

### Tool steels

Alloy	Chemical composition							
	C %	Mn %	Si %	Cr %	Mo %	W %	V %	Other %
CA-2	0.95-1.05	0.75	1.50	4.75-5.50	0.90-1.40	-	0.20-0.50	
CA-6	0.65-0.75	1.80-2.20	1.00	0.80-1.20	0.80-1.30	-	-	
CD-2	1.40-1.60	1.00	1.50	11.0-13.0	0.70-1.20	-	0.40-1.00	
CD-3	2.10-2.30	0.75	1.00	11.5-13.0	0.40	-	-	
CD-6	2.10-2.35	0.75	0.80-1.20	11.5-13.0	0.40	0.80-1.20	-	
CD-7	2.15-2.45	0.75	1.00	11.5-13.0	0.80-1.20	-	3.50-4.50	
CH-11	0.30-0.40	0.75	0.95-1.15	4.6-5.4	1.20-1.60	-	0.30-0.50	
CH-12	0.30-0.40	0.75	1.50	4.75-5.75	1.25-1.75	1.00-1.70	0.20-0.50	
CH-13	0.30-0.42	0.75	1.50	4.75-5.75	1.25-1.75	-	0.75-1.20	
CL-6	0.65-0.75	0.75	1.00	0.80-1.0	-	-	-	Ni:1.50-1.90
CI-M-2	0.95-1.05	0.75	1.00	3.75-4.50	4.50-5.50	5.50-6.75	1.75-2.20	Ni:0.25
CM-2	0.78-0.88	0.75	1.00	3.75-4.50	4.50-5.50	5.50-6.75	1.25-2.20	Ni:0.25
CM-4	1.25-1.35	0.75	1.00	3.75-4.50	4.50-5.50	5.20-6.20	3.60-4.40	
CM-42	1.00-1.20	0.75	1.00	3.50-4.25	9.00-10.00	1.25-1.75	0.95-1.35	Co:7.50-8.50
CM-43	1.15-1.35	0.75	1.00	3.50-4.25	8.25-9.25	1.50-2.00	1.50-2.00	Co:7.75-8.75
CO-1	0.85-1.00	1.00-1.30	1.50	0.40-1.00	-	0.40-0.60	0.30	
CO-2	0.85-0.95	1.50-1.80	1.00	0.40	0.30	-	0.30	
CO-7	1.10-1.20	0.75	1.00	0.50-0.70	-	1.65-1.85	0.15-0.25	
CS-1	0.45-0.55	0.75	1.00	1.35-1.65	-	2.35-2.65	-	
CS-2	0.45-0.55	0.75	0.90-1.20	-	0.40-0.60	-	0.30	
CS-4	0.50-0.60	0.70-0.90	1.80-2.20	0.30	-	-	0.30	
CS-5	0.50-0.65	0.60-1.00	1.75-2.25	0.35	0.20-0.80	-	0.35	
CS-7	0.50-0.60	0.50-0.80	1.00	3.00-3.50	1.20-1.60	-	-	
CT-1	0.65-0.75	0.75	1.00	3.75-4.50	-	17.25-18.75	0.90-1.30	
CT-2	0.80-0.90	0.75	1.00	3.75-4.50	1.00	17.50-19.00	1.80-2.40	
CT-6	0.75-0.85	0.75	1.00	4-4.75	0.70-1.00	18.50-21.25	1.50-2.10	Co:10.00-13.70

\*Max, unless a range is shown 0.25% S and 0.25% P max all grades

ALLOY	HARDNESS		
	Annealed with Slow Cool Max	Cycle Anneal Max	Hardened Range (Rc)
CA-2	20Rc	27Rc	47-60
CA-6	100Rb		48-59
CD-2		35Rc	50-59
CD-3		35Rc	47-61
CD-6	100Rb		50-63
CD-7	24Rc		50-63
CH-11	100Rb		46-55
CH-12	100Rb		50-53
CH-13	100Rb		45-53
CL-6	95Rb		39-60
CI-M-2		30Rc	61-63
CM-2		30Rc	61-63
CM-4	30Rc		62-64
CM-42		35Rc	60-64
CM-43	27Rc		61-64
CO-1		100Rb	45-61
CO-2		100Rb	38-60
CO-7	95Rb		35-64
CS-1		100Rb	44-57
CS-2		100Rb	44-55
CS-4	100Rb		42-53
CS-5	100Rb		37-59
CS-7		100Rb	35-57
CT-1	100Rb		60-66
CT-2	100Rb		60-66
CT-6	30Rc		60-64

Properties of separately cast test bars of Iron , Carbon and Low alloy steels

Alloy	Heat treatment Condition	Tensile strength		0.2% yield strength		%Elongation range (in=2.54cm)	Hardness range or max
		English (psia)	Metric (Mpa)	English (psia)	Metric Mpa		
<b>1.2% silicon iron</b>		50-60000	345-414	37-43000	255-296	30-35	55Rb
<b>2.5% silicon iron</b>						0	85Rb
<b>lc 1010</b>	annealed	50-60000	345-414	30-35000	207-241	30-35	50-55Rb
<b>lc 1020</b>	annealed	60-70000	414-483	40-45000	276-310	25-40	80Rb
<b>lc 1025</b>	annealed	63-73000	434-503	42-47000	290-324	25-35	80Rb
<b>lc 1030</b>	Annealed	65-75000	448-517	45-50000	310-345	20-30	75Rb
	hardened	85-150000	586-1034	60-150000	414-1034	0-15	20-50Rc
<b>lc 1035</b>	Annealed	70-80000	483-552	45-55000	310-379	20-30	80Rb
	hardened	90-150000	621-1034	85-150000	586-1034	0-15	25-52Rc
<b>lc 1045</b>	Annealed	80-90000	552-621	50-60000	345-414	20-25	100Rb
	hardened	100-180000	690-1241	90-180000	621-1241	0-10	25-57Rc
<b>lc 1050</b>	Annealed	90-110000	621-758	50-65000	345-448	20-25	100Rb
	hardened	125-180000	862-1241	100-180000	690-1241	0-10	30-60Rc
<b>lc 1060</b>	Annealed	100-120000	690-827	55-70000	379-483	12-20	25Rc
	hardened	120-200000	827-1379	100-180000	690-1241	0-5	30-60Rc
<b>lc 1090</b>	Annealed	110-150000	758-1034	70-80000	483-552	5-10	30Rc
	hardened	130-180000	896-1241	130-180000	876-1241	0-3	37-50Rc
<b>lc 2345</b>	Annealed	-	-	-	-	-	100Rb
	hardened	130-200000	896-1394	110-180000	758-1241	5-10	30-58Rc
<b>lc 3120</b>	annealed						100Rb
<b>lc 4130</b>	Annealed						100Rb
	hardened	130-170000	896-1172	100-130000	690-896	5-20	23-49Rc
<b>lc 4140</b>	Annealed						100Rb
	hardened	130-200000	876-1394	100-155000	690-1069	5-20	29-57Rc
<b>lc 4150</b>	Annealed						100Rb
	hardened	140-200000	965-1394	120-180000	827-1241	5-10	25-58Rc
<b>lc 4330</b>	Annealed						20Rc
	hardened	130-190000	876-1310	100-175000	690-1207	5-20	25-48Rc
<b>lc 4340</b>	Annealed						20Rc
	hardened	130-200000	876-1394	100-180000	690-1241	5-20	20-55Rc
<b>lc 4620</b>	Annealed						100Rb
	hardened	110-150000	758-1034	90-130000	621-896	10-20	20-32Rc
<b>lc 6120</b>	annealed						100Rb
<b>lc 6150</b>	Annealed						100Rb
	hardened	140-200000	965-1394	120-180000	827-1241	5-10	30-60Rc
<b>lc 8620</b>	Annealed						100Rb
	hardened	100-130000	690-896	80-110000	552-758	10-20	20-45Rc
<b>lc 8630</b>	Annealed						100Rb
	hardened	120-170000	827-1172	100-130000	690-896	7-20	25-50Rc
<b>lc 8640</b>	Annealed						20Rc
	hardened	130-200000	876-1394	100-180000	690-1241	5-20	30-60Rc

<b>Ic 8665</b>	Annealed	-	-	-	-	-	25Rc
	hardened	170-220000	1172-1517	140-200000	965-1394	0-10	-
<b>Ic 8730</b>	Annealed	-	-	-	-	-	100Rb
	hardened	120-170000	827-1172	110-150000	758-1034	7-20	-
<b>Ic 8740</b>	Annealed	-	-	-	-	5-10	100Rb
	hardened	140-200000	965-1394	120-180000	827-1241	-	30-60Rc
<b>Ic 52100</b>	Annealed	180-230000	-	-	-	-	25Rc
	hardened	-	1241-230000	140-180000	965-1241	1-7	30-65Rc
<b>Ic 1722AS</b>	Annealed	130-170000	876-1172	100-140000	690-1241	6-12	25Rc
	hardened	-	-	-	-	-	25-48Rc
<b>Ductile iron ferritic</b>	annealed	60-80000	414-552	40-50000	276-345	18-24	(143- 200BHN)
<b>Ductile iron pearlitic</b>	normalized	100-120000	690-830	70-80000	483-552	3-10	(243- 303BHN)