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**THE SUPPLIER IS RESPONSIBLE FOR REVIEWING THIS DOCUMENT
WHENEVER A NEW PURCHASE ORDER OR CHANGE IS SENT TO THE
SUPPLIER.**

The following DRS Test & Energy Management Quality Terms and Requirements apply as indicated in the Purchase Order or Contract. If you cannot meet any applicable term, notify the DRS-TEM Buyer listed on the face of the Purchase Order. All material purchased by DRS-TEM is listed alphabetically by commodity in the spread sheet located at the bottom of this page immediately following the Quality Requirement listings.

1. Certificate of Compliance:

For tracking purposes each shipment shall be accompanied by a certificate of compliance signed by a company official responsible for product assurance. The certification shall identify as a minimum the purchase order number, line item number, part number as listed on the PO, quantity and the manufacturer. **Certification requirements for raw printed circuit cards are detailed in PQR # 18**

2. Quality Program:

Supplier Quality Programs and data retention shall meet the requirements of **ISO-9001 2008/AS 9100** or an acceptable equivalent and shall be approved in advance by DRS-TEM. Independent third party certification is not required. Systems and processes once approved by DRS Supplier Quality Assurance shall not be changed by the supplier without prior written notification and approval by DRS Purchasing and DRS Supplier Quality Assurance. This encompasses any change in equipment, manufacturing shifts, materials, documentation, processes, sub-tier suppliers or any other material or physical aspects of the process.

Suppliers doing business with or subcontracting to any sub-tier supplier on any Contract or Purchase order let by DRS-TEM shall be responsible for flowing down and enforcing any requirements that are stated on the original Purchase Order, Contract or other documents provided to the contractor. Suppliers are required to notify DRS-TEM of any problems with sub-tier suppliers that may affect Quality or

delivery to DRS-TEM.

Suppliers having been approved by DRS-TEM supplier Quality Assurance and having an approved ISO registered systems or equivalent, shall have a current Quality Manual on file with DRS-TEM. Manuals over two years old are not considered current and will not be accepted. Special processes such as plating, welding and casting are subject to review and approval by DRS-TEM. Suppliers required to conduct SPC shall maintain these records. Data that is required in the purchase order/contract are to be retained for 5 years at the supplier's facility in such a manner as to protect and facilitate its review. Data retention is from the date of purchase order completion.

The supplier shall maintain an active counterfeit avoidance program if supplying electronic components. The program shall center on the prevention of inclusion into any assemblies of counterfeit, non-authentic, altered or used components. These methods should included component testing, Manufacturers certification of authenticity, Part acquisition direct from manufacturers. Purchasing of components from unauthorized distributors is discouraged.

Acceptable methods to verify authenticity of the component could include procuring from suppliers who have a counterfeit avoidance program satisfactory to DRS TEM or certified to a known Counterfeit Component Avoidance Program such as **CCAP 101, from CTI Inc (<http://www.cti-us.com>)** or independently audited to **SAE 5553 standard (<http://www.sae.org>)**. DRS TEM recognizes these 2 standards as adequate and satisfactory.

The risk avoidance strategy that a supplier chooses shall include acquisition directly from manufacturers, their authorized distributors and or authorized franchised sellers. Purchasing of components from unauthorized distributors, independent brokers not certified or approved by DRS TEM is discouraged.

Turn key suppliers may achieve these results through an onsite system or through an accredited laboratory or using procuring strategies listed above. Counterfeit avoidance programs that are not **CCAP 101** or **AS-5553** must be approved in advance by DRS-TEM Supplier Quality Engineering. Copies of proposed counterfeit programs must be submitted to DRS-TEM Supplier Quality Engineering before the start of procurement.

The supplier's counterfeit component avoidance program shall comply with the following requirements.

All date codes, markings, logo, pin # 1 identification, and packaging, shall be

verified as valid and belonging to the Original Component Manufacturers.

As part of the suppliers process for authentication the parts shall be subjected to die checks by means of x Ray and de-capping

- A Certificate of Conformance (C of C) issued by the OCM is preferred
- All devices shall meet the solder ability requirements of **IPC/EIA J-STD-002**.

Devices shall be clearly identified as passed or failed. Tested parts, those which pass shall not be co-mingled for shipping purposes with those parts that failed.

- All devices shall be handled and packaged in accordance with standard ESD/MSD requirements.

Full inspection and verification by the supplier that the mechanical characteristics of the device, such as leads, part configuration and body meet the OCM specification/data sheet. A statement that the devices operate as stated on the specification/data sheet shall be included with the C of C. The C of C shall be signed by the Supplier's authorized representative.

- Blank verification shall be performed on all programmable devices.

A copy of all applicable test reports, certifications, date codes, lot codes and quantity of each date code and lot code must be included with all shipments.

3. ITAR Requirement

Any supplier conducting business with DRS-TEM that involves the transfer of United States Government technical information in any format is required to be registered with The U.S. Department of State. Registration and information is available at http://www.pmdtdc.state.gov/regulations_laws/itar_official.html. There are no exceptions to this requirement.

4. Component Solderability:

All parts that require soldering shall meet industry standards for hand and machine soldering. It is the supplier's responsibility to ensure compliance to **IPC/EIA J-STD-002**. Components that require re-tinning shall be tested and certified to **IPC/EIA J-STD-002 sec 4.3.1 test "E"** for leaded components and **4.3.2 test "F"** for leadless components. For ball grid arrays **IPC/EIA J-STD-013** applies.

NOTE: Subcontractors are required to verify that all MSD's (Moisture Sensitive Devices) Provided to and or purchased must comply with the baking requirements of IPC/JEDEC J-STD-033: Standard for Handling, Packing, Shipping, and Use of Moisture/Re-flow Sensitive Surface Mount Devices.

Franchised and Non-franchised component suppliers:

Non-franchised component suppliers shall comply with the following:

- Supplier must meet the requirements of **CCAP-101 or SAE 5553** any components with date codes in excess of two years from the original manufacturers date code shall require re-tinning.
- Components that are less than two years old sealed in the original factory packaging with factory certificate of conformance we will accept provided that the supplier meets CCAP-101.
- All date codes shall be verified as valid Original Component Manufacturers (OCM) date codes.
- All devices shall meet the solderability requirements of **IPC/EIA J-STD-002**.
- Full electrical functional test and certification that devices meet the requirements of the OCM specification/data sheet. The test report shall identify the quantity tested and the quantity failed.
- Devices shall be clearly identified as passed or failed. Tested parts, those which pass shall not be co-mingled for shipping purposes with those parts that failed.
- All devices shall be handled and packaged in accordance with standard ESD/MSD requirements.
- Full inspection and verification by the supplier that the mechanical characteristics of the device, such as leads, part configuration and body meet the OCM specification/data sheet. A statement that the devices operate as stated on the specification/data sheet shall be included with the C of C. The C of C shall be signed by the Supplier's authorized representative.
- Blank verification shall be performed on all programmable devices.
- A copy of all applicable test reports, certifications, date codes, lot codes and quantity of each date code and lot code must be included with all shipments.

Franchised suppliers shall comply with:

- Components with date codes in excess of two years from the manufacturers date code still sealed in factory packaging with the original manufacturers certificate of conformance we will accept as is.
- If the components have been opened then the full requirements of this section (4.0) apply.

5. First Piece Inspection:

This applies to built to print (BTP) fabricated sheet metal or machined parts. These parts will have a first piece inspection completed. The initial shipment of parts shall be accompanied by the first piece unit and the dimensional data recorded in the supplier's format. The first piece unit will be tagged in a conspicuous manner as to identify it as the first piece. (Bagged, tagged or temporary label)

First Piece is only required on the first shipment of a new component, or on a component that has not been manufactured in the preceding 12 months. First piece is also required on any revision changes that affect the physical characteristics of the part. First piece is not required on documentation changes.

6. First article inspection: (This does not apply to raw circuit cards)

This applies to all finished products or components that are not machined or formed to specific tolerances. The initial shipment shall be accompanied by the first article data recorded in the supplier's format. The first article unit will be tagged in a conspicuous manner as to identify it as the first article. (Bagged, tagged or temporary label)

First article is only required on the first shipment of a new assembly, or on an assembly that has not been manufactured in the preceding 12 months. First article is also required on any revision changes that affect the physical characteristics of the assembly. First article is not required on documentation changes.

Suppliers shall review **QAP 4.21** First Article Acceptance procedure **check list** for the documents and information that is required when submitting a First Article. This check list is available from Supplier Quality Assurance at: **256-895-2340**.

7. Workmanship:

Suppliers are responsible for delivering products that are fit for use; meet the specifications or directions identified on the drawings or in the Purchase Order. Products must be manufactured in such a way that they are free from sharp edges, burrs, scratches, dents and blemishes. Electronic assemblies shall be soldered in accordance with **IPC/EIA J-STD-001 CLASS THREE** or as specified in the supporting documentation. The use of organic acids (OA) and /or any water-soluble flux/paste is prohibited on electronic assemblies. Fluxes are identified in **IPC/EIAJ-STD-004**. This applies unless waived by DRS Quality Assurance in writing.

8. Statistical Process Control (SPC):

Group I suppliers shall have a SPC process in place that includes a plan. Suppliers

shall be able to demonstrate actual use of SPC to control the process and identify opportunities for improvements. DRS-TEM reserves the right to review all SPC data. SPC process will be in accordance with **IPC-9191**.

9. Calibration Services:

The supplier of calibration services shall have a system that meets the requirements of **ISO-17025-2005, ISO-9001-2008 or A2LA** accredited and shall be able to demonstrate traceability of standards used to the National Institute of Standards and Technology (N.I.S.T). Calibration services will provide with each item calibrated a certificate of calibration identifying calibration date, due date, standards used and any significantly out of tolerance condition and will be signed by a representative of the company responsible for Quality Assurance.

10. Packaging:

The packaging materials shall not degrade or damage any portion of the product being shipped; materials will be packaged and shipped using best commercial practices. The purchase order will reflect any special packaging requirements for electronic parts. Moisture sensitive devices (MSD) will indicate the moisture sensitive level (MSL) on the outside of the package. Packaging will be in compliance with **IPC /JEDEC J-STD-033** ESD sensitive parts will be packaged and marked accordingly using ESD warning labels and ESD protective containers. This will be in compliance with **EIA-541**

11. ESD Program:

The supplier shall maintain an ESD program as outlined in **ANSI/ESD-20.20**.

12. Government Surveillance/Source inspection:

Government inspection/source is required at the contractor facility. Notify DRS-TEM 15 days in advance of the estimated completion date to arrange for a Government inspector.

13. DRS-TEM, Facility Surveillance

The seller shall maintain a quality system fully compliant with **ISO 9001-2008/AS-9100** or equivalent and will permit an on-site verification of the system by a DRS Quality Representative upon request and with reasonable notice.

14. Mercury Free Certification:

When required, parts shall be certified to be free of Mercury or exposure to Mercury. Test data to support this certification will be maintained for a period of 5 years from the completion of the purchase order or contract.

15. Radioactive Restrictions:

When required, parts shall be certified to be free of any radioactive material

(16. Reserved)

17. Special packaging provision:

Raw circuit cards are to be individually wrapped in a clear plastic sleeve to facilitate contamination free Handling and viewing of any data printed on the card. This applies to single and bulk quantities.

18. Printed Circuit Board Requirements:

Product Quality Requirements (PQR) for Rigid Printed Boards, Flexible Printed Boards including Rigid-Flex and High Density Interconnect (HDI) Layers or Boards is located in **Document # PE52265 and PE50795**. Copies of these requirements are available from Supplier Quality Assurance. (256)-895-2340.

19. Shelf Life:

Age sensitive materials will arrive with at least 75% of the MANUFACTURERS shelf life remaining on the product. **THE DATE OF MANUFACTURE AND THE SHELF LIFE EXPIRATION WILL BE MARKED ON THE CONTAINER.** All chemicals will be shipped with Material Safety Data Sheet (MSDS).

20. Part/Assembly marking:

Parts must be delivered and marked as required by the purchase order, print and any supporting documentation. If not indicated on the print or documentation; then all parts will be “bagged and tagged” or shall have affixed a tag to identify the assembly. All parts, chassis, cables and assemblies (**excluding raw circuit cards**) shall have in addition to those markings identified in the documentation the following data marked on the parts; the parts shall be marked in as close proximity as possible to the original markings as specified on the print.

All submissions must be marked as it relates to manufacturing origin as follows.

<p>CAGE CODE: 24290</p> <p>MFRG CODE: XXXXX</p> <p>(XXXXXX) = manufacturers cage code.</p>

Character size, color, marking method and location shall be dictated by the print. If not specified on the print then MIL-STD-130 shall apply.

Questions should be directed to the supplier Quality Engineer at 256-895-2340 or 256-895-2811.

21. Quality requirements for turnkey CCA assemblies:

1.1 Quality System Requirements

1.1.1. The CM (Contract Manufacturer) will as a minimum have and maintain a quality system fully compliant with ISO 9001:2008 or an approved equivalent and will permit on-site verification of the system by a DRS Quality Representative upon request with reasonable notice. A 3rd party ISO registration is not required.

1.1.2. The CM's Quality system will focus on measuring and improving customer satisfaction, root cause identification and closed-loop resolution of non-conformance for materials and services within their supply base, the supplier will also maintain an active control process over its suppliers, in-house operations and customer feedback.

1.1.3. The CM will establish and maintain in-process and out-bound inspection activities for the basis of measuring in process and final yields for each part number. This will be reported to the DRS Quality representative on time line to be decided prior to the start of the production run. Web access to this data is permissible. The yields will be inclusive of all non-conformance categories. Consecutive yields as

dictated by procedure of 100% per lot and no inspection failures at DRS TEM will qualify the supplier to be considered as a Certified Supplier.

1.1.4 The Contract Manufacturer (CM) will submit a Quality Plan in the form of a flow chart. A Quality Plan identifying key processes and inspection points will be sufficient.

1.1.5 The supplier shall maintain an active counterfeit avoidance program. The program shall center on the prevention of inclusion into any assemblies of counterfeit, non-authentic, altered or used components. These methods shall included component testing, Manufacturers certification of authenticity, Part acquisition direct from manufacturers. Purchasing of components from unauthorized distributors is discouraged.

The supplier's counterfeit component avoidance program shall comply with the following requirements. Turn key suppliers may achieve these results through an onsite system or through an accredited laboratory. Counterfeit avoidance programs must be approved in advance by DRS-TEM Supplier Quality Engineering. Copies of proposed counterfeit programs must be submitted to DRS-TEM Supplier Quality Engineering before the start of production.

- All date codes shall be verified as valid Original Component Manufacturers (OCM) date codes.

- All devices shall meet the solderability requirements of **IPC/EIA J-STD-002**.

- Full electrical functional test and certification that devices meet the requirements of the OCM specification/data sheet. The test report shall identify the quantity tested and the quantity failed.

- Devices shall be clearly identified as passed or failed. Tested parts, those which pass shall not be co-mingled for shipping purposes with

those parts that failed.

- All devices shall be handled and packaged in accordance with standard ESD/MSD requirements.

- Full inspection and verification by the supplier that the mechanical characteristics of the device, such as leads, part configuration and body meet the OCM specification/data sheet. A statement that the devices operate as stated on the specification/data sheet shall be included with the C of C. The C of C shall be signed by the Supplier's authorized representative.

- Blank verification shall be performed on all programmable devices.

- A copy of all applicable test reports, certifications, date codes, lot codes and quantity of each date code and lot code must be included with all shipments.

1.1.6 For the purpose of manufacturing, the order of precedence is the Purchase order, Master drawing, Engineering change orders (ECO) and any additional written instructions. Verbal changes or changes transmitted other than through the designated buyer are not valid.

1.2. Inspection and First Article Inspection

1.2.1 All Assemblies will be subject to first article inspection and approval by DRS. All such inspections and approvals shall not relieve the CM of its obligations under the Purchase Order to deliver acceptable product, this includes but is not limited to the applicable warranty. DRS shall have the right to inspect the products at any time during the manufacturing process at CM's facilities or elsewhere provided DRS gives reasonable advance notice of each visit, and such visit does not disrupt the manufacturing capability of the CM, or violate the CM's safety, security policies, or clean room procedures. DRS will at our

discretion conduct First Article Inspection at the supplier's facility for each part number or assembly.

1.2.2 The First Article documentation package will contain all physical inspection and test data. CCA's will require cleanliness test data (Ionic); to verify conformance to cleanliness requirements of class three, this will be one assembly per lot or run, Ionic's will be per IPC-TM-650. Assembly acceptance criteria will be per IPC-A-610 class 3. Manufacturing will be per **ANSI/J-STD-001 CLASS 3**. All other requirements called out on the drawing apply. This includes any approved ECOs.

1.2.3 Each shipment or first article will be accompanied by a C of C both signed by an authorized Quality Assurance designee. The C of C's shall identify

- Part number, serial number, lot number and date of manufacture.
- Cleanliness testing data to be attached (ionic) if applicable.
- Testing data for ICT or FCT, if required, shall be attached if applicable

1.2.4 Any deviation or waivers will require pre-approval from DRS; requests will be forwarded to the appropriate buyer as noted on the purchase order. Requests for deviation or waiver will be submitted on form **TEM-024-02**

1.2.5 Assembly Process verification on site is required on every shipment. Request for inspection shall be addressed to Ken Loree at kloree@drs-tem.com with cc to mburgeson@drs-tem.com. Such requests shall be made 5 business days in advance. DRS reserve the right to waive the source inspection.

1.3 CCA Process requirements

1.3.1 Solder chemistry/Cleaning Chemicals. The use of ROLO flux is preferred. Use of any OA type flux will require submittal of SIR Testing per IPC-TM-650. HPLC testing per IPC-TM-650 test results should validate the assembly/test articles to be free of corrosive chemicals including the presence of any ionic contamination. The testing shall be

current and recent; any testing done more than a year ago shall not be acceptable. DRS shall be provided a list of all solders, fluxes, chemicals, glues and adhesives. Once they are declared for use, shall not be changed without prior authorization by DRS QA.

1.3.2 Appropriate ESD controls in accordance with ANSI/ESD S20.20 or equivalent shall be utilized.

1.3.3 Any repair shall require prior DRS QA approval (**reference PQR 24**). Rework is acceptable if done in accordance with IPC-7711.

1.3.4 Part marking shall be in accordance with drawing requirements.

1.3.5 BGA x-rays are to be provided as part of First Article Requirements.

1.3.6 Solder joint acceptance shall be in accordance with IPC-A-610D class 3 for inspection and ANSI/J-STD-001 class 3 for manufacturing. DRS TEM does not require compliance with RoHS.

1.3.7 DRS may, at its option, reject and return any products which do not conform to the Order, applicable drawings, and specifications. The rejected products which DRS returns to the CM, as well as any replacement or repaired products which are returned to DRS, shall be at the CM's risk and expense.

1.3.8 DRS may, at its option use either a sampling plan or 100% inspection. Lots which fail to pass such sampling plans may, at DRS' option, be inspected 100% at CM's cost. The CM shall first have the right to inspect parts on DRS' premises to determine the non-compliance and appropriate disposition. DRS shall return any defective or nonconforming articles or lots to CM at CM's risk and expense.

1.3.9 Testing will be accomplished in accordance with the Purchase Order, print and any other supporting documentation

1.3.10 raw circuit cards procured by the turn key supplier for inclusion in DRS TEM product shall comply with the following.

- Boards received and which have remained sealed in the

manufacturers packaging; if stored for more than thirty days shall be baked prior to assembly.

- Boards not received in the manufacturers packing or opened for any reason and the exposure time not documented shall be baked prior to assembly and shall adhere to these same requirements.
- Suppliers shall maintain a bake log of all boards and list them by part number, revision, date code, manufacturers cage code and the drying parameters used
- Assembly shall take place within twenty four hours of baking.

1.4 Corrective actions

1.4.1 DRS may, at its option, require written responses to a Supplier Corrective Action Request (SCAR) issued by DRS. CM's shall acknowledge the SCAR within 24 hours of notice. The CM shall develop and submit a plan to DRS that includes the identification of the nonconforming product, root cause, as well as the CM's proposal for resolution, and submit this plan to DRS within 10 business days from the date of receipt of the SCAR.

1.4.2 The CM shall evaluate each rejected item to determine if it conforms, in all material respects to the Specifications. DRS shall give the CM written notice of any rejection of an item N/C Non-conformance report as soon as reasonably possible. Such written notice of rejection of an item for failure to materially conform to the Specifications shall include a detailed description of DRS basis for asserting that the item does not materially conform to the Specifications ("Non-Conformance report"). If the CM disputes the basis for rejection set forth in a Non-Conformance report, it shall provide written notice of the same to DRS within ten (10) business days to Quality Assurance and the Purchasing department following the receipt of the Non-Conformance report. If the CM does not dispute the basis for rejection set forth in the Non-Conformance report the CM shall follow its standard RMA procedure.

.5 Material Control

1.5.1 All components supplied under this order shall comply with the following:

- Components both active and passive shall not have a date code more than two years old. All parts with date codes of more than two years old shall require approval by DRS.
- Components shall be subjected to a process review for the identification of Fake, Counterfeit, altered or other non-genuine parts.
- Parts bought for DRS programs which are not bought from franchised dealers will have been tested by the component supplier. The test data and a certification of conformance will be provided to the CM. This data will be available for review by DRS.
- Raw circuit cards bought for DRS assemblies shall have the appropriate test data and cross sections available for testing and review by DRS.
- All data and samples shall be archived for a period of not less than five years from the completion of the contract.
- Date code sensitive materials will be monitored. Out of date material will not be used on DRS assemblies.
- Shipments to DRS will conform to best commercial practices associated with the shipment of ESD sensitive materials.

1.6 Workmanship

- 1.6.1 Suppliers are responsible for delivering products that are fit for use, meet the specifications identified on drawings and are manufactured such that they are free from sharp edges, burrs, scratches, dents and Blemishes
- 1.6.2 Parts subjected to special processes such as painting, plating, welding etcetera will be certified by the supplier of the process.
- 1.6.3 Electronic assemblies **other than circuit card assemblies** shall be soldered in accordance with
- IPC/EIA J-STD-001 CLASS THREE** or as specified in the supporting documentation.

22. Sidecar Cable Testing Requirements. (rev 4/6/09)

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1.0 INTRODUCTION

- 1.1 Scope. This First Article Test Plan establishes the performance and environmental test procedures for DRS TEM. Part Numbers for testing will be identified by DRS-TEM Quality Engineering. Contact DRS-TEM Purchasing

- Buyer point of contact listed on the PO to obtain the required part numbers.
- 1.2 Purpose: The cable assembly as noted in section 1.1 will be selected by DRS TEM as representation of all sidecar cable assemblies associated with this RFQ/PO and will be used as the qualification test unit(s) for all assemblies on the purchase order.

2.0 GENERAL REQUIREMENTS

- 2.1 The supplier will perform First Article Inspections and Tests. Selection of the units for FAI and FAT as determined by DRS TEM. All 100 percent inspection and test results shall be made available upon request.
- 2.2 A First Article shall be performed on each one of the selected part numbers by DRS TEM as stated in 1.1 of this document. First Article units will be derived from this statement.

Suppliers who have submitted First Articles that have been accepted by DRS Supplier Quality Assurance as acceptable shall be deemed to have had their manufacturing processes approved for the construction of all similar cables of like content and construction, no further first articles are required.

Additional first articles are only required if the supplier has ceased manufacturer of DRS parts for a period of one year or if there have been changes in the manufacturing process, design or material makeup of the cable. These may also be required if a request from DRS Engineering or Program Management so directs.

Additional First Articles may also be required if directed by customer purchase order/contract or as directed by same.

First article questions should be directed to the Buyer as stated on the purchase order.

- 2.3 The supplier shall provide an outline of their proposed testing process/plan; a flow chart will be acceptable.
- 2.4 The test Location shall be identified within the plan and shall contain the address of the facility in which the testing is to be performed.
- 2.5 A failure is the inability of a component to meet a requirement of the Product Fabrication Specification or Quality Assurance Requirements (QAR).

- 2.6 If an incident/failure occurs, testing will stop. All incidents/failures shall be reported with 24 hours by telephone to the Quality Engineer at DRS TEM. Point of contact will be Mark Burgeson 256-895-2340 mburgeson@drs-tem.com.
- 2.7 A final Test Report shall be written in accordance with the Test Requirements.
- 2.8 A copy of the final Test Report shall be forwarded to the Quality Engineering within two weeks of the test completion.
- 2.9 Inspection and acceptance of the first article from the supplier constitutes acceptance of the manufacturing process for sidecar cables. Acceptance of the process relieves the supplier of any further test requirements on future Purchase Orders providing that the supplier maintains a constant manufacturing process and no changes of any nature are undertaken and all cables are of a similar design and materials. A new first article and test cycle will be required if any of the following occur.
- The supplier is new and has never built the product before.
 - There has been a stop in the manufacturing of the product that exceeds one year (1).
 - There has been a change in materials or processes.
 - There has been a significant failure of the product under any circumstance.
 - DRS-TEM directs a new test cycle as deemed necessary.

3.0 APPLICABLE DOCUMENTS

The following documents in effect on the date of invitation for bids, request for quote or Purchase Order form a part of this Test Plan to the extent specified within. In the event of a conflict between the documents referenced herein and this Test Plan, the order of precedence shall be the Purchase order, Master drawing, specification, military specifications/standards, QAR, then this Test Plan.

3.1 DRAWINGS: P/N: DRWG REV:

TBD

3.2 DRS TEM SPECIFICATIONS:

- Purchase order
- This document
- Prints

3.2.1 CHANGE REQUESTS:

None Known

3.2.2 WAIVERS/DEVIATIONS:

None known

4.0 TEST EQUIPMENT

4.1 Inspection and Test Equipment

Unless otherwise specified in the contract, the supplier and/or outside laboratories are responsible for the maintenance of all inspection and test equipment necessary to assure that supplies and services conform to contract requirements. Commercial, modified commercial or supplier designed inspection equipment and/or measuring setups must be capable of repetitive measurements to accuracy of 2 % percent of the component specification tolerance. Calibration of inspection and test equipment shall be in accordance with ISO-10012. A log of instruments and equipment listing the manufacturer name, serial number, model, measurement range, accuracy, frequency of calibration and calibration due date, as utilized during the entire test program, shall be maintained.

5.0 TEST CONDITIONS FOR PRODUCTION TESTING.

5.1 Standard Ambient Test Conditions

Unless otherwise specified, all tests shall be conducted under the following conditions:

Air Temperature 73 °F ± 18 °F

Barometric Pressure 28.5 (+2.0, -3.0) inches of Hg

Relative Humidity 50 ± 30 percent

5.2 Test Tolerances

The tolerances listed below shall be maintained at the control sensor during each of the environments outlined with this test plan unless otherwise specified.

Temperature (°C/°F) $\pm 1.4\text{ }^{\circ}\text{C} / \pm 2.5\text{ }^{\circ}\text{F}$

5.3 Installation of Test Items at the Test Facility

Unless otherwise specified, the assembly shall be installed in the test facility in a manner that will simulate service usage, making connections and attaching instrumentation as necessary. Plugs, covers, and inspection plates not used in continued operation, but used in servicing shall remain in place. When mechanical or electrical connections are not in use, the connections normally protected in service shall be adequately covered. For tests where temperature values are controlled, the test chamber shall be at standard ambient conditions when the assembly is installed. The assembly may then be operated to determine that no malfunction or damage was caused due to faulty installation or handling when operation is required during exposure to the specified test.

6.0 PERFORMANCE TEST

The performance test shall be conducted in accordance with this critical Item production Fabrication Specification for Harness/Cable including extreme high temperature of +130.0°C during and after DC resistance and insulation resistance testing.

- 6.1.1 Electrical. Each circuit of the cable assembly will be subjected to a continuity test between every other circuit, ground and connector shell to determine that opens, shorts, or insulation leaks are not present and that the required circuit continuity exists and conforms to the required circuit continuity exists and conforms to all requirements. This electrical test will be performed by the supplier in a designated facility utilizing a DIT-MCO testing machine, or equivalent test equipment.
- 6.1.2 Insulation Resistance. Each conductor in the cable assembly shall be tested for Insulation resistance to other conductors. Insulation resistance between each pair of pins, between each pin and any pin-connected shield and between each pin and the assembly connectors shall have a minimum value of 100 mega ohms with 500±50 volts direct current (VDC) applied for a minimum of 1 second.
- 6.1.3 DC Resistance. The DC resistance shall not exceed what is specified on part drawing or 0.5 ohms for the 20 AWG wire used when measured from the connector contact at one end of a wire to the corresponding contact at the other end. Resistance for other wire sizes shall be in compliance with

sec 3.2.1.1 of SC –X15110F.

NOTE: When shields are terminated at connector shells, the resistance between any two-connector shells of the cable assembly shall not exceed 0.5 ohms.

6.1.4 Test Conditions. Unless otherwise specified, all tests shall be conducted under the following conditions:

- Air Temperature 73±18°F
- Barometric Pressure 28.5(+2.0,-4.5)inches of mercury
- Relative Humidity 50±30 percent

7.0 DESIGN AND CONSTRUCTION

7.1 Production Drawings

7.1.1 Verify visual and dimensional inspections were performed during fabrication and assembly to verify conformance to drawing of each part number. In lieu of performing this verification, a copy the inspection sheets are acceptable and must be included in the final Test Report.

7.2 Materials

7.2.1 Verify the materials used to construct the assembly are as specified in referenced specifications, standards and drawings and are free from defects that adversely affect performance or serviceability of the finished product.

7.3 Identification and Marking

7.3.1 The assembly is identified and marked in accordance with MIL-STD-130.

Workmanship

7.3.2 Verify the following:

- Visual inspections were performed during all phases of fabrication, assembly and test that verify the assembly is free of burrs, chips, scratches, sharp edges, cracks, corrosion and surfaces out of alignment or out of contour.
- There is no evidence of conditions that could present a safety hazard to operating or maintenance personnel and the assembly does not contain any loose or foreign material.
- Electrical portions of the assembly are in accordance with

MIL-HDBK-454, guideline 9.

7.5 Soldering

7.5.1 All soldering shall be in accordance with ANSI/J-STD-001 Class 3 and IPC-620 Class 3.

8.0 PHYSICAL CHARACTERISTICS

8.1 Weight

8.1.1 There is no weight requirement specified in the TDP.

8.2 Color

8.2.1 There is no color requirement specified in the TDP.

9.0 BASELINE TEST

(STANDARD AMBIENT CONDITIONS)

9.1 Place the Cable Assembly at the test station in an orientation that simulates service usage, making connections and attaching instruments as necessary.

9.2 Conduct the performance test of Section 6.0.

10.0 OPERATING LOW TEMPERATURE TEST

10.1 Install the cable assembly in the test chamber coiled to fit as necessary, however not less than 18" diameter, to test as a single unit. Attach instruments as necessary to record testing parameters.

10.2 Connect a thermocouple to the UUT at the point that has the longest thermal lag of a cable assembly.

10.3 Maintain a continuous record of temperature versus time throughout the storage and operational temperature environments on a data logger set to record every minute or on a circular chart. Include a copy of the data logger or circular chart in the final Test Report.

NOTE: The rate of temperature change shall not exceed 8°C (18°F) per minute until temperature stabilization has been attained.

10.4 Lower the internal chamber temperature and cable assembly to the storage temperature of (-50.0°C (C+0/-3.0°C))*.

10.5 After the UUT stabilizes at (-50.0°C) maintain this temperature for a period

of (24)* hours.

NOTE: Stabilization is determined by temperature of cable assembly.

10.6 Return the UUT, to standard ambient conditions and conduct the performance test of Section 6.0.

10.7 Record all actual test parameter, indicating pass or fail, for each P/N and Serial Number.

11.0 OPERATING HIGH TEMPERATURE TEST

11.1 EXTREME HIGH TEMPERATURE must meet operating high temperature of + 130.0°C (+3°/-0°C) for 48 hours.

11.2 Allow cable and chamber to reach +130.0°C then start cycle

11.3 At the end of 48 hours, subject unit to testing as required in 6.0 while at + 130.0°C

11.4 Return unit to ambient temp and repeat testing.

11.5 Conduct Performance Test per section 6.0

11.6 Record all actual test parameter, indicating pass or fail, for each P/N and Serial Number.

12.0 HUMIDITY

12.1 Conduct baseline performance test per section 6.0 prior to humidity testing.

12.2 Maintain a continuous record of the dry bulb and dry/wet bulb differential temperatures versus time during the entire humidity test on a data logger set to record every minute or on a circular chart. Include a copy of the data logger or circular chart in the Final Test Report.

12.3 Place unmated cable in oven for preconditioning.

12.4 Condition cable assembly at + 50° C (+/-2° C) for 24 hours.

12.5 If a performance test was not conducted immediately before humidity testing, conduct the performance test of Section 6.0 after completion of the 24 hours of

conditioning and prior to subjecting the cable assembly to 90 – 100% RH.

- 12.6 Place in humidity chamber temperature to +50° C- and the relative humidity to 90-100% RH.
- 12.7 Allow the chamber to return to test specifications. The cable assembly shall remain in chamber for 24 hours in accordance with 12.6
- 12.8 Upon completion, air dry for 30-60 minutes and test. This needs to be stipulated to prevent any false failures due to surface moisture that will be on the face of the unmated connector.
- 12.9 Conduct Performance Test per section 6.0
- 12.9.1 Record all actual test parameter, indicating pass or fail, for each P/N and Serial Number

13.0 SUBMERGENCE TEST

- 13.1 Each individual part number cable assembly shall be conducted independently. Not as a batch.
- 13.2 Place the cable assembly into a tank that is filled with clear water and that is capable of introducing and sustaining a differential pressure (vacuum) of **3.0 PSI ± 0.5 psid**
- 13.3 Submerge the cable assembly to the depth of **1.0 inch** (submergence depth shall be measured between the water surface and top surface of the UUT) and apply the differential pressure for a minimum of five (5) minutes.
- 13.4 Monitor the UUT for leakage as evidenced by any air bubbles escaping from the interior of the UUT (be careful not to misconstrue bubbles from the assembly surface as air escaping from the UUT). Any evidence of leakage shall be cause for rejection.
- 13.5 Leakage is defined as a steady stream of bubbles escaping from the interior of the assembly, and from the same general location for the harness. (I.e. the same boot, transition branch, adapter to connector interface, ECT.) Bubbles which result from entrapped air on exterior surface of assembly shall not be

considered a leak.

13.6 Following the test, remove the cable assemblies from the water tank, air dry for 30-60 minutes and conduct the performance test of section 6.0

13.7 Conduct Performance Test per section 6.0

13.8 Record all actual test parameter, indicating pass or fail, for each P/N and Serial Number.

14.0 ENVIRONMENTAL TEST DOCUMENTATION

14.1 Testing/Manufacturing Facility shall provide a written test report for each of the environmental tests in sections:

- 10.0 – Operating Low Temperature Test
- 11.0 – Operating High Temperature Test
- 12.0 – Humidity
- 13.0 – Submergence Test

14.1.1 Test Documentation will include baseline electrical test results prior to specific environmental test, documentation of test parameters including any associated charts; and performance test results conducted after specific environmental test completion.

23. DRS-TEM source inspection

Source inspection is required on this shipment. Notify DRS Supplier Quality Engineering five business days in advance of the estimated ship date to arrange for the inspection of the parts. Request for source inspection should be directed to.

24. Repair Authority

Suppliers do not have repair authority on any DRS product. All suppliers who wish to conduct repairs on any product shall obtain approval in advance and in writing. DRS will direct the repair process and state the appropriate repair specification at that time. Turn key suppliers and board assembly **contractors shall keep on staff a certified IPC-7711/7721 repair technician for any board level repairs.** This technician shall be certified to IPC. No other training or certification is acceptable.

Suppliers who conduct repairs without the pre-approval of DRS shall be responsible

for all costs associated with any necessary actions to bring the units/components up to an acceptable operational level as determined by DRS or for the full cost of the units/components replacement as determined by DRS.

Supplier Quality Engineering:
 Mark Burgeson: 256-895-2340
 Email: mburgeson@drs-tem.com

Supplier Quality Manager 256-895-2811
 Email: ewoodfin@drs-tem.com

All shipments are subject to various inspections. The supplier shall notify the listed POCs the appropriate number of business days in advance as directed by each requirement to schedule a source inspection. Contact points are DRS-TEM Incorporated 110 Wynn Drive | Huntsville, Alabama 35805 | email: mburgeson@DRS-TEM.com or Mark Burgeson at Phone 256.895.2340 | Fax 256.895.2471 or ewoodfin@drs-tem.com Supplier Quality Manager at phone 256-895-2447. Copyright © 2000 DRS-TEM LLC. ALL RIGHTS RESERVED This Web site also contains trademarks of other companies. Unless indicated otherwise, all prices are in United States dollars and subject to change without notice. DRS-TEM, LLC. Is an Equal Employment Opportunity employer.

COMMODITY	B TP	CO TS	SE R	QA REQUIREMENTS	KEY	REV=6/ 8/2009
					BTP= built to print	
ADHESIVES/ PASTES/LOCTITE/CHEMICAL S		X		1,10,	COTS= Commercial off the shelf	
AMPLIFIERS		X		1, 2, 4, 10, 11, 20	SER= services	
ATTENUATOR		X		1, 2, 4, 10, 11, 20	GFE= Government Furnished	
BATTERIES		X		1, 10, 20		
CABINETS, ENCLOSURES, CHASSIS (COTS)		X		1, 7, 10, 20		
CABINETS, ENCLOSURES, CHASSIS (BTP)	X			1, 2, 3, 5, 7, 8, 10, 13, 20, 23		
CABLE ASSEMBLIES (COTS)		X		1, 7, 10, 20		
CABLE ASSEMBLIES (BTP)	X			1, 2, 3, 4, 6, 7, 8, 10 11, 13, 20, 23,24		
CABLE ASSEMBLIES (SIDECAR ASSY)	X			1, 2, 3, 4, 6, 7, 8, 10 11, 13, 20, 22, 23,24	NOTE SPECIAL TEST REQUIRMENTS	
CALIBRATION OF DRS-TEM EQUIPMENT			X	9		
CALIBRATION OF GFE EQUIPMENT			X	9		
CAPACITORS AND CAPACITORS ARRAYS		X		1, 2, 3, 4, 7, 10, 11, 20		
CASES METAL/PLASTIC		X		1, 7,10, 20		

(COTS)					
CASES METAL/PLASTIC (BTP)	X			1, 2, 3, 5, 7,10, 13, 20, 23	
CASTINGS	X			TBD	
CIRCUIT BREAKERS		X		1, 4, 7, 10, 20	
CIRCUIT CARD ASSEMBLIES	X			1, 2, 3, 4, 6, 7, 8, 10, 11, 13, 20, 21, 23,24	
CIRCUIT CARDS RAW, RIDGED AND RIGID-FLEX	X			1, 2, 3, 6, 7, 8,10, 11,13, 17, 18, 20, 23,24	
COLLIMATOR / ASSEMBLIES		X		1, 3, 7, 10, 20	
CONDUITS AND BACK SHELLS	X			1, 2, 3, 6, 7, 8, 10, 13, 20, 23	
CONNECTORS AND ACCESSORIES		X		1, 2, 3, 4, 7, 8, 10, 11, 20	
CRYSTALS AND OSCILLATORS		X		1, 2, 3, 4, 10, 11, 20	
DIODES, ARRAYS, RECTIFIERS		X		1, 2, 3, 4, 10, 11, 20	
DISPLAYS (COTS)		X		1, 7, 10, 20	
DISPLAYS (BTP)	X			1, 2, 3, 4, 6, 7, 8, 10, 11, 13, 20, 23	
ELECTRIC MOTORS AND CONTROLLERS (COTS)		X		1, 4, 7, 10, 20	
ELECTRIC MOTORS AND CONTROLLERS (BTP)	X			1, 2, 3, 4, 6, 7, 8, 10, 11, 13, 20, 23	
ELECTRICAL ASSEMBLIES OTHER THAN CCA's		X		1, 7, 10, 20	
FOAM OR RUBBER PARTS (COTS)		X		1, 7, 10, 20	
FOAM OR RUBBER PARTS (BTP)	X			1, 2, 3, 6, 7,10, 13, 20, 23	
FANS, BLOWERS		X		1, 7, 10, 20	
FUSES, HOLDERS, FUSE BLOCKS		X		1, 7, 10, 20	
GASKETS/GROMMETS/BOOT S/INSULATOR PADS		X		1, 7, 10, 20	
HARDWARE		X		1, 7, 10, 20	
HEAT SINKS		X		1, 7, 10, 20	
INDUCTORS/CHOKES		X		1, 2, 3, 4, 10, 11, 20	
INTEGRATED CIRCUITS		X		1, 3, 4, 10, 11, 20	
LABELS/DECALS/TAGS		X		1, 7, 10, 20	
LAMPS/BULBS		X		1, 7, 10, 20	
LED's		X		1, 4, 10, 11, 20	
METAL PARTS, MACHINED/FORMED/STAMPED	X			1, 2, 3, 5, 7, 8, 10, 13, 20, 23	
OPTICAL FILTERS		X		1, 7, 10, 20	
OPTICS					
LENSES/LASERS/CAMERAS		X		1, 7, 10, 20	
PACKAGING MATERIALS		X		1, 7, 10	
POTENTIOMETERS		X		1, 2, 4, 10, 11, 20	
POWER SUPPLIES (COTS)		X		1, 4, 10, 11, 20	

POWER SUPPLIES (BTP)	X		1, 2, 3, 4, 10, 11, 20		
RELAYS AND CONTACTORS		X	1, 2, 3, 4, 10, 11		
RESISTORS AND NETWORKS		X	1, 2, 3, 4, 7, 10, 11, 20		
SENSOR ASSEMBLIES		X	1, 2, 4, 6, 7, 10, 11, 20		
SOCKETS AND CARRIERS		X	1, 4, 7, 10, 20		
SPEAKERS		X	1, 7, 10, 20		
SWITCHES AND SOLENOIDS		X	1, 2, 4, 7, 10, 20		
TERMINAL AND BARRIER BLOCKS		X	1, 4, 7, 10, 20		
TEST EQUIPMENT		X	1, 10,		
TOOLS		X	1, 10		
TRANSDUCER MODULES		X	1, 2, 4, 7, 10, 20		
TRANSFORMERS/COILS/CORES/FERRITE BEADS (COTS)		X	1, 2, 4, 7, 10, 20		
TRANSFORMERS/COILS/CORES/FERRITE BEADS (BTP)	X		1, 2, 3, 4, 7, 10		
TRANSISTORS AND ARRAYS (BTP)		X	1, 2, 3, 4, 10, 11, 20		
TRANSISTORS AND ARRAYS (COTS)		X	1, 2, 4, 10, 11, 20		
TURN KEY ASSEMBLIES	X		1, 2, 3, 4, 6, 7, 8, 10, 11, 13, 20, 23,24		