

QUALITY ASSURANCE REQUIREMENTS **EXTERNALLY-THREADED STEEL FASTENERS**

1.0 **SCOPE**

- * This document establishes the minimum requirements to be met by all manufacturers and/or distributors of at least Grade 5 or Property Class 8.8 externally-threaded steel fasteners, or by all suppliers of assemblies which contain externally-threaded steel fasteners. Such suppliers must comply with Section 2.0 or 3.0, as applicable.
- * Suppliers of assemblies which contain externally-threaded steel fasteners less than Grade 5 or Property Class 8.8, must submit, as part of the production Part Approval Process (PPAP), the declaration shown in Appendix A. **The remainder of this document does not apply to such suppliers.**

1.1 **DEFINITIONS**

- * 1.1.1 **High Strength Fasteners**
An externally-threaded steel fastener of at least Grade 5, as defined by SAE J429, or Property Class 8.8 (metric equivalent), as defined by SAE J1199 or ISO 898.
- 1.1.2 **Externally-Threaded Fasteners**
These include bolts, screws, studs, sems, and u-bolts. **Nuts are internally-threaded** and, as such, are **not subject** to the requirements of this document.
- 1.1.3 **Lot**
A quantity of fasteners of the same part number from that manufacturer having had the same operations/processes performed, that are submitted for inspection/test at the same time.
- 1.1.4 **Homogeneous Lot**
A lot showing uniformity in all of the following aspects: chemical composition, mechanical properties, dimensional characteristics, plating, and manufacturer.
- 1.1.5 **Manufacturer's Symbol (Logo)**
The marking on the fastener that identifies the manufacturer. This symbol shall be registered with the Defense Supply Center Philadelphia (DSCP) – http://www.dscp.dla.mil/gi/prod_services/logoreg.html or Fastener Quality Act (FQA) – <http://www.uspto.gov/web/offices/tac/fqa/index.html> (site names subject to change).
- * 1.1.6 **Grade/Property Class**
Grade or Property Class markings identify the fastener Grade or Property Class, as described in SAE J429, SAE J1199 or ISO 898. These systems allow standardized mechanical and chemical properties to be associated to a fastener through recognizable markings.

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2.0 REQUIREMENTS FOR HIGH STRENGTH FASTENERS SHIPPED LOOSE

- * The supplier must implement and maintain a quality assurance system which ensures lot traceability back to the fastener manufacturer and provide objective evidence of the **homogeneity** of the lot. This objective evidence shall be prepared, maintained and provided to Buyer with each shipment, as detailed in Section 2.2.

2.1 COMPLIANCE REQUIREMENTS

To determine the conformance of fastener lots with the marking and dimensional requirements, a sample from each lot will be taken in accordance with MIL-STD-105, General Inspection Level II (Section 4.1). In determining compliance to chemical, mechanical and plating requirements, sampling shall be IAW MIL-STD-105, Special Inspection Level S-2 (Section 4.2). The following acceptance criteria shall apply: **Accept** lot zero (0) defects. **Reject** lot with one (1) defect. Each sample shall be examined for the following:

2.1.1 Manufacturer's Trademark (Logo)

Every fastener in the lot shall be marked with the manufacturer's trademark; the specified manufacturer's identification symbol as registered with DSCP or FQA.

2.1.2 Grade

The Grade (or Property Class) markings shall be the same for each bolt and comply with specified head marking requirements.

2.1.3 Dimensional Characteristics

All dimensional requirements must be met.

2.1.4 Chemical Composition

Testing of chemical composition shall include, as a minimum, percent by weight analysis of all elements as detailed by the applicable material specification.

2.1.5 Mechanical Properties

Hardness as specified.

Tensile Strength as specified.

2.1.6 Plating

Plating and/or finish as specified.

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2.2 **DOCUMENTATION REQUIREMENTS**

- 2.2.1 A certification (Appendix B) stating that fasteners in a given lot meet all requirements shall be provided with each shipment.
- 2.2.2 Test reports confirming that the fasteners meet the following technical requirements, as applicable, shall be provided with each shipment: Chemical Composition, Hardness, Tensile Strength, and Plating. The name of the test laboratory shall be stated on the corresponding test report/certification.
- 2.2.3 Lot traceability shall be maintained and ensured by referencing the lot identification code on all corresponding documentation.

3.0 **REQUIREMENTS FOR HIGH STRENGTH FASTENERS AS PART OF AN ASSEMBLY**

Assemblies containing high strength fasteners as defined in Section 1.0 will fall into one of two classes:

- (1) Commercial; or
- (2) Non-commercial.

A *commercial* item will be defined as an item (end item or component of an end item), procured by the Government or the buyer, with the same or similar configuration and performance as sold or traded to the general public at the time of contract award.

Those items that do not fall within the above definition will be considered *non-commercial*.

3.1 **COMMERCIAL ASSEMBLY COMPLIANCE REQUIREMENTS**

- * 3.1.1 Suppliers of commercial assemblies, as defined above, must provide certification (Appendix C) with PPAP only, stating that:
 - (a) the item is a commercial item, as defined in Section 3.0, and
 - * (b) the fastener quality assurance system meets the intent of Section 2.0 and will prevent delivery of substandard product.
- 3.1.1 These requirements allow for the utilization of proven contractor Quality Assurance systems. These systems must assure fastener conformance to all requirements as defined in Section 2.0 above. Objective evidence of conformance shall be kept on file with the supplier and may be subject to review by the buyer.

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3.2 **NON-COMMERCIAL ASSEMBLY COMPLIANCE REQUIREMENTS**

- * Suppliers of non-commercial assemblies must prepare and maintain a fastener quality assurance system that meets the requirements as outlined in Section 2.0.
- * 3.2.1 Suppliers of non-commercial assemblies must provide certification with PPAP only stating that their quality control systems for fasteners meet all requirements of Section 2.0 (Appendix D); and
- 3.2.2 Inspection and test reports must be kept on file with the supplier and be provided to the buyer upon request. These records may be subject to periodic review by Quality Assurance.

4.0 **SAMPLING SIZE DETERMINATION USING MIL-STD-105**

4.1 **INSPECTION LEVEL II**

Knowing the lot (shipment) size, use Table II to determine the sample size code letter, i.e. given lot of batch size = 1000 and Table II, General Inspection Level II, provides a sample size code letter of J.

Knowing the sample size code letter, use Table III to determine the sample size, i.e. given sample size code letter J and Table III, provides a sample size of 80.

4.2 **INSPECTION LEVEL S-2**

This is a special inspection level for batch sampling of product produced by a monitored and controlled process. Table II & III have been used in the method as described above, using the S-2 Special Inspection Level, to produce Table I. Table I also provides test allocations within the sample size(s) as follows: chemical composition, core hardness, tensile strength and plating.

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TABLE 1 – Sample sizes for technical requirements testing

LOT SIZE	SAMPLE SIZE	CHEMICAL COMPOSITION	CORE HARDNESS	TENSILE STRENGTH	PLATING
2-25	2	1	1	1	1
26-150	3	1	1	1	1
151-1200	5	2	2	1	1
1201-35000	8	3	3	1	1
35001-OVER	13	6	3	3	1

TABLE II – Sample size code letters

LOT SIZE	SPECIAL INSPECTION LEVELS				GENERAL INSPECTION LEVELS		
	S-1	S-2	S-3	S-4	I	II	III
2-8	A	A	A	A	A	A	B
9-15	A	A	A	A	A	B	C
16-25	A	A	B	B	B	C	D
26-50	A	B	B	C	C	D	E
51-90	B	B	C	C	C	E	F
91-150	B	B	C	D	D	F	G
151-280	B	C	D	E	E	G	H
281-500	B	C	D	E	F	H	J
501-1200	C	C	E	F	G	J	K
1201-3200	C	D	E	G	H	K	L
3201-10000	C	D	F	G	J	L	M
10001-35000	C	D	F	H	K	M	N
35001-150000	D	E	G	J	L	N	P
150001-500000	D	E	G	J	M	P	Q
500001-OVER	D	E	H	K	N	Q	R

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TABLE III – Single sampling plans for normal inspection

SAMPLE SIZE CODE LETTER	SAMPLE SIZE
A	2
B	3
C	5
E	8
D	13
F	20
G	32
H	50
J	80
K	125
L	200
M	315
N	500
P	800
Q	1250
R	2000

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APPENDIX A

DECLARATION

We have reviewed all externally-threaded steel fasteners used in assembly part number _____ and have determined that they are less than Grade 5 or Property class 8.8, as defined in SAE J429, SAE J1199 or ISO 898.

SIGNATURE _____

DATE _____
dd/mm/yyyy).....

COMPANY _____
ADDRESS _____

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APPENDIX B

CERTIFICATION

We hereby certify that this shipment of fastener part number _____ on Purchase Order _____ has been found to meet all requirements as described in Section 2.0 of Form 4496.

Corresponding reports are attached.

These fasteners are traceable to the shipment by the following lot identification code:

MANUFACTURER _____

LOT CODE _____

The required tests were performed by the following laboratory(s):

TEST LABORATORY _____

SIGNATURE _____
TITLE _____
DATE _____
dd/mm/yyyy.....

COMPANY _____
ADDRESS _____

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APPENDIX C

COMMERCIAL ASSEMBLY CERTIFICATION

We hereby certify that assembly part number _____ on Purchase Order _____ is a commercial item as defined in Section 3.0 of Form 4496. Our quality assurance system for fasteners meets the intent of Section 2.0 of Form 4496 and will prevent delivery of substandard product.

SIGNATURE _____
TITLE _____
DATE _____
dd/mm/yyyy.....

COMPANY _____
ADDRESS _____

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APPENDIX D

NON-COMMERCIAL ASSEMBLY CERTIFICATION

We hereby certify that assembly part number _____ on Purchase Order _____ incorporates fasteners under quality assurance systems which meet all requirements of Section 2.0 of Form 4496 and will prevent delivery of substandard product.

SIGNATURE _____
TITLE _____
DATE _____
dd/mm/yyyy.....

COMPANY _____
ADDRESS _____

