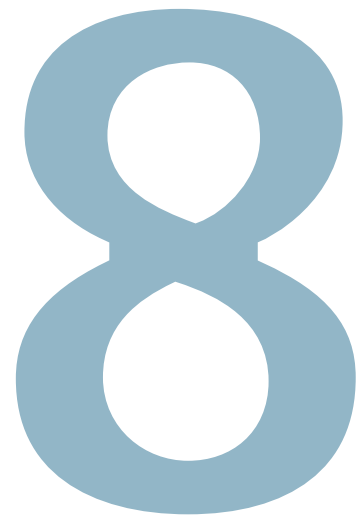
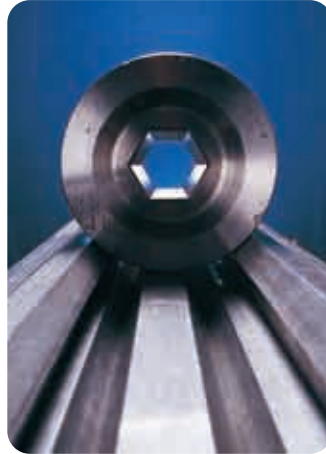
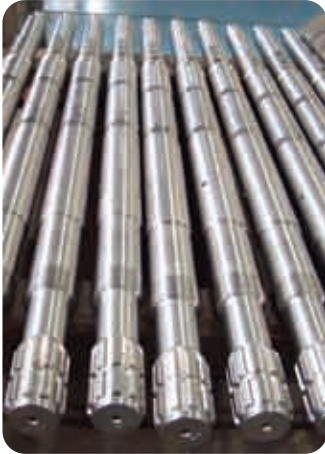


Engineering Steel Bar



www.atlassteels.com.au



Bright mild steel bar

Bright steel bars are carbon steel which has had the surface condition improved over the hot rolled finish supplied by the steel mill. Advantages achieved include improved machinability, enhancement of physical and mechanical properties and improved dimensional tolerances and straightness.

Cold finished steels are covered by Australian Standard AS1443 or similar overseas alternatives.

Types of cold finished bars

Cold drawn bars are widely used in mass production of parts due to their excellent mechanical and dimensional properties, with machinability in excess of the hot rolled condition. Round, hexagonal and square bars can be produced by cold drawing.

Turned and polished round bars have similar mechanical properties to those of equivalent hot rolled bar, but exhibit a smooth, bright surface finish and improved dimensional accuracy. They are widely used where a surface free of decarburisation is required, for example in induction hardening and when the surface must be free from surface defects, such as for use in cold forming.

Cold drawn and precision ground or turned and precision ground round bars, where very close dimensional tolerances and finishes are required, e.g. plating.

Cold rolled sizes up to 100mm wide and 7mm thick inclusive are produced by cold rolling to produce flat and some special shape sections to suitable tolerances and surface finishes.

Carbon steel groups

10xx	Plain carbon steels.
11xx	Sulphurised free cutting carbon steels. (Free machining steels)
12xx	Phosphorised and sulphurised free cutting carbon steels. (Free machining steels)
xxLxx	Lead bearing free machining carbon steels.
13xx	Carbon – manganese steels. (Pearlitic manganese steels)

Steel making practice

Old Prefix	New Prefix	Practice	Example of Old Prefix	Example of New Prefix
R	U	Steel with unspecified deoxidation (no minimum % Si specified)	R1008	U1004
S	U		S1010	U1010
CS	M	Merchant quality. Similar to “U” with wider composition range	CS1020	M1020
K	No Prefix	As per relevant table in Standard	K1045	1045
X	X	A major deviation in chemical composition from AISI-SAE grades	XK1320	X1320

Chemical composition (specified elemental limits as per AS1443)

Grade	C	Si	Mn	P	S	Pb
M1020	Min	0.15	–	0.30	–	–
	Max	0.25	0.35	0.90	0.050	0.050
M1030	Min	0.25	–	0.30	–	–
	Max	0.35	0.35	0.90	0.050	0.050
1045	Min	0.43	0.10	0.60	–	–
	Max	0.50	0.35	0.90	0.040	0.040
1214	Min	–	–	0.80	0.04	0.25
	Max	0.15	0.10	1.20	0.09	0.35
12L14	Min	–	–	0.80	0.04	0.25
	Max	0.15	0.10	1.20	0.09	0.35

Typical minimum tensile properties (not guaranteed as these grades are not tensile tested)

Grade	Cold Drawn Condition Tensile Strength (MPa)		
	Up to 16mm incl.	Over 16mm to 38mm incl.	Over 38mm to 63.5mm incl.
M1020	480 min	460 min	430 min
M1030	560 min	540 min	520 min
1045	690 min	650 min	640 min
1214	480 min	430 min	400 min
12L14	480 min	430 min	400 min
Grade	Turned and Polished Condition Tensile Strength (MPa)		
	Up to 50mm incl.	Over 50mm to 250mm incl.	
M1020	410 min	410 min	
M1030	500 min	500 min	
1045	600 min	600 min	
1214	370 min	370 min	
12L14	370 min	370 min	

Note that alternative grades with guaranteed mechanical properties are available subject to special order.

Shape and section measurements



Round bar: measured across the diameter.



Square bar: measured across the flats (AF).



Hexagonal bar: measured across the flats (AF).



Flat bar: measured width x thickness.

Product and stock range for bright mild steel

Production method	Shape	Size (mm)		Standard nominal lengths (m)
		Min.	Max.	
Cold drawn	Round	3.17	63.5	3.5 or 6
	Hexagon	4.76	73.02	3.5
	Square	3	50.8	3.5
	Flat	9.52x3.17	152.4x76.2	3.5
Turned and polished	Round	10	260	3.5 or 6
Centreless precision ground	Round	3	160	3.5 or 6
Coil cold rolled	Flat	6.35x1.59	20x5	3.5
Bar cold rolled	Flat	25x5	100x7	3.5

Dimensional tolerances for bright mild steel

Form and condition					
Round			Square	Hexagonal	Flat
Precision ground	Cold drawn	Turned and polished			
h8	h10	h11	h11	h11	h11

Diameter or cross-sectional dimension (mm)	Tolerance grade (mm)					
	h7	h8	h9	h10	h11	h12
up to 3	+0 -0.010	+0 -0.014	+0 -0.025	+0 -0.040	+0 -0.060	+0 -0.100
over 3 to 6	+0 -0.012	+0 -0.018	+0 -0.030	+0 -0.048	+0 -0.075	+0 -0.120
over 6 to 10	+0 -0.015	+0 -0.022	+0 -0.036	+0 -0.058	+0 -0.090	+0 -0.150
over 10 to 18	+0 -0.018	+0 -0.027	+0 -0.043	+0 -0.070	+0 -0.110	+0 -0.180
over 18 to 30	+0 -0.021	+0 -0.033	+0 -0.052	+0 -0.084	+0 -0.130	+0 -0.210
over 30 to 50	+0 -0.025	+0 -0.039	+0 -0.062	+0 -0.100	+0 -0.160	+0 -0.250
over 50 to 80	+0 -0.030	+0 -0.046	+0 -0.074	+0 -0.120	+0 -0.190	+0 -0.300
over 80 to 120	+0 -0.035	+0 -0.054	+0 -0.087	+0 -0.140	+0 -0.220	+0 -0.350
over 120 to 180	+0 -0.040	+0 -0.063	+0 -0.100	+0 -0.160	+0 -0.250	+0 -0.400
over 180 to 250	+0 -0.046	+0 -0.072	+0 -0.115	+0 -0.185	+0 -0.290	+0 -0.460
over 250 to 315	+0 -0.052	+0 -0.081	+0 -0.130	+0 -0.210	+0 -0.320	+0 -0.520

The above table can be used for k tolerance dimensions. k tolerance = -0, +all.

Bright mild steel cold finished round bar

Product range and theoretical weights								
Diameter		Weight (kg/m)	Diameter		Weight (kg/m)	Diameter		Weight (kg/m)
mm	inches		mm	inches		mm	inches	
3.18	0.125	0.06	25.00	0.984	3.85	76.20	3.000	35.80
4.76	0.187	0.14	25.40	1.000	3.98	80.00	3.150	39.46
6.00	0.236	0.22	26.00	1.024	4.17	82.55	3.250	42.01
6.35	0.250	0.25	27.00	1.063	4.49	88.90	3.500	48.72
7.00	0.276	0.30	28.57	1.125	5.03	90.00	3.543	49.94
7.94	0.313	0.39	30.00	1.181	5.55	95.00	3.740	55.64
8.00	0.315	0.39	31.75	1.250	6.21	95.25	3.750	56.01
9.00	0.354	0.50	32.00	1.260	6.31	100.00	3.937	61.65
9.52	0.375	0.56	33.00	1.300	6.72	101.60	4.000	63.64
10.00	0.394	0.62	34.92	1.375	7.52	110.00	4.331	74.60
11.11	0.437	0.76	35.00	1.378	7.55	114.30	4.500	80.54
12.00	0.472	0.89	36.00	1.417	7.99	120.00	4.724	88.78
12.70	0.500	0.99	38.10	1.500	8.95	127.00	5.000	99.44
13.00	0.512	1.04	39.00	1.535	9.38	130.00	5.118	104.19
14.00	0.551	1.21	40.00	1.575	9.86	139.70	5.500	120.32
14.29	0.563	1.26	41.27	1.625	10.50	152.40	6.000	143.19
14.55	0.572	1.30	42.42	1.670	11.09	165.10	6.500	168.05
15.00	0.591	1.39	44.45	1.750	12.18	177.80	7.000	194.89
15.87	0.625	1.55	45.00	1.772	12.48	203.20	8.000	254.55
16.00	0.630	1.58	46.00	1.811	13.04	254.00	10.000	397.74
17.00	0.669	1.78	47.62	1.875	13.98			
17.46	0.687	1.88	50.00	1.969	15.41			
18.00	0.709	2.00	52.07	2.050	16.71			
19.00	0.748	2.23	50.80	2.000	15.91			
19.05	0.750	2.24	53.67	2.113	17.76			
20.00	0.787	2.47	55.00	2.165	18.65			
20.64	0.812	2.63	57.15	2.250	20.14			
21.00	0.827	2.72	60.00	2.362	22.19			
22.00	0.866	2.98	63.50	2.500	24.86			
22.22	0.875	3.04	65.00	2.559	26.05			
23.81	0.937	3.49	70.00	2.756	30.21			
24.00	0.945	3.55	75.00	2.953	34.68			

Grades: M1020/M1030, 1045, 1214, 12L14

Bright mild steel cold finished hexagonal bar

Product range and theoretical weights					
Diameter		Weight (kg/m)	Diameter		Weight (kg/m)
mm	inches		mm	inches	
3.18	0.125	0.07	25.00	0.984	4.25
4.76	0.187	0.15	25.40	1.000	4.39
6.00	0.236	0.24	26.00	1.024	4.59
6.35	0.250	0.27	27.00	1.063	4.96
7.00	0.276	0.33	28.57	1.125	5.55
7.94	0.313	0.43	30.00	1.181	6.12
8.00	0.315	0.43	31.75	1.250	6.85
9.00	0.354	0.55	32.00	1.260	6.96
9.52	0.375	0.62	33.00	1.300	7.40
10.00	0.394	0.68	34.92	1.375	8.29
11.11	0.437	0.84	35.00	1.378	8.33
12.00	0.472	0.98	36.00	1.417	8.81
12.70	0.500	1.10	38.10	1.500	9.87
13.00	0.512	1.15	39.00	1.535	10.34
14.00	0.551	1.33	40.00	1.575	10.88
14.29	0.563	1.39	41.27	1.625	11.58
14.55	0.572	1.44	42.42	1.670	12.23
15.00	0.591	1.53	44.45	1.750	13.43
15.88	0.625	1.71	45.00	1.772	13.77
16.00	0.630	1.74	46.00	1.811	14.38
17.00	0.669	1.96	47.62	1.875	15.42
17.46	0.687	2.07	50.00	1.969	16.99
18.00	0.709	2.20	52.07	2.050	18.43
19.00	0.748	2.45	50.80	2.000	17.54
19.05	0.750	2.47	53.67	2.113	19.58
20.00	0.787	2.72	55.00	2.165	20.56
20.64	0.812	2.90	57.15	2.250	22.20
21.00	0.827	3.00	60.00	2.362	24.47
22.00	0.866	3.29	63.50	2.500	27.41
22.22	0.875	3.36	65.00	2.559	28.72
23.81	0.937	3.85	70.00	2.756	33.31
24.00	0.945	3.92	75.00	2.953	38.24

Grades: 1045, 1214, 12L14

Other sizes available up to 100mm mill sourced generally.

Bright steel – flat bar and square-edged flat bar

Cold rolled square edge – U1004

Cold drawn square edge – M1020

		Imperial flats																		
		Thickness (mm)																		
Width (mm)		3.17	4.76	6.35	7.96	9.52	12.70	15.88	19.05	22.22	25.40	31.75	38.10	44.45	50.80	57.15	63.50	76.20	101.60	
9.52																				
15.87																				
19.05																				
25.40																				
31.75																				
38.10																				
44.45																				
50.80																				
63.50																				
76.20																				
88.90																				
101.60																				
127.00																				
152.40																				

Coloured sizes typically available ex stock. Consult Atlas branch for current availability ex stock or by indent.

Available in Grades 1004 or M1020.

		Metric flats											
		Thickness (mm)											
Width (mm)		3	4	5	6	7	8	10	15	20	25	40	50
10													
20													
25													
32													
40													
50													
75													
100													
150													

Bright mild steel square bar – cold drawn squares

Product range and theoretical weights		
Across Flats		Weight (kg/m)
mm	inches	
6.00	0.236	0.28
6.35	0.250	0.32
7.94	0.313	0.49
8.00	0.315	0.50
9.53	0.375	0.71
10.00	0.394	0.78
11.11	0.437	0.97
12.00	0.472	1.13
12.70	0.500	1.27
14.29	0.563	1.60
15.87	0.625	1.98
16.00	0.630	2.01
17.46	0.687	2.39
19.05	0.750	2.85
20.00	0.787	3.14
20.64	0.813	3.34
22.23	0.875	3.88
23.81	0.937	4.45

Product range and theoretical weights		
Across Flats		Weight (kg/m)
mm	inches	
25.00	0.984	4.91
25.40	1.000	5.06
28.58	1.125	6.41
30.00	1.181	7.06
31.75	1.250	7.91
34.93	1.375	9.58
38.10	1.500	11.39
40.00	1.575	12.56
41.27	1.625	13.37
44.45	1.750	15.51
47.63	1.875	17.81
50.00	1.969	19.62
50.80	2.000	20.26
63.50	2.500	31.65
75.00	2.953	44.16
100.00	3.937	78.50
150.00	5.906	176.62

Grade: 1214



Carbon steel round bar 1045

Refer to the “Atlas Steels – Technical Handbook of Bar Products”, for more detail on specifications, dimensions and technical data.

Related Specifications

AS 1442 - 1045
JIS G4051 – S45C
BS 970: En8D / 43B

Chemical Composition (% by weight - nominal values)

Grade	C	Mn	Si	P	S
1045	0.45	0.7	0.2	0.02	0.02

Grade 1045 is a fully killed medium carbon steel supplied in the as-rolled condition or normalised (subject to the diameter). The tensile strength is not guaranteed, but is typically in the range of 550 – 700 MPa.

Applications

The steel machines readily and is ideal for applications including:

- Axles
- Bolts
- Hydraulic rams
- Pins
- Rolls
- Shafts
- Sprockets
- Machined parts requiring better strength than mild steel

The steel is also well suited to induction and flame hardening

Dimensional Tolerances

The following tolerances apply to bar supplied to AS 1442.

Similar but not identical tolerances apply for other related specifications.

Nominal Diameter (mm)	Diameter Tolerance (mm)	Out-of-square Tolerance (mm)
Up to 25	±0.25	0.40
Over 25 to 30	±0.30	0.45
Over 30 to 40	±0.40	0.60
Over 40 to 50	±0.50	0.75
Over 50 to 60	±0.60	0.90
Over 60 to 70	±0.70	1.05
Over 70 to 80	±0.80	1.20
Over 80 to 100	±0.90	1.35
Over 100 to 125	+3.20 / -nil	3.20
Over 125 to 170	+4.80 / -nil	4.80
Over 170 to 215	+6.40 / -nil	6.40

Product range and theoretical weights					
Diameter		Weight	Diameter		Weight
mm	inches	kg/m	mm	inches	kg/m
16	0.630	1.6	200	7.874	247
20	0.787	2.5	210	8.268	272
24	0.945	3.6	220	8.661	299
27	1.063	4.5	230	9.055	326
30	1.181	5.6	240	9.449	355
33	1.299	6.7	250	9.843	385
36	1.417	8.0	260	10.236	417
39	1.535	9.4	270	10.630	449
42	1.654	9.0	280	11.024	483
45	1.772	5.0	290	11.417	518
50	1.969	15.4	300	11.811	555
55	2.165	18.7	310	12.205	592
56	2.205	19.3	320	12.598	631
60	2.362	22.2	330	12.992	671
65	2.559	26.1	340	13.386	713
70	2.756	30.2	350	13.780	755
73	2.874	32.9	360	14.173	799
75	2.953	34.7	380	14.961	890
80	3.150	39.5	400	15.748	986
85	3.346	44.5	410	16.142	1036
90	3.543	49.9	415	16.339	1062
95	3.740	55.6	420	16.535	1088
100	3.937	61.7	440	17.323	1194
105	4.134	68.0	450	17.717	1248
110	4.331	74.6	460	18.110	1305
120	4.724	88.8	480	18.898	1420
130	5.118	104	500	19.685	1541
140	5.512	121	525	20.669	1699
150	5.906	139	550	21.654	1865
160	6.299	158	590	23.228	2146
170	6.693	178	610	24.016	2294
180	7.087	200	650	25.591	2605
190	7.480	223			

Available in random 5.0m - 6.0m lengths



Alloy constructional and case hardening steel round bar

Low alloy steels

For applications requiring higher tensile strengths and toughness than the carbon steels there is a range of low alloy steels. These are categorised as high tensile or constructional steels and case hardening steels. The high tensile strength steels have sufficient alloying additions enabling through hardening (by quench and temper treatment) according to their alloying additions.

Case hardening (carburising) steels

Case hardening steels are a group of alloy steels in which a high hardness surface zone (hence the term 'case hardened') is developed during heat treatment by absorption and diffusion of carbon. The high hardness zone is supported by the unaffected underlying core zone, which is lower hardness and higher toughness.

Plain carbon steels that can be used for case hardening are restricted. Where plain carbon steels are used, the rapid quenching necessary to develop satisfactory hardness within the case can cause distortion and the strength that can be developed in the core is very limited. Alloy case hardening steels allow the flexibility of slower quenching methods to minimise distortion and high core strengths can be developed.

Nitriding steels

Nitriding steels can have higher surface hardness developed by absorption of nitrogen, when exposed to a nitriding atmosphere at temperatures in the range of 510-530°C, after hardening and tempering.

High tensile steels suitable for nitriding are: 4130, 4140, X4150, 4340, En25, En26.

Chemical composition (% by weight – nominal values)

Grade	C	Si	Mn	Cr	Mo	S	Ni
High tensile							
4140	0.40	–	0.80	0.90	0.20	–	
4340	0.40	–	0.80	0.80	0.25	–	
En25	0.30	–	0.60	0.65	0.55	–	2.00
En26	0.40	–	0.60	0.65	0.55	–	2.50
Hytuf	0.25	1.5	1.40	0.30	0.40	–	1.75
Case hardening							
En36A	0.12	–	0.50	0.90		–	3.25
En39B	0.15	–	0.50	1.20	0.20	–	4.20
8620	0.20	–	0.80	0.50	0.20	–	0.50
6587 (17CrNiMo6)	0.16	–	0.50	1.65	0.30	–	1.55

Mechanical property specifications

Grade	Specification
4140	Up to 50mm AS 1444, Condition T. 50 to 100mm AS 1444, Condition T. Over 100mm ASTM A434, Class BD.
4340	Up to 100mm AS 1444, Condition U. Above 100mm ASTM A434, 4340, Class BD.
En25	AS 1444, Condition U or BS970: Part 3, 826 M31, Condition U.
En26	BS 970: Part 3, 826M40, Condition W.
Hytuf	SAE AMS 6418. Annealed condition.

Note 1: Specified hardenability grades are available on request.

Note 2: The actual specification of the product ordered will depend upon the product's origin – for deviations from the above specification refer the to the Technical Department.

Note 3: Alloy bar can be sourced in alternative conditions, i.e. annealed or other hardened and tempered conditions.

Designation of tensile strengths

AS 1444/BS 970 tensile strength designation		ASTM A434 Class BD tensile strength	
Tensile strength designator	Tensile strength (MPa)	Diameter (mm)	Tensile strength Min. (MPa)
R	700-850	38.1 and under	1070
S	770-930	over 38.1 to 63.5 inclusive	1030
T	850-1000	over 63.5 to 114 inclusive	960
U	930-1080	over 114 to 178 inclusive	930
V	1000-1150	over 178 to 241.3 inclusive	900
W	1080-1230		
X	1150-1300		
Y	1230-1380		
Z	1550 min.		

Yield (proof) stress and elongation limits also apply – refer to AS 1444, BS 970 or ASTM A434.

Typical applications

Grade	Description
High tensile	
4140	General-purpose high tensile, used for axles, shafts, high tensile studs and bolts, gears and drill rods. The steel is also suitable for flame and induction hardening.
4340	Suitable for the most severe duties where freedom from temper-brittleness is necessary. It has high strength and toughness in large sections. Used in highly stressed shafts in the larger sizes, heavy truck and tractor axles and transmission shafts. In the heat-treated condition.
En25	En25 is used extensively in most industry sectors for applications requiring higher tensile and yield strength than 4140 can provide, similar to En26 but with lower carbon content.
En26	Characterised by high strength and toughness in very large sections, similar to En25 but with a higher carbon content. En26 is used extensively in most industry sectors for applications requiring higher tensile and yield strength than 4140, 4340 or En25 can provide.
Hytuf	Hytuf offers an excellent combination of very high toughness and high strength. This aerospace specification steel finds application in critical mineral processing.
Case hardening	
8620	General-purpose case hardening steel suitable for comparatively lightly stressed components. Used for automatic components such as transmission gears, crown wheels, ring gears, hypoid gears and racers, king pins and pinions.
Atlas 6587 (17CrNiMo6)	The high chromium content produces high case hardness with excellent core strength. Used for gears, bearings, sleeves, pins, bushes, shafts, plastic moulds and any highly stressed or high wear component.
En36A	Used extensively for highly stressed gears in trucks, agriculture and mining machinery, pins and brushes, heavily loaded shafts and other applications requiring a hard surface with a tough shock-resisting core. Core tensile strength 800MPa minimum after hardening and tempering.
En39B	An exceptionally high hardenability steel for large or highly stressed gears where core strength and toughness is required. May be used as an alloy engineering steel. Core tensile strength 1100MPa minimum after hardening and strengthening.

Alloy and case hardening steel round bar ASTM A434M, BS 970 or AS 1444

Product range and theoretical weights											
Diameter		Weight (kg/m)	Diameter		Weight (kg/m)	Diameter		Weight (kg/m)	Diameter		Weight (kg/m)
mm	inches		mm	inches		mm	inches		mm	inches	
10.00	0.394	0.62	39.00	1.535	9.38	75.00	2.953	34.68	170.00	6.693	178.17
12.00	0.472	0.89	40.00	1.575	9.86	76.00	2.992	35.61	172.00	6.772	182.38
12.70	0.500	0.99	40.50	1.594	10.11	76.20	3.000	35.80	175.00	6.890	188.80
13.00	0.512	1.04	41.28	1.625	10.51	78.00	3.071	37.51	180.00	7.087	199.75
14.00	0.551	1.21	42.00	1.654	10.87	80.00	3.150	39.47	182.00	7.165	204.21
15.88	0.625	1.55	42.50	1.673	11.14	82.00	3.228	41.45	185.00	7.283	211.00
16.00	0.630	1.58	42.65	1.679	11.21	82.55	3.250	42.01	190.00	7.480	222.56
18.00	0.709	2.00	43.50	1.713	11.67	84.00	3.307	43.50	192.00	7.559	227.26
19.00	0.748	2.23	44.45	1.750	12.18	87.00	3.425	46.66	195.00	7.677	234.42
19.05	0.750	2.24	45.00	1.772	12.48	88.90	3.500	48.72	200.00	7.874	246.60
20.00	0.787	2.47	46.20	1.819	13.16	90.00	3.543	49.94	205.00	8.071	259.08
22.00	0.866	2.98	47.50	1.870	13.91	92.00	3.622	52.18	210.00	8.268	271.88
22.22	0.875	3.04	47.62	1.875	13.98	96.00	3.780	56.82	220.00	8.661	298.39
24.00	0.945	3.55	48.00	1.890	14.20	97.00	3.819	58.01	230.00	9.055	326.13
25.00	0.984	3.85	50.00	1.969	15.41	100.00	3.937	61.65	240.00	9.449	355.10
25.40	1.000	3.98	50.80	2.000	15.91	101.60	4.016	64.14	250.00	9.843	385.31
26.00	1.024	4.17	51.50	2.028	16.35	102.00	4.016	64.14	260.00	10.236	416.75
27.00	1.063	4.49	52.00	2.047	16.67	106.00	4.173	69.27	270.00	10.630	449.42
27.45	1.081	4.64	54.00	2.126	17.98	110.00	4.331	74.60	280.00	11.024	483.34
28.00	1.102	4.83	55.00	2.165	18.65	116.00	4.567	82.96	290.00	11.417	518.48
28.57	1.125	5.03	55.50	2.187	19.03	120.00	4.724	88.78	300.00	11.811	554.85
29.00	1.142	5.18	56.00	2.205	19.33	125.00	4.921	96.33	310.00	12.205	592.46
29.50	1.161	5.36	57.15	2.250	20.14	127.00	5.000	99.43	320.00	12.598	631.30
30.00	1.181	5.55	58.00	2.283	20.74	130.00	5.118	104.19	330.00	12.992	671.37
31.50	1.240	6.12	60.00	2.362	22.19	136.00	5.354	114.03	340.00	13.386	712.67
31.75	1.250	6.21	62.00	2.441	23.70	140.00	5.512	120.83	350.00	13.780	755.21
32.00	1.260	6.31	63.00	2.480	24.47	142.00	5.591	124.31	360.00	14.173	798.98
32.50	1.280	6.51	63.50	2.500	24.86	145.00	5.709	129.62	370.00	14.567	843.98
33.00	1.299	6.71	63.80	2.512	25.09	146.00	5.748	131.41	380.00	14.961	890.23
34.50	1.358	7.34	64.00	2.520	25.25	150.00	5.906	138.72	390.00	15.354	937.70
34.92	1.374	7.52	65.00	2.559	26.05	152.00	5.984	142.44	400.00	15.748	986.40
35.00	1.378	7.55	66.00	2.598	26.85	155.00	6.102	148.11	450.00	17.717	1248.41
36.00	1.417	7.99	68.00	2.677	28.51	158.00	6.220	153.90	500.00	19.685	1541.25
37.50	1.476	8.67	69.85	2.750	30.08	160.00	6.299	157.82			
38.00	1.496	8.90	70.00	2.756	30.21	162.00	6.378	161.79			
38.10	1.500	8.95	72.00	2.835	31.96	165.00	6.496	167.84			



Hard chrome bar

Hard chrome bar is a chromium-plated steel product used primarily as piston rod material in all standard applications in hydraulics and pneumatics. Common applications are found in cranes, dump trucks, lifters, garbage compactors, agricultural machinery and production equipment with movable sections.

Because hard chrome bar is normally used in conditions of high stress, friction and harsh climatic environment, the quality of the base metal and surface treatment are of paramount importance. Wear, impact and corrosion resistance, as well as high yield strength, surface smoothness and uniform quality are most important properties of hard chrome bar.

Hard chrome bar typical properties

The basic grades of steel used in the manufacture of hard chrome bar are 1045, 4140 hardened and tempered and 1045 induction (surface) hardened.

Grade 1045 steel bar is primarily used in hard chrome bar manufacture due to its wide range of properties consistent with end use applications. Grade 4140 is used in applications where greater yield strength is required and induction hardened grade 1045 is used in applications requiring greater surface impact resistance.

Chromium deposit: Thickness 0.025mm minimum, or 0.050mm on the diameter.

Hardness: 1000-1150HV (Vickers Micro Hardness).

Diameter tolerances:

Diameter mm	Tolerance mm
Up to 51	+0.00 -0.025
Over 51-102	+0.00 -0.050
Over 102	+0.00 -0.075

Size range: Size 19.05mm - 127mm diameter. Sizes outside this range can be quoted against enquiry.

Length: Can be supplied in lengths 3.6 metres to 7.0 metres. Normally in 4.0 metres for sizes 19.05mm to 25.4mm and 6.0 metres for sizes above 25.4mm.

Finish: 0.10 - 0.30 micrometres Ra. Chrome bar is precision ground to achieve a fine finish.

Packing: All hard chrome bars are packaged in cardboard tubes which provide cushioning against impact damage which may occur in handling and transit. All bars are then boxed.

Chemical composition (% by weight)

Grade	C	Mn	Si	P	S	Cr	Mo
1045	0.43 - 0.45	0.60 - 0.90	0.10 - 0.35	0.05 max.	0.05 max.	–	–
4140	0.38 - 0.43	0.75 - 1.00	0.15 - 0.35	0.04 max.	0.04 max.	0.8 - 1.10	0.15 - 0.25

Chrome bar: product range and theoretical weights

Diameter (mm)	Weight (kg/m)	Diameter (mm)	Weight (kg/m)
19.05	2.24	50.80	15.93
20.00	2.47	56.00	19.33
22.22	3.05	57.15	20.16
25.00	3.85	60.00	22.22
25.40	3.98	63.00	24.27
28.57	5.03	63.50	24.89
30.00	5.55	69.85	30.11
31.75	6.22	70.00	30.24
32.00	6.32	76.20	35.84
34.92	7.52	80.00	39.42
35.00	7.55	82.55	42.00
36.00	8.00	85.00	44.54
38.10	8.96	88.90	48.78
40.00	9.87	90.00	50.00
44.45	12.19	100.00	61.73
45.00	12.50	101.60	63.72
47.63	13.98	114.30	80.54
50.00	15.43	127.00	99.56

Grades: 1045, 1045 induction hardened, 4140 hardened & tempered.



Carbon steel hollow bar

Hollow bar, otherwise known as seamless mechanical tubing, is a tubular product made with characteristics and properties suitable for subsequent transformation into a great variety of hollow products and cylindrical components for general engineering purposes. Carbon and alloy steel hollow bars are normally supplied as circular sections although other shapes are available.

Selection of the most suitable raw material for production of circular hollow components, whether the component is a plain bush or a complex precision part, should take into consideration the advantages in using hollow bar as feedstock. It is important to remember when comparing hollow bar and solid bar that the raw material cost is dependent on the length of material used to produce the component. Since the purchase price of raw material is based on weight, the price per length is an important factor.

Hollow bar is preferred by many users because of significant savings on raw material cost and machining time. In many instances it is possible to choose a hollow bar with outside diameter and wall thickness very close to the finished dimensions of the component to be manufactured. The need for preliminary operations such as turning and boring is therefore substantially reduced or eliminated. Benefits are gained from reduction in setting-up time and machine cycle times, lower labour and overhead costs for each component, reduced tool costs, lower lubricant usage and machinery maintenance costs. Swarf handling problems are also simplified.

Carbon steel hollow bar

Products are sourced under internationally recognised specifications including ASTM A519M and ISO2938, as well as a variety of proprietary grades which comply with the requirements of appropriate specifications.

The typical grades of carbon steel hollow bar stocked by Atlas Steels are:

- VM312, Grade 147M
- 20Mn V6
- TIM V6
- St52
- Ovako 28 (New Zealand only)

Seamless carbon steel hollow bar is normally supplied in the as-rolled condition and is suitable for a wide range of thermal treatments such as normalising, surface hardening and hardening and tempering.

Low alloy steel hollow bar

Atlas Steels can supply both 4140 and 4340 grades of alloy steel hollow bar, compliant with ASTM A519M or equivalent specification and supplied in various conditions, usually hardened and tempered, but also annealed or as-rolled conditions subject to the specific application.

Further enquiries should be made on any specific requirements.

A comparison – hollow bar vs solid bar

Boring from hollow bar	Drilling from solid bar
No drilling is necessary and a shorter time cycle for the manufacture of each component is made possible.	Time is required for drilling from solid bar and the boring operation may still be required.
Boring from hollow bar creates less swarf resulting in low material wastage and less-frequent machine cleaning.	Drilling from solid bar creates an excessive amount of swarf resulting in high wastage and frequent machine cleaning.
Coolant may not be needed.	Coolant most likely required.

Hollow bar: product range and theoretical weights

OD (mm)	ID (mm)	Weight (kg/m)	OD (mm)	ID (mm)	Weight (kg/m)	OD (mm)	ID (mm)	Weight (kg/m)
32	16	4.85	75	45	22.70	100	80	22.80
32	20	3.98	75	50	19.70	106	56	50.60
36	16	6.54	75	56	15.80	106	63	45.50
36	20	5.66	75	60	13.34	106	71	30.80
36	25	4.29	80	40	30.10	106	80	30.50
40	20	7.54	80	45	27.50	106	85	25.40
40	25	6.17	80	50	24.50	112	63	53.70
40	28	5.20	80	56	20.60	112	71	47.10
45	20	10.18	80	63	15.50	112	80	38.70
45	28	7.83	85	45	32.60	112	90	28.20
45	32	6.36	85	50	29.70	118	63	62.30
50	25	11.74	85	55	26.40	118	71	55.60
50	32	9.30	85	67	17.40	118	80	47.30
50	36	7.63	90	45	37.45	118	85	42.59
56	28	14.49	90	50	35.10	118	90	36.80
56	32	13.02	90	56	31.20	118	95	32.08
56	36	11.60	90	63	26.00	125	71	66.20
56	40	9.70	90	67	22.95	125	80	57.80
63	32	18.50	90	71	19.40	125	90	47.30
63	36	16.80	95	50	40.80	125	95	41.60
63	40	14.90	95	60	33.45	125	100	35.60
63	45	12.30	95	56	36.90	132	80	67.96
63	50	9.40	95	63	32.08	132	71	77.50
71	36	23.50	95	67	28.60	132	80	69.10
71	40	21.70	95	75	21.50	132	90	58.60
71	45	19.00	100	56	42.90	132	98	49.40
71	50	16.10	100	63	37.80	132	106	39.30
71	56	12.20	100	71	31.20	140	90	72.10
75	40	25.30	100	75	27.60	140	80	82.60

Hollow bar: product range and theoretical weights

OD (mm)	ID (mm)	Weight (kg/m)	OD (mm)	ID (mm)	Weight (kg/m)
140	90	72.10	212	170	101.04
140	100	60.40	224	132	211.95
140	106	52.80	224	160	155.80
140	112	44.70	224	180	115.60
150	80	100.70	236	140	228.40
150	85	100.77	236	170	169.90
150	95	84.60	236	190	127.50
150	106	70.90	250	150	261.17
150	118	54.40	250	180	190.90
150	125	43.70	250	200	142.80
160	90	109.50	273	173	275.00
160	100	97.80	273	193	230.00
160	112	82.10	273	201	210.40
160	122	67.70	273	213	180
160	132	52.00	273	223	157.00
162.1	79.7	122.80	298	198	306.41
162.1	111.3	85.60	298	218	255.00
170	100	118.40	298	238	199.00
170	118	94.20	298	248	170.00
170	130	75.90	298	258	137.00
170	140	59.20	324	224	337.80
172.3	121.3	92.20	324	244	280.00
180	100	140.10	324	274	186.00
180	112	126.03	356	236	437.00
180	125	105.04	356	256	377.00
180	140	80.90	356	276	311.00
180	150	63.00	406	286	512.00
190	109	156.20	406	306	439.00
190	132	117.50	406	334	324.00
190	150	86.20	457	327	628.00
190	160	67.10	457	357	502.00
200	112	176.85			
200	140	129.62			
200	160	92.25			
212	125	180.99			
212	150	142.3			

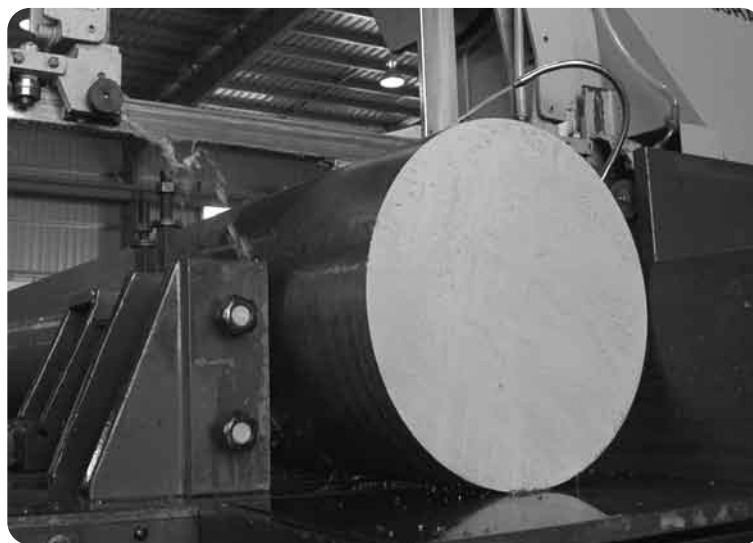


Bandsaw and hacksaw processing equipment

Within our branches we operate automated bandsaw and hacksaw facilities offering a complete cutting service for your bar requirements. The local markets and regional centres are supported by the nearest capital city when required.

Maximum cutting diameter is 650mm.

For more details regarding our processing service please contact your nearest sales office.



www.atlassteels.com.au