

1.0 PURPOSE AND SCOPE

- 1.1 **Purpose:** This specification provides the aerospace industry with a standardization of machine toolholder nose configurations. The requirements contained herein are intended to provide a high degree of toolholder interchangeability between cutting tools.
- 1.2 **Scope:** This standard includes toolholder nose design parameters, pertinent geometries and a glossary of terms. This nose configuration with applicable drive system is referred to as a toolholder basic.
- 1.3 **Revision and Amendment:** As warranted, the scope and related portions of this specification may be expanded to provide additional tool holder—basic series.

2.0 PRECEPTS AND REQUIREMENTS

- 2.1 **Functional Precepts:** All toolholders-basic will embrace the following functional precepts unless reflected as optional.
- 2.1.1 Division into classifications for definition of differences such as size and accuracy.
- 2.1.2 Overhang of the toolholder basic shall be held to a practical minimum.
- 2.1.3 Provision for positive cutter retention.

3.0 INDEX

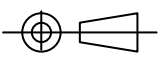
Section	Subject	Sheet
1.0	Purpose and Scope	1
2.0	Precepts and Requirements	1
3.0	Index	1
4.0	Glossary of Terms	2
5.0	Toolholder - Nose Configuration Numbering System	3
6.0	General Notes	3
7.0	Applicable Specifications	4
8.0	Toolholder - Nose Configurations - Type 1A	4
9.0	Toolholder - Nose Configurations - Types 2A and 3A	8
10.0	Toolholder - Nose Configurations - Types 1W	9
11.0	Toolholder - Nose Configurations - Types 2W and 3W	13
12.0	Jam Plug Fabrication and Jam Screw Location Details	14
13.0	Cutter Pre-Set Dimensional Data	15
14.0	Cutter Pre-Set Procedure and Set Screw Torque Data	16
15.0	Toolholder - Nose Configurations - Type 1P	17
16.0	Hexagon Socket Setscrew Dimensions for End Mill Holders (Weldon Shank Type End Mill)	18

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.
1000 WILSON BLVD.
ARLINGTON, VA 22209

THIS DRAWING SUPERSEDES ALL ANTECEDENT STANDARD DRAWINGS FOR THE SAME
PRODUCT AND SHALL BECOME EFFECTIVE NO LATER THAN SIX MONTHS FROM THE LAST
REVISION DATE:

REVISION DATE: MAY 31, 2013

ISSUE DATE: OCTOBER 1977

THIRD ANGLE PROJECTION		CUSTODIAN ENGINEERING MANAGEMENT COMMITTEE	REVISION 1
PROCUREMENT SPECIFICATION NONE	TITLE TOOL HOLDER, NOSE CONFIGURATION - MACHINE TOOLS	CLASSIFICATION DESIGN STANDARD	NAS987 SHEET 1 OF 18

4.0 GLOSSARY OF TERMS Terms relevant to this specification and the application of same areas follows:

- 4.1 Spindle: A component assembly of the machine tool, the function of which is to accept the "Tool Holder—Basic", locate, center, retain and drive it.
- 4.2 Tool Holder—Basic: The unit that fits directly into the "Spindle" of the machine and holds the "Tool."
- 4.3 Tool: A device retained by the "Tool Holder—Basic" and contacts the workpiece for the purpose of material removal.
- 4.4 Tool Set—up: Describes a combination of a "tool" and "toolholder-basic" to form a fixed unit to achieve the desired tool to "spindle" relationship.
- 4.5 Tool Preset: The capability to assemble and fix the "Tool Set-Up" off-line to pre-established length requirements.
- 4.6 SHANK: That projecting portion of an end mill which locates and drives the end mill.
- 4.7 Flute Length: As applied to end mills, the effective axial length of cutting edge (not including the cutter sweep).
- 4.8 Total Indicator Variation (TIV): The total amount of deviation from a true reading.
- 4.9 Jam Screw: A secondary setscrew normal to end mill setscrew which, when tightened, will prevent loosening of the end mill set screw.
- 4.10 Set Screw: A screw which retains an end mill in the toolholder basic.
- 4.11 Jam Plug: A soft brass plug installed between the jam screw and the end mill setscrew to prevent damage to the end mill setscrew when the jam screw is tightened.
- 4.12 Gage Line/Plane: The plane in which the gage diameter of the taper is defined (reference ANSI B5.18) or the basic reference plane from which axial dimensions of the nose are established.
- 4.13 Runout: Measured in TIV, indicated acceptable tolerances.
- 4.14 Chamfer: A beveled surface to eliminate an otherwise sharp corner.
- 4.15 Axial Screw: An axially located screw in a toolholder-basic used to position an end mill having an angular flat type shank.

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.
1000 WILSON BLVD.
ARLINGTON, VA 22209

THIS DRAWING SUPERSEDES ALL ANTECEDENT STANDARD DRAWINGS FOR THE SAME
PRODUCT AND SHALL BECOME EFFECTIVE NO LATER THAN SIX MONTHS FROM THE LAST
REVISION DATE.

FORM 09-01

REVISION

1

NAS987
SHEET 2



Document Sharing Hub

USE OF OR RELIANCE UPON THIS DOCUMENT OR ANY NATIONAL AEROSPACE STANDARD IS ENTIRELY VOLUNTARY. AIA DOES NOT QUALIFY SUPPLIERS OR CERTIFY

Copyright Aerospace Industries Association of America Inc. THIS DOCUMENT IS PRODUCED UNDER NATIONAL AEROSPACE STANDARD: AIA MAKES NO REPRESENTATION OR CLAIM RESPECTING (1) THE SUITABILITY OF
Provided by IHS under license with AIA/NAS. Licensee= www.sepana.ir/5991803002, User=sam, albert
No reproduction or networking permitted without license from IHS. Not for Resale, 01/04/2016 05:46:27 MST. TRADEMARKS RIGHTS.

Full document details: AIA NAS987 2013

5.0 TOOLHOLDER-NOSE CONFIGURATION NUMBERING SYSTEM

HOLDER NOSE LENGTH	LOCKING SYSTEM TYPE		
	ANGULAR	WELDON	PIN
STANDARD	1A	1W	1P
EXTENDED	2A	2W	-
EXTRA-EXTENDED	3A	3W	-

EXAMPLE:

NAS 987-2W-.500

.500" BORE DIA.

EXTENDED LENGTH
(HOLDER NOSE)
(WELDON CONFIGURATION)

TOOLHOLDER, NOSE CONFIGURATION FOR MACHINE TOOLS

6.0 GENERAL NOTES

- All linear dimensions in this standard are inches unless otherwise indicated.
- Toolholders—basic shall be manufactured from steels that have a capability of being heat treated to minimum yield strength of 120KSI. All surfaces, except threads and L diameter holes, shall be carburized from .020 to .040 deep and hardened to Rc 58-62. AISI 8620 or equivalent steel may be used. When AISI 8620 steel is used, the single quench method of heat treatment is preferred.
- Drive ring and shank geometry shall be in accordance with customer's requirements.
- A chemically produced black oxide finish (oiled) is required for all holders.
- Tolerances, except as noted, are as follows:

Decimal Dimensions: .X = ± .060
 .XX = ± .030
 .XXX = ± .010

Angular Dimensions = +/- 0°30'

- All corner and fillet radii = .01, except as noted.
- Finish per ASA B46.1-1962:
125 $\sqrt{1/AA}$ maximum, on all surfaces except as noted.

REVISION

1

NAS987
SHEET 3



Document Sharing Hub

USE OF OR RELIANCE UPON THIS DOCUMENT OR ANY NATIONAL AEROSPACE STANDARD IS ENTIRELY VOLUNTARY. AIA DOES NOT QUALIFY SUPPLIERS OR CERTIFY

Copyright Aerospace Industries Association of America, Inc. ALL RIGHTS RESERVED. AIA MAKES NO REPRESENTATION OR CLAIM RESPECTING (1) THE SUITABILITY OF
Provided by IHS under license with AIA/NAS. ANY PARTIAL OR APPLICATION OR (2) THE EXISTENCE OF OR APPLIC Licensee= www.sepana.ir/5991803002, User=sam, albert
No reproduction or networking permitted without license from IHS. Not for Resale, 01/04/2016 05:46:27 MST TRADEMARKS RIGHTS.

Full document details: AIA NAS987 2013

7.0 APPLICABLE SPECIFICATIONS

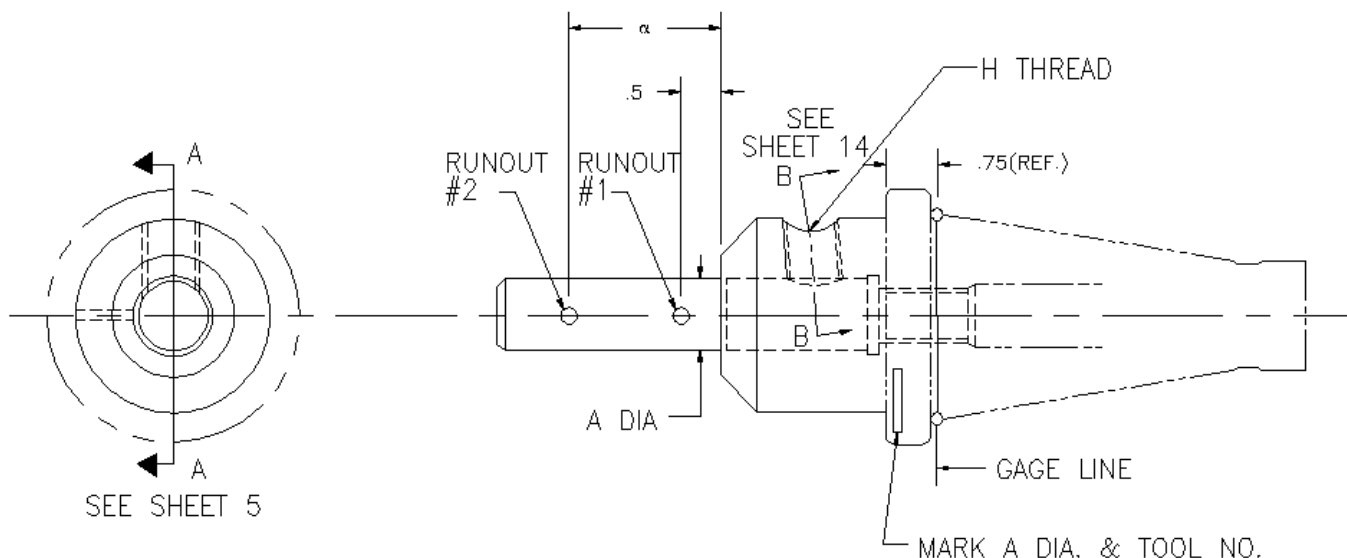
- 7.1 Milling Cutters and End Mills – ANSI B94.19, The American Society of Mechanical Engineers
- 7.2 End Mills - NAS 986, Aerospace Industries Association of America
- 7.3 Spindle Noses and Tool Shanks for Milling Machines - ANSI B5.18, The American Society of Mechanical Engineers
- 7.4 Socket Cap, Shoulder and Set Screws - ANSI B18.3, The American Society of Mechanical Engineers
- 7.5 Surface Texture - ANSI B46.1 The American Society of Mechanical Engineers

8.0 TYPE 1A - STANDARD LENGTH ANGULAR LOCKING SYSTEM

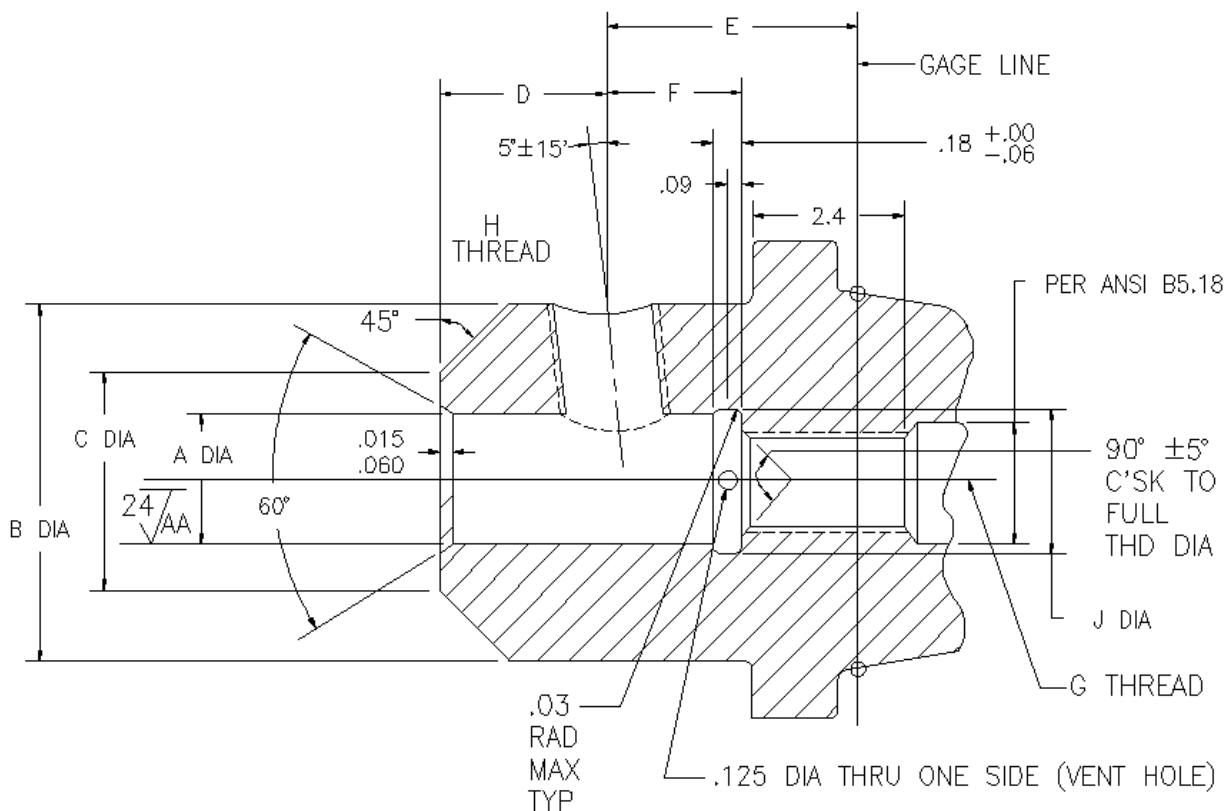
Two configurations of the Type 1A Toolholder are shown in this section. The single set screw configuration shown below is for tool shafts up to 1.250. A dual set screw configuration is shown on subsequent pages for tool shafts greater than 1.250.

$\alpha = 2.0$ FOR .375 AND .500 A DIAMETER BORES

$\alpha = 4.000$ FOR .625 THRU 1.250 A DIAMETER BORES



Concentricity tolerances at #1 and #2 relative to shank axis to be checked by snug fitting plug gage, full depth in A diameter. Runout of plug gage not to exceed .001 TIV with the set screw in H thread tightened to a finger tight torque of 1 to 5 in-lbs.



SECTION A-A
SEE SHEET 4

A DIA +.0002 -.0000	B DIA ±.015	C DIA ±.030	D ±.015	E ±.015	F ±.015	G CLASS 2B THREAD	H CLASS 3B THREAD	J DIA +.000 -.030
.3750	1.375	.62	.79	2.03	.77	3/8 - 24	3/8 - 24	.437
.5000	1.625	.75	.94	1.79	.83	3/8 - 24	3/8 - 24	.562
.6250	1.813	1.00	.95	1.71	.94	3/8 - 24	1/2 - 20	.687
.7500	2.000	1.25	1.04	1.59	.98	5/8 - 18	1/2 - 20	.812
.8750	2.250	1.38	1.03	1.60	.99	5/8 - 18	1/2 - 20	.937
1.0000	2.625	1.62	1.17	1.83	1.10	5/8 - 18	3/4 - 16	1.062
1.2500	2.875	2.00	1.17	1.83	1.10	5/8 - 18	3/4 - 16	1.312

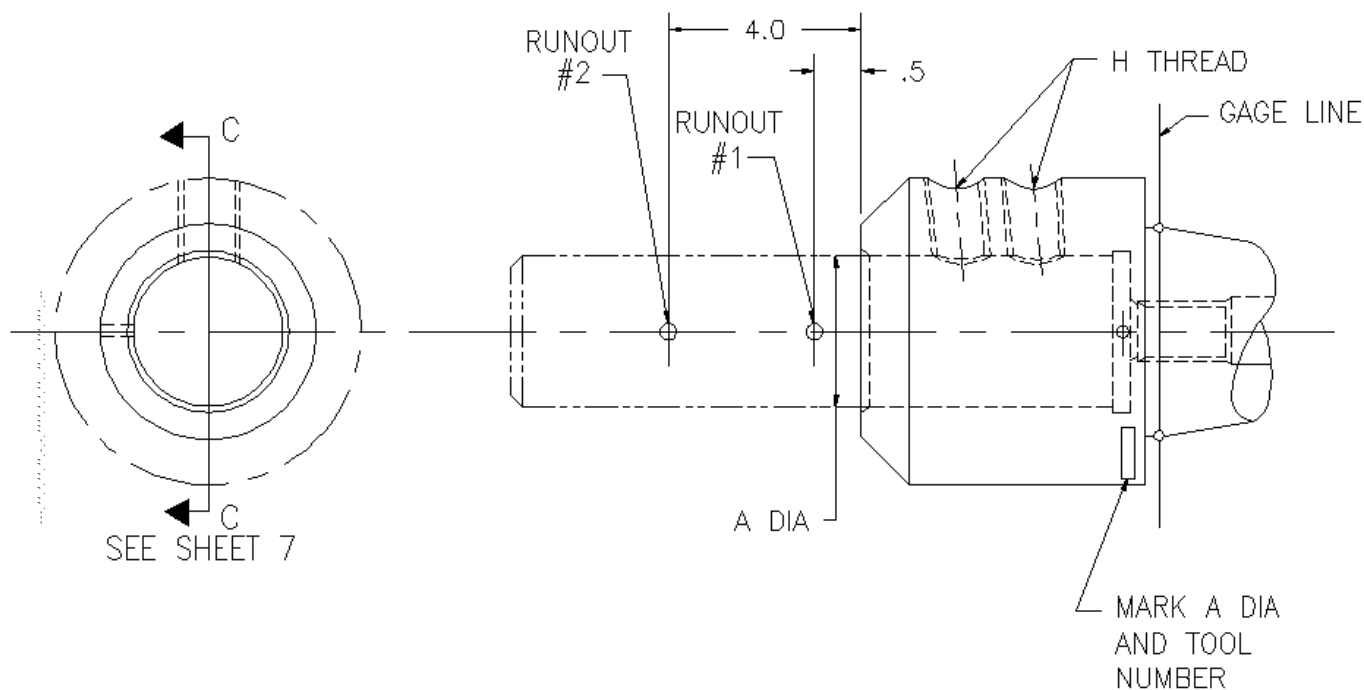
REVISION

1

DAS987
SHEET 5



Document Sharing Hub



Concentricity tolerances at #1 and #2 relative to shank axis to be checked by snug fitting plug gage, full depth in A diameter. Runout of plug gage not to exceed .001 TIV with set screws in H thread tightened to a finger tight torque of 1 to 5 in-lbs.

REVISION

1

NAS987

SHEET 6



Document Sharing Hub