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A		Initial Release	B. Klatt	R. Goeke	04/16/91
B		General Revision			01/20/06
C		General Editorial Update	B. Klatt	M. Bautz	07/16/14
D		Incorporate GSFC 541-PG-8072.1.2Rev B	J. Rios	R. Goeke	03/27/15

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Fasteners

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Revision D
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Preface

Revision A was the Initial Release of 99-02008 written by Brian Klatt 04/16/91 and checked by R. F. Goeke on 04/16/91.

Revision B issued a General Revision on 01/20/06.

Revision C issued a new format and general editorial update on 07/16/14.

Revision D makes this document current with NASA/GSFC 541-PG-8072.1.2Rev B

1.0 Purpose

This procedure provides guidance for selection and procurement of fasteners.

2.0 Scope

This procedure applies to all fasteners used by MKI on flight hardware. Fasteners are defined as bolts, screws, nuts, anchor nuts, rivets, shear pins, helical and cylindrical inserts, and setscrews that join components and transfer load.

3.0 Applicable Documents

NASA/GSFC 541-PG-8072.1.2B	Goddard Space Flight Center Integrity Requirements
99-02006	Receiving Inspection
99-02004	Nonconforming Material and Nonconforming Material Reports

4.0 Fastener Selection

Goddard Space Flight Center Fastener Integrity Requirements, NASA/GSFC 541-PG-8072.1.2 must be used as a guide in selection of fasteners for flight hardware. Fasteners with the designation MS (Military Standard) or NAS (National Aerospace Standard) are preferred.

5.0 Procurement

Fasteners shall be procured directly from the fastener manufacturer or the fastener manufacturer's authorized distributor. No other source is acceptable. This will help avoid counterfeit parts. Residual inventory shall not be used unless the requirements of this procedure have been met.

5.1 Critical Fastener / Controlled Fastener

5.1.1 Critical Fasteners:

Fasteners used in a way that, in the event of a single fastener failure, would present a catastrophic hazard (disabling or fatal personnel injury, loss of spacecraft/launch vehicle, or failure to meet mission objectives. As a requirement, they shall be bolts or nuts M5 (size #10) or larger, unless prior approval is obtained.

5.1.2 Controlled Fasteners:

Fasteners used in a way that, in the event of a single fastener failure, would not present a catastrophic hazard.

5.2 Documentation

Certificate of Compliance (C of C) shall accompany all fasteners, and in addition, contain the applicable material test reports. Material test reports (including applicable Chemical & Physical testing results) are required for all critical fasteners,

as well as controlled fasteners size M5 (size#10) or larger, and rivets/shear pins 5mm diameter (3/16") and larger.

6.0 Inspection and Test Requirements

Inspection and testing is outlined below; applicable tests and extent of sampling vary by fastener type, and are outlined in Table 2 of GSFC 541-PG-8072.1.2

6.1 Visual Inspection

A preliminary visual inspection to assure lot uniformity shall be performed at 1X on the entire fastener lot. Visual inspection for finish and other characteristics requiring visual inspection by the appropriate procurement specification shall be performed at 10X magnification, on a sampling basis as listed below.

6.2 Dimensional

Dimensional inspection shall include a verification of the dimensions specified in the procurement documentation or applicable specifications. This includes thread dimensions for threaded items (excludes helical wire inserts), or diameter and length for non-threaded items and helical wire inserts.

6.3 Chemical and Physical Tests

If the manufacturer's chemical and physical test data is not available, MKI must have chemical and physical tests performed on a sample of the fasteners. Sample size and acceptance criteria shall be as listed in Section 7.0 below. Testing may include the following:

6.3.1 Tensile Test

When required, testing shall be performed to a standard method, and the method identified with the test results.

6.3.2 Hardness Test

When required, for a bolt or screw, it should be performed on the thread end. Testing on the thread end of a bolt is non-destructive; testing on the face of a nut is destructive.

6.3.3 Composition

When required, elemental composition shall be determined by spectroscopy or other analytical methods. Pre-existing destructively tested samples are suitable test vehicles; testing may be destructive or non-destructive based on the method used.

7.0 Sampling

Lot Size	Destructive Sampling	NDE sampling	Accept Criteria
1 to 25	2	2	0 defective
26 to 50	2	3	0 defective
51 to 150	3	4	0 defective
151 to 500	4	5	0 defective
501 to 1200	5	5	0 defective
1201 and over	5	8	0 defective

A failure in the random sampling above is reason for rejection.
Refer to 99-02006, Receiving Inspection; and 99-02004, Nonconforming Material

and Nonconforming Material Reports, for additional guidance and requirements.

8.0 Non-Destructive Evaluation (NDE)

All Fasteners (100%), used in Safety Critical applications must be subjected to non-destructive evaluation. Acceptable NDE methods include visual inspection, dye penetrant, X-ray, eddy current, and magnetic particle inspections.

9.0 Traceability

Mission Assurance shall retain procurement documentation, including the manufacturer's chemical and physical test data. This includes chemical and physical test data from tests done by or for MKI.

Fastener manufacturer and lot date code shall be recorded in the Assembly Work Order (AWO), created by MKI.