

A M E R I C A N S T A N D A R D

Miniature Screws

ASA B18.11-1961

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Foreword

MINIATURE screws, as covered by this standard, are those having threads of a nominal diameter from 0.0118 inch (0.3 mm) to 0.0551 inch (1.4 mm). Demand for screws and threads of such sizes has extended in recent years from the needs of the watch industry to subminiaturization requirements of control mechanisms, instruments, and other devices. This led to the development of Unified Miniature Screw Threads, ASA B1.10-1958. This is the complement to the screw thread standard to provide a recommended series of miniature screws and nuts.

Subcommittee 13 of Sectional Committee B18 first undertook development of a product standard for miniature screws which was submitted to letter ballot of the Sectional Committee February 9, 1960. Final approval as an American Standard was given on February 20, 1961. Standards for nuts are in process of development.

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AMERICAN STANDARD

Slotted Head Miniature Screws

INTRODUCTION

1. Scope. This standard establishes head types, their dimensions, and lengths of slotted head miniature screws, threaded in conformance with American Standard Unified Miniature Screw Threads, ASA B1.10.

This standard is predicated upon information derived through research of the maximum using industries. The inclusion of four head types and the given thread sizes in the data tables is not intended to imply that all of those described in this standard are stock production items. Preferred diameter pitch combinations for general use are shown in bold type in the tables. Consumer interests are requested to consult manufacturers' catalogs for lists of current stock production miniature screws.

HEAD TYPES

2. Fillister Head. The fillister head has a flat top surface (oval crown optional), cylindrical sides, and a flat bearing surface. Head proportions are given in Table 1.

3. Pan Head. The pan head has a flat top surface, cylindrical sides, and a flat bearing surface. The head height is less than the fillister but the head diameter is slightly larger. Head proportions are given in Table 2.

4. Flat Head. The flat head has a flat top surface and a conical bearing surface with an included angle of approximately 100°. Head proportions are given in Table 3.

5. Binding Head. The head height is less than the pan head but the head diameter is greater, and is intended for applications which would otherwise require washers. Head proportions are given in Table 4.

SPECIFICATIONS

6. Head Height. The head heights given in the dimensional tables represent the metal measurement (after slotting).

7. Depth of slots. The depth of slots on fillister, pan and binding head screws is measured

from the bearing surface to the intersection of the bottom of the slot with the head diameter. On heads with a conical bearing surface, the depth of slots is measured parallel to the axis of the screw from the flat top surface to the intersection of the bottom of the slot with the bearing surface. The maximum permissible concavity of the slot shall not exceed 3 per cent of the mean head diameter.

8. Bearing surface. The bearing surface of fillister, pan and binding head screws shall be at right angles to the axis of the body within 2°.

9. Eccentricity. Eccentricity is defined as one-half of the total indicator reading.

9(a). Head Eccentricity. The heads of miniature fastening screws shall not be eccentric with the screw bodies by more than 2 per cent of the maximum head diameter or 0.001, whichever is the greater.

9(b). Eccentricity of Slots. Slots in miniature fastening screw heads shall not be eccentric with screw bodies by more than 5 per cent of the nominal body diameter.

10. Underhead Fillets. The radius of the fillet under perpendicular bearing surface type heads shall not exceed 1/2 times the pitch of the thread. The radius of the fillet under conical bearing surface type heads shall not exceed 2 times the pitch of the thread. The radius of the fillet under the binding head is given in Table 4.

11. Unthreaded Diameter. On miniature fastening screws not threaded to the head, the diameter of the unthreaded body shall not be more than the maximum major diameter of the thread nor less than the minimum pitch diameter of the thread.

12. Length. The length of miniature screws having perpendicular bearing surface type heads shall be measured from the bearing surface to the extreme end in a line parallel to the axis of the screw. The length of screws with conical bearing surface type heads shall be measured from the top of the head to the extreme end in a line parallel to the axis of the screw. Preferred lengths are those listed in Table 5.

SLOTTED HEAD MINIATURE SCREWS

13. Tolerance on Length. The length tolerance of miniature screws shall conform to the limits given in Table 5.

14. Length of Thread. On all miniature screws having a length four times the nominal body diameter or less the threaded length shall extend to within two threads of the bearing surface of the head. Screws of greater length shall possess complete threads for a minimum of four diameters.

15. End of Body. Miniature fastening screws shall be regularly supplied with flat ends having a chamfer of approximately 45° extending to the minor diameter of the thread as a minimum depth.

16. Thread Series and Tolerances. The screw threads of miniature screws shall be in conformance with American Standard Unified Miniature Screw Threads, ASA B1.10-1958.

17. Material and Finish. Miniature screws are generally supplied in ferrous and nonferrous materials, coatings and heat treatments which must be specified by the user. Coatings, when required, are limited to those of electro-plating or chemical oxidation.

18. Designation. Screws in conformance with this standard shall be identified by the designation for thread size in conformance with American Standard ASA B1.10 followed by the nominal length in units of 1/1000 inch (omitting the decimal point) and the head type. Typical examples are:

60 UNM $\times$ 040 FIL HD
100 UNM $\times$ 080 PAN HD
120 UNM $\times$ 120 FLAT HD
140 UNM $\times$ 250 BIND HD

19. Machined Finish. Roughness of the machined surfaces of heads shall not exceed 63 micro-inches arithmetical average (per ASA B46.1, Surface Texture) determined by visual comparison with roughness comparison specimens.

AMERICAN STANDARD

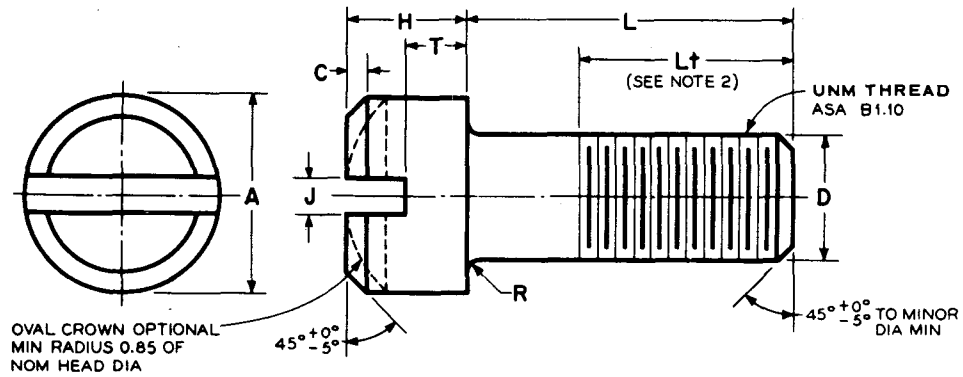


Table 1 – Fillister Head

Size Designation (a)	Thds per Inch	D Basic Major Dia	Fillister Head Dimensions									
			A Head Dia		H Head Hgt		J Slot Width		T (b) Slot Depth		C Chamfer	R (c) Radius
			Max	Min	Max	Min	Max	Min	Max	Min	Max	Max
30 UNM	318	0.0118	0.021	0.019	0.012	0.010	0.004	0.003	0.006	0.004	0.002	0.002
35 UNM	282	0.0138	0.023	0.021	0.014	0.012	0.004	0.003	0.007	0.005	0.002	0.002
40 UNM	254	0.0157	0.025	0.023	0.016	0.013	0.005	0.003	0.008	0.006	0.002	0.002
45 UNM	254	0.0177	0.029	0.027	0.018	0.015	0.005	0.003	0.009	0.007	0.002	0.002
50 UNM	203	0.0197	0.033	0.031	0.020	0.017	0.006	0.004	0.010	0.007	0.003	0.002
55 UNM	203	0.0217	0.037	0.035	0.022	0.019	0.006	0.004	0.011	0.008	0.003	0.002
60 UNM	169	0.0236	0.041	0.039	0.025	0.021	0.008	0.005	0.012	0.009	0.004	0.003
70 UNM	145	0.0276	0.045	0.043	0.028	0.024	0.008	0.005	0.014	0.011	0.004	0.003
80 UNM	127	0.0315	0.051	0.049	0.032	0.028	0.010	0.007	0.016	0.012	0.005	0.004
90 UNM	113	0.0354	0.056	0.054	0.036	0.032	0.010	0.007	0.018	0.014	0.005	0.004
100 UNM	102	0.0394	0.062	0.058	0.040	0.035	0.012	0.008	0.020	0.016	0.006	0.005
110 UNM	102	0.0433	0.072	0.068	0.045	0.040	0.012	0.008	0.022	0.018	0.006	0.005
120 UNM	102	0.0472	0.082	0.078	0.050	0.045	0.016	0.012	0.025	0.020	0.008	0.006
140 UNM	85	0.0551	0.092	0.088	0.055	0.050	0.016	0.012	0.028	0.023	0.008	0.006

(a) Bold face type indicates preferred size

(b) "T" measured from bearing surface

(c) Relative to max. major dia.

MATERIAL: CORROSION RESISTANT STEELS: ASTM Designation A276

CLASS 303, COND A

CLASS 416, COND A, HEAT TREAT TO APPROX 120,000–150,000 PSI (ROCKWELL C28–34)

CLASS 420, COND A, HEAT TREAT TO APPROX 220,000–240,000 PSI (ROCKWELL C50–53)

BRASS: TEMPER HALF HARD ASTM Designation B16

NICKEL SILVER: TEMPER HARD ASTM Designation B151, Alloy C

MACHINE FINISH:

Machined surface roughness of heads shall be approximately 63MU in. arithmetical average determined by visual comparison.

APPLIED COATINGS:

CORROSION RESISTANT STEEL: Passivate

BRASS: Bare, Black Oxide or Nickel Flash.

NICKEL SILVER: None

NOTE:

1. The diameter of the unthreaded body shall not be more than the maximum major diameter nor less than the minimum pitch diameter of the thread.
2. For screw lengths four times the major diameter or less, thread length (Lt) shall extend to within two threads of the head bearing surface. Screws of greater length shall have complete threads for a minimum of four major diameters.
3. Screws shall be free of all projecting burrs, observed at 3X magnification.
4. All dimensions are in inches.

SLOTTED HEAD MINIATURE SCREWS

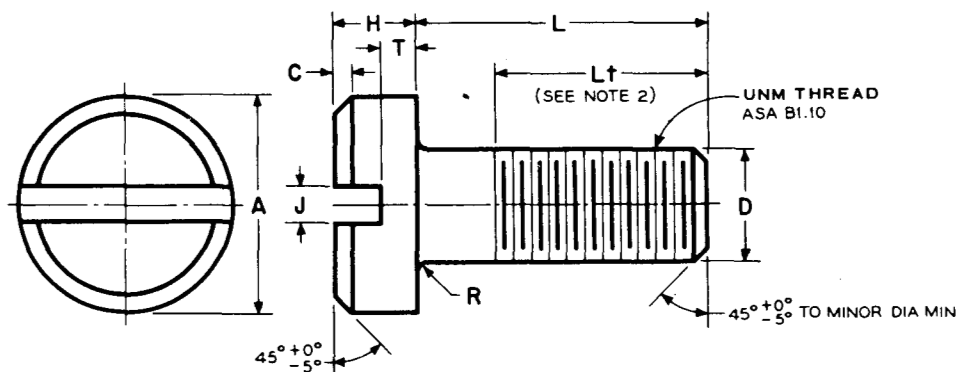


Table 2 – Pan Head

Size Designation (a)	Thds per Inch	D Basic Major Dia	Pan Head Dimensions									
			A Head Dia		B Head Hgt		J Slot Width		T (b) Slot Depth		C Chamfer	R (c) Radius
			Max	Min	Max	Min	Max	Min	Max	Min	Max	Max
30 UNM	318	0.0118	0.025	0.023	0.010	0.008	0.005	0.003	0.005	0.003	0.002	0.002
35 UNM	282	0.0138	0.029	0.027	0.011	0.009	0.005	0.003	0.006	0.004	0.002	0.002
40 UNM	254	0.0157	0.033	0.031	0.012	0.010	0.006	0.004	0.006	0.004	0.002	0.002
45 UNM	254	0.0177	0.037	0.035	0.014	0.012	0.006	0.004	0.007	0.005	0.002	0.002
50 UNM	203	0.0197	0.041	0.039	0.016	0.013	0.008	0.005	0.008	0.006	0.003	0.002
55 UNM	203	0.0217	0.045	0.043	0.018	0.015	0.008	0.005	0.009	0.007	0.003	0.002
60 UNM	169	0.0236	0.051	0.049	0.020	0.017	0.010	0.007	0.010	0.007	0.004	0.003
70 UNM	145	0.0276	0.056	0.054	0.022	0.019	0.010	0.007	0.011	0.008	0.004	0.003
80 UNM	127	0.0315	0.062	0.058	0.025	0.021	0.012	0.008	0.012	0.009	0.005	0.004
90 UNM	113	0.0354	0.072	0.068	0.028	0.024	0.012	0.008	0.014	0.011	0.005	0.004
100 UNM	102	0.0394	0.082	0.078	0.032	0.028	0.016	0.012	0.018	0.014	0.006	0.005
110 UNM	102	0.0433	0.092	0.088	0.036	0.032	0.016	0.012	0.018	0.014	0.006	0.005
120 UNM	102	0.0472	0.103	0.097	0.040	0.035	0.020	0.015	0.020	0.016	0.008	0.006
140 UNM	85	0.0551	0.113	0.107	0.045	0.040	0.020	0.015	0.022	0.018	0.008	0.006

(a) Bold face type indicates preferred size (b) "T" measured from bearing surface (c) Relative to max. major dia

MATERIAL: CORROSION RESISTANT STEELS: ASTM Designation A276

CLASS 303, COND A

CLASS 416, COND A, HEAT TREAT TO APPROX 120,000–150,000 PSI (ROCKWELL C28–34)

CLASS 420, COND A, HEAT TREAT TO APPROX 220,000–240,000 PSI (ROCKWELL C50–53)

BRASS: TEMPER HALF HARD ASTM Designation B16

NICKEL SILVER: TEMPER HARD ASTM Designation B151, Alloy C

MACHINE FINISH: Machined surface roughness of heads shall be approximately 63MU in. arithmetical average determined by visual comparison.

APPLIED COATINGS: CORROSION RESISTANT STEEL: Passivate.
BRASS: Bare, Black Oxide or Nickel Flash.
NICKEL SILVER: None

NOTE: 1. The diameter of the unthreaded body shall not be more than the maximum major diameter nor less than the minimum pitch diameter of the thread.
2. For screw lengths four times the major diameter or less, thread length (Lt) shall extend to within two threads of the head bearing surface. Screws of greater length shall have complete threads for a minimum of four major diameters.
3. Screws shall be free of all projecting burrs, observed at 3X magnification.
4. All dimensions are in inches.

AMERICAN STANDARD

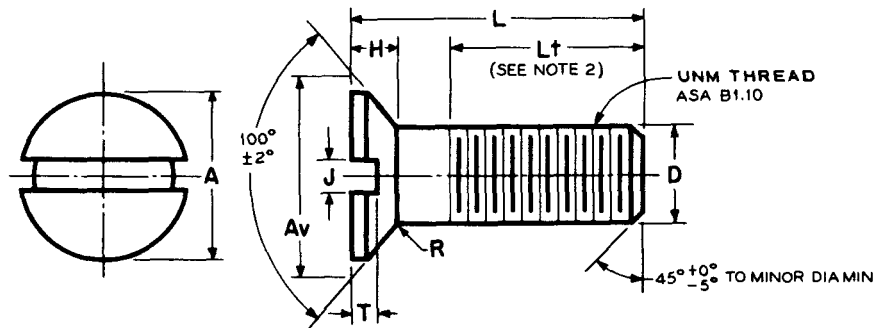


Table 3 - 100-Deg Flat Head

Size Designation (a)	Thds per Inch	D Basic Major Dia	Head Dimensions									
			A Head Dia		Av (b) Dia of Full Cone At Max H	H Head Hgt		J Slot Width		T Slot Depth		R (c) Radius
			Max	Min		Max	Min	Max	Min	Max	Min	
30 UNM	318	0.0118	0.023	0.021	0.0285	0.007	0.005	0.004	0.003	0.004	0.002	0.005
35 UNM	282	0.0138	0.025	0.023	0.0305	0.007	0.005	0.004	0.003	0.004	0.002	0.005
40 UNM	254	0.0157	0.029	0.027	0.0348	0.008	0.006	0.005	0.003	0.005	0.003	0.006
45 UNM	254	0.0177	0.033	0.031	0.0392	0.009	0.007	0.005	0.003	0.005	0.003	0.006
50 UNM	203	0.0197	0.037	0.035	0.0459	0.011	0.008	0.006	0.004	0.006	0.004	0.008
55 UNM	203	0.0217	0.041	0.039	0.0503	0.012	0.009	0.006	0.004	0.006	0.004	0.008
60 UNM	169	0.0236	0.045	0.043	0.0546	0.013	0.010	0.008	0.005	0.008	0.005	0.010
70 UNM	145	0.0276	0.051	0.049	0.0610	0.014	0.011	0.008	0.005	0.008	0.005	0.010
80 UNM	127	0.0315	0.056	0.054	0.0696	0.016	0.012	0.010	0.007	0.010	0.006	0.012
90 UNM	113	0.0354	0.062	0.058	0.0759	0.017	0.013	0.010	0.007	0.010	0.006	0.012
100 UNM	102	0.0394	0.072	0.068	0.0847	0.019	0.015	0.012	0.008	0.012	0.008	0.016
110 UNM	102	0.0433	0.082	0.078	0.0957	0.022	0.018	0.012	0.008	0.012	0.008	0.016
120 UNM	102	0.0472	0.092	0.088	0.1068	0.025	0.020	0.016	0.012	0.016	0.010	0.020
140 UNM	85	0.0551	0.103	0.097	0.1197	0.027	0.022	0.016	0.012	0.016	0.010	0.020

(a) Bold face type indicates preferred sizes
(c) Relative to max major dia

(b) (Av) Derived from max D, max H and mean angle

MATERIAL: CORROSION RESISTANT STEELS: ASTM Designation A276

CLASS 303, COND A

CLASS 416, COND A, HEAT TREAT TO APPROX 120,000–150,000 PSI (ROCKWELL C28–34)

CLASS 420, COND A, HEAT TREAT TO APPROX 220,000–240,000 PSI (ROCKWELL C50–53)

BRASS: TEMPER HALF HARD ASTM Designation B16

NICKEL SILVER: TEMPER HARD ASTM Designation B151 Alloy C

MACHINE FINISH: Machined surface roughness of heads shall be approximately 63MU in. arithmetical average determined by visual comparison.

APPLIED COATINGS: CORROSION RESISTANT STEEL: Passivate

BRASS: Bare, Black Oxide or Nickel Flash.

NICKEL SILVER: None

NOTE:

1. The diameter of the unthreaded body shall not be more than the maximum major diameter nor less than the minimum pitch diameter of the thread.
2. For screw lengths four times the major diameter or less, thread length (L_t) shall extend to within two threads of the head bearing surface. Screws of greater length shall have complete threads for a minimum of four major diameters.
3. Screws shall be free of all projecting burrs, observed at 3X magnification.
4. All dimensions are in inches.

SLOTTED HEAD MINIATURE SCREWS

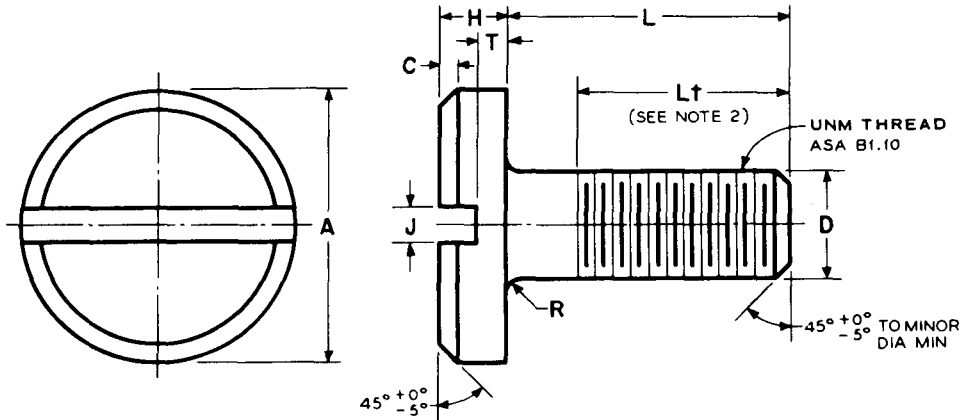


Table 4 – Binding Head

Size Designation (a)	Thds per Inch	D Basic Major Dia	Binding Head Dimensions										
			A Head Dia		H Head Hgt		J Slot Width		T (b) Slot Depth		C Chamfer	R Radius	
			Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
40 UNM	254	0.0157	0.041	0.039	0.010	0.008	0.006	0.004	0.005	0.003	0.002	0.004	0.002
45 UNM	254	0.0177	0.045	0.043	0.011	0.009	0.006	0.004	0.006	0.004	0.002	0.004	0.002
50 UNM	203	0.0197	0.051	0.049	0.012	0.010	0.008	0.005	0.006	0.004	0.003	0.004	0.002
55 UNM	203	0.0217	0.056	0.054	0.014	0.012	0.008	0.005	0.007	0.005	0.003	0.004	0.002
60 UNM	169	0.0236	0.062	0.058	0.016	0.013	0.010	0.007	0.008	0.006	0.004	0.006	0.003
70 UNM	145	0.0276	0.072	0.068	0.018	0.015	0.010	0.007	0.009	0.007	0.004	0.006	0.003
80 UNM	127	0.0315	0.082	0.078	0.020	0.017	0.012	0.008	0.010	0.007	0.005	0.008	0.004
90 UNM	113	0.0354	0.092	0.088	0.022	0.019	0.012	0.008	0.011	0.008	0.005	0.008	0.004
100 UNM	102	0.0394	0.103	0.097	0.025	0.021	0.016	0.012	0.012	0.009	0.006	0.010	0.005
110 UNM	102	0.0433	0.113	0.107	0.028	0.024	0.016	0.012	0.014	0.011	0.006	0.010	0.005
120 UNM	102	0.0472	0.124	0.116	0.032	0.028	0.020	0.015	0.016	0.012	0.008	0.012	0.006
140 UNM	85	0.0551	0.144	0.136	0.036	0.032	0.020	0.015	0.018	0.014	0.008	0.012	0.006

(a) Bold face type indicates preferred sizes

(b) "T" measured from bearing surface

MATERIAL: CORROSION RESISTANT STEELS: ASTM Designation A276

CLASS 303, COND A

CLASS 416, COND A, HEAT TREAT TO APPROX 120,000–150,000 PSI (ROCKWELL C28–34)

CLASS 420, COND A, HEAT TREAT TO APPROX 220,000–240,000 PSI (ROCKWELL C50–53)

BRASS: TEMPER HALF HARD ASTM Designation B16

NICKEL SILVER: TEMPER HARD ASTM Designation B151 Alloy C

MACHINE FINISH: Machined surface roughness of heads shall be approximately 63MU in. arithmetical average determined by visual comparison.

APPLIED CORROSION RESISTANT STEEL: Passivate.

COATINGS: BRASS: Bare, Black Oxide or Nickel Flash.

NICKEL SILVER: None

- NOTE:
1. The diameter of the unthreaded body shall not be more than the maximum major diameter nor less than the minimum pitch diameter of the thread.
 2. For screw lengths four times the major diameter or less, thread length (Lt) shall extend to within two threads of the head bearing surface. Screws of greater length shall have complete threads for a minimum of four major diameters.
 3. Screws shall be free of all projecting burrs, observed at 3X magnification.
 4. All dimensions are in inches.

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Table 5
FILLISTER AND PAN HEAD

L Length (In.)		Standard Lengths (a)													
		30 UNM	35 UNM	40 UNM	45 UNM	50 UNM	55 UNM	60 UNM	70 UNM	80 UNM	90 UNM	100 UNM	110 UNM	120 UNM	140 UNM
Max	Min	(0.0118)	(0.0138)	(0.0157)	(0.0177)	(0.0197)	(0.0217)	(0.0236)	(0.0276)	(0.0315)	(0.0354)	(0.0394)	(0.0433)	(0.0472)	(0.0551)
0.020	0.016	30-020													
0.025	0.021	30-025	35-025	40-025											
0.032	0.027	30-032	35-032	40-032	45-032	50-032									
0.040	0.035	30-040	35-040	40-040	45-040	50-040	55-040	60-040							
0.050	0.044	30-050	35-050	40-050	45-050	50-050	55-050	60-050	70-050	80-050					
0.060	0.054	30-060	35-060	40-060	45-060	50-060	55-060	60-060	70-060	80-060	90-060	100-060			
0.080	0.072	30-080	35-080	40-080	45-080	50-080	55-080	60-080	70-080	80-080	90-080	100-080	110-080	120-080	
0.100	0.092	30-100	35-100	40-100	45-100	50-100	55-100	60-100	70-100	80-100	90-100	100-100	110-100	120-100	140-100
0.120	0.110	30-120	35-120	40-120	45-120	50-120	55-120	60-120	70-120	80-120	90-120	100-120	110-120	120-120	140-120
0.160	0.150		35-160	40-160	45-160	50-160	55-160	60-160	70-160	80-160	90-160	100-160	110-160	120-160	140-160
0.200	0.188				45-200	50-200	55-200	60-200	70-200	80-200	90-200	100-200	110-200	120-200	140-200
0.250	0.238						55-250	60-250	70-250	80-250	90-250	100-250	110-250	120-250	140-250
0.320	0.304								70-320	80-320	90-320	100-320	110-320	120-320	140-320
0.400	0.384										90-400	100-400	110-400	120-400	140-400
0.500	0.480												110-500	120-500	140-500
0.600	0.580														140-600

(a) Bold face type indicates preferred sizes

100 DEG FLAT HEAD

L Length (In.)		Standard Lengths (a)													
		30 UNM	35 UNM	40 UNM	45 UNM	50 UNM	55 UNM	60 UNM	70 UNM	80 UNM	90 UNM	100 UNM	110 UNM	120 UNM	140 UNM
Max	Min	(0.0118)	(0.0138)	(0.0157)	(0.0177)	(0.0197)	(0.0217)	(0.0236)	(0.0276)	(0.0315)	(0.0354)	(0.0394)	(0.0433)	(0.0472)	(0.0551)
0.025	0.020	30-025													
0.032	0.027	30-032	35-032	40-032											
0.040	0.035	30-040	35-040	40-040	45-040	50-040									
0.050	0.044	30-050	35-050	40-050	45-050	50-050	55-050	60-050							
0.060	0.054	30-060	35-060	40-060	45-060	50-060	55-060	60-060	70-060	80-060					
0.080	0.072	30-080	35-080	40-080	45-080	50-080	55-080	60-080	70-080	80-080	90-080	100-080			
0.100	0.092	30-100	35-100	40-100	45-100	50-100	55-100	60-100	70-100	80-100	90-100	100-100	110-100	120-100	
0.120	0.110	30-120	35-120	40-120	45-120	50-120	55-120	60-120	70-120	80-120	90-120	100-120	110-120	120-120	140-120
0.160	0.150	30-160	35-160	40-160	45-160	50-160	55-160	60-160	70-160	80-160	90-160	100-160	110-160	120-160	140-160
0.200	0.188		35-200	40-200	45-200	50-200	55-200	60-200	70-200	80-200	90-200	100-200	110-200	120-200	140-200
0.250	0.238				45-250	50-250	55-250	60-250	70-250	80-250	90-250	100-250	110-250	120-250	140-250
0.320	0.304						55-320	60-320	70-320	80-320	90-320	100-320	110-320	120-320	140-320
0.400	0.384								70-400	80-400	90-400	100-400	110-400	120-400	140-400
0.500	0.480										90-500	100-500	110-500	120-500	140-500
0.600	0.580												110-600	120-600	140-600

(a) Bold face type indicates preferred sizes

SLOTTED HEAD MINIATURE SCREWS

Table 5 (Concluded)

BINDING HEAD

L Length (In.)		Standard Lengths (a)											
		40 UNM (0.0157)	45 UNM (0.0177)	50 UNM (0.0197)	55 UNM (0.0217)	60 UNM (0.0236)	70 UNM (0.0276)	80 UNM (0.0315)	90 UNM (0.0354)	100 UNM (0.0394)	110 UNM (0.0433)	120 UNM (0.0472)	140 UNM (0.0551)
Max	Min												
0.025	0.021	40-025											
0.032	0.027	40-032	45-032	50-032									
0.040	0.035	40-040	45-040	50-040	55-040	60-040							
0.050	0.044	40-050	45-050	50-050	55-050	60-050	70-050	80-050					
0.060	0.054	40-060	45-060	50-060	55-060	60-060	70-060	80-060	90-060	100-060			
0.080	0.072	40-080	45-080	50-080	55-080	60-080	70-080	80-080	90-080	100-080	110-080	120-080	
0.100	0.092	40-100	45-100	50-100	55-100	60-100	70-100	80-100	90-100	100-100	110-100	120-100	140-100
0.120	0.110	40-120	45-120	50-120	55-120	60-120	70-120	80-120	90-120	100-120	110-120	120-120	140-120
0.160	0.150	40-160	45-160	50-160	55-160	60-160	70-160	80-160	90-160	100-160	110-160	120-160	140-160
0.200	0.188		45-200	50-200	55-200	60-200	70-200	80-200	90-200	100-200	110-200	120-200	140-200
0.250	0.238				55-250	60-250	70-250	80-250	90-250	100-250	110-250	120-250	140-250
0.320	0.304						70-320	80-320	90-320	100-320	110-320	120-320	140-320
0.400	0.384								90-400	100-400	110-400	120-400	140-400
0.500	0.480										110-500	120-500	140-500
0.600	0.580												140-600

(a) Bold face type indicates preferred sizes

AMERICAN STANDARD

Appendix A

Inch - Millimeter Conversion

in.	mm	in.	mm
0.001	0.0254	0.051	1.2954
0.002	0.0508	0.052	1.3208
0.003	0.0762	0.053	1.3462
0.004	0.1016	0.054	1.3716
0.005	0.1270	0.055	1.3970
0.006	0.1524	0.056	1.4224
0.007	0.1778	0.057	1.4478
0.008	0.2032	0.058	1.4732
0.009	0.2286	0.059	1.4986
0.010	0.2540	0.060	1.5240
0.011	0.2794	0.061	1.5494
0.012	0.3048	0.062	1.5748
0.013	0.3302	0.063	1.6002
0.014	0.3556	0.064	1.6256
0.015	0.3810	0.065	1.6510
0.016	0.4064	0.066	1.6764
0.017	0.4318	0.067	1.7018
0.018	0.4572	0.068	1.7272
0.019	0.4826	0.069	1.7526
0.020	0.5080	0.070	1.7780
0.021	0.5334	0.071	1.8034
0.022	0.5588	0.072	1.8288
0.023	0.5842	0.073	1.8544
0.024	0.6096	0.074	1.8796
0.025	0.6350	0.075	1.9050
0.026	0.6604	0.076	1.9304
0.027	0.6858	0.077	1.9558
0.028	0.7112	0.078	1.9812
0.029	0.7366	0.079	2.0066
0.030	0.7620	0.080	2.0320
0.031	0.7874	0.081	2.0574
0.032	0.8128	0.082	2.0828
0.033	0.8382	0.083	2.1082
0.034	0.8636	0.084	2.1336
0.035	0.8890	0.085	2.1590
0.036	0.9144	0.086	2.1844
0.037	0.9398	0.087	2.2098
0.038	0.9652	0.088	2.2352
0.039	0.9906	0.089	2.2606
0.040	1.0160	0.090	2.2860
0.041	1.0414	0.091	2.3114
0.042	1.0668	0.092	2.3368
0.043	1.0922	0.093	2.3622
0.044	1.1176	0.094	2.3876
0.045	1.1430	0.095	2.4130
0.046	1.1684	0.096	2.4384
0.047	1.1938	0.097	2.4638
0.048	1.2192	0.098	2.4892
0.049	1.2446	0.099	2.5146
0.050	1.2700	0.100	2.5400



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