

		Similar Grades				Grades for Potential Substitution		
Stocked Product	BS 970: 1955	British Standards	European	Werkstoff	SAE/AISI	Lesser	Greater	Supply Size Range
230M07 (230)	EN1A		11SMn30	1.0715	1113 / 1213		070M20 (070)	10mm-80mm Dia
230M07Pb (23P)	EN1A Leaded		11SMnPb30	1.0718				10mm-80mm Dia
070M20 (070)	EN3A EN32	080A15	C15 C20 ST52-3 (ST5) S235 (S23) S275 (S27 & S28)	1.0402 1.0401 1.1151	1020 1023		LF2 (LF2)	10mm - 860mm Dia
080M40 (080)	EN8 EN8D	080A42 (08A)	C40	1.0511	1040		C45E (08B) 070M55 (07A)	10mm - 860mm Dia
C45E (08B)		080M46 (08E) 080M50 (08I)			1050 (10M)	080M40 (080)	070M55 (07A)	32mm - 860mm Dia
070M55 (07A)	EN9	080M50 (08I)	C55 C60 (C60)	1.0535	1050 (10M) 1055	C45E (08B)		32mm - 860mm Dia
150M19 (150)	EN14		ST52-3 (ST5) S275 (S27 & S28) S355 (S36 & S38)	1.1170	1320 1024	LF2 (LF2)		32mm - 860mm Dia
605M36 (605)	EN16						38MB5 (035) 4130 (41C) 945M38 (945)	32mm - 240mm Dia
709M40 (709)	EN19	708M40 (708)	42CrMo4 (C44)	1.7225	4140 (41F & 41G) 4142 B7 L7	945M38 (945) 41CrS4 (C41)	4145 (411) 4340 (43B) 817M40 (817) 826M40 (826)	32mm - 860mm Dia
817M40 (817)	EN24		34CrNiMo6 (C36) 40CrNiMo6	1.6565 1.6582	4340 (43B)		4145 (411) 4340 (43B) 826M40 (826) 4330V (43V)	32mm - 860mm Dia
826M40 (826)	EN26		40NiMoCr10-5	1.6745		4340 (43B)	4330V (43V)	45mm - 405mm Dia
835M30 (83A)	EN30B		30NiCrMo16-6	1.6747		1.2767	4330V (43V)	30mm - 400mm Dia
722M24 (722)	EN40B		32CrMo12	1.7361				32mm - 860mm Dia
535A99 (535)	EN31		100Cr6 (CC1)	1.3505	52100		100CrMo7-3 (CC3)	38mm - 235mm Dia
665M17 (665)	EN34				4615 4617		655M13 (655)	60mm - 250mm Dia
655M13 (655)	EN36	832M13 (832)	14NiCr4	1.5752	3415 3310	18CrNiMo7-6 (C18)	835M15 (835)	32mm - 860mm Dia
835M15 (835)	EN39		15NiCrMo16-5	1.6723				38mm - 210mm Dia
8620 (86B)		635M15 (635) 805M20	21NiCrMo2-2	1.6543	8617	16MnCr5 (M15)	8630 (86D) 655M13 (655) 18CrNiMo7-6 (C18)	45mm - 280mm Dia
16MnCr5 (M15)		590M17	20MnCr5 (M25)	1.7131	5115 5117		8620 (86B) 635M15 (635) 655M13 (655) 18CrNiMo7-6 (C18)	95mm - 250mm Dia
4140 mod (41F & 41G)	EN19	708M40 (708) 709M40 (709)	42CrMo4 (C44)	1.7225	4142 B7 (B7A) L7		4340 (43B)	32mm - 860mm Dia
4145 mod (411)						817M40 (817)	4340 (43B)	32mm - 760mm Dia
4330V (43V)						826M40 (826)	835M30 (83A)	120mm - 368mm Dia
17-4 (Y17)				1.4542	Grade 630 S17400 (UNS)			36mm - 305mm Dia

The above represents an example of products available. Others grades are available on request.
Also, we can offer a bespoke product design service to create the most cost effective raw material solution for your application.

Similar Grades – Grades of similar (not identical) chemistry. Please note the similar grades are based on chemistry only, and may not meet the necessary mechanical properties (in the standard 'as stocked' state).
Grades for Potential Substitution – Grades capable of achieving similar mechanical properties (material may need further treatment to achieve the desired properties). The potential substitution grades are based on mechanical properties, not necessarily the chemical analysis.

Notes:
1) Items in **bold** denote stocked item
2) Where queries exist regarding offering similar or substituted grades, please refer to the Sales Team.

For full details on grades, service and technical data please call 0114 2331133



Hardness Conversions

VPN	Rockwell Scales		Brinell	U.T.S.	
	B	C		Kpsi	Mps
DPH HV/10			BHN 3000KG		
746		62	688		
720		61	670		
697		60	654	320	2206
674		59	634	310	2137
653		58	615	300	2069
633		57	595	290	2000
613		56	577	282	1944
595	120	55	560	274	1889
577	120	54	543	266	1834
560	119	53	523	257	1772
544	119	52	512	245	1689
528	118	51	496	239	1648
513	117	50	481	233	1607
498	117	49	469	227	1565
484	116	48	455	221	1524
471	116	47	443	217	1496
458	115	46	432	212	1462
446	115	45	421	206	1420
434	114	44	409	200	1379
423	113	43	400	196	1351
412	113	42	390	191	1317
402	112	41	381	187	1289
392	112	40	371	182	1255
382	111	39	362	177	1220
372	110	38	353	173	1193
363	110	37	344	169	1165
354	109	36	336	165	1138
345	109	35	327	160	1103
336	108	34	319	156	1076
327	108	33	311	152	1048
318	107	32	301	147	1014
310	106	31	294	144	993
302	105	30	286	140	965
294	104	29	279	137	945
286	104	28	271	133	917
279	103	27	264	129	889
272	103	26	258	126	869

VPN	Rockwell Scales		Brinell	U.T.S.	
	B	C		Kpsi	Mps
DPH HV/10			BHN 3000KG		
266	102	25	253	124	855
260	101	24	247	121	834
254	100	23	240	118	814
248	99	22	234	115	793
243	98	21	228	112	772
238	97	20	222	109	752
234	97	19	218	107	738
230	96	18	214	106	731
226	96	17	210	104	717
222	95	16	208	102	703
217	95	15	205	100	690
213	94	14	203	99	683
208	93	13	200	98	676
204	92	12	195	96	662
200	92	11	193	95	655
196	91	10	190	93	641
192	90	9	185	91	627
188	89	8	180	88	607
184	88	7	176	86	593
180	87	6	172	84	579
176	86	5	169	83	572
172	85	4	165	81	558
168	84	3	162	79	545
164	83	2	159	78	538
160	82	1	156	76	524
156	81	0	153	75	517
152	80		150	73	503
148	79		147		
144	78		144		
141	77		141		
139	76		139		
137	75		137		
135	74		135		
132	73		132		
130	72		130		
127	71		127		
125	70		125		

Approx. Weight Calculations Formulae

Rounds (inches)	$\text{Dia}^2 \times 1.211$	kgs per foot
Rounds (inches)	$\text{Dia}^2 \times 3.973$	kgs per metre
Rounds (millimetres)	$\text{Dia}^2 \div 533$	kgs per foot
Rounds (millimetres)	$\text{Dia}^2 \div 162$	kgs per metre
Hexagons (inches)	$A/F^2 \times 1.337$	kgs per foot
Hexagons (inches)	$A/F^2 \times 4.387$	kgs per metre
Hexagons (millimetres)	$A/F^2 \div 482.6$	kgs per foot
Hexagons (millimetres)	$A/F^2 \div 147.1$	kgs per metre
Squares/Flats (inches)	$W \times T \times 1.542$	kgs per foot
Squares/Flats (inches)	$W \times T \times 5.059$	kgs per metre
Squares/Flats (millimetres)	$W \times T \div 418$	kgs per foot
Squares/Flats (millimetres)	$W \times T \div 127$	kgs per metre

Maximum recommended finished machined sizes for hot rolled bars according to BS 970: Part 1: 1996

Hot Rolled Dia mm	Rec. Fin. Size Dia mm	Hot Rolled Dia mm	Rec. Fin. Size Dia mm	Hot Rolled Dia mm	Rec. Fin. Size Dia mm
20	18.912	53	50.304	125	118.080
21	19.872	54	51.246	130	122.880
22	20.832	55	52.224	135	127.680
23	21.792	56	53.184	140	132.480
24	22.752	57	54.144	145	137.280
25	23.712	58	55.104	150	142.080
26	24.672	59	56.064	155	146.880
27	25.536	60	57.024	160	151.680
28	26.496	61	57.984	165	156.000
29	27.456	62	58.944	170	160.800
30	28.416	63	59.904	175	165.600
31	29.376	64	60.864	180	170.400
32	30.336	65	61.728	185	175.200
33	31.296	66	62.688	190	180.000
34	32.356	67	63.648	195	184.800
35	33.216	68	64.608	200	189.600
36	34.176	69	65.568	205	193.920
37	35.136	70	66.528	210	198.720
38	36.096	71	67.488	215	203.520
39	36.960	72	68.448	220	208.320
40	37.920	73	69.408	230	217.920
41	38.880	74	70.368	240	227.520
42	39.840	75	71.328	250	237.120
43	40.800	76	71.712	255	241.920
44	41.760	80	75.552	260	246.720
45	42.720	85	80.352	270	256.320
46	43.680	90	85.512	280	265.920
47	44.640	95	89.760	290	275.520
48	45.600	100	94.560	300	285.120
49	46.560	105	99.360	305	289.920
50	47.520	110	104.160	320	304.320
51	48.480	115	108.960	330	313.920
52	49.344	120	113.760	350	333.120

Please note that forged bars are produced to a different tolerance. Information available on request.

General Conversions	Multiply By	Inversion
Length		
cm to inch	0.3937	2.540
m to ft	3.281	0.304
mm to inch	0.0394	25.380

Energy		
ft/lb to J	1.356	0.737

Pressure		
N/mm ² to P.S.I.	144.99	0.006
K.S.I. to P.S.I.	1000	0.001
K.S.I. to N/mm ²	6.89476	0.145
Tons/in ² to N/mm ²	15.4442	0.064

Every care has been taken in the preparation of this technical data, however no liability can be accepted for any errors nor the consequences arising from such errors.

Tolerances for hot rolled round and square bar and rough turned rounds as per BS 970 : Part 1 : 1996				
Size	Permitted Variation			
	General Applications			
	Primary rolled round material		Re-rolled material	
	Dia	Out of section	Dia or width across flats	Out of section
mm	mm	mm	mm	mm
≤ 16	-	-	0.2	0.3
> 16 ≤ 26	-	-	0.3	0.5
> 26 ≤ 38	-	-	0.4	0.6
> 38 ≤ 51	-	-	0.5	0.8
> 51 ≤ 64	-	-	0.6	0.9
> 64 ≤ 76	-	-	0.7	1.1
> 76 ≤ 90	1.3	2.0	0.7	1.1
> 90 ≤ 120	1.5	2.3	0.8	1.2
> 120 ≤ 160	2.0	3.0		
> 160 ≤ 200	2.5	3.8		
> 200	3.0	4.5		

Tolerances for cold drawn bar as per BS 970 : Part 3 : 1991		
Section	Size diameter or width across flats	Permitted variation
	mm	mm
Round	≤ 6 ≤ 18	+ 0 to - 0.070
	> 18 ≤ 30	+ 0 to - 0.085
	> 30 ≤ 50	+ 0 to - 0.100
	> 50 ≤ 80	+ 0 to - 0.120
	> 80 ≤ 100	+ 0 to - 0.140
Square and Hexagon	> 6 ≤ 18	+ 0 to - 0.090
	> 18 ≤ 30	+ 0 to - 0.110
	> 30 ≤ 50	+ 0 to - 0.130
	> 50 ≤ 80	+ 0 to - 0.160
	> 80 ≤ 105	+ 0 to - 0.250
Flat (width)	< 18	+ 0 to - 0.110
	> 18 ≤ 30	+ 0 to - 0.130
	> 30 ≤ 50	+ 0 to - 0.160
	> 50 ≤ 80	+ 0 to - 0.190
	> 80 ≤ 100	+ 0 to - 0.220
	> 100 ≤ 130	+ 0 to - 0.350
	> 130 ≤ 160	+ 0 to - 1.000
	> 160 ≤ 320	+ 0 to - 1.000
Flat (thickness)	< 18	+ 0 to - 0.110
	> 18 ≤ 30	+ 0 to - 0.130
	> 30 ≤ 50	+ 0 to - 0.250
	> 50 ≤ 80	+ 0 to - 0.350

ISO Tolerances						
h13	h12	h11	h10	h9	h8	h7
Tolerances as per table below. The total tolerance is taken as MINUS						
i.e 45mm dia h9 = -0.062						
k13	k12	k11	k10	k9	k8	k7
Tolerances as per table below. The total tolerance is taken as PLUS						
i.e 45mm dia k9 = +0.062						
j13	j12	j11	j10	j9	j8	j7
Tolerances as per table below. The total tolerance is taken as DIVIDED OVER PLUS AND MINUS						
i.e 45mm dia j9 = +/-0.031						

Nominal Sizes							
mm	13	12	11	10	9	8	7
> 1 to 3	0.140	0.100	0.050	0.040	0.025	0.014	0.010
> 3 to 6	0.180	0.120	0.075	0.048	0.030	0.018	0.012
> 6 to 10	0.220	0.150	0.090	0.058	0.036	0.022	0.015
> 10 to 18	0.270	0.180	0.110	0.070	0.043	0.027	0.018
> 18 to 30	0.330	0.210	0.130	0.084	0.052	0.033	0.021
> 30 to 50	0.390	0.250	0.150	0.100	0.062	0.039	0.025
> 50 to 80	0.460	0.300	0.190	0.120	0.074	0.046	0.030
> 80 to 120	0.540	0.350	0.220	0.140	0.087	0.054	0.035
> 120 to 180	0.630	0.400	0.250	0.160	0.100	0.063	0.040

The tolerances shown above are normally applied to metric sizes of drawn, turned and ground finish bright steel bars.

Every care has been taken in the preparation of this technical data, however no liability can be accepted for any errors nor the consequences arising from such errors.