

TOLERANCES

HR CARBON AND ALLOY BARS

Rounds and Squares

Specified Size in Inches	Variation from Size in Inches		Out of Round* or Square in Inches
	Over	Under	
Up to $\frac{5}{16}$, incl.	.005	.005	.008
Over $\frac{5}{16}$ to $\frac{7}{16}$, incl.	.006	.006	.009
Over $\frac{7}{16}$ to $\frac{5}{8}$, incl.	.007	.007	.010
Over $\frac{5}{8}$ to $\frac{7}{8}$, incl.	.008	.008	.012
Over $\frac{7}{8}$ to 1, incl.	.009	.009	.013
Over 1 to $1\frac{1}{8}$, incl.	.010	.010	.015
Over $1\frac{1}{8}$ to $1\frac{1}{4}$, incl.	.011	.011	.016
Over $1\frac{1}{4}$ to $1\frac{3}{8}$, incl.	.012	.012	.018
Over $1\frac{3}{8}$ to $1\frac{1}{2}$, incl.	.014	.014	.021
Over $1\frac{1}{2}$ to 2, incl.	$\frac{1}{64}$	$\frac{1}{64}$.023
Over 2 to $2\frac{1}{2}$, incl.	$\frac{1}{32}$	0	.023
Over $2\frac{1}{2}$ to $3\frac{1}{2}$, incl.	$\frac{3}{64}$	0	.035
Over $3\frac{1}{2}$ to $4\frac{1}{2}$, incl.	$\frac{1}{16}$	0	.046
Over $4\frac{1}{2}$ to $5\frac{1}{2}$, incl.	$\frac{5}{64}$	0	.058
Over $5\frac{1}{2}$ to $6\frac{1}{2}$, incl.	$\frac{1}{8}$	0	.070
Over $6\frac{1}{2}$ to $8\frac{1}{4}$, incl.	$\frac{5}{32}$	0	.085
Over $8\frac{1}{4}$ to $9\frac{1}{2}$, incl.	$\frac{3}{16}$	0	.100
Over $9\frac{1}{2}$ to 10, incl.	$\frac{1}{4}$	0	.120

*Out-of-round is the difference between the maximum and minimum diameters of a round bar measured at the same cross section. Out-of-square is the difference in the two dimensions at the same cross section of a square bar—each dimension being the distance between opposite faces.

HEXAGONS AND OCTAGONS

Specified Sizes Between Opposite Sides, in.	Permissible Variations from Specified Size, in.		Out-of-Hexagon (Carbon Steel and Alloy Steel) or Out-of-Octagon (Alloy Steel), in.*
	Over	Under	
To $\frac{1}{2}$, incl.	0.007	0.007	0.001
Over $\frac{1}{2}$ to 1, incl.	0.010	0.010	0.015
Over 1 to $1\frac{1}{2}$, incl.	0.021	0.013	0.025
Over $1\frac{1}{2}$ to 2, incl.	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{32}$
Over 2 to $2\frac{1}{2}$, incl.	$\frac{3}{64}$	$\frac{1}{64}$	$\frac{3}{64}$
Over $2\frac{1}{2}$ to $3\frac{1}{2}$, incl.	$\frac{1}{16}$	$\frac{1}{64}$	$\frac{1}{16}$
Over $3\frac{1}{2}$ to $4\frac{1}{6}$, incl.	$\frac{5}{64}$	$\frac{1}{64}$	$\frac{5}{64}$

*Out-of-hexagon or out-of-octagon is the greatest difference between any two dimensions at the same cross section between opposite faces.

SQUARE EDGE AND ROUND EDGE FLATS

Tolerances apply to thickness in Inches

Specified width in Inches	.023 - .230 excl.	Variations from Thickness in Inches (Tolerances are over or under)						Variations from width in Inches	
		Under $\frac{1}{4}$	$\frac{1}{4}$ - $\frac{1}{2}$	Over $\frac{1}{2}$ - 1	Over 1 - 2	Over 2 - 3	Over 3	Over $\frac{1}{64}$	Under $\frac{1}{64}$
Up to 1	0.007	.007	.008	.010	—	—	—	$\frac{1}{64}$	$\frac{1}{64}$
Over 1-2	0.007	.007	.012	.015	$\frac{1}{32}$	—	—	$\frac{1}{32}$	$\frac{1}{32}$
Over 2-4	0.008	.008	.015	.020	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{32}$
Over 4-6	0.009	.009	.015	.020	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{3}{64}$	$\frac{3}{32}$	$\frac{1}{16}$
Over 6-8	—	.015	.016	.025	$\frac{1}{32}$	$\frac{3}{64}$	**	$\frac{1}{8}$ **	$\frac{3}{32}$ **

* Not produced as bar flats.

** Thickness and width tolerances for flats over 6" to 8", incl., in width and over 3" in thickness should be established in each instance.

Standard Straightness — $\frac{1}{4}$ " in any 5 feet, or $\frac{1}{4}$ " \times number of feet of length divided by 5.

Special Straightness — $\frac{1}{8}$ " in any 5 feet, or $\frac{1}{8}$ " \times number of feet of length divided by 5.

NOTE — Straightness tolerances do not apply to hot rolled alloy steel bars if any subsequent heating operation has been performed.

TOLERANCES**CF CARBON BARS**

Cold Drawn or Turned & Polished

Size Range in Inches	Undersize Variations in Inches			
	Max. Carbon Range .28% or less	Max. Carbon Range Over .28% to .55% incl.	Max. Carbon Range to 0.55% incl. Stress Relieved or Annealed After Cold Finishing	Max. Carbon Range Over 55% or all Grades Quenched & Tempered or Normalized and Tempered Before Cold Finishing
1½ or under	.002	.003	.004	.005
Over 1½ to 2½, incl.	.003	.004	.005	.006
Over 2½ to 4, incl.	.004	.005	.006	.007
Over 4 to 6, incl.	.005	.006	.007	.008
Over 6 to 8, incl.	.006	.007	.008	.009
Over 8 to 9, incl.	.007	.008	.009	.010
Over 9.008	.009	.010	.011	

COLD DRAWN HEXAGONS

¾ or under	.002	.003	.004	.006
Over ¾ to 1½, incl.	.003	.004	.005	.007
Over 1½ to 2½, incl.	.004	.005	.006	.008
Over 2½ to 3½, incl.	.005	.006	.007	.009
Over 3½ to 4, incl.	.005	.006	—	—

COLD DRAWN SQUARES

¾ or under	.002	.004	.005	.007
Over ¾ to 1½, incl.	.003	.005	.006	.008
Over 1½ to 2½, incl.	.004	.006	.007	.009
Over 2½ to 4, incl.	.006	.008	.009	.011
Over 4 to 5, incl.	.010	—	—	—
Over 5 to 6, incl.	.014	—	—	—

COLD DRAWN FLATS

Tolerances for flats apply to thickness as well as width

Width in Inches				
To ¾, incl.	.003	.004	.006	.008
Over ¾ to 1½, incl.	.004	.005	.008	.010
Over 1½ to 3, incl.	.005	.006	.010	.012
Over 3 to 4, incl.	.006	.008	.011	.016
Over 4 to 6, incl.	.008	.010	.012	.020
Over 6.013	.015	—	—	—

**TURNED, GROUND AND POLISHED ROUNDS
COLD DRAWN, GROUND AND POLISHED ROUNDS**

Size Range in Inches	Undersize Variations in Inches	
	Turned, Ground and Polished Rounds	Cold Drawn, Ground and Polished Rounds
1½ and under	-.0005 to -.0015	.001
Over 1½ to less than 2½	-.0005 to -.0020	.0015
2½ to 3, incl.	-.0005 to -.0025	.002
Over 3 to 4, incl.	-.0005 to -.0035	.003
Over 4 to 6, incl.	-.0005 to -.0045	.004
Over 6-.0005 to -.0055	.005	

*All tolerances are on the minus side, +.000.

For nonresulphurized steels (steels specified to maximum sulphur limits under 0.08%) or for steels thermally treated, the tolerance is increased by .001".

TOLERANCES**CF ALLOY BARS****Cold Drawn or Turned & Polished**

Specified Size in Inches	Undersize Variations in Inches			Max. Carbon range over 0.55% with or without stress relieving or annealing after cold finishing. Also all carbons Heat Tr. or Norm. & Temp. before cold Finishing
	Max. Carbon Range .28% or less	Max. Carbon Range over .28 to .55% incl.	Annld. or Stress Relieved after C.F. Max. carb. to .55%	
To 1 incl. (in coils)	.002	.003	.004	.005
To 1½ incl.	.003	.004	.005	.006
Over 1½ to 2½	.004	.005	.006	.007
Over 2½ to 4	.005	.006	.007	.008
Over 4 to 6	.006	.007	.008	.009
Over 6 to 8	.007	.008	.009	.010
Over 8 to 9	.008	.009	.010	.011
Over 9.009	.010	.011	.012	

COLD DRAWN HEXAGONS

To ¾, incl.	.003	.004	.005	.007
Over ¾ to 1½	.004	.005	.006	.008
Over 1½ to 2½	.005	.006	.007	.009
Over 2½ to 3½	.006	.007	.008	.010

COLD DRAWN SQUARES

To ¾, incl.	.003	.005	.006	.008
Over ¾ to 1½	.004	.006	.007	.009
Over 1½ to 2½	.005	.007	.008	.010
Over 2½ to 4	.007	.009	.010	.012
Over 4 to 5	.011	—	—	—

COLD DRAWN FLATS

Tolerances for flats apply to thickness as well as width

Width in Inches				
To ¾, incl.	.004	.005	.007	.009
Over ¾ to 1½	.005	.006	.009	.011
Over 1½ to 3	.006	.007	.011	.013
Over 3 to 4	.007	.009	.012	.017
Over 4 to 6	.009	.011	.013	.021
Over 6.014	—	—	—	—

**COLD DRAWN, GROUND AND POLISHED ROUNDS
TURNED, GROUND AND POLISHED ROUNDS**

Diameter in Inches	Cold Drawn, Ground & Polished		Turned, Ground & Polished	
	All Carbons with or without thermal treatment before Cold Drawing		Not Heat Treated All Carb.	Heat* Treated All Carb.
To 1½ incl.	.001	.0005	.0015	.0015
Over 1½ to 2½, excl.	.0015	.0005	.0020	.0020
2½ to 3, incl.	.002	.0005	.0025	.0025
Over 3 to 4, incl.	.003	.0005	.0035	.0035
Over 4 to 6, incl.	—	.0005	.0045	.0045
Over 6—	.0005	.0055	.0055	

*All tolerances are on the minus side, +.000. Applies to quenched and tempered (heat treated), normalized and tempered, or any similar double treatment prior to turning.