

	PER CO #XXXX	Approved By	Effective Date	Document No. 61159	Revision A
	Originator DAVID PFOSI	Checked By	Page 1 of 15	Reference OPM-277-24	Class 24

**SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS
OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM**

TABLE OF CONTENTS:

1.0	RELATED DOCUMENTS
2.0	INTRODUCTION
3.0	SYSTEM DESCRIPTION
4.0	HARNESS ASSEMBLY DESCRIPTION
5.0	SAFETY AND ENVIRONMENTAL IMPACT
6.0	OPERATIONAL SPECIFICATION
7.0	HOSE REQUIREMENTS
8.0	SEALING
9.0	IDENTIFICATION AND MARKING
10.0	SCREENING PROCESS AND FINAL SHIPMENT TEST DETAILS
11.0	BUILD STANDARD
12.0	KEY DOCUMENTATION
13.0	QUALITY ASSURANCE REQUIREMENTS
14.0	RELIABILITY
15.0	SUPPLIER QA SYSTEM
16.0	TRACEABILITY
17.0	MINIMUM SET OF RECORDS
18.0	HISTORY OF CHANGES
19.0	QUALIFICATION AND LIFE TEST SPECIFICATIONS
20.0	TRANSPORTATION / SHIPPING REQUIREMENTS
21.0	DELIVERABLE DATA
22.0	ACCEPTANCE TEST REPORT
23.0	SPARES
24.0	REPLACEMENT / REJECTION PROTOCOL

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 2 of 15	Reference OPM-227-24	Class 24

1.0 **RELATED DOCUMENTS:**

- **D/N 57026** (OPM-189-07) CTA CABLE TERMINATION INTERFACE SYSTEM LAYOUT FOR REFERENCE ONLY (REVISION A)
- **D/N 59002** (OPM-194-01) HI-POWER PENETRATOR TO HI-POWER FLYING ROV RECEPTACLE GENERAL ASSEMBLY DRAWING, REVISION A
- **D/N 59007** (OPM-196-01) HI-POWER PENETRATOR TO HI-POWER FIXED ROV PLUG GENERAL ASSEMBLY DRAWING, REVISION A
- **D/N 60045** (OPM-208-03) HI-POWER BULKHEAD PENETRATOR INTERFACE DRAWING, REVISION B
- **D/N 33325** (ROV-328-03) 4-WAY HIGH POWER NAUTILUS WET MATE ROV CONNECTORS INTERFACE DRAWING, REVISION B
- **D/N 59019** (QTP-135-40) ACCELERATED LIFE TEST - DC HIGH VOLTAGE QUALIFICATION TEST PROCEDURE, REVISION A
- **D/N 10538** (QM-1.0) QUALITY MANAGEMENT REQUIREMENTS AND STRUCTURE DOCUMENT, REVISION D
- **D/N 19421** (ODN-130-24) OCEAN DESIGN JUMPER HOSE CUSTOMER SPECIFICATION DRAWING, REVISION C2
- **D/N 10368** (ODN-004-23) INSTALLATION & OPERATION MANUAL FOR NAUTILUS CONNECTORS, REVISION F
- **D/N 10397** (ODN-139-23) HANDLING AND STORAGE PROCEDURE FOR OIL-FILLED JUMPER ASSEMBLIES, REVISION B1
- **D/N 61738** (OPM-233-04) ISOLATION RING FOR HIGH POWER PENETRATOR REVISION A
- **D/N 61394** QUALITY PLAN FOR ALCATEL (MARS) SYSTEM
- **D/N 63115** STANDARD FLOW CHART FOR HIGH POWER ASSEMBLIES - MANUFACTURING PLAN, REVISION A
- **D/N 28191** RELIABILITY ANALYSIS OF ODI NAUTILUS CONNECTORS
- **D/N 34267** SGS INTERNATIONAL CERTIFICATION SERVICES, INC. ISO CERTIFICATION DOCUMENT, CERTIFICATE #98/1312,

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 3 of 15	Reference OPM-227-24	Class 24

REVISION B

- CERTIFICATED STATEMENT OF RETENTION OF QUALITY RECORDS

2.0 **INTRODUCTION**

THIS FUNCTIONAL DESIGN SPECIFICATION COVERS THE DEVELOPMENT AND QUALIFICATION OF THE HIGH VOLTAGE CONNECTOR SYSTEM FOR USE ON THE MARS SUBSEA OBSERVATORY. THE CONNECTION SYSTEM IS THE LINK BETWEEN ELECTRICAL CABLE TERMINATION ASSEMBLY AND SCIENCE ASSEMBLY MODULES.

THE DEVELOPMENT OF THE CONNECTION SYSTEM IS BASED ON THE PREVIOUSLY DEVELOPED WET-MATEABLE NAUTILUS ELECTRICAL CONNECTORS. THE SYSTEM IS INTENDED TO MEET THE DESIGN REQUIREMENTS OF 1,300 METERS.

THE FOLLOWING DESIGN ISSUE/DEVELOPMENT WILL NEED TO BE ADDRESSED:

- A. HYDROSTATIC PRESSURE QUALIFICATION (3,000 PSI = 1.5 X OPERATING PRESSURE)
- B. DC OPERATIONS VOLTAGE

3.0 **SYSTEM DESCRIPTION**

THE SYSTEM LAYOUT D/N 57026 (OPM-189-07), SHEETS ONE AND TWO IDENTIFIES THE CONNECTOR CIRCUIT CONFIGURATION, GENDER, INTERFACE REQUIREMENTS, CONNECTOR PART NUMBERS, QUANTITIES AND DESCRIPTIONS.

THE CONNECTOR SYSTEM BEGINS AT THE CTA (CABLE TERMINATION ASSEMBLY) WITH JUMPERS CONSISTING OF PENETRATORS ON THE CTA TO FLYING ROV RECEPTACLES. THE HIGH VOLTAGE FLYING ROV CONNECTOR MATES WITH A BULKHEAD PLUG WITH A JUMPER TO A PENETRATOR MOUNTED ON THE POWER MODULE.

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: **DESIGN AND QUALIFICATION
SPECIFICATION FOR MARS
OBSERVATORY 10 KVDC HIGH VOLTAGE
INTER-CONNECT SYSTEM**

Effective Date

Document No.

Revision

61159

A

Page

Reference

Class

4 of 15

OPM-227-24

24

4.0 **HARNESS ASSEMBLY DESCRIPTION**

THE DC HIGH VOLTAGE HARNESS WHICH INTERFACES THE CTA PENETRATOR TO BULKHEAD PLUG IS DESCRIBED AS P/N 1033239, (OPM-194-01), A 2-WAY HIGH VOLTAGE PENETRATOR TO AN OIL FILLED HOSE LENGTH SPECIFIED BY THE ASSEMBLY DRAWING AND SECTION 7.0, HOSE REQUIREMENT, TO A 4-WAY HIGH POWER FLYING ROV RECEPTACLE (SEE THE FIGURE 1 BELOW FOR REFERENCE). THE HOSE OUTER DIAMETER IS 1.150" [29.2 MM] WITH AN INTERNAL DIAMETER OF 0.625" [15.8 MM]. THE HOSE IS CONSTRUCTED FROM A PROPRIETARY MATERIAL AND NATURE, HOWEVER, IS UTILIZED THROUGHOUT ODI'S EQUIPMENT. PLEASE REFERENCE D/N 19421 (ODN-130-24), OCEAN DESIGN JUMPER HOSE CUSTOMER SPECIFICATION DRAWING FOR FURTHER INFORMATION AS REQUIRED. THE 2-WAY HIGH VOLTAGE PENETRATOR CONSISTS OF 2 HIGH VOLTAGE PINS ENCASED WITHIN A TITANIUM SHELL WITH STRAIGHT TERMINATION, WHICH IS THEN ISOLATED FROM THE DISSIMILAR CTA METAL HOUSING BY AN ULTEM 2300 ISOLATION RING AS OUTLINED IN D/N 60045 (OPM-208-03) HI-POWER BULKHEAD PENETRATOR INTERFACE DRAWING. THE 4-WAY HIGH POWER FLYING ROV RECEPTACLE CONSISTS OF 4 HIGH POWER RECEPTACLE MODULES (2 ACTIVE), ENCASED IN A TITANIUM SHELL AND SLIDE WITH A 45° HOSE TERMINATION.

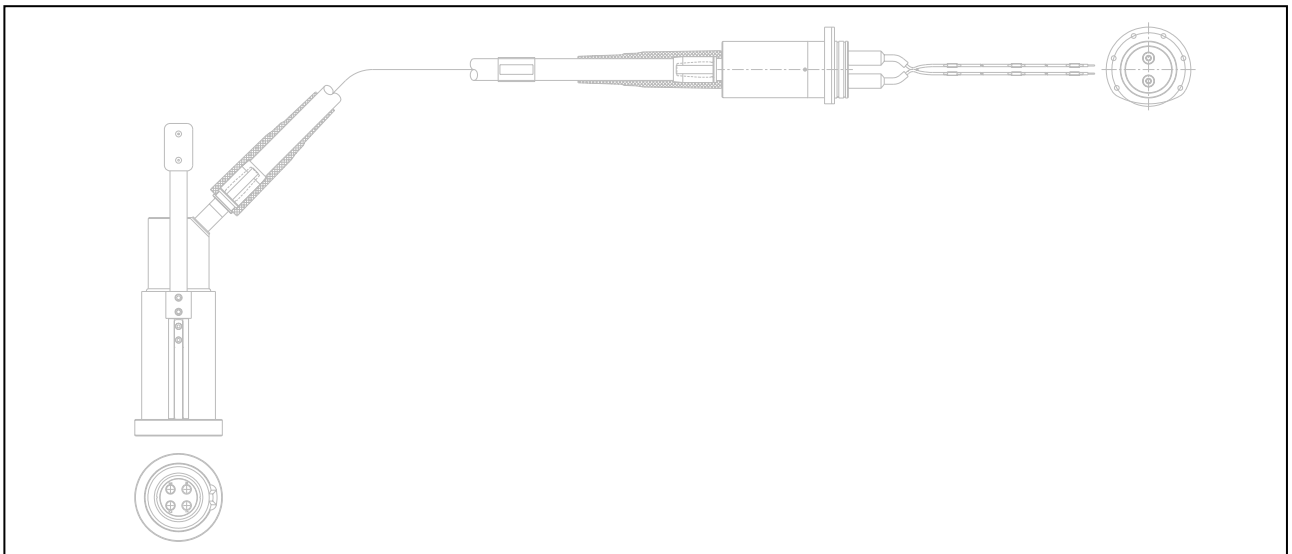


Figure 1

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

**SUBJECT: DESIGN AND QUALIFICATION
SPECIFICATION FOR MARS
OBSERVATORY 10 KVDC HIGH VOLTAGE
INTER-CONNECT SYSTEM**

Effective Date

Document No.

Revision

61159

A

Page

Reference

Class

5 of 15

OPM-227-24

24

THE MATING ASSEMBLY TO THE CTA HARNESS P/N 1033241 (OPM-196-01), CONSISTS OF A 4-WAY HIGH POWER BULKHEAD PLUG TO AN OIL-FILLED HOSE TO A LENGTH SPECIFIED BY THE ASSEMBLY DRAWING AND PARAGRAPH 7.0 HOSE REQUIREMENT, TO A 2-WAY HIGH VOLTAGE PENETRATOR (SEE FIGURE TWO BELOW FOR REFERENCE). THE HOSE AND PENETRATOR ASSEMBLY IS IDENTICAL TO THAT UTILIZED ON THE CTA TO BULKHEAD PLUG ASSEMBLY DESCRIBED ABOVE, WITH THE EXCEPTION OF THE TERMINATION SHELL. A 4-WAY HIGH POWER BULKHEAD PLUG REPLACES THE 4-WAY HIGH POWER FLYING ROV RECEPTACLE ASSEMBLY FROM ABOVE. THIS 4-WAY HIGH POWER BULKHEAD PLUG CONSIST OF 4-HIGH POWER PINS ENCASED IN A TITANIUM SHELL, WHICH ALLOWS FOR BULKHEAD MOUNTING AND POSSESSES A 90° TERMINATION SHELL.



Figure 2

TO ALLOW FOR SITE TESTING OF THE POWER MODULE TO BULKHEAD PLUG, A TEST ASSEMBLY CONSISTING OF AN IDENTICAL 4-WAY FLYING ROV RECEPTACLE AS DESCRIBED ABOVE IS TERMINATED TO A 5-METER NON-OIL FILLED HOSE WHICH IS IN TURN TERMINATED TO A TEST BOX. THE TEST BOX ALLOWS FOR THE PHYSICAL MANAGEMENT OF THE HIGH VOLTAGE CONDUCTORS AND IS MADE FROM ALUMINUM.

D/N 33325 (ROV-328-03) 4-WAY HIGH POWER NAUTILUS WET-MATE ROV CONNECTORS INTERFACE DRAWING IDENTIFIES THE RELATIVE DIMENSIONS BETWEEN THE ROV CONNECTORS.

NOTE: AS THE CONNECTORS ARE UTILIZED ON NUMEROUS ASSEMBLIES IN VARIOUS CONFIGURATIONS, NO DRAWING IS AVAILABLE FOR THE SPECIFIC TERMINATED CONFIGURATION FOR THE MARS APPLICATION.

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 6 of 15	Reference OPM-227-24	Class 24

5.0 **SAFETY AND ENVIRONMENTAL IMPACT:**

ODI WILL COMPLY WITH AND SUPPLY TO ALCATEL THE RELAVENT ENVIRONMENTAL IMPACT DECLARATION REGULATIONS IN ACCORDINACE WITH ECMA-TR70.

6.0 **OPERATIONAL SPECIFICATION:**

2-WAY HIGH VOLTAGE PENETRATOR P/N 1033777 (OPM-232-01-TAB) WITH ISOLATION RING

QUALIFICATION PRESSURE:	3,000 PSI (2,000 METERS)
MAXIMUM WORKING PRESSURE:	2,000 PSI (1,500 METERS)
MAXIMUM DC VOLTAGE:	10,000 VDC
MAXIMUM LEAKAGE CURRENT @ 10 KVDC:	1 MICRO AMP
CONTACT RESISTANCE:	0.1 MOHM (+ CABLE RESISTANCE)
INSULATION RESISTANCE:	TBD
MAXIMUM CURRENT:	2 AMPS
WORKING TEMPERATURE MAXIMUM/MINIMUM:	50°C (122°F) / 0°C (32°F) 3,000 PSI
STORAGE TEMPERATURE MAX/MIN:	50°C (122°F) / -40°C (-40°F)
MATERIAL COMPATIBILITIES:	SEAWATER AND SILICONE OIL
PIGTAIL LENGTH:	8 METERS
MATE CYCLES CLEAN FREE FLOWING WATER:	100 MATES OVER LIFE
MATE CYCLES TURBID WATER:	100 MATES OVER LIFE
MAXIMUM ALLOWABLE ROV CONNECTOR MISALIGNMENT:	
ANGULAR:	2-5°
ROTATIONAL:	10°
RADIAL:	0.065"

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 7 of 15	Reference OPM-227-24	Class 24

MATING FORCE: <100 LB.

DE-MATING FORCE: <100 LB.

ROV CONNECTOR SHOCK PERFORMANCE:

AMPLITUDE: 30 G

WAVE FORM: ½ SINE

DURATION: 11 msec

NUMBER OF SHOCKS: 3

DIRECTION: 6-AXIS

VIBRATION PERFORMANCE:

AMPLITUDE: +/-2 mm (5 TO 25 Hz),
5g ACCELERATION (25 - 150 Hz)

FREQUENCY RANGE: 5 TO 150 Hz - DOUBLE SWEEP

DURATION: N/A

RANDOM SWEPT SINE: N/A

SWEEP RATE: 1 OCTAVE/MIN

DESIGN LIFETIME: 25 YEARS

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 8 of 15	Reference OPM-227-24	Class 24

7.0 HOSE REQUIREMENTS:

TYPE UTILIZED ON HARNESS: SEE D/N 19421 (ODN-130-24)

LENGTH OF HARNESS:

FLYING ROV HARNESS: 5 METERS

FIXED ROV HARNESS: 5 METERS

MINIMUM BEND RADIUS: 5" [125MM]

AXIAL LOAD:

MAXIMUM WORKING: 600 LBS

MINIMUM FAILURE: 900 LBS

MAXIMUM AXIAL STRETCH: 3% @600 LBS

PRESSURE RATING:

MAXIMUM WORKING: 225 PSI

PROOF TEST: 400 PSI

MINIMUM BURST: 900 PSI

MINIMUM RADIAL EXPANSION: 15% @150 PSI

LENGTH CHANGE UNDER PRESSURE: +0/-1% @150 PSI

FLUID COMPATIBILITY: SEAWATER AND SILICONE OIL

TEMPERATURE RATING:

OPERATING:

LOWER LIMIT: -2°C

UPPER LIMIT: +50°C

STORAGE:

LOWER LIMIT: -2°C

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: **DESIGN AND QUALIFICATION
SPECIFICATION FOR MARS
OBSERVATORY 10 KVDC HIGH VOLTAGE
INTER-CONNECT SYSTEM**

Effective Date

Document No.

Revision

61159

A

Page

Reference

Class

9 of 15

OPM-227-24

24

UPPER LIMIT: +50°C

COLOR: ORANGE

8.0 **SEALING:**

BORE STYLE O-RINGS ARE UTILIZED ON THE PENETRATOR AND ISOLATION RING. THE O-RING DUROMETER FOR THE MARS APPLICATION WILL BE BETWEEN 70 AND 90 AND THE MATERIAL IS SPECIFIED AS NBR PURCHASED FROM PARKER O-RINGS.

REFER TO D/N 61738 (OPM-233-04), ISOLATION RING FOR HIGH VOLTAGE PENETRATOR AND FOR SPECIFIC DETAILS.

THE O-RINGS UTILIZED ON THE HIGH VOLTAGE PENETRATOR ARE:

P/N 1000397 (2-040-N674-70)

P/N 1000386 (2-036-N674-70)

P/N 1000394 (2-039-N674-70)

9.0 **IDENTIFICATION AND MARKING:**

EACH CONNECTOR AND PENETRATOR WILL BE LASER ENGRAVED WITH OCEAN DESIGN INC., AND AN ODI SERIAL NUMBER WHICH CONSISTS OF A SEVEN DIGIT PART NUMBER FOLLOWED BY A UNIQUE SERIAL NUMBER, FOR EXAMPLE:

OCEAN DESIGN INC.
P/N 1033777-1

EACH HOSE ASSEMBLY WILL BE LABELED WITH A P-TOUCH STYLE LABEL SHRUNK INTO PLACE OVER THE HOSE WITH HEAT SHRINK. THE TYPICAL JUMPER WILL BE MARKED WITH TWO LABELS AT OPPOSING ENDS. THE HOSE ASSEMBLY WILL BE THE DEFINING UPPER LEVEL PART NUMBER, SUPERSEDING THE LOWER LEVEL PENETRATOR AND CONNECTOR PART NUMBERS FOR ASSEMBLY IDENTIFICATION. THE HARNESS ASSEMBLIES WILL BE LABELED AT BOTH ENDS WITH THE CUSTOMER PART NUMBER (I.E. 29C-OD00 800 AAA) AND ODI PART NUMBER.

NOTE: THE ALCATEL PART NUMBER IS THE SAME FOR BOHT THE ROV AND BULKHEAD HARNESSES.

ANY PIGTAILS WHICH REQUIRE LABELING WILL UTILIZE AN IDENT LABEL SHRUNK INTO PLACE EVERY 24" [609 MM]. EACH LABEL WILL BE REPRESENTATIVE OF THE CIRCUIT TO WHICH IT IS ATTACHED.

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 10 of 15	Reference OPM-227-24	Class 24

ANY HARNESSSES WHICH ARE NOT INTENDED FOR OR HYDROSTATICALLY TESTED PRIOR TO SHIPMENT FROM ODI, WILL BE LABELED "NOT FOR SUBSEA USE", TO AVOID ACCIDENTAL DEPLOYMENT.

10.0 **SCREENING PROCESS AND FINAL SHIPMENT TEST DETAILS:**

EACH ASSEMBLY RECEIVES AN IN-PROCESS BENCH TEST, AS DEFINED IN THE DELIVERY DOCUMENTATION PACKAGE, TO VERIFY SUITABILITY OF THE BUILD PROCESS. A MATE-ABILITY, INSULATION RESISTANCE AND CONTINUITY TESTS ARE PERFORMED DURING FINAL FACTORY ACCEPTANCE TESTING, WITH SOME TESTS BEING REDUNDANT TO THOSE PERFORMED DURING THE ASSEMBLY PROCESS. INSULATION RESISTANCE, OR OTHER CUSTOMER SPECIFIED TESTING, ARE PERFORMED AND RECORDED BOTH DRY AND DURING HYDROSTATIC TESTING DICTATED BY THE TEST SCHEDULE ASSOCIATED TO THE ASSEMBLY UNDER TEST. INDIVIDUAL PASS CRITERIA'S AND TESTING PARAMETERS ARE ALSO IDENTIFIED ON THE TESTING SCHEDULE FOR THE PARTICULAR ASSEMBLY UNDER TEST. TESTING SCHEDULE, OR SIMILAR, WILL DICTATE THE TESTING PARAMETERS FOR FINAL ACCEPTANCE OF THE MARS SYSTEM.

NOTE: ALL ASSEMBLIES WILL BE TESTED AT ROOM TEMPERATURE OR THAT OF THE TESTING MEDIUM. NO EXTERNAL TEMPERATURE INDUCTORS WILL BE UTILIZED.

NOTE: ASSEMBLIES NOT INTENDED FOR SUBSEA USE WILL NOT BE SUBJECTED TO HYDROSTATIC PRESSURE TESTING AND WILL ONLY BE BENCH TESTED PRIOR TO SHIPMENT.

THE DOCUMENTATION PACKAGE WHICH WILL ACCOMPANY THE ASSEMBLY WILL INCLUDE THE FOLLOWING:

- FINAL ACCEPTANCE TESTING DATA IDENTIFIED ON THE TEST LOG SHEET TO INCLUDE:
 1. MATEABILITY
 2. INSULATION RESISTANCE AT DRY AND AT PRESSURE
 3. LEAKAGE CURRENT AT OVER VOLTAGE RESULTS
 4. TEST PRESSURE
 5. NIPPLE CRACK WHERE APPROPRIATE
 6. CONTACT RESISTANCE

THE MEASUREMENT UNCERTAINTY WILL BE DICTATED BY THE EQUIPMENT

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: **DESIGN AND QUALIFICATION
SPECIFICATION FOR MARS
OBSERVATORY 10 KVDC HIGH VOLTAGE
INTER-CONNECT SYSTEM**

Effective Date

Document No.

Revision

61159

A

Page

Reference

Class

11 of 15

OPM-227-24

24

UTILIZED DURING THE TESTING OF THE ASSEMBLY. ALL TEST LOG SHEETS REQUIRE THE TESTING EQUIPMENT MODEL, SERIAL NUMBER AND CALIBRATION DATE BE RECORDED.

11.0 BUILD STANDARD:

EACH ASSEMBLY IS BUILT USING EITHER A SPECIFIC ASSEMBLY PROCEDURE OR A STANDARD BUILD PROCEDURE, WHICH IS ATTACHED TO THE PART NUMBER WITHIN ODI'S ERP SYSTEM, IFS. EACH BUILD PROCEDURE DICTATES THE METHOD OF ASSEMBLY AND ANY SPECIFIC STEPS REQUIRED TO ACCURATELY ASSEMBLE THE COMPONENTS PER THE RELATIVE DRAWING.

NOTE: THE ASSEMBLY AND/OR STANDARD BUILD PROCEDURES ARE CONSIDERED PROPRIETARY TO ODI AND WILL NOT BE SUBMITTED FOR REFERENCE, BUT WILL BE AVAILABLE FOR CUSTOMER REVIEW AT ODI.

12.0 KEY DOCUMENTATION:

A SPECIFIC QUALITY PLAN IS INITIATED AND WILL BE DELIVERED TO THE CUSTOMER FOR REVIEW.

THE PART NUMBERS UTILIZED FOR THE MARS SYSTEM APPLICATION ARE DERIVED FROM THE QUOTATION AND PURCHASE ORDER, AND ARE AS FOLLOWS:

P/N 1033239 (OPM-194-01), D/N 59002, HI-POWER PENETRATOR TO
HI-POWER FLYING ROV
RECEPTACLE, REVISION A

P/N 1033241 (OPM-196-01), D/N 59007 HI-POWER PENETRATOR TO HI-
POWER FIXED ROV PLUG,
REVISION A

EACH ASSEMBLY WILL BE TESTED PER SECTION 10.0 LABELED, "SCREENING PROCESS AND FINAL SHIPMENT TEST DETAILS" WITHIN THIS DOCUMENT.

THE MANUFACTURING FLOW CHART D/N 63115, REVISION A IS ATTACHED FOR REVIEW.

A CERTIFICATE OF TEST AND CERTIFICATE OF CONFORMANCE WILL BE PROVIDED WITHIN THE DATA PACKAGE AT TIME OF PRODUCT DELIVERY. THE CUSTOMER DELIVERY REQUIREMENTS SHOULD BE IDENTIFIED ON THE PURCHASE ORDER, AND WILL BE REVIEWED AND INCORPORATED INTO THE QUALITY PLAN FOR THE SUBJECT SYSTEM COMPONENTS.

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 12 of 15	Reference OPM-227-24	Class 24

13.0 **QUALITY ASSURANCE REQUIREMENTS**

PRODUCT REALIZATION SHALL BE IN ACCORDANCE WITH THE DOCUMENTED QUALITY PLAN AND THE CUSTOMER SHALL BE FORDED THE OPPORTUNITY TO PARTICIPATE IN THE APPROPRIATE STEPS AS A "REVIEW", "WITNESS", OR "HOLD" POINT. THE INTERVENTION METHOD SHALL BE SO DOCUMENTED IN THE FINAL QUALITY PLAN.

14.0 **RELIABILITY**

RELIABILITY OF THE HIGH POWER MARS HIGH VOLTAGE INTER-CONNECT SYSTEM IS DERIVED FROM SIMILARITY TO THE STANDARD ODI NAUTILUS CONNECTORS. THE OBVIOUS VARIANT IS THE VOLTAGE RATINGS FOR THIS SYSTEM, HOWEVER, MECHANICAL DESIGN CRITERIA FOR THE HIGH POWER VARIANTS ARE BASED ON THE STANDARD NAUTILUS WHERE THE INFORMATION IS DERIVED. RELIABILITY DATA IS PROVIDED WITHIN D/N 28191, REVISION A, RELIABILITY ANALYSIS OF ODI NAUTILUS CONNECTORS ATTACHED AS REFERENCE.

15.0 **SUPPLIER QA SYSTEM**

D/N 34267* SGS INTERNATIONAL CERTIFICATION SERVICES, INC. ISO CERTIFICATION DOCUMENT IS ATTACHED AS A REFERENCE DOCUMENT FOR ISO9000:2000 CERTIFICATE VERIFICATION.

D/N 10538 (QM-1.0) QUALITY MANAGEMENT REQUIREMENTS AND STRUCTURE DOCUMENT IS ATTACHED AS A REFERENCE FOR THE QUALITY MANAGEMENT MANUAL. THE CUSTOMER MAY AUDIT ODI'S QUALITY SYSTEM BY SCHEDULING THE ACTION WITH THE QUALITY MANAGER IN ADVANCE. A FULL COPY OF AN UNCONTROLLED QUALITY MANUAL SHALL BE MADE AVAILABLE UPON WRITTEN REQUEST.

16.0 **TRACEABILITY**

THE CERTIFICATED STATEMENT OF RETENTION OF QUALITY RECORDS, INCLUDING NONCONFORMANCE RECORDS, FAILURE REPORTS, CORRECTIVE ACTIONS, MATERIAL TRACEABILITY RETENTION INCLUDING FABRICATED AND PURCHASED COMPONENTS AND INSPECTION AND TEST RECORDS IS ATTACHED WITHIN THE REFERENCE DOCUMENTS SECTION OF THIS DOCUMENT.

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 13 of 15	Reference OPM-227-24	Class 24

17.0 **MINIMUM SET OF RECORDS:**

- CONTRACT REVIEW RESULTS
- DESIGN REVIEW RESULTS
- QUALIFICATION TEST RESULTS
- SUB-TIER SUPPLIER QUALITY ASSESSMENT RESULTS
- PURCHASE ORDER REQUIREMENTS
- INCOMING INSPECTION OR TESTING RESULTS
- MATERIAL TEST REPORTS AND TRACEABILITY RECORDS
- INVENTORY/TRACEABILITY RECORDS
- CALIBRATION RECORDS OF MONITORING AND MEASURING EQUIPMENT
- MANUFACTURING PROCESS CONTROL RECORDS
- ACCEPTANCE TEST REPORTS
- INSPECTION RECORDS
- NONCONFORMANCE RECORDS
- CORRECTIVE/PREVENTATIVE ACTIONS
- FAILURE ANALYSIS RECORDS
- CONFIGURATION RECORDS FOR SERIALIZED PARTS

18.0 **HISTORY OF CHANGES:**

REVISION AND CHANGE CONTROL IS MAINTAINED WITHIN "IFS", ODI'S ERP SYSTEM. ALL PREVIOUS REVISIONS ARE RETAINED WITHIN THE SYSTEM FOR REVIEW BY ODI EMPLOYEES. REQUESTS FOR CUSTOMER REVIEW OF UPPER LEVEL ASSEMBLY DRAWINGS AND HISTORY OF CHANGES SHOULD BE MADE VIA WRITTEN DOCUMENTATION TO THE QUALITY MANAGER OR PROJECT ENGINEER. DETAIL MANUFACTURING DRAWINGS WHICH WERE NOT PREVIOUSLY SUPPLIED WILL REQUIRE PRIOR APPROVAL FROM THE ENGINEERING MANAGER OR SENIOR MANAGEMENT.

19.0 **QUALIFICATION AND LIFE TEST SPECIFICATIONS:**

THE QUALIFICATION TEST PLAN FOR THE MARS HIGH VOLTAGE SYSTEM IS COVERED UNDER D/N 59019 (QTP-135-40) ACCELERATED LIFE TEST - DC HIGH VOLTAGE QUALIFICATION TEST PROCEDURE.

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 14 of 15	Reference OPM-227-24	Class 24

20.0 **TRANSPORTATION / SHIPPING REQUIREMENTS:**

A SPECIFIC PACKAGING PROCEDURE FOR THE MARS SYSTEM ASSEMBLIES WILL BE CREATED AND ATTACHED TO THE RELATIVE PART NUMBERS WITHIN THE ERP SYSTEM. THE PACKAGING PROCEDURE WILL PROVIDE INSTRUCTIONS FOR THE FOLLOWING POINTS OF INTEREST:

- A. PACKAGING WILL BE MARKED WITH ODI AND ALCATEL PART NUMBERS AND SERIAL NUMBERS.
- B. ALL PACKAGING WILL ENSURE THE ASSEMBLIES ARE NOT DAMAGED DURING TRANSPORT AND WILL ADHERE TO ODI'S PACKAGING STANDARDS.
- C. ALL O-RINGS WILL BE INSTALLED ONTO THE CONNECTORS AND ISOLATION RINGS AS DICTATED BY THE ASSEMBLY DRAWINGS. THE ISOLATION RINGS WILL BE SECURED TO THE PENETRATOR SHELLS BY A MECHANICAL MEANS FOR TRANSIT ONLY.
- D. ANY PIGTAILED ASSEMBLIES WILL BE FITTED WITH A MECHANICAL PACKAGING ARRANGEMENT, I.E. NEWARK ALUMINUM BOX, FOR PROTECTION DURING SHIPMENT AND NORMAL SHOP HANDLING PRACTICES.

21.0 **DELIVERABLE DATA:**

A SYSTEM GENERATED DELIVERY NOTE IS INCLUDED WITHIN THE SHIPMENT PACKAGE BY THE QUALITY CONTROL REPRESENTATIVE.

22.0 **ACCEPTANCE TEST REPORT:**

NO LOWER LEVEL CHILD DATA IS PROVIDED TO THE CUSTOMER AT TIME OF DELIVERY. HOWEVER, THE INFORMATION IS MAINTAINED AT ODI FOR REVIEW UPON CUSTOMER WRITTEN REQUEST.

23.0 **SPARES:**

SPARE COMPONENTS, SUCH AS O-RING SEALS, WILL BE IDENTIFIED ON THE BILL OF MATERIAL OF THE RELEVANT ASSEMBLIES. NO SEPARATE SPARE PARTS LIST WILL BE PROVIDED, UNLESS REQUESTED BY THE CUSTOMER IN WRITING.

SUBJECT: DESIGN AND QUALIFICATION SPECIFICATION FOR MARS OBSERVATORY 10 KVDC HIGH VOLTAGE INTER-CONNECT SYSTEM	Effective Date	Document No. 61159	Revision A
	Page 15 of 15	Reference OPM-227-24	Class 24

24.0 **REPLACEMENT / REJECTION PROTOCOL:**

UPON THE NEED FOR REFURBISHMENT OR RECONFIGURATION OF EXISTING DELIVERED PRODUCT, THE CUSTOMER SHALL CONTACT ODI FIELD SERVICE TO REQUEST AN RMA NUMBER. THE ADVANCED ASSIGNMENT OF THE NUMBER WILL ALLOW ODI TO PRIORITIZE RESOURCES TO SERVICE THE REPAIR/RECONFIGURE CUSTOMER ORDER.

UPON COMPLETION OF THE REPAIR OR RECONFIGURATION, THE QUALITY REQUIREMENTS OF THE ORIGINAL ORDER SHALL APPLY UNLESS THE CUSTOMER PROVIDES ADDITIONAL REQUIREMENTS, WHICH SUPERCEDE THE ORIGINAL.

PRELIMINARY

UNCONTROLLED COPY, COPY FOR INFORMATION ONLY, WILL NOT BE KEPT UP TO DATE