INCH-POUND

MS51960D
20 April 2011
SUPERSEDING
MS51960C
29 March 1991

DETAIL SPECIFICATION SHEET

# SCREW, MACHINE – FLAT COUNTERSUNK HEAD, 82 DEGREE, CROSS-RECESSED, CORROSION RESISTANT STEEL, UNF-2A

This specification sheet is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and FF-S-92.

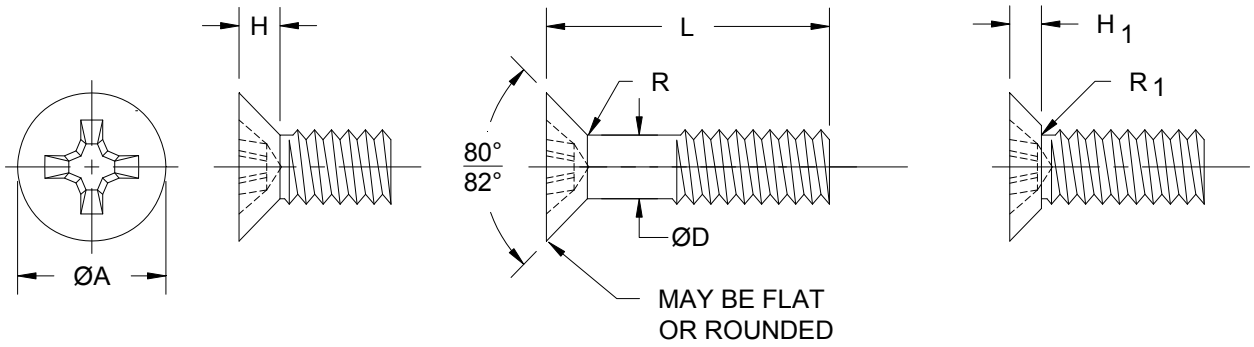


FIGURE 1. Screw.

TABLE I. Dash numbers and dimensions

| NOMINAL SIZE | | .060 | .086 | .112 | .138 | .164 | .190 | .250 | .3125 | .375 | .4375 | .500 | .5625 | .625 | .750 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| THREADS PER INCH UNF-2A | | 80 | 64 | 48 | 40 | 36 | 32 | 28 | 24 | 24 | 20 | 20 | 18 | 18 | 16 |
| ∅D BODY DIAMETER | MAX | .0600 | .0860 | .1120 | .1380 | .1640 | .1900 | .2500 | .3125 | .3750 | .4375 | .5000 | .5625 | .6250 | .7500 |
| | MIN | .0496 | .0733 | .0954 | .1184 | .1424 | .1658 | .2225 | .2806 | .3430 | .3995 | .4619 | .5205 | .5828 | .7029 |
| ∅A HEAD DIAMETER | MAX SHARP | .119 | .172 | .225 | .279 | .332 | .385 | .507 | .635 | .762 | .812 | .875 | 1.000 | 1.125 | 1.375 |
| | MIN SHARP | .105 | .156 | .207 | .257 | .308 | .359 | .477 | .600 | .722 | .767 | .831 | .950 | 1.069 | 1.306 |
| | ABS MIN | .099 | .147 | .195 | .244 | .292 | .340 | .452 | .568 | .685 | .723 | .775 | .889 | 1.002 | 1.230 |
| H HEAD HEIGHT - FULL HEAD | REF | .035 | .051 | .067 | .083 | .100 | .116 | .153 | .191 | .230 | .223 | .223 | .260 | .298 | .372 |
| $H_1$ HEAD HEIGHT UNDERCUT HEAD | MAX | .025 | .036 | .047 | .059 | .070 | .081 | .107 | .134 | .161 | .156 | .156 | .182 | .208 | .260 |
| | MIN | .018 | .028 | .038 | .048 | .058 | .068 | .092 | .116 | .140 | .133 | .130 | .153 | .176 | .223 |
| R RADIUS - FULL HEAD | MAX | .024 | .034 | .045 | .055 | .066 | .076 | .100 | .125 | .150 | .175 | .200 | .225 | .250 | .300 |
| $R_1$ RADIUS - UNDERCUT HEAD | MAX | .009 | .013 | .017 | .021 | .025 | .028 | .038 | .047 | .056 | .066 | .075 | .084 | .094 | .112 |
| DRIVER SIZE | | 0 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |
| TENSILE STRENGTH ** LOAD LBS-MIN | | 140 | 310 | 530 | 810 | 1180 | 1600 | 2910 | 4640 | 7020 | 9500 | 12800 | 16200 | 20500 | 29800 |
| L LENGTH | TOL. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. | DASH NO. |
| .12 | | 1 | 6 | 15 | 26 | 41 | | | | | | | | | |
| .19 | | 2 | 7 | 16 | 27 | 42 | 60 | | | | | | | | |
| .25 | | 3 | 8 | 17 | 28 | 43 | 61 | 78 | | | | | | | |
| .31 | | 4 | 9 | 18 | 29 | 44 | 62 | 79 | | | | | | | |
| .38 | +.00 | 5 | 10 | 19 | 30 | 45 | 63 | 80 | 95 | | | | | | |
| .44 | - .03 | | 11 | 20 | 31 | 46 | 64 | 81 | 96 | | | | | | |
| .50 | | | 12 | 21 | 32 | 47 | 65 | 82 | 97 | 110 | | | | | |
| .62 | | | 13 | 22 | 33 | 48 | 66 | 83 | 98 | 111 | 123* | | | | |
| .75 | | | 14 | 23 | 34 | 49 | 67 | 84 | 99 | 112 | 124* | 135* | | | |
| .88 | | | | 24 | 35 | 50 | 68 | 85 | 100 | 113 | 125* | 136* | 146* | 156* | |
| 1.00 | | | | 25 | 36 | 51 | 69 | 86 | 101 | 114 | 126* | 137* | 147* | 157* | 166* |
| 1.25 | | | | | 37 | 52 | 70 | 87 | 102 | 115 | 127* | 138* | 148* | 158* | 167* |
| 1.50 | | | | | 38 | 53 | 71 | 88 | 103 | 116 | 128* | 139* | 149* | 159* | 168* |
| 1.75 | +.00 | | | | 39 | 54 | 72 | 89 | 104 | 117 | 129* | 140* | 150* | 160* | 169* |
| 2.00 | - .06 | | | | 40 | 55 | 73 | 90 | 105 | 118 | 130* | 141* | 151* | 161* | 170* |
| 2.25 | | | | | | 56* | 74 | 91 | 106 | 119 | 131* | 142* | 152* | 162* | 171* |
| 2.50 | +.00 | | | | | 57* | 75 | 92 | 107 | 120 | 132* | 143* | 153* | 163* | 172* |
| 2.75 | - .09 | | | | | 58* | 76* | 93* | 108* | 121 | 133* | 144* | 154* | 164* | 173* |
| 3.00 | | | | | | 59* | 77* | 94* | 109* | 122 | 134* | 145* | 155* | 165* | 174* |

* Inactive for new design after 20 August 1974.

** Based on 80,000 PSI minimum tensile strength, load pounds are calculated by the stress areas in accordance with FED-STD-H28/2.

Requirements:

1. Material. Corrosion resistant steel, 300 series as specified in SAE AMS-QQ-S-763. Type 304 or 316 or equal to or interchangeable with 16:18 or 18:8 chromium-nickel alloy steel.

2. Surface treatment. Passivated in accordance with procurement specification.

3. Protective coating. Black oxide coating in accordance with procurement specification. (When black oxide coating is required, the dash number shall be followed by a code letter “B”).

4. Magnetic permeability. The screw shall meet the magnetic permeability requirements of the procurement specification.

5. Threads. Threads shall be in accordance with FED-STD-H28/2. Acceptability of screw threads shall be in accordance with FED-STD-H28/20, System 21.

6. Thread length. Full form threads shall extend to within 2 threads or less of head bearing surface for lengths thru 2.00 inches. Longer lengths shall have a minimum full form thread length of 1.50 inches.

7. Recess. The recess shall be in accordance with NASM9006.

8. Self-locking element. The self-locking element shall be in accordance with MIL-DTL-18240. (When a self-locking element is required, the dash number shall be followed by a code letter “L”. If black oxide coating is also required, the dash number would first be proceeded with a “B” followed by a “L”).

9. Part number. The part number shall consist of the basic MS number, followed by a dash number from Table I. A code letter ”B” for black oxide then a code letter “L” for self-locking will follow the dash number, if applicable. If black oxide is not required, and self-locking is required, an “L” will follow the dash number.

Example: MS51960 – 65 B L

- L — Self-locking element
- B — Black oxide coating
- 65 — Dash number
- MS51960 — Basic MS number

MS51960-65BL - Screw, machine-flat countersunk head, 82°, cross-recessed-corrosion resistant steel, UNF-2A; .190-32UNF-2A nominal thread size; .50 length; black oxide coated with self-locking element.

Notes:

1. All dimensions in inches.

2. Sizes above dotted line have undercut heads.

3. MS51960 supersedes MS35201, MS35250 and in part: MS35358, MS35363 and AN510.

4. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.

5. Changes from previous issue: Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Table II. AN510 Interchangeability.

The screws covered by the following dash numbers given in AN510 in part are canceled after the date indicated on the document. The canceled screws cannot always replace the new screws and should be used until existing stocks are depleted. Use only the new screws for new design and engineering. Replacement shall be in accordance with this table and as follows: AN510 dash numbers having an “R” in place of the “-“ are superseded byMS51960 dash numbers as those having the “-“.

| Part Number | | Part Number | | Part Number | | Part Number | | Part Number | |
|---|---|---|---|---|---|---|---|---|---|
| Canceled | New | Canceled | New | Canceled | New | Canceled | New | Canceled | New |
| AN510 | MS51960 | AN510 | MS51960 | AN510 | MS51960 | AN510 | MS51960 | AN510 | MS51960 |
| C0-2 | 1 | C4-11 | ** | C6-30 | ** | C8-42 | ** | C10-44 | 76 |
| C0-3 | 2 | C4-12 | 23 | C6-32 | 40 | C8-44 | 58 | C10-46 | ** |
| C0-4 | 3 | C4-13 | ** | C6-34 | ** | C8-46 | ** | C10-48 | 77 |
| C0-5 | 4 | C4-14 | 24 | C6-36 | ** | C8-48 | 59 | C416-6 | 80 |
| C0-6 | 5 | C4-15 | ** | C6-38 | ** | C10-4 | 61 | C416-7 | 81 |
| C0-7 | ** | C4-16 | 25 | C6-40 | ** | C10-5 | 62 | C416-8 | 82 |
| C0-8 | ** | C4-18 | ** | C8-4 | 43 | C10-6 | 63 | C416-9 | ** |
| C1-2 | ** | THRU | ** | C8-5 | 44 | C10-7 | 64 | C416-10 | 83 |
| THRU | ** | C4-28 | ** | C8-6 | 45 | C10-8 | 65 | C416-11 | ** |
| C1-8 | ** | C5-4 | ** | C8-7 | 46 | C10-9 | ** | C416-12 | 84 |
| C2-3 | 7 | THRU | ** | C8-8 | 47 | C10-10 | 66 | C416-13 | ** |
| C2-4 | 8 | C5-28 | ** | C8-9 | ** | C10-11 | ** | C416-14 | 85 |
| C2-5 | 9 | C6-4 | 28 | C8-10 | 48 | C10-12 | 67 | C416-15 | ** |
| C2-6 | 10 | C6-5 | 29 | C8-11 | ** | C10-13 | ** | C416-16 | 86 |
| C2-7 | 11 | C6-6 | 30 | C8-12 | 49 | C10-14 | 68 | C416-18 | ** |
| C2-8 | 12 | C6-7 | 31 | C8-13 | ** | C10-15 | ** | C416-20 | 87 |
| C2-9 | ** | C6-8 | 32 | C8-14 | 50 | C10-16 | 69 | C416-22 | ** |
| C2-10 | 13 | C6-9 | ** | C8-15 | ** | C10-18 | ** | C416-24 | 88 |
| C2-11 | ** | C6-10 | 33 | C8-16 | 51 | C10-20 | 70 | C416-26 | ** |
| C2-12 | 14 | C6-11 | ** | C8-18 | ** | C10-22 | ** | C416-28 | 89 |
| C3-3 | ** | C6-12 | 34 | C8-20 | 52 | C10-24 | 71 | C416-30 | ** |
| THRU | ** | C6-13 | ** | C8-22 | ** | C10-26 | ** | C416-32 | 90 |
| C3-12 | ** | C6-14 | 35 | C8-24 | 53 | C10-28 | 72 | C416-34 | ** |
| C4-3 | 16 | C6-15 | ** | C8-26 | ** | C10-30 | ** | C416-36 | 91 |
| C4-4 | 17 | C6-16 | 36 | C8-28 | 54 | C10-32 | 73 | C416-38 | ** |
| C4-5 | 18 | C6-18 | ** | C8-30 | ** | C10-34 | ** | C416-40 | 92 |
| C4-6 | 19 | C6-20 | 37 | C8-32 | 55 | C10-36 | 74 | C416-42 | ** |
| C4-7 | 20 | C6-22 | ** | C8-34 | ** | C10-38 | ** | C416-44 | 93 |
| C4-8 | 21 | C6-24 | 38 | C8-36 | 56 | C10-40 | 75 | C416-46 | ** |
| C4-9 | ** | C6-26 | ** | C8-38 | ** | C10-42 | ** | C416-48 | 94 |
| C4-10 | 22 | C6-28 | 39 | C8-40 | 57 | | | | |

** No replacement

TABLE III. MS35201 and MS35250 Interchangeability.

The screws covered by the following dash numbers given in MS35201 and MS35250 are canceled after 19 December 1963. The canceled screws cannot always replace the new screws and should be used until existing stocks are depleted. Use only the new screws for new design and engineering. Replacement shall be in accordance with this table.

| Part Number | | | Part Number | | | Part Number | | | Part Number | |
|---|---|---|---|---|---|---|---|---|---|---|
| Canceled | | New | Canceled | | New | Canceled | | New | Canceled | New |
| MS35201 | MS35250 | MS51960 | MS35201 | MS35250 | MS51960 | MS35201 | MS35250 | MS51960 | MS35250 | MS51960 |
| | 1 | 1 | 37 | 49 | 42 | 73 | 93 | 86 | 137 | 130 |
| | 2 | 2 | 38 | 50 | 43 | 74 | 94 | 87 | 138 | 131 |
| | 3 | 3 | 39 | 51 | 44 | 75 | 95 | 88 | 139 | 132 |
| | 4 | 4 | 40 | 52 | 45 | 76 | 96 | 89 | 140 | 133 |
| | 5 | 5 | 41 | 53 | 46 | 77 | 97 | 90 | 141 | 134 |
| | 6 | ** | 42 | 54 | 47 | 78 | 98 | 91 | 142 | 135 |
| | THRU | ** | 43 | 55 | 48 | 79 | 99 | 92 | 143 | 136 |
| | 12 | ** | 44 | 56 | 49 | | 100 | 93 | 144 | 137 |
| 1 | 13 | 6 | 45 | 57 | 50 | | 101 | 94 | 145 | 138 |
| 2 | 14 | 7 | 46 | 58 | 51 | 80 | 102 | 95 | 146 | 139 |
| 3 | 15 | 8 | 47 | 59 | 52 | 81 | 103 | 96 | 147 | 140 |
| 4 | 16 | 9 | 48 | 60 | 53 | 82 | 104 | 97 | 148 | 141 |
| 5 | 17 | 10 | 49 | 61 | 54 | 83 | 105 | 98 | 149 | 142 |
| 6 | 18 | 11 | 50 | 62 | 55 | 84 | 106 | 99 | 150 | 143 |
| 7 | 19 | 12 | | 63 | 56 | 85 | 107 | 100 | 151 | 144 |
| 8 | 20 | 13 | | 64 | 57 | 86 | 108 | 101 | 152 | 145 |
| 9 | 21 | 14 | | 65 | 58 | 87 | 109 | 102 | 153 | 146 |
| 10 | 22 | 15 | | 66 | 59 | 88 | 110 | 103 | 154 | 147 |
| 11 | 23 | 16 | | 67 | 60 | 89 | 111 | 104 | 155 | 148 |
| 12 | 24 | 17 | 51 | 68 | 61 | 90 | 112 | 105 | 156 | 149 |
| 13 | 25 | 18 | 52 | 69 | 62 | 91 | 113 | 106 | 157 | 150 |
| 14 | 26 | 19 | 53 | 70 | 63 | 92 | 114 | 107 | 158 | 151 |
| 15 | 27 | 20 | 54 | 71 | 64 | | 115 | 108 | 159 | 152 |
| 16 | 28 | 21 | 55 | 72 | 65 | | 116 | 109 | 160 | 153 |
| 17 | 29 | 22 | 56 | 73 | 66 | 93 | 117 | 110 | 161 | 154 |
| 18 | 30 | 23 | 57 | 74 | 67 | 94 | 118 | 111 | 162 | 155 |
| 19 | 31 | 24 | 58 | 75 | 68 | 95 | 119 | 112 | 163 | 156 |
| 20 | 32 | 25 | 59 | 76 | 69 | 96 | 120 | 113 | 164 | 157 |
| 21 | 33 | 26 | 60 | 77 | 70 | 97 | 121 | 114 | 165 | 158 |
| 22 | 34 | 27 | 61 | 78 | 71 | 98 | 122 | 115 | 166 | 159 |
| 23 | 35 | 28 | 62 | 79 | 72 | 99 | 123 | 116 | 167 | 160 |
| 24 | 36 | 29 | 63 | 80 | 73 | 100 | 124 | 117 | 168 | 161 |
| 25 | 37 | 30 | 64 | 81 | 74 | 101 | 125 | 118 | 169 | 162 |
| 26 | 38 | 31 | 65 | 82 | 75 | 102 | 126 | 119 | 170 | 163 |
| 27 | 39 | 32 | | 83 | 76 | 103 | 127 | 120 | 171 | 164 |
| 28 | 40 | 33 | | 84 | 77 | 104 | 128 | 121 | 172 | 165 |
| 29 | 41 | 34 | | 85 | 78 | 105 | 129 | 122 | 173 | 166 |
| 30 | 42 | 35 | 66 | 86 | 79 | | 130 | 123 | 174 | 167 |
| 31 | 43 | 36 | 67 | 87 | 80 | | 131 | 124 | 175 | 168 |
| 32 | 44 | 37 | 68 | 88 | 81 | | 132 | 125 | 176 | 169 |
| 33 | 45 | 38 | 69 | 89 | 82 | | 133 | 126 | 177 | 170 |
| 34 | 46 | 39 | 70 | 90 | 83 | | 134 | 127 | 178 | 171 |
| 35 | 47 | 40 | 71 | 91 | 84 | | 135 | 128 | 179 | 172 |
| 36 | 48 | 41 | 72 | 92 | 85 | | 136 | 129 | 180 | 173 |
| | | | | | | | | | 181 | 174 |

** No replacement

Custodians:
Army - AV
Navy - SH
Air Force - 99

Review activities:
Army – AT,EA,MI
Navy – MC, OS

Preparing activity:
DLA - IS

(Project 5305-2011-007)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.daps.dla.mil.