

## MATERIAL RANGE

### SPECIALIST IN SUPPLY OF ODD / SPECIAL GRADES STEEL MATERIALS

#### CARBON / ALLOY STEEL FORGINGS

RINGS / PINS / SHAFTS / FLANGES / GEAR BLANKS IN  
EN-19 ● EN-24 ● EN-29 B ● EN-36 ● EN-40 B ● EN-353 GRADES

#### BHEL SPECN STEELS

HY 19366 ● HW 19386 ● HW 10781 ● HW 10687 ● HW 10683 ● HW 10681 ● AA 10628 ● AA 10622

#### CARBON / SPRING STEEL PLATES / SHEETS

EN-8 ● EN-9 ● EN-42 J ● EN-45 ● EN-47 GRADES

#### NITRIDING STEELS

EN 29B ● EN 40B ● EN41B GRADES

#### HIGH MANGANESE STEEL PLATES / SHEETS

12% - 14% MANGANESE STEEL GRADE

#### SPECIALITY METALS / SHEETS

INCONEL ● MONEL ● HASTALLOY ● NICKEL ● INCOLOY ● TITANIUM GRADES

#### DIE STEEL BLOCKS & BARS / MOULD STEEL

P-20 ● DIN 2713 ● DIN 2714 GRADES

#### WEAR RESISTANT PLATES

SAIL MA 350 HI ● SAIL MA 410 HI ● St 52.3 ● Fe 540 WHT GRADES

#### FLANGE STEELS

ASTM A 182-77A F5 ● F11 ● F22 GRADES

#### STAINLESS STEELS / DUPLEX STEELS

SS 303 ● SS 310 ● SS 440 ● SS 446 ● 17/4 PH ● 17/7 PH GRADES

#### BOILER QUALITY PLATES

SA 515 / 516 GR 60/70 IS:2002 GR2A / 2B IS:2062 GR A/B GRADES

#### ALLOY STEEL & CARBON STEEL PIPES

ASTM - AISI - EN SERIES GRADES

**GUARANTEED DELIVERY IN 3-4 DAYS**

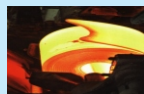
## STOCKISTS & SUPPLIERS OF REGULAR GRADES IN TOOL / ALLOY / DIE AND STAINLESS STEELS

HIGH SPEED STEEL ● HOT DIE STEEL ● HCHCR ● OHNS  
1% CARBON ● EN-1A ● EN-3B ● EN-8 ● EN-9 ● EN-16  
EN-18 ● EN-19 ● EN-24 ● EN-27 ● EN-28 ● EN-29B ● EN-30B  
EN-31 ● EN-32B ● EN-36 ● EN-36C ● EN-39B ● EN-40B  
EN-41B ● EN-42J ● EN-45 ● EN-47 ● EN-48A ● EN-52  
EN-100 ● EN-111 ● EN-202 ● EN-353 ● EN-354 ● SAE-1117  
SAE-4130 ● SAE-4140 ● SAE-4161 ● SAE-4320 ● SAE-4340  
SAE-52100 ● SAE-6150 ● SAE-8620 ● 16/20Mn Cr5  
15 CRNi6 ● 18 CRNi8 ● MILD STEEL ● SS-410 ● SS-416  
SS-420 ● SS-431 ● SS-304 ● SS-304L ● SS-316 ● SS-316L  
SS-321 ● BRASS ● COPPER ● ALUMINIUM ● TIN  
SHEETS ● NICKEL ● BRIGHT BARS ● PHOSPHOR BRONZE  
GUN METAL ● ZINC (IMPORTED & INDIAN PRIME QUALITY)

**SAME DAY DELIVERY ASSURED**

## MATERIAL SECTIONS

- ❖ BILLETS ❖ HEAVY SHAFTS ❖ GEAR BLANKS ❖ WIRE RODS ❖ ROUND BARS ❖
- ❖ SLABS ❖
- ❖ PLATES ❖
- ❖ SHEETS ❖
- ❖ SQUARES ❖ PROFILE CUT PLATES ❖ ROUND/SQUARE PIPES & TUBES ❖



COILS ❖  
STRIPS ❖  
RODS ❖

### SIZE RANGE

#### ROUNDS

2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 18, 19, 20, 22, 25, 26, 28, 30, 32, 35, 38, 40, 42, 45, 48, 50, 52, 56, 60, 63, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 120, 125, 130, 135, 140, 145, 150, 155, 160, 170, 175, 180, 190, 200, 210, 220, 225, 230, 240, 245, 250, 255, 260, 270, 280, 290, 300, 310, 330, 340, 350, 360, 370, 380, 390, 400, 425, 440, 450, 465, 475, 490, 500, 510, 525, 540, 560, 600, 635, 680, 700, 750, 800, 840, 880, 900, 925, 950, 980, 1000, 1050, 1200MM DIA

#### SQUARES

6, 8, 10, 12, 16, 18, 20, 22, 25, 28, 30, 36, 40, 45, 50, 60, 63, 65, 70, 75, 80, 85, 90, 95, 100, 110, 125, 140, 150, 160, 165, 175, 190, 200, 210, 225, 240, 250, 260, 275, 300, 325, 340, 350, 375, 400, 440, 480, 520, 560, 600MM SQ/RCS

#### FLATS

ALL SIZES AVAILABLE / CAN BE MADE AS PER EXACT REQUIREMENT

#### HEXAGONS

5, 6, 7, 8, 10, 12, 14, 16, 20, 22, 25, 28, 32, 36, 38, 40, 45, 50, 63, 75, 80, 90, 100, 125, 140, 160MM A/F

#### PLATES

4, 5, 6, 8, 10, 12, 15, 16, 18, 20, 22, 25, 28, 32, 36, 38, 40, 45, 50, 55, 60, 63, 65, 70, 75, 80, 90, 100, 110, 125, 140, 160, 180, 200, 220, 240, 260, 280, 290, 300, 320, 800 MM Thick.

#### RINGS

ALL SIZES UPTO 1200MM OD x 300MM ID x 400MM THK AVAILABLE

#### BLOCKS

ALL SIZES UPTO 30" X 30" X 30" AVAILABLE.

#### SHEETS

10, 12, 14, 16, 18, 20, 22, 23, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42 Swg thick.

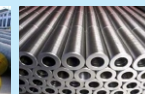
#### PIPES / TUBES

4mm OD x 1mm ID upto 1000mm OD x 800mm ID

**NOTE:** INCH DIMENSION SIZES ALSO AVAILABLE

## MATERIAL CONDITIONS

- ❖ COLD ROLLED ❖ COLD DRAWN ❖ PEELED ❖ CENTRELESS GROUND
- ❖ HOT ROLLED ❖
- ❖ FORGED ❖ ANNEALED ❖ QUENCHED & TEMPERED ❖ HARDENED & TEMPERED



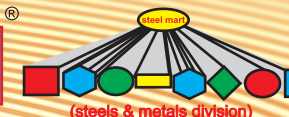
NORMALISED

### HIGHLIGHTS

- ✓ Specialists in heavy forgings / rolls / blanks / shafts as per specific design
- ✓ Spacious warehouse with all facilities, viz. Hacksaw (12" & 20"), Gas Cutting (plasma), Profile Cutting Machines and Band Saw Cutting Machine for accuracy (without taper cut)
- ✓ Easy access to vast stocks of ALLOY-TOOL-CARBON-SPECIAL-DIE-STAINLESS STEELS in complete range of standards sizes in Round, Square, Flat, Block, Plate, Sheet, Hexagon sections as well as in ODD GRADES / SIZES
- ✓ Constant upgradation of facilities to provide timely service & prompt supply to all clients
- ✓ Rigid quality control at all levels, to ensure top-class, cent-per-cent PRIME grade materials
- ✓ Special facility for immediate booking & supply of small orders



**steel mart**



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**e-mail : juzerfaizy@gmail.com ★ steelmart@mtnl.net.in**  
**skype : steelmartmumbai ★ website : www.steelmart.in**

**SILVER JUBILEE YEAR - It pays to deal with an Experienced Business House**

## CARBON STEEL / BOILER QUALITY STEEL PLATES

| Specification      | GRADE  | %C Max    | %Mn Max | %Si Max   | %P Max    | %S Max | CE (max)                                                                   | % Others                                                                              |     |     |                                | UTS Mpa (min)         | YS Mpa (min)                |     |                      | Elong. % (min) | Bend test          | Charpy V-Notch Impact Energy                                                        |                      |  |
|--------------------|--------|-----------|---------|-----------|-----------|--------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----|-----|--------------------------------|-----------------------|-----------------------------|-----|----------------------|----------------|--------------------|-------------------------------------------------------------------------------------|----------------------|--|
| SAILMA             | 300    | 0.25      | 1.50    | 0.45      | 0.055     | 0.055  |                                                                            |                                                                                       |     |     | Nb+V+Ti = 0.30 max             | 440-560               | 300                         |     |                      | 20             | 3T                 | 40J at 0 for 300HI, 30J at -20 for 350HI, 25J at 20 for 410HI, 20J at -20 for 450HI |                      |  |
|                    | 300HI  | 0.20      | 1.50    | 0.45      | 0.040     | 0.040  |                                                                            |                                                                                       |     |     |                                | 440-560               | 300                         |     |                      | 21             | 3T                 |                                                                                     |                      |  |
|                    | 350    | 0.25      | 1.50    | 0.45      | 0.055     | 0.055  |                                                                            |                                                                                       |     |     |                                | 490-610               | 350                         |     |                      | 20             | 3T                 |                                                                                     |                      |  |
|                    | 350HI  | 0.20      | 1.50    | 0.45      | 0.040     | 0.040  |                                                                            |                                                                                       |     |     |                                | 490-610               | 350                         |     |                      | 21             | 3T                 |                                                                                     |                      |  |
|                    | 410    | 0.25      | 1.50    | 0.45      | 0.055     | 0.055  |                                                                            |                                                                                       |     |     |                                | 540-660               | 410                         |     |                      | 19             | 3T                 |                                                                                     |                      |  |
|                    | 410HI  | 0.20      | 1.50    | 0.45      | 0.040     | 0.040  |                                                                            |                                                                                       |     |     |                                | 540-660               | 410                         |     |                      | 20             | 3T                 |                                                                                     |                      |  |
|                    | 450    | 0.25      | 1.50    | 0.45      | 0.055     | 0.055  |                                                                            |                                                                                       |     |     |                                | 570-720               | 450                         |     |                      | 18             | 3T                 |                                                                                     |                      |  |
|                    | 450HI  | 0.20      | 1.50    | 0.45      | 0.040     | 0.040  |                                                                            |                                                                                       |     |     |                                | 570-720               | 450                         |     |                      | 19             | 3T                 |                                                                                     |                      |  |
| DIN17100           | ST52.3 | 0.22      | 1.60    | 0.55      | 0.040     | 0.040  |                                                                            |                                                                                       |     |     | Al 0.02min                     | 490-630               | 355                         |     |                      | 18             |                    | 27J at -20                                                                          |                      |  |
| IS2002             | 2      | 0.20      | 1.20    | 0.35      | 0.035     | 0.040  | 0.44                                                                       |                                                                                       |     |     | Cu 0.10max, Al 0.022max        | 410-530               | <16-265,>16-40-255, >40-245 |     |                      | 22             | 2T                 |                                                                                     |                      |  |
| ASTMA 516          | 60     | 0.24-0.27 | *       | 0.40      | 0.035     | 0.035  | *T<12.5mm= 0.6-0.9, >12.5mm= 0.85-1.20                                     |                                                                                       |     |     | 415-550                        | 220                   |                             |     | 25                   | 1.5T           | 18J at -51 (<26mm) |                                                                                     |                      |  |
|                    | 65     | 0.28-0.31 | 0.90    | 0.40      | 0.035     | 0.035  |                                                                            |                                                                                       |     |     |                                | 450-585               | 240                         |     |                      | 23             | 2T                 | 18J at -51 (<26mm)                                                                  |                      |  |
|                    | 70     | 0.31-0.33 | 1.20    | 0.40      | 0.035     | 0.035  |                                                                            |                                                                                       |     |     |                                | 485-620               | 260                         |     |                      | 21             | 2T                 | 20J at -46 (<26mm)                                                                  |                      |  |
| ASTMA 537          | CL-1   | 0.24      | 1.60    | 0.50      | 0.035     | 0.035  | 0.25                                                                       |                                                                                       |     |     | Al - 0.02 min<br>Cu - 0.35 max | 485-620               | 345                         |     |                      | 22             |                    |                                                                                     |                      |  |
| SILHARD            |        | 0.23      | 1.60    | 0.50      | 0.050     | 0.050  | %Cr-0.64max                                                                |                                                                                       |     |     |                                | Hardness-200BHN (min) |                             |     |                      |                |                    |                                                                                     |                      |  |
| DSQ                |        | 0.05      | 0.35    | 0.10      | 0.030     | 0.030  |                                                                            |                                                                                       |     |     |                                |                       |                             |     |                      |                |                    |                                                                                     |                      |  |
| IRSM-41/<br>SILCOR |        | 0.10      | 0.45    | 0.50      | 0.07-0.14 | 0.030  | Al 0.03max, Cr 0.35-0.60, Ni 0.28-0.47, Cu 0.30-0.60, V0.05max, Mo 0.05max |                                                                                       |     |     | 480                            | 340                   |                             |     | 22                   | T              |                    |                                                                                     |                      |  |
| En10025            | S275J0 | 0.21      | 1.50    |           | 0.040     | 0.040  | 0.42                                                                       |    |     |     |                                | 410-560               | 275                         |     |                      | 20             |                    |                                                                                     |                      |  |
|                    | S275JR | 0.21      | 1.50    |           | 0.045     | 0.050  | 0.42                                                                       |                                                                                       |     |     |                                | 410-560               | 275                         |     |                      | 22             |                    |                                                                                     |                      |  |
|                    | S355J0 | 0.24      | 1.60    | 0.55      | 0.040     | 0.040  | 0.47                                                                       |                                                                                       |     |     |                                | 490-630               | 355                         |     |                      | 20             |                    |                                                                                     |                      |  |
|                    | S355JR | 0.24      | 1.60    |           | 0.045     | 0.050  | 0.47                                                                       |                                                                                       |     |     |                                | 490-630               | 355                         |     |                      | 22             |                    |                                                                                     |                      |  |
|                    |        |           |         |           |           |        |                                                                            |                                                                                       |     |     |                                |                       |                             |     | <20                  | 20-40          | 40>                |                                                                                     |                      |  |
| IS2062             | E250 A | 0.23      | 1.50    | 0.40      | 0.045     | 0.045  | 0.42                                                                       |                                                                                       |     |     |                                | 410                   | 250                         | 240 | 230                  | 23             | 2T<25 & 3T>25      |                                                                                     |                      |  |
|                    | E250 B | 0.22      | 1.50    | 0.40      | 0.045     | 0.045  | 0.41                                                                       |                                                                                       |     |     |                                | 410                   | 250                         | 240 | 230                  | 23             | 2T<25 & 3T>25      |                                                                                     | 27J at RT            |  |
|                    | E250 C | 0.20      | 1.50    | 0.40      | 0.040     | 0.040  | 0.39                                                                       |                                                                                       |     |     |                                | 410                   | 250                         | 240 | 230                  | 23             | 2T<25 & 3T>25      |                                                                                     | 27J at RT            |  |
|                    | E300   | 0.20      | 1.30    | 0.045     | 0.045     | 0.045  | 0.40                                                                       |                                                                                       |     |     |                                | 440                   | 300                         | 290 | 280                  | 22             | 2T<25 & 3T>25      |                                                                                     | 50J at RT/30J at -20 |  |
|                    | E350   | 0.20      | 1.50    | 0.045     | 0.045     | 0.045  | 0.42                                                                       |                                                                                       |     |     |                                | 490                   | 350                         | 330 | 320                  | 22             | 2T<25 & 3T>25      |                                                                                     | 50J at RT/25J at -20 |  |
|                    | E410   | 0.20      | 1.60    | 0.045     | 0.045     | 0.045  | 0.44                                                                       | 540                                                                                   | 410 | 390 | 380                            | 20                    | 2T<25 & 3T>25               |     | 50J at RT/25J at -20 |                |                    |                                                                                     |                      |  |
|                    | E450 D | 0.22      | 1.60    | 0.045     | 0.045     | 0.045  | 0.46                                                                       | 570                                                                                   | 450 | 430 | 420                            | 20                    | 2T<25 & 3T>25               |     | 45J at RT/20J at -20 |                |                    |                                                                                     |                      |  |
| ASTM A36           |        | 0.25      | 1.20    | 0.15-0.40 | 0.040     | 0.050  |                                                                            |                                                                                       |     |     | 400-550                        |                       | 250                         |     | 18(200GL)            |                |                    |                                                                                     |                      |  |
| DIN17200           | C-35   | 0.32-0.35 | 0.80    | 0.15-0.35 | 0.045     | 0.050  |                                                                            |  |     |     |                                |                       |                             |     |                      |                |                    |                                                                                     |                      |  |
|                    | C-45   | 0.42-0.50 | 0.80    | 0.15-0.35 | 0.045     | 0.050  |                                                                            |                                                                                       |     |     |                                |                       |                             |     |                      |                |                    |                                                                                     |                      |  |
|                    | C-55   | 0.52-0.60 | 0.90    | 0.15-0.35 | 0.045     | 0.050  |                                                                            |                                                                                       |     |     |                                |                       |                             |     |                      |                |                    |                                                                                     |                      |  |

| ALLOY STEELS              |                                                                                                                                                       |                        |            |           |           |           |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------|-----------|-----------|-----------|
| BS : 970<br>EN :<br>Specn | Type of Application                                                                                                                                   | Chemical Composition % |            |           |           |           |
|                           |                                                                                                                                                       | C                      | Mn         | Ni        | Cr        | Mo        |
| EN-16                     | Manganese-Molybdenum Steel suitable for tensile ranges of 45/75 tons according to the ruling section.                                                 | 0.30/0.40              | 1.30/1.80  | —         | —         | 0.20/0.35 |
| EN-18                     | 1 per cent Chromium Steel Suitable for tensile ranges of 45/65 tons according to the ruling section                                                   | 0.35/0.45              | 0.60/0.90  | —         | 0.85/1.15 | —         |
| EN-19                     | 1 per cent Chromium-Molybdenum Steel suitable for tensile ranges of 45/80 tons according to the ruling section of the part                            | 0.35/0.45              | 0.50/0.80  | —         | 0.90/1.50 | 0.20/0.40 |
| EN-24                     | 1 ½ percent Nickel-Chromium Molybdenum Steel suitable for tensile ranges of 50/100 tons according to the ruling section of the part                   | 0.35/0.45              | 0.45/0.70  | 1.30/1.80 | 2.30/2.80 | 0.20/0.35 |
| EN-25                     | 2 ½ percent Nickel-Chromium Molybdenum Steel. (Medium Carbon), suitable for tensile ranges of 50/100 tons according to the ruling section of the part | 0.27/0.35              | 0.50/0.70  | 2.30/2.80 | 0.50/0.80 | 0.40/0.70 |
| EN-26                     | 2 ½ percent Nickel-Chromium Molybdenum Steel (High Carbon), suitable for tensile ranges of 60/100 tons according to the ruling section of the part    | 0.36/0.44              | 0.50/0.70  | 2.30/2.80 | 0.50/0.80 | 0.40/0.70 |
| EN-27                     | 3 per cent Nickel-Chromium Molybdenum Steel suitable for tensile ranges of 55/80 tons, according to the ruling section of the part                    | 0.25/0.35              | 0.40/0.70  | 3.00/3.75 | 0.50/1.30 | 0.20/0.65 |
| EN-28                     | 3 ½ percent Nickel-Chromium Molybdenum Steel suitable for tensile ranges of 60/90 tons according to the ruling section of the part                    | 0.25/0.40              | 0.40/0.70  | 3.00/4.50 | 0.75/1.50 | 0.20/0.65 |
| EN-29 B                   | 3 percent Nickel-Chromium Molybdenum Steel suitable for tensile ranges of 45/100 tons, according to the ruling section of the part                    | 0.15/0.35              | 0.30/0.65  | 0.40 max  | 2.50/3.50 | 0.30/0.70 |
| EN-30 B                   | 3 per cent Nickel-Chromium Steel Case Hardening Steel                                                                                                 | 0.26/0.34              | 0.40/0.60  | 3.90/4.30 | 1.10/1.40 | 0.20/0.40 |
| EN-36                     | 4 ½ percent Nickel-Chromium Molybdenum Steel suitable for tensile for gears, aero engine connecting rounds high duty bolts, spindles etc.             | 0.12/0.18              | 0.30/0.60  | 3.00/3.75 | 0.60/1.10 | —         |
| EN-36 C                   | 4 percent Nickel-Chromium Molybdenum Case Hardening Steel                                                                                             | 0.12/0.18              | 0.30/0.60  | 3.00/3.75 | 0.60/1.10 | 0.10/0.25 |
| EN-39 B                   | 4 1/4 Percent Nickel-Chromium case hardening steel suitable for High Duty Transmission & Reduction gears                                              | 0.12/0.18              | 0.50 max   | 3.80/4.50 | 1.00/1.40 | 0.15/0.35 |
| EN-40 B                   | 3 per cent Chromium-Molybdenum Nitriding Steel                                                                                                        | 0.20/0.30              | 0.40/0.650 | 0.40 max  | 2.90/3.50 | 0.40/0.70 |
| EN-41 B *                 | 1 ½ per cent Chromium-Aluminium Molybdenum Nitriding Steel                                                                                            | 0.35/0.45              | 0.30/0.65  | 0.40 max  | 1.40/1.80 | 0.10/0.25 |
| EN 52**                   | Silicon Chromium Valve Steel                                                                                                                          | 0.40/0.50              | 0.30/0.60  | —         | 7.50/9.50 | —         |
| EN-100                    | Low Alloy Steel                                                                                                                                       | 0.35/0.45              | 1.20/1.50  | 0.50/1.00 | 0.30/0.60 | 0.15/0.25 |
| EN-111                    | Low Nickel Chromium Steel                                                                                                                             | 0.30/0.40              | 0.60/0.90  | 1.00/1.50 | 0.45/0.75 | —         |
| EN-202                    | Carbon-Manganese Case-Hardening Steel (Semi - free cutting)                                                                                           | 0.08/0.18              | 1.20/1.50  | —         | —         | —         |
| EN-353                    | 1 1/4 per cent Nickel-Chromium Case-Hardening Steel                                                                                                   | 0.10/0.20              | 0.50/1.00  | 1.00/1.50 | 0.75/1.25 | 0.08/0.15 |
| EN-354                    | 1 ½ per cent Nickel-Chromium Molybdenum Case-Hardening Steel                                                                                          | 0.10/0.20              | 0.50/1.00  | 1.50/2.00 | 0.75/1.25 | 0.10/0.20 |

\* AL = 0.90 / 1.30 \*\* Si = 1.40 / 1.70

| ALUMINUM ALLOYS : CHEMICAL COMPOSITION LIMITS |       |                         |        |      |           |     |         |      |      |           |      |                 |                                                         |
|-----------------------------------------------|-------|-------------------------|--------|------|-----------|-----|---------|------|------|-----------|------|-----------------|---------------------------------------------------------|
| Alloy (ISS)                                   |       | Equivalent alloy (A.A.) | Copper |      | Magnesium |     | Silicon |      | Iron | Manganese |      | *Others (total) | Remarks                                                 |
| Old                                           | New   | U.S.A.                  | Min.   | Max  | Min.      | Max | Min.    | Max  | Max  | Min.      | Max  | Max             |                                                         |
| 1 C                                           | 19000 | 1100                    | —      | 0.1  | —         | —   | —       | 0.50 | 0.6  | —         | 0.1  | 0.1             | Aluminium 99.0%Min.                                     |
| 1 B                                           | 19500 | 1050                    | —      | 0.05 | —         | —   | —       | 0.30 | 0.4  | —         | 0.05 | 0.1             | Aluminium 99.5%Min.                                     |
| 1 E                                           | 19501 | 1050 EC                 | —      | 0.04 | —         | —   | —       | 0.15 | 0.35 | —         | —    | 0.1             | Aluminium 99.5%Min.                                     |
| —                                             | 19600 | 1060                    | —      | 0.05 | —         | —   | —       | 0.25 | 0.35 | —         | 0.03 | 0.1             | Aluminium 99.6%Min.                                     |
| —                                             | 19700 | 1070                    | —      | 0.03 | —         | —   | —       | 0.20 | 0.25 | —         | 0.03 | 0.1             | Aluminium 99.7%Min.                                     |
| —                                             | —     | 2011                    | 5.0    | 6.0  | —         | 0.1 | —       | 0.4  | 0.7  | —         | 0.1  | 0.4             | Also lead & bismuth 0.2-0.6% Each                       |
| H15                                           | 24345 | 2014                    | 3.8    | 5.0  | 0.2       | 0.8 | 0.5     | 1.2  | 0.7  | 0.3       | 1.2  | 0.5             | —                                                       |
| H14                                           | 24534 | 2017                    | 3.5    | 4.7  | 0.4       | 1.2 | 0.2     | 0.7  | 0.7  | 0.4       | 1.2  | 0.5             | —                                                       |
| N 3                                           | 31000 | 3003                    | —      | 0.1  | —         | 0.1 | —       | 0.6  | 0.7  | 0.8       | 1.5  | 0.4             | —                                                       |
| N 21                                          | 43000 | 4043                    | —      | 0.1  | —         | 0.2 | 4.5     | 6.0  | 0.6  | —         | 0.5  | 0.2             | —                                                       |
| N 2                                           | 46000 | 4047                    | —      | 0.1  | —         | 0.2 | 10.0    | 13.0 | 0.6  | —         | 0.5  | 0.2             | —                                                       |
| N 4                                           | 52000 | 5052                    | —      | 0.1  | 1.7       | 2.6 | —       | 0.6  | 0.5  | —         | 0.5  | 0.4             | Chromium + Mn + 0.5                                     |
| N 5                                           | 53000 | 5086                    | —      | 0.1  | 2.8       | 4.0 | —       | 0.6  | 0.5  | —         | 0.5  | 0.4             | Cr + Mn = 0.5                                           |
| N 6                                           | 55000 | 5056                    | —      | 0.1  | 4.5       | 5.5 | —       | 0.6  | 0.7  | —         | 0.5  | 0.4             | Chromium up to 0.25                                     |
| N 8                                           | 54300 | 5083                    | —      | 0.1  | 4.0       | 4.9 | —       | 0.4  | 0.7  | 0.5       | 1.0  | 0.4             | Chromium up to 0.25                                     |
| H 20                                          | 65032 | 6061                    | 0.15   | 0.4  | 0.7       | 1.2 | 0.4     | 0.8  | 0.7  | 0.2       | 0.8  | 0.4             | Chromium (0.15-0.35) Either Mn or Cr, shall be present. |
| H 9                                           | 63400 | 6063                    | —      | 0.1  | 0.4       | 0.9 | 0.3     | 0.7  | 0.6  | —         | 0.3  |                 | Chromium up to 0.10                                     |
| —                                             | —     | 6066                    | 0.7    | 1.2  | 0.8       | 1.4 | 0.9     | 1.8  | 0.7  | 0.6       | 1.1  | 0.4             | —                                                       |
| —                                             | 64423 | —                       | 0.5    | 1.0  | 0.5       | 1.3 | 0.7     | 1.3  | 0.8  | —         | 1.0  | —               | —                                                       |
| 91 E                                          | 63401 | 6101                    | —      | 0.05 | 0.4       | 0.9 | 0.3     | 0.7  | 0.5  | —         | 0.03 | 0.1             | —                                                       |
| —                                             | 64401 | 6201                    | —      | 0.1  | 0.6       | 0.9 | 0.5     | 0.9  | 0.5  | —         | 0.03 | 0.1             | —                                                       |
| H 30                                          | 64430 | 6351                    | —      | 0.1  | 0.4       | 1.2 | 0.6     | 1.3  | 0.6  | 0.4       | 1.0  | 0.3             | Chromium up to 0.25                                     |
| —                                             | 74530 | 7039                    | —      | 0.2  | 1.0       | 1.5 | —       | 0.4  | 0.7  | 0.2       | 0.7  | 0.4             | Zinc (4.5%)                                             |
| —                                             | —     | 7075                    | 1.20   | 2.0  | 2.1       | 2.9 | —       | 0.5  | 0.7  | —         | 0.3  | 0.2             | Zinc (5.1-6.1) & Chromium (0.2-0.8)                     |







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## BRASS / COPPER

| Material                                     | DIN 1787<br>DIN 17660 | ISO R 1337<br>ISO 426 | BS 2870 | ASTM B 36 | NFA 53-100<br>NFA 51-103 | Composition % |       |                |
|----------------------------------------------|-----------------------|-----------------------|---------|-----------|--------------------------|---------------|-------|----------------|
| Electrolytic Copper*                         | E-Cu 58               | E-Cu ETP              | C 101   | C 110 00  | Cu/a 1                   | Cu            | Zn    | P              |
| *Oxygen content of E-Cu 58 = 0.005% to 0.04% |                       |                       |         |           |                          | > 99.9        | ----- | -----          |
| Phosphorus deoxidised copper                 | SF-Cu                 | Cu DHP                | C 106   | C 122 00  | Cu/b                     | > 99.9        | ----- | 0.015<br>0.040 |
| Cu-Zn alloys (Brasses)                       | CuZn 10               | CuZn 10               | CZ 101  | C 220 00  | U-Z10                    | 89-91         | Rest  |                |
|                                              | CuZn 15               | CuZn 15               | CZ 102  | C 230 00  | U-Z15                    | 84-86         | Rest  |                |
|                                              | CuZn 28               | CuZn 28               | -----   | -----     | U-Z28                    | 71-73         | Rest  |                |
|                                              | CuZn 30               | CuZn 30               | CZ 106  | C 260 00  | U-Z30                    | 69-71         | Rest  |                |
|                                              | CuZn 37               | CuZn 37               | CZ 108  | C 272 00  | U-Z36                    | 63.5-65       | Rest  |                |



## CHROMIUM BEARING STEELS

| BS : 970<br>EN : Specn | SAE/AISI<br>Specn | C         | Mn        | Si        | Cr        |
|------------------------|-------------------|-----------|-----------|-----------|-----------|
| EN-31                  | -----             | 0.95/1.10 | 0.25/0.45 | 0.15/0.35 | 0.90/1.20 |
| EN-31                  | 52100             | 0.95/1.10 | 0.25/0.45 | 0.15/0.35 | 1.40/1.60 |
| EN-18D                 | 5140              | 0.38/0.44 | 0.60/0.90 | 0.10/0.35 | 0.90/1.20 |
| EN-48                  | 5147              | 0.45/0.55 | 0.60/0.90 | 0.10/0.35 | 0.90/1.20 |

## FREE CUTTING STEELS

| BS : 970<br>EN : Specn | SAE/AISI<br>Specn | C         | Mn        | Si   | S&P       |
|------------------------|-------------------|-----------|-----------|------|-----------|
| EN-1 A                 | 1213              | 0.08/0.15 | 0.80/1.20 | 0.10 | 0.25/0.05 |
| EN-7                   | 1115              | 0.20/0.30 | 1.00/1.50 | 0.25 | 0.15/0.05 |
| EN-8 M                 | 1140              | 0.35/0.45 | 0.80/1.20 | 0.25 | 0.20/0.05 |
| EN-15 AM               | 1137              | 0.35/0.45 | 1.30/1.70 | 0.25 | 0.10/0.05 |

## SPRING STEELS

| BS : 970<br>EN : Specn | SAE/AISI<br>Specn | C         | Mn        | Si        | Cr        |
|------------------------|-------------------|-----------|-----------|-----------|-----------|
| EN-9                   | 1055              | 0.50/0.60 | 0.60/0.90 | 0.10/0.35 | -----     |
| EN-42J                 | 1085              | 0.75/0.90 | 0.60/0.90 | 0.20/0.35 | -----     |
| EN-44                  | 9255              | 0.90/1.20 | 0.40/0.70 | 0.10/0.35 | -----     |
| EN-45                  | 9225              | 0.55/0.65 | 0.70/1.00 | 1.50/2.00 | -----     |
| EN-47*                 | 6150              | 0.45/0.55 | 0.50/0.80 | 0.30/0.50 | 0.80/1.20 |
| EN-48                  | 5147              | 0.45/0.55 | 0.60/0.90 | 0.10/0.35 | 0.90/1.20 |

## CARBON STEELS

| BS : 970<br>EN : Specn | SAE/AISI<br>Specn | C         | Mn        | Si        |
|------------------------|-------------------|-----------|-----------|-----------|
| EN-3 B                 | 1020              | 0.15/0.25 | 0.00/1.00 | 0.10/0.35 |
| EN-32 B                | 1015              | 0.10/0.20 | 0.60/0.90 | 0.15/0.35 |
| EN-4                   | 1026              | 0.20/0.30 | 0.60/0.90 | 0.15/0.35 |
| EN-5                   | 1030              | 0.25/0.35 | 0.60/0.90 | 0.15/0.35 |
| EN-8                   | 1040              | 0.35/0.45 | 0.60/0.90 | 0.15/0.35 |
| EN-9                   | 1055              | 0.50/0.60 | 0.60/0.90 | 0.15/0.35 |
| EN-42 B                | 1065              | 0.60/0.70 | 0.60/0.90 | 0.15/0.35 |

## Section Weight in Kgs Per Meter (ROUNDS-SQUARES-HEXAGONS)

| Size  |       | Rounds | Squares | Hexagons | Size  |       | Rounds | Squares | Hexagons |
|-------|-------|--------|---------|----------|-------|-------|--------|---------|----------|
| inch  | mm    | Kg/m   | Kg/m    | Kg/m     | inch  | mm    | Kg/m   | Kg/m    | Kg/m     |
| 3/16  | 4.76  | 0.14   | 0.18    | 0.1541   | 1.7/8 | 47.63 | 13.97  | 17.79   | 15.42    |
| 1/4   | 6.35  | 0.25   | 0.32    | 0.2739   | 2     | 50.80 | 15.90  | 20.24   | 17.53    |
| 5/16  | 7.94  | 0.39   | 0.49    | 0.4279   | 2.1/8 | 53.98 | 17.95  | 22.85   | 19.79    |
| 3/8   | 9.53  | 0.56   | 0.71    | 0.6162   | 2.1/4 | 57.15 | 20.12  | 25.61   | 22.18    |
| 7/16  | 11.11 | 0.76   | 0.97    | 0.8387   | 2.3/8 | 60.33 | 22.42  | 28.54   | 24.72    |
| 1/2   | 12.70 | 0.99   | 1.26    | 1.095    | 2.1/2 | 63.50 | 24.84  | 31.63   | 27.40    |
| 9/16  | 14.29 | 1.25   | 1.58    | 1.386    | 2.5/8 | 66.68 | 27.38  | 34.87   | 30.20    |
| 5/8   | 15.88 | 1.55   | 1.98    | 1.712    | 2.3/4 | 69.85 | 30.05  | 38.26   | 33.14    |
| 3/4   | 19.05 | 2.23   | 2.85    | 2.470    | 2.7/8 | 73.03 | 32.85  | 41.82   | 36.22    |
| 7/8   | 22.23 | 3.04   | 3.87    | 3.350    | 3     | 76.20 | 35.77  | 45.54   | 39.44    |
| 1     | 25.40 | 3.97   | 5.06    | 4.380    | 3.1/4 | 82.55 | 41.98  | 53.44   | -----    |
|       |       |        |         |          | 3.1/2 | 88.90 | 48.68  | 61.98   | -----    |
| 1.1/8 | 28.58 | 5.03   | 6.40    | 5.550    | 4     | 101.6 | 63.59  | 80.96   | -----    |
| 1.1/4 | 31.75 | 6.21   | 7.91    | 6.850    | 4.1/2 | 114.3 | 80.47  | 102.46  | -----    |
| 1.3/8 | 34.93 | 7.51   | 9.97    | 8.280    | 5     | 127.0 | 99.35  | 126.50  | -----    |
| 1.1/2 | 38.10 | 8.94   | 11.38   | 9.860    | 6     | 152.4 | 143.1  | 182.20  | -----    |
| 1.5/8 | 41.28 | 10.50  | 13.36   | 11.57    | 8     | 203.2 | 254.3  | 323.80  | -----    |
| 1.3/4 | 44.45 | 12.17  | 15.50   | 13.42    | 10    | 254.0 | 397.4  | 505.90  | -----    |

\*V:0.15%

## BORON STEELS

These Steels Can Be Expected To Contain 0.0005 To 0.003 Per Cent Boron

| GRADES |        | C         | Mn        | S     | P     | Si        | Mo        | Cr        | V         |
|--------|--------|-----------|-----------|-------|-------|-----------|-----------|-----------|-----------|
| 15B21H | H15211 | 0.17-0.24 | 0.70-1.20 | 0.040 | 0.050 | 0.15-0.35 | —         | —         | —         |
| 15B35H | H15351 | 0.31-0.39 | 0.70-1.20 | 0.040 | 0.050 | 0.15-0.35 | —         | —         | —         |
| 15B37H | H15371 | 0.30-0.39 | 1.00-1.50 | 0.040 | 0.050 | 0.15-0.35 | —         | —         | —         |
| 15B41H | H15411 | 0.35-0.45 | 1.25-1.75 | 0.040 | 0.050 | 0.15-0.35 | —         | —         | —         |
| 15B48H | H15481 | 0.43-0.53 | 1.00-1.50 | 0.040 | 0.050 | 0.15-0.35 | —         | —         | —         |
| 15B62H | H15621 | 0.54-0.67 | 1.00-1.50 | 0.040 | 0.050 | 0.40-0.60 | —         | —         | —         |
| 50B44  | G50441 | 0.43-0.48 | 0.75-1.00 | 0.035 | 0.040 | 0.15-0.30 | —         | 0.40-0.60 | —         |
| 50B46  | G50461 | 0.44-0.49 | 0.75-1.00 | 0.035 | 0.040 | 0.15-0.30 | —         | 0.20-0.35 | —         |
| 50B50  | G50501 | 0.48-0.53 | 0.75-1.00 | 0.035 | 0.040 | 0.15-0.30 | —         | 0.40-0.60 | —         |
| 50B60  | G51601 | 0.56-0.64 | 0.75-1.00 | 0.035 | 0.040 | 0.15-0.30 | —         | 0.40-0.60 | —         |
| 51B60  | G51601 | 0.56-0.64 | 0.75-1.00 | 0.035 | 0.040 | 0.15-0.30 | —         | 0.70-0.90 | —         |
| 81B45  | G81451 | 0.43-0.48 | 0.75-1.00 | 0.035 | 0.040 | 0.15-0.30 | 0.20-0.40 | 0.35-0.55 | 0.08-0.15 |
| 94B17  | G94171 | 0.15-0.20 | 0.75-1.00 | 0.035 | 0.040 | 0.15-0.30 | 0.30-0.60 | 0.30-0.50 | 0.08-0.15 |
| 94B30  | G94301 | 0.28-0.33 | 0.75-1.00 | 0.035 | 0.040 | 0.15-0.30 | 0.30-0.60 | 0.30-0.50 | 0.08-0.15 |

## Section Weight for Sheets

| Gauge (SWG) | MM.  | Sheet 4x8<br>(1250mm x 2500mm) | Sheet 1Ft. x 4Ft.<br>(312.5mm x 1250mm) | Sheet 1Ft. x 1Mtr.<br>(312.5mm x 1000mm) |
|-------------|------|--------------------------------|-----------------------------------------|------------------------------------------|
| 10          | 3.00 | 75.000 Kg.                     | 9.375 Kg.                               | 7.500 Kg.                                |
| 12          | 2.50 | 62.500 Kg.                     | 7.825 Kg.                               | 6.250 Kg.                                |
| 14          | 2.00 | 50.000 Kg.                     | 6.250 Kg.                               | 5.000 Kg.                                |
| 16          | 1.60 | 40.000 Kg.                     | 5.000 Kg.                               | 4.000 Kg.                                |
| 18          | 1.25 | 31.250 Kg.                     | 3.925 Kg.                               | 3.125 Kg.                                |
| 19          | 1.00 | 25.000 Kg.                     | 3.125 Kg.                               | 2.500 Kg.                                |
| 20          | 0.90 | 22.500 Kg.                     | 2.825 Kg.                               | 2.250 Kg.                                |
| 21          | 0.80 | 20.000 Kg.                     | 2.500 Kg.                               | 2.000 Kg.                                |
| 22          | 0.70 | 17.500 Kg.                     | 2.200 Kg.                               | 1.750 Kg.                                |
| 23          | 0.63 | 15.750 Kg.                     | 1.975 Kg.                               | 1.575 Kg.                                |
| 24          | 0.55 | 13.750 Kg.                     | 1.725 Kg.                               | 1.375 Kg.                                |
| 26          | 0.50 | 12.500 Kg.                     | 1.575 Kg.                               | 1.250 Kg.                                |
| 28          | 0.40 | 10.000 Kg.                     | 1.250 Kg.                               | 1.000 Kg.                                |
| 30          | 0.30 | 07.500 Kg.                     | 0.950 Kg.                               | 0.750 Kg.                                |



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(steels & metals division)

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# TOOL & DIE STEELS

| STEEL TYPE           | BOHLER VEW       | CHEMICAL ANALYSIS % |              |                |                |               |                |              |               | HEAT TREATMENT        |                  |                       |                           | CORR SPECN | TYPICAL APPLICATIONS                                                                                                                                                                                                                                                                                                     |
|----------------------|------------------|---------------------|--------------|----------------|----------------|---------------|----------------|--------------|---------------|-----------------------|------------------|-----------------------|---------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  | C%                  | Si%          | Mn%            | Cr%            | Mo%           | W%             | V%           | Co%           | Hardening Temperature | Quenching Medium | Tempering Temperature | Brinell Rockwell Hardness | AISI       |                                                                                                                                                                                                                                                                                                                          |
| HIGH SPEED STEEL     | S 600            | 0.80 to 0.90        | <0.40        | <0.40          | 3.80 to 4.50   | 4.50 to 5.50  | 5.50 to 6.70   | 1.60 to 2.20 |               | 1190-1230             | OIL / AIR        | 540-570               | 64-66                     | M-2        | Thread Cutting Tool, Twist Drills, Reamers, Broaching Tools, Metal Saws Various Milling Tools, Wood Working Tools, Cold Work Tools.                                                                                                                                                                                      |
|                      | S 705            | 0.80 to 0.90        | <0.40        | <0.40          | 3.80 to 4.50   | 4.80 to 6.20  | 5.50 to 6.70   | 1.70 to 2.30 | 4.50 to 5.50  | 1190-1230             | OIL / AIR        | 550-580               | 64-66                     | M-35       | Various Turning & Planing Tools, Milling Cutters, Taps, Twist Drills, Wood Working Tools, Cold Work Tools                                                                                                                                                                                                                |
|                      | S 500            | 1.00 to 1.15        | <0.50        | <0.40          | 3.80 to 4.50   | 9.00 to 10.00 | 1.20 to 1.90   | 0.90 to 1.40 | 7.50 to 8.50  | 1170-1210             | OIL / AIR        | 530-560               | 67-69                     | M-42       | Milling Cutters, Twist Drills, Thread Cutting Tools, Broaching Tools, Cold Work Tools                                                                                                                                                                                                                                    |
|                      | S 700            | 1.15 to 1.30        | <0.40        | <0.40          | 3.80 to 4.50   | 3.00 to 4.00  | 9.00 to 11.00  | 3.00 to 3.70 | 9.00 to 11.00 | 1200-1240             | OIL / AIR        | 540-570               | 65-67                     | T-42       | Turning & Milling Tools For Roughing & Finishing Work, Wood Working Tools, Heavy Duty Cold Work Tools, Tool Bits                                                                                                                                                                                                         |
|                      | S 200            | 0.70 to 0.85        | <0.40        | <0.40          | 3.80 to 4.50   | ----          | 17.00 to 19.00 | 0.80 to 1.20 | ----          | 1250-1290             | OIL / AIR        | 550-580               | 64-66                     | T-1        | Turning Planing & Slotting Tools, Taps, Twist Drills, Threading Dies, Profile Cutting Tools, Broaching Tools, Reamers.                                                                                                                                                                                                   |
|                      | S 305            | 0.70 to 0.85        | <0.40        | <0.40          | 3.80 to 4.50   | ----          | 17.00 to 19.00 | 0.80 to 1.20 | 4.50 to 5.50  | 1240-1280             | OIL / AIR        | 550-580               | 64-66                     | T-4        | Turning Planing & Milling Tools In Particular For Roughing Work.                                                                                                                                                                                                                                                         |
|                      | S 300            | 0.70 to 0.85        | <0.40        | <0.40          | 3.80 to 4.50   | ----          | 17.00 to 19.00 | 0.80 to 1.20 | 9.00 to 11.00 | 1250-1290             | OIL / AIR        | 560-590               | 64-66                     | T-5        | Turning Planing & Milling Tools In Particular For Roughing Work.                                                                                                                                                                                                                                                         |
|                      | S 590 ISO MATRIX | 1.00 to 1.50        | <0.50        | <0.30          | 3.50 to 4.50   | 4.50 to 5.50  | 6.00 to 7.00   | 2.90 to 3.20 | 7.50 to 9.50  | 1075-1180             | OIL SALT BATH    | 550-580               | 64-66                     | ASP 30     | Snaper cutters hobs milling cutters broaching tools taps twist drills.                                                                                                                                                                                                                                                   |
|                      | S 790 ISO MATRIX | 1.00 to 1.50        | <0.40        | <0.40          | 3.50 to 4.50   | 5.00 to 6.00  | 6.00 to 7.00   | 2.80 to 3.50 | ----          | 1050-1180             | OIL SALT BATH    | 540-570               | 64-66                     | ASP 23     | Powder HSS, Excellent wear resistance & toughness.                                                                                                                                                                                                                                                                       |
| HOT DIE STEEL        | W 300            | 0.32 to 0.42        | 0.80 to 1.20 | <0.50          | 4.50 to 5.50   | 1.00 to 1.50  | ----           | 0.30 to 0.50 | ----          | 1000-1040             | OIL / AIR        | 550-650               | 52-56 (Oil) 50-54 (Air)   | H-11       | High Duty Hot Work Tools Such As Manderls, Dies & Containers FoMetal Tube & Rod Extrusion, Hot, Impact Extrusion Tools, Tools For The Manufacture of Hollow Bodies, Tools For The Manufacture of Screws Nuts, Rivets & Bolts, Pressure Die Casting Dies, Forming Dies, Die Inserts, Hot Shear Blades                     |
|                      | W 302            | 0.32 to 0.42        | 0.80 to 1.20 | <0.50          | 4.50 to 5.50   | 1.00 to 1.50  | ----           | 0.80 to 1.20 | ----          | 1020-1080             | OIL / AIR        | 550-650               | 52-56 (Oil) 50-54 (Air)   | H-13       |                                                                                                                                                                                                                                                                                                                          |
|                      | W 100            | 0.25 to 0.35        | <0.40        | <0.60          | 2.00 to 3.00   | ----          | 9.00 to 10.00  | 0.30 to 0.50 | ----          | 1070-1150             | OIL / AIR        | 600-650               | 48-52 (Oil) 44-48 (Air)   | H-21       |                                                                                                                                                                                                                                                                                                                          |
| COLD WORK TOOL STEEL | K 100            | 1.90 to 2.20        | 0.10 to 0.40 | 0.15 to 0.45   | 11.00 to 12.00 | ----          | ----           | ----         | ----          | 930-980               | OIL / AIR        | 150-200               | 63-65                     | D-3        | High Efficiency Cutting Tools (dies & Punches), Blanking Tools, Wood Working Tools, Shear Blades For Cutting Thin Materials, Thread Rolling Dies, Drawing, Deep Drawing & Extrusion Tools, Pressing Tools For The Ceramics & The Pharmaceutical Industry, Cold Rolls For Multiple Roller Stands, Gauges, Plastic Modes . |
|                      | K 105            | 1.55 to 1.75        | 0.25 to 0.40 | 0.20 to 0.40   | 11.00 to 12.00 | 0.50 to 0.70  | 0.40 to 0.60   | 0.10 to 0.50 | ----          | 650-700               | OIL / AIR        | ----                  | 63-65                     | D-2        |                                                                                                                                                                                                                                                                                                                          |
|                      | K 110            | 1.50 to 1.80        | 0.10 to 0.40 | 0.15 to 0.45   | 11.00 to 12.00 | 0.60 to 0.80  | ----           | 0.90 to 1.10 | ----          | 650-700               | OIL / AIR        | ----                  | 63-65                     | D-2        |                                                                                                                                                                                                                                                                                                                          |
|                      | K 460            | 0.90 to 1.05        | 0.15 to 0.35 | 1.00 to 1.20   | 11.00 to 12.00 | ----          | 0.50 to 0.70   | 0.05 to 0.15 | ----          | 780-820               | OIL              | 150-200               | 63-65                     | 0-1        | Cutting Tools (dies & Punches), Blanking Tools, Thread Cutting Tools, Wood Working Tools, Machine Knives For The Cellulose, Paper & Pulp & Metal Working Industrial Gauges, Plastic Moulds.                                                                                                                              |
|                      | K 720            | 0.85 to 0.95        | 0.10 to 0.40 | 1.90 to 2.10   | 0.20 to 0.50   | ----          | 0.05 to 0.15   | 0.05 to 0.15 | ----          | 790-820               | OIL              | ----                  | 63-65                     | 0-2        |                                                                                                                                                                                                                                                                                                                          |
|                      | K 700            | 1.00 to 1.30        | ----         | 12.00 to 14.00 | ----           | ----          | ----           | ----         | ----          | 1000-1050             | WATER            | ----                  | 63-65                     | SCMNH1     | Various components for hard cushioning, bulk material handling & ORE dressing & processing equipment such as crusher jaws, impact bars, plates, hammers, breaker plates grizzly bars, anvils, liners, elevator bucket, dredgee bucket, dredger & scraper teeth, bucket links, track rollers & chain roller.              |
|                      | K 455            | 0.55 to 0.65        | 0.50 to 0.70 | 0.15 to 0.45   | 0.90 to 1.20   | ----          | 1.80 to 2.10   | 0.10 to 0.20 | ----          | 870-900               | OIL              | ----                  | ----                      | S-1        | Cutting Tools (dies & Punches) For Heavy Plate, Cold Punches, Cold Shear Blades, Wood Working Tools, Bits For Pneumatic Tools, Highly Stregged Embossing Tools, Hot Work Tools For Low Thermal Stresal.                                                                                                                  |
|                      | K 305            | 0.90 to 1.05        | 0.20 to 1.40 | 0.40 to 0.70   | 4.80 to 5.50   | 0.90 to 1.20  | ----           | 0.10 to 0.36 | ----          | 950-980               | OIL / AIR        | ----                  | 58-62                     | A-2        | Cutting tools (dies & Punches), blanking tools, thread rolling dies, shear blades.                                                                                                                                                                                                                                       |
| PLASTIC MOULD STEEL  | M 201            |                     |              |                |                |               | ----           | ----         | ----          | 840-870               | OIL              | ----                  | 51                        | P-20       | Plastic Moulds, Mould Frames For Plastic Moulds & Pressure Casting Dies Recipient Sleeves.                                                                                                                                                                                                                               |
|                      | M 200            | 0.35 to 0.45        | 0.30 to 0.50 | 1.40 to 1.60   | 1.80 to 2.00   | 0.15 to 0.25  | ----           | ----         | ----          | 840-860 860-880       | OIL AIR          | 600-650               | ----                      | P-20 +S    |                                                                                                                                                                                                                                                                                                                          |
|                      | M 238            | 0.35 to 0.45        | 0.20 to 0.40 | 1.30 to 1.60   | 1.80 to 2.10   | 0.15 to 0.25  | NI 1.0         | ----         | ----          | 840-870               | OIL              | ----                  | 51                        | P-20 +NI   | Ltis micro-alloyed, Vacuum-degassed steel with excellent Features, good machinability, outstanding Polish ability, good texturing properties Large plastic moulds with deep engraving & high core stresses.                                                                                                              |
|                      | M 310            | 0.35 to 0.45        | 0.30 to 0.50 | 0.20 to 0.40   | 12.50 to 13.50 | ----          | ----           | ----         | ----          | 1000-1050             | OIL              | 100-200               | 53-56                     | STAVEX     | Moulds for chemically aggresing Plastics & Plastics containing abrasive Filters.                                                                                                                                                                                                                                         |
|                      | M 300            | 0.33 to 0.43        | 1.00 Max     | 1.00 Max       | 15.00 to 17.00 | 1.00 to 1.30  | NI 1.00 Max    | ----         | ----          | 1000-1050             | OIL / AIR        | 600-700               | 46-49 (OIL) 42-48 (AIR)   | RAMEX S    | Moulds for processing plastics with corrosive action.                                                                                                                                                                                                                                                                    |
|                      | K 600            | 0.40 to 0.50        | 0.10 to 0.40 | 0.15 to 0.45   | 1.20 to 1.50   | 0.15 to 0.35  | NI 3.8/4.3     | ----         | ----          | 840-870               | OIL / AIR        | ----                  | 53-57 (OIL) 54-58 (AIR)   | 420        | Cutlery dies, cutting tools for thick material, billet shear blades, drawing jaws, solid embossing & bending tools, plastic mould, casting.                                                                                                                                                                              |

| STAINLESS STEEL                 |         |                           |             |           |                                                                                             |           |                                                             |                  |                      |                        |
|---------------------------------|---------|---------------------------|-------------|-----------|---------------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------|------------------|----------------------|------------------------|
| ALLOY                           | UNS     | TYPICAL CHEMICAL ANALYSIS |             |           |                                                                                             |           |                                                             | DIN              | ASTM                 | AMS                    |
|                                 |         | C Max                     | Ni          | Cr        | Other (MAX)                                                                                 |           |                                                             |                  |                      |                        |
| AUSTENITIC GRADES               |         |                           |             |           |                                                                                             |           |                                                             |                  |                      |                        |
| 301                             | S30100  | 0.15                      | 6.0-8.00    | 16.0-18.0 | Mn 2.0; P .045; S .03; Si 1.0                                                               |           |                                                             | 1.4310           | Chem(A-167)<br>A-580 | ----                   |
| 302                             | S30200  | 0.15                      | 8.0-10.0    | 17.0-19.0 | Mn 2.0; P .045; S .03; Si 1.0                                                               |           |                                                             | 1.6900           |                      | ----                   |
| 302HQ                           | S30430  | 0.10                      | 8.0-10.0    | 17.0-19.0 | Mn 2.0; P .035; S .035; Si 1.0; Mo .50; Cu 3.0-4.0                                          |           |                                                             | 1.4567           | A-581                | 5640                   |
| 302-Cu <sup>TMS</sup>           | S30430  | 0.10                      | 8.0-10.0    | 17.0-19.0 | Mn 2.0; P .035; S .035; Si 1.0; Mo .50; Cu 3.0-4.0                                          |           |                                                             | 1.4567           |                      |                        |
| 303                             | S30300  | 0.15                      | 8.0-10.0    | 17.0-19.0 | Mn 2.0; P 0.2; S 0.15; Si 1.0; Mo .60                                                       |           |                                                             | 1.4305           | A-580                | 5639, 5697             |
| 304                             | S30400  | 0.08                      | 8.0-10.5    | 18.0-20.0 | Mn 2.0; P .045; S .03; Si 1.0                                                               |           |                                                             | 1.4301           | A-580                | 5647                   |
| 304L                            | S30403  | 0.03                      | 8.0-12.0    | 18.0-20.0 | Mn 2.0; P .045; S .03; Si 1.0                                                               |           |                                                             | 1.4306           | A-580                | 5686                   |
| 305                             | S30500  | 0.12                      | 10.5-13.0   | 17.0-19.0 | Mn 2.0; P .045; S .03; Si 1.0                                                               |           |                                                             | 1.4303           | A-580                | 5650                   |
| 309S                            | S30908  | 0.08                      | 12.0-15.0   | 22.0-24.0 | Mn 2.0; P .045; S .03; Si 1.0                                                               |           |                                                             | 1.4833           | A-580                | 5651                   |
| 310S                            | S31008  | 0.08                      | 19.0-22.0   | 24.0-26.0 | Mn 2.0; P .045; S .03; Si 1.5                                                               |           |                                                             | 1.4841           | A-580                | 5652                   |
| 314                             | S31400  | 0.25                      | 19.0-22.0   | 23.0-26.0 | Mn 2.0; P .045; S .03; Si 1.5-3.0                                                           |           |                                                             | 1.4841           | A-580                | 5648, 5690             |
| 316                             | S31600  | 0.08                      | 10.0-14.0   | 16.0-18.0 | Mn 2.0; P .045; S .03; Si 1.0; Mo 2.0-3.0                                                   |           |                                                             | 1.4401           | A-580                | 5653                   |
| 316L                            | S31603  | 0.03                      | 10.0-14.0   | 16.0-18.0 | Mn 2.0; P .045; S .03; Si 1.0; Mo 2.0-3.0                                                   |           |                                                             | 1.4404           | A-580                | ----                   |
| 317L                            | S31703  | 0.03                      | 11.0-15.0   | 18.0-20.0 | Mn 2.0; P .045; S .03; Si 1.0; Mo 3.0-4.0                                                   |           |                                                             | 1.4438           | Chem(A-167)          | ----                   |
| 321                             | S32100  | 0.08                      | 9.0-12.0    | 17.0-19.0 | Mn 2.0; P .045; S .03; Si 1.0; Ti 5 X C min.                                                |           |                                                             | 1.4541           | A-580                | 5645, 5689             |
| 330                             | N08330  | 0.08                      | 34.0-37.0   | 17.0-20.0 | Mn 2.0; P .04; S .03; Si 0.75-1.50; Mo 1.0-2.0                                              |           |                                                             | 1.4864           | Chem(B-511)          | 5716                   |
| 347                             | S34700  | 0.08                      | 9.0-13.0    | 17.0-19.0 | Mn 2.0; P .045; S .03; Si 1.0; Cb + Ta 10 X C min.                                          |           |                                                             | 1.4550           | A-580                | 5646                   |
| CARPENTER 20 Cb-3 <sup>10</sup> | N08020  | 0.06                      | 32.5-35.0   | 19.0-21.0 | Mo 2.0-3.0; Cu 3.0-4.0, 8 X C ≤ Cb + Ta ≤ 1.0, FeBal.                                       |           |                                                             | 2.4660           | A-473                | ----                   |
| FERRITIC GRADES                 |         |                           |             |           |                                                                                             |           |                                                             |                  |                      |                        |
| 430                             | S43000  | 0.12                      |             | 16.0-18.0 | Mn 1.0; P .04; S 1.0; Si 1.0                                                                |           |                                                             | 1.4016           | A-580                | 5627                   |
| 446                             | S44600  | 0.20                      |             | 23.0-27.0 | Mn 1.5; P .04; S .03; Si 1.0; N .25                                                         |           |                                                             | 1.4762           | A-580                | ----                   |
| MARTENSITIC GRADES              |         |                           |             |           |                                                                                             |           |                                                             |                  |                      |                        |
| 410                             | S41000  | 0.15                      |             | 11.5-13.5 | Mn 1.0; P .04; S .03; Si 1.0                                                                |           |                                                             | 1.4006           | A-580                | 5613                   |
| 416                             | S41623  | 0.15                      |             | 12.0-14.0 | Mn 1.25; P .06; S .15 min.; Si 1.0; Mo .60                                                  |           |                                                             | 1.4005           | A-581                | 5610                   |
| 420                             | S42000  | .15min.                   |             | 12.0-14.0 | Mn 1.0; P .04; S .03; Si 1.0                                                                |           |                                                             | 1.4021           | A-580                | 5621                   |
| PRECIPITATION HARDENING GRADES  |         |                           |             |           |                                                                                             |           |                                                             |                  |                      |                        |
| 17-7PH <sup>TMS</sup>           | S17700  | 0.09                      | 6.50-7.75   | 16.0-18.0 | Al .75-1.5; Si 1.0; P .04; S .03                                                            |           |                                                             | 1.4568           | Chem(A-693)          | Chem (5528, 5529)      |
| A285 <sup>TMS</sup>             | S66286  | 0.08                      | 24.0-27.0   | 13.5-16.0 | Mn 2.0; Si 1.0; P .040; S .030; Mo 1.0-1.5; Al .035<br>B .001-.010, Ti 1.90-2.35, V .10-.50 |           |                                                             | 1.4980           | —                    | 5731                   |
| NICKEL ALLOYS                   |         |                           |             |           |                                                                                             |           |                                                             |                  |                      |                        |
| ALLOY                           | UNS     | TYPICAL CHEMICAL ANALYSIS |             |           |                                                                                             |           |                                                             | DIN              | ASTM                 | AMS                    |
|                                 |         | Ni+                       | C           | Mn        | Fe                                                                                          | Si        | Other                                                       |                  |                      |                        |
| AUSTENITIC GRADES               |         |                           |             |           |                                                                                             |           |                                                             |                  |                      |                        |
| Nickel 200                      | N02200  | 99.5 min.                 | 0.8 max.    | 0.18      | 0.20                                                                                        | 0.18      | Cu .13 max.                                                 | 2.4066           | B-160                | ----                   |
| Nickel 201                      | N02201  | 99.5 min.                 | .01 max.    | 0.18      | 0.20                                                                                        | 0.18      | Cu .13 max.                                                 | 2.4068           | B-160                | ----                   |
| Nickel 233                      | N02233  | 99.5                      | 0.09        | 0.18      | 0.05                                                                                        | 0.005     | Mg .07, Cu .03, Ti .003, S .005                             | 2.4061           | B-164                | 4730, 4731             |
| MONEL 400                       | N04400  | 66.5                      | 0.15        | 1.0       | 1.25                                                                                        | 0.50      | Cu 31.5, S 0.12                                             | 2.4360           |                      |                        |
| INCONEL 600                     | N06600  | 76.0                      | 0.08        | 0.5       | 8.0                                                                                         | 0.25      | Cu .25, Cr 15.5                                             | 2.4816           | B-166                | 5665, 5687             |
| INCONEL 601                     | N06601  | 60.5                      | 0.05        | 0.50      | 14.1                                                                                        | 0.25      | Cu .50, Cr 23                                               | 2.4851           |                      | 5715                   |
| INCONEL 625 <sup>1</sup>        | N06625  | 61.0                      | 0.08        | 0.25      | 2.5                                                                                         | 0.25      | Cr 21.5 max., Al .2, Ti .2, Mo 9.0 max., (Cb+Ta) 3.65       | 2.4856           | B-446                | 5837                   |
| INCONEL 702 <sup>1</sup>        | N07702  | 79.0                      | 0.04        | 0.50      | 1.0                                                                                         | 0.35      | S .005, Cu .25, Cr 15.5, Ti .60, Al 3.25                    | 2.4668           |                      | 5832                   |
| INCONEL 718 <sup>1</sup>        | N07718  | 52.5                      | 0.04        | 0.18      | bal.                                                                                        | 0.18      | Cu .15, Al .50, Ti .90, Cr19.0, S.008, Mo 3.05, (Cb+Ta)5.13 |                  |                      |                        |
| INCONEL 722 <sup>1</sup>        | N07722  | 75.0                      | 0.04        | 0.50      | 7.0                                                                                         | 0.35      | S.005, Cu .25, Al .70, Cr.15.5, Ti 2.38                     |                  |                      | 5714                   |
| INCONEL X-750 <sup>1</sup>      | N07750  | 73.0                      | 0.04        | 0.50      | 7.0                                                                                         | 0.25      | S.005, Cu.25, Al .70, Cr 15.5, Ti 2.50, (Cb+Ta).95          | 2.4669           |                      | 5667, 5670, 5698, 5699 |
| INCONEL 800 <sup>1</sup>        | N08800  | 32.5                      | 0.05        | 0.75      | 46.0                                                                                        | 0.50      | Cr.21.0, Ti .38, Al .38, Cu .38                             | 1.4876           | B-408                | 5766                   |
| INCONEL 825 <sup>1</sup>        | N08825  | 42.0                      | 0.03        | 0.50      | 29.0                                                                                        | 0.25      | S.015, Ti.90, Al .10, Cu 2.25, Cr21.5, Mo 3.0               | 2.4858           | B-425                |                        |
| HASTELLOY B-2 <sup>2</sup>      | N10665  | bal.                      | .02 max.    | ≥ 1.00    | ≥ 2.0                                                                                       | 1.0 max.  | Co ≥ 1.0, Cr ≥ 1.0, Mo 26.0-30.0                            | 2.4615, 2.4617   | B-574                |                        |
| HASTELLOY C-276 <sup>2</sup>    | N10276  | bal.                      | 0.05 - 0.15 | 1.00 max. | 4.0-7.0                                                                                     | 0.08      | Co 2.50 max., Cr14.5-16.5, W .2-1.0, Mo15-17                | 2.4819           |                      |                        |
| HASTELLOY X <sup>2</sup>        | N06002  | bal.                      | 0.05 - 0.15 | 1.0 max   | 17.0-20.0                                                                                   | 1.0 max.  | Co .5-2.5, Cr 20.5-23.0, W .2-1.0, Mo 8.0-10.0              | 2.4665           |                      |                        |
| COBALT ALLOYS                   |         |                           |             |           |                                                                                             |           |                                                             |                  |                      |                        |
| HAYNES 25 (L-605)               | R30605  | 9.0-11.0                  | 0.05-0.15   | 1.25 max  | 3.0 max.                                                                                    | 0.40 max  | Co balance, Cr 19.0-21.0, W14.0-16.8                        | 2.4967           |                      | 5759                   |
| WASPALLOY <sup>TMS</sup>        | N07001  | bal.                      | .02-1.0     | 1.00 max. | 2.0 max.                                                                                    | 0.15 max. | Co 13.5, Al 1.3, Cr19.5, Cu.10, Mo 4.25, Ti 3.0             | 2.4964<br>2.4654 |                      |                        |
| COMMERCIALLY PURE TITANIUM      |         |                           |             |           |                                                                                             |           |                                                             |                  |                      |                        |
| ALLOY                           |         | UNS                       |             | C         | Fe                                                                                          | N         | O                                                           | H                | ASTM                 | AMS                    |
| Ti 35A                          | Grade 1 | R507                      |             | 0.08      | 0.20                                                                                        | 0.03      | 0.18                                                        | 0.0100           | F67GR1               | 4921                   |
| Ti 40A                          | Grade 2 | R507                      |             | 0.10      | 0.30                                                                                        | 0.03      | 0.25                                                        | 0.0100           | F67GR2               | 4921                   |
| Ti 75A                          | Grade 4 | R507                      |             | 0.10      | 0.50                                                                                        | 0.05      | 0.40                                                        | 0.0100           | F67GR4               | 4921                   |