

PAGE: 1

PRINT DATE: 11/07/88

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B2-0548-X

SUBSYSTEM NAME: ARS - COOLING

REVISION : 11/07/88

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CLASSIFICATION	NAME	PART NUMBER
LRU :	PRI COOL PUMP AND ACCUM	MC621-0008-0455
SRU :	VALVE, CHECK	SV755547

QUANTITY OF LIKE ITEMS: 1

DESCRIPTION/FUNCTION:  
CHECK VALVE, LOOP 1 PUMP PACKAGE

THIS SHUTTLE-BALL CHECK VALVE IS A THREE ORIFICE ASSEMBLY IN WHICH A BALL IS SHUTTLED IN POSITION OVER THE UNUSED ORIFICE BY THE FLOW PRESSURE OF THE OPERATING PUMP TO BLOCK BACK FLOW THROUGH THE NON-OPERATING PUMP AND PROVIDE A FLOW PATH FOR THE OPERATING PUMP.

PAGE: 7

PRINT DATE: 11/07/88

SHUTTLE CRITICAL ITEMS LIST - ORBITER

NUMBER: 06-1B2-0548-03

REVISION: 11/07/88

SUBSYSTEM: ARS - COOLING  
LRU :PRI COOL PUMP AND ACCUM  
ITEM NAME: VALVE, CHECK

CRITICALITY OF THIS  
FAILURE MODE:1R2

FAILURE MODE:  
INTERNAL LEAKAGE

MISSION PHASE:

LO LIFT-OFF  
CO ON-ORBIT  
DO DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:	102	COLUMBIA
	103	DISCOVERY
	104	ATLANTIS

CAUSE:  
MECHANICAL SHOCK, VIBRATION, PHYSICAL BINDING/JAMMING, CORROSION, SEAL  
MATERIAL DEGRADATION, CONTAMINATION

CRITICALITY 1/1 DURING ANY MISSION PHASE OR ABORT? N

REDUNDANCY SCREEN A) PASS

B) N/A

C) PASS

A)

B)  
SCREEN B IS N/A BECAUSE REDUNDANT LOOP IS IN STANDBY UNTIL REQUIRED.

C)

- FAILURE EFFECTS -

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B2-0548-05

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(A) SUBSYSTEM:  
COOLANT BYPASS THROUGH IDLE PUMP.

(B) INTERFACING SUBSYSTEM(S):  
LOSS OF COOLING OF WATER COOLANT LOOP ONE. FREE WATER IN CABIN.

(C) MISSION:  
POSSIBLE EARLY MISSION TERMINATION IF LEAK DEBILITATES BOTH PUMPS BELOW MINIMUM INTERCHANGER FLOW REQUIREMENTS.

(D) CREW, VEHICLE, AND ELEMENT(S):  
POTENTIAL LOSS OF CREW/VEHICLE UPON SUBSEQUENT LOSS OF REDUNDANT WATER COOLANT LOOP.

**RATIONALE FOR CRITICALITY:**

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**- DISPOSITION RATIONALE -**

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(A) DESIGN:  
THE CHECK VALVE IS MADE OF STAINLESS STEEL CRES AISI 347. IT IS BRAZED TO THE OUTLET MANIFOLD. A RUBBER VITON SEAL IS USED BETWEEN THE PUMP OUTLET AND THE CHECK VALVE. THE SHUTTLE BALL IS MADE OF TEFLON. SYSTEM CONTAINS HIGH PURITY AND LOW O<sub>2</sub> CONTENT WATER.

(B) TEST:  
ACCEPTANCE TEST - INTERNAL AND EXTERNAL LEAK, PROOF TEST, FLOW VS. DELTA-P TESTS PERFORMED. OUTPUT PRESSURE RISE OF 46.5 +/- 1.2 PSID AT 970 LB/HR.

QUALIFICATION TEST - DIELECTRIC AND TWO AND THREE PHASE CHECKS DONE. OUTPUT PRESSURE RISE OF 46.5 +/- 1.2 PSID AT 970 LB/HR. INSULATION RESISTANCE OF 100 MEGOHM MINIMUM. EMI/EMC OF 1 VOLT PER MOTOR. SUBJECTED TO RANDOM VIBRATION SPECTRUM ENVELOPE OF 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.03 G\*\*2/HZ, CONSTANT AT 0.03 G\*\*2/HZ FROM 150 TO 1000 HZ, DECREASING AT 6 DB/OCTAVE FROM 1000 TO 2000 HZ FOR 48 MINUTES PER AXIS IN THREE ORTHOGONAL AXES. DESIGN SHOCK - THREE TERMINAL SAWTOOTH PULSES OF 20 G PEAK AMPLITUDE AND 11 MS DURATION APPLIED IN BOTH DIRECTIONS ALONG EACH OF THREE ORTHOGONAL AXES.

IN-VEHICLE TESTING - PUMP PRESSURES ARE CONTINUOUSLY MONITORED WHEN THE VEHICLE IS POWERED UP, AND INDICATE PUMP/CHECK VALVE PERFORMANCE.

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B2-0548-05

OMRSD - PUMP PRESSURES ARE CONTINUOUSLY MONITORED WHEN THE VEHICLE IS POWERED UP DURING EACH TURNAROUND AND INDICATE PUMP/CHECK VALVE PERFORMANCE. WATER IS SAMPLED PER SPEC SE-S-0073 DURING SERVICING.

(C) INSPECTION:  
RECEIVING INSPECTION  
INCOMING MATERIALS ARE VERIFIED FOR MATERIAL AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL  
CORROSION PROTECTION IS CHECKED AND VERIFIED. CLEANLINESS IS CHECKED AND MAINTAINED PER REQUIREMENTS.

ASSEMBLY/INSTALLATION  
MACHINED PARTS ARE INSPECTED DIMENSIONALLY IN ACCORDANCE WITH REQUIREMENT. CRITICAL SEALING SURFACE IS VISUALLY INSPECTED UNDER 10X MAGNIFICATION TO PRECLUDE ANY IMPERFECTION OR FLAW. ADHESIVE BONDING OF COMPONENTS ARE VERIFIED PER DRAWING SPEC. WATER LEAK DETECTION (BUBBLE TEST) IS VERIFIED. END SURFACE FINISH OF VALVE SEAT IS VERIFIED PER DRAWING REQUIREMENT.

CRITICAL PROCESSES  
HEAT TREATMENT IMPOSED ON COMPONENTS IS VERIFIED BY INSPECTION. BRAZING OF TUBE TO FLANGE IS VERIFIED PER REQUIREMENT.




TESTING  
ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING  
PACKAGING FOR STORAGE AND SHIPMENT IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:  
NO FAILURE HISTORY APPLICABLE TO INTERNAL LEAKAGE FAILURE MODE. THE CHECK VALVE HAS SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH THE DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE:  
TBS.

- APPROVALS -

RELIABILITY ENGINEERING:	N. L. STEISLINGER:	<i>NLS</i>	
DESIGN ENGINEERING	: N. K. DUONG	<i>NK</i>	
QUALITY ENGINEERING	: D. R. STOICA	<i>DRS</i>	

PAGE: 10

PRINT DATE: 11/07/8

SHUTTLE CRITICAL ITEMS LIST - ORBITER

NUMBER: 06-1B2-0548-05

NASA RELIABILITY :  
NASA DESIGN :  
NASA QUALITY ASSURANCE :

: T. A. D. [Signature] 4/17/88  
: [Signature] 01/22/88  
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