24

Preferred Numbers

Table 24.1 *Basic Series of Preferred Numbers*

Preferred Numbers of Basic Series				Serial Number
R5	R10	R20	R40	
(1)	(2)	(3)	(4)	(5)
1.00	1.00	1.00	1.00	0
			1.06	1
		1.12	1.12	2
			1.18	3
	1.25	1.25	1.25	4
			1.32	5
		1.40	1.40	6
			1.50	7
1.60	1.60	1.60	1.60	8
			1.70	9
		1.80	1.80	10
			1.90	11
	2.00	2.00	2.00	12
			2.12	13
		2.24	2.24	14
			2.36	15
2.50	2.50	2.50	2.50	16
			2.65	17
		2.80	2.80	18
			3.00	19
	3.15	3.15	3.15	20
			3.35	21
		3.55	3.55	22
			3.75	23
4.00	4.00	4.00	4.00	24
			4.25	25
		4.50	4.50	26
			4.75	27

Table 24.1 *Basic Series of Preferred Numbers (Contd.)*

	5.00	5.00	5.00	28
			5.30	29
		5.60	5.60	30
			6.00	31
6.30	6.30	6.30	6.30	32
			6.70	33
		7.10	7.10	34
			7.50	35
	8.00	8.00	8.00	36
			8.50	37
		9.00	9.00	38
			9.50	39
10.00	10.00	10.00	10.00	40

Table 24.2 *Preferred Numbers of R80 Series*

1.00	1.80	3.15	5.60
1.03	1.85	3.25	5.80
1.06	1.90	3.35	6.00
1.09	1.95	3.45	6.15
1.12	2.00	3.55	6.30
1.15	2.06	3.65	6.50
1.18	2.12	3.75	6.70
1.22	2.18	3.87	6.90
1.25	2.24	4.00	7.10
1.28	2.30	4.12	7.30
1.32	2.36	4.25	7.50
1.36	2.43	4.37	7.75
1.40	2.50	4.50	8.00
1.45	2.58	4.62	8.25
1.50	2.65	4.75	8.50
1.55	2.72	4.87	8.75
1.60	2.80	5.00	9.00
1.69	2.90	5.15	9.25
1.70	3.00	5.30	9.50
1.75	3.07	5.45	9.75

IS: 1076-1967

I

Appendix

Designation and Properties of Materials

(I) **Designation of Steels Based on Letter Symbols:**

The designation shall consist of the following in the order given.

(a) Symbol 'Fe' or 'FeE' depending on whether the steel has been specified on the basis of minimum tensile strength or yield stress.

(b) Figure indicating the minimum tensile strength or yield stress in, N/mm^2. If no minimum tensile or yield strength is guaranteed, the figure shall be 00.

(c) Chemical symbols for elements the presence of which characterize the steel.

(d) Symbol indicating special characteristics as listed below.

(i) Method of deoxidation:

(i) *R* for rimming steel, and

(ii) *K* for killed steel.

Note: If no symbol is used, it shall mean that the steel is of semi-killed type.

(ii) steel quality:

Q. 1–Non-ageing quality,

Q. 2–Freedom flakes,

Q. 3–Grain size controlled,

Q. 4–Inclusion controlled, and

Q. 5–Internal homogeneity guaranteed.

(iii) Degree of purity:

P.25–(0.025% phosphorous and 0.025% sulphur)
P.35–(0.035% phosphorous and 0.035% sulphur)
P.50–(0.050% phosphorous and 0.050% sulphur)
P.70–(0.070% phosphorous and 0.070% sulphur)

No symbol will mean (0.055% phosphorous and 0.055% sulphur)

(iv) Weldability guarantee:

W–Fusion weldable.

W_1–Weldable by resistance welding but not fusion weldable.

(v) Resistance to brittle fracture: Symbol 'B', 'B0', 'B2', or 'B4', indicating resistance to brittle fracture based on the results of the V-notch Charpy impact test.

(vi) Surface condition:

S1–Deseamed or scarfed.
S2-Descaled;
S3–Picked (including washing and neutralizing);
S4–Shot, grit or sand blasted;
S5–Peeled (skinned);
S6–Bright drawn or cold rolled: and
S7–Ground.

Note If no symbol is used, it shall mean that the surface is in as rolled or as forged condition.

(vii) Formability (applicable to sheet only):

D1–Drawing quality,
D2–Deep drawing quality, and
D3–Extra deep drawing quality.

Note: If no symbol is used, it shall mean that the steel is commercial quality.

(viii) Surface finish (applicable to sheet only):

F1–General purpose finish,
F2–Full finish.
F3–Exposed,
F4–Unexposed,
F5–Matt finish,
F6–Bright finish,
F7–Plating finish,
F8–Unpolished finish,
F9–Polished finish,
F10–Polished and coloured blue,
F11–Polished and coloured yellow,
F12–Mirror finish,
F13–Vitreous enamel finish, and
F14–Direct annealed finish.

(ix) Treatment:

T1–Shot peened,
T2–Hard drawn,
T3–Normalized,
T4–Controlled rolled,
T5–Annealed,
T6–Patented,
T7–Solution treated,
T8–Solution treated and aged,
T9–Controlled cooled,
T10–Bright annealed,
T11–Spherodized,
T12–Stress relieved,
T13–Case hardened, and
T14–Hardened and tempered.

Note: If no symbol is used, it means that the steel is hot rolled.

(x) Elevated temperature properties: For guarantee with regard to elevated temperature properties, the letter 'H' shall be used. However, in the designation only the room temperature properties shall be shown. Elevated temperature properties shall be intimated to the purchaser separately by the manufacturer.

(xi) Cryogenic quality: For guarantee with regard to low temperature properties, the letter 'L' shall be used.

(e) Symbol indicating applications, if necessary.

Examples:

Fe 410 Cu K — Killed steel containing copper as alloying element with a minimum tensile strength of 410 N/mm^2

FeE 300 P 35 — Semi-killed steel with a minimum yield strength of 300 N/mm^2 and degree of purity as follows:

S & P=0.035% max.

FeE 550 S6 — Bright drawn or cold rolled steel with a minimum yield strength of 550 N/mm^2

Fe 00 R — Rimming quality steel with no guarantee of minimum tensile or yield strength.

FeE 590 F7 — Sheet steel of plating finish and minimum yield strength of 590 N/mm^2

Fe 710 H — Steel with guaranteed elevated temperature properties and a minimum room temperature tensile strength of 710 N/mm^2

Fe 410 Q1 — Semi-killed non-ageing quality steel with S&P=0.055% Max. and minimum tensile=410 N/mm^2.

(B) Steels Designation on the Basis of Chemical Composition:

(i) *Unalloyed steels:* The designation shall consist of the following in the order given:

(a) Figure indicating 100 times the average percentage of carbon content.

(b) Letter 'C', and

(c) Figure indicating 10 times the average percentage of manganese content. The figure after multiplying shall be rounded off to the nearest integer.

(d) Symbol indicating special characteristics including guaranteed hardenability for which symbol 'G' shall be used at the end of the designation.

Examples:

25C5BO Semi-killed steel with average 0.25 percent carbon and 0.5 percent manganese content and resistance to brittle fracture grade BO.

45C10G Steel with average 0.45% carbon, 1% manganese and guaranteed hardenability.

(ii) *Unalloyed tool steels:* The designation shall consist of:

(a) Figure indicating 100 times the average percentage of carbon;

(b) Symbol 'T' for tool steel; and

(c) Figure indicating 10 times the average percent manganese content.

Examples:

75T5 Unalloyed tool steel with average 0.75% carbon and 0.5% manganese

80T11 Unalloyed tool steel with average carbon content of 0.80% and 1.1% manganese.

(iii) *Unalloyed free cutting steels:* The designation shall consist of;

(a) Figure indicating 100 times the average percentage of carbon;

(b) Letter 'C';

(c) Figure indicating 10 times the average percentage of manganese;

(d) Symbol 'S', 'Se', 'Te' or 'Pb' depending on the element present which makes the steel free cutting followed by the figure indicating 100 times the percentage content of the element. In the case of the phosphorized steels the symbol 'P' shall be included; and

(e) Symbol indicating special characteristics covering the method of deoxidation, surface condition and heat treatment.

Examples:

35C10S14K Free cutting steel with average 0.35% carbon, 1% manganese and 0.14% sulphur, killed quality.

20C12Pb15T14 Free cutting steel with average 0.15% lead, 0.20% carbon and 1.2% manganese, hardened and tempered.

(iv) *Alloy steels:*

(a) *Low and medium alloy steels* (total alloying elements not exceeding 10%)– The designation of steels shall consist of:

(1) Figure indicating 100 times the average percentage carbon.

(2) Chemical symbol for alloying elements each followed by the figure for its average percentage content multiplied by a factor as given below:

Element	Multiplying Factor
Cr, Co, Ni, Mn, Si and W	4
Al, Be, V, Pb, Cu, Nb, Ti, Ta, Zr and Mo	10
P, S, N	100

Note 1– The figure after multiplying shall be rounded off to the nearest integer.

Note 2– Symbol 'Mn' for manganese shall be included in case manganese content is equal to or greater than 1 percent.

Note 3– The chemical symbols and their figures shall be listed in the designation in the order of decreasing content.

(3) Symbol indicating special characteristics covering degree of purity hardenability, weldability guarantee, elevated temperature properties, surface condition, surface finish and heat treatment.

Examples:

25Cr4Mo2G Steel with guaranteed hardenability and having average 0.25% carbon, 1% chromium and 0.20% molybdenum

40Ni8Cr8V2 Hot rolled steel with average 0.40% carbon, 2% chromium 2% nickel and 0.2% vanadium.

(b) *High alloy steels* (total alloying elements more than 10%)–The designation shall consist of:

(1) Letter 'X'.

(2) Figure indicating 100 times the percentage carbon content.

(3) Chemical symbol for alloying elements each followed by the figure for its average percentage content rounded off to the nearest integer.

(4) Chemical symbol to indicate specially added element to attain the desired properties.

(5) Symbol indicating specific characteristics covering hardenability, weldability guarantee, elevated temperature properties, surface condition, surface finish and heat treatment.

Examples:

X10Cr18Ni9S3 Steel in pickled condition with average carbon 0.10%, chromium 18% and nickel 9%.

X15Cr25Ni12 Steel with 0.15% carbon, 25% chromium and 12% nickel.

(c) Alloy tool steels–The steel designation shall be as for low, medium and high alloy steels as given under (a) and (b) above except that the symbol 'T' will be included in the beginning of the designation of low alloy and medium alloy tool steel and 'XT' instead of 'X' in the case of high alloy tool steels.

Examples:

XT75W18Cr4V1

High alloy tool steel with average carbon 0.75%, tungsten 18%, chromium 4% and vanadium 1%.

XT98W6Mo5Cr4V1

High alloy steel with average carbon 0.98%, tungsten 6%, molybdenum 5%, chromium 4% and vanadium 1%.

(d) *Free cutting alloy steels:* The steel designation shall be as for low, medium and high alloy steals as given under (a) and (b) above except that depending on the percentage of S, Se, Te and Zr present, the designation shall also con-

sist of the chemical symbol of the element present followed by the figure indicating 100 times its content.

Examples:

X15Cr25Ni15S40

Alloy free cutting steel with carbon 0.15%, chromium 25%, nickel 15% and sulphur 0.40%.

X12Cr18Ni3S25

Alloy free cutting steel with 18% chromium, nickel 3% and sulphur 0.25%

Designation of Ferrous Castings:

(II) (a) Based on mechanical properties: ∗300

*Any of the symbols listed below

FG – Grey Iron castings

BM – Black-heart (Malleable Iron)

PM – Pearlitic (Malleable Iron)

WM – White-heart (Malleable Iron)

SG – Spheroidal or nodular graphite iron

AFG – Austenitic flake graphite iron

AFG – Austenitic spheroidal or nodular graphite iron

ABR – Abrasion resistant iron

CS – Steel castings

CSH – Heat-resistant steel castings

CSC – Corrosion-resistant steel castings.

300 – Minimum tensile strength in N/mm^2

(σ_u = 300 N/mm^2)

(b) Based on chemical composition: *33Ni4Cr2

*Any of the above listed symbols

33 – Total carbon 3.3%

Ni4 – 4% Nickel (average)

Cr2 – 2% chromium (average),

(III) Designation of pig Iron: PG 12 Mn3P15

PG – Designation for Pig Iron

12 – Indicates silicon as four times its average percentage content rounded off to the nearest integer without its chemical symbol (Si). (i.e. in the case silicon content is about 3%).

Mn3 – indicates manganese as four times average percentage rounded off to the nearest integer i.e. 1% manganese).

P15 – indicate phosphorous as hundred times the average percentage (i.e. 0.15% phosphorous).

PG 12 Mn3P15K

PG, 12, Mn3, P15 } same as listed above.

K – where the maximum limit of sulphur content is restricted below 0.04%, the symbol 'K' shall be used.

PG12Mn3P15KC35

PG, 12, Mn_3, P15, K } same as listed above.

C35 – indicates carbon as ten times the minimum limit (i.e. total carbon=3.5%).

Properties of Materials

Table I.1 *Mechanical Properties of Carbon Steel Castings for General Engg. Purposes*

*Grade designation (1)	Yield stress Min. (MN/m^2) (2)	Tensile strength Min. (MN/m^2) (3)	Elongation% Min. Gauge length 5.65 $\sqrt{S_0}$ (4)	Reduction of area percent Min. (5)	Impact strength Min. J/cm^2 (6)	Angle of bend Min. (7)
20-40	200	400	25	40	30	90°
23-45	230	450	22	31	25	90°
26-52	260	520	18	25	22	60
27-54	270	540	16	23	20	60
30-57	300	570	15	21	18	60

*On the basis of minimum yield stress and tensile strength values respectively expressed in 10 MN/m^2.

IS:1030-1982

Table I.2 *Mechanical Properties of Iron Castings with Spheroidal or Nodular Graphite*

Grade Designation (1)	Tensile Strength Min. N/mm^2 (2)	Elongation percent Min (3)	Typical Brinall Hardness Range (HB) (4)	Predominant Structural constituent and applications (5)
SG 800/2	800	2	248-352	Pearlite or tempered structure-High tensile strength and less ductility.
SG 700/2	700	2	229-302	Pearlite-High tensile strength and less ductility
SG 600/3	600	3	192-269	Pearlite and Ferrite-High tensile strength and less ductility
SG 500/7	500	7	170-241	Ferrite and pearlite-Medium strength with reasonable ductility
SG 400/12	400	12	201, Max	Ferrite-Medium tensile strength with substantial ductility and toughness
SG 370/17	370	17	179, Max	Ferrite-High resistance to impact.

IS: 1865-1975

Table I.3 *Typical Properties of Grey Cast Iron*

Properties	Unit	Grade						
		FG 150	FG 200	FG 220	FG 260	FG 300	FG 350	FG 400
Tensile strength	(N/mm^2)	150	200	220	260	300	350	400
0.01 percent proof stress	(N/mm^2)	42	56	62	73	84	98	112
0.1 percent proof stress	(N/mm^2)	98	130	143	169	195	228	260
Total strain at failure	Percent	0.60-0.75*	0.48-0.67*	0.39-0.63*	0.57	0.50	0.50	0.50
Elastic strain at failure	..	0.15	0.17	0.18	0.20	0.22	0.25	0.28
Total minus elastic strain at failure	..	0.45-0.60*	0.31-0.50*	0.21-0.45*	0.37	0.28	0.25	0.22
Notched tensile strength (See Note 2)								
Circumferential 45° V-notch, root radius 0.25 mm (Notch depth 2.5 mm, notch dia 20 mm or notch depth 3.3 mm. notch diameter 7.6 mm)	(N/mm^2)	120	160	176	208	240	280	320
Circumferential notch. Radius 9.5 mm (Notch depth 2.5 mm, notch diameter 20 mm)	(N/mm^2)	150	200	220	260	300	350	400
Compressive strength	(N/mm^2)	600	720	768	864	960	1080	1200
0.01 percent proof stress	(N/mm^2)	84	112	123	146	168	196	224
0.1 percent proof stress	(N/mm^2)	195	260	286	338	390	455	520
Shear strength	(N/mm^2)	173	230	253	299	345	403	460
Torsional strength	(N/mm^2)	173	230	253	299	345	403	460
Shear strain at failure	Percent	> 4	> 4	> 4	4	Up to 4	Up to 4	Up to 4
Modulus of elasticity	GN/mm^2	100	114	120	128	135	140	145

Table I.3 *Typical Properties of Grey Cast Iron (Contd.)*

Properties	Unit	Grade						
		FG 150	**FG 200**	**FG 220**	**FG 260**	**FG 300**	**FG 350**	**FG 400**
Tension								
Compression	GN/mm^2	100	114	120	128	135	140	145
Modulus of rigidity	GN/mm^2	40	46	48	51	54	56	58
Poisson's ratio	–			0.26				
Fatigue limit (Wöhler)								
Unnotched (8.4 mm dia)	(N/mm^2)	68	90	99	117	135	149	152
V-notched (Circumferential 45° V-notch with 0.25 mm root radius. Diameter at notch 8.4 mm, depth of notch 3.4 mm)	(N/mm^2)	68	87	94	108	122	129	127
Relative density		7.05	7.10	7.15	7.20	7.25	7.30	7.30
Hardness	Hardness is not simply related to tensile strength and varies with casting section thickness and material composition.							

Note: 1 – The typical properties given in this appendix are the proparties in a 30-mm diameter separately cast test bar or in casting section correctly represented by this size of test bar. Where the tensile strength does not correspond to that given, other properties may differ slightly from those given.

Note: 2 – Notched tensile strengths increases slightly as notch serverity ratio, notch radius; notch diameter, increases above 0.47.

*Value depends on the composition of iron.

Table I.4 *Mechanical Properties of Grey Iron Castings*

Grade (See IS: 4843-1968)*	Tensile strength Min (N/mm^2)	Brinell Hardness (HB)
FG 150	150	130 to 180
FG 200	200	160 to 220
FG 220	220	180 to 220
FG 260	260	180 to 230
FG 300	300	180 to 230
FG 350	350	207 to 241
FG 400	400	207 to 270
*Code for designation of ferrous Castings.		

IS: 210-1978

Table I.5 *Mechanical Properties of High Tensile Steel Castings*

Grade	Designation	Tensile strength Min (MN/m^2)	Yield stress (0.5 percent) (Proof stress), Min. (MN/m^2)	Reduction in area, Min. Percent	Elongation of gauge length = 5.65 $\sqrt{S_0}$ Min. Percent	Brinell Hardness, Min. HB	Izod Impact strength, Min. J†
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	CS 640	640	390	35	15	190	30
2	CS 700	700	560	30	14	207	30
3	CS 840	840	700	28	12	248	28
4	CS 1030	1030	850	20	8	305	20
5	CS 1230	1230	1000	12	5	355	–

IS: 2644-1979.

Table I.6 *Tensile Properties and Hardness of Carbon Steel Forgings for General Engg. Purposes*

Class	Designation	Tensile strength. Min. N/mm^2	Yield strength Min. N/mm^2	Elongation percent, Min. Gauge Length = 5.65 $\sqrt{S_0}$	Brinell Hardness, Min BHN	Normalizing Temperature C
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1A	15 C 8	410	220	25	110	880-910
2	20 C 8	430	230	24	120	880-910
2A	25 C 8	460	250	22	130	880-910
3	30 C 8	490	270	21	140	860-890
3A	35 C 8	540	280	20	155	850-880
4	45 C 8	620	320	15	175	830-860
5	55 C 8	710	350	13	200	810-840
6	65 C 6	740	370	10	210	800-830
Note: The properties given in the table refer to 100 mm ruling section in the forged and normalized condition and are applicable to test samples taken along the direction of grain flow.						

IS: 2004-1978

Table I.7 *Tensile and Yield Properties of Standard Wrought Steels*

Designation	Tensile strength (N/mm^2)	Yield stress Min. (N/mm^2)	Elongation, percent, Min. (Gauge length $5.65\sqrt{A}$)
(1)	(2)	(3)	(4)
Fe 290	290	170	27
FeE 220	290	220	27
Fe 310	310	180	26
FeE 230	310	230	26
Fe 330	330	200	26
FeE 250	300	250	26
Fe 360	360	220	25
FeE 270	360	270	25
Fe 410	410	250	23
FeE 310	410	310	23
Fe 490	490	290	21
FeE 370	490	370	21
Fe 540	540	320	20
FeE 400	540	400	20
Fe 620	620	380	15
FeE 460	620	460	15
Fe 690	690	410	12
FeE 520	690	520	12
Fe 770	770	460	10
FeE 580	770	580	10
Fe 870	870	520	8
FeE 650	870	650	8

Table I.8 *Properties and Uses of Corbon Steels*

Designation (ISI Grade)	%C	%Mn	Tensile strength† N/mm^2	Yield stress† N/mm^2	Minimum elongation percentage (gauge length 5.65 $\sqrt{A^*}$ round test piece)	Brinell hardness (HB)No.	Suggested uses
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C 07	0.12 max	0.50 max	314-392	196	27	—	Cold forming and deep drawing Rimming quality used for automobile bodies and rivets, killed quality used for forgings
C 10	0.15 max	0.30-0.60	333-412	206	26	—	–do–
C 14	0.10-0.18	0.40-0.70	363-441	216	26	137	Cam shafts, cams, light duty gears, worms, gudgeon pins, spindles, ratchets chain wheels tappets, etc.
C 15	0.20 max	0.30-0.60	363-481	235	25	137	Cold worked-rivets
C 15 Mn 75	0.10-0.20	0.60-0.90	412-490	245	25	163	General purpose-low stressed components
C 20	0.15-0.25	0.60-0.90	432-510	245	24	156	-do-
C 25	0.20-0.30	0.30-0.60	432-520	275	27	170	-do-
C 25 Mn 75	0.20-0.30	0.60-0.90	461-560	275	22	207	-do-
C 30	0.25-0.35	0.60-0.90	490-588	294	21	179	Cold formed levers, Hardened and tempered tie rods, cables, sprockets, hubs and bushes, steel tubes etc.
C 35	0.30-0.40	0.30-0.60	510-608	304	20	187	Low stressed components, automobile tubes and fasteners
C35 Mn 75	1.30-0.40	0.60-0.90	540-637	314	20	223	Low stressed parts, cycle and motor cycle frame tubes, fish plates for rails and fasteners.

Table I.8 ***Properties and Uses of Corbon Steels (Contd.)***

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C 40	0.35-0.45	0.60-0.90	570-667	324	18	217	Crank shafts, shafts, spindles, axle beams, push rods, connecting rods, studs, bolts, gears, etc.
C 45	0.40-0.50	0.60-0.90	618-696	353	15	229	Shafts, bolts, gears and spindles of machine tools
C 50	0.45-0.55	0.60-0.90	647-765	373	13	241	Shafts, keys cylinders, hardened stock for worms and worm gears
C 50 Min.	0.45-0.55	1.00-1.10	706 (min)	392	11	255	Rail steel, bolts, gear shafts, rocking levers and cylinder liners.
C 55 Mn 75	0.50-0.60	0.60-0.90	706 (min)	392	13	265	Keys, crank shafts, cylinders, cams, gears, sprockets, parts requiring moderate wear resistance.
C 60	0.55-0.65	0.50-0.80	736 (min)	412	11	255	Hardened screws and nuts, Crank shafts, axles, couplings, gears and spindles for machine tools.
C 65	0.60-0.07	0.50-0.80	736 (min)	422	10	255	Locomotive carriage and wagon tyres, engine valve springs, washers and thin stamped parts.

*a, area of cross section.

†To obtain the values in metric units, i.e., kgf/mm^2, divide the value given in columns (5) and (6) with 9.80665.

Table I.9 *Properties and Uses of Alloy Steels (Other than Stainless and Heat Resisting Steels)*

Designation (ISI Grade)	Tensile strength MN/m^{2*}	Yield strength MN/m^{2*}	Minimum Elongation ($e = 6.55\sqrt{a^{**}}$)	Minimum Izod Impact value, Nm*	Brinell Hardness No. HB	Suggested uses
(1)	(2)	(3)	(4)	(5)	(6)	(7)
20 Mn 2	588-736	432	18	47.07	170-217	Welded structures, crank shafts, steering, shafting and spindles.
	687-834	490	16	47.07	201-248	
27 Mn 2	588-736	432	18	47.07	170-217	Welded structures, crank shafts, shafts, spindles and steering.
	687-834	490	16	47.07	201-248	
37 Mn 2	588-736	432	18	47.07	170-217	Crank shafts, shafts, axles and connecting rods
	687-834	530	18	47.07	201-248	
	785-932	588	16	47.07	229-277	
	882-1030	687	15	40.21	255-311	
35 Mn 2 Mo 28	687-834	530	18	54.00	201-248	Crank shafts, levers, bolts and connecting rods
	785-932	588	16	54.00	229-277	
	882-1030	687	15	54.00	255-311	
	981-1128	785	13	47.07	285-341	
35 Mn 2 Mo 45	785-932	588	16	54.00	229-277	Crank shafts, connecting rods, bolts, and levers.
	882-1030	687	15	54.00	225-311	
	981-1128	785	13	47.07	285-341	
40 Cr 1	687-834	530	18	54.00	201-248	Connecting rods, gears, wear resisting plates, etc.
	785-932	588	16	54.00	229-277	
	882-1030	687	15	54.00	255-311	
40 Cr 1 Mo 28	687-834	530	18	54.00	201-248	Shafts, gears, bolts and studs.
	785-932	588	16	54.00	229-277	
	882-1030	687	15	54.00	255-311	
	981-1128	785	13	47.07	255-341	
15 Cr 3 Mo 55 and 25 Cr 3 Mo 55	687-834	530	18	54.00	201-248	Parts requiring high surface hardness and wear resistance.
	785-932	588	16	54.00	229-277	
	882-1030	687	15	54.00	255-311	
	981-1128	785	13	47.07	285-341	
	1080-1226	863	12	40.21	311-363	
	1520 min	1275	8	13.73	444 Min	