

| NAME<br>P/N<br>QTY                              | CRIT | FAILURE<br>MODE &<br>CAUSES  | FAILURE EFFECT   | RATIONALE FOR ACCEPTANCE   |
|---|------|--|--|--|
| -----   |      |  |  |  |
|   |      | 102FM15  |  |  |
| WATER LINE & VENT<br>TUBE ASSEMBLY,<br>ITEM 102 | 2/1R | Restricted gas<br>flow, return<br>vent duct.   | END ITEM:<br>Partially<br>blocked vent<br>flow return<br>duct.   | A. Design -<br>Vent system design flow measured across PLSS inlet and outlet ports may not<br>exceed 0.43 inches of water at 8.9 pph of O2 at 4.3 psia.  |
| -----<br>0102-82437-27<br>(RUCOTHANE)<br>(1)    |      | Contamination<br>or foreign<br>material<br>entrained in<br>the return<br>vent tube,<br>missing or<br>loose screws. | GFE INTERFACE:<br>Reduced flow<br>rate.  | This indicates that some blockage could occur without exceeding pressure drop<br>limits. The duct cross-section is approx. 1 x 3/8 inch and is unlikely to be<br>completely blocked by normal debris generated during one flight. Screens located<br>at the end of the arm and leg vent ducts will keep some foreign material from<br>entering the vent system.  |
| -----<br>0102-82437-28<br>(HELASTIC)<br>(1)     |      |  | MISSION:<br>Terminate EVA.<br>Loss of use of<br>one EMU.   | B. Test -<br>Acceptance:<br>Vendor certification and lot acceptance testing is required for all materials<br>prior to manufacture of each item.  |
|   |      |  | CREW/VEHICLE:<br>None for first<br>failure. Loss<br>of crewman if<br>SOP or Item<br>121 vent flow<br>sensor fails. | PDA:<br>HUT vent system pressure drop is measured per ILC Document 0111-70028J (Pivoted<br>HUT) or 0111-710112 (Planar HUT) during PDA.  |
|   |      |  | TIME TO EFFECT<br>/ACTIONS:<br>Seconds.<br>Actuate purge<br>valve, return<br>to airlock.                           | Certification:<br>Helastic:<br>Bench testing to S/AD requirements of 461 hours pressurized time was performed<br>at ILC Dover. Ref. Cert Test Report for the SSA, ILC Document 0111-70027.<br>Pressure drop testing for vent lines monitored during cert testing of bladder<br>flocking and showed no significant flock accumulation over the six year life of<br>the bladders. Ref. ILC EM 85-1034. The vent tube assembly on the cert HUT has<br>been in use for approximately 2400 hours without failure. |
|   |      |  | TIME<br>AVAILABLE:<br>Minutes.   | Rucothane:<br>The Rucothane HUT Vent Duct was certified by similarity to the Helastic HUT Vent<br>Duct. Ref. ILC Cert Test Report 0111-711669.   |
|   |      |  | TIME REQUIRED:<br>Seconds.   | C. Inspection -<br>During PDA, in accordance with ILC Document 0111-70028J (Pivoted HUT) or 0111-<br>710112 (Planar HUT), the following MIP's are performed.<br>1. Verify quality of workmanship and cleanliness.<br>2. Verify no structural damage after proof pressure test.   |
|   |      |  | REDUNDANCY<br>SCREENS:<br>A-PASS<br>B-PASS<br>C-PASS   | D. Failure History -<br>Helastic:<br>B-EMU-102-A020 (6/28/92) - The Water Line Vent Tube Assembly was not firmly<br>attached to the HUT flange due to two out of four improperly torqued screws. The<br>Maintenance Manual installation and torquing procedures for the four screws at<br>the WLVT/HUT interface has been split into two steps, one for the two forward<br>pan head screws and one for the two aft socket head screws.   |
|   |      |  |  | Rucothane:<br>None.  |
|   |      |  |  | E. Ground Turnaround -<br>Tested for non-EET processing per FEMU-R-001, Fan/Pump/Separator/Vent Flow<br>Sensor Performance. None for EET processing. Additionally, every 229 hours of<br>manned pressurized time the Planar HUT is demated from the DCM and PLSS and   |

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|                    |      | 102FM15                     |                | <p>subjected to HUT level gas and structural and leakage tests and gas Delta "P" tests. Additionally, every 56 hours of manned pressurized time the Pivoted HUT is demated from the DCM and PLSS and subjected to HUT level gas and structural and leakage tests and gas Delta "P" tests. Additionally, every 229 hours of manned pressurized time the Planar HUT is demated from the DCM and PLSS and subjected to HUT level gas and water structural and leakage tests and gas delta "P" tests.</p> <p>F. Operational Use -<br/>Crew Response -<br/>Pre EVA; Trouble-shoot problem, if no success, consider EMU 3 if available.<br/>EMU no go for EVA.<br/>EVA: When CWS data detects loss of ventilation flow, open helmet purge valve to anti-fog helmet and clear CO2 if required.<br/>Training -<br/>Crewmembers are trained to recognize the symptoms of high CO2.<br/>Operational Considerations -<br/>Flight rules define go/no go criteria related to EMU ventilation flow. Flight rules require termination of EVA upon activation of SOP unscheduled EVA. EVA checklist and FDF procedures verify hardware integrity and system operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.</p> |

EXTRAVEHICULAR MOBILITY UNIT  
SYSTEMS SAFETY REVIEW PANEL REVIEW  
FOR THE  
I-102 HARD UPPER TORSO (HUT)  
CRITICAL ITEM LIST (CIL)  
EMU CONTRACT NO. NAS 9-97150

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