



## LHFCRC-QL1, REV 0

# LEVEL 1 – MATERIAL QUALITY REQUIREMENTS

REF: EB Spec. 2678N, Appendix A

### 1. GENERAL

- 1.1 Suppliers of Level 1 material shall have an effective quality management system that complies with the EB2678 specification and the requirements of the purchase order.
- 1.2 The requirements of the Quality Clause shall be used for Level 1 material in conjunction with the requirements the EB2678 specification, MIL-I-45209, MIL-Q-9858, or one of the ISO Quality Systems Modules, as specified by the applicable contract or purchase order. When more stringent material Quality Assurance requirements are provided in the Purchaser's purchase order or component specification, they shall take precedence.
- 1.3 Suppliers shall have an effective quality program and a material control/identification system which complies with the EB2678 specification and the requirements of the applicable procurement specifications or drawings and which will permit the collection and issuance of Objective Quality Evidence required to allow purchaser acceptance of materials and components.
  - 1.3.1 Objective Quality Evidence (OQE) will be required for the material identified as "Level 1" in the list of materials in the basic design document or purchase order.
- 1.4 The manner in which required OQE is developed by the Supplier shall be controlled by a written procedure(s). The OQE for the actual item being shipped shall be representative of the individual heat, batch, or lot as defined in the applicable specification and shall be in compliance with the invoked acceptance criteria. However, for continuous melt or continuous pour processes, the OQE shall be representative of the time period (as determined by the invoked specifications) during which the material was poured.

### 2. QUALITY SYSTEM REQUIREMENTS

Quality system requirements shall be established and maintained to assure that sub-tier suppliers also have effective systems for controlling Level 1 material including traceability to OQE. The system shall assure that OQE is established and controlled in accordance with the requirements of the EB2678 specification. Special quality provisions, along with the applicable specifications and/or drawing requirements, shall be included in the purchase order to the sub-tier supplier.

### 3. MATERIAL SYSTEM REQUIREMENTS

3.1 Purchase Order Review: The quality representative shall review Level I material purchase orders to sub-tier suppliers prior to placement to ensure that the applicable purchaser's requirements are included. The preparer of a purchase order shall not review his/her own work. The purchase documents which include Level I material shall contain readily recognizable Level I identification.

3.2 Receiving Inspection: The supplier shall inspect Level I material at time of receipt from their sub-tier Suppliers, Processors, or Inspection Organizations to assure conformance to purchase order requirements and shall document the results.

3.3 Certifications from Sub-Tier Suppliers:

3.3.1 The supplier shall obtain from sub-tier Suppliers a certification of quality conformance for all Level I material in addition to the required test reports. Unless otherwise specified, the certification as a minimum shall state that the material meets specification requirements.

3.3.2 Each test report and/or inspection report provided by the sub-tier Supplier shall be reviewed by the Supplier's Quality personnel prior to releasing the material to inventory. The following minimum requirements shall be verified during the review:

- Test reports are legible.
- Material is not from a prohibited source (certain foreign countries).
- The country of origin is readily identified, or has been annotated by the Supplier
- Test results are compared with and comply with the specification and purchase order requirements.
- The type of tests and number of tests meet specification and purchase order requirements.
- Reports are identified with a unique traceability code that agrees with the material marking.
- Test Reports provide the location of the test specimens, when applicable.
- Reports are duly authorized/signed by the testing facility Representative and that the data is recorded on an official copy with the testing facilities letterhead (See Paragraph 8.2).
- Reports are reviewed to ensure no unauthorized changes, obliterations, corrections, and evidence of falsification.

- The quantity given on the reports is consistent with the quantity of material actually received.
- Material that has been heat treated is uniquely re-identified.
- Dates of reports and signatures thereon agree with the sequence of processing by sub-tier supplier(s).

#### 4. MATERIAL HANDLING/STORAGE

- 4.1 Material handling and storage procedures shall provide methods for controlling Level I material from receipt through issue.
- 4.2 Level I material that is awaiting or undergoing inspection or is in storage shall be physically segregated from non-Level I material as soon as possible to prevent comingling and unauthorized use. The method of segregation shall ensure that similar appearing material of different alloys and/or material conditions, grades or condition be segregated through physical separation unless readily differentiated by attributes such as size, or physical appearance.
- 4.3 Segregation may be accomplished by use of separate cages, racks, bins, shelves, boxes, or roped off areas. Storage areas for Level I material shall be distinctly identified and marked.
- 4.4 Material control tags and/or travelers marked "Level I" shall be used to positively identify material in transit to avoid unauthorized movement, comingling and improper use.
- 4.5 Staging of Level I material with other material is acceptable for a specific job or fabrication process, provided the Level I material is clearly marked as required and the material for the specific job or fabrication process is grouped together, identified by the job or process number, and segregated from material grouped for other processes or jobs.
- 4.6 Level I nonconforming material must be marked as "Level I" and be segregated from non-Level I nonconforming material. Separate pallets, boxes, or other containers are acceptable.

#### 5.0 MATERIAL TRACEABILITY

- 5.1 The Supplier shall establish a Level I material traceability system that provides positive identity of the item throughout the manufacturing process. Each piece shall be physically marked or identified with the traceability code. The marking shall be legible throughout the manufacturing process.
- 5.2 When material is worked or heat-treated, resulting in changes to its mechanical properties, the mechanical properties shall be re-determined and the material shall be uniquely re-identified to provide traceability to the final heat treatment and mechanical properties of material in its final condition.

### 5.3 Material Traceability Marking

- 5.3.1 The traceability marking may consist of raw material heat number and a heat treat lot number (if applicable) or a unique trace code number that provides, through documentation, traceability back to the raw material heat number and heat treat lot number (when applicable). In all cases, the traceability marking utilized shall be unique in that given only the traceability marking, the supplier shall be able to provide all Objective Quality Evidence associated with the processing of that item, including heat treat.
- 5.3.2 When the marking on a part or piece of material will be removed by the manufacturing process, the marking shall be transferred to another location on the piece. If marking cannot be transferred to another location, it shall be restored after the completion of the operation. Items too small to mark or items that continually have their marking removed by the various manufacturing operations making it impractical to maintain, can be controlled by the use of totes, bags, and/or boxes identified with the proper traceability information provided the identity is maintained at all times.
- 5.3.3 In all cases, the accompanying paperwork (route sheet, traveler, etc.) shall indicate the proper traceability code and shall be identified "Level I" in letters that are legible and of sufficient size to be easily recognized. This paperwork shall also provide accountability throughout the manufacturing process (i.e., number of pieces cut, rejected, scrapped, tested, etc.).

### 5.4 Loss of Traceability Marking

- 5.4.1 Items where the traceability marking is lost shall be considered nonconforming material until appropriate tests have been performed that can absolutely identify the heat from which the item was produced. This requirement is not applicable to items that are uniquely identifiable by their size, configuration and uniqueness of material.

## 6.0 RECORDS

- 6.1 Permanent records shall be maintained that provide a clear and concise documentation trail from the starting material to the finished product and all intermediate process operations.
- 6.2 Each record shall identify the traceability code for the specific item to which it applies. The records shall include or refer to permanent records, which contain the actual processing parameters the product received during manufacturing or inspection. The records shall also show the results of all material testing, the identity of all material samples selected for testing (including retest samples when required), and the parent material from which the selection was made.

## 7.0 HEAT TREATMENT

Furnace charts shall identify the heat treater, the time of heat treatment, the heat treatment lot number, furnace identification, operation (e.g. temper, anneal, etc.) date, quantity, heat numbers, and item description. In addition, the autographic recorder rate (i.e., inches/hour) shall be annotated. Furnace charts shall be retained by the supplier, unless otherwise specified, as OQE for audit purposes. The material shall be uniquely re-identified to provide traceability to the final heat treatment and mechanical properties certified for the heat treated material.

## 8.0 FINISHED PRODUCT REQUIREMENTS

### 8.1 Generic Alloy Identity Testing

8.1.1 When generic alloy identity testing is specifically required by the purchase order or invoked specifications, the selected sample of parts shall be verified by a suitable nondestructive test to assure that material being provided or installed is of the specified metallurgical group. This test shall be performed by the first-tier Supplier or the Supplier who assembles the finished product in accordance with a procedure that is approved by the Purchaser.

8.1.2 Parts shall be verified at time of final inspection, prior to shipment. However, Level I parts that are inaccessible after assembly shall be verified just prior to installation.

8.1.3 The procedure utilized shall be capable of verifying all generic metallurgical groups of materials used in the Supplier's facility. Generic metallurgical groups are identified as follows:

- (1) Steel
- (2) 300 Series Stainless Steel
- (3) 400 Series or 17-7PH or 17-4PH Stainless Steel
- (4) Monel (NiCu)
- (5) K-Monel (NiCuAl)
- (6) Copper Nickel (CuNi)
- (7) Inconel (NiCrFe), (NiCrMoCb)
- (8) Nickel Aluminum Bronze
- (9) Bronze
- (10) Brass
- (11) Copper
- (12) Bi-Metallic Weld
- (13) Cobalt Base Alloy
- (14) Silver Brazing Alloy
- (15) Titanium

8.1.4 A record of the test and results shall be provided with the certification package.

## 8.2 Test Records and Certifications provided to the Purchaser

8.2.1 Suppliers shall provide total and complete traceability for all Level I material supplied. This traceability requires certified material test reports from the producer of the raw material (mill) which contains quantitative mechanical and chemical data (OQE).

8.2.2 Where the mechanical properties of the material have been altered by heat treatment or metal working processes, the material shall be uniquely re-identified, and the mechanical properties re-determined. The mill certification shall be accompanied by supplemental certification from the heat treatment or metal working facility. This supplemental certification shall contain quantitative data for the process performed.

Additionally, the original mill certification shall be overstamped and/or annotated to contain the following information:

Traceability Number/Code \_\_\_\_\_ is fabricated from raw material Heat No. / Heat-Treat No \_\_\_\_\_ Date, Name and Signature of the Authorized Company Representative

Note: When applying overstamp or annotation to the certification report, no pertinent data shall be obliterated or rendered illegible. Certifications, or Test Reports for Level I materials where the Mechanical Properties have been altered, and are dated after September 1, 2014, will not be accepted by the Procuring Shipyard without the appropriate Overstamping.

8.2.3 All chemical and mechanical test reports shall be supplied with a certification statement that indicates that the test reports represent the actual attributes of the items furnished for the Purchaser's purchase order, and that the test results are in full compliance with all applicable specification and order requirements.

8.2.4 In cases of foreign certifications, conversion of foreign language units of measure into U.S. units of measure shall be annotated on the furnished foreign certifications if space permits, or placed on an addendum in the same format as the foreign certification data. Such translation/conversion shall be identified as to origin with name, title, and signature of the authorized representative of the company making the translation/conversion.

8.2.5 In cases where the material was not produced by a domestic mill, or melt source, the country of origin shall be identified on the test report, or annotated by the Supplier. If the producer or melt source is a domestic source, the test report shall be clearly indicated as such, or annotated on the test report by the supplier as produced or melted by a domestic source (United States of America or it's outlying areas).

8.2.6 In addition to the above requirements, other test reports required by the contract shall also comply in all respects with the ordering data and the invoked specification.

### 8.3 Marking Requirements (Finished Product)

8.3.1 Permanent marking is required on all Level I material, separately furnished or in assemblies. The supplier shall verify marking 100%. The permanent marking must provide the following information, listed in the order of precedence. Additional marking to that required below is permitted where required by the purchase order or specifications therein.

(1) The Kind of Material: The specific material designator in accordance with the purchase order.

(2) Supplier Traceability Code: A code that provides positive traceability to the unique OQE of the piece of material including homogeneous heat, melt, or batch and inspection information. For continuous process material, the specific traceability provisions of applicable procurement specifications apply. Where specific traceability provisions are not contained in applicable procurement specifications for continuous process material, traceability to OQE representative of material supplied is required.

(3) The Supplier's Name, Trademark or Symbol

NOTE: If all the marking cannot be applied due to space limitations, the Supplier shall request permission of the purchaser via a VIR of the marking that will be applied using the order of precedence above, and state the reason why all the markings cannot be applied.

8.3.2 Those items that cannot have markings physically applied shall be packaged and the package labeled with all marking required. All items in the package must be in the same homogeneous lot. When removing any material from the package, all material must be labeled or tagged with all the markings on the package, unless being removed from the package for immediate installation.

8.3.3 Permanent marking is not required for small items included as part of the pressure boundary of a completed assembly (Level 1 fasteners excluded). However, certification statements relating these small items to objective quality evidence shall be provided.

8.3.4 All markings shall be legible. Marking shall be located as not to affect form, fit, or function of the item.

8.3.5 Marking shall be accessible to permit identification without disassembly, except for justifiable situations when alternative methods (e.g., tagging, assembly records, etc.) of identification shall be used to identify these materials.

- 8.3.6 Marking of fasteners manufactured from hardened material by vibro- etching or integral marking is permitted provided the marking is in an unstressed area.
- 8.3.7 All Level 1 fasteners shall be marked with the kind of material, Supplier traceability code and manufacturer's name, trademark or symbol. In those cases where the fastener specification does not provide a kind of material, or material type, the material shall be marked either with the grade, as specified in the ordering data, or specification, or with the applicable Material Designator per Electric Boat Specification 3952, Material Designators, Marking Requirements.

## 9.0 EXTERNAL AUDITS

### 9.1 Suppliers of Level I Material

- 9.1.1 If a sub-tier supplier is an approved Level I supplier by the EB, an on-site audit is not required for that sub-tier supplier.
- 9.1.2 The Level 1 supplier shall establish and maintain an external quality audit program for sub-tier suppliers. This program shall be designed and implemented to determine compliance to purchase order requirements.
- 9.1.3 All external audits will be pre-planned using a checklist of audit elements that are capable of determining if contract requirements can or are being satisfied. An audit report will document the level of compliance found during the audit. Non-conformances will be clearly documented with a supplier corrective action report and required follow-up actions sufficient to determine satisfactory resolution. Records of audits and corrective and preventive actions shall be maintained by the supplier and made available for review by the Purchaser upon request.