

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B3-0579-X

SUBSYSTEM NAME: ARS - COOLING

REVISION : 0 02/17/89 W

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: LINES, FLEXIBLE	ME271-0091-1111
LRU	: LINES, FLEXIBLE	ME271-0091-1112
LRU	: LINES, FLEXIBLE	ME271-0091-1113
LRU	: LINES, FLEXIBLE	ME271-0091-1114
LRU	: LINES, FLEXIBLE	ME271-0091-1115
LRU	: LINES, FLEXIBLE	ME271-0091-1116
LRU	: LINES, FLEXIBLE	ME271-0091-1117
LRU	: LINES, FLEXIBLE	ME271-0091-1118
LRU	: LINES, FLEXIBLE	ME271-0091-1119
LRU	: LINES, FLEXIBLE	ME271-0091-1120
LRU	: LINES, FLEXIBLE	ME271-0091-1130
LRU	: LINES, FLEXIBLE	ME271-0091-1131
LRU	: LINES, FLEXIBLE	ME271-0091-1132
LRU	: LINES, FLEXIBLE	ME271-0091-1133
LRU	: LINES, FLEXIBLE	ME271-0091-1134
LRU	: LINES, FLEXIBLE	ME271-0091-1135

QUANTITY OF LIKE ITEMS: 38

DESCRIPTION/FUNCTION:

PROVIDE FLEXIBILITY IN THE WATER COOLANT LINES TO PERMIT EASY INSTALLATION OF HEAT EXCHANGERS AND AVIONICS BAY COLDPLATES AND TO RELIEVE STRESSES CAUSED BY VIBRATION DURING FLIGHT AND TRANSPORT OPERATIONS.

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SUBSYSTEM: ARS - COOLING
LMU : LINES, FLEXIBLE
ITEM NAME: LINES, FLEXIBLE

CRITICALITY OF THIS
FAILURE MODE: 1R2

FAILURE MODE:
RESTRICTED FLOW

MISSION PHASE:

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

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

CAUSE:
MECHANICAL SHOCK, CONTAMINATION, CORROSION, KINKING

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 -

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(A) SUBSYSTEM:
REDUCED OR LOST CAPABILITY OF ONE WATER COOLANT LOOP.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT - REDUNDANT LOOP WILL PROVIDE COOLING.

(C) MISSION:
POSSIBLE EARLY MISSION TERMINATION FOR LOSS OF ONE WATER COOLANT LOOP FOR CABIN AND AVIONICS COOLING.

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

RATIONALE FOR CRITICALITY:

- DISPOSITION RATIONALE -

(A) DESIGN:
HOSES HAVE A CONVOLUTED 316L STAINLESS STEEL INNER LINER AND EXTERNAL WIRE BRAID SUPPORTS INNER HOSE. INNER LINER I.D. IS 0.626 INCH AND WALL THICKNESS IS 0.025 INCH.

(B) TEST:
ACCEPTANCE TEST - PROOF PRESSURE TESTED TO 180, LEAKAGE 1×10^{-9} SCCS GHE MAX AT 1 ATMOSPHERE DELTA, BALL CHECK (BALL MUST PASS THROUGH TUBE FREELY).

QUALIFICATION TEST/CERTIFICATION - PROOF AT 180 PSIG, COLLAPSE PRESSURE 30 PSIA BY ANALYSIS. LEAK TEST AT 1 ATMOSPHERE DELTA. BURST PRESSURE TEST TO 360 PSIG. RANDOM VIBRATION TEST - 20 TO 100 HZ INCREASING AT 6 DB/OCTAVE TO 0.2 G**2/HZ, CONSTANT AT 0.2 G**2/HZ FROM 100 TO 300 HZ, DECREASING AT 9 DB/OCTAVE FROM 300 TO 2000 HZ FOR 48 MINUTES PER AXIS IN THREE ORTHOGONAL AXES. ACCELERATION TEST +/- 5 G IN EACH DIRECTION. SHOCK BY ANALYSIS PER MF0004-014. TEMPERATURE BY ANALYSIS FOR -10 TO 130 F. FUNGUS, HUMIDITY, SALT FOG AND OZONE BY ANALYSIS.

IN-VEHICLE TESTING - PUMP CHECKS ARE PERFORMED AND PUMP OUT PRESSURE IS CONTINUOUSLY MONITORED WHEN THE VEHICLE IS POWERED UP; SERVES AS AN INDICATION OF BLOCKAGE IN THE LOOP.

OMRSD - PUMP OUTLET PRESSURE IS CONTINUOUSLY MONITORED WHEN THE VEHICLE

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IS POWERED UP DURING EACH TURNAROUND AND SERVES AS AN INDICATION OF BLOCKAGE IN THE LOOP. WATER IS SAMPLED PER SPEC SE-S-0073 DURING SERVICING.

(C) INSPECTION:

RECEIVING INSPECTION

INCOMING PARTS ARE VISUALLY INSPECTED AND VERIFIED FOR MATERIAL AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL

ASSEMBLY CLEANLINESS IS MAINTAINED AND VERIFIED TO LEVEL 300. CORROSION PROTECTION PROVISIONS AND CONTAMINATION CONTROL PLAN ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

PART PROTECTION, MANUFACTURING PROCESSES AND REQUIREMENTS ARE VERIFIED BY INSPECTION. MANDATORY INSPECTION POINTS ARE INCLUDED IN ASSEMBLY PROCESS.

NONDESTRUCTIVE EVALUATION

DYE PENETRANT INSPECTION IS VERIFIED BY INSPECTION.

CRITICAL PROCESSES

FUSION WELD AND ELECTRO-POLISHING OF TUBE ENDS ARE VERIFIED BY INSPECTION.

TESTING

ATP, INCLUDING PROOF PRESSURE TEST, IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

INSPECTION VERIFIES PACKAGING AND SHIPPING REQUIREMENTS AND METHODS TO ASSURE SAFE HANDLING AND MAINTENANCE OF THE PRESCRIBED CLEANLINESS LEVEL.

(D) FAILURE HISTORY:

NO FAILURE HISTORY APPLICABLE TO RESTRICTED FLOW FAILURE MODE. THE FLEX LINES HAVE SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH THE DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE:

TBS.

- APPROVALS -

RELIABILITY ENGINEERING: N. L. STEISLINGER: 

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NUMBER: 06-1B3-0579-02

DESIGN ENGINEERING : M. K. DUONG
 QUALITY ENGINEERING : D. R. STOICA
 NASA RELIABILITY :
 NASA DESIGN :
 NASA QUALITY ASSURANCE :

Handwritten signatures and dates:
 : Stahel James Allen
 : Stahel James Allen
 : Stahel James Allen 11/17/86
 : Stahel James Allen 11/21/86
 : Stahel James Allen