

CEL  
CRITICAL ITEMS LIST  
FILE: C015/1

| NAME, P/N QTY   | CRIT        | FAILURE MODE & CAUSE  | FAILURE EFFECT  | RATIONALE FOR ACCEPTANCE   |
|---|-------------|---|---|--|
| <p>O2 PRESSURE REGULATOR, 25F STAGE ITEM 2158 SV/770475-13 411</p> <p>FC174-1</p> | <p>Z/RR</p> | <p>SYMPTOM:<br/>EXTERNAL GAS LEAKAGE.</p> <p>CAUSE:<br/>SEAL FAILURE,<br/>METAL DIAPHRAGM LEAKAGE, IPD CAP LEAKAGE.</p> | <p>END ITEM:<br/>LEAKAGE OF EMERGENCY O2 SUPPLY TO AIRCRAFT.</p> <p>GFE INTERFACE:<br/>(LOSS OF SOP O2 SUPPLY.</p> <p>MISSION:<br/>LOSS OF USE OF ONE EFM.<br/>TERMINATE EVA WHEN ONE ISSUES THE LOW PRESSURE WARNING.</p> <p>CREW/VEHICLE:<br/>NONE FOR SINGLE FAILURE.<br/>POSSIBLE LOSS OF CREW/VEHICLE WITH LOSS OF THE PLSS.</p> | <p>A. DESIGN -<br/>LEAKAGE PATHS ARE THROUGH THE DIAPHRAGM, THE DIAPHRAGM SILICONE O-RING, THE FILL PORT VALVE AND ITS SILICONE O-SEAL, THE TEST PORT VALVE AND ITS SILICONE O-SEAL. ALL OF THESE O-RINGS ARE BACKED UP BY KEL-F DELTA RINGS TO PREVENT EXTRUSION AND THE SEAL SURFACES HAVE A 32 MICROMETER FINISH. THE FILL AND TEST PORTS CAPS HAVE METAL TO METAL SEALS (MADE OF LOW REACTIVE MATERIALS (TETORU-20 AND NOMEI K500) AND THEY HAVE A REDUNDANT BALL SEAT INSTREAM. THE DIAPHRAGM IS IDENTICAL TO THAT USED IN THE NASA DEVELOPMENTAL HIGH PRESSURE REGULATOR PROGRAM WHICH WAS DESIGNED FOR 6750 PSI USE.</p> <p>B. TEST -<br/>VENOM COMPONENT ACCEPTANCE TEST -<br/>THE REGULATOR MANUFACTURER, CTT, PERFORMS AN EXTERNAL LEAKAGE TEST TO ASSURE SEAL, DIAPHRAGM, ITEM 25F CAP AND IPD CAP INTEGRITY.</p> <p>QMA TESTS -<br/>THE ITEM IS EXTERNAL LEAKAGE TESTED ON THE SECONDARY OXYGEN PACKAGE. THE SOP BOTTLES ARE PRESSURIZED TO 5000-6000 PSIG WITH A 22 CHE AND 902 CHE MIXTURE. THE FILL VALVE, ITEM 25F AND THE TEST PORT VALVE, IPD, ARE CAPPED WITH THE APPROPRIATE FLIGHT CAP AND TORQUED TO 30-40 IN-LBS. THE ITEM IS TESTED IN CHAMBER VACUUM AND LEAKAGE MUST NOT EXCEED 5.0 K RD-5 SEC/SEC CHE. THIS VALUE REPRESENTS TOTAL SOP LEAKAGE.</p> <p>CERTIFICATION TEST -<br/>THE ITEM COMPLETED THE FOLLOWING CYCLE TEST DURING 5/85) ON/OFF ACTUAL 1025, SPEC 1011; NO FLOW HOURS ACTUAL 984, SPEC 10; HIGH/LOW ACTUAL 112, SPEC 15, 100 CLASS 1 ENGINEERING CHANGES HAVE BEEN INCORPORATED SINCE THIS CONFIGURATION WAS CERTIFIED.</p> |

| NAME<br>P/M<br>QTY  | CRIT | FAILURE<br>MODE &<br>CAUSE             | FAILURE EFFECT | RATIONALE FOR ACCEPTANCE   |
|---|------|--|----------------|--|
| 02<br>PRESSURE<br>REGULATOR,<br>1ST STAGE<br>ITEM 2130<br>SV/770475-<br>11<br>11) | 2/10 | 2130P004B;<br>EXTERNAL GAS<br>LEAKAGE. |                | <p><b>C. INSPECTION -</b><br/>         O2 D-RING SEALING SURFACES ARE 100% INSPECTED FOR DIMENSIONS AND SURFACE FINISH REQUIREMENTS. D-RING SURFACES ARE 100% INSPECTED FOR SURFACE CHARACTERISTICS PER SVMS 143E CLASS II.<br/>         THE BACKUP RING AND DELTA RING ARE 100% INSPECTED FOR DIMENSIONS AND SURFACE CHARACTERISTICS PER SVMS 052E. THE OXYGEN MANIFOLD FITTING IS TRIAL ASSEMBLED, REMOVED, AND INSPECTED (HSP) FOR EVIDENCE OF DAMAGE OR PARTICLES CAUSED BY THE ASSEMBLY PROCESS. THE D-RING IS LUBRICATED WITH BRAYCORP (SVP 211) PRIOR TO FINAL ASSEMBLY.</p> <p><b>D. FAILURE HISTORY -</b><br/>         H-EMU-200-A-001 (11-4-79) EXTERNAL LEAKAGE DUE TO SCRATCHES ON THE O-SEAL AREA OF THE SOP OUTLET TUBE WHICH OCCURRED DURING A PRESS FIT CHECK BECAUSE THE O-SEAL WAS OVERTIGHT. INTERNAL LEAKAGE ALSO DUE TO POROSITY IN THE HIGH PRESSURE OXYGEN MANIFOLD FITTING MATERIAL. FITTINGS WERE SCRAPPED AND REPLACED.<br/>         H-EMU-213A002 (8-20-80) EXTERNAL LEAKAGE FROM MANIFOLD/REGULATOR CONNECTION DUE TO:<br/>         OVERTIGHT OME SEAL FROM THE DUAL SEAL CONNECTOR; AND A LARGE GAP BETWEEN SEALING SURFACES. REDESIGNED MANIFOLD NOW INCORPORATES A SINKER SEAL WITH A SMALL GAP BETWEEN SEALING SURFACES. THESE CHANGES WERE MADE PRIOR TO CERTIFICATION.</p> <p><b>E. GROUND TUNING/TESTS -</b><br/>         TESTED PER FEMU-B-000, EXTERNAL LEAKAGE, SOP SERVICING FOR FLIGHT.</p> <p><b>F. OPERATIONAL USE -</b><br/>         CREW RESPONSE -<br/>         EVA: SINCE EVA TERMINATION IS REQUIRED AS SOON AS SOP IS FLOWING, CREW WOULD ABORT EVA WHEN EXCESSIVE SOP RATE IS DETECTED.<br/>         SPECIAL TRAINING - STANDARD EMU TRAINING COVERS THIS FAILURE MODE.<br/>         OPERATIONAL CONSIDERATIONS - EVA CHECKLIST PROCEDURES VERIFY HARDWARE INTEGRITY AND SYSTEMS OPERATIONAL STATUS PRIOR TO EVA. FLIGHT RULES DEFINE GO/NO GO CRITERIA RELATED TO EMU PRESSURE INTEGRITY AND REGULATION. FLIGHT RULES DEFINE EMU AS LOST FOR LOSS OF OPERATIONAL SOP. REAL TIME DATA SYSTEM ALLOWS GROUND MONITORING OF EMU SYSTEMS.</p> |

FC174-2  
 H