



PRODUCT SUMMARY GUIDE

OUR PRODUCTS

- ➔ Bright Mild Steel
- ➔ Black Carbon Bar
- ➔ High Tensile Alloy
- ➔ Case Hardening Alloy
- ➔ Tool Steel
- ➔ Stainless Bar
- ➔ Chrome Bar & Tube
- ➔ Hollow Bar
- ➔ Aluminium Bar
- ➔ Cast Iron
- ➔ Wire
- ➔ Bronze

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STEEL & ALLOY SELECTOR CHART

BLACK CARBON STEELS			
1020	Low Carbon steel suitable for parts not requiring high strength. Typical ultimate tensile range 380-450MPa. Suitable for welded components	C .20 Mn .45 Si .25	P* .04 S* .04 *max
1045	Medium carbon steel supplied as rolled with an ultimate tensile strength of 550-650 Mpa. Suitable for flame or induction hardening	C .45 Mn .75 Si .25	P* .03 S* .035 *max

BRIGHT STEELS			
1020	Cold finished mild steel, easy to weld, easy to machine and can be case hardened. Min Tensile strength 410 Mpa.	C .20 Mn .45 Si .35	P* .05 S* .05 *max
1030	Suitable for similar components as 1020 but requiring a slightly higher tensile strength. Can be welded. Not suitable for case hardening. Min Tensile strength 500 Mpa.	C .30 Mn .60 Si* .35	P* .05 S* .05 *max
1045	A fully killed medium carbon steel, designed for hardening and tempering to obtain mechanical properties. Min Tensile strength 600 Mpa.	C .45 Mn .75 P* .04	S* .04 Si .25 *max
S1214	Standard general purpose free machining steel, S1214 responds well to case hardening. Min Tensile strength 370 Mpa.	C* .15 Mn 1.00 Si 1.00	S .30 P .06 *max
S12L14	Free-cutting steel with a lead addition to enhance machining characteristics. Ideal feedstock for bar automatics. Min Tensile strength 370 Mpa.	C* .15 Mn 1.00 Si .10 S 0.30	P .06 Pb .25 *max

ALLOY CASE HARDENING STEELS			
8620/8620H	Low Case Hardening Steel with strict analytical limits for production Case Hardened components such as automotive gears and bearing races.	C .20 Mn .80 Mo .20	Cr .50 Ni .50 Si .25
X3312 EN36A	A Case Hardening Steel that combines toughness of core with high case hardness after carburizing and quenching.	C .12 Mn .50 Ni 3.20	Cr .90 Si .25
1.6587 17CrNiMo6 18CrNiMo7-6	Similar to EN36A - ideally suited to large gears requiring deep case depths.	C .18 Mn .50 Mo .30	Cr 1.65 Ni 1.55 Si .25
X9315 EN39B	A high core strength Case Hardening Steel used in Highly stressed applications.	C .15 Mn .35 Mo .20	Cr 1.20 Ni 4.10 Si .25

ALLOY HIGH TENSILE STEELS			
4140	Economical general purpose high tensile steel used for axles, pins, gears and light duty roll form sets. 850-1000 MPa	C .40 Mn .80 Si .20	Cr .90 Ni .25
4340	Nickel, chromium and molybdenum high tensile high used for components requiring higher strength than 4140. 930-1080 MPa	C .40 Mn .80 Mo .25	Cr .50 Ni 1.75 Si .25
X9931 EN25	Similar applications to 4340 and suitable for severe duties requiring strength and toughness in larger cross sections. 930-1080 MPa	C .30 Mn .60 Mo .50	Cr .65 Ni 2.50 Si .25
X9940 EN26	Suitable for applications requiring high tensile strength and where high surface pressures exist, such as heavy gears and shafts. 1080-1230 MPa	C .40 Mn .60 Mo .55	Cr .65 Ni 2.50 Si .25

CHROMIUM PLATED STEEL (CROMAX®)			
CROMAX® 280	Micro alloyed base steel, ground and hard chromium plated. This medium tensile steel is easily welded and is suitable for hydraulic piston rods.	C .18 Mn 1.55 Si .35	S .025 V* .12 *max
CROMAX® 42CrMo4 / 4140	Hardened & tempered high tensile based steel is used in the plating process. Typical tensile range 850-1000 N/mm² Ultimate.	C .42 Mn .80 Mo .20	Cr 1.05 Si .25 S .02
CROMAX® 482iH	High core strength 850-1000 MPa ultimate tensile strength base steel, induction case hardened 55RC minimum. Used for piston rods, pivot and bucket pins.	C .39 Mn 1.20 V .13	Cr* .03 Si .40 *max
NiKrom 350	Micro alloyed low carbon steel is used as base material. Has enhanced dual plating, a layer of corrosion resistant nickel substrate and a layer of hard chromium	C .18 Mn 1.55 V .12	P .02 S .025 *max
CROMAX® TUBE	Starting material is a low carbon weldable steel of 20MnV6 type. Exhibits good combination of strength toughness. Excellent machinability and weldability.	C .19 Mn 1.50 V .11	Si .35 S .02

HOLLOW BAR			
280	Carbon steel that has been micro alloyed and specially balanced to improve yield and tensile strength. Good machinability and weldability.	C .18 Mn 1.50 Si .40	S .03 Cr .25 V .10
20MnV6	20MnV6 is a carbon-manganese steel micro alloyed with vanadium, generally supplied in the black hot rolled condition. A broader specification of 280.	C .20 Mn 1.45 Si .25	S .03 V .12
4140	For quenching and tempering. Good combination of strength and toughness. Restrictive weldability.	C .40 Mn .85 Si .30	Mo .20 Cr 1.00

CAST IRON			
T250	Continuous cast iron bar free from casting shrinkage. Used for high speed machining. Applications include V-pulleys, gears and sprockets.	C 3.25 Mn .65 Si 2.50	P* .10 S* .20 *max
ST1 (SG)	Ductile iron, the graphite occurs as spherulites. ST1 has higher strength and ductility compared to grey iron. Used for pump bodies and glands	C 3.65 Mn* .20 Si 2.75	Mg* .04 P* .10 *max

BRONZE			
LG2	General purpose leaded gunmetal. Excellent machining characteristics, medium strength and good pressure tightness. Used for bushings, bearings and light duty gears	Cu 5.00 Sn 5.00	Pb 5.00 Zn 5.00
AB1	Alloy 954 is a high strength Aluminium bronze. A very hard abrasion resistant alloy, having excellent strength and wear resistance with reasonable machining properties. Suitable for high strength bearings.	Cu* 86.0 Fe 3.00	Al 9.00 *min
PB1	Phosphor bronze with good machining characteristics. High strength and good resistance to seawater and brine corrosion. Used for pump and valve components.	Cu 11.0 Sn .25	REM

ALUMINIUM			
2011 T4	A high mechanical strength alloy that machines exceptionally well. The excellent machining characteristics allow the production of complex and detailed parts.	Al 5.5 Si* .40 Fe* .70	REM Cu Zn* .30 *max
6026	An alloy produced to comply with current European Automotive & electrical standards. components which require good corrosion resistance, aesthetic finishes, and it can also be readily anodised	Si 1.0 Cu 0.35 Mg 0.9	Mn 0.6 Bi 1.0
5083 H112	Exceptional performance in extreme environments. Highly resistant to attack by both seawater and industrial chemical environments. Material can be anodized to aid corrosion resistance.	Al 8.0 Mn .70 Mg 4.50	REM Cr .15 Si* .40 *max
6061 T6	A versatile heat treatable extruded alloy with medium to high strength capabilities. 6061 responds well to decorative and hard anodizing.	Al 0.20 Cu .30 Mg 1.00	REM Cr .60 Si
7075 T6	High strength machined components used in aircraft, defence, toolmaking and motor sport. Can be hard anodized to increase its wear and corrosion resistance	Al 0.23 Cu 1.60 Mg 2.5	REM Zn 5.60

COLD WORK TOOL STEEL			
2379 / D2	Standard air hardening 12% chromium tool steel. An ideal selection for processing stock thickness up to 3mm. Used for press tools, shear blades and roll formers.	C 1.55 Cr 12.0 Mo .80	V .90

HOT WORK ALLOYS			
2344 / H13	2344 has excellent resistance to shock and softening as well as resistance to heat checking. Used for aluminium extrusion tools, die casting dies and plastic moulds.	C .39 Cr 5.25 Mo 1.35	Cr 1.90

STAINLESS STEELS			
303	Free machining austenitic stainless. It is used where extensive machining is involved.	C* .15 Cr 18.0 Mn* 2.00	Ni 9.00 S .25 *max
304	A general purpose austenitic stainless steel used for the food and chemical industries.	C* .08 Cr 19.0 Mn 2.00	Ni 9.50 *max
304L	Low carbon variant of 304 type, minimises carbide precipitation during welding. Hence improved corrosion resistance and improved machinability quality.	C* .03 Mn 2.00 Ni 10.0	Cr 19.0 *max
316	Austenitic 18-8 stainless with molybdenum to enhance weldability and resistance to pitting corrosion. Recommended for marine and chemical equipment. Available in L grade and improved machinability quality.	C* .08 Mn* 2.00 Mo 2.5	Cr 17.0 Ni 12.0 *max
316L	Low carbon variant of 316 more suitable for welding.	C* .03 Mn* 2.00 Mo 2.50	Cr 17.0 Ni 12.0 *max
420C	High carbon Martensitic stainless. Used where higher tensile strength is required. Used for pump and valve parts.	C* .15 Mn* 1.00 Si* 1.00	Cr 13.0 *max
431 Conc. T	A high tensile stainless developed for pump shaft applications. Corrosion resistance is slightly lower than 304.	C .15 Mn* 1.00 Si* 1.00	Cr 16.0 Ni 1.85 *max
630 PH580	A precipitation hardening stainless with high strength after aging. Corrosion resistance and tensile strength. Excellent resistance to pitting and stress corrosion.	C* .07 Cu 4.00 Mn* 1.00 Nb .30	Si* 1.0 Cr 16.0 *max
2205	2205 is a duplex stainless with general localized and stress corrosion resistance properties in addition to high strength and excellent impact toughness	C 0.03 Ni 5.5 Mn 2.00	Cr 22.0 Mo 3.0 Si 1.00

HYDRAULIC CYLINDER TUBES			
CDS	Produced from solid billet which is pierced, turned and drawn. CDS is produced to SAE 1026 for improved machinability on sizes up to and including 9.5" OD over 9.5" produced to SAE 1020		
DOM	Produced from strip and electric resistance welded, then cold drawn to size. SAE 1020 is usually used in small diameters below 10 gauge or thin wall steel tube. SAE 1026 is used for larger sizes		

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HOLLOW BAR CHART

EURO-NORM EN10294-1 OVAKO HOLLOW BAR GUARANTEED CLEAN TURNED SIZE*

Euro-Norm Size CTS	Delivered size OD	Approx Kg/Metre	Euro-Norm Size CTS	Delivered size OD	Approx Kg/Metre	Euro-Norm Size CTS	Delivered size OD	Approx Kg/Metre	Euro-Norm Size CTS	Delivered size OD	Approx Kg/Metre
30 / 20	31.0	18.7	4.23	95 / 80	96.6	77.1	20.88	140 / 110	141.9	106.3	54.48
35 / 25	36.0	23.7	5.10	100 / 50	101.6	45.5	50.88	140 / 115		111.6	47.36
40 / 20	40.5	19.25	8.16	100 / 55		50.8	47.73	145 / 90	147.0	85.0	88.68
40 / 30	41.0	28.7	5.97	100 / 60		56.0	44.31	145 / 120		116.6	49.41
45 / 25	45.5	24.25	9.54	100 / 65		61.3	40.48	150 / 80	152.0	74.2	108.50
45 / 30	45.5	29.25	7.94	100 / 70		66.5	36.38	150 / 85		79.4	103.58
45 / 35	46.0	33.7	6.84	100 / 75		71.8	31.86	150 / 90		84.7	98.21
50 / 25	51.0	24.25	12.82	100 / 80		77.1	26.99	150 / 100		95.2	86.57
50 / 30	50.5	29.25	10.92	100 / 85		82.1	22.09	150 / 105		100.5	80.17
50 / 35	51.4	32.3	9.86	105 / 55	106.7	50.5	54.47	150 / 110		105.7	73.56
50 / 40	51.0	38.7	7.71	105 / 60		54.9	51.61	150 / 120		116.3	59.05
55 / 35	56.4	32.3	13.18	105 / 65		61.0	47.25	150 / 125		121.5	51.43
55 / 40		37.3	11.03	105 / 70		66.3	43.09	155 / 90	157.1	84.4	108.25
55 / 45		42.3	8.58	105 / 73		69.9	40.07	155 / 100		94.9	96.64
60 / 30	61.4	26.8	18.82	105 / 80		76.8	33.83	155 / 125		121.2	61.60
60 / 35		32.0	16.93	105 / 85		82.0	28.74	155 / 130		126.5	53.50
60 / 40		37.3	14.67	105 / 90		87.1	23.42	160 / 85	162.1	78.8	123.72
60 / 45		42.3	12.21	110 / 60	111.7	55.4	58.00	160 / 95		89.4	112.73
62 / 34	63.6	31.1	18.98	110 / 70		66.0	50.07	160 / 100		94.6	106.83
62 / 41		39.1	15.51	110 / 75		71.2	45.67	160 / 105		99.9	100.47
62 / 51		48.9	10.20	110 / 80		76.5	40.84	160 / 110		105.2	93.77
65 / 35	66.4	31.7	20.99	110 / 85		81.8	35.67	160 / 115		110.4	86.86
65 / 40		37.0	18.74	110 / 90		87.0	30.26	160 / 120		115.7	79.47
65 / 45		42.3	16.15	110 / 95		92.1	24.63	160 / 125		120.9	71.89
65 / 50		47.3	13.39	111 / 66	112.7	61.9	54.69	160 / 130		126.2	63.81
70 / 35	71.4	31.5	25.31	115 / 60	116.7	55.1	65.25	160 / 135		131.5	55.39
70 / 38		35.0	24.05	115 / 65		60.4	61.47	165 / 100	167.1	94.3	117.33
70 / 40		36.7	23.13	115 / 70		65.7	57.35	165 / 110		104.9	104.31
70 / 45		42.0	20.56	115 / 80		76.2	48.17	165 / 120		115.4	90.05
70 / 47		44.0	19.67	115 / 90		86.7	37.62	165 / 130		125.9	74.43
70 / 50		47.2	17.70	115 / 95		92.0	31.78	170 / 95	172.2	88.8	134.20
70 / 55		52.3	14.57	117 / 66	118.8	61.9	63.39	170 / 105		99.3	122.03
70 / 57		54.8	13.09	117 / 74		69.9	56.89	170 / 110		104.6	115.36
72 / 46		43.0	22.36	117 / 82		78.9	48.63	170 / 115		109.8	106.49
75 / 40	76.4	36.4	27.82	**	118.6	50.0	71.30	170 / 120		115.1	101.14
75 / 45		41.7	25.27	120 / 65	121.8	60.1	69.20	170 / 125		120.4	93.45
75 / 50		47.0	22.37	120 / 70		65.4	65.09	170 / 130		125.6	85.56
75 / 55		52.2	19.19	120 / 80		75.9	55.95	170 / 135		130.9	77.18
75 / 60		57.2	15.81	120 / 90		86.4	45.44	170 / 140		136.1	68.62
80 / 40	81.5	36.1	32.92	120 / 100		97.0	33.45	170 / 145		141.4	59.55
80 / 45		41.4	30.38	125 / 75	126.8	70.4	68.57	180 / 105	182.3	98.7	144.84
80 / 50		46.7	27.51	125 / 85		80.9	58.78	180 / 120		114.5	124.07
80 / 55		51.9	24.34	125 / 95		91.4	47.62	180 / 130		125.0	108.56
80 / 60		57.2	20.78	125 / 100		96.7	41.48	180 / 140		135.6	91.53
80 / 65		62.2	17.10	125 / 105		101.9	35.11	180 / 145		140.8	82.67
84 / 47	85.7	44.0	33.35	125 / 110		105.7	30.25	180 / 150		146.1	73.29
84 / 52		48.9	30.54	130 / 70	131.9	64.8	81.37	180 / 155		151.4	63.57
85 / 45	86.5	41.1	35.72	130 / 75		70.1	76.97	180 / 160		153.6	59.44
85 / 50		46.4	32.86	130 / 80		75.3	72.30	**	180.9	70.0	171.60
85 / 55		51.6	29.72	130 / 85		80.6	67.21	190 / 130	192.3	124.5	132.43
85 / 60		56.9	26.17	130 / 90		85.8	61.88	190 / 140		135.0	115.63
85 / 65		62.2	22.28	130 / 95		91.1	56.10	190 / 145		140.2	106.80
85 / 70		67.2	18.29	130 / 100		96.4	49.97	190 / 150		145.5	97.47
89 / 52	90.7	49.0	35.92	130 / 105		101.6	43.62	190 / 160		156.0	77.95
90 / 50	91.5	46.1	38.52	130 / 110		106.9	36.81	190 / 165		161.3	67.58
90 / 55		51.3	35.39	**	132.7	55.0	90.00	200 / 135	202.4	129.1	149.81
90 / 60		56.6	31.87	135 / 80	136.9	75.0	80.87	200 / 140		134.4	141.20
90 / 65		61.9	27.99	135 / 90		85.6	70.37	200 / 150		144.9	123.12
90 / 70		67.1	23.86	135 / 100		96.1	58.61	200 / 160		155.5	103.49
90 / 75		72.2	19.48	135 / 110		106.6	45.49	200 / 170		166.0	82.68
94 / 53	95.8	49.0	41.78	139 / 84	140.9	78.9	84.02	200 / 180	203.2	173.2	69.80
95 / 50	96.6	45.8	44.60	140 / 75	141.9	69.5	94.36	210 / 130	212.5	123.3	184.67
95 / 55		51.0	41.50	140 / 80		74.7	89.74	210 / 135		128.6	176.44
95 / 60		56.3	37.99	140 / 90		85.3	79.28	210 / 140		133.8	168.03
95 / 65		61.6	34.14	140 / 95		90.5	73.65	210 / 145		139.1	159.11
95 / 70		66.8	30.02	140 / 100		95.8	67.56	210 / 150		144.3	150.03
95 / 75		72.1	25.48	140 / 105		101.1	61.13	210 / 155		149.6	140.42

20MnV6 HOLLOW BAR

Nominal size delivered	Approx Kg/Metre	Nominal size delivered	Approx Kg/Metre
254 / 154	266.00	356 / 276	319.00
254 / 174	220.00	356 / 286	292.00
254 / 182	205.00	356 / 296	248.00
254 / 204	145.00	356 / 306	210.00
267 / 187	230.00	368 / 248	467.00
273 / 173	283.00	368 / 258	437.00
273 / 183	268.00	368 / 268	403.00
273 / 193	237.00	371 / 301	307.00
273 / 201	223.00	406 / 286	527.00
273 / 209	208.00	406 / 306	451.00
273 / 213	185.00	406 / 316	420.00
273 / 223	158.00	406 / 326	371.00
273 / 248	85.00	406 / 346	286.00
292 / 165	368.00	406 / 356	242.00
295 / 250	160.00	419 / 279	619.00
298 / 198	315.00	419 / 299	547.00
298 / 218	262.00	419 / 309	508.00
298 / 238	205.00	419 / 319	467.00
298 / 242	197.00	430 / 310	564.00
298 / 248	174.00	457 / 317	686.00
298 / 258	141.00	457 / 327	545.00
318 / 255	245.00	457 / 357	516.00
323 / 223	346.00	457 / 377	422.00
323 / 243	287.00	457 / 407	274.00
323 / 263	224.00	508 / 368	776.00
324 / 224	348.00	508 / 388	682.00
324 / 244	288.00	508 / 408	581.00
324 / 264	224.00	510 / 410	583.00
324 / 274	189.00	557 / 434	773.00
340 / 215	440.00	585 / 401	1148.00
356 / 236	449.00	610 / 490	835.00
356 / 256	388.00	610 / 510	710.00

CHEMISTRY

	C%	Si%	Mn%	P%	S%	Cr%	Ni%	Mo%	Cu%	V%	Ca ppm	Ti ppm	O2 ppm	N ppm
OVAKO 280 COLD ROLLED	0.17	0.30	1.45	-	0.020	0.20	-	-	-	0.08	-	-	-	70
OVAKO 280 HOT ROLLED	0.20	0.45	1.60	0.03	0.035	0.30	0.30	0.10	0.30	0.12	15	30	15	150
20 Mn V6 HOT ROLLED	0.16	0.10	1.30	-	0.020	-	-	-	-	0.08	-	-	-	-
	0.22	0.35	1.60	0.03	0.040	0.30	0.30	0.08	-	0.15	-	-	-	-

DESCRIPTION

Cold rolling improves strength and machinability compared to hot rolled tubes. Cold rolling provides greater dimensional accuracy.

Hot rolled micro alloyed tubes for demanding applications. Hot rolled tubes are easy to weld and machine and can also be case hardened by carburising and quenching.

Hot rolled mechanical tube is available in larger dimensions and heavy wall thicknesses. It is fully weldable.

MECHANICAL PROPERTIES

YIELD STRESS Min. Mpa	U.T.S Min. Mpa	ELONGATION %
740	760	10
≥25 500	670	20
>25 470	640	20
<30 430	550	18
<40 420	550	18
<50 410	550	18
<70 400	550	18

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*The guaranteed clean turned size for the Ovakos range is applicable for finished lengths of 2.5 x OD up to 200mm diameter. For sizes with a diameter greater than 200mm, the guaranteed clean turned size is applicable for lengths up to 200mm.

Global Metals Pty Ltd will not accept any responsibility for any loss or other damage to any person or company as a result of the use of information contained herein.

Note the weights shown are approximate and are intended as a guide only. The sizes shown are indicative of the complete range manufactured. Some sizes may not be stocked and subject to a mill order.

** No Euro-norm size available.



CASE HARDENING STEEL SUMMARY OF GRADES

GRADE TO AS1444-2007	CHEMICAL COMPOSITION							
	C%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%

8620	0.18	0.10	0.70	-	-	0.40	0.15	0.40
	0.23	0.35	0.90	0.04	0.04	0.60	0.25	0.70

TYPICAL APPLICATIONS

Low Case hardening steel with strict analytical limits for production case hardened parts such as automotive gears and bearing races.

8620H	0.17	0.10	0.60	-	-	0.35	0.15	0.35
	0.23	0.35	0.95	0.04	0.04	0.65	0.25	0.75

TYPICAL APPLICATIONS

Same as 8620. The "H" guarantees hardenability.

EN36A (655M13)	0.10	0.10	0.35	-	-	0.70	-	3.00
	0.16	0.35	0.60	0.04	0.04	1.00	-	3.75

TYPICAL APPLICATIONS

An excellent general purpose case hardening steel combining good toughness of core and high case hardness after carburising and quenching. Jobbing gears, mining equipment, pins and bushes.

1.6587 (17&18CrNiMo6)	0.15	0.10	0.40	-	-	1.50	0.25	1.40
	0.20	0.35	0.60	0.04	0.04	1.80	0.35	1.70

TYPICAL APPLICATIONS

Similar applications to X3312 (EN36A) and is especially suited to larger gears requiring deep case depths.

EN39B	0.12	0.10	0.25	-	-	1.00	0.15	3.90
	0.18	0.35	0.50	0.04	0.04	1.40	0.30	4.30

TYPICAL APPLICATIONS

A high core strength case hardening steel. Used for highly stressed gears, pins and axles.

HIGH TENSILE STEEL SUMMARY OF GRADES

Grade AISI/AST M A276	CHEMICAL COMPOSITION									MECHANICAL PROPERTIES	
	C%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%	N	Ultimate Tensile Strength <small>*Limiting ruling section applies on diameter</small>	Hardness

4140	0.38	0.10	0.75	-	-	0.80	0.15	-	-	850-1000 Mpa	248-302 Bhn
	0.43	0.35	1.00	0.04	0.04	1.10	0.25	-	0.10		

TYPICAL APPLICATIONS

General purpose high tensile construction steel. Used for shafts, axles, studs and bolts, large gears and light duty form rolls.

4340	0.38	0.10	0.60	-	-	0.70	0.20	1.65	-	930-1080 Mpa	269-331 Bhn
	0.43	0.35	0.80	0.04	0.04	0.90	0.30	2.00	0.10		

TYPICAL APPLICATIONS

Similar applications to 4140 but has the advantage of higher tensile strength, particularly in the heavy sections above 150mm.

EN25	0.27	0.10	0.45	-	-	0.50	0.45	2.30	-	930-1080 Mpa	269-321 Bhn
	0.35	0.35	0.70	0.04	0.04	0.80	0.65	2.80	0.10		

TYPICAL APPLICATIONS

Suitable for high tensile applications where freedom from temper brittleness is necessary. Heavy drive shafts axles and gears.

EN26	0.36	0.10	0.45	-	-	0.50	0.45	2.30	-	1080-1230 Mpa	311-375 Bhn
	0.44	0.35	0.70	0.04	0.04	0.80	0.65	2.80	0.10		

TYPICAL APPLICATIONS

Similar to X9931, however, has higher carbon content. Suitable where high surface pressure exists. Gears axles and pinions.

DESCRIPTION

Alloy high tensile steels are primarily stocked in the hardened and tempered condition. The steels listed are in approximate order of increasing tensile strength in the sizes stocked. When selecting a high tensile steel, care must be given to the relevant ruling section for each grade. The tensile strength of each grade is generally reduced as diameter increases and lower tensiles are normal beyond quoted maximum ruling sections.

BRIGHT MILD STEEL SUMMARY OF GRADES

Grade AISI/ASTM A276	CHEMICAL COMPOSITION LIMITS PERCENT						APPROXIMATE MINIMUM MECHANICAL PROPERTIES							
							COLD DRAWN						TURNED & POLISHED	
							TENSILE MPa (N/mm ²)			ELONGATION % 5.65 √So			TENSILE MPa (N/mm ²) TO 260	ELONG'N % 5.65 √So
	C	Si	Mn	S	P	Pb	mm under 16	mm 16-38	mm 38-63	mm under 16	mm 16-38	mm 38-63		

1004	-	0.10	0.25	-	-	-	MECHANICAL PROPERTIES NOT USUALLY REQUIRED (This grade is not included in AS1442)							
	0.06	0.35	0.50	0.04	0.04	-								

DESCRIPTION & TYPICAL APPLICATIONS

Low carbon steel with an excellent surface finish after cold rolling.

1020	0.15	-	0.30	-	-	-	480	460	430	12	12	13	410	22
	0.25	0.35	0.90	0.05	0.05	-								

DESCRIPTION & TYPICAL APPLICATIONS

Cold finished mild steel for machined parts 430-470 MPa. It can be case hardened, and welds readily.

1030	0.25	-	0.30	-	-	-	560	540	520	10	11	12	500	20
	0.35	0.35	0.90	0.05	0.05	-								

DESCRIPTION & TYPICAL APPLICATIONS

Cold finished medium tensile steel for machined parts, shafts and medium stressed parts. Can be welded.

1040	0.35	-	0.40	-	-	-	650	610	600	8	9	10	540	16
	0.45	0.35	0.90	0.05	0.05	-								

DESCRIPTION & TYPICAL APPLICATIONS

Medium tensile steel for shafts and studs requiring a 620 MPa tensile. Steel responds to heat treatment.

1045	0.43	0.10	0.60	-	-	-	690	650	640	8	8	9	600	14
	0.50	0.35	0.90	0.04	0.04	-								

DESCRIPTION & TYPICAL APPLICATIONS

Similar applications to 1040, steel is suitable for flame or induction heating. Steel can be welded with precautions.

1214	-	-	0.80	0.25	0.04	-	480	430	400	7	8	9	370	17
	0.15	0.10	1.20	0.35	0.09	-								

DESCRIPTION & TYPICAL APPLICATIONS

A resulphurised steel for enhanced machinability. Used for fine machining work or parts requiring high cutting rates. Welding produces a low strength result.

12L14	-	-	0.80	0.25	0.04	0.15	480	430	400	7	8	9	370	17
	0.15	0.10	1.20	0.35	0.09	0.35								

DESCRIPTION & TYPICAL APPLICATIONS

Lead has been added to 1214 Grade to create the highest machinability and is suitable for high volume and high speed machining.

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BLACK CARBON STEEL SUMMARY OF GRADES

Grade Reference AS 1442	CHEMICAL COMPOSITION					
		C%	Si%	Mn%	P%	S%

1020	Min.	0.18	0.10	0.30	-	-
	Max.	0.23	0.35	0.60	0.04	0.04

TYPICAL APPLICATIONS

General purpose low tensile, low hardenability carbon steel supplied in the black hot rolled condition.
Good machinability with reasonable strength, ductility and weldability.

1045	Min.	0.43	0.10	0.60	-	-
	Max.	0.50	0.35	0.90	0.04	0.04

TYPICAL APPLICATIONS

1045 is a medium tensile, low hardenability carbon steel generally supplied in the black hot rolled condition. Used in engineering applications when better strength and impact properties than 1020 is a requirement and higher strength of the low alloy high tensile steels is not required. Typical tensile strength range 570 - 700MPa and Brinell hardness range 170 - 210 in either condition. Can be flame or induction hardened.

CROMAX® SUMMARY OF GRADES

GRADE	CHEMICAL COMPOSITION %										MECHANICAL PROPERTIES				
	C	Si	Mn	P	S	Cr	Mo	Ni	V	Ce	Size mm	Yield MPa	U.T.S MPa Min.	Elong'n % min:	Hardness Brinell Max.

Cromax 280X	0.17	0.30	1.45	-	0.02	0.20	-	-	-	-	<20	520	650-800	12	200-240
	0.20	0.45	1.60	0.03	0.035	0.30	0.10	0.30	0.12	0.55 max	20-90	520	650-800	19	200-240
											>90	440	550-700	19	180-230

DESCRIPTION & TYPICAL APPLICATIONS

Chrome plated (20um min) micro alloyed low carbon steel. It combines a unique combination of high yield strength with good machinability and weldability.

Cromax 42CrMo4 (4140)	0.45	0.40	0.90	0.025	0.02	1.20	0.30	-	-	-	<40	750	1000-1200	11	295-355
	0.45	0.40	0.90	0.025	0.02	1.20	0.30	-	-	-	40-95	650	900-1100	12	265-325
											>95	550	800-950	13	235-295

DESCRIPTION & TYPICAL APPLICATIONS

Chrome plated (20um min) hardened and tempered high tensile base steel. Used when elevated strength is required in combination with high toughness.

Cromax 482IH	0.34	0.15	1.20	0.025	0.015	-	-	-	0.08	0.01	ALL	580	850-1000	14	250-300
	0.41	0.80	1.60	0.025	0.02	0.30	0.08	-	0.15	0.72					

DESCRIPTION & TYPICAL APPLICATIONS

Induction hardened based on a modern micro alloyed steel, which is characterised by high strength in the as rolled condition. The addition of an induction hardened layer makes this grade an ideal selection for heavy duty piston rods.

HOLLOW BAR SUMMARY OF GRADES

GRADE	CHEMICAL COMPOSITION LIMITS %											MECHANICAL PROPERTIES				
		C %	Si %	Mn %	P	S	Cr	Mo	Ni	V	Ce	Tensile Strength >25mm Mpa Min	Yield Strength >25mm Mpa Min.	Elonga- tion A5 min. %	Hard- ness approx. HB	Impact Strength min at +20 C J

OVAKO 280	Min.	0.17	0.30	1.45	-	0.02	0.20	-	-	-	0.08	640	470	20	220	27
	Max.	0.20	0.45	1.60	0.03	0.035	0.30	0.30	0.10	0.30	0.12					

DESCRIPTION & TYPICAL APPLICATIONS

Ovako 280 is equivalent to 20MnV6 carbon steel that has been micro alloyed and specially balanced to improve yield strength and ultimate tensile strength, yet maintaining good machinability and weldability.

20MnV6 (HR Cond.)	Min	0.16	0.10	1.30	-	0.02	-	-	-	-	0.08	550	430	18	180	-
	Max	0.22	0.35	1.60	0.03	0.04	-	-	-	-	0.15					

DESCRIPTION & TYPICAL APPLICATIONS

20MnV6 is a carbon-manganese steel micro alloyed with vanadium, generally supplied in the black hot rolled condition.

4140 (H&T)	Min	0.38	0.15	0.75	-	-	0.80	-	0.15	-	-	1000	900	16	300	-
	Max	0.43	0.40	1.00	0.04	0.04	1.10	-	0.25	-	-					

DESCRIPTION & TYPICAL APPLICATIONS

4140 is a steel for quenching and tempering, which has a good combination of strength and toughness. For general purpose use. 4140 has a restrictive weldability.

OVAKO 495	Min	0.47	0.20	0.75	-	0.013	1.00	0.43	0.93	-	0.11	-	-	-	-	-
	Max	0.50	0.30	0.85	0.15	0.020	1.20	0.50	1.00	-	0.15					

DESCRIPTION & TYPICAL APPLICATIONS

Ovako 495 is a high strength quench and tempering steel with high wear resistance, good toughness and good dimensional stability. The steel can be tempered at high temperatures and it is microalloyed to obtain a precipitation hardening effect.

STAINLESS STEEL SUMMARY OF GRADES

Grade AISI/AST M A276	CHEMICAL COMPOSITION LIMITS PERCENT										TYPICAL MECHANICAL PROPERTIES			
		C	Si	Mn	Ni	Cr	Mo	P	S	N	Yield MPa Min.	U.T.S MPa Min.	Elong'n % in 50mm Min.	Hard- ness Brinell Max.

304	Min.	-	-	-	8.00	18.00	-	-	-	-	205	515	40	195
	Max.	0.08	1.00	2.00	11.00	20.00	-	0.045	0.03	0.10				

DESCRIPTION & TYPICAL APPLICATIONS

304 is a general purpose 18/8 stainless steel with good strength and good atmospheric corrosion resistance. Most versatile and widely used of the 300 series. Used for food processing, architectural trim, brewing and oil refinery equipment.

304L	Min.	-	-	-	8.00	18.00	-	-	-	-	170	485	30	195
	Max.	0.03	1.00	2.00	12.00	20.00	-	0.045	0.03	0.10				

DESCRIPTION & TYPICAL APPLICATIONS

304L is a low carbon variant of 304. It is more suitable for welding.

316	Min.	-	-	-	10.00	16.00	2.00	-	-	-	205	515	40	195
	Max.	0.08	1.00	2.00	14.00	18.00	3.00	0.045	0.03	0.10				

DESCRIPTION & TYPICAL APPLICATIONS

An enhanced 18/8 stainless with 2-4% molybdenum for improved corrosion resistance. 316 contains higher levels of nickel and molybdenum improving its corrosion or pitting resistance values over 304.

316L	Min.	-	-	-	10.00	16.00	2.00	-	-	-	170	485	40	195
	Max.	0.03	1.00	2.00	14.00	18.00	3.00	0.045	0.03	0.10				

DESCRIPTION & TYPICAL APPLICATIONS

316L is a low carbon variant of 316. More suitable for welding.

NOTE

In many cases these grades with a low carbon content are supplied as dual specification, i.e. 304/304L.

STAINLESS STEEL SUMMARY OF GRADES CONT.

Grade AISI/ASTM A276	CHEMICAL COMPOSITION LIMITS PERCENT											TYPICAL MECHANICAL PROPERTIES			
		C	Si	Mn	Ni	Cr	Cu	P	S	N	Nb + Ta	Yield MPa	U.T.S MPa Min.	Elong'n % in 50mm Min.	Hardness Brinell Max.

420	Min.	-	-	-	-	12.00	-	-	-	-	-	600	850	12	280 max
	Max.	0.15	1.00	1.00	-	14.00	-	0.04	0.03	-	-				

DESCRIPTION & TYPICAL APPLICATIONS

A martensitic 12% chromium stainless steel that can be hardened to 500 Brinell. Used in mildly corrosive conditions. Applications include moulds for PVC, pump, valve parts.

431 Cond. T	Min.	0.12	-	-	1.25	15.00	-	-	-	-	-	665	850	12	302 max
	Max.	0.20	1.00	1.00	2.50	17.00	-	0.04	0.03	-	-				

DESCRIPTION & TYPICAL APPLICATIONS

Usually supplied prehardened and tempered. It has superior corrosion resistance compared to 12% chromium martensitic stainless steel. Used for high tensile shafts, submersible pump shafts and valve parts.

630 Cond. (PH580)	Min.	-	-	-	3.00	15.00	3.00	-	-	3.00	0.15	860	1000	13	311 max
	Max.	0.07	1.00	1.00	5.00	17.50	5.00	0.04	0.03	-	0.45				

DESCRIPTION & TYPICAL APPLICATIONS

A precipitation hardening grade (17-4PH) capable of obtaining a wide range of mechanical properties, depending on ageing temperature selected. Corrosion resistance is similar to 304 grade.

HARDNESS CONVERSION CHART*

Rockwell 'C' Scale	Diamond Pyramid Scale HV10 HV30	Brinell		Tensile Stress Equivalents				Scler Scope Hard- ness Number	Rockwell		Diamond Pyramid Scale HV10 HV30
		Dia. Imp. for 10mm Ball	Carbide Ball	Tons/in2	1000lb/ in2	kg/mm2	MPa (N/mm2)		'A' scale	'C' scale	
67.7	900							96	85.6	67.7	900
67	880							95	85	67	880
66.3	860							93	84.7	66.3	860
65.5	840							92	84.2	65.5	840
64.8	820							90	83.8	64.8	820
64	800							88	83.4	64	800
63.3	780							87	83	63.3	780
62.5	760							86	82.6	62.5	760
61.7	740							84	82.2	61.7	740
61	725	2.44	630	-	-	-	-	82	81.8	61	725
60.5	710	2.45	627	-	-	-	-	-	81.5	60.5	710
60	698	2.5	601	132	295	208	2039	81	81.2	60	698
58.9	670	2.55	578	127	284	200	1961	78	80.6	58.9	670
57.1	630	2.6	555	122	273	192	1884	75	79.6	57.1	630
56.1	609	2.65	534	117	262	184	1807	73	79	56.1	609
54.4	572	2.7	514	112	250	176	1729	71	78.2	54.4	572
51.9	532	2.75	495	108	241	170	1668	68	76.9	51.9	532
50.7	517	2.8	477	105	235	165	1621	66	76.3	50.7	517
49.5	497	2.85	461	101	226	160	1559	64	75.5	49.5	497
47.5	470	2.9	444	98	219	155	1513	62	74.2	47.5	470
46	452	2.95	429	95	212	150	1467	60	73.5	46	452
44.8	437	3	415	92	206	145	1420	58	73	44.8	437
43.7	422	3.05	401	88	197	139	1359	56	72.5	43.7	422
42.4	408	3.1	388	85	190	134	1312	54	71.5	42.4	408
41.3	395	3.15	375	82	183	129	1266	52	71	41.3	395
39.9	381	3.2	363	80	179	126	1235	51	70.3	39.9	381
38.8	370	3.25	352	77	172	121	1189	49	69.8	38.8	370
37.7	359	3.3	341	75	168	118	1158	48	69.2	37.7	359
36.7	349	3.35	331	73	163	114	1127	46	68.8	36.7	349
35	337	3.4	321	71	159	111	1096	45	68	35	337
34	327	3.45	311	68	152	107	1050	43	67.5	34	327
33	318	3.5	302	66	147	104	1019	42	66.8	33	318
32	308	3.55	293	64	143	101	988	41	66.2	32	308
30.9	300	3.6	285	63	141	99	973	40	65.7	30.9	300
29.8	292	3.65	277	61	136	96	942	38	65.2	29.8	292
29	284	3.7	269	59	132	93	911	37	64.6	29	284
27.5	275	3.75	262	58	130	91	895	36	64	27.5	275
26.6	269	3.8	255	56	125	89	865	35	63.6	26.6	269
25.2	261	3.85	248	55	123	87	849	34	62.9	25.2	261
24.3	255	3.9	241	53	118	84	818	33	62.6	24.3	255
23	247	3.95	235	51	114	81	787	32	62	23	247
22	241	4	229	50	112	79	772	31	61.6	22	241
20.8	234	4.05	223	49	110	77	756	30	60.7	20.8	234
-	228	4.1	217	48	107	76	741	-	-	-	228

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HARDNESS CONVERSION CHART* CONT.

Rockwell 'C' Scale	Diamond Pyramid Scale HV10 HV30	Brinell		Tensile Stress Equivalents				Scler Scope Hard- ness Number	Rockwell		Diamond Pyramid Scale HV10 HV30
		Dia. Imp. for 10mm Ball	Carbide Ball	Tons/in2	1000lb/ in2	kg/mm2	MPa (N/mm2)		'A' scale	'C' scale	

Hardness 'B' Scale										Hardness 'B' Scale	
98	222	4.15	212	46	103	73	710	29	-	98	222
97	218	4.2	207	45	101	71	695	28	-	97	218
96	212	4.3	197	43	97	68	664	27	-	96	212
93	196	4.4	187	41	92	65	632	25	-	93	196
91	188	4.5	179	39	88	62	602	-	-	91	188
88.5	178	4.6	170	36	81	57	556	24	-	88.5	178
86	171	4.7	163	35	78	55	540	-	-	86	171
84.2	163	4.8	156	34	76	54	525	23	-	84.2	163
82	156	4.9	149	32	72	51	494	-	-	82	156
80	150	5	143	3t	69	49	479	22	-	80	150
77	143	5.1	137	30	67	48	463	21	-	77	143
75	137	5.2	131	29.5	66	47	455	20.5	-	75	137
72.5	132	5.3	126	29	65	46	448	20	-	72.5	132
70	127	5.4	121	28	63	44	432	-	-	70	127
67	122	5.5	116	26	58	42	401	15	-	67	122

COMPARISON OF HARDNESS SCALES APPROX. ** AND TENSILE STRESS EQUIVALENTS APPROX.
(MAXIMUM VALUE) IN IMPERIAL AND METRIC UNITS.

* These charts were prepared using information contained in B.S.860/1967. This standard differs significantly from the superseded standard B.S. 860/1939, and differs slightly from the conversion scales adopted by SAE and ASTM sources.

** Where hardness acceptance values are specified and a conversion from one scale to another is necessary the source of the conversion data should be stated and understood by the parties involved.

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ISO TOLERANCES

THE TOLERANCES SHOWN BELOW ARE NORMALLY APPLIED TO METRIC SIZES DRAWN, TURNED & GROUND FINISH BRIGHT STEEL BARS

ISO h-TOLERANCES					
THE TOTAL TOLERANCE IS TAKEN AS PLUS ZERO, MINUS THE FOLLOWING;					
Nominal Sizes in mm	h7	h8	h9	h10	h11
> 1 to 3	0.010	0.014	0.025	0.040	0.060
> 3 to 6	0.012	0.018	0.030	0.048	0.075
> 6 to 10	0.015	0.022	0.036	0.058	0.090
> 10 to 18	0.018	0.027	0.043	0.070	0.110
> 18 to 30	0.021	0.033	0.052	0.084	0.130
> 30 to 50	0.025	0.039	0.062	0.100	0.130
> 50 to 80	0.030	0.046	0.074	0.120	0.190
> 80 to 120	0.035	0.054	0.087	0.140	0.220
> 120 to 180	0.040	0.063	0.100	0.160	0.250
> 180 to 250	0.046	0.072	0.115	0.185	0.290
> 250 to 315	0.052	0.081	0.130	0.210	0.320

ISO k-TOLERANCES					
THE TOTAL TOLERANCE IS TAKEN AS MINUS ZERO, PLUS THE FOLLOWING;					
Nominal Sizes in mm	k8	k9	k10	k11	k12
> 1 to 3	0.014	0.025	0.040	0.060	0.100
> 3 to 6	0.018	0.030	0.048	0.075	0.120
> 6 to 10	0.022	0.036	0.058	0.090	0.150
> 10 to 18	0.027	0.043	0.070	0.110	0.180
> 18 to 30	0.033	0.052	0.084	0.130	0.210
> 30 to 50	0.039	0.062	0.100	0.160	0.250
> 50 to 80	0.046	0.074	0.120	0.190	0.300
> 80 to 120	0.054	0.087	0.140	0.220	0.350
> 120 to 180	0.063	0.100	0.160	0.250	0.400
> 180 to 250	0.072	0.115	0.185	0.290	0.460
> 250 to 315	0.081	0.130	0.210	0.320	0.520

TENSILE RANGE DESIGNATIONS

FOR QUENCHED & TEMPERED HIGH TENSILE STEELS

Mechanical property designation	Tensile strength MPa	
R	≥ 700	≤ 850
S	≥ 770	≤ 930
T	≥ 850	≤ 1000
U	≥ 930	≤ 1080
V	≥ 1000	≤ 1150
W	≥ 1080	≤ 1230
X	≥ 1150	≤ 1300
Y	≥ 1230	≤ 1380
Z	≥ 1550	

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RECOMMENDED MACHINING ALLOWANCES

In selecting a feed stock bar size, it is recommended that the following allowances be added to the finish part size. Recommendations are for part lengths 4 times to diameter ratio. Longer components may require larger amounts of machining allowance.

BLACK BARS	HOT FINISHED
Feed Stock Sizes mm	Minimum allowance on diameter

	≤ 16	0.80
> 16	≤ 22	1.10
> 22	≤ 24	1.15
> 24	≤ 27	1.25
> 27	≤ 30	1.40
> 30	≤ 36	1.50
> 36	≤ 39	1.70
> 39	≤ 50	2.10
> 50	≤ 65	2.60
> 65	≤ 75	3.60
> 75	≤ 130	6.40
> 130	≤ 215	9.50
> 215	≤ 300	12.0
> 300	≤ 400	15.0
> 400	≤ 550	20.0

COLD SIZED BARS	
Feed stock sizes mm	Minimum allowance on diameter

	≤ 20	0.55
> 20	≤ 25	0.60
> 25	≤ 30	0.70
> 30	≤ 35	0.75
> 35	≤ 40	0.85
> 40	≤ 50	1.10
> 50	≤ 70	1.30

PEELED BARS	
Feed stock sizes mm	Minimum allowance on diameter

> 10	≤ 40	0.25
> 40	≤ 65	0.60
> 65	≤ 215	1.50
> 215	≤ 400	4.00
> 400	≤ 550	6.00
> 40	≤ 50	1.10
> 50	≤ 70	1.30

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