

HDL RESEARCH LAB, INC.

QUALITY REQUIREMENT CODES (QRCs) (09/01/2012)

SCOPE:

The quality requirements defined herein are applicable to Purchase Orders issued by HDL Research Labs Inc. (HDL) when incorporated by reference to the applicable clause or clauses by code numbers (QRC) in such purchase orders. (These codes may also be referred to as "inspection codes".) Acceptance of the articles or materials specified on the purchase order will be withheld pending receipt of all required data and documentation. HDL is also referred to as "Buyer" and "Customer" herein.

SIGNIFICANCE:

These requirements and the execution thereof shall be in addition to and not in derogation of other purchase order requirements from Buyer to Seller. Sellers are also referred to as "Supplier" and/or "Distributor" as appropriate.

CODES:

1. Basic Quality Program Required

Supplier's quality management system shall be in compliance with the current revision of AS9100, ISO 9001 or an HDL approved Quality Management System.

Suppliers certified to AS9100 or ISO 9001 shall be evidenced by a third party certification.

Suppliers certified to AS9100 or ISO 9001 must provide evidence of certification and are required to provide evidence of recertification prior to their current certification expiring.

New Suppliers that are not certified to AS9100 or ISO 9001 must pass an HDL Quality Management System audit.

Distributor's (non-value added) quality management system shall be in compliance with the current revision of AS9120, ISO 9001 or have an HDL approved Quality Management System.

Distributors certified to AS9120 or ISO 9001 shall be evidenced by a third party certification.

Distributors certified to AS9120 or ISO 9001 must provide evidence of certification and are required to provide evidence of recertification prior to their current certification expiring.

Distributors that are not certified to AS9120 or ISO 9001 must pass an HDL Quality Management System audit.

2. Calibration Program Required

The supplier shall maintain a calibration program in accordance with MIL-STD-45662A or ANSI Z540-1-1994 or later revisions. All measurement / test equipment must be accompanied by certification that calibration to manufacturer's specifications was performed in accordance with one of the aforementioned standards. This requirement is also applicable to all re-calibrated, repaired, leased, and/or rented measurement / test equipment.

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3. **Test/Inspection Data Required**

The supplier shall furnish a copy of test/inspection data with each shipment. Test/inspection data will contain manufacturer's name and part numbers or HDL part numbers, serial numbers, purchase order number and required test limits as well as actual measured values.

4. **Chemical and Physical Test Data Required**

The supplier shall include a copy of the chemical and physical test data with each shipment for each part number, lot, or batch as applicable. Test data must reference this purchase order number, applicable specification and part numbers, and contain actual measured values.

5. **Record Storage**

The supplier shall maintain all applicable test/inspection and contract quality data for a period of not less than five years unless a longer retention period is specified in the Purchase Order or Drawing. HDL shall be allowed access to all applicable data at any time within normal business hours given reasonable advance notice. The records shall be adequate to ascertain the quality level of production processes.

6. **Certificate of Conformance**

The supplier shall provide a Certificate of Conformance with each shipment. The certificate shall contain (1) an identification of the material shipped; (2) the specification(s) to which the material was inspected/tested; (3) a statement that the material conforms to purchase order requirements; (4) the HDL purchase order number; (5) the title and signature of the suppliers' authorized agent; (6) the quantity inspected/tested and whether the tests were "go/no go" or quantitative type; and (7) the location of substantiating data for Buyer review if required, and (8) reference to the date, lot or S/N of the item(s). The packing list may include this information to supplement a general C of C, but must include an identification of the device manufacturer.

7. **Customer Access**

The supplier shall allow HDL personnel and the customers of HDL access to any and all of the suppliers facilities providing such access does not compromise supplier's proprietary processes. Access shall not be unreasonably denied. HDL shall give reasonable written notice to schedule a visit.

8. **Notice of Changes**

The supplier shall notify HDL, in writing, of any changes in part number or nomenclature that differ from purchase order information prior to shipment. The supplier shall notify the Procurement Agent of any proposed changes in design, fabrication method, or process that affects the form, fit, or function of the item, and obtain prior written concurrence from HDL to implement such changes on products to be delivered to HDL. Appropriate identification of those articles on which the change is incorporated shall be required. The supplier shall notify HDL of any planned or pending obsolescence.

9. **Control of ESD**

The supplier shall practice ESD control when storing, handling, or shipping static sensitive devices. Proper measures shall be taken to ensure that clean, static free bags and containers are used and that parts are clearly labeled stating that they are static sensitive.

10. **Established Reliability Semi-Conductor/Micro-Electronics Certification and Traceability**

The supplier shall comply with the certification and traceability requirements of MIL-S-19500 and CML-19500 when furnishing, JAN, JANTX, JANTXV and JANS devices to Buyer.

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11. Shelf-Life Identification

The supplier shall mark the expiration date on articles covered by this purchase order which are subject to shelf-life deterioration, and not deliver articles with less than 25% of shelf-life remaining at time of receipt by Buyer unless otherwise approved in advance by the HDL Procurement Agent. Marking of individual containers with cure date, assembly date, or expiration date may be by decal, rubber stamp or tag.

12. Control of Raw Materials

The supplier shall control the quality of their raw materials at incoming inspection. Raw materials used in the manufacture of any product to be delivered under the purchase order must be accompanied by a certificate of conformance and/or physical laboratory analysis to substantiate the conformance of the raw material. The supplier shall be responsible to periodically verify the integrity of the certificates and/or analyses.

13. Higher Level Quality Program per AS9100

The supplier shall maintain a quality program in compliance with the latest revisions of AS9100. Compliance with this requirement must be evidenced by third party certification.

14. Solderability and High Reliability Finishes

Components and components in completed subassemblies furnished under this Purchase Order shall be delivered with one of the approved termination finishes as listed below. The termination finish shall meet the solderability requirements of IPC/EIA-J-STD-002 (Category 3, Test Method A, B or C, as applicable). A double tinning or dynamic solder wave process shall be used for any gold plating removal if required to avoid embrittlement. Printed wiring shall meet the solderability requirements of IPC/EIA J-STD-003 or equivalent.

Approved Termination Finishes:

- Tin-Lead (SnPb) with a minimum of 3% lead (Pb)
- Palladium-Silver (Pd/Ag)
- Nickel-Palladium-Gold (Ni/Pd/Au) with less than 150 angstroms of gold
- Gold (Au) on surface mount components in unformed flat packs and unformed quad packs
- Gold (Au) on through-hole components/terminals with a gold thickness of less than 100 micro inches (2.5 um).

15. Military Part Certification and Traceability

The supplier shall comply with the certification and traceability requirements of the applicable military specification when furnishing military parts and/or materials to Buyer.

16. Printed Wiring per MIL-P-55110

Printed wiring shall be fabricated and tested in accordance with the requirements of MIL-P-55110 for multi-layer and two-sided plated through hole boards, as applicable. In addition to MIL-P-55110 requirements, 100 percent inspection is required on multi-layer boards. A minimum of one test tab for each board or panel shall be solder floated at 260°C for 10 seconds then micro-sectioned and examined for cracks or innerplane separation. Electrical testing of each board for circuit continuity, current carrying capacity, dielectric withstanding voltage, and insulation resistance shall be accomplished. In addition, one board per lot shall be floated on 260°C for 10 seconds, micro-sectioned, and examined for plating cracks.

17. General Requirements for Printed Wiring

Printed wiring shall meet requirements of IPC-A-600, IPC-A-610, and IPC/EIA J-STD-001 (Class 3). Qualification per IPC-RB 276 shall be required only when specifically invoked by the purchase order. "X-outs" (one or more non-compliant boards) on a panel are NOT permitted without prior written consent from the HDL Procurement Agent. Printed wiring shall meet the solderability requirements of IPC/EIA J-STD-003 or equivalent.

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18. Control of Filmwork, Drawings, and Electronic Media

Filmwork shall be returned with the delivery of printed wiring boards or panels. Drawings may be returned or destroyed at the supplier's option. Electronic media shall be returned or erased at the supplier's option. Data storage is strictly prohibited. All data shall be controlled during use. HDL provided data marked "PROPRIETARY" shall not be transmitted using public internet / email.

19. Packing and Packaging

All parts shall be packed so as not to be damaged in shipment. Best commercial practices shall be applied. All solderable parts, including printed wiring boards, shall be packaged and preserved to meet the solderability requirements a minimum of two (2) years after the delivery of the products. All non-solderable parts shall be packaged and preserved so as not to degrade in form, fit, function, and/or finish after five (5) years of storage in a climate-controlled environment. Shelf-life sensitive materials shall be so marked. Moisture sensitive parts shall be packaged and preserved so as to assure the part quality.

20. HDL Customer Source Inspection (CSI) Required

HDL customer source inspection is required. Contact the HDL Procurement Agent to schedule a CSI date when material is ready for shipment. Do not ship without CSI or CSI waiver.

21. Government Source Inspection (GSI) Required

Government source inspection is required prior to shipment. The supplier shall notify the appropriate Government Representative of this requirement. The supplier shall sign for acceptance of this purchase order agreement and indicate on the face of the purchase order the name and phone number of the appropriate Government Representative and return a copy to HDL. The supplier shall provide notification to the appropriate Government Representative prior to commencement of the work effort under this purchase order.

22. Preference for Domestic Specialty Metals

The supplier furnishing this product must provide a Specialty Metals Certificate of Compliance reflecting all requirements of the contractual performance clause at DFARS [252.225-7008 \(Jul 2009\)](#), [252.225.7009 \(Jan 2011\)](#) and/or [252.225.7010 \(Jul 2009\)](#) as applicable per subpart 225.70 (Revised Mar 2012) are met for each part number listed on the purchase order. Any specialty metals (as defined in paragraph (a) of the clause) included in any articles delivered under this purchase order must comply with that clause. The supplier shall flow down the applicable requirements to all lower tier subcontractors, suppliers and vendors supplying any articles and/or materials delivered under this purchase order that include specialty metals. A sample Specialty Metals Certificate of Compliance is provided at Addendum A to the QRC list.

Exemptions to requirements of the above clauses may exist, as outlined in the clauses themselves or by operation of applicable Department of Defense Domestic Non-Availability Determinations (DNADs) posted on its public web site for that purpose. If Seller believes an exemption(s) applies (apply), Seller shall document the specifics prior to commencing work and provide sufficient information to the Procurement Agent to demonstrate their entitlement thereto.

23. Printed Boards (IPC – 6011/6012)

The supplier furnishing printed wiring boards shall meet the requirements of IPC-6011/6012 (class and all notes as specified on the drawing).

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24. **Plating, Surface Finishes and Conditioning Requirements (NADCAP)**

The purchase order requires plating, surface finishing or conditioning to be performed by an approved NADCAP (National Aerospace and Defense Contractors Accreditation Program) processor. This requirement, if applicable to the order, must be flowed down to any and all subcontractors, suppliers and/or vendors. A list of NADCAP approved processors can be found at www.eauditnet.com.

25. **Product Non-Conformance**

Supplier shall notify the HDL Research Lab, Inc. Procurement Agent within five (5) business days of any discovery of nonconforming product. Supplier shall request a Waiver/Deviation from HDL Research Lab, Inc. and receive written authorization prior to shipping any nonconforming materials to HDL Research Lab, Inc. Do not ship non-compliant material without evidence of this written authorization.

26. **Record Retention**

Supplier shall control and retain records and documents which are created by and/or acquired for the purpose of complying with the contract, or maintaining the quality management system for a period of five (5) years minimum.

27. **One-Way Traceability**

Supplier shall maintain a traceability system on all electronic and electrical parts, raw material and mechanical machined parts, and JAN Branded devices from receipt at Supplier's facility to shipment of the supplies. A written detailed description of the system shall be available for review by the Buyer.

For JAN Branded devices, manufacturer documentation shall include certification that the devices involved have received Government source inspection when required by MIL-spec (i.e., MILSTD-19500, paragraph 4.1.1).

The system shall provide for one-way (backward) traceability for all parts used in supplies that can be traced back to the "Lot" received at the Supplier's facility.

The system shall provide a means of correlation between the data derived from the testing, inspection and processing of the supplies.

Traceability requirements shall also apply to supplies that are modified, repaired or reworked.

The Supplier is required to apply the above system to any sub-tier suppliers.

Note: Traceability is not required to be maintained on bulk hardware items ordered to MIL-spec or industry standard part numbers, e.g. bolts, screws, nuts, terminals, rivets, clamps, washers, eyelets.

28. **Documentation – Revision and Configuration Control**

The Supplier shall assure access to the revision of the drawing matching the revision noted on this Purchase Order. For assistance, contact the Procurement Agent whose name is on the Purchase Order for the current drawing revision level.

The Seller shall only accept changes in the revision status of any of these drawings by means of a duly executed Purchase Change Order. The Seller shall not accept any changes via verbal direction. The Seller shall not accept any email or other form of written direction from anyone other than the Procurement Agent.

If an item on this Purchase Order invokes by reference a military specification, military standards, or other revision controlled requirement documents, the revisions in effect are as of the date of this Purchase Order.

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29. No Changes Without Approval

Except for first time purchases, items furnished under this Purchase Order shall be identical in form, fit and function to a product previously delivered to HDL.

The Supplier shall notify HDL of any proposed changes in design, materials, parts, fabrication methods or processes, major plant rearrangement, or plant relocation and changes that may impact form, fit and/or function. Prior to fulfilling the purchase order, HDL must approve any/all changes with notification provided to the Supplier by the responsible Procurement Agent.

30. Prohibition of Pure Tin

The uses of Pure Tin (Sn) Plated finishes are strictly PROHIBITED. Any Tin Plating or Tin Solder processes shall contain NO LESS than 3% LEAD (Pb) composition. These restrictions apply for all types and levels of procurements, with the Supplier responsible for communicating these restrictions to subcontractors or sub-tier suppliers.

31. Quality System Requirement Flowdown

The Supplier's Quality System shall assure all relevant Purchase Order requirements are flowed down to their sub-tier suppliers. The Supplier's sub-tier suppliers are responsible to comply with the same specifications and requirements on this Purchase Order

32. Foreign Object Elimination

The Supplier shall establish and maintain an effective Foreign Object Damage (FOD) Prevention Program to reduce FOD using NAS412 as a guideline.

The material supplied on this Purchase Order shall be manufactured in an environment that is free of foreign objects. Material supplied shall be free of foreign objects. The Supplier's program shall utilize effective FOD prevention practices. The program shall be proportional to the sensitivity of the design of the product(s) to FOD, as well as, to the FOD generating potential of the manufacturing methods.

33. General Requirements for Solderability

Components and components in completed subassemblies furnished under this Purchase Order shall feature a termination finish that meets the solderability requirements of IPC/EIA-J-STD-002 (Category 3, Test Method A, B or C, as applicable).

34. Tin Whisker Risk Mitigation

The Supplier shall implement tin whisker mitigation by TMTI Robotic Hot Solder Dip (RHSD) processing. Replace pure tin termination finish on HDL provided components with a Sn63Pb37 eutectic solder, de-tape (as required), post process bake and dry pack using nitrogen purge and provide desiccant, humidity indicator cards and labeling compliant to the appropriate MSL and re-tape (if de-taped). Up to four (4) devices may be used for process set-up.

The part labeling shall contain the "800-" prefix to denote the achievement of this process. The purchase order part numbers contain an "800-" prefix to the industry or manufacturer's part number for tracking purposes.

Note: TMTI is the Navy Transformational Manufacturing Technology Initiative

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35. Restricted / Directed Source of Supply

The Supplier shall provide a specific source of supply (or brand) of parts indicated on the Purchase Order. The source shall be restricted to the source(s) listed in the instruction block. If this QRC is invoked without a source listed in the instruction block, contact the HDL Procurement Agent. The Supplier shall have a counterfeit risk management plan to assure that this source control is genuine.

36. First Article Inspection

The Supplier shall conduct and provide evidence of a First Article Inspection (FAI) unless an FAI has been conducted within the last two (2) years and no change in material, process and/or location has occurred. AS9102 shall be used as a guide.

37. Source Limited

This purchase order mandates a specific source of supply. Shipment of an equivalent item is NOT authorized without express written consent from the HDL Buyer. This information will be provided in the instruction section of the purchase order as applicable.

38. Franchised Distributor

In an effort to avoid counterfeit material risks, the Buyer has issued this purchase order with the express condition that the Seller is a franchised distributor for the item(s) listed on the purchase order. The Seller shall advise the Buyer of any actual, pending or probable changes to this status in writing. This obligation survives delivery. The Seller agrees that loss of franchised status shall invalidate the purchase order and shall supersede any non-cancellable/non returnable (NCNR) agreements.

39. OEM (Original Equipment Manufacturer) Data

This order requires factory documentation supporting date, lot or S/N traceability to the component manufacturer. This is an essential element of the performance.

40. Cosmetic Finishes

When required by contract, this requirement denotes that the item has one or more surfaces that are exposed as part of the final deliverable product. As such, the finish or cosmetic product appearance is very important. Scratches, dings, dents, and non-uniform surfaces that detract from a blemish free finish are prohibited. This requirement is intended to flow to raw material selection, processing, post-processing handling, packaging and any other operation that may endanger this objective. If the drawing does not denote which surfaces are exposed and subject to these requirements or if the information is unclear, the Seller shall be solely responsible to seek clarification or else to provide parts that offer a high quality cosmetic appearance on each surfaces of the parts delivered for acceptance.

41. Cad Data

If the Seller has requested and has been provided an electronic CAD/CAM file, e.g. STP file, by Buyer or Buyer's representative, then this has been provided for general information only. The requirements on the released drawing supercede any and all details derived from a CAD/CAM file. Resolving differences are the sole responsibility of the Seller and all risks remain with the Seller.

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ADDENDUM A QUALITY REQUIREMENT CODE 22 SPECIALTY METALS CERTIFICATE OF COMPLIANCE

EACH SUPPLIER OF SPECIALTY METALS SHALL PROVIDE A SPECIFIC CERTIFICATION OF COMPLIANCE ADDRESSING DFARS 252.225-7008, DFARS 252.225-7009 AND/OR DFARS 252.225-7010 AS APPLICABLE, PREFERENCE FOR DOMESTIC SPECIALTY METALS WITH EACH SHIPMENT.

THIS IS AN ESSENTIAL AND INTEGRAL PART OF THE PERFORMANCE REQUIREMENTS ASSOCIATED WITH THE PURCHASE ORDER WHEN INVOKED BY REFERENCE ON THE FACE OF THE ORDER.

THE FORMAT PROVIDED WITH THIS NOTICE MAY BE USED OR A SIMILAR SUPPLIER FORMAT MAY BE USED PROVIDED SPECIFIC REFERENCE TO THE APPLICABLE DFARS CLAUSE IS MADE.

REF: HDL PURCHASE ORDER _____

ANY SPECIALTY METALS PROVIDED UNDER THE REFERENCED PURCHASE ORDER COMPLY WITH THE ABOVE REQUIREMENTS, PREFERENCE FOR DOMESTIC SPECIALTY METALS.

PREFERENCE FOR DOMESTIC SPECIALTY METALS (JAN 2011)

(a) DEFINITIONS. AS USED IN THE CLAUSE-

- (1) "QUALIFYING COUNTRY"- MEANS ANY COUNTRY LISTED IN SUBSECTION 225.003 OF THE DEFENSE FEDERAL ACQUISITION REGULATION SUPPLEMENT.
- (2) "SPECIALTY METALS" MEANS-
 - (i) STEEL
 - (A) WITH A MAXIMUM ALLOY CONTENT EXCEEDING ONE OR MORE OF THE FOLLOWING LIMITS: MANGANESE, 1.65 PERCENT; SILICON, 0.60 PERCENT; OR COPPER, 0.60 PERCENT; OR
 - (B) CONTAINING MORE THAN 0.25 PERCENT OF ANY OF THE FOLLOWING ELEMENTS: ALUMINUM, CHROMIUM, COBALT, COLUMBIUM, MOLYBDENUM, NICKEL, TITANIUM, TUNGSTEN, OR VANADIUM;
 - (ii) METAL ALLOYS CONSISTING OF NICKEL, IRON-NICKEL, AND COBALT BASE ALLOYS CONTAINING A TOTAL OF OTHER ALLOYING METALS (EXCEPT IRON) IN EXCESS OF 10 PERCENT;
 - (iii) TITANIUM AND TITANIUM ALLOYS; OR
 - (iv) ZIRCONIUM AND ZIRCONIUM BASE ALLOYS.

(b) ANY SPECIALTY METALS INCORPORATED IN ARTICLES DELIVERED UNDER THIS CONTRACT SHALL BE MELTED OR PRODUCED IN THE UNITED STATES OR ITS OUTLYING AREAS.

(c) THIS CLAUSE DOES NOT APPLY TO SPECIALTY METALS MELTED IN A QUALIFYING COUNTRY OR INCORPORATED IN AN ARTICLE MANUFACTURED IN A QUALIFYING COUNTRY.

____ WE COMPLY WITH THE REQUIREMENTS -OR-

____ THE REQUIREMENTS ARE NOT APPLICABLE BECAUSE _____
SUBMITTED,

SIGNATURE

DATE

COMPANY NAME

NAME

TITLE