



Metallurgical Brochure

SINCE 1974

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Specifications of High Grade Tool, Alloy and Carbon Steels with Technical Data



SONI STEELS

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Best Compliments from,



SONI STEELS

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SONI STEELS is a leading dealer of SPECIAL TOOL, ALLOY & CARBON STEELS which forms the core material required to build and manufacture machines, machine tools / tooling & components.

We source and stock materials of VISL-SAIL, ASP-SAIL, MUSCO, MUKUND Kalyani & Imports. Our detailed literature in this Hand-Book also indicates the entire range of steel viz: HIGH SPEED STEELS, HCHCR, HOT DIE STEEL H-11 & H-13, P-20, EN-41B, Case Hardening Steel such as EN-36C, EN-353 & EN-354, 20MnCr5, EN-207. Special Alloy Steels such as EN-19, EN-24, EN-31 & SAE-8620, EN-14B, EN-47, M.S. This means that more than 2000 sizes in the above is stocked.

Automatic Band Saws up to 550mm cutting capacity have been installed. EOT Crane takes care of handle bulky & heavy Load.

We have been in the business of marketing steel for the past 32years catering to the Public Sector, Medium sector and small scale units. Needless to mention we have always maintained QUATITY AS OUR PRIME CONCERN.

Looking forward for your valued enquires/ orders which will be dealt with promptly and to your satisfaction.

STEEL IS OUR BUSINESS

QUALITY OUR CONCERN

Thanking you and assuring you of our best services at all times.

METALLURGICAL BROCHURE

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TOOL STEELS

HIGH SPEED STEELS

Approximate Other Equivalents :

IS : XT 87W6 MO5 CR4 V2 VISL : M-SREMO BASL : B-HS-2 POWMEX : Im2
DIN : S 6-5-2 (M2) S 6-5-2-5 (M35/M36) AISI : M-2 & M 35/36 JIS : SKH 51

CHEMISTRY :

QUALITY	C	SI	MN	CR	MO	V	W	CO
M-2	0.82	0.15	0.15	3.75	4.50	1.70	5.50	-
	0.92	0.45	0.40	4.50	5.60	2.50	6.75	
	0.85	0.40	0.15	3.75	4.50	1.50	5.50	5.00
M 35/36	0.95	0.40	0.40	4.50	5.60	2.50	6.50	5.25

SPECIFIC HEAT TREATMENT

Our Colour Code: WHITE & GREEN

QUALITY	M-2	M 35/36
Forging Temperature	1050 to 900°C	1100 to 800°C
Annealing Temperature	800 to 850°C	770 to 840°C
Annealed Hardness BHN Max	278 BHN	—
Hardening Temperature	1190 to 1240°C	1180 to 1220°C
Quenching Media	Oil/Compressed Air	Oil/Compressed Air
	Mar tempering bath	Mar tempering bath
Obtainable Hardness R.C.	64 to 66 R.C.	67 to 69 R.C.
Working Hardness HRC	—	—
Tempering Temperature	540 to 570°C	550 to 580°C

Application :

AISI M-2 : Broaches/Twist Drills/Milling Cutters/Segments for Circular Saws etc.
AISI M 35/36 : Milling Cutters/Twist Drills/Taps/Broaches etc.

TOOL STEELS

OIL HARDENING NON SHRINKING STEEL WITH TUNGSTEN OHNS(W)

Approximate Other Equivalents :

IS : T90 Mn2 W 50 Cr45 VISL : M - AMUTIT-S BASL : B-CW 4
DIN : 100 MnCr W4 AISI : O-1 ASP : CW1

CHEMISTRY :

QUALITY	C	SI	Mn	Cr	V	W
AISI O1	0.85	0.10	1.00	0.30	0.025	0.40
	0.95	0.30	1.75	0.60	MAX	0.60

SPECIFIC HEAT TREATMENT

Our Colour Code: GREEN

QUALITY	AISI O-1
Forging Temperature	1050 to 850°C
Annealing Temperature	750 to 780°C
Annealed Hardness BHN Max	234 BHN
Hardening Temperature	780 to 830°C
Quenching Media	Oil
Obtainable Hardness R.C.	63 to 66 R.C.
Working Hardness HRC	55 to 63 HRC
Tempering Temperature	100 to 350°C

Application :

Cutting Dies, Punches, Thread Rolling Dies, Wood Working Tools, Machine Knives For the Wood working Pulp & Paper & Metal Working Industries, Measuring Tools, Plastic Moulding Dies.

TOOL STEELS

HIGH CARBON HIGH CHROMIUM STEELS

Approximate Other Equivalents :

IS : XT 160Cr12 (D3) VISL : M SPL K (D3) BASL : B-CW-2 (D3)
X 165CrMo12 (D2) M SPL KNL (D2) B-CW 3 (D2)
DIN : X 210 Cr 12 (D3) AISI : AISI - D3 ASP : CW 4 (D3)
X 165CrMo12 (D2) BOHLER GRADE : K-100 (D3) CW 3 (D2)
K-110 (D2)

CHEMISTRY :

QUALITY	C	SI	MN	CR	W
AISI - D3	2.00	0.10	0.25	11.00	—
	2.30	0.35	0.50	13.00	—
AISI - D2	1.50	0.10	0.25	11.00	0.50
	1.70	0.35	0.50	13.00	MAX

SPECIFIC HEAT TREATMENT

Our Colour Code: WHITE & YELLOW With ORANGE Stripes D2

Our Colour Code: WHITE & YELLOW D3

QUALITY	AISI D-3	AISI D-2
Forging Temperature	1050 to 850°C	1050 to 850°C
Annealing Temperature	800 to 850°C	800 to 850°C
Annealed Hardness BHN Max	234 BHN	234 BHN
Hardening Temperature	920 to 980°C	970 to 990°C
Quenching Media	Oil / Air	Oil / Air
Obtainable Hardness R.C.	63 to 65 R.C.	63 to 65 R.C.
Working Hardness HRC	50 to 63 HRC	58 to 65 HRC
Tempering Temperature	100 TO 350°C	100 to 350°C

Application :

AISI D-2 : Blanking & Punching Dies with excellent edge Holding Properties, Abrasion Resistance & Dimensional Stability.
AISI D-3 : High duty Blanking & Punching Dies & Tools, Wood working Tools, Shear Blades or Handling light gauges, Thread Dies, Deep Drawing & Impact Extrusion Tools, Press Tools, for Ceramics & Pharmaceutical Industries, Cluster Mill Cold Rolls, Plastic Moulding Dies

SPECIAL ALLOY STEELS

EN - 19 STEELS HIGH TENSILE ALLOY CONSTRUCTIONS

Approximate Other Equivalents :

Is : 40 Cr4 Mo3 VISL : M - VCL 140 BASL : B - ACS 17
DIN : 42 Cr Mo4 SAE/AISI : 4140

CHEMISTRY :

QUALITY	C	SI	Mn	Cr	P & S	Mo
EN - 19	0.35	0.10	0.50	0.90	0.055	0.20
	0.45	0.35	0.80	1.20	MAX	0.35

SPECIFIC HEAT TREATMENT

Our Colour Code: ORANGE & YELLOW

QUALITY	EN - 19
Forging Temperature	1050 to 850°C
Annealing Temperature	680 to 720 (Soft Annealing)
Annealed Hardness BHN Max	217 BHN
Hardening Temperature	830 to 850°C (Oil)
	820 to 840°C (water)
Quenching Media	Oil/Water
Obtainable Hardness R.C.	—
Working Hardness HRC	—
Tempering Temperature	670 to 530°C
Normalising Temperature	850 to 880°C

Application :

Parts of Medium cross section where High Tensile & Impact Values are required. Combined with high endurance bending strength. Used in manufacture of Gears/Shafts/Connecting Rod/High Tensile Bolts, Nuts and Fasteners Etc.,

TOOL STEELS

HOT DIE STEELS

Approximate Other Equivalents :

IS : T35Cr5Mo1V30 (H-11) VISL : M US ULTRA (H-11) BASL : B-HW-1
T35Cr5MoV1 (H-13) M US ULTRA 2 (H-13) B-HW 2
DIN : X38CrMoV51 (H-11) AISI : H-11 ASP : HW 4 (H-11)
X40CrMoV51 (H-13)

CHEMISTRY :

QUALITY	C	SI	Mn	Cr	Mo	V	W
H-11	0.30	0.80	0.25	4.75	1.20	0.20	-
	0.40	1.20	0.50	5.25	1.60	0.40	-
H-13	0.30	0.80	0.25	4.75	1.20	1.00	-
	0.40	1.20	0.30	5.25	1.60	1.20	-

SPECIFIC HEAT TREATMENT

Our Colour Code: RED & BLACK H11

Our Colour Code: RED & BLACK With Green Strips H13

QUALITY	H-11	H-13
Forging Temperature	1100 to 900°C	1100 to 900°C
Annealing Temperature	750 to 800°C	750 to 800°C
Annealed Hardness BHN Max	210 BHN MAX	234 BHN MAX
Hardening Temperature	930 to 970°C	1040 to 1080°C
Quenching Media	Oil	Oil / Compressed Air
Obtainable Hardness R.C.	54 to 58 R.C.	52-56/50-54 R.C.
Working Hardness HRC	30 to 53 HRC	40 to 54 HRC
Tempering Temperature	400 to 700°C	400 to 700°C

Application :

Common for both H-11 & H 13 Steel :
Heavy Duty Hot work Tools such as Extrusion Mandrels, Dies, Container for Metal Tubings Rod Extrusion, Hot Impact Extrusion, Hollow Body manufacturing tools, Die Casting Equipments, Forming Dies, Die Inserts Hot Shear Blades, Screw, Nut, Bolt, Rivet manufacturing Tools.

SPECIAL ALLOY STEELS

EN - 24 STEELS (HIGH TENSILE ALLOY CONSTRUCTION STEEL) (Ni-Cr-Mo STEEL)

Approximate Other Equivalents :

IS : 40 Ni6 Cr Mo3 VISL : M - NMH BASL : B - ACS 21
SAE/AISI : 4340

CHEMISTRY :

QUALITY	C	SI	Mn	Cr	Ni	Mo	P & S
EN - 24	0.35	0.10	0.40	0.90	1.25	0.10	0.055
	0.45	0.35	0.70	1.30	1.75	0.20	MAX

SPECIFIC HEAT TREATMENT

Our Colour Code: GREY

QUALITY	EN - 24
Forging Temperature	1050 to 850°C
Annealing Temperature	650 to 700°C (Soft Annealing)
Annealed Hardness BHN Max	220 BHN
Hardening Temperature	830 to 850°C (Oil)
Quenching Media	Oil
Obtainable Hardness R.C.	—
Working Hardness HRC	—
Tempering Temperature	670 to 530°C
Normalising Temperature	850 to 880°C

Application :

Due to High Molybdenum content, these Steels are Instructible to over Heating and free from Temper Brittleness while permit Higher stress Relieving Temperatures. Used in construction of Aircrafts/Heavy Vehicles/Crank Shafts, Gear Rods and Connecting Rods etc.,

SPECIAL ALLOY STEELS

**EN - 31 & SAE 52100 (BALL BEARING QUALITY)
1% CARBON CHROMIUM STEEL**

Approximate Other Equivalents :

IS : 104Cr2/103Cr2Mn70
T105Cr1/T105Cr1Mn6
DIN : 100Cr6

VISL : M - K150
AISl : 52100

BASL : B - B2

CHEMISTRY :

QUALITY	C	Si	Mn	Cr	P & S
EN - 31	0.95	0.15	0.25	0.40	0.025
AND	1.15	0.35	0.45	1.65	MAX
SAE 52100					

SPECIFIC HEAT TREATMENT

Our Colour Code: GREEN & YELLOW

QUALITY	EN - 31	SAE 52100
Forging Temperature	1050 to 850°C	1050 to 850°C
Annealing Temperature	750 to 800°C	750 to 800°C
Annealed Hardness BHN Max	207 BHN	207 BHN
Hardening Temperature	800 to 820°C (Water)	800 to 820°C
	830 to 850°C (Oil)	830 to 850°C
Quenching Media	Water /Oil	Water /Oil
Obtainable Hardness R.C.	63-67 & 63-67 HRC	63-67 & 63-67 HRC
Working Hardness HRC	61-65 & 61-63 HRC	61-65 & 61-63 HRC
Tempering Temperature	150 to 250°C	150 to 250°C
Normalising Temperature	—	—

Note : Values may vary between En - 31 (Tool Steel) to En - 31 (BB) SAE 52100 Quality. Please check with Metallurgist/your Customer.

Application :
Used in manufacture of Ball & Roller Bearing, Connecting Rods, big end Bushes, Lathe Centres & Collets. EN - 31 BB SAE 52100 are also be used as back up Rolls in cold Rolling and Stainless Steels Sheets Rolling Mills. Can also be used for small hardened steel Rolling Mill shear Blades, Instrument Pivots & Spindles, Pillars & Bushes for Die Sets

CASE HARDENING STEELS

EN - 353 AND 354 STEELS

Approximate Other Equivalents :

IS : 15NiCrMo12 (EN - 353)
T6NiCr2Mo20 (EN - 354)
DIN : 17CrNiMo6

VISL : M - ECN 170
AISl - 4317H/4317H

BASL : B - CH 14 (EN-353)
BASL : B - CH 16 (EN-354)
BS : 820 M 17

CHEMISTRY :

QUALITY	C	Si	Mn	Cr	Ni	Mo	P & S
EN - 353	0.12	0.10	0.60	0.75	1.00	0.68	0.040
	0.18	0.35	1.00	1.25	1.50	0.15	MAX
EN - 354	0.12	0.10	0.50	0.75	1.50	0.10	0.040
	0.18	0.35	1.00	1.25	2.00	0.25	MAX

SPECIFIC HEAT TREATMENT

Our Colour Code: BLUE & RED

QUALITY	EN - 353 AND EN 354
Forging Temperature	1050 to 850°C
Annealing Temperature	640 to 890°C (Soft Annealing)
Annealed Hardness BHN Max	217 BHN
Hardening Temperature	840 to 870°C & 800 to 830°C R&H
Quenching Media	Oil / Salt Bath
Obtainable Hardness R.C.	—
Working Hardness HRC	—
Tempering Temperature	170 to 210°C
Normalising Temperature	830 to 875°C

Application :
This Steel posses high tensile Strength of Core Coupled with high toughness. Used for components in Vehicle & Air crafts as well as for General Engineering purposes where Blows & Shocks are Involved Mostly for Gear Box and Transmission Components, Cam Shafts.

CASE HARDENING STEELS

**EN - 36 STEELS
(Ni-Cr- Mo STEEL)**

Approximate Other Equivalents :

IS : 13 Ni 113 Cr 3
AISl : 3310

VISL : MES SPL MO

BS : 655 M13

CHEMISTRY :

QUALITY	C	Si	Mn	Cr	Ni	Mo	P & S
EN - 36C	0.10	0.10	0.30	0.60	3.00	0.15	0.055
	0.15	0.35	0.60	1.00	3.75	0.25	MAX

SPECIFIC HEAT TREATMENT

Our Colour Code: BLUE

QUALITY	EN - 36 C
Forging Temperature	1100 to 850°C
Annealing Temperature	640 to 660°C (Soft Annealing)
Annealed Hardness BHN Max	217 BHN
Hardening Temperature	830 to 850°C
	700 to 800°C R & H
Quenching Media	Oil Salt Bath at 180 to 250°C
Obtainable Hardness R.C.	—
Working Hardness HRC	—
Tempering Temperature	170 to 200°C
Normalising Temperature	850 to 880°C

Application :
Heavy Duty Gearing, Air Craft & Transport Vehicle construction Button Bits for Borwell Boring, Automobile Transmission Parts.

NITRIDING STEELS

**EN - 41 B STEELS
NITRIDING STEEL WITH AL**

Approximate Other Equivalents :

Is : 40Cr7Al10Mo5
DIN : 34CrAl6/34CrAlMo5, 34CrAlN17 & 41CrAlMo7

VISL : M - ACE

CHEMISTRY :

QUALITY	C	Si	Mn	Cr	Ni	MO	P & S	Al
EN - 41B	0.35	0.10	0.40	1.50	0.50	0.10	0.055	0.90
	0.45	0.45	0.70	1.80	MAX	0.25	MAX	1.30

SPECIFIC HEAT TREATMENT Our Colour Code: BLACK / RED / With WHITE Stripe

QUALITY	EN - 41 B
Forging Temperature	1050 to 850°C
Annealing Temperature	700 to 720°C (Soft Annealing)
Annealed Hardness BHN Max	234 BHN
Hardening Temperature	870 to 900°C (Water)
Quenching Media	Water
Obtainable Hardness R.C.	—
Working Hardness HRC	—
Tempering Temperature	580 to 650°C
Normalising Temperature	900 to 930°C

Application :
Used in Components requiring maximum Surface hardness of a Nitrided Case combined with a Fairly High core strength. Parts with Small Rolling sections, Small Bolts, Needle Beds, parts with thin webs and fine Grooves, Gauges & Precision Measuring Tools Super heated steam valves plastic machines borells.

CASE HARDENING STEELS

**EN - 207 STEELS / 20Mncr5 & 16Mncr5
(Cr-Mn STEEL)**

Approximate Other Equivalents :

IS : 16 MnCr 4/15 Cr5
Din : 15Cr3, 16MnCr5/20MnCr5

VISL : MEB 60 (15Cr5), MEB 95 (20MnCr5), 80 (16MnCr5)
AISl : 5120 ASP : EN 207 (15Cr3)

CHEMISTRY :

QUALITY	C	Si	Mn	Cr	P & S
15Cr3	0.12	0.15	0.40	0.40	0.055
	0.18	0.40	0.60	0.70	MAX
16MnCr5	0.14	0.15	1.00	0.80	0.055
	0.19	0.40	1.30	1.10	MAX
20MnCr5	0.16	0.15	1.00	0.90	0.055
	0.23	0.40	1.40	1.10	MAX

SPECIFIC HEAT TREATMENT

Our Colour Code: WHITE & BLUE

QUALITY	15 Cr 3	16 Mncr5	20 Mncr5
Forging Temperature	1100 to 850°C	1100 to 850°C	1100 to 850°C
Annealing Temperature	650 to 700°C	650 to 700°C	650 to 700°C
Annealed Hardness BHN Max	200 BHN	207 BHN	217 BHN
Hardening Temperature	870 to 900°C	870 to 900°C	850 to 880°C
Quenching Media	Oil Salt Bath	Oil Salt Bath	Oil Salt Bath
	At 180 to 250°C	At 180 to 250°C	At 180 to 250°C
Obtainable Hardness R.C.	—	—	—
Working Hardness HRC	—	—	—
Tempering Temperature	150 to 180°C	170 to 200°C	170 to 200°C
Normalising Temperature	870 to 900°C	870 to 890°C	860 to 890°C

Application :
15Cr3 : Small parts with medium core strength & good wear Resistance Piston Rings, Bushes, Drilling Machine Spindles.
16MnCr5 & 20 MnCr5 : Parts subject to Medium Stress but with High such as Gear Wheel Steering of Vehicle & General Engineering Work.

CHROME VANADIUM COLLET STEEL

COLLETS SPRING STEELS

EN - 47 STEELS

Approximate Other Equivalents :

Is : T55Cr70V15
DIN : 50CrV4 & 58CrV4

VISL : M - CrV
AISl : 5152 & 5155

CHEMISTRY :

QUALITY	C	Si	Mn	Cr	V	P & S
EN - 47	0.45	0.10	0.50	0.90	0.15	0.055
	0.55	0.35	0.80	1.20	0.30	MAX

SPECIFIC HEAT TREATMENT

Our Colour Code: WHITE / BLACK

QUALITY	EN - 47
Forging Temperature	1050 to 850°C
Annealing Temperature	660 to 720°C (Soft Annealing)
Annealed Hardness BHN Max	224 BHN
Hardening Temperature	860 to 900°C (Water)
Quenching Media	Water
Obtainable Hardness R.C.	—
Working Hardness HRC	—
Tempering Temperature	670 to 530°C
Normalising Temperature	860 to 900°C

Application :
Used in Oil Hardening Spring Steel having deep Hardenability than Silicon Manganeses Spring steels. Suitable for High and Heavy duty valute & leaf springs for Heavier Engine valve Springs. It is not as susceptible to decarburisations as Billets of Silico Manganeses Spring Steel & other Similar Grades.



MEDIUM CARBON STEELS

EN - 8 STEELS MEDIUM CARBON STEEL

Approximate Other Equivalents :

IS : C 40 / C 45 VISL : M - E 40/M-E 45 AISI : 1040/1045
DIN : C-40/C 4

CHEMISTRY :

QUALITY	C	Si	Mn
EN - 8	0.35	0.25	0.80
	0.45	MAX	1.20
C - 45	0.40	0.10	0.60
	0.50	0.35	0.90

SPECIFIC HEAT TREATMENT

Our Colour Code: WHITE

QUALITY	EN - 8/C - 45 / CK - 45
Forging Temperature	1100 to 850°C
Annealing Temperature	840 to 880°C (Soft Annealing)
Annealed Hardness BHN Max	185 to 200°C BHN
Hardening Temperature	830 to 860°C (Oil) 820 to 850°C (Water)
Quenching Media	Oil/Water
Obtainable Hardness R.C.	—
Working Hardness HRC	—
Tempering Temperature	670 to 530°C
Normalising Temperature	840 to 880°C

Application :

Heat Treatment Bolts, Engine Shafts, Connecting Rods, Dynamo & Motor Shafts, small ARM parts not subject to High Stress & Severe wear.

PLASTIC MOULD STEEL

Special Steel Bars Blocks Forgings

Delivery condition :

Hardened and double tempered with a hardness of 280 - 325 HB (950 - 1100 N/mm²)

Cleanliness :

ASTM E45 - Method A with type A ≤ 1.5

B, C and D each 2 ≤ or

DIN 50602 - K4 20 ≤ or

acc to your request

Service strength

280 - 325 H B

Structure

Fine Bainitic Structure

Physical Properties

Coefficient of thermal expansion	20 - 100° Celsius	20 - 200° Celsius	20 - 300° Celsius	20 - 400° Celsius	20 - 500° Celsius	20 - 600° Celsius	20 - 700° Celsius
(10 ⁻⁶ m/m x k)	11.1	12.9	13.4	13.8	14.2	14.6	14.9
Thermal conductivity [W/(m x k)]	20° Celsius	350° Celsius	700° Celsius				
	35.7	33.2	31.9				

MEDIUM CARBON STEELS

EN - 9 STEELS

Approximate Other Equivalents :

IS : C 55/T55/C55 Mn 75 VISL : M - E - 55 AISI : 1055
DIN : CF 53 CK 56

CHEMISTRY :

QUALITY	C	Mn	Si
EN - 9	0.50	0.50	0.15
	0.57	0.70	0.35

SPECIFIC HEAT TREATMENT

Our Colour Code: WHITE

QUALITY	EN - 9
Forging Temperature	1100 to 850°C
Annealing Temperature	820 to 850°C
Annealed Hardness BHN Max	185 to 200°C BHN
Hardening Temperature	810 to 840°C (Oil) 800 to 830°C (Water)
Quenching Media	Oil/Water
Obtainable Hardness R.C.	—
Working Hardness HRC	—
Tempering Temperature	660 to 700°C
Normalising Temperature	820 to 850°C

Application :

Heat Treatment Bolts, Engine Shafts, Connecting Rods, Dynamo & Motor Shafts, small ARM parts not subject to High Stress & Severe wear.

LIST OF STANDARD SIZES

HIGH CARBON HIGH CHROMIUM STEEL D - 3 GRADE :

ROUNDS :

6, 8, 10, 13, 16, 18, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 140, 150, 160, 170, 180, 190, 200, 205, 210, 220, 230, 240, 250, 260, 270, 280, 300, 310, 320, 330, 340, 350, 360, 380, 410, MM DIA.

ROLLED FLATS :

6 x 25, 32, 40, 50, 65, 80, 105, 130, 150, 180, 200
10 x 25, 32, 40, 50, 65, 80, 105, 130, 150, 180, 200
13 x 25, 32, 40, 50, 65, 80, 105, 130, 150, 180, 200
16 x 25, 32, 40, 50, 65, 80, 105, 130, 150, 180, 200
20 x 25, 32, 40, 50, 65, 80, 105, 130, 150, 180, 200
25 x 32, 40, 50, 65, 80, 105, 130, 150, 180, 200
32 x 40, 50, 65, 80, 105, 130, 150, 180, 200
40 x 50, 65, 80, 105, 130, 150, 180, 200
50 x 65, 80, 105, 130, 150, 180, 200

FORGED FLATS :

25 x 250, 300, 350, 400
32 x 250, 300, 350, 400
40 x 250, 300, 350, 400
50 x 250, 300, 350, 400
65 x 80, 105, 130, 150, 180, 200, 250, 300, 350, 400
80 x 105, 130, 150, 180, 200, 250, 300, 350, 400
100 x 80, 100, 130, 150, 180, 200, 250, 300, 350, 400
130 x 80, 100, 200, 250, 300, 350, 400
150 x 80, 100, 200, 250, 300, 350, 400
200 x 300, 350, 400

PLASTIC MOULD STEEL

P - 20

Special Steel Bars Blocks Forgings

W.1.2311 (Similar to A151 P-20)

CHEMISTRY :

C	Si	Mn	P	S	Cr	Mo
0.37	≤ 0.50	1.40	≤ 0.025	≤ 0.005	1.80	0.15
0.42		1.60			2.10	0.25

General

- Hardenable and temperable plastic mould steel
- Well polishable
- Nitridable
- Suitable for chrome plating and pitting ;
- Uniform hardness up to a cross-section of approx. 400 mm
- Good toughness
- Good machinability

Application :

- Plastic Moulds
- Tool Frames
- Mould frames for Plastic and Pressure casting moulds

SQUARES : D -3 Grade

6, 8, 11, 13, 16, 20, 25, 32, 40, 50, 65, 80, 100, 130, 150 MM SQ.

HIGH CARBON HIGH CHROMIUM STEEL D - 2 GRADE : ROUNDS

10, 13, 16, 18, 20, 22, 26, 28, 32, 36, 40, 45, 50, 56, 60, 65, 70, 75, 80, 90, 100, 110, 115, 120, 125, 130, 140, 150, 160, 170, 180, 190, 205, 210, 220, 230, 240, 250, 260, 280, 300, 310, 320, 330, 350, 360, 380, 410 MM DIA.

FLATS :

20 x 30, 40, 50 30 x 55, 58 28 x 65, 105
32 x 105, 160 40 x 100, 150
50 x 75, 105 80 x 130

HOT DIE STEEL ROUNDS H - 11 GRADE :

6, 8, 10, 13, 16, 20, 22, 25, 28, 32, 36, 40, 45, 50, 60, 65, 70, 75, 80, 90, 100, 110, 125, 130, 140, 150, 160, 180, 200, 210, 220, 230, 240, 250, 260, 280, 300, 310 MM DIA.

HOT DIE STEEL FLATS H - 11 GRADE :

20 x 80, 100
25 x 80, 100, 130, 150, 200
32 x 100, 130, 150, 200, 250
35 x 80
40 x 200, 260
50 x 105, 130, 150, 200
150 x 250

HOT DIE STEEL ROUNDS H - 13 GRADE :

20 To 310 MM DIA

HOT DIE STEEL FLATS H - 13 GRADE :

40 x 100 65 x 210, 310, 360
80 x 210, 310, 360, 400 105 x 210, 260, 360, 400
130 x 360, 400 160 x 260, 310, 460

OIL HARDENING NON SHRINKING STEEL WITH TUNGSTEN BASE : ROUNDS : OHNS(W)

10, 13, 16, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 60, 63, 65, 70, 75, 80, 90, 100, 110, 125, 130, 140, 150, 160, 170, 180, 205, 220, 230, 240, 250, 260, 280, 300 MM DIA.

HIGH SPEED STEEL ROUNDS M - 2 GRADE & M -35 GRADE :

6.3, 10, 13, 16, 20, 22, 25, 28, 32, 36, 40, 45, 50, 65, 80, 100, 110, 125, 140, 150, 200, MM DIA.

EN - 19 STEEL ROUNDS - HOT ROLLED/ANNEALED CONDITION :

13, 14, 16, 18, 20, 22, 25, 28, 32, 34, 36, 38, 40, 42, 45, 50, 56, 65, 70, 75, 80, 90, 100, 105, 110, 120, 125, 140, 155, 160, 180, 200, 360, MM DIA.

EN - 19 STEEL Squares :

75 mm sq, 110 mm sq, 125 mm sq

EN - 19 STEEL BRIGHT DRAWN HEXAGON :

14, 17, 19, 22, 24, 27, 30 ANS 36MM A/F.

EN - 24 STEEL ROUNDS - HOT ROLLED/ANNEALED CONDITION HIGH TENSILE STEEL :

13 x 32, 40, 50, 65, 80, 100, 130, 150, 200
16 x 32, 40, 50, 65, 80, 100, 130, 150, 200
20 x 40, 50, 65, 80, 100, 130, 150, 200
25 x 40, 50, 65, 80, 100, 130, 150, 200
32 x 40, 50, 65, 80, 100, 130, 150, 200
40 x 50, 65, 80, 100, 130, 150, 200
50 x 65, 80, 100, 130, 150, 200
65 x 80, 100, 130, 150, 200
80 x 100, 130, 150, 200
100 x 130, 150, 200
160 x 210

EN - 31 STEEL FORGED FLATS - 1% CARBON, CHROME & MANGANESE-BALL BEARING STEEL :

25 x 250, 300, 350 32 x 250, 300, 350
40 x 250, 300, 350 65 x 250, 300, 350
50 x 250, 300, 350 100 x 250, 300, 350
80 x 250, 300, 350 150 x 250, 300, 350
130 x 250, 300, 350

OHNS(W) FLATS

6 x 32, 40, 50, 65, 80, 100, 130, 150, 200, 250
10 x 32, 40, 50, 65, 80, 100, 130, 150, 200, 250
13 x 40, 50, 65, 80, 100, 130, 150, 200, 250
16 x 40, 50, 65, 80, 100, 130, 150, 200, 250
20 x 40, 50, 65, 80, 100, 130, 150, 200, 250
25 x 40, 50, 65, 80, 100, 130, 150, 200, 250
32 x 40, 50, 65, 80, 100, 130, 150, 200, 250
40 x 50, 65, 80, 100, 130, 150, 200, 250, 300
50 x 65, 80, 100, 130, 150, 200, 250, 300
65 x 80, 100, 130, 150, 200, 250, 300
75/80 100, 130, 150, 200, 250, 300

SQUARES :

20, 25, 32, 40, 50, 65, 80, 100, 125 MM SQ.

12, 16, 18, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 60, 63, 65, 70, 75, 80, 90, 100, 110, 120, 130, 150, 170, 190, 210, 220, 230, 240, 250, 260, 280, 300, 310, 320, 125, 140, 160, 180, 200, 330 MM DIA.

EN - 24 STEEL FORGED FLATS-HOT ROLLED/ANNEALED CONDITION HIGH TENSILE STEEL :

40 X 80, 100, 130, 150, 200
50 X 80, 100, 130, 150, 200

EN - 31 STEEL ROUNDS - 1% CARBON, CHROME & MANGANESE - BALL BEARING STEEL :

20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 63, 65, 70, 75, 80, 90, 100, 115, 125, 140, 150, 160, 180, 200, 230, 250, 435, 450, MM DIA.

EN - 31 STEEL ROLLED FLATS - 1% CARBON, CHROME & MANGANESE BALL BEARING STEEL :

6 X 25, 32, 40, 50, 65, 80, 100
10 X 25, 32, 40, 50, 65, 80, 100, 130, 150, 200

EN - 31 STEEL SQUARES - 1% CARBON, CHROME & MANGANESE-BALL BEARING STEEL :

20, 25, 28, 32, 40, 50, 56, 65, 75/80, 100, 130, 150 MM SQ.

EN - 36 STEEL ROUNDS - 3.5% NICKEL CHROMIUM CASE HARDENING STEEL :

22, 26, 28, 32, 36, 40, 45, 50, 56, 60, 63, 65, 70, 75, 80, 90, 100, 110, 125, 140, 150, 160, 180, 200, MM DIA.

EN - 353/354 STEEL ROUNDS-NICKEL CHROMIUM MOLYBDENUM CASE HARDENING STEELS :

16, 20, 22, 25, 32, 36, 38, 40, 45, 50, 56, 60, 63, 65, 70, 75, 80, 90, 100, 105, 110, 120, 125, 140, 150, 160, 180, 200, 210, 230, 250/260, 280 MM DIA.

20MNCr5 STEEL ROUNDS - LOW CARBON, CHROMIUM MANGANESE CASE HARDENING STEEL :

20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 60, 65, 70, 75, 80, 90, 100, 105, 110, 115, 125, 140, 150, 160, 180, 200, 220, 250, 285, MM DIA.

EN - 41B NITRIDING STEEL ROUNDS :

20, 25, 28, 32, 36, 40, 45, 50, 56, 60, 65, 70, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 140, 150, 160, 170, 180, 200, 210, 220 MM DIA

EN - 8/C - 45 STEEL FLATS - HOT ROLLED BLACK BARS :

6 x 25, 32, 40, 50, 65, 80, 100
10 x 25, 32, 40, 50, 65, 80, 100, 130, 150
12 x 25, 32, 40, 50, 65, 80, 100, 130, 150, 200
16 x 25, 32, 40, 50, 65, 80, 100, 130, 150, 200
20 x 25, 32, 40, 50, 65, 80, 100, 130, 150, 200
25 x 32, 40, 50, 65, 80, 100, 130, 150, 200
32 x 40, 50, 65, 80, 100, 130, 150, 200
40 x 50, 65, 80, 100, 130, 150, 200
50 x 65, 80, 100, 130, 150, 200
65 x 80, 100, 130, 150, 200
80 x 100, 130, 150, 200
105 x 210, 250, 310 (FORGED/ANNEALED)

EN - 8 STEEL SQUARES - HOT ROLLED BLACK BARS :-

16, 20, 25, 32, 36, 40, 50, 65, 75/80, 90, 100, 120, 125, 160, 170, 180, 210, MM SQ.

EN - 8/C - 45 STEEL BRIGHT HEXAGON :

12, 14, 17, 19, 21, 24, 27, 30, 32, 36, 41, 55 MM A/F.

EN - 47 COLLECT SPRING STEEL ROUNDS :

12.5, 20, 22, 25, 28, 30, 32, 36, 40, 45, 50, 56, 60, 65, 70, 75, 80, 90, 100, 110, 125, 140, 160/165, 180, 200 MM DIA.

SILVER STEEL GROUND ROUNDS :

1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 1.5, 2.5, 3.5, 4.5, 5.5, 6.3 MM DIA.

EN - 8/C - 45 STEEL ROUNDS - HOT ROLLED BLACK BARS

10, 12, 16, 18, 20, 22, 25, 28, 30, 32, 36, 38, 40, 45, 50, 53, 56, 60, 63, 65, 70, 75, 80, 85, 90, 100, 110, 120, 125, 130, 140, 150, 160, 180, 200, 205/210, 230, 240, 250, 260, 270/280, 300, 320, 340, 350, 380, 435, MM DIA.

EN - 8 STEEL ROUNDS BRIGHT BARS :

6 MM to 55 MM DIA.

EN - 8/C - 45 STEEL PLATES :

(GAS CUTTING CAN BE ARRANGED FOR SPECIFIC DIMENSION)
6, 10, 12, 16, 20, 25, 32, 36, 40, 45, 50, 63 MM THICKNESS.

EN - 8 STEEL BRIGHT ROUNDS :

6, 8, 10, 11, 12/13, 14, 15, 16, 18, 20, 22, 25, 28, 32, 36, 38, 40, 45, 50 MM DIA

NOTE :

- SPECIFICATIONS AND SIZES NOT MENTIONED IN THE STOCK LIST MAY BE ENQUIRED TO ENABLE US TO OFFER THE SAME.
- CUTTING FACILITY AVAILABLE UPTO 600 MM DIA.

SECTIONAL WEIGHT OF STEELS BARS/IN KG/MTR/(SP.GR.7.85)

Dimensions	Rounds	Squares	Hexagons	Dimensions	Rounds	Squares	Hexagons
2.5 MM	0.04	0.05	0.04	16 MM	1.58	2.01	1.74
3 MM	0.06	0.07	0.06	17 MM	1.78	2.27	1.97
3.5 MM	0.08	0.10	0.08	18 MM	2.00	2.54	2.20
4 MM	0.10	0.13	0.11	19 MM	2.23	2.83	2.45
4.5 MM	0.13	0.16	0.14	20 MM	2.47	3.14	2.72
5 MM	0.15	0.20	0.17	21 MM	2.72	3.46	3.00
5.5 MM	0.19	0.24	0.21	22 MM	2.98	3.80	3.29
6 MM	0.22	0.28	0.24	23 MM	3.26	4.15	3.60
7 MM	0.30	0.38	0.33	24 MM	3.55	4.52	3.92
8 MM	0.40	0.50	0.43	25 MM	3.85	4.91	4.25
9 MM	0.50	0.64	0.55	26 MM	4.17	5.31	4.60
10 MM	0.62	0.79	0.68	27 MM	4.50	5.72	4.96
11 MM	0.75	0.95	0.82	28 MM	4.82	6.15	5.33
12 MM	0.89	1.13	0.98	29 MM	5.19	6.60	5.72
13 MM	1.04	1.33	1.15	30 MM	5.55	7.07	6.12
14 MM	1.21	1.54	1.33	31 MM	5.93	7.54	6.53
15 MM	1.39	1.77	1.53	32 MM	6.31	8.04	6.96

Dimensions	Rounds	Squares	Hexagons	Dimensions	Rounds	Squares	Hexagons
33 MM	6.71	8.55	7.40	58 MM	20.74	26.41	22.87
34 MM	7.13	9.08	7.86	60 MM	22.20	28.26	24.47
35 MM	7.55	9.62	8.33	62 MM	23.70	30.18	26.13
36 MM	7.99	10.17	8.81	63 MM	24.50	31.20	27.00
37 MM	8.44	10.75	9.31	65 MM	26.05	33.17	28.70
38 MM	8.90	11.34	9.82	68 MM	28.50	36.30	31.44
39 MM	9.38	11.94	10.34	70 MM	30.21	38.46	33.31
40 MM	9.87	12.65	10.88	72 MM	31.96	40.69	35.24
41 MM	10.36	13.20	11.43	73 MM	32.90	41.80	36.30
42 MM	10.88	13.85	11.99	75 MM	34.68	44.16	38.30
45 MM	12.49	15.90	13.76	78 MM	37.50	47.76	41.36
46 MM	13.05	16.61	14.38	80 MM	39.46	50.24	43.41
48 MM	14.21	18.09	15.66	83 MM	42.50	54.10	46.90
50 MM	15.41	19.63	17.00	85 MM	44.55	56.71	49.12
52 MM	16.67	21.23	18.38	90 MM	49.94	63.58	55.07
53 MM	17.32	22.10	19.00	95 MM	55.64	70.85	61.36
55 MM	18.65	23.80	20.60				



SECTIONAL WEIGHT OF STEELS BARS/IN KG/MTR/(SP.GR.7.85)

Dimensions	Rounds	Squares	Dimensions	Rounds	Squares
100 MM	61.65	78.50	190 MM	222.57	283.00
105 MM	67.97	86.55	195 MM	234.44	298.50
110 MM	74.60	94.99	200 MM	246.61	314.00
115 MM	81.54	103.82	205 MM	259.10	329.00
120 MM	88.78	113.04	210 MM	271.89	346.19
125 MM	96.34	122.66	215 MM	284.99	363.80
130 MM	104.20	132.67	225 MM	312.12	397.60
135 MM	112.36	143.07	230 MM	326.15	415.27
140 MM	120.84	153.68	235 MM	340.48	433.52
145 MM	129.63	165.05	240 MM	355.12	452.16
150 MM	138.72	176.03	241 MM	358.98	457.07
155 MM	148.12	188.60	245 MM	370.07	471.19
160 MM	157.83	200.96	250 MM	385.33	490.43
165 MM	167.85	213.72	253 MM	397.76	506.43
170 MM	178.18	228.87	255 MM	400.90	510.44
175 MM	188.81	240.41	260 MM	416.77	530.66
180 MM	199.76	254.34	265 MM	432.96	551.26
185 MM	211.01	268.67	270 MM	449.45	572.26

Dimensions	Rounds	Squares	Dimensions	Rounds	Squares
275 MM	466.25	593.65	345 MM	733.83	934.34
280 MM	483.36	615.44	350 MM	755.25	961.62
285 MM	500.78	636.16	355 MM	776.99	989.29
290 MM	518.50	660.18	360 MM	799.03	1017.36
295 MM	536.54	683.14	365 MM	821.38	1045.81
300 MM	554.88	706.50	370 MM	844.03	1074.66
305 MM	573.53	730.24	375 MM	867.00	1103.90
310 MM	611.75	754.38	380 MM	890.27	1133.54
315 MM	631.33	778.91	385 MM	913.86	1163.56
320 MM	651.21	803.84	390 MM	937.75	1193.96
325 MM	633.33	829.15	395 MM	961.95	1224.79
330 MM	671.40	854.86	400 MM	968.45	1256.00
335 MM	691.40	880.96			
340 MM	712.71	907.46			

Note : Above Tables are Approximate
FORMULA (IN MILLIMETER)
 Rounds : DIA x DIA x Length ÷ 162179
 Flats : Thickness x Width x Length ÷ 125000
 Squares : Square x Square x Length ÷ 125000
 Hexagon : Hexagon x Hexagon x Length ÷ 144000

MACHINE ALLOWANCES FOR ROUNDS

DIAMETER	MINIMUM MACHINING ALLOWANCE ON DIA (MM)
Over 50 up to & incl. 75	4.5
Over 50 up to & incl. 100	6.0
Over 100 up to & incl. 125	7.5
Over 125 up to & incl. 150	9.0
Over 150 up to & incl. 175	16.0
Over 175 up to & incl. 275	20.0
Over 275 up to & incl. 400	25.0
Over 400 up to & incl. 600	30.0

Note :
 Maximum Limit of Decarburisation is 80% of the machining allowances

SECTIONAL WEIGHT OF STEELS BARS/IN KG/MTR/(SP.GR.7.85)

Dimensions	Rounds	Squares	Dimensions	Rounds	Squares
405 MM	1011.27	1287.59	485 MM	1450.24	1846.51
410 MM	1036.39	1319.58	490 MM	1480.30	1884.78
415 MM	1081.83	1351.96	495 MM	1510.67	1923.44
420 MM	1087.57	1384.74	500 MM	1541.34	1962.50
425 MM	1113.62	1417.90	505 MM	1572.32	2001.94
430 MM	1139.97	1451.46	510 MM	1603.61	2041.78
435 MM	1166.64	1485.41	515 MM	1635.21	2082.01
440 MM	1193.61	1519.76	520 MM	1667.11	2122.64
445 MM	1222.28	1554.49	525 MM	1699.33	2163.65
450 MM	1248.48	1589.62	530 MM	1731.85	2205.06
455 MM	1276.38	1625.14	535 MM	1764.68	2246.86
460 MM	1304.59	1661.06	540 MM	1797.82	2289.06
465 MM	1333.10	1697.36	545 MM	1831.26	2331.64
470 MM	1361.93	1734.05	550 MM	1865.02	2374.62
475 MM	1391.06	1771.15	555 MM	1899.08	2417.99
480 MM	1420.50	1808.64	560 MM	1933.46	2461.76

Dimensions	Rounds	Squares
565 MM	1968.14	2505.91
570 MM	2003.12	2550.46
575 MM	2038.42	2595.40
580 MM	2074.03	2640.74
585 MM	2109.94	2686.46
590 MM	2146.16	2732.58
595 MM	2182.69	2779.09
600 MM	2219.53	2826.00

Note : Above Tables are Approximate
FORMULA (IN MILLIMETER)
 Rounds : DIA x DIA x Length ÷ 162179
 Flats : Thickness x Width x Length ÷ 125000
 Squares : Square x Square x Length ÷ 125000
 Hexagon : Hexagon x Hexagon x Length ÷ 144000

MACHINE ALLOWANCES FOR FLATS

WIDTH (MM)	THICKNESS IN MM															
	Up to & Incl. 13		Over 13 Up to & Incl. 25		Over 25 Up to & Incl. 50		Over 50 Up to & Incl. 75		Over 75 Up to & Incl. 100		Over 100 Up to & Incl. 125		Over 100 Up to & Incl. 150		Over 150	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
up to incl. 13	0.75	0.75														
Over 13 up to & incl. 25	0.75	1.20	1.50	1.50												
Over 25 up to & incl. 50	0.90	1.60	1.50	1.90	2.30	2.30										
Over 50 up to & incl. 75	1.00	2.00	1.60	2.20	2.30	2.60	3.00	3.00								
Over 75 up to & incl. 100	1.10	2.50	1.60	2.60	2.30	2.70	3.00	3.30	3.80	3.80						
Over 100 up to & incl. 125	1.40	3.10	1.90	3.10	2.50	3.10	3.10	3.50	3.80	3.80	4.50	4.50				
Over 125 up to & incl. 150	1.60	1.80	2.00	3.70	2.80	3.80	3.30	3.80	4.00	4.00	4.50	4.50	5.30	5.30		
Over 150 up to & incl. 175	1.80	4.20	2.10	4.30	2.90	4.40	3.40	4.40	4.50	4.50	4.80	4.80	5.60	5.60	6.30	6.30
Over 175 up to & incl. 200	1.90	5.00	2.30	5.10	3.10	5.20	3.80	5.20	5.20	5.20	5.30	5.30	5.60	5.60	6.30	6.30
Over 200 up to & incl. 225	--	--	2.50	5.10	3.50	5.20	4.00	5.20	5.30	5.30	5.70	5.70	6.30	6.30	6.30	6.30
Over 225 up to & incl. 250	--	--	2.80	5.10	3.80	5.20	4.40	5.20	5.70	5.70	6.30	6.30	6.30	6.30	6.30	6.30

NOTE : Maximum Limit of Decarburisation is 80% of the machining allowance per side

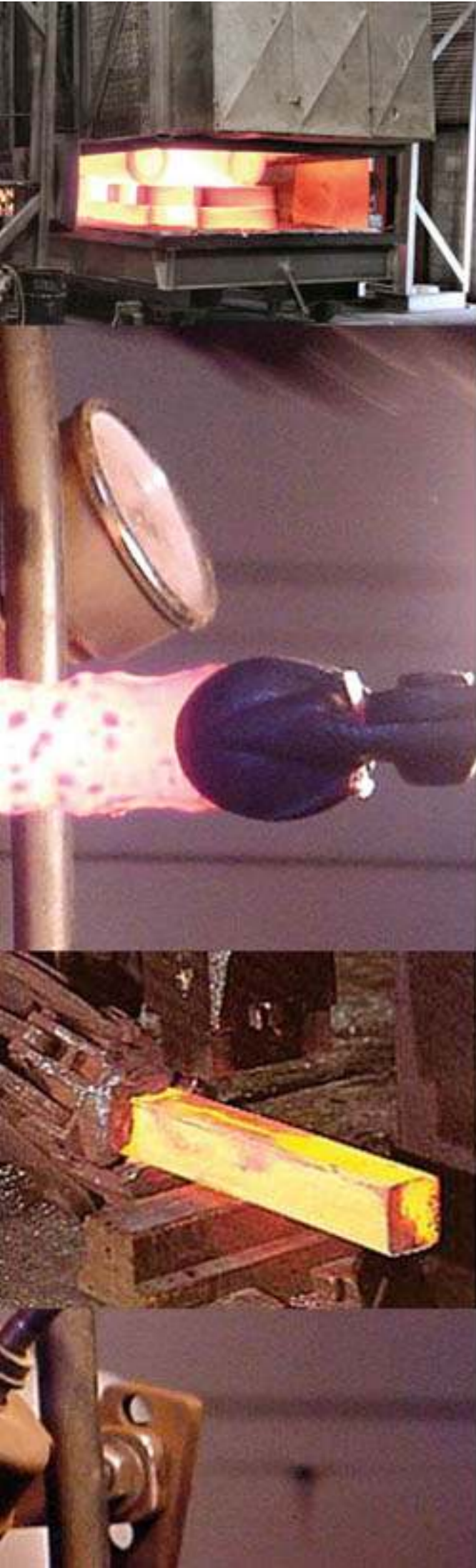
SECTIONAL WEIGHT FOR FLATE (KG PER METRE/SPECIFIC GRAVITY 7.85)

Width IN MM	THICKNESS IN MM															
	6	10	12	16	20	25	32	40	50	65	80	100	130	150	200	
25	1.18	1.96	2.36	3.14	3.93	4.90	6.28	7.85								
32	1.50	2.51	3.01	4.01	5.02	6.28	8.03	10.04								
40	1.88	3.14	3.77	5.02	6.28	7.85	10.04	12.56								
50	2.35	3.92	4.71	6.28	7.85	9.81	12.56	15.70	19.62							
65	3.06	5.10	6.12	8.16	10.20	12.75	16.32	20.41	26.00	33.17						
80	3.77	6.28	7.53	10.04	12.56	15.70	20.09	25.12	32.00	41.60	50.24					
100	4.71	7.85	9.42	12.56	15.70	19.62	25.12	31.40	40.00	52.00	64.00	78.50				
130	6.12	10.20	12.24	16.32	20.41	25.51	32.45	40.82	52.00	67.60	83.20	104.00	132.67			
150	7.06	11.77	14.13	18.84	23.55	29.43	37.68	47.10	60.00	78.00	96.00	120.00	156.00	176.03		
180	8.48	14.13	16.95	22.66	28.26	35.32	45.21	56.52	72.00	93.60	115.20	144.00	187.20			
200	9.42	15.17	18.84	25.12	31.40	39.25	50.24	62.80	78.50	104.00	132.80	168.00	208.00	240.00	314.00	
250	11.77	19.62	23.55	31.40	39.25	49.06	62.80	78.50	98.12	130.00	160.00	200.00	260.00	300.00		
300					47.10	58.87	75.36	94.40	117.75	156.00	192.00	240.00	312.00	360.00		
400						80.00										

Note : Above Tables are Approximate
FORMULA (IN MILLIMETER)
 Rounds : DIA x DIA x Length ÷ 162179
 Flats : Thickness x Width x Length ÷ 125000
 Squares : Square x Square x Length ÷ 125000
 Hexagon : Hexagon x Hexagon x Length ÷ 144000

ABBREVIATIONS

1.	Al	ALUMINIUM
2.	C	CARBON
3.	Cr	CHROMIUM
4.	Co	COBALT
5.	Mn	MANGANESE
6.	Mo	MOLYBDENUM
7.	P	PHOSPHORUS
8.	S	SULPHUR
9.	Si	SILICON
10.	V	VANADIUM
11.	W	TUNGSTEN (WOLFRAM)
12.	AFNOR	ASSOCIATION FRANCAISE DE NORMALISATION, FRANCE.
13.	AISI	AMERICAN IRON AND STEEL INSTITUTE
14.	ASP	ALLOY STEEL PLANT DURGAPUR
15.	BASL	BIHAR ALLOY STEELS LIMITED
16.	BS	BRITISH STANDARDS
17.	DIN	STANDARDS OF DEUTSCHER NORMENASSCHU
18.	IS	INDIAN STANDARD STEELS
19.	JIS	JAPANESE STANDARD SPECIFICATIONS
20.	SAE	SOCIETY OF AMERICAN AUTOMOTIVE ENGRS. PHILADELPHIA
21.	ISL	VISVESVARAYA IRON & STEEL LIMITED



DEFINITION OF SOME USEFUL PROCESS OVER STEEL HEAT TREATMENT

HEAT TREATMENT

Heat treatment is an operation or combination of operations involving the heating and cooling of a metal or alloy when in solid form to obtain certain desirable conditioner properties. Heating and cooling for the sole purpose of mechanical working are excluded from the meaning of the definition.

ANNEALING

The term annealing usually implies to relatively slow cooling. In annealing the Temperature, rate of heating and cooling and the time depends upon the composition, shape and size of the steel that is being treated. The purpose of annealing is to remove stress to induce softness, to reduce hardness, to alter ductility, toughness, improve machinability, facilitate cold working, to produce a desired micro-structure, to change electric, magnetic or other physical and mechanical properties.

DISTORTION

The deviation from the desired size, shape or form, as occurring in heat treatment.

HARDNESS PROCESS

HARDENING

Any process of increasing the hardness of metal or alloy superior to that obtained when the alloy is not quenched by suitable treatment usually heating above the critical temperature range and cooling by Quenching. The term is usually restricted to the formation of martensite.

CASE HARDENING

Hardening a ferrous alloy in order to change the outer surface or case substantially harder than the inner surface or core, by inward diffusion from a gas or liquid followed by appropriate thermal treatment. The term is usually applied to carburizing, cyaniding or nitriding treatment followed by quenching to produce a hard case and a core of suitable properties.

TEMPERING

The reheating of quench hardened or normalized steel below transformation range and the cooling slowing at a desired rate. The object of this process a desired combination of mechanical properties such as release of stress, restore, some ductility, develop toughness though regulation or readjustment of the embrittled structural constituents of the metal.



SONI STEELS

