SUBJECT: **NAUTILUS HIGH POWER CONNECTOR COMPOSITE TESTING**

TABLE OF CONTENTS

1.0 **PURPOSE:**

THE PURPOSE OF THIS PROCEDURE IS TO QUALIFY THE HIGH POWER NAUTILUS CONNECTORS (P/N 1049501 AND P/N 1049573) THROUGH A RIGOROUS TESTING SEQUENCE INVOLVING MULTIPLE MODES OF STRESS. THESE CONNECTORS WILL BE SUBJECTED TO 10,000 PSI HYDROSTATIC PRESSURE AT HIGH AND LOW TEMPERATURES WITH 15,000 VDC APPLIED.

2.0 **MATERIALS NEEDED:**

- **D/N 155964** (HPR-219-01) RECEPTACLE GENERAL ASSEMBLY DRAWING
- **D/N 1049501** (HPR-205-01) PLUG GENERAL ASSEMBLY DRAWING
- **D/N 10637** (SOP-021-39) STANDARD PRACTICE FOR CONNECTOR TERMINATING
- **D/N 11143** (A7B) ELECTRICAL LEAKAGE AND CONTINUITY TEST PROCEDURE
- **D/N 165233** (ATP-117-40) PARTIAL DISCHARGE TEST PROCEDURE FOR HIGH POWER COMPONENTS AND ASSEMBLIES
- **D/N 71501** (ATP-060-40) LEAKAGE CURRENT TESTING PROCEDURE
- **D/N 75879** (SOP-085-39) DIGITAL IMAGING PROCEDURE
- **D/N 50166** HIGH VOLTAGE TESTING SAFETY
- **D/N 110829** LOCKOUT/TAG OUT AND KEY CONTROL PROCEDURE FOR HIGH VOLTAGE TESTING SAFETY
- **D/N 110833** APG LAB HIGH-VOLTAGE SAFETY RULES
- **P/N 1049501** HIGH POWER PLUG CONNECTOR (1)
- **P/N 1050251** HIGH POWER PLUG BOOT SEALS (2)
- **P/N 1020254** HIGH POWER PLUG SPLICE BOOT SEAL (1)
- **P/N 1049573** HIGH POWER RECEPTACLE CONNECTOR (1)
- **P/N 1050260** HIGH POWER RECEPTACLE CONNECTOR BOOT SEALS (2)
- **P/N 1050261** HIGH POWER RECEPTACLE CONNECTOR SPLICE BOOT SEAL (1)
- **P/N 1044250** HIGH POWER PENETRATOR (2)
- **P/N 1033242** HIGH POWER PENETRATOR BOOT SEALS (8)
- **P/N 1034781** AND/OR **P/N 1034774** REYNOLDS HIGH VOLTAGE WIRE
- DATA ACQUISITION SYSTEM TO MONITOR PRESSURES AND TEMPERATURES
- DC-4 DOW CORNING DIELECTRIC LUBRICANT
- DIGITAL CAMERA
- ELECTRICAL TESTING FACILITIES AND ASSOCIATED EQUIPMENT (BOTH AC AND DC POWER)
- PARTIAL DISCHARGE TESTING EQUIPMENT
- DC HIPOT CAPABLE OF APPLYING 40,000 VDC
- ISOPROPYL ALCOHOL
- MEGGER CAPABLE OF SUPPLYING 10,000 VDC
- MICROSCOPE WITH CAMERA
- MULTIMETER FOR CONTACT RESISTANCE / CONTINUITY MEASUREMENTS
- NANOAMP CAPABLE OF APPLYING 20,000 VDC
- PRESSURE TESTING FACILITIES CAPABLE OF WITHSTANDING 10 KPSI @80°C AND 5°C FOR LONG DURATIONS

CAUTION: THIS QUALIFICATION TESTING REQUIRES THE USE OF HIGH POWER ELECTRICAL EQUIPMENT. USE CAUTION TO PREVENT PERSONAL INJURY OR DEATH. ADVISE SUPERVISOR OR SAFETY COMMITTEE MEMBER OF ANY CONCERNS BEFORE STARTING TESTS. MAINTAIN SAFETY PRACTICES PER D/N 50166, D/N 110829, AND D/N 110833.

CAUTION: THIS QUALIFICATION TESTING REQUIRES THE USE OF HIGH PRESSURE. USE CAUTION TO PREVENT PERSONAL INJURY OR DEATH. ADVISE SUPERVISOR OR SAFETY COMMITTEE MEMBER OF ANY CONCERNS BEFORE STARTING TESTS.

NOTE: DIGITAL PHOTOGRAPHS SHOULD BE TAKEN THROUGHOUT THE QUALIFICATION TESTING TO ASSIST IN DOCUMENTING THE SET-UP, ACTIONS AND RESULTS. THE MINIMUM REQUIRED PHOTOS ARE IDENTIFIED IN THE PROCEDURE.

NOTE: ALL ELECTRONIC DATA INCLUDING PHOTOGRAPHS, COMPUTER GATHERED DATA, ETC. SHOULD BE COPIED TO AN ELECTRONIC STORAGE DEVICE (DISK), LABELED AND INSERTED INTO THE APPROPRIATE SECTION SLEEVE WHEN THAT PARTICULAR SECTION IS COMPLETED.

3.0 REFERENCE MATERIAL:

- **D/N 135594** (ENG-727-40) HIGH POWER NAUTILUS CONNECTOR EPOXY PIN FAILURE INVESTIGATION SUMMARY REPORT

4.0 **DOCUMENTATION:**

NOTE: IF FAILING READINGS ARE TAKEN OR ANY DAMAGE IS NOTED AT ANY TIME DURING TESTING, INITIATE A DISCREPANCY REPORT (DR), CONTACT ENGINEERING WITH THE DR NUMBER AND ATTACH A COPY OF THE DISPOSITIONED DR TO THE SHOP PACK FOR RETENTION.

4.1 REVIEW THE QUALITY PLAN (IF PRESENT) TO DETERMINE ENGINEERING WITNESS AND HOLD POINTS. IF ENGINEERING WITNESS OR HOLD IS REQUIRED, ADVISE THE PROJECT ENGINEER OF THE ESTIMATED STARTING DATE VIA E-MAIL. ATTACH A COPY OF THE E-MAIL TO THIS DOCUMENT. ATTACH TEMPORARY MARKERS TO THIS PROCEDURE FOR ANY STEPS THAT HAVE BEEN IDENTIFIED AS HOLD POINTS. THESE STEPS ARE NOT TO BE PERFORMED WITHOUT ENGINEERING APPROVAL. OBTAIN A COPY OF THE QUALITY PLAN (IF PRESENT) AND ATTACH TO THIS TEST PROCEDURE.

OPERATOR INITIALS:_____ DATE:_____

4.2 RECORD ALL OF THE INFORMATION REQUESTED BELOW FOR ALL OF THE EQUIPMENT, COMPONENTS AND DOCUMENTS USED IN THIS QUALIFICATION. INCLUDE ALL ASSEMBLY AND COMPONENT LEVEL DRAWINGS AND ATTACH ALL INSPECTION DOCUMENTS.

JOB NUMBER (IF APPLICABLE):_____

QUALITY PLAN DOCUMENT NUMBER (IF PRESENT):_____

PROJECT ENGINEER:_____

DOCUMENTS

DOCUMENT NO.	REFERENCE NO.	DESCRIPTION	REVISION

TECHNICIANS (PRINT):_____;_____

OPERATOR INITIALS:_____ DATE:_____

4.3 ATTACH ALL DOCUMENTS TO THIS TEST PROCEDURE, INCLUDING RELEVANT INFORMATION FROM THE LOWER LEVEL ASSEMBLIES FOR COMPLETENESS. ALSO, OBTAIN AND ATTACH A PRINTED COPY OF THE ASSEMBLY PARTS LIST AND RECORD THE REVISION OF EACH PART USED.

OPERATOR INITIALS:_____ DATE:_____

4.4 QUALITY ENGINEERING TO ENSURE THIS SECTION IS COMPLETE, INCLUDING ALL TEST RESULTS, PHOTOGRAPHS AND REFERENCE INFORMATION. ENSURE ALL ARE LABELED AND ATTACHED. ALL ELECTRONIC DATA SHALL BE COPIED AND THE STORAGE DEVICE (DISK) SHALL BE APPROPRIATELY PLACED WITHIN THIS SECTION OF THE PROCEDURE.

OPERATOR INITIALS:_____ DATE:_____

QUALITY ENGINEER:_____ DATE:_____

5.0 **TEST PREPARATION:**

NOTE: FAILURE TO COMPLETELY FILL OUT ALL PAPERWORK PERTAINING TO THE BUILD AND QUALIFICATION OF THIS UNIT WILL VOID THIS QUALIFICATION TEST.

NOTE: IF FAILING READINGS ARE TAKEN OR ANY DAMAGE IS NOTED AT ANY TIME DURING TESTING, CONTACT ENGINEERING, INITIATE A DISCREPANCY REPORT, RECORD THE DR NUMBER AND ATTACH A COPY OF THE DISPOSITIONED DR TO THIS DOCUMENT FOR RETENTION. PHOTOGRAPH ANY SIGNS OF DAMAGE.

5.1 RECORD THE NAME OF ALL OPERATORS AND OBSERVERS INVOLVED WITH THIS TEST.

OPERATOR/OBSERVER NAME(S):_____;_____

DATE:_____

5.2 RECORD THE TYPE, ODI ID NUMBER, LAST CALIBRATION DATE AND NEXT CALIBRATION DATE INFORMATION FOR ANY TEST EQUIPMENT USED.

TABLE 1 –CALIBRATION INFORMATION

EQUIPMENT TYPE	ODI ID NUMBER	LAST CALIBRATION DATE	NEXT CALIBRATION DATE

OPERATOR INITIALS:_____ DATE:_____

5.3 PHOTOGRAPH TEST SET-UP AND RELATED PORTIONS OF THE TEST DURING PROCEDURES PER **D/N 75879** (SOP-085-39), **OR EQUIVALENT DOCUMENTATION METHOD**. LABEL AND ATTACH THE PHOTOGRAPHS TO THIS DOCUMENT.

OPERATOR INITIALS:_____ DATE:_____

5.4 ENSURE THAT ALL REQUIRED INFORMATION HAS BEEN RECORDED REGARDING THE TEST EQUIPMENT AND TEST ARTICLES.

OPERATOR INITIALS:_____ DATE:_____

5.5 OBTAIN THE CONNECTOR PAIR TO BE TESTED. RECORD THE TRACEABILITY OF THE OBTAINED PLUG AND RECEPTACLE CONNECTORS IN THE PROVIDED SPACE BELOW.

CONNECTOR PART NUMBER	MR NUMBER

OPERATOR INITIALS:_____ DATE:_____

5.6 INSPECT THE CONNECTORS FOR SIGNS OF DAMAGE PRIOR TO BEGINNING TESTING. PHOTOGRAPH ANY DEFECTS/ABNORMALITIES. MARK ALL PHOTOS WITH THE DATE, TIME, QUALIFICATION D/N, STEP NUMBER AND TECHNICIAN NAME. LOG PHOTOS PER **D/N 75879** (SOP-085-39), **OR EQUIVALENT DOCUMENTATION METHOD**. ATTACH ALL PHOTOS TO THIS DOCUMENT. ENSURE THE MAGNIFICATION USED FOR EACH PHOTOGRAPH IS RECORDED IN THE TITLE (IF APPLICABLE). ENSURE THIS SECTION IS COMPLETED PRIOR TO PROCEEDING TO THE NEXT SECTION.

NOTE: THROUGHOUT THE TESTING, ENSURE THAT ALL PHOTOS ARE GIVEN AN APPROPRIATE DESCRIPTIVE LABEL AND ARE ATTACHED (ELECTRONIC AND COLOR HARD COPIES) TO THE SECTION OF THIS TEST PROCEDURE TO WHICH THAT PHOTO RELATES. A PHOTOGRAPHIC RECORD OF ALL TEST SET-UPS IS REQUIRED.

COMMENTS:_____

OPERATOR INITIALS:_____ DATE:_____

5.7 MATE AND DEMATE THE CONNECTORS 5 TIMES AND OBSERVE FOR ANY UNUSUAL RESISTANCE OR BINDING. RECORD ANY OBSERVATIONS IN THE PROVIDED SPACE BELOW.

COMMENTS:_____

_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

5.8 PERFORM A CONTINUITY TEST ON EACH CIRCUIT OF THE MATED CONNECTOR PAIR. PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE CONTINUITY RESULTS IN TABLE 2. RECORD THE INSULATION RESISTANCE TEST RESULTS IN TABLE 3.

TABLE 2 - BASELINE CONTACT RESISTANCE RESULTS

PASS ≤ 0.0025 Ω

CIRCUIT	RESULT (Ω)	CIRCLE ONE
1		PASS/FAIL
2		PASS/FAIL
3		PASS/FAIL

TABLE 3 - BASELINE INSULATION RESISTANCE TESTING

PASS ≥ 100 GΩ

	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

5.9 PERFORM A PARTIAL DISCHARGE TEST ON THE MATED CONNECTORS PER **D/N 165233** (ATP-117-40), WITH A TEST VOLTAGE OF 7,200 VAC. RECORD THE PLUG RESULTS IN TABLE 4 AND THE RECEPTACLE RESULTS IN TABLE 5.

TABLE 4 – PLUG PIN TO GROUND PD TESTING RESULTS

PASS IS ≤10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

TABLE 5 – RECEPTACLE PIN TO GROUND PD TESTING RESULTS

PASS IS ≤10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

OPERATOR INITIALS:_____ DATE:_____

5.10 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN TABLE 6.

TABLE 6 - BASELINE MATED CONNECTOR LEVEL LEAKAGE CURRENT RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)	COMMENTS
1		
2		
3		

OPERATOR INITIALS:_____ DATE:_____

5.11 PERFORM A HIGH VOLTAGE WITHSTAND TEST ON THE MATED CONNECTORS WITH A TEST VOLTAGE OF 40,000 +500/-0 VDC. ATTACH THE POSITIVE TEST LEAD OF THE HIPOT TO THE CIRCUIT TO BE TESTED AND ATTACH THE GROUND/NEGATIVE TEST LEAD TO THE CONNECTOR SHELL ALONG WITH THE OTHER TWO CIRCUITS (FOR INSTANCE, IF CIRCUIT ONE IS BEING TESTED, GROUND THE SHELL, CIRCUIT TWO AND CIRCUIT THREE). AFTER THE CONNECTOR HAS BEEN SUBJECTED TO THE TEST VOLTAGE FOR TWO MINUTES, RECORD THE HIPOT LEAKAGE CURRENT VALUE IN TABLE 7.

TABLE 7 - BASELINE CONNECTOR LEVEL VOLTAGE WITHSTAND RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @40,000 VDC	LEAKAGE CURRENT AFTER 4 HOURS @40,000 VDC	COMMENTS
1			
2			
3			

OPERATOR INITIALS:_____ DATE:_____

5.12 HOLD THE TEST VOLTAGE FOR 4 HOURS MINIMUM. OBSERVE CURRENT LEAKAGE PERIODICALLY TO ENSURE THAT IT REMAINS CONSTANT OVER THE 4 HOUR TEST PERIOD. AT THE END OF THE 4 HOUR HOLD, RECORD THE LEAKAGE CURRENT FOR THAT CIRCUIT IN TABLE 7. REPEAT THIS PROCESS FOR ALL CIRCUITS.

OPERATOR INITIALS:_____ DATE:_____

5.13 IF NOT ALREADY DONE, THREAD THE SOLDER POTS (P/N 1050130) ONTO EACH PLUG AND RECEPTACLE PIN ON THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

5.14 OBTAIN ENOUGH WIRE (PART NUMBER 1034781 OR 1034774) TO BE ABLE TO MANAGE THE CONNECTORS AND PENETRATORS EFFECTIVELY WITHIN THE PRESSURE VESSEL (REFER TO FIGURE 4 FOR TEST SET-UP). RECORD THE TRACEABILITY OF THE OBTAINED WIRE IN THE PROVIDED SPACE BELOW. CLEAN APPROXIMATELY 1 FOOT OF EACH END OF EACH WIRE WITH ALCOHOL.

WIRE PART NUMBER	MR NUMBER
_____	_____
_____	_____
_____	_____

OPERATOR INITIALS:_____ DATE:_____

5.15 OBTAIN TWO BOOT SEALS P/N 1050251 AND ONE BOOT SEAL P/N 1050254 FOR THE PLUG SOLDER POTS. OBTAIN TWO BOOT SEALS P/N 1050260 AND ONE BOOT SEAL P/N 1050261 FOR THE RECEPTACLE SOLDER POTS. RECORD THE TRACEABILITY OF THE OBTAINED BOOT SEALS IN THE PROVIDED SPACE BELOW. CLEAN AND LUBRICATE THE BOOT SEALS.

BOOT SEAL PART NUMBER	MR NUMBER
_____	_____
_____	_____
_____	_____
_____	_____

OPERATOR INITIALS:_____ DATE:_____

5.16 SLIDE THE BOOT SEALS (P/N 1050251 FOR PLUG, P/N 1050260 FOR RECEPTACLE) ONTO THE WIRE LENGTHS. THESE WILL BE USED FOR CIRCUIT 1 AND CIRCUIT 3. PROVIDE ENOUGH ROOM FOR SOLDERING OPERATIONS.

OPERATOR INITIALS:_____ DATE:_____

5.17 SLIDE THE SPLICE BOOT SEAL (P/N 1050254 FOR PLUG, P/N 1050261 FOR RECEPTACLE) ONTO THE CIRCUIT 2 WIRE. SLIDE ANOTHER WIRE (15 INCHES OR LONGER) INTO THE OTHER SPLICE NIPPLE ON THE SPLICE BOOT. THIS WILL BE THE LOOPED WIRE SEEN IN FIGURE 1. PROVIDE ENOUGH ROOM FOR SOLDERING OPERATIONS.

OPERATOR INITIALS:_____ DATE:_____

5.18 WITH THE CONNECTORS UNMATED, SOLDER THE WIRE LEADS TO P/N 1050130 PER THE GENERAL REQUIREMENTS OF **D/N 10637** (SOP-021-39), REFERRING TO FIGURE 1 FOR CIRCUIT CONFIGURATION.

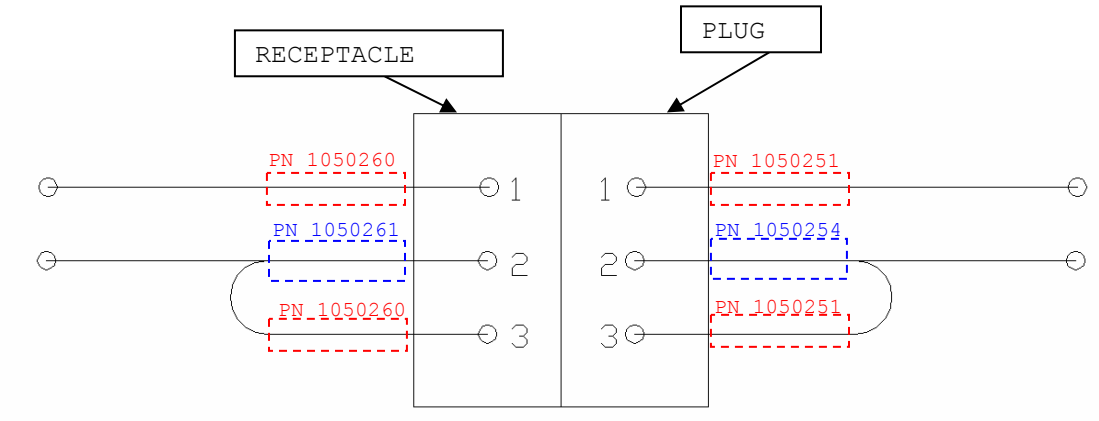


FIGURE 1: SOLDERED WIRE CONFIGURATION FOR CONNECTORS WITH BOOT SEAL PART NUMBERS

OPERATOR INITIALS:_____ DATE:_____

5.19 SLIDE THE BOOT SEALS ONTO THE RESPECTIVE SOLDER POTS, ENSURING THAT THEY ARE FULLY SEATED.

OPERATOR INITIALS:_____ DATE:_____

5.20 MATE THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

5.21 PERFORM A CONTINUITY TEST TO VERIFY THAT THE CIRCUITS ARE INTACT. RECORD THE VALUES BELOW. THESE VALUES ARE NOT PASS OR FAIL, BUT ARE USED PURELY AS AN INDICATOR OF CONTINUITY.

CIRCUIT 1:_____Ω

CIRCUIT 2 AND 3:_____Ω

OPERATOR INITIALS:_____ DATE:_____

NOTE: IF FAILING READINGS ARE TAKEN OR ANY DAMAGE IS NOTED AT ANY TIME DURING TESTING, CONTACT ENGINEERING, INITIATE A DISCREPANCY REPORT, RECORD THE DR NUMBER AND ATTACH A COPY OF THE DISPOSITIONED DR TO THIS DOCUMENT FOR RETENTION. PHOTOGRAPH ANY SIGNS OF DAMAGE.

5.22 OBTAIN A CLEAN WATER BATH. ENSURING THAT THE FREE END OF THE TEST LEADS DO NOT GET WET, SUBMERGE THE CONNECTOR PAIR IN THE BATH.

OPERATOR INITIALS:_____ DATE:_____

5.23 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

5.24 RECORD ANY COMMENTS CONCERNING ANY OF THE STEPS PERFORMED IN SECTION 5.

COMMENTS:_____

_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

6.0 **PRESSURE VESSEL ASSEMBLY:**

6.1 RECORD THE MATERIALS REQUISITION (MR) NUMBER(S) (IF APPLICABLE) ASSOCIATED WITH THE PROCUREMENT OF ANY PARTS REQUIRED FOR THIS TESTING.

MR NUMBER(S):_____

OPERATOR INITIALS:_____ DATE:_____

6.2 IF NOT ALREADY DONE, OBTAIN ALL MATERIALS (I.E., PROCEDURES, DRAWINGS, PARTS, EQUIPMENT, TOOLS ETC.) REQUIRED TO COMPLETE THE FOLLOWING TESTING.

OPERATOR INITIALS:_____ DATE:_____

6.3 OBTAIN THE CONNECTOR PAIR THAT WAS CONFIGURED IN SECTION 5.

OPERATOR INITIALS:_____ DATE:_____

6.4 CLEAN APPROXIMATELY 1 FOOT OF THE FREE ENDS OF THE SOLDERED WIRES (ON BOTH THE PLUG AND RECEPTACLE CONNECTORS) WITH ALCOHOL.

OPERATOR INITIALS:_____ DATE:_____

6.5 OBTAIN 8 EACH OF PENETRATOR BOOT SEAL P/N 1033242. RECORD THE TRACEABILITY OF THE OBTAINED BOOT SEALS IN THE PROVIDED SPACE BELOW. ENSURE ALL OF THE BOOT SEALS ARE CLEAN.

BOOT SEAL PART NUMBER	CONTROL NUMBER	MR NUMBER

OPERATOR INITIALS:_____ DATE:_____

6.6 LUBRICATE FOUR OF THE PENETRATOR BOOT SEALS. SLIDE EACH OF THE FOUR BOOT SEALS ONTO THEIR OWN FREE END OF WIRE (P/N 1034781 OR P/N 1034774). ENSURE THAT THE BOOT SEALS ARE SLID BACK FAR ENOUGH AS NOT TO INTERFERE WITH SOLDERING OPERATIONS.

OPERATOR INITIALS:_____ DATE:_____

6.7 SOLDER THE WIRE LEADS TO THE PENETRATOR PINS PER THE GENERAL REQUIREMENTS OF **D/N 10637** (SOP-021-39), REFERRING TO FIGURE 2 FOR CIRCUIT CONFIGURATION. RECORD THE TRACEABILITY OF THE OBTAINED PENETRATORS IN THE PROVIDED SPACE BELOW.

PENETRATOR PART NUMBER MR NUMBER

_____ _____

_____ _____

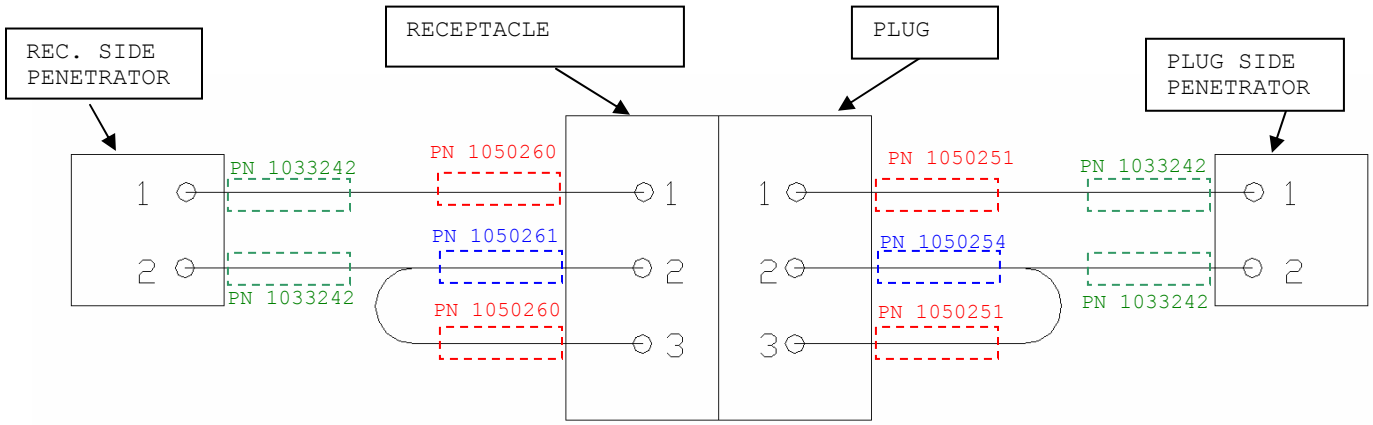


FIGURE 2: CONNECTORS SOLDERED TO PENETRATORS WITH BOOT SEAL PART NUMBERS

OPERATOR INITIALS:_____ DATE:_____

6.8 CUT FOUR LENGTHS OF WIRE (P/N 1034781 OR P/N 1034774) WITH A MINIMUM LENGTH THAT SATISFIES THE LENGTH NEEDED BETWEEN THE PRESSURE VESSEL AND THE REQUIRED TEST EQUIPMENT.

OPERATOR INITIALS:_____ DATE:_____

6.9 CLEAN THE END OF THE WIRE LENGTHS (APPROXIMATELY 1 FOOT CLEANED LENGTH) THAT WILL BE SOLDERED TO THE LOW PRESSURE SIDE OF THE PENETRATORS WITH ALCOHOL.

OPERATOR INITIALS:_____ DATE:_____

6.10 ENSURE THAT THE REMAINING FOUR P/N 1033242 PENETRATOR BOOT SEALS ARE CLEAN. LUBRICATE THE BOOT SEALS AND SLIDE THEM ONTO THE CLEAN ENDS OF THE WIRE (ONE BOOT SEAL PER WIRE). ENSURE THAT THE BOOT SEALS ARE SLID BACK FAR ENOUGH THAT THEY DO NOT INTERFERE WITH SOLDERING OPERATIONS.

OPERATOR INITIALS:_____ DATE:_____

6.11 SOLDER THE WIRES ONTO THE LOW PRESSURE SIDE PINS OF THE PENETRATORS AS DEPICTED IN FIGURE 3. ENSURE THE SOLDERED JOINTS ARE CLEAN AND SLIDE THE BOOT SEALS ONTO THE SOLDER POTS.

OPERATOR INITIALS:_____ DATE:_____

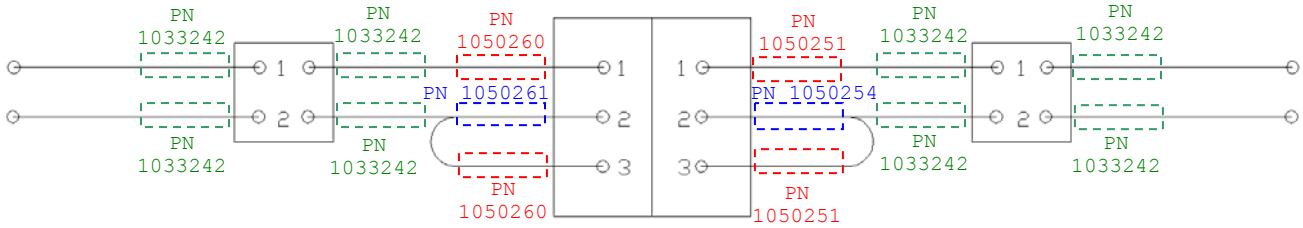


FIGURE 3: OVERALL SOLDERING REQUIRED FOR TESTING

OPERATOR INITIALS:_____ DATE:_____

6.12 PERFORM THE CALCULATIONS REQUIRED IN APPENDIX A TO DETERMINE THE SYSTEM CIRCUIT RESISTANCE FOR CIRCUIT ONE AND CIRCUIT TWO. WRITE THESE CALCULATED VALUES IN THE PROVIDED SPOTS BELOW FOR REFERENCE THROUGHOUT THE PROCEDURE. PROVIDE A COMPLETED COPY OF APPENDIX A TO THE ENGINEER FOR REVIEW. THE PROJECT ENGINEER MUST SIGN THIS STEP BEFORE MOVING FORWARD IN THIS PROCEDURE.

$R_{TOTAL\ CKT\ 1}$ = _____Ω

$R_{TOTAL\ CKT\ 2}$ = _____Ω

OPERATOR INITIALS:_____ DATE:_____

ENGINEER: _____ DATE: _____

6.13 PERFORM A CONTINUITY TEST ON EACH CIRCUIT TO VERIFY THAT THE ENTIRE SOLDERING OPERATION WAS SATISFACTORY.

CIRCUIT 1: _____Ω
PASS ≤ $R_{TOTAL\ CKT\ 1}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2(CONNECTOR CIRCUIT TWO AND THREE): _____Ω
PASS ≤ $R_{TOTAL\ CKT\ 2}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

6.14 CREATE A CLEAN WATER BATH CAPABLE OF HOLDING THE ENTIRE VOLUME OF THE ASSEMBLY SEEN IN FIGURE 3.

OPERATOR INITIALS:_____ DATE:_____

6.15 ENSURE THAT ALL OF THE BOOT SEALS ARE PROPERLY INSTALLED IN THEIR APPROPRIATE LOCATIONS.

OPERATOR INITIALS:_____ DATE:_____

6.16 ENSURING THAT THE FREE ENDS OF THE WIRES (ON THE LOW PRESSURE SIDE OF THE PENETRATORS) DO NOT GET WET, SUBMERGE THE ENTIRE ASSEMBLY INTO THE WATER BATH.

OPERATOR INITIALS:_____ DATE:_____

6.17 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE WATER BATH.

OPERATOR INITIALS:_____ DATE:_____

6.18 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

NOTE: FROM THIS POINT FORWARD, UNLESS OTHERWISE SPECIFIED, THE CIRCUITS CALLED OUT WILL BE THE PENETRATOR CIRCUITS. PENETRATOR CIRCUIT TWO IS EQUIVALENT TO CONNECTOR CIRCUIT TWO AND THREE (WHICH ARE CONNECTED IN PARALLEL).

6.19 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

6.20 REFER TO FIGURE 4 FOR GUIDANCE IN ASSEMBLING THE PRESSURE VESSEL ASSEMBLY.

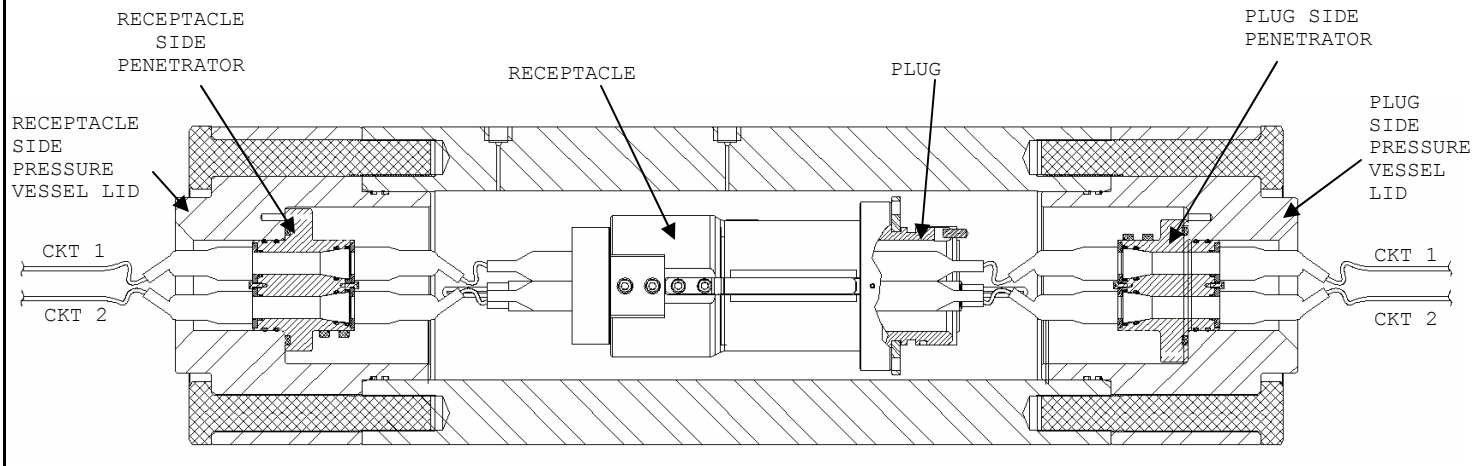


FIGURE 4: PRESSURE VESSEL TEST CONFIGURATION

6.21 OBTAIN THE PLUG SIDE PRESSURE VESSEL LID O-RING(S). ENSURE THAT THE PLUG SIDE PRESSURE VESSEL LID O-RING GROOVES ARE CLEAN. CLEAN AND LUBRICATE THE O-RINGS AND INSTALL THEM ONTO THE PLUG SIDE PRESSURE VESSEL LID.

OPERATOR INITIALS:_____ DATE:_____

6.22 ENSURE THAT THE PLUG SIDE PENETRATOR O-RING GROOVES ARE CLEAN. CLEAN AND LUBRICATE THE PLUG SIDE PENETRATOR SHELL O-RING(S). INSTALL THE PLUG SIDE PENETRATOR O-RING(S).

OPERATOR INITIALS:_____ DATE:_____

6.23 ENSURE THAT THE PLUG SIDE PRESSURE VESSEL LID BORE IS CLEAN AND INSTALL THE PLUG SIDE PENETRATOR INTO THE PRESSURE VESSEL LID, FEEDING THE TEST LEADS/WIRES THROUGH THE LID.

OPERATOR INITIALS:_____ DATE:_____

6.24 CAREFULLY FEED THE RECEPTACLE SIDE PENETRATOR THROUGH THE PRESSURE VESSEL AND OUT OF THE OTHER SIDE OF THE VESSEL. CAREFULLY FEED THE MATED CONNECTOR PAIR INTO THE PRESSURE VESSEL, CENTERING THE MATED CONNECTORS IN THE VESSEL AS BEST AS POSSIBLE.

OPERATOR INITIALS:_____ DATE:_____

6.25 MANAGE ALL OF THE WIRES SO THAT THE INSTALLATION OF THE PRESSURE VESSEL LID DOES NOT DAMAGE THE WIRES.

OPERATOR INITIALS:_____ DATE:_____

6.26 INSTALL THE PLUG SIDE PRESSURE VESSEL LID WITH THE MOUNTED PENETRATOR ONTO THE PRESSURE VESSEL BODY, SEALING THE PRESSURE VESSEL PER STANDARD LAB PRACTICES WHILE ENSURING THAT THE O-RINGS ARE INSTALLED AND FASTENERS ARE TORQUED.

OPERATOR INITIALS:_____ DATE:_____

6.27 OBTAIN THE RECEPTACLE SIDE PRESSURE VESSEL LID O-RING(S). ENSURE THAT THE RECEPTACLE SIDE PRESSURE VESSEL LID O-RING GROOVES ARE CLEAN. CLEAN AND LUBRICATE THE O-RINGS AND INSTALL THEM ONTO THE RECEPTACLE SIDE PRESSURE VESSEL LID.

OPERATOR INITIALS:_____ DATE:_____

6.28 ENSURE THAT THE RECEPTACLE SIDE PENETRATOR SHELL O-RING GROOVES ARE CLEAN. CLEAN AND LUBRICATE THE RECEPTACLE SIDE PENETRATOR SHELL O-RING(S). INSTALL THE RECEPTACLE SIDE PENETRATOR O-RING(S).

OPERATOR INITIALS:_____ DATE:_____

6.29 ENSURE THAT THE RECEPTACLE SIDE PRESSURE VESSEL LID BORE IS CLEAN AND INSTALL THE RECEPTACLE SIDE PENETRATOR INTO THE RECEPTACLE SIDE PRESSURE VESSEL LID, FEEDING THE TEST LEADS/WIRES THROUGH THE LID.

OPERATOR INITIALS:_____ DATE:_____

6.30 MANAGE ALL OF THE WIRES SO THAT THE INSTALLATION OF THE PRESSURE VESSEL LID DOES NOT DAMAGE THE WIRES.

OPERATOR INITIALS:_____ DATE:_____

6.31 INSTALL THE RECEPTACLE SIDE PRESSURE VESSEL LID WITH THE MOUNTED PENETRATOR ONTO THE PRESSURE VESSEL BODY, SEALING THE PRESSURE VESSEL PER STANDARD LAB PRACTICES WHILE ENSURING THAT THE O-RINGS ARE INSTALLED AND FASTENERS ARE TORQUED.

OPERATOR INITIALS:_____ DATE:_____

6.32 REFER TO FIGURE 4 TO VERIFY THAT THE PRESSURE VESSEL IS ASSEMBLED CORRECTLY.

OPERATOR INITIALS:_____ DATE:_____

6.33 RECORD ANY COMMENTS CONCERNING ANY OF THE STEPS PERFORMED IN SECTION 6.

COMMENTS:_____

_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

7.0 **HIGH TEMPERATURE SOAK:**

7.1 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

7.2 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

7.3 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

7.4 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

7.5 VENT THE PRESSURE VESSEL AND COMPLETELY FILL THE PRESSURE VESSEL WITH TAP WATER.

OPERATOR INITIALS:_____ DATE:_____

7.6 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

7.7 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

7.8 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

7.9 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

7.10 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

7.11 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

7.12 OBTAIN A HIPOT CAPABLE OF MAINTAINING A CONSTANT DC VOLTAGE OF 15,000 VDC FOR LONG PERIODS OF TIME (MONTHS). ENSURE THAT THE HIPOT'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1.

OPERATOR INITIALS:_____ DATE:_____

7.13 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

7.14 BEGIN THE DATA ACQUISITION OF THE VESSEL TEMPERATURE, PRESSURE AND TIME. RECORD THESE VALUES THROUGHOUT THE ENTIRE TESTING PROCESS.

OPERATOR INITIALS:_____ DATE:_____

7.15 WITH THE PRESSURE VESSEL VENTED, RAISE THE PRESSURE VESSEL TEMPERATURE TO 80°C +5/-0°C.

OPERATOR INITIALS:_____ DATE:_____

7.16 ALLOW THE VESSEL TO REMAIN @80°C +5/-0°C FOR A MINIMUM OF 4 HOURS.

OPERATOR INITIALS:_____ DATE:_____

7.17 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

7.18 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

7.19 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

7.20 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

7.21 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

7.22 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

7.23 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

7.24 RAISE THE VOLTAGE TO 15,000 VDC +500/-0 VDC. AFTER TWO MINUTES HAS ELAPSED WITH VOLTAGE APPLIED, RECORD THE LEAKAGE CURRENT THAT IS DISPLAYED BY THE HIPOT.

APPLIED VOLTAGE: _____VDC

LEAKAGE CURRENT: _____A

OPERATOR INITIALS:_____ DATE:_____

7.25 DE-ENERGIZE THE HIPOT AND ENSURE THAT THE SYSTEM IS DISCHARGED TO GROUND (VIA A CONDUCTIVE CONNECTION BETWEEN THE VESSEL/TUBING AND GROUND). DISCONNECT THE HIPOT LEADS FROM THE SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

CAUTION: THE FOLLOWING STEPS WILL INVOLVE THE USE OF HIGH PRESSURE. EXERCISE CAUTION WHEN PRESSURIZING A SYSTEM. IF THERE ARE ANY SAFETY CONCERNS WHILE THE SYSTEM IS PRESSURIZED, DEPRESSURIZE THE SYSTEM AND CONTACT ENGINEERING IMMEDIATELY.

7.26 CLOSE THE PRESSURE VESSEL VENT. RAISE THE PRESSURE VESSEL PRESSURE TO 500±100 PSI AND CAREFULLY EXAMINE THE SYSTEM FOR LEAKS. RECORD ANY FINDINGS IN THE SPACE PROVIDED BELOW.

COMMENTS: _____

_____

_____

INSPECTION RESULT (CIRCLE RESULT): PASS / FAIL
PASS CRITERIA IS NO LEAKS

OPERATOR INITIALS: _____ DATE: _____

7.27 INCREASE THE PRESSURE OF THE VESSEL TO 5000 ± 100 PSI. HOLD PRESSURE @5000 ± 100 PSI FOR A MINIMUM OF 5 MINUTES. WHERE ACCESSIBLE, OBSERVE FOR SIGNS OF LEAKAGE (SUCH AS THE PUMP WORKING EXCESSIVELY TO MAINTAIN PRESSURE). COMMENT ON THE STATUS OF THE SYSTEM IN THE PROVIDED SPACE BELOW:

COMMENTS: _____

_____

_____

_____

RESULT (CIRCLE RESULT): PASS / FAIL
PASS CRITERIA IS NO LEAKS

OPERATOR INITIALS: _____ DATE: _____

7.28 RAISE PRESSURE TO 10,000 PSI +200/-0 PSI AT A RATE OF APPROXIMATELY 500 PSI/MINUTE.

OPERATOR INITIALS:_____ DATE:_____

7.29 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

7.30 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

7.31 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

7.32 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

7.33 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

7.34 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

7.35 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

7.36 AT A MINIMUM, TAKE READINGS ON THE LEAKAGE CURRENT (DISPLAYED ON THE HIPOT) ONCE A DAY, EXCLUDING WEEKENDS AND HOLIDAYS. THE READINGS WILL BE RECORDED IN TABLE B1 IN APPENDIX B. COPY TABLE B1 AS MUCH AS NECESSARY TO ADEQUATELY CAPTURE THE INFORMATION.

OPERATOR INITIALS:_____ DATE:_____

7.37 AT A MINIMUM, TAKE LEAKAGE CURRENT READINGS ON THE SYSTEM USING THE NANOAMP WEEKLY. THESE READINGS WILL BE TAKEN AS THEY WERE IN STEPS 7.33 AND 7.34. RECORD THESE VALUES IN THE APPROPRIATE LOCATION IN TABLE B1 IN APPENDIX B. AFTER THESE READINGS ARE TAKEN, ENSURE THAT THE HIPOT IS RECONNECTED TO THE SYSTEM PER STEPS 7.36 AND THE SYSTEM CONDITIONS RE-ESTABLISHED PER STEP 7.40.

OPERATOR INITIALS:_____ DATE:_____

7.38 SHOULD THERE BE A FAILURE AT ANY TIME DURING TESTING, ANNOTATE THE FAILURE MODE IN THE COMMENTS SECTION AT THE BOTTOM OF TABLE B1 IN APPENDIX B.

OPERATOR INITIALS:_____ DATE:_____

7.39 ALLOW THE SYSTEM TO REMAIN IN THE FOLLOWING CONDITIONS FOR 1 MONTH (720 HOURS) UNLESS TOLD OTHERWISE BY ENGINEERING IN WRITING.

SYSTEM PRESSURE: 10,000 +200/-0 PSI
SYSTEM TEMPERATURE: 80°C +5/-0°C
APPLIED VOLTAGE: 15,000 +500/-0 VDC
DURATION OF TEST: 1 MONTH

OPERATOR INITIALS:_____ DATE:_____

7.40 AFTER ONE MONTH HAS ELAPSED, NOTE THE LEAKAGE CURRENT ON THE HIPOT.

APPLIED VOLTAGE: _____VDC

LEAKAGE CURRENT: _____A

7.41 DE-ENERGIZE THE HIPOT AND ENSURE THAT THE SYSTEM IS DISCHARGED TO GROUND (VIA A CONDUCTIVE CONNECTION BETWEEN THE VESSEL/TUBING AND GROUND). DISCONNECT THE HIPOT LEADS FROM THE SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

7.42 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

7.43 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

7.44 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

7.45 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

7.46 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

7.47 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

7.48 DEPRESSURIZE THE PRESSURE VESSEL (TO 0 PSI) AT A RATE OF APPROXIMATELY 500 PSI/MINUTE.

OPERATOR INITIALS:_____ DATE:_____

7.49 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

7.50 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

7.51 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

7.52 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

7.53 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

7.54 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

7.55 REDUCE THE PRESSURE VESSEL TEMPERATURE TO AMBIENT. ALLOW THE PRESSURE VESSEL TO REMAIN AT AMBIENT TEMPERATURE FOR A MINIMUM OF 4 HOURS.

OPERATOR INITIALS:_____ DATE:_____

7.56 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

7.57 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

7.58 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1	[redacted]	[redacted]	[redacted]	PASS/FAIL
2		[redacted]	[redacted]	
3			[redacted]	
GROUND				

OPERATOR INITIALS:_____ DATE:_____

7.59 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

7.60 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

7.61 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

7.62 REMOVE THE MATED CONNECTORS FROM THE PRESSURE VESSELS.

OPERATOR INITIALS:_____ DATE:_____

7.63 INSPECT THE CONNECTORS FOR ANY SIGNS OF VISIBLE DAMAGE.

COMMENTS:_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

7.64 DEMATE THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

NOTE: TO MINIMIZE VARIABLES IN TESTING, MAINTAIN EACH SOLDER POT WITH ITS RESPECTIVE PIN. FOR INSTANCE, IT MAY BE EASIEST TO PLACE THE SOLDER POT IN A CLEAN BAG LABELED WITH THE ASSOCIATED CIRCUIT AND CONNECTOR.

7.65 INSPECT THE CONNECTORS FOR ANY SIGNS OF VISIBLE DAMAGE.

COMMENTS:_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

7.66 CLEAN THE LEADS DIRECTLY ABOVE THE CONNECTOR BOOT SEALS AND SLIDE THE CONNECTOR BOOT SEALS BACK AWAY FROM THE SOLDER POTS.

OPERATOR INITIALS:_____ DATE:_____

7.67 DE-SOLDER THE WIRE FROM THE SOLDER POTS FROM THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

7.68 MATE AND DEMATE THE CONNECTORS 5 TIMES AND OBSERVE FOR ANY UNUSUAL RESISTANCE OR BINDING. RECORD ANY OBSERVATIONS IN THE PROVIDED SPACE BELOW.

COMMENTS:_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

7.69 PERFORM A CONTINUITY TEST ON EACH CIRCUIT OF THE MATED CONNECTOR PAIR. PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE CONTINUITY RESULTS IN TABLE 8. RECORD THE INSULATION RESISTANCE TEST RESULTS IN TABLE 9.

TABLE 8 - CONTACT RESISTANCE RESULTS

PASS ≤ 0.0025 Ω

CIRCUIT	RESULT (Ω)	CIRCLE ONE
1		PASS/FAIL
2		PASS/FAIL
3		PASS/FAIL

TABLE 9 - INSULATION RESISTANCE TESTING

PASS ≥ 100 GΩ

	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

7.70 PERFORM A PARTIAL DISCHARGE TEST ON THE UNMATED CONNECTORS PER **D/N 165233** (ATP-117-40), WITH A TEST VOLTAGE OF 7,200 VAC. RECORD THE PLUG RESULTS IN TABLE 10 AND THE RECEPTACLE RESULTS IN TABLE 11.

TABLE 10 – PLUG PIN TO GROUND PD TESTING RESULTS

PASS IS <10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

TABLE 11 – RECEPTACLE PIN TO GROUND PD TESTING RESULTS

PASS IS <10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

OPERATOR INITIALS:_____ DATE:_____

7.71 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN TABLE 12.

TABLE 12 - MATED CONNECTOR LEVEL LEAKAGE CURRENT RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)	COMMENTS
1		
2		
3		

OPERATOR INITIALS:_____ DATE:_____

7.72 PERFORM A HIGH VOLTAGE WITHSTAND TEST ON THE MATED CONNECTORS WITH A TEST VOLTAGE OF 40,000 +500/-0 VDC. ATTACH THE POSITIVE TEST LEAD OF THE HIPOT TO THE CIRCUIT TO BE TESTED AND ATTACH THE GROUND/NEGATIVE TEST LEAD TO THE CONNECTOR SHELL ALONG WITH THE OTHER TWO CIRCUITS (FOR INSTANCE, IF CIRCUIT ONE IS BEING TESTED, GROUND THE SHELL, CIRCUIT TWO AND CIRCUIT THREE). AFTER THE CONNECTOR HAS BEEN SUBJECTED TO THE TEST VOLTAGE FOR TWO MINUTES, RECORD THE HIPOT LEAKAGE CURRENT VALUE IN TABLE 13.

TABLE 13 - CONNECTOR LEVEL VOLTAGE WITHSTAND RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @40,000 VDC	LEAKAGE CURRENT AFTER 4 HOURS @40,000 VDC	COMMENTS
1			
2			
3			

OPERATOR INITIALS:_____ DATE:_____

7.73 HOLD THE TEST VOLTAGE FOR 4 HOURS MINIMUM. OBSERVE CURRENT LEAKAGE PERIODICALLY TO ENSURE THAT IT REMAINS CONSTANT OVER THE 4 HOUR TEST PERIOD. AT THE END OF THE 4 HOUR HOLD, RECORD THE LEAKAGE CURRENT FOR THAT CIRCUIT IN TABLE 13. REPEAT THIS PROCESS FOR ALL CIRCUITS.

OPERATOR INITIALS:_____ DATE:_____

7.74 SUBMIT THE RESULTS TO THE PROJECT ENGINEER. OBTAIN THE PROJECT ENGINEERS APPROVAL PRIOR TO PROCEEDING IN THIS PROCEDURE.

ENGINEER: _____ DATE: _____

OPERATOR INITIALS:_____ DATE:_____

8.0 **LOW TEMPERATURE SOAK:**

8.1 REASSEMBLE THE CONNECTORS/PENETRATORS BACK INTO THE PRESSURE VESSEL PER THE REQUIREMENTS OF SECTION 6 OF THIS DOCUMENT.

OPERATOR INITIALS:_____ DATE:_____

8.2 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

8.3 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

8.4 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

8.5 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

8.6 VENT THE PRESSURE VESSEL AND COMPLETELY FILL THE PRESSURE VESSEL WITH TAP WATER.

OPERATOR INITIALS:_____ DATE:_____

8.7 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

8.8 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

8.9 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

8.10 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

8.11 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.12 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

8.13 OBTAIN A HIPOT CAPABLE OF MAINTAINING A CONSTANT DC VOLTAGE OF 15,000 VDC FOR LONG PERIODS OF TIME (MONTHS). ENSURE THAT THE HIPOT'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1.

OPERATOR INITIALS:_____ DATE:_____

8.14 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.15 BEGIN THE DATA ACQUISITION OF THE VESSEL TEMPERATURE, PRESSURE AND TIME. RECORD THESE VALUES THROUGHOUT THE ENTIRE TESTING PROCESS.

OPERATOR INITIALS:_____ DATE:_____

8.16 WITH THE PRESSURE VESSEL VENTED, LOWER THE PRESSURE VESSEL TEMPERATURE TO 4^0C ± 3°C.

OPERATOR INITIALS:_____ DATE:_____

8.17 ALLOW THE VESSEL TO REMAIN @ 4^0C ± 3°C FOR A MINIMUM OF 4 HOURS.

OPERATOR INITIALS:_____ DATE:_____

8.18 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

8.19 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

8.20 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

8.21 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

8.22 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.23 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

8.24 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.25 RAISE THE VOLTAGE TO 15,000 VDC +500/-0 VDC. AFTER TWO MINUTES HAS ELAPSED WITH VOLTAGE APPLIED, RECORD THE LEAKAGE CURRENT THAT IS DISPLAYED BY THE HIPOT.

APPLIED VOLTAGE: _____VDC

LEAKAGE CURRENT: _____A

OPERATOR INITIALS:_____ DATE:_____

8.26 DE-ENERGIZE THE HIPOT AND ENSURE THAT THE SYSTEM IS DISCHARGED TO GROUND (VIA A CONDUCTIVE CONNECTION BETWEEN THE VESSEL/TUBING AND GROUND). DISCONNECT THE HIPOT LEADS FROM THE SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

CAUTION: THE FOLLOWING STEPS WILL INVOLVE THE USE OF HIGH PRESSURE. EXERCISE CAUTION WHEN PRESSURIZING A SYSTEM. IF THERE ARE ANY SAFETY CONCERNS WHILE THE SYSTEM IS PRESSURIZED, DEPRESSURIZE THE SYSTEM AND CONTACT ENGINEERING IMMEDIATELY.

8.27 CLOSE THE PRESSURE VESSEL VENT. RAISE THE PRESSURE VESSEL PRESSURE TO 500±100 PSI AND CAREFULLY EXAMINE THE SYSTEM FOR LEAKS. RECORD ANY FINDINGS IN THE SPACE PROVIDED BELOW.

COMMENTS:_____

_____

_____

INSPECTION RESULT (CIRCLE RESULT): PASS / FAIL
PASS CRITERIA IS NO LEAKS

OPERATOR INITIALS: _____ DATE: _____

8.28 INCREASE THE PRESSURE OF THE VESSEL TO 5000 ± 100 PSI. HOLD PRESSURE @5000 ± 100 PSI FOR A MINIMUM OF 5 MINUTES. WHERE ACCESSIBLE, OBSERVE FOR SIGNS OF LEAKAGE (SUCH AS THE PUMP WORKING EXCESSIVELY TO MAINTAIN PRESSURE). COMMENT ON THE STATUS OF THE SYSTEM IN THE PROVIDED SPACE BELOW:

COMMENTS: _____

_____

_____

_____

RESULT (CIRCLE RESULT): PASS / FAIL
PASS CRITERIA IS NO LEAKS

OPERATOR INITIALS: _____ DATE: _____

8.29 RAISE PRESSURE TO 10,000 PSI +200/-0 PSI AT A RATE OF APPROXIMATELY 500 PSI/MINUTE.

OPERATOR INITIALS:_____ DATE:_____

8.30 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

8.31 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

8.32 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

8.33 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

8.34 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.35 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

8.36 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.37 AT A MINIMUM, TAKE READINGS ON THE LEAKAGE CURRENT (DISPLAYED ON THE HIPOT) ONCE A DAY, EXCLUDING WEEKENDS AND HOLIDAYS. THE READINGS WILL BE RECORDED IN TABLE B1 IN APPENDIX B. COPY TABLE B1 AS MUCH AS NECESSARY TO ADEQUATELY CAPTURE THE INFORMATION.

OPERATOR INITIALS:_____ DATE:_____

8.38 AT A MINIMUM, TAKE LEAKAGE CURRENT READINGS ON THE SYSTEM USING THE NANOAMP WEEKLY. THESE READINGS WILL BE TAKEN AS THEY WERE IN STEPS 7.37 AND 7.38. RECORD THESE VALUES IN THE APPROPRIATE LOCATION IN TABLE B1 IN APPENDIX B. AFTER THESE READINGS ARE TAKEN, ENSURE THAT THE HIPOT IS RECONNECTED TO THE SYSTEM PER STEPS 7.40 AND THE SYSTEM CONDITIONS RE-ESTABLISHED PER STEP 7.45.

OPERATOR INITIALS:_____ DATE:_____

8.39 SHOULD THERE BE A FAILURE AT ANY TIME DURING TESTING, ANNOTATE THE FAILURE MODE IN THE COMMENTS SECTION AT THE BOTTOM OF TABLE B1 IN APPENDIX B.

OPERATOR INITIALS:_____ DATE:_____

8.40 ALLOW THE SYSTEM TO REMAIN IN THE FOLLOWING CONDITIONS FOR 1 MONTH (720 HOURS) UNLESS TOLD OTHERWISE BY ENGINEERING IN WRITING.

SYSTEM PRESSURE: 10,000 +200/-0 PSI
SYSTEM TEMPERATURE: 4^{0}C ± 3°C
APPLIED VOLTAGE: 15,000 +500/-0 VDC
DURATION OF TEST: 1 MONTH

OPERATOR INITIALS:_____ DATE:_____

8.41 AFTER ONE MONTH HAS ELAPSED, NOTE THE LEAKAGE CURRENT ON THE HIPOT.

APPLIED VOLTAGE: _____VDC

LEAKAGE CURRENT: _____A

8.42 DE-ENERGIZE THE HIPOT AND ENSURE THAT THE SYSTEM IS DISCHARGED TO GROUND (VIA A CONDUCTIVE CONNECTION BETWEEN THE VESSEL/TUBING AND GROUND). DISCONNECT THE HIPOT LEADS FROM THE SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

8.43 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.44 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

8.45 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

8.46 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

8.47 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

8.48 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

8.49 DEPRESSURIZE THE PRESSURE VESSEL (TO 0 PSI) AT A RATE OF APPROXIMATELY 500 PSI/MINUTE.

OPERATOR INITIALS:_____ DATE:_____

8.50 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

8.51 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

8.52 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

8.53 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

8.54 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.55 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

8.56 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.57 REDUCE THE PRESSURE VESSEL TEMPERATURE TO AMBIENT. ALLOW THE PRESSURE VESSEL TO REMAIN AT AMBIENT TEMPERATURE FOR A MINIMUM OF 4 HOURS.

OPERATOR INITIALS:_____ DATE:_____

8.58 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

8.59 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

8.60 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

8.61 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

8.62 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

8.63 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

8.64 REMOVE THE MATED CONNECTORS FROM THE PRESSURE VESSELS.

OPERATOR INITIALS:_____ DATE:_____

8.65 INSPECT THE CONNECTORS FOR ANY SIGNS OF VISIBLE DAMAGE.

COMMENTS:_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

8.66 DEMATE THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

NOTE: TO MINIMIZE VARIABLES IN TESTING, MAINTAIN EACH SOLDER POT WITH ITS RESPECTIVE PIN. FOR INSTANCE, IT MAY BE EASIEST TO PLACE THE SOLDER POT IN A CLEAN BAG LABELED WITH THE ASSOCIATED CIRCUIT AND CONNECTOR.

8.67 INSPECT THE CONNECTORS FOR ANY SIGNS OF VISIBLE DAMAGE.

COMMENTS:_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

8.68 CLEAN THE LEADS DIRECTLY ABOVE THE CONNECTOR BOOT SEALS AND SLIDE THE CONNECTOR BOOT SEALS BACK AWAY FROM THE SOLDER POTS.

OPERATOR INITIALS:_____ DATE:_____

8.69 DE-SOLDER THE WIRE FROM THE SOLDER POTS FROM THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

8.70 MATE AND DEMATE THE CONNECTORS 5 TIMES AND OBSERVE FOR ANY UNUSUAL RESISTANCE OR BINDING. RECORD ANY OBSERVATIONS IN THE PROVIDED SPACE BELOW.

COMMENTS:_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

8.71 PERFORM A CONTINUITY TEST ON EACH CIRCUIT OF THE MATED CONNECTOR PAIR. PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE CONTINUITY RESULTS IN TABLE 8. RECORD THE INSULATION RESISTANCE TEST RESULTS IN TABLE 9.

TABLE 8 - CONTACT RESISTANCE RESULTS

PASS ≤ 0.0025 Ω

CIRCUIT	RESULT (Ω)	CIRCLE ONE
1		PASS/FAIL
2		PASS/FAIL
3		PASS/FAIL

TABLE 9 - INSULATION RESISTANCE TESTING

PASS ≥ 100 GΩ

	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

8.72 PERFORM A PARTIAL DISCHARGE TEST ON THE UNMATED CONNECTORS PER **D/N 165233** (ATP-117-40), WITH A TEST VOLTAGE OF 7,200 VAC. RECORD THE PLUG RESULTS IN TABLE 10 AND THE RECEPTACLE RESULTS IN TABLE 11.

TABLE 10 – PLUG PIN TO GROUND PD TESTING RESULTS

PASS IS <10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

TABLE 11 – RECEPTACLE PIN TO GROUND PD TESTING RESULTS

PASS IS <10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

OPERATOR INITIALS:_____ DATE:_____

8.73 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN TABLE 12.

TABLE 12 - MATED CONNECTOR LEVEL LEAKAGE CURRENT RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)	COMMENTS
1		
2		
3		

OPERATOR INITIALS:_____ DATE:_____

8.74 PERFORM A HIGH VOLTAGE WITHSTAND TEST ON THE MATED CONNECTORS WITH A TEST VOLTAGE OF 40,000 +500/-0 VDC. ATTACH THE POSITIVE TEST LEAD OF THE HIPOT TO THE CIRCUIT TO BE TESTED AND ATTACH THE GROUND/NEGATIVE TEST LEAD TO THE CONNECTOR SHELL ALONG WITH THE OTHER TWO CIRCUITS (FOR INSTANCE, IF CIRCUIT ONE IS BEING TESTED, GROUND THE SHELL, CIRCUIT TWO AND CIRCUIT THREE). AFTER THE CONNECTOR HAS BEEN SUBJECTED TO THE TEST VOLTAGE FOR TWO MINUTES, RECORD THE HIPOT LEAKAGE CURRENT VALUE IN TABLE 13.

TABLE 13 - CONNECTOR LEVEL VOLTAGE WITHSTAND RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @40,000 VDC	LEAKAGE CURRENT AFTER 4 HOURS @40,000 VDC	COMMENTS
1			
2			
3			

OPERATOR INITIALS:_____ DATE:_____

8.75 HOLD THE TEST VOLTAGE FOR 4 HOURS MINIMUM. OBSERVE CURRENT LEAKAGE PERIODICALLY TO ENSURE THAT IT REMAINS CONSTANT OVER THE 4 HOUR TEST PERIOD. AT THE END OF THE 4 HOUR HOLD, RECORD THE LEAKAGE CURRENT FOR THAT CIRCUIT IN TABLE 13. REPEAT THIS PROCESS FOR ALL CIRCUITS.

OPERATOR INITIALS:_____ DATE:_____

8.76 SUBMIT THE RESULTS TO THE PROJECT ENGINEER. OBTAIN THE PROJECT ENGINEERS APPROVAL PRIOR TO PROCEEDING IN THIS PROCEDURE.

ENGINEER: _____ DATE: _____

OPERATOR INITIALS:_____ DATE:_____

9.0 **ENGINEER PRESCRIBED TEMPERATURE SOAK:**

9.1 REASSEMBLE THE CONNECTORS/PENETRATORS BACK INTO THE PRESSURE VESSEL PER THE REQUIREMENTS OF SECTION 6 OF THIS DOCUMENT.

OPERATOR INITIALS:_____ DATE:_____

9.2 OBTAIN, FROM THE RESPONSIBLE ENGINEER, THE VALUES FOR THE TEMPERATURE AND DURATION OF THIS TESTING AND RECORD BELOW.

TEMPERATURE: _____ ^{0}C

DURATION: _____HOURS

ENGINEER: _____ DATE: _____

OPERATOR INITIALS:_____ DATE:_____

9.3 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

9.4 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

9.5 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1	[redacted]	[redacted]	[redacted]	PASS/FAIL
2		[redacted]	[redacted]	
3			[redacted]	
GROUND				

OPERATOR INITIALS:_____ DATE:_____

9.6 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

9.7 VENT THE PRESSURE VESSEL AND COMPLETELY FILL THE PRESSURE VESSEL WITH TAP WATER.

OPERATOR INITIALS:_____ DATE:_____

9.8 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

9.9 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

9.10 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

9.11 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

9.12 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.13 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

9.14 OBTAIN A HIPOT CAPABLE OF MAINTAINING A CONSTANT DC VOLTAGE OF 15,000 VDC FOR LONG PERIODS OF TIME (MONTHS). ENSURE THAT THE HIPOT'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1.

OPERATOR INITIALS:_____ DATE:_____

9.15 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.16 BEGIN THE DATA ACQUISITION OF THE VESSEL TEMPERATURE, PRESSURE AND TIME. RECORD THESE VALUES THROUGHOUT THE ENTIRE TESTING PROCESS.

OPERATOR INITIALS:_____ DATE:_____

9.17 WITH THE PRESSURE VESSEL VENTED, LOWER THE PRESSURE VESSEL TEMPERATURE TO THE TEMPERATURE PREVIOUSLY DEFINED BY ENGINEERING.

OPERATOR INITIALS:_____ DATE:_____

9.18 ALLOW THE VESSEL TO REMAIN AT TEMPERATURE FOR A MINIMUM OF 4 HOURS.

OPERATOR INITIALS:_____ DATE:_____

9.19 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

9.20 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

9.21 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

9.22 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

9.23 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.24 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

9.25 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.26 RAISE THE VOLTAGE TO 15,000 VDC +500/-0 VDC. AFTER TWO MINUTES HAS ELAPSED WITH VOLTAGE APPLIED, RECORD THE LEAKAGE CURRENT THAT IS DISPLAYED BY THE HIPOT.

APPLIED VOLTAGE: _____VDC

LEAKAGE CURRENT: _____A

OPERATOR INITIALS:_____ DATE:_____

9.27 DE-ENERGIZE THE HIPOT AND ENSURE THAT THE SYSTEM IS DISCHARGED TO GROUND (VIA A CONDUCTIVE CONNECTION BETWEEN THE VESSEL/TUBING AND GROUND). DISCONNECT THE HIPOT LEADS FROM THE SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

CAUTION: THE FOLLOWING STEPS WILL INVOLVE THE USE OF HIGH PRESSURE. EXERCISE CAUTION WHEN PRESSURIZING A SYSTEM. IF THERE ARE ANY SAFETY CONCERNS WHILE THE SYSTEM IS PRESSURIZED, DEPRESSURIZE THE SYSTEM AND CONTACT ENGINEERING IMMEDIATELY.

9.28 CLOSE THE PRESSURE VESSEL VENT. RAISE THE PRESSURE VESSEL PRESSURE TO 500±100 PSI AND CAREFULLY EXAMINE THE SYSTEM FOR LEAKS. RECORD ANY FINDINGS IN THE SPACE PROVIDED BELOW.

COMMENTS:_____

_____

_____

INSPECTION RESULT (CIRCLE RESULT): PASS / FAIL
PASS CRITERIA IS NO LEAKS

OPERATOR INITIALS: _____ DATE: _____

9.29 INCREASE THE PRESSURE OF THE VESSEL TO 5000 ± 100 PSI. HOLD PRESSURE @5000 ± 100 PSI FOR A MINIMUM OF 5 MINUTES. WHERE ACCESSIBLE, OBSERVE FOR SIGNS OF LEAKAGE (SUCH AS THE PUMP WORKING EXCESSIVELY TO MAINTAIN PRESSURE). COMMENT ON THE STATUS OF THE SYSTEM IN THE PROVIDED SPACE BELOW:

COMMENTS: _____

_____

_____

_____

RESULT (CIRCLE RESULT): PASS / FAIL
PASS CRITERIA IS NO LEAKS

OPERATOR INITIALS: _____ DATE: _____

9.30 RAISE PRESSURE TO 10,000 PSI +200/-0 PSI AT A RATE OF APPROXIMATELY 500 PSI/MINUTE.

OPERATOR INITIALS:_____ DATE:_____

9.31 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

9.32 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

9.33 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

9.34 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

9.35 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.36 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

9.37 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.38 AT A MINIMUM, TAKE READINGS ON THE LEAKAGE CURRENT (DISPLAYED ON THE HIPOT) ONCE A DAY, EXCLUDING WEEKENDS AND HOLIDAYS. THE READINGS WILL BE RECORDED IN TABLE B1 IN APPENDIX B. COPY TABLE B1 AS MUCH AS NECESSARY TO ADEQUATELY CAPTURE THE INFORMATION.

OPERATOR INITIALS:_____ DATE:_____

9.39 AT A MINIMUM, TAKE LEAKAGE CURRENT READINGS ON THE SYSTEM USING THE NANOAMP WEEKLY. THESE READINGS WILL BE TAKEN AS THEY WERE IN STEPS 7.37 AND 7.38. RECORD THESE VALUES IN THE APPROPRIATE LOCATION IN TABLE B1 IN APPENDIX B. AFTER THESE READINGS ARE TAKEN, ENSURE THAT THE HIPOT IS RECONNECTED TO THE SYSTEM PER STEPS 7.40 AND THE SYSTEM CONDITIONS RE-ESTABLISHED PER STEP 7.45.

OPERATOR INITIALS:_____ DATE:_____

9.40 SHOULD THERE BE A FAILURE AT ANY TIME DURING TESTING, ANNOTATE THE FAILURE MODE IN THE COMMENTS SECTION AT THE BOTTOM OF TABLE B1 IN APPENDIX B.

OPERATOR INITIALS:_____ DATE:_____

9.41 ALLOW THE SYSTEM TO REMAIN IN THE FOLLOWING CONDITIONS UNLESS TOLD OTHERWISE BY ENGINEERING IN WRITING.

SYSTEM PRESSURE: 10,000 +200/-0 PSI
SYSTEM TEMPERATURE: PREVIOUSLY DEFINED BY ENGINEERING
APPLIED VOLTAGE: 15,000 +500/-0 VDC
DURATION OF TEST: PREVIOUSLY DEFINED BY ENGINEERING

OPERATOR INITIALS:_____ DATE:_____

9.42 AFTER ONE MONTH HAS ELAPSED, NOTE THE LEAKAGE CURRENT ON THE HIPOT.

APPLIED VOLTAGE: _____VDC

LEAKAGE CURRENT: _____A

9.43 DE-ENERGIZE THE HIPOT AND ENSURE THAT THE SYSTEM IS DISCHARGED TO GROUND (VIA A CONDUCTIVE CONNECTION BETWEEN THE VESSEL/TUBING AND GROUND). DISCONNECT THE HIPOT LEADS FROM THE SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

9.44 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.45 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

9.46 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

9.47 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

9.48 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

9.49 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

9.50 DEPRESSURIZE THE PRESSURE VESSEL (TO 0 PSI) AT A RATE OF APPROXIMATELY 500 PSI/MINUTE.

OPERATOR INITIALS:_____ DATE:_____

9.51 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

9.52 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

9.53 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

9.54 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

9.55 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.56 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

9.57 CONNECT THE POSITIVE LEAD OF THE HIPOT TO CIRCUIT 1 AND GROUND CIRCUIT TWO AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.58 REDUCE THE PRESSURE VESSEL TEMPERATURE TO AMBIENT. ALLOW THE PRESSURE VESSEL TO REMAIN AT AMBIENT TEMPERATURE FOR A MINIMUM OF 4 HOURS.

OPERATOR INITIALS:_____ DATE:_____

9.59 PERFORM CONTINUITY TESTING ON THE CIRCUITS, RECORDING THE VALUES BELOW.

CIRCUIT 1: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 1}}$ (AS RECORDED IN STEP 6.12)

CIRCUIT 2: _____Ω
PASS ≤ $\mathbf{R_{TOTAL\ CKT\ 2}}$ (AS RECORDED IN STEP 6.12)

PASS / FAIL (CIRCLE ONE)

OPERATOR INITIALS:_____ DATE:_____

9.60 ATTACH THE POSITIVE LEAD OF THE MEGGER TO THE CIRCUIT BEING TESTED AND GROUND PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

9.61 PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE INSULATION RESISTANCE TEST RESULTS IN THE TABLE BELOW.

INSULATION RESISTANCE TESTING				
PASS ≥ 100 GΩ				
	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

9.62 ENSURE THAT THE MEGGER IS DE-ENERGIZED AND DISCONNECT THE MEGGER LEADS FROM THE CONNECTORS/SYSTEM.

OPERATOR INITIALS:_____ DATE:_____

9.63 OBTAIN A NANOAMP CAPABLE OF MAINTAINING A DC VOLTAGE OF 20,000 VDC. ENSURE THAT THE NANOAMP'S CALIBRATION INFORMATION IS RECORDED IN TABLE 1. CONNECT THE POSITIVE LEAD OF THE NANOAMP TO THE CIRCUIT UNDER TEST AND GROUND THE OTHER CIRCUIT AND THE PRESSURE VESSEL/TUBING.

OPERATOR INITIALS:_____ DATE:_____

9.64 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN THE TABLE BELOW.

LEAKAGE CURRENT RESULTS		
CIRCUIT	**LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)**	**COMMENTS**
1		
2		

OPERATOR INITIALS:_____ DATE:_____

9.65 REMOVE THE MATED CONNECTORS FROM THE PRESSURE VESSELS.

OPERATOR INITIALS:_____ DATE:_____

9.66 INSPECT THE CONNECTORS FOR ANY SIGNS OF VISIBLE DAMAGE.

COMMENTS:_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

9.67 DEMATE THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

NOTE: TO MINIMIZE VARIABLES IN TESTING, MAINTAIN EACH SOLDER POT WITH ITS RESPECTIVE PIN. FOR INSTANCE, IT MAY BE EASIEST TO PLACE THE SOLDER POT IN A CLEAN BAG LABELED WITH THE ASSOCIATED CIRCUIT AND CONNECTOR.

9.68 INSPECT THE CONNECTORS FOR ANY SIGNS OF VISIBLE DAMAGE.

COMMENTS:_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

9.69 CLEAN THE LEADS DIRECTLY ABOVE THE CONNECTOR BOOT SEALS AND SLIDE THE CONNECTOR BOOT SEALS BACK AWAY FROM THE SOLDER POTS.

OPERATOR INITIALS:_____ DATE:_____

9.70 DE-SOLDER THE WIRE FROM THE SOLDER POTS FROM THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

9.71 MATE AND DEMATE THE CONNECTORS 5 TIMES AND OBSERVE FOR ANY UNUSUAL RESISTANCE OR BINDING. RECORD ANY OBSERVATIONS IN THE PROVIDED SPACE BELOW.

COMMENTS:_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

9.72 PERFORM A CONTINUITY TEST ON EACH CIRCUIT OF THE MATED CONNECTOR PAIR. PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE CONTINUITY RESULTS IN TABLE 8. RECORD THE INSULATION RESISTANCE TEST RESULTS IN TABLE 9.

TABLE 8 - CONTACT RESISTANCE RESULTS

PASS ≤ 0.0025 Ω

CIRCUIT	RESULT (Ω)	CIRCLE ONE
1		PASS/FAIL
2		PASS/FAIL
3		PASS/FAIL

TABLE 9 - INSULATION RESISTANCE TESTING

PASS ≥ 100 GΩ

	1	**2**	**3**	**CIRCLE ONE**
1	[redacted]	[redacted]	[redacted]	PASS/FAIL
2		[redacted]	[redacted]	
3			[redacted]	
GROUND				

OPERATOR INITIALS:_____ DATE:_____

9.73 PERFORM A PARTIAL DISCHARGE TEST ON THE UNMATED CONNECTORS PER **D/N 165233** (ATP-117-40), WITH A TEST VOLTAGE OF 7,200 VAC. RECORD THE PLUG RESULTS IN TABLE 10 AND THE RECEPTACLE RESULTS IN TABLE 11.

TABLE 10 – PLUG PIN TO GROUND PD TESTING RESULTS

PASS IS <10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

TABLE 11 – RECEPTACLE PIN TO GROUND PD TESTING RESULTS

PASS IS <10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

OPERATOR INITIALS:_____ DATE:_____

9.74 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN TABLE 12.

TABLE 12 - MATED CONNECTOR LEVEL LEAKAGE CURRENT RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)	COMMENTS
1		
2		
3		

OPERATOR INITIALS:_____ DATE:_____

9.75 PERFORM A HIGH VOLTAGE WITHSTAND TEST ON THE MATED CONNECTORS WITH A TEST VOLTAGE OF 40,000 +500/-0 VDC. ATTACH THE POSITIVE TEST LEAD OF THE HIPOT TO THE CIRCUIT TO BE TESTED AND ATTACH THE GROUND/NEGATIVE TEST LEAD TO THE CONNECTOR SHELL ALONG WITH THE OTHER TWO CIRCUITS (FOR INSTANCE, IF CIRCUIT ONE IS BEING TESTED, GROUND THE SHELL, CIRCUIT TWO AND CIRCUIT THREE). AFTER THE CONNECTOR HAS BEEN SUBJECTED TO THE TEST VOLTAGE FOR TWO MINUTES, RECORD THE HIPOT LEAKAGE CURRENT VALUE IN TABLE 13.

TABLE 13 - CONNECTOR LEVEL VOLTAGE WITHSTAND RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @40,000 VDC	LEAKAGE CURRENT AFTER 4 HOURS @40,000 VDC	COMMENTS
1			
2			
3			

OPERATOR INITIALS:_____ DATE:_____

9.76 HOLD THE TEST VOLTAGE FOR 4 HOURS MINIMUM. OBSERVE CURRENT LEAKAGE PERIODICALLY TO ENSURE THAT IT REMAINS CONSTANT OVER THE 4 HOUR TEST PERIOD. AT THE END OF THE 4 HOUR HOLD, RECORD THE LEAKAGE CURRENT FOR THAT CIRCUIT IN TABLE 13. REPEAT THIS PROCESS FOR ALL CIRCUITS.

OPERATOR INITIALS:_____ DATE:_____

9.77 SUBMIT THE RESULTS TO THE PROJECT ENGINEER. OBTAIN THE PROJECT ENGINEERS APPROVAL PRIOR TO PROCEEDING IN THIS PROCEDURE.

ENGINEER: _____ DATE: _____

OPERATOR INITIALS:_____ DATE:_____

10.0 **POST TEST INSPECTION**:

10.1 DRAIN THE PRESSURE VESSEL AND REMOVE THE CONNECTORS FROM THE PRESSURE VESSEL.

OPERATOR INITIALS:_____ DATE:_____

10.2 CLEAN THE LEADS DIRECTLY ABOVE THE CONNECTOR BOOT SEALS AND SLIDE THE CONNECTOR BOOT SEALS BACK AWAY FROM THE SOLDER POTS.

OPERATOR INITIALS:_____ DATE:_____

10.3 DE-SOLDER THE WIRES FROM THE CONNECTOR SOLDER POTS AND UNTHREAD THE SOLDER POTS FROM THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

10.4 INSPECT THE CONNECTORS FOR ANY SIGNS OF VISIBLE DAMAGE.

COMMENTS:_____

_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

10.5 DEMATE THE CONNECTORS.

OPERATOR INITIALS:_____ DATE:_____

10.6 MATE AND DEMATE THE CONNECTORS 5 TIMES AND OBSERVE FOR ANY UNUSUAL RESISTANCE OR BINDING. RECORD ANY OBSERVATIONS IN THE PROVIDED SPACE BELOW.

COMMENTS:_____

_____

_____

_____

OPERATOR INITIALS:_____ DATE:_____

10.7 PERFORM A CONTINUITY TEST ON EACH CIRCUIT OF THE MATED CONNECTOR PAIR. PERFORM AN INSULATION RESISTANCE TEST ON THE MATED CONNECTOR PAIR PER **D/N 11143** (A7B) WITH AN APPLIED VOLTAGE OF 10,000 +500/-0 VDC AND A ONE MINUTE DWELL. RECORD THE CONTINUITY RESULTS IN TABLE 20. RECORD THE INSULATION RESISTANCE TEST RESULTS IN TABLE 21.

TABLE 20 - CONTACT RESISTANCE RESULTS

PASS ≤ 0.0025 Ω

CIRCUIT	RESULT (Ω)	CIRCLE ONE
1		PASS/FAIL
2		PASS/FAIL
3		PASS/FAIL

TABLE 21 - INSULATION RESISTANCE TESTING

PASS ≥ 100 GΩ

	1	**2**	**3**	**CIRCLE ONE**
1				PASS/FAIL
2				
3				
GROUND				

OPERATOR INITIALS:_____ DATE:_____

10.8 PERFORM A PARTIAL DISCHARGE TEST ON THE UNMATED CONNECTORS PER **D/N 165233** (ATP-117-40), WITH A TEST VOLTAGE OF 7,200 VAC. RECORD THE PLUG RESULTS IN TABLE 22 AND THE RECEPTACLE RESULTS IN TABLE 23.

TABLE 22 – PLUG PIN TO GROUND PD TESTING RESULTS

PASS IS <10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

TABLE 23 – RECEPTACLE PIN TO GROUND PD TESTING RESULTS

PASS IS <10pC

PIN #	TEST VOLTAGE (VAC)	PARTIAL DISCHARGE (pC)	INCEPTION VOLTAGE (VAC)	EXTINCTION VOLTAGE (VAC)	CIRCLE ONE
1					PASS/FAIL
2					PASS/FAIL
3					PASS/FAIL

OPERATOR INITIALS:_____ DATE:_____

10.9 PERFORM A LEAKAGE CURRENT TEST ON THE MATED CONNECTOR PAIR PER **D/N 71501** (ATP-060-40) AT A TEST VOLTAGE OF 20,000 +500/-0 VDC FOR A TWO MINUTE DWELL. RECORD THE LEAKAGE CURRENT RESULTS IN TABLE 24.

10.10

TABLE 24 - MATED CONNECTOR LEVEL LEAKAGE CURRENT RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @20,000 VDC (nA)	COMMENTS
1		
2		
3		

OPERATOR INITIALS:_____ DATE:_____

10.11 PERFORM A HIGH VOLTAGE WITHSTAND TEST ON THE MATED CONNECTORS WITH A TEST VOLTAGE OF 40,000 +500/-0 VDC. ATTACH THE POSITIVE TEST LEAD OF THE HIPOT TO THE CIRCUIT TO BE TESTED AND ATTACH THE GROUND/NEGATIVE TEST LEAD TO THE CONNECTOR SHELL ALONG WITH THE OTHER TWO CIRCUITS (FOR INSTANCE, IF CIRCUIT ONE IS BEING TESTED, GROUND THE SHELL, CIRCUIT TWO AND CIRCUIT THREE). AFTER THE CONNECTOR HAS BEEN SUBJECTED TO THE TEST VOLTAGE FOR TWO MINUTES, RECORD THE HIPOT LEAKAGE CURRENT VALUE IN TABLE 25.

TABLE 25 - CONNECTOR LEVEL VOLTAGE WITHSTAND RESULTS

CIRCUIT	LEAKAGE CURRENT AFTER 2 MINUTES @40,000 VDC	LEAKAGE CURRENT AFTER 4 HOURS @40,000 VDC	COMMENTS
1			
2			
3			

OPERATOR INITIALS:_____ DATE:_____

10.12 HOLD THE TEST VOLTAGE FOR 4 HOURS MINIMUM. OBSERVE CURRENT LEAKAGE PERIODICALLY TO ENSURE THAT IT REMAINS CONSTANT OVER THE 4 HOUR TEST PERIOD. AT THE END OF THE 4 HOUR HOLD, RECORD THE LEAKAGE CURRENT FOR THAT CIRCUIT IN TABLE 25. REPEAT THIS PROCESS FOR ALL CIRCUITS.

OPERATOR INITIALS:_____ DATE:_____

10.13 SUBMIT ALL RESULTS TO THE PROJECT ENGINEER UPON COMPLETION OF THE TEST.

OPERATOR INITIALS:_____ DATE:_____

APPENDIX A:

RESISTANCE EQUATION CALCULATIONS:

VARIABLES:

$R_{TEST\ LEAD\ REC}$ = RESISTANCE DUE TO WIRE LENGTH FROM RECEPTACLE SIDE PENETRATOR TO TEST EQUIPMENT IN Ω

R_{PEN}= PENETRATOR RESISTANCE = 0.0025Ω

$R_{WIRE\ REC\ TO\ PEN}$= RESISTANCE DUE TO WIRE LENGTH FROM RECEPTACLE SOLDER POT TO PENETRATOR SOLDER POT IN Ω

$R_{CONNECTORS}$= MATED CONNECTOR CIRCUIT MAXIMUM RESISTANCE = 0.0025Ω

$R_{WIRE\ PLUG\ TO\ PEN}$= RESISTANCE DUE TO WIRE LENGTH FROM PLUG SOLDER POT TO PENETRATOR SOLDER POT IN Ω

$R_{TEST\ LEAD\ PLUG}$ = RESISTANCE DUE TO WIRE LENGTH FROM RECEPTACLE SIDE PENETRATOR TO TEST EQUIPMENT IN Ω

R_{EQ} = EQUIVALENT RESISTANCE OF CIRCUIT TWO AND THREE IN PARALLEL

$R_{WIRE\ LOOP}$ = RESISTANCE DUE TO LENGTH OF EACH LOOPED WIRE BETWEEN CIRCUIT TWO AND THREE IN Ω

RESISTANCE DUE TO WIRE LENGTH:

THE WIRE RESISTANCE PER FOOT LENGTH FOR THE WIRE USED IN THIS PROCEDURE IS 0.000758 Ω/INCH (BASED ON 9.1 Ω/1000 FT PER VENDOR).

$R_{TEST\ LEAD\ REC}$ = _____ INCHES * 0.000758 Ω/INCH = _____Ω

$R_{WIRE\ REC\ TO\ PEN}$ = _____ INCHES * 0.000758 Ω/INCH = _____Ω

$R_{WIRE\ PLUG\ TO\ PEN}$ = _____ INCHES * 0.000758 Ω/INCH = _____Ω

$R_{TEST\ LEAD\ PLUG}$ = _____ INCHES * 0.000758 Ω/INCH = _____Ω

$R_{WIRE\ LOOP}$ = _____ INCHES * 0.000758 Ω/INCH = _____Ω

RESISTANCE CALCULATION FOR CIRCUIT 1:

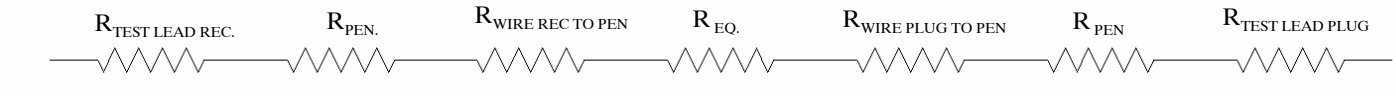
$R_{TOTAL\ CKT\ 1} = R_{TEST\ LEAD\ REC} + 2\ (R_{PEN}) + R_{WIRE\ REC\ TO\ PEN} + R_{CONNECTORS} + R_{WIRE\ PLUG\ TO\ PEN} + R_{TEST\ LEAD\ PLUG}$

$= R_{TEST\ LEAD\ REC} + 0.0050 + R_{WIRE\ REC\ TO\ PEN} + 0.0025 + R_{WIRE\ PLUG\ TO\ PEN} + R_{TEST\ LEAD\ PLUG}$

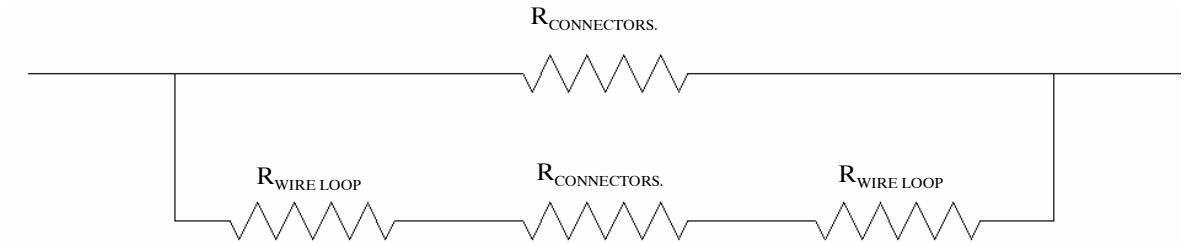
$= \_\_\_\_\_ + 0.0050 + \_\_\_\_\_ + 0.0025 + \_\_\_\_\_ + \_\_\_\_\_$

$R_{TOTAL\ CKT\ 1} = \_\_\_\_\_\ \Omega$

RESISTANCE CALCULATION FOR CIRCUIT 2 AND THREE IN PARALLEL:



WHERE THE DRAWING REPRESENTING R_{EQ} IS



$$REQ = \frac{(R_{CONNECTORS})(2*R_{LOOP\,WIRE} + R_{CONNECTORS})}{(2*R_{CONNECTORS} + 2*R_{LOOP\,WIRE})} = \frac{(0.0025)(2*R_{LOOP\,WIRE} + 0.0025)}{(0.0050 + 2*R_{LOOP\,WIRE})}$$

CALCULATED R_{EQ} = _____Ω

$R_{TOTAL\ CKT\ 2}$ = $R_{TEST\ LEAD\ REC}$ + 2 (R_{PEN}) + $R_{WIRE\ REC\ TO\ PEN}$ + R_{EQ} + $R_{WIRE\ PLUG\ TO\ PEN}$ + $R_{TEST\ LEAD\ PLUG}$

= $R_{TEST\ LEAD\ REC}$ + 0.0050 + $R_{WIRE\ REC\ TO\ PEN}$ + R_{EQ} + $R_{WIRE\ PLUG\ TO\ PEN}$ + $R_{TEST\ LEAD\ PLUG}$

= _____ + 0.0050 + _____ + R_{EQ} + _____ + _____

$R_{TOTAL\ CKT\ 1}$ = _____Ω

APPENDIX B:

TABLE B1 – HIGH TEMPERATURE SOAK AT PRESSURE DATA

DATE	TIME	SYSTEM PRESSURE (PSI)	SYSTEM TEMP. (°C)	HIPOT LEAKAGE CURRENT (nA)	NANOAMP LEAKAGE CURRENT (nA)	INITIAL

COMMENTS:

TABLE B2 – LOW TEMPERATURE SOAK AT PRESSURE DATA						
DATE	**TIME**	**SYSTEM PRESSURE (PSI)**	**SYSTEM TEMP. (°C)**	**HIPOT LEAKAGE CURRENT (nA)**	**NANOAMP LEAKAGE CURRENT (nA)**	**INITIAL**

COMMENTS:

PAGE ___ OF _____

TABLE B3 – ENGINEER PRESCRIBED TEMPERATURE SOAK AT PRESSURE DATA						
DATE	**TIME**	**SYSTEM PRESSURE (PSI)**	**SYSTEM TEMP. (°C)**	**HIPOT LEAKAGE CURRENT (nA)**	**NANOAMP LEAKAGE CURRENT (nA)**	**INITIAL**

COMMENTS:

PAGE ____ OF ______