



SciPod  
Estd. 1991

**PADMAVATI**  
**STEEL & ENGG Co.**  
AN ISO 9001-2015 CERTIFIED CO.



## **Corporate Info.**

### **About Us**

Padmavati Steel & Engg. Co. one of the leading Importers, Stockiest , Exporters and Suppliers of Stainless steel, Alloy steel, Carbon steel, Copper, Brass, Inconel, Monel, Aluminum, Hastelloy, Titanium, Tantalum, Hordox in the state of Sheets, Plates, Coils, Pipe, Tubes, Rods, Wires, Angels and the whole scope of Flanges and Pipes Fittings, for example, BW/SW/Screwed/Forged and pressure sort with Ferrules, for example, Elbows, Tees, Reducers, stubends, Union, Caps, Nipples, Couplings, Elbowlets, Weldolets, Nuts, Bolts, Studs, Washers, Valves, Gaskets and so on.

**Exports** Having establish our presence in the Indian market, we are now aggressively venturing into exporting of our products to various countries. We are already exporting our product to Europe, middle East, Far East and African Countries.

ISO 9001-2008: In recognition of our efforts in quality control we have been awarded the coveted ISO 9001-2008 quality certification from reputed agency.

**Vision** To wind up distinctly a venturesome association in the field of Ferrous & non-ferrous metal items. To be known for nature of items and astounding administration.

**Mission** To Satisfy our customers' needs by giving top notch items at Competitive cost according to the timetable and to keep up long haul association with our customers.

**Quality Policy** We are focused on ceaselessly update our insight and aptitudes to enhance the effectiveness of our association and take a stab at exceptional nature of our items





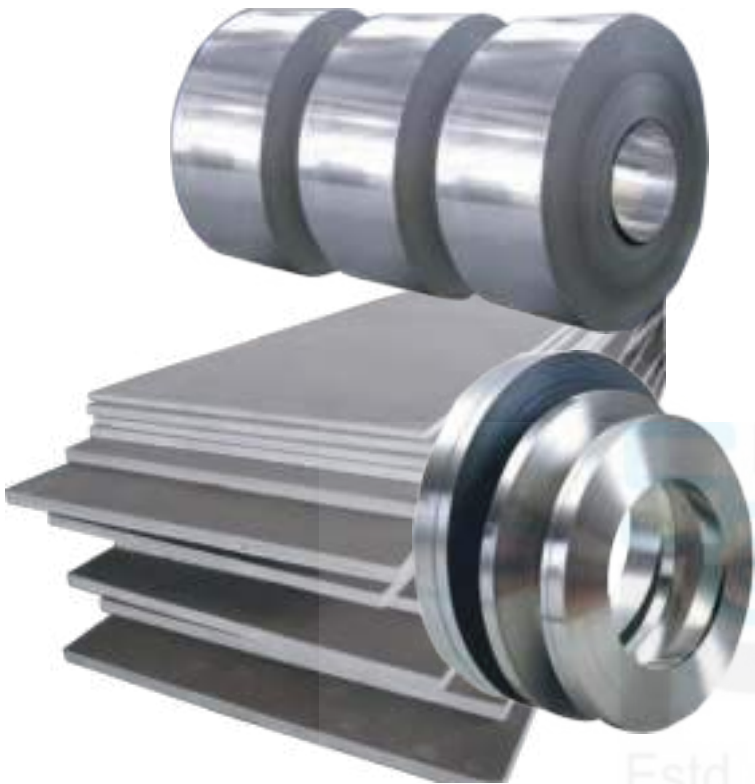


# Certifications.





## SHEET, COILS & STRIPS



**Stainless Steel :** 202, 201, JT, J4, J1, 4%  
304, 304L, 304LN, 309, 309S, 309H, 316, 316L,  
316H, 316LN, 316Ti, 317, 317L, 321, 321H, 347, 347H,  
409, 410, 420, 430, 440, 904L etc.

### Nickel Alloy

ASTM / ASME SB 162 UNS 2200 (NICKEL 200)  
ASTM / ASME SB 162 UNS 2201 (NICKEL 201)  
ASTM / ASME SB 127 UNS 4400 (MONEL 400)  
ASTM / ASME SB 463 UNS 8020 (ALLOY20 / 20 CB 3)  
ASTM / ASME SB 424 UNS 8825 (INCONEL 825)  
ASTM / ASME SB 168 UNS 6600 (INCONEL 600)  
ASTM / ASME SB 409 UNS 8810/8811 (INCONEL 800/800HT)  
ASTM / ASME SB 443 UNS 6625 (INCONEL 625)  
ASTM / ASME SB 575 UNS 10276 (HASTELLOY C276)

**Carbon Steel / Boiler Quality Plates :** as per IS  
2062/ASTMA36, Gr. A, B & C, IS 2002 Gr. 1 & 2 ASTM A  
516 Gr. 60 & 70, Hardox, Abrex

**Alloy Steel Plates :** as per ASTM A387, Gr. P2, P5, P9,  
P11, P12, P22, Gr. A & B, DIN 17175 Gr. 15Mo3 & 16Mo3  
with IBR Test Certificate.

**Range:** 0.5 mm To 200 mm thick in 1000 mm To 3000 mm  
width & length as per your requirements.

## PIPES & TUBES

**Stainless Steel :** 202, 201, JT, J4, J1, 4%  
304, 304L, 304LN, 309, 309S, 309H, 316, 316L,  
316H, 316LN, 316Ti, 317, 317L, 321, 321H, 347, 347H,  
409, 410, 420, 430, 440, 904L etc.

### Nickel Alloy

ASTM / ASME SB 161/B725/B730 UNS 2200 (NICKEL 200)  
ASTM / ASME SB 161/B725/B730 UNS 2201 (NICKEL 201)  
ASTM / ASME SB 165/B725/B730 UNS 4400 (MONEL 400)  
ASTM / ASME SB 729/B464/B468 UNS 8020 (ALLOY20 / 20 CB 3)  
ASTM / ASME SB 423/B705/B704 UNS 8825 (INCONEL 825)  
ASTM / ASME SB 167/B517/B516 UNS 6600 (INCONEL 600)  
ASTM / ASME SB 407/B514/B515 UNS 8810/8811 (INCONEL 800/HT)  
ASTM / ASME SB 444/B705/B704 UNS 6625 (INCONEL 625)  
ASTM / ASME SB 622/B619/B622 UNS 10276 (HASTELLOY C276)

### Duplex Steel

2205, S32205, S31803, 2304, S32750, S732760, 32550, 22101

### Carbon Steel

A53 Grade B Seamless Pipes, ASTM A106 Seamless Pipes, Carbon Steel  
Seamless Pipes & Tubes, ASTM A333 Gr.6 Low Temperature Steel Pipe & Tubes,  
Carbon Steel ERW Pipes & Tubes, ASTM A672 Grade C60/C65/C70  
EFW Pipes & Tubes Manufacturer in India.

### Alloy Steel

ASTM / ASME A 335 GR P 1, P 5, P 9, P 11, P 12, P 22, P 23, P 91







# ROUND BARS



- Stainless Steel & Duplex Steel
- Nickel Alloy
- Carbon - Nickel Alloy

**Stainless Steels** : 202, 201, JT, J4, J1, 4%, 304, 304L, 304LN, 309, 309S, 309H, 316, 316L, 316H, 316LN, 316Ti, 317, 317L, 321, 321H, 347H, 410, 430, 440, 17-4PH, 15-5PH, Nitronic 50/60, Nimonic 80/80A

**Duplex & Super Duplex** : UNS S31803, UNS S32750, UNS S32760, UNS S32550, 254SMO

**Hastelloy Alloy** : Hastelloy C4, Hastelloy B2, Hastelloy G30, Hastelloy B3, Hastelloy C276, Hastelloy X, Hastelloy C22

**Inconel Alloys** : Inconel Alloy 20, Inconel Alloy 800, Inconel Alloy 800H/800HT, Inconel Alloy 825, Inconel Alloy 925, Inconel Alloy A286, Inconel Alloy 600, Inconel Alloy 601, Inconel Alloy 625, Inconel Alloy 718, Inconel Alloy 725, Inconel Alloy X750

**Monel Alloys** : Monel 400, Monel R405, Monel K500.

**Type** : Round / Square / Hexagonal / Rectangular / Flat

## WEIGHT OF RODS IN KILOGRAMS PER LINER FOOT

| SIZE   |                  |         | STAINLESS STEEL/ALLOY STEEL |        |        | BRASS  |        |        | ALUMINIUM |       |       |
|--------|------------------|---------|-----------------------------|--------|--------|--------|--------|--------|-----------|-------|-------|
| INCH   | FRACTION OF INCH | MM      | ROUND                       | HEX    | SQ.    | ROUND  | HEX    | SQ.    | ROUND     | HEX   | SQ.   |
| 1/8"   | 0.125            | 3.173   | -                           | -      | -      | 0.020  | 0.023  | 0.026  | -         | -     | -     |
| 3/16"  | 0.187            | 4.762   | 0.043                       | 0.047  | 0.054  | 0.046  | 0.051  | 0.059  | 0.015     | 0.017 | 0.020 |
| 1/4"   | 0.250            | 6.350   | 0.076                       | 0.084  | 0.097  | 0.082  | 0.091  | 0.104  | 0.030     | 0.035 | 0.037 |
| 5/16"  | 0.312            | 7.937   | 0.119                       | 0.132  | 0.151  | 0.129  | 0.142  | 0.164  | 0.042     | 0.047 | 0.054 |
| 3/8"   | 0.375            | 9.52    | 0.171                       | 0.188  | 0.218  | 0.185  | 0.224  | 0.235  | 0.061     | 0.068 | 0.078 |
| 7/16"  | 0.437            | 11.112  | 0.233                       | 0.257  | 0.296  | 0.252  | 0.278  | 0.321  | 0.083     | 0.092 | 0.106 |
| 1/2"   | 0.500            | 12.700  | 0.305                       | 0.336  | 0.386  | 0.329  | 0.363  | 0.419  | 0.109     | 0.120 | 0.138 |
| 9/16"  | 0.562            | 14.287  | 0.384                       | 0.424  | 0.490  | 0.416  | 0.461  | 0.529  | 0.138     | 0.152 | 0.175 |
| 5/8"   | 0.625            | 15.875  | 0.473                       | 0.520  | 0.604  | 0.516  | 0.566  | 0.652  | 0.170     | 0.188 | 0.217 |
| 11/16" | 0.687            | 17.462  | 0.87                        | 0.647  | 0.760  | 0.621  | 0.684  | 0.789  | 0.206     | 0.227 | 0.262 |
| 3/4"   | 0.750            | 19.050  | 0.687                       | 0.736  | 0.870  | 0.739  | 0.817  | 0.940  | 0.245     | 0.270 | 0.312 |
| 13/16" | 0.812            | 20.637  | 0.800                       | 0.882  | 1.021  | 0.867  | 0.958  | 1.104  | 0.287     | 0.317 | 0.366 |
| 7/8"   | 0.875            | 22.225  | 0.931                       | 1.038  | 1.184  | 1.008  | 1.109  | 1.282  | 0.333     | 0.368 | 0.424 |
| 15/16" | 0.937            | 23.812  | 1.067                       | 1.176  | 1.359  | 1.154  | 1.273  | 1.474  | 0.383     | 0.422 | 0.486 |
| 1"     | 1.00             | 25.400  | 1.223                       | 1.350  | 1.546  | 1.314  | 1.451  | 1.675  | 0.436     | 0.481 | 0.555 |
| 1.1/8" | 1.125            | 28.575  | 1.569                       | 1.730  | 1.950  | 1.665  | 0.834  | 2.122  | 0.553     | 0.608 | 0.705 |
| 1.1/4" | 1.250            | 31.750  | 1.888                       | 2.080  | 2.415  | 2.053  | 2.268  | 2.619  | 0.680     | 0.748 | 0.867 |
| 1.3/8" | 1.375            | 34.925  | 2.760                       | 3.042  | 3.478  | 2.487  | 2.742  | 3.167  | 0.980     | 1.082 | 1.248 |
| 1.1/2' | 1.500            | 38.100  | 2.318                       | 2.554  | 2.922  | 2.961  | 3.262  | 3.167  | 0.821     | 0.907 | 1.082 |
| 1.5/8" | 1.625            | 41.275  | 3.205                       | 3.540  | 4.072  | 3.742  | 3.833  | 4.426  | 1.152     | 1.272 | 1.466 |
| 1.3/4" | 1.750            | 44.450  | 3.738                       | 4.120  | 4.756  | 4.029  | 4.444  | 5.129  | 1.352     | 1.474 | 1.720 |
| 1.7/8" | 1.875            | 47.625  | 4.300                       | 4.740  | 5.475  | 4.627  | 5.101  | 5.890  | 1.529     | 1.692 | 1.942 |
| 2"     | 2.000            | 50.800  | 4.905                       | 5.415  | 6.224  | 5.266  | 5.804  | 6.703  | 1.742     | 1.919 | 2.220 |
| 2.1/4" | 2.250            | 57.150  | 6.210                       | 6.850  | 7.910  | 6.662  | 7.346  | 8.482  | 2.204     | 2.433 | 2.802 |
| 2.1/2" | 2.500            | 63.500  | 7.614                       | 8.400  | 9.700  | 8.225  | 9.067  | 10.472 | 2.722     | 3.005 | 3.462 |
| 2.3/4" | 2.750            | 69.850  | 9.282                       | 10.20  | 11.820 | 10.199 | 11.225 | 12.955 | 3.003     | 3.315 | 3.820 |
| 3"     | 3.000            | 76.200  | 10.996                      | 12.210 | 14.000 | 12.454 | 13.267 | 15.341 | 3.919     | 4.327 | 4.990 |
| 3.1/2" | 3.500            | 88.900  | 14.946                      | 16.500 | 19.020 | 16.364 | 18.040 | 20.824 | 5.408     | 5.970 | 6.884 |
| 4"     | 4.000            | 101.600 | 19.619                      | 21.620 | 25.000 | 21.477 | 23.210 | 27.358 | 6.968     | 7.693 | 8.870 |





## STAINLESS STEEL WELDING ELECTRODES & FILLER WIRES



### **Stainless Steel MIG & TIG**

AWS Class ER308/308H MIG&TIG  
AWS Class ER316LSi MIG&TIG  
AWS Class ER308/308L MIG &TIG  
AWS Class ER317L MIG & TIG  
AWS Class ER308LSi MIG & TIG  
AWS Class ER320LR MIG & TIG  
AWS Class ER309/309L MIG&TIG  
AWS Class ER330 MIG & TIG  
AWS Class ER309LSi MIG & TIG  
AWS Class ER347 MIG&TIG  
Alloy 309LMo MIG & TIG  
AWS Class ER385 MIG &TIG  
AWS Class ER310 MIG&TIG  
AWS Class ER410 MIG &TIG  
AWS Class ER312 MIG&TIG  
AWS Class ER410NiMo MIG & TIG  
AWS Class ER316/316H MIG& TIG  
AWS Class ER420 MIG& TIG  
AWS Class ER316/316L MIG &TIG  
AWS Class ER630 MIG &TIG



### **Nickel Alloy MIG & TIG**

AWS Class ERNiCrMo-4 MIG&TIG  
AWS Class ERNiCrCoMo-1 MIG & TIG  
AWS Class ERNiCrMo-13 MIG & TIG  
AWS Class ERNiCrMo-10 MIG & TIG  
AWS Class ERNiCu-7 MIG& TIG  
AWS Class ERNiCrMo-3 MIG &TIG  
AWS Class ERNi-1 MIG& TIG  
AWS Class ERNiFeCr-2 MIG &TIG  
AWS Class ERCuNi MIG&TIG  
AWS Class ERNiCrMo-14 MIG &TIG  
AWS Class ERNiCr-3 MIG& TIG  
AWS Class ERNiFeC-1 MIG &TIG

### **Titanium MIG & TIG**

AWS Class ERTi-1 MIG & TIG  
AWS Class ERTi-2 MIG & TIG  
AWS Class ERTi-5 MIG & TIG  
AWS Class ERTi-7 MIG & TIG  
AWS Class ERTi-9 MIG & TIG  
AWS Class ERTi-12 MIG & TIG

### **Aluminium MIG & TIG**

AWS Class ER 4043  
AWS Class ER 5183  
AWS Class ER 5356  
AWS Class ER 4047

### **Zirconium MIG & TIG**

AWS Class ERZr2 MIG & TIG  
AWS Class ERZr4 MIG & TIG

### **High Temperature Welding Wire**

HAYNES® 25 Welding Wire







## FLATS, ANGLE, CHANNEL & BEAM

### Carbon Steel

A53 Grade B Seamless Pipes, ASTM A106 Seamless Pipes, Carbon Steel, Seamless Pipes & Tubes, ASTM A333 Gr.6 Low Temperature Steel Pipe & Tubes, Carbon Steel ERW Pipes & Tubes, ASTM A672 Grade C60/C65/C70 EFW Pipes & Tubes Manufacturer in India.

### Stainless Steel:

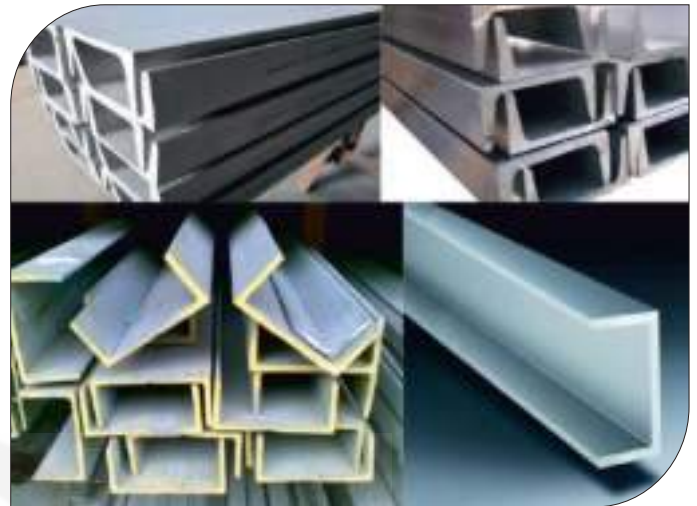
SA 240 TP 304/ 304L/ 304H/ 316/ 316L/ 316Ti/ 317/ 317L/ 321/ 309/ 310/ 347/ 409/ 410/ 430/ 904L Etc.

### Other Alloys :

Nickel, Monel, Inconel, Hastelloy, Alloy20, Incoloy, Duplex & Super Duplex, 5M06-254, Carbon Steel, Alloy Steel, Copper, Brass, Cupro Nickel, Aluminium, Titanium Etc.,

### Types :

Angle, Channel, Flat Bar, Beams Etc.



## OLETS



**Elements :** Nippolet, Elbowlet, Letrolet, Sockolet & Weldolet, Threadolet

### Stainless Steel :

ASTM A-182, F304L, 316L, 310, 904L

**Carbon Steel :** ASTM A 105

**Size :** B/W Standard & Extra Long 1/8" To 24", Sch. 160 1/2" To 6"  
3000# Threaded And S/W 1/8" To 4", 6000# Threaded And S/W 1/2" To 2"

**Rating :** 3000# (for Small Bore Branches)

**Ends :** Nippolet : Plain End, Sockolet : S/W End, Weldolet & Elbowlet : B/W, Letrolet : S/W, B/W (as Per Branch Size)

**Grade :** Duplex, Super Duplex, Inconel, Monel, Hastelloy C, Nickel Alloy, Alloy 20 Etc.

**Dim Standard :** MSS-SP-97





# FLANGES



- Stainless Steel
  - Nickel Alloy & Duplex Steel
  - Carbon Steel
- Stainless Steel** : ASTM A182, F304,304L,304H,316, 316L,317,317L,321,310,347,904L
- Duplex & Super Duplex** : UNS S31803, UNS S32750, UNS S32760,
- Hastelloy Alloy** : ASTM B564 Hastelloy B2, C276, C22
- Incoloy Alloys** : ASTM B564 Alloy 20, Alloy A286 Alloy 800H/800HT, Alloy 825,
- Inconel Alloys** : ASTM B564 Alloy 600, Alloy 601, Alloy 625, Alloy 718, Alloy 725,
- Monel Alloys** : ASTM B564 Monel 400, Monel K500.
- Carbon Steel** : ASTM A105,A694 F42,A350 Lf2
- Alloy Steel** : ASTM A182 F1,F5,F9,F11,F22,F91
- Size** : 1/2" NB TO 72" NB
- Class** : 150#, 300#, 600#, 900#, 1500# & 2500#.
- TYPE**
- SLIP-ON FLANGE
  - LAP JOINT FLANGE
  - WELDNECK FLANGE
  - ORIFACE FLANGE
  - LONG WELD NECK FLANGE
  - THREADED FLANGE
  - SOCKETWELD FLANGE
  - BLIND FLANGE (DUMMY FLANGE)
  - RTJ FLANGE
  - TABLE FLANGES (D, E, F, H TABLE)

## Salient features :

- Server vibration under impulse pressure
- Static Pressure
- High tolerance
- Dimensional preciseness
- Corrosion resistance
- Long service life
- Perfect installation & application
- Study construction
- Fast performance

- Stainless Steels** : 202, 201, JT, J4, J1, 4%, 304, 304L, 304LN, 309, 309S, 309H, 316, 316L, 316H, 316LN, 316Ti, 317, 317L, 321, 321H, 347, 347H, 409, 410, 420, 430, 440, 904L etc.
- Carbon Steel** : 4.6, 8.8, 10.9, 12.9.
- Duplex & Super Duplex** : UNS S31803, UNS S32750, UNS S32760, UNS S32550, 254SMO
- Hastelloy Alloy** : Hastelloy C4, Hastelloy B2, Hastelloy G30, Hastelloy B3,Hastelloy C276, Hastelloy X, Hastelloy C22
- Incoloy Alloys** : Incoloy Alloy 20, Incoloy Alloy 800, Incoloy Alloy 800H/800HT, Incoloy Alloy 825, Incoloy Alloy 925, Incoloy , Alloy A286
- Inconel Alloys** : Inconel Alloy 600, Inconel Alloy 601, Inconel Alloy 625, Inconel Alloy 718, Inconel Alloy 725, Inconel Alloy X750
- Monel Alloys** : Monel 400, Monel R405, Monel K500.

## TYPES

- ANCHOR FASTENERS
- STUD BOLTS
- HEX HEAD BOLTS
- THREADED RODS
- SOCKET CAPS SCREW
- COUNTERSUNK BOLTS
- HEX NUTS
- FLAT / SPRING / LOCK WASHERS
- EYE BOLTS
- FOUNDATION BOLTS

# FASTENERS







# SOCKET WELD FITTINGS

|                        |                                                                 |
|------------------------|-----------------------------------------------------------------|
| <b>Stainless Steel</b> | : ASTM A182, F304,304L,304H,316, 316L,317,317L,321,310,347,904L |
| <b>High Nickel</b>     | : Monel, Nickel, Inconel, Hastelloy                             |
| <b>Carbon Steel</b>    | : ASTM A105,A694 F42,A350 LF2                                   |
| <b>Alloy Steel</b>     | : ASTM A182 F1,F5,F9,F11,F22,F91                                |
| <b>Size</b>            | : 1/4" NB TO 4" NB                                              |
| <b>Class</b>           | : 3000#, 6000#, 9000#                                           |

- Stainless Steel & Duplex Steel
- Nickel Alloy & Copper Nickel Alloy
- Carbon Steel & Alloy Steel

**Types** : Elbow, Tee, Union, Cross, Coup Bushing, Plug, Swage Nipple, Welding Boss, Hexagon Nipple, Barrel Nipple, Welding Nipple, Parraler Nipple, Street Elbow, Hexagon Nut, Hose Nipple, Bend, Adapter, Insert, Weldolet, Elbowlet, Sockolet, Thredolet, Nipolet, Letrolet,etc.



Estd. 1991

# BUTT-WELD FITTINGS



|                                  |                                                                    |
|----------------------------------|--------------------------------------------------------------------|
| <b>Stainless Steel</b>           | : ASTM A403, WP304,304L,304H,316, 316L,317,317L,321,310,347,904L   |
| <b>Duplex &amp; Super Duplex</b> | : UNS S31803, UNS S32750, UNS S32760,                              |
| <b>Hastelloy Alloy</b>           | : ASTM B366 Hastelloy B2, Hastelloy C276, Hastelloy C22            |
| <b>Incoloy Alloys</b>            | : ASTM B366 Alloy 20, Alloy 800H/800HT, Alloy 825, Alloy A286      |
| <b>Inconel Alloys</b>            | : ASTM B366 Alloy 600, Alloy 601, Alloy 625, Alloy 718, Alloy 725, |
| <b>Monel Alloys</b>              | : ASTM B366 Monel 400, Monel K500.                                 |
| <b>Carbon Steel</b>              | : ASTM A234 WPB,A420 WPL3,A420 WPL6, MSS-SP-75 WPHY 42/46/52       |
| <b>Alloy Steel</b>               | : ASTM A234WP1,WP5,WP9,WP11,WP22                                   |
| <b>Size</b>                      | : 1/4" NB TO 24" NB (seamless)<br>4" NB TO 72" NB (welded)         |
| <b>Wall Thickness</b>            | : Sch. 5s To Sch. XXS                                              |

## TYPE OF BUTTWELD FITTINGS

- ELBOW (1D/1.5D/3D/5D)
- 180° RETURN BEND / MITER BEND
- EQUAL TEE
- REDUCING TEE / CROSS TEE
- LONG STUBEND
- SHORT STUBEND
- REDUCER (CON./ECC.)
- END CAP / DISH END CAP





SPECIFICATIONS

| CHEMICAL COMPOSITION           |                   |           |           |          |          |           |             |             |
|--------------------------------|-------------------|-----------|-----------|----------|----------|-----------|-------------|-------------|
|                                | Designation/Grade | %C (Max)  | %Mn (Max) | %P (Max) | %S (Max) | %Si (Max) | %Cr         | %Ni         |
| Austenitic Cr-Mn               | 201#              | 0.15      | 5.5-7.5   | 0.060    | 0.030    | 1.00      | 16.00-18.00 | 3.50-5.50   |
|                                | 201L              | 0.030     | 5.5-7.5   | 0.045    | 0.030    | 0.75      | 16.00-18.00 | 3.50-5.50   |
|                                | 201LN             | 0.030     | 6.4-7.5   | 0.045    | 0.015    | 0.75      | 16.00-17.50 | 4.00-5.00   |
|                                | 202               | 0.15      | 7.5-10.0  | 0.060    | 0.030    | 1.00      | 17.00-19.00 | 4.00-6.00   |
|                                | 204CS             | 0.10      | 6.5-9.0   | 0.060    | 0.010    | 0.75      | 16.00-17.50 | 1.50-3.50   |
|                                | JSLAUS(J1)        | 0.08      | 6.0-8.0   | 0.070    | 0.010    | 0.75      | 16.00-18.00 | 4.00-6.00   |
|                                | J-4               | 0.10      | 8.50-10.0 | 0.080    | 0.010    | 0.75      | 15.00-16.00 | 1.00-2.00   |
| Austenitic Cr-Ni               | 301               | 0.15      | 2.00      | 0.045    | 0.030    | 1.00      | 16.00-18.00 | 6.00-8.00   |
|                                | 301L              | 0.030     | 2.00      | 0.045    | 0.030    | 1.00      | 16.00-18.00 | 6.00-8.00   |
|                                | 301LN             | 0.030     | 2.00      | 0.045    | 0.030    | 1.00      | 16.00-18.00 | 6.00-8.00   |
|                                | 304               | 0.07      | 2.00      | 0.045    | 0.030    | 0.75      | 17.50-19.50 | 8.00-10.50  |
|                                | 304M              | 0.04-0.10 | 2.00      | 0.045    | 0.030    | 0.75      | 18.00-20.00 | 8.00-10.50  |
|                                | 304L              | 0.030     | 2.00      | 0.045    | 0.030    | 0.75      | 17.50-19.50 | 8.00-12.00  |
|                                | 304LN             | 0.030     | 2.00      | 0.045    | 0.030    | 0.75      | 18.00-20.00 | 8.00-12.00  |
|                                | 309               | 0.20      | 2.00      | 0.045    | 0.030    | 0.75      | 22.00-24.00 | 12.00-15.00 |
|                                | 309S              | 0.08      | 2.00      | 0.045    | 0.030    | 0.75      | 22.00-24.00 | 12.00-15.00 |
|                                | 310               | 0.25      | 2.00      | 0.045    | 0.030    | 1.50      | 24.00-26.00 | 19.00-22.00 |
|                                | 310S              | 0.08      | 2.00      | 0.045    | 0.030    | 1.50      | 24.00-26.00 | 19.00-22.00 |
|                                | 316               | 0.08      | 2.00      | 0.045    | 0.030    | 0.75      | 16.00-18.00 | 10.00-14.00 |
|                                | 316L              | 0.030     | 2.00      | 0.045    | 0.030    | 0.75      | 16.00-18.00 | 10.00-14.00 |
|                                | 316LN             | 0.030     | 2.00      | 0.045    | 0.030    | 0.75      | 16.00-18.00 | 10.00-14.00 |
|                                | 316Ti             | 0.08      | 2.00      | 0.045    | 0.030    | 0.75      | 16.00-18.00 | 10.00-14.00 |
|                                | 317               | 0.08      | 2.00      | 0.045    | 0.030    | 0.75      | 18.00-20.00 | 11.00-15.00 |
|                                | 317L              | 0.030     | 2.00      | 0.045    | 0.030    | 0.75      | 18.00-20.00 | 11.00-15.00 |
|                                | 317LN             | 0.030     | 2.00      | 0.045    | 0.030    | 0.75      | 18.00-20.00 | 11.00-15.00 |
|                                | 31727             | 0.030     | 1.00      | 0.030    | 0.030    | 1.00      | 17.50-19.00 | 14.50-16.50 |
|                                | 321               | 0.08      | 2.00      | 0.045    | 0.030    | 0.75      | 17.00-19.00 | 9.00-12.00  |
|                                | 347               | 0.08      | 2.00      | 0.045    | 0.030    | 0.75      | 17.00-19.00 | 9.00-13.00  |
| Martensitic                    | 410               | 0.08-0.15 | 1.00      | 0.040    | 0.030    | 1.00      | 11.50-13.50 | 0.75max     |
|                                | 415               | 0.05      | 0.50-1.00 | 0.030    | 0.030    | 0.60      | 11.50-14.00 | 3.50-5.50   |
|                                | 420               | 0.15 min  | 1.00      | 0.040    | 0.030    | 1.00      | 12.00-14.00 | 0.75max     |
|                                | 431               | 0.20      | 1.00      | 0.040    | 0.030    | 1.00      | 15.00-17.00 | 1.25-2.50   |
|                                | JBS               | 0.6-0.7   | 1.00      | 0.030    | 0.015    | 0.75      | 12.50-13.50 | -           |
| Ferritic                       | 405               | 0.08      | 1.00      | 0.040    | 0.030    | 1.00      | 11.50-14.50 | 0.60        |
|                                | 409               | 0.030     | 1.00      | 0.040    | 0.020    | 1.00      | 10.50-11.70 | 0.50 max    |
|                                | 409L              | 0.030     | 1.00      | 0.040    | 0.030    | 1.00      | 10.50-11.70 | 0.50 max    |
|                                | 410S              | 0.08      | 1.00      | 0.040    | 0.030    | 1.00      | 11.50-13.50 | 0.60 max    |
|                                | 430               | 0.12      | 1.00      | 0.040    | 0.030    | 1.00      | 16.00-18.00 | 0.75 max    |
|                                | 430Ti             | 0.030     | 1.00      | 0.040    | 0.030    | 1.00      | 16.00-19.00 | -           |
|                                | 436               | 0.120     | 1.00      | 0.040    | 0.030    | 1.00      | 16.00-18.00 | -           |
|                                | 4367              | 0.025     | 1.00      | 0.040    | 0.030    | 1.00      | 16.00-19.00 | -           |
|                                | 439               | 0.030     | 1.00      | 0.040    | 0.030    | 1.00      | 17.00-19.00 | 0.50 max    |
|                                | 441               | 0.030     | 1.00      | 0.040    | 0.015    | 1.00      | 17.50-18.50 | -           |
| Ferritic + Martensitic         |                   |           |           |          |          |           |             |             |
|                                | 409M              | 0.030     | 0.8-1.5   | 0.030    | 0.030    | 1.00      | 10.80-12.50 | 1.50 max    |
| Duplex (Austenitic + Ferritic) |                   |           |           |          |          |           |             |             |
|                                | 2205              | 0.030     | 2.00      | 0.030    | 0.020    | 1.00      | 22.00-23.00 | 4.50-6.50   |
|                                | 2304              | 0.030     | 2.50      | 0.040    | 0.030    | 1.00      | 21.50-24.50 | 3.00-5.50   |
|                                | 31803             | 0.030     | 2.00      | 0.030    | 0.020    | 1.00      | 21.00-23.00 | 4.50-6.50   |







|           |             |                                                       | MECHANICAL COMPOSITION     |                          |                   |                           |
|-----------|-------------|-------------------------------------------------------|----------------------------|--------------------------|-------------------|---------------------------|
| %Mo       | N Ppm (Max) | %OTHERS                                               | Tensile Strength MPa (min) | Yield strength MPa (min) | %Elongation (min) | Headness Rockwell B (max) |
| -         | 2500        | -                                                     | 655                        | 310                      | 40                | 100                       |
| -         | 2500        | -                                                     | 655                        | 260                      | 40                | 95                        |
| -         | 1000-2500   | Cu = 1.0 Max                                          | 655                        | 310                      | 45                | 100                       |
| -         | 2500        | -                                                     | 620                        | 260                      | 40                | 100                       |
| -         | 1000-2000   | Cu = 2.0-4.0                                          | 620                        | 310                      | 40                | 100                       |
| -         | 1000        | Cu = 1.5-2.0                                          | 550                        | 205                      | 40                | 95                        |
| -         | 2000        | Cu = 1.5-2.0                                          | 650                        | 325                      | 40                | 100                       |
| -         | 1000        | -                                                     | 515                        | 205                      | 40                | 95                        |
| -         | 2000        | -                                                     | 550                        | 220                      | 45                | 100                       |
| -         | 700-2000    | -                                                     | 550                        | 240                      | 45                | 100                       |
| -         | 1000        | -                                                     | 515                        | 205                      | 40                | 92                        |
| -         | -           | -                                                     | 515                        | 205                      | 40                | 92                        |
| -         | 1000        | -                                                     | 485                        | 170                      | 40                | 92                        |
| -         | 1000-1600   | -                                                     | 515                        | 205                      | 40                | 95                        |
| -         | -           | -                                                     | 515                        | 205                      | 40                | 95                        |
| -         | -           | -                                                     | 515                        | 205                      | 40                | 95                        |
| -         | -           | -                                                     | 515                        | 205                      | 40                | 95                        |
| -         | -           | -                                                     | 515                        | 205                      | 40                | 95                        |
| 2.00-3.00 | 1000        | -                                                     | 515                        | 205                      | 40                | 95                        |
| 2.00-3.00 | 1000        | -                                                     | 485                        | 170                      | 40                | 95                        |
| 2.00-3.00 | 1000-1600   | -                                                     | 515                        | 205                      | 40                | 95                        |
| 2.00-3.00 | 1000        | Ti=5X(C+N) Min., 0.70Max                              | 515                        | 205                      | 35                | 95                        |
| 3.00-4.00 | 1000        | -                                                     | 515                        | 205                      | 40                | 95                        |
| 3.00-4.00 | 1000        | -                                                     | 515                        | 205                      | 40                | 95                        |
| 3.00-4.00 | 1000-2200   | -                                                     | 550                        | 240                      | 35                | 95                        |
| 3.80-4.50 | 1500-2100   | Cu=2.8-4.0                                            | 550                        | 245                      | 40                | 96                        |
| -         | 1000        | Ti=5X(C+N)Min., 0.70Max                               | 515                        | 205                      | 40                | 95                        |
| -         | -           | Nb= 10XCMin., 1.00 Max.                               | 515                        | 205                      | 20                | 92                        |
| -         | -           | -                                                     | 450                        | 205                      | 15                | 96                        |
| 0.50-1.00 | -           | -                                                     | 795                        | 620                      | 15                | 32rc                      |
| 0.50 max  | -           | -                                                     | 690                        | -                        | -                 | 96                        |
| -         | -           | -                                                     | -                          | -                        | -                 | 29rc                      |
| -         | -           | -                                                     | -                          | -                        | 20                | -                         |
| -         | -           | Al = 0.10-0.30                                        | 415                        | 170                      | 20                | 88                        |
| -         | -           | Ti = 6X(C+N)Min., 0.5Max.                             | 380                        | 170                      | 20                | 88                        |
| -         | 300         | Ti = 6X(C+N)Min., 0.75Max.                            | 380                        | 170                      | 22                | 88                        |
| -         | -           | -                                                     | 415                        | 205                      | 22                | 89                        |
| -         | -           | -                                                     | 450                        | 205                      | 22                | 89                        |
| -         | -           | Ti = 0.10-1.00                                        | 360                        | 175                      | 22                | 90                        |
| 0.75-1.25 | -           | Nb = 5XC Min., 0.70Max.                               | 450                        | 240                      | 20                | 89                        |
| 0.75-1.25 | 250         | %Nb or & Ti or %combination = 8X(C+N) Min., 0.80 Max. | 410                        | 245                      | 22                | 96                        |
| -         | 300         | Ti =0.20+4X(C+N) Min., 1.10 Max. Al=0.5 Max           | 415                        | 205                      | 18                | 89                        |
| -         | -           | Nb = 3X%C+0.3Min. 1% Max., T1=0.1-06%                 | 430                        | 250                      |                   | 88                        |
| -         | 300         | Ti= 0.75Max                                           | 450                        | 275                      | 20                | 90                        |
| 3.0-3.50  | 1400-2000   | -                                                     | 655                        | 450                      | 25                | 31rc                      |
| 0.05-0.60 | 500-2000    | Cu 0.05 Min.-0.60Max                                  | 600                        | 400                      | 25                | 32rc                      |
| 2.50-3.50 | 800-2000    | -                                                     | 620                        | 450                      | 25                | 31rc                      |





EQUIVALENT INTERNATIONAL STAINLESS STEEL GRADES

|                                | JSL Designation/ Grade | UNS Designation | USA - Canada /<br>AISI - ASTM - ASME | INDIA/IS<br>Letter Symbol | European | Chinese        | GERMANY/DIN<br>Designation | Japan/JIS | GOST         |
|--------------------------------|------------------------|-----------------|--------------------------------------|---------------------------|----------|----------------|----------------------------|-----------|--------------|
| Austenitic<br>Cr-Mn            | 201                    | 20100           | 201                                  | X10Cr17Mn6Ni4N20          | -        | -              | X12CrMnNiN17-7-5           | SUS201    | -            |
|                                | 201L                   | 20103           | 201L                                 | -                         | 1.4371   | -              | X2CrMnNiN17-7-5            | -         | -            |
|                                | 201LN                  | 20153           | 201LN                                | -                         | -        | -              | -                          | -         | -            |
|                                | 202                    | 20200           | 202                                  | X10Cr18Mn9Ni5             | -        | -              | X12CrMnNiN18-9-5           | SUS202    | -            |
|                                | 204Cu                  | 20430           | -                                    | -                         | -        | -              | -                          | -         | -            |
|                                | JSLAUS(J1)             | -               | -                                    | -                         | -        | -              | -                          | -         | -            |
| Austenitic<br>Cr-Ni            | 301                    | 30100           | 301                                  | X10Cr17Ni7                | 1.4310   | 1Cr17Ni7       | X12CrNi17-7                | SUS301    | -            |
|                                | 301L                   | 30103           | 301L                                 | -                         | -        | -              | -                          | -         | -            |
|                                | 301LN                  | 30153           | 301LN                                | -                         | 1.4318   | -              | X2CrNiN18-7                | -         | -            |
|                                | 304                    | 30400           | 304                                  | X04Cr19Ni9                | 1.4301   | 0Cr18Ni9       | X5CrNi18-10                | SUS304    | -            |
|                                | 304H                   | 30409           | 304H                                 | -                         | -        | -              | -                          | -         | -            |
|                                | 304L                   | 30403           | 304L                                 | -                         | 1.4307   | -              | X2CrNi18-9                 | SUS304L   | -            |
|                                | 304LN                  | 30453           | 304LN                                | -                         | 1.4311   | -              | X2CrNiN18-10               | SUS304LN  | -            |
|                                | 309                    | 30900           | 309                                  | X15Cr24Ni13               | 1.4828   | -              | -                          | -         | -            |
|                                | 309S                   | 30908           | 309S                                 | -                         | 1.4833   | 1Cr23Ni13      | X7CrNi23-14                | SUS309S   | -            |
|                                | 310                    | 31000           | 310                                  | X20Cr25Ni20               | -        | -              | X15CrNiSi25-20             | SUH310    | 20Ch25N20S2  |
|                                | 310S                   | 31008           | 310S                                 | -                         | 1.4845   | 0Cr25Ni20      | X12CrNi25-21               | SUS310S   | 20Ch23N18    |
|                                | 316                    | 31600           | 316                                  | X04Cr17Ni12Mo2            | 1.4401   | 0Cr17Ni12Mo2   | X5CrNiMo17-12-2            | SUS316    | -            |
|                                | 316L                   | 31603           | 316L                                 | X02Cr17Ni12Mo2            | 1.4404   | 00Cr17Ni14Mo2  | X2CrNiMo17-13-2            | SUS316L   | -            |
|                                | 316LN                  | 31653           | 316LN                                | -                         | 1.4429   | -              | X2CrNiMoN17-11-2           | SUS316LN  | -            |
|                                | 316Ti                  | 31635           | 316Ti                                | X04Cr17Ni12Mo2Ti          | 1.4571   | 0Cr18Ni12Mo2Ti | X6CrNiMoTi17-12-2          | SUS316Ti  | 10Ch17N13M2T |
|                                | 317                    | 31700           | 317                                  | -                         | -        | -              | -                          | -         | -            |
|                                | 317L                   | 31703           | 317L                                 | -                         | 1.4438   | 00Cr19Ni13Mo3  | X2CrNiMo18154              | SUS317L   | -            |
|                                | 317LN                  | 31753           | 317LN                                | -                         | -        | -              | -                          | -         | -            |
|                                | J31727                 | 31727           | -                                    | -                         | -        | -              | -                          | -         | -            |
|                                | 321                    | 32100           | 321                                  | X04Cr18Ni10Ti             | 1.4541   | 0Cr18Ni10Ti    | X6CrNiTi18-10              | SUS321    | 08Ch18N10T   |
|                                | 347                    | 34700           | 347                                  | X04Cr18Ni10Nb             | 1.4550   | 0Cr18Ni11Nb    | X6CrNiNb18-10              | SUS347    | 08Ch18N12B   |
| Martensitic                    | 410                    | 41000           | 410                                  | X12Cr12                   | 1.4006   | 1Cr12          | X12Cr13                    | SUS410    | -            |
|                                | 415                    | 41500           | -                                    | -                         | 1.4313   | -              | X3CrNiMo13-4               | -         | -            |
|                                | 420                    | 42000           | 420                                  | X12Cr13                   | 1.4021   | -              | X20Cr13                    | SUS420J1  | -            |
|                                | 431                    | 43100           | 431                                  | -                         | 1.4057   | 1Cr17Ni2       | X17CrNi15-2                | -         | 20Ch17N2     |
|                                | JBS                    | -               | -                                    | -                         | -        | -              | -                          | -         | -            |
| Ferritic                       | 405                    | 40500           | 405                                  | X04Cr12                   | 1.4002   | 0Cr17Ni2       | X6CrAl13                   | SUS405    | -            |
|                                | 409                    | 40900           | 409                                  | -                         | 1.4512   | -              | X2CrTi12                   | SUH409    | -            |
|                                | 409RC                  | -               | -                                    | -                         | -        | -              | -                          | -         | -            |
|                                | 410S                   | 41008           | 410S                                 | -                         | 1.4000   | 0Cr13          | X6Cr-13                    | SUS403    | -            |
|                                | 430                    | 43000           | 430                                  | X07Cr17                   | 1.4016   | 1Cr17          | X6Cr17                     | SUS430    | -            |
|                                | 430Ti                  | -               | -                                    | -                         | -        | -              | X3CrTi17                   | SUS430LX  | -            |
|                                | 436                    | 43600           | 436                                  | -                         | -        | -              | -                          | -         | -            |
|                                | 436L                   | 43932           | 436L                                 | -                         | -        | -              | -                          | SUS436L   | -            |
|                                | 439                    | 43035           | 439                                  | -                         | -        | 00Cr18Ti       | X3CrTi17                   | -         | -            |
|                                | 441                    | 43940           | -                                    | -                         | 1.4509   | -              | X2CrTiNb18                 | -         | -            |
| Ferritic + Martensitic         |                        |                 |                                      |                           |          |                |                            |           |              |
|                                | 409M                   | -               | -                                    | -                         | -        | -              | -                          | -         | -            |
| Duplex (Austenitic + Ferritic) |                        |                 |                                      |                           |          |                |                            |           |              |
|                                | 2205                   | 32205           | 2205                                 | -                         | -        | -              | -                          | -         | -            |
|                                | 31803                  | 31803           | -                                    | -                         | 1.4462   | -              | X2CrNiMoN 22-5-3           | SUS329J3L | -            |
|                                | 2304                   | 32304           | 2304                                 | -                         | 1.4362   | -              | X2CrN N 23-4               | -         | -            |





Chemical Composition of Nickel Alloys

NICKLE BASE ALLOYS

| NOMINAL CHEMICAL COMPOSITION, % (NOT FOR SPECIFICATION PURPOSES) |          |         |         |           |           |          |                |         |        |         |          |         |          |
|------------------------------------------------------------------|----------|---------|---------|-----------|-----------|----------|----------------|---------|--------|---------|----------|---------|----------|
| Nickel                                                           | NI       | C       | Mn      | Fe        | S         | Si       | Cu             | Cr      | Co     | Mo      | Al       | Ti      | Other    |
| Nickel                                                           | 99.5     | 0.08    | 0.18    | 0.2       | 0.005     | 0.18     | 0.13           | -       | -      | -       | -        | -       | -        |
| Nickel201                                                        | 99.5     | 0.01    | 0.18    | 0.2       | 0.005     | 0.18     | 0.13           | -       | -      | -       | -        | -       | -        |
| Nickel 205                                                       | 99.5     | 0.08    | 0.18    | 0.10      | 0.004     | 0.08     | 0.08           | -       | -      | -       | -        | 0.03    | Mg 0.05  |
| Nickel 212                                                       | 97.7     | 0.10    | 2.0     | 0.05      | 0.005     | 0.05     | 0.03           | -       | -      | -       | -        | -       | -        |
| Nickel 222                                                       | 99.5     | 0.01    | 0.02    | 0.04      | 0.0025    | 0.01     | 0.01           | 0.01    | 0.06   | -       | 0.01     | 0.01    | Mg 0.08  |
| Nickel 270                                                       | 99.98    | 0.01    | 0.003   | <0.001    | <0.001    | <0.001   | <0.001         | <0.001  | <0.001 | -       | -        | <0.001  | Mg<0.001 |
|                                                                  | NI       | C       | Mn      | Fe        | S         | Si       | Cu             | Cr      | Co     | Mo      | Al       | Ti      | Other    |
| MONEL alloy 400                                                  | 63.0min  | 0.15    | 1.0     | 25 max    | 0.024 max | 0.05 max | 31.0           | -       | -      | -       | -        | -       | -        |
| MONEL k alloy-500                                                | 63.0min  | 0.15    | 1.5max  | 2.0 max   | 0.010max  | 0.5      | 30.0           | -       | -      | -       | 2.9      | 0.6     | -        |
| Cast MONEL alloy                                                 | 63.0min  | 0.07    | 0.75    | 2.5max    | 0.02max   | 0.04max  | 30.0           | 0.10max | -      | 0.20max | 0.05max  | 0.01max | -        |
| Cast MONEL alloy                                                 | 63.0min  | 0.03max | 0.20max | 2.5max    | 0.02max   | 0.04max  | 30.0           | 0.10    | -      | 0.20max | 0.05 max | 0.01max | -        |
|                                                                  |          |         |         |           |           |          |                |         |        |         |          |         |          |
| INCONEL alloy 600                                                | 72.0min  | 0.15max | 1.0max  | 8.0       | 0.015max  | 0.05max  | 0.5max         | 15.5    | -      | -       | -        | -       | Nb + Ta  |
| INCONEL alloy 625                                                | 60.5     | 0.10max | 0.25    | 5.0max    | 0.015max  | 0.5max   | -              | 21.5    | -      | 9.0     | 0.25     | 0.25    | 3.65     |
|                                                                  |          |         |         |           |           |          |                |         |        |         |          |         |          |
| INCOLOY alloy 800                                                | 32.5     | 0.10max | 1.5max  | Bal       | 0.015max  | 1.0max   | 0.75max        | 21.0    | -      | -       | 0.38     | 0.38    | -        |
| INCOLOY alloy 825                                                | 42.0     | 0.05max | 1.0max  | Bal       | 0.03max   | 0.5max   | 2.25           | 21.5    | -      | 3.0     | 0.20max  | 0.9     | -        |
| INCOLOY alloy 904                                                | 32.5     | 0.025   | 0.025   | Bal       | 0.015     | 0.25     | 0.25           | -       | 14.5   | -       | 0.1      | 1.6     | -        |
| INCOLOY alloy DS                                                 | 37.0     | 1.2     | 1.2     | Bal       | -         | 2.3max   | 2.3max         | 18.0    | -      | -       | -        | 0.20    | -        |
|                                                                  |          |         |         |           |           |          |                |         |        |         |          |         |          |
| Hastelloy B                                                      | Rest/Bal | 0.10    | 0.80    | 5.58      | 0.7       |          | 0.6            | 1.25    | 28     | -       | -        | -       | -        |
| Hastelloy C                                                      | Rest/Bal | 0.07    | 0.80    | 5.75      | 0.7       |          | 16.0           | 1.25    | 17     | -       | -        | -       | -        |
| Hastelloy G Alloy                                                | Rest/Bal | 0.05    | 1.0-2.0 | 18.0-21.0 | 0.7       |          | 1.5<br>21-23.5 | 1.25    | 5.575  | -       | -        | -       | -        |

PHYSICAL AND MECHANICAL PROPERTIES

| Nickel            | Density<br>Kg./mm² | Melting range<br>C | Specific heat<br>at 20°C<br>J/Kg C | Thermal<br>Conductivity<br>at 20°C<br>W/m C | Thermal<br>expansion<br>10-c/C<br>20-95°C | Electrical<br>resistivity<br>at 20°C<br>Microhm cm | Tensile<br>Strength<br>N/mn³ | Hardness<br>HV |
|-------------------|--------------------|--------------------|------------------------------------|---------------------------------------------|-------------------------------------------|----------------------------------------------------|------------------------------|----------------|
| Nickel 200        | 8.89               | 1435-1445          | 456                                | 74.9                                        | 13.3                                      | 9.5                                                | 380-550                      | 90-120         |
| Nickel 201        | 8.89               | 1435-1445          | 456                                | 79.2                                        | 13.3                                      | 7.6                                                | 340-420                      | 75-100         |
| Nickel 205        | 8.89               | 1435-1445          | 456                                | 74.9                                        | 13.3                                      | 9.5                                                | 340                          | 77             |
| Nickel 212        | 8.89               | 1435-1445          | 430                                | 44.1                                        | -                                         | 10.9                                               | 476                          | 144            |
| Nickel 222        | 8.89               | 1435-1445          | 456                                | 74.9                                        | 13.3                                      | 8.8                                                | 340                          | 77             |
| Nickel 270        | 8.89               | 1435-1445          | 460                                | 85.7                                        | 13.3                                      | 7.5                                                | 340                          | 80             |
|                   |                    |                    |                                    |                                             |                                           |                                                    |                              |                |
| MONEL alloy 400   | 8.83               | 1300-1350          | 419                                | 21.7                                        | 14.1                                      | 51.0                                               | 480-620                      | 111-151        |
| MONEL alloy K-500 | 8.46               | 1315-1350          | 419                                | 17.4                                        | 13.7                                      | 61.4                                               | 620-760                      | 141-189        |
|                   |                    |                    |                                    |                                             |                                           |                                                    |                              |                |
| INCONEL alloy 600 | 8.42               | 1370-1425          | 461                                | 14.8                                        | 13.3                                      | 103                                                | 550-690                      | 121-173        |
| INCONEL alloy 625 | 8.44               | 1290-1350          | 410                                | 9.8                                         | 12.8                                      | 129                                                | 830-1040                     | 146-247        |
|                   |                    |                    |                                    |                                             |                                           |                                                    |                              |                |
| INCOLOY alloy 800 | 7.95               | 1355-1385          | 502                                | 11.7                                        | 14.2                                      | 99                                                 | 520-700                      | 121-188        |
| INCOLOY alloy 825 | 8.14               | 1370-1400          | 441                                | 10.9                                        | 14.0                                      | 113                                                | 590-730                      | 121-183        |
| INCOLOY alloy 904 | 8.12               | -                  | 442                                | 14.9                                        | 4.6                                       | 72                                                 | 923                          | -              |
| INCOLOY alloy DS  | 7.92               | 1330-1400          | 452                                | 12.0                                        | 14.1                                      | 108                                                | 680                          | 208            |







| CHEMICAL COMPOSITIONS OF TITANIUM GRADES & ALLOYS |            |                                                                                                                                                                                                                                                                |                                                                                                                      |                   |                 |          |                       |                 |
|---------------------------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------|-----------------|----------|-----------------------|-----------------|
| Trade Name                                        | UNS        | Titanium Industry Specifications                                                                                                                                                                                                                               | Chemical Composition                                                                                                 | Min.Tensile (KSI) | Min.Yield (KSI) | Hardness | Modulus of Elasticity | Poisson's Ratio |
| Grade 1                                           | UNS R50250 | AMS AMS-T-81915<br>ASTM F67(1), B265(1), B338(1), B348(1), B381(F-1), B861(1), B862(1), B863(1), F467(1), F468(1), F1341<br>MIL SPEC MIL-T-81556                                                                                                               | C 0.10 max<br>Fe 0.20 max<br>H 0.015 max<br>N 0.03 max<br>O 0.18 max<br>Ti Remaining                                 | 35                | 25              | 14.9     | 103 GPa               | 0.34-0.40       |
| Grade 2                                           | UNS R50400 | AMS 4902, 4941, 4942, AMS-T-9046<br>ASTM F67(2), B265(2), B337(2), B338(2), B348(2), B367(C-2), B381(F-2), B861(2), B862(2), B863(2), F467(2), F468(2), F1341<br>MIL SPEC MIL-T-81556<br>SAE J467(A40)                                                         | C 0.10 max<br>Fe 0.30 max<br>H 0.015 max<br>N 0.03 max<br>O 0.25 max<br>Ti Remaining                                 | 50                | 40              | 14.9     | 103 GPa               | 0.34-0.10       |
| Grade 5                                           | UNS R56400 | AMS 4905, 4911, 4920, 4928, 4930, 4931, 4932, 4934, 4935, 4954, 4963, 4965, 4967, 4993, AMS-T-9046, AMS-T-81915, AS7460, AS7461<br>ASTM B265(5), B348(5), B367(C-5), B381(F-5), B861(5), B862(5), B863(5), F1472<br>AWS A5.16 (ERTi-5)<br>MIL SPEC MIL-T-81556 | Al 5.5-6.75 max<br>C 0.10 max<br>Fe 0.40 max<br>H 0.015 max<br>N 0.05 max<br>O 0.20 max<br>Ti Remaining<br>V 3.5-4.5 | 130               | 120             | 16.4     | 114 GPa               | 0.30-0.33       |
| Grade 7                                           | UNS R52400 | ASTM B265(7), B338(7), B348(F-7), B861(7), B862(7), B863(7), F467(7), F468(7)                                                                                                                                                                                  | C 0.10 max<br>Fe 0.30 max<br>H 0.015 max<br>N 0.03 max<br>O 0.25 max<br>Ti Remaining<br>Other Pd 0.12-0.25           | 50                | 40              | 14.9     | 103 GPa               | -               |
| Grade 9                                           | UNS R56320 | AMS 4943, 4944, 4945, AMS-T-9046<br>ASME SFA5.16(ERTi-9)<br>ASTM B265(9), B338(9), B348(9), B381(9), B861(9), B862(9), B863(9)<br>AWS A5.16(ERTi-9)                                                                                                            | Al 2.5-3.5<br>C 0.05 max<br>Fe 0.25 max<br>H 0.013 max<br>N 0.02 max<br>O 0.12 max<br>Ti Remaining<br>V 2.0-3.0      | 90                | 70              | 13.1     | 107 GPa               | 0.34            |
| Grade 12                                          | UNS R53400 | ASTM B265(12), B338(12), B348(12), B381(F-12), B861(12), B862(12), B863(12)                                                                                                                                                                                    | C 0.08 max<br>Fe 0.30 max<br>H 0.015 max<br>Mo 0.2-0.4<br>N 0.03 max<br>Ni 0.6-0.9<br>O 0.25 max<br>Ti Remaining     | 70                | 50              | 14.9     | 103 GPa               | -               |





Titanium Alloys

|            |              |                                 |
|------------|--------------|---------------------------------|
| Grade 1    | UNS R56400   | Titanium 6Al-4V                 |
| Grade 2    | UNS R53400   | Titanium 5Al-2.5Sn              |
| Grade 5    | UNS R56320   | Titanium 3Al-2.5V               |
| Grade 7    | Titanium CP4 | Titanium Grade 12-Ti-0.3-0.8Ni, |
| Grade 9    | Titanium CP3 | Titanium Grade 23               |
| Grade 12   | Titanium CP2 | Titanium 6Al-4V ELI.            |
| UNS R50250 | Titanium CP1 |                                 |
| UNS R50400 | CP Ti-0.15Pd |                                 |

Aluminium Alloys

|               |              |              |              |
|---------------|--------------|--------------|--------------|
| 1050 / 19500  | 6082 / He 30 | 5056 / 55000 | 2014 / 24345 |
| 1060 / 19600  | 6061         | 5052 / 52000 | 2011         |
| 7475 / 8011   | 6101         | 3003         | 2007         |
| 7075 / DT5124 | 5754         | 2024         |              |
| 7050          | 5086 / 53000 | 2017         |              |
| 6351          | 5083 / 54300 | 2014A        |              |

Chemical Composition of Carbon Alloys

| GRADE      | C         | Mn        | Si       | S        | P        | Cr        | Ni        | Mo        |
|------------|-----------|-----------|----------|----------|----------|-----------|-----------|-----------|
| EN-8       | .35-.45   | .60-1.00  | .10-.35  | .050MAX  | .050MAX  | -         | -         | -         |
| EN-8D      | .40-.45   | .70-.90   | .05-.35  | .060 MAX | .060 MAX | -         | -         | -         |
| EN-9       | .50-.60   | .50-.80   | .05-.35  | .040 MAX | .040 MAX | -         | -         | -         |
| EN-19      | .35-.45   | .50-.80   | .10-.35  | .040     | .040     | .90-1.40  | -         | .20-.40   |
| EN-24      | .35-.45   | .45-.70   | .10-.35  | .040     | .040     | .90-1.40  | 1.30-1.80 | .20-.40   |
| EN-31      | .90-1.20  | .30-.75   | .10-.35  | .040     | .040     | 1.00-1.60 | -         | -         |
| EN-41B     | .35-.45   | 60 Max    | .10-.45  | .040     | .040     | 1.50-1.80 | 40 MAX    | .10-.25   |
| EN-47      | .45-.55   | .50-.80   | .50 Max  | .040     | .040     | .80-1.20  | -         | -         |
| 20MnCr5    | .17-.22   | 1.10-1.40 | .10-.35  | .035     | .035     | 1.00-1.30 | -         | -         |
| SAE-4140   | .38-.43   | .75-.1.00 | .20-.35  | .035     | .035     | .80-1.10  | .15-.25   | -         |
| SAE-8620   | .18-.23   | .70-.90   | .20-.35  | .040     | .040     | .40-.60   | .40-.70   | .15-.25   |
| EN-353     | .20 Max   | .50-1.00  | .35 Max  | .040     | .040     | .75-1.25  | 1.00-1.50 | .80-.15   |
| EN-36C     | .12-.18   | .30-.60   | .10-.35  | .040     | .040     | .60-1.10  | 3.00-3.75 | .10-.25   |
| OHNS       | .85-1.00  | 1.00-1.20 | .15-.35  | .03      | .03      | .50-.70   | -         | -         |
| WPS-D3     | 2.0-2.35  | .60       | .60      | .03      | .03      | 11-13.50  | .30       | -         |
| WPS-D2     | 1.40-1.60 | .60       | .60      | .03      | .03      | 11.0-13.0 | .30       | .70-1.20  |
| H11        | .33-.43   | .20-.50   | .80-1.20 | .03      | .03      | 4.75-5.50 | .30       | 1.10-1.60 |
| H13        | .32-.45   | .20-.50   | .80-1.20 | .03      | .03      | 4.75-5.50 | .30       | 1.10-1.75 |
| DIN 1.2714 | .50-.60   | .65-.95   | .10-.40  | <.004    | <.015    | 1.0-1.20  | 1.50-1.80 | .45-.55   |
| P20 1.2311 | .40       | 1.45      | .30      | -        | -        | 1.95      | -         | 0.20      |
| P20 1.2738 | .35-.45   | 1.30-1.60 | .20-.40  | Max .035 | Max .030 | 1.80-2.10 | .90-1.20  | .15-.25   |
| P20 1.2316 | .33-.43   | Max 1.00  | Max 1.00 | Max .005 | -        | 15.0-17.0 | Max 1.00  | 1.00-1.30 |

| Designation | Cr    | Ni    | C max | Mn max | P max | Si max | others                 |
|-------------|-------|-------|-------|--------|-------|--------|------------------------|
| 17-7 Ph     | 18.60 | 4.0   | 0.07  | 1.0    | 0.04  | --     | Cu 4.0 Cb + Ta 0.3     |
| 17-7 PH     | 17.0  | 7.1   | 0.09  | 1.0    | 0.04  | --     | Al 1.0                 |
| 13-8 MO     | 12.75 | 8.2   | 0.035 | 0.02   | --    | 0.03   | MO 2.16 Al 1.1         |
| 15/5 PH     | 15    | 4.8   | 0.04  | 0.28   | --    | 0.6    | Cu 3.3                 |
| 19-9 DX     | 19    | 9     | 0.30  | --     | --    | --     | --                     |
| 904-L       | 19/23 | 23/28 | 0.02  | 2.0    | --    | 1.0    | MO 4/5                 |
| 2205        | 22.0  | 5.0   | 0.03  | 1.50   | 0.04  | 1.00   | Cu 1.00 Max<br>Mo 3.00 |
| 21-4N       | 22.0  | 4.0   | 0.075 | 10.0   | 0.05  | 0.25   | Fe 83.0                |

| Alloy Designation | Ni         | Cr        | Cb                         | Mo    | W  | C    | Ti   | Al   | Cu   | Fe   |
|-------------------|------------|-----------|----------------------------|-------|----|------|------|------|------|------|
| Nimonic 75        | 77.6       | 20.5      | --                         | --    | -- | 0.10 | 0.35 | 0.2  | 0.05 | 0.50 |
| Nimonic 80        | 74.5       | 20.5      | --                         | --    | -- | 0.05 | 2.50 | 1.25 | 0.05 | 0.55 |
| Nimonic 90        | 58.0       | 19.5      | 18.0                       | --    | -- | 0.10 | 2.3  | 1.2  | --   | --   |
| Nimonic 95        | 50.0       | 20.0      | 20.0                       | --    | -- | --   | 3.0  | 2.0  | --   | --   |
| Nimonic 100       | 50.0       | 19.0      | 20.0                       | 5.0   | -- | 0.10 | 3.0  | 2.0  | --   | --   |
| Nimonic 105       | 48.0       | 15.0      | 20.0                       | 5.0   | -- | 0.15 | 1.45 | 4.5  | --   | --   |
| Nimonic 115       | 42.5       | 15.0      | 15.0                       | 3.5   | -- | 0.20 | 4.0  | 5.0  | --   | --   |
| Niresist 1        | 15.5       | 1.75      | --                         | --    | -- | 3.00 | --   | --   | 6.0  | BAL  |
|                   |            |           | Other : Si 2.0             |       |    |      |      |      |      |      |
| Niresist 2        | 20.0       | 2.0       | --                         | --    | -- | 3.00 | --   | --   | --   | BAL  |
|                   |            |           | Other : Si 2.0             |       |    |      |      |      |      |      |
| Niresist 3        | 30.0       | 3.0       | --                         | --    | -- | 2.60 | --   | --   | --   | BAL  |
|                   |            |           | Other : Si 1.5             |       |    |      |      |      |      |      |
| Niresist 4        | 30.5       | 5.0       | --                         | --    | -- | 2.80 | --   | --   | --   | BAL  |
|                   |            |           | Other : Si 5.5             |       |    |      |      |      |      |      |
| Niresist 5        | 35.0       | 3.1       | --                         | --    | -- | 2.40 | --   | --   | --   | BAL  |
|                   |            |           | Other : Si 1.5             |       |    |      |      |      |      |      |
| Nitronic 33       | 2.25-3.75  | 17.0-19.0 | --                         | --    | -- | 0.08 | --   | --   | --   | BAL  |
| Nitronic 40       | 5/7        | 18/20     | --                         | --    | -- | 0.08 | --   | --   | --   | BAL  |
|                   |            |           | Other : Mn 8.10, Si 1.0    |       |    |      |      |      |      |      |
| Nitronic 50       | 11.5/13.5  | 20.5/23.5 | --                         | 1.5/3 | -- | 0.06 | --   | --   | --   | BAL  |
|                   |            |           | Other : Mn 4/6, Si 1.0     |       |    |      |      |      |      |      |
| Nitronic 60       | 8/9        | 16/18     | --                         | --    | -- | 0.10 | --   | --   | --   | BAL  |
|                   |            |           | Other : Mn 7/9, Si 3.5/4.5 |       |    |      |      |      |      |      |
| Ni-Span C         | 42.0       | 5.4       | --                         | --    | -- | 0.02 | 2.4  | 0.65 | 0.05 | BAL  |
| Permalloy         | 78.5       | --        | --                         | --    | -- | --   | --   | --   | --   | 21.5 |
| Permendur         | --         | --        | 50.0                       | --    | -- | --   | --   | --   | --   | 50.0 |
| PWA 653           | See WI 52  |           |                            |       |    |      |      |      |      |      |
| PWA 663           | See B 1900 |           |                            |       |    |      |      |      |      |      |

### Typical properties of commonly used copper tungsten compositions

| Composition | Density             | Hardness                 | Resistivity | IACS | Bending strength |
|-------------|---------------------|--------------------------|-------------|------|------------------|
| wt. %       | g/cm <sup>3</sup> ≥ | HB Kgf/mm <sup>2</sup> ≥ | μΩ.cm ≤     | % ≥  | Mpa ≥            |
| W50/Cu50    | 11.85               | 115                      | 3.2         | 54   | —                |
| W55/Cu45    | 12.30               | 125                      | 3.5         | 49   | —                |
| W60/Cu40    | 12.75               | 140                      | 3.7         | 47   | —                |
| W65/Cu35    | 13.30               | 155                      | 3.9         | 44   | —                |
| W70/Cu30    | 13.80               | 175                      | 4.1         | 42   | 790              |
| W75/Cu25    | 14.50               | 195                      | 4.5         | 38   | 885              |
| W80/Cu20    | 15.15               | 220                      | 5.0         | 34   | 980              |
| W85/Cu15    | 15.90               | 240                      | 5.7         | 30   | 1080             |
| W90/Cu10    | 16.75               | 260                      | 6.5         | 27   | 1160             |





## DIMENSION OF PIPES & TUBE

| Size of Pipes & Tubes |       | DIMENSION ANSI B 36-10       |       |       |    |    |      |       |    |    |       |        |     | DIMENSION ANSI B 36-10       |     |          |              |                     |    |      |     |    |      |    |    | Nominal Thickness and Weight |    |    |    |    |     |     |     |     |          |              |                     |
|-----------------------|-------|------------------------------|-------|-------|----|----|------|-------|----|----|-------|--------|-----|------------------------------|-----|----------|--------------|---------------------|----|------|-----|----|------|----|----|------------------------------|----|----|----|----|-----|-----|-----|-----|----------|--------------|---------------------|
|                       |       | Nominal Thickness and Weight |       |       |    |    |      |       |    |    |       |        |     | Nominal Thickness and Weight |     |          |              |                     |    |      |     |    |      |    |    | Nominal Thickness and Weight |    |    |    |    |     |     |     |     |          |              |                     |
|                       |       | Number of Schedule           |       |       |    |    |      |       |    |    |       |        |     | Number of Schedule           |     |          |              |                     |    |      |     |    |      |    |    | Number of Schedule           |    |    |    |    |     |     |     |     |          |              |                     |
| mm                    | kg/m  | 10S                          | mm    | kg/m  | 20 | 30 | 40   | 50    | 60 | 70 | 80    | 100    | 120 | 140                          | 160 | Standard | Extra Strong | Double Extra Strong | mm | kg/m | 10S | mm | kg/m | 20 | 30 | 40                           | 50 | 60 | 70 | 80 | 100 | 120 | 140 | 160 | Standard | Extra Strong | Double Extra Strong |
| 1/2"                  | 0.2   | -                            | 1.28  | 2.25  | -  | -  | 1.73 | 0.26  | -  | -  | 2.41  | 9.41   | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 3/4"                  | 0.7   | -                            | 1.65  | 2.45  | -  | -  | 2.25 | 0.65  | -  | -  | 3.02  | 9.85   | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 1"                    | 1.31  | -                            | 1.95  | 2.92  | -  | -  | 2.31 | 0.85  | -  | -  | 3.30  | 1.12   | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 1 1/4"                | 2.12  | 1.02                         | 2.41  | 3.02  | -  | -  | 2.77 | 1.26  | -  | -  | 3.75  | 1.65   | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 1 1/2"                | 2.87  | 1.65                         | 3.10  | 3.75  | -  | -  | 3.40 | 1.60  | -  | -  | 4.07  | 2.45   | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 2"                    | 3.34  | 1.66                         | 3.77  | 4.45  | -  | -  | 3.38 | 2.15  | -  | -  | 4.55  | 3.22   | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 2 1/2"                | 4.22  | 1.66                         | 4.77  | 5.62  | -  | -  | 3.36 | 3.00  | -  | -  | 4.85  | 4.45   | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 3"                    | 4.91  | 1.66                         | 5.27  | 6.35  | -  | -  | 3.38 | 3.45  | -  | -  | 5.33  | 5.45   | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 3 1/2"                | 5.32  | 1.66                         | 5.77  | 7.04  | -  | -  | 3.31 | 5.48  | -  | -  | 6.34  | 7.47   | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 4"                    | 6.12  | 2.11                         | 6.48  | 8.00  | -  | -  | 3.35 | 6.52  | -  | -  | 7.12  | 10.40  | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 5"                    | 7.15  | 2.11                         | 7.55  | 9.25  | -  | -  | 3.40 | 8.52  | -  | -  | 7.12  | 16.55  | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 6"                    | 8.25  | 2.11                         | 8.65  | 10.50 | -  | -  | 3.45 | 10.52 | -  | -  | 8.35  | 21.75  | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 8"                    | 10.15 | 2.11                         | 10.55 | 12.75 | -  | -  | 3.45 | 12.52 | -  | -  | 9.35  | 30.92  | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 10"                   | 12.15 | 2.11                         | 12.55 | 15.00 | -  | -  | 3.45 | 14.52 | -  | -  | 10.97 | 42.92  | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 12"                   | 14.15 | 2.11                         | 14.55 | 17.25 | -  | -  | 3.45 | 16.52 | -  | -  | 12.97 | 58.90  | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 14"                   | 16.15 | 2.11                         | 16.55 | 19.50 | -  | -  | 3.45 | 18.52 | -  | -  | 13.76 | 68.97  | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 16"                   | 18.15 | 2.11                         | 18.55 | 21.75 | -  | -  | 3.45 | 20.52 | -  | -  | 15.02 | 86.94  | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 18"                   | 20.15 | 2.11                         | 20.55 | 24.00 | -  | -  | 3.45 | 22.52 | -  | -  | 16.45 | 103.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 20"                   | 22.15 | 2.11                         | 22.55 | 26.25 | -  | -  | 3.45 | 24.52 | -  | -  | 17.45 | 121.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 22"                   | 24.15 | 2.11                         | 24.55 | 28.50 | -  | -  | 3.45 | 26.52 | -  | -  | 18.45 | 141.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 24"                   | 26.15 | 2.11                         | 26.55 | 30.75 | -  | -  | 3.45 | 28.52 | -  | -  | 19.45 | 161.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 26"                   | 28.15 | 2.11                         | 28.55 | 33.00 | -  | -  | 3.45 | 30.52 | -  | -  | 20.45 | 181.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 28"                   | 30.15 | 2.11                         | 30.55 | 35.25 | -  | -  | 3.45 | 32.52 | -  | -  | 21.45 | 201.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 30"                   | 32.15 | 2.11                         | 32.55 | 37.50 | -  | -  | 3.45 | 34.52 | -  | -  | 22.45 | 221.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 32"                   | 34.15 | 2.11                         | 34.55 | 39.75 | -  | -  | 3.45 | 36.52 | -  | -  | 23.45 | 241.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 34"                   | 36.15 | 2.11                         | 36.55 | 42.00 | -  | -  | 3.45 | 38.52 | -  | -  | 24.45 | 261.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 36"                   | 38.15 | 2.11                         | 38.55 | 44.25 | -  | -  | 3.45 | 40.52 | -  | -  | 25.45 | 281.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  | -  | -   | -   | -   | -   | -        | -            |                     |
| 38"                   | 40.15 | 2.11                         | 40.55 | 46.50 | -  | -  | 3.45 | 42.52 | -  | -  | 26.45 | 301.87 | -   | -                            | -   | -        | -            | -                   | -  | -    | -   | -  | -    | -  | -  | -                            | -  | -  | -  |    |     |     |     |     |          |              |                     |

N.B.: Thickness and weights "Extra strong" & "double extra strong" within swell edges have a correspondent value in "Schedule" for different thickness that suitable the weights can proceeds by following formula 24.66 (d.t)



## COPPER & BRASS

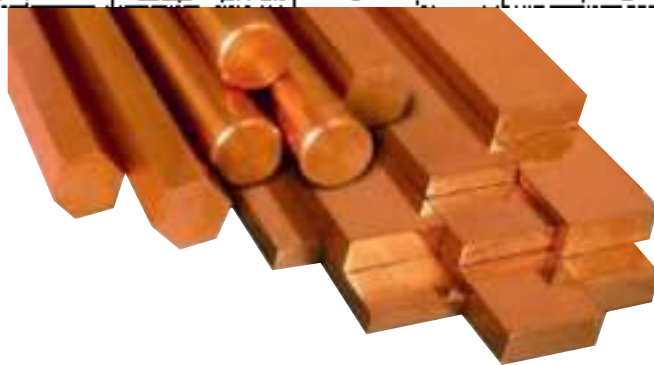
Since our establishment way back in the year 1985, we Padmavati Steel & Engg. Co. one of the leading importers, stockiest & suppliers of electrolytic & copper in the form of strips, wires, flats, rods, section, pipes & tubes. Our product range includes bus bar (heavy type), flexible bus bar - type I, strips, rods & pipes, copper wire, bus bars & flats, flexible connectors, bus bar assemblies, flat copper wire, winding strips & wires of copper, forged copper clamp and flexible bus bar - type II.

### Products

- Copper Bars • Copper Rods • Copper Tape and Foils • Copper Pipes & Tubes
- Flexible Copper Products • Other Copper Products • Brass Bars • Brass Rods

All the above products are supplied in copper nickel alloy, Brass Alloys & other copper alloys.

| Copper and Copper-Base Alloys<br>Composition, % |       |                         |           |             |           |                |            |         |           |           |         |              |             |
|-------------------------------------------------|-------|-------------------------|-----------|-------------|-----------|----------------|------------|---------|-----------|-----------|---------|--------------|-------------|
| UNS Designation Number                          | Alloy | General Name            | Aluminum  | Copper, min | Iron, max | Manganese, max | Phosphorus | Silicon | Zinc, max | Lead, max | Tin     | Arsenic, max | Nickel, max |
| C11000                                          | 110   | ETP copper              | -         | 99.9        | -         | -              | -          | -       | -         | -         | -       | -            | -           |
| C25000                                          | 260   | brass                   | -         | 68.5-71.5   | 0.05      | -              | -          | -       | balance   | 0.07      | -       | -            | -           |
| C27000                                          | 370   | brass                   | -         | 63.0-64.5   | 0.07      | -              | -          | -       | balance   | 0.1       | -       | -            | -           |
| C46200                                          | 462   | naval brass             | -         | 62.0-63.0   | 0.1       | -              | -          | -       | balance   | 0.2       | 0.5-1   | -            | -           |
| C46400                                          | 464   | naval brass             | -         | 59.0-62.0   | 0.1       | -              | -          | -       | balance   | 0.2       | 0.5-2   | -            | -           |
| C51000                                          | 510   | phosphor bronze         | -         | balance     | 0.1       | -              | 0.08-0.35  | -       | 0.3       | 0.05      | 4-25    | -            | -           |
| C61300                                          | 613   | aluminum bronze         | 6.0-7.5   | 85          | 2.0-3.0   | 0.1            | 0.013      | 0.1     | 0.05      | 0.01      | 0.2-0.5 | -            | 0.15        |
| C61400                                          | 614   | aluminum bronze         | 6.5-8.0   | 84.00       | 1.5-3.5   | 1              | -          | -       | -         | -         | -       | -            | -           |
| C63000                                          | 630   | aluminum bronze         | 9.0-11.0  | 78.00       | 20-40     | 1.5            | -          | 0.25    | -         | -         | 0.2     | -            | 4-5.5       |
| C64300                                          | 643   | aluminum silicon bronze | 6.3-7.6   | 88.650      | 0.3       | 0.1            | -          | 1.5-2.2 | 0.5       | 0.03      | 0.2     | 0.15         | 0.25        |
| C85100                                          | 851   | silicon bronze          | -         | 90.00       | 0.8       | 0.7            | -          | 0.8-2   | 1.5       | 0.05      | -       | -            | -           |
| C85500                                          | 855   | silicon bronze          | -         | 94.40       | 0.8       | 1.5            | -          | 2.8-3.8 | 1.5       | 0.05      | -       | -            | 0.6         |
| C86100                                          | 861   | silicon bronze          | 0.25 max. | 94.00       | 0.25      | 1.5            | -          | 2.8-3.5 | 1.5       | 0.2-0.8   | -       | -            | -           |
| C67500                                          | 675   | manganese bronze        | -         | 57.0-60.0   | 0.8-2.0   | 0.05-0.5       | -          | -       | balance   | 0.2       | 0.5-1.5 | -            | -           |
| C71000                                          | 710   | cupro-nickel            | -         | 74.00       | 0.5       | 1              | -          | -       | 1         | 0.05      | -       | -            | 19-25       |
| C71500                                          | 715   | cupro-nickel            | -         | 65.00       | 0.4-0.7   | 1              | -          | -       | 1         | 0.05      | -       | -            | 28-33       |





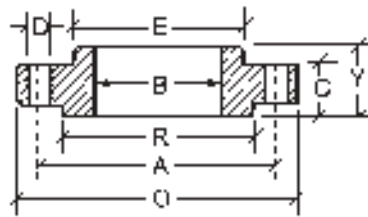
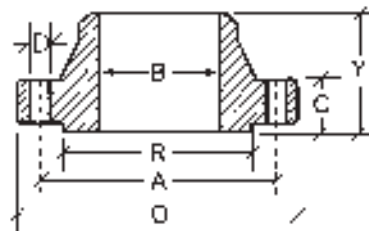
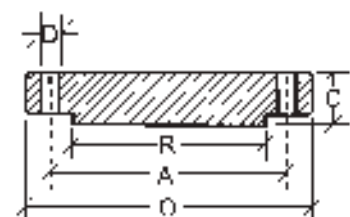
## Copper Alloys

| CATEGORY/STANDARD                                                        | ASTM   | BS     | EN     | JIS                    | DIN    | ISO              | IS                                |
|--------------------------------------------------------------------------|--------|--------|--------|------------------------|--------|------------------|-----------------------------------|
| <b>Chromium Zirconium Copper (General Reference Density 8.89 Gm/Cm3)</b> |        |        |        |                        |        |                  |                                   |
| Zirconium Copper                                                         | C15000 |        | GW120C | Z3234;90)-<br>CuZr     | 2.150  | CuZr             | IS 9365 CuZr                      |
| Copper Chromium Nickel Silicon                                           | C18000 | DTD198 | GW111C |                        | 2.0856 | CuNi2Si          |                                   |
| Copper Chromium Zirconium                                                | C10150 | CC107  | GW103C |                        | 2.1293 | CuCr17r          | IS 9366 CuCr17r                   |
| Chromium Copper                                                          | C18200 | CC101  | GW105C |                        | 2.1291 | 1E40-CuCr1       | IS 9365 CuCr1                     |
| <b>Copper Nickel (General Reference Density 8.94 Gm/Cm3)</b>             |        |        |        |                        |        |                  |                                   |
| CuNi2.2                                                                  | C70200 |        |        |                        |        |                  |                                   |
| CuNi11                                                                   | C70200 |        |        |                        |        |                  |                                   |
| Copper Nickel 95/5                                                       | C70400 | CN101  |        | C2532-<br>GCNi10       |        |                  | IS 9367 95/5                      |
| Copper Nickel                                                            | C71500 | CN107  | GW364H | H3300;82)-<br>C7164 T  | 2.0392 | 1E34-CuNi30Mn1Fe | IS 9362 70/30                     |
| CuNi8                                                                    | C70500 | CN102  |        |                        |        |                  |                                   |
| Copper Nickel 90/10                                                      | C70600 | CN102  | GW362H | Z3341;96)-<br>YCuNi-1  | 2.0372 | 1E34-CuNi10Fe1Mn | IS 9362 90/10                     |
| <b>Other Copper (General Reference Density 8.94 Gm/Cm3)</b>              |        |        |        |                        |        |                  |                                   |
| Electrolytic Tough Pitch (ETP)                                           | C11000 | C101   | GW004A | H3250;82)-<br>C1100 BE | 2.008  | P1337-CuETP      | IS1911 - CuETP<br>IS 9312 2 - ETP |
| Phosphorus Deoxidized                                                    | C12000 | C109   | GW009A | H3300;82)-<br>C1201 T  | 2.0076 | Cu-DLP           |                                   |
| Tellurium Copper                                                         | C14500 | C109   | GW118C |                        | 2.1526 | 1E37-CuTe        | IS 9328                           |
| Low Lead Nickel Copper                                                   | C19140 |        |        |                        |        | CuNiPbP          |                                   |
| DLIP COPPER                                                              | C12200 | C12200 | GW004A | C1220                  | 2.009  | Cu DLIP          | IS 1511 - Cu DLIP                 |
| DLP COPPER                                                               | C12000 |        | GW023A | C1201                  | 2.0075 | CL-DLP           | IS 1545 Cu-DLP                    |
| Lead Nickel Copper                                                       | C19160 |        |        |                        |        | CuNi1Pb1P        |                                   |

## Beryllium Copper C17200,C17510,C17500,CCNB





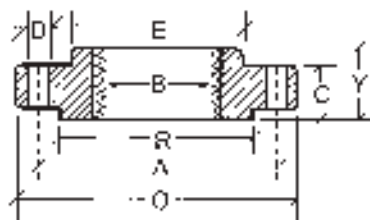
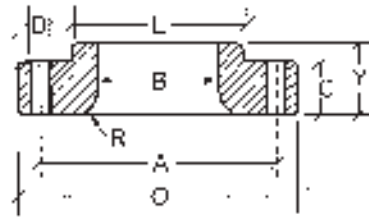
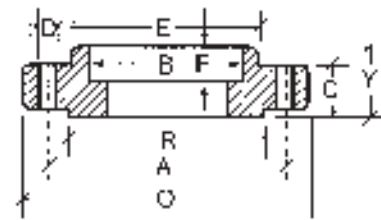
**SLIP - ON FLANGE**

**WELDING NECK FLANGE**

**BLIND FLANGE**

**DIMENSIONS OF CLASS 150 FLANGES AS PER ANSI B 16.5**

| Nominal Flange<br>Pipe<br>Size | Da of<br>Flange | Da of<br>Bolt<br>Circle | Da of<br>Bolt<br>Holes | No. of<br>Holes | Thk of<br>Flange | Da of<br>Hub | Length through Hub<br>S/O & S/W W/N L/J |       |      | Da of Bore<br>S/O & S/W L/J |       | Da of<br>H/F | Depth of<br>Socket |
|--------------------------------|-----------------|-------------------------|------------------------|-----------------|------------------|--------------|-----------------------------------------|-------|------|-----------------------------|-------|--------------|--------------------|
|                                | O               | A                       | D                      |                 | C                | E            | Y                                       | Y     | Y    | B                           | B     | R            | F                  |
| 15                             | 88.9            | 80.3                    | 15.9                   | 4               | 11.1             | 32.2         | 15.9                                    | 17.6  | 15.9 | 22.3                        | 22.9  | 31.3         | 9.5                |
| 20                             | 98.4            | 89.8                    | 15.9                   | 4               | 12.7             | 38.1         | 15.9                                    | 22.4  | 15.9 | 27.7                        | 28.2  | 42.8         | 11.1               |
| 25                             | 107.9           | 99.4                    | 15.9                   | 4               | 14.3             | 43.2         | 17.5                                    | 25.8  | 17.5 | 34.5                        | 35.0  | 50.8         | 12.7               |
| 32                             | 117.5           | 108.9                   | 15.9                   | 4               | 15.9             | 50.7         | 20.6                                    | 27.1  | 20.6 | 43.2                        | 43.7  | 60.5         | 14.3               |
| 40                             | 127.0           | 118.4                   | 15.9                   | 4               | 17.5             | 58.1         | 22.2                                    | 28.9  | 22.2 | 49.5                        | 50.0  | 73.0         | 15.9               |
| 50                             | 152.4           | 143.8                   | 19.0                   | 4               | 19.0             | 77.6         | 25.4                                    | 33.5  | 25.4 | 62.0                        | 62.5  | 92.1         | 17.5               |
| 65                             | 177.8           | 169.2                   | 19.0                   | 4               | 22.2             | 90.5         | 28.6                                    | 39.0  | 28.6 | 74.7                        | 75.4  | 104.8        | 19.0               |
| 80                             | 190.5           | 182.4                   | 19.0                   | 4               | 23.8             | 107.9        | 30.2                                    | 40.8  | 30.2 | 90.7                        | 91.4  | 127.0        | 20.6               |
| 100                            | 228.6           | 220.5                   | 19.0                   | 8               | 23.8             | 134.9        | 33.3                                    | 46.2  | 33.3 | 116.1                       | 116.8 | 157.2        | 23.8               |
| 125                            | 254.0           | 245.9                   | 22.2                   | 8               | 23.8             | 163.5        | 36.5                                    | 55.8  | 36.5 | 143.8                       | 144.5 | 185.7        | 23.8               |
| 150                            | 279.4           | 271.3                   | 22.2                   | 8               | 25.4             | 192.1        | 38.7                                    | 66.9  | 38.7 | 170.7                       | 171.4 | 215.9        | 27.0               |
| 200                            | 342.9           | 334.8                   | 22.2                   | 8               | 28.6             | 248.1        | 44.4                                    | 101.5 | 44.4 | 221.5                       | 222.2 | 289.9        | 31.7               |
| 250                            | 406.4           | 398.3                   | 25.4                   | 12              | 30.2             | 304.8        | 49.2                                    | 101.5 | 49.2 | 276.5                       | 277.4 | 323.8        | 35.3               |
| 300                            | 482.6           | 474.5                   | 25.4                   | 12              | 31.8             | 369.1        | 55.8                                    | 114.3 | 55.8 | 327.1                       | 328.0 | 381.0        | 38.7               |
| 350                            | 533.4           | 525.3                   | 28.6                   | 12              | 34.9             | 409.5        | 57.1                                    | 127.5 | 57.1 | 359.7                       | 360.2 | 412.7        | 41.3               |
| 400                            | 598.9           | 590.8                   | 28.6                   | 16              | 36.5             | 457.2        | 63.5                                    | 127.5 | 63.5 | 410.5                       | 411.2 | 469.9        | 44.4               |
| 450                            | 635.0           | 626.9                   | 31.7                   | 16              | 38.7             | 504.3        | 66.3                                    | 139.7 | 66.3 | 461.3                       | 462.3 | 533.4        | 49.2               |
| 500                            | 688.9           | 680.8                   | 31.7                   | 20              | 42.9             | 568.8        | 73.0                                    | 144.5 | 73.0 | 519.1                       | 520.1 | 584.7        | 54.0               |
| 600                            | 812.8           | 804.7                   | 34.9                   | 20              | 47.6             | 683.5        | 82.5                                    | 152.4 | 82.5 | 615.9                       | 616.9 | 692.1        | 59.5               |

**DIMENSIONS OF CLASS 300 FLANGES AS PER ANSI B 16.5**

| Nominal Flange<br>Pipe<br>Size | Da of<br>Flange | Da of<br>Bolt<br>Circle | Da of<br>Bolt<br>Holes | No. of<br>Holes | Thk of<br>Flange | Da of<br>Hub | Length through Hub<br>S/O & S/W W/N L/J |       |       | Da of Bore<br>S/O & S/W L/J |       | Da of<br>H/F | Depth of<br>Socket |
|--------------------------------|-----------------|-------------------------|------------------------|-----------------|------------------|--------------|-----------------------------------------|-------|-------|-----------------------------|-------|--------------|--------------------|
|                                | O               | A                       | D                      |                 | C                | E            | Y                                       | Y     | Y     | B                           | B     | R            | F                  |
| 15                             | 88.9            | 80.3                    | 15.9                   | 4               | 14.3             | 30.1         | 22.2                                    | 22.4  | 22.2  | 22.3                        | 22.9  | 34.9         | 9.5                |
| 20                             | 117.5           | 108.9                   | 19.0                   | 4               | 15.9             | 47.6         | 25.4                                    | 27.1  | 25.4  | 27.7                        | 28.2  | 42.8         | 11.1               |
| 25                             | 123.8           | 115.3                   | 19.0                   | 4               | 17.5             | 54.0         | 27.0                                    | 28.9  | 27.0  | 34.5                        | 35.0  | 50.8         | 12.7               |
| 32                             | 133.3           | 124.8                   | 19.0                   | 4               | 19.0             | 63.5         | 27.0                                    | 30.2  | 27.0  | 43.2                        | 43.7  | 60.5         | 14.3               |
| 40                             | 155.8           | 147.3                   | 22.2                   | 4               | 20.6             | 69.8         | 30.2                                    | 33.3  | 30.2  | 49.5                        | 50.0  | 73.0         | 15.9               |
| 50                             | 165.1           | 156.6                   | 19.0                   | 8               | 22.2             | 81.1         | 33.3                                    | 39.0  | 33.3  | 62.0                        | 62.5  | 92.1         | 17.5               |
| 65                             | 190.5           | 182.4                   | 22.2                   | 8               | 25.4             | 100.0        | 38.1                                    | 46.2  | 38.1  | 74.7                        | 75.4  | 104.8        | 19.0               |
| 80                             | 209.5           | 201.4                   | 22.2                   | 8               | 28.6             | 117.5        | 42.9                                    | 49.2  | 42.9  | 90.7                        | 91.4  | 127.0        | 20.6               |
| 100                            | 254.0           | 245.9                   | 22.2                   | 8               | 31.8             | 146.0        | 47.6                                    | 55.7  | 47.6  | 116.1                       | 116.8 | 157.2        | 23.8               |
| 125                            | 279.4           | 271.3                   | 22.2                   | 8               | 34.9             | 177.8        | 50.8                                    | 66.9  | 50.8  | 143.8                       | 144.5 | 185.7        | -                  |
| 150                            | 317.5           | 309.4                   | 22.2                   | 12              | 36.5             | 206.4        | 52.4                                    | 73.0  | 52.4  | 170.7                       | 171.4 | 215.9        | -                  |
| 200                            | 381.0           | 372.9                   | 25.4                   | 12              | 41.3             | 262.3        | 61.9                                    | 111.1 | 61.9  | 221.5                       | 222.2 | 289.9        | -                  |
| 250                            | 444.5           | 436.4                   | 28.6                   | 16              | 47.6             | 323.7        | 66.7                                    | 117.5 | 66.7  | 276.5                       | 277.4 | 323.8        | -                  |
| 300                            | 520.7           | 512.6                   | 31.7                   | 16              | 50.8             | 374.6        | 73.0                                    | 130.2 | 73.0  | 327.1                       | 328.0 | 381.0        | -                  |
| 350                            | 584.7           | 576.6                   | 31.7                   | 20              | 54.0             | 425.4        | 76.2                                    | 142.0 | 76.2  | 359.7                       | 360.2 | 412.7        | -                  |
| 400                            | 647.7           | 639.6                   | 34.9                   | 20              | 57.2             | 482.0        | 82.5                                    | 146.0 | 82.5  | 410.5                       | 411.2 | 469.9        | -                  |
| 450                            | 711.2           | 703.1                   | 34.9                   | 24              | 60.3             | 533.4        | 88.9                                    | 158.7 | 88.9  | 461.3                       | 462.3 | 533.4        | -                  |
| 500                            | 774.7           | 766.6                   | 34.9                   | 24              | 63.5             | 587.4        | 95.2                                    | 161.9 | 95.2  | 519.1                       | 520.1 | 584.7        | -                  |
| 600                            | 914.1           | 906.0                   | 34.9                   | 24              | 69.8             | 701.7        | 106.4                                   | 168.3 | 106.4 | 615.9                       | 616.9 | 692.1        | -                  |

All Dimensions are in Millimeters

**THREADED FLANGE**

**LAP JOINT FLANGE**

**SOCKET - WELD FLANGE**

**DIMENSIONS OF CLASS 600 FLANGES AS PER ANSI B 16.5**

| Nominal Flange<br>Pipe<br>Size | Dia. of<br>Bolt<br>Circle | Dia. of<br>Bolt<br>Holes | No. of<br>Holes | Thk. of<br>Flange | Dia. of<br>Hub | Length through Hub |       |       | Dia. of Bore |       | Dia. of<br>R/F | Depth of<br>Socket |
|--------------------------------|---------------------------|--------------------------|-----------------|-------------------|----------------|--------------------|-------|-------|--------------|-------|----------------|--------------------|
|                                |                           |                          |                 |                   |                | S/O & S/W          | W/N   | L/J   | S/O & S/W    | L/J   |                |                    |
| O                              | A                         | D                        | C               | E                 |                | Y                  | Y     | Y     | B            | B     | R              | F                  |
| 15                             | 98.5                      | 98.7                     | 4               | 14.3              | 36.7           | 22.2               | 52.4  | 22.3  | 22.3         | 22.8  | 34.9           | 9.5                |
| 20                             | 117.5                     | 92.5                     | 4               | 15.9              | 47.6           | 25.4               | 57.1  | 25.4  | 27.7         | 28.1  | 42.9           | 11.1               |
| 25                             | 129.8                     | 98.9                     | 4               | 17.5              | 54.0           | 27.3               | 61.9  | 26.9  | 34.5         | 35.0  | 50.8           | 12.7               |
| 32                             | 133.3                     | 98.4                     | 4               | 20.6              | 63.5           | 28.6               | 66.7  | 26.4  | 43.2         | 43.6  | 63.5           | 14.2               |
| 40                             | 155.8                     | 114.3                    | 4               | 22.2              | 69.0           | 31.7               | 69.9  | 31.7  | 49.5         | 50.0  | 73.0           | 15.8               |
| 50                             | 160.1                     | 127.0                    | 8               | 25.4              | 84.1           | 36.5               | 73.0  | 36.5  | 62.3         | 62.4  | 92.7           | 17.4               |
| 65                             | 190.5                     | 149.2                    | 8               | 28.6              | 102.0          | 41.3               | 79.4  | 41.1  | 74.7         | 75.4  | 104.8          | 19.0               |
| 80                             | 209.5                     | 166.3                    | 8               | 31.8              | 117.5          | 45.0               | 82.5  | 45.0  | 90.7         | 91.4  | 127.0          | -                  |
| 100                            | 273.3                     | 215.9                    | 8               | 38.1              | 152.1          | 54.0               | 101.6 | 50.8  | 116.1        | 116.9 | 157.2          | -                  |
| 125                            | 330.2                     | 266.7                    | 8               | 44.4              | 188.9          | 60.3               | 114.3 | 60.4  | 143.8        | 141.5 | 185.7          | -                  |
| 150                            | 355.1                     | 292.1                    | 12              | 47.6              | 222.2          | 66.7               | 117.5 | 66.5  | 170.7        | 171.4 | 215.9          | -                  |
| 200                            | 419.1                     | 349.2                    | 12              | 55.6              | 273.0          | 76.2               | 133.3 | 76.2  | 221.5        | 222.2 | 269.9          | -                  |
| 250                            | 502.7                     | 431.8                    | 16              | 63.5              | 342.9          | 85.7               | 152.1 | 111.2 | 276.0        | 277.0 | 323.0          | -                  |
| 300                            | 558.8                     | 488.9                    | 20              | 69.7              | 400.0          | 92.1               | 165.8 | 117.3 | 327.1        | 328.1 | 381.0          | -                  |
| 350                            | 603.7                     | 527.0                    | 20              | 69.9              | 431.8          | 93.7               | 165.1 | 127.0 | 359.1        | 350.1 | 412.7          | -                  |
| 400                            | 685.8                     | 623.2                    | 20              | 70.2              | 495.3          | 106.4              | 177.8 | 139.7 | 410.5        | 411.2 | 469.9          | -                  |
| 450                            | 742.9                     | 654.0                    | 20              | 82.6              | 546.7          | 117.5              | 184.1 | 152.4 | 461.8        | 452.2 | 533.1          | -                  |
| 500                            | 812.6                     | 723.9                    | 24              | 86.9              | 609.6          | 127.0              | 190.5 | 165.7 | 513.1        | 514.3 | 584.2          | -                  |
| 600                            | 1039.5                    | 838.2                    | 24              | 101.6             | 717.5          | 139.7              | 203.2 | 184.1 | 615.9        | 615.9 | 692.1          | -                  |

**DIMENSIONS OF CLASS 900 FLANGES AS PER ANSI B 16.5**

| Nominal Flange<br>Pipe<br>Size | Dia of<br>Bolt<br>Circle | Dia of<br>Bolt<br>Holes | No. of<br>Holes | Thk of<br>Flange | Dia of<br>Hub | Length through Hub |       |       | Dia of Bore |       | Dia of<br>R/F | Depth of<br>Socket |
|--------------------------------|--------------------------|-------------------------|-----------------|------------------|---------------|--------------------|-------|-------|-------------|-------|---------------|--------------------|
|                                |                          |                         |                 |                  |               | S/O & S/W          | W/N   | LU    | S/O & S/W   | LU    |               |                    |
| O                              | A                        | D                       |                 | C                | E             | Y                  | Y     | Y     | B           | B     | H             | F                  |
| 15                             | 120.7                    | 92.5                    | 4               | 22.2             | 33.1          | 31.7               | 60.3  | 31.7  | 22.3        | 22.8  | 34.9          | 9.5                |
| 20                             | 130.2                    | 98.9                    | 4               | 25.4             | 44.4          | 34.9               | 69.9  | 35.0  | 27.7        | 28.1  | 42.9          | 11.1               |
| 25                             | 149.2                    | 101.6                   | 4               | 28.6             | 52.4          | 41.3               | 73.0  | 41.1  | 31.5        | 35.0  | 50.8          | 12.7               |
| 32                             | 158.7                    | 111.7                   | 4               | 28.6             | 63.5          | 41.3               | 73.0  | 41.1  | 43.2        | 43.6  | 63.5          | 14.2               |
| 40                             | 177.5                    | 123.8                   | 4               | 31.8             | 69.6          | 44.4               | 82.5  | 44.4  | 49.5        | 50.0  | 73.0          | 15.8               |
| 50                             | 215.9                    | 165.1                   | 8               | 38.1             | 104.0         | 57.1               | 101.6 | 57.1  | 62.3        | 62.4  | 92.7          | 17.4               |
| 65                             | 244.1                    | 190.5                   | 8               | 41.3             | 123.8         | 63.5               | 104.8 | 63.5  | 74.7        | 75.4  | 104.8         | 19.0               |
| 80                             | 271.3                    | 192.5                   | 8               | 38.1             | 127.0         | 50.9               | 101.6 | 63.8  | 90.7        | 91.4  | 127.0         | -                  |
| 100                            | 302.7                    | 234.9                   | 8               | 44.4             | 158.7         | 60.3               | 114.3 | 63.5  | 116.0       | 116.9 | 157.2         | -                  |
| 125                            | 349.2                    | 275.4                   | 8               | 50.8             | 190.5         | 79.0               | 127.0 | 79.2  | 143.7       | 141.5 | 185.7         | -                  |
| 150                            | 381.0                    | 317.5                   | 12              | 55.6             | 234.0         | 85.8               | 139.7 | 85.8  | 170.5       | 171.4 | 215.9         | -                  |
| 200                            | 469.9                    | 392.7                   | 12              | 63.5             | 298.4         | 101.6              | 162.0 | 114.3 | 221.4       | 222.2 | 269.9         | -                  |
| 250                            | 540.1                    | 409.9                   | 16              | 69.9             | 334.3         | 117.5              | 184.1 | 127.0 | 276.2       | 277.0 | 323.0         | -                  |
| 300                            | 609.6                    | 533.4                   | 20              | 79.3             | 418.1         | 117.4              | 203.2 | 142.7 | 327.1       | 328.1 | 381.0         | -                  |

All Dimensions are in Millimeters

# DIMENSION OF FLANGES AS PER TABLE BS- 10

**TABLE D**

For Working Steam Pressure upto 50 lbs per sq. inch

| Nominal Pipe Size | O.D. of Pipe | C.D.  | P.C.D. | No. of Bolt | Dia of Bolt | Thickness |
|-------------------|--------------|-------|--------|-------------|-------------|-----------|
| 1/2"              | 21.3         | 33.3  | 66.7   | 4           | 12.7        | 6.8       |
| 3/4"              | 26.7         | 101.3 | 73.0   | 4           | 12.7        | 6.8       |
| 1"                | 33.4         | 114.3 | 82.6   | 4           | 12.7        | 7.1       |
| 1 1/4"            | 42.2         | 120.7 | 87.3   | 4           | 12.7        | 7.4       |
| 1 1/2"            | 48.3         | 133.4 | 98.4   | 4           | 12.7        | 8.7       |
| 2"                | 60.3         | 152.4 | 114.3  | 4           | 15.9        | 9.5       |
| 2 1/2"            | 73.0         | 181.2 | 146.1  | 4           | 15.9        | 10.3      |
| 3"                | 88.9         | 203.2 | 165.1  | 4           | 15.9        | 11.1      |
| 3 1/2"            | 101.6        | 215.9 | 177.8  | 4           | 15.9        | 11.9      |
| 4"                | 114.3        | 228.6 | 190.5  | 8           | 15.9        | 12.7      |
| 5"                | 141.3        | 254.0 | 229.6  | 8           | 15.9        | 13.5      |
| 6"                | 168.3        | 279.4 | 259.6  | 8           | 15.9        | 14.3      |
| 7"                | 190.5        | 304.8 | 289.6  | 8           | 15.9        | 15.1      |
| 8"                | 219.1        | 335.6 | 322.1  | 8           | 15.9        | 15.9      |
| 9"                | 244.5        | 368.3 | 355.6  | 8           | 15.9        | 16.7      |
| 10"               | 273.0        | 406.4 | 395.6  | 12          | 15.9        | 17.5      |
| 12"               | 323.9        | 457.2 | 457.2  | 12          | 15.9        | 18.3      |
| 14"               | 355.6        | 527.2 | 489.9  | 12          | 15.9        | 19.1      |
| 16"               | 406.4        | 577.9 | 520.7  | 12          | 22.2        | 19.9      |
| 18"               | 457.2        | 641.4 | 584.2  | 12          | 22.2        | 20.7      |
| 20"               | 508.0        | 704.9 | 641.4  | 15          | 22.2        | 21.5      |
| 24"               | 609.6        | 825.5 | 755.7  | 16          | 25.4        | 22.3      |

**TABLE F** For Working Steam Pressure above 100 lbs and upto 150 lbs per sq. inch.

| Nominal Pipe Size | O.D. of Pipe | C.D.  | P.C.D. | No. of Bolt | Dia of Bolt | Thickness |
|-------------------|--------------|-------|--------|-------------|-------------|-----------|
| 1/2"              | 21.3         | 33.3  | 66.7   | 4           | 12.7        | 6.8       |
| 3/4"              | 26.7         | 101.3 | 73.0   | 4           | 12.7        | 6.8       |
| 1"                | 33.4         | 120.7 | 87.3   | 4           | 15.9        | 9.5       |
| 1 1/4"            | 42.2         | 128.6 | 98.4   | 4           | 15.9        | 10.3      |
| 1 1/2"            | 48.3         | 133.4 | 104.3  | 4           | 15.9        | 11.1      |
| 2"                | 60.3         | 152.4 | 114.3  | 4           | 15.9        | 11.9      |
| 2 1/2"            | 73.0         | 181.2 | 146.1  | 8           | 15.9        | 12.7      |
| 3"                | 88.9         | 203.2 | 165.1  | 8           | 15.9        | 13.5      |
| 3 1/2"            | 101.6        | 215.9 | 177.8  | 8           | 15.9        | 14.3      |
| 4"                | 114.3        | 228.6 | 190.5  | 8           | 15.9        | 15.1      |
| 5"                | 141.3        | 254.0 | 229.6  | 8           | 15.9        | 15.9      |
| 6"                | 168.3        | 279.4 | 259.6  | 8           | 15.9        | 16.7      |
| 7"                | 190.5        | 304.8 | 289.6  | 12          | 15.9        | 17.5      |
| 8"                | 219.1        | 335.6 | 322.1  | 12          | 15.9        | 18.3      |
| 9"                | 244.5        | 368.3 | 355.6  | 12          | 15.9        | 19.1      |
| 10"               | 273.0        | 406.4 | 395.6  | 12          | 15.9        | 20.7      |
| 12"               | 323.9        | 457.2 | 457.2  | 16          | 15.9        | 21.5      |
| 14"               | 355.6        | 527.2 | 489.9  | 16          | 15.9        | 22.3      |
| 16"               | 406.4        | 577.9 | 520.7  | 20          | 22.2        | 23.1      |
| 18"               | 457.2        | 641.4 | 584.2  | 20          | 22.2        | 23.9      |
| 20"               | 508.0        | 704.9 | 641.4  | 24          | 25.4        | 24.7      |
| 24"               | 609.6        | 825.5 | 755.7  | 24          | 25.4        | 25.5      |

Note : For 12.7 mm and 15.87 mm Bolts Dia the diameters of the holes will be 1.55 mm larger and for 19.01 and above the Hole Dia will be 3.17 larger.

**TABLE E**

For Working Steam Pressure upto 100 lbs per sq. inch

| Nominal Pipe Size | O.D. of Pipe | C.D.  | P.C.D. | No. of Bolt | Dia of Bolt | Thickness |
|-------------------|--------------|-------|--------|-------------|-------------|-----------|
| 1/2"              | 21.3         | 33.3  | 66.7   | 4           | 12.7        | 6.8       |
| 3/4"              | 26.7         | 101.3 | 73.0   | 4           | 12.7        | 6.8       |
| 1"                | 33.4         | 114.3 | 82.6   | 4           | 12.7        | 7.1       |
| 1 1/4"            | 42.2         | 120.7 | 87.3   | 4           | 12.7        | 7.4       |
| 1 1/2"            | 48.3         | 133.4 | 98.4   | 4           | 12.7        | 8.7       |
| 2"                | 60.3         | 152.4 | 114.3  | 4           | 15.9        | 9.5       |
| 2 1/2"            | 73.0         | 181.2 | 146.1  | 4           | 15.9        | 10.3      |
| 3"                | 88.9         | 203.2 | 165.1  | 4           | 15.9        | 11.1      |
| 3 1/2"            | 101.6        | 215.9 | 177.8  | 4           | 15.9        | 11.9      |
| 4"                | 114.3        | 228.6 | 190.5  | 8           | 15.9        | 12.7      |
| 5"                | 141.3        | 254.0 | 229.6  | 8           | 15.9        | 13.5      |
| 6"                | 168.3        | 279.4 | 259.6  | 8           | 15.9        | 14.3      |
| 7"                | 190.5        | 304.8 | 289.6  | 8           | 15.9        | 15.1      |
| 8"                | 219.1        | 335.6 | 322.1  | 8           | 15.9        | 15.9      |
| 9"                | 244.5        | 368.3 | 355.6  | 12          | 15.9        | 16.7      |
| 10"               | 273.0        | 406.4 | 395.6  | 12          | 15.9        | 17.5      |
| 12"               | 323.9        | 457.2 | 457.2  | 12          | 15.9        | 18.3      |
| 14"               | 355.6        | 527.2 | 489.9  | 12          | 15.9        | 19.1      |
| 16"               | 406.4        | 577.9 | 520.7  | 12          | 22.2        | 19.9      |
| 18"               | 457.2        | 641.4 | 584.2  | 16          | 22.2        | 20.7      |
| 20"               | 508.0        | 704.9 | 641.4  | 16          | 22.2        | 21.5      |
| 24"               | 609.6        | 825.5 | 755.7  | 16          | 25.4        | 22.3      |

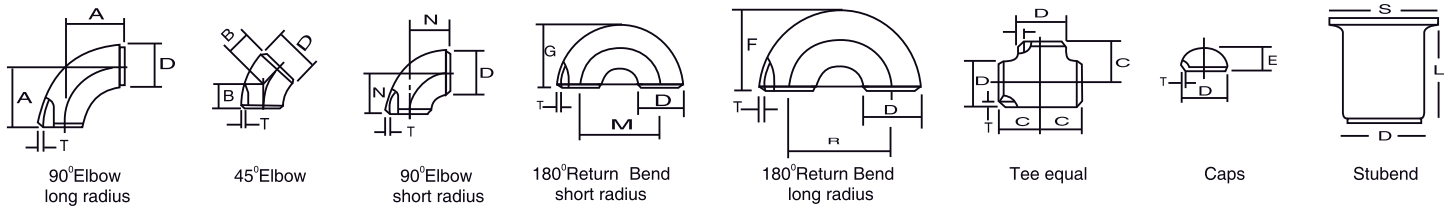
**TABLE H** For Working Steam Pressure above 150 lbs and upto 250 lbs per sq. inch.

| Nominal Pipe Size | O.D. of Pipe | C.D.  | P.C.D. | No. of Bolt | Dia of Bolt | Thickness |
|-------------------|--------------|-------|--------|-------------|-------------|-----------|
| 1/2"              | 21.3         | 114.3 | 82.6   | 4           | 15.9        | 12.7      |
| 3/4"              | 26.7         | 114.3 | 82.6   | 4           | 15.9        | 12.7      |
| 1"                | 33.4         | 120.7 | 87.3   | 4           | 15.9        | 14.3      |
| 1 1/4"            | 42.2         | 133.4 | 98.4   | 4           | 15.9        | 15.1      |
| 1 1/2"            | 48.3         | 139.7 | 104.3  | 4           | 15.9        | 15.9      |
| 2"                | 60.3         | 152.4 | 114.3  | 4           | 15.9        | 16.7      |
| 2 1/2"            | 73.0         | 181.2 | 146.1  | 8           | 15.9        | 17.5      |
| 3"                | 88.9         | 203.2 | 165.1  | 8           | 15.9        | 18.3      |
| 3 1/2"            | 101.6        | 215.9 | 177.8  | 8           | 15.9        | 19.1      |
| 4"                | 114.3        | 228.6 | 190.5  | 8           | 15.9        | 20.7      |
| 5"                | 141.3        | 254.0 | 229.6  | 8           | 15.9        | 21.5      |
| 6"                | 168.3        | 279.4 | 259.6  | 12          | 15.9        | 22.3      |
| 7"                | 190.5        | 304.8 | 289.6  | 12          | 15.9        | 23.1      |
| 8"                | 219.1        | 335.6 | 322.1  | 12          | 15.9        | 23.9      |
| 9"                | 244.5        | 368.3 | 355.6  | 12          | 15.9        | 24.7      |
| 10"               | 273.0        | 406.4 | 395.6  | 12          | 15.9        | 25.5      |
| 12"               | 323.9        | 457.2 | 457.2  | 16          | 22.2        | 26.3      |
| 14"               | 355.6        | 527.2 | 489.9  | 16          | 22.2        | 27.1      |
| 16"               | 406.4        | 577.9 | 520.7  | 20          | 22.2        | 27.9      |
| 18"               | 457.2        | 641.4 | 584.2  | 20          | 22.2        | 28.7      |
| 20"               | 508.0        | 704.9 | 641.4  | 24          | 25.4        | 29.5      |
| 24"               | 609.6        | 825.5 | 755.7  | 24          | 25.4        | 30.3      |





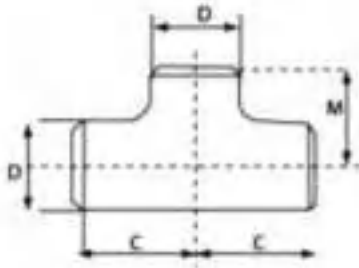
## Butt Welding Pipe Fitting Dimensional Standard ANSI B-16.9, B-16.2B



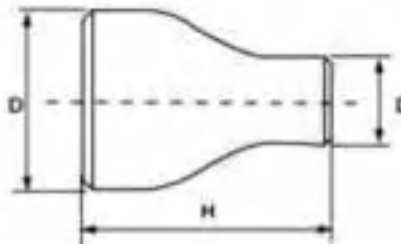
| Nominal Pipe Size |      | Outside Diameter | Center to Face |     |     |      | Back to Face |      |     | Center to Center |      |       | Length 'L' |             |
|-------------------|------|------------------|----------------|-----|-----|------|--------------|------|-----|------------------|------|-------|------------|-------------|
| Inch.             | mm   | D                | A              | B   | C   | N    | E            | F    | G   | R                | M    | S     | MSS SP43   | ANSI B 16.9 |
| 1/2               | 15   | 21.3             | 38             | 16  | 25  | —    | 25           | 48   | —   | 76               | —    | 34.9  | 50.8       | 76.2        |
| 3/4               | 20   | 26.7             | 29             | 11  | 29  | —    | 25           | 43   | —   | 57               | —    | 42.8  | 50.8       | 76.2        |
| 1                 | 25   | 33.4             | 38             | 22  | 38  | 25   | 38           | 56   | 41  | 76               | 51   | 50.8  | 50.8       | 101.6       |
| 1 1/4             | 32   | 42.2             | 48             | 25  | 48  | 32   | 38           | 70   | 52  | 95               | 64   | 63.5  | 50.8       | 101.6       |
| 1 1/2             | 40   | 48.3             | 57             | 29  | 57  | 38   | 38           | 83   | 62  | 114              | 76   | 73.0  | 50.8       | 101.6       |
| 2                 | 50   | 60.3             | 76             | 35  | 64  | 51   | 38           | 106  | 81  | 152              | 102  | 92.0  | 63.5       | 152.4       |
| 2 1/2             | 65   | 73.0             | 95             | 44  | 76  | 64   | 38           | 132  | 100 | 191              | 127  | 104.8 | 63.5       | 152.4       |
| 3                 | 80   | 88.9             | 114            | 51  | 86  | 76   | 51           | 159  | 121 | 229              | 152  | 127.0 | 63.5       | 152.4       |
| 3 1/2             | 90   | 101.6            | 133            | 57  | 95  | 89   | 64           | 184  | 140 | 267              | 178  | 139.7 | 76.2       | 152.4       |
| 4                 | 100  | 114.3            | 152            | 64  | 105 | 102  | 64           | 210  | 159 | 305              | 203  | 157.2 | 76.2       | 152.4       |
| 5                 | 125  | 141.3            | 190            | 79  | 124 | 127  | 76           | 262  | 197 | 381              | 254  | 185.7 | 76.2       | 203.2       |
| 6                 | 150  | 168.3            | 229            | 95  | 143 | 152  | 89           | 313  | 237 | 457              | 305  | 215.9 | 88.9       | 203.2       |
| 8                 | 200  | 219.1            | 305            | 127 | 178 | 203  | 102          | 414  | 313 | 610              | 406  | 270.0 | 101.6      | 203.2       |
| 10                | 250  | 273.1            | 381            | 159 | 216 | 254  | 127          | 518  | 391 | 762              | 508  | 324.0 | 127.0      | 254.0       |
| 12                | 300  | 323.9            | 457            | 190 | 254 | 305  | 152          | 619  | 467 | 914              | 610  | 381.0 | 152.4      | 254.0       |
| 14                | 350  | 355.6            | 533            | 222 | 279 | 356  | 165          | 711  | 533 | 1067             | 711  | 412.8 | 152.4      | 305.0       |
| 16                | 400  | 406.4            | 610            | 254 | 305 | 406  | 178          | 813  | 610 | 1219             | 813  | 470.0 | 152.4      | 305.0       |
| 18                | 450  | 457.2            | 686            | 286 | 343 | 457  | 203          | 914  | 686 | 1372             | 914  | 533.4 | 152.4      | 305.0       |
| 20                | 500  | 508.0            | 762            | 318 | 381 | 508  | 229          | 1016 | 762 | 1524             | 1016 | 584.2 | 152.4      | 305.0       |
| 22                | 550  | 559.0            | 838            | 343 | 419 | 559  | 254          | 1118 | 838 | 1676             | 1118 | 614.4 | 152.4      | 305.0       |
| 24                | 600  | 610.0            | 914            | 381 | 432 | 610  | 267          | 1219 | 914 | 1829             | 1219 | 692.2 | 152.4      | 305.0       |
| 26                | 650  | 660.0            | 991            | 406 | 495 | 660  | 267          | —    | —   | —                | —    | —     | —          | —           |
| 28                | 700  | 711.0            | 1067           | 438 | 521 | 711  | 267          | —    | —   | —                | —    | —     | —          | —           |
| 30                | 750  | 762.0            | 1143           | 470 | 559 | 762  | 267          | —    | —   | —                | —    | —     | —          | —           |
| 32                | 800  | 813.0            | 1219           | 502 | 597 | 813  | 267          | —    | —   | —                | —    | —     | —          | —           |
| 34                | 850  | 864.0            | 1295           | 533 | 635 | 864  | 267          | —    | —   | —                | —    | —     | —          | —           |
| 36                | 900  | 914.0            | 1372           | 565 | 673 | 914  | 267          |      |     |                  |      |       |            |             |
| 38                | 950  | 965.0            | 1448           | 600 | 711 | 965  | 305          |      |     |                  |      |       |            |             |
| 40                | 1000 | 1016.0           | 1524           | 632 | 749 | 1016 | 305          |      |     |                  |      |       |            |             |
| 42                | 1050 | 1067.0           | 1600           | 660 | 762 | 1067 | 305          |      |     |                  |      |       |            |             |
| 44                | 1100 | 1118.0           | 1676           | 695 | 813 | 1118 | 343          |      |     |                  |      |       |            |             |
| 46                | 1150 | 1168.0           | 1753           | 727 | 851 | 1168 | 343          |      |     |                  |      |       |            |             |
| 48                | 1200 | 1219.0           | 1829           | 759 | 889 | 1219 | 343          |      |     |                  |      |       |            |             |



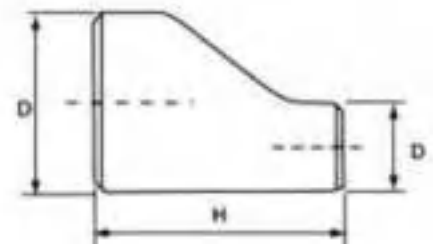
## BUTT WELDING PIPE FITTING ANSI 16.9 / 16.28



**REDUCING TEES**



**CONCENTRIC REDUCERS**



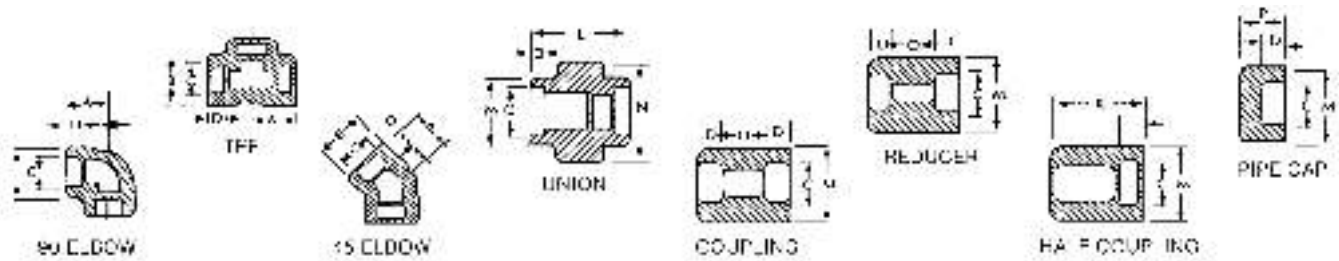
**ECCENTRIC REDUCERS**

| Nominal Pipe Size |           | Outside Diameter |       | Center to End |     | Length |
|-------------------|-----------|------------------|-------|---------------|-----|--------|
| Inch.             | mm        | D                | P     | C             | M   | H      |
| 1 1/2 x 3/8       | 15 x 10   | 21.3             | 17.1  | 25            | 25  | -      |
| 1 1/2 x 1/4       | 15 x 8    | 21.3             | 13.7  | 25            | 25  | -      |
| 3/4 x 1/2         | 20 x 15   | 26.7             | 21.3  | 29            | 29  | 38     |
| 3/4 x 3/8         | 20 x 10   | 26.7             | 17.1  | 29            | 29  | 38     |
| 1 x 3/4           | 25 x 20   | 33.4             | 26.7  | 36            | 36  | 51     |
| 1 x 1/2           | 25 x 15   | 33.4             | 21.3  | 36            | 36  | 51     |
| 1 1/4 x 1         | 32 x 25   | 42.2             | 33.4  | 48            | 48  | 51     |
| 1 1/4 x 3/4       | 32 x 20   | 42.2             | 26.7  | 48            | 48  | 51     |
| 1 1/4 x 1 1/2     | 32 x 15   | 42.2             | 21.3  | 48            | 48  | 51     |
| 1 1/2 x 1 1/2     | 40 x 32   | 48.3             | 42.2  | 57            | 57  | 64     |
| 1 1/2 x 1         | 40 x 25   | 48.3             | 33.4  | 57            | 57  | 64     |
| 1 1/2 x 3/4       | 40 x 20   | 48.3             | 26.7  | 57            | 57  | 64     |
| 1 1/2 x 1/2       | 40 x 15   | 48.3             | 21.3  | 57            | 57  | 64     |
| 2 x 1 1/2         | 50 x 40   | 60.3             | 48.2  | 64            | 60  | 76     |
| 2 x 1 1/4         | 50 x 32   | 60.3             | 42.2  | 64            | 57  | 76     |
| 2 x 1             | 50 x 25   | 60.3             | 33.4  | 64            | 51  | 76     |
| 2 x 3/4           | 50 x 20   | 60.3             | 26.7  | 64            | 44  | 76     |
| 2 1/2 x 2         | 65 x 50   | 73.0             | 60.3  | 76            | 70  | 89     |
| 2 1/2 x 1 1/2     | 65 x 40   | 73.0             | 48.3  | 76            | 67  | 89     |
| 2 1/2 x 1 1/4     | 65 x 32   | 73.0             | 42.2  | 76            | 64  | 89     |
| 2 1/2 x 1         | 65 x 25   | 73.0             | 33.4  | 76            | 57  | 89     |
| 3 x 2 1/2         | 80 x 65   | 88.9             | 73.0  | 86            | 83  | 89     |
| 3 x 2             | 80 x 50   | 88.9             | 60.3  | 86            | 76  | 89     |
| 3 x 1 1/2         | 80 x 40   | 88.9             | 48.3  | 86            | 73  | 89     |
| 3 x 1 1/4         | 80 x 32   | 88.9             | 42.2  | 86            | 70  | 89     |
| 3 1/2 x 3         | 90 x 80   | 101.6            | 88.9  | 95            | 92  | 102    |
| 3 1/2 x 2 1/2     | 90 x 65   | 101.6            | 73.0  | 95            | 89  | 102    |
| 3 1/2 x 2         | 90 x 50   | 101.6            | 60.3  | 95            | 83  | 102    |
| 3 1/2 x 1 1/2     | 90 x 40   | 101.6            | 48.3  | 95            | 79  | 102    |
| 3 1/2 x 1         | 90 x 32   | 101.6            | 42.2  | -             | -   | 102    |
| 4 x 3 1/2         | 100 x 90  | 114.3            | 101.6 | 105           | 102 | 102    |
| 4 x 3             | 100 x 80  | 114.3            | 88.9  | 105           | 98  | 102    |
| 4 x 2 1/2         | 100 x 65  | 114.3            | 73.0  | 105           | 95  | 102    |
| 4 x 2             | 100 x 50  | 114.3            | 60.3  | 105           | 89  | 102    |
| 4 x 1 1/2         | 100 x 40  | 114.3            | 48.3  | 105           | 86  | 102    |
| 5 x 4             | 125 x 100 | 141.3            | 114.3 | 124           | 117 | 127    |
| 5 x 3 1/2         | 125 x 90  | 141.3            | 101.6 | 124           | 114 | 127    |
| 5 x 3             | 125 x 80  | 141.3            | 88.9  | 124           | 111 | 127    |
| 5 x 2 1/2         | 125 x 65  | 141.3            | 73.0  | 124           | 108 | 127    |
| 5 x 2             | 125 x 50  | 141.3            | 60.3  | 124           | 105 | 127    |
| 6 x 5             | 150 x 125 | 168.3            | 141.3 | 143           | 137 | 140    |
| 6 x 4             | 150 x 100 | 168.3            | 114.3 | 143           | 130 | 140    |
| 6 x 3 1/2         | 150 x 90  | 168.3            | 101.6 | 143           | 127 | 140    |
| 6 x 3             | 150 x 80  | 168.3            | 88.9  | 143           | 124 | 140    |
| 6 x 2 1/2         | 150 x 65  | 168.3            | 73.0  | 143           | 121 | 140    |

| Nominal Pipe Size |           | Outside Diameter |       | Center to End |     | Length |
|-------------------|-----------|------------------|-------|---------------|-----|--------|
| Inch.             | mm        | D                | P     | C             | M   | H      |
| 8 x 6             | 200 x 150 | 219.1            | 168.3 | 178           | 168 | 152    |
| 8 x 5             | 200 x 125 | 219.1            | 141.3 | 178           | 162 | 152    |
| 8 x 4             | 200 x 100 | 219.1            | 114.3 | 178           | 156 | 152    |
| 8 x 3 1/2         | 200 x 90  | 219.1            | 101.6 | 178           | 152 | 152    |
| 10 x 8            | 250 x 200 | 273.1            | 219.1 | 216           | 203 | 178    |
| 10 x 6            | 250 x 150 | 273.1            | 168.3 | 216           | 194 | 178    |
| 10 x 5            | 250 x 125 | 273.1            | 141.3 | 216           | 191 | 178    |
| 10 x 4            | 250 x 100 | 273.1            | 114.3 | 216           | 184 | 178    |
| 12 x 10           | 300 x 250 | 323.9            | 273.1 | 254           | 241 | 203    |
| 12 x 8            | 300 x 200 | 323.9            | 219.1 | 254           | 229 | 203    |
| 12 x 6            | 300 x 150 | 323.9            | 168.3 | 254           | 219 | 203    |
| 12 x 5            | 300 x 125 | 323.9            | 141.3 | 254           | 216 | 203    |
| 14 x 12           | 350 x 300 | 355.6            | 323.9 | 279           | 270 | 330    |
| 14 x 10           | 350 x 250 | 355.6            | 273.1 | 279           | 257 | 330    |
| 14 x 8            | 350 x 200 | 355.6            | 219.1 | 279           | 248 | 330    |
| 14 x 6            | 350 x 150 | 355.6            | 168.3 | 279           | 238 | 330    |
| 16 x 14           | 400 x 350 | 406.4            | 355.6 | 305           | 305 | 356    |
| 16 x 12           | 400 x 300 | 406.4            | 323.9 | 305           | 295 | 356    |
| 16 x 10           | 400 x 250 | 406.4            | 273.1 | 305           | 283 | 356    |
| 16 x 8            | 400 x 200 | 406.4            | 219.1 | 305           | 273 | 356    |
| 16 x 6            | 400 x 150 | 406.4            | 168.3 | 305           | 264 | 356    |
| 18 x 16           | 450 x 400 | 457.0            | 406.4 | 343           | 330 | 381    |
| 18 x 14           | 450 x 350 | 457.0            | 355.6 | 343           | 330 | 381    |
| 18 x 12           | 450 x 300 | 457.0            | 323.9 | 343           | 321 | 381    |
| 18 x 10           | 450 x 250 | 457.0            | 273.1 | 343           | 308 | 381    |
| 18 x 8            | 450 x 200 | 457.0            | 219.1 | 343           | 298 | 381    |
| 20 x 18           | 500 x 450 | 508.0            | 457.0 | 381           | 368 | 508    |
| 20 x 16           | 500 x 400 | 508.0            | 406.4 | 381           | 356 | 508    |
| 20 x 14           | 500 x 350 | 508.0            | 355.6 | 381           | 356 | 508    |
| 20 x 12           | 500 x 300 | 508.0            | 323.9 | 381           | 346 | 508    |
| 20 x 10           | 500 x 250 | 508.0            | 273.1 | 381           | 333 | 508    |
| 20 x 8            | 500 x 200 | 508.8            | 219.1 | 381           | 324 | 508    |
| 22 x 20           | 550 x 500 | 559.0            | 508.0 | 419           | 406 | 508    |
| 22 x 18           | 550 x 450 | 559.0            | 457.0 | 419           | 394 | 508    |
| 22 x 16           | 550 x 400 | 559.0            | 406.4 | 419           | 381 | 508    |
| 22 x 14           | 550 x 350 | 559.0            | 355.6 | 419           | 381 | 508    |
| 22 x 12           | 550 x 300 | 559.0            | 323.9 | 419           | 371 | 508    |
| 24 x 10           | 550 x 250 | 559.0            | 273.1 | 419           | 359 | 508    |
| 24 x 22           | 600 x 550 | 610.0            | 559.0 | 432           | 432 | 508    |
| 24 x 20           | 600 x 500 | 610.0            | 508.0 | 432           | 432 | 508    |
| 24 x 18           | 600 x 450 | 610.0            | 457.0 | 432           | 419 | 508    |
| 24 x 16           | 600 x 400 | 610.0            | 406.4 | 432           | 406 | 508    |
| 24 x 14           | 600 x 350 | 610.0            | 355.6 | 432           | 406 | 508    |
| 24 x 12           | 600 x 300 | 610.0            | 323.9 | 432           | 397 | 508    |
| 24 x 10           | 600 x 250 | 610.0            | 273.1 | 432           | 384 | 508    |

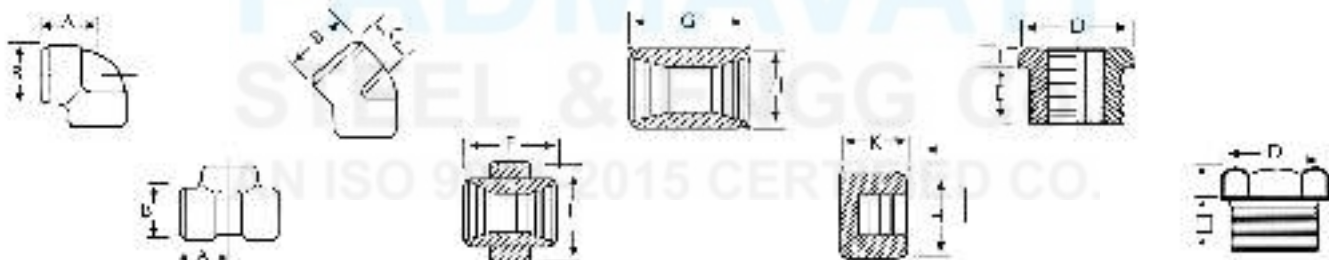


## SOCKET WELD FITTING TO ANSI B - 16.11



| NOM    |        | 3000 LBS. |        |    |    |     |       |     |      |    | COMMON FACTORS |        |        |        | 6000 LBS. |     |    |    |     |
|--------|--------|-----------|--------|----|----|-----|-------|-----|------|----|----------------|--------|--------|--------|-----------|-----|----|----|-----|
| BORE   | O.D.   | A max.    | B max. | K  | J  | L   | M     | N   | P    | Q  | C min.         | D min. | O min. | O max. | A         | B   | M  | K  | N   |
| 1/8"   | 10.3   | 22        | 18.5   | 26 | 16 | 40  | 17.3  | 32  | 15   | 10 | 10.7           | 10     | 5      | 8      | 22        | 22  | 20 | 25 | 46  |
| 1/4"   | 13.7   | 22        | 22     | 26 | 18 | 43  | 21.2  | 32  | 15   | 10 | 14.1           | 10     | 5      | 8      | 27        | 25  | 24 | 25 | 51  |
| 3/8"   | 17.2   | 25        | 25     | 26 | 19 | 48  | 25.4  | 36  | 16.5 | 10 | 17.6           | 10     | 3      | 9      | 27        | 28  | 28 | 26 | 60  |
| 1/2"   | 21.3   | 27        | 32     | 30 | 21 | 51  | 31    | 41  | 16.5 | 10 | 21.7           | 10     | 6      | 13     | 31        | 34  | 34 | 31 | 72  |
| 3/4"   | 26.7   | 34        | 38     | 36 | 24 | 57  | 37    | 50  | 19.5 | 13 | 27             | 13     | 6      | 13     | 37        | 42  | 41 | 35 | 80  |
| 1"     | 33.4   | 37        | 46     | 40 | 25 | 64  | 45.2  | 60  | 22.5 | 13 | 33.8           | 13     | 9      | 17     | 42        | 50  | 50 | 40 | 94  |
| 1 1/4" | 42.2   | 42        | 56     | 40 | 29 | 70  | 55    | 70  | 22.5 | 13 | 42.6           | 13     | 9      | 17     | 47        | 59  | 58 | 41 | 100 |
| 1 1/2" | 48.3   | 47        | 62     | 40 | 30 | 79  | 61.4  | 78  | 24   | 13 | 48.7           | 13     | 9      | 17     | 53        | 67  | 66 | 43 | 122 |
| 2"     | 60.3   | 56        | 75     | 52 | 37 | 89  | 75    | 95  | 29   | 13 | 61.2           | 16     | 15     | 23     | 59        | 84  | 83 | 55 | -   |
| 2 1/2" | 73.02  | 60        | 92     | 52 | 48 | 114 | 91.3  | 125 | 32   | 16 | 73.8           | 16     | 14     | 24     | -         | 102 | -  | 56 | -   |
| 3"     | 89.00  | 76        | 110    | 52 | 51 | 127 | 108.8 | 140 | 35   | 16 | 89.8           | 16     | 14     | 24     | -         | 121 | -  | 58 | -   |
| 4"     | 114.50 | 88        | 137    | 58 | -  | 150 | 136.9 | -   | 32   | 19 | 115.5          | 19     | 14     | 24     | -         | 152 | -  | 64 | -   |

## FORGED SCREWED FITTING TO ANSI B - 16.11 3000/6000 LBS. THREADED TO ASA B - 2.1



| NOM BORE | PIPE D.D. | 3000 LBS |     |    |     |     | COMMON FACTORS |       |    |     |    |    |     |     | 6000 LBS |    |     |     |    |
|----------|-----------|----------|-----|----|-----|-----|----------------|-------|----|-----|----|----|-----|-----|----------|----|-----|-----|----|
|          |           | A        | B   | C  | G   | H   | K              | D     | E  | F   | I  | J  | L   | A   | B        | C  | G   | H   | K  |
| 1/8"     | 10.3      | 21       | 22  | 17 | 32  | 16  | 19             | 11    | 10 | 40  | -  | 8  | -   | 25  | 25       | 19 | 32  | 22  | -  |
| 1/4"     | 13.7      | 25       | 25  | 18 | 35  | 19  | 25             | 18    | 11 | 45  | 3  | 8  | 32  | 28  | 33       | 22 | 35  | 25  | 27 |
| 3/8"     | 17.2      | 29       | 33  | 22 | 38  | 22  | 25             | 17.5  | 18 | 48  | 4  | 8  | 38  | 33  | 38       | 25 | 38  | 27  | -  |
| 1/2"     | 21.3      | 30       | 36  | 25 | 46  | 29  | 32             | 22    | 15 | 51  | 5  | 9  | 46  | 38  | 46       | 29 | 49  | 38  | 33 |
| 3/4"     | 26.7      | 38       | 46  | 29 | 51  | 35  | 37             | 27    | 16 | 57  | 6  | 10 | 51  | 44  | 56       | 33 | 51  | 44  | 38 |
| 1"       | 33.4      | 44       | 56  | 33 | 60  | 44  | 41             | 25    | 15 | 64  | 5  | 10 | 60  | 51  | 62       | 35 | 60  | 57  | 43 |
| 1 1/4"   | 42.2      | 51       | 62  | 35 | 67  | 57  | 44             | 44.5  | 21 | 70  | 7  | 14 | 72  | 60  | 75       | 40 | 67  | 64  | 46 |
| 1 1/2"   | 48.3      | 60       | 75  | 43 | 79  | 64  | 44             | 51    | 21 | 79  | 8  | 16 | 80  | 64  | 84       | 44 | 73  | 78  | 48 |
| 2"       | 60.3      | 64       | 84  | 45 | 86  | 76  | 48             | 62.5  | 22 | 88  | 9  | 17 | 84  | 82  | 102      | 52 | 89  | 92  | 51 |
| 2 1/2"   | 73.02     | 83       | 102 | 52 | 92  | 82  | 60             | 76    | 27 | 116 | 10 | 21 | 122 | 95  | 121      | 64 | 92  | 108 | 64 |
| 3"       | 89.00     | 95       | 121 | 64 | 108 | 108 | 65             | 89    | 28 | 121 | 10 | 25 | 140 | 106 | 146      | 79 | 108 | 127 | 68 |
| 4"       | 114.50    | 114      | 152 | 79 | 121 | 140 | 89             | 117.5 | 32 | 150 | 12 | 25 | 180 | 114 | 152      | 79 | 121 | 168 | 75 |





## APPLICATION INDUSTRIES



**Heat Exchange & Condensors**

**Chemical Equipment**

**Pharmaceuticals**

**Sugar Industries**

**Furniture**

**Fabrication (Vessel)**

**Oil & Gas Industries**

**Dairy & Foods Industries**

**Automobile**

**Paper & Pulp Industries**

**Doors & Handles**

**Boilers**

**Sanitary & Plumbing**

**Instrumentation**

**Fertilizer Plants**

**Power Plants**

**Railway Coaches**





## FORMULAS FOR CALCULATING WEIGHT

WIGHT CALCULATOR ALSO AVAILABLE ON [www.padmavatisteel.com](http://www.padmavatisteel.com)

### WEIGHT OF S.S. PIPE

$$\text{O.D. (mm)} - \text{W Thick (mm)} \times \text{W.Thick (mm)} \times 0.0248 = \text{Wt. Per Mtr.}$$

$$\text{O.D. (mm)} - \text{W Thick (mm)} \times \text{W.Thick (mm)} \times 0.00756 = \text{Wt. Per Feet.}$$

### WEIGHT OF S.S. ROUND BAR

$$\text{DIA (mm)} \times \text{Dia (mm)} \times 0.00623 = \text{Wt. Per. Mtr.}$$

$$\text{DIA (mm)} \times \text{Dia (mm)} \times 0.0019 = \text{Wt. Per. Feet.}$$

### WEIGHT OF S.S. SQUARE BAR

$$\text{DIA (mm)} \times \text{Dia (mm)} \times 0.00788 = \text{Wt. Per. Mtr}$$

$$\text{DIA (mm)} \times \text{Dia (mm)} \times 0.0024 = \text{Wt.Per. Feet.}$$

### WEIGHT OF S.S. HEXAGONAL BAR

$$\text{DIA (mm)} \times \text{Dia (mm)} \times 0.00680 = \text{Wt. Per.Mtr}$$

$$\text{Width (mm)} \times \text{Dia (mm)} \times 0.002072 = \text{Wt. Per Feet}$$

### WEIGHT OF S.S. FLATE BAR

$$\text{Width (mm)} \times \text{Thick (mm)} \times 0.00798 = \text{Wt.Per Mtr.}$$

$$\text{Width (mm)} \times \text{Thick (mm)} \times 0.00243 = \text{Wt.Per Feet.}$$

### WEIGHT OF S.S. SHEETS & PLATES

$$\text{Length (Mtrs)} \times \text{Width (Mtrs)} \times \text{Thick (MM)} \times 8 = \text{Wt. Per PC}$$

$$\text{Length (Feet)} \times \text{Width (Feet)} \times \text{Thick (Feet)} \times \frac{3}{4} = \text{Kg Per PC}$$

### WEIGHT OF S.S. CIRCLE

$$\text{DIA (mm)} \times \text{Dia (mm)} \times \text{Thick (mm)} \div 160 = \text{Gms. Per PC}$$

$$\text{DIA (mm)} \times \text{Dia (mm)} \times \text{Thick (mm)} \times 0.0000063 = \text{Kg. Per PC.}$$

### WEIGHT OF BRASS PIPE / COPPER PIPE

$$\text{O.D. (mm)} - \text{Thick (mm)} \times \text{Thick (mm)} \times 0.0260 = \text{Wt. Per Mtr.}$$

### WEIGHT OF LEAD PIPE

$$\text{O.D. (mm)} - \text{Wt (mm)} \times \text{Wt (mm)} \times 0.0345 = \text{Wt. Per Mtr.}$$

### WEIGHT OF ALUMINIUM PIPE

$$\text{O.D. (mm)} - \text{Thick (mm)} \times \text{Thick (mm)} \times 0.0083 = \text{Wt.Per. Mtr.}$$

### WEIGHT OF ALUMINIUM SHEET

$$\text{Length (Mtr)} \times \text{Width (Mtr)} \times \text{Thick (mm)} \times 2.69 = \text{Wt.Per PC}$$

### WEIGHT OF CONVERSION OF MTR TO FEET

$$1 \text{ Mtr.} = 3.280 \text{ Feet.}$$

### WIDTH OF SHEET REQUIRED FOR MAKING PIPE

$$\text{Outer DIA} - \text{Wall Thickness} \times \frac{22}{7} = \text{Width of sheet}$$

### TENSILE STRENGTH CONVERSION TABLE

1.  $\text{Kg/mm}^2 \times 9.81 = \text{N/mm}^2 = \text{Mpa}$
2.  $\text{Psi} \times 0.0007 = \text{Kg/mm}^2$
3.  $\text{Ksi} \times 1000 = \text{Psi}$
4.  $\text{Kg/mm}^2 \times 1.422 = \text{Ksi}$

Formula for Healthy Business = Honesty + Quality of Goods + Quick Service = Good Healthy Business





# **PADMAVATI**

## **STEEL & ENGG Co.**

AN ISO 9001-2015 CERTIFIED CO.

📍 14/16, Kanta Tarrace, Dr. Wilson Street, Near VP Road,  
C.P. Tank Circle, Mumbai - 400004, Maharashtra, INDIA.

✉ info@psecm.com

🌐 www.padmavatisteel.com

📞 +91 9930388308, +91 22 6651 8706 / 6639 4262

🖨 +91 22 23 876 006

**STAINLESS STEEL, NICKEL ALLOYS, BRONZE ALLOYS,  
ALUMINIUM ALLOYS, COPPER ALLOYS, CARBON ALLOYS**  
In form of Sheet, Coil, Round, Pipe, Wire, Flange,  
Fittings, Fasteners, Angle, Channel, Beam etc.

