

	PER CO #15650	Tech RN	Approved By R. JAZOWSKI	Effective Date 1-29-08	Document No. 166321	Revision A
	Originator BRIAN CORNELIUS	Checked By W. MUDGE		Page 1 of 61	Reference QTP-312-40	Class 40

SUBJECT: HIGH POWER NAUTILUS ELECTRICAL PIN ACCELERATED LIFE HIGH PRESSURE SOAK FOR PIN LIFE PREDICTION QUALIFICATION

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1.0 PURPOSE:

THE PURPOSE OF THIS PROCEDURE IS TO QUALIFY A LARGE VOLUME OF HIGH POWER NAUTILUS PINS THROUGH A RIGOROUS TESTING SEQUENCE TO OBTAIN ACCURATE STATISTICAL DATA FOR ANALYSIS. THESE PINS WILL BE SUBJECTED TO HIGH AC AND DC VOLTAGE, THERMAL CYCLES AND THERMAL SHOCK, LONG TERM PRESSURE SOAK AT ELEVATED TEMPERATURES, AND ULTIMATELY A HIGH VOLTAGE DC BREAKDOWN TEST AND A PIN STRAIN TO FAILURE TEST (CANTILEVER DEFLECTION).

2.0 MATERIALS NEEDED:

- D/N 10637 (SOP-021-39) STANDARD PRACTICE FOR CONNECTOR TERMINATING
- D/N 50166 (EHS.3-23) HIGH VOLTAGE TESTING SAFETY
- D/N 110829 LOCKOUT/TAG OUT & KEY CONTROL PROCEDURE FOR HIGH VOLTAGE TESTING SAFETY
- D/N 110833 APG LAB HIGH-VOLTAGE SAFETY RULES
- D/N 75879 (SOP-085-39) DIGITAL IMAGE NAMING CONVENTION PROCEDURE
- D/N 166319 (QTP-310-40) STRAIN TO FAILURE QUALIFICATION TEST PROCEDURE FOR HIGH POWER NAUTILUS PINS AND ALL MATERIALS ASSOCIATED WITH IT
- P/N 1050515 (HPR-248-01) PARTIAL DISCHARGE TEST FIXTURE
- P/N 1049549 (HPR-221-04) RECEPTACLE MODULE BLADDER HP
- P/N 1047261 (HPR-244-04) HIGH POWER PLUG ELECTRICAL PIN
- COTTON SWABS
- DATA ACQUISITION SYSTEM TO MONITOR PRESSURES AND TEMPERATURES
- DC4 DOW CORNING DIELECTRIC LUBRICANT
- DC200/100CS SILICONE OIL
- DIGITAL CAMERA
- ELECTRICAL TESTING FACILITIES AND ASSOCIATED EQUIPMENT (BOTH AC AND DC POWER)
- ISOPROPYL ALCOHOL
- LARGE CONTAINER FOR ICE WATER BATH (THERMAL SHOCK)
- LARGE VOLUME METAL STRAINER PAN OR BASKET TO AID IN THERMAL SHOCK TEST
- MEGGER CAPABLE OF SUPPLYING 10,000 VDC
- MESH BAGS
- MICROSCOPE WITH CAMERA
- PRESSURE TESTING FACILITIES CAPABLE OF WITHSTANDING 15 KPSI
- PRESSURE VESSEL FIXTURE CAPABLE OF 15 KPSI PRESSURE AT 45°C
- SIMULATED SEAWATER
- TEMPERATURE METER TO MONITOR ICE BATH TEMPERATURE
- THERMAL CHAMBER (TEST RANGE IS -25°C TO 55°C)

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3.0 REFERENCE MATERIAL:

- D/N 161589 (HPR-244-04) HIGH POWER PLUG ELECTRICAL PIN DETAIL DRAWING
- D/N 162716 (HPR-248-01) PD/BREAKDOWN TEST FIXTURE DRAWING
- D/N 135594 (ENG-727-20) HIGH POWER NAUTILUS CONNECTOR EPOXY PIN FAILURE INVESTIGATION SUMMARY REPORT

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.

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.

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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: _____

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- 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: _____

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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.

- 5.1 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: _____

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

OPERATOR INITIALS: _____ DATE: _____

- 5.3 OBTAIN 105 HIGH POWER PLUG PINS (P/N 1047261). ENSURE THAT THESE PINS HAVE SUCCESSFULLY PASSED THE REQUIRED INCOMING INSPECTION AND PARTIAL DISCHARGE TESTING.

OPERATOR INITIALS: _____ DATE: _____

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- 5.4 MARK THE 105 PINS FROM 1 TO 105. USE INDELIBLE INK OR SOME OTHER NON DESTRUCTIVE METHOD THAT BEST GUARANTEES THAT THE MARKING SYSTEM WILL REMAIN INTACT THROUGHOUT TESTING.

OPERATOR INITIALS: _____ DATE: _____

- 5.5 INSPECT THE PINS 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: _____

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6.0 AC HIGH VOLTAGE WITHSTAND:

CAUTION: THE NEXT STEPS WILL REQUIRE THE USE OF HIGH VOLTAGE, WHICH CAN LEAD TO INJURY AND CAUSE SERIOUS DAMAGE TO TEST EQUIPMENT IF NOT SET-UP PROPERLY. PLEASE EXERCISE EXTREME CAUTION DURING OPERATION TO ENSURE SAFETY AND PROTECT EQUIPMENT.

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.

NOTE: IT IS ACCEPTABLE TO TEST MORE THAN ONE PIN AT A TIME, IN A PARALLEL CONFIGURATION. SHOULD MORE THAN ONE PIN BE TESTED IN A PARALLEL CONFIGURATION, ENSURE THAT THE POWER REQUIRED TO TEST THE CONFIGURATION DOES NOT EXCEED THE POWER THAT THE HIPOT IS RATED TO SUPPLY.

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

OPERATOR/OBSERVER NAME(S): _____;

DATE: _____

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

TABLE 1 - AC HIGH VOLTAGE CALIBRATION INFORMATION			
EQUIPMENT TYPE	ODI ID NUMBER	LAST CALIBRATION DATE	NEXT CALIBRATION DATE

OPERATOR INITIALS: _____ DATE: _____

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- 6.3 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: _____

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

OPERATOR INITIALS: _____ DATE: _____

- 6.5 OBTAIN THE FOLLOWING COMPONENTS:

TABLE 2 - COMPONENTS REQUIRED FOR PD TESTING			
PART NUMBER	REFERENCE NUMBER	DESCRIPTION	QUANTITY REQUIRED
1047261	HPR-244-01	HIGH POWER PLUG ELECTRICAL PIN	105, AS DESCRIBED IN SECTION 5
1049549	HPR-221-01	MODULE BLADDER, HIGH POWER	MINIMUM OF 2

OPERATOR INITIALS: _____ DATE: _____

- 6.6 OBTAIN A MINIMUM OF ONE SOLDER POT (P/N 1050130) WITH A SUFFICIENT LENGTH OF TEST LEAD WIRE (P/N 1034781 OR 1034774) SOLDERED TO IT. THREAD THE TEST LEAD ONTO THE THREADED PORTION OF THE PIN TO BE TESTED. ENSURE THAT IT IS ON COMPLETELY AND HAND TIGHT.

OPERATOR INITIALS: _____ DATE: _____

- 6.7 CLEAN AND LUBRICATE THE INTERIOR SEALING SURFACES OF TWO MODULE BLADDERS. ORIENT THE FIRST MODULE BLADDER SO THAT THE LARGER MODULE BLADDER OUTSIDE DIAMETER (THICKER WALL) WILL BE THE SEALING SURFACE ON THE PIN. SLIDE THE FIRST BLADDER DOWN OVER THE SOLDER POT AND A MINIMUM DISTANCE OF 1.25 INCHES PAST THE ULTEM INTERFACE.

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- 6.8 OBTAIN A CLEAN STOPPER WITH A SMOOTH, 32 MICRO INCHES (32 RMS) SURFACE FINISH, ENSURE THAT THE STOPPER HAS AN OUTSIDE DIAMETER OF 0.375 INCH (MODULE BLADDER INTERFACE ID IS 0.29 INCH, PROVIDING 30% STRETCH, PLUS THE PIN OUTSIDE DIAMETER IS 0.370 INCH). ENSURE THAT THE MINIMUM LENGTH OF THE STOPPER IS 1 INCH.

OPERATOR INITIALS: _____ DATE: _____

- 6.9 CLEAN AND LUBRICATE THE OUTSIDE DIAMETER OF THE STOPPER. INSTALL THE STOPPER INTO THE SMALLER OUTSIDE DIAMETER END OF THE SECOND MODULE BLADDER.

OPERATOR INITIALS: _____ DATE: _____

- 6.10 ORIENT THE SECOND MODULE BLADDER SO THAT THE LARGER MODULE BLADDER OUTSIDE DIAMETER (THICKER WALL) WILL BE THE SEALING SURFACE ON THE PIN. SLIDE THE SECOND BLADDER DOWN OVER THE PIN CONTACT AND A MINIMUM DISTANCE OF 1.25 INCH PAST THE ULTEM INTERFACE.

OPERATOR INITIALS: _____ DATE: _____

NOTE: DO NOT SUBMERGE THE ENTIRE PIN/BLADDER ASSEMBLY, AS THE TOP OF THE UPPER BLADDER DOES NOT SEAL ON THE WIRE. ENTIRE IMMERSION OF THE ASSEMBLY WILL SHORT THE PIN TO GROUND AND FAIL THE PIN.

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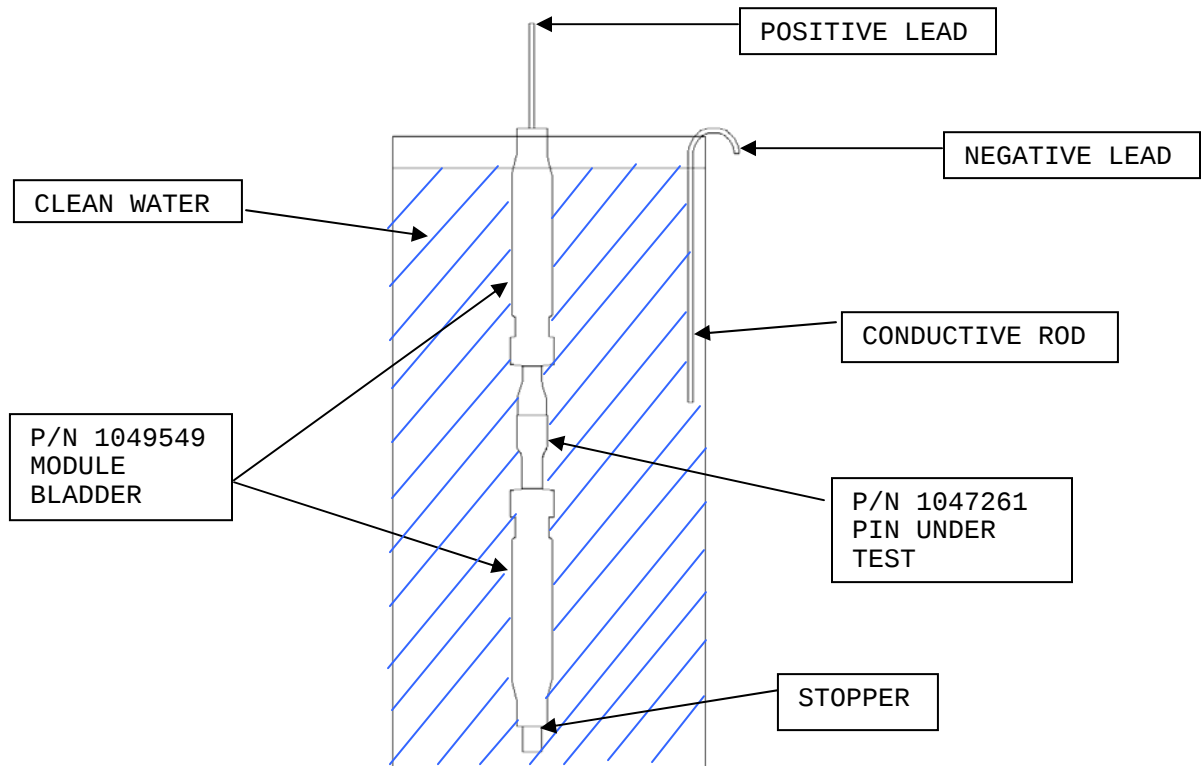
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- 6.11 HOLDING THE PIN/BLADDER ASSEMBLY VERTICALLY WITH THE STOPPER END DOWN, SUBMERGE THE ASSEMBLY IN A CLEAN WATER BATH UP TO THE POINT WHERE THE TOP OF THE WATER LEVEL IS APPROXIMATELY 1 TO 1.5 INCH BELOW THE TOP OF THE UPPER MODULE BLADDER AS SEEN IN THE FIGURE BELOW.

OPERATOR INITIALS: _____ DATE: _____



TEST CONFIGURATION FOR HIGH VOLTAGE WITHSTAND TESTING

- 6.12 OBTAIN A HIPOT CAPABLE OF MAINTAINING 20,000 VAC. ENSURE THAT THE HIPOT CALIBRATION DATA IS RECORDED IN TABLE 1. ATTACH THE POSITIVE TEST LEAD OF THE HIPOT TO THE WIRE SOLDERED TO THE PIN AND GROUND THE NEGATIVE TEST LEAD TO THE WATER BATH.

OPERATOR INITIALS: _____ DATE: _____

- 6.13 RAISE THE VOLTAGE OF THE HIPOT TO 20,000 +350/-0 VAC.

OPERATOR INITIALS: _____ DATE: _____

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7.0 DC HIGH VOLTAGE WITHSTAND:

CAUTION: THE NEXT STEPS WILL REQUIRE THE USE OF HIGH VOLTAGE, WHICH CAN LEAD TO INJURY AND CAUSE SERIOUS DAMAGE TO TEST EQUIPMENT IF NOT SET-UP PROPERLY. PLEASE EXERCISE EXTREME CAUTION DURING OPERATION TO ENSURE SAFETY AND PROTECT EQUIPMENT.

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.

NOTE: IT IS ACCEPTABLE TO TEST MORE THAN ONE PIN AT A TIME, IN A PARALLEL CONFIGURATION. SHOULD MORE THAN ONE PIN BE TESTED IN A PARALLEL CONFIGURATION, ENSURE THAT THE POWER REQUIRED TO TEST THE CONFIGURATION DOES NOT EXCEED THE POWER THAT THE HIPOT IS RATED TO SUPPLY.

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

OPERATOR/OBSERVER NAME(S): _____;

DATE: _____

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

TABLE 3 - DC HIGH VOLTAGE CALIBRATION INFORMATION			
EQUIPMENT TYPE	ODI ID NUMBER	LAST CALIBRATION DATE	NEXT CALIBRATION DATE

OPERATOR INITIALS: _____ DATE: _____

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- 7.3 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: _____

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

OPERATOR INITIALS: _____ DATE: _____

- 7.5 OBTAIN THE 105 PINS THAT WERE TESTED IN SECTION 6.0. OBTAIN THE MINIMUM QUANTITY (2) OF P/N 1049549 MODULE BLADDERS.

OPERATOR INITIALS: _____ DATE: _____

- 7.6 OBTAIN A MINIMUM OF ONE SOLDER POT WITH A TEST LEAD SOLDERED TO IT. THREAD THE TEST LEAD ONTO THE THREADED PORTION OF THE FIRST PIN TO BE TESTED. ENSURE THAT IT IS ON COMPLETELY AND HAND TIGHT.

OPERATOR INITIALS: _____ DATE: _____

- 7.7 CLEAN AND LUBRICATE THE INTERIOR SEALING SURFACES OF TWO MODULE BLADDERS. ORIENT THE FIRST MODULE BLADDER SO THAT THE LARGER MODULE BLADDER OUTSIDE DIAMETER (THICKER WALL) WILL BE THE SEALING SURFACE ON THE PIN. SLIDE THE FIRST BLADDER DOWN OVER THE SOLDER POT AND A MINIMUM DISTANCE OF 1.25 INCH PAST THE ULTEM INTERFACE.

OPERATOR INITIALS: _____ DATE: _____

- 7.8 OBTAIN A CLEAN STOPPER WITH A SMOOTH 32 MICRO INCHES (32 RMS) SURFACE FINISH, ENSURE THAT THE STOPPER HAS AN OUTSIDE DIAMETER OF 0.375 INCH (MODULE BLADDER INTERFACE ID IS 0.29 INCH, PROVIDING 30% STRETCH, PLUS THE PIN OUTSIDE DIAMETER IS 0.370 INCH). ENSURE THAT THE MINIMUM LENGTH OF THE STOPPER IS ONE INCH.

OPERATOR INITIALS: _____ DATE: _____

- 7.9 CLEAN AND LUBRICATE THE OUTSIDE DIAMETER OF THE STOPPER. INSTALL THE STOPPER INTO THE SMALLER OUTSIDE DIAMETER END OF THE SECOND MODULE BLADDER.

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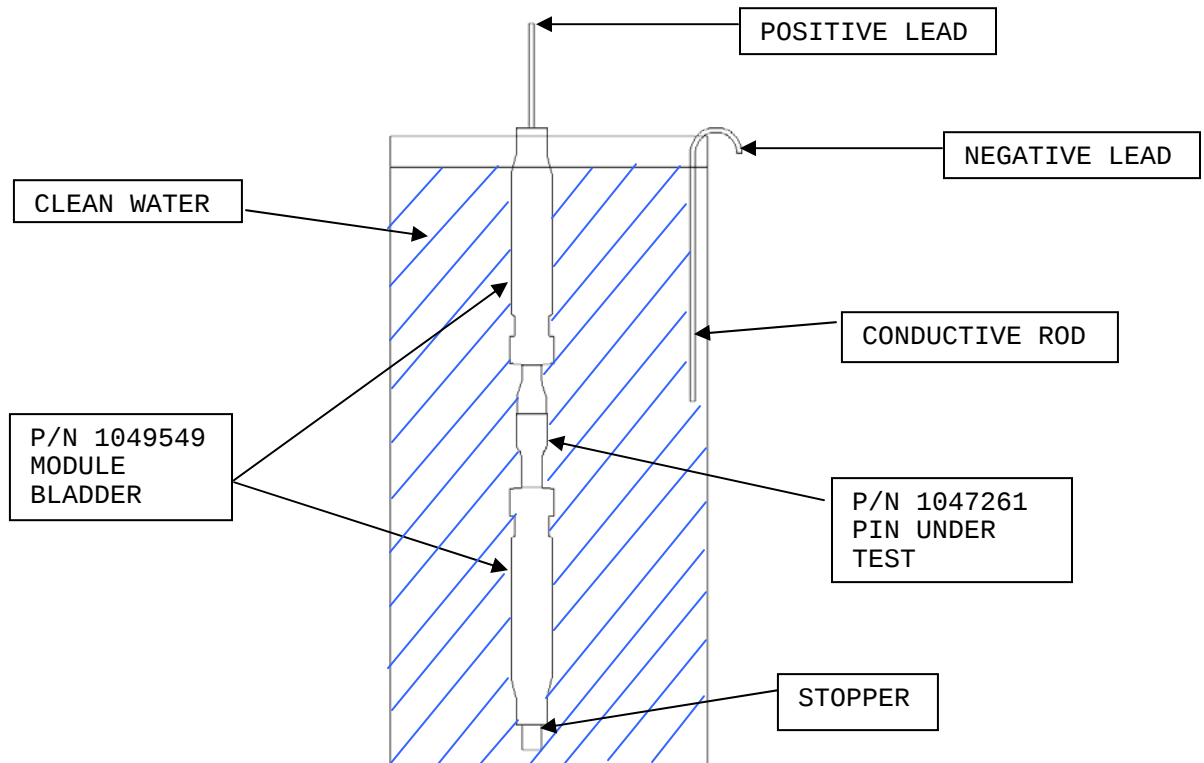
7.10 ORIENT THE SECOND MODULE BLADDER SO THAT THE LARGER MODULE BLADDER OUTSIDE DIAMETER (THICKER WALL) WILL BE THE SEALING SURFACE ON THE PIN. SLIDE THE SECOND BLADDER DOWN OVER THE PIN CONTACT AND A MINIMUM DISTANCE OF 1.25 INCH PAST THE ULTEM INTERFACE.

OPERATOR INITIALS: _____ DATE: _____

NOTE: DO NOT SUBMERGE THE ENTIRE PIN/BLADDER ASSEMBLY, AS THE TOP OF THE UPPER BLADDER DOES NOT SEAL ON THE WIRE. ENTIRE IMMERSION OF THE ASSEMBLY WILL SHORT THE PIN TO GROUND AND FAIL THE PIN.

7.11 HOLDING THE PIN/BLADDER ASSEMBLY VERTICALLY WITH THE STOPPER END DOWN, SUBMERGE THE ASSEMBLY IN A CLEAN WATER BATH UP TO THE POINT WHERE THE TOP OF THE WATER LEVEL IS APPROXIMATELY 1 TO 1.5 INCHES BELOW THE TOP OF THE UPPER MODULE BLADDER.

OPERATOR INITIALS: _____ DATE: _____



TEST CONFIGURATION FOR HIGH VOLTAGE WITHSTAND TESTING

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7.12 OBTAIN A HIPOT CAPABLE OF MAINTAINING 40,000 VDC. ENSURE THAT THE HIPOT CALIBRATION DATA IS RECORDED IN TABLE 3. ATTACH THE POSITIVE TEST LEAD OF THE HIPOT TO THE WIRE SOLDERED TO THE PIN AND GROUND THE NEGATIVE TEST LEAD TO THE WATER BATH.

OPERATOR INITIALS: _____ DATE: _____

7.13 RAISE THE VOLTAGE OF THE HIPOT TO 40,000 +500/-0 VDC.

OPERATOR INITIALS: _____ DATE: _____

7.14 HOLD THE VOLTAGE FOR 4 HOURS MINIMUM. OBSERVE CURRENT LEAKAGE PERIODICALLY TO ENSURE THAT IT REMAINS CONSTANT OVER THE 4 HOUR TEST PERIOD.

COMMENTS: _____

INITIALS: _____ DATE: _____

7.15 LOWER THE VOLTAGE TO ZERO AND DE-ENERGIZE THE HIPOT. DISCONNECT THE POSITIVE TEST LEAD FROM THE PIN WIRE.

OPERATOR INITIALS: _____ DATE: _____

7.16 PERFORM AN IR TEST ON EACH PIN AT 10,000 VDC WITH A 1 MINUTE DWELL. MAKE AS MANY COPIES OF TABLE A1 IN APPENDIX A AS REQUIRED AND RECORD THE RESULTING INSULATION VALUES IN THAT TABLE. ENSURE THAT THIS STEP NUMBER IS RECORDED IN THE ALLOCATED SPACE IN THE TABLE AS WELL.

OPERATOR INITIALS: _____ DATE: _____

7.17 REMOVE THE TESTED PIN FROM THE WATER BATH. REMOVE THE BLADDERS FROM THE TESTED PIN. ENSURE THAT THE NUMBERING ON THE PIN IS STILL INTACT AND CAREFULLY SET THE PIN ASIDE.

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8.0 THERMAL CYCLES:

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.

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

OPERATOR/OBSERVER NAME(S): _____;

DATE: _____

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

TABLE 4 - THERMAL CYCLE CALIBRATION INFORMATION			
EQUIPMENT TYPE	ODI ID NUMBER	LAST CALIBRATION DATE	NEXT CALIBRATION DATE

OPERATOR INITIALS: _____ DATE: _____

- 8.3 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: _____

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

OPERATOR INITIALS: _____ DATE: _____

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8.5 OBTAIN THE 105 PINS THAT WERE TESTED IN SECTION 7.0.

OPERATOR INITIALS: _____ DATE: _____

8.6 PLACE ALL 105 PINS INTO A THERMAL CHAMBER THAT IS CAPABLE OF OPERATING IN THE RANGE OF $-25^{\circ}\text{C} +0^{\circ}\text{C}/-5^{\circ}\text{C}$ TO $55^{\circ}\text{C} +5^{\circ}\text{C}/-0^{\circ}\text{C}$. ENSURE THAT THE THERMAL CHAMBER CALIBRATION DATA IS RECORDED IN TABLE 4. PHOTOGRAPH THE PIN LAYOUT.

NOTE: SPACE PINS FROM EACH OTHER AS MUCH AS POSSIBLE TO MAXIMIZE CONVECTION HEAT TRANSFER TO EACH PIN. THE PINS MAY BE TESTED IN STAGES IF THE THERMAL CHAMBER CAPACITY CANNOT ACCEPT ALL 105 PINS.

OPERATOR INITIALS: _____ DATE: _____

8.7 ENSURE THAT THE THERMAL CHAMBER TEMPERATURE CAN BE MONITORED CONTINUOUSLY THROUGHOUT ALL CYCLES WITH A DATA ACQUISITION SYSTEM. THE PLOTS OF THE THERMAL CYCLES WILL BE SUBMITTED AT THE END OF THE TEST. START THE DATA ACQUISITION PRIOR TO THE INITIAL RAISE IN TEMPERATURE FOR THIS TEST.

OPERATOR INITIALS: _____ DATE: _____

8.8 TURN ON THE THERMAL CHAMBER AND ENSURE THAT IT IS SET TO $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

OPERATOR INITIALS: _____ DATE: _____

8.9 RAISE THE THERMAL CHAMBER TEMPERATURE TO $55^{\circ}\text{C} +5^{\circ}\text{C}/-0^{\circ}\text{C}$ AND MAINTAIN $55^{\circ}\text{C} +5^{\circ}\text{C}/-0^{\circ}\text{C}$ FOR 1 HOUR.

OPERATOR INITIALS: _____ DATE: _____

8.10 LOWER THE THERMAL CHAMBER TEMPERATURE TO $-25^{\circ}\text{C} +0^{\circ}\text{C}/-5^{\circ}\text{C}$ AND MAINTAIN $-25^{\circ}\text{C} +0^{\circ}\text{C}/-5^{\circ}\text{C}$ FOR 1 HOUR.

OPERATOR INITIALS: _____ DATE: _____

8.11 REPEAT STEPS 8.9 AND 8.10 UNTIL A TOTAL OF 20 CYCLES BETWEEN $-25^{\circ}\text{C} +0^{\circ}\text{C}/-5^{\circ}\text{C}$ AND $55^{\circ}\text{C} +5^{\circ}\text{C}/-0^{\circ}\text{C}$ ARE ACHIEVED.

OPERATOR INITIALS: _____ DATE: _____

8.12 SET THE THERMAL CHAMBER TEMPERATURE TO $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ AND ALLOW THE PINS TO SOAK AT THIS TEMPERATURE FOR 1 HOUR.

OPERATOR INITIALS: _____ DATE: _____

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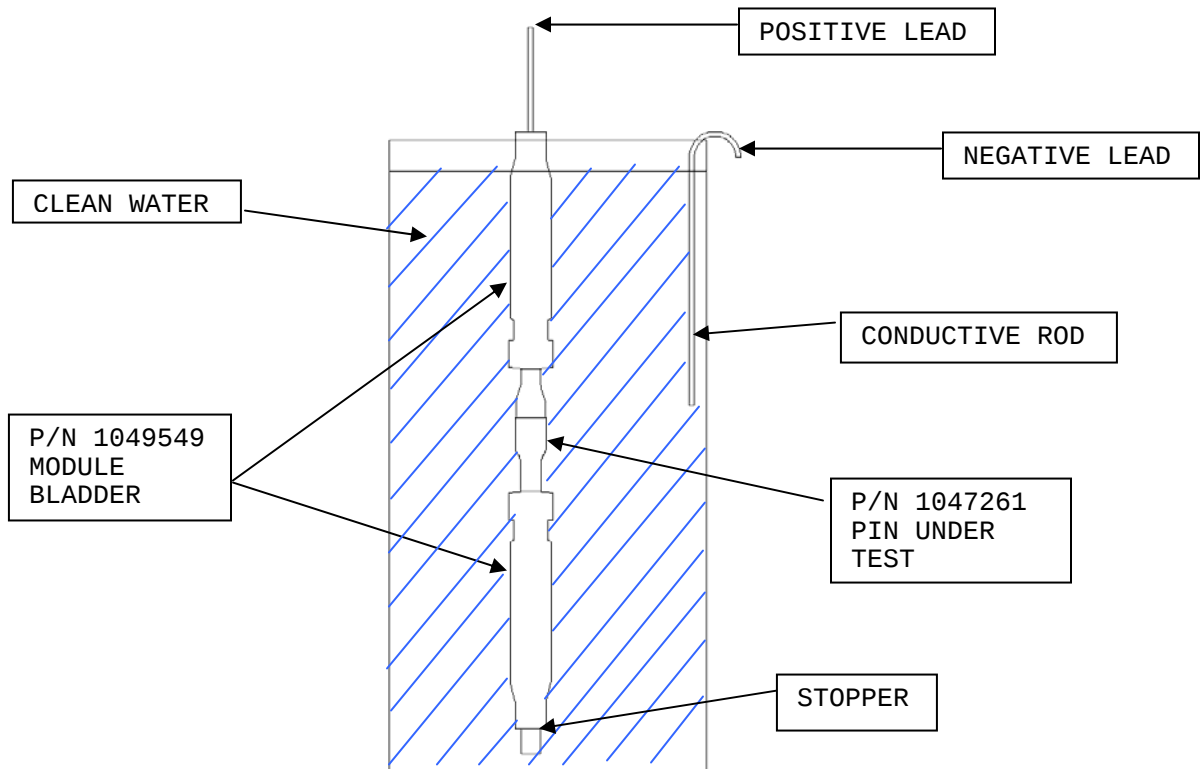
Reference

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8.15 PERFORM AN IR TEST (REFER TO THE FIGURE BELOW FOR TEST SET-UP) ON EACH PIN AT 10,000 VDC WITH A 1 MINUTE DWELL. MAKE AS MANY COPIES OF TABLE A1 IN APPENDIX A AS REQUIRED AND RECORD THE RESULTING INSULATION VALUES IN THAT TABLE. ENSURE THAT THIS STEP NUMBER IS RECORDED IN THE ALLOCATED SPACE IN THE TABLE AS WELL.



TEST CONFIGURATION FOR INSULATION RESISTANCE TESTING

OPERATOR INITIALS: _____ DATE: _____

8.16 ENSURE THAT ALL 105 PINS HAVE BEEN TESTED PER SECTION 8.0.

OPERATOR INITIALS: _____ DATE: _____

8.17 ATTACH A PLOT (OR PLOTS) OF THE THERMAL CHAMBER TEMPERATURE VS. TIME FOR ALL THERMAL CYCLES CONDUCTED IN SECTION 8.0 TO THE END OF THIS DOCUMENT OR ASSOCIATED PROJECT FOLDER.

OPERATOR INITIALS: _____ DATE: _____

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9.0 THERMAL SHOCK:

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.

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

OPERATOR/OBSERVER NAME(S): _____;

DATE: _____

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

TABLE 5 - THERMAL SHOCK CALIBRATION INFORMATION

EQUIPMENT TYPE	ODI ID NUMBER	LAST CALIBRATION DATE	NEXT CALIBRATION DATE

OPERATOR INITIALS: _____ DATE: _____

- 9.3 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: _____

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

OPERATOR INITIALS: _____ DATE: _____

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9.5 OBTAIN THE 105 PINS THAT WERE TESTED IN SECTION 8.0.

OPERATOR INITIALS: _____ DATE: _____

9.6 OBTAIN A THERMAL CHAMBER THAT IS CAPABLE OF OPERATING IN THE RANGE OF -25°C +0°C/-5°C TO 55°C +5°C/-0°C. ENSURE THAT THE THERMAL CHAMBER CALIBRATION DATA IS RECORDED IN TABLE 5.

OPERATOR INITIALS: _____ DATE: _____

9.7 FIND A SUITABLE CONTAINER IN WHICH TO CREATE AN ICE WATER BATH. ENSURE THE CONTAINER IS BIG ENOUGH TO HANDLE THE ICE WATER VOLUME AND THE PIN VOLUME. IF USING A BASKET OR PAN TO TRANSFER THE PINS, ENSURE THAT THE ICE BATH CONTAINER CAN HANDLE THAT VOLUME AS WELL. ENSURE THAT THE ICE WATER VOLUME IS ALSO LARGE ENOUGH TO WITHSTAND SUBMERSION OF ALL 55°C PINS AND STILL NOT RAISE THE ICE WATER BATH TEMPERATURE OVER THE MAXIMUM TEMPERATURE OF 4°C WHEN THE 55°C PINS ARE SUBMERGED. ENSURE THAT THE ICE WATER VOLUME IS LARGE ENOUGH TO WITHSTAND SUBMERSION OF ALL -25°C PINS AND STILL NOT LOWER THE ICE WATER BATH TEMPERATURE PAST THE MINIMUM TEMPERATURE OF 0°C.

NOTE: THIS TEST CAN BE RUN IN SMALLER GROUPS AND/OR WITH MANY ICE BATHS. THE INTENT IS TO SHOCK THE PINS AS AGGRESSIVELY AS POSSIBLE TO VALIDATE THE DURABILITY OF THE PINS IN THE WORST CASE THERMAL SHOCK CONDITIONS.

OPERATOR INITIALS: _____ DATE: _____

9.8 ESTABLISH THE ICE WATER BATH. MONITOR THE ICE WATER BATH TEMPERATURE WITH A METER TO ENSURE THAT IT MAINTAINS A TEMPERATURE OF 0°C +4°C/-0°C.

OPERATOR INITIALS: _____ DATE: _____

9.9 ENSURE THAT THE THERMAL CHAMBER TEMPERATURE AND THE ICE WATER BATH TEMPERATURE CAN BE MONITORED CONTINUOUSLY THROUGHOUT ALL THERMAL SHOCK CYCLES WITH A DATA ACQUISITION SYSTEM. START THE DATA ACQUISITION OF THE THERMAL CHAMBER TEMPERATURE AND ICE WATER BATH TEMPERATURE PRIOR TO THE INITIAL RAISE IN TEMPERATURE FOR THIS TEST.

OPERATOR INITIALS: _____ DATE: _____

9.10 SET THE THERMAL CHAMBER TO MAINTAIN 55°C +5°C/-0°C.

OPERATOR INITIALS: _____ DATE: _____

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9.11 PLACE THE PINS IN A CONTAINER (OR MULTIPLE CONTAINERS) SUCH AS A STRAINER BASKET. IF POSSIBLE, MANAGE ALL OF THE PINS IN SINGLE LAYERS. IF STACKING IS NEEDED, MAINTAIN A MINIMAL SPACE OF ½ INCH BETWEEN EACH LAYER OF PINS TO PROMOTE FASTER HEAT TRANSFER BETWEEN THE PINS. PHOTOGRAPH THE PIN LAYOUT.

NOTE: PINS MAY BE TESTED IN STAGES IF THERMAL CHAMBER CAPACITY CANNOT ACCEPT 105 PINS.

NOTE: PLACING SEVERAL OR ALL OF THE PINS IN A STRAINER TYPE BASKET/PAN WILL ENSURE RAPID TRANSFER OF PINS FROM ONE TEMPERATURE EXTREME TO ANOTHER.

OPERATOR INITIALS: _____ DATE: _____

9.12 PLACE THE PINS INTO THE THERMAL CHAMBER. ALLOW THE PINS TO SOAK IN THE CHAMBER AT 55°C +5°C/-0°C FOR A MINIMUM OF 1 HOUR.

OPERATOR INITIALS: _____ DATE: _____

9.13 AFTER THE 1 HOUR MINIMUM 55°C +5°C/-0°C THERMAL CHAMBER SOAK TIME HAS ELAPSED, REMOVE THE PINS FROM THE CHAMBER AND IMMEDIATELY SUBMERGE THEM INTO THE 0°C +4°C/-0°C ICE WATER BATH. ENSURE THAT THE PINS ARE TRANSFERRED FROM THE THERMAL CHAMBER TO THE ICE BATH WITHIN 15 SECONDS.

OPERATOR INITIALS: _____ DATE: _____

9.14 ALLOW THE PINS TO REMAIN WITHIN THE ICE WATER BATH FOR A MINIMUM OF 10 MINUTES.

OPERATOR INITIALS: _____ DATE: _____

9.15 REMOVE THE PINS FROM THE ICE WATER BATH.

OPERATOR INITIALS: _____ DATE: _____

9.16 REPEAT STEPS 9.12 THROUGH 9.15 FOR A TOTAL OF 20 THERMAL SHOCK CYCLES.

OPERATOR INITIALS: _____ DATE: _____

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9.17 SET THE THERMAL CHAMBER TO MAINTAIN -25°C +0°C/-5°C.

OPERATOR INITIALS: _____ DATE: _____

9.18 MAINTAIN OR RE-ESTABLISH THE ICE WATER BATH IN ACCORDANCE WITH THE GUIDELINES IN STEPS 9.7 AND 9.8. MONITOR THE ICE WATER BATH TEMPERATURE WITH A METER TO ENSURE THAT IT MAINTAINS A TEMPERATURE OF 0°C +4°C/-0°C.

OPERATOR INITIALS: _____ DATE: _____

9.19 PLACE THE PINS INTO THE THERMAL CHAMBER. ALLOW THEM TO SOAK IN THE CHAMBER AT -25°C +0°C/-5°C FOR A MINIMUM OF 1 HOUR.

OPERATOR INITIALS: _____ DATE: _____

9.20 AFTER THE 1 HOUR MINIMUM -25°C +0°C/-5°C THERMAL CHAMBER SOAK TIME HAS ELAPSED, REMOVE THE PINS FROM THE CHAMBER AND IMMEDIATELY SUBMERGE THEM INTO THE 0°C +4°C/-0°C ICE WATER BATH. ENSURE THAT THE PINS ARE TRANSFERRED FROM ONE THERMAL ENVIRONMENT TO THE NEXT WITHIN 15 SECONDS.

OPERATOR INITIALS: _____ DATE: _____

9.21 ALLOW THE PINS TO REMAIN WITHIN THE ICE WATER BATH FOR A MINIMUM OF 10 MINUTES.

OPERATOR INITIALS: _____ DATE: _____

9.22 REMOVE THE PINS FROM THE ICE WATER BATH.

OPERATOR INITIALS: _____ DATE: _____

9.23 REPEAT STEPS 9.19 THROUGH 9.22 FOR A TOTAL OF 20 THERMAL SHOCK CYCLES.

OPERATOR INITIALS: _____ DATE: _____

9.24 PLACE THE PINS BACK INTO THE THERMAL CHAMBER AND RETURN THE THERMAL CHAMBER TEMPERATURE TO 25°C±2°C. ALLOW THE PINS TO SOAK AT THIS TEMPERATURE FOR A MINIMUM OF 1 HOUR.

OPERATOR INITIALS: _____ DATE: _____

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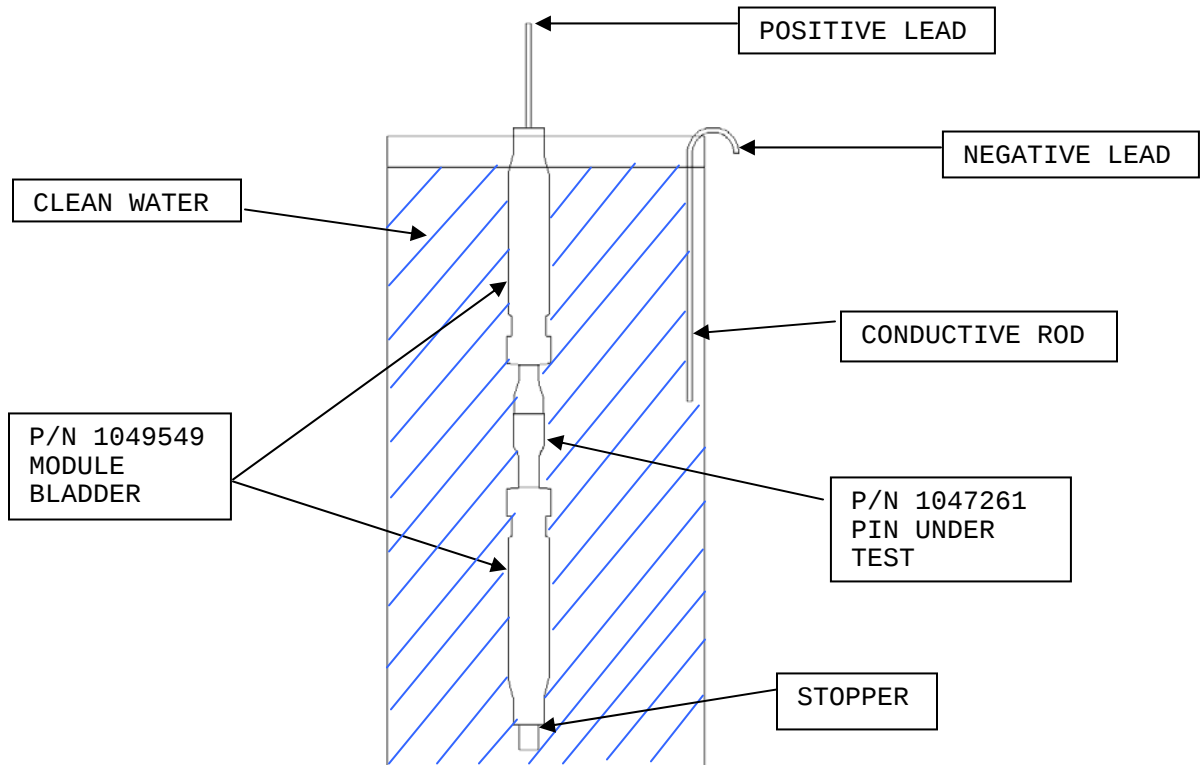
Reference

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9.26 PERFORM AN IR TEST (REFER TO THE FIGURE BELOW FOR TEST SET-UP) ON EACH PIN AT 10,000 VDC WITH A 1 MINUTE DWELL. MAKE AS MANY COPIES OF TABLE A1 IN APPENDIX A AS REQUIRED AND RECORD THE RESULTING INSULATION RESISTANCE VALUES IN THAT TABLE. ENSURE THAT THIS STEP NUMBER IS RECORDED IN THE ALLOCATED SPACE IN THE TABLE AS WELL.



TEST CONFIGURATION FOR INSULATION RESISTANCE TESTING

OPERATOR INITIALS: _____ DATE: _____

9.27 ENSURE THAT ALL 105 PINS HAVE BEEN TESTED PER SECTION 9.0.

OPERATOR INITIALS: _____ DATE: _____

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9.28 PRODUCE PLOTS OF THE ICE WATER BATH TEMPERATURE (Y AXIS) VS. TIME (X AXIS) FOR EACH THERMAL SHOCK CYCLE. FOR EACH PLOT, DISPLAY THE ICE WATER BATH TEMPERATURE A MINIMUM OF 30 SECONDS BEFORE THE THERMAL SHOCK UNTIL THE END OF THE 10 MINUTE THERMAL SHOCK CYCLE IS COMPLETE. AS A MINIMUM, ANNOTATE ON EACH PLOT THE THERMAL CHAMBER TEMPERATURE AND THE THERMAL SHOCK CYCLE NUMBER FOR THAT THERMAL CHAMBER TEMPERATURE. ATTACH THE PLOTS OF THE THERMAL CHAMBER TEMPERATURE VS. TIME FOR ALL THERMAL SHOCK CYCLES CONDUCTED IN SECTION 9.0 TO THE END OF THIS DOCUMENT OR ASSOCIATED PROJECT FOLDER.

OPERATOR INITIALS: _____ DATE: _____

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10.0 HIGH PRESSURE AND TEMPERATURE SOAK OF PINS IN SEAWATER:

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: 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.

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

OPERATOR/OBSERVER NAME(S): _____;

DATE: _____

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

TABLE 6 - HIGH PRESSURE/TEMPERATURE SOAK CALIBRATION INFORMATION			
EQUIPMENT TYPE	ODI ID NUMBER	LAST CALIBRATION DATE	NEXT CALIBRATION DATE

OPERATOR INITIALS: _____ DATE: _____

10.3 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: _____

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

OPERATOR INITIALS: _____ DATE: _____

10.5 OBTAIN ALL 105 PINS THAT WERE PREVIOUSLY TESTED IN SECTION 9.0.

OPERATOR INITIALS: _____ DATE: _____

NOTE: PINS 1 - 30 WILL BE RETRIEVED AFTER 500 HOURS, PINS 31 - 60 WILL BE RETRIEVED AFTER 1000 HOURS AND PINS 61 - 105 WILL BE RETRIEVED AT THE END OF THE TEST. THE TECHNICIAN MAY WANT TO ORGANIZE THE COLLECTION OF PINS TO FACILITATE EASIER REMOVAL OF THE PINS AS DESCRIBED.

10.6 PLACE PINS 1-30 INTO A LARGE, PLASTIC, SEALABLE BAG. PLACE PINS 31-60 INTO ANOTHER, DIFFERENT, LARGE PLASTIC SEALABLE BAG. PLACE THE REMAINING PINS IN A 3RD LARGE PLASTIC SEALABLE BAG. FILL EACH BAG WITH SIMULATED SEAWATER FOR TESTING.

OPERATOR INITIALS: _____ DATE: _____

10.7 PLACE ALL OF THE PINS INTO A PRESSURE VESSEL CAPABLE OF MAINTAINING 15,000 PSI AT 45°C FOR EXTENDED PERIODS OF TIME. ENSURE THAT THE PRESSURE AND TEMPERATURE CAN BE RECORDED CONTINUOUSLY THROUGHOUT THE TEST THROUGH A DATA ACQUISITION SYSTEM WITH A MAXIMUM ERROR OF 1%.

OPERATOR INITIALS: _____ DATE: _____

10.8 INITIATE THE DATA ACQUISITION OF THE VESSEL PRESSURE AND TEMPERATURE.

OPERATOR INITIALS: _____ DATE: _____

10.9 WITH THE PRESSURE VESSEL VENTED TO ATMOSPHERE, RAISE THE TEMPERATURE OF THE PRESSURE VESSEL TO 45°C +5°C/-0°C. MAINTAIN THIS TEMPERATURE THROUGHOUT THE DURATION OF THIS TEST.

OPERATOR INITIALS: _____ DATE: _____

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10.10 WHEN THE PRESSURE VESSEL HAS REACHED A THERMAL STEADY STATE CONDITION AT 45°C +5°C/-0°C, CLOSE THE VENT AND INCREASE THE PRESSURE TO 500 ± 100 PSI. HOLD PRESSURE AT 500 ± 100 PSI. PERFORM A THOROUGH VISUAL INSPECTION OF ALL VESSELS AND CONNECTED EQUIPMENT TO ENSURE THAT THERE ARE NO LEAKS. COMMENT ON THE STATUS OF THE SYSTEM IN THE PROVIDED SPACE BELOW:

COMMENTS: _____

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

OPERATOR INITIALS: _____ DATE: _____

10.11 INCREASE THE PRESSURE OF THE VESSEL TO 5000 ± 100 PSI. HOLD PRESSURE AT 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: _____

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10.12 INCREASE THE PRESSURE OF THE VESSELS TO 10,000 ± 100 PSI. HOLD PRESSURE AT 10,000 ± 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: _____

10.13 ONCE THE SYSTEM IS VERIFIED TO BE LEAK FREE, PRESSURIZE THE SYSTEM TO 15,000 +200/-0 PSI AT A RATE OF APPROXIMATELY 500 PSI/MINUTE. RECORD THE TEST DATE AND TIME, THE TEST TEMPERATURE AND THE TEST PRESSURE AT THE START OF THE 15,000 PSI HOLD.

TEST START DATE/TIME: _____

TEST PRESSURE (PSI): _____

TEST TEMPERATURE (°C): _____

OPERATOR INITIALS: _____ DATE: _____

10.14 MAINTAIN THE 15,000 +200 PSI/-0 PSI PRESSURE AND THE 45°C +5°C/-0°C TEMPERATURE FOR 500 HOURS.

OPERATOR INITIALS: _____ DATE: _____

10.15 AT THE END OF THE 500 HOUR HOLD, RECORD THE TEST STOP DATE AND STOP TIME, THE TEST TEMPERATURE AND THE TEST PRESSURE JUST BEFORE VENTING THE SYSTEM.

TEST STOP DATE/TIME: _____

TEST PRESSURE (PSI): _____

TEST TEMPERATURE (°C): _____

OPERATOR INITIALS: _____ DATE: _____

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10.16 DEPRESSURIZE THE PRESSURE VESSEL TO ATMOSPHERIC PRESSURE AT A RATE OF APPROXIMATELY 500 PSI PER MINUTE.

OPERATOR INITIALS: _____ DATE: _____

10.17 REDUCE THE TEMPERATURE OF THE PRESSURE VESSEL TO AMBIENT TEMPERATURE. ALLOW THE PINS TO REMAIN IN THE PRESSURE VESSEL FOR A MINIMUM OF 4 HOURS AT AMBIENT TEMPERATURE AND PRESSURE BEFORE REMOVING THEM FROM THE VESSEL.

OPERATOR INITIALS: _____ DATE: _____

10.18 REMOVE PINS 1 - 30 FROM THE PRESSURE VESSEL. MAINTAIN THE PINS IN A ROOM TEMPERATURE SEAWATER BATH UNTIL THEY ARE TESTED FOR INSULATION RESISTANCE. AFTER THEY ARE TESTED FOR INSULATION RESISTANCE, MAINTAIN THE PINS IN A ROOM TEMPERATURE SEAWATER BATH UNTIL THEY ARE TESTED PER SECTION 11 OR SECTION 12.

OPERATOR INITIALS: _____ DATE: _____

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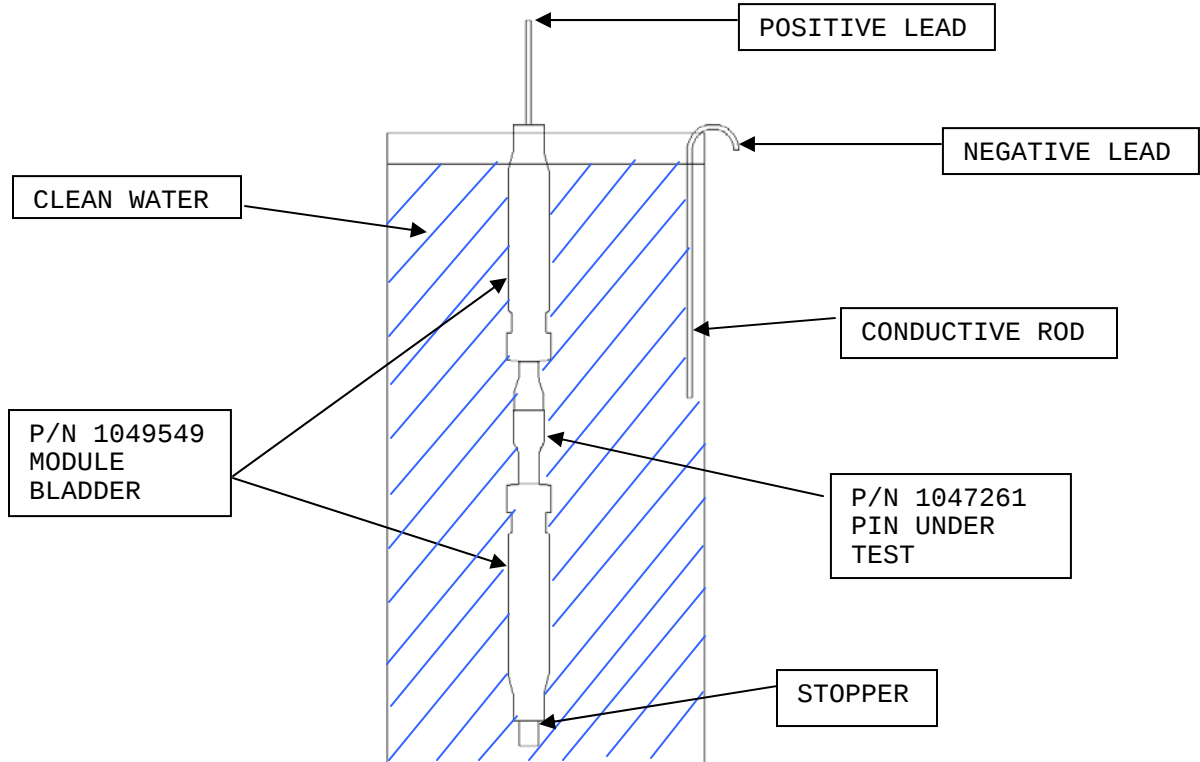
Reference

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10.19 PERFORM AN IR TEST (REFER TO THE FIGURE BELOW FOR TEST SET-UP) ON EACH OF THE 30 REMOVED PINS AT 10,000 VDC WITH A 1 MINUTE DWELL. MAKE AS MANY COPIES OF TABLE A1 IN APPENDIX A AS REQUIRED AND RECORD THE RESULTING INSULATION RESISTANCE VALUES IN THAT TABLE. ENSURE THAT THIS STEP NUMBER IS RECORDED IN THE ALLOCATED SPACE IN THE TABLE AS WELL.



TEST CONFIGURATION FOR INSULATION RESISTANCE TESTING

OPERATOR INITIALS: _____ DATE: _____

10.20 TEST PINS 1 - 15 OF THE 30 REMOVED PINS PER SECTION 11.

OPERATOR INITIALS: _____ DATE: _____

10.21 TEST PINS 16 - 30 OF THE 30 REMOVED PINS PER SECTION 12.

OPERATOR INITIALS: _____ DATE: _____

10.22 INSPECT THE PRESSURE VESSEL O-RING(S) BEFORE PROCEEDING AND REPLACE AS NECESSARY.

OPERATOR INITIALS: _____ DATE: _____

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10.23 WITH THE REMAINING PINS STILL IN THE PRESSURE VESSEL, CLOSE THE PRESSURE VESSEL AND FILL AND VENT THE SYSTEM WITH SEAWATER.

OPERATOR INITIALS: _____ DATE: _____

10.24 RAISE THE PRESSURE VESSEL SEAWATER TEMPERATURE TO 45°C + 5°C/-0°C.

OPERATOR INITIALS: _____ DATE: _____

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10.25 WHEN THE PRESSURE VESSEL HAS REACHED A THERMAL STEADY STATE CONDITION AT 45°C +5°C/-0°C, CLOSE THE VENT AND INCREASE THE PRESSURE TO 500 ± 100 PSI. HOLD PRESSURE AT 500 ± 100 PSI. PERFORM A THOROUGH VISUAL INSPECTION OF ALL VESSELS AND CONNECTED EQUIPMENT TO ENSURE THAT THERE ARE NO LEAKS. COMMENT ON THE STATUS OF THE SYSTEM IN THE PROVIDED SPACE BELOW:

COMMENTS: _____

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

OPERATOR INITIALS: _____ DATE: _____

10.26 INCREASE THE PRESSURE OF THE VESSEL TO 5000 ± 100 PSI. HOLD PRESSURE AT 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: _____

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10.27 INCREASE THE PRESSURE OF THE VESSELS TO 10,000 ± 100 PSI. HOLD PRESSURE AT 10,000 ± 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: _____

10.28 ONCE THE SYSTEM IS VERIFIED TO BE LEAK FREE, PRESSURIZE THE SYSTEM TO 15,000 +200/-0 PSI AT A RATE OF APPROXIMATELY 500 PSI/MINUTE. RECORD THE TEST DATE AND TIME, THE TEST TEMPERATURE AND THE TEST PRESSURE AT THE START OF THE 15,000 PSI HOLD.

TEST START DATE/TIME: _____

TEST PRESSURE (PSI): _____

TEST TEMPERATURE (°C): _____

OPERATOR INITIALS: _____ DATE: _____

10.29 MAINTAIN THE 15,000 +200 PSI/-0 PSI PRESSURE AND THE 45°C +5°C/-0°C TEMPERATURE FOR AN ADDITIONAL 500 HOURS +4 HOURS/-0 HOURS.

OPERATOR INITIALS: _____ DATE: _____

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10.30 AT THE END OF THE SECOND 500 HOUR HOLD (1000 HOURS CUMULATIVE TIME), RECORD THE TEST STOP DATE AND STOP TIME, THE TEST TEMPERATURE AND THE TEST PRESSURE JUST BEFORE VENTING THE SYSTEM.

TEST STOP DATE/TIME: _____

TEST PRESSURE (PSI): _____

TEST TEMPERATURE (°C): _____

OPERATOR INITIALS: _____ DATE: _____

10.31 DEPRESSURIZE THE PRESSURE VESSEL TO ATMOSPHERIC PRESSURE AT A RATE OF APPROXIMATELY 500 PSI PER MINUTE.

OPERATOR INITIALS: _____ DATE: _____

10.32 REDUCE THE TEMPERATURE OF THE PRESSURE VESSEL TO AMBIENT TEMPERATURE. ALLOW THE PINS TO REMAIN IN THE PRESSURE VESSEL FOR A MINIMUM OF 4 HOURS AT AMBIENT TEMPERATURE AND PRESSURE BEFORE REMOVING THEM FROM THE VESSEL.

OPERATOR INITIALS: _____ DATE: _____

10.33 REMOVE PINS 31 - 60 FROM THE PRESSURE VESSEL. MAINTAIN THE PINS IN A ROOM TEMPERATURE SEAWATER BATH UNTIL THEY ARE TESTED FOR INSULATION RESISTANCE. AFTER THEY ARE TESTED FOR INSULATION RESISTANCE, MAINTAIN THE PINS IN A ROOM TEMPERATURE SEAWATER BATH UNTIL THEY ARE TESTED PER SECTION 11 OR SECTION 12.

OPERATOR INITIALS: _____ DATE: _____

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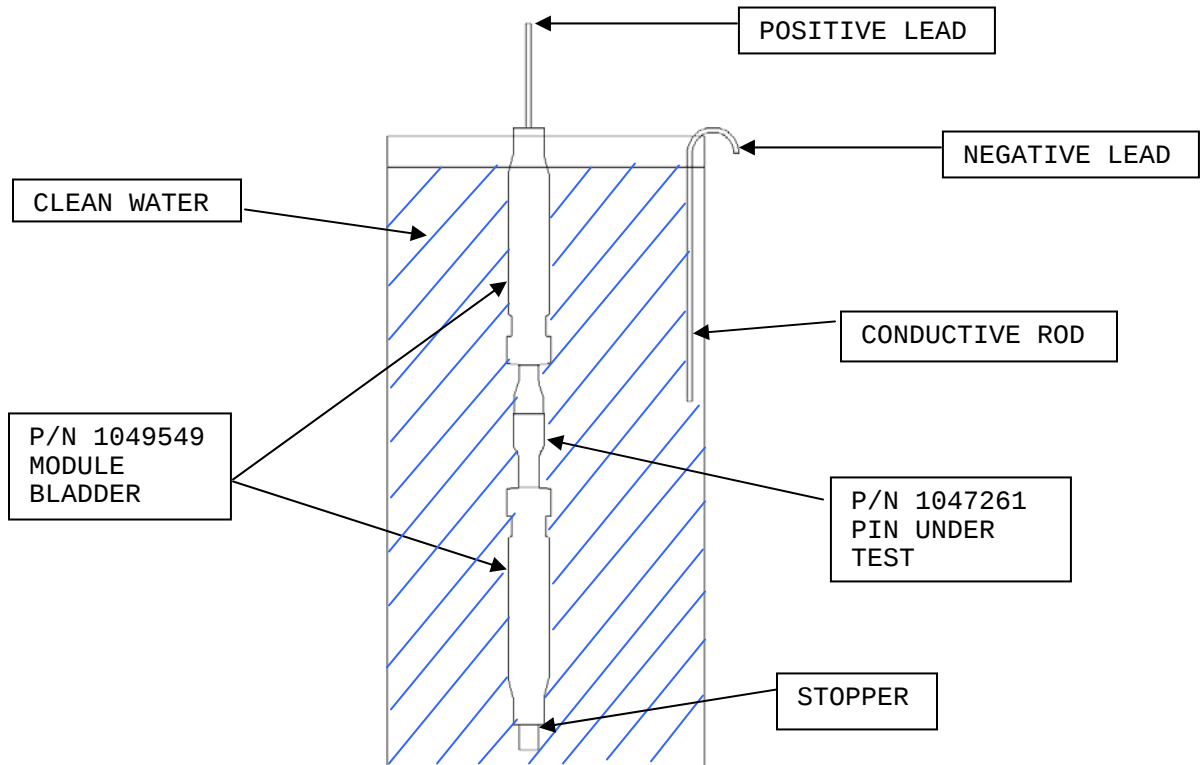
Reference

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10.34 PERFORM AN IR TEST (REFER TO THE FIGURE BELOW FOR TEST SET-UP) ON EACH OF THE 30 REMOVED PINS AT 10,000 VDC WITH A 1 MINUTE DWELL. MAKE AS MANY COPIES OF TABLE A1 IN APPENDIX A AS REQUIRED AND RECORD THE RESULTING INSULATION RESISTANCE VALUES IN THAT TABLE. ENSURE THAT THIS STEP NUMBER IS RECORDED IN THE ALLOCATED SPACE IN THE TABLE AS WELL.



TEST CONFIGURATION FOR INSULATION RESISTANCE TESTING

OPERATOR INITIALS: _____ DATE: _____

10.35 TEST PINS 31 - 45 OF THE 30 REMOVED PINS PER SECTION 11.

OPERATOR INITIALS: _____ DATE: _____

10.36 TEST PINS 46 THROUGH 60 OF THE 30 REMOVED PINS PER SECTION 12.

OPERATOR INITIALS: _____ DATE: _____

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10.37 BASED ON THE RESULTS FROM THE TESTS PERFORMED (SECTION 11 AND 12) ON THE 60 REMOVED PINS, THE ENGINEER WILL PROVIDE THE DURATION OF THE LAST PRESSURE/TEMPERATURE SOAK CYCLE. ENSURE THAT THE DURATION VALUE IS RECORDED BELOW AND THAT THE ENGINEER SIGNS IN THE APPROPRIATE LOCATION, EXPRESSING APPROVAL FOR THE RECORDED VALUE.

RECOMMENDED TEST DURATION (HOURS): _____

OPERATOR INITIALS: _____ DATE: _____

ENGINEER: _____ DATE: _____

10.38 INSPECT THE PRESSURE VESSEL O-RING(S) BEFORE PROCEEDING AND REPLACE AS NECESSARY.

OPERATOR INITIALS: _____ DATE: _____

10.39 WITH THE REMAINING PINS STILL IN THE PRESSURE VESSEL, CLOSE THE PRESSURE VESSEL AND FILL AND VENT THE SYSTEM WITH SEAWATER.

OPERATOR INITIALS: _____ DATE: _____

10.40 RAISE THE PRESSURE VESSEL SEAWATER TEMPERATURE TO 45°C +5°C/-0°C.

OPERATOR INITIALS: _____ DATE: _____

10.41 WHEN THE PRESSURE VESSEL HAS REACHED A THERMAL STEADY STATE CONDITION AT 45°C +5°C/-0°C, CLOSE THE VENT AND INCREASE THE PRESSURE TO 500 ± 100 PSI. HOLD PRESSURE AT 500 ± 100 PSI. PERFORM A THOROUGH VISUAL INSPECTION OF ALL VESSELS AND CONNECTED EQUIPMENT TO ENSURE THAT THERE ARE NO LEAKS. COMMENT ON THE STATUS OF THE SYSTEM IN THE PROVIDED SPACE BELOW:

COMMENTS: _____

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

OPERATOR INITIALS: _____ DATE: _____

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10.42 INCREASE THE PRESSURE OF THE VESSEL TO 5000 ± 100 PSI. HOLD PRESSURE AT 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: _____

10.43 INCREASE THE PRESSURE OF THE VESSELS TO 10,000 ± 100 PSI. HOLD PRESSURE AT 10,000 ± 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: _____

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10.44 ONCE THE SYSTEM IS VERIFIED TO BE LEAK FREE, PRESSURIZE THE SYSTEM TO 15,000 +200/-0 PSI AT A RATE OF APPROXIMATELY 500 PSI/MINUTE. RECORD THE TEST DATE AND TIME, THE TEST TEMPERATURE AND THE TEST PRESSURE AT THE START OF THE 15,000 PSI HOLD.

TEST START DATE/TIME: _____

TEST PRESSURE (PSI): _____

TEST TEMPERATURE (°C): _____

OPERATOR INITIALS: _____ DATE: _____

10.45 MAINTAIN THE 15,000 +200 PSI/-0 PSI PRESSURE AND THE 45°C +5°C/-0°C TEMPERATURE FOR THE RECOMMENDED TIME AS RECORDED IN STEP 10.44, +4 HOURS/-0 HOURS.

OPERATOR INITIALS: _____ DATE: _____

10.46 AFTER THE RECOMMENDED DURATION HAS ELAPSED, RECORD THE TEST STOP DATE AND STOP TIME, THE TEST TEMPERATURE AND THE TEST PRESSURE JUST BEFORE VENTING THE SYSTEM.

TEST STOP DATE/TIME: _____

TEST PRESSURE (PSI): _____

TEST TEMPERATURE (°C): _____

OPERATOR INITIALS: _____ DATE: _____

10.47 DEPRESSURIZE THE PRESSURE VESSEL TO ATMOSPHERIC PRESSURE AT A RATE OF APPROXIMATELY 500 PSI PER MINUTE.

OPERATOR INITIALS: _____ DATE: _____

10.48 REDUCE THE TEMPERATURE OF THE PRESSURE VESSEL TO AMBIENT TEMPERATURE. ALLOW THE PINS TO REMAIN IN THE PRESSURE VESSEL FOR A MINIMUM OF 4 HOURS AT AMBIENT TEMPERATURE AND PRESSURE BEFORE REMOVING THEM FROM THE VESSEL.

OPERATOR INITIALS: _____ DATE: _____

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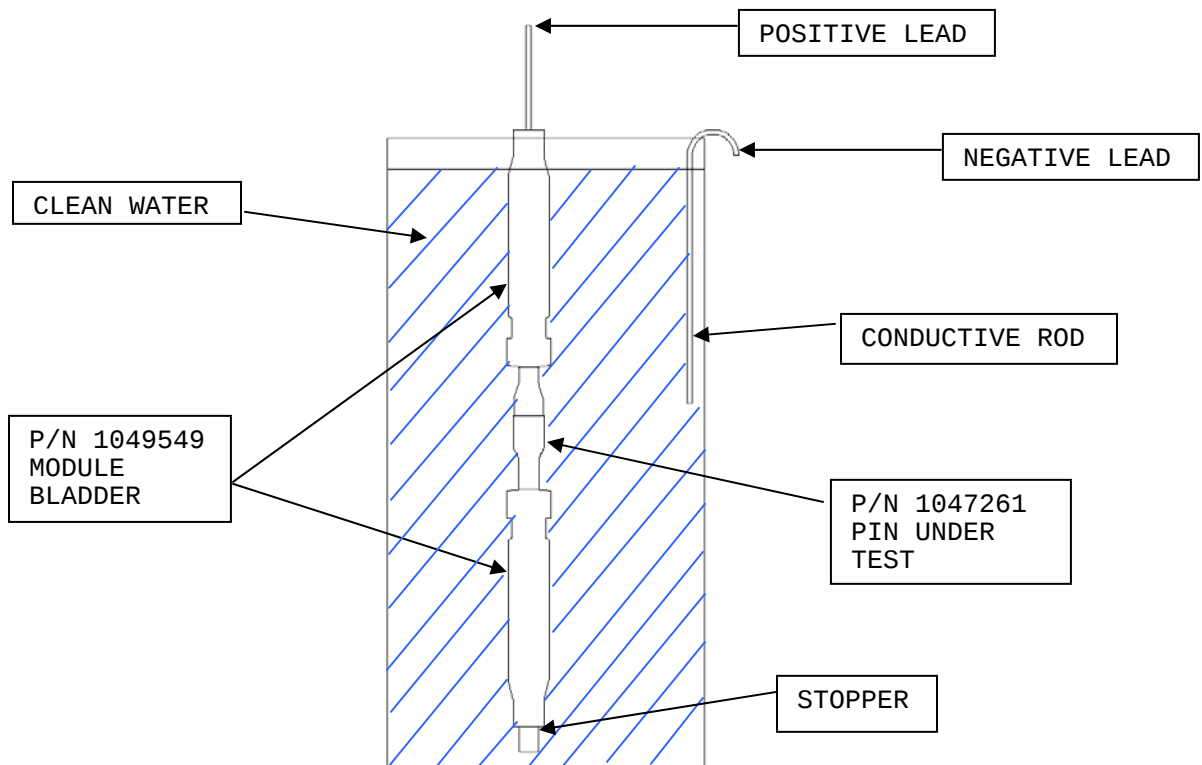
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10.49 REMOVE THE REMAINING PINS FROM THE PRESSURE VESSEL.
MAINTAIN THE PINS IN A ROOM TEMPERATURE SEAWATER BATH UNTIL
THEY ARE TESTED PER SECTION 11 OR SECTION 12.

OPERATOR INITIALS: _____ DATE: _____

10.50 PERFORM AN IR TEST (REFER TO THE FIGURE BELOW FOR TEST SET-
UP) ON PINS 61 THROUGH 90 AT 10,000 VDC WITH A 1 MINUTE
DWELL. MAKE AS MANY COPIES OF TABLE A1 IN APPENDIX A AS
REQUIRED AND RECORD THE RESULTING INSULATION RESISTANCE
VALUES IN THAT TABLE. ENSURE THAT THIS STEP NUMBER IS
RECORDED IN THE ALLOCATED SPACE IN THE TABLE AS WELL.



TEST CONFIGURATION FOR INSULATION RESISTANCE TESTING

OPERATOR INITIALS: _____ DATE: _____

10.51 TEST PINS 61 THROUGH 75 PER SECTION 11.

OPERATOR INITIALS: _____ DATE: _____

10.52 TEST PINS 76 THROUGH 90 PER SECTION 12.

OPERATOR INITIALS: _____ DATE: _____

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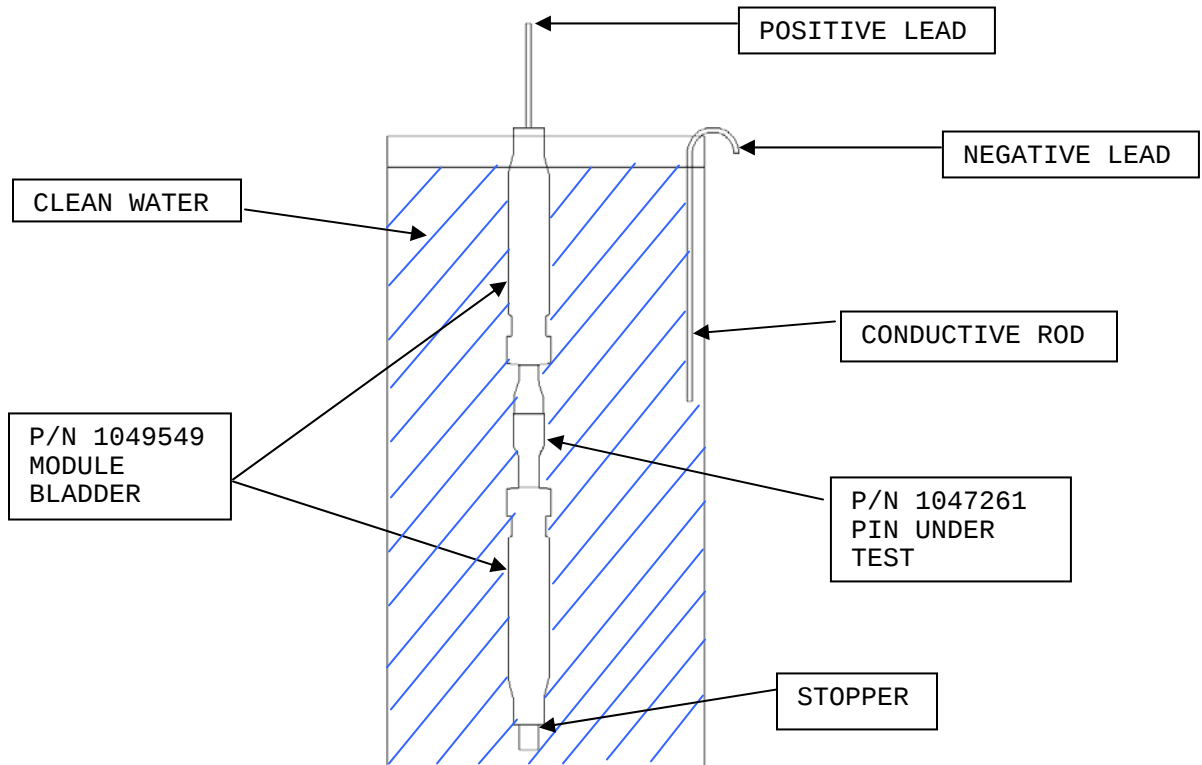
Reference

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10.53 PERFORM AN IR TEST (REFER TO THE FIGURE BELOW FOR TEST SET-UP) ON EACH OF THE 15 REMAINING PINS AT 10,000 VDC WITH A 1 MINUTE DWELL. MAKE AS MANY COPIES OF TABLE A1 IN APPENDIX A AS REQUIRED AND RECORD THE RESULTING INSULATION RESISTANCE VALUES IN THAT TABLE. ENSURE THAT THIS STEP NUMBER IS RECORDED IN THE ALLOCATED SPACE IN THE TABLE AS WELL.



TEST CONFIGURATION FOR INSULATION RESISTANCE TESTING

OPERATOR INITIALS: _____ DATE: _____

10.54 PLACE THE REMAINING 15 PINS INTO A CLEAN, LABELED BAG AND PROVIDE THEM TO THE PROJECT ENGINEER.

OPERATOR INITIALS: _____ DATE: _____

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11.0 STRAIN TO FAILURE TEST:

11.1 TEST THE PINS IN TABLE 7 PER D/N 166319 (QTP-310-41) FOLLOWING THE STRAIN TEST OUTLINED IN TABLE 7.

TABLE 7 - STRAIN TO FAILURE TEST SCHEDULE			
PIN NUMBER			STRAIN TEST
AFTER 500 HOURS AT 15,000 PSI AND 45°C	AFTER 1000 HOURS AT 15,000 PSI AND 45°C	AFTER SPECIFIED DURATION AT 15,000 PSI AND 45°C	
1-5	31-35	61-65	RAPID RAMP
6-10	36-40	66-70	SHORT TERM DURATION - 48 HOURS
11-15	41-45	71-75	LONG TERM DURATION - 336 HOURS

OPERATOR INITIALS: _____ DATE: _____

11.2 ENSURE ALL PINS ARE BAGGED AND LABELED PROPERLY AT THE END OF THE TEST SEQUENCE.

OPERATOR INITIALS: _____ DATE: _____

11.3 ATTACH THE COMPLETED COPIES OF D/N 166319 (QTP-310-41) FOR THESE PINS TO THE END OF THIS DOCUMENT OR THE ASSOCIATED PROJECT FOLDER.

OPERATOR INITIALS: _____ DATE: _____

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12.0 VOLTAGE DC BREAKDOWN TESTING:

12.1 OBSERVE TABLE 8 FOR PROPER DC VOLTAGE BREAKDOWN TEST SCHEDULE OF HIGH POWER PINS.

TABLE 8 - HIGH VOLTAGE DC BREAKDOWN TEST SCHEDULE

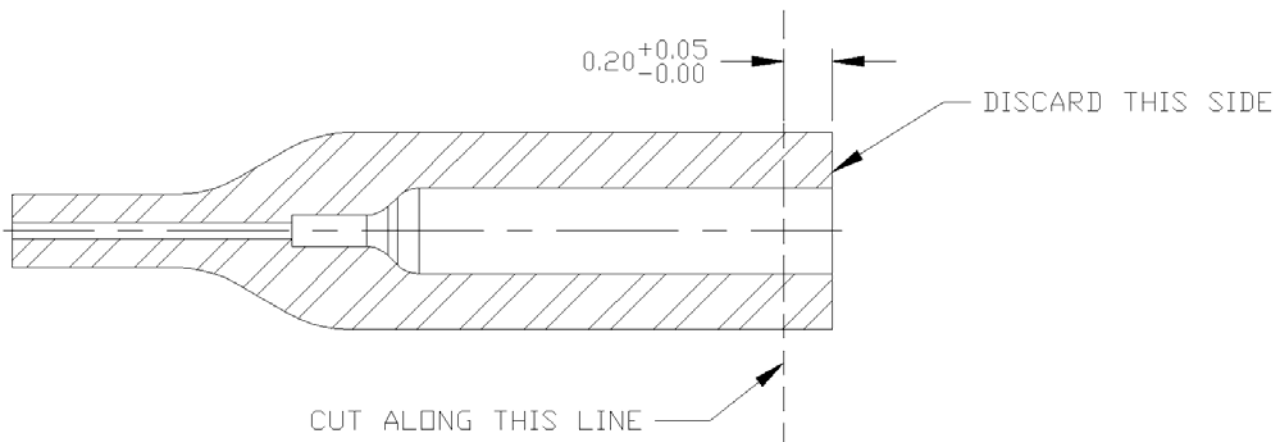
PIN NUMBER			HIGH VOLTAGE DC BREAKDOWN TEST
AFTER 500 HOURS AT 15,000 PSI AND 45°C	AFTER 1000 HOURS AT 15,000 PSI AND 45°C	AFTER SPECIFIED DURATION AT 15,000 PSI AND 45°C	
16-20	46-50	76-80	RAPID RAMP
21-25	51-55	81-85	LONG TERM DURATION - 48 HOURS
26-30	56-60	86-90	LONG TERM DURATION - 336 HOURS

OPERATOR INITIALS: _____ DATE: _____

12.2 SET ASIDE THE PINS THAT WILL BE TESTED PER THE 48 HOUR AND 336 HOUR LONG TERM DURATION TEST METHOD.

OPERATOR INITIALS: _____ DATE: _____

12.3 MODIFY BOOT P/N 1050251 PER THE FIGURE BELOW (UNITS ARE IN INCHES).



BOOT SEAL MODIFICATION DIAGRAM

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12.4 ULTRASONICALLY CLEAN MODIFIED P/N 1050251 BOOT SEALS, P/N 1049549 BLADDERS, AND THE STOPPER(S) FOR AS MINIMUM OF 30 MINUTES IN A CLEAN ALCONOX SOLUTION. RINSE THE PARTS OFF WITH CLEAN DISTILLED WATER AND ALLOW THEM TO DRY.

OPERATOR INITIALS: _____ DATE: _____

12.5 OBTAIN THE FIRST PIN TO BE TESTED PER THE RAPID RAMP TEST METHOD.

OPERATOR INITIALS: _____ DATE: _____

12.6 IF TEST LEADS ARE NOT ALREADY SOLDERED TO P/N 1050130 SOLDER POTS AND READY FOR TEST, CLEAN APPROXIMATELY 1 FOOT OF THE TEST LEAD ENDS (WIRE P/N 1034781 OR P/N 1034774) WITH ALCOHOL AND SOLDER THE WIRE LEADS TO P/N 1050130 PER THE GENERAL REQUIREMENTS OF D/N 10637 (SOP-021-39).

OPERATOR INITIALS: _____ DATE: _____

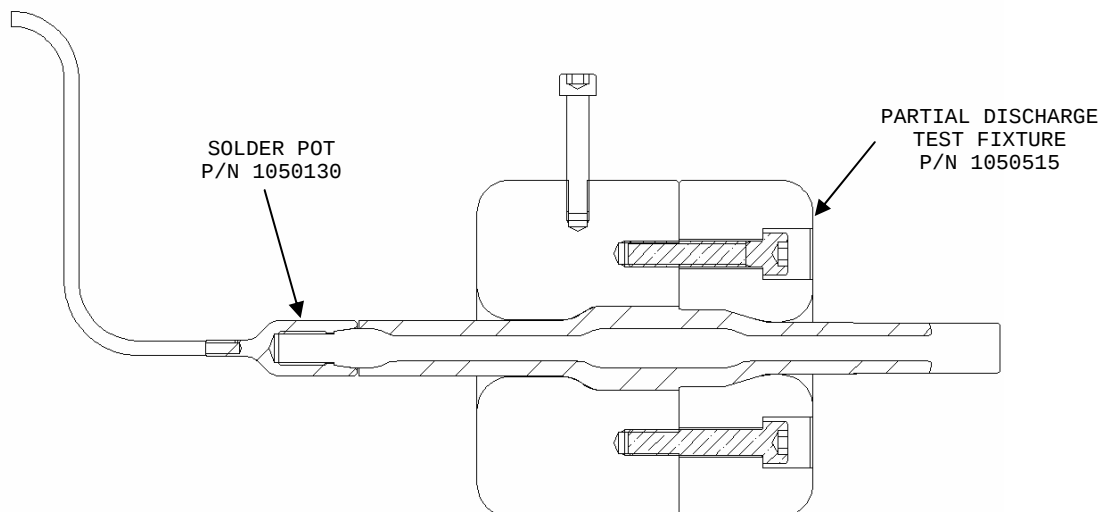
12.7 THREAD THE SOLDER POT (P/N 1050130) ONTO THE PIN.

OPERATOR INITIALS: _____ DATE: _____

12.8 REPEAT STEP 12.6 AND 12.7 FOR ALL PINS THAT ARE TO BE TESTED.

OPERATOR INITIALS: _____ DATE: _____

12.9 ASSEMBLE THE PINS INTO THE PARTIAL DISCHARGE TEST FIXTURE. REFER TO THE FIGURE BELOW FOR GUIDANCE.



HIGH VOLTAGE TEST ASSEMBLY DIAGRAM

OPERATOR INITIALS: _____ DATE: _____

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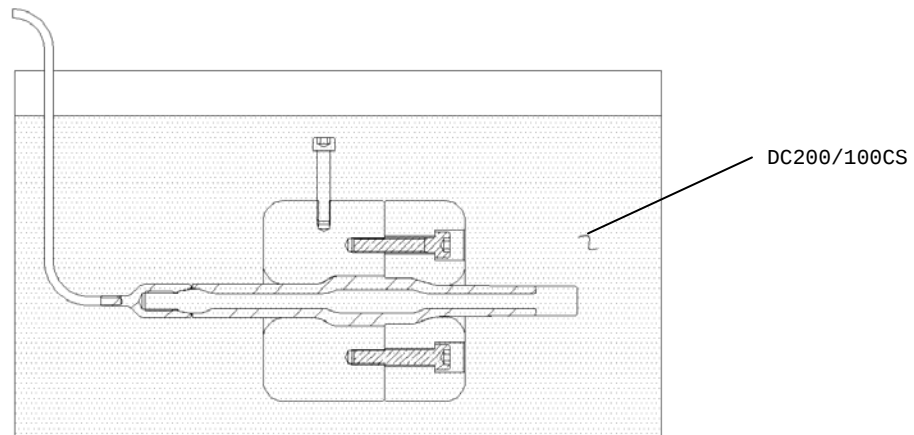
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12.10 PLACE THE ASSEMBLY INTO A CONTAINER OF CLEAN DC200/100CS SILICONE OIL (PREFERABLY ONE THAT THE TESTING IS TO BE CONDUCTED IN), ENSURING THAT IT IS COMPLETELY SUBMERGED WHILE LEAVING THE FREE END OF THE WIRE OUT OF THE OIL BATH. REFER TO THE FIGURE BELOW. PLACE THE MODIFIED BOOT SEAL (P/N 1050251), AND RECEPTACLE MODULE BLADDER (P/N 1049549) INTO THE SAME CONTAINER OF OIL. PULL A VACUUM ON THE OIL BATH FOR A MINIMUM OF 45 MINUTES TO REMOVE AS MUCH AIR FROM THE ASSEMBLY AND ELASTOMERIC COMPONENTS AS POSSIBLE.



HIGH VOLTAGE DEGAS PROCESS CONFIGURATION

OPERATOR INITIALS: _____ DATE: _____

NOTE: ONCE THE PIN/FIXTURE ASSEMBLY IS ASSEMBLED IN THE OIL, THE ASSEMBLY SHALL NOT BE REMOVED UNTIL THE COMPLETION OF PARTIAL DISCHARGE TESTING FOR THAT PIN.

12.11 WHILE SUBMERGED IN THE DEGASSED OIL, SLIDE THE MODIFIED BOOT SEAL P/N 1050251 DOWN THE TEST LEAD UNTIL IT IS PROPERLY SEATED ONTO THE PIN. ENSURE THAT ALL THE AIR IS REMOVED FROM THE INSIDE OF THE BOOT SEAL. WORK AS MUCH OIL OUT OF THE BOOTS AS POSSIBLE.

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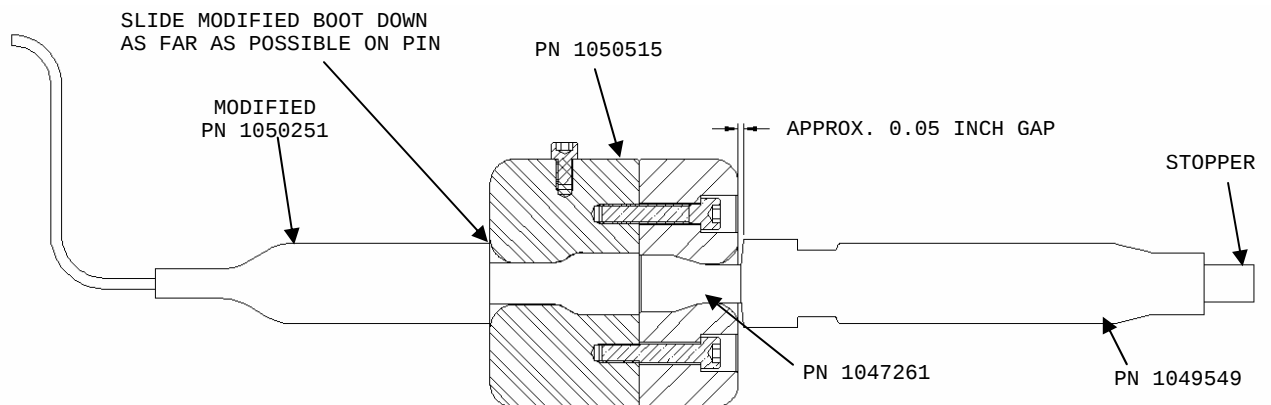
Reference

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12.12 WHILE SUBMERGED IN OIL, ENSURE THAT ALL THE AIR IS REMOVED FROM THE INSIDE OF THE BLADDERS AND SLIDE THE RECEPTACLE MODULE BLADDER (P/N 1049549) OVER THE PIN CONTACT TO THE POINT WHERE A GAP OF APPROXIMATELY 0.05 INCH IS MAINTAINED BETWEEN THE END OF THE BLADDER AND THE PD FIXTURE. INSERT A STOPPER INTO THE OPEN END OF THE BLADDER, MAKING SURE NOT TO TRAP ANY AIR IN THE BLADDER DURING INSTALLATION. REFER TO THE FIGURE BELOW FOR PROPER TEST CONFIGURATION.



COMPLETE HIGH VOLTAGE TEST ASSEMBLY

OPERATOR INITIALS: _____ DATE: _____

NOTE: ONCE THE PIN/FIXTURE ASSEMBLY IS ASSEMBLED IN THE OIL, THE ASSEMBLY SHALL NOT BE REMOVED UNTIL THE COMPLETION OF PARTIAL DISCHARGE TESTING FOR THAT PIN.

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12.13 WHILE THE PIN/FIXTURE ASSEMBLY IS STILL SUBMERGED IN OIL, GROUND THE TEST FIXTURE ONLY AND CONNECT THE TEST LEAD TO THE HIGH VOLTAGE DC HIPOT SOURCE CAPABLE OF ACHIEVING A MINIMUM OF 160,000 VDC.

OPERATOR INITIALS: _____ DATE: _____

12.14 CONTACT ENGINEERING AT THIS POINT TO WITNESS THE HIGH VOLTAGE TESTING.

OPERATOR INITIALS: _____ DATE: _____

NOTE: USE EXTREME CAUTION WHEN AROUND HIGH VOLTAGE, FOLLOW ALL POSSIBLE PRECAUTIONS AND LAB GUIDELINES.

12.15 ENERGIZE THE DC HIPOT.

OPERATOR INITIALS: _____ DATE: _____

NOTE: THE VOLTAGE INCREASE WILL BE PERFORMED AS QUICKLY AS POSSIBLE TO SIMULATE AN INSTANTANEOUS HIGH VOLTAGE APPLICATION.

12.16 RAMP THE VOLTAGE UP AS QUICKLY AS POSSIBLY UNTIL BREAKDOWN OCCURS. ENSURE THAT THE BREAKDOWN VOLTAGE IS RECORDED. IF THE COMPONENT DOES NOT FAIL DURING THE FAST RAMP, MAINTAIN THE MAXIMUM VOLTAGE THAT THE HIPOT CAN SUPPLY AND RECORD THE TIME IT TAKES TO BREAKDOWN AT THAT VOLTAGE. RECORD THESE VALUES IN TABLE B1 IN APPENDIX B.

OPERATOR INITIALS: _____ DATE: _____

12.17 DE-ENERGIZE THE TEST ASSEMBLY.

OPERATOR INITIALS: _____ DATE: _____

12.18 REMOVE THE TEST ASSEMBLY FROM THE OIL BATH AND REMOVE THE PIN FROM ITS FIXTURE. ENSURE THAT THE NUMBERING SYSTEM ON THE PIN IS STILL CLEARLY LEGIBLE. SET ASIDE THE PIN FOR FUTURE INSPECTION.

OPERATOR INITIALS: _____ DATE: _____

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12.19 REPEAT STEP 12.9 THROUGH 12.18 FOR THE REMAINDER OF THE RAPID RAMP PINS. RECORD ALL VALUES AND COMMENTS IN TABLE B1 IN APPENDIX B.

OPERATOR INITIALS: _____ DATE: _____

12.20 SUBMIT THE TABLE B1 RESULTS TO THE PROJECT ENGINEER BEFORE MOVING FORWARD IN THIS PROCEDURE. THE ENGINEER MUST SIGN THIS STEP BEFORE THE TEST CAN PROCEED.

OPERATOR INITIALS: _____ DATE: _____

ENGINEER: _____ DATE: _____

12.21 OBTAIN THE PINS THAT HAVE NOT YET BEEN TESTED FOR DC VOLTAGE BREAKDOWN.

OPERATOR INITIALS: _____ DATE: _____

12.22 ENSURE THAT THE REMAINING PINS HAVE BEEN PREPARED AS THE RAPID RAMP PINS HAVE BEEN PREPARED (STEP 12.9 THROUGH 12.14).

OPERATOR INITIALS: _____ DATE: _____

12.23 RECORD THE REQUIRED LONG TERM VOLTAGE VALUES PROVIDED BY THE PROJECT ENGINEER. RECORD THESE VALUES IN TABLE 9 AND ENSURE THAT THE PROJECT ENGINEER HAS SIGNED THIS STEP TO APPROVE THE WRITTEN VALUES.

TABLE 9 - ASSIGNED LONG TERM BREAKDOWN VOLTAGE VALUES		
PIN NUMBERS	TARGET TEST DURATION	REQUIRED HOLD VOLTAGE (VDC)
21-25, 51-55, 81-85	48 HOURS	
26-30, 56-60, 86-90	336 HOURS	

OPERATOR INITIALS: _____ DATE: _____

ENGINEER: _____ DATE: _____

NOTE: FAILURE TO OBTAIN THE PROJECT ENGINEERS SIGNATURE FOR THIS STEP BEFORE MOVING THE NEXT STEP WILL VOID THIS QUALIFICATION TEST.

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12.24 FOR THE LONG TERM HOLD PINS (BOTH THE 48 HOUR AND THE 336 HOUR DURATION), RAMP THE VOLTAGE (VDC) TO THE APPROPRIATE VALUE REQUIRED IN TABLE 9 (STEP 12.20) AND MAINTAIN IT UNTIL THE COMPONENT FAILS. RECORD THE HOLD VOLTAGE AND THE START DATE AND TIME IN TABLE B2 (APPENDIX B). CONTACT THE ENGINEER AND ADVISE HIM/HER OF THE MAINTAINED VOLTAGE VALUES AND THE START TIME OF THE TEST.

OPERATOR INITIALS: _____ DATE: _____

12.25 PHOTOGRAPH THE PINS DURING TESTING.

OPERATOR INITIALS: _____ DATE: _____

12.26 CONTINUOUSLY RECORD THE VOLTAGE AND TIME THROUGHOUT THE TEST. TAKE VOLTAGE AND TIME READINGS THREE TIMES A DAY, RECORDING THE VALUES IN TABLE B3 IN APPENDIX B. MAKE AS MANY COPIES AS NEEDED FROM APPENDIX A TO ADEQUATELY CAPTURE THE REQUIRED INFORMATION. INSPECT THE PINS AND VOLTAGE METER WHILE TAKING READINGS TO ENSURE THAT THE TEST IS PROPERLY MAINTAINED. CONTINUE THIS PROCESS UNTIL THE PINS FAIL.

OPERATOR INITIALS: _____ DATE: _____

12.27 AS SOON AS 48 HOURS ELAPSE, CONTACT AND INFORM THE PROJECT ENGINEER ON THE STATUS OF 48 HOUR DURATION PINS. IF THE PINS HAVE NOT YET FAILED, MAINTAIN THE TESTING CONDITIONS UNTIL THE PINS FAIL.

OPERATOR INITIALS: _____ DATE: _____

12.28 NOTE THE TIME OF FAILURE FOR 48 HOUR DURATION PINS IN TABLE B4 IN APPENDIX B.

OPERATOR INITIALS: _____ DATE: _____

12.29 AS SOON AS 14 DAYS (336 HOURS) ELAPSE, CONTACT AND INFORM THE PROJECT ENGINEER ON THE STATUS OF THE 336 HOUR DURATION PINS. IF THE PINS HAVE NOT YET FAILED, MAINTAIN THE TESTING CONDITIONS UNTIL THE PINS FAIL.

OPERATOR INITIALS: _____ DATE: _____

12.30 NOTE THE TIME OF FAILURE FOR THE 336 HOUR DURATION PINS IN TABLE B5 IN APPENDIX B.

OPERATOR INITIALS: _____ DATE: _____

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12.31 BEFORE PROCEEDING ANY FURTHER, CONTACT THE PROJECT ENGINEER. THE PROJECT ENGINEER MUST BE PRESENT PRIOR TO PROCEEDING ANY FURTHER IN THE PROCEDURE. THE PROJECT ENGINEER MUST SIGN THIS STEP TO VALIDATE HIS/HER PRESENCE FOR THIS POST TEST INSPECTION.

OPERATOR INITIALS: _____ DATE: _____

ENGINEER INITIALS: _____ DATE: _____

12.32 CAREFULLY REMOVE THE BOOT SEALS AND BLADDERS FROM THE PINS. ENSURE THAT EACH BOOT SEAL AND BLADDER IS BAGGED AND MAINTAINED WITH THE PIN WITH WHICH THEY WERE ASSOCIATED.

OPERATOR INITIALS: _____ DATE: _____

12.33 REMOVE THE PINS FROM THE PARTIAL DISCHARGE TEST FIXTURES.

OPERATOR INITIALS: _____ DATE: _____

12.34 VISUALLY INSPECT THE INDIVIDUAL COMPONENTS AND ANNOTATE ANY OBSERVATIONS ON TABLE B6 IN APPENDIX B. PHOTOGRAPH THE PINS AT THE FAILURE LOCATION AND COMMENT ON THE FAILURE LOCATION AND MODE IN TABLE B6 IN APPENDIX B.

OPERATOR INITIALS: _____ DATE: _____

12.35 CAREFULLY MAINTAINING THE NUMBERING, ENSURE THAT THE PINS, BOOT SEALS AND BLADDERS ARE LABELED AND BAGGED. SUBMIT THE TESTED COMPONENTS TO THE PROJECT ENGINEER FOR FURTHER EVALUATION.

OPERATOR INITIALS: _____ DATE: _____

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APPENDIX A:

TABLE A1 - INSULATION RESISTANCE TEST RESULTS SHEET

STEP NUMBER:

PIN NUMBER	INSULATION RESISTANCE (GΩ)	COMMENTS	OPERATOR INITIALS

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APPENDIX B:

**TABLE B1 - RAPID RAMP TEST RESULTS FOR DC HIGH VOLTAGE BREAKDOWN
TEST**

PIN NUMBER	PRESSURE SOAK DURATION (HOURS)	PEAK VOLTAGE (VDC)	TIME TO FAILURE (MIN)	COMMENTS	OPERATOR INITIALS
16	500				
17	500				
18	500				
19	500				
20	500				
46	1000				
47	1000				
48	1000				
49	1000				
50	1000				
76	SPECIFIED BY ENGINEER				
77	SPECIFIED BY ENGINEER				
78	SPECIFIED BY ENGINEER				
79	SPECIFIED BY ENGINEER				
80	SPECIFIED BY ENGINEER				

TABLE B2 - MAINTAINED TEST VOLTAGE AND START DATE/TIME FOR LONG

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TERM DC HIGH VOLTAGE BREAKDOWN PINS

MINIMUM TEST DURATION (HOURS)	PIN NUMBER	MAINTAINED VOLTAGE (VDC)	START DATE/TIME	OPERATOR INITIALS
48	21			
	22			
	23			
	24			
	25			
	51			
	52			
	53			
	54			
	55			
	81			
	82			
	83			
	84			
	85			
336	26			
	27			
	28			
	29			
	30			
	56			
	57			
	58			
	59			
	60			
	86			
	87			
	88			
	89			
	90			

TABLE B3 - DAILY VERIFICATION/RESULTS ON LONG TERM PINS

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		APPLIED VOLTAGE (VDC)				OPERATOR INITIALS
	Date/Time	Pin ____	Pin ____	Pin ____	Pin ____	
Day ____						
Day ____						
Day ____						
Day ____						
Day ____						
Day ____						
Day ____						
Day ____						
Day ____						
Day ____						
Day ____						
Day ____						

PAGE ____ OF ____

TABLE B4 - DATE AND TIME OF DC HIGH VOLTAGE BREAKDOWN FAILURE FOR

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48 HOUR DURATION PINS

PIN NUMBER	MAINTAINED VOLTAGE VALUE (VDC)	DATE/TIME OF FAILURE	OPERATOR INITIALS
21			
22			
23			
24			
25			
51			
52			
53			
54			
55			
81			
82			
83			
84			
85			

**SUBJECT: HIGH POWER NAUTILUS ELECTRICAL
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**TABLE B5 -DATE AND TIME OF DC HIGH VOLTAGE BREAKDOWN FAILURE FOR 336 HOUR
DURATION PINS**

PIN NUMBER	MAINTAINED VOLTAGE VALUE (VDC)	DATE/TIME OF FAILURE	OPERATOR INITIALS
26			
27			
28			
29			
30			
56			
57			
58			
59			
60			
86			
87			
88			
89			
90			

SUBJECT: HIGH POWER NAUTILUS ELECTRICAL
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TABLE B6 - POST TEST INSPECTION COMMENTS CONCERNING INDIVIDUAL PIN
COMPONENTS

MINIMUM TEST DURATION (HOURS)	PIN NUMBER	COMMENTS	OPERATOR INITIALS
48	26		
	27		
	28		
	29		
	30		
	56		
	57		
	58		
	59		
	60		
	86		
	87		
	88		
	89		
336	26		
	27		
	28		
	29		
	30		
	56		
	57		
	58		
	59		
	60		
	86		
	87		
	88		
	89		
	90		