

AEROSPACE MATERIAL SPECIFICATIONS

AMS 2231c

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TOLERANCES Carbon Steel Bars

1. PURPOSE: To publish established manufacturing tolerances.
2. APPLICATION: Tolerances shown herein apply, unless otherwise agreed upon by purchaser and vendor. These tolerances apply to all conditions, unless otherwise noted.
3. DIAMETER OR THICKNESS:
 - 3.1 Cold Finished:

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TABLE I

| Nominal Diameter or Thickness Inches | Tolerances, Inch, Minus Only Maximum of Carbon Range, % | | | |
|--|--|------------------------------|-----------------------------------|--|
| | Up to 0.28, incl | Over 0.28 to 0.55 incl | All Carbons Stress Relieved | Over 0.55 and all carbons Heat Treated |

ROUNDS

| | | | | |
|---------------------------|-------|-------|-------|-------|
| Up to 1.000, incl | 0.002 | 0.003 | 0.004 | 0.006 |
| Over 1.000 to 2.000, incl | 0.003 | 0.004 | 0.006 | 0.008 |
| Over 2.000 to 4.000, incl | 0.004 | 0.005 | 0.008 | 0.010 |
| Over 4.000 to 6.000, incl | 0.005 | 0.006 | 0.010 | 0.012 |
| Over 6.000 to 7.750, incl | 0.006 | 0.008 | 0.012 | 0.016 |
| Over 7.750 to 9.000, incl | 0.007 | 0.010 | 0.014 | 0.018 |

HEXAGONS

| | | | | |
|----------------------------|-------|-------|-------|-------|
| Up to 0.3125, incl | 0.002 | 0.003 | 0.004 | 0.006 |
| Over 0.3125 to 1.000, incl | 0.003 | 0.004 | 0.006 | 0.008 |
| Over 1.000 to 2.500, incl | 0.004 | 0.005 | 0.008 | 0.010 |
| Over 2.500 to 3.125, incl | 0.005 | 0.006 | 0.010 | 0.012 |

SQUARES

| | | | | |
|----------------------------|-------|-------|-------|-------|
| Up to 0.3125, incl | 0.003 | 0.004 | 0.006 | 0.008 |
| Over 0.3125 to 1.000, incl | 0.004 | 0.005 | 0.008 | 0.010 |
| Over 1.000 to 2.500, incl | 0.005 | 0.006 | 0.010 | 0.012 |
| Over 2.500 to 4.000, incl | 0.006 | 0.008 | 0.012 | 0.016 |

TABLE I (Con't.)

FLATS

| Nominal Width Inches | | | | |
|---------------------------|-------|-------|-------|-------|
| Up to 0.750, incl | 0.003 | 0.004 | 0.006 | 0.008 |
| Over 0.750 to 1.500, incl | 0.004 | 0.005 | 0.008 | 0.010 |
| Over 1.500 to 3.000, incl | 0.005 | 0.006 | 0.010 | 0.012 |
| Over 3.000 to 4.000, incl | 0.006 | 0.008 | 0.011 | 0.016 |
| Over 4.000 to 6.000, incl | 0.008 | 0.010 | 0.012 | 0.020 |
| Over 6.000 | 0.013 | -- | -- | -- |

3.1.1 When rough turned bars are permitted, the above tolerances shall be doubled.

3.1.2 The tolerance for flats applies to both width and thickness.

3.2 Ground and Polished Rounds:

| ϕ | Nominal Diameter Inches | Tolerance, Inch, Minus Only |
|--------|----------------------------|-----------------------------|
| | Up to 2.5, excl | 0.002 |
| | 2.5 to 4.0, incl | 0.003 |

3.3 Hot Finished:

TABLE II

ROUNDS AND SQUARES

| ϕ | Nominal Diameter or Thickness Inches | Tolerance, Inch | | Out-of-Round or Out-of-Square Inch |
|--------|--|-----------------|-------|--|
| | | Plus | Minus | |
| | Up to 0.3125, incl | 0.005 | 0.005 | 0.008 |
| | Over 0.3125 to 0.4375, incl | 0.006 | 0.006 | 0.009 |
| | Over 0.4375 to 0.625, incl | 0.007 | 0.007 | 0.010 |
| | Over 0.625 to 0.875, incl | 0.008 | 0.008 | 0.012 |
| | Over 0.875 to 1.000, incl | 0.009 | 0.009 | 0.013 |
| | Over 1.000 to 1.125, incl | 0.010 | 0.010 | 0.015 |
| | Over 1.125 to 1.250, incl | 0.011 | 0.011 | 0.016 |
| | Over 1.250 to 1.375, incl | 0.012 | 0.012 | 0.018 |
| | Over 1.375 to 1.500, incl | 0.014 | 0.014 | 0.021 |
| | Over 1.500 to 2.000, incl | 0.016 | 0.016 | 0.023 |
| | Over 2.000 to 2.500, incl | 0.031 | 0 | 0.023 |
| | Over 2.500 to 3.500, incl | 0.047 | 0 | 0.035 |
| | Over 3.500 to 4.500, incl | 0.063 | 0 | 0.046 |
| | Over 4.500 to 5.500, incl | 0.078 | 0 | 0.058 |
| | Over 5.500 to 6.500, incl | 0.125 | 0 | 0.070 |
| | Over 6.500 to 8.250, incl | 0.156 | 0 | 0.085 |
| | Over 8.250 to 9.500, incl | 0.188 | 0 | 0.100 |