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THIRD ANGLE PROJECTION		CUSTODIAN		REVISION	
		NATIONAL AEROSPACE STANDARDS COMMITTEE		3	
PROCUREMENT SPECIFICATION	NONE	TITLE		CLASSIFICATION	
				STANDARD PRACTICE	
		NA DOCUMENTS PREPARATION AND MAINTENANCE IN SI (METRIC) UNITS		NAS10000	
				SHEET 1 OF 21	

1. SCOPE

- 1.1 Purpose. The standard practices established in this document provide means of obtaining uniformity in the preparation and maintenance of National Aerospace Standards prepared in the International System of Units (SI) (Metric) and shall be adhered to insofar as practicable. For preparation and maintenance of inch unit documents see NAS380.
- 1.2 Classification
- 1.2.1 Document Classification. National Aerospace Standards Documents prepared in accordance with this standard practice shall be classified as one of the following:
- 1.2.1.1 Part Standard. A standard which completely defines a stockable detail or assembly with respect to material, finish, size, shape, and tolerance.
- 1.2.1.2 Standard Practice. A standard setting forth drafting convention, symbols, practices, etc; inspection methods, procedures, or standards; equivalent parts, processes, or standards (by means of a comparison table); or standard terminology and definitions.
- 1.2.1.3 Design Standard. A standard depicting standardized features of design such as shape, controlling dimensions, tolerances, clearance dimensions, installation methods and requirements, engineering design considerations, and engineering requirements for manufacturing processes.
- 1.2.1.4 Specification. A standard which determines the technical requirements of a standard part, or establishes the standards for work to be accomplished; in general, describing the processes of operation, quality of materials, and giving information not normally contained on related standard drawings.
- 1.2.2 Requirement Identifier. The requirements defined in this standard practice shall be identified by the requirement identifying numbers derived as shown in 5.2.2, 5.3.2 and 5.4.2.

2. REFERENCED DOCUMENTS

- 2.1 The following documents form a part of this standard practice to the extent specified herein.

2.1.1 Governmental

MIL-STD-961 Military Specifications and Assorted Documents, Preparation Of
Cataloging Handbook H6 Federal Item Name Directory for Supply Cataloging

Copies can be obtained from the Department of Defense Single Stock Point (DODSSP). <http://dodssp.daps.dla.mil>

2.1.2 Nongovernmental

ASTM International

ASTM A342/A342M Standard Test Method for Permeability of Feebly Magnetic Materials
ASTM SI10 American National Standard for Use of the International System of Units (SI): The Modern Metric System

Copies can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. www.astm.org

ASME

ASME B46.1 Surface Texture
ASME Y14.38 Abbreviations and Acronyms for Use on Drawings and Related Documents
ASME Y14.100 Engineering Drawing Practices

Copies can be obtained from ASME, Three Park Ave., New York, NY 10016-5990. www.asme.org

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Aerospace Industries Association)

NA0043	Identification of Male Threaded Fasteners, Metric
NA0156	Design Parameters for Male Threaded Fasteners
NA*	Design Parameters for Female Threaded Fasteners
NA*	Design Parameters for Rivet Type Fasteners
NA*	Design Parameters for Bearings
NA*	Design Parameters for Fluid Fittings
NAS380	NAS Documents, Preparation and Maintenance in the Inch System of Units
NAS1495	Recommended Qualification Test Procedure for Compliance with NAS Specifications and Standard Drawings
NAS10001	Preferred Metric Units for the United States Aerospace Industry

Copies can be obtained from the Aerospace Industries Association, 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209. www.aia-aerospace.org

American National Metric Council
ANMC Metric Editorial Guide

Copies can be obtained from the U.S. Metric Association, Inc. 2032 Mendon Drive, Rancho Palos Verdes, CA 902753. www.metric.org

3. DEFINITIONS

- 3.1 Part Identifying Number. For NA part standards, parts are identified by part identifying numbers which are derived by suffixing part standard document numbers with appropriate dash numbers. For NAM part standards that were transitioned from government standards, the part identifying numbers remain the original government part numbers.
- 3.2 Requirement Identifying Number. Technical requirements are identified by requirement identifying numbers which are derived by suffixing nonpart document (standard practice, design standard, or specification) numbers with appropriate dash numbers.
- 3.3 Dash Number. A number or grouping of numbers, or numbers and letters, added as a suffix to a document number to establish a complete identification for a specific standard part or technical requirement.
- 3.4 Inactive for Design After (Date). This restrictive notation shall be interpreted to mean that the inactivated parts or requirements may be used for existing requirements but shall not be specified in design contracted for subsequent to the noted inactivation date.
- 3.5 Canceled (Date). This restrictive notation shall be interpreted to mean that all industry requirements for the parts or requirements have ceased to exist, or that because of unsatisfactory performance or hazardous defects the canceled parts or requirements are not to be used either in design or for replacement after the noted cancellation date.

4. GENERAL REQUIREMENTS

- 4.1 Standard Form. The NASC metric (NA) standard form is printed on a 216 x 279 mm format, with border lines spaced 184 x 250 mm. The NA standard title page format shall include in the title block the third-angle projection symbol as shown in Figures 1 and 2. The NA standard second page format, omitting blocks for the title, classification, custodian, and procurement specification notation, shall be used for multisheet documents.
- 4.1.1 Electronic standard templates for the preparation of NAS documents are available on the AIA/NASC web site. Project sponsors should utilize the NASC Template Tip Sheet also available on the AIA/NASC web site.

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- 4.1.2 Document Number. The document shall be identified by the letters "NA" followed by four digits (starting with 0001) and placed in the lower right-hand box of each sheet of the document. These numbers shall be obtained from the NASC Secretary. For transitioned documents from Government sources, the document shall be identified by the letters "NAM" in place of "NA."
- 4.1.3 Titles. Documents shall be titled in accordance with the instructions in Cataloging Handbook H6. The title shall be placed in the box provided for it, and shall include the word "METRIC" (see Figures 1 and 2).
- 4.1.3.1 Table Numbering and Titling. All tables shall be numbered and titled in accordance with the requirements of MIL-STD-961 except Arabic numerals shall be used.
- 4.1.4 Classification. Documents shall be classified in accordance with Paragraph 1.2. The classification phrase shall be placed in the box provided for it (see Figures 1 and 2).
- 4.1.5 Sheet Number. When a document consists of more than one sheet, a sheet number shall be placed below the document number of each sheet. Only Sheet 1 shall indicate the total number of sheets. Example: SHEET 1 OF 3.
- 4.1.6 Current Revision. Commencing with the release of revision 3 of NAS10000, revision control of all standards will change from each sheet carrying its own revision to a single revision number for the whole document, i.e. the revision of each sheet of the document will be the same as Sheet 1. Sheet 1 and any subsequent sheets shall show the current revision in the revision block in the lower right hand section of each sheet. The date of original issue of the document shall show in right hand margin of Sheet 1 after "ISSUE DATE". For existing standards and specifications, the "LIST OF CURRENT SHEETS" block shall be removed from Sheet 1.
- NOTE: Information may be added or deleted anywhere within the body of the document, subject to the restrictions of 4.6.1, and the subsequent information shall be relocated, as necessary, so that the addition or deletion of sheets occurs at the end of the document.
- 4.1.7 Custodian. The custodian is the AIA committee responsible for the preparation and maintenance of the document. The committee name shall be placed in the custodian box as shown in Figures 1 and 2.
- 4.1.8 Approval Date. The approval date of new standards and the revision dates of existing standards shall consist of the month, day, and the year, and shall be placed in the right-hand margin on Sheet 1 by the NASC Secretary. The issue date of existing standards that specify only the month and year may continue to use that practice.
- 4.2 Data Presentation. The data presented in NA documents using the International System of Units (SI) shall be prepared in accordance with the following rules in order to permit their ready understanding, use, conversion, and adoption as international standards, as well as their easy development based upon standards promulgated by the international standardization organizations.
- 4.2.1 Arrangement. NA documents should be arranged essentially in accordance with the examples shown in Figures 1 and 2.
- 4.2.2 Legibility. Care should be taken with all operations in the preparation of copy to assure legibility.
- 4.2.2.1 Lettering and Dimensions. The font type for the text and tables shall be Tahoma with a font size 9. For tables only, the font size may be reduced to size 8 or 7 as required in order to fit data within the rows and columns and the table on sheet. For figures created in AutoCAD®, the font shall be Tahoma and the size shall be approximately size 9 with the understanding that it is difficult to control the font size of an imported figure created in a different program. The NA number shall be in bold faced type and be font size 14. If the standard number is a series such as NA0001 Thru NA0006, the font size should be reduced in accordance with the Tip Sheet. For Part Standards, the preferred text type is all capitals. For Standard Practices, Design Standards, and Specifications, the use of sentence case is preferred.
- 4.2.3 Electronic Master. The electronic file furnished to the NASC Executive Secretary for publishing shall be the original (master). It will be available through the office of the NASC Secretary and be made available for subsequent revision by the Custodian Committee representatives.

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- 4.2.4 Style. Except as otherwise noted herein, the ANMC Metric Editorial Guide shall be used as a guide to capitalization, spelling, punctuation, syllabication, etc, and ASTM SI10 Standard Practice, for conversion factors and definitions of the International System of Units (SI).
- 4.2.4.1 Abbreviations and symbols, other than those governed by SI rules, shall be in accordance with ASME Y14.38. In text, the use of upper or lowercase letters shall agree with the parent work or phrase being abbreviated. On pictorial presentations, abbreviations used directly therewith, such as dimensions, tables, notes, etc, shall be in uppercase letters except where the use of lowercase letters has been established by long practice, or is governed by SI rules.
- 4.2.4.2 Symbols for SI units do not change in the plural. When spelled out, an "s" is added to the unit name if the quantity expressed is greater than one.
- 4.2.4.3 The symbols for SI units are written in lowercase except when the name is derived from a proper name and for the prefixes "E", "M", "G", "P", and "T". The names of SI units are, however, all written in lowercase when spelled out, except for Celsius, Exa, and Peta. On NASC documents, liter shall be written in lowercase when spelled out and an uppercase "L" used when abbreviated. When using the Greek alphabet symbols for ohm (Ω) and micro (μ), typed or handwritten symbols may be used. A lowercase "u" shall not be used as the symbol for the submultiple micro.
- 4.2.4.4 Periods are not used after the symbol for an SI unit, except at the end of a sentence.
- 4.2.4.5 When a numerical value is used with an SI unit symbol, a space is used to separate them.
- 4.2.4.6 In numbers, either a comma or period may be used as a decimal marker to separate the whole number from the decimal fraction; however, the method selected shall be used exclusively throughout any document.
- 4.2.4.7 Whenever a numerical value is less than one, a zero must precede the decimal marker.
- 4.2.4.8 To facilitate the reading of numbers having five or more digits, the digits should be divided into groups of three, separated by a space instead of a comma, counting both to the left and to the right of the decimal marker.
- 4.2.4.9 In general, it is recommended that in choosing between the use of an SI unit and its multiple or submultiple the choice be governed by making the selection so that the resulting numerical values will lie between 0,1 and 1 000. See Table III. For example, 16 090 m can be more suitably expressed as 16,09 km, and 0,028 34 kg can be more suitably expressed as 28,34 g.
- 4.2.5 Dimensions and Tolerances. Dimensioning and tolerancing per ANSI Y14.5M-09 is recommended in the preparation of new standards and in revisions where the changes are extensive and the standard is being redrawn. All dimensions and tolerances shall be in SI units and decimal fractions of the unit. The number of places in the decimal dimension shall be the same as the number of places in the required tolerance. See Table IV for round-off recommendations.
- 4.2.5.1 For dimensioning of parts, all linear dimensions shall be in millimeters and decimal fractions of millimeters.
- 4.2.5.2 Tensile and shear stress shall be shown in megapascals (MPa). See Table VI.
- 4.2.5.3 Tensile and shear loads shall be shown in Newtons (N).
- 4.2.5.4 Pressure values for liquid and gas shall be shown in kilopascals (kPa).
- 4.2.5.5 Surface texture values shall be noted in micrometers (μ m). See Table V.
- 4.2.5.6 Mass values shall be noted in kilograms (kg). See Table II.
- 4.2.5.7 Although the SI unit for the plane angle is the radian, angles stated in degrees, minutes, and seconds, or in degrees and decimal of a degree (preferred), shall be used when dimensioning parts.

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- 4.2.6 Form of Coding. ASME Y14.100 specifies that part numbers including all prefix letters, dashes, and suffixes shall not exceed 15 character spaces. NA coding shall meet this limitation for all part and requirement identifying numbers. Spaces, decimal markers, fractions, and Roman numerals shall not be used. Dashes between letters and letters or, letters and numerals shall not be used. Dashes shall be used when letters are omitted.
- 4.2.6.1 The following letters are disapproved code letters and should not be used in part or requirement identifying numbers:
I, O, Q, S, X, and Z
- 4.3 Copyright and Patents
- 4.3.1 Copyright Recognition. Where copyrighted data is used in the preparation of a standard, permission to use the data shall be obtained, and where requested by the copyright holder, a note recognizing the copyright should be included based on the following policy:
- 4.3.1.1 Where substantial portions of a contributor's copyrighted data remain unchanged and are directly incorporated into NA standards, a copyright notice of the source will be included whenever it is feasible to do so without destroying the value of the standard as a reference material.
- 4.3.1.2 Where a contributor's copyrighted data is substantially incorporated into a new data source in a manner so as to lose its identity with the copyrighted source, a general acknowledgment of the contributor, without reference to any copyright, will be included whenever it is feasible to do so without destroying the value of the standard as a reference material.
- 4.3.1.3 Where a contributor's data, not copyrighted, is used substantially, acknowledgment of the source will be included when it is feasible to do so without destroying the value of the standard as a reference material.
- 4.3.1.4 Minor usage of data, whether copyrighted or not, as a general rule will not be acknowledged, to avoid destroying the value of the standard as a reference material.
- 4.3.2 Trade Names or Trademarks. NASC standards shall no longer document proprietary or trademarked items or features. When revising standards that contain trade names or trademarks, the established generic names shall be used instead and the trade name or trademark deleted from the standard. The generic names are as follows:
- | <u>Trade Name</u> | <u>Generic Name</u> |
|---------------------|-------------------------|
| Torq-set® | Offset Cruciform |
| Torq-set® with ACR® | Offset Cruciform-Ribbed |
| Phillips® with ACR® | Cruciform-Ribbed |
| Phillips® | Cruciform |
| Torx® | Six Lobe Drive-Internal |
| Hi-Torque® | Dovetail Slot |
| Tri-Wing® | Tri-Slot |
| Monel® | Nickel-Copper |
| Inconel® | Nickel Alloy |
| Kel-F® | PCTFE |
- 4.3.3 Patent Numbers. Reference to patent numbers shall not be made.
- 4.4 Testing Requirements. When a Military specification which requires qualification is specified as the procurement specification for an NA Standard Part, the drawing shall bear the following exception to the procurement specification:

Specification number except as noted. All parts must meet qualification and inspection requirements. Manufacturers shall provide evidence of qualification when required. Testing shall be performed by manufacturer or independent laboratory. Procuring agency may conduct confirming qualification tests. No Qualified Products List shall be established.

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- 4.4.1 When no Military specification is available and an NA specification is prepared which requires a test procedure to assure compliance, the procedures delineated in NAS1495 shall be made applicable by specific reference.
- 4.5 Applicable Documents. The practices set forth in the following documents shall be applied to the fullest extent practicable when preparing NA documents:
- NA0156 Design Parameters for Male Threaded Fasteners;
 - NA* Design Parameters for Female Threaded Fasteners;
 - NA* Design Parameters for Rivet Type Fasteners;
 - NA* Design Parameters for Bearings; and
 - NA* Design Parameters for Fluid Fittings.
- 4.5.1 Referenced Documents. When a document is referenced on an NA standard, the revision level (letter, number, year, etc.) shall not be included as part of the reference unless the referenced standard dictates that the revision be listed. When necessary to distinguish between specific materials, platings, coatings or lubricants, types and/or classes should be included as part of the textual reference.
- 4.6 Revisions
- 4.6.1 No revision resulting in a "change" to a standard will be permitted affecting the interchangeability of parts or technical requirements. In no case will information pertaining to the description of a part or technical requirement ever be deleted from an NA document. Where a revision would result in dimensional or technical requirement changes which would affect physical or functional interchangeability, a separate identification shall be provided for the new item. The old identification must not be compromised.
- 4.6.2 Permissible Revisions. Permissible revisions would include the following:
- 4.6.2.1 Revisions will normally be made to NA documents in order to include additional sizes, types, grades, etc. through the addition of dash numbers or other codings providing new identifications.
- 4.6.2.2 Changes to approximate dimensions or scale, editorial updating, etc. which do not affect physical or functional interchangeability are acceptable.
- 4.6.2.3 Revisions may be made to correct obvious and unrecognized errors, but must be subjected to special review to assure that no misinterpretations could have been made which could compromise the integrity of the standard.
- 4.6.2.4 Revisions may be made to effect inactivation or cancellation.
- 4.6.3 Notation of Revision. Revisions to NA standards shall be designated by number, commencing with number 1 for the first revision, and so on. The revision number, enclosed in a 5 mm diameter circle (8 mm for oversize form), shall be placed on the field near each document change, or as indicated in 4.6.5.
- 4.6.3.1 The encircled revision number shall also be placed in the right-hand margin in the space provided for it. The revision date will be added by the NASC Secretary at the time of printing.
- 4.6.3.2 If there have been previous changes, the previous revision numbers shall be removed from the field.
- 4.6.3.3 The previous revision number and date in the margin shall be removed and the new revision and date added.
- 4.6.4 Multi-Sheet Revision. Each sheet shall show the document revision number of Sheet 1 in the revision block provided (see 4.6.3).
- 4.6.4.1 When the revision involves the addition of new pages, the revision of the new pages shall be the same as Sheet 1. If a new page is added between existing pages, the addition is considered a complete revision of that page, and all subsequent pages must be renumbered because of the inserted page.

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