



ALLOYS

- HOT ROLLED HEAT TREATED ROUNDS
- COLD DRAWN

HOT ROLLED 4140 HT ROUNDS

Sizes In Inches	Lbs Per Foot	Est Lbs Per 20' Bar
1"	2.67	53
1-1/4	4.176	84
1-1/2	6.008	120
1-3/4	8.18	164
2"	10.68	214
2-1/4	13.52	270
2-1/2	16.69	334
2-3/4	20.20	404
3"	24.03	481
3-1/2	32.71	654
4"	42.73	855
4-1/2	54.08	1082
5"	66.76	1335
5-1/2	80.78	1616
6"	96.13	1923
6-1/2	112.81	2256
7	130.8	2616
8	170.88	3418
9	216.30	4326
10	267.00	5340

HOT ROLLED ALLOY BARS SIZE TOLERANCES AND OUT- OF- ROUND OR OUT- OF- SQUARE TOLERANCES

Hot Rolled Alloy Bars Round, Square, and Round-Cornered Square

Specified Sizes (Inches)	Size Tolerances (Inches)		Out-Of-Round or Out-of-Square Section (Inches)
	Over	Under	
Up thru 5/16	0.005	0.005	0.008
Over 5/16 thru 7/16	0.006	0.006	0.009
Over 7/16 thru 5/8	0.007	0.007	0.010
Over 5/8 thru 7/8	0.008	0.008	0.012
Over 7/8 thru 1	0.009	0.009	0.013
Over 1 thru 1-1/8	0.010	0.010	0.015
Over 1-1/8 thru 1-1/4	0.011	0.011	0.016
Over 1-1/4 thru 1-3/8	0.012	0.012	0.018
Over 1-3/8 thru 1-1/2	0.014	0.014	0.021
Over 1-1/2 thru 2	1/64	1/64	0.023
Over 2 thru 2-1/2	1/32	0	0.023
Over 2-1/2 thru 3-1/2	3/64	0	0.035
Over 3-1/2 thru 4-1/2	1/16	0	0.046
Over 4-1/2 thru 5-1/2	5/64	0	0.058
Over 5-1/2 thru 6-1/2	1/8	0	0.070
Over 6-1/2 thru 8-1/4	5/32	0	0.085
Over 8-1/4 thru 9-1/2	3/16	0	0.100
Over 9-1/2 thru 10	1/4	0	0.120

Out-of-round is the difference between the maximum and minimum diameters of the bar, measured at the same transverse cross section. Out-of-square section is the difference in perpendicular distance between opposite faces, measured at the same transverse cross section.

DCF TOLERANCES - FLATS and SQUARES.

Thickness 1/2" thru 4" +0.015 to +0.077 oversize on width

Thickness over 4" +0.062 to +0.124 oversize on width

Thickness +0.015 to +0.035 oversize

AISI 4140 - ANNEALED ROUNDS

HR (ALSO AVAILABLE IN DCF)

Diameter (Inches)	Pounds (per ft.)	Diameter (Inches)	Pounds (per ft.)	Diameter (Inches)	Pounds (per ft.)
1/2	0.672	2-3/4	20.196	6-1/4	104.292
5/8	1.044	2-7/8	22.068	6-1/2	112.812
3/4	1.500	3"	24.036	6-3/4	121.656
7/8	2.040	3-1/8	26.076	7"	130.836
1"	2.676	3-1/4	28.200	7-1/4	140.340
1-1/8	3.384	3-3/8	30.408	7-1/2	150.192
1-1/4	4.176	3-1/2	32.712	7-3/4	160.368
1-3/8	5.052	3-5/8	35.088	8"	170.880
1-1/2	6.012	3-3/4	37.548	8-1/4	181.728
1-5/8	7.056	4"	42.720	8-1/2	192.912
1-3/4	8.172	4-1/4	48.228	9"	216.276
1-7/8	9.384	4-1/2	54.072	9-1/2	240.972
2"	10.680	4-3/4	60.240	10"	267.000
2-1/8	12.060	5"	66.756	10-1/2	294.372
2-1/4	13.512	5-1/4	73.596	11"	323.076
2-3/8	15.060	5-1/2	80.772	11-1/2	353.112
2-1/2	16.692	5-3/4	88.272	12"	384.480
2-5/8	18.396	6"	96.120		

Stock lengths 12' (20' available in most sizes).

AISI 4140 and 41L40* - COLD FINISHED ROUNDS ANNEALED COLD DRAWN

Diameter (Inches)	Pounds (per ft.)	Diameter (Inches)	Pounds (per ft.)	Diameter (Inches)	Pounds (per ft.)
1/2	0.672	1-3/4	8.172	3"	24.036
5/8	1.044	1-7/8	9.384	3-1/8	26.076
3/4	1.500	2"	10.680	3-1/4	28.200
7/8	2.040	2-1/8	12.060	3-3/8	30.408
1"	2.676	2-1/4	13.512	3-1/2	32.712
1-1/8	3.384	2-3/8	15.060	3-5/8	35.088
1-1/4	4.176	2-1/2	16.692	3-3/4	37.548
1-3/8	5.052	2-5/8	18.396	4"	42.720
1-1/2	6.012	2-3/4	20.196		
1-5/8	7.056	2-7/8	22.068		

Stock lengths 12' (20' available in most sizes).

*41L40 is a superior free machining direct hardening alloy (Lead of .15/.35).

AISI 4140 - ANNEALED

AVAILABLE IN HOT ROLLED AND DCF CONDITION

This medium carbon alloy grade is widely used for many general purpose parts requiring high tensile strength and toughness. 4140 contains chromium and molybdenum as alloying elements and may be heat treated over a wide range to give the combined advantages of proper hardness, strength and ductility. In conditions where localized hardness may be required, this steel is readily flame or induction hardened.

TYPICAL ANALYSIS	AISI 4140
Carbon (C)	.38/.43
Manganese (Mn)	.75/1.00
Silicon (Si)	.15/.30
Tungsten (W)	
Molybdenum (Mo)	.15/.25
Chromium (Cr)	.80/1.10
Phosphorus (P)	.035 MAX
Sulphur (S)	.040 MAX
FORGING (a)	
Start forging at	2000°F – 2200°F (1100°C – 1200°C)
Do not forge below	1800°F (980°C)
NORMALIZING (b)	
	1600°F – 1650°F (871°C – 899°C)
ANNEALING (c)	
Temperature	1500°F – 1550°F (816°C – 843°C)
Rate of cooling, max. per hour	
Typical annealed hardness, Brinell	212
HARDENING	
Rate of heating	Slowly
Preheat temperature	1500°F – 1550°F
Hardening temperature	(816°C – 843°C)
Time at temperature, minutes	
Quenching medium	0(l)
TEMPERING	
Tempering temperature	400°F (204°C)
Approx. tempered hardness, Rockwell C	52-54
WEAR RESISTANCE	Medium
TOUGHNESS	Very High
RESISTANCE TO SOFTENING EFFECT OF ELEVATED TEMPERATURE	Low
DEPTH OF HARDENING	Medium
MACHINABILITY	Medium
GRINDABILITY	High
DISTORTION IN HEAT TREATING	Medium
SAFETY IN HARDENING	Low
RESISTANCE TO DECARBURIZATION	Medium

STANDARD MANUFACTURING TOLERANCES COLD FINISHED ALLOY BARS

UNDERSIZE VARIATION IN INCHES

Size & Shape	Carbon Thru Over .28% Max	Max. carbon Over .28% All Thru .55%	Max. Carbon Over .55% or Carbons Heat Treated
ROUNDS (Cold Drawn Or Turned & Polished)			
Up thru 1-1/2	.003	.004	.006
Over 1-1/2 thru 2-1/2	.004	.005	.007
Over 2-1/2 thru 4	.005	.006	.008
Over 4 thru 6	.006	.007	.009
Over 6 thru 8	.007	.008	.010
Over 8 thru 9	.008	.009	.011
HEXAGONS			
Up thru 3/4	.003	.004	.007
Over 3/4 thru 1-1/2	.004	.005	.008
Over 1-1/2 thru 2-1/2	.005	.006	.009
Over 2-1/2 thru 3-1/8	.006	.007	.010
SQUARES			
Up thru 3/4	.003	.005	.008
Over 3/4 thru 1-1/2	.004	.006	.009
Over 1-1/2 thru 2-1/2	.005	.007	.010
Over 2-1/2 thru 3-1/8	.007	.009	.012
FLATS (Width)			
Up thru 3/4	.004	.006	.009
Over 3/4 thru 1-1/2	.005	.007	.011
Over 1-1/2 thru 3	.006	.008	.013
Over 3 thru 4	.007	.010	.017
Over 4 thru 6	.009	.012	.021
Over 6	.014	-	-

*Tolerances for flats apply to thickness as well as to width.

SIZE TOLERANCES - ROUNDS TURNED & GROUND / TURNED, GROUND & POLISHED

Diameter Range (In)	Not Heat Treated All Carbons	Heat Treated All Carbons
Up thru 1-1/2	+ 0 - 0.001	+ 0 - 0.001
Over 1-1/2 thru 2-1/2	+ 0 - 0.0015	+ 0 - 0.0015
Over 2-1/2 thru 3	+ 0 - 0.002	+ 0 - 0.002
Over 3 thru 4	+ 0 - 0.003	+ 0 - 0.003
Over 4 thru 6	+ 0 - 0.004	+ 0 - 0.005
Over 6	+ 0 - 0.005	+ 0 - 0.006