

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.

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B3-0579-01

REVISION: 0 02/17/88 W

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

CRITICALITY OF THIS
FAILURE MODE: 1R2

FAILURE MODE:
EXTERNAL LEAKAGE

MISSION PHASE:
LO LIFT-OFF
OO ON-ORBIT
DO DE-ORBIT

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

CAUSE:
MECHANICAL SHOCK, VIBRATION, HANDLING FLEXURE, CORROSION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? N

REDUNDANCY SCREEN A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF REDUNDANCY - LOSS OF ONE WATER COOLANT LOOP.

(B) INTERFACING SUBSYSTEM(S):
POSSIBLE EARLY MISSION TERMINATION FOR LOSS OF ONE WATER COOLANT LOOP.
FREE WATER IN CABIN.

(C) MISSION:
POSSIBLE EARLY MISSION TERMINATION FOR LOSS OF COOLING IN AFFECTED
WATER COOLANT LOOP.

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

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COOLANT LOOP.

(E) FUNCTIONAL CRITICALITY EFFECTS

- DISPOSITION RATIONALE -

(A) DESIGN:

HOSES HAVE A CONVOLUTED 321L STAINLESS STEEL INNER LINER AND 321 CRES 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 X 10 EXP -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 - SYSTEM DECAY TEST IS PERFORMED USING GN2 AT 85 - 95 PSIG, 0.25 PSI/HR MAX LEAKAGE. PUMP OUT PRESSURE AND ACCUMULATOR QUANTITY ARE CONTINUOUSLY MONITORED WHEN THE VEHICLE IS POWERED UP AND SERVE AS AN INDICATION OF EXTERNAL LEAKAGE.

OMRSD - PUMP ACCUMULATOR QUANTITY AND OUTLET PRESSURE ARE CONTINUOUSLY MONITORED WHILE THE VEHICLE IS POWERED UP DURING EACH TURNAROUND AND SERVE AS AN INDICATION OF EXTERNAL LEAKAGE. 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

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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 CLEANLINES
LEVEL.

(D) FAILURE HISTORY:

THE FOLLOWING FAILURES OCCURRED ON OV101 FLEXLINES; THEY WERE ALL
MANAGED BY CAR A3386-010, 11/12/75, DOWNEY:
A2088-110, A2134-010, A2146-010, A2154-010, A2160-010, A2162-010,
A3454-010, A3846-010. THE FAILURES WERE ATTRIBUTED TO FLEXING DURING
MANUFACTURING AND INSTALLATION HANDLING. THE ANNEALED AREA BEING
ADJACENT TO THE RIGID END FITTING ON ONE SIDE AND THE WORK HARDENED
OPEN PITCH CONVOLUTES ON THE OTHER TENDED TO CONCENTRATE THE FLEXING OF
THE HOSE IN THE ROOT OF THE ANNEALED CONVOLUTE. FLEXING, WHEN
CONCENTRATED IN ONE SMALL AREA, RESULTED IN MATERIAL FATIGUE AND
FAILURE. CORRECTIVE ACTION - FLEXHOSE ASSEMBLY DESIGN AND
MANUFACTURING PROCEDURES WERE REVISED TO MINIMIZE THE HEAT AFFECTED
ZONE AND ADD PROTECTION AGAINST CONCENTRATION OF FLEXING AT THE FIRST
CONVOLUTE.

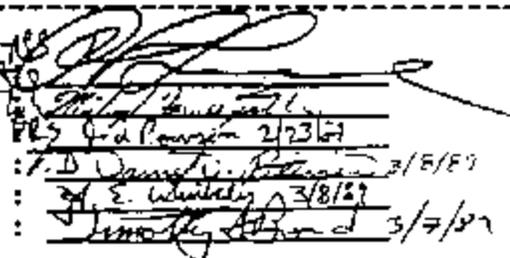
IN ADDITION, PER CAR A8061-010, 11/9/76, PALMDALE, A TRAINING COURSE
COVERING HANDLING OF FLEXIBLE HOSES WAS GIVEN TO THE TECHNICIANS.

(E) OPERATIONAL USE:

TBS.

- APPROVALS -

RELIABILITY ENGINEERING: N. L. STEISSLINGER
DESIGN ENGINEERING : N. K. DUONG
QUALITY ENGINEERING : D. R. STOICA
NASA RELIABILITY :
NASA SUBSYSTEM MANAGER :
NASA QUALITY ASSURANCE :


F. D. [Signature] 3/5/83
E. [Signature] 3/8/83
[Signature] 3/7/83