

Stainless Steel Bar

Round, Flat, Angle and Sections



6 Stainless Steel Bar Round,
Flat, Angle, Sections & Wires



6

Improved Machinery Bar



Atlas Steels distributes “Improved Machinability” (IM) Stainless Steel Bar.

Improved machinability bar results from a controlled melting process, giving high chip-breaking properties and providing a self-lubricating quality through the processing of machining.

Range of IM Grades

- 303, 304/304L and 316/316L round bar, 3.18 to 101.6mm
- 316/316L round bar, 101.6 to 304.8mm
- 303 and 316/316L hex bar, 13.34 to 57.15mm
- 316L – hollow bar

The benefits

- Improved machinability
- Increased cutting speeds
- Lower unit cost of production
- Increased tool life
- Lower production power requirements
- Consistent machinability
- Improved product surface finish
- Chemical composition within ASTM standards
- Properties the same as commercial grades of stainless steel
 - corrosion resistance
 - mechanical properties
 - weldability
 - formability
- improved drilling and tapping characteristics

IM grades will reduce wear on tools and extend tool life

Highly abrasive inclusions which damage tools are excluded in the IM manufacturing steel melt process.

There is a decrease in flank wear and crater wear of carbide tooling which results in:

- less dismounting and reassembling of tools
- less adjustment time; and
- a noticeable improvement in the life of cutting tools

Atlas Steels distributes Ugima “Improved Machinability” grades but also other generic brands are available.

Stainless steel bar comprises numerous products referred to by the shape, the section dimension, grade, condition and surface finish.

Shapes and Section Measurement



Round bar: measured across the diameter



Square bar: measured across the flats (A/F or AF)



Hexagonal bar: measured across the flats (A/F or AF)



Flat bar: measured width x thickness



Equal angle: measured leg length x thickness



Channels: measured flange width x web width x thickness



Hollow Bar: measured outside diameter (OD) x inside diameter (ID).
Some manufacturers describe as OD x Wall Thickness.

Grade

303, 304/304L, 316/316L, 321, 253MA, 416, 431, 2205, 630

Condition

H&T: Hardened and tempered

ANN: Annealed

PH: Precipitation hardened

Surface Finish

CD: Cold drawn

CG: Centreless ground

P&T: Peeled and turned

P: Polished

HF: Hot finished

RT: Rough turned / peeled

BD: Bright drawn

CF: Cold finished

ST: Smooth turned

SRE: Slit rolled edge

HRAP: Hot rolled annealed and pickled

PR: Peeled and reeled

Cold Finished is a generic term to cover: CD, CG, Peeled, Turned, BD and ST.

Dimensional Tolerances for Bar

Form and condition: Stainless Steel Bars				
Round			Square	Hexagonal
Centreless ground	Bright/Cold drawn	Cold finished/smooth turned		
h8 or h9	h9	h10	h11	h11

Note: Round bar stocked in sizes above 101.6mm is usually in a Rough Turned (Peeled) condition with an all-plus diameter tolerance.

Nominal bar size (mm)	Tolerance Number								
	6*	7*	8	9	10	11	12	13	14*
Up to 3	0.006	0.010	0.014	0.025	0.040	0.060	0.10	0.14	0.25
over 3 to 6	0.008	0.012	0.018	0.030	0.048	0.075	0.12	0.18	0.30
over 6 to 10	0.009	0.015	0.022	0.036	0.058	0.090	0.15	0.22	0.36
over 10 to 18	0.011	0.018	0.027	0.043	0.070	0.110	0.18	0.27	0.43
over 18 to 30	0.013	0.021	0.033	0.052	0.084	0.130	0.21	0.33	0.52
over 30 to 50	0.016	0.025	0.039	0.062	0.100	0.160	0.25	0.39	0.62
over 50 to 80	0.019	0.030	0.046	0.074	0.120	0.1490	0.30	0.476	0.74
over 80 to 120	0.022	0.035	0.054	0.087	0.140	0.220	0.35	0.54	0.87
over 120 to 180	0.025	0.040	0.063	0.100	0.160	0.250	0.40	0.63	1.00
over 180 to 250	0.029	0.046	0.072	0.115	0.185	0.290	0.46	0.72	1.15
over 250 to 315	0.032	0.052	0.081	0.130	0.210	0.320	0.52	0.81	1.30
over 315 to 400	0.036	0.057	0.089	0.140	0.230	0.360	0.57	0.89	1.40
over 400 to 500	0.040	0.063	0.097	0.155	0.250	0.400	0.63	0.97	1.55

Notes

Units are millimetres

h = all minus, k = all plus

* This table shows h tolerances across all tolerance classes.

k tolerances are in accordance with this table for tolerance classes k8 to k13 only.

k tolerances are not standardized for k14 and above.

Examples

25.40mm diameter bright drawn bar to h9 tolerance = +nil, -0.052mm

90mm diameter peeled bar to k12 tolerance = +0.35, -nil

Common Stainless Steel Bar Specifications

ASTM A276M	Hot or cold finished bar except bars for reforging (see ASTM A314). Includes rounds, squares, hexagons, hot rolled or extruded shapes such as angles, flats, channels and commonly used grades of stainless steel, including 'improved machinability'. Free machining grades such as 303 and 416 are not included (see spec. A582/A582M).
ASTM A479M	This specification covers the same sections as ASTM A276M, for use in pressure vessel construction. Also referred to in ASME boiler and pressure vessel code.
ASTM A582M	Hot or cold finished free-machining stainless steel bar (except bars for forging), primarily grades 303 and 416. These high sulphur grades have excellent machinability but reduced corrosion resistance, formability and weldability.
ASTM A484M	General requirements for stainless steel wrought bars, shapes, forgings and billets, under each ASTM specification.

Stainless Steel Round Bar – ASTM A276M

Condition: 25.4mm and less generally drawn, above 25.4mm and less than 101.6mm is generally annealed, turned and polished. Sizes above 101.6mm are generally rough turned to an all-plus tolerance

Grades: 431 and 2205 are often stocked in a smooth turned or centreless ground finish.

Diameter		Weight (kg/m)	Diameter		Weight (kg/m)
mm	inches		mm	Inches	
3.00	0.118	0.06	31.75	1.250	6.22
3.18	0.125	0.06	34.92	1.375	7.53
3.97	0.156	0.10	35.00	1.378	7.56
4.00	0.157	0.10	36.00	1.417	8.00
4.76	0.187	0.14	38.10	1.500	8.96
4.90	0.193	0.15	40.00	1.575	9.88
5.00	0.197	0.15	41.27	1.625	10.51
6.00	0.236	0.22	44.45	1.750	12.20
6.35	0.250	0.25	50.00	1.969	15.43
7.94	0.313	0.39	50.80	2.000	15.93
8.00	0.315	0.39	53.97	2.125	17.98
9.00	0.354	0.50	57.15	2.250	20.16
9.52	0.375	0.56	60.00	2.362	22.22
10.00	0.394	0.62	63.50	2.500	24.89
11.11	0.437	0.76	69.85	2.750	30.12
12.00	0.472	0.89	76.20	3.000	35.84
12.70	0.500	1.01	82.55	3.250	42.07
14.00	0.551	1.21	88.90	3.500	48.79
14.28	0.562	1.26	95.25	3.750	56.00
15.87	0.625	1.55	100.00	3.937	61.73
16.00	0.630	1.58	101.60	4.000	63.72
17.46	0.687	1.88	114.30	4.500	80.65
18.00	0.709	2.00	127.00	5.000	99.56
19.05	0.750	2.24	140.00	5.512	120.99
20.00	0.787	2.47	152.40	6.000	143.37
22.00	0.866	2.99	165.00	6.496	168.06
22.23	0.875	3.05	177.80	7.000	195.15
24.00	0.945	3.56	203.20	8.000	254.89
25.00	0.984	3.86	205.00	8.071	259.42
25.40	1.000	3.98	228.60	9.000	322.59
28.58	1.125	5.04	254.00	10.000	398.26
30.00	1.181	5.56	304.80	12.000	573.80

Flat Bar – ASTM A276M

Finish: HRAP or SRE

Grades: 304, 316

Width (mm)	Thickness (mm)	Weight (kg/m)
12.00	3.00	0.29
	6.00	0.59
20.00	3.00	0.49
	5.00	0.82
	6.00	0.98
	10.00	1.63
25.00	3.00	0.61
	5.00	1.02
	6.00	1.23
	8.00	1.63
	10.00	2.04
	12.00	2.45
30.00	3.00	0.74
	5.00	1.23
	6.00	1.47
	8.00	1.96
	10.00	2.45
	12.00	2.94
40.00	3.00	0.98
	5.00	1.63
	6.00	1.96
	8.00	2.62
	10.00	3.27
	12.00	3.92
50.00	3.00	1.23
	5.00	2.04
	6.00	2.45
	8.00	3.27
	10.00	4.09
	12.00	4.91
	16.00	6.54
	20.00	8.18
	25.00	10.22

Width (mm)	Thickness (mm)	Weight (kg/m)	
65.00	5.00	2.66	
	6.00	3.19	
	8.00	4.25	
	10.00	5.31	
75.00	12.00	6.38	
	5.00	3.07	
	6.00	3.68	
	8.00	4.91	
75.00	10.00	6.13	
	12.00	7.36	
	16.00	9.81	
	20.00	12.27	
	25.00	15.33	
	100.00	6.00	4.91
		8.00	6.54
		10.00	8.18
12.00		9.81	
16.00		13.08	
20.00		16.35	
25.00		20.44	
150.00	6.00	7.36	
	10.00	12.27	
	12.00	14.72	

HRAP – Hot rolled, annealed and pickled.**SRE** – Slit rolled edge.**Size Ranges:**

SRE – up to 5mm thick, all widths

SRE – 6mm thick up to and including 40mm width

HRAP – 6mm thick, 50mm and wider

HRAP – all thicknesses above 6mm

Lengths:

All SRE is 4mm long

All HRAP is 6mm long

Angle Bar – ASTM A276M

Condition: HRAP
Grades 304, 316

Leg length		Thickness (mm)	Weight (kg/m)
mm	mm		
20.00	20.00	3.00	0.90
25.00	25.00	3.00	1.10
		5.00	1.80
		6.00	2.10
30.00	30.00	3.00	1.30
		4.00	1.80
		5.00	2.20
		6.00	2.05
40.00	40.00	3.00	1.80
		4.00	2.40
		5.00	2.90
		6.00	3.50
50.00	50.00	3.00	2.30
		4.00	3.00
		5.00	3.70
		6.00	4.40
		10.00	7.10
65.00	65.00	6.00	5.80
		10.00	9.40
75.00	75.00	6.00	6.80
		10.00	9.40
100.00	100.00	6.00	9.10
		10.00	14.90
		12.00	17.70

Hexagonal Bar – ASTM A276M

Condition: cold drawn
Grades 303,316

'AF' across flats		Weight (kg/m)
mm	inches	
6.35	0.250	0.27
7.93	0.312	0.43
8.00	0.315	0.44
9.53	0.375	0.62
11.11	0.437	0.84
13.34	0.525	1.21
15.27	0.601	1.59
18.03	0.710	2.21
19.05	0.750	2.47
20.83	0.820	2.95
22.00	0.866	3.29
22.23	0.875	3.36
23.37	0.920	3.72
24.00	0.945	3.92
25.65	1.010	4.48
28.58	1.125	5.56
30.00	1.181	6.13
30.48	1.200	6.32
31.75	1.250	6.86
33.05	1.300	7.42
34.92	1.374	8.30
37.59	1.479	9.59
38.10	1.500	9.93
42.42	1.670	12.22
47.63	1.875	15.40
50.80	2.000	17.52
57.15	2.250	22.17
63.50	2.500	27.37

Square Bar – ASTM A276M

Condition: cold drawn
Grades 304, 316

'AF' across flats		Weight (kg/m)
mm	inches	
6.00	0.240	0.28
6.35	0.250	0.32
8.00	0.310	0.50
9.52	0.370	0.71
10.00	0.930	0.78
12.00	0.470	1.13
12.70	0.500	1.26
14.00	0.550	1.54
15.88	0.630	1.98
16.00	0.630	2.01
19.05	0.750	2.84
20.00	0.790	3.14
25.00	0.980	4.90
25.40	1.000	5.06
31.75	1.250	7.90
32.00	1.260	8.03
38.10	1.500	11.38
40.00	1.570	12.54
50.80	2.000	20.23

Channels– ASTM A276M

Condition: HRAP
Grades 304,316

Web (mm)	Flange (mm)	Thickness (mm)	Weight (kg/m)
50.0	25.0	3.0	2.2
80.0	40.0	5.0	6.0
100.0	50.0	4.0	6.2
100.0	50.0	5.0	7.6
100.0	50.0	6.0	9.0
150.0	75.0	6.0	13.8
250.0	100.0	9.0	27.5

Laser Fused Structural Sections

Specification: ASTM A1069M “Standard Specification for Laser-Fused Stainless Steel Bars, Plates and Shapes”

Laser Fused Structural Sections

Laser fused structural stainless steel sections are a new product range that has wide application in architecture, building and construction, machinery, food processing plants, automotive and shipbuilding, water and sewage treatment plants and petrochemical industries.

“**Low Impact**” Laser Fused sections are also produced with low heat input welding so that pre-polished special finish sections can be used for high-visibility prestige architectural applications.

Product Benefits

Laser fused sections are welded on automated lines ensuring sections with precise dimensions, minimal distortion, very small heat affected zone and fusion zone and all can be manufactured in small batch size.

Manufacturer

Montanstahl AG, located in Switzerland, are the world leader in production of standard and custom laser fused sections. The technology developed by Montanstahl utilises the advantages of laser welding to produce sections not feasible by other processes. Further details are given at <http://www.montanstahl.com/>

Grades

Common austenitic grades 304/304L, 316/316L are held in Atlas stock. Other grades available for non-stock products include 316Ti, duplex and super duplex stainless steels. A range of carbon steel grades is also available from the mill.

Laser Fused Shapes

Commonly available shapes

- Angles
- Channels
- Beams
- Tees

Specials available on request are limited only by the imagination! A vast range of shapes including box sections can be produced.

The size range possible includes thicknesses from 3mm to 50mm, heights or flange widths up to 2,000mm and lengths up to a maximum of 15m

Finishes

Standard finish is grit blasted mill finish. Other grit finishes and mirror polished are also available on request.

The Complete Stainless Steel Structural Package from Atlas Steels

The solution to all structural needs in stainless steel...

- Laser fused sections
- Hot rolled sections – angles, flats, channels
- Square & Rectangular Hollow sections
- Circular Hollow sections – welded or seamless pipe or tube
- Slotted Tube – single or double slot

A vast range of options including decorative finishes both standard and special.

For other products refer to the relevant section of this Atlas Product Reference Manual.

Bandsaw and hacksaw processing equipment



Within our Service Centres 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 Service Centre.

