

synergy

**SYNERGY
ENGINEERING SOLUTION**

PRODUCTS

**ROUND BATS
FLAT BARS
BRIGHT BARS**

GRADES

**MILD STEEL
CARBON STEEL
ALLOY STEEL
STAINLESS STEEL**



Synergizing Ideas, Delivering Excellence

STAINLESS STEEL, ALLOY STEEL & EN SERIES RODS



EN SERIES STEEL ROUND

E.N. No.	Type and Application	Chemical composition & max						Physical Properties min			Limiting Size (diameter or width) Across Plats)	Condition	
		C	Mn	Ni	Cr.	Mo.	Others	T.I t/sq	El %	Izod ft.lbs			
IA	Free cutting machining Steel for low duty bolts, nuts, studs etc	.07/.15	.80/1.20	-	-	-	s. .2/.3 P. .07 Si. .10	32 28 25 23 23	10 14 14 14 26	- - - - -	17/32" and less Over 17/32" to 1-1/2" Over 1-1/2" to 2 1/2" Over 2 1/2" to 4" 4" Other nishes	Cold rolled or Cold drawn	-
8	40CARBON STEEL without grain size control. For mother connecting rods, crankshafts, bolts and machine details in general.	.35/.45	.6/10				Si .06/.36 S & P .06	35 Q 40 H 45 35 Q 40 R 45	20 20 20 17 17 17	- 10 10 - - -	6" 2 1/2" 7/8" 6" 2 1/2" 7/8"	Normalized H & T H & T N & CD H & T & CD H & T & CD	152/207 179/229 201/255 152/207 169/229 201/255
19	1 percent chromium Molybdenum steel Suitable for tensile ranges of 45/80 tons according to the ruling section of the part	.35/.45	.50/.80	-	.90 1.50	.2/4	S & P .05 Si .0.10/.35	R. 45 S. 50 T. 55 U. 60 V. 65 W. 70 Y. 80	22 20 18 17 16 15 10	40 40 40 35 35 30 10	6" PS 32 4" - 36 2 1/2 - 41 2 1/2" - 46 1.1/8" - 50 1. 1/8 - 55 1" - 64	H & T H & T H & T H & T H & T H & T H & T	201/255 223/177 248/302 269/321 293/341 311/375 363/415
24	1 1/2 percent Nickel-Chromium Molybdenum steel. Suitable for tensile ranges of 50/100 tons according to the ruling section of the part.	.35/.45	.45/.7	1.3/ 1.8	.9/1.4	.2/35	Si. 10/35 S. P 0.05	S. 50 T. 55 U. 60 V. 65 W. 70 X. 75 Y. 80 Z.100	20 18 17 16 15 14 14 8	40 40 35 35 30 25 25 8	6" PS 36 6" - 41 4" - 46 2 1/2 - 50 1.1/8" - 55 1.1/8" - 59 1.1/8" - 64 1.1/8" - 80	H & T H & T H & T H & T H & T H & T H & T H & T	223/277 248/302 269/321 293/341 311/375 341/388 363/415 444 Min
36A	3 percent Nickel- Chromium	.15	.3/6	3/3.75	.6/1.1	-	Si .10/.35	55	15	35	-	-	-
36B	Case- hardening steel	.12/.18	.3/6	3/3.75	.6/1.1	-	-	65	13	30	-	-	-
36C	3 percent Nickel Chromium. Molybdenum Case	.12/.18	.3/6	3/3.75	.6/1.1	.1/25	Si .10/.35	65	13	30	-	-	-
353	1.1/4 percent, Nickel Chromium Case Hard-	.20	.50/1.0	1.0/ 1.5	.75/ 1.25	.08/ .15	Si. .35 S. & P. .05	65	12	20	-	-	-

LOW TEMP. ROUND CHEMICAL & PHYSICAL PROP

S. S. ROUND BAR CHEMICAL & PHYSICAL PROP

ASTM Grade	C	Min	Si	S	P	Cr	Ni	Mo	Other	Tensile Ksi(MPa)	Yield Ksi(Mpa)	Elongation % Strip/Round	Impact Jules. Av. min	Redn. in Area
A350LF1	0.30 MAX	0.60 1.35	0.15 0.30	0.040 MAX	0.035 MAX	0.30 MAX	0.40 MAX	0.12 MAX	Cu-0.4 max Cb - 0.4 max Cb - 0.02 max	60.85 (415.585)	0(205)	28/35	18/14	38
LF2	0.30 MAX	0.90 MAX	0.15 0.30	0.040 MAX	0.035 MAX	0.30 MAX	0.40 MAX	0.12 MAX	Cb-0.02 max Va-0.3	0.95 (485.655)	36(250)	30/22	20/16	36
LF3	0.20 MAX	0.6 1.35	0.20 0.35	0.040 MAX	0.035 MAX	0.30 MAX	3.25 3.75	0.12 MAX	Cu-0.4 max Cb-0.02max Va-0.3 max	0.95 (485.655)	37.5(250)	30/22	20/16	35
LF5	0.30 MAX	0.60 1.35	0.20 0.35	0.040 MAX	0.035 MAX	0.30 MAX	1.0 2.0	0.12 MAX	Cu-0.4max cb-0.02max Va-0.3max	Cl.1.60.85(415.585) Cl.2.70.95(485.655)	Cl.1.30(205) Cl.2.37.5(260)	Cl.1.28/25 Cl.2.30/22	20/16	Cl.1.38 Cl.1.35
LF6	0.22 1.50	1.15 1.50	0.15 0.30	0.025 MAX	0.025 MAX	0.30 MAX	0.40 MAX	0.12 MAX	Cu-0.4 max Cb-0.02 max Va-0.04-0.11	Cl.1.66-91(455-495) Cl.2.75-100(515-690)	52(360) 60(415)	Cl.1.30/22 Cl.2.28/20	2016	40
LF9	0.20 MAX	0.40 1.06	-	0.040 MAX	0.035 MAX	0.30 MAX	1.60 2.24	-	Cb-0.02 max Cu-0.75-1.25 Va-0.03	63-88 (435-605)	46(315)	28/25	18/14	38
A 420WPL-6	0.30 MAX	0.39 1.06	0.10 MIN	0.030 MAX	0.030 MAX	-	-	-	-	60-85 (415-585)	35(240)	30/22 Long 16.5/12 Trans	17.6/13.6 17.6-13.6	
WPL - 9	0.20 MAX	0.40 1.06	-	0.030 MAX	0.030 MAX	-	1.60 2.24	-	Cu-0.75-1.25	63-88 (435-610)	46(315)	28/20 Long 18- Trans.	17.6/13.6 17.6/11.6	
WPL 3	0.20 MAX	0.31 0.64	0.13 0.37	0.050 MAX	0.050 MAX	-	3.18 3.82	-	-	65-90 (450-620)	35(240)	30/22Long 20/14 Trans	17.6/13.6 17.6/13.6	
WPL 8	0.13 MAX	0.90 MAX	0.13 0.37	0.030 MAX	0.030 MAX	-	8.40 9.60	-	-	100-125 (690-865)	75(515)	22/16	33.9/27.1	

ASTM Grade	C	Mn	Si	S	P	Cr	Ni	Mo	Other	Tensile Ksi(MPa)	Yield Ksi(Mpa)	Elongation % Strip/Round	Impact Jules. Av. min	Redn. in Area
A479 TP 304	0.08 MAX	2.00 MAX	1.00 MAX	0.030 MAX	0.045 MAX	18.0 20.0	8.0 11.0	-	N2-0.10 MAX	75000 (515)	3000 (205)	30	-	40
A479 TP 316	0.08 MAX	2.00 MAX	1.00 MAX	0.030 MAX	0.045 MAX	16.0 18.0	10.0 14.0	2.0 3.0	N20.10 MAX	75000 (515)	30000 (250))	30	-	40
A479 TP 317 L	0.035 MAX	2.00 MAX	1.00 MAX	0.030 MAX	0.045 MAX	18.0 20.0	11.0 15.0	3.0 4.0	N2-0.10 MAX	75000 (515)	30000 (250)	30	-	40
A479 TP 310S	0.08 MAX	2.00 MAX	1.00 MAX	0.030 MAX	0.045 MAX	24.0 26.0	19.0 22.0	-	-	75000 (515)	3000 (205)	30	-	40
A479 TP 316 H	0.04 0.10	2.00 MAX	1.00 MAX	0.030 MAX	0.040 MAX	16.0 18.0	10.0 14.0	2.0 3.0	-	75000 (515)	30000 (205)	30	-	40
A479 TP 347 H	0.04 0.10	2.00 MAX	1.00 MAX	0.030 MAX	0.040 MAX	17.0 19.0	9.0 13.0	-	Cb=Bxc -13.0	75000 (515)	30000 (205)	30	-	40

ROUND BAR - METRIC

Size	Weights in kg.	
	mm Wt. per ft.	Wt. per. Mtr
.5	.0004	.0015
1.0	.0018	.0062
1.5	.0042	.014
2.0	.0076	.039
2.5	.012	.039
3.0	.017	.055
3.5	.023	.076
4.0	.030	.099
4.5	.038	.125
5.0	.047	.154
5.5	.057	.187
6.0	.068	.222
6.5	.079	.260
7.0	.092	.302
7.5	.106	.347
8.0	.120	.395
8.5	.136	.445
9.0	.152	.499
9.5	.169	.556
10	.188	.617
11	.227	.746
12	.271	.888
13	.317	1.04
14	.369	1.21
15	.424	1.39
16	.482	1.58
17	.543	1.78
18	.610	2.00
19	.680	2.23
20	.753	2.47

Size	Weights in kg.	
	mm Wt. per ft.	Wt. per. Mtr
21	.829	2.72
22	.908	2.98
23	.994	3.26
24	1.08	3.55
25	1.17	3.85
26	1.27	4.17
27	1.37	4.50
28	1.47	4.83
30	1.69	5.55
32	1.92	6.31
33	2.05	6.71
35	2.30	7.55
36	2.44	7.99
38	2.71	8.90
39	2.86	9.38
40	3.01	9.86
42	3.32	10.88
45	3.80	12.48
48	4.33	14.21
50	4.70	15.41
52	5.08	16.67
55	5.69	18.65
56	5.89	19.33
58	6.32	20.74
60	6.77	22.20
62	7.22	23.70
64	7.70	25.25
65	7.94	26.05
68	8.69	28.51
70	9.21	30.21

Size	Weights in kg.	
	mm Wt. per ft.	Wt. per. Mtr
72	9.74	31.96
75	10.57	34.68
80	12.03	39.46
90	15.22	49.94
100	18.79	61.65
110	22.74	74.6
120	27.07	88.8
130	31.70	104
140	36.88	121
150	42.37	139
160	48.16	158
170	54.26	178
180	60.96	200
190	67.97	223
200	75.3	247
220	90.8	298
240	108	355
250	117	385
260	127	417
280	147	483
300	169	555
320	192	631
340	217	713
350	230	755
360	244	799
380	271	890
400	301	986
500	469	1540

STAINLESS , ALLOY STEELS, ROUND BAR

WEIGHT OF S. S. ROUND

DIA (MM) X DIA (MM) X 0.0019 KG. (PER FEET)

HEXAGONAL BAR - METRIC

Size	Weights in kg.	
	mm Wt. per ft.	Wt. per. Mtr
..5	.0518	.170
5.5	.0628	.206
7	.102	.333
8	.133	.435
10	.207	.680
11	.251	.823
12	.298	.979
13	.351	1.15
14	.405	1.33
15	.466	1.53

Size	Weights in kg.	
	mm Wt. per ft.	Wt. per. Mtr
16	.530	1.74
17	.597	1.96
18	.671	2.20
19	.747	2.45
20	.829	2.72
22	1.00	3.29
24	1.20	3.92
25	1.30	4.25
27	1.51	4.96
30	1.87	6.12

Size	Weights in kg.	
	mm Wt. per ft.	Wt. per. Mtr
32	2.12	6.56
35	2.54	8.33
36	2.69	8.81
38	2.99	9.82
40	3.32	10.9
41	3.48	11.4
46	4.39	14.4
48	4.79	15.7
50	5.18	17.0

SQUARE BAR - METRIC

Size	Weights in kg.	
	mm Wt. per ft.	Wt. per. Mtr
5	.0597	.196
5.5	.0722	.237
6	.0862	.283
7	.117	.385
8	.153	.502
9	.194	.636
10	.239	.785
11	.290	.950
12	.344	1.13
13	.405	1.33
14	.469	1.54
15	.540	1.77

Size	Weights in kg.	
	mm Wt. per ft.	Wt. per. Mtr
16	.613	2.01
17	.692	2.27
18	.774	2.54
19	.863	2.83
20	.957	3.14
21	1.06	3.46
22	1.16	3.80
23	1.27	4.15
24	1.38	4.52
25	1.50	4.91
26	1.62	5.31
27	1.74	5.72

Size	Weights in kg.	
	mm Wt. per ft.	Wt. per. Mtr
28	1.88	6.15
30	2.15	7.06
32	2.45	8.04
35	2.93	9.62
36	3.11	10.2
38	3.44	11.3
40	3.84	12.6
42	4.21	13.8
45	4.85	15.9
46	5.06	16.6
48	5.52	18.1
50	5.97	19.6

STAINLESS, ALLOY STEELS, HEXAGON, AND SQUARE BAR

WEIGHT OF S. S. HEXAGONAL ROD.

DIA (MM)X DIA (MM) X 0.002072 KG. (PER FEET)

FORMULAE

1) WEIGHT OF STAINLESS STEEL PIPES & TUBES

$\text{OD (mm)} - \text{W.T. (mm)} \times \text{W.T. (mm)} \times 0.02466 = \text{Kg. per Mtr.}$

2) SHEET WIDTH REQUIRED FOR ROLLED AND WELDED PIPES

$\text{O.D. (mm)} - \text{THK (mm)} \times 3.14 = \text{Sheet Width}$

3) WEIGHT OF STAINLESS STEEL SHEETS

$\text{Length (mtr.)} \times \text{Wdth (mtr.)} \times \text{Thk (mm)} \times 8 = \text{Kg Per Sheet}$

4) WEIGHT OF STAINLESS STEEL CIRCLE & BLANKS

$\text{O.D. (mm)} \times \text{O.D.} > \text{(mm)} \times \text{Thk (mm)} / 160/1000 = \text{Kg Per Pcs.}$

5) WEIGHT OF STAINLESS STEEL ROUNDS

$\text{Dia. (mm)} \times \text{Dia. (mm)} \times 0.00623 = \text{Per Mtr.}$

6) WEIGHT OF STAINLESS STEEL HEXAGONAL RODS

$\text{Dia. (mm)} \times \text{Dia. (mm)} \times 0.00679 = \text{Per Mtr.}$

7) WEIGHT OF STAINLESS STEEL SQUARE BARS

$\text{Dia. (mm)} \times \text{Dia. (mm)} \times 0.00787 = \text{Kg Per Mtr.}$

8) WEIGHT OF CARBON STEEL PIPES & TUBES

$\text{O.D. (mm)} - \text{W.T. (mm)} \times \text{W.T. (mm)} \times 0.02466 = \text{Kg. Per Mtr.}$

9) WEIGHT OF CARBON STEEL SHEETS - PLATES

$\text{Length (mtr.)} \times \text{Width (mtr.)} \times \text{Thk (mm)} \times 7.85 = \text{Kg. Per Sheet}$

10) WEIGHT OF COPPER PIPES

$\text{O.D. (mm)} - \text{W.T. (mm)} \times \text{W.T. (mm)} \times 0.0256 = \text{Kg. Per Mtr.}$

11) WEIGHT OF LEAD PIPES (appro.)

$\text{O.D. (mm)} - \text{W.T. (mm)} \times \text{W.T. (mm)} \times 0.0345 = \text{Per Mtr.}$

12) WEIGHT OF LEAD SHEETS (appro.)

$\text{Length (mtr.)} \times \text{Width (mtr.)} \times \text{Thk (mm)} \times 11.2 = \text{Kg. Per Sheet}$

13) WEIGHT OF ALLUMINIUM PIPES (appro.)

$\text{O.D. (mm)} - \text{W.T. (mm)} \times \text{W.T. (mm)} \times 0.0082 = \text{Kg. Per Mtr.}$

14) WEIGTH OF ALLUMINIUM SHEETS (appro.)

$\text{Length (mtr.)} \times \text{Width (mtr.)} \times \text{Thk (mm)} \times 2.66 = \text{Kg Per Sheet}$



Synergy

ENGINEERING SOLUTION

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