

# GENERAL DYNAMICS

## Ordnance and Tactical Systems

### Healdsburg Supplier Quality Requirements

QR-0053

Revision	Date
-	02/27/2019

## MDA Silver Plated Copper Wire (Red Plague) Controls

### Revision History

REV.	CN #	DATE INCORP.	NOTES
-	40764	02/27/2019	Initial Release

### Requirements

Silver coated copper wire used in the production of Cables and Harnesses must be in compliance with Raytheon specification P8658300 and this document.

#### 1 Scope

##### 1.1 Subassemblies with Silver Coated Copper Wire

This specification applies to the procurement of General Dynamics specific subassemblies with silver coated copper wire. Silver coated copper wire is susceptible to galvanic corrosion in the presence of liquid phase water due to the substantial electro-potential between silver and copper. Contained herein are age control, packaging and documentation requirements, General Dynamics' product acceptance criteria (Appendix A) and recommended best practices for reducing the risk of corrosion (Appendix B).

#### 2 Requirements

##### 2.1 Age Control

The elapsed time between date of manufacture (DOM) and receipt at General Dynamics shall not exceed 2-years. Date of manufacture (DOM) is the date assigned by the deliverable end products' manufacturer. The DOM of subassemblies with silver coated copper wire assign the DOM for the General Dynamics specific subassembly without regard for the age of the wire, cable or conductor material used.

##### 2.2 Packaging

General Dynamics specific subassemblies shall be shipped in a sealed package *without* desiccant. For FOD mitigation, desiccant shall not be used in the packaging.

Continuous lengths of insulated wire emanating from the subassemblies shall have ends sealed using heat shrinkable caps or an equivalent device for preventing unimpeded ingress of water (liquid and/or vapor).

### **2.3 Wire Finish**

Silver coating shall be without exposed copper. There shall be no evidence of galvanic corrosion. Receiving/Inspection at General Dynamics will accept or reject the supplier's subassemblies based upon evidence of galvanic corrosion per the inspection criteria of Appendix A. Appendix B consists of best practices to preclude galvanic corrosion.

### **2.4 Lot Definition**

A lot is comprised of General Dynamics specific subassemblies identified with the same manufacturer's lot code, received from the same supplier and received at General Dynamics on the same date. Lot definition and lot identification is critical vis-à-vis ¶2.1 Age Control date of manufacture.

## **3 Shipping Documentation Requirements**

In addition to other required Supplier Quality Requirement certifications, the Supplier shall provide a Corrosion Control Certificate of Compliance (CoC) with each delivery. The Corrosion Control CoC shall contain the following:

### **3.1 Supplier's Name**

### **3.2 GD-OTS Healdsburg PO Number**

### **3.3 GD-OTS Part Name, Part Number and Revision**

### **3.4 Lot Number and quantity in each shipment. Different lots are not to be co-mingled and are separately labeled.**

### **3.5 Serial number(s) of any serialized items delivered**

### **3.6 Explicit certification that the following items are in compliance with this document:**

**GENERAL DYNAMICS**  
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**Healdsburg Supplier Quality Requirements**

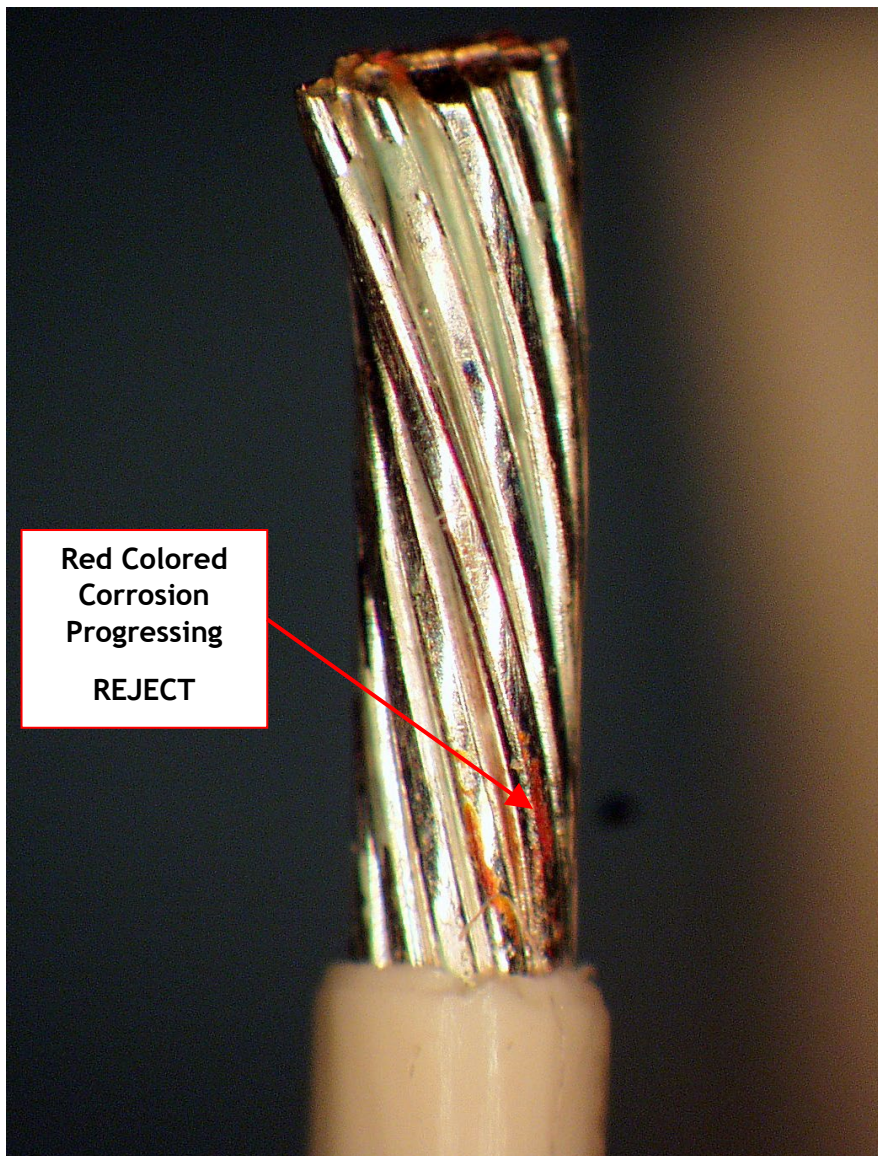
- 3.6.1 The elapsed time between the Date of Manufacture and receipt at GD-OTS will be less than 24-months
- 3.6.2 Subassemblies are shipped in a sealed package *without* desiccant.
- 3.6.3 Continuous lengths of insulated wire emanating from the subassemblies have ends sealed using heat shrinkable caps or an equivalent device for preventing unimpeded ingress of water (liquid and/or vapor).
- 3.6.4 There is no evidence of galvanic corrosion.
- 3.6.5 Date and signature from an authorized representative of the Supplier.

## **Appendix A**

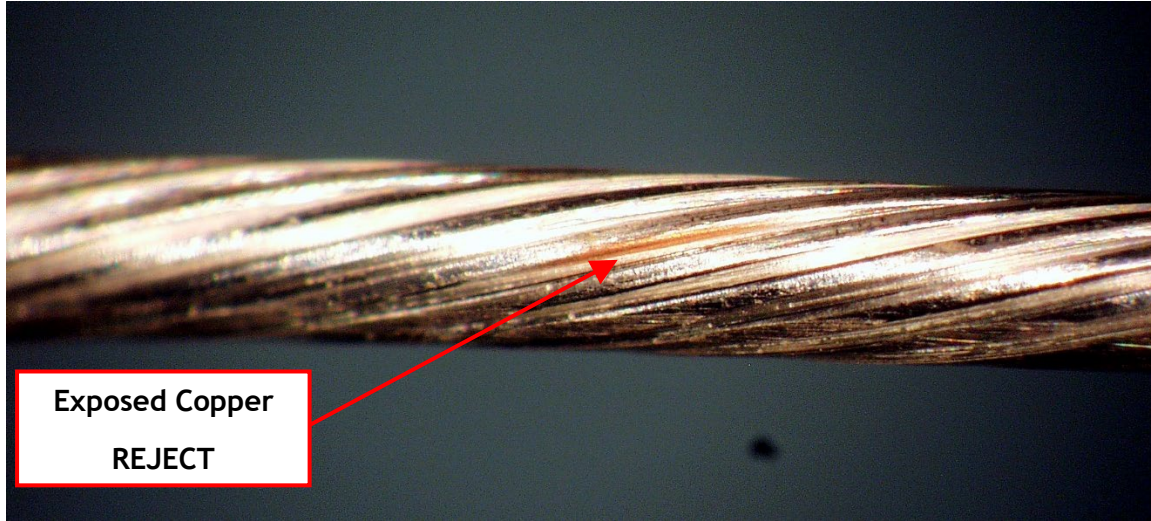
### **General Dynamics Accept/Reject Criteria**

Sampling for wire finish inspection will occur upon receipt of General Dynamic specific subassemblies. A destructive sample of up to 3 inches will be removed from selected wire ends. The sample will be inspected along its length per the requirements of ¶2.3 and this Appendix.

Visual inspection shall be performed using 20X magnification. Dielectric insulation material shall be removed to enable viewing of the wire strands. Silver coating shall be without exposed copper except as caused by removal of dielectric insulation to accomplish inspection. Electrical wire will be “bird caged” to separate strands for inspection purposes. Evidence of galvanic corrosion is cause for subassembly rejection and return to vendor disposition. An example of the red-colored galvanic corrosion (Reject) at 20X magnification is shown in Figure A1. An example of missing silver coating and exposed copper (Reject) is shown in Figure A2.



**Figure A1. Conductor Wire, 20X Magnification. Galvanic Corrosion Progressing, Reject**



**Figure A2. Conductor Wire, 20X Magnification. Exposed Copper, Reject**

**Appendix B****Best Practices for Galvanic Corrosion Control for Manufacture of Subassemblies with Silver Coated Copper Wire****1 Purpose**

Wire and cable inspection near cut ends presents an opportunity for identification of galvanic corrosion on finished subassemblies. The age control, storage and manufacturing environment controls herein listed aid in precluding condensation and subsequent galvanic corrosion of silver coated copper wires potentially resulting in the rejection of the subassembly.

**2 Age Control**

The elapsed time between date of manufacture (DOM) of wires and cables and receipt at the manufacturer of the subassembly is recommended not to exceed 2-years. Date of manufacture (DOM) is the date assigned by that item's manufacturer. The 2-years apply to wire and cable manufacturers DOM for wire and cable without regard for the age of the conductor material used.

**3 Packaging**

Recommendation is that wire and cable (shielded and unshielded) be shipped to the subassembly manufacturer in a sealed package containing desiccant. Bagging material, if used, should be polyethylene. Continuous lengths of wire and cable should have ends sealed using heat shrinkable caps or an equivalent device for preventing unimpeded ingress of water (liquid and/or vapor).

**4 Wire Storage**

The temperature within storage areas for the silver coated copper wire should be less than 100% humidity. Exit doors to areas lacking the same environmental controls should be closed when not in use. If the storage temperature becomes less than or equal to the dew point temperature, i.e. RH rises to 100%, the material can be baked to drive out the moisture. The baking temperature should be between 140°F (60°C) and 190°F (88°C) for 2-hours minimum.

Alternatively, moisture protection of the wire may be accomplished by packaging within sealed polyethylene bags containing desiccant. For FOD mitigation, desiccant shall not be used in packaging the manufacturer's General Dynamics specific subassembly.

## **5 Production Conditions**

Storage RH should be maintained in the production controlled environment.

No production operation should be employed that involves direct contact of silver coated copper wire with liquid phase water or aqueous solution, either along a length of exposed metal or at unprotected ends of electrical wire. Dipping of exposed wire ends into Tetra-Etch™ solution and associated rinses and aqueous cleaning of flux residue are examples of procedures to be avoided.

Examination by production personnel for evidence of galvanic corrosion of exposed conductors during assembly operations is an effective procedure for avoiding rejection of the manufacturer's product upon delivery to General Dynamics. General Dynamics' receiving/inspection will sample incoming subassemblies at 20X magnification for galvanic corrosion per ¶2.3 and Appendix A. Subassemblies with evidence of galvanic corrosion will be rejected and dispositioned as returned to vendor.