

MIDRAND SPECIAL STEELS (PTY) LTD

Reg No: 1995/01984/07

118 Sarel Baard Crescent

P O Box 127 Irene 0062

Gateway Industrial Park

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Centurion

Fax No: +27 (12) 661 7607

The management and staff of Midrand Special Steels (Pty) Ltd would like to take this opportunity to introduce our company. Established in 1983, Midrand Steel Services (Pty) Ltd underwent a name change during 1995 to become Midrand Special Steels (Pty) Ltd. in order to identify with our core products, speciality steels.

Our mission and ethic remains service and quality excellence in the commercial and speciality steel market in Southern Africa. We provide customers access to a comprehensive spectrum of locally produced as well as imported products.

FORMULAE FOR THEORETICAL MASS CALCULATION

Section	Formula x Spec	ALI	Brass	Bronze	Copper	Steel	Stainless
 Round	$D \times D \times t$	0.002132	0.006675	0.006924	0.007010	0.00616	0.00631
 Hollow	$(D - t) \times t \times x$	0.0085	0.026	0.02778	0.028	0.02466	0.0253
 Flat	$W \times t \times x$	0.002712	0.00848	0.00882	0.00889	0.00786	0.00804
 Square	$S \times S \times x$	0.002712	0.00848	0.00882	0.00889	0.00786	0.00804
 Hexagon	$H \times H \times x$	0.00235	0.007344	0.007638	0.00776	0.0068	0.006963






















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Email: info@mssteel.co.za • www.mssteel.co.za

9SMnPb36k LEADED FREE CUTTING		
220M07 (EN1A) BRIGHT FREE CUTTING		
070M20 (EN3) BRIGHT MILD TURNED / DRAWN /		 
070M20 (EN3A) BLACK MILD		
080M40 (EN8) BRIGHT AXLE / BLACK AXLE		 
070M55 (EN9) BLACK CARBON		
709M40 (EN19) ANN. & H.T & AS ROLLED		 As rolled
817M40 (EN24) ANN. & H.T & AS ROLLED		 As rolled
835M30 (EN30B) ANN.		
655M13 (EN36A/B)		

FORMULAE FOR THEORETICAL MASS CALCULATION

Section	Formula x Spec	AlI	Brass	Bronze	Copper	Steel	Stainless
 Round	$D \times D \times$	0.002132	0.006675	0.006924	0.007010	0.00616	0.00631
 Hollow	$(D - t) \times t \times$	0.0085	0.026	0.02778	0.028	0.02466	0.0253
 Flat	$W \times t \times$	0.002712	0.00848	0.00882	0.00889	0.00786	0.00804
 Square	$S \times S \times$	0.002712	0.00848	0.00882	0.00889	0.00786	0.00804
 Hexagon	$H \times H \times$	0.00235	0.007344	0.007638	0.00776	0.0068	0.006963

Midrand Special Steels (Pty) Ltd. stocks a comprehensive range of engineering steels. We also have a versatile 24 hour service centre specializing in cut to size using fully automatic band saws, which gives us the capability of doing high volume and accurate cutting.

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Whilst every effort has been made to ensure the accuracy of the information contained in this publication, Midrand Special Steel assumes no responsibility for error in, or misinterpretation of, the information in this brochure or in its use.

Our technical advisory service is always available.

9SMnPb36k

Colour Code
PURPLE

ROUND BAR

**LEADED FREE CUTTING IMPORTED BRIGHT MATERIAL
PRE CHAMFERED BOTH ENDS**

CHEMICAL COMPOSITION

CARBON	: 0,15
SILICON	: 0,05
MANGANESE	: 1,10 - 1,50
PHOSPHORUS	: 0,100
SULPHUR	: 0,34 - 0,40
LEAD	: 0,15 - 0,35

MECHANICAL PROPERTIES

Several have verified that there is no significant or discernible difference in static strength, ductility or notch sensitivity between fine grained leaded carbon steels and their non leaded counterparts.

STD STOCK SIZES = LENGTHS 3 MTR'S

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
6	0,222	13	1,042	24	3,551	35	7,553
7	0,302	14	1,175	25	3,853	36	7,990
8	0,395	15	1,387	26	4,168	38	8,903
9	0,499	16	1,578	27	4,495	40	9,865
10	0,617	18	1,998	28	4,824	45	12,485
11	0,746	20	2,466	30	5,549	50	15,413
12	0,888	22	2,984	32	6,313	55	18,650

TYPICAL USES:

FOR HIGH SPEED PRODUCTION OF REPETITION WORK (E.G. MANUFACTURE OF BUSHES, PINS, BOLTS, NUTS, STUDS AND COUPLINGS) WHERE THE MAJOR REQUIREMENTS ARE RAPID MACHINING AND MAXIMUM TOOL LIFE.

CUTTING SPEEDS AND FEEDS CAN BE INCREASED CONSIDERABLY DUE TO THE HIGHER LEAD CONTENT.

FABRICATION:

ALL REPORTS HAVE INDICATED THAT THE LEADED GRADES CAN BE FORGED, COLD FORGED, SWAGED, WELDED, BRAZED AND SOLDERED AS WELL AS SIMILAR NON LEADED GRADES.

9SMnPb36k

Colour Code
PURPLE

HEXAGON

LEADED FREE CUTTING IMPORTED BRIGHT MATERIAL
PRE CHAMFERED BOTH ENDS

CHEMICAL COMPOSITION

CARBON	: 0,15
SILICON	: 0,05
MANGANESE	: 1,10 - 1,50
PHOSPHORUS	: 0,100
SULPHUR	: 0,34 - 0,40
LEAD	: 0,15 - 0,35

MECHANICAL PROPERTIES

Several have verified that there is no significant or discernible difference in static strength, ductility or notch sensitivity between fine grained leaded carbon steels and their non leaded counterparts.

STANDARD STOCK SIZES = LENGTHS 3 MTR'S

10	0,680	18	2,203	36	8,811
11	0,823	20	2,719	38	9,817
12	0,979	21	2,998	41	11,428
13	1,149	24	3,916	46	14,385
14	1,332	26	4,596	50	16,996
15	1,530	27	4,956	55	20,565
16	1,740	30	6,118		
17	1,965	33	7,403		

TYPICAL USES: 9SMnPb36k

FOR HIGH SPEED PRODUCTION OF REPETITION WORK (E.G. MANUFACTURE OF BUSHES, PINS, BOLTS, NUTS, STUDS AND COUPLINGS) WHERE THE MAJOR REQUIREMENTS ARE RAPID MACHINING AND MAXIMUM TOOL LIFE.

CUTTING SPEEDS AND FEEDS CAN BE INCREASED CONSIDERABLY DUE TO THE HIGHER LEAD CONTENT.

220M07 (En1A)

Colour Code
BLUE

BRIGHT ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
220 M 07	1112	1.0711

CHEMICAL COMPOSITION

CARBON	: 0,07 - 0,15
SILICON	: 0,10 MAX
MANGANESE	: 0,80 - 1,20
SULPHUR	: 0,20 - 0,30
PHOSPHORUS	: 0,07 MAX

MECHANICAL PROPERTIES

SIZE Dia or Width A/F in mm	13,5 mm or less	13,5 mm 38 mm	38 mm 63,5 mm	63,5 mm 100 mm
PROPERTY				
Tensile Strength: MPa	490	430	385	355
Elongation: % Minimum	10	14	14	14

STD STOCK SIZES

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
6	0,222	13	1,042	24	3,551	35	7,553
7	0,302	14	1,175	25	3,853	36	7,990
8	0,395	15	1,387	26	4,168	38	8,903
9	0,499	16	1,578	27	4,495	40	9,865
10	0,617	18	1,998	28	4,824	45	12,485
11	0,746	20	2,466	30	5,549	50	15,413
12	0,888	22	2,984	32	6,313	55	18,650

TYPICAL USES:

FOR HIGH SPEED PRODUCTION OF REPETITION WORK (E.G. MANUFACTURE OF BUSHES, PINS, BOLTS, NUTS, STUDS AND COUPLINGS) WHERE THE MAJOR REQUIREMENTS ARE RAPID MACHINING AND MAXIMUM TOOL LIFE.

CUTTING SPEEDS ON BRIGHT DRAWN FREECUTTINGS STEEL BAR ARE CONSIDERABLY ABOVE THOSE OF ORDINARY MILD QUALITY STEEL, AND COMPONENTS ARE PRODUCED OF SIMILAR MECHANICAL PROPERTIES WITH A FAR SUPERIOR SURFACE FINISH.

220M07 (En1A)

Colour Code
BLUE

BRIGHT HEXAGON

BS 970	SAE (AISI)	WERKSTOFF NO.
220 M 07	1112	1.0711

CHEMICAL COMPOSITION

CARBON	: 0,07 - 1,15
SILICON	: 0,10 MAX
MANGANESE	: 0,80 - 1,20
SULPHUR	: 0,20 - 0,30
PHOSPHORUS	: 0,07 MAX

MECHANICAL PROPERTIES

Limited Ruling Sections Min.....	100
Tensile Strength, Tons/Sq. in. Min.....	23
Elongation, percent Min.	26
Brinell Hardness Number.....	103

STD STOCK SIZES

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
6	0,222	13	1,042	24	3,551	35	7,553
7	0,302	14	1,175	25	3,853	36	7,990
8	0,395	15	1,387	26	4,168	38	8,903
9	0,499	16	1,578	27	4,495	40	9,865
10	0,617	18	1,998	28	4,824	45	12,485
11	0,746	20	2,466	30	5,549	50	15,413
12	0,888	22	2,984	32	6,313	55	18,650

TYPICAL USES:

FOR HIGH SPEED PRODUCTION OF REPETITION WORK (E.G. MANUFACTURE OF BUSHES, PINS, BOLTS, NUTS, STUDS AND COUPLINGS) WHERE THE MAJOR REQUIREMENTS ARE RAPID MACHINING AND MAXIMUM TOOL LIFE.

070M20 (En3A)

Colour Code
RED

BRIGHT ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
070 M 20	1020	1.0402

CHEMICAL COMPOSITION

CARBON	: 0,25 MAX
SILICON	: 0,35 MAX
MANGANESE	: 1,00 MAX
SULPHUR	: 0,06 MAX
PHOSPHORUS	: 0,06 MAX

MECHANICAL PROPERTIES

Tensile Strength, Tons/Sq. in, Min28
Elongation percent, Min.....17

STANDARD STOCK SIZES

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
6 mm	0,222	20 mm	2,466	38 mm	8,903	70 mm	30,210	125 mm	96,337
7 mm	0,302	21 mm	2,719	1 ½ ”	8,950	75 mm	34,680	127 mm	99,441
8 mm	0,395	22 mm	2,984	40 mm	9,865	3”	35,799	130 mm	104,195
9 mm	0,499	7/8 “	3,045	42 mm	10,876	80 mm	39,458	135 mm	112,364
10 mm	0,617	24 mm	3,551	1 3/4 ”	12,181	85 mm	44,545	140 mm	120,841
11 mm	0,746	25 mm	3,853	45 mm	12,485	3 ½ ”	48,726	145 mm	129,627
12 mm	0,888	1”	3,978	48 mm	14,205	90 mm	49,939	150 mm	138,721
1/2”	0,994	26 mm	4,168	50 mm	15,413	95 mm	55,642	6”	143,195
14 mm	1,175	28 mm	4,824	2”	15,911	100 mm	61,654	155 mm	148,123
15 mm	1,387	1 1/8 ”	5,034	2 1/8 ”	17,962	4”	63,642	160 mm	157,833
5/8 ”	1,554	30 mm	5,549	55 mm	18,650	105 mm	67,973		
16 mm	1,578	1 1/4 ”	6,215	2 1/4 ”	20,137	110 mm	74,601		
17 mm	1,782	32 mm	6,313	60 mm	22,195	4 ½ “	80,547		
18 mm	1,998	35 mm	7,553	2 ½ “	24,861	115 mm	81,537		
19 mm	2,226	36 mm	7,990	65 mm	26,049	120 mm	88,781		

TYPICAL USES:

SHAFTS, BOLTS, NUTS, STUDS, COUPLINGS AND MACHINERY COMPONENTS WHERE A LOW TENSILE STRENGTH MATERIAL IS REQUIRED.

080M40 (En8)

Colour Code
YELLOW

BRIGHT ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
080 M 40	1043	1.0503

CHEMICAL COMPOSITION

CARBON	: 0,36 - 0,44
SILICON	: 0,05 - 0,35
MANGANESE	: 0,60 - 1,00
SULPHUR	: 0,06 MAX
PHOSPHORUS	: 0,06 MAX

MECHANICAL PROPERTIES	NORMAL- IZED	CONDITION	
		Hardened & Tempered	
		Q	R
Limited Ruling Sections Min.	150	65	22
Tensile Strength, Tons/Sq. in. Min.	35	40	45
Yield Stress, Tons/Sq. in.	18	28	32
Elongation, percent Min.	20	22	20
Izod Impact Value, Ft. LB. Min.		10	10
Brinell Hardness Number	152 /207	179 /229	210 / 255

STANDARD STOCK SIZES

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
6 mm	0,222	20 mm	2,466	38 mm	8,903	70 mm	30,210	125 mm	96,337
7 mm	0,302	21 mm	2,719	1 ½ ”	8,950	75 mm	34,680	127 mm	99,441
8 mm	0,395	22 mm	2,984	40 mm	9,865	3”	35,799	130 mm	104,195
9 mm	0,499	7/8 “	3,045	42 mm	10,876	80 mm	39,458	135 mm	112,364
10 mm	0,617	24 mm	3,551	1 ¾ ”	12,181	85 mm	44,545	140 mm	120,841
11 mm	0,746	25 mm	3,853	45 mm	12,485	3 ½ ”	48,726	145 mm	129,627
12 mm	0,888	1”	3,978	48 mm	14,205	90 mm	49,939	150 mm	138,721
½ ”	0,994	26 mm	4,168	50 mm	15,413	95 mm	55,642	6”	143,195
14 mm	1,175	28 mm	4,824	2”	15,911	100 mm	61,654	155 mm	148,123
15 mm	1,387	1 1/8 ”	5,034	2 1/8 ”	17,962	4”	63,642	160 mm	157,833
5/8 ”	1,554	30 mm	5,549	55 mm	18,650	105 mm	67,973		
16 mm	1,578	1 ¼ ”	6,215	2 ¼ ”	20,137	110 mm	74,601		
17 mm	1,782	32 mm	6,313	60 mm	22,195	4 ½ “	80,547		
18 mm	1,998	35 mm	7,553	2 ½ “	24,861	115 mm	81,537		
19 mm	2,226	36 mm	7,990	65 mm	26,049	120 mm	88,781		

TYPICAL USES:

DYNAMO AND MOTORSHAFTS, HEAT-TREATED BOLTS, CRANKSHAFTS, CONNECTING RODS, DRIVING RINGS & FLANGES, RAILWAY COUPLINGS, AXLES, BRACKETS, HOUSINGS, MISCELLANEOUS GUN CARRIAGE AND SMALL ARMS PARTS NOT SUBJECTED TO HIGH STRESSES OR SEVERE WEAR.

080M40 (En8)

BRIGHT HEXAGON

Colour Code
YELLOW

BS 970	SAE (AISI)	WERKSTOFF NO.
080 M 40	1043	1.0503

CHEMICAL COMPOSITION

CARBON : 0,36 - 0,44
 SILICON : 0,05 - 0,35
 MANGANESE : 0,60 - 1,00
 SULPHUR : 0,06 MAX
 PHOSPHORUS : 0,06 MAX

<u>MECHANICAL PROPERTIES</u>	En8
Limited Ruling Sections Min.....	150
Tensile Strength, Tons/Sq. in. Min.....	35
Yield Stress, Tons/Sq. in.....	18
Elongation, percent Min.	20
Izod Impact Value, Ft. LB. Min.	
Brinell Hardness Number	152 /207

STANDARD STOCK SIZES

10	0,680	18	2,203	36	8,811
11	0,823	20	2,719	38	9,817
12	0,979	21	2,998	41	11,428
13	1,149	24	3,916	46	14,385
14	1,332	26	4,596	50	16,996
15	1,530	27	4,956	55	20,565
16	1,740	30	6,118		
17	1,965	33	7,403		

TYPICAL USES: En 8

DYNAMO AND MOTORSHAFTS, HEAT-TREATED BOLTS, CRANKSHAFTS, CONNECTING RODS, DRIVING RINGS & FLANGES, RAILWAY COUPLINGS, AXLES, BRACKETS, HOUSINGS, MISCELLANEOUS GUN CARRIAGE AND SMALL ARMS PARTS NOT SUBJECTED TO HIGH STRESSES OR SEVERE WEAR.

070M20 (En3A)

Colour Code
WHITE

BLACK ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
070 M 20	1020	1.0402

CHEMICAL COMPOSITION

CARBON	: 0,15 - 0,25
SILICON	: 0,05 - 0,35
MANGANESE	: 0,40 - 0,90
SULPHUR	: 0,06 MAX
PHOSPHORUS	: 0,06 MAX

MECHANICAL PROPERTIES

Limited Ruling Sections	152 mm
Tensile Strength; MPa minimum.....	430
Yield Stress; MPa minimum	215
Elongation, percent Min.....	21
Izod Impact Value	-
Brinell Hardness Number.....	126/179

STD STOCK SIZE IN THE AS ROLLED OR NORMALIZED CONDITION IN ROUND BAR

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
20	2,466	70	30,210	130	104,195	230	326,148
25	3,853	75	34,680	140	120,841	240	355,125
30	5,549	80	39,458	150	138,721	250	385,336
35	7,553	85	44,545	160	157,833	280	493,40
40	9,865	90	49,939	170	178,179	305	586,34
45	12,485	95	55,642	180	199,757	330	685,20
50	15,413	100	61,654	190	222,570	350	769,84
55	18,650	108	71,846	200	246,614		
60	22,195	115	81,537	210	271,893		
65	26,049	120	88,781	220	298,403		

TYPICAL USES:

SHAFTS, BOLTS, NUTS, STUDS, COUPLINGS AND MACHINERY COMPONENTS
WHERE A LOW TENSILE STRENGTH MATERIAL IS REQUIRED.

080M40 (En8)

Colour Code
YELLOW

BLACK ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
080 M 40	1043	1.0503

CHEMICAL COMPOSITION

CARBON	: 0,36 - 0,44
SILICON	: 0,05 - 0,35
MANGANESE	: 0,60 - 1,00
SULPHUR	: 0,06 MAX
PHOSPHORUS	: 0,06 MAX

MECHANICAL PROPERTIES

	CONDITION		
	N	Q	R
Limited Ruling Sections; mm	254	64	19
Tensile Strength; MPa minimum	510/540	620/770	690/850
Yield Stress; MPa Min	245	385	465
Elongation, percent Min	17	16	16
Izod Impact Value; Joule	20	33,4	33,4
Brinell Hardness Number	152/207	179/229	201/255

STD STOCK SIZE IN THE AS ROLLED OR NORMALIZED CONDITION

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
20	2,466	70	30,210	130	104,195	230	326,148
25	3,853	75	34,680	140	120,841	240	355,125
30	5,549	80	39,458	150	138,721	250	385,336
35	7,553	85	44,545	160	157,833	280	493,40
40	9,865	90	49,939	170	178,179	305	586,34
45	12,485	95	55,642	180	199,757	330	685,20
50	15,413	100	61,654	190	222,570	350	769,84
55	18,650	108	71,846	200	246,614		
60	22,195	115	81,537	210	271,893		
65	26,049	120	88,781	220	298,403		

TYPICAL USES:

DYNAMO AND MOTORSHAFTS, HEAT-TREATED BOLTS, CRANKSHAFTS, CONNECTING RODS, DRIVING RINGS AND FLANGES, RAILWAY COUPLINGS, AXLES, BRACKETS, HOUSINGS, MISCELLANEOUS GUN CARRIAGE AND SMALL ARMS PARTS NOT SUBJECT TO HIGH STRESSES OR SEVERE WEAR.

070M55 (En9)

Colour Code
GREEN

BLACK ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
070 M 55	1055	1.1209

CHEMICAL COMPOSITION

CARBON	: 0,50 - 0,60
SILICON	: 0,05 - 0,35
MANGANESE	: 0,50 - 0,80
SULPHUR	: 0,06 MAX
PHOSPHORUS	: 0,06 MAX

MECHANICAL PROPERTIES

	CONDITION			
	N	R	S	T
Limited Ruling Sections; mm	254	102	64	19
Tensile Strength; MPa minimum	600/700	690/850	770/930	850/1000
Yield Stress; MPa Min	310	415	480	570
Elongation, percent Min	13	14	14	12
Izod Impact Value; Joule	-	-	-	-
Brinell Hardness Number	201/255	201/255	223/277	248/302

STD STOCK SIZE IN THE AS ROLLED OR NORMALIZED CONDITION

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
20	2,466	70	30,210	130	104,195	230	326,148
25	3,853	75	34,680	140	120,841	240	355,125
30	5,549	80	39,458	150	138,721	250	385,336
35	7,553	85	44,545	160	157,833	280	493,40
40	9,865	90	49,939	170	178,179	305	586,34
45	12,485	95	55,642	180	199,757	330	685,20
50	15,413	100	61,654	190	222,570	350	769,84
55	18,650	108	71,846	200	246,614		
60	22,195	115	81,537	210	271,893		
65	26,049	120	88,781	220	298,403		

TYPICAL USES:

SPROCKETS AND SPRINGS, CYLINDERS, CAMS, CRANKSHAFTS, KEYS, SMALL ARMS PARTS SUCH AS RIFLE BARRELS, SMALL GEARS, MACHINE TOOLS, BALLS FOR BALL MILLS, BALLRACES, MACHINED PARTS REQUIRING MODERATE WEAR RESISTANCE.

709M40 (En19)

Colour Code
RED Heat Treated
RED WITH YELLOW DOT as rolled

BLACK ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
709 M 40	4140	1.7225

CHEMICAL COMPOSITION

CARBON	: 0,35 - 0,45
SILICON	: 0,10 - 0,35
MANGANESE	: 0,50 - 0,80
CHROMIUM	: 0,90 - 1,20
MOLYBDENUM	: 0,20 - 0,40
SULPHUR	: 0,05 MAX
PHOSPHORUS	: 0,05 MAX

MECHANICAL PROPERTIES

	CONDITION				
	R	S	T	U	V
Limited Ruling Sections; mm	254	152	102	64	29
Tensile Strength; MPa	690/850	770/930	850/1000	930/1080	1000/1160
Yield Stress; MPa Min	480	570	665	740	835
Elongation, percent Min.	15	15	13	12	12
Izod Impact Value; Joule	34	54	54	47,5	47,5
Brinell Hardness Number	201/255	223/277	248/302	269/331	293/352

STD STOCK SIZE IN THE AS ROLLED OR NORMALIZED CONDITION

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
20	2,466	70	30,210	130	104,195	230	326,148
25	3,853	75	34,680	140	120,841	240	355,125
30	5,549	80	39,458	150	138,721	250	385,336
35	7,553	85	44,545	160	157,833	280	493,40
40	9,865	90	49,939	170	178,179	305	586,34
45	12,485	95	55,642	180	199,757	330	685,20
50	15,413	100	61,654	190	222,570	350	769,84
55	18,650	108	71,846	200	246,614		
60	22,195	115	81,537	210	271,893		
65	26,049	120	88,781	220	298,403		

TYPICAL USES:

AXLES SHAFTS, CRANKSHAFTS, CONNECTING RODS, GEARS, HIGH TENSILE BOLTS AND STUDS, PROPELLER SHAFT JOINTS, RIFLE BARRELS AND BREECH MECHANISMS FOR SMALL ARMS PARTS, INDUCTION HARDENED TRACKPINS.

817M40 (En 24)

Colour Code
RED & WHITE
RED & WHITE WITH
YELLOW DOT as rolled

BLACK ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
817 M 40	9850	1.6565

CHEMICAL COMPOSITION

CARBON	: 0,35 - 0,45
SILICON	: 0,10 - 0,35
MANGANESE	: 0,45 - 0,70
NICKEL	: 1,30 - 1,80
CHROMIUM	: 0,90 - 1,40
MOLYBDENUM	: 0,20 - 0,35
SULPHUR	: 0,05 MAX
PHOSPHORUS	: 0,05 MAX

MECHANICAL PROPERTIES

	CONDITION					
	T	U	V	W	X	Z
Limited Ruling Sections; mm	254	102	64	29	29	29
Tensile Strength; MPa	850/1000	930/1080	1000/1160	1080/1240	1160/1310	1540 min
Yield Stress; MPa Min	635	740	835	925	1005	1130
Elongation, percent Min.	13	12	12	11	10	5
Izod Impact Value; Joule	40,7	47,5	47,5	40,7	34	11
Brinell Hardness Number	248/302	269/331	293/352	311/375	341/401	444 min.

STD STOCK SIZE IN THE AS ROLLED OR NORMALIZED CONDITION

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
20	2,466	70	30,210	130	104,195	230	326,148
25	3,853	75	34,680	140	120,841	240	355,125
30	5,549	80	39,458	150	138,721	250	385,336
35	7,553	85	44,545	160	157,833	280	493,40
40	9,865	90	49,939	170	178,179	305	586,34
45	12,485	95	55,642	180	199,757	330	685,20
50	15,413	100	61,654	190	222,570	350	769,84
55	18,650	108	71,846	200	246,614		
60	22,195	115	81,537	210	271,893		
65	26,049	120	88,781	220	298,403		

TYPICAL USES:

AUTOMOBILE MAIN SHAFTS, AXLE SHAFTS, CONNECTING ROD BOLTS, SYNCHRONISING CONES, PUSH RODS, STUDS, DIFFERENTIAL SHAFTS, MOTORCYCLE KICK STARTER RATCHETS, PINION SLEEVES, MANDREL BARS FOR TUBE MANUFACTURING, GUN BARRELS, BREECH MECHANISM PARTS, HIGH DUTY ENGINE CONNECTING RODS, HIGH TEMPERATURE BOLTS IN OIL REFINING AND STEAM INSTALLATIONS, VARIOUS PARTS OF MACHINE TOOLS SUCH AS SPINDLE GEARS, COMPENSATING WASHERS, POWER TRANSMISSION GEARS, SLIDE RACKS AND SLIDE CAMS.

835M30 (En30B)

Colour Code
ORANGE

ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
835 M 30		1.6747

CHEMICAL COMPOSITION

CARBON	: 0,26 - 0,34
SILICON	: 0,10 - 0,35
MANGANESE	: 0,40 - 0,60
NICKEL	: 3,90 - 4,30
CHROMIUM	: 1,10 - 1,40
MOLYBDENUM	: 0,20 - 0,40
SULPHUR	: 0,05 MAX
PHOSPHORUS	: 0,05 MAX

<u>MECHANICAL PROPERTIES</u>	<u>CONDITION</u>
	Z
Limited Ruling Sections; mm	152
Tensile Strength; MPa Min.	1540
Yield Stress; MPa Min	1125
Elongation, percent Min.	7
Izod Impact Value; Joule	20
Brinell Hardness Number	444 min.

STD STOCK SIZE IN THE AS ROLLED OR NORMALIZED CONDITION

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
20	2,466	70	30,210	130	104,195	230	326,148
25	3,853	75	34,680	140	120,841	240	355,125
30	5,549	80	39,458	150	138,721	250	385,336
35	7,553	85	44,545	160	157,833	280	493,40
40	9,865	90	49,939	170	178,179	305	586,34
45	12,485	95	55,642	180	199,757	330	685,20
50	15,413	100	61,654	190	222,570	350	769,84
55	18,650	108	71,846	200	246,614		
60	22,195	115	81,537	210	271,893		
65	26,049	120	88,781	220	298,403		

TYPICAL USES:

GEARS, SHAFTS HIGH DUTY BOLTS, HIGH DUTY SPINDLES AND OTHER PARTS DEMANDING MAXIMUM STRENGTH, TOUGHNESS OR WEAR RESISTANCE. THIS STEEL IS STOCKED IN THE ANNEALED CONDITION, TO RENDER MACHINING POSSIBLE, AND MUST BE HEAT TREATED AS FOLLOWS: HARDEN IN AIR (OR OIL FOR LARGER SECTIONS OVER 2 ½ " DIAMETERS) FROM A TEMPERATURE OF 810 ° 830 ° C. TEMPER, IF DESIRED, AT A SUITABLE TEMPERATURE NOT EXCEEDING 250°C.

655M13 (En36A/B)

Colour Code
BROWN

ROUND BAR

BS 970	SAE (AISI)	WERKSTOFF NO.
655 M 13	3316	1.5752

CHEMICAL COMPOSITION

CARBON	: 0,12 - 0,18
SILICON	: 0,10 - 0,35
MANGANESE	: 0,30 - 0,60
NICKEL	: 3,00 - 3,75
CHROMIUM	: 0,60 - 1,10
SULPHUR	: 0,05 MAX
PHOSPHORUS	: 0,05 MAX

HEAT TREATED CONDITION

Tensile Strength; MPa minimum.....	1000
Elongation, percent Minimum.....	9
Izod Impact Value; Joule	40
Brinell Hardness Number.....	255

STD STOCK SIZE IN THE AS ROLLED OR NORMALIZED CONDITION

SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m	SIZE	Kg/m
20	2,466	70	30,210	130	104,195	230	326,148
25	3,853	75	34,680	140	120,841	240	355,125
30	5,549	80	39,458	150	138,721	250	385,336
35	7,553	85	44,545	160	157,833	280	493,40
40	9,865	90	49,939	170	178,179	305	586,34
45	12,485	95	55,642	180	199,757	330	685,20
50	15,413	100	61,654	190	222,570	350	769,84
55	18,650	108	71,846	200	246,614		
60	22,195	115	81,537	210	271,893		
65	26,049	120	88,781	220	298,403		

TYPICAL USES:

HIGH DUTY GEARS FOR AIRCRAFT, AUTO AND HEAVY VEHICLE TRANSMISSION COMPONENTS, STEERING WORMS, TRACK ROD PINS, GUDGEON PINS, TIMING WHEELS, BREECH MECHANISMS AND SMALL ARMS PARTS.

HOLLOW BAR SIZE AND WEIGHT SIZE ST 52

OD mm.	ID mm.	Wall Thickness mm.	Average Weight Kg./M.	OD mm.	ID mm.	Wall Thickness mm.	Average Weight Kg./M.	OD mm.	ID mm.	Wall Thickness mm.	Average Weight Kg./M.
36	16	10	6,7	125	71	27	67,8	254	184	35	189
36	25	5.5	4,5	125	90	17.5	49,4	254	204	25	141
40	20	10	7,7	125	100	12.5	37,8	267	147	60	307
45	20	12.5	10,4	132	71	30.5	79,1	267	177	45	253
45	28	8.5	8,1	132	90	21	60,7	267	187	40	220
45	32	6.5	6,6	132	106	13	41,8	267	197	35	207
50	25	12.5	12,0	140	80	30	84,7	267	204	31.5	182
50	32	9	9,6	140	100	20	63,0	267	217	25	149
50	36	7	7,9	140	112	14	47,5	273	173	50	275
56	28	14	15,0	150	80	35	102,9	273	183	45	253
56	36	10	11,9	150	90	30	89,0	273	193	40	230
56	40	8	10,0	150	106	22	73,7	273	201	36	210
63	32	15.5	18,7	150	125	12.5	47,0	273	217	28	169
63	40	11.5	15,2	160	90	35	112,0	273	223	25	154
63	50	6.5	9,9	160	100	30	96,2	273	228,6	22.2	137,0
71	36	17.5	23,7	160	112	24	85,0	273	228	32	231
71	45	13	19,5	160	132	14	55,8	298,5	198,5	50	306
71	56	7.5	12,7	170	100	35	121,0	298,5	208,5	45	281
75	40	17.5	25,8	170	118	26	97,8	298,5	218,5	40	255
75	50	12.5	20,3	170	140	15	63,4	298,5	226,5	36	233
75	60	7.5	13,6	180	100	40	143,4	298,5	238,5	30	199
80	40	20	30,6	180	125	27.5	109,5	323,9	223,9	50	330,0
80	45	17.5	27,0	180	150	15	68,0	323,9	233,9	45	310,0
80	50	15	25,2	190	106	42	159,0	323,9	243,9	40	280,0
80	63	8.5	16,3	190	132	29	121,5	323,9	259,9	32	230,0
85	45	20	33,3	190	140	25	101,7	323,9	273,9	25	186,0
85	50	17.5	20,1	190	160	15	72,3	323,9	283,9	20	150,0
85	55	15	27,2	200	112	44	176,0	355,6	255,6	50	377,0
85	67	9	18,3	200	115	42.5	165,1	355,6	265,6	45	345,0
90	50	20	35,8	200	140	30	133,1	355,6	275,6	40	311,0
90	63	13.5	27,0	200	160	20	96,8	355,6	291,6	32	255,0
90	71	9.5	20,5	200	160	20	96,8	355,6	291,6	32	255,0
95	50	22.5	41,6	210	148	31	137,0	355,6	305,6	25	205,0
95	63	16	32,17	212	125	43.5	188,4	355,6	315,6	20	166,0
95	67	14	29,7	212	150	31	147,0	406,4	306,4	50	439,0
95	75	10	22,9	212	170	21	108,0	406,4	316,4	45	401,0
100	56	22	43,9	224	132	46	210,5	406,4	326,4	40	361,0
100	71	14.5	32,4	224	160	32	161,0	406,4	342,4	32	295,0
100	80	10	24,2	224	180	22	120,0	406,4	362,4	22.0	210,0
106	56	25	51,8	236	140	48	232,0	406,4	366,4	20	191,0
106	71	17.5	40,0	236	170	33	176,0	419	319	50	455,0
106	80	13	32,0	236	190	23	132,2	419	329	45	415
112	63	24.5	54,9	250	150	50	257,0	419	339	40	374,0
112	80	16	40,1	250	180	35	197,4	419	355	32	305,0
112	90	11	30,0	250	186	32	172,2	419	369	25	245,0
118	63	27.5	63,7	250	200	25	151,8				
118	71	23.5	54,76								
118	80	19	48,9								
118	90	14	38,8								

CHEMICAL COMPOSITION:	C%	S1%	Mn%	P%	S%	V%
Din 1629 - ST 52.0	0,22 Max	0,10-0,55	1,20-1,60	0,035 Max	0,035 Max	
ISO 2938 -20 Mn V S6	0,16-0,22	0,20-0,50	1,30-1,70	0,035 Max	0,035	0,08-0,20
MECHANICAL PROPERTIES	Tensile - N/mm2 (Ave)		Yield-N/mm2 (Ave)		Elongation % Min	
Din 1629 - St52.0 - as Rolled	520		345		22	
ISO 2938-20Mn VS6 - as Rolled	620		450		18	

BRIGHT MILD STEEL - SQUARES AND FLATS

BMS	BMS
6 sq	30 x 10
8 sq	30 x 12
10 sq	30 x 15
12 sq	30 x 16
15 sq	30 x 20
16 sq	30 x 25
20 sq	35 x 12
22 sq	40 x 3
25 sq	40 x 5
30 sq	40 x 6
32 sq	40 x 8
35 sq	40 x 10
38 sq	40 x 12
40 sq	40 x 15
45 sq	40 x 16
50 sq	40 x 20
60 sq	40 x 25
70 sq	40 x 30
75 sq	45 x 15
80 sq	45 x 16
90 sq	50 x 6
100 sq	50 x 8
10 x 5	50 x 10
16 x 3	50 x 12
16 x 5	50 x 16
20 x 3	50 x 20
20 x 5	50 x 25
20 x 6	50 x 30
20 x 8	50 x 40
20 x 10	60 x 6
20 x 12	60 x 8
20 x 15	60 x 10
20 x 16	60 x 12
25 x 3	60 x 15
25 x 5	60 x 16
25 x 6	60 x 20
25 x 8	60 x 30
25 x 10	65 x 12
25 x 12	70 x 10
25 x 14	70 x 20
25 x 16	70 x 25
25 x 20	70 x 40
30 x 5	70 x 50
30 x 6	75 x 25
30 x 8	75 x 40
	75 x 50

BRIGHT MILD STEEL - SQUARES AND FLATS

BMS	BMS
80 x 6	125 x 50
80 x 10	150 x 6
80 x 12	150 x 10
80 x 15	150 x 15
80 x 16	150 x 16
80 x 20	150 x 20
80 x 25	150 x 25
80 x 30	150 x 50
80 x 40	200 x 20
80 x 50	200 x 25
100 x 6	250 x 20
100 x 8	250 x 25
100 x 10	
100 x 12	
100 x 15	
100 x 16	
100 x 20	
100 x 25	
100 x 30	
100 x 40	
100 x 50	
125 x 12	
125 x 25	
	BSS - IMPERIAL
	2" Sq
	3" Sq
	4" Sq
	4 x 3
	6 x 2
	EN 1A
	12 Sq
	16 Sq
	25 Sq

KEY STEEL and SILVER STEEL

IMPERIAL

1/8 Sq	_____
3/16 Sq	_____
1/4 Sq	_____
5/16 Sq	_____
3/8 Sq	_____
7/16 Sq	_____
1/2 Sq	_____
5/8 Sq	_____
3/4 Sq	_____
7/8 Sq	_____
1" Sq	_____
1.1/8 Sq	_____
1.1/4 Sq	_____
1.1/2 Sq	_____
1.3/4 Sq	_____
2" Sq	_____
5/16 x 1/4	_____
3/8 x 1/4	_____
3/8 x 5/16	_____

1/2 x 3/8	_____
5/8 x 7/16	_____
5/8 x 1/2	_____
3/4 x 1/2	_____
7/8 x 5/8	_____
1 x 1/2	_____
1 x 3/4	_____
1.1/4 x 7/8	_____
1.1/4 x 1	_____
1.1/2 x 1	_____
1.3/4 x 1.1/4	_____
2 x 1.1/2	_____
2 x 1.3/4	_____
2.1/2 x 1.1/4	_____

STAINLESS 316

8 X 7	_____
10 X 8	_____
12 X 8	_____
14 X 9	_____

KEY STEEL and SILVER STEEL

METRIC

SILVER STEEL

4 Sq _____	1/8 Dia. _____
5 Sq _____	3/16 Dia. _____
6 Sq _____	1/4 Dia. _____
8 Sq _____	5/16 Dia. _____
10 Sq _____	3/8 Dia. _____
12 Sq _____	7/16 Dia. _____
14 Sq _____	1/2 Dia. _____
15 Sq _____	9/16 Dia. _____
16 Sq _____	5/8 Dia. _____
18 Sq _____	3/4 Dia. _____
20 Sq _____	7/8 Dia. _____
22 Sq _____	1" Dia. _____
24 Sq _____	1.1/8 Dia. _____
25 Sq _____	1.1/4 Dia. _____
28 Sq _____	2mm Dia. _____
30 Sq _____	2,5mm Dia. _____
32 Sq _____	3mm Dia. _____
36 Sq _____	3,5mm Dia. _____
38 Sq _____	4mm Dia. _____
40 Sq _____	4,5mm Dia. _____
45 Sq _____	5mm Dia. _____
50 Sq _____	5,5mm Dia. _____
6 x 4 _____	6,0mm Dia. _____
8 x 7 _____	6,5mm Dia. _____
10 x 6 _____	7mm Dia. _____
10 x 8 _____	7,5mm Dia. _____
12 x 8 _____	8mm Dia. _____
12 x 10 _____	8,5mm Dia. _____
14 x 9 _____	9mm Dia. _____
16 x 10 _____	9,5mm Dia. _____
18 x 11 _____	10mm Dia. _____
20 x 12 _____	11mm Dia. _____
22 x 14 _____	12mm Dia. _____
25 x 14 _____	13mm Dia. _____
25 x 16 _____	14mm Dia. _____
25 x 20 _____	15mm Dia. _____
28 x 16 _____	16mm Dia. _____
32 x 16 _____	17mm Dia. _____
32 x 18 _____	18mm Dia. _____
36 x 20 _____	19mm Dia. _____
40 x 22 _____	20mm Dia. _____
40 x 25 _____	22mm Dia. _____
45 x 25 _____	24mm Dia. _____
50 x 25 _____	25mm Dia. _____
50 x 28 _____	28mm Dia. _____
56 x 32 _____	30mm Dia. _____
	32mm Dia. _____
	35mm Dia. _____
	40mm Dia. _____
	45mm Dia. _____
	50mm Dia. _____

CONTINUOUS CAST IRON BAR

DESCRIPTION:

Continuous Cast Grey Iron, high grade, close grain structure to specification BS. 1452 Grade 17.

CHEMICAL COMPOSITION

TOTAL CARBON	: 3,35%
SILICON	: 2,5%
SULPHUR	: 0,01%
PHOSPHORUS	: 0,7%
MANGANESE	: 0,55%
BALANCE	: Iron

MECHANICAL PROPERTIES		
Tensile Strength;	13 - 19 TSI	200,8 - 293,4 mPA
Hardness	200 - 240 Brinell	
Compression Strength	50 - 70 TSI	772,2 - 1 081 mPA
Transverse Bending Strength	25 - 38 TSI	386,1 - 587 mPA
Defection (in a bar of 30 mm diameter at 600 mm centres)	10 - 14 mm	
Modulus of Elasticity	15,5 t 18,5 x 10 ⁶ p.s.i.	10 900 - 13 000 kg/mm ²

SOLID ROUNDS

mm	Mass/M	mm	Mass/M	mm	Mass/M
25	3,7	105	63,2	250	359
30	5,2	110	69,3	260	387,4
35	8,9	115	75,8	270	417,8
40	9,2	120	82,5	280	449,3
45	11,6	130	96,9	290	481,9
50	14,3	140	112,3	300	515,8
55	17,3	150	128,0	320	586,8
60	20,6	160	147,7	340	662,5
65	24,2	170	165,6	360	742,7
70	28,1	180	185,7	375	805,9
75	32,2	190	206,9		
80	36,7	200	229,2		
85	41,4	210	252,7		
90	46,4	220	277,4		
95	51,7	230	303,1		
100	57,3	240	330,1		

SYMBOLS FOR HARDNESS

SYMBOL	TON f/SQ IN.	MPa Newtons/sq	HARDNESS (Brinell)
P	35/45	540/695	152/207
Q	40/50	618/772	179/229
R	45/55	695/849	201/255
S	50/60	772/926	223/277
T	55/65	849/1004	248/302
U	60/70	926/1080	269/331
V	65/75	1004/1158	293/352
W	70/80	1080/1235	311/375
X	75/85	1158/1312	341/401
Y	80/90	1235/1390	363/429
Z	100 MIN.	1544 MIN.	444 MIN.

BRASS: BS 2874CZ121

COPPER : BS. 2874C101 / C102

COPPER : 99.99%

CHEMICAL COMPOSITION

COPPER 58%

LEAD 3%

ZINC BALANCE

SIZE: ROUNDS : 3MM - 75 MM DIA

FLAT : UP TO 75 WIDE

: UP TO 12 MM THICK

MECHANICAL PROPERTIES

TENSILE : 390 MPA

ELONGATION : 15%

SIZES

: ROUND

SQUARE

HEX

HOLLOW HEX

3 MM - 170 MM DIA

4 MM - 76 MM SQ

8 MM - 76 MM SQ

8 MM - 76 MM

TABLES

REVISED HARDNESS CONVERSION CHART FOR STEEL

N.B. These conversions may not apply to austenitic steels in the cold worked condition.

These conversions must not be used for Copper / Brass

Vickers/ Pyramid Diamond HV 10/30 Allowable error ±2%	BRINELL		ROCKWELL		Shore Sclero- scope No.	TENSILE STRENGTH	
	Impression Dia 10 mm Ball error ±3%	H.B. 10/ 3000 kgs error ± 3%	'B' Scale 100 kgs 1/16 in. dia Ball error ± 2 Units	'C' Scale 150 kgs Diamond Cone error ± 1.5 Units		tons/ sq. in.	kilo/ sq. mm
965			-	70	106		
936			-	69	103		
908			-	68	100		
880			-	67	97		
853			-	66	95		
826			-	65	93		
799			-	64	91		
773			-	63	89		
747			-	62	87		
718	2.35	682	-	61	84	147	232
687	2.40	653	-	59	82	142	224
660	2.45	627	-	58.5	81	137	216
633	2.50	601	-	57	78	132	208
608	2.55	578	-	56	76	127	200
584	2.60	555	-	55	75	122	192
562	2.65	534	-	53.5	72	117	179
541	2.70	514	-	52	70	112	176
521	2.75	495	-	51	68	108	170
502	2.80	477	-	50	67	105	165
485	2.85	461	-	48	65	101	160
467	2.90	444	-	47	63	98	155
452	2.95	429	-	45.5	61	95	150
437	3.00	415	-	44.5	59	92	145
422	3.05	401	-	42	55	88	139
408	3.10	388	-	41	54	85	134
395	3.15	375	-	40	52	82	130
382	3.20	363	-	39	51	80	126
371	3.25	352	-	37.5	50	77	122
359	3.30	341	-	36.5	49	75	118
348	3.35	331	-	35.5	48	73	114
338	3.40	321	-	34	45	71	111
327	3.45	311	-	33	44	68	107
318	3.50	302	-	32	43	66	104
308	3.55	293	-	31	42	64	101
300	3.60	285	-	29.5	40	63	99
292	3.65	277	-	28.5	38	61	96
283	3.70	269	-	27	38	59	93
276	3.75	262	-	26	37	58	91
268	3.80	255	-	25	37	56	89
261	3.85	248	-	24	36	55	87
254	3.90	241	-	23.5	35	53	84

TABLES

REVISED HARDNESS CONVERSION CHART FOR STEEL

N.B. These conversions may not apply to austenitic steels in the cold worked condition.

These conversions must not be used for Copper / Brass

Vickers/ Pyramid Diamond HV 10/30 Allowable error ±2%	BRINELL		ROCKWELL		Shore Sclero- scope No.	TENSILE STRENGTH	
	Impression Dia 10 mm Ball error ±3%	H.B. 10/ 3000 kgs error ± 3%	'B' Scale 100 kgs 1/16 in. dia Ball error ± 2 Units	'C' Scale 150 kgs Diamond Cone error ± 1.5 Units		tons/ sq. in.	kilo/ sq. mm
247	3.95	235	-	21.1	34	51	81
241	4.00	229	-	20.5	33	50	79
235	4.05	223	99.9	19.5	33	49	77
228	4.10	217	98.7	-	32	48	76
223	4.15	212	98	-	32	46	73
218	4.20	207	97	-	31	45	71
213	4.25	202	95.5	-	31	44	70
207	4.30	197	95	-	30	43	68
202	4.35	192	94	-	30	42	66
197	4.40	187	93	-	29	41	65
192	4.45	182	92	-	29	40	64
188	4.50	179	91	-	28	40	62
183	4.55	174	90	-	28	39	60
179	4.60	170	88	-	27	38	57
175	4.65	166	88	-	26	37	55
172	4.70	163	87	-	26	36	55
167	4.75	159	85.5	-	25	35	55
164	4.80	156	84	-	25	34	54
161	4.85	153	84	-	25	34	52
157	4.90	149	82	-	24	33	51
154	4.95	146	81	-	23	33	50
151	5.00	143	81	-	23	32	49
147	5.05	140	79	-	22	32	49
144	5.10	137	78	-	22	31	48
141	5.15	134	76	-	21	30	48
138	5.20	131	74	-	20	30	47
135	5.25	128	73	-	20	29	47
133	5.30	126	72	-	-	28	46
131	5.35	124	72	-	-	28	45
127	5.40	121	70	-	-	27	44
124	5.45	118	68	-	-	27	43
122	5.50	116	67	-	-	26	43
120	5.55	114	66	-	-	26	41
118	5.60	112	64	-	-	26	41
115	5.65	109	64	-	-	25	40
113	5.70	107	61	-	-	25	40
111	5.75	105	61	-	-	24	39
108	5.80	103	-	-	-	24	39

TABLES

THEORETICAL MASS

mm	SIZES		ROUND		SQUARE		HEXAGON	
	fractions of an inch	decimals of an inch	kg / m	lb / ft	kg / m	lb / ft	kg / m	lb / ft
3		1.1181	0.056	0.0373	0.071	0.0477	0.061	0.0401
3.175	1/8	0.1250	0.062	0.0418	0.079	0.0531	0.069	0.0464
3.5		0.1378	0.076	0.0507	0.096	0.0645	0.083	0.0558
3.9687	5/32	0.1563	0.097	0.0653	0.124	0.0833	0.107	0.0719
4		0.1575	0.099	0.0663	0.126	0.0846	0.109	0.0732
4.5		0.1772	0.125	0.0839	0.159	0.1068	0.138	0.09276
4.7625	3/16	0.1875	0.140	0.0939	0.178	0.1196	0.154	0.1035
5		0.1969	0.154	0.1036	0.196	0.1317	0.170	0.1142
5.5		0.2165	0.187	0.1253	0.237	0.1593	0.206	0.1384
5.5562	7/32	0.2188	0.190	0.1279	0.242	0.1626	0.210	0.1411
6		0.2362	0.222	0.1492	0.283	0.1902	0.245	0.1646
6.3500	1/4	0.2500	0.247	0.1670	0.317	0.2130	0.274	0.1841
6.5		0.2559	0.261	0.1750	0.332	0.2231	0.287	0.1928
7		0.2756	0.302	0.2030	0.385	0.2581	0.333	0.2238
7.1439	9/32	0.2813	0.315	0.2114	0.401	0.2695	0.347	0.2332
7.5		0.2953	0.347	0.2330	0.442	0.2970	0.382	0.2567
7.9375	5/16	0.3125	0.388	0.2610	0.495	0.3326	0.428	0.2876
8		0.3150	0.395	0.2652	0.502	0.3373	0.435	0.2923
8.5		0.3346	0.445	0.2993	0.567	0.3810	0.491	0.3299
8.7312	11/32	0.3438	0.470	0.3158	0.598	0.4018	0.518	0.3481
9		0.3543	0.499	0.3356	0.636	0.4272	0.551	0.3702
9.5		0.3740	0.556	0.3739	0.708	0.4757	0.614	0.4126
9.5250	3/8	0.3750	0.559	0.3759	0.712	0.4784	0.617	0.4146
10		0.3937	0.617	0.4143	0.785	0.5275	0.680	0.4569
10.3787	13/32	0.4063	0.657	0.4411	0.836	0.5618	0.724	0.4865
10.5		0.4134	0.680	0.4567	0.865	0.5812	0.750	0.5040
11		0.4331	0.746	0.513	0.950	0.6384	0.823	0.5530
11.1125	7/16	0.4375	0.761	0.5116	0.969	0.6511	0.840	0.5644
11.5		0.4528	0.815	0.5479	1.038	0.6975	0.899	0.6041
11.9062	15/32	0.4688	0.874	0.5873	1.113	0.7479	0.964	0.6478
12		0.4724	0.888	0.5966	1.13	0.7593	0.979	0.6578
12.5		0.4921	0.963	0.6473	1.227	0.8245	1.062	0.7136
12.6998	1/2	0.5000	0.994	0.6682	1.266	0.8507	1.096	0.7365
13		0.5118	1.042	0.7001	1.327	0.8917	1.149	0.7721
13.4937	17/32	0.5313	1.123	0.7543	1.429	0.9602	1.238	0.8319
13.5		0.5315	1.124	0.7550	1.431	0.9616	1.239	0.8325
14		0.5512	1.175	0.7896	1.539	1.034	1.332	0.8950
14.2875	9/16	0.625	1.259	0.8456	1.602	1.076	1.388	0.9327
14.5		0.5709	1.296	0.8710	1.650	1.109	1.429	0.692
15		0.5906	1.387	0.9321	1.766	1.127	1.530	1.028
15.0812	19/32	0.5978	1.402	0.9423	1.785	1.199	1.546	1.039
15.5		0.6102	1.481	0.9953	1.886	1.267	1.633	1.097
15.8750	5/8	0.6250	1.554	1.044	1.978	1.329	1.713	1.151
16		0.6299	1.578	1.061	2.010	1.351	1.740	1.169
16.5		0.6496	1.678	1.128	2.137	1.436	1.851	1.244
16.6687	21/32	0.6563	1.713	1.151	2.181	1.466	1.889	1.269
17		0.6693	1.782	1.197	2.269	1.525	1.965	1.320
17.4625	11/16	0.6875	1.880	1.263	2.394	1.609	2.073	1.393
17.5		0.6890	1.888	1.269	2.404	1.615	2.082	1.399
18		0.7087	1.998	1.342	2.543	1.709	2.203	1.480
18.2562	23/32	0.7188	2.055	1.381	2.617	1.758	2.266	1.523
18.5		0.7263	2.110	1.418	2.687	1.806	2.327	1.564

TABLES (continued)

mm	SIZES		ROUND		SQUARE		HEXAGON	
	fractions of an inch	decimals of an inch	kg / m	lb / ft	kg / m	lb / ft	kg / m	lb / ft
19		0.7480	2.226	1.496	2.834	1.904	2.454	1.649
19.0500	3/4	0.7500	2.237	1.503	2.849	1.914	2.467	1.658
19.5		0.7677	2.344	1.575	2.985	2.006	2.585	1.797
19.8431	25/32	0.7813	2.426	1.630	3.091	2.077	2.677	1.799
20		0.7814	2.466	1.657	3.140	2.110	2.719	1.827
20.6375	13/16	0.8125	2.626	1.764	3.343	2.246	2.895	1.945
21		0.8264	2.719	1.827	3.462	2.326	2.998	2.015
21.4312	27/32	0.8438	2.832	1.903	3.605	2.422	3.122	2.098
22		0.8661	2.984	2.005	3.799	2.553	3.290	2.211
22.2250	7/8	0.8750	3.045	2.046	3.875	2.604	3.358	2.256
23		0.9055	3.262	2.192	4.153	2.791	3.596	2.416
23.0187	29/32	0.9063	3.267	2.195	4.159	2.795	3.602	2.420
23.8125	15/16	0.9375	3.496	2.349	4.451	2.991	3.855	2.590
24		0.9449	3.551	2.386	4.522	3.039	3.916	2.631
24.6062	31/32	0.9688	3.733	2.508	4.753	3.194	4.116	2.766
25		0.9843	3.853	2.589	4.906	3.297	4.249	2.855
25.4000	1	1.0000	3.978	2.673	5.065	3.403	4.352	2.924
26		1.0236	4.168	2.801	5.307	3.566	4.596	3.088
27		1.0630	4.495	3.020	7.723	3.846	4.956	3.330
28		1.1024	4.824	3.248	6.154	4.135	5.330	3.581
28.5750	1.1/8	1.1250	5.034	3.383	6.410	4.307	5.551	3.730
29		1.1417	5.185	3.484	6.602	4.436	5.717	3.842
30		1.1811	5.549	3.729	7.065	4.747	6.118	4.111
31		1.2205	5.925	3.981	7.544	5.069	6.533	4.399
31.7499	1.1/4	1.2500	6.215	4.176	7.913	5.317	6.853	4.605
32		1.2598	6.313	4.242	8.038	5.401	6.961	4.677
33		1.2992	6.714	4.512	8.549	5.745	7.403	4.974
34		1.3386	7.127	4.789	9.075	6.098	7.859	5.281
34.9249	1.3/8	1.3750	7.520	5.053	9.575	6.434	8.292	5.572
35		1.3780	7.553	5.075	9.616	6.461	8.328	5.596
36		1.4173	7.990	5.369	10.174	6.836	8.811	5.921
37		1.4567	8.440	5.671	10.747	7.221	9.307	6.254
38		1.4961	8.903	5.982	11.335	7.617	9.817	6.597
38.0999	1.1/2	1.5000	8.950	6.014	11.395	7.657	9.868	6.631
39		1.5354	9.378	6.302	11.940	8.023	10.340	6.948
40		1.5748	9.865	6.629	12.560	8.440	10.877	7.309
41		1.6142	10.364	6.965	13.190	8.867	11.428	7.679
41.2749	1.5/8	1.6250	10.504	7.058	13.373	8.986	11.582	7.783
42		1.6535	10.876	7.308	13.847	9.304	11.992	8.058
43		1.6929	11.400	7.660	14.515	9.753	12.570	8.446
44		1.7323	11.936	8.020	15.198	10.21	13.162	8.844
44.4499	1.3/4	1.7500	12.181	8.185	15.510	10.42	13.432	9.026
45		1.7717	12.485	8.389	15.896	10.68	13.767	9.251
46		1.8110	13.046	8.766	16.611	11.16	14.385	9.666
47		1.8504	13.619	9.151	17.341	11.65	15.017	10.09
47.6249	1.7/8	1.8750	13.984	9.397	17.805	11.96	15.419	10.36
48		1.8898	14.205	9.545	18.086	12.15	15.663	10.52
49		1.9291	14.803	9.947	18.848	12.66	16.323	10.97
50		1.9685	15.413	10.36	19.625	13.19	16.996	11.42
50.7999	2	2.0000	15.911	10.69	20.258	13.61	17.544	11.79
51		2.0079	16.036	10.78	20.418	13.72	17.682	11.88
52		2.0472	16.671	11.20	21.226	14.26	18.383	12.35
53		2.0866	17.319	11.64	22.051	14.82	19.096	12.83
53.9749	2.1/8	2.1250	17.962	12.07	22.869	15.37	19.805	13.31
54		2.1260	17.978	12.08	22.891	15.38	19.824	13.32

TABLES (continued)

mm	SIZES		ROUND		SQUARE		HEXAGON	
	fractions of an inch	decimals of an inch	kg / m	lb / ft	kg / m	lb / ft	kg / m	lb / ft
55		2.1654	18.650	12.53	23.746	15.96	20.565	13.82
56		2.2047	19.335	12.99	24.618	16.54	21.319	14.33
57		2.2441	20.031	13.46	25.505	17.14	22.088	14.84
57.1499	2.1/4	2.2500	20.137	13.53	25.639	17.23	22.204	14.92
58		2.2835	20.740	13.94	26.407	17.74	22.868	15.37
59		2.3228	21.462	14.42	27.326	18.36	23.665	15.90
60		2.3622	22.195	14.91	28.260	18.99	24.474	16.45
60.3249	2.3/8	2.3750	22.436	15.08	28.567	19.20	24.740	16.62
61		2.4016	22.941	15.42	29.210	19.63	25.296	17.00
62		2.4409	23.700	15.83	30.175	20.28	26.133	17.56
63		2.4803	24.470	16.44	31.157	20.94	26.982	18.13
63.4999	2.1/2	2.5000	24.861	16.71	31.653	21.27	27.412	18.42
64		2.5197	25.253	16.97	32.154	21.61	27.846	18.71
65		2.5591	26.049	17.50	33.166	22.29	28.723	19.30
66		2.5984	26.856	18.05	34.195	22.98	29.613	19.90
66.6749	2.5/8	2.650	27.408	18.42	34.898	23.45	30.222	20.31
67		2.6378	27.676	18.60	35.239	23.68	30.518	20.51
68		2.6772	28.509	19.16	36.298	24.39	31.435	21.12
69		2.7165	29.353	19.72	37.374	25.11	32.367	21.75
69.8499	2.3/4	2.7500	30.018	20.21	38.300	25.74	33.169	22.29
70		2.7559	30.210	20.30	38.465	25.85	33.312	22.38
72		2.8347	31.961	21.48	40.694	27.34	35.242	23.68
73.0249	2.7/8	2.8750	32.878	22.09	41.861	28.13	36.253	24.36
74		2.9134	33.762	22.69	42.987	28.89	37.227	25.01
75		2.9528	34.680	23.30	44.156	29.67	38.240	25.70
76		2.9921	35.611	23.93	45.342	30.47	39.267	26.39
76.1999	3.	3.000	35.799	24.06	45.580	30.63	39.474	26.52
78		3.0709	37.510	25.20	47.759	32.09	41.361	27.79
80		3.1496	39.458	26.51	50.240	33.76	43.509	29.24
82.5499	3.1/4	3.2500	42.013	28.23	53.494	35.95	45.204	30.37
85		3.3465	44.545	29.93	56.716	38.11	49.118	32.93
88.8998	3.1/2	5.5000	48.726	32.74	62.040	41.69	53.728	36.10
90		3.5433	49.939	33.56	63.585	42.73	55.066	37.00
95		3.7402	55.642	37.39	70.846	47.60	61.355	41.23
95.2498	3.3/4	3.7500	55.936	37.59	71.219	47.86	61.678	41.44
100		3.9370	61.654	41.43	78.500	52.75	67.983	45.68
101.5998	4.	4.000	63.642	42.76	81.032	54.45	70.175	47.15
105		4.1339	67.973	45.67	86.546	58.15	74.951	50.36
107.9489	4.1/4	4.2500	71.846	48.28	91.477	61.47	79.222	53.23
110		4.3307	74.601	50.13	94.985	66.51	82.259	55.27
114.2998	4.1/2	4.500	80.547	54.12	102.556	68.92	88.816	59.68
115		4.5276	81.537	54.79	103.816	69.76	89.907	60.41
120		4.7244	88.781	59.66	113.040	75.96	97.895	65.78
120.6498	4.3/4	4.7500	89.745	60.90	114.268	76.78	98.958	66.49
125		4.9213	96.337	64.73	122.656	82.42	106.223	71.38
126.9998	5.	5.0000	99.441	66.82	126.612	85.08	108.649	73.68
130		5.1181	104.195	70.01	132.665	89.14	114.891	77.20
133.3498	5.1/4	5.2500	109.634	73.67	139.590	93.80	120.888	81.23
135		5.3150	112.364	75.50	143.066	96.13	123.899	83.25
139.6998	5.1/2	5.5000	120.323	80.85	153.201	102.9	132.676	89.15
140		5.5180	120.841	81.20	153.860	103.4	133.247	89.54
145		5.7087	129.627	87.10	165.046	110.9	142.934	96.04
146.0497	5.3/4	5.7500	131.511	88.37	167.445	112.5	145.011	97.44

TABLES (continued)

mm	SIZES		ROUND		SQUARE		HEXAGON	
	fractions of an inch	decimals of an inch	kg / m	lb / ft	kg / m	lb / ft	kg / m	lb / ft
150		5.9055	138.721	93.31	176.625	118.7	152.962	102.8
152.2997	6	6.0000	143.195	96.22	182.321	122.5	157.895	106.1
155		6.1024	148.132	99.53	188.596	126.7	163.329	109.7
158.7497	6.1/4	6.2500	155.376	104.40	197.809	132.9	171.327	115.1
160		6.2992	157.833	106.06	200.960	135.0	174.036	116.9
165		6.4961	167.852	112.79	213.716	143.6	185.084	124.4
165.0997	6.1/2	6.5000	168.055	112.92	213.975	143.8	185.307	124.5
170		6.6929	178.179	119.73	226.865	152.4	196.471	132.0
171.4497	6.3/4	6.7500	181.231	121.78	230.751	155.1	199.836	134.3
175		6.8898	188.814	126.87	240.406	161.5	208.198	139.9
177.7997	7	7.0000	194.904	130.97	248.160	166.8	214.913	144.4
180		7.0866	199.757	134.23	254.340	170.9	220.265	148.0
184.1497	7.1/4	7.2500	209.075	140.49	266.202	178.9	230.538	154.9
185		7.2835	211.010	141.79	268.666	180.5	232.672	156.3
190		7.4803	222.570	149.56	283.385	190.4	245.418	164.9
190.4997	7.1/2	7.5000	223.742	150.34	284.799	191.4	246.711	165.8
195		7.6722	234.438	157.53	298.496	200.6	258.505	173.7
196.8497	7.3/4	7.7555	238.907	160.53	304.186	204.4	263.433	177.0
200		7.8740	246.614	165.71	314.000	211.0	271.932	180.7
203.1996	8	8.0000	251.509	171.06	324.127	217.8	280.702	188.6
205		8.0709	259.100	174.10	329.896	221.7	285.98	192.0
210		8.2677	271.893	182.70	346.185	232.6	299.805	201.5
215		8.4646	284.994	191.50	362.866	243.8	314.251	211.2
215.8996	8.1/2	8.5000	287.384	193.11	365.909	245.9	316.886	212.9
220		8.6614	298.403	200.51	379.940	255.3	329.038	221.1
225		8.8858	312.122	209.73	397.406	267.0	344.164	231.3
228.5996	9	9.0000	322.189	216.49	410.244	275.7	355.264	238.7
230		9.0551	326.148	219.16	415.265	279.0	359.630	241.7
235		9.2520	340.483	228.73	433.516	291.3	375.436	252.3
240		9.4488	355.125	238.63	452.160	303.8	391.582	263.1
241.2996	9.1/2	9.5000	358.981	241.22	457.070	307.1	395.834	266.0
245		9.6457	370.076	248.67	471.196	316.6	408.068	274.2
250		9.8425	385.336	258.93	490.125	329.7	424.894	285.5
253.996	10	10.0000	397.768	267.28	506.433	340.3	438.583	294.7
255		10.0394	400.903	269.39	510.446	343.0	442.059	297.0
260		10.2362	416.779	280.05	530.660	356.6	459.565	308.8
265		10.4331	432.963	290.93	551.266	370.4	477.410	320.8
266.6995	10.1/2	10.5000	435.534	294.67	558.360	375.2	483.553	324.9
270		10.6299	449.455	302.01	572.265	384.5	495.596	333.0
275		10.8268	466.256	313.30	593.656	398.9	514.121	345.5
279.3995	11	11.0000	481.294	323.41	612.803	411.8	530.702	356.6
280		11.0236	483.365	324.80	615.440	413.5	532.986	358.1
285		11.2205	500.782	336.50	637.616	428.4	552.192	371.0
290		11.4174	518.508	348.41	660.185	443.6	571.737	384.2
292.0995	11.1/2	11.5000	526.042	353.47	669.779	450.1	580.045	389.8
295		11.6142	536.541	360.53	683.146	459.0	591.622	397.5
300		11.8110	554.883	372.85	706.500	474.7	611.847	411.1
304.7995	12	12.0000	572.780	384.88	729.286	490.0	631.580	424.4
305		12.0079	573.534	385.39	730.246	490.7	632.411	424.9
310		12.2047	592.492	398.12	754.385	506.9	653.316	439.0
315		12.4016	611.759	411.07	778.916	523.4	674.561	453.3
317.4995	12.1/2	12.5000	621.506	417.62	791.327	531.7	685.301	460.5
320		12.5984	631.334	424.22	803.840	540.1	696.146	467.8
325		12.7953	651.217	437.59	829.156	557.2	718.070	482.5
330		12.9921	671.409	451.15	854.865	574.4	740.334	497.5

TABLES (continued)

mm	SIZES		ROUND		SQUARE		HEXAGON	
	fractions of an inch	decimals of an inch	kg / m	lb / ft	kg / m	lb / ft	kg / m	lb / ft
330.1994	13	13.0000	672.220	451.70	855.898	557.1	741.229	498.1
335		13.1890	691.909	464.93	880.966	592.0	762.933	512.7
340		13.3858	712.717	478.91	907.460	609.8	785.883	528.1
342.8994	13.1/2	13.5000	724.924	487.11	923.003	620.2	799.343	537.1
345		13.5827	733.833	493.10	943.346	627.8	809.167	543.7
350		13.7796	755.258	507.50	961.625	646.2	832.791	559.6
355		13.9764	776.991	522.10	989.296	664.8	856.775	575.7
355.5994	14	14.0000	779.617	523.86	992.640	667.0	859.650	577.6
360		14.1733	799.032	536.91	1017.360	683.6	881.059	592.0
365		14.3701	821.381	551.93	1045.816	702.7	905.703	608.6
368.2994	14.1/2	14.5000	836.298	561.95	1064.809	715.5	922.150	619.6
370		14.5670	844.039	567.15	1074.665	722.1	930.687	625.4
375		14.7638	867.005	582.58	1103.906	741.8	956.010	642.4
380		14.9607	890.279	598.22	1133.540	671.7	981.674	659.6
380.9993	15	15.0000	894.968	601.37	1139.510	765.7	986.843	663.1
385		15.5575	913.862	614.07	1163.566	781.9	1007.677	677.1
390		15.3540	937.753	630.12	1193.985	802.3	1034.021	694.8
393.6993	15.1/2	15.5000	955.627	642.13	1216.743	817.6	1053.729	708.1
395		15.5512	961.952	646.38	1224.796	823.0	1060.704	712.7
400		15.7481	986.459	662.85	1256.000	844.0	1087.727	730.9
405		15.9449	1011.275	679.53	1287.596	865.2	1115.091	749.3
406.3993	16	16.0000	1018.275	684.23	1296.509	871.2	1122.808	754.5
410		16.1418	1036.399	696.41	1319.585	886.7	1142.794	767.9
415		16.3386	1081.831	726.94	1351.966	908.5	1170.837	786.7
419.0993	16.1/2	16.5000	1082.911	727.66	1318.807	926.5	1194.080	802.4
420		16.5355	1087.571	730.79	1384.740	930.5	1199.219	805.8
425		16.7323	1113.620	748.39	1417.906	952.8	1227.942	825.1
430		16.9292	1139.977	766.01	1451.465	975.3	1257.005	844.6
431.7993	17	17.0000	1149.537	772.43	1463.637	983.5	1267.545	851.7
435		17.1260	1166.642	783.93	1485.416	998.1	1286.408	864.4
440		17.3229	1193.616	802.05	1519.760	1021.2	1316.150	884.4
444.4992	17.1/2	17.5000	1220.855	802.35	1550.999	1042.2	1343.203	902.6
445		17.5197	1222.285	821.31	1554.496	1044.5	1346.233	904.6
450		17.7166	1248.487	838.92	1589.625	1068.1	1376.655	925.0
455		17.9134	1276.386	857.67	1625.146	1092.0	1407.417	945.7
457.1992	18	18.0000	1288.754	865.98	1640.894	1102.6	1421.054	954.9
460		18.1103	1304.592	876.62	1661.060	1116.1	1438.519	966.6
465		18.3071	1333.107	835.78	1697.366	1140.5	1469.962	987.7
469.8992	18.1/2	18.5000	1361.346	914.76	1733.313	1164.7	1501.098	1008.7
470		18.5040	1361.930	915.15	1734.056	1156.2	1501.744	1009.1
475		18.7008	1391.062	934.72	1771.156	1190.1	1533.866	1030.7
480		18.8977	1420.501	954.51	1808.640	1215.3	1566.327	1052.5
482.5992	19	19.0000	1435.927	964.87	1828.281	1228.5	1583.335	1063.9
485		19.0945	1450.249	974.49	1846.516	1240.8	1599.129	1074.5
490		19.2914	1480.305	994.69	1884.785	1266.5	1632.271	1096.8
495		19.4882	1510.670	1015.09	1923.446	1292.5	1665.756	1119.3
495.2991	19.1/2	19.5000	1512.496	1016.32	1925.771	1294.0	1667.764	1120.7
500		19.6851	1541.343	1035.71	1962.500	1318.7	1699.574	1142.0
505		19.8819	1572.323	1056.52	2001.946	1345.2	1733.734	1165.0
507.9991	20	20.0000	1591.055	1069.11	2025.795	1361.2	1754.388	1178.9

MASS TABLE

DIAMETER	TOLERANCE	THEORETICAL	MAXIMUM	ACTUAL	AVERAGE MASS
14.50	0.38	1.38	1.36	5.31%	1.33
15.00	0.38	1.39	1.46	5.13%	1.42
16.00	0.38	1.58	1.65	4.81%	1.61
17.00	0.38	1.78	1.86	4.52%	1.82
18.00	0.38	2.00	2.08	4.27%	2.04
19.00	0.38	2.22	2.31	4.04%	2.27
19.50	0.79	2.34	2.54	8.27%	2.44
20.00	0.79	2.46	2.66	8.06%	2.56
20.50	0.79	2.59	2.79	7.86%	2.69
21.50	0.79	2.85	3.06	7.48%	2.95
22.00	0.79	2.98	3.20	7.31%	3.09
23.50	0.79	3.40	3.63	6.84%	3.52
24.00	0.79	3.55	3.79	6.69%	3.67
25.00	0.79	3.85	4.10	6.42%	3.97
26.00	0.79	4.16	4.42	6.17%	4.29
28.00	0.79	4.83	5.11	5.72%	4.97
28.50	0.79	5.00	5.28	5.62%	5.14
30.00	0.79	5.54	5.84	5.34%	5.69
32.00	0.79	6.31	6.62	5.00%	6.47
35.00	0.79	7.55	7.89	4.57%	7.72
36.00	0.79	7.98	8.34	4.44%	8.16
38.00	0.79	8.90	9.27	4.20%	9.08
40.00	0.79	9.86	10.25	3.99%	10.05
45.00	0.79	12.47	12.92	3.58%	12.69
48.00	0.79	14.19	14.66	3.32%	14.43
50.00	0.79	15.40	15.89	3.18%	15.65
55.00	1.20	18.63	19.46	4.41%	19.04
58.00	1.20	20.72	21.59	4.18%	21.16
60.00	1.20	22.18	23.07	4.04%	22.62
63.00	1.20	24.45	25.39	3.85%	24.92
65.00	1.20	26.03	27.00	3.73%	26.51
68.00	1.20	28.48	29.50	3.56%	28.99
70.00	1.20	30.18	31.23	3.46%	30.71
75.00	1.20	34.65	35.77	3.23%	35.21
80.00	1.57	39.42	40.99	3.96%	40.21
85.00	1.57	44.51	46.17	3.73%	45.34
90.00	1.57	49.90	51.65	3.52%	50.77
95.00	1.57	55.59	57.45	3.33%	56.52
100.00	1.57	61.60	63.55	3.16%	62.57
103.00	1.57	65.35	67.36	3.07%	66.36
110.00	1.50	74.54	76.58	2.75%	75.56
115.00	1.50	81.47	83.61	2.63%	82.54
120.00	1.50	88.70	90.94	2.52%	89.82
125.00	1.50	96.25	98.57	2.41%	97.41
130.00	1.50	104.10	106.52	2.32%	105.31
140.00	1.50	120.74	123.34	2.15%	122.04
150.00	1.50	138.60	141.39	2.01%	139.99
160.00	1.50	157.70	160.67	1.88%	159.18
165.00	1.50	167.71	170.77	1.83%	169.24
170.00	3.00	178.02	184.36	3.56%	181.19
180.00	3.00	199.58	206.29	3.36%	202.94
190.00	3.00	222.38	229.45	3.18%	225.91
205.00	3.00	258.87	266.51	2.95%	262.69
215.00	3.00	284.75	292.75	2.81%	288.75
220.00	3.00	298.14	306.33	2.75%	302.24
230.00	4.00	325.86	337.30	3.51%	331.58
240.00	4.00	354.82	366.74	3.36%	360.78
250.00	4.00	385.00	397.42	3.23%	391.21
260.00	6.00	416.42	435.86	4.67%	426.14
270.00	6.00	449.06	469.24	4.49%	459.15
280.00	6.00	482.94	503.86	4.33%	493.40
290.00	7.00	518.06	543.37	4.89%	530.71
305.00	7.00	573.03	599.64	4.64%	586.34
320.00	7.00	630.78	658.68	4.42%	644.73
330.00	7.00	670.82	699.59	4.29%	685.20
340.00	7.00	712.10	741.72	4.16%	726.91
350.00	7.00	754.60	785.09	4.04%	769.84
360.00	8.00	798.34	834.21	4.49%	816.27
370.00	8.00	843.30	880.17	4.37%	861.73
380.00	8.00	889.50	927.35	4.25%	908.43
390.00	8.00	936.94	975.77	4.14%	956.35
400.00	8.00	985.60	1025.42	4.04%	1005.51
405.00	8.00	1050.71	1050.71	3.99%	1030.55

STANDARD METRIC TOLERANCES

ALL TOLERANCES + 0.00mm				
ROUNDS			HEXAGONS	
SIZE IN mm	MAXIMUM CARBON RANGE 0,25%	CARBON RANGE OVER 0,25% UP TO & INCL. 0,55%	WIDTH A/F mm	TOLERANCE mm
4 - 38,1	0,05	0,075	11 - 18	0,110
38,1 - 63,5	0,075	0,100	18 - 30	0,130
63,5 - 101,6	0,100	0,125	30 - 50	0,160
101,6 - 152,4	0,125	0,150	50 - 80	0,190
152,4 - 200	0,150	0,180		

MIDRAND SPECIAL STEELS (PTY) LTD

Reg No: 1995/01984/07

118 Sarel Baard Crescent

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Gateway Industrial Park

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Centurion

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CONVERSION TABLE

TO CONVERT	INTO	MULTIPLE	RECIPROCAL
Inches	Millimetres	25.4	0.0394
Inches	Centimetres	2.540	0.3937
Feet	Metres	0.3048	3.2809
Yards	Metres	0.9144	1.0936
Miles	Kilometres	1.6093	0.6214
Sq.Inches	Sq.Centimetres	6.4514	0.155
Sq.Feet	Sq.Metres	0.0929	10.7643
Cub.Inches	Cub.Centimetres	16.3862	0.610
Cub.Feet	Cub.Metres	0.0283	35.3166
Gallons	Litres	4.5459	0.220
Lbs(av)	Kilograms	0.4536	2.2046
Ft.-Pounds	Kilog.Metres	0.1382	7.2331
Lbs.per Sq.Inch	Kilos.per Sq.Centimetre	0.0703	14.223
Lbs.per Sq.Foot	Kilos.per Sq.Metre	4.8826	0.2048
Lbs.perYard	Kilos.per Metre	0.4961	2.0159
Megapascals (Mpa) tons square inch	Tons/sq.inch Megapascals (Mpa)	15.430	15.430