



**Supplier Quality Assurance Requirements (SQAR)**

**Supplier Quality Assurance Manual**

Applies to RAM's External Providers

REV 9/20/2021



**SUPPLIER QUALITY  
ASSURANCE REQUIREMENTS (SQAR)  
SUPPLIER QUALITY MANUAL**  
Applies to RAM's External Providers

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**REVISIONS**

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9/20/2021	JA	Updated RAM name and special quality requirements in Q Codes	All

## **Q010 GENERAL REQUIREMENTS CLAUSES – Applies to all Purchase Orders**

### **1.0 PURPOSE**

The purpose of this document is to clearly define, for each purchase of products or services, the necessary and applicable technical and quality requirements with which the Supplier must comply to meet the requirements of **RAM Aviation, Space & Defense**, its customers and/or regulatory authorities. This document establishes general and special product assurance requirements clauses for use on the Purchase Order and is part of the terms and conditions when referenced on the Purchase Order. For the balance of this document **RAM Aviation, Space & Defense** shall be referred to as “RAM”, the Customer which has entered into a Purchase Order agreement with the External Provider, also known as Suppliers and Sub-tier Suppliers (as applicable).

**Failure to comply with any of the requirements flowed down in the Purchase Order, drawing or the applicable clauses of this document may result in investigations, monetary forfeitures, payment withholdings and/or contract termination. All questions about requirements must be understood and resolved before accepting the Purchase Order.**

### **2.0 APPLICATION**

Unless expressly excluded by the Purchase Order, Q010 which includes sections 1, 2, 3 and 4 herein **applies to all Purchase Orders**. The “Q” codes listed in section 5 apply only when the specific Q-code number is included in the Quality Assurance Requirements section of the Purchase Order.

**The Supplier is responsible to flow down all applicable requirements to any approved Sub-tier source they intend to use in the performance of this Purchase Order. This shall include both RAM and RAM's customer requirements, as stated on the Purchase Order.**

Depending on the commodity and customer requirements, exceptions to the Supplier Quality Assurance Requirements may be approved. Any exception must be submitted in writing, approved by RAM, and documented on the purchase order or deviation request documentation, prior to delivery. Notify RAM purchasing with any exception requests as soon as possible after a purchase order is received.

### **3.0 SUPPLIER RESPONSIBILITIES**

#### **3.1 Supplier Code of Conduct (Ethics and Safety)**

Suppliers shall ensure operations are being performed in a manner that is appropriate, as it applies to their ethical, legal, environmental, safety and social responsibilities. This shall include, but is not limited to:

- Compliance with Local Laws and Regulations
- Compliance with Environmental, Health and Safety Laws
- Compliance to Product Safety
- Compliance to Non-Discrimination Laws/Regulations
- Compliance to Labor Laws
- Compliance to Ethical Behavior Standards and Supplier Ethics
- Any other requirements for the fulfillment of this purchase order

##### **3.1.1 Code of Conduct and Policy Enforcement**

This Code of Conduct applies to Suppliers and Sub-tier sources. The Supplier shall flow down these requirements to Sub-tier sources and shall be responsible to monitor and verify compliance.

##### **3.1.2 Confidentiality**

The Supplier shall ensure the confidentiality of RAM and RAM customers products, designs and intellectual property that may be shared as a result of working with RAM. Refer to RAM Non-Disclosure Agreements (NDA) for additional information.

### 3.2 Government Rated Contracts

If this Purchase Order is in support of a government rated order certified for national defense use, the Supplier is required to follow the provisions of the Defense Priorities and Allocations System (DPAS) regulations (15 CFR Part 700). Per the requirements of DPAS, a DO Rated order shall take precedence over any unrated orders. DX Rated orders shall take precedence over DO Rated orders or any unrated orders. The Supplier is required to accept this order electronically via email within 15 business days of receipt of DO-rated orders and within 10 business days of receipt of DX-rated orders. Rated orders are identified in the Purchase Order notes by a priority rating such as DX, DO, etc. This requirement also applies if the drawing or Purchase Order notes identify the order as in support of a government contract.

When an order is identified as DPAS Rated (DO/DX Rated) and/or the technical data provided by RAM is flagged with an "ITAR Requirements Apply" identifier, **United States International Traffic in Arms Regulations (ITAR)** also apply. The Supplier agrees that all technical data provided by RAM will be used in strict compliance with the ITAR requirements and solely for the performance of the work per the Purchase Order. The Supplier agrees to implement procedures for restricting access to the technical data to **U.S. Nationals only**. If during the performance of the work, the Supplier is required to provide such technical data or part to a Sub-tier source, the Supplier may do so provided that such Sub-tier source is also located in the United States and further provided that the Supplier has imposed upon the Sub-tier source the same ITAR obligation/restrictions as contained herein. Upon completion of the work hereunder, including any warranty period, the Supplier and all Sub-tier source(s) involved shall return all technical data to RAM.

**Debarment Certification** – For government rated Purchase Orders, Suppliers must be eligible for government contract work and must certify Sub-tier Suppliers are not debarred, suspended, proposed for debarment, or declared ineligible for government contract work. To verify a sub-tier source is eligible, visit <https://sam.gov/SAM/pages/public/searchRecords/search.jsf>

### 3.3 Anti-Terrorism Policy

The Supplier agrees to comply with the Executive Order 13224 – blocking property and prohibiting transactions with persons who commit, or support terrorism notice of September 24, 2001 – and further agrees to include this statement in each Sub-tier contract or purchase order issued hereunder.

### 3.4 Prohibited Practices

The following acts and practices are prohibited, unless approved by RAM in writing. Any violation by the Supplier or Sub-tier Supplier may result in the return of product and/or disapproval of the Supplier for future business with RAM.

#### 3.4.1 Verbal Instructions

The Supplier's Quality Management System shall be structured such that it does not allow verbal agreements or instructions as authorization or approval to proceed (e.g. on items that affect quality, fit, form or function). Any changes to purchase order agreements or drawing requirements must be requested in writing and approval communicated back in writing in the form of a modified PO change, approved deviation, or a signed drawing change before acceptance.

#### 3.4.2 Unauthorized Changes to Facility, Process, Method, etc.

The Supplier shall notify RAM in writing at least 90 days in advance of any of the following changes:

- 1) The sale, relocation, or transfer of any manufacturing operations. This includes movement of equipment and/or changes in manufacturing methods.
- 2) Any condition deviating from the original approved manufacturing methods used to produce the original first article part, including any change which could have an effect on the product at the next assembly or affect function at the end item user.
- 3) Any proposed change of original Sub-tier Suppliers used to manufacture the first article product.

RAM may be required to notify and obtain approval from the customer for these types of changes. The Supplier is not authorized to proceed with the implementation of the change until written approval is obtained from RAM. See Section 3.15 for a description of changes and approval process.

### **3.4.3 Unauthorized Product Repairs & Salvage**

The Supplier may not perform any repairs such as welding, brazing, soldering, plugging, peening, bushing, use of paints, adhesives or plating, or use any standard or other repair practice or method on products damaged or found to be discrepant. This restriction also applies during fabrication or processing or on defects in casting or forgings unless such repairs are specifically permitted by the applicable drawing or specification or are specifically authorized by RAM in writing for each occurrence. Unless specifically authorized by RAM, this prohibition also applies to reworking products by removing plating (stripping) and re-plating. In the case where RAM-authorized product repair, salvage or stripping has been accomplished, the Supplier shall include on the packing list/shipper and on the Certificate of Conformance (C of C) that the product being delivered was subject to such RAM-approved repair, salvage or stripping and the method used.

### **3.4.4 Unauthorized Product Changes or Substitutions**

The Supplier shall not make any changes or substitutions to any product(s) or services required by the applicable drawing, specification, or Purchase Order (PO) without prior written authorization by RAM. Authorization may be contingent on RAM or RAM's representative's review of proposed changes at the Supplier's facility.

### **3.4.5 Unauthorized Use of Non-Conventional Manufacturing Methods**

Unless specified on the drawing, applicable specifications or Purchase Order, the Supplier shall not use any non-conventional manufacturing or processing methods, such as electrical discharge machining (EDM), electro chemical machining (ECM), laser or abrasive water-jet cutting or drilling, flame spray coatings, etc., on product(s) scheduled for delivery to RAM without prior written authorization of RAM.

### **3.4.6 Unauthorized Use of Glass Beads**

The use of glass beads is prohibited during the manufacture of any products to be delivered to RAM.

### **3.4.7 Unauthorized Altering of Data on Documents**

The use of any method that causes the original data on documents to be obliterated and unreadable (i.e. the use of correction fluids, correction tape, write-over, or other methods) to correct, modify or otherwise alter the data and/or entries on any certifications, test reports, or other documents required by the Purchase Order is strictly prohibited.

Any necessary correction shall be made by a single line through the incorrect data and the correct data entered as close as possible to the original entry. The change shall then be initialed or stamped and dated by the person making the change.

## **3.5 Required Practices**

The Supplier shall flow-down the General Requirements Clauses (Q010) and any applicable Additional Quality Clauses (Q020-Q200) on this Purchase Order to Supplier's approved Sub-tier sources performing work for the Supplier that is scheduled for delivery to RAM.

### **3.5.1 Responsibility for Product Conformance**

Neither audit, surveillance, inspection and/or tests made by RAM or RAM's representative at either the Supplier's or RAM's facility, nor Supplier's compliance with applicable quality assurance requirements clauses herein, shall relieve Supplier of the responsibility to furnish product(s) that conform to all requirements of the Purchase Order.



### 3.5.1.1 Order of Precedence Between RAM Documents

If any clause or requirement conflicts with a similar clause or requirement, contact RAM purchasing for clarification. Unless otherwise specified, the order of precedence between documents shall be as noted below:

1. RAM Purchase Order Notes and/or Instructions
2. RAM and/or Customer Supplied Drawing Notes and/or Instructions
3. RAM Supplier Quality Assurance Requirements (SQAR)
4. RAM Purchasing Terms and Conditions

If a clause or requirement is not outlined in a document with precedence, it is understood that this is not an omission of responsibility, and such requirements will be followed and incorporated accordingly.

### 3.5.2 Raw Material Source

All raw metallic materials provided on this Purchase Order and/or used to produce products or assemblies (except COTS items) manufactured per this contract **must be from a DFARS approved country and may also require Domestic Melt Material. Domestic Melt Material is required when ANY of the following apply: the purchase order or item number/description indicates "DM", "Domestic Melt", "Domestic Required" or similar, or when Q200 is required. When required, material must be Domestic Melt Source as indicated on the raw material certification. In addition, when indicated on the purchase order or if DFARS 252.225-7008 is flowed down, all raw material and products (including COTS items) must be from Domestic Sources. Unless prior approval is obtained from RAM to use non-DFARS or non-Domestic Melt source material (when Domestic Melt is required), any parts delivered from unapproved sources will be returned to the Supplier for replacement at the Supplier's expense.** A list of DFARS approved countries can be found by visiting the Defense Pricing and Contracting (DPC) system <https://www.acq.osd.mil/DPAP> (click DFARS/PGI and see DFARS Procedures Subpart 225.0). The origin of mill source must be identified on the supplied certifications. **Refer to Section 3.12 and Q050 for more detail regarding certification requirements.**

For Specialty Metals, unless otherwise specified on the Purchase Order or other applicable documents, Suppliers shall be compliant to the requirements of DFARS 252.225-7009 *'Restriction on Acquisition of Certain Articles Containing Specialty Metal'*. In the case of conflicting requirements, RAM's purchase order requirements will take precedence over restrictions or exceptions to the DFARS clauses. RAM reserves the right to allow for exceptions as necessary, within customer and DFARS requirements.

**Raw Material** is defined as metal in raw form (bars, sheets, strips, etc.) consisting of a basic metallic element and/or a mixture of one or more metallic, or non-metallic, alloying elements.

**Product** (or Assembly) is defined as an item forming a portion of a system or subsystem that can be supplied and replaced as an entity and incorporates multiple, replaceable parts.

**Commercial Off-The-Shelf (COTS) Items** are defined as commercially available items (components or assemblies) sold in substantial quantities in the commercial marketplace and are offered to the government without modification, in the same form as it is sold to the commercial marketplace. Unless otherwise noted, COTS items that are exempt from specialty metal requirements can be manufactured from non-DFARS raw material. See DFARS 252.225-7009 for the list of exceptions to Specialty Metal restrictions for COTS items.

Other materials, such as non-metallic raw material (i.e. plastic bar stock, molding powder, rubber, etc.) that do not fall under the above categories will be exempt from DFARS requirements, unless specified as DFARS or DM Required on the purchase order.

**Certifications must be legible and reproducible for two generations. Material will be rejected if the certification is not legible. Refer to Section 4.1 for more details regarding records and record retention.**

#### 3.5.2.1 DFARS Clauses and Definitions

The following definitions apply when the DFARS clauses are indicated on the purchase order:

**DFARS Compliant Material Required** – All raw metallic material (Specialty Metal and Non-specialty Metal) supplied or used to manufacture products shall be from a DFARS Compliant country per DFARS 225.872-1.

**DFARS 252.225-7008 Required** – All Specialty Metals, as defined in this clause, to be supplied or used to manufacture products shall be from Domestic Melt sources only.

**DFARS 252.225-7009 Required** – All Specialty Metals, as defined in this clause, to be supplied or used to manufacture products shall be from Domestic or DFARS compliant sources, unless exempt under the exceptions listed in the clause.

**DFARS 252.225-7014 Required** – For Specialty Metals, as defined in this clause, preference shall be given for Domestic or DFARS compliant material to be supplied or used to manufacture products for this order, unless exempt under the exceptions listed in the clause.

### **3.5.2.2 Raw Material Heat Lot Traceability**

In order to aid in raw material traceability between components and final assemblies, it is preferred that suppliers manufacture parts from single raw material heat lots. For purchase orders that indicate ‘Single Heat Lot Required’, ‘Space Application – Special Material Traceability Required’ or similar, all parts shall be manufactured from a single heat lot of raw material. See Section 3.12.1 for additional information regarding ‘Space’ application parts. If the purchase order does not specify single heat lot requirements, RAM will accept parts manufactured from multiple heat lots. However, parts must be separated by heat lot and marked to identify which parts were manufactured from each individual heat lot.

### **3.5.3 Counterfeit Raw Material and Electronic Parts: Avoidance, Detection, Mitigation and Disposition**

Any Supplier providing raw materials or electronic components to RAM shall have a system in place compliant to AS5553 and/or AS6174 to detect and preclude delivery of any counterfeit components or materials to RAM. The Supplier shall ensure that only new and authentic materials are used in products delivered to RAM. The Supplier may only purchase raw materials directly from original melt sources, or authorized distributors who can provide evidence of certification from the original melt source. Electrical components shall only be procured from the original component manufacturers (OCM), OCM franchised distributors, or authorized aftermarket manufacturers. **No product delivered to RAM is to be procured from brokers.** Use of product that was not provided from authorized sources is not allowed without prior written approval from RAM. The Supplier must present compelling support documentation (e.g. certification with the product from the melt source in the case of raw materials or from the OCM in the case of electronic components) that authenticates traceability of the product to the original source as proof that the product is authentic and conforming to these requirements.

### **3.5.4 Conflict Materials**

The Dodd-Frank Act addresses concerns that conflict minerals are traded to finance groups that engage in violations of human rights. As defined in the Act, Conflict Minerals include gold, tin, tantalum, and tungsten. Conflict Minerals originating in the Democratic Republic of the Congo (DRC) or an adjoining country (Angola, Burundi, Central African Republic, the Republic of the Congo, Rwanda, South Sudan, Tanzania, Uganda, and Zambia) are not authorized to be supplied to RAM. The Supplier must be able to certify product containing any of the materials noted above as originating from a smelter that is validated as compliant in accordance with the Conflict-Free Smelter (CFS) Program and listed on the Compliant List. The Conflict-Free Smelter Program is a list of certified compliant smelters in accordance with EICC criteria. The full list and additional information are available at <http://www.responsiblemineralsinitiative.org>.

### **3.5.5 Additional Material Requirements**

**Hardware, Bulk-item and Age Control Material Certifications** – Common Off the Shelf (COTS) items and large quantity hardware items including nuts, bolts, washers, shims, springs, etc. that are high volume and light weight shall be accompanied by a C of C, citing that the materials meet the specification called for on the Purchase Order. The Supplier will be responsible for crediting RAM for any shortage of parts exceeding 3% of the order’s line item(s). Overages will not be accepted for payment. The count of parts may be accomplished by weight. The scale used must be able to accurately weigh parts repetitively and be calibrated per the requirements of Section 4.2.

**Bulk-Items** – Bulk items such as paint, potting, sealants, etc. furnished hereunder shall be accompanied by a Certificate of Conformance stating that the materials meet the specification called for on the Purchase Order. The certification shall meet all the requirements of Q050. Copies of certifications, as applicable, from actual material manufacturers shall be included with each shipment.

**Age Sensitive Material** – The material expiration, as applicable, shall be noted on the certification. **A minimum 80% shelf life shall remain** upon shipment unless waived by RAM in writing.

**REACH Compliance** – Suppliers must understand and comply with the December 18, 2006 European Union (EU) regulation titled “Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)”. Prohibited substances as defined by REACH must be disclosed to RAM prior to delivery and documented on accompanying Certificate of Conformance.

**Mercury-Free Compliance** – Suppliers must understand, comply with, and disclose non-compliance as required per customer, industry and government standards and regulations.

**Country of Origin:** All foreign origin articles imported into the United States must be marked with the English name of the country of origin. Seller’s packing slip, invoice, and purchase order acknowledgement shall certify the country of origin for each item supplied (19 U.S.C. 1304 & 19 C.F.R. Part 134).

### **3.5.5.1 Raw Material Mill Certifications**

When possible, raw metallic material certifications from the original mill shall be provided for all material used to fulfill the Purchase Order. A distributor certification or certificate of test may be acceptable but is subject to approval at RAM. At a minimum, distributor certifications shall include the following:

Name of Distributor  
Name of Mill  
Country of Melt  
Material Type/Grade  
Applicable Specifications  
Heat Lot Number  
Mechanical and Chemical Analysis Results as Required per Specification  
Name of Certifying Person with Signature/Stamp and Date

### **3.5.6 Obsolescence Requirements**

The Supplier shall perform an obsolescence analysis of the product Bill of Material (BOM) for any product being delivered to RAM where they control the design. The purpose is to categorize every item in the product BOM as to 1) known obsolescence; 2) potential obsolescence; and 3) small or no obsolescence concern. Should this analysis apply to the product being offered to RAM, the Supplier shall notify RAM of the part/material that is affected, and the recommended replacement, allowing RAM to get the necessary approvals from the customer.

### **3.6 Access to Facilities**

It is agreed that in the execution of this Purchase Order, RAM and/or its prime contractor, including FAA or Government representatives, will be permitted on site to review Supplier’s facilities and procedures, as deemed necessary.

### **3.7 Basic Quality System Requirements**

The Supplier shall maintain a Quality Management System with preference for a system compliant to ISO 9000, AS9100 or AS9120. However, RAM realizes that for some Suppliers it would not be economically feasible to comply with the level of these quality systems. When authorized by RAM’s customer requirements, RAM holds the option to require compliance to systems such as MIL-I-45208, MIL-Q-9858 or equivalent, providing the quality of the product meets the flowed-down requirements from RAM and RAM’s Customers. Compliance to these requirements shall be verified through Supplier surveys and/or onsite visits, as well as results from RAM’s Receiving Inspection process.

### 3.8 Inspection and Acceptance

All personnel performing final acceptance inspection activities shall have annual eye tests by certified optometrist or medically qualified personnel. These records shall be made available to RAM upon request. See table below for reference.

Vision Parameter	Requirement
Far Vision	Snellen Chart 20/50 or better
Near Vision	Snellen 14/18 or better (20/25 or better, Jaeger Type 1, Ortho-rated 8 or equivalent).
Color Vision	Average or normal (4 to 6 responses on Titmus, B+L, or American Optical testing machine, or a satisfactory response when tested with an Ishihara or Pseudoischromatic plate). Ability to distinguish red, green, blue, and yellow colors as prescribed in Dvorine Charts, Ishihara plates or equivalent. A practical test using color-coded wires and/or color-coded electrical parts shall be acceptable.

Table 1 – Visual Acuity Requirements for Inspection and Calibration Personnel

The product(s) pertaining to this Purchase Order are subject to inspection, testing and approval at all reasonable times and places by RAM, RAM's Customer or Government representative before, during and after performance and delivery. RAM may require the Supplier to rework, replace or reimburse the purchase price of rejected material or RAM may accept any materials and upon discovery of nonconformance, may reject or keep and rework any such non-conforming materials. Cost of repair, rework, replacement, inspection, transportation, repackaging, and/or re-inspection by RAM shall be at Supplier's expense.

RAM's failure to inspect does not relieve Supplier of any responsibility to perform according to the terms of the Purchase Order. If sampling is used by the Supplier to accept parts, the sampling plan must meet the minimum quantity requirements of Q030. Note that sampling does not alleviate the additional inspection requirements for Key Characteristics/Flight Safety Features per Section 3.9.

#### 3.8.1 Visual Inspection Requirements

Whether lot sampling is acceptable, or when 100% inspection is required, the parts shall be inspected under 10X magnification to ensure conformity to visual acceptance requirements. See the Supplier Workmanship Guidelines for additional definitions and examples of conforming and non-conforming product.

#### 3.8.2 Additional Inspection Requirements

When indicated on the Purchase Order, special inspection and/or sampling plans are required. For example, threads for space application require 100% inspection if noted on the PO.

RAM manufactures a multitude of products for a variety of applications in many industries. In order to raise awareness of specific requirements, RAM is implementing processes to specify the industry on supplier Purchase Orders. Purchase orders may include a color code indicating the customer industry:

Space (Blue): Components will be used in assemblies that are critical to space flight. Additional quality requirements will apply. Refer to drawings, purchase order notes, SQAR's and Workmanship Guidelines regarding Space application hardware.

Military (Green): Components will be used in assemblies that are critical to military operations, including flight and ground vehicles. Additional requirements may apply, refer to drawings, purchase order notes, SQAR's and Workmanship Guidelines regarding military hardware.

Medical (Red): Components will be used in assemblies intended for medical use. Appropriate care must be taken to follow protocol and requirements for manufacturing and inspection medical hardware. Refer to drawings and purchase order notes for specific requirements.

Industrial (Orange): Components will be used for non-flight industrial applications such as mail sorting or industrial fluid control. Hardware should be inspected to RAM's standard, but inspection and sampling plans may be reduced if allowed by customer and RAM requirements. Refer to drawings and purchase orders for specific requirements.

**Commercial (Gray):** Components will be used for commercial applications such as private aircraft. RAM standard quality and inspection requirements represent standard requirements for commercial hardware. If the application is not indicated on the purchase order, the hardware should be considered as Commercial. Commercial hardware may have additional quality and inspection requirements, refer to purchase orders, drawings, SQAR's and Workmanship Guidelines for specific requirements.

When an industry (or color-code) is indicated on the purchase order, refer to the RAM Supplier Workmanship Guidelines (available online at <https://ramcompany.com/services/quality-assurance/>) and specific notes on the Purchase Order for additional inspection requirements that will apply. Note that the industry inspection requirements do not supersede drawing or purchase order inspection and acceptance criteria. Suppliers shall inspect to RAM quality and inspection standards or the color-code requirements when invoked, whichever is greater.

### 3.9 Flight Safety Critical (FSC) and Critical to Quality (CTQ) Inspection Requirements

**Key Characteristics of a Critical Item (Flight Safety Critical (FSC)/Critical to Quality (CTQ)) have the greatest impact to customer safety and/or performance and will be identified with Flight/Mission Safety Critical Characteristics: ★ (Black Star), KPC1, KPC2, Box '0' or Box '2'. Any feature identified as a Critical Characteristic requires special inspection criteria.**

Special inspection criteria for features identified on the drawing by one of the following symbols:

- ★ – (Black Star) – Flight/Mission Safety Characteristics (FSC) requires 100% inspection.
- KPC1 - These characteristics require 100% inspection.
- KPC2 - These characteristics may be sample inspected per ASQ Z1.4, general inspection level II, .65% AQL or per Appendix A – RAM Sampling Plan AOQL .79. C=0 acceptance requirement applies for both inspection plans.
- ◻ – ('0' inside a box) - requires 100% inspection of this characteristic.
- ◻ – ('2' inside a box) - These characteristics indicate sampling per ASQ Z1.4 general inspection level II, .65% AQL or per Appendix A – RAM Sampling Plan AOQL .79. C=0 acceptance requirement applies for both inspection plans.

C=0 means if any nonconforming characteristic(s) are found the full lot shall be screened 100% for the nonconforming feature/characteristics and the nonconforming parts shall be removed from the lot before shipping to RAM.

**For those features requiring additional/increased inspection, the Supplier must document that these FSC and/or CTQ dimensions were inspected as required per the characteristic designation.** The shipment documentation must include a record of all measurements taken for each Key Characteristic type (FSC, KPC1, etc.). The supplier may use any preferred format, as long as each feature is identified, and the required number of measurements are documented. All documentation should include a reference to the part number and PO number (line & release). Failure to provide evidence of the required inspection may result in rejections and/or debits against the supplier for the cost of completing the required inspection at RAM (see Section 3.13.5 – Recovery of Cost of Poor Quality).

### 3.10 Supplier Workmanship Guidelines

To support Supplier quality, RAM has developed RCS-2021 "Supplier Workmanship Guidelines". The purpose of this document is to provide details regarding RAM's quality expectations. RCS-2021 provides general guidelines and may not include all possible quality related issues. Meeting the guidelines of RSC-2021 does not relieve Supplier of any responsibility to perform according to RAM quality standards, industry standards and/or the terms of the Purchase Order. The Supplier Workmanship Guidelines are available on the RAM website <https://ramcompany.com/services/quality-assurance/>

### 3.11 Sub-tier Source Selection

The Supplier shall not use Sub-tier sources for the manufacture or processing of any materials or processes on product(s) scheduled for delivery to RAM unless they are RAM approved, and a Customer approved source when that requirement is specified on the Purchase Order. When not specified, a Nadcap certified source shall be used. If a Supplier proposes to use a Sub-tier source not meeting either of these requirements, the Supplier must get prior written authorization from RAM before use. The Supplier shall submit to RAM within five (5) calendar days following receipt of this Purchase Order, the Sub-tier company name(s) and address(s) of all the sources planned

for use in accomplishment of work hereunder. Failure to use Sub-tier sources approved by RAM may result in rejection of delivered items.

All requirements flowed down to the Supplier in the Purchase Order shall be flowed to sub-tier Suppliers, including RAM and RAM's customer requirements.

### **3.12 Certification Requirements**

The Supplier shall provide a Certificate of Conformance (C of C) on company letterhead or other identifying document with a written statement that all product and/or services being provided to RAM were processed (i.e., manufactured, honed, heat treated, tested, plated, etc.) and comply with all requirements of the Purchase Order, drawing or other specifications. At a minimum, all certifications shall contain (as applicable): the material description, part number, revision, reference to all applicable material and/or process specifications, acceptance criteria specifications, Key Characteristics and Critical to Quality inspection requirements, quantity delivered and RAM's Purchase Order number with both line and release. **Certifications must be legible and reproducible for two generations. Material may be rejected if the certification is not legible. Refer to Section 4.1 for more details.**

A Certificate of Conformance meeting the requirements above shall be provided at no cost to RAM. Additional charges for material or process certifications as required per Q050 shall be submitted with quote and approved by RAM prior to Supplier accepting the purchase order.

If you intend to deliver a few extra pieces over what is called for on the PO, the actual quantity being shipped must be noted on the C of C for traceability purposes. Excess quantities of 10 or more parts must be approved by RAM prior to acceptance. If approval is not received in advance these extra pieces may not be accepted by RAM.

#### **3.12.1 Certification Requirements for Space Application (SP)**

For Purchase Orders indicating Space Application, noted as 'Space', 'Space Application' or part numbers ending in 'SP', suppliers shall provide all raw material certifications, original manufacturer certifications (for purchased items i.e. COTS items), special process certifications and test reports. This shall include all Supplier and Sub-tier certifications for raw materials (metallic and non-metallic materials), machined parts, manufactured assemblies, special processes, material testing, original manufacturer certifications for COTS items and assemblies, etc. Full material traceability from every component to final assembly is mandatory to meet the customer requirements for Space Applications when indicated on the Purchase Order. The Supplier is responsible for providing these certifications, and if necessary, submitting a quote for the cost of additional certifications prior to accepting the Purchase Order.

### **3.13 Nonconforming Products & Material Review (MRB) Authority**

#### **3.13.1 Supplier Material Review Authority**

The only Material Review Authority granted to the Supplier is **Rework** to bring the product to full compliance with all requirements or **Scrap**. No other material disposition authority is currently granted to the Supplier.

#### **3.13.2 Notification, Segregation and Control of Nonconforming Products**

Unless otherwise specified in the Purchase Order, all nonconforming material shall be documented and submitted to RAM Engineering for review and disposition. RAM can provide a template, or the Supplier may use their current format to notify RAM of the nonconformance, including the requirement and the dimensional or other characteristic deviation(s) from the requirement. A section shall be included which identifies the root cause and corrective action to avoid a recurrence of a future deviation. A non-conformance report (NCR) may be generated to track the request. Should RAM approve the deviation, a copy of the approval signed by a RAM representative(s) shall be returned to the Supplier. The Supplier shall segregate and clearly identify all nonconforming product. The identification shall include a reference to the deviation approval. When delivering nonconforming material, a copy of the signed approved deviation document shall be included with the shipment. A use-as-is or repair disposition by RAM does not relieve the Supplier of the legal responsibility and liability for such products.

### 3.13.3 Notification of Nonconforming Product Delivered to RAM

When the Supplier has determined that nonconforming product has been delivered to RAM, the Supplier shall notify RAM's buyer in writing within twenty-four (24) hours of the initial discovery. The Supplier shall use "receipt acknowledged" e-mail or other positive notification method. The initial notification shall be followed by a formal "Disclosure Letter" delivered to the RAM buyer within five (5) days of the initial notification. The Supplier shall again use "receipt acknowledged" e-mail or other positive notification method for disclosure. For initial notification and formal disclosure, a Supplier representative may contact RAM Quality Assurance for a recommended format. If the Supplier has a form that contains all the necessary information, that form may be used. At a minimum, the initial notification shall include the following:

**Supplier Name**  
**Purchase Order, Line and Release Number**  
**Part Number and Description**  
**Affected Quantities**  
**Dates Shipped**  
**Brief Description of the Nonconforming Condition**

The formal Disclosure Letter shall be delivered within five (5) working days of the initial notification and shall consist of a complete description of the nonconforming condition(s), immediate action(s) by the Supplier to contain the nonconforming product(s), root cause analysis of the nonconforming condition(s), root cause corrective action(s) plan, schedule of implementation and the plan and schedule for verifying the effectiveness of the corrective action(s).

RAM reserves the right to participate in the nonconforming product investigation at the facilities of the Supplier or its Sub-tier sources.

### 3.13.4 Re-submittal of Products Previously Rejected by RAM

Products returned to the Supplier, re-worked or replaced and re-submitted to RAM shall be clearly identified as re-submitted products. **The Supplier's packing list/shipper shall include a statement that the products delivered are replacement or reworked to meet all applicable requirements and include a reference to a Non-Conformance Report (NCR) or approved deviation document as applicable.** All re-submitted product shall be re-inspected by the Supplier before submittal.

### 3.13.5 Recovery of Costs for Non-Conforming Material - Supplier COPQ

Supplier Cost of Poor Quality (COPQ) is the actual incurred cost to RAM due to Supplier non-conformance. To recover some of these costs, RAM reserves the right to debit the Supplier a processing fee of \$75 for every non-conforming shipment delivered to RAM. The initial \$75 processing fee only covers the administrative cost of processing paperwork related to non-conforming hardware. In addition to the processing fee, other costs incurred that will require debit may include cost to rework parts at RAM, cost of scrap parts (and assemblies) at RAM, cost of returning parts for rework, replacement or credit, or other costs to RAM as a result of non-conforming hardware. A debit may be issued, up to the total COPQ incurred, due to non-conforming hardware delivered to RAM. The Supplier Quality Engineer will notify suppliers of debits and coordinate with purchasing and accounts payable to resolve claims.

### 3.13.6 Root Cause and Corrective Action

Suppliers are responsible for performing root cause investigation and corrective action when non-conformances are found. When RAM notifies the Supplier of a non-conformance, the Supplier shall act immediately to ensure the non-conformance is contained and eliminated. The Supplier shall verify that the root cause was identified, and corrective action has been effective. When the Supplier is requested to submit a formal corrective action, the supplier shall complete the investigation and submit the completed report by the required due date. RAM reserves the right to reject a root cause and/or corrective action and request subsequent investigation and/or corrective action as necessary. Failure to complete investigations and corrective actions within the time allotted is not acceptable and can result in reduction of orders, cancellation of orders and loss of approved status as a RAM supplier. Extensions may be given but must be requested in writing prior to the required due date.

## 3.14 Document Sources

### **3.14.1 RAM and/or Customer Drawings**

Copies of RAM or RAM Customer proprietary documents (i.e. drawing, specification, etc.) required by the Supplier to comply with the Purchase Order requirements will be furnished to the Supplier by RAM with the Purchase Order.

For repeat orders, the Supplier shall confirm that the drawing on file matches the revision level indicated on the PO. The Supplier shall not proceed with the performance of the PO if the revision level of the drawing or any other documentation does not match the revision specified on the PO. The Supplier shall contact RAM for resolution of any revision issues before processing.

These proprietary documents shall be controlled such that they are not shared or utilized by personnel or other entities not associated with the performance of the Purchase Order. Once the purchase order has been completed these proprietary documents shall be returned to RAM with the final shipment. It is the Supplier's responsibility to maintain current revision copies of industry, national, international or US government documents and standards that are required to comply with the drawing and purchase order requirements. Any problems experienced by the Supplier in obtaining the required documents shall be brought to the attention of RAM's buyer.

### **3.14.2 Industry/MIL/Other Specification Document Revision Status**

The Supplier shall use the most current revision, or superseding document, for specifications required on the drawing and/or purchase order. The only exception would be special instructions on the purchase order to use a superseded specification or a previous revision per RAM's customer requirements. Contact RAM's buyer for clarification of requirements prior to accepting the order.

### **3.14.3 Internal Document Control**

The accuracy of documents and forms is of the highest importance. Where applicable, Suppliers shall have procedures in place regarding document control, revision control, digital forms, electronic signatures, etc.

## **3.15 Contract Changes & Their Effectivity**

### **3.15.1 RAM Initiated Changes**

The Supplier shall incorporate, at the specified and agreed upon effectivity points, all changes initiated by RAM and/or RAM's customer and communicated to the Supplier through a formal Purchase Order change and/or amendment. Such changes may be in the form of revised drawings, specifications, tests, inspection, or fabrication methods, etc., and may apply to products as well as to the Supplier's management and administrative systems. The Supplier's business management system shall include appropriate controls and records, including controls at the Supplier's Sub-tier sources, which provide objective evidence that changes were incorporated as required by the Purchase Order.

Objective evidence may be in the form of date, lot, serial number, revision letter, or other positive identification. Such records are subject to on-site verification by RAM at the Supplier's facilities or the facilities of the Supplier's Sub-tier sources.

### **3.15.2 Supplier Initiated Changes**

The Supplier may not make any changes in product design, drawings, performance specifications, materials or processes that will result in a Class I change, without specific approval by RAM in writing prior to incorporating or making such changes in products or data. When applicable, the Supplier shall flow-down this requirement to the Supplier's Sub-tier sources. The Supplier may make changes on products under Supplier's proprietary engineering design control that result in a Class II change. The Supplier shall furnish a copy of the Class II change to RAM prior to the initial delivery of the (changed) product, so that RAM can verify that the change does not violate the product specification requirements.

### **3.15.3 Drawing Change Classes**

RAM defines Class I and Class II changes as:



**Class I Changes** – Class I changes are considered mandatory and shall have firm effectivity change points established and verified for traceability. Under no circumstances are Class I changes made which affect RAM or RAM's Customer requirements unless specific authorization by RAM (and/or RAM's Customer) has been granted. Proposed Class I changes will affect form, fit or function of the final assembled part and shall be submitted for approval to RAM, prior to implementation. Only when such approval is granted in writing from RAM will affected drawings, travelers, ATPs, or other affected documentation be revised. Class I change is defined as a change to an existing product that has been qualified. Engineering will not make any changes in materials, process, design details or acceptance test procedure which may affect the part or the component part thereof with respect to part number identification, physical or functional interchangeability, and performance. Examples of Class I changes could include:

- Changes that reduce or impact the specified performance requirements of the design.
- Changes that affect the reliability, maintainability, or survivability of the design.
- Changes to the interface characteristics.
- Changes that affect compliance to other technical requirements in the specification.

**Class II Changes** – Class II changes are considered improvements to be accomplished as determined by manufacturing coordination. The cut-in or effectivity point of this type of change is at the option of engineering / manufacturing. This type of change does not affect form, fit, or function of the final assembled part. The old and new part must be fully interchangeable. RAM's customer controlled (Build-to-print) designs can only be changed with approval from RAM and RAM's Customer. RAM Engineering can create an equivalent RAM manufacturing sketch incorporating a Class II change if the change clarifies the information or tightens the existing customer tolerance. The RAM design must continue to meet all original customer drawing requirements after the change. Examples of Class II changes could include:

- Correction of a deficiency discovered during item functional checks that is necessary to ensure compliance with RAM or Customer requirements.
- Any change to a piece part print that does not affect form, fit or function of the final assembled part.
- Chemical or physical properties of a material used to manufacture the product.
- Any change in the manufacturing process that changes or alters the configuration, composition, or physical properties of the item produced.

RAM reserves the right to make the final determination if a requested change will qualify as a Class I or Class II change.

### **3.16 Cyber Security Requirements**

Suppliers play an important role in safeguarding technical defense information. *DFARS 252.204-7012, Safeguarding Covered Defense Information and Cyber Reporting* was published by the DOD to prevent improper access of important, unclassified information in the supply base. Suppliers shall be familiar with cyber security requirements of DFARS 252.204-7012 and flow these requirements to sub-tier Suppliers.

#### **3.15.3 Control of CUI**

Controlled Unclassified Information (CUI) such as ITAR or government drawings, specifications, etc., must be protected by Suppliers and their sub-tiers. RAM has implemented a secure FTP in order to share CUI with Suppliers. When sensitive documents are to be shared with Suppliers, instructions for the Supplier to retrieve documents will be forwarded from RAM I.T. Suppliers shall use this portal when sharing CUI information with RAM. Suppliers shall also develop a plan that follows DFARS Cyber security requirements and industry best practices when they must share CUI with sub-tier suppliers.

### **3.17 RAM Tooling and Hardware**

Suppliers shall be responsible to procure and maintain required gages and tooling necessary to fulfill the Purchase Order. RAM may make specialty gages available to Suppliers as necessary. Suppliers must verify correct gages are used to accept product. Suppliers shall ensure RAM gages are handled with care and returned to RAM in working order or must notify RAM immediately of damaged or non-conforming gages.

### 3.18 Silver-Coated Copper Wire Red Plague Avoidance

Silver-coated copper conductor is susceptible to galvanic corrosion in the presence of water or humidity and oxygen. The phenomenon is also referred to as 'Red Plague'. This corrosion can lead to electrical or mechanical failure of the affected wire. Once corrosion is initiated, corrosion of the copper conductor can continue indefinitely in the presence of oxygen. The Supplier shall take all steps necessary to prevent and detect the formation of corrosion (Red Plague) on wires per SAE ARP6400. The certifications provided with the wire shall state that the product has been verified to be free of any Red Plague corrosion per this specification.

## 4.0 ADDITIONAL QUALITY REQUIREMENTS

### 4.1 Record Retention

Unless otherwise specified on the Purchase Order, the Supplier shall retain all quality records as objective evidence of conformance to Purchase Order requirements, including Supplier's and their Sub-tier source's records and certifications of the inspections and tests performed during procurement. Examples of quality records may include inspection records, special process records/certifications, manufacturing documentation, training records, internal audits, eye examinations, work instructions and/or any other quality records pertinent to the manufacture of the product supplied. These records shall be retained for a **minimum of fifteen (15) years after completion of the order**. Such records shall be maintained to ensure their legibility for **two (2) reproductions (copies)** and must be retrievable within 24 hours should RAM request copies be provided. In lieu of hard copy, the records may be kept electronically providing the electronic copy is fully legible. **Prior to physical destruction or disposal** of these records, the Supplier shall offer the records to RAM for retention at no additional cost to RAM and/or RAM's customers. This requirement shall be flowed down to any Sub-tier Supplier used in the manufacture of the product supplied.

### 4.2 Supplier Calibration System

Suppliers shall properly maintain all Measuring & Test Equipment (M&TE) used to measure and/or test product for final acceptance. Supplier's M&TE equipment must be calibrated by either an outside lab, or internally if the calibration is performed per ANSI/NCSL Z540 3. **Calibration laboratories shall be certified to ISO 17025**. Other Calibration services may be used with RAM approval. The Supplier shall notify RAM of any product accepted with equipment found with out-of-tolerance conditions. An out-of-tolerance condition is one where the uncertainty of the measurement equipment itself or the master standard(s) used to calibrate the equipment is found to exceed the limit called out in the specification cited above. The Supplier and/or Sub-tier source calibration certification(s) shall include a statement indicating the traceability number to the National Institute of Standards and Technology (NIST) used to calibrate the equipment. **The Supplier shall ensure that any internal or outside personnel performing calibration services have current annual eye exams on file** and those files are made available to RAM upon request.

**For Suppliers performing Calibration services, calibration shall be performed in compliance to ANSI/NCSL Z540 3 and the Supplier shall be certified to ISO 17025.** The Supplier performing the calibration shall notify RAM immediately of out-of-tolerance conditions. An out-of-tolerance condition is one where the uncertainty of the measurement equipment itself or the master standard(s) used to calibrate the equipment is found to exceed the limit called out in the specification cited above. Certifications shall be provided per Section 3.12, except instead of part number and revision, the certification shall reference the equipment identifier (ID #). The certification shall include a statement indicating the traceability number to the NIST standard used.

**Any personnel performing calibration of equipment shall have on file an annual eye examination performed by a certified optometrist or medically qualified individual. See the table in Section 3.8 for visual acuity requirements for inspection and calibration personnel.** A copy shall be available for review upon request.

### 4.3 Material Handling

Damage due to handling is a frequent cause for rejection of product at RAM. The Supplier shall control product(s) during manufacturing, special processing, testing and shipment, as well as visually inspect for and avoid dents, scratches, discoloration,

contamination, etc. which violate the surface requirements of the product(s) drawing and specifications. For example, damage due to part-to-part contact or handling is not allowed. Surfaces identified as sealing or critical surfaces shall be processed and handled with extra care; scratches or damage are not allowed. The Supplier must verify surface finishes meet requirements called out on purchase order instructions and/or applicable drawings. **Nonconforming or damaged parts will be returned to the Supplier for rework or replacement at the Supplier's expense.** Refer to the Supplier Workmanship Guidelines, found by accessing RAM's website at <https://ramcompany.com/services/quality-assurance/> for additional examples.

Unless otherwise specified in the Purchase Order, product(s) should be packaged to protect and shipped using best commercial practices for safe arrival at RAM's facility. This could include segregation of individual piece parts to prevent part-to-part contact damage to critical surfaces during shipment. Contact RAM's buyer for recommended trays and packaging.

#### **4.4 Foreign Object Damage/Foreign Object Debris (FOD)**

Foreign Object Damage/Foreign Object Debris (FOD) is not allowed. Supplier shall have a FOD prevention program compliant to NAS 412. Parts shall be cleaned, oiled, and packaged to prevent part-to-part contact, prior to delivery. Parts shall be handled during manufacture and shipping in a manner that will protect them from exposure to contamination by foreign objects or materials. Packaging and handling shall also prevent part-to-part contact or other handling damage. Protection may include clean trays and packaging materials which will not contaminate the surfaces, such as the use of protective caps, clean covered plastic trays, etc. **Loose packing materials, such as "Packing Peanuts", or any similar type of Styrofoam or other material is strictly prohibited.** Paper egg crate trays are not allowed for RAM parts unless specifically approved by RAM (purchase order, purchasing or quality approval). Refer to purchase order notes for additional tray and FOD requirements.

##### **4.4.1 FOD - Burrs on Machined Components**

Burrs are prohibited on RAM hardware. Suppliers shall inspect all parts for burrs as necessary to ensure components are delivered burr-free. Inspection for burrs shall be at 10X magnification, minimum. See RAM's Supplier Workmanship Guidelines for definitions and examples of burrs.

##### **4.4.2 Packaging and Trays**

Suppliers are required to provide adequate trays to protect parts during handling and shipping. The Supplier may request sample trays from RAM for first time orders, but it is the Supplier responsibility to procure and provide trays for parts, unless specific RAM trays are required on the purchase order. Contact RAM's buyer for trays and instructions.

#### **4.5 Rust Prevention**

To protect parts from rust and/or corrosion between the time they are manufactured and during storage, the Supplier shall coat the parts with rust preventative oil within 8 hours of manufacture. This requirement applies to materials such as C1026, C1117, C1215, Greek Ascoloy, C416, C440C, mag iron or any other material containing iron that is prone to rust when exposed to moisture or high humidity during storage periods. RAM's preference is for ZC-010 or equivalent rust preventative oil.

##### **4.5.1 440C Weld Assemblies**

440C steel welded assemblies (i.e. Seat Weld Assemblies) are extremely susceptible to rust/corrosion and contamination. When processing assemblies through NDT (penetrant, magnetic particle), assemblies must be thoroughly cleaned, dried, and oiled with rust preventative oil. Suppliers shall use ZC-010 or equivalent to prevent rust/corrosion and build-up of FOD/contamination inside assemblies.

#### **4.6 PO Acceptance and **On-Time Delivery (OTD)** Window**

It is very important for suppliers to accept purchase orders in a timely manner or request any changes as soon as possible. Suppliers should accept purchase orders or request due date or other changes within seven (7) business days. After seven days, the due date is considered accepted, and any orders delivered after the due date will be considered late.

The Supplier shall make deliveries to RAM based on the following receiving window:

**On-Time is considered received on the due date or up to 7 days early**

**Unacceptable** delivery performance is considered more than 7 days early or more than 1 day late

All receipt of products outside this window will be scored as LATE and will affect the Supplier's score card. RAM reserves the right to refuse early shipments and may elect to return them at Supplier's expense.

#### **4.7 Flight Safety Hardware**

All products or features being purchased, manufactured, or processed that are identified as Flight Safety Critical (FSC) on the drawing or purchase order shall have locked/frozen work instructions. Once the initial lot is approved and accepted at RAM, the manufacturing and/or process instructions must be locked/frozen and must not change without written approval from RAM prior to any proposed changes being implemented. See Section 3.9 for more information regarding Flight Safety Critical Features.

#### **4.8 Additional Quality Clauses**

The special product quality assurance clauses defined by the various Q-codes in Section 5.0 apply when the Q-code number is specified in the Quality Assurance Requirements section of the Purchase Order.

## **5.0 ADDITIONAL QUALITY CLAUSES – Only apply when included on Purchase Order**

Specific Q-Codes (clauses) will apply when indicated on the Purchase Order. Refer to the Quality Assurance Requirements section of the Purchase Order (bottom right corner of the purchase order form) for applicable clauses.

### **Q020 Adopted Additional Requirements**

Due to the complexity of some of the quality requirements flowed down to RAM by our customers, RAM may adopt their requirements in addition to our internal requirements to form our total purchase order quality requirements. In these cases, copies of these documents will be provided with our Purchase Order. Examples of these documents could include MQIs, P9112, Supplier Quality Manuals, manufacturing process instructions, etc. RAM shall note the specific documents and requirements on the Purchase Order.

### **Q030 Lot Acceptance**

For manufactured product(s), unless otherwise specified on the Purchase Order, the Supplier shall inspect each lot prior to delivery to RAM by using sampling per ANSI/ASQ Z1.4. Alternate lot sampling plans that meet RAM Sampling requirements are acceptable. See Section 3.8 and Appendix A – RAM INSPECTION SAMPLING PLAN, for required minimum AQL/AOQL for RAM and RAM's customers. Should any characteristic be found to be noncompliant, the lot shall be screened 100% for that characteristic(s) and all nonconforming parts shall be removed from the lot before shipment (c=0 rule). This applies to all characteristics other than Key Characteristics/Flight Safety Characteristics/Critical to Quality characteristics. For Key Characteristics, see Q010 Section 3.9.

### **Q040 Source Inspection**

Items on this Purchase Order are subject to inspection and/or test at Supplier's facility by a RAM quality representative prior to shipment. The representative may be accompanied by, or the representative may be, a RAM customer, FAA, or government source representative. The Supplier shall furnish, at no cost, acceptable facilities, equipment, personnel, and assistance as necessary for such inspectors or tests.

Evidence of source inspection shall accompany Supplier's shipment, but source inspection shall not constitute final acceptance of the material. Final acceptance shall be at RAM's facility only. The Supplier shall notify RAM at least 48 hours in advance of material readiness to schedule source inspection.

### **Q050 Certificate of Conformance (C of C)**

In addition to providing a C of C meeting the requirements of Q010 Section 3.12., the Supplier shall furnish all certifications (material, process, etc.), issued by Supplier or Supplier's Sub-tier sources. All certifications shall be legible and remain legible for two (2) reproductions (copies). A copy of all certifications must be included in the shipment. The Supplier is responsible for verifying certifications furnished by Supplier's Sub-tier sources for their adequacy and compliance to the Purchase Order and the requirements herein. To assure the adequacy and authenticity of all certifications furnished by Supplier, the certifications shall include the name of the issuing organization and shall be signed by an official of the issuing organization. Only actual signatures rendered in black (preferred) or dark blue ink by the signing official or digital signatures are acceptable to RAM. The Supplier or Sub-tier source official may use a quality or inspection stamp in lieu of a signature, providing that such stamp(s) identify the Supplier and the Supplier's authorized individual to whom the stamp is assigned, and that the issue, use and control of such stamp(s) are governed by Supplier's and/or Sub-tier source's documented procedures.

**Welding:** Mix ratio, gas mixture purity after mixing, purity requirements, certification to AWS A5.32/a5.32M and analysis of resulting dew-point or moisture PPM and purity as stated on PO must be stated on material certificate.

**NDT:** For calibration services, the Supplier shall identify or provide traceability to requirements for the standard to be used, accuracy, range of use and number of points to be checked.

## **Q060 Supplier Furnished Raw Material**

With each delivery of products, the Supplier shall provide material certifications and test reports covering the material used to fill this order. All certifications shall meet the requirements of Q010 Section 3.12. A copy of the certifications shall be included with the shipment.

In addition, for metallic materials, each lot or heat of material supplied on this purchase order shall include, as applicable, the material name or designation, alloy, type, class, grade or condition, producer (mill) name, the lot or heat number, the material specification and revision and the chemical / physical test report(s) to which the material complies. The certifications shall also clearly state the country of origin of melt for all raw materials being provided or used to manufacture the product being provided. In addition, the seller shall ensure compliance to the counterfeit parts requirements per Q010 Section 3.5.3.

**When a manufactured part is furnished using raw materials provided by the Supplier, and subsequent Heat Treat is required per the drawing or indicated on the Purchase Order, the Supplier shall furnish at least three 1" long samples of raw stock from the same material used to produce the parts delivered to RAM.** These samples are for use by RAM for hardness verification testing after heat treat of manufactured parts. These material samples shall be bagged and tagged with the following minimum information: material type, size, mill heat number, RAM purchase order number and RAM part number. If multiple heat lots are utilized, the parts shall be segregated by heat lot used and multiple segregated samples from each lot of material shall be provided and clearly marked with the relevant material lot information.

**For orders with multiple releases, bar stock samples shall be included with every delivery (every line/release) of parts.**

**(Q070 Moved – Q060 Applies)**

## **Q080 Ram Furnished Material**

Raw material will be furnished by RAM. The Supplier shall verify the material is tagged with the material type and lot number and that the material type matches the drawing or purchase order requirements. When delivering the final product, a Certificate of Conformance meeting the requirements of Q010 Section 3.12 shall be submitted with the shipment to RAM. In addition to the required information, the C of C shall include the statement: "Parts manufactured from material furnished by RAM Company." The disposition of any excess material will be RAM's responsibility. It is the responsibility of the Supplier to maintain control of RAM furnished material to avoid lost traceability or use on any other product while in their possession. Traceability at a minimum shall include the material identification (RAM P/N) and original RAM material purchase order number. This is the same information provided with the material and shall accompany any excess material when returned to RAM. RAM works with many sizes and types of similar materials, which is why maintaining positive control and traceability of material is extremely important. If material traceability is lost (i.e. tag lost, bars misplaced without lot/tag information), the material is suspect and must be segregated, marked as suspect and returned to RAM for replacement at the Supplier's expense. **Material with no traceability shall not be used on parts delivered to RAM.**

**When a manufactured part is furnished using raw materials provided by RAM, and subsequent Heat Treat is required per the drawing or indicated on the Purchase Order, the Supplier shall furnish at least three 1" long samples of raw stock from the same RAM supplied material used to produce the parts delivered to RAM.** These samples are for use by RAM for hardness verification testing after heat treat of manufactured parts. These material samples shall be bagged and tagged with the following minimum information: RAM material purchase order number, Supplier purchase order number and RAM part number. If multiple heat lots are utilized, the parts shall be segregated by heat lot used and multiple segregated samples from each lot of material shall be provided and clearly marked with the relevant material lot information.

**For orders with multiple releases, bar stock samples shall be included with every delivery (every line/release) of parts.**

## **Q090 Special Process Certifications**

Each special process to be performed in support of this purchase order (i.e. welding, plating, heat treatment, chemical film application, x-ray, dye penetrant inspection, magnetic particle inspection, brazing, etc.) shall be certified by the Supplier or Sub-tier source performing the process as having been performed to the applicable specifications called for on the Purchase Order. **All special**

**processes must be performed by Nadcap approved suppliers** (as applicable). Depending on the commodity and customer requirements, exceptions may be approved, but the Supplier must submit requests for exceptions in writing, prior to delivery of parts. **When indicated on the Purchase Order, the Supplier must use special process Suppliers approved by RAM's customer.** Approved process Suppliers for RAM's various customers are available upon request. **All certifications shall meet the requirements of Q010 Section 3.12.** In addition to the process certification, when certified operators are a requirement as called out in the process specification, the certification shall include a statement similar to: "We hereby certify that [operator's name or other identifying information i.e. controlled stamp, etc.] performed the [name of process] required by [drawing number/specification], in accordance with [applicable specification]. Operator has been trained to perform stated process and objective evidence of their current qualification status is on file and available for review".

Suppliers and Sub-tier Suppliers performing special processes must immediately notify RAM if special process certification or customer approval is lost. See Q010 Section 3.13.3 regarding notification of non-conforming material delivered to RAM for additional details.

**Testing of Actual Parts is Prohibited.** Destructive test results such as hardness indentations are detrimental and unacceptable to the end use of the part. **No actual part testing which causes deformation or damage to the part surface shall be performed without prior approval by RAM.** These samples shall be processed with the lot in order to represent the same processing as the part(s).

### Q100 Test Data

For special processes (heat treat, plating, NDT, etc.), the certification shall report compliance with requirements of the applicable specification, including both acceptance criteria and actual test results. All certifications must meet the requirements of Q010 Section 3.12.

**Testing of Actual Parts is Prohibited.** Per Q060, bar stock samples will be provided for testing in lieu of testing the actual part(s). Destructive test results such as hardness indentations are detrimental and unacceptable to the end use of the part. **No actual part testing which causes deformation or damage to the part surface shall be performed without prior approval by RAM.** These samples shall be processed with the lot in order to represent the same processing as the part(s). For heat treated or annealed materials, at least one of these 1" long samples used during the process shall be returned to RAM with the shipment for use by RAM to verify the reported hardness results. This sample shall be identified with the part number, Sub-tier outside process purchase order number and RAM purchase order number.

**Sub-tier Special Process testing of Actual Parts is Prohibited.** When the Supplier is providing raw material for manufactured parts, and subsequent processing such as heat treat is required, the Supplier shall provide a minimum of three 1" long samples to their approved Sub-tier source for testing in lieu of actual part testing. **The Supplier shall flow down to the Sub-tier source(s) the requirement that no actual part testing which causes deformation or damage to the part surface shall be performed without prior approval by RAM.** The Supplier shall require the Sub-tier source to return at least one of these 1" long samples to them for verification of hardness or other required test verifications. This sample shall be retained by the Supplier per the requirements of Q010 Section 4.1. The Supplier may also forward this sample to RAM, with the product delivery, for retention at RAM. This sample must be bagged and clearly marked with RAM's Purchase Order number and line, part number, revision, Supplier purchase order number, Sub-tier source, material type and specification.

### Q110 Raw Material Analysis

Prior to manufacturing, the Supplier shall, at no charge, furnish a sample of material intended to be used to complete this Purchase Order. This sample shall be submitted to RAM for chemical and physical analysis. **When Q110 is required, any decision by the Supplier to fabricate parts prior to analysis and material approval shall be at Supplier's risk.**

### Q120 Supplier Analysis

When required by RAM's customer flow down or when requested by RAM, the Supplier shall send a sample of material they intend for use on this Purchase Order to an independent testing laboratory for chemical and physical analysis at the Supplier's expense. **The independent laboratory shall be certified to ISO 17025. Any decision to fabricate parts with this material prior to analysis results and approval shall be at Supplier's risk.** The material analysis results must comply with the material composition and

properties listed in the applicable material specification. This additional verification shall be performed at least once during a twelve (12) month period. The results of this analysis shall be reported to RAM. The Supplier will notify RAM of any material found to be non-conforming during verification, along with containment action plan within 24 hours (See Q010 – 3.13.3 Notification of Non-Conforming Product Delivered to RAM).

**(Q130 Calibration – Moved to Q010 Section 4.2 – Applies to all orders)**

**Q140 First Article Inspection Report (FAIR)**

The Supplier shall prepare a First Article Inspection Report (FAIR) package per AS9102 and furnish a copy of the completed FAIR results (including all material, process and other certifications required by the Purchase Order and/or drawing notes) with the initial delivery of products on the Purchase Order. The FAIR shall be repeated and submitted any time an event specified in AS9102 occurs (such as a change to the revision of the drawing, significant changes in the manufacturing method, lapse in production of 2 years, etc.) or if the Purchase Order specifies a FAIR is required with each delivery. If specified on the Purchase Order the First Article part shall be submitted to RAM for review and acceptance prior to delivery of the lot. The First Article part shall be separately bagged and clearly identified.

**Q150 Final Inspection Report (FIR)**

Prior to each delivery of products to RAM, the Supplier shall perform final inspection on all products and document the results on a Final Inspection Report (FIR). The FIR shall represent the manufacturing lot to be shipped. The FIR format is optional but shall show each requirement and the actual result or range of inspection results obtained for each of the drawing or specification requirements. The FIR shall be submitted with the shipment to RAM.

**(Q160 Silver-Coated Copper Wire Red Plague Avoidance – Moved to Q010 Section 3.18)**

**Q200 Domestic Melt Source Required**

All raw materials and materials used to manufacture parts per this contract **must be Domestic Melt Material. Additionally, Domestic Melt Material is required when ANY of the following apply: the purchase order or item number/description indicates “DM”, “Domestic Melt”, “Domestic Required” or similar. Unless prior approval is obtained from RAM to use non-Domestic Melt source material, any parts delivered from unapproved sources will be returned to the Supplier for replacement at the Supplier’s expense.** The origin of mill source must be identified on the supplied certifications. **Refer to Q010 Section 3.12 and Q050 for more detail regarding certification requirements.**

**Certifications must be legible and reproducible for two generations. Material will be rejected if the certification is not legible. Refer to Q010 Section 4.1 for more details regarding records and record retention.**





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**APPENDIX A – RAM INSPECTION SAMPLING PLAN**

Lot Size	AOQL .79	AOQL 1.9	AOQL 3.0	AOQL 4.94	Index 1.0	Index 2.5	AQL 1.0	Lot Size	AOQL .79	AOQL 1.9	AOQL 3.0	AOQL 4.94	Index 1.0	Index 2.5	AQL 1.0
1 - 1	1	1	1	1	1	1	1	54 - 58	26	15	11	7	13	11	13
2 - 2	2	2	2	2	2	2	2	59 - 63	27	15	11	7	13	11	13
3 - 3	3	3	3	3	3	3	3	64 - 64	28	15	11	7	13	11	13
4 - 4	4	4	4	3	4	4	4	65 - 69	28	16	11	7	13	11	13
5 - 5	5	5	4	4	5	5	5	70 - 76	29	16	11	7	13	11	13
6 - 6	6	5	5	4	6	5	6	77 - 83	30	16	11	7	13	11	13
7 - 7	7	6	5	4	7	5	7	84 - 88	31	16	11	7	13	11	13
8 - 8	7	6	5	4	8	5	8	89 - 89	31	17	11	7	13	11	13
9 - 9	8	7	6	5	13	6	9	90 - 91	31	17	11	8	13	11	13
10 - 10	9	7	6	5	13	6	10	92 - 96	32	17	11	8	13	11	13
11 - 11	9	8	6	5	13	6	11	97 - 101	32	17	12	8	13	11	13
12 - 12	10	8	7	5	13	6	12	102 - 112	33	17	12	8	13	11	13
13 - 13	11	8	7	5	13	6	13	113 - 124	34	17	12	8	13	11	13
14 - 14	11	9	7	5	13	6	13	125 - 131	35	17	12	8	13	11	13
15 - 15	12	9	7	6	13	6	13	132 - 139	35	18	12	8	13	11	13
16 - 16	12	9	8	6	13	6	13	140 - 150	36	18	12	8	13	11	13
17 - 17	13	10	8	6	13	6	13	151 - 156	36	18	12	8	29	13	50
18 - 19	14	10	8	6	13	6	13	157 - 177	37	18	12	8	29	13	50
20 - 20	15	10	8	6	13	6	13	178 - 203	38	18	12	8	29	13	50
21 - 22	15	11	8	6	13	6	13	204 - 232	39	18	12	8	29	13	50
23 - 24	16	11	9	6	13	6	13	233 - 235	39	19	12	8	29	13	50
25 - 25	17	11	9	6	13	6	13	236 - 278	40	19	12	8	29	13	50
26 - 26	17	12	9	6	13	7	13	279 - 280	41	19	12	8	29	13	50
27 - 28	18	12	9	6	13	7	13	281 - 334	41	19	12	8	29	16	50
29 - 29	18	12	9	7	13	7	13	335 - 369	42	19	12	8	29	16	50
30 - 30	19	12	9	7	13	7	13	370 - 416	42	19	13	8	29	16	50
31 - 31	19	13	9	7	13	7	13	417 - 500	43	19	13	8	29	16	50
32 - 32	20	13	9	7	13	7	13	501 - 541	43	19	13	8	34	19	80
33 - 34	20	13	10	7	13	7	13	542 - 741	44	19	13	8	34	19	80
35 - 38	21	13	10	7	13	7	13	742 - 758	44	20	13	8	34	19	80
39 - 41	22	14	10	7	13	7	13	759 - 1200	45	20	13	8	34	19	80
42 - 45	23	14	10	7	13	7	13	1201 - 1232	45	20	13	8	42	23	125
46 - 49	24	14	10	7	13	7	13	1233 - 3059	46	20	13	8	42	23	125
50 - 50	25	15	10	7	13	7	13	3060 - 3200	47	20	13	8	42	23	125
51 - 51	25	15	10	7	13	11	13	3201 - 10000	47	20	13	8	50	29	200
52 - 53	25	15	11	7	13	11	13								

c = 0 applies to all plans

Plan	Application
AOQL .79	KPC2, Box 2
AOQL 1.9	RAM Company Aerospace, Default
AOQL 3.0	Parker, Honeywell
AOQL 4.94	RAM Company commercial (Requires RAM approval)
Index 1.0	Aerofluid Products
Index 2.5	B/E, Collins, HS, P&WC, UTAS, UTC
AQL 1.0	Moog
100%	Black Star, FSC, KPC1, Box 0, SpaceX Threads

Instructions: Select sampling plan for supplier noted on drawing. If supplier is not listed above, use RAM Default (AOQL 1.9).

**APPENDIX B – SPECIALTY METALS REFERENCE LIST (PER DFARS 252.225-7009)**

The table in Appendix B is provided as a ‘For Reference Only’ list of materials commonly used for RAM and RAM customer’s designs. Each material is categorized as ‘Specialty Metal’ or ‘Non-specialty Metal’ as defined by DFARS 252.225-7009 *Restriction on Acquisition of Certain Articles Containing Specialty Metal*. In the event this list conflicts with the DFARS requirements, DFARS shall take precedence. The list of materials in the table below does not include every metal used in every RAM or RAM customer’s design. When a metal is encountered that is not included in this list, refer to the requirements of DFARS 252.225-7009 for definitions, restrictions, and exceptions. The omission of any material from the table below does not indicate that the material is or is not a specialty metal. This table may be updated as necessary, in accordance with changes to DFARS requirements as applicable.

**When a RAM purchase order indicates that ‘DFARS Material is Required’, raw metallic material shall be from a DFARS compliant country whether the material is considered Specialty Metal or Non-specialty Metal.**

Material Category	Type/Specification	Trade Name (If Applicable)	Specialty Metal as Defined by DFARS 252.225-7009
STEEL	300M		YES
STEEL	4037	AISI 4037	YES
STEEL	4130	AISI 4130	YES
STEEL	4140	Chrome- Molybdenum	YES
STEEL	4340 or E4340 or 4340M		YES
STEEL	4340 per AMS 6415	SAE 4340 Alloy Steel	YES
STEEL	4620 or 4620H		YES
STEEL	52100		YES
STEEL	6150		YES
STEEL	8620 or 8620H		YES
STEEL	8630	AISI 8630	YES
STEEL	8740		YES
STEEL	9254 per ASTM A877		YES
STEEL	9310		YES
STEEL	A2		YES
STEEL	Alloy Steel per FF-S-86		YES
STEEL	AMS 6280	AMS 6280G	YES
STEEL	ASTM A351 All Grade		YES
STEEL	ASTM A600 All Types		YES
STEEL	ASTM A681 All Types		YES
STEEL	ASTM F835		YES
STEEL	Carpenter Silicon Core B-FM		YES
STEEL	D2		YES
STEEL	D6AC		YES
STEEL	FX-1008		YES
STEEL	H11		YES
STEEL	Chrome or Silicon Wire Per ASTM A401		YES



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Material Category	Type/Specification	Trade Name (If Applicable)	Specialty Metal as Defined by DFARS 252.225-7009
STEEL	Chrome Vanadium Spring Wire Per ASTM A232		YES
STEEL	M-50 Per AMS 6490		YES
STEEL	Nitralloy or Nitralloy 135		YES
STEEL	QQ-W-412 Comp 1		YES
STEEL	QQ-W-412 Comp 2		YES
STEEL	Silicon Core Iron per ASTM A867		YES
STEEL	Steel per AN-S-9 or MIL-S-6050		YES
STEEL	Vascomax All Grades	Maraging 300 Alloy Steel	YES
STEEL	1010		NO
STEEL	1015		NO
STEEL	1018		NO
STEEL	1020		NO
STEEL	1025		NO
STEEL	1026		NO
STEEL	1075		NO
STEEL	1090		NO
STEEL	1095		NO
STEEL	B1113		NO
STEEL	C1117		NO
STEEL	C1137		NO
STEEL	1141		NO
STEEL	1144		NO
STEEL	1213 or C1213		NO
STEEL	1215 or C1215		NO
STEEL	4750		NO
STEEL	Carbon Steel per FED-SDT-66		NO
STEEL	Carbon Steel per FF-S-103		NO
STEEL	Carbon Steel per FF-S-107		NO
STEEL	Carbon Steel per MIL-S-7952	SAE 1020	NO
STEEL	G10180 per ASTM A108	AISI 1018 Carbon Steel	NO
STEEL	G12150 per ASTM A108	AISI 1215 Carbon Steel	NO
STEEL	Low Carbon Steel per QQ-S-698	AISI 1018 Mild/Low Carbon Steel	NO
STEEL	Low Carbon Steel IAW AISI 1067-1075	AISI 1075	NO
STEEL	MIL-S-7952	Steel Comp 1025	NO
STEEL	Music Wire	ASTM A 228	NO
STEEL	Music Wire per QQ-W-470	ASTM A 228	NO
STEEL	Steel Weldless Safety Chain per RR-C-271		NO



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Material Category	Type/Specification	Trade Name (If Applicable)	Specialty Metal as Defined by DFARS 252.225-7009
STAINLESS STEEL	A286		YES
STAINLESS STEEL	AM 355		YES
STAINLESS STEEL	301 Or 301.250H or 301-H	Stainless 301	YES
STAINLESS STEEL	302 or 302 COND B	Stainless Steel Grade 302	YES
STAINLESS STEEL	303		YES
STAINLESS STEEL	304 or 304L		YES
STAINLESS STEEL	316 or 316L		YES
STAINLESS STEEL	321		YES
STAINLESS STEEL	347	Chromium-Nickel	YES
STAINLESS STEEL	384		YES
STAINLESS STEEL	410		YES
STAINLESS STEEL	416		YES
STAINLESS STEEL	420		YES
STAINLESS STEEL	430F or 430F(Se)	UNS S43020	YES
STAINLESS STEEL	431	Martensitic Stainless Steel	YES
STAINLESS STEEL	440 or 440C		YES
STAINLESS STEEL	13-8 or 13-8 Mo, or PH 13-8 Mo	UNS S13800	YES
STAINLESS STEEL	15-5	15-5 PH	YES
STAINLESS STEEL	15-7 or 15-7 Mo, or PH 15-7 Mo	UNS S15700	YES
STAINLESS STEEL	17-4	17-4 Stainless Steel	YES
STAINLESS STEEL	17-7	17-7 PH Stainless Steel	YES
STAINLESS STEEL	18-8	Type 304	YES
STAINLESS STEEL	AMS 5504	410 Stainless	YES
STAINLESS STEEL	AMS 5610	321 Stainless	YES
STAINLESS STEEL	AMS 5621	420 Stainless	YES
STAINLESS STEEL	AMS 5688	302 Stainless	YES
STAINLESS STEEL	AMS 5731	Alloy A286	YES
STAINLESS STEEL	AMS 7245	304 Stainless	YES
STAINLESS STEEL	ASTM B473	Alloy 20	YES
STAINLESS STEEL	ASTM B729	Alloy 20 Seamless Nickel Pipe	YES
STAINLESS STEEL	CRES per ASTM 276 or ASTM A276		YES
STAINLESS STEEL	CRES per FED-STD-66		YES
STAINLESS STEEL	CRES per QQ-S-763		YES
STAINLESS STEEL	Custom 455		YES
STAINLESS STEEL	Greek Ascology	418 Stainless	YES
STAINLESS STEEL	N08020	Nickel Alloy 20	YES
STAINLESS STEEL	S34700		YES
STAINLESS STEEL	Steel Wire per QQ-W-432		YES



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Material Category	Type/Specification	Trade Name (If Applicable)	Specialty Metal as Defined by DFARS 252.225-7009
STAINLESS STEEL	Steel Per AMS 7211		YES
STAINLESS STEEL	XM-7	302HQ, 304CU, 304HQ	YES
NICKEL ALLOY	Hastelloy X		YES
NICKEL ALLOY	Inconel 600	AMS 5540 - N06600	YES
NICKEL ALLOY	Inconel 625		YES
NICKEL ALLOY	Inconel 718		YES
NICKEL ALLOY	Inconel X-750		YES
NICKEL ALLOY	Monel K-500		YES
NICKEL ALLOY	Nickel Copper/ QQ-N-281	Monel 400	YES
NICKEL ALLOY	N21	Ni 200	NO
TITANIUM	Ti 6A1-4V or Ti 6A1-4V STA		YES
TITANIUM	All Titanium Compositions		YES
COBALT ALLOY	Cobalt Alloy per ES2-171		YES
COBALT ALLOY	Elgiloy		YES
COBALT ALLOY	Haynes 25	L605	YES
COBALT ALLOY	Haynes 188		YES
COBALT ALLOY	L-605	Haynes 25	YES
COBALT ALLOY	MP159		YES
COBALT ALLOY	Stellite 6B		YES
IRON-NICKEL ALLOY	Nitronic 60	Alloy 218	YES
IRON-NICKEL ALLOY	HYMU80		NO
MAGNETIC ALLOY	Alnico 5.5/0.64		YES
MAGNETIC ALLOY	Alnico-V		YES
MAGNETIC ALLOY	Alnico-I		YES
MAGNETIC ALLOY	Alnico-II		YES
MAGNETIC ALLOY	Alnico-III		YES
MAGNETIC ALLOY	Alnico-8		YES
MAGNETIC ALLOY	Hiperco 50A	(Cobalt Alloy)	NO
MAGNETIC ALLOY	MIL-N-14411 COMP 3		NO
MAGNETIC ALLOY	Neodymium Iron Boron Type 30/18		NO
MAGNETIC ALLOY	Permendur 2V		NO
MAGNETIC ALLOY	Permendur 49		NO
MAGNETIC ALLOY	Samarium Cobalt		NO
MAGNETIC ALLOY	Carpenter Electrical Iron per ASTM A848 Alloy 1	Mag Iron	NO
MAGNETIC ALLOY	MIL-N-14411 Comp 5		NO
OTHER METALLIC ALLOY	C66430 per ASTM B694	Copper Zinc Alloy	NO



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Material Category	Type/Specification	Trade Name (If Applicable)	Specialty Metal as Defined by DFARS 252.225-7009
OTHER METALLIC ALLOY	Meehanite		NO
OTHER METALLIC ALLOY	Tantalum 10W		NO
OTHER METALLIC ALLOY	Tungsten		NO
OTHER METALLIC ALLOY	TZM Type 364		NO
COPPER ALLOY	Al-Ni-Br, or Al-Ni Br OND A, or Al-Ni-BRZ		NO
COPPER ALLOY	AMS 4510		NO
COPPER ALLOY	AMS 4720		NO
COPPER ALLOY	ASTM B16		NO
COPPER ALLOY	ASTM B36		NO
COPPER ALLOY	ASTM B98		NO
COPPER ALLOY	ASTM B99		NO
COPPER ALLOY	ASTM B134		NO
COPPER ALLOY	ASTM B206		NO
COPPER ALLOY	Berylco 14		NO
COPPER ALLOY	Beryllium Copper		NO
COPPER ALLOY	BRASS per QQ-B-611		NO
COPPER ALLOY	Cupronickel		NO
COPPER ALLOY	CDA 715		NO
COPPER ALLOY	CDA A67300		NO
COPPER ALLOY	C17200 or Be-Cu		NO
COPPER ALLOY	C17510		NO
COPPER ALLOY	C26000		NO
COPPER ALLOY	C62400		NO
COPPER ALLOY	C63000		NO
COPPER ALLOY	C64200		NO
COPPER ALLOY	C65100		NO
COPPER ALLOY	C65500		NO
COPPER ALLOY	C66100		NO
COPPER ALLOY	C67300		NO
COPPER ALLOY	C92900		NO
COPPER ALLOY	642		NO
COPPER ALLOY	6730		NO
COPPER ALLOY	6731		NO
COPPER ALLOY	674 Brass		NO
COPPER ALLOY	675 Bronze		NO
ALUMINUM	850		NO



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ALUMINUM	1100		NO
ALUMINUM	1145		NO
ALUMINUM	2011		NO
ALUMINUM	2024		NO
ALUMINUM	2219		NO
ALUMINUM	3003		NO
ALUMINUM	356, A356, or A356.0		NO
ALUMINUM	355, C355, or C355.0		NO
ALUMINUM	357, A357, or A357.0		NO
ALUMINUM	380, A380, or A380.0		NO
ALUMINUM	6061		NO
ALUMINUM	7050		NO
ALUMINUM	7075		NO
ALUMINUM	TENS 50		NO
NON-METALS	Nitrile		NO
NON-METALS	Vespel All Types		NO