.

Details of this testing, and the results, can be found in the Materials Control Plan FR-19673-6.

Use of materials which do not meet NHB 8060.1B requirements, are documented and approved by NASA with the Material Usage Agreement (MUA).

LOX wetted surface area calculations can be found in design job 90WYA283.

General Quality Requirements:

Supplier Quality Assurance requirements are included in PW-QA-8078, and include such requirements as first piece layouts. This requires the documentation of dimensions on all characteristics represented on the delivered article.

Those parts on this list which have been designated as being fracture critical will meet the requirements of the fracture control plan FR-19783-2 and safe life fracture mechanics requirements.

These parts meet CEI requirements.

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Functional Assy: <u>Structural Section B50004</u>		Prepared by: <u>M.T. Spencer</u>	Approved by: <u>R.L. Fugh</u>	Issue Date: <u>December 23, 1993</u>
		CIL Item: <u>040402</u>		Rev. Date: <u>December 09, 1995</u>
Inspection and Test				
Possible Causes	Significant Characteristics	Inspection and Test		Document Ref

f/n : Listed LOX wetted parts

Failure Cause : General

Material Integrity

Review of the vendor supplied documentation of the required material properties and quality requirements specified in the purchase order, should provide the necessary information relative to the compliance with the test articles.

All Cause

General Quality Requirements:

Supplier Quality Assurance requirements are included in PW-QA-6078, and include such requirements as first piece layouts. This requires the documentation of dimensions on all characteristics represented on the delivered article.

Inspection Methods Sheets for use in the inspection of purchased parts and assemblies contain the necessary information to insure that the requirements of the QADA, engineering drawings, and referenced documents are satisfied. For shop fabricated parts, the sheets are audited by Inspection Methods.

The purchase orders for vendor supplied parts must comply with PWA-SP 300, 'Control of Materials Processes and Parts', which requires the vendor to provide material, process, and dimensional information to the Quality Department.

Waivers

This section would contain a description of any limiting features of CIL hardware

DAR Numbers

Not applicable at this time

Controls

Contamination control

PWA-SP 5P 36180

LOX compatibility

PWA-SP 5P 82

Cleanliness control

PWA-SP 5P 60

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