EARLE M. JORGENSEN COMPANY

REFERENCE BOOK

ALLOY • ALUMINUM • BRASS • BRONZE
CARBON • CAST IRON • CHROME • NICKEL
STAINLESS • SUPER ALLOY • TITANIUM
BAR • PIPE • PLATE • SHEET • TUBE

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SECTION J

TOOL STEELS

AISI TOOL STEEL CLASSIFICATION SYSTEM

In order to overcome the difficulties arising from the existence of hundreds of different trade names assigned by various tool steel manufacturers, the American Iron and Steel Institute (AISI) has published a uniform designation system. A letter symbol is provided for each major group, as follows:

- High Speed
  - Molybdenum Base . . . . . M
  - Tungsten Base . . . . . T
- Hot Work . . . . . H
- Cold Work
  - High Carbon, High Chromium . . . . . D
  - Medium Alloy Air Hardening . . . . . A
  - Oil Hardening . . . . . O
- Shock Resisting . . . . . S
- Mold Steels . . . . . P
- Special Purpose Low Alloy L
- Water Hardening . . . . . W

Each major group may contain a number of individual types, which are identified by suffix numbers.

As will be noted throughout this section, EMJ Tool Steels are classified according to the AISI system. However, trade names of various producers for the respective AISI grades are shown for your convenience.

COLD WORK TOOL STEELS

These steels are particularly designed to resist wear and abrasion. In addition, they are safe-hardening, which tends to minimize the danger of cracking in the heat treating or hardening operation. They are non-deforming, which minimizes distortion and warpage. Applications include tools and dies for cold shearing, forming, drawing, trimming, and punching, knurling tools, reamers, taps, gauges, and master tools.

TYPE	AISI O 1 UNS T31501 Low Manganese Oil Hardening	AISI O 6 UNS T31506 Graphitic Oil Hardening	AISI A 2 UNS T30102 5% Chrome Air Hardening	AISI A 10 UNS T30110 Graphitic Air Hardening	AISI D 2 UNS T30402 High Carbon High Chrome Air Hardening
TYPICAL ANALYSIS	C .90 Mn 1.00 Cr .50 W .50	C 1.45 Mn .80 Si 1.00 Mo .25	C 1.00 Cr 5.00 Mo 1.00	C 1.35 Mn 1.80 Si 1.25 Mo 1.50 Ni 1.80	C 1.50 Cr 12.00 Mo 1.00 V 1.00
WEAR RESISTANCE	MEDIUM	MEDIUM	HIGH	HIGH	VERY HIGH
TOUGHNESS	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW
DISTORTION IN H.T.	VERY LOW	VERY LOW	LOWEST	LOWEST	LOWEST
RED HARDNESS	LOW	LOW	HIGH	MEDIUM	HIGH
MACHINABILITY	HIGH	HIGHEST	MEDIUM	HIGH	LOW
FORGING					
Start at	1800º-1950ºF	1800º-1950ºF	1850º-2000ºF	1800º-1925ºF	1850º-2000ºF
Do not forge below	1550ºF	1500ºF	1650ºF	1600ºF	1700ºF
ANNEALING					
Temperature.	1400º-1450ºF	[a]1410º-1450ºF	1550º-1600ºF	[b]1410º-1460ºF	1600º-1650ºF
Max. cooling rate/hour	40ºF	20ºF	40ºF	15ºF	40ºF
Brinell Hardness. .	183-212	183-217	201-235	235-269	217-255
HARDENING					
Temperature.	1450º-1500ºF	1450º-1500ºF	1700º-1800ºF	1450º-1500ºF	1800º-1875ºF
Quenching Medium	Oil	Oil	Air	Air	Air
TEMPERING					
Temperature.	350º-500ºF	350º-600ºF	350º-1000ºF	350º-800ºF	400º-1000ºF
Rc Hardness	62-57	63-58	62-57	62-55	61-54

[a]O 6 is normalized from 1600ºF prior to annealing.
[b]A 10 is normalized from 1460ºF prior to annealing.

SHOCK RESISTING and SPECIAL PURPOSE TOOL STEELS

Shock Resisting Tool Steels are designed for use where the ability to withstand repeated blows at normal operating temperatures is more important than the ability to resist wear and abrasion. Applications include hand and pneumatic tools for chipping, punching, riveting, as well as drift pins, grippers, and mandrels.

AISI L6 is a Special Purpose Low Alloy Tool Steel, generally used for machine parts and in applications where toughness is an important consideration. Typical applications are arbors, cams, chucks, collets, jigs, and various machined tool parts.

TYPE	AISI S 1 UNS T41901 Chrome-Tungsten Oil Hardening	AISI S 5 UNS T41905 Silicon-Manganese Oil Hardening	AISI S 7 UNS T41907 Chrome-Moly Air Hardening	AISI L 6 UNS T61206 Cr-Ni-Mo Oil Hardening
TYPICAL ANALYSIS	C .50 Cr 1.50 W 2.50	C .55 Mn .80 Si 2.00 Mo .40	C .50 Cr 3.25 Mo 1.40	C .70 Cr .75 Ni 1.50 Mo .25
WEAR RESISTANCE	MEDIUM	MEDIUM	MEDIUM	MEDIUM
TOUGHNESS	VERY HIGH	HIGHEST	VERY HIGH	VERY HIGH
DISTORTION IN H.T.	MEDIUM	MEDIUM	LOWEST	LOW
RED HARDNESS	MEDIUM	LOW	HIGH	LOW
MACHINABILITY	MEDIUM	HIGH	MEDIUM	MEDIUM
FORGING Start at . . . . . . Do not forge below . .	 1850º-2050ºF 1600ºF	 1850º-2050ºF 1600ºF	 1950º-2050ºF 1700ºF	 1800º-2000ºF 1550ºF
ANNEALING Temperature . . . . . . Max. cooling rate/hour. Brinell Hardness	 1450º-1500ºF 40ºF 183-229	 1425º-1475ºF 25ºF 192-229	 1500º-1550ºF 25ºF down to 1000º; then air cool 187-223	 1400º-1450ºF 40ºF 183-255
HARDENING Temperature . . . . . . Quenching Medium. .	 1650º-1750ºF Oil	 1600º-1700ºF Oil	 1700º-1750ºF To 2½"-Air Over 2½"-Oil (until black)	 1450º-1550ºF Oil
TEMPERING Temperature . . . . . . Rc Hardness	 400º-1200ºF 58-40	 350º-800ºF 60-50	 400º-1150ºF 57-45	 350º-1000ºF 62-45

HOT WORK TOOL STEELS

These steels are designed to resist abrasion and washing action. They have excellent shock resistance. In addition they have enough red hardness to retain their properties at high operation temperatures. Applications include dies for hot metalworking (shearing, forming, punching, extruding, and trimming), dummy blocks, and mandrels. They are also used for structural applications where high engineering strength at elevated temperatures are required.

TYPE	AISI H 11 UNS T20811 Chrome-Moly Vanadium	AISI H 12 UNS T20812 Chrome-Moly Tungsten	AISI H 13 UNS T20813 Chrome-Moly High Vanadium
TYPICAL ANALYSIS	C .35 Cr 5.00 Mo 1.50 V .40	C .35 Cr 5.00 W 1.50 Mo 1.50 V .40	C .35 Cr 5.00 Mo 1.50 V 1.00
WEAR RESISTANCE	MEDIUM	MEDIUM	MEDIUM
TOUGHNESS	VERY HIGH	VERY HIGH	VERY HIGH
DISTORTION IN H.T.	VERY LOW	VERY LOW	VERY LOW
RED HARDNESS	HIGH	HIGH	HIGH
MACHINABILITY	HIGH	HIGH	HIGH
FORGING Start at . . . . . . Do not forge below	 1950º-2100ºF 1650ºF	 1950º-2100ºF 1650ºF	 1950º-2100ºF 1650ºF
ANNEALING Temperature . . . . . . Max. cooling rate/hour . . Brinell Hardness	 1550º-1650ºF 40ºF 192-235	 1550º-1650ºF 40ºF 192-235	 1550º-1650ºF 40ºF 192-229
HARDENING Preheat temperature . . . Hardening temperature . Quenching Medium	 1500ºF 1825º-1875ºF Air	 1500ºF 1825º-1875ºF Air	 1500ºF 1825º-1900ºF Air
TEMPERING Temperature . . . . . . Rc Hardness	 1000º-1200ºF 54-38	 1000º-1200ºF 55-38	 1000º-1200ºF 53-38

HIGH SPEED TOOL STEELS

These steels are specifically designed to maintain high hardness at elevated temperatures (red hardness), with sufficient abrasion and shock-resisting properties for good cutting characteristics. Applications include cutting tools for lathes, shapers, boring mills, and other cutting machines, broaches, drills, and special dies.

TYPE	AISI T 1 UNS T12001 Tungsten (18-4-1)	AISI M 1 UNS T11301 Molybdenum (8-2-1)	AISI M 2 UNS T11302 Moly-Tungsten (6-5-2)
TYPICAL ANALYSIS	C .75 Cr 4.00 W 18.00 V 1.00	C .85 Cr 4.00 W 1.50 Mo 8.50 V 1.00	C .85 Cr 4.00 W 6.00 Mo 5.00 V 2.00
WEAR RESISTANCE	VERY HIGH	VERY HIGH	VERY HIGH
TOUGHNESS	LOW	LOW	LOW
DISTORTION IN H.T.	MEDIUM	MEDIUM	MEDIUM
RED HARDNESS	VERY HIGH	VERY HIGH	VERY HIGH
MACHINABILITY	MEDIUM	MEDIUM	MEDIUM
FORGING			
Start at	1950º-2150ºF	1900º-2100ºF	1900º-2100ºF
Do not forge below	1750ºF	1700ºF	1700ºF
ANNEALING			
Temperature	1600º-1650ºF	1500º-1600ºF	1600º-1650ºF
Max. cooling rate/hour.	40ºF	40ºF	40ºF
Brinell Hardness	217-255	207-235	212-241
HARDENING			
Preheat temperature	1500º-1600ºF	1350º-1550ºF	1350º-1550ºF
Hardening temperature	2300º-2375ºF	2150º-2225ºF	2175º-2250ºF
Quenching Medium	Oil or Air	Oil or Air	Oil or Air
TEMPERING			
Temperature	1000º-1100ºF	1000º-1100ºF	1000º-1200ºF
Rc Hardness	65-60	65-60	65-60

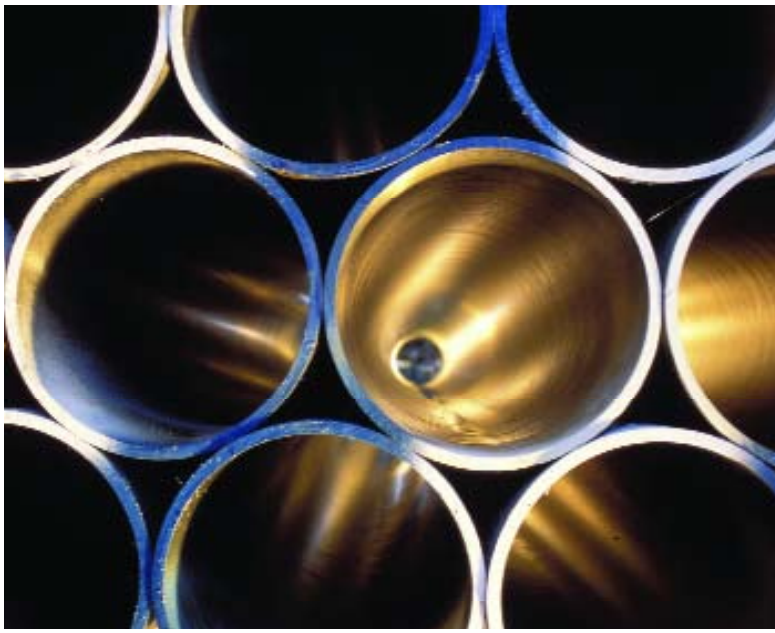
WATER HARDENING (CARBON) TOOL STEELS

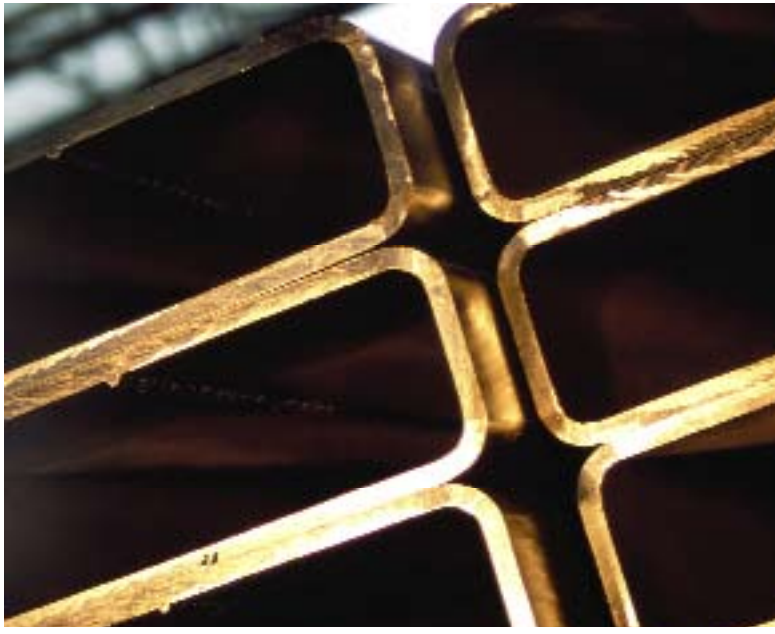
Two grades of water hardening (carbon) tool steels are stocked:

AISI W 1 Tool Steel is an excellent general purpose tool steel that will produce high hardness to uniform depth when heat treated.

AISI W 2 Tool Steel is similar to AISI W 1, but the addition of vanadium gives this grade a greater ability to retain a fine grain structure after heat treatment.

TYPE	AISI W 1 UNS T72301	AISI W 2 UNS T72302
TYPICAL ANALYSIS	C .60/1.40	C .60/1.40 V .25
FORGING		
Start at	1800º-1950ºF	1800º-1950ºF
Do not forge below	1500ºF	1500ºF
ANNEALING		
Temperature	1360º-1450ºF	1360º-1450ºF
Max. cooling rate/hour	40ºF	40ºF
Brinell Hardness	156-201	156-201
HARDENING		
Temperature	1400º-1550ºF	1400º-1550ºF
Quenching Medium	Water	Water
TEMPERING		
Temperature	350º-650ºF	350º-650ºF
Rc Hardness	64-50	64-50





BRAKE DIE STEEL

Brake Die Steel is a special chromium-molybdenum analysis designed especially for brake dies. It combines good machinability with high compressive strength, wear resistance, and toughness.

It is heat treated, straightened, and stress relieved to Brinell 248-293 (Rc 24-31), and is generally used without further heat treatment.

AVAILABLE TOOL STEEL SIZES

AISI O 1 BARS **Color Marking:** Ends painted Blue with Gold Stripe

Rounds — 1/4" through 16"

Squares — 3/8" through 6"

Flats — 1/4" x 1/2" through 6" x 12"

AISI O 6 BARS **Color Marking:** Ends painted Aluminum with Black Stripe

Rounds — 1/4" through 13"

Squares — 1/2" through 8"

Flats — 1/4" x 3/4" through 6" x 10"

AISI A 2 BARS **Color Marking:** Ends painted Green and White

Rounds — 1/4" through 16"

Squares — 1/2" through 6"

Flats — 3/8" x 1 1/2" through 6" x 12"

AISI A 10 BARS **Color Marking:** Ends painted Aluminum with Blue Stripe

Rounds — 3/8" through 12"

Squares — 3/4" through 4 1/2"

Flats — 3/8" x 1" through 6" x 10"

AISI D 2 BARS **Color Marking:** Ends painted Red

Rounds — 1/4" through 16"

Squares — 1/2" through 6"

Flats — 1/2" x 3/4" through 6" x 12"

AISI S 1 BARS **Color Marking:** Ends painted Brown

Rounds — 1/4" through 8"

Squares — 1 1/4" through 5"

Flats — 1/2" x 3/4" through 4" x 6"

AISI S 5 BARS **Color Marking:** Ends painted Pink

Rounds — 5/16" through 6"

Squares — 3/8" through 3"

Hexagons — 1/2" through 1 1/4"

Octagons — 1/4" through 1 1/4"

Flats — 1/2" x 1 1/2" through 4" x 6"

AVAILABLE TOOL STEEL SIZES (Continued)

AISI S 7 BARS **Color Marking:** Ends painted Yellow with Blue Stripe

Rounds — 1/2" through 13"

Squares — 1/2" through 8"

Flats — 1/2" x 1" through 6" x 8"

AISI L 6 BARS **Color Marking:** Ends painted Gold with Green Stripe

Rounds — 1/2" through 2 1/2"

AISI H 12 BARS **Color Marking:** Ends painted Green and Yellow

Rounds — 1" through 10"

AISI H 13 BARS **Color Marking:** Ends painted Blue with White Stripe

Rounds — 1/2" through 12"

AISI T 1 BARS **Color Marking:** Ends painted Blue with Yellow Stripe

Rounds — 3/4" through 4 1/2"

Squares — 1 1/4" through 2"

Flats — 3/8" x 1 1/2" through 1 1/2" x 2"

AISI M 1 BARS **Color Marking:** Ends painted Black with White Stripe

Rounds — 1/2" through 7"

AISI M 2 BARS **Color Marking:** Ends painted Yellow

Rounds — 9/32" through 6"

Squares — 1/2" through 2"

Flats — 5/16" x 1/2" through 3" x 4"

AISI W 1 BARS **Color Marking:** Rounds — Ends painted Green

Hexagons & Octagons — Color Marking: Ends painted Orange

Rounds — 1/4" through 3"

Hexagons — 3/4" through 1 1/8"

Octagons — 3/8" through 1 1/4"

BRAKE DIE **Color Marking:** Ends painted Pink with White Stripe

Rounds — 3/4" through 10"

Squares — 1/2" through 6"

Flats — 1/2" x 1 1/2" through 3" x 6"

POLISHED DRILL ROD
and
PRECISION GROUND FLAT STOCK

Polished Drill Rod and Flat Ground Stock are supplied ready for use in a wide variety of applications. Surfaces are ground to a finish of better than 40 micro inches and are free from defects and decarburizaion.

These products are available in convenient, easy-to-work sizes so that no time need be spent nor metal wasted in preparing the surface to make the tool or die. They are ideally suited for precision jobs. Precision Ground Flat Stock is available in over-size stock as well as standard sizes.

TYPICAL ANALYSIS

	C	Mn	Si	Cr	W	V	Mo
Carbon (W 1)	1.00	.30	.30	—	—	—	—
Oil Hardening (O 1)	.90	1.20	.35	.50	.50	.20	—
Graph-Mo (O 6)	1.45	1.00 Max.	1.25 Max.	—	—	—	.25
Air Hardening (A 2)	1.00	.50	.30	5.00	—	.25	1.10
1018 Low Carbon	.18	.50	.20	—	—	—	—
Air Hardening (A 6)	.70	2.00	.30	1.00	—	—	1.35

APPLICATIONS — Drill Rod rounds are particularly suitable for drills, taps, dies, arbors, balance staffs, chasers, cutting-off tools, engravers' tools, gauges, jewelers' tools, keys, machinery parts, milling tools, pins, punches, pinion, pivots, roller bearings, threading dies, etc.

Ground Flat Stock is ideally suited for numerous precision jobs where ease of working and fine performance are required — such as dies, fixtures, jigs, stamps, machine parts, punches, templates, stripper plates, tools, gauges, shims, etc.

TOLERANCES

Drill Rod Rounds:

Size	Diameter Tolerance
.124" or smaller	+/- .0003"
.125" to .499"	+/- .0005"
.500" to 2.000"	+/- .001"

Precision Ground Flat Stock:

	Thickness Tolerance	Width Tolerance
Standard Sizes	+/- .001"	+ .005", - 0"
Over-Sized Stock		
Under 3/16" Thick	+/- .001"	+ .005", - 0"
3/16" Thick & Over	+ .011"/.013", - 0"	+ .010"/.015", -0"

DRILL ROD ROUNDS

W 1 (Water Hardening)

O 1 (Oil Hardening)

Stock Lengths 3'

Diameter Decimal Inches	Size No. or Fraction	Weight Lbs. per 3-Ft. Lgth.	Diameter Decimal Inches	Size No. or Fraction	Weight Lbs. per 3-Ft. Lgth.	Diameter Decimal Inches	Size No. or Fraction	Weight Lbs. per 3-Ft. Lgth.
.0156	1/64"	.002	.172	17	.237	.4531	29/64"	1.626
.0312	1/32"	.008	.175	16	.246	.4687	15/32"	1.749
.032	66	.008	.178	15	.255	.4843	31/64"	1.875
.033	65	.009	.180	14	.261	.500	1/2"	2.001
.035	64	.010	.182	13	.267	.5156	33/64"	2.127
.036	63	.011	.185	12	.276	.5312	17/32"	2.250
.037	62	.011	.1875	3/16"	.282	.5468	35/64"	2.391
.038	61	.011	.188	11	.282	.5625	9/16"	2.532
.039	60	.012	.191	10	.288	.5781	37/64"	2.673
.040	59	.013	.194	9	.297	.5937	19/32"	2.811
.041	58	.014	.197	8	.312	.6093	39/64"	3.000
.042	57	.015	.199	7	.318	.625	5/8"	3.126
.045	56	.018	.201	6	.321	.6406	41/64"	3.312
.0468	3/64"	.018	.2031	13/64"	.327	.6562	21/32"	3.435
.050	55	.021	.204	5	.327	.6718	43/64"	3.561
.055	54	.024	.207	4	.345	.6875	11/16"	3.750
.058	53	.027	.212	3	.363	.7031	45/64"	3.936
.0625	1/16"	.030	.2187	7/32"	.387	.7187	23/32"	4.125
.063	52	.033	.219	2	.387	.7348	46/64"	4.314
.066	51	.036	.227	1	.414	.750	3/4"	4.500
.069	50	.039	.234	A	.441	.7656	49/64"	4.686
.072	49	.042	.2343	15/64"	.441	.7812	25/32"	4.875
.075	48	.045	.238	B	.450	.7969	51/64"	5.124
.077	47	.048	.242	C	.462	.8125	13/16"	5.250
.0781	5/64"	.051	.246	D	.483	.8281	53/64"	5.484
.079	46	.051	.250	1/4"	.501	.8437	27/32"	5.688
.081	45	.054	.250	E	.501	.8593	55/64"	5.910
.085	44	.057	.257	F	.522	.875	7/8"	6.126
.088	43	.063	.261	G	.543	.8906	57/64"	6.354
.092	42	.069	.2656	17/64"	.561	.9062	29/32"	6.564
.0937	3/32"	.069	.266	H	.564	.9219	59/64"	6.786
.095	41	.072	.272	I	.594	.9375	15/16"	6.999
.097	40	.075	.277	J	.615	.9531	61/64"	7.248
.099	39	.078	.281	K	.636	.9687	31/32"	7.593
.101	38	.084	.2812	9/32"	.639	.9844	63/64"	7.749
.103	37	.087	.290	L	.675	1.000	1"	7.998
.106	36	.090	.295	M	.699	1.0158	1 1/64"	8.247
.108	35	.093	.2968	19/64"	.702	1.0313	1 1/32"	8.499
.1093	7/64"	.093	.302	N	.726	1.0625	1 1/16"	9.030
.110	34	.096	.3125	5/16"	.780	1.0937	1 3/32"	9.582
.112	33	.102	.316	O	.813	1.125	1 1/8"	10.125
.115	32	.108	.323	P	.831	1.1562	1 5/32"	10.696
.120	31	.117	.3281	21/64"	.861	1.1875	1 3/16"	11.313
.125	1/8"	.126	.332	Q	.882	1.2187	1 7/32"	11.898
.127	30	.129	.339	R	.924	1.250	1 1/4"	12.501
.134	29	.144	.3437	11/32"	.939	1.2812	1 9/32"	13.122
.139	28	.156	.348	S	.975	1.3125	1 5/16"	13.800
.1406	9/64"	.156	.358	T	1.026	1.3437	1 11/32"	14.445
.143	27	.165	.3593	23/64"	1.032	1.3750	1 3/8"	15.147
.146	26	.171	.368	U	1.086	1.4062	1 13/32"	15.822
.148	25	.177	.375	3/8"	1.125	1.4375	1 7/16"	16.563
.151	24	.183	.377	V	1.149	1.4687	1 15/32"	17.259
.153	23	.189	.386	W	1.200	1.500	1 1/2"	18.000
.155	22	.195	.3906	25/64"	1.221	1.5625	1 9/16"	19.560
.1562	5/32"	.198	.397	X	1.263	1.625	1 5/8"	21.150
.157	21	.198	.404	Y	1.281	1.75	1 3/4"	24.510
.161	20	.207	.4062	13/32"	1.311	1.8125	1 13/16"	26.310
.164	19	.216	.413	Z	1.374	1.875	1 7/8"	28.140
.168	18	.228	.4218	27/64"	1.416	1.9375	1 15/16"	30.060
.1718	11/64"	.234	.4375	7/16"	1.530	2.000	2"	32.040

PRECISION GROUND FLAT STOCK

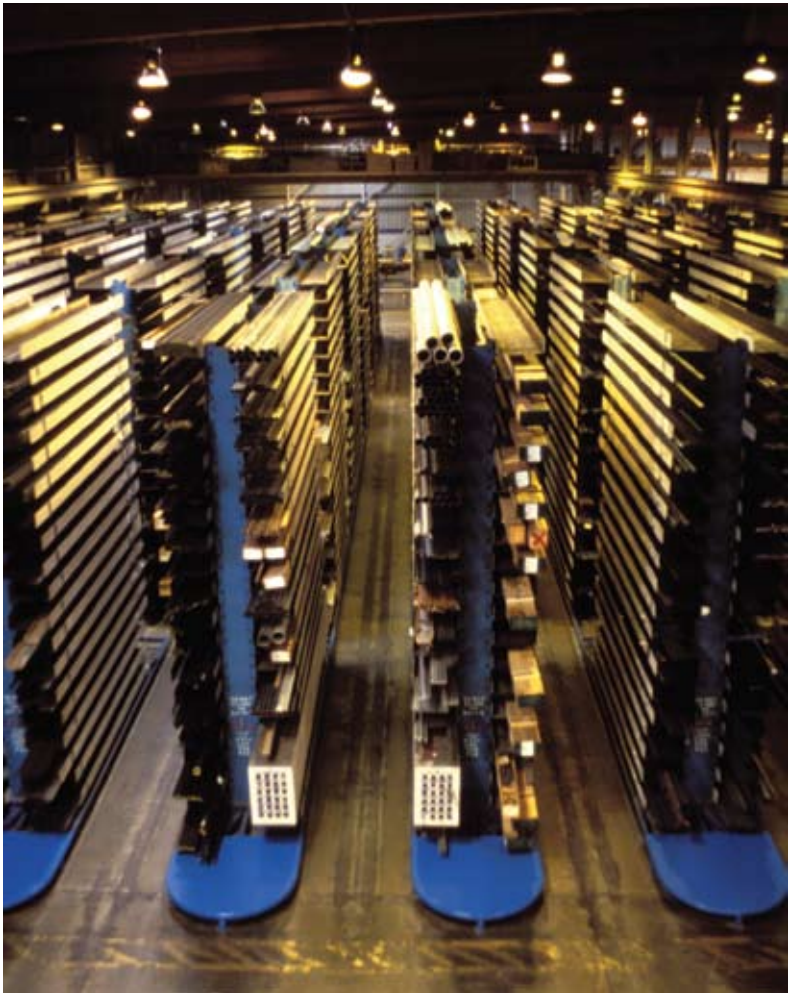
Stock Lengths: W1, 1018 — 24"
O 1, O 6, A 2, A 6 — 18" and 36"

Thickness and Width	Wt. per Piece 18" Long	Wt. per Piece 24" Long
1/64 X 1/2	.04	.05
3/4	.06	.08
1	.08	.11
1 1/2	.12	.16
2	.16	.21
2 1/2	.20	.27
3	.24	.32
4	.32	.43
1/32 X 1/2	.08	.11
3/4	.12	.16
1	.16	.21
1 1/4	.20	.27
1 1/2	.24	.32
1 3/4	.28	.37
2	.32	.43
2 1/2	.40	.53
3	.48	.64
3 1/2	.56	.75
4	.64	.85
5	.80	1.07
5 1/2	.88	1.17
6	.95	1.27
3/64 X 1/2	.12	.16
3/4	.18	.24
1	.24	.32
1 1/2	.36	.48
2	.48	.64
2 1/2	.60	.80
3	.72	.96
4	.95	1.27
5	1.20	1.60
6	1.43	1.91
8	1.90	2.53
1/16 X 1/2	.16	.21
3/4	.24	.32
1	.32	.43
1 1/4	.40	.53
1 1/2	.48	.64
1 3/4	.56	.75
2	.64	.85
2 1/2	.80	1.07
3	.96	1.28
3 1/2	1.12	1.49
4	1.27	1.69
5	1.59	2.12
6	1.91	2.54
8	2.55	3.39
10	3.19	4.25
5/64 X 1/2	.20	.27
3/4	.30	.40
5/64 X 1	.40	.53
1 1/2	.60	.80
2	.80	1.07
2 1/2	1.00	1.33
3/32 X 1/2	.24	.32
3/4	.36	.48
1	.48	.64
1 1/4	.60	.80
1 1/2	.72	.96
1 3/4	.84	1.12
2	.96	1.28
2 1/2	1.20	1.60
3	1.43	1.91
3 1/2	1.67	2.23
4	1.91	2.55
5	2.39	3.19
6	2.87	3.83
8	3.83	5.11
7/64 X 1/2	.28	.37
3/4	.42	.56
1	.56	.75
2	1.12	1.49
1/8 X 1/8	.08	.11
1/2	.32	.43
5/8	.40	.53
3/4	.48	.64
1	.64	.85
1 1/4	.80	1.07
1 1/2	.96	1.28
1 3/4	1.12	1.49
2	1.28	1.71
2 1/2	1.59	2.12
3	1.91	2.55
3 1/2	2.23	2.97
4	2.55	3.40
4 1/2	2.87	3.83
5	3.19	4.25
6	3.83	5.11
8	5.10	6.80
10	6.38	8.51
12	7.66	10.21
9/64 X 1	.72	.96
1 1/2	1.08	1.43
3	2.15	2.87
5/32 X 5/32	.12	.16
1/2	.40	.53
3/4	.60	.80
1	.80	1.07
1 1/4	1.00	1.33
5/32 X 1 1/2	1.20	1.60
2	1.59	2.12
2 1/2	1.99	2.65
3	2.39	3.19
3 1/2	2.79	3.72
4	3.19	4.25
6	4.78	6.27
8	6.38	8.51
11/64 X 4	3.51	4.68
3/16 X 3/16	.18	.24
5/16	.30	.40
1/2	.48	.64
3/4	.72	.96
7/8	.84	1.12
1	.96	1.28
1 3/4	1.20	1.60
1 1/2	1.43	1.91
1 3/4	1.67	2.23
2	1.91	2.55
2 1/2	2.39	3.19
3	2.87	3.83
3 1/2	3.35	4.47
4	3.83	5.11
5	4.78	6.37
6	5.74	7.65
8	7.65	10.20
10	9.56	12.74
12	11.48	15.30
7/32 X 7/32	.24	.32
1/2	.56	.75
3/4	.84	1.12
1	1.12	1.49
1 1/4	1.40	1.87
1 1/2	1.67	2.23
2	2.23	2.97
2 1/2	2.79	3.72
3	3.35	4.47
4	4.46	5.95
6	6.70	8.93
1/4 X 1/4	.32	.43
3/8	.48	.64
1/2	.64	.85
3/4	.96	1.28
1	1.28	1.71
1 1/4	1.60	2.13
1 1/2	1.91	2.55
1 3/4	2.23	2.97
2	2.55	3.40
2 1/2	3.19	4.25

PRECISION GROUND FLAT STOCK (Continued)

Stock Lengths: W1, 1018 — 24"
O 1, O 6, A 2, A 6 — 18" and 36"

Thickness and Width	Wt. per Piece 18" Long	Wt. per Piece 24" Long
3	3.83	5.11
3 1/2	4.46	5.95
4	5.10	6.80
4 1/2	5.74	7.65
5	6.38	8.51
6	7.65	10.20
8	10.20	13.60
10	12.75	17.00
12	15.30	20.40
9/32 X 1	1.43	1.91
2 1/2	3.60	4.80
3	4.30	5.73
5/16 X 5/16	.50	.67
1/2	.80	1.07
3/4	1.19	1.59
1	1.59	2.12
1 1/4	1.99	2.65
1 1/2	2.39	3.19
1 3/4	2.79	3.72
2	3.19	4.25
2 1/2	3.98	5.31
3	4.78	6.37
3 1/2	5.58	7.44
4	6.38	8.51
4 1/2	7.18	9.57
5	7.97	10.62
6	9.56	12.74
8	12.75	17.00
10	15.94	21.25
12	19.13	25.50
3/8 X 3/8	.72	.96
1/2	.96	1.28
3/4	1.43	1.91
1	1.91	2.55
1 1/4	2.39	3.19
1 1/2	2.87	3.83
1 3/4	3.35	4.46
2	3.83	5.11
2 1/2	4.78	6.37
3	5.74	7.65
3 1/2	6.70	8.93
4	7.65	10.20
4 1/2	8.61	11.47
5	9.56	12.74
6	11.48	15.30
8	15.30	20.40
10	19.13	25.50
12	22.95	30.59
7/16 X 3/4	1.67	2.23
1	2.23	2.97
1 1/2	3.35	4.46
2	4.46	5.95
3	6.69	8.92
1/2 X 1/2	1.28	1.71
5/8	1.60	2.13
3/4	1.91	2.55
1	2.55	3.40
1 1/4	3.19	4.25
1 1/2	3.83	5.11
2	5.10	6.80
2 1/2	6.38	8.51
3	7.65	10.20
3 1/2	8.93	11.90
4	10.20	13.60
4 1/2	11.48	15.30
5	12.75	17.00
6	15.30	20.40
8	20.40	27.19
10	25.50	33.99
12	30.60	40.79
9/16 X 1	2.87	3.83
2 1/2	7.18	9.57
5/8 X 5/8	1.99	2.65
3/4	2.39	3.19
1	3.19	4.25
1 1/4	3.99	5.32
1 1/2	4.78	6.37
2	6.38	8.51
2 1/2	7.97	10.62
3	9.56	12.74
4	12.75	17.00
5	15.94	21.25
6	19.13	25.50
8	25.50	33.99
10	31.88	42.50
12	38.26	51.00
3/4 X 3/4	2.87	3.83
1	3.83	5.11
1 1/4	4.78	6.37
1 1/2	5.74	7.65
2	7.65	10.20
2 1/2	9.56	12.75
3	11.48	15.30
3 1/2	13.39	17.85
4	15.30	20.40
4 1/2	17.22	22.95
5	19.13	25.50
6	22.95	30.59
8	30.60	40.79
10	38.25	50.99
12	45.90	61.18
14	53.55	71.38
13/16 X 1	4.14	5.52
1 1/4	5.18	6.91
7/8 X 7/8	3.91	5.21
1	4.46	5.95
2	8.92	11.90
1 X 1	5.10	6.80
1 1/4	6.38	8.51
1 1/2	7.65	10.20
1 3/4	8.93	11.91
2	10.20	13.60
2 1/2	12.75	17.00
3	15.30	20.40
4	20.40	27.19
5	25.50	33.99
6	30.60	40.79
7	35.70	47.59
8	40.80	54.39
10	51.00	67.98
12	61.20	81.58
14	71.40	95.18
1 1/4 X 1 1/4	7.97	10.62
1 1/2	9.57	12.76
2	12.75	17.00
3	19.13	25.50
4	25.50	33.99
5	31.88	42.50
6	38.25	50.99
7	44.63	59.49
8	51.00	67.98
10	63.75	84.98
12	76.50	101.97
14	89.25	118.97
1 1/2 X 1 1/2	11.48	15.30
2	15.30	20.40
3	22.95	30.59
4	30.60	40.79
5	38.25	50.99
6	45.90	61.18
8	61.20	81.58
10	76.50	101.97
1 5/8 X 1 5/8	13.47	17.96
2X 2	20.40	27.19
2 1/2 X 2 1/2	31.88	42.50
3 X 3	45.90	61.18
4 X 4	81.60	108.77



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