SIEMENS

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DigiTRON Electrical Flying Leads, Jumpers and Harness Assemblies Site Received Test Manual

www.siemens.com/energy/connector-operations-manual

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DigiTRON Electrical Flying Leads, Jumpers and Harness Assemblies Site Received Test Manual

Rev	Compiled By	Compiled Date	Checked By	Issue Date	Remarks / Pages Affected
5	L.Belcher	04/10/2018	J.P.Smith	04/10/2018	Ethernet testing added throughout . Earth CP core test note added
4	L.Belcher	09.06.2015	M.D.Bell	09.06.2015	Warning note with regard to lifting and PPE added at Section 6. Cable Assemblies added to IR in section 11.
3	P.Westwell	29.4.2014	B.Leach	29.4.2014	New Cover design & complete document reformat.
2	L.Belcher		B.Leach	18.3.2014	Re-format, various text amendments, general updates
1	P.Westwell		B.Leach	1.8.2013	First issue

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Contents

1. INTRODUCTION

This document is to provide the customer a simple test and check procedure to perform on receipt of supplied Electrical Flying Leads, Jumpers and Harnesses to confirm identification, quality and operation.
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2. SCOPE

This document defines the procedure and equipment required to carry out the Site Received Test on Electrical Flying Leads, Jumper and Harness. This is to determine no damage has taken place in transit and the EFL / JUMPER / HARNESS is fit to be deployed. This test will also confirm basic electrical performance.

Any information, records or Health and Safety feedback that needs to be detailed, can be recorded in the punch list at the rear of the document.
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3. ABBREVIATIONS

A	**Ampere**
AC	**Alternating Current**
Assy	**Assembly**
API	**American Petroleum Institute**
AWG	**American Wire Gauge**
BOM	**Bill of Material**
°C	**Degree Celsius**
CE	**Community European**
Comms	**Communication Signal**
CP	**Cathodic Protection**
DC	**Direct Current**
DWG	**Drawing**
EFL	**Electrical Flying Leads**
EMF	**Electrical Magnetic field**
FAT	**Factory Acceptance Test**
IR	**Insulation Resistance**
ISO	**International Organization for Standardization**
ITP	**Inspection Test Plan**
K	**Kelvin**
LTC	**Long Term Cover**
M	**Metres**
Max.	**Maximum**
MFG	**Manufacturer**
Min.	**Minimum**
No.	**Number**
ROV	**Remotely Operated Vehicle**
SI	**Standard International**
SRT	**Site Received Test**
SST	**Stainless Steel**
TBD	**To Be Defined**
TSP	**Twisted Screened Pairs**
UNS	**Unified Numbering System for Metals and Alloys**
V	**Volt**

4. PURPOSE

The purpose of this document is to ensure that the Site Received Test is performed where specified, on all AquaTRON oil-filled electrical jumpers and cable harness assemblies. IR and Continuity tests will be performed along with a visual inspection for any damage pre and post test.

5. RESPONSIBILITIES

It is the operators' responsibility to comply with this instruction and to ensure all test equipment is within calibration and report any problems to the Quality Control Inspector.

The operator shall also be responsible for completing the Test Results Sheets.
All tests shall be carried out within a test cell, or specifically designed test area, which shall be clearly identified. Controlled access to such areas shall be enforced.
Care must be taken during handling, any damage to the hose or connectors can result in schedule delays.

6. HEALTH & SAFETY

Manual Handling, Lifting and Carrying are known to be the largest contributors to occupational ill-health. Ensure that mechanical handling aids are used whenever possible to avoid manual handling. Where manual handling is considered appropriate for the task safe lifting guidelines must be followed, e.g. adopt correct posture, consider team lifting, employ safe lifting technique, etc.

WARNING: Please refer to product packaging for accurate lifting weight and ensure the appropriate lifting equipment and PPE are used during handling operations.

Only competent persons are permitted to perform tasks without supervision, if in doubt ask. Good Housekeeping avoids Slips Trips and Falls, keep your area clean and tidy. It is the operator's responsibility to comply with current Company & regional health and safety legislation.

Caution shall be exercised during assembly and testing to ensure that fittings and hydraulic/pneumatic equipment are properly installed. All high voltage testing shall be performed by trained personnel using equipment that has been checked for safety within the last 12 months from the date of use. The operator shall be protected from electrocution by earth-screened enclosures that contain the H.V. hazard after every H.V. test, an earth stick shall be used to verify that the conductors are discharged. For tests involving D.C. sufficient time must be allowed for the circuit to discharge before touching the conductors. The discharge period shall be at least equal to the period of charging.

In the event of a safety incident or any safety improvement suggestions please contact the Health and Safety Department at **prodsafe.gb@siemens.com** and/or complete and return the punch list in section 12.

Note – All receptacle's (male pins) must be mated to its correct mating half before it is energised (this includes the correct Test, Dummy and Wet Mate Pair).

7. MANUAL HANDLING PACKING AND STORAGE

- Details on each of these sections, is explained in the IOM-001 manual.
- If goods are removed from packaging, once inspected and or electrically tested ensure goods are repacked if required as per IOM-001 manual.

8. VISUAL INSPECTION AND CHECKS

- Upon receipt of EFL / Jumper / Harness please handle in accordance with procedures detailed in the IOM manual.
- Each page of this document contains a signature section to be completed by the user.
- Visual inspection for damage to be completed by Siemens trained technician.

Please use check box as shown Pass ☑ Fail ☒

Check EFL / Jumper / harness and connectors are correct to parts ordered. If EFL is terminated with incorrect parts please stop test and inform Technical Dept..... ☐

Lay out EFL flat on a clean surface and check entire length for any visual damage or leaks. Some example images can be found below and on next page..... ☐

Ensure hose is straight and check length against GA drawing..... ☐

Remove protective caps from connectors and check contact face / seal for Debris or damage..... ☐

Check pins / sockets for damage..... ☐

Inspect connector body for any impact damage, scratches..... ☐

Re-install protective caps..... ☐

Check tagging and etching is to project requirements..... ☐

Any failure to this criterion must be recorded on the Information and Notes / Health and Safety Feedback list at the back of this document and the technical department must be informed.

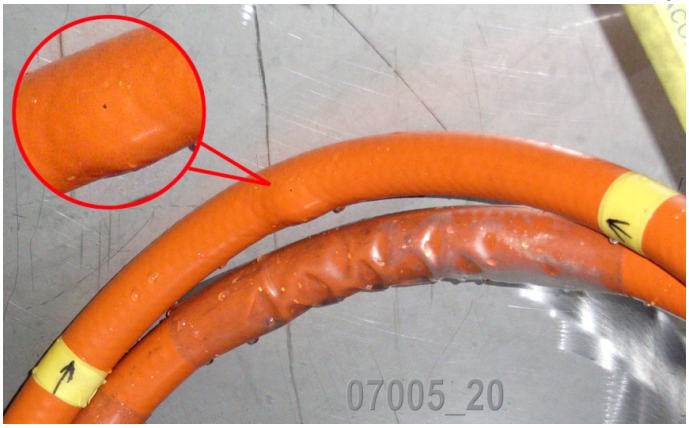
Photos must be taken as evidence to help rectify any non-conformance.

Example images: To help identify hose damage, debris, defects and fading.

Check Hose surface for damage such as cuts, rips, tears, leaks and deformity.

(Picture shows cut in hose)

Check hose for discolouration and surface deformity.



Faded hoses can be acceptable so long as they are in good condition with no leaks or cracks.

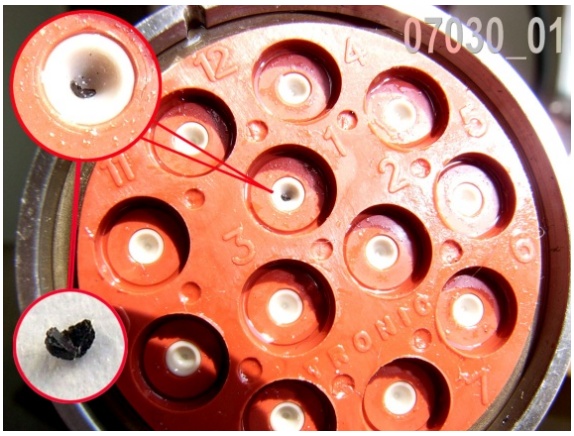
(Picture shows deformity)

Hose / Cable minimum bend radius must NOT be less than stated, this could result in damage to the Hose / Cable

Minimum Bend Radius

Aquatron 50 Hose……..125 mm
Aquatron 75 Hose……..180 mm

Tronic 2 Core cable……273 mm
Tronic 4 Core cable……273 mm
Tronic 7 Core cable……300 mm
Tronic 12 Core cable…..400 mm



Make sure all contacts and mating faces are Clean and free from debris.

(Picture shows debris in contact)

9. ELECTRICAL TESTING

ALL TESTS TO BE PERFORMED BY SIEMENS/CLIENT TRAINED OPERATIVES ONLY.

General Equipment;-
Ambient temperature / humidity recorder
Barometer

Record atmospheric pressure, temperature & humidity (in accordance with the IEC 60060 standard) during electrical & function testing

Note: All calibrated equipment must have a current calibration certification at the time of the test. Details must be recorded on the results Record Sheets included in this document

The appropriate test connector must always be used to make electrical contact during testing. UNDER NO CIRCUMSTANCES should a foreign object (such as a screwdriver, test probe, or crocodile clip) be used as a test connection as this could damage the seals and insulation. Such actions will invalidate the warranty of the connector / harness.

Note: Refer to project paperwork or electrical requirements in regard to 3rd party connectors.

Note: Ensure electrical schematic has been reviewed prior to electrical test.

10. CONTINUITY TEST

Equipment Required
9V Continuity Tester
Test Leads
Test Connector
Wiring Diagram

Continuity Test

All equipment is functional and with calibration certificates..... ☐

Pre test Visual inspection of connectors and harness completed..... ☐

Test connector and leads to be inspected for damage / debris..... ☐

Inspect Test connector fixtures for damage / condition..... ☐

Visual inspection of hose / cable for damage or defects prior to testing..... ☐

If the above criterion is passed testing may begin..... ☐

TEST PROCEDURE

- Attach the test leads to the 9V continuity tester.
- Touch the conductive ends of the test leads together. If the tester is in working order it will sound a "bleep".
- Attach one of the free ends of the test leads to one conductor, pin or socket (ensuring the plating is not damaged by the test lead).
- Attach the other test lead to the opposite end of the same conductor, pin or socket.
- If there is a "bleep" continuity is acceptable and recorded as a PASS, If there is no bleep there is a break in continuity and must be recorded as a FAIL on Results sheet on next page.
- With the test lead attached to the first conductor the second test lead shall be attached to each of the remaining conductors in turn. Record Results. The bleep must not sound during this test as this determines if a contact has been shorted or cross connected and shall ensure each conductor is isolated from the remaining conductors. If the bleep does sound the item must be reworked
- When complete ensure protective caps are clean and free from debris, these must be re-fitted onto the connector immediately.

10.1 FAULT INVESTIGATION

(only complete if a fault is present)

If EFL / Jumper / Harness fails test:-

Check all connections are fully connected..... ☐

Remove all connections and inspect all contacts for damage or debris..... ☐

While disconnected check all equipment is working and set up correctly.... ☐

If using a bench test board this must be fully checked for correct operation..... ☐

Re-connect all equipment and repeat tests..... ☐

<u>If there is still a fail please stop test and contact Technical Dept</u>

10.2 CONTINUITY TEST RESULTS SHEET

Date.....

Name of tester.....

Project:		**Part No:**	**Each pin to all others**
Equipment used:		**Serial No:**	
Connector A - Pin	Connector B - Pin	PASS / FAIL	PASS / FAIL
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		
7	7		
8	8		
9	9		
10	10		
11	11		
12	12		
Pin……. to body	Pin…… to body		

11. IR TEST

Equipment Required:
DC H.V tester (BM 21/MIT520 Megger or similar).
Electrical test board with up to 12 connections. Test board specification resistance to be greater than 10G Ohm. (Check prior to starting test)
Suitable Test Connector where applicable
Wiring Diagram
All equipment to be inspected for functionality prior to starting testing completed

Insulation Resistance Test
Note test voltage:
Connector to Connector jumpers 1000V DC (Include oil hose and cable assemblies)
Connector to Sensor jumpers 50V DC
Ethernet 50V DC

All equipment is functional and with calibration certificates..... ☐

Pre test Visual inspection of connectors and harness completed.... ☐

Test connector and leads to be inspected for damage debris..... ☐

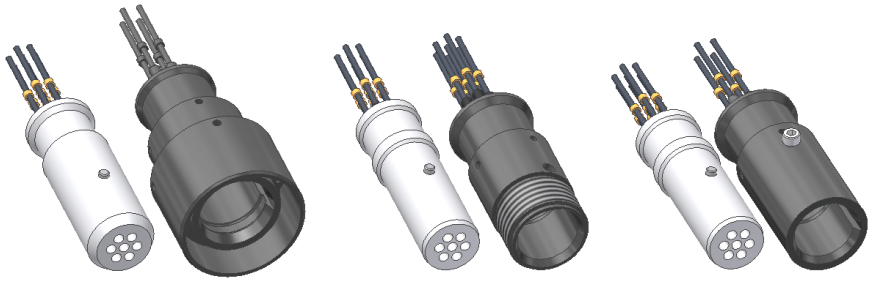
Inspect Test connector fixtures for damage / condition..... ☐

Visual inspection of hose / cable for damage or defects prior to testing..... ☐

If the above criterion is passed testing may begin..... ☐

Note: Ensure electrical schematic has been reviewed prior to testing

Test connector to be mated to EFL, once mated place on a suitable bench for testing to begin.



ROV DIVER STAB

Image to show standard Siemens test connectors

Procedure:

NOTE: On harnesses featuring nickel over braid, perform continuity test on the pin that has the over braid termination and the connector body to ensure no contact between them.

For harnesses incorporating Resistors:
Perform insulation resistance test all pins to body/earth @ 50V DC through the appropriate connector until the specified pass criteria is reached. Continue to run the test for a further minute (see note below) then record the result.

For Ethernet:
Perform insulation resistance test all pins to body/earth @ 50V DC through the appropriate connector until the specified pass criteria is reached. Power cores 1000V DC. Continue to run the test for a further minute (see note below) then record the result.

For harnesses NOT incorporating Resistors:
Perform insulation resistance test all pins to body/earth @ 1000V DC (500V DC if screens included refer to notes below) through the appropriate connector until the specified pass criteria is reached. Continue to run the test for a further 1 minute (see note below) then record the result.

For harnesses with nickel over braid:
Perform insulation resistance test on the pin that has the over braid termination @ 500V **DC** through the appropriate connector until the specified pass criteria is reached. Continue to run the test for a further 1 minute (see note below) then record the result.

NOTE: if the acceptance criteria is not reached within 10 minutes, contact the Technical Dept.

IMPORTANT: IF THE EITHER CP WIRE OR SCREEN ARE INCLUDED SEPARATE THE TEST:

Eg Test 1: All Power cores to body excluding Earth CP cores test to 1000V

Eg Test 2: CP Earth cores or screen to body excluding Power cores test to 500V

IR Test Acceptance:
≥ 10GΩ @ 1000V DC on total wire length + test leads ≤ 50m (See note below).
≥ 1GΩ @ 1000V DC on total wire length + test leads > 50m (See note below).
>1MΩ @ 500V DC for screens + nickel over braid.
No breakdown or flashover shall occur.

NOTE: The pass criteria used should be based on the accumulative length of wire attached to the pin(s) plus the accumulative length of the test lead(s).

For tests involving DC sufficient time must be allowed for the circuit to discharge before touching the conductors. The discharge period shall be at least equal to the period of charging.

- Record atmospheric pressure, temperature & humidity (in accordance with the IEC 60060 standard) during electrical & function testing. Record results in table.

- When complete ensure protective caps are clean and free from debris, these must be re-fitted onto the connector immediately.

Note:
Insulation Resistance is dependent on a number of factors for example test voltage, humidity (moisture content), temperature, time constant of sample, material properties, pressure, etc. A change in one of the above parameters will result in a change in the IR reading.

In practice the control of these parameters is very difficult to achieve (i.e. IR readings are sensitive to change) and this is recognised in international specifications such as MIL-STD-883E, IEC60502, etc.

11.1 FAULT INVESTIGATION

(only complete if a fault is present)

If EFL / Jumper / Harness fails test:

Check all connections are fully connected..... ☐

Remove all connections and inspect all contacts for damage or debris..... ☐

While disconnected check all equipment is working and set up correctly..... ☐

If using a bench test board this must be fully checked for correct operation ..... ☐

Re-connect all equipment and repeat tests..... ☐

<u>If there is still a fail please stop test and contact Technical Dept</u>

FINAL CHECK
Make sure this document has been fully completed and all results / information recorded in the correct section.

11.2 INSULATION RESISTANCE TEST RESULTS SHEET

Project:		**Part No:**
Equipment used:		**Serial No:**
Conductor ID (Pin-Pin)	**TEST VOLTAGE** Refer to Section 11	**REFER TO FOLLOWING NOTE**
1	Ω	_____ Ω
2	Ω	
3	Ω	
4	Ω	
5	Ω	
6	Ω	
7	Ω	
8	Ω	
9	Ω	
10	Ω	
11	Ω	
12	Ω	
13	Ω	
TEMP. (˚C)		TESTER
HUMIDITY (%)		DATE:

NOTE:

IMPORTANT: IF EITHER THE CP WIRE OR SCREEN ARE INCLUDED SEPARATE THE TEST:
Eg Test 1: All Power cores to body excluding Earth CP cores test to 1000V
Eg Test 2: CP Earth cores and/or Screen to body excluding Power cores test to 500V

12. INFORMATION AND NOTES / HEALTH & SAFETY FEEDBACK

All non-conformances must be reported to the QC/QA department for investigation
Take photos and contact Technical Dept.

Date	Record Fail	Action

13. SIGN OFF SECTION

Please sign and date where indicated to confirm that each page of this document has been read and complied with in full.

Name	Signature	Date