SPACEFLIGHT FASTENER REQUIREMENTS FOR BUYER DESIGNED PRODUCT

Seller shall assure all spaceflight fasteners provided to Buyer under this purchase contract meet the requirements herein.

Definition – Spaceflight Metallic Fastener is as an item such as a bolt (e.g. a tensile or shear bolt, shoulder bolt, screw, HiLok®, HiTigue®, or lockbolt), nut, nut plate or anchor nut, rivet, shear pin, helical or cylindrical insert, setscrew, washer, safety wire, cotter pin, etc., which joins or retains components or structural elements.

A. Chain of Custody

A complete chain of custody from the original fastener manufacturer through all intermediate distributors is required for all fasteners. To meet the chain of custody requirement the Seller shall comply with the following:

1. The seller shall assure any fastener provided are solely fabricated by manufacturers listed in Boeing's D1-4426 "Manufacturer's Authorized Distributors of Structural Fasteners – Listed by Qualified Manufacturer" and procured only from the original Manufacturer or their Authorized Distributors identified for their products. Authorized distributors of structural fasteners are listed by their qualified manufacturer at this link:

   http://active.boeing.com/doingbiz/d14426/bfmanuf.cfm?Type_cd=F

   Note: Fasteners may be procured from non-Boeing qualified manufacturers or non-authorized distributors, provided the Certification Validation Test (CVT) requirements per paragraphs C.1 through C.3 are performed using sample sizes listed in paragraph C.5.
2. Seller shall include with each shipment the raw material manufacturer's test report (i.e., mill test report) for each fastener lot utilized that states that the lot of material furnished has been tested, inspected, and found to be in compliance with the applicable material specifications.
3. Seller shall include with each shipment the following for each fastener lot utilized:
   a. The original fastener manufacturer's signed (electronic signature acceptable) or stamped CoC.
   b. A Certificate of Conformance and Supply Chain Traceability (CoCT).

   NOTE: If Seller cannot obtain a complete chain of custody per paragraphs A.2 and A.3 then partial traceability is acceptable, provided that the Seller performs CVT according to paragraphs C.1 through C.3 utilizing sample sizes listed in paragraph C.4. Seller is still required to conform to paragraph B, Receiving Inspection, even when CVT is performed.

4. Seller's CoC will:
    a. Have a statement attesting that the receiving inspection requirements, per paragraph B, Receiving Inspection, have been met and that those records will be made available upon request.
    b. Attest to utilizing Boeing qualified manufacturers and their authorized distributors for each fastener lot.
        i. If non-Boeing qualified manufacturers or non-authorized distributors are utilized then Seller shall identify each fastener lot and its associated non-Boeing qualified manufacturer and/or non-authorized distributor.
        ii. Attest that the CVT requirements per paragraphs C.1 through C.3 are performed using sample sizes listed in paragraph C.5 have been met and records will be available upon request for each lot procured from non-Boeing qualified manufacturers or non-authorized distributors.
    c. Attest that each fastener lot utilized has complete traceability except as follows:
        i. If the Seller cannot obtain a complete chain of custody per paragraph A., then the Seller's CoC will have an additional statement attesting that the CVT requirements per paragraphs C.1 through C.3 were performed using sample sizes listed in C.4 and that those records will be made available upon request.
        ii. Seller will identify which fastener lots did not have complete traceability.
        iii. Seller will provide what traceability data they have.
    d. Identify the number of unique fastener lots utilized in this deliverable line item.
5. Sample size determination table

	RI Sample Size	CVT Sample Size
Qualified Manufacturer with Authorized Distributor with Complete Traceability	¶ B	Not Required
Qualified Manufacturer with Authorized Distributor without Complete Traceability	¶ B	¶ C.4
Qualified Manufacturer with Non-Authorized Distributor	¶ B	¶ C.5
Non-Qualified Manufacturer	¶ B	¶ C.5

B. Receiving Inspection (RI)

Seller shall perform the following:

Note: RI minimum sample size per ANSI/ASQ Z1.4.

1. Visual RI Requirements
    - A preliminary visual inspection to assure lot uniformity shall be performed at 1X magnification (unaided eye) on every fastener in a given lot.

- Each lot shall be sample inspected at 10X magnification for finish and other characteristics.

2. Dimensional RI Requirements

   Sample dimensional inspection shall include verification of:

   - Threaded Fasteners – head height, fillet radius, thread length, shank length, pitch diameter, and threads
   - Nut – outside diameter, thickness, and threads
   - Nutplate or anchor nut – length, width, height, hole size, and threads
   - Washer – outside diameter, inside diameter, thickness
   - HiLok® collars – outside diameter, thickness, threads
   - Rivet or Pin – diameter, length, and manufacturer's identification and material identification mark, as applicable
   - Safety Wire – nomenclature, wire diameter per part number per spec sheet, and marking
   - Inserts – outside diameter, thickness, and thread

C. Certification Validation Test (CVT)

Note 1: CVT is only required when a complete chain of custody from the Boeing qualified fastener manufacturer through all intermediate distributors cannot be obtained or when parts are not obtained from a Boeing qualified manufacturer or their authorized distributor.

Note 2: CVT sampling size shall be per A.5.

1. Tensile Test Performance

   a. Tensile testing shall be performed on a sampling basis for threaded fasteners according to one of the following three standards:

      i. NASM1312-8, Fastener Test Methods, Method 8, Tensile Strength;

      ii. NAM1312-108, Fastener Test Methods, Metric, Method 108, Tensile Strength;

      iii. ASTM F 606, Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets.

   b. The location of the tensile break and the ultimate load or ultimate strength (whichever is required by the specification) determined shall be recorded.

   c. The specification minimum value shall also be recorded for comparison.

2. Hardness Substitution for Tensile Test

   Note: Hardness testing may be substituted for tensile testing if the fastener is too short for tensile testing.

   a. When choosing hardness testing as a substitution, consideration shall be given to the correlation between hardness and tensile data. In addition, when hardness testing is substituted, a microstructural evaluation of the fastener lot is required to demonstrate that it meets the requirements of the applicable fastener procurement specification.

   b. This microstructural examination shall consist of inspection for gross defects or anomalies, a check of the flow lines pertaining to forging and/or rolling operation(s), and a grain size determination.

3. Chemical/Elemental Analysis

   a. Chemical/elemental analysis shall be performed on fastener materials on a sampling basis, using any quantitative or semi-quantitative chemical/elemental analysis technique.

   b. A quantitative Optical Emission Spectroscopy (OES) analysis is destructive to the fastener but is the preferred test method.

4. Sample Size for Boeing Qualified Manufacturer's Products

   Sample size and acceptance criteria shall be as follows for approved manufacturer's products:

Lot Size	Sample Size	Acceptance Criteria
3 to 50	2	0 failures
51 to 100	3	0 failures
101 to 500	5	0 failures
501 to 1200	6	0 failures
1201 and over	7	0 failures

5. Sample Size for Non-Qualified Manufacturer's Products

   Sample size and acceptance criteria shall be as follows for non-qualified manufacturer's products:

Lot Size	Sample Size	Acceptance Criteria
4 to 50	3	0 failures
51 to 100	5	0 failures
101 to 500	7	0 failures
501 to 1200	8	0 failures
1201 and over	9	0 failures