

Supplier Quality Codes

For Redwire Space Goleta

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Revisions					
Revision	Date	Section	Paragraph	Summary of change	Authorized by
-	2014-06-26			Initial issue	QA: J. Espinoza
A	2014-08-15			Released into PDM	QA: J. Espinoza
B	2014-10-30			Revised and reorganized quality codes and added Group Code Table 1	QA: J. Espinoza
C	2015-02-17			Added QA Group Codes 34 & 35 'Tooling' Code 8 - Defined Batch Inspection Sample sizes Code 9 – Further defined material samples	QA: J. Espinoza
D	2016-04-11			Corrected typo's throughout, added Quality Code 18 and group code 36 (composites)	QA: J. Espinoza QA: J. Rivas Eng: J. Buckingham-Cain
E	2016-08-22	Q Code 8 Table 1		Code 8 - Moved Inspection Report to Code 9 Added Group Codes a and b, to distinguish Inspection Report req.	QA: J. Espinoza QA: J. Rivas
F	2016-10-13	Table 1 Q Code 9		Table 1, updated PO Group codes and moved to Page 1, Updated Q code 9	QA: J. Espinoza QA: J. Rivas
G	2017-02-23	Table 1 Groups		Added Groups; ENG-02 & COTS-02	QA: J. Espinoza QA: J. Rivas

H	2017-11-27	Table 1 Groups		<p>Added Group: ENG-02, COM-01</p> <p>Updated Quality Code 03: Added Subcontractor outsourcing requirement.</p> <p>Updated Quality Code 08: Added "Invoice" and "If Applicable" in revision statement.</p> <p>Updated Quality Code 09: Removed "Inspection Report" & "First Piece"</p>	<p>QA: J. Espinoza QA: J. Rivas</p>
J	2018-01-05	Table 1 Q CODE 15		<p>PO Group Codes "ENG-03, COM-01: Added "Raw Materials"</p> <p>Added "or equivalent approved by DSS".</p>	<p>QA: J. Espinoza QA: J. Rivas</p>
K	2018-03-15	Table of Contents Table 1 and Quality Codes Q CODE 09		<p>Added SAFE-01, Group Code Q19 "Safety/Lifting Requirements" and</p> <p>Added HSF-01, Group Code Q20 "Human Space Flight"</p> <p>8) Sampling Requirements</p>	<p>QA: J. Espinoza QA: J. Rivas</p>
L	2019-09-09	Table of Contents Quality Codes Q Codes 21, 22 & 23		<p>Moved Table of Contents to page iv. Added Group Codes CRT-01, CRT-02, ENG-03, EEE-02. Added Q-Code 21, 22 and 23. Added Q-code 06, Letter D. Updated Q Code 09 for IR and FAIR. Update QA-017 Letter C, added 11) & 12)</p>	<p>QA: J. Espinoza QA: J. Rivas</p>
M	2020-01-23	Table of Contents Table 1 Code 9		<p>Moved Table of Contents to page v. Added CRT-03. Added Flight Only.</p>	<p>QA: J. Espinoza QA: J. Rivas</p>

N	2021-06-21	TOC Table 1 Section 1G		Added TOC Consolidated group codes to simplify listings Added code 1G (NCR SS3)	QA: S. Reichert
P	2022-03-29	TOC Table 1 1.0 9.0, 24 15.0 25.0		Renamed Q code 15 to "Calibrated Equipment Certification" Removed Q Code 08 C, OEM Cert from FLT-01 Updated Q Code 13 A-C Updated Q Code 15 A and 15 B throughout Added Q Code 16 to EEE-01 Updated 1B to refer to QAF- 117 for approvals Revise wording of code 9 and changed 9.b to code 24, reference code 15 A. Added Q Code 15 B Added Q Code 25	QA: S. Reichert Supply Chain: B. Spink
R	2022-09-12	26.0		Revised Q Code 1 C Added Q Code 26 Added PO Group Code LSLM-02	QA: J. Byars Supply Chain: B. Spink
T	2023-02-03	TOC Q code 12(A)		Revised Q code 12(A) to clarify Source Inspection parameters Added Q code 12 (A1): Scheduling Source Inspection	SQA: David Gaitan QA: S. Reichert Supply Chain: B. Spink
U	2023-04-12			Remove 6A,C from EEE-01 Split 7 into A and B Add 11C and rename FLT-02 Create 11C	SQE: David Gaitan QAM: S. Reichert SCM: S. Jimenez

V	2023-04-26			Replace logo. Update filename. Replace QAF-083 in Section 21C.	QA: S. Reichert
W	2023-09-05			Added Rev info to 2C Added codes 27-29	SQE: David Gaitan QAM: S. Reichert SCM: S. Jimenez

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TABLE 1 – SUPPLIER QUALITY GROUP CODES

PO Group Codes	Type of Product	Redwire Supplier Codes
FLT-01	Flight Material w/ Special Process	01 A-G, 02 A-C, 03, 04, 05 A-C, 08 A-B, 09, 10, 11 A, 13 A-C, 15 A, 16, 17 A-C
FLT-02	Flight COTS (incl Fasteners)	01 A-G, 02 A-C, 03, 04, 08 A-C, 11 C, 16, 17 C
ENG-01	Non-Flight Material Packing Slip Only	08 A Only
ENG-02	Non-Flight Material w/ Cert of Conformance	01 A-E&G, 03, 04, 08 A-B
CRT-01	Critical Tool w/ Inspection Report	01 A-G, 02 A-C, 03, 04, 05 A-C, 08 A-B, 09, 10, 15 A, 17 A-C
EEE-01	Flight Electrical Component and Assembly	01 A-G, 02 A-B, 03, 04, 06 D, 08 A-C, 16, 17 A-C
COMP-01	Composites	01 A-G, 02 A-C, 03, 04, 05 A-C, 06 A & B, 08 A-C, 09, 11 A, 12 A, 15 A, 17 A-C, 18
LSLM-01	Limited Shelf-Life Material	01 A-G, 02 A-C, 03, 04, 06 A, 08 A-C, 11 A, 17 C
LSLM-02	LSLM w C of A	01 A-G, 02 A-C, 03, 04, 11 A, 17 C, 26
CAL-01	Calibration Tools & Services	01 A-G, 02 A-C, 04, 05 B, 06 C, 08 A-B, 15 B
RAW-01	Raw Materials	01 A-G, 02 A-C, 04, 08 A-C, 11 A, 17 C
SPL-01	Special Processes	01 A-G, 02 A-C, 04, 05 B & C, 08 A & B, 13 A-C, 15 A, 17 A-C
HAZ-01	Hazardous Materials	01 A-G, 02 A-C, 03, 04, 06 B, 08 A-C, 17 A-C
TST-01	Testing Assemblies	01 A-G, 02 A-C, 04, 08 A-B, 12 B, 13 B-C, 15 A, 17 A-B
TST-02	Testing Raw Material	01 A-G, 02 A-C, 04, 08 A-B, 11 A, 13 B-C, 15 A, 17 A-B
SRV-01	On-Site Service	13 B and 15 A
SAFE-01	Safety Requirements	19
HSF-01	Human Space Flight Items	20

This document identifies specific quality requirements that may be levied on suppliers, distributors, and/or sub-tier contractors, who provide material and/or purchased items to Redwire. This document is also intended to enhancement the purchase order/contract requirements.

1.0 QUALITY CODE: 01 – GENERAL REQUIREMENTS

- A) These Quality requirements, codes and clauses are intended to be in addition to, not in derogation of, procurement action requirements.
- B) If a Supplier cannot comply with any applicable quality requirement listed within a quality code or quality clause of a purchase order (PO), resolution and/or changes to the requirements must be obtained via QAF-117 prior to acceptance of the Redwire purchase order.
- C) **IMPORTANT:** The primary point-of-contact for the contract shall be the Redwire procurement representative (buyer or designee as identified in writing). The supplier, distributor, and/or sub-tier contractors shall not take any direction or instructions from any other Redwire personnel. Any modification to the PO/Contract shall be incorporated, revised, and approved to the Purchase Order by the Redwire procurement representative and Program Quality Engineer.
- D) Distributors, as the direct Supplier to Redwire, as well as the original Manufacturer are responsible for compliance with all purchase order requirements. The applicable requirements of all quality codes, quality clauses, and any technical requirements listed on the purchase order, will apply to both the Distributor and the Manufacturer of the product. All reasonable measures shall be taken by the Distributor and Manufacturer to validate all items sold to Redwire are from an authorized source and certify that all materials provided are not counterfeit articles. If any Distributor items or materials are discovered to be counterfeit, from any source, Redwire shall be immediately notified in writing (See Q-Code 05).
- E) All data, documents, and any certificates of conformance from the Supplier and sub-tiers shall be in English, or contain an English translation, and must be signed by a company management representative.
- F) **Record Retention:** All assembly/production/programing documents, material certifications (including inserts/hardware), supplier generated quality documents (C of C, FAI reports, inspection records, and discrepancy reports), Redwire models, POs, and any customer related flow down documents shall be archived for 7 years and available upon request unless otherwise requested via PO.
- G) Supplier must comply with all applicable laws and regulations and be committed to the highest standards of ethics and business conduct. Supplier must not engage in unfair business practices (i.e. business gifts, etc.), and should avoid involvement in activities that could be perceived as a conflict-of-interest. Supplier to enforce all product safety requirements, including the management of critical items and key characteristics. Supplier to communicate any concerns regarding product safety to Redwire. Supplier will ensure that employees and people working on its behalf are aware of:
 - Their contribution to product or service conformity
 - Their contribution to product safety

- The importance of ethical behavior

2.0 QUALITY CODE: 02 – QUALITY MANAGEMENT SYSTEM

- A) Supplier's Management System shall conform to a national and/or internationally recognized QA system (i.e., AS9003, AS9100, AS9120, ISO9001, MIL-Q-9858, ISO10012-1, ISO17025, ANSI/NCSL Z540, NADCAP) as applicable to the type of products and/or services provided to Redwire, unless an alternate quality system level/type has been determined acceptable by Redwire Quality.
- B) Suppliers shall notify Redwire when changes occur that will affect their management system (address/location or quality system approval level/type). In order to maintain an accurate Approved Supplier List, Redwire may conduct periodic reviews (surveys, questionnaires, on-site visit, etc.) to ensure a Supplier's information is correct and current.
- C) **Configuration Control:** The Supplier shall have a documented system to ensure Redwire design model, DPD, supplier-derived files and PO change orders are placed under configuration control. Supplier-derived production files shall be validated prior to use and maintained in a manner that prevents misuse or alteration. All revisions shall be controlled. Supplier requests for changes to the design model or DPD shall be documented and submitted to Redwire in writing and changes are only allowed with written permission from Redwire. Supplier is expected to utilize the latest, released revision of any technical document (MIL STD, ASTM, etc.) referred to within the PO unless otherwise specified.

3.0 QUALITY CODE: 03 – SUB-TIER FLOW DOWN

Direct Suppliers to Redwire shall flow down applicable quality and purchase order requirements to their sub-tier Suppliers to ensure that the integrity of the specified requirements is maintained throughout the supply chain (i.e., first piece/article inspection, customer approved special processes, key characteristics, record retention, etc.).

Subcontractor may not outsource fabrication efforts unless approved by Redwire Procurement Representative.

4.0 QUALITY CODE: 04 – CUSTOMER RIGHT OF ACCESS

Redwire, Redwire's Customers and regulatory agencies may visit the Supplier's facility and/or their sub-tier Suppliers for the purpose of verifying contract compliance and product conformity (i.e., source inspection, witness testing, product audit, quality system audit). Supplier will provide the necessary support to the visiting personnel. Arrangements for such visits will be coordinated through the Redwire Buyer or Quality Management representative.

5.0 QUALITY CODE: 05 – MRB AUTHORITY & NON-CONFORMANCE REPORTING

- A) Supplier is NOT granted Material Review Board (MRB) authority for any product that is manufactured to a Redwire drawing/specification or a Redwire Customer's drawing/specification. Any deviations to engineering drawings/specifications must have Redwire and/or the Redwire Customer's written approval using Redwire Form QAF-117 prior to shipment of product.

- B) Supplier will notify Redwire, when discrepancies in the Supplier's process or product are discovered or suspected which may affect the fit, form, or function of any product in process or delivered to Redwire. Authorization to continue processing any material not meeting the drawing or purchase order requirements is required. Proceeding without this authorization shall be at the supplier's risk.
- C) Supplier is to provide Root Cause analysis and Corrective Action when a **Supplier Corrective Action Request (SCAR)** is issued as a result of non-conforming products, services, on-site survey/evaluation, or documentation and/or delivery discrepancies.

6.0 QUALITY CODE: 06 – SPECIAL HANDLING MATERIALS

- A) **Limited Life Products** subject to degradation with age or varying temperatures must be clearly stated on the certificate of conformance/packing slip or product/packaging in addition to expiration date, cure date and lot identification. Product/materials shall have a minimum of 75% shelf life remaining at time material is received at Redwire. If the Supplier desires to provide product with less than 75% shelf life, Supplier is required to obtain approval from the Redwire Quality Management prior to shipment.
- B) **Hazardous Materials** shall be properly packaged in accordance with the applicable Federal Regulations (DOT). Containers will be plainly marked as to the contents with appropriate warnings, precautions, instructions and storage conditions. Appropriate documentation (MSDS, handling, etc.) shall accompany each shipment.
- C) **Electrostatic Sensitive Devices (ESD)** shall be packaged and labeled in accordance with the appropriate specification/drawing requirements (i.e., ANSI/ESD S20.20-1999) for the product/material being provided to Redwire.
- D) **Age Control of EEE Parts and Assemblies** All Electrical, Electronic, or Electromechanical (EEE) parts procured from the Supplier shall have been manufactured within **5 (Five)** years from the delivery date. Manufacturing date shall be clearly stated on the Certificate of Conformance. If the Supplier desires to provide product, Supplier is required to obtain approval from the Redwire Quality Management prior to shipment.

7.0 QUALITY CODE: 07 – GOVERNMENT / CUSTOMER FURNISHED EQUIPMENT / MATERIALS

- A) **Cost-Reimbursement or Time-and-Material Type Purchase Order:** Material and property acquired, fabricated, or otherwise provided by the Contractor under this cost-reimbursement or time-and-material type Purchase Order is Government Property. Under FAR 52.245-1, the Contractor is accountable for the identified material and property and shall have a system that will allow the Contractor to obtain, control, use, preserve, protect, repair, and deliver the material and property in the Contractor's possession.
- B) **Outside Processing for Parts/Assemblies (including rework):** For performance of work under this Purchase Order, Redwire and/or the Government will make available Government property identified within this Purchase Order on a no charge-for-use basis pursuant to the clause at FAR 52.245-1, Government Property, as incorporated in this Purchase Order. The Contractor shall use this property in the performance of this Purchase Order at the location identified on the PO and at other location(s) as may be approved by the Contracting Officer. When property is

furnished by Redwire and/or funding is provided by the Government, the Contractor shall inspect the shipment upon receipt for any damage that may have incurred while in transit, and provide for the protection, periodic inspection, and controls necessary to preclude damage or deterioration during handling, storage, or use. The contractor shall report any government furnished property found damaged, malfunctioning, or otherwise unsuitable for use, and shall determine and report the probable cause and necessity for withholding such property from use. Unsuitable property shall be properly handled to prevent further damage and/or additional repair costs. Damaged CFE or GFE shall be documented on the Supplier's internal defect reporting record and processed through the non-conforming material board. Under FAR 52.245-1, the Contractor is accountable for the identified property.

8.0 QUALITY CODE: 08 – DOCUMENTATION DELIVERY

Supplier is required to provide a documentation package with each shipment sent to Redwire that contains the following documents at a minimum:

- A) Packing Slip and/or Invoice which references the PO number, quantity shipped, part number, revision if applicable and description of the items being delivered.
- B) A signed Certificate of Conformance referencing the PO number, part number, revision, and quantity being shipped.
- C) Certification from the OEM (Original Equipment Manufacturer) that includes lot number traceability and/or manufacturing date code, if applicable.

9.0 QUALITY CODE: 09 – INSPECTION REPORT

An **Inspection Report** is required for the item/services ordered. The inspection report shall include actual inspection results for each item provided with the shipment.

A sampling plan that conforms to ANSI/ASQ Z1.4, General Inspection Level II, Single, Normal and AQL 1.0 may be used in lieu of 100% inspection.

The report shall contain the information listed as a minimum:

1. Drawing number, configuration, revision, Redwire PO number, and PO line item number.
2. Actual inspection results of all drawing features, dimensions, drawing notes, tolerance block and Purchase Order requirements. When inspecting more than one unit, the range of the actual results is acceptable. Actual results are required, no check marks or "pass" notations are acceptable as a form of dimensional acceptance.
3. Notation, verification, and OEM certifications of applicable materials, process specifications used, and components installed per drawing or Purchase Order requirements, including traceability to lot number, heat number, date code or batch number (i.e., unique Certification number).
4. All information related to any non-conforming condition experienced during manufacturing shall be included in the inspection report, including final disposition and Redwire approval (See Q code 5).

5. All tools and equipment used to perform the inspection listed in the inspection report. The objective being if a device fails calibration, identification of where it was used is readily retrievable (See Q Code 15 A).
6. A completed and signed Inspection Report for machined articles, molded, and manufactured 3-D parts.

10.0 QUALITY CODE: 10 – DIGITAL PRODUCT DEFINITION

DPD Definition: This is an engineering definition of the product, provided in a 3D computerized presentation typically viewable on a Computer Aided Design (CAD) system. In addition to the CAD model, the entire product definition may include information such as a parts lists, material specifications, and tolerancing. (Reference: ASME Y14.41-2012, ISO 16792:2006)

The DPD is usually provided to the supplier in the form of a .stp, iges, or .dxf, or parasolid.

Supplier DPD System Requirements shall include:

1. Revision control of the digital model supplied by Redwire.
2. Purchase Order reference of the digital model revision provided by Redwire.
3. A comprehensive inspection report that verifies the machined article meets the requirements of the digital model.
4. The tools used to perform the inspection with their calibration status.
5. Sampling size shall be defined and approved by Redwire prior to submitting to final inspection.

11.0 QUALITY CODE: 11 – RAW MATERIALS

- A) **Raw Material Test Data:** Supplier is to provide a copy of the raw material test data (chemical, physical, heat treatment, etc.) for the ordered product that demonstrates compliance with applicable specifications (QQ-N-; AMS-; SAE-; etc.) and/or drawings requirements. If the Redwire purchase order or drawing requires specific materials, and the supplier substitutes these materials, approval by Redwire QA management is required prior to procuring or using any material that is not on the applicable purchase order or drawing.
- B) **Material Samples:** Supplier shall submit test samples of each batch of material sufficient to conduct tests in accordance with specification or purchase agreement requirements. The test samples shall accompany the finished product, and either be an exact duplicate, functional representative, or a fully processed block sufficient to undergo testing. Each test sample shall be clearly and permanently marked and/or Bag and Tagged with the following: batch or lot number; date manufactured; specification or material control information number; Supplier's designation; and the purchase agreement number.
- C) **Certificate of Analysis:** Supplier is to provide a signed and dated Certificate of Analysis (CoA) referencing a purchase order number, part number, lot/serial number(s), specifications, and test results as applicable.

12.0 QUALITY CODE: 12 – SOURCE INSPECTION

- A) **Customer Source Inspection:** Redwire and/or Redwire Customer reserve the right to impose Source Inspection prior to shipment of product. When source inspection is **imposed**, refer to section A1 below. If Redwire has **NOT** contacted the supplier to impose source inspection then the supplier is to continue with internal release of product, packaging, and shipment.

A1) **Scheduling of the Source Inspection:** Redwire will notify the supplier when source inspection is imposed. The supplier is to contact Redwire purchasing or the Redwire quality management representative at least 3 working days before the start of the Redwire and/or Redwire Customer inspection.

- B) **Customer Test Witnessing:** Redwire and/or Redwire Customer may witness acceptance testing at Supplier facility if requested per Purchase order instructions. Supplier is to contact Redwire Procurement representative or the Redwire Quality Manager in advance of acceptance testing activities to make arrangements for witnessing of testing if instructed by PO.

13.0 QUALITY CODE: 13 – SPECIAL PROCESS CERTIFICATION

Redwire reserves the right to request/receive evidence of compliance to specification requirements (training, qualifications, etc.) for any employee or subcontractor that performed a special process associated with an ordered item. Technicians/Personnel performing any Special Process described on this Purchase Order shall be qualified and certified to the current applicable standard/specification for that process referenced in the Redwire drawing or PO. Each special process certification shall have QA Manager/Supervisor approval.

- A) **Special Process Certifications** - Supplier shall furnish certificate(s) of conformance with the specification(s) of the special processes performed, including but not limited to: flame/metal spraying, welding, heat treatment, plating and coating (electroplating, chemical film, anodizing, powder coating, paint), etching and priming.
- B) **Testing Certifications** - Supplier shall furnish certificates of conformance for testing that includes the specification(s) associated with the performed testing including but not limited to: nondestructive testing (ultrasonic, magnetic particle, dye penetrant, and X-ray inspections, spectral scans), environmental and laboratory testing, and environmental testing such as vibration, acoustic, shock, and thermal cycle
- C) The personnel performing the service and are in direct contact with Redwire product, shall be certified according to the PO requirements. The Supplier shall have records of its personnel certifications and sub-tier supplier special process approvals on file and available for review by Redwire if requested.

14.0 QUALITY CODE: 14 – GOVERNMENT SOURCE INSPECTION

The Government reserves the right to perform Government Source Inspection (GSI) on this order. During performance of this order, all material certification, special processes, build documentation, and any other documentation related to this order. Your quality control, inspection system, and manufacturing processes are also subject to review, verification, and analysis, by authorized Government representatives.

15.0 QUALITY CODE: 15 – CALIBRATED TOOLS CERTIFICATION

- A) For each item/service the Supplier provides, the Supplier shall identify what tools are used to monitor conditions or validate dimensions. This shall include a discrete control number and a description of the tool. Any equipment used to satisfy the requirements of this PO, must be certified to meet the requirements of ANSI/NCSL Z540, ISO 10012-1, or ISO/IEC 17025 or equivalent approved by Redwire. Equipment or calibration standards shall be traceable to the National Institute of Standards and Technology (NIST). The Supplier is required to have a certificate of calibration for all equipment used on file and provide a copy to Redwire if requested.
- B) Calibrated Tool Providers, Calibration Service Laboratories, or OEM shall provide a signed calibration certificate with a detailed reporting of results in accordance with ANSI/NCSL Z540, ISO/IEC 17025 or equivalent approved by Redwire. Any equipment used to satisfy the requirements of this PO, must be certified to meet the requirements of ANSI/NCSL Z540, ISO 10012-1, or ISO/IEC 17025 or equivalent approved by Redwire. Equipment or calibration standards shall be traceable to the National Institute of Standards and Technology (NIST).

16.0 QUALITY CODE: 16 – COUNTERFEIT PARTS PREVENTION

Redwire requires this commodity to be procured directly from the original manufacturer or authorized distributor only. Parts must be procured per AS5553.

The supplier is to provide a Certificate of Conformance that lists this information:

1. If an OEM, provide an OEM/OCM Certificate of Conformance, or
2. If an Authorized Distributor, provide an Authorized Franchise Distributor Certificate of Conformance.

The Certificate of Conformance should also include, at a minimum, the following information:

1. Redwire purchase order number,
2. Part number and/or description of the ordered item,
3. Revision number/letter of the item being provided, when applicable, and
4. Signature and/or stamp of the Supplier's representative.

17.0 QUALITY CODE: 17 – PROCESS CONTROL

- A) **Changes:** Redwire Supplier is required to notify Redwire when changes occur to the manufacturing/service process, process procedures and/or products/solutions that affect piece part and/or assembly level configuration.
- B) **Process Controls for Fabrication Process:** The Supplier shall prepare procedures to control fabrication processes (e.g., metal joining, bonding, plating and coating, chemical or surface treatment, pressure testing) wherein inspection cannot ensure uniform quality. When samples or visual aids are necessary to define acceptable workmanship, they shall be selected by the Supplier and approved by Redwire QAM.
- C) **Prohibited Materials:** The use of any of the following materials in any flight hardware is prohibited unless specifically reviewed and approved by Redwire:

1. Solder alloys with greater than 97% tin
2. Platings, coatings, or claddings of tin unless they contain a minimum of 3% alloying constituent (such as lead, silver, etc.)
3. Tin plated wire in crimped wire terminations (soldered terminations are acceptable)
4. Cadmium, selenium, magnesium, or zinc except internal to hermetically sealed devices
5. Brass with zinc content greater than 15% unless over-plated or over-coated with an approved material
6. Mercury or compounds of mercury
7. Zinc chromate protective coatings
8. Vinyl or polyvinyl chloride (PVC)
9. Tin-copper, tin-zinc, tin-bismuth solder alloys and other so called "lead free" solder alloys
10. Corrosive solder fluxes (Type RA or IPC ANSI/J-STD-004 Type ROM0, ROM1, ROH0, & ROH1)
11. Ethyl alcohol, methyl alcohol or chlorinated solvents shall not come in contact with Titanium or Titanium Alloys

Class 1 Ozone Depleting Substances shall not be used in the manufacture, assembly, test, handle, packaging, ship, or store Redwire hardware.

All subcontractors and their suppliers must also comply with these restrictions. Compliance to these restrictions is subject to review and periodic audit by Redwire.

Subcontractors that do not perform physical testing of materials and/or EEE parts, for verification of compliance to the above prohibited materials restriction's, may be required to submit sample materials or parts to Redwire or other outside testing service for validation.

18.0 QUALITY CODE: 18 – COMPOSITE MATERIAL/HARDWARE

Composite materials and hardware must be considered extremely critical to flight operations and must be handled with extreme care. Protective gloves and clothing must be worn whenever handling this category of hardware. Traceability to all materials, processes, and procedures must be stringently adhered to at all times, and accurately recorded in the build documentation. Any/all deviations to internal process controls must be documented and approved by Redwire prior to implementation. Changes to Redwire provided documentation cannot be made without written authorization from Redwire engineering and Quality Assurance.

19.0 QUALITY CODE: 19 – SAFETY/LIFTING REQUIREMENTS

This order requires compliance to the safety requirements defined in NASA-STD-8719.9, National Consensus Standards, applicable Federal OSHA standards, or (approved equivalent) for handling, lifting, supporting, or manipulating critical and non-critical Redwire hardware.

20.0 QUALITY CODE: 20 – HUMAN SPACE FLIGHT

FOR USE IN HUMAN SPACE FLIGHT; MATERIALS, MANUFACTURING, AND WORKMANSHIP OF HIGHEST QUALITY STANDARDS ARE ESSENTIAL TO ASTRONAUT SAFETY. IF YOU ARE ABLE TO SUPPLY THE

DESIRED ITEM WITH A HIGHER QUALITY THAN THAT OF THE ITEMS SPECIFIED OR PROPOSED, YOU ARE REQUESTED TO BRING THIS FACT TO THE IMMEDIATE ATTENTION OF THE PURCHASER.

21.0 QUALITY CODE: 21 – SERVICES

- A) A Packing Slip and/or invoice which references the PO number and service completed that has been performed by the supplier.
- B) A signed Certification of Conformance for the service shall be provided with each shipment or service performed upon completion per the PO requirements.
- C) If requested, a Non-Disclosure Agreement Form shall be signed and submitted to Redwire.

22.0 QUALITY CODE: 22 – SINGLE LOT/DATE CODE

All items provided for this PO Line item shall be traceable from a single manufacturing lot/date code. Mixed lot date codes will not be accepted.

23.0 QUALITY CODE 23 – SILICONE

Supplier shall have control plans for the use of silicone materials. No silicone adhesive, sealant, or tapes shall come in contact with parts supplied to Redwire unless specifically reviewed and approved by Redwire.

24.0 QUALITY CODE: 24 – FIRST ARTICLE INSPECTION

First Article Inspection (FAI) shall be performed by the Supplier in accordance with AS9102 or Redwire approved equivalent. The sample shall have been fabricated using the same parts, materials, processes, and locations proposed for full production. A report of acceptable first article inspection shall accompany the first part delivered and shall include all dimensional measurements and results of all applicable electrical, mechanical, and non-destructive inspections and tests. The report shall show the item meets all requirements. When FAI is imposed, approval of the first article is required before proceeding with full production.

25.0 QUALITY CODE: 25 – CRITICAL DIMENSIONS

Supplier shall inspect and report all critical dimensions on 100% of parts. A critical dimension is identified by a diamond flag on the drawing, or as noted by the PO.

26.0 QUALITY CODE: 26 – LSLM WITH CERTIFICATE OF ANALYSIS

Supplier is required to provide a documentation package with each shipment sent to Redwire that contains the following documents:

1. Packing Slip and/or Invoice which references the PO number, part number, item description, quantity shipped and lot number.
2. Product Data Sheet document that includes the product warranty period.
3. Signed Certificate of Analysis. Limited Life Products subject to degradation with age or varying temperatures must be clearly stated on a signed certificate of analysis. The Certificate of Analysis shall reference the PO number, part number, quantity shipped, lot number and the “warranted to” date.
4. SDS. A copy of the latest product Safety Data Sheet.

27.0 QUALITY CODE: 27 – RED PLAGUE PREVENTION (FOR SILVER COATED COPPER WIRE)

Stock wire and cable with a shelf life exceeding 10 years from manufacturing date shall be segregated and shall not be used in harness assemblies and hardware. Completed cable, harness assemblies, and hardware incorporating silver-coated copper wire and cable, with a combined storage and use life exceeding 10 years from date of assembly shall be identified, periodically inspected and tested, and tracked as a "Limited-Life Article".

Silver-coated copper wire and cable shall be protected to reduce and control exposure to environmental conditions and contamination that promote the development of cuprous / cupric oxide corrosion (Red Plague). Completed hardware shall be stored in water-vapor-proof packaging OR in an environmentally controlled and monitored area where dew point is not attained, and the relative humidity is less than 70%RH. They shall be shipped and stored with capped ends conforming to SAE-AMS-DTL-23053/4 or dipped in insulating electrical varnish for a length of ~2.5 cm, in sealed water-vapor-proof packaging (i.e.- Moisture Barrier Bag, dry pack, etc.), activated desiccant, and an irreversible humidity indicator card (1-HIC). Wire and cable shall not be stored in paper wrapping materials or cardboard boxes.

Corrosion susceptibility testing may be conducted on an as-requested basis, but must be requested by Redwire at the time of order placement. If testing is conducted, representative wire samples shall conform to codes 0 — 3 of the accelerated corrosion test for uninsulated silver-plated conductors as outlined in ASTM B961-08 [9.2].

28.0 QUALITY CODE: 28 – TITANIUM REQUIREMENTS

Supplier shall prevent any contamination by substances that can induce stress corrosion or hydrogen embrittlement cracking or reduce fracture toughness, including (but are not limited to) the following:

1. hydrochloric acid (HCl)
2. sulfuric acid (H₂SO₄)
3. dry fuming red nitric acid (HNO₃) with less than 1.5% water
4. nitrogen tetroxide (N₂O₄) other than MIL-P-26539 comp. MON-1 or
5. chlorine gas (Cl)
6. hydrogen gas (H₂) at elevated temperature or pressure
7. oxygen gas (O₂) above 1 atm. pressure
8. liquid oxygen (LOX)
9. MF Freon
10. methyl alcohol (methanol)
11. chlorinated cutting oils or solvents
12. cadmium (Cd)
13. silver (Ag) and its compounds
14. bismuth (Bi)
15. lead (Pb)
16. zinc (Zn)
17. mercury (Hg)

Cleaning fluids and other chemicals used on titanium shall be completely removed by cleaning prior to heat treatment, assembly, or shipment. Processing materials that will directly contact titanium during manufacture, processing, testing, inspection, and operation and that are not listed as compatible with titanium in ARP982 or in Table 1 must be submitted to the Buyer via QAF-117 prior to use on test or production articles.

Use of cutting fluids that are known to damage titanium shall not be used for machining. Do not use fluids that contain chlorinated oils, sulfur, or phosphorus. Look for 'non-chlorinated', 'sulfur free', or 'phosphorus free' in the coolant labeling. Cutting fluids that are advertised as safe for titanium machining are formulated to avoid these compounds and are generally acceptable. Cutting fluids listed in table 1 below are also acceptable. If a cutting fluid is not listed in table 1, is not labelled as titanium safe, and gives no indication of being chlorine/sulfur free, it cannot be used on titanium without written permission from Redwire.

For cleaning titanium, use of trichloroethylene or methyl alcohol is prohibited. Isopropyl alcohol (IPA) is acceptable.

TABLE 1 – MATERIALS COMPATIBLE WITH TITANIUM ALLOYS

MATERIAL	SUPPLIER OR SPECIFICATION
A. LUBRICANTS	
Note: Removal of lubricant residues by applicable cleaners (see section B. below) is required prior to heating titanium above 200F, with the exception of rough forgings that will be subsequently machined.	
#1 Fuel Oil (Polishing Lubricant)	Phillips Petroleum
511NA	Dasco
550	Vantrol
Acculube (blue liquid or paste)	Lubricating Systems Inc.
Algi-Die Resin & Liquid	Orthodontic Supply Co.
Boelube 70104 (red liquid)	The Orelube Co.
Brayco 3L-38 RP Grease	Bray Oil Co.
Cetyl Alcohol	Commercial
Cimcool Cutting Oil	Sonnet Supply Co.
Cocoa Butter	Commercial
Hocut 237	E.F Houghton Co.
Honing Oil	Pemeco
HW Lubricant	Texaco
Isopar M	Exxon
Leeder 203Z	Leeder Chemicals, Inc.
Lubco #110 and #5110	Lubrication Co. of America
M56	Johnson's
Microcut 26 and 567-73	Quaker Chemical Co.
Oakite #5 (Sulfur-free) and #58	Oakite Products, Inc.
Oil-Base Solution plus graphite plus cerium soaps	Arcturus Manufacturing Co.
Paraffin Wax	Commercial
Sol-U-Sal	Mobil Oil Co.
Solvol 912	Dasco

MATERIAL	SUPPLIER OR SPECIFICATION
Tapmatic Fluid #1	Tapmatic Corp.
Threadlube 4	Dow-Corning Corp.
Titan lube #3 and #1129	Penreco, Inc.
Van Stratton 550P	Van Stratton Chemical Co.
Vitrolube 1220 LB0140-004	National Process Industries
White & Bagley 5120	The White & Bagley Co.
WS-500-A	Rustlick
B. CLEANING AND PROCESSING MATERIALS	
Note: All chemicals listed in section B shall be removed by solvents, scrubbing and/or scraping, as necessary. Where rinsing is required, deionized water shall be used as a final rinse prior to any heating of the titanium above 200F.	
1,1,2 Tricholoro, 1,2,2 Trifluoroethane Cleaning Agent (Freon TF)	MIL-C-81302
Acetone, Technical	O-A-51
Acid Descaling Solution: Nitric Acid (42 Be) 63 to 70% (by vol.) Ammonium Bifluoride 4.2 to 11.4 oz/gal. Water, Remainder	Commercial
Acid Pickle: Nitric Acid (42 Be) 52 to 58% (by wt.) Ammonium Bifluoride 2.8 to 3.2 % (by wt.) Deionized Water, Remainder	O-N-350 Commercial Commercial
Acid Pickle: Nitric Acid (42 Be) 18to 25% (by vol.) Hydrofluoric Acid (70%) 1 to 2 % (by vol.) Deionized Water, Remainder	O-N-350 O-H-795 Commercial
Alkaline Cleaner #4030, 4142, 4215 or RTC	Turco Products, Inc.
Alkaline Cleaner #NST	Oakite Products, Inc.
Alkaline Cleaner 117A or 316A4	Leeder Chemical
Alkaline Cleaner Escolosearch 112	Escolosearch Chemical Products, Inc.
Alkaline Cleaner MX-4, MX-39 or MX-43 (non-chromated)	Cee-Bee Chemical Co.
Alkaline Cleaner Penn Chem 2368A	Pennsalt Chemicals
Alkaline Cleaner, Sprex A.C.	Dubois
Aluminum Tape No. 425	3M Co.
Alundum	Commercial
Ashburn 10000 Coolant	Ashburn Corp.
Ashburn Rejuvenator Biocide	Ashburn Corp.
Bruhin 815 GD	Bruhin Co.
Chem Mill Maskant (Hand strippable)	Turco Products or Organocerams, Inc.
Chemical Milling Solution, Turcoform 200	Turco Products
Chromic Acid	Commercial
Cleaner #NNS	Oakite Products, Inc.
Coating, Vinyl Strippable Unplasticized	Turco Products or Organocerams, Inc.
Dascool 789 Coolant	D.A. Stewart Co.
Deionized water	MB210-007, Type IV, Type I
Distell 12	Diversey Chemicals, Inc.

MATERIAL	SUPPLIER OR SPECIFICATION
Dodecylbenzene Sulfonic Acid	Commercial
Freon T-B1 Cutting Fluid	duPont
Glacial Acetic Acid	Commercial
Glass Beads	MIL-A-9954
Gloves and Wipers, Low Lint, White	Commercial
Glycerin	Commercial
Grotan Biocide	Troy Corp.
GS 37 Sealant	General Sealants
Hocut 795 Coolant	Houghton Int'l. Inc.
Hocut 795B Coolant	Houghton Int'l. Inc.
Hydro 123 Corrosion Inhibitor	Hydrohone Mfg. Co.
Isopropyl Alcohol	TT-I-735
Kraft Paper, Untreated Wrapping	UU-P-268
Leeder 240-L	Leeder Chemicals, Inc.
M66 Mylar Pressure Sensitive Tape	Connecticut Hard Rubber Co.
Methyl Ethyl Ketone, C.P. or Reagent Grade	TT-M-261
Mineral Spirits	AMS 3160
MS122 (Parting Agent)	Miller-Stephenson Chemical Co.
Neoprene Rubber	Commercial
Nitric Acid (42 Be) 70% or less	O-N0350
Nitric Stripper MX-7	Cee-Bee Chemical Co.
Novaculite	Commercial
Oakite #90	Oakite Products, Inc.
PH Paper Hydrion	Commercial
Press tite Putty 582	Inmot Corp.
PVC film	Commercial
Saracool 10000 Coolant	Commercial
Saran film	Dow Chemical Co.
Scale Inhibiting Compound	Turco Products, Inc.
Silastic RTV #502 Rubber and Thinner	Dow Corning Corp.
Sodium Dichromate	Commercial
Sodium Hydroxide	Commercial
Solvent M-17	John B. Moore Co.
Steam Cleaner X-3 Pennchem 2416 165-R	Turco Products Pennsalt Chemicals Leeder Chemicals
Steam Cleaner #89	Kelite Inc.
Steel Wool	Commercial
Stoddard Solvent (High Flash Naphtha)	P-D-680, Type I
Surface Conditioners: Tri Sodium Phosphate 4.0 – 5.0 % by wt. Sodium Fluoride 1.1 – 1.3 % by wt. Hydrofluoric acid 2.5 – 2.9 % by wt.	O-S-642 Commercial O-H-795

MATERIAL	SUPPLIER OR SPECIFICATION
Deionized water, remainder	Commercial
Surface Conditioners: Tri Sodium Phosphate 4.5 – 5.5 % by wt. Sodium Fluoride 0.7 – 1.1 % by wt. Hydrofluoric acid 1.4 – 1.8 % by wt. Deionized water, remainder	O-S-641 Commercial O-H-795 Commercial
Syntillo 9913 Coolant	Castrol Industries
Syntillo 9918 Coolant	Castrol Industries
Tape, Electroplaters No. 470	3M Co.
Tape, Lead No. 420	3M Co.
TiBrite Solution	Pennsalt Chemicals
Toluene	JAN-T-171
Toluene, Technical Grade	TT-T-548
Toolstone T-10	J. F. McCoughlin Co.
Turco 4316 Scale Conditioner	Turco Products, Inc.
Turco 522 Maskant	Turco Products, Inc.
Turco 5578 Alkaline Etch	Turco Products, Inc.
Turco Form 622A Damask	Turco Products, Inc.
TX 1040 Glass Parting Fabric	Santillanes Corp.
Vac-Pac HS8171 Vacuum Bag Film	Richmond Corp.
Water Conditioner, Rustlick 103-J and B-5J	Rust-Lick, Inc.
Wire, Stainless Steel, Annealed	Commercial
Z-C-1 cleaner	Magnaflux, Inc.
C. PENETRANT INSPECTION FLUIDS	
Note: Removal of chemicals by applicable cleaners (see section B. above) is required prior to heating titanium above 200F.	
D-100	Sherwin Corp.
D-495	Tracer-Tech. Co.
D-499C	Tracer-Tech. Co.
E153	Tracer-Tech. Co.
E157A	Tracer-Tech. Co.
ER-82	Sherwin Corp.
FP-22	Sherwin Corp.
K410	Tracer-Tech. Co.
P-133	Tracer-Tech. Co.
P-133A	Tracer-Tech. Co.
P-134	Tracer-Tech. Co.
P-134A	Tracer-Tech. Co.
P-149	Tracer-Tech. Co.
SKD-NF	Magnaflux Corp.
SKD-S	Magnaflux Corp.
ZE-4B	Magnaflux Corp.
ZL-17B	Magnaflux Corp.
ZL-23A	Magnaflux Corp.

MATERIAL	SUPPLIER OR SPECIFICATION
ZP-13A	Magnaflux Corp.
ZP-4	Magnaflux Corp.
ZP-4A	Sherwin Corp.
ZP-5	Magnaflux Corp.
ZP-9 Form. B	Magnaflux Corp.
ZR-1	Magnaflux Corp.
D. TESTING LIQUIDS AND GASES	
Note: Compatibility is based on use below 160F.	
1,1,2 Trichloro-1,2,2 Trifluoroethane (Freon TF)	MIL-C-81302
Air (5 psia max. oxygen partial pressure)	
Argon Gas	MIL-A-18455
Deionized Water	Commercial
Helium Gas, High Purity	MIL-P-27407
Hydraulic Fluid	MIL-H-5606 or MIL-H-83282
Inhibited Deionized Water, Chromic Acid 0.1% by wt.	O-C-303
Inhibited Deionized Water, Sodium Chromate 13 lb/1000 gal.	O-S-588
Liquid Hydrogen	MIL-P-27201, Type II
Liquid Nitrogen	MIL-P-27401, Type II
Nitrogen Gas, Cold or Hot	MIL-P-27401, Type I
E. MARKING AND IDENTIFYING MATERIALS	
American Art Clay	Commercial
APC Cleaner-Monde T-10	Monode, Inc. & Marking Methods, Inc.
Dykem, Layout, Red DX-296	The Dykem Co.
Dykem, Steel Blue DX-100	The Dykem Co.
Eberhard 2125	Eberhard-Faber
Electro Chemical Etch	Electro-Chem Etch, Inc.
Electro Mark	Commercial
Electrolyte Formula MSC3	Marking Methods, Inc.
Electrolyte-Mode T-10(Titanium)	Monode, Inc. & Marking Methods, Inc.
Higgins Ink (75671) India Ink	Higgins Ink Co.
Hysol #50 Rubber Stamp Ink	Hysol
Lectroetch	The Lectroetch Co.
Series M Silk Screening Ink	Hysol
F. FUNCTIONAL FLUIDS AND PROPELLANTS	
Note: Compatibility is based on use below 160F.	
Hydraulic Fluid	MIL-H-5606 or MIL-H-83282
Hydrazine	MIL-P-26536
Liquid Hydrogen	MIL-P-27201, Type II
Monomethylhydrazine	MIL-P-27404
Nitrogen Tetroxide (N ₂ O ₄) + Nitric Oxide (NO) MON-1, MON-3	MIL-P-26539



29.0 QUALITY CODE: 29 – SUBTIER APPROVAL REQUIRED

Supplier shall submit all vendors used for any outsourced process to Redwire Buyer for approval and authorization to proceed.