



# NASA-STD-6008

## Key Changes Between Baseline and Rev A

10/30/2019



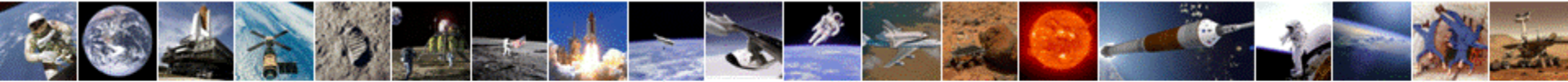
# Overview of Changes

- Changed Title from “spaceflight hardware” to “mission hardware”
  - Allows use for other types of mission hardware and programs as needed.
  - Can be invoked for fasteners used on aircraft
- Reorganized the document for improved requirement flow
  - Subsection layout parallels the requirements table
- Updated requirements table
  - Merged the previous two tables into one table
- Updated terms and definitions for clarity
- Updated verbiage to align with other quality standards and recent strategic updates



# Key Technical Changes

- Applicability for Aircraft
  - Provides requirements that can be applied for aircraft modifications
  - Waives some supplier and incoming inspection requirements for aircraft fasteners obtained from military depots
  - Waives some requirements that are N/A for aircraft OEM-supplied fasteners
- Quality Control Level
  - Created three control levels to align with application criticality
  - Control levels defined with or without traceability to NASA-STD-5019 terminology
    - Note: From NASA-STD-5019 *The low-risk classification is intended for parts that are extremely unlikely to contain or develop critical flaws because of (1) extremely low likelihood of flaws being induced by manufacturing processes, environmental effects, or service events and (2) large structural margins.*
- Supplier qualification
  - Allows suppliers that are qualified by 3rd party audits of AS9100 certification or AS9003 compliance
  - Allows suppliers who are listed in the Defense Logistics Agency (DLA) Qualified Supplier List
  - Still allows qualification by 2nd party audits by the hardware developer
  - No longer references a NASA approved vendor list (which doesn't exist)
- Traceability
  - Complete traceability is required for Non-Fracture Critical – Low Risk fasteners, which are now grouped as part of the Control Level I classification for fasteners whose failure results in a catastrophic hazard
  - Fasteners that are part of a COTS assembly are no longer required meet the traceability requirements of NASA-STD-6008



# Key Technical Changes – Cont.

- Visual Inspection
  - Visual inspection performed in accordance with the applicable part specification that describes how the inspection is to be performed
  - The requirement for 10x magnification is no longer stated
    - The 10x magnification requirement was removed to align with the fastener procurement specifications (they do not use magnified visual inspection).
- Dimensional Inspection
  - Changed scope from all fastener types except retention devices to only threaded fasteners
    - Tight dimensional control of threaded fasteners is necessary to meet the required joint assembly strength and ensure proper preload and effectiveness of locking features. Deviations in dimensions of non-threaded fasteners are less likely to have significant effect on service strength but may affect the fit during installation.
  - Changed from ASME B1.3 System 22 for all threaded fasteners to System 22 for Control Level I fasteners and System 21 for Control Level II and III fasteners (though System 22 may be used for all threaded fasteners if desired)
    - System 22 is more stringent than System 21 in that it requires quantitative measurement of dimensions whereas System 21 allows acceptance through gages. Gage verification is sufficient for level II and III fasteners.
- Chemical Analysis
  - Requires a quantitative method (e.g. OES) for Control Level II fasteners that are procured through an unqualified supplier without complete traceability
    - Quantitative (OES) or semi-quantitative method (XRF and EDS) allowed for all other fasteners control level and procurement conditions
  - Chemical analysis is required for level II fasteners procured through unqualified suppliers, even when complete traceability is obtained. In the previous revision, chemical analysis was not required when complete traceability was obtained.
    - The requirement to add testing for unqualified suppliers with complete traceability is for the purpose of increasing counterfeit avoidance measures.



# Key Technical Changes – Cont.

- **Tensile Testing**

- Hardness testing is no longer an acceptable substitute for tensile tests when fasteners are too small or short to test for the following reasons:
  - Very little correlation between hardness and strength for the majority of commonly used fastener materials
  - Procurement specs specifically state that hardness cannot be used to verify strength
  - No acceptance criteria is provided for hardness testing

Note: Procurement can be made through qualified suppliers with complete traceability to preclude the requirement for tensile testing
- Tensile testing is required for level II fasteners procured through unqualified suppliers, even when complete traceability is obtained. In the previous revision, tensile testing was not required when complete traceability was obtained.
  - The requirement to add testing for unqualified suppliers with complete traceability is for the purpose of increasing counterfeit avoidance measures.

- **Sample Sizes**

- Samples sizes are taken from ASTM F1470 to align with industry practices, with a modification to ensure at least 2 samples are performed, which can allow observation of mixed lots
- The samples sizes are generally lower except the following cases
  - Dimensional and visual inspection samples are larger when using a qualified manufacturer and incomplete traceability
  - Sample sizes for unqualified suppliers are similar for small lots but significantly larger for larger lots