

DATE: May 14, 2015  
TO: Center Directives Manager  
Langley Research Center



FROM: Grant M. Watson  
Director, SMAO

SUBJECT: Memo Authorizing Continued Use of Expired Langley Directive  
LAPD 5330.3 – Langley Research Center (LaRC) Standards for the Acquisition  
of Threaded Fasteners (Bolts)  
Expiration date: May 24, 2015

REF A: NASA Requirement Waiver for NPR 1400.1 (3.5.2.6), NRW 1400-37

In accordance with reference A, I authorize the continued use of the expired subject directive.

LAPD 5330.3 – Langley Research Center (LaRC) Standards for the Acquisition of Threaded Fasteners (Bolts)

**The subject directive has been reviewed prior to the expiration date and a summary of the required changes is:**

The document is currently being updated to comply with NASA requirements which require major revisions.

**The directive was also assessed for the risk of continued use after expiration versus the risk of not having the directive available after expiration. The results of that risk assessment are:**

This LAPD is part of the Langley Management system and it sets forth the requirements, responsibilities, and definitions for safety-critical, spaceflight, and specialized fastener usage within the framework of LaRC safety policies and constraints.

**Justification for the delay is:**

Due to the loss of time during several Center closures caused by inclement weather, these revisions took longer to complete than initially expected. There would be high risk to the efficient and effective implementation of the LaRC Safety Program if this requirements document is not available in the LMS.

The updated directive was submitted for Center wide review on April 21, 2015.

Please refer any questions or concerns regarding the continued use of this directive to Grant M. Watson, Director

  
Grant M. Watson, Director, SMAO

5/15/15  
(Date)

cc:  
218/K. C. Suddreth

304/LJNorthern:ljn 5/14/15 (44569)



LANGLEY  
POLICY  
DIRECTIVE

Directive: LAPD 5330.3F

Effective Date: December 5, 2011

Expiration Date: May 24, 2015

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Responsible Office: Safety and Mission Assurance Office

**SUBJECT: Langley Research Center (LaRC) Standards for the Acquisition or Use of Threaded Fasteners**

**P.1 POLICY**

This directive sets forth policy, definitions and responsibilities for the acquisition or use of threaded fasteners to be used at Langley Research Center (LaRC) for safety-critical and spaceflight applications.

- a. Requirements for receipt inspection of safety-critical and spaceflight fasteners are found in LAPD 4520.1, "Langley Research Center (LaRC) Requirements for Safety-Critical Product Testing," and LMS-CP-4520.6, "Receipt Inspection for Fastener, Insert and Nut Products."
- b. **Safety-critical applications:** All non-spaceflight safety-critical fasteners as defined in Appendix A.10 shall be subject to the following procurement requirements, and the receipt inspection and testing defined in LAPD 4520.1, "Langley Research Center (LaRC) Requirements for Safety-Critical Product Testing," and LMS-CP-4520.6, "Receipt Inspection for Fastener, Insert and Nut Products."
  - (1) Manufacturer's registered trademark, and any style names or other identification shall be identified on the container/packaging.
  - (2) Manufacturer's Certification Traceability Documentation shall be included within the container/packaging to assure traceability of item identification and lot integrity.
  - (3) Items shall be packaged in containers that are coded for identification of the lot to enable traceability of certification and test reports back to the heat treatment of the steel.
  - (4) Items shall be packaged in sealed containers in a manner to ensure no co-mingling of lots.
  - (5) Certification and Manufacturer's Test Report (MTR) documentation shall be provided with the Fasteners so the Quality Assurance Branch (QAB) Material Analysis and Quality Assurance Laboratory (MAQAL) can certify traceability of the fasteners back to heat treatment of the steel.

- (6) The required documentation shall be supplied by the vendor or manufacturer of the fasteners.
- (7) All Non-spaceflight safety-critical applications products, regardless of procurement method or source of supply, shall be sent to the Quality Assurance Branch (QAB), Materials Analysis and Quality Assurance Laboratory (MAQAL) upon delivery for inspection in accordance with LMS-CP-4520.6, "Receipt Inspection for Fastener, Insert and Nut Products."

**c. Spaceflight hardware applications:** All fasteners such as threaded bolts/nuts/inserts/ washers/rivets/shear-pins/set-screws/retention-devices procured (via purchase request, credit card, stock, excess, contractor, or other) for spaceflight hardware applications, including Government Furnished Equipment (GFE) or payloads that are flown on spaceflight vehicles, shall be selected based on the criteria set-forth in NASA-STD-6008, "NASA Fastener Procurement, Receiving Inspection, and Storage Practices for Spaceflight Hardware." Requirements for receipt inspection of spaceflight fasteners are found in LAPD 4520.1 and LMS-CP 4520.6.

#### **(1) Fastener Selection**

- (a) All fasteners used on spaceflight hardware shall be selected so that they are controlled by government or industry specifications that include design, performance, and quality assurance requirements.
- (b) An appropriate LaRC engineering organization shall classify the use of each fastener and fastener-related product based upon engineering analysis techniques.
  - i. These classifications include, but are not limited to, Fracture Critical, Low-Risk Fracture, Fail Safe, Low Released Mass, and Contained fastener. See LMS-CP-4520.6 or NASA-STD-6008 for definitions of these fastener types.
- (c) Metallic fastener materials shall be selected from tables IA-E of MSFC STD-3029, "Guidelines for the Selection of Metallic Materials for Stress Corrosion Cracking Resistance in Sodium Chloride Environments," which lists alloys that exhibit a high resistance to stress corrosion cracking.
- (d) Use of other (non-table I) metallic materials shall require documentation of acceptance rationale in a Material Usage Agreement (MUA) that is approved by the responsible LaRC engineering organization.

#### **(2) Approved Manufacturers and Distributors**

- (a) Fracture-critical fasteners, low-risk fasteners, and nuts and inserts used with such fasteners (see NASA STD-6008 for definitions of these fastener types) shall be obtained from manufacturers and distributors who have

been approved by an on-site quality or product audit conducted by the procuring organization (see section 4.7 of NASA-STD-6008).

- (b) NASA Centers, developers, and prime contractors that do not audit their manufacturers and distributors shall be permitted to procure spaceflight fasteners from a list of NASA-approved vendors that have been audited according to the above paragraph P.1.c.(2)(a) of this document. and section 4.7 of NASA-STD-6008.
  - i. Distributors or vendors that are on a list that has been audited and approved by any of the NASA prime contractors are also acceptable.
  - ii. Fastener types that are not listed in paragraph P.1.c.(2)(a) may be procured from non-audited distributors or manufacturers, provided the screening requirement in table 1 of NASA-STD-6008 and the Certification Validation Test (CVT) requirements specified in table 2 of NASA-STD-6008 are performed.
- (c) All fasteners shall be procured in lots.
- (d) A single lot of fasteners shall not include fasteners that have traceability to different material batches/lots. The policy for traceability requirements is discussed in the below paragraph P.1.c.(5) and section 4.6 of NASA-STD-6008
- (e) All fastener lots shall be packaged in containers that are coded for identification of the lot to enable traceability of certification and test reports back to the heat treatment of the steel.

### **(3) Manufacturer's Test Report (MTR)**

- (a) An MTR shall be obtained for each fracture-critical, low-risk, and fail safe fastener purchased.
- (b) All rivets, shear pins, inserts, and retention devices (such as cotter pins, hitch pins, safety wires, and ties) shall have MTR documentation.

### **(4) Certificate of Conformance (COC).**

- (a) A COC to the applicable fastener specification shall be required for every fastener lot.
- (b) A COC to the applicable fastener specification shall be obtained from the manufacturer or distributor selling the fasteners.
- (c) A COC shall be obtained for all types of fastener hardware referenced in NASA-STD-6008, table 1, such as fracture-critical, low-risk fracture, fail safe, low-released mass and contained devices.

**(5) Traceability:**

- (a) Either complete or partial traceability shall be maintained for all spaceflight fasteners by QAB/MAQAL.
- (b) Traceability documentation shall be maintained for all spaceflight hardware, as specified by the appropriate program/project requirement documents.
- (c) Complete traceability shall be required for all fracture-critical fasteners and all inserts and nuts that are used with fracture-critical fasteners.
- (d) Complete traceability documentation includes the entire chain of custody and all of the following stipulations:
  - i. The original manufacturer shall have lot traceability back through the manufacturing process to the raw material test certifications.
  - ii. Any subsequent manufacturer that modifies a given fastener shall have lot traceability to the manufacturing process performed and back through to the original manufacturer.
- (e) When complete traceability cannot be achieved, partial traceability is acceptable for all non-fracture critical fasteners, including low-risk and fail safe fasteners, provided that lot Certification Validation Testing (CVT) is performed for verification according to section 4.11.2 of NASA-STD-6008.

**(6) Audits and Storage**

- (a) Audits shall be used to verify that a company's processes and products meet the requirements of applicable specifications in accordance with NPD 8730.5, "NASA Quality Assurance Program Policy."
- (b) Audit approval is limited to the audited location and its product and not to affiliated companies or dissimilar products.
- (c) The supplier shall be audited, approved, and maintained based on the NASA Center's supplier approval and surveillance process for a maximum of 3 years before being re-audited.
- (d) A given NASA Center may utilize the audits and approved vendor lists from any other NASA Center or from any NASA prime contractor. Once NASA has approved the audit results, the manufacturer shall be placed on the approved vendor list.
- (e) Fasteners shall be maintained in storage according to program requirements until issued for use.

- (f) Utilization of a storage system where fasteners or inserts from two or more different lots are commingled (co-located or stored in the same bin or other holding container) shall be expressly prohibited.

### **(7) Fasteners Critical for Mission Success**

If the Technical Authority determines that a fastener is critical for mission success, they shall impose on it the same traceability and receiving inspection requirements as a fracture-critical fastener, even when the actual fracture classification is of a less critical nature.

### **(8) Fasteners in Commercial-Off-The-Shelf (COTS) Hardware**

Fracture-critical, low-risk, and fail safe fasteners used in COTS hardware shall meet the traceability requirements of this directive.

### **(9) Specialized Fasteners**

- (a) Appropriate material, design, processing, and screening requirements, shall be developed for specialized fasteners on a case-by-case basis by the responsible engineering organization.
- (b) These requirements shall be approved by the governing Technical Authority and placed in the program/project requirements document(s).
- (c) Non-metallic fasteners shall be considered specialized fasteners.

## **P.2 APPLICABILITY**

This LAPD is applicable to all LaRC civil service employees and to contractors engaged in the acquisition and use of threaded fasteners at LaRC to the extent specified in their contracts.

## **P.3 AUTHORITY**

None

## **P.4 APPLICABLE DOCUMENTS AND FORMS**

- a. LAPD 4520.1, "Langley Research Center (LaRC) Requirements for Safety-Critical Product Testing."
- b. LMS-CP-4520.6, "Receipt Inspection for Fastener, Insert and Nut Products."
- c. NASA-STD-6008, "NASA Fastener Procurement, Receiving Inspection, and Storage Practices for Spaceflight Hardware."

- d. MSFC-STD-3029, "Guidelines for the Selection of Metallic Materials for Stress Corrosion Cracking Resistance in Sodium Chloride Environments."
- e. NPD 8730.5, "NASA Quality Assurance Program Policy."

## **P.5 RESPONSIBILITY**

### **a. Acquiring Organization**

- (1) The organization acquiring the fasteners shall ensure that fasteners obtained (via procurement, credit card, stock, excess, contractor, or other) comply with this Policy.
  - (a) This includes organizations initially buying and using the fasteners, or any organization that gains possession of the fasteners at a later date.
- (2) Each acquiring organization shall maintain the evidence that fasteners in their possession comply with this Policy.

## **P.6 DELEGATION OF AUTHORITY**

None

## **P.7 MEASUREMENT/VERIFICATION**

Evidence consists of affirmative test documentation.

## **P.8 CANCELLATION**

LAPD 5330.3, dated May 24, 2010

*Original signed on file*

Stephen G. Jurczyk  
Deputy Director

Distribution:

Approved for public release via the Langley Management System; distribution is unlimited.

## **ATTACHMENT A DEFINITIONS**

- A.1 Certificate of Conformance (COC)** - a document that is signed by the fastener supplier to affirm that the product has met the requirements of the relevant specifications(s), contract(s), and any other applicable regulations. It attests that the fasteners are of the quality specified in the acceptance document and conform in all respects with contractual requirements, including specifications, drawings, preservation, packaging, packing, marking requirements, applicable heat/lot number, and physical item identification part number.
- A.2 Complete Traceability** - documentation that demonstrates a solid chain of custody from the original fastener manufacturer through all intermediate distributors down to the buyer. Normally, it consists of a string of purchase orders from the original manufacturer down through each distributor or vendor, linking the sale of a particular lot of fasteners with a unique fastener manufacturer's lot number.
- A.3 Fastener** A screw/threaded bolts/nuts/inserts/washers/rivets/shear-pins/set-screws/retention-devices or stud having internal or external threads, or a load-indicating washer.
- A.4 Grade identification marking** – any symbol appearing on a fastener purporting to indicate the fastener's base material, strength or properties.
- A.5 High strength fastener** – A screw/threaded bolt/nut/insert/washer/rivet/shear-pins/set-screw/retention-device or stud having internal or external threads, or a load-indicating washer which bears a grade identification marking required by a standard or specification, or performance capabilities that conform to a specific standard of a consensus standards organization or government agency (i.e., American Society of Testing Materials (ASTM), American National Standards Institute (ANSI), American Society of Mechanical Engineers (ASME), Military Standards (MS), National Aerospace Standards (NAS)).
- A.6 Manufacturer's Test Report (MTR)** - a document that is produced by the fastener manufacturer to certify information required by the applicable fastener specification. The information typically includes fastener lot number, manufacturing date, lot quantity, raw material heat number, chemical composition, and mechanical and metallurgical test results.
- A.7 Partial Traceability** - documentation from a supplier or vendor that does not necessarily include the full chain of custody back to the original fastener manufacturer.

**A.8 Traceability** - the concept that a buyer can trace the history of a given lot of fasteners back through any number of distributors or vendors to the original manufacturer(s).

**A.9 Washer** – a high-strength fastener if it is subject to a standard or specification applicable to a screw, nut, bolt, or stud as defined in this attachment under A.5.

**A.10 Safety Critical Fastener –**

- a. Any high-strength fastener/nut/insert/retention-device used in non-spaceflight flight project hardware and associated ground support equipment as defined within the scope of LPR 5300.1 – “Product Assurance Plan”. These projects include all sub-orbital flight tests supporting space flight programs, low-risk flight projects, risk reduction flights or flight experiments; flights of opportunity that are sub-orbital; involve sounding rockets; un-crewed aerospace vehicles; and major drop models or Unmanned Aerial Vehicles (UAV) as decided by LaRC Center Management. Excluded from this definition are projects involving aircraft experiments.
- b. Any fastener or other component used in a Langley facility that is critically loaded/stressed (factor of safety is less than 4 on ultimate strength and 3 on yield strength) and whose failure can result in critical or catastrophic (Category I or Category II) injury/facility damage, as defined in LPR 1740.4, "Facility System Safety Analysis and Configuration Management." The factor of safety calculation shall be made by the appropriate engineering organization. The Facility Safety Head or Project Engineer shall contact cognizant center personnel (e.g., Model Systems SPE) for guidance to determine the appropriate engineering organization. A fastener is any single part which joins other structural elements and transfers loads from one element to another across a joint.

**ATTACHMENT B  
EXCEPTIONS TO POLICY**

**B.1 Non-Safety-Critical Application Fasteners:**

- a. Wood screws, sheet metal screws, lag bolts, stove bolts, or screws made of brass or aluminum, shall not to be used in safety-critical applications.

**B.2 Special Specification Fasteners**

- a. Fasteners designed and fabricated in accordance with special specifications shall not be subject to this Policy, but do require receipt inspection services in accordance with Center Policy.
- b. Special fastener specifications shall be:
  - (1) Described in the specification document (drawings, procurement specifications, Statement of Work, or other area of the solicitation).
  - (2) Approved, in the specification document, in writing, by a governing Technical Authority, such as a standard practice engineer, model system engineer, facility safety head, or a line manager who is cognizant of the application.
  - (3) Any threaded fasteners used under this exception shall be clearly marked as to their strength, grade, and manufacturer identification.
  - (4) Non-metallic fasteners shall be considered specialized fasteners.