

Basic Steel

AISI No.	Chemical Composition Percent									
	C	Mn	Si	Ni	Cr	Mo	P	S	SAE	
C 1030	0.28 - 0.34	0.60 - 0.96	--	--	--	--	0.040	0.050	1030	
C 1035	0.32 - 0.38	0.60 - 0.90	--	--	--	--	0.040	0.050	1035	
C 1040	0.37 - 0.48	0.60 - 0.90	--	--	--	--	0.040	0.050	1040	
C 1045	0.43 - 0.50	0.60 - 0.90	--	--	--	--	0.040	0.050	1045	
C 1137	0.32 - 0.39	1.37 - 1.65	--	--	--	--	0.040	0.08-0.13	1137	
C 1140	0.37 - 0.44	0.70 - 1.00	--	--	--	--	0.040	0.08 - 0.13	1140	
4027	0.25 - 0.30	0.70 - 0.90	0.20 - 0.35	--	--	0.20 - 0.30	0.040	0.040	4027	
4037	0.35 - 0.40	0.70 - 0.90	0.20 - 0.35	--	--	0.20 - 0.30	0.040	0.040	4037	
4140	0.38 - 0.43	0.70 - 1.00	0.20 - 0.35	--	0.08 - 1.10	0.15 - 0.25	0.040	0.040	4140	
4320	0.17 - 0.22	0.45 - 0.65	0.20 - 0.35	1.65 - 2.00	0.40 - 0.60	0.20 - 0.30	0.040	0.040	4320	
E 4340	0.38-0.43	0.65 - 0.85	0.20 - 0.35	1.65 - 2.00	0.70 - 0.90	0.20 - 0.30	0.025	0.025	E4340	
5140	0.38 - 0.43	0.70 - 0.90	0.20 - 0.35	---	0.70 - 0.90	--	0.040	0.040	5140	
E52100	0.95 - 1.10	0.25 - 0.45	0.20 - 0.35	---	1.30 - 1.60	--	0.025	0.025	52100	

AISI Number	Chemical Composition Percent									
	C	Mn	Si	Ni	Cr	Mo	P	S	SAE	
8620	0.18 – 0.23	0.70 – 0.90	0.20 – 0.35	0.40 – 0.70	0.40 – 0.60	0.15 – 0.25	0.040	0.040	0820	
8640	0.38 – 0.43	0.75 – 1.00	0.20 – 0.35	0.40 – 0.70	0.40 – 0.60	0.15 – 0.25	0.040	0.040	8640	
8822	0.20	0.75	0.20	0.40	0.40	0.30	0.040	0.040	8822	

CARBON STEEL (ASTM)						
STEEL	TYPE GRADE	TYPICAL CHEMICAL COMPOSITION LIMITS IN %			TENSILE STRENGTH KSI	MIN.YIELD STRENGTH KSI
		CARBON	MANGANESE	SILICON		
A27	60 - 30	0.30	0.60	0.80	60MIN.	30
A36	-	0.29	0.80 - 1.20	0.15-0.40	58-80	36
A53	A	0.25	0.95 - 1.20	-	48 min.	30
	B	0.30	0.95 - 1.20	-	60 min.	35
A 106	A	0.25	0.27 - 0.93	0.10 min	48 min.	30
	B	0.30	0.29 - 1.06	0.10 min	60min	35
	C	0.35	0.29 - 1.06	0.10 min	70min	40
A 216	WCA	0.25	0.70	0.60	60 - 85	30
	WCB	0.30	1.00	0.60	70 - 95	36
	WCC	0.25	1.20	0.60	70 - 95	40
A 285	A	0.17	0.90	-	45 - 65	24
	B	0.22	0.90	-	50 - 70	27
	C	0.28	0.90	-	55 - 75	30
A 299	-	0.30	0.90 - 1.40	0.15 - 0.40	75 - 95	40
A 352	LCA	0.25	0.70	0.60	60 - 85	30

CARBON STEEL (ASTM)						
STEEL	TYPE GRADE	TYPICAL CHEMICAL COMPOSITION LIMITS IN %			TENSILE STRENGTH KSI	MIN.YIELD STRENGTH KSI
		CARBON	MANGANESE	SILICON		
	LCB	0.30	1.00	0.60	65 - 90	35
	LCC	0.25	1.20	0.60	70 - 95	40
A442	55	0.24	0.60 - 0.90	0.15-0.40	55 - 75	30
	60	0.27	0.60 - 0.90	0.15 - 0.40	60 - 80	32
A 501	-	0.26	-	-	58 min.	36
A515	55	0.28	0.90	0.15-0.40	55 - 75	30
	60	0.31	0.90	0.15-0.40	60 - 80	32
	65	0.33	0.90	0.15-0.40	65 85	35
	70	0.35	1.20	0.15 - 0.40	70 - 90	38
A516	55	0.26	0.60 - 1.20	0.15-0.40	55 - 75	30
	60	0.27	0.85 - 1.20	0.15 - 0.40	60 - 80	32
	65	0.29	0.85 - 1.20	0.15 - 0.40	65 - 85	35
	70	0.31	0.85 - 1.20	0.15 - 0.40	70 - 90	38
A 529	-	0.27	1.20	-	60 - 90	42
A537	1	0.24	0.70 - 1.60	0.15-0.50	65 - 90	45
	2	0.24	0.70 - 1.60	0.15 - 0.50	75 -100	55
A 570	30,33,36	0.24	0.90	-	49 - 55	30
	40,45,50	0.25	1.35	-	60 - 65	45
A573	58	0.23	0.60 - 0.90	0.10-0.35	58 - 71	32
	65	0.26	0.85 - 1.20	0.15-0.40	65 - 77	35
"	70	0.28	0.85 - 1.20	0.15 - 0.40	70 - 90 .	42

STANDARD CASTING SPECIFICATION								
DESIGNATION	GRADE	CHEMICAL COMPOSITION						
		C	Mn	Si	Ni	Cr	Mo	OTHERS
A 217 Martensitic Stainless Steel & Alloy casting For pressure Containing Parts suitable For HT service	WC1	0.25	0.5 - 0.8	0.6	-	-	0.45- 0.65	.
	WC4	0.20	-	-	0.7 - 1.1	0.5 . 0.8	-	-
	WC5	0.20	0.4 - 0.7	-	0.6 - 1.0	0.5 . 0.9	0.9 - 1.2	-
	WC6	0.20	0.5 - 0.8	-	-	1.0 - 1.5	0.45 - 0.65	-
	WC9	0.18.	0.4 - 0.7	-	-	2.0 - 2.75	0.90 - 1.20	.
	C5	0.20	0.4 - 0.7	6.75	-	4.0 - 6.5	0.45 - 0.65	-
	C 12	0.20	0.35-.65	1.0	-	8.0 - 10.0	0.9 - 1.20	-
	C 15	0.15	1.0	1.50	-	11.5- 14.0	0.5.	
A 295 Corrosion Resistant Fe,Cr,Fe- Cr,Ni, & Ni Base alloy Casting for	CF 8	0.08	1.5	2.0	8.0- 11.0	18.0 - 21.0	--	--
	CG -12	0.12	1.5	2.0	10.0- 13.0	20.0	23.0	--
	CF -20	0.20	1.5	2.0	8.0 - 11.0	18.0- 21.0	--	--
	CF 8M	0.08	1.5	2.0	9.0 - 12.0	18.0- 21.0	2.0-3.0	--
	CF 8C	0.08	1.5	2.0	9.0- 12.0	18.0- 21.0	--	Cb stb
	CH 20	0.20	1.5	2.0	12.0- 15.0	22.0- 26.0	--	--
	CK 20	0.20	2.0	2.0	19.0- 22.0	23.0- 27.0	--	--

LOW ALLOY STEELS (ASTM)										
Steel	Type/ Grade	CHEMICAL COMPOSITION IN %							Tensile Strength in KSI	Min Y.S. KSI
		C	Mn	Si	Cr	Ni	Mo	v		
A 202	A	0.17	1.05- 1.40	0.60- 0.90	0.35- 0.60	-	-	-	75 - 95	45-
	B	0.25	1.05- 1.40	0.60- 0.90	0.35- 0.60	-	-	-	85 - 110	47
A 203	A	0.23	0.80	0.15- 0.30	-	2.10 - 2.50	-	-	65 - 85	37
	B	0.25	0.80	0.15- 0.30	-	2.10 - 2.50	-	-	70 - 90	40
	O	0.20	0.80	0.15- 0.30	-	3.25 - 3.75	-	-	65 - 85	37
	E	0.23	0.80	0.15- 0.30	-	3.25- 3.75	-	-	70 - 90	40
A 204	A	0.25	0.90	0.15- 0.30	-	-	0.45 - 0.60	-	65 - 85	37
	B	0.27	0.90	0.15- 0.30	-	-	0.45- 0.60	-	70 - 90	40
	C	0.28	0.90	0.15- 0.30	-	-	0.45- 0.60	-	75 - 95	43
A 225	C	0.25	1.60	0.15- 0.40	-	0.40- 0.70	-	0.13- 0.18	105 -135	70
	D	0.20	1.70	0.10- 0.50	-	0.40- 0.70	-	0.10- 0.18	.75 -105	55- 60
A 242	1	0.15	1.00	-	-	-	-	Cu- 0.20 MIN	63 - 70	45- 50

LOW ALLOY STEELS (ASTM)										
Steel	Type/ Grade	CHEMICAL COMPOSITION IN %							Tensile Strength in KSI	Min Y.S. KSI
		C	Mn	Si	Cr	Ni	Mo	v		
A302	A	0.25	0.95- 1.30	0.15- 0.30	-	-	0.45- 0.60	-	75-95	45
	B	0.25	1.15- 1.50	0.15- 0.30	-	0.45- 0.60	-	-	80 - 100	50
	C	0.25	1.15- 1.50	0.15- 0.30	-	0.40- 0.70	0.45- 0.60	-	80 - 1 00	50
	D	0.25	1.15- 1.50	0.15- 0.30	-	0.70- 1.00.	0.45- 0.60	-	80 - 1 00	50
A 353	-	0.13	0.90	0.15- 0.30	-	8.50- 9.50	-	-	100 - 120	75
A 441	-	0.22	0.85- 1.25	0.30	-	-	V 0.02 min	Cu 0.20 min	60 - 70	40 - 50
A 572	42	0.21	1.35	0.30	-	-	-	Cu 0.20 mm	60 min	42
	50	0.23	1.35	0.30	-	-	-	Cu 0.20 min	65 min	50
A 633	A	0.18	1.00- 1.35	0.15- 0.50	-	-	-	Cb 0.05	65 - 85	42
A 710	A	0.07	0.40- 0.70	0.35	0.65- 0.90	0.70- 1.00	0.15- 0.25	Cu 1.00-	65 - 95	55 - 85 1.30
A 735'	-	0.06	1.20- 2.20	0.40	-	-	0.23- 0.47	Cu 0.20 - 0.35	80 - 115	65 - 80
A 736	- 0.07	0.40- 0.70	0.35	0.60- 0.90	0.70- 1.00	0.15- 0.25	-	Cu 1.00 - 1.30	72 - 1 05	55 - 75
A 737	B	0.20	1.15- 1.50	0.15- 0.50	-	-	-	Cb 0.05	70 - 90	50

CARBON CONTENT OF CARBON STEEL FOR DIFFERENT USES

CARBON RANGE %	USES OF CARBON STEEL
0.05 – 0.12	Chain, Stampings, rivets, nails, wire, pipe, welding stock, where very soft plastic steel is needed.
0.10 – 0.20	Very soft, tough steel. Structural steels, machine parts. For case hardened .machine parts, screws.
0.20 – 0.30	Better grade of machine and structural steel. Gears shafting, bars, bases, levers, etc
0.30 – 0.40	Responds to heat treatment , connecting rods, shafting crane hooks, machine parts, axles
0.40 - 0.50	Crankshafts, gear, axles, shafts and heat treated machine parts.
0.60 - 0.70	Low carbon tool steel, used where a keen edge is not necessary, but where stock strength is wanted. Drop hammer dies, set screws, locomotiv~ tyres, screw drivers.
0.70 - 0.80	Tough and hard steel, Anvil faces, band saws, hammers, wrenches, cable wire, etc
0.80 – 0.90	Punches for metal, rock drills, shear blades, cold chisels, rivet sets and lmany hand tools.
0.90 – 1.00	Used for hardness and high tensile strength, springs, high tensile wire, knives, axes, dies for all purposes.
1.00 – 1.10	Drills. taps. milling cutters, knives, etc.
1.10 -1.20	Used for all tools where hardness is a prime consideration, for example, ball bearings, cold-cutting dies, drills, wood-working tools, lathe tools, etc
1.20 – 1.30	Files, reamers, knives, tools for cutting brass and wood.
1.30 – 1.40	Used where a keen cutting edge is necessary, razors, saws, instruments and machine parts where maximum resistance to wear is needed. Boring and finishing tools.

STAINLESS STEEL

AISI NO.	CARBON	MANGANESE	SILICON	CHROMIUM	NICKEL	OTHERS
201	0.15 max.	5.5 - 7.5	1.00	16.0 - 18.0	3.5 - 5.5	N-0.25 max
202	0.15 max	7.5 - 10.0	1.00	17.0 - 19.0	4.0 - 6.0	N-0.25 max
301	0.15 max	2.0	1.00	16.0 - 18.0	6.0 - 8.0	-
302	0.15 max	2.0	1.00	17.0- 19.0	8.0 - 10.0	-
302 B	0.15 max	2.0	2.0 - 3.0	17.0- 19.0	8.0 - 10.0	-
303	0.15 max.	2.0	1.00	17.0- 19.0	8.0 - 10.0	\$-0.15 min. .
303 Se	0.15 max	2.0	1.00	17.0- 19.0	8.0 - 10.0	Se-0.15 min
304	0.08 max	2.0	1.00	18.0 - 20.0	8.0 - 12.0	-
304 L	0.03 max	2.0	1.00	18.0 - 20.0	8.0 - 12.0	-
305	0.12 max	2.0	1.00	17.0- 19.0	10.0 - 13.0	-
308	0.08 max	2.0	1.00	19.0 - 21.0	10.0 - 12.0	-
309	0.20 max	2.0	1.00	22.0 - 24.0	12.0 - 15.0	-
309 S	0.08 max	2.0	1.00	22.0 - 24.0	12.0 - 15.0	
310	0.25 max	2.0	1.5	24.0 - 26.0	19.0 - 22.0	-
310 S	0.08 max	2.0	1.50	24.0 - 26.0	19.0 - 22.0	-
314	0.25 max	2.0	1.5 - 3.0	23.0 - 26.0	19.0 - 22.0	-
316	0.08 max	2.0	1.00	16.0 -18.0	10.0 - 14.0	Mo - 2.0 - 3.0
316 L	0.03 max	2.0	1.00	16.0-18.0	10.0 - 14.0	Mo - 2.0 - 3.0

STAINLESS STEEL						
AISI NO.	CARBOM	MANGANESE	SILICON	CHROMIUM	NICKEL	OTHERS
317	0.08 max	2.0	1.00	18.0 – 20.0	11.0 - 15.0	MO - 3.0 - 4.0
317 L	0.03 max	2.0	1.0	18.0 – 20.0	1.0- 15.0	Mo - 3.0 - 4.0
321	0.08 max	2.00	1.00	17.0 – 19.0	9.0 – 12.0	Ti - 5 x C min.
347	0.08 max	2.00	1.00	17.0 – 19.0	9.0 – 13.0	Cb+ Ta-1 0 xC min.
348	0.08 max	2.00	1.00	17.0 – 19.0	9.0 – 13.0	Ta - 0.10 max.
403	0.15 max	1.00	1.00	11.5 – 13.0	-	-
405	0.08 max	1.00	1.00	11.5 – 14.5	-	Al - 1.1 - 0.3
410	0.15 max	1.00	1.00	11.5 – 13.5	-	-
414	0.15 max	1.00	1.00	11.5 – 13.5	1.25 - 2.50	-
416	0.15 max	1.25	1.00	12.0- 14.0	-	S - 0.15 min.
416 Se	0.15max	1.25	1.00	12.0- 14.0	-	Se - 0.15 min
420	over 0.15	1.00	1.00	12.0- 14.0	-	-
430	0.12 max	1.00	1.00	14.0- 18.0	-	-
430 F	0.12 max	1.25	1.00	14.0 – 18.0	-	S - 0.15 min
430 F Se	0.12 max	1.25	1.00	14.0 – 18.0	-	Se - 0.15 min.
431	0.20 max	1.00	1.00	15.0- 17.0	1.25 - 1.50	-
440A	0.60 - 0.75	1.00	1.00	16.0 – 18.0	-	Mo - 0.75 max
440 B	0.75 - 0.95	1.00	1.00	16.0 - 18.0	-	Mo - 0.75 max
440 C	0.95 - 1.20	1.00	1.00	16.0- 18.0	-	Mo - 0.75 max

TYPICAL COMPOSITION OF COBALT BASED ALLOYS

ALLOY	COMPOSITION										
	Co	Cr	C	W	Mo	Ni	Si	B	Fe	Mn	others
CARVER -1	BAL	32	2.5	13	--	2.5	1	--	2.5	1	--
CARVER -3	BAL	31	2.5	13	--	2.5	1	-	2.5	1	--
CARVER - 6	BAL	27	1	5	--	2.5	1	-	2.5	1	--
CARVER - 12	BAL	30	1.8	9	--	2.5	1	--	2.5	1	--
CARVER - 20	BAL	32	2.5	17	--	2.5	1	--	2.5	0.5	--
CARVER - 21	BAL	27	0.2	--	5	2.5	1	--	1.5	1	--
CARVER - 31	BAL	26	0.5	7	--	10	1	--	1.5	1	--
CARVER - 190	BAL	26	3.3	14	--	1	1	--	8	0.5	--
CARVER - 238	BAL	26	0.1	--	3	--	1	--	20	1	--
CARVER - 306	BAL	25	0.4	2	--	6	1	--	4	1	Nb=5
CARVER - 394	BAL	28	1	19	--	5	1	--	2.5	1	V=1