

Presenting
the **ultimate** range of
steel products



MAHABALI
STEEL CENTRE

AN ISO 9001 : 2015 CERTIFIED COMPANY

COMPANY PROFILE



Mahabali Steel Centre is one of the reputed manufacturer and Exporter's of Stainless Steel, Carbon Steel, Alloy Steel, Duplex, Titanium, Monel, Inconel, Haste alloy Products that includes Sheets, Plates, Coils, Pipes, Tubes, Rods, Wires, Fastener's, Flanges, Valves etc.. Our range is catered to many sectors such as Chemical, Power Plant, Government Organization, Nuclear Power, Mining and many others. Designed using finest quality raw materials our range is acclaimed by our clients for durability, high functionality, corrosion resistance and high tensile strength.

Located in Mumbai we are equipped with all the latest technologies for rendering the best tour esteem clients. Our sound infrastructure facility assists us in offering impeccable range in compliance with international quality standards.

Our products have found various applications in different industrial requirements, including - Oil & Gas, Chemical, Petrochemical, Power Plant, Pulp & Paper, Environmental & Water Projects, Engineering Projects and more. Through regular and consistent supply of our products at industry leading prices, we have established ourselves a reliable player in the industry.

We work with the core objective of providing maximum customer satisfaction and are committed to continuously improve the quality of our products & services, to create value for our customers. Whether big or small, we respect all our clients and every care is taken to give them a pleasant and hassle-free business experience. We deliver our orders in bulk as well as economic order quantities and as a rule, the quality of our products and services always remains the same, regardless of specification or quantity desired.

Evolving ourselves with time, we have secured a special place for ourselves within the industry as well as among our clients in the domestic as well as international markets.

Infrastructure

Our Company works with a firm belief that no organization can be successful until they have robust infrastructure. Going by the same, we have evolved our infrastructure as per the changing market environment and technology. Today, we are well equipped with all the necessary machinery and equipment, which assist us in manufacturing products that can match various quality standards.

Warehousing & Packaging

Our modern warehousing unit has sufficient capacity to store the bulk ferrous & non-ferrous metal pipes, tubes, plates, flanges & fittings. We have experienced inventory managers, who keep complete record of incoming and outgoing products. All the products are stored in a segregated manner to avoid any confusion during dispatch.

Prior to the dispatch, all the products are carefully packed to ensure safe delivery. The packages are properly labeled with complete information about the products. Moreover, our logistics department is always updated the special packaging requirements for export consignments.

INDUSTRIES WE SERVE

OIL & GAS

Mahabali Steel Centre has been acquainted with the specific requirement of the Oil & Gas Industry having intensive interaction with the refineries and gas plants for many years. Whether it is a requirement for the bulk supply to projects, emergency shut down or day maintenance, we are able to provide complete piping solutions to all the customers in Oil & Gas Industry.



OFFSHORE

Mahabali Steel Centre is well aware of the requirements to the Offshore Industry. Our supplies to this industry includes pipes, fittings, forgings in grades Stainless Steel, Carbon Steel, Alloy Steel, Duplex & Nickel Based Alloy. We have supplied piping materials in grades line Duplex & Super Duplex to many offshore fabricators.



CHEMICAL INDUSTRIES

Mahabali Steel Centre has full capability in supplying through various delivery programs which are based on the requirements of the Petrochemical Industries. Through stocks of more than 2000 tonnes available from our business partners in Stainless Steel, Carbon Steel & Low Temperature Steel, Cr-Mo Alloys in all grades and Nickel Alloys.



POWER

With the growing power generation industries the requirements have grown multiple times through the years, Mahabali Steel Centre has special relationship with major stockiest & manufacturing mills worldwide for the requirement of piping materials either stock or mill deliveries in all Cr-Mo steel grades like grades A115, P1, P11, P22, PS, P9 and Stainless Steel.



INDUSTRIES WE SERVE

CONSTRUCTION

Over the years, the entire World has seen signature tower blocks, airports and ports being constructed in large scale. To meet the demand of this specific industry, we have agreements with many stockist & manufacturing mills to supply high strength large diameter & thick wall pipes.



DISTRICT COOLING

Due to environment concerns, most new building towers within the countries adopted district cooling schemes. To serve this industries we have tied up with reputed manufacturers to supply pipes in ASTM A51 Grade B standards and delivered to the most prestigious district cooling schemes carried out in the region in general and to the UAE & KSA in specific



Beverage Industries



Sugar Industries



Paper & Pulp Mills

PRODUCT RANGE

FLANGES

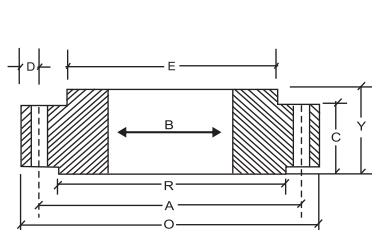




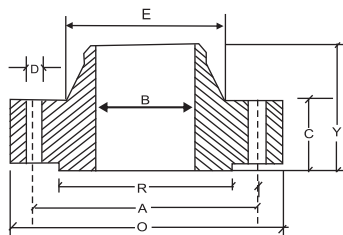
| TYPE | SIZE | PRESSURE RATING | MATERIAL GRADE |
|---|-------------|---|---|
| CS & low Alloy Forged Flanges | 1/2" to 56" | 150# to 250# Pn6 to PN 100 | ASTM A105/ 105N / A694 F42 / F48/ F52/ F56/ F60/ F65/ F70 |
| CS Low Temperature Forged Flanges | 1/2" to 56" | 150# to 250# Pn6 to PN 100 | ASTM A350 Lf2/ LF3/LF6 |
| Low Alloy Forged Flanges | 1/2" to 56" | 150# to 250# Pn6 to PN 100 | ASTM A182 F5/ F9/ F11/ F22/ F91 |
| Stainless Steel Teel Flanges | 1/2" to 56" | 150# to 250# Pn6 to PN 100 | ASTM A182 F304/F304L/F316/ F316L/F316Ti/317L/F321/F321 H/F347/F347H |
| Fig 8 & Spacer & Blank | 1/2" to 24" | Cl. 150 to Cl.2500 | ASTM A516 Gr.60/A105 Gr. B Stainless Steel, Duplex & Nickel Based Alloys |
| Stainless Steel Duplex & Super Duplex Flanges | 1/2" to 56" | Cl. 150 to Cl. 2500 Pn6 to PN100 | ASTM A182 F44/ f51/f53 F55/F60 |
| Copper Nickel Forged Flanges | 1/2" to 4" | Cl.150 to Cl. 2500 & Drawing | CN 102, C70600, C7060X (Cu-Ni 90/10), CN107, C71500 (Cu-Ni 70/30) |
| Nickel Based Alloys | 1/2" to 24" | 150# to 2500# Pn6 to PN 100 & Drawing | ASTM B462-A-20 ASTM B626 C-276 ASTM B564 A-400 ASTM B564 A-600 ASTM B564 A-625 ASTM B564 A-825 |

Available in all Sch & Wall Thickness

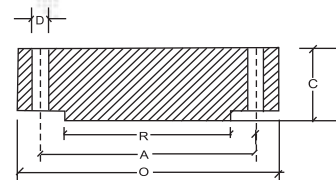
DIMENSIONS OF FORGED FLANGES ANSI 16.5



SLIP-ON FLANGE



WELDING NECK FLANGE



BLIND FLANGE

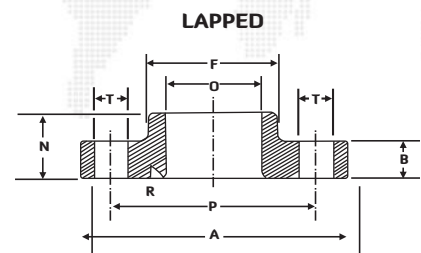
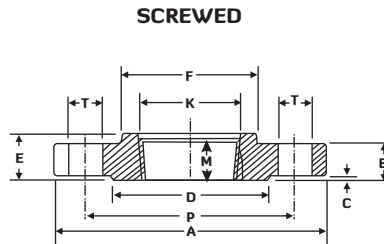
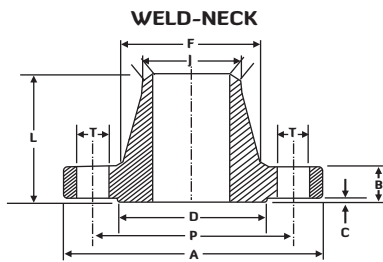
ASA 150 CLASS

| Nominal Pipe Size | Flange Dia | Dia of Bolt Circle | Dia of Bolt Holes | No. of Holes | Thk of Flange | Dia of Hub | Length Through Hub | | | Dia of Bore | | Dia of R/F | Depth of Socket | Pipe Dia |
|-------------------------|---------------|--------------------------|-------------------------|-----------------|------------------|---------------|--------------------|-------|-------|-------------|-------|---------------|--------------------|-------------|
| | | | | | | | S/O & S/W | W/N | L/J | S/O & S/W | L/J | | | |
| (MM) | (INCH.) | O | A | D | C | E | Y | Y | Y | B | B | R | F | X |
| 15 | 1/2 | 88.9 | 60.3 | 15.9 | 4 | 11.1 | 15.9 | 47.6 | 15.9 | 22.3 | 22.9 | 34.9 | 9.5 | 21.33 |
| 20 | 3/4 | 98.4 | 69.8 | 15.9 | 4 | 12.7 | 15.9 | 52.4 | 15.9 | 27.7 | 28.2 | 42.9 | 11.1 | 26.67 |
| 25 | 1 | 107.9 | 79.4 | 15.9 | 4 | 14.3 | 17.5 | 55.6 | 17.5 | 34.5 | 35.0 | 50.8 | 12.7 | 33.40 |
| 32 | 1 1/4 | 117.5 | 88.9 | 15.9 | 4 | 15.9 | 20.6 | 57.1 | 20.6 | 43.2 | 43.7 | 63.5 | 14.3 | 42.16 |
| 40 | 1 1/2 | 127.0 | 98.4 | 15.9 | 4 | 17.5 | 22.2 | 61.9 | 22.2 | 49.5 | 50.0 | 73.0 | 15.9 | 48.26 |
| 50 | 2 | 152.4 | 120.6 | 19.0 | 4 | 19.0 | 25.4 | 63.5 | 25.4 | 62.0 | 62.5 | 92.1 | 17.5 | 60.31 |
| 65 | 2 1/2 | 177.8 | 139.7 | 19.0 | 4 | 22.2 | 28.6 | 69.8 | 28.6 | 74.7 | 75.4 | 104.8 | 19.0 | 73.02 |
| 80 | 3 | 190.5 | 152.4 | 19.0 | 4 | 23.8 | 30.2 | 69.8 | 30.2 | 90.7 | 91.4 | 127.0 | 20.6 | 88.90 |
| 100 | 4 | 228.6 | 190.5 | 19.0 | 8 | 23.8 | 33.3 | 76.2 | 33.3 | 116.1 | 116.8 | 157.2 | 23.8 | 114.30 |
| 125 | 5 | 254.0 | 215.9 | 22.2 | 8 | 23.8 | 36.5 | 88.9 | 36.5 | 143.8 | 144.5 | 185.7 | 23.8 | 141.30 |
| 150 | 6 | 279.4 | 241.3 | 22.2 | 8 | 25.4 | 39.7 | 88.9 | 39.7 | 170.7 | 171.4 | 215.9 | 27.0 | 168.27 |
| 200 | 8 | 342.9 | 298.4 | 22.2 | 8 | 28.6 | 44.4 | 101.6 | 44.4 | 221.5 | 222.2 | 269.9 | 31.7 | 219.07 |
| 250 | 10 | 406.4 | 361.9 | 25.4 | 12 | 30.2 | 49.2 | 101.6 | 49.2 | 276.3 | 277.4 | 323.8 | 33.3 | 273.05 |
| 300 | 12 | 482.6 | 431.8 | 25.4 | 12 | 31.8 | 55.6 | 114.3 | 55.6 | 327.1 | 328.2 | 381.0 | 39.7 | 323.85 |
| 350 | 14 | 533.4 | 476.2 | 28.6 | 12 | 34.9 | 57.1 | 127.0 | 79.4 | 359.1 | 360.2 | 412.7 | 41.3 | 355.60 |
| 400 | 16 | 596.9 | 539.7 | 28.6 | 16 | 36.5 | 63.5 | 127.0 | 87.3 | 410.5 | 411.2 | 469.9 | 44.4 | 406.40 |
| 450 | 18 | 635.0 | 577.8 | 31.7 | 16 | 39.7 | 68.3 | 139.7 | 96.8 | 461.8 | 462.3 | 533.4 | 49.2 | 457.20 |
| 500 | 20 | 698.5 | 635.0 | 31.7 | 20 | 42.9 | 73.0 | 144.5 | 103.2 | 513.1 | 514.3 | 584.2 | 54.0 | 508.00 |
| 600 | 24 | 812.8 | 749.3 | 34.9 | 20 | 47.6 | 82.5 | 152.4 | 111.1 | 615.9 | 615.9 | 692.1 | 63.5 | 609.60 |

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with (1.6mm) Raised Face, which is included in Thickness(C) and Length through Hub(Y).

ASA 300 CLASS

| Nominal Pipe Size | Flange Dia | Dia of Bolt Circle | Dia of Bolt Holes | No. of Holes | Thk of Flange | Dia of Hub | Length Through Hub | | | Dia of Bore | | Dia of R/F | Depth of Socket | Pipe Dia |
|-------------------------|---------------|--------------------------|-------------------------|-----------------|------------------|---------------|--------------------|-------|-------|-------------|-------|---------------|--------------------|-------------|
| | | | | | | | S/O & S/W | W/N | L/J | S/O & S/W | L/J | | | |
| (MM) | (INCH.) | O | A | D | C | E | Y | Y | Y | B | B | R | F | X |
| 15 | 1/2 | 95.2 | 66.7 | 15.9 | 4 | 14.3 | 22.2 | 52.4 | 22.2 | 22.3 | 22.9 | 34.9 | 9.5 | 21.33 |
| 20 | 3/4 | 117.5 | 82.5 | 19.0 | 4 | 15.9 | 25.4 | 57.1 | 25.4 | 27.7 | 28.2 | 42.9 | 11.1 | 26.67 |
| 25 | 1 | 123.8 | 88.9 | 19.0 | 4 | 17.5 | 27.0 | 61.9 | 27.0 | 34.5 | 35.0 | 50.8 | 12.7 | 33.40 |
| 32 | 1 1/4 | 133.3 | 98.4 | 19.0 | 4 | 19.0 | 27.0 | 65.1 | 27.0 | 43.2 | 43.7 | 63.5 | 14.3 | 42.16 |
| 40 | 1 1/2 | 155.6 | 114.3 | 22.2 | 4 | 20.6 | 30.2 | 68.3 | 30.2 | 49.5 | 50.0 | 73.0 | 15.9 | 48.26 |
| 50 | 2 | 165.1 | 127.0 | 19.0 | 8 | 22.2 | 33.3 | 69.8 | 33.3 | 62.0 | 62.5 | 92.1 | 17.5 | 60.31 |
| 65 | 2 1/2 | 190.5 | 149.2 | 22.2 | 8 | 25.4 | 38.1 | 76.2 | 38.1 | 74.7 | 75.4 | 104.8 | 19.0 | 73.02 |
| 80 | 3 | 209.5 | 168.3 | 22.2 | 8 | 28.6 | 42.9 | 79.4 | 42.9 | 90.7 | 91.4 | 127.0 | 20.6 | 88.90 |
| 100 | 4 | 254.0 | 200.0 | 22.2 | 8 | 31.8 | 47.6 | 85.7 | 47.6 | 116.1 | 116.8 | 157.2 | 23.8 | 114.30 |
| 125 | 5 | 279.4 | 234.9 | 22.2 | 8 | 34.9 | 50.8 | 98.4 | 50.8 | 143.8 | 144.5 | 185.7 | - | 141.30 |
| 150 | 6 | 317.5 | 269.9 | 22.2 | 12 | 36.5 | 52.4 | 98.4 | 52.4 | 170.7 | 171.4 | 215.9 | - | 168.27 |
| 200 | 8 | 381.0 | 330.2 | 25.4 | 12 | 41.3 | 61.9 | 111.1 | 61.9 | 221.5 | 222.2 | 269.9 | - | 219.07 |
| 250 | 10 | 444.5 | 387.3 | 28.6 | 16 | 47.6 | 66.7 | 117.5 | 95.2 | 276.3 | 277.4 | 323.8 | - | 273.05 |
| 300 | 12 | 520.7 | 450.8 | 31.7 | 16 | 50.8 | 73.0 | 130.2 | 101.6 | 327.1 | 328.2 | 381.0 | - | 323.85 |
| 350 | 14 | 584.2 | 514.3 | 31.7 | 20 | 54.0 | 76.2 | 142.9 | 111.1 | 359.1 | 360.2 | 412.7 | - | 355.60 |
| 400 | 16 | 647.7 | 571.5 | 34.9 | 20 | 57.2 | 82.5 | 146.0 | 120.6 | 410.5 | 411.2 | 469.9 | - | 406.40 |
| 450 | 18 | 711.2 | 628.5 | 34.9 | 24 | 60.3 | 88.9 | 158.7 | 130.2 | 461.8 | 462.3 | 533.4 | - | 457.20 |
| 500 | 20 | 774.7 | 685.8 | 34.9 | 24 | 63.5 | 95.2 | 161.9 | 139.7 | 513.1 | 514.3 | 584.2 | - | 508.00 |
| 600 | 24 | 914.4 | 812.8 | 41.3 | 24 | 69.8 | 106.4 | 168.3 | 152.4 | 615.9 | 615.9 | 692.1 | - | 609.60 |



DIMENSIONS OF CLASS 600 FLANGES AS PER ANSI B 16.5

| N.B. | A | B | C | D | E | F | G | H | J | K | L | M | N | O | P | R | No.of Holes | |
|------|-----|-------|-----|-----|-----|-----|-------|------|-------|-------|-----|----|-----|-------|-------|------|-------------|----|
| 15 | 95 | 14.3 | 6.4 | 35 | 22 | 38 | 22.4 | 9.5 | 21.3 | 23.5 | 52 | 16 | 22 | 23.0 | 66.7 | 3.0 | 15.9 | 4 |
| 20 | 117 | 15.9 | 6.4 | 43 | 25 | 48 | 27.7 | 11.0 | 26.7 | 29.0 | 57 | 16 | 25 | 28.0 | 82.6 | 3.0 | 19.0 | 4 |
| 25 | 124 | 17.5 | 6.4 | 51 | 27 | 54 | 34.5 | 12.5 | 33.4 | 36.0 | 62 | 17 | 27 | 35.0 | 88.9 | 3.0 | 19.0 | 4 |
| 32 | 133 | 20.6 | 6.4 | 64 | 29 | 64 | 43.2 | 14.5 | 42.2 | 44.5 | 67 | 21 | 29 | 43.5 | 98.4 | 5.0 | 19.0 | 4 |
| 40 | 156 | 22.2 | 6.4 | 73 | 32 | 70 | 49.5 | 16.0 | 48.3 | 50.5 | 70 | 22 | 32 | 50.0 | 114.3 | 6.5 | 22.2 | 4 |
| 50 | 165 | 25.4 | 6.4 | 92 | 37 | 84 | 62.0 | 17.5 | 60.3 | 63.5 | 73 | 29 | 37 | 62.5 | 127.0 | 8.0 | 19.0 | 8 |
| 65 | 190 | 28.6 | 6.4 | 105 | 41 | 100 | 74.7 | 19.0 | 73.0 | 76.0 | 79 | 32 | 41 | 75.5 | 149.2 | 8.0 | 22.2 | 8 |
| 80 | 210 | 31.8 | 6.4 | 127 | 46 | 117 | 90.7 | 20.5 | 88.9 | 92.0 | 83 | 35 | 46 | 91.5 | 168.3 | 9.5 | 22.2 | 8 |
| 90 | 229 | 34.9 | 6.4 | 140 | 49 | 133 | 103.4 | - | 101.6 | 105.0 | 86 | 40 | 49 | 104.0 | 184.2 | 9.5 | 25.4 | 8 |
| 100 | 273 | 38.1 | 6.4 | 157 | 54 | 152 | 116.1 | - | 114.3 | 118.0 | 102 | 41 | 54 | 117.0 | 215.9 | 11.0 | 25.4 | 8 |
| 125 | 330 | 44.4 | 6.4 | 186 | 60 | 189 | 143.8 | - | 141.3 | 145.0 | 114 | 48 | 60 | 145.0 | 266.7 | 11.0 | 28.6 | 8 |
| 150 | 356 | 47.6 | 6.4 | 216 | 67 | 222 | 170.7 | - | 168.3 | 171.0 | 117 | 51 | 67 | 171.0 | 292.1 | 12.5 | 28.6 | 12 |
| 200 | 419 | 55.6 | 6.4 | 270 | 76 | 273 | 221.5 | - | 219.1 | 222.0 | 133 | 57 | 76 | 222.0 | 349.2 | 12.5 | 31.8 | 12 |
| 250 | 508 | 63.5 | 6.4 | 324 | 86 | 343 | 276.4 | - | 273.0 | 276.0 | 152 | 65 | 111 | 277.0 | 431.8 | 12.5 | 34.9 | 16 |
| 300 | 559 | 66.7 | 6.4 | 381 | 92 | 400 | 327.2 | - | 323.9 | 329.0 | 156 | 70 | 117 | 328.0 | 489.0 | 12.5 | 34.9 | 20 |
| 350 | 603 | 69.8 | 6.4 | 413 | 94 | 432 | 359.2 | - | 355.6 | 360.0 | 165 | 73 | 127 | 360.0 | 527.0 | 12.5 | 38.1 | 20 |
| 400 | 686 | 76.2 | 6.4 | 470 | 106 | 495 | 410.5 | - | 406.4 | 411.0 | 178 | 78 | 140 | 411.0 | 603.2 | 12.5 | 41.3 | 20 |
| 450 | 743 | 82.6 | 6.4 | 533 | 117 | 546 | 461.8 | - | 457.2 | 462.0 | 184 | 79 | 152 | 462.0 | 654.0 | 12.5 | 44.4 | 20 |
| 500 | 813 | 88.9 | 6.4 | 584 | 122 | 610 | 513.1 | - | 508.0 | 513.0 | 190 | 83 | 165 | 514.0 | 723.9 | 12.5 | 44.4 | 24 |
| 600 | 940 | 101.6 | 6.4 | 692 | 140 | 718 | 616.0 | - | 609.6 | 614.0 | 203 | 92 | 184 | 616.0 | 838.2 | 12.5 | 50.8 | 24 |

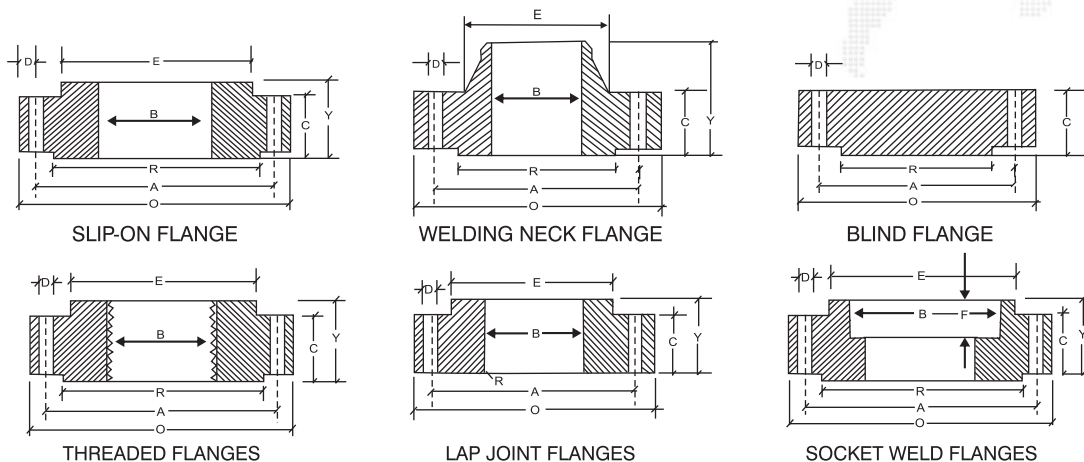
DIMENSIONS OF CLASS 900 FLANGES AS PER ANSI B 16.5

| N.B. | A | B | C | D | E | F | G | H | J | K | L | M | N | O | P | R | | No.of Holes |
|------|------|-------|-----|-----|-----|-----|------|------|-------|-------|-----|----|-----|-------|-------|------|------|-------------|
| 15 | 121 | 22.2 | 6.4 | 35 | 32 | 38 | 22.4 | 9.5 | 21.3 | 23.5 | 60 | 22 | 32 | 23.0 | 82.6 | 3.0 | 22.2 | 4 |
| 20 | 130 | 25.4 | 6.4 | 43 | 35 | 44 | 27.7 | 11.0 | 26.7 | 29.0 | 70 | 25 | 35 | 28.0 | 88.9 | 3.0 | 22.2 | 4 |
| 25 | 149 | 28.6 | 6.4 | 51 | 41 | 52 | 34.5 | 12.5 | 33.4 | 36.0 | 73 | 29 | 41 | 35.0 | 101.6 | 3.0 | 25.4 | 4 |
| 32 | 159 | 28.6 | 6.4 | 64 | 41 | 64 | 43.2 | 14.5 | 42.2 | 44.5 | 73 | 30 | 41 | 43.5 | 111.1 | 5.0 | 25.4 | 4 |
| 40 | 178 | 31.8 | 6.4 | 73 | 44 | 70 | 49.5 | 16.0 | 48.3 | 50.5 | 83 | 32 | 44 | 50.0 | 123.8 | 6.5 | 28.6 | 4 |
| 50 | 216 | 38.1 | 6.4 | 92 | 57 | 105 | 62.0 | 17.5 | 60.3 | 63.5 | 102 | 38 | 57 | 62.5 | 165.1 | 8.0 | 25.4 | 8 |
| 65 | 244 | 41.3 | 6.4 | 105 | 64 | 124 | 74.7 | 19.0 | 73.0 | 76.0 | 105 | 48 | 64 | 75.5 | 190.5 | 8.0 | 28.6 | 8 |
| 80 | 267 | 47.6 | 6.4 | 127 | 73 | 133 | - | - | 88.9 | 92.0 | 117 | 51 | 73 | 91.5 | 203.2 | 9.5 | 31.8 | 8 |
| 100 | 311 | 54.0 | 6.4 | 157 | 91 | 162 | - | - | 114.3 | 118.0 | 124 | 57 | 91 | 117.0 | 241.3 | 11.0 | 34.9 | 8 |
| 125 | 325 | 73.0 | 6.4 | 186 | 105 | 197 | - | - | 141.3 | 145.0 | 156 | 64 | 105 | 145.0 | 292.1 | 11.0 | 41.3 | 8 |
| 150 | 394 | 82.6 | 6.4 | 216 | 119 | 229 | - | - | 168.3 | 171.0 | 171 | 70 | 119 | 171.0 | 317.5 | 12.5 | 38.1 | 12 |
| 200 | 483 | 92.1 | 6.4 | 270 | 143 | 292 | - | - | 219.1 | 222.0 | 213 | 75 | 143 | 222.0 | 393.7 | 12.5 | 44.4 | 12 |
| 250 | 584 | 108.0 | 6.4 | 324 | 159 | 368 | - | - | 273.0 | 276.0 | 254 | 84 | 178 | 277.0 | 482.6 | 12.5 | 50.8 | 12 |
| 300 | 673 | 123.8 | 6.4 | 381 | 181 | 451 | - | - | 323.9 | 329.0 | 283 | 92 | 219 | 328.0 | 571.5 | 12.5 | 54.0 | 16 |
| 350 | 749 | 133.4 | 6.4 | 413 | | 495 | - | - | 356.6 | - | 298 | - | 241 | 360.0 | 635.0 | 12.5 | 60.3 | 16 |
| 400 | 826 | 146.1 | 6.4 | 470 | | 552 | - | - | 406.4 | - | 311 | - | 260 | 411.0 | 704.8 | 12.5 | 66.7 | 16 |
| 450 | 914 | 161.9 | 6.4 | 533 | | 597 | - | - | 457.2 | - | 327 | - | 276 | 462.0 | 774.7 | 12.5 | 73.0 | 16 |
| 500 | 984 | 178.0 | 6.4 | 584 | | 641 | - | - | 508.0 | - | 356 | - | 292 | 514.0 | 831.8 | 12.5 | 79.4 | 16 |
| 600 | 1168 | 203.0 | 6.4 | 692 | | 762 | - | - | 609.6 | - | 406 | - | 330 | 616.0 | 990.6 | 12.5 | 92.0 | 16 |

1) All dimensions are in Millimeters

2) Flanges except Lap joint will be furnished with (1.6) Raised Face, which is included in "Thickness(C)" and "Length through Hub(Y)".

DIMENSIONS OF FORGED FLANGES ANSI B 16.5



ASA 1500 CLASS

| Nominal Pipe Size | | Flange Dia | Dia of Bolt Circle | Dia of Bolt Holes | No. of Holes | Thk of Flange | Dia of Hub | Length Through Hub | | | Dia of Bore | | Dia of R/F | Depth of Socket | Pipe Dia |
|--|---------|---------------|-----------------------|----------------------|--------------|---------------|------------|--------------------|-------|-------|-------------|-------|------------|-----------------|----------|
| | | | | | | | | S/O & S/W | W/N | L/J | S/O & S/W | L/J | | | |
| (MM) | (INCH.) | O | A | D | | C | E | Y | Y | Y | B | B | R | F | X |
| For Dimensions from 1/2" to 2 1/2" kindly refer ASA 900 LBS Table. | | | | | | | | | | | | | | | |
| 80 | 3 | 266.7 | 203.2 | 31.7 | 8 | 47.6 | 133.3 | 73.0 | 117.5 | 73.0 | 90.7 | 91.4 | 127.0 | - | 88.90 |
| 100 | 4 | 311.1 | 241.3 | 34.9 | 8 | 54.0 | 161.9 | 90.5 | 123.0 | 90.4 | 116.1 | 116.8 | 157.2 | - | 114.30 |
| 125 | 5 | 374.6 | 292.1 | 41.3 | 8 | 73.0 | 196.8 | 104.8 | 155.6 | 104.8 | 143.8 | 144.5 | 185.7 | - | 141.30 |
| 150 | 6 | 393.7 | 317.5 | 38.1 | 12 | 82.6 | 228.6 | 119.1 | 171.4 | 119.1 | 170.7 | 171.4 | 215.9 | - | 168.27 |
| 200 | 8 | 482.6 | 393.7 | 44.4 | 12 | 92.1 | 292.1 | 142.9 | 212.7 | 142.8 | 221.5 | 222.2 | 269.9 | - | 219.07 |
| 250 | 10 | 584.2 | 482.6 | 50.8 | 12 | 107.9 | 368.3 | 158.7 | 254.0 | 177.8 | 276.3 | 277.3 | 323.8 | - | 273.05 |
| 300 | 12 | 673.1 | 571.5 | 54.0 | 16 | 123.8 | 450.8 | 181.0 | 282.5 | 218.9 | 327.1 | 328.1 | 381.0 | - | 323.85 |

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with (6.35mm) Raised Face, which is not included in Thickness(C) and Length through Hub(Y).

ASA 2500 CLASS

| Nominal Pipe Size | | Flange Dia | Dia of Bolt Circle | Dia of Bolt Holes | No. of Holes | Thk of Flange | Dia of Hub | Length Through Hub | | | Dia of Bore | | Dia of R/F | Depth of Socket | Pipe Dia |
|-------------------------|---------|---------------|-----------------------|----------------------|-----------------|------------------|---------------|--------------------|-------|-------|-------------|-------|---------------|--------------------|-------------|
| | | | | | | | | S/O & S/W | W/N | L/J | S/O & S/W | L/J | | | |
| (MM) | (INCH.) | O | A | D | | C | E | Y | Y | Y | B | B | R | F | X |
| 15 | 1/2 | 133.3 | 88.9 | 22.2 | 4 | 30.2 | 42.9 | 39.7 | 73.0 | 39.7 | 22.3 | 22.3 | 34.9 | - | 21.33 |
| 20 | 3/4 | 139.7 | 95.3 | 22.2 | 4 | 31.7 | 50.8 | 42.9 | 79.4 | 42.9 | 27.7 | 27.7 | 42.9 | - | 26.67 |
| 25 | 1 | 158.7 | 107.9 | 25.4 | 4 | 34.9 | 57.1 | 47.7 | 88.9 | 47.7 | 34.5 | 34.5 | 50.8 | - | 33.40 |
| 32 | 1 1/4 | 184.1 | 130.2 | 28.6 | 4 | 38.1 | 73.0 | 52.4 | 95.2 | 52.4 | 43.2 | 43.2 | 63.5 | - | 42.16 |
| 40 | 1 1/2 | 203.2 | 146.0 | 31.7 | 4 | 44.4 | 79.4 | 60.3 | 111.1 | 60.3 | 49.5 | 49.5 | 73.0 | - | 48.26 |
| 50 | 2 | 234.9 | 171.4 | 28.6 | 8 | 50.8 | 95.2 | 69.8 | 127.0 | 69.8 | 62.4 | 62.0 | 92.1 | - | 60.31 |
| 65 | 2 1/2 | 266.7 | 196.8 | 31.7 | 8 | 57.1 | 114.3 | 79.4 | 142.9 | 79.4 | 74.7 | 74.7 | 104.8 | - | 73.02 |
| 80 | 3 | 304.8 | 228.6 | 34.9 | 8 | 66.7 | 133.3 | 92.1 | 168.3 | 92.1 | 90.7 | 90.7 | 127.0 | - | 88.90 |
| 100 | 4 | 355.6 | 273.0 | 41.2 | 8 | 76.2 | 165.1 | 107.9 | 190.5 | 107.9 | 116.1 | 116.1 | 157.2 | - | 114.30 |
| 125 | 5 | 419.1 | 323.8 | 47.6 | 8 | 92.1 | 203.2 | 130.0 | 228.6 | 130.0 | 143.8 | 143.8 | 185.7 | - | 141.30 |
| 150 | 6 | 482.6 | 368.3 | 54.0 | 8 | 107.9 | 234.9 | 152.4 | 273.0 | 152.4 | 170.7 | 170.7 | 215.9 | - | 168.27 |
| 200 | 8 | 552.4 | 438.1 | 54.0 | 12 | 127.0 | 304.8 | 177.8 | 317.5 | 177.8 | 221.5 | 221.5 | 269.9 | - | 129.07 |
| 250 | 10 | 673.1 | 539.7 | 66.7 | 12 | 165.1 | 374.6 | 228.6 | 419.1 | 228.6 | 276.3 | 276.3 | 323.8 | - | 273.05 |
| 300 | 12 | 762.0 | 619.1 | 73.0 | 12 | 184.1 | 441.3 | 254.0 | 463.5 | 254.0 | 327.1 | 327.1 | 381.0 | - | 323.85 |

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with (6.35mm) Raised Face, which is not included in Thickness(C) and Length through Hub(Y).

FITTINGS



BUTT WELD FITTINGS TO ANSI B16.9 & 16.28

Dimensions

Dimensions of Elbows, Tees, Caps and Reducers from ½" NB to 60" short Radius Elbows and Return Bends from Bends from 1" to 24" N.B. and Long Radius Bends from ½" N.B. to 24 are as stated in the current editions of ANSI B 16.9 and B-16.28 wall thickness are as listed ANSI B 36.10M.

Material

Stainless Steel : ASTM A403, WP 304 / 304L / 304H / 316 / 316L / 317 / 317L / 321 / 310 / 347 / 904L etc.

Carbon Steel : ASTM A234 WPB / A420 WPL3 / A420 / WPL6 / MSS-SP-75 WPHY 42 / 46 / 52 / 56 / 60 / 65 / 70

Alloy Steel : ASTM A234 WP1 / WP5 / WP9 / WP11 / WP22 / WP91 etc.

Manufacture & Heat Treatment

In accordance with the relevant ASTM or MSS Specification.

Weld Preparation

All fittings have a weld preparation to ANSI B 16.25

Marking

Fittings are marked with : the nominal size (or sizes) ; schedule or wall thickness; material grade; that reference manufacturer's mark. Where the size of fittings does not permit full marking then nominal size(s); schedule or wall thickness; and material grade are omitted.

Test Certificate

Fittings test certificates are available and are supplied with all goods. Test Certificates include full chemical analysis and Mechanical Properties with 3.1 Certificate, Impact Test & NACE MR 0175 / MR 0103 in addition as per requirement.

Inspection

All stock is statically sample inspected on receipt. The sampling plan is selected from BS6001.

OTHER PRODUCTS AVAILABLE

Other Schedules / wall thicknesses Nickel base alloys, Copper, Nickel & Duplex are available from short delivery time.



FERROUS STEELS

| | |
|------------------------|---|
| A 403 / A 403M | WROUGHT BUTT WELDED FITTINGS AUSTENITIC STAINLESS PIPING , GRADE TP 304 , 304L , 316, 316L, 321, 347,321H,304H,347,347H,316,316H316Ti,317L. 8904-904L RADIOGRAPHY , SOLUTION ANNEALING, ULTRASONIC TEST ON WELD , SEAMLESS AND WELDED FITTINGS AS PER ASME B 16.9 , MSS SP 43 , -90 DEG ELBOW LR & SR , 45 DEG ELBOW LR & SR , EQUAL TEE AND UNEQUAL TEE , REDUCER CONCENTRIC & ECCENTRIC , SWAGE , PIPE NIPPLE THREADED AND PLAIN END , LONG AND SHORT STUBEND , LONG RADIUS BENDS OF R = 3D,5D,6D,7D,10D, AND HIGHER THAN THAT , 180 DEG RETURN BEND. TWO HALVES WELDED FITTINGS BY QUALIFIED WELDER QUALIFICATION , IGC PRACTICE - E,C,A , NACE MR 0175/MR 0103. 100% RADIOGRAPHY-XRAY , GAMMA RAYS, DIE PENETRANT TEST. |
| A 420 / A 420M | PIPING FITTINGS OF WROUGHT CARBON STEEL AND ALLOY STEEL FOR LOW TEMPERATURE SERVICE , LTCE MATERIAL , GRADE - WPL6 , HOT FORGING & FORMING , NORMALISE AND TEMPER , SUPPLEMENTARY REQUIREMENT S58 OF SPECIFICATION A 960/ A 960M , IMPACT TESTED , HEAT TREATED , SIMULATION HET TREATMENT OF TEST COUPEN , POST WELD HEAT TREATMENT , SEAMLESS AND WELDED FITTINGS , 100% RADIOGRAPHY , IMPACT TEST TEMP , TESTING AS PER PED , PRESSURE EQUIPMENT DIRECTIVE , DIMENSION AS PER MSS SP 43 , ASME B 16.9 , MSS SP 43 , RADIOGRAPHY UW 51 SEC VIII DIV1. |
| A 815 / A 815M | WROUGHT FERRITIC , FERRITIC & AUSTENITIC AND MARTENSITIC STAINLESS STEEL PIPING FITTINGS , SEAMLESS & WELDED PIPE FITTINGS , 100% RADIOGRAPHY TEST GRADE - 31803 , S32750 , S32205 , 410-DUPLEX , SUPER DUPLEX MATERIAL , SOLUTION ANNEALING , SUPPLEMENTARY REQUIREMENT AS PER A 960 , WP WX , WU , BUTT WELDED FITTINGS-90 DEG ELBOW , 45 DEG ELBOW , LR & SR , EQUAL TEE , 180 DEG RETURN BEND , UNEQUAL TEE , CONC REDUCER , ECCENTRIC REDUCER , STUBEND , LONG RADIUS R = 3D , 5D , 6D , 7D , 10D AND HIGHER THAN THAT . FORGING AND FORMING , INTERGRANULAR CORROSION TEST A262 PRACTICE 'A' , 'C' , 'E' NACE MR 0175/MR 0103. |
| A 694 / A 694 M | CARBON AND ALLOY STEEL FORGING FOR PIPE FLANGED FITTINGS , VALVES AND PARTS FOR HIGH PRESSURE TRANSMISSION SERVICE - GRADE F42,F46,F48,F50,F52,F52,F56,F60,F70-MECHANICAL PROPERTIES , - DIMS AS PER B 16.5 , B16.11 |
| A 240 / A 240M | HEAT RESISTING CHROMIUM AND CHROMIUM-NICKEL STAINLESS STEEL PLATE , SHEET AND STRIP FOR PRESSURE VESSEL , FINISH 1 , 1A,2,3 , BRIGHT FINISH , ANNEALED , SOLUTION ANNEALED GRADE TP 304 , 304L,316 , 316L , 321 , 347 , 321H,304H,347,647H,316,16H,316Ti,317,317L. 8904-904L , 410,310,310S , 310H , 31803 , 32205 , 32750 - PLATE AUSTENITIC , MARTENSITIC , FERRITIC - SOLUTION ANNEALED , HOT ROLLED , COLD ROLLED , ULTRASONIC TESTED , IGC PRACTICE A 262 'E' , 'C' , 'A' , . TO BE USED TO MANUFACTURE THE TWO HALVE FITTINGS. NACE MR 0175/ MR 0103-HARDNESS 22 HRC |
| A 480 / A 480M | GENERAL REQUIREMENT FOR FLAT ROLLED STAINLESS AND HEAT RESISTING STEEL PLATE , SHEET AND STRIP |
| A 515 / A 515M | PRESSURE VESSEL PLATE , CARBON STEEL FOR INTERMEDIATE AND HIGHER TEMPERATURE SERVICES - GRADE 60 , 70- ULTRASONIC TEST , FLATTENING TEST , BEND TEST , TENSILE AND CHEMICAL ANALYSIS , NORMALSED , IBR PLATES , NACE MR 0175 / MR 0103. |
| A 516 / A 516M | PRESSURE VESSEL PLATE , CARBON STEEL FOR MODERATE AND LOWER TEMPERATURE SERVICES GRADE 60 , 70- ULTRASONIC TEST , FLATTENING TEST , BEND TEST , TENSILE AND CHEMICAL ANALYSIS , NORMALSED , IBR PLATES , NACE MR 0175 / MR 0103. |
| A 517 / A 517M | PRESSURE VESSEL PLATE , ALLOY STEEL , HIGH STRENGTH , QUENCHED AND TEMPERED-ULTRASONIC TEST. |
| A 36 / A 36M | PLATES , CARBON STRUCTURAL STEEL-ANGLE , PLATS , SHAPES-CHEMICAL , TENSILE PROPERTIES. |
| A 387 / A 387M | PRESSURE VESSEL PLATES , ALLOY STEEL , CHROMIUM-MOLYBDENUM-CLASS1 , CLASS2- TENSILE DIFFERENCE , P1,P5,P11,P22 , CHEMICAL AND PHYSICAL ANALYSIS , U.T.TEST , IBR PLATES. |
| A 479 / A 479M | STAINLESS STEEL BARS AND SHAPES FOR FOR USE IN BOILER AND OTHER PRESSURE VESSEL , GRADE F1 , F5 , F9 , F91 , F11 CL1 , CL2 , CL3 , F 12 , F 22 CL1 , CL3 , F304 , 304L , 316 , 321 , 321H , 304H , 347 , 347H , 316 , 16H , 316Ti , 317 , 317L. 8904 , 904L , F50 , F51 , F60 , SOLUTION ANNEALED , ULTRASONIC TESTED. |
| A 193 / A 193M | ALLOY STEEL AND STAINLESS STEEL BOLTING MATERIAL FOR HIGH TEMPERATURE SERVICE , HEAVY HEX BOLT , WITH WASHER- GRADE FERRITIC STEEL , AUSTENITIC STEEL CLASS 1 , 1A , 1D , 2 GRADE B5,B65 , B6X , B7 , B7M , B16 , B8 , B8A , B8C , B8CA , B8M,B8MA,B8M2 , B8M3 , B8P , B8PA , B8N , B8NA , B8MA , B8T , CARBIDE SOLUTION TREATED , STRAIN HARDENED , THREAD NPT , BSPE , BSW , UNC. THREADED. |
| A 194 / A 194M | CARBON STEEL AND ALLOY STEEL NUTS FOR BOLTS FOR HIGH TEMPERATURE AND HIGH PRESSURE SERVICE , SQUARE AND HEX HEAD NUTS , AUSTENITIC AND FERRITIC GRADE , GRADE 1 , 2 , 2H , 2HM , 4 , 3 , 6 , 6F , 7 , 7M , 8 , 8AM8C , 8CA , 8M,8MA,8T,8LN , PROOF LOAD , CARBIDE SOLUTION TREATED , STRAIN HARDENING. |
| A 320 / A 320 | ALLOY STEEL AND STAINLESS STEEL BOLTING MATERIAL FOR LOW TEMPERATURE SERVICE . - FERRITIC STEELS AND AUSTENITIC STEEL , GRADE L7,L7ML70,B8,B8A,B8C,B8T,CLASS 1 , 1A,2 , B8LN , B8M , B8MA . IMPACT TESTED- CARBIDE SOLUTION TREATED , STRAIN HARDENED . HEX BOLTS. |

PIPES & TUBES



ANSI B 36.19 STAINLESS STEEL PIPE DIMENSION IN MM & WEIGHT PER KG.

| Nominal Pipe size | | Outside Diameter | Schedule 5S | | Schedule 10S | | Schedule 20S | | Schedule 40S | | Schedule 80S | | Schedule 160S | | Schedule XXS | |
|-------------------|-------|------------------|-------------|-------|--------------|-------|--------------|--------|--------------|--------|--------------------------------|-------|---------------|--------|--------------|--------|
| MM | INCH | MM | W.T. | KG/M | W.T. | KG/M | W.T. | KG/M | W.T. | KG/M | W.T. | KG/M | W.T. | KG/M | W.T. | KG/M |
| 3 | 1/8 | 10.3 | 1.2 | 0.26 | 1.24 | 0.28 | 1.5 | 0.33 | 1.73 | 0.37 | 2.41 | 0.47 | - | - | - | - |
| 6 | 1/4 | 13.7 | 1.2 | 0.37 | 1.65 | 0.49 | 2.00 | 0.58 | 2.24 | 0.630 | 3.02 | 0.80 | - | - | - | - |
| 10 | 3/8 | 17.1 | 1.2 | 0.47 | 1.65 | 0.63 | 2.00 | 0.74 | 2.31 | 0.840 | 3.20 | 1.10 | - | - | - | - |
| 15 | 1/2 | 21.3 | 1.65 | 0.80 | 2.11 | 1.00 | 2.30 | 1.07 | 2.77 | 1.27 | 3.73 | 1.62 | 4.78 | 1.94 | 7.47 | 2.55 |
| 20 | 3/4 | 26.7 | 1.65 | 1.02 | 2.11 | 1.28 | 2.55 | 1.52 | 2.87 | 1.69 | 3.91 | 2.20 | 5.56 | 2.90 | 7.82 | 3.64 |
| 25 | 1 | 33.4 | 1.65 | 1.30 | 2.77 | 2.09 | 2.55 | 1.94 | 3.38 | 2.50 | 4.55 | 3.24 | 6.35 | 4.24 | 9.09 | 5.45 |
| 32 | 1.1/4 | 42.2 | 1.65 | 1.65 | 2.77 | 2.70 | 3.00 | 2.90 | 3.56 | 3.39 | 4.85 | 4.47 | 6.35 | 5.61 | 9.70 | 7.77 |
| 40 | 1.1/2 | 48.3 | 1.65 | 1.90 | 2.77 | 3.11 | 3.00 | 3.35 | 3.68 | 4.05 | 5.08 | 5.41 | 7.14 | 7.25 | 10.15 | 9.55 |
| 50 | 2 | 60.3 | 1.65 | 2.39 | 2.77 | 3.93 | 3.00 | 4.24 | 3.91 | 5.44 | 5.54 | 7.48 | 8.74 | 11.11 | 11.07 | 13.44 |
| 65 | 2.1/2 | 73.0 | 2.11 | 3.69 | 3.05 | 5.26 | 4.00 | 6.81 | 5.16 | 8.63 | 7.01 | 11.41 | 9.53 | 14.91 | 14.02 | 20.39 |
| 80 | 3 | 88.9 | 2.11 | 4.51 | 3.05 | 6.45 | 4.00 | 8.37 | 5.49 | 11.29 | 7.62 | 15.27 | 11.1 | 21.30 | 15.24 | 27.68 |
| 100 | 4 | 114.3 | 2.11 | 5.84 | 3.05 | 8.36 | 4.50 | 12.18 | 6.02 | 16.07 | 8.56 | 22.32 | 13.49 | 33.54 | 17.12 | 41.03 |
| 125 | 5 | 141.3 | 2.77 | 9.47 | 3.40 | 11.57 | 5.00 | 16.80 | 6.55 | 21.8 | 9.53 | 30.97 | 15.88 | 49.11 | 19.05 | 57.43 |
| 150 | 6 | 168.3 | 2.77 | 11.32 | 3.40 | 13.82 | 6.35 | 25.36 | 7.11 | 28.26 | 10.97 | 42.56 | 18.25 | 67.53 | 21.95 | 79.22 |
| 200 | 8 | 219.1 | 2.77 | 14.78 | 3.76 | 19.96 | 6.35 | 33.31 | 8.18 | 42.55 | 12.7 | 64.64 | 23.01 | 111.27 | 22.23 | 107.92 |
| 250 | 10 | 273.1 | 3.40 | 22.61 | 4.19 | 27.78 | 6.35 | 41.77 | 9.27 | 60.31 | 12.7 | 81.55 | 28.58 | 172.33 | 25.40 | 155.15 |
| 300 | 12 | 323.8 | 3.96 | 31.24 | 4.57 | 36.00 | 6.35 | 49.7 | 9.53 | 73.85 | 12.7 | 97.43 | 33.32 | 238.68 | 25.40 | 186.90 |
| 350 | 14 | 355.6 | 3.96 | 34.34 | 4.78 | 41.30 | 7.92 | 67.90 | 11.13 | 94.54 | ASTM A 312 GR. TP 304/304L () | | | | | |
| 400 | 16 | 406.4 | 4.19 | 41.56 | 4.78 | 47.34 | 7.92 | 77.82 | 12.7 | 123.30 | ASTM A 312 GR. TP 316/316L () | | | | | |
| 450 | 18 | 457.2 | 4.19 | 46.81 | 4.78 | 53.32 | 7.92 | 87.74 | 14.27 | 155.86 | ASTM A 358 GR. TP 317L () | | | | | |
| 500 | 20 | 508.0 | 4.78 | 59.31 | 5.54 | 68.64 | 9.53 | 117.14 | 15.09 | 183.42 | | | | | | |
| 600 | 24 | 610.0 | 5.54 | 82.57 | 6.35 | 94.52 | 9.53 | 141.11 | 17.48 | 255.41 | | | | | | |

All Dimensions in millimeters. W.T. = Wall Thickness. KG/M = Kilograms per Meter.

ANSI SPECIFICATION & TOLERANCE FOR TUBING & PIPING

| Specification | Allowable Outside Diameter Variation in mm | | | Allowable wall Thickness Variation | | Exact Length Tolerances in mm | | Testing |
|--|---|-----------------|--------|---------------------------------------|---------|----------------------------------|---|--|
| ASTMA - 213 Seamless Boiler, Superheater and Heat Exchanger Tubes | Nominal Diameter | Over | Under | Over % | Under % | Over | Under | Macro Test Flattening Test Tension Test Flare Test Hardness Test 100% Hydrostatic Test Refer to ASTM A-450 |
| | Upto 25.4 | 0.1016 | 0.1016 | +20 | -0 | 3.175 | 0 | |
| | 25.4 - 38.1 incl. | 0.1524 | 0.1524 | +20 | -0 | 3.175 | 0 | |
| | 38.1 - 50.8 incl. | 0.2032 | 0.2032 | +22 | -0 | 3.176 | 0 | |
| | 50.8 - 63.5 incl. | 0.2540 | 0.2540 | +22 | -0 | 3.760 | 0 | |
| | 63.5 - 73.2 incl. | 0.3048 | 0.3048 | +22 | -0 | 4.760 | 0 | |
| ASTMA - 249 Welded Boiler, Superheater, Heat Exchanger And Condenser Tubes | Under 25.4 | 0.1016 | 0.1016 | +10 | -10 | 3.175 | 0 | Tension Test, Flattening Test Flare Test Reverse Bend Test Hardness Test 100% Hydrostatic Test |
| | 25.4 - 38.1 incl. | 0.1524 | 0.1524 | +10 | -10 | 3.175 | 0 | |
| | 38.1 - 50.8 excl. | 0.2032 | 0.2032 | +10 | -10 | 3.175 | 0 | |
| | 50.8 - 63.5 excl. | 0.2540 | 0.2540 | +10 | -10 | 3.760 | 0 | |
| | 63.5 - 76.2 excl. | 0.3048 | 0.3048 | +10 | -10 | 4.760 | 0 | |
| | 76.2 - 101.6 incl. | 0.3810 | 0.3810 | +10 | -10 | 4.760 | 0 | |
| ASTMA - 269 Seamless & Welded Tubing for General Service | Upto 12.7 | 0.13 | 0.13 | +15 | -15 | 3.2 | 0 | Flare Test (Seamless only) Flange Test (Welded only) Hardness Test Reverse Flattening test (Welded only) 100% Hydrostatic Test Refer to ASTM A-269 |
| | 12.7 - 38.1 excl. | 0.13 | 0.13 | +10 | -10 | 3.2 | 0 | |
| | 38.1 - 88.9 excl. | 0.25 | 0.25 | +10 | -10 | 4.8 | 0 | |
| | 88.9 - 139.7 excl. | 0.38 | 0.38 | +10 | -10 | 4.8 | 0 | |
| | 139.7 - 203.2 excl. | 0.76 | 0.76 | +10 | -10 | 4.8 | 0 | |
| | | | | | | | | |
| ASTMA - 312 Seamless & Welded ERW Pipes | 13.7 - 48.3 incl. | 0.40 | 0.79 | Minimum Wall tubes | 6.4 | 6.4 | 0 | Tension Test Flattening Test 100% Hydrostatic Test |
| | 38.1 - 101.6 incl. | 0.79 | 0.79 | 12.5% under | | 6.4 | 0 | |
| | 114.3 - 220 incl. | 1.59 | 0.79 | wall nominal Specification | | 6.4 | 0 (Normally Random Lengths ordered) | |
| ASTMA - 358 ERW Welded Pipe | 219.08 - 750mm or 0.01 inch | +0.5% | | -0.3 | | | 6.0 | Refer to ASTM A - 530 |
| ASTMA - 409 Welded ERW | 355.6 - 750mm | +0.2% to + 0.4% | | | -0.46 | | | Refer to ASTM A - 530 |

CARBON STEEL & ALLOY STEEL PIPE DIMENSIONS ANSI B 36.10

| Nominal Pipe size | O/D | Schedule 10 | Schedule 20 | Schedule 30 | Schedule STD | Schedule 40 | Schedule 60 | Schedule XS | Schedule 80 | Schedule 100 | Schedule 120 | Schedule 140 | Schedule 160 | Schedule XXS |
|----------------------|-------|----------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| MM | INCH | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M | W.T. KG/M |
| 3 | 1/8 | 10.3 | | | 1.73 | 0.37 | 1.73 | 0.37 | 2.41 | 0.47 | 2.41 | 0.47 | | |
| 6 | 1/4 | 13.7 | | | 2.24 | 0.63 | 2.24 | 0.63 | 3.02 | 0.80 | 3.02 | 0.80 | | |
| 10 | 3/8 | 17.1 | | | 2.31 | 0.84 | 2.31 | 0.84 | 3.20 | 1.10 | 3.20 | 1.10 | | |
| 15 | 1/2 | 21.3 | | | 2.77 | 1.27 | 2.77 | 1.27 | 3.73 | 1.62 | 3.73 | 1.62 | 4.78 | 1.95 |
| 20 | 3/4 | 26.7 | | | 2.87 | 1.69 | 2.87 | 1.69 | 3.91 | 2.20 | 3.91 | 2.20 | 5.56 | 2.90 |
| 25 | 1 | 33.4 | | | 3.38 | 2.50 | 3.38 | 2.50 | 4.55 | 3.24 | 4.55 | 3.24 | 6.35 | 4.24 |
| 32 | 1 1/4 | 42.2 | | | 3.56 | 3.39 | 3.56 | 3.39 | 4.85 | 4.47 | 4.85 | 4.47 | 6.35 | 5.61 |
| 40 | 1 1/2 | 48.3 | | | 3.68 | 4.05 | 3.68 | 4.05 | 5.08 | 5.41 | 5.08 | 5.41 | 7.14 | 7.25 |
| 50 | 2 | 60.3 | | | 3.91 | 5.44 | 3.91 | 5.44 | 5.54 | 7.48 | 5.54 | 7.48 | 8.74 | 11.11 |
| 65 | 2 1/2 | 73.0 | | | 5.16 | 8.63 | 5.16 | 8.63 | 7.01 | 11.41 | 7.01 | 11.41 | 9.53 | 14.92 |
| 80 | 3 | 88.9 | | | 5.49 | 11.3 | 5.49 | 11.3 | 7.62 | 15.3 | 7.62 | 15.3 | 11.13 | 21.35 |
| 90 | 3 1/2 | 101.6 | | | 5.74 | 13.57 | 5.74 | 13.57 | 8.08 | 18.63 | 8.08 | 18.63 | - | |
| 100 | 4 | 114.3 | | | 6.02 | 16.07 | 6.02 | 16.07 | 8.56 | 22.3 | 8.56 | 22.3 | 13.5 | 33.5 |
| 125 | 5 | 141.3 | | | 6.55 | 21.77 | 6.55 | 21.77 | 9.53 | 30.9 | 9.53 | 30.9 | 15.9 | 49.11 |
| 150 | 6 | 168.3 | | | 7.11 | 28.26 | 7.11 | 28.26 | 10.97 | 42.5 | 10.97 | 42.5 | 18.3 | 67.5 |
| 200 | 8 | 219.1 | 6.35 | 33.3 | 8.18 | 42.5 | 8.18 | 42.5 | 12.7 | 64.6 | 12.7 | 64.6 | 23.0 | 111.27 |
| 250 | 10 | 273.0 | 6.35 | 41.7 | 9.27 | 60.3 | 9.27 | 60.3 | 15.1 | 96.0 | 15.1 | 96.0 | 28.6 | 172.3 |
| 300 | 12 | 323.8 | 6.35 | 49.7 | 9.53 | 73.8 | 10.31 | 79.7 | 17.5 | 132.0 | 17.5 | 132.0 | 33.3 | 238.7 |
| 350 | 14 | 355.6 | 6.35 | 54.7 | 9.53 | 81.3 | 11.13 | 94.6 | 19.0 | 158.0 | 19.0 | 158.0 | 35.7 | 281 |
| 400 | 16 | 406.4 | 6.35 | 62.6 | 9.53 | 93.3 | 12.7 | 123.0 | 21.44 | 203.0 | 21.44 | 203.0 | 40.5 | 366.0 |
| 450 | 18 | 457.2 | 6.35 | 70.6 | 9.53 | 105.0 | 14.20 | 156.0 | 23.8 | 254.6 | 23.8 | 254.6 | 45.2 | 459.0 |
| 500 | 20 | 508.0 | 6.35 | 78.5 | 9.53 | 117.2 | 15.09 | 183.0 | 26.2 | 311.0 | 26.2 | 311.0 | 50.0 | 564.0 |
| 550 | 22 | 558.8 | 6.35 | 86.6 | 9.53 | 129.0 | | | 28.6 | 373.0 | 28.6 | 373.0 | 54.0 | 672.0 |
| 600 | 24 | 610.0 | 6.35 | 94.5 | 9.53 | 141.0 | 17.48 | 255.0 | 30.9 | 442.08 | 30.9 | 442.08 | 59.5 | 808.22 |
| 650 | 26 | 660.0 | 7.92 | 127.3 | 9.53 | 153.0 | | | 12.7 | 202 | | | | |
| 700 | 28 | 711.0 | 7.92 | 137.4 | 9.53 | 165.0 | | | 12.7 | 218 | | | | |
| 750 | 30 | 762.0 | 7.92 | 147.9 | 9.53 | 176.0 | | | 12.7 | 235 | | | | |
| 800 | 32 | 812.8 | 7.92 | 157.9 | 9.53 | 188.2 | 17.48 | 342.0 | 12.7 | 251 | | | | |
| 850 | 34 | 863.6 | 7.92 | 167.9 | 9.53 | 200.0 | 17.48 | 364.9 | 12.7 | 266 | | | | |
| 900 | 36 | 914.4 | 7.92 | 176.9 | 9.53 | 212.0 | 19.05 | 420.6 | 12.7 | 282 | | | | |



All Dimensions in millimeters. W.T. = Wall Thickness. KG/M = Kilograms per Meter.

MILD STEEL PIPES CONFIRMING TO IS : 1239 (PART 1) - 1979

| Nominal Bore | | Outside Diameter | | Light | | Medium | | Heavy | |
|--------------|--------|------------------|--------|-----------|--------|-----------|---------|-----------|---------|
| | | | | Thickness | Weight | Thickness | Weight | Thickness | Weight |
| Inch | In mm | In | mm | mm | kg/mtr | mm | Kg/Mtr. | mm | Kg/Mtr. |
| 1/8" | 3 mm | 0.406 | 10.32 | 1.80 | 0.361 | 2.00 | 0.407 | 2.65 | 0.493 |
| 1/4" | 6 mm | 0.532 | 13.49 | 1.80 | 0.517 | 2.35 | 0.650 | 2.90 | 0.769 |
| 3/8" | 10 mm | 0.872 | 17.10 | 1.80 | 0.674 | 2.35 | 0.852 | 2.90 | 1.02 |
| 1/2" | 15 mm | 0.844 | 21.43 | 2.00 | 0.952 | 2.65 | 1.122 | 3.25 | 1.45 |
| 3/4" | 20 mm | 1.094 | 27.20 | 2.35 | 1.410 | 2.65 | 1.580 | 3.25 | 1.90 |
| 1" | 25 mm | 1.312 | 33.80 | 2.65 | 2.010 | 3.25 | 2.440 | 4.05 | 2.97 |
| 1.1/4" | 32 mm | 1.656 | 42.90 | 2.65 | 2.580 | 3.25 | 3.140 | 4.05 | 3.84 |
| 1.1/2" | 40 mm | 1.906 | 48.40 | 2.90 | 3.250 | 3.25 | 3.610 | 4.05 | 4.43 |
| 2" | 50 mm | 2.375 | 60.30 | 2.90 | 4.110 | 3.65 | 5.100 | 4.47 | 6.17 |
| 2.1/2" | 65 mm | 3.004 | 76.20 | 3.25 | 5.840 | 3.65 | 6.610 | 4.47 | 7.90 |
| 3" | 80 mm | 3.500 | 88.90 | 3.25 | 6.810 | 4.05 | 8.470 | 4.85 | 10.1 |
| 4" | 100 mm | 4.500 | 114.30 | 3.65 | 9.890 | 4.50 | 12.10 | 5.40 | 14.4 |
| 5" | 125 mm | 5.500 | 139.70 | - | - | 4.85 | 16.20 | 5.40 | 17.8 |
| 6" | 150 mm | 6.500 | 165.10 | - | - | 4.85 | 19.20 | 5.40 | 21.2 |

BIG DIAMETER ERW PIPES CONFIRMING TO IS 3589

| Wall Thickness in mm | Nominal Bore 7" NB 193.7 mm OD | Nominal Bore 8" NB 219.1 mm OD | Nominal Bore 10" NB 273 mm OD | Nominal Bore 12" NB 323.7 mm OD | Nominal Bore 14" NB 355.6 mm OD | Nominal Bore 16" NB 406.4 mm OD | Nominal Bore 18" NB 457 mm OD | Nominal Bore 20" NB 508 mm OD |
|-------------------------|--------------------------------------|--------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|-------------------------------------|-------------------------------------|
| kg/mtr | kg/mtr | kg/mtr | kg/mtr | kg/mtr | kg/mtr | kg/mtr | kg/mtr | kg/mtr |
| 4.85 | 22.59 | 25.62 | 32.07 | 38.13 | - | - | - | - |
| 5.20 | 24.17 | 27.43 | 34.34 | 40.85 | - | - | - | - |
| 5.60 | 26.00 | 29.28 | 36.93 | 43.93 | 48.11 | - | - | - |
| 6.00 | 27.88 | 31.53 | 39.50 | 47.02 | 51.49 | 61.00 | 69.00 | - |
| 6.35 | 29.34 | 33.28 | 41.73 | 49.67 | 54.43 | 62.35 | 70.50 | 78.50 |
| 7.01 | 32.27 | 36.76 | 46.43 | 55.45 | 61.82 | 69.04 | - | - |
| 7.94 | - | 41.00 | 50.95 | 61.85 | 67.98 | 77.92 | 87.80 | - |
| 8.18 | - | 42.56 | 53.42 | 65.12 | - | - | - | - |
| 9.53 | - | 51.50 | 60.24 | 73.75 | 81.21 | 93.13 | 105.00 | 117.00 |
| 12.70 | - | - | - | - | 107.28 | 123.30 | 139.00 | 155.00 |

Tolerance on Thickness and Weight : as per IS 1239

The following manufacturing tolerance shall be permitted on the tubes and sockets.

- (a) **Thickness**
- (1) **Butt welded Light tubes** + Not limited
- 8 percent
- Medium and Heavy tubes** + Not Limited
- 10 percent
- (2) **Seamless tubes** + Not Limited
- 12.5 percent
- (b) **Weight :**
- (1) **Single tube (light series)** + 10 percent
- 8 percent
- (2) **Single tube (medium and heavy series)** + 10 percent

MAXIMUM PERMISSIBLE PRESSURE AND TEMPERATURE FOR TUBES WITH STEEL COUPLINGS OR SCREWED AND SOCKETED JOINTS

| Nominal Bore | Maximum Permissible | | Maximum Permissible |
|---------------------------------------|-------------------------------|---------------------|---------------------|
| mm | Pressure N/mm ² | Kg./cm ² | Temperature °C |
| Upto and Including 25 mm | 1.20 | 12.24 | 260 |
| Over 25 mm upto and Including 40 mm | 1.03 | 10.50 | 260 |
| Over 40 mm upto and Including 80 mm | 0.86 | 8.77 | 260 |
| over 80 mm upto and Including 100 mm | 0.69 | 7.04 | 260 |
| | 0.83 | 8.47 | 177 |
| Over 100 mm upto and Including 125 mm | 0.69 | 7.04 | 171 |
| Over 125 mm upto and Including 150 mm | 0.50 | 5.10 | 160 |

For tubes fitted with appropriate fittings of suitably butt welded together, the Max. permissible pressure shall be 21.00 Kg/cm² and Max. permissible temp. 260°C

PIPES & TUBES ASTM / API / BS / DIN / IS

MATERIAL SPECIFICATION FOR PIPES & TUBES STAINLESS STEEL ALLOY STEEL, CARBON STEEL & MILD STEEL

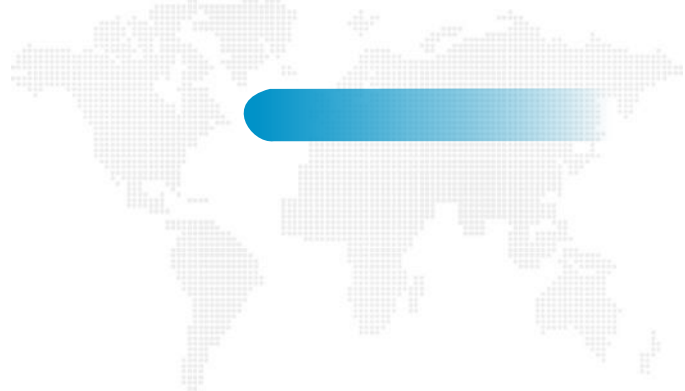
| PIPE SPECIFICATION | CHEMICAL PROPERTIES | | | | | | MECHANICAL PROPERTIES | | | OTHERS | | | |
|------------------------|---------------------|-----------|-------------|-------------|-----------|------------|-----------------------|-----------|--------|--------|------|-----------------|--|
| | C% | Mn% | P% (Max) | S% (Max) | Si% | Cr% | Ni% | Mo% | U.T.S. | | Y.S. | ELONG. (Min) | |
| | | | | | | | | | Mpa | | Mpa | | |
| ASTMA 312 Gr. TP 304 | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 18.0-20.0 | 8.0-11.0 | - | 515 | 205 | 35 | 25 | - |
| ASTMA 312 Gr. TP 304L | 0.035 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 18.0-20.0 | 8.0-13.0 | - | 485 | 170 | 35 | 25 | - |
| ASTMA 312 Gr. TP 304H | 0.04-0.10 | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 18.0-20.0 | 8.0-11.0 | - | 515 | 205 | 35 | 25 | - |
| ASTMA 312 Gr. TP 304LN | 0.035 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 18.0-20.0 | 8.0-12.0 | - | 515 | 205 | 35 | 25 | N% \leq 0.10-0.16 |
| ASTMA 312 Gr. TP 309S | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 22.0-24.0 | 12.0-15.0 | 0.75 Max | 515 | 205 | 35 | 25 | - |
| ASTMA 312 Gr. TP 310S | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 24.0-26.0 | 19.0-22.0 | 0.75 Max | 515 | 205 | 35 | 25 | - |
| ASTMA 312 Gr. TP 316 | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 16.0-18.0 | 11.0-14.0 | 2.00-3.00 | 515 | 205 | 35 | 25 | - |
| ASTMA 312 Gr. TP 316L | 0.035 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 16.0-18.0 | 10.0-14.0 | 2.00-3.00 | 485 | 170 | 35 | 25 | - |
| ASTMA 312 Gr. TP 316H | 0.04-0.10 | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 16.0-18.0 | 11.0-14.0 | 2.00-3.00 | 515 | 205 | 35 | 25 | - |
| ASTMA 312 Gr. TP 316LN | 0.035 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 16.0-18.0 | 11.0-14.0 | 2.00-3.00 | 515 | 205 | 35 | 25 | N% \leq 0.10-0.16 |
| ASTMA 312 Gr. TP 317 | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 18.0-20.0 | 11.0-14.0 | 3.00-4.00 | 515 | 205 | 35 | 25 | - |
| ASTMA 312 Gr. TP 317L | 0.035 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 18.0-20.0 | 11.0-15.0 | 3.00-4.00 | 515 | 205 | 35 | 25 | - |
| ASTMA 312 Gr. TP 321 | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 17.0-19.0 | 9.0-12.0 | - | 515 | 205 | 35 | 25 | Ti%=(5XC)-0.70 |
| ASTMA 312 Gr. TP 321H | 0.04-0.10 | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 17.0-19.0 | 9.0-12.0 | - | 515 | 205 | 35 | 25 | Ti%=(4XC)-0.60 |
| ASTMA 312 Gr. TP 347 | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 17.0-19.0 | 9.0-13.0 | - | 515 | 205 | 35 | 25 | Cb%=(10XC)-1.00 |
| ASTMA 312 Gr. TP 347H | 0.04-0.10 | 2.00 Max | 0.045 | 0.030 | 1.00 Max | 17.0-19.0 | 9.0-13.0 | - | 515 | 205 | 35 | 25 | Cb%=(8XC)-1.10 |
| ASTMA 358 Gr. TP 304 | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 0.75 Max | 18.0-20.0 | 8.0-10.5 | - | 515 | 205 | 40 | 40 | N% \leq 0.10 Max, HRB=92 Max |
| ASTMA 358 Gr. TP 304L | 0.035 Max | 2.00 Max | 0.045 | 0.030 | 0.75 Max | 18.0-20.0 | 8.0-12.0 | - | 485 | 170 | 40 | 40 | N% \leq 0.10 Max, HRB=92 Max |
| ASTMA 358 Gr. TP 309S | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 0.75 Max | 22.0-24.0 | 12.0-15.0 | - | 515 | 205 | 40 | 40 | HRB=95 Max |
| ASTMA 358 Gr. TP 310S | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 1.50 Max | 24.0-26.0 | 19.0-22.0 | - | 515 | 205 | 40 | 40 | HRB=95 Max |
| ASTMA 358 Gr. TP 316 | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 0.75 Max | 16.0-18.0 | 10.0-14.0 | 2.00-3.00 | 515 | 205 | 40 | 40 | N% \leq 0.10 Max, HRB=95 Max |
| ASTMA 358 Gr. TP 316L | 0.035 Max | 2.00 Max | 0.045 | 0.030 | 0.75 Max | 16.0-18.0 | 10.0-14.0 | 2.00-3.00 | 485 | 170 | 40 | 40 | N% \leq 0.10 Max, HRB=95 Max |
| ASTMA 358 Gr. TP 321 | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 0.75 Max | 17.0-19.0 | 9.0-12.0 | - | 515 | 205 | 40 | 40 | N% \leq 0.10 Max, Ti% \leq 5X(C+N)-0.70, HRB=95 Max |
| ASTMA 358 Gr. TP 347 | 0.080 Max | 2.00 Max | 0.045 | 0.030 | 0.75 Max | 17.0-19.0 | 9.0-13.0 | - | 515 | 205 | 40 | 40 | Cb%=(10XC)-1.00, HRB=92 Max |
| ASTMA 106 Gr. A | 0.25 Max | 0.27-0.93 | 0.035 | 0.035 | 0.10 Min | 0.40 Max | 0.40 Max | 0.15 Max | 330 | 205 | 35 | 25 | Cu% \leq 0.40 Max, Va%: 0.08 |
| ASTMA 106 Gr. B | 0.30 Max | 0.29-1.06 | 0.035 | 0.035 | 0.10 Min | 0.40 Max | 0.40 Max | 0.15 Max | 415 | 240 | 30 | 16.5 | Cu% \leq 0.40 Max, Va%: 0.08 |
| ASTMA 106 Gr. C | 0.35 Max | 0.29-1.06 | 0.035 | 0.035 | 0.10 Min | 0.40 Max | 0.40 Max | 0.15 Max | 485 | 275 | 30 | 16.5 | Cu% \leq 0.40 Max, Va%: 0.08 |
| ASTMA 53 Gr. A | 0.25 Max | 0.95 Max | 0.050 | 0.045 | - | 0.40 Max | 0.40 Max | 0.15 Max | 330 | 205 | 30 | 16.5 | Cu% \leq 0.40 Max, Va%: 0.08 |
| ASTMA 53 Gr. B | 0.30 Max | 1.20 Max | 0.050 | 0.045 | - | 0.40 Max | 0.40 Max | 0.15 Max | 415 | 240 | 30 | 16.5 | Cu% \leq 0.40 Max, Va%: 0.08 |
| ASTMA 333 Gr. 1 | 0.30 Max | 0.40-1.06 | 0.025 | 0.025 | - | - | - | - | 380 | 205 | 35 | 25 | Impact Test= -45°C, J=18 Min, HRB=85 Max |
| ASTMA 333 Gr. 6 | 0.30 Max | 0.29-1.06 | 0.025 | 0.025 | 0.10 Min | - | - | - | 415 | 240 | 30 | 16.5 | Impact Test= -45°C, J=18 Min, HRB=85 Max |
| ASTMA 335 Gr. P1 | 0.10-0.20 | 0.30-0.80 | 0.025 | 0.025 | 0.10-0.50 | - | - | 0.44-0.65 | 380 | 205 | 30 | 20 | - |
| ASTMA 335 Gr. P2 | 0.10-0.20 | 0.30-0.61 | 0.025 | 0.025 | 0.10-0.30 | 0.50-0.81 | - | 0.44-0.65 | 380 | 205 | 30 | 20 | - |
| ASTMA 335 Gr. P5 | 0.15 Max | 0.30-0.60 | 0.025 | 0.025 | 0.50 Max | 4.00-6.00 | - | 0.45-0.65 | 415 | 205 | 30 | 20 | - |
| ASTMA 335 Gr. P9 | 0.15 Max | 0.30-0.60 | 0.025 | 0.025 | 0.25-1.00 | 8.00-10.00 | - | 0.90-1.10 | 415 | 205 | 30 | 20 | - |
| ASTMA 335 Gr. P11 | 0.05-0.15 | 0.30-0.60 | 0.025 | 0.025 | 0.50-1.00 | 1.00-1.50 | - | 0.44-0.65 | 415 | 205 | 30 | 20 | - |
| ASTMA 335 Gr. P12 | 0.05-0.15 | 0.30-0.61 | 0.025 | 0.025 | 0.50 Max | 0.80-1.25 | - | 0.44-0.65 | 415 | 220 | 30 | 20 | - |
| ASTMA 335 Gr. P22 | 0.05-0.15 | 0.30-0.60 | 0.025 | 0.025 | 0.50 Max | 1.90-2.60 | - | 0.87-1.13 | 415 | 205 | 30 | 20 | - |
| ASTMA 335 Gr. P91 | 0.08-0.12 | 0.30-0.60 | 0.020 | 0.010 | 0.20-0.50 | 8.00-9.50 | 0.40 Max | 0.85-1.05 | 620 | 440 | 20 | - | V% \leq 0.18-0.25, Nb% \leq 0.004-0.070, Al% \leq 0.02 Max, Cb% \leq 0.06-0.10 |
| ASTMA 213 Gr. T2 | 0.10-0.20 | 0.30-0.61 | 0.025 | 0.025 | 0.10-0.30 | 0.50-0.81 | - | 0.44-0.65 | 415 | 205 | 30 | 30 | HRB=85 Max |
| ASTMA 213 Gr. T5 | 0.15 Max | 0.30-0.60 | 0.025 | 0.025 | 0.50 Max | 4.00-6.00 | - | 0.45-0.65 | 415 | 205 | 30 | 30 | HRB=85 Max |
| ASTMA 213 Gr. T11 | 0.05-0.15 | 0.30-0.60 | 0.025 | 0.025 | 0.50-1.00 | 1.00-1.50 | - | 0.44-0.65 | 415 | 205 | 30 | 30 | HRB=85 Max |
| ASTMA 213 Gr. T12 | 0.05-0.15 | 0.30-0.61 | 0.025 | 0.025 | 0.50 Max | 0.80-1.25 | - | 0.44-0.65 | 415 | 220 | 30 | 30 | HRB=85 Max |
| ASTMA 213 Gr. T22 | 0.05-0.15 | 0.30-0.60 | 0.025 | 0.025 | 0.50 Max | 1.90-2.60 | - | 0.87-1.13 | 415 | 205 | 30 | 30 | HRB=85 Max |
| ASTMA 179 | 0.06-0.18 | 0.27-0.63 | 0.035 | 0.035 | - | - | - | - | 325 | 180 | 35 | 35 | HRB=72 Max |
| ASTMA 210 Gr. A1 | 0.27 Max | 0.93 Max | 0.035 | 0.035 | 0.10 Min | - | - | - | 415 | 255 | 30 | 30 | HRB=79 Max |

V%:0.18-0.25, W%:0.030-0.070, Al%:0.02 Max,
C%:0.06-0.10

PIPES & TUBES ASTM / API / BS / DIN / IS

MATERIAL SPECIFICATION FOR PIPES & TUBES OF STAINLESS STEEL, ALLOY STEEL, CARBON STEEL & MILD STEEL

| PIPE SPECIFICATION | CHEMICAL PROPERTIES | | | | | | | | | | MECHANICAL PROPERTIES | | | OTHERS |
|---------------------------|---------------------|-----------|-------------|-------------|-----------|-----------|-----------|-----------|------------------------|----------------------|--|--------------|--|--------|
| | C% | Mn% | P% (Max) | S% (Max) | Si% | Cr% | Ni% | Mo% | U.T.S. (Min) Mpa | Y.S. (Min) Mpa | ELONG. (Min) | | | |
| | | | | | | | | | | | L | T | | |
| API 5L Gr. A | 0.22 Max | 0.90 Max | 0.030 | 0.030 | - | - | - | - | 331 | 207 | $\sigma = 625 \text{ } 000 \text{ } A_{0.2} / U_{0.9}$ | | For Seamless : C% Will be 0.028 for Gr. B to x 70 Mn% will be 1.40 for Gr. X65 to X 70 | |
| API 5L Gr. B | 0.26 Max | 1.20 Max | 0.030 | 0.030 | - | - | - | - | 414 | 241 | | | | |
| API 5L Gr. X 42 | 0.26 Max | 1.30 Max | 0.030 | 0.030 | - | - | - | - | 414 | 290 | | | | |
| API 5L Gr. X 46 | 0.26 Max | 1.40 Max | 0.030 | 0.030 | - | - | - | - | 434 | 317 | | | | |
| API 5L Gr. X 52 | 0.26 Max | 1.40 Max | 0.030 | 0.030 | - | - | - | - | 455 | 359 | | | | |
| API 5L Gr. X 56 | 0.26 Max | 1.40 Max | 0.030 | 0.030 | - | - | - | - | 490 | 386 | | | | |
| API 5L Gr. X 60 | 0.26 Max | 1.45 Max | 0.030 | 0.030 | - | - | - | - | 517 | 414 | | | | |
| API 5L Gr. X 65 | 0.26 Max | 1.65 Max | 0.030 | 0.030 | - | - | - | - | 531 | 448 | | | | |
| API 5L Gr. X 70 | 0.26 Max | 1.65 Max | 0.030 | 0.030 | - | - | - | - | 565 | 483 | | | | |
| BS 3059 PT-I Gr. 320 | 0.16 Max | 0.30-0.70 | 0.040 | 0.040 | 0.35 Max | - | - | - | 320-480 | 195 | | | | 25 |
| BS 3059 PT-II Gr. 360 | 0.17 Max | 0.40-0.80 | 0.035 | 0.035 | 0.10-0.35 | - | - | - | 360-500 | 235 | 24 | | | |
| BS 3059 PT-II Gr. 440 | 0.12-0.18 | 0.90-1.20 | 0.035 | 0.035 | 0.10-0.35 | - | - | - | 440-580 | 245 | 21 | | | |
| BS 3059 PT-I Gr. 620 | 0.10-0.15 | 0.40-0.70 | 0.030 | 0.030 | 0.10-0.35 | 0.70-0.10 | - | 0.45-0.65 | 460-610 | 180 | 22 | | | |
| BS 6323 Gr. 1 | 0.13 Max | 0.60 Max | 0.050 | 0.050 | - | - | - | - | 300 | 200 | 20 | | | |
| BS 6323 Gr. 2 | 0.16 Max | 0.70 Max | 0.050 | 0.050 | - | - | - | - | 340 | 250 | 15 | | | |
| BS 6323 Gr. 3 | 0.20 Max | 0.90 Max | 0.050 | 0.050 | 0.35 Max | - | - | - | 400 | 300 | 12 | | | |
| BS 1387 | 0.20 Max | 1.20 Max | 0.045 | 0.045 | - | - | - | - | 320-460 | 195 | 20 | | | |
| DIN 17175 Gr. St 35.8 | 0.17 Max | 0.40-0.80 | 0.040 | 0.040 | 0.10-0.35 | - | - | - | 225 | 360-480 | 25 | | | |
| DIN 17175 Gr. St 45.8 | 0.21 Max | 0.40-1.20 | 0.040 | 0.040 | 0.10-0.35 | - | - | - | 245 | 410-530 | 21 | | | |
| DIN 17175 Gr. 17Mn4 | 0.14-0.20 | 0.90-1.20 | 0.040 | 0.040 | 0.20-0.40 | 0.30 Max | - | - | 275 | 460-580 | 23 | | | |
| DIN 17175 Gr. 19Mn5 | 0.17-0.22 | 1.00-1.30 | 0.040 | 0.040 | 0.30-0.36 | 0.30 Max | - | - | 315 | 510-610 | 19 | | | |
| DIN 17175 Gr. 15Mo3 | 0.12-0.20 | 0.40-0.80 | 0.035 | 0.035 | 0.10-0.35 | - | - | 0.25-0.35 | 275 | 550-600 | 22 | | | |
| DIN 17175 Gr. 13CrMo44 | 0.10-0.18 | 0.40-0.80 | 0.035 | 0.035 | 0.10-0.35 | 0.70-1.10 | - | 0.45-0.65 | 295 | 440-590 | 22 | | | |
| DIN 17175 Gr. 10CrMo910 | 0.08-0.15 | 0.40-0.70 | 0.035 | 0.035 | 0.50 Max | 2.00-2.50 | - | 0.90-1.20 | 385 | 550-600 | 20 | | | |
| DIN 17175 Gr. 13CrMo910 | 0.10-0.18 | 0.40-0.70 | 0.035 | 0.035 | 0.10-0.35 | 0.70-1.10 | - | 0.45-0.65 | 295 | 440-590 | 22 | | | |
| DIN 17175 Gr. 14MoV63 | 0.10-0.18 | 0.40-0.70 | 0.035 | 0.035 | 0.10-0.35 | 0.50-0.70 | - | 0.50-0.70 | 325 | 460-610 | 20 | V: 0.22-0.32 | | |
| DIN 17175 Gr. X20CrMoV121 | 0.17-0.23 | 1.00 Max | 0.030 | 0.030 | 0.50 Max | 0.80-1.20 | 0.30-0.80 | 0.80-1.20 | 490 | 690-850 | 17 | V: 0.25-0.35 | | |
| IS 1239 Part I | - | - | 0.050 | 0.050 | - | - | - | - | 320 | - | 20 | | | |
| IS 3589 Gr. Fe 380 | 0.16 Max | 1.20 Max | 0.040 | 0.040 | - | - | - | - | 330 | 195 | 20 | | | |
| IS 3589 Gr. Fe 410 | 0.20 Max | 1.30 Max | 0.040 | 0.040 | - | - | - | - | 410 | 235 | 18 | | | |
| IS 1979 Gr. YST 290 | 0.28 Max | 1.25 Max | 0.040 | 0.050 | - | - | - | - | 410 | 290 | $\sigma = 625 \text{ } 000 \text{ } A_{0.2} / U_{0.9}$ | | | |
| IS 1979 Gr. YST 320 | 0.30 Max | 1.35 Max | 0.040 | 0.050 | - | - | - | - | 430 | 320 | | | | |
| IS 1979 Gr. YST 360 | 0.30 Max | 1.35 Max | 0.040 | 0.050 | - | - | - | - | 450 | 360 | | | | |
| IS 1979 Gr. YST 390 | 0.26 Max | 1.35 Max | 0.040 | 0.050 | - | - | - | - | 490 | 390 | | | | |
| IS 1979 Gr. YST 410 | 0.26 Max | 1.35 Max | 0.040 | 0.050 | - | - | - | - | 520 | 410 | | | | |
| IS 1979 Gr. YST 450 | 0.26 Max | 1.40 Max | 0.040 | 0.050 | - | - | - | - | 530 | 450 | | | | |
| IS 1979 Gr. YST 480 | 0.26 Max | 1.60 Max | 0.040 | 0.040 | - | - | - | - | 565 | 480 | | | | |
| IS 1978 Gr. YST 210 | 0.22 Max | 0.90 Max | 0.040 | 0.050 | - | - | - | - | 330 | 210 | | | $\sigma = 1942 \text{ } 57 \text{ } A_{0.2} / U_{0.9}$ | |
| IS 1978 Gr. YST 240 | 0.27 Max | 1.15 Max | 0.040 | 0.050 | - | - | - | - | 410 | 240 | | | | |



Pipes & Tubes :-

Stainless Steel Seamless & ERW Tubes for Boilers, Super Heaters, Heat Exchangers and Condensers : as per ASTM A 213, A 249, A 271 & A688, Gr. TP 201, 202, 304, 304L, 304H, 304LN, 309, 309S, 309H, 310S, 316, 316L, 316H, 316LN, 317, 317L, 321, 321H, 347, 347H, 348, 348H, etc.

Stainless Steel Seamless & ERW Tubes and Pipes for High Temperature services as per ASTM A 269, A 312 & A376 Gr. TP 304, 304L, 304H, 304LN, 309, 309S, 310S, 310H, 316, 316L, 316H, 316LN, 317, 317L, 321, 321H, 347, 347H, 348, 348H, etc.

Stainless Steel ERW Large Diameter Pipes as per ASTM A 358 and A 409 Gr. TP 304, 304L, 304H, 304LN, 309, 309S, 309H, 310S, 310H, 316, 316L, 316H, 316LN, 316Ti, 317, 317L, 321, 321H, 347, 347H, 348, 348H etc.

Alloy Steel Seamless Pipes & Tubes for High Temperature/ Pressure services as per ASTM A335, Gr.P1, P2, P5, P9,P11, P12, P22, P91 : ASTM A213 Gr. T2, T5, T11, T12 & T22 with IBR Test Certificate.

Carbon Steel Seamless Pipes as per ASTM A 106 Gr. B, A53 Gr. B, API 5L Gr. A, B, X42, X46, X52, X56 & X60 with IBR Test Certificate.

Carbon Steel Seamless Pipes & Tubes for Low Temperature Services as per ASTM A333, Gr. 1 & Gr.6 with IBR TC.

Carbon Steel ERW & Seamless Boiler Tubes as per BS 3059 Part I Gr.320, BS 3059 Part II Gr. 360, 440 & 620 with IBR Test Certificate.

CDW & ERW Air Heater Tubes as per IS 3601, BS 1775 & BS 6323.

MS ERW & Hot Dipped Galvanised (G.I.) ERW Pipes as per IS 1239 & IS 3589 Gr. Fe330 & 410.

SAW/EFW Pipes as per ASTM A 53 Gr. B, API 5L Gr. B & ASTM A 671, 672 & 691 in all Class with IBR Test Certificate.



Butt-Weld Fittings :-

Stainless Steel Fittings for High Temperature Services as per ASTM A 403 Gr. WP 304, 304L, 304H, 304LN, 309, 309S, 310S, 310H, 316, 316L, 316LN, 317, 317L, 321, 321H, 347, 347H, 348, 348H etc.

Alloy Steel Fittings for Moderate & Elevated Temperature Services as per ASTM A 234 Gr. WP1, WP2, WP5, WP9, WP11, WP12, WP22 & WP91 in CL-1, CL-2 & CL-3.

Carbon Steel Fittings for Moderate & Elevated Temperature Services as per ASTM A234 Gr. WPC.

Carbon Steel Fittings for Low Temperature Services as per ASTM A 420 Gr. WPL 3 & WPL 6. Butt-welding Fittings such as Long/Short Radius Elbows, Equal/Unequal Tees, Concentric Reducers, Caps, Cross, Short/Long Neck Stub-Ends, Long Piggable Bends, 3D/5D/6D/8D upto 22D, S/J/U/ Expansion Bends & Swivels are manufactured according to ANSI B 16.9, B 16.28, MSS SP-43, MSS SP-95 & NACE etc.



Flanges :-

Stainless Steel: ASTM A182 F304/304L/ 304H/ 316/ 316L/ 317/ 317L/ 321/ 310/ 347/ 904L etc.

Carbon Steel: ASTM A105/A694/F42/46/ 52/56/60/65/70/A350 LF3/A350 LF2, etc.

Alloy Steel: ASTM A182 F1/ F5/ F9/ F11/ F22/ F91 etc.

High Nickel Alloy: Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types: Weldneck, Slipon, Blind, Socket Weld, Lap Joint, Spectacles, Ring Joint, Oriface, Long Weldneck, Deck Flange, etc.

Size: 1/2" NB TO 24" NB.

Class: 150#, 300#, 400#, 600#, 900#, 1500# & 2500#.



Screwed & Forged Fittings :-

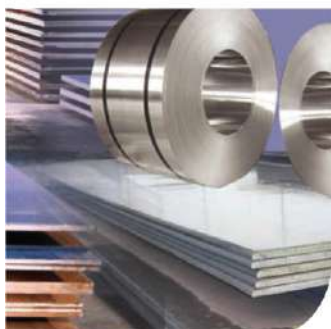
Stainless Steel Forged Socket Weld, Screwed Fittings for High Temperature Services as per ASTM A 182 Gr. F 304, 304L, 304H, 304LN, 309, 309S, 309H, 310S, 310H, 316, 316L, 316H, 316LN, 317, 317L, 321, 321H, 347, 347H, 348, 348H etc.

Alloy Steel Forged Socket Weld, Screwed Fittings for High Temperature Services as per ASTM A 182 Gr. F1, F2, F5, F9, F11, F12, F22 & F91.

Carbon Steel Forged Socket Weld, Screwed Fittings for Low Temperature Services as per ASTM A 105.

Forged Fittings such as Elbows, Equal/Unequal Tees, Concentric/Eccentric Reducers, Full/Half Coupling, Reducing Couplings, Caps, Cross, Unions, Hex/Reducing/Flash Bushings, Plugs, Nipples, Concentric/ Eccentric Swages, Reducer Insets, Boss, Laterals, Street Elbows & Outlets/Branch Connections (Weldolets, Thredolets, Sockolets, Flexolets, Latrolets, Elbolets, Sweepolets, Insert Weldolets, Brazolets, Coupolets) are manufactured according to ANSI B 16.11, BS 3799, MSS SP-79, MSS SP-97 & SP-95 etc.

Heat & Corrosion Resistance Metals Like Inconel, Incoloy, Hastelloy, Monel, Nickel, Nimonic, Alloy-20, Alloy-904L, Titanium, Tantalum & Non-ferrous Metals Like Aluminium, Copper, Brass, Cupro-nickel are also available on request.



Sheet, Plate & Coil :-

Stainless Steel Sheets & Plates as per ASTM A240, Gr. TP 304, 304L, 304H, 304LN, 309, 309S, 309H, 310S, 310H, 316, 316L, 316H, 316LN, 316Ti, 317, 317L, 321, 321H, 347, 347H, 348, 348H, 409, 410, 420, 430 etc.

Alloy Steel Plates as per ASTM A 387 Gr. 2, 5, 9, 11, 12 & 22 in class 1 & 2 : ASTM A 204, Gr. A & B DIN 17175, Gr. 15Mo3 & 16Mo3 with IBR Test Certificate.

Carbon Steel/ Boiler Quality Plates as per IS 2062 Gr. A, B & C, IS 2002 Gr. 1 & 2, ASTM A516 Gr.60 & 70, ASTM A515 Gr.70

Abrasion Resistant Steel Plates : 400, 450, 500 (SAILHARD, TISCRA, JISCRA, HARDOX, DILLIBUR, ABRASO, RAEX, FORA, CREUSBRO)

High Tensile Steel Plates : Sailma 350, S275J2G3, S355J2G3, S355JR



Fasteners :-

Stainless Steel : AISI 302, 304, 304L, 316, 316L, 310, 317, 317L, 321, 347, 410, 420, 904L etc.

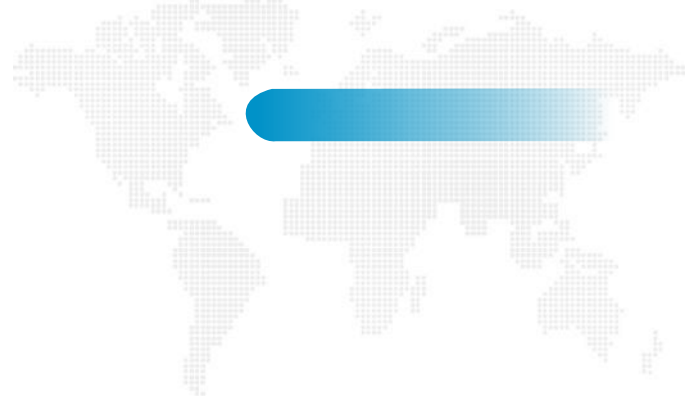
Alloy Steel : 4.6, 5.6, 6.6, 8.8, 10.9 & 12.9 / 'R', 'S', 'T' Conditions.

Carbon Steel : Bare Condition, Galvanized, Phosphetised, Cadmium Plated, Hot Deep Galvanized, Bloodied, Nickel Chrome Plated, etc.

High Nickel Alloy : Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Non Ferrous Metal : Copper, Brass, Aluminium, Titanium, Nichrome, Al. Bronze Phosphorous Bronze, etc.

Types : Bolts, Nuts, Washers, Anchor Fasteners, Stud Bolts, Eye Bolt, Stud, Threaded Rod, Cotter Pin, Socket Screw, Fine Fasteners & Spares, Foundation Fasteners, etc.



Quality Assurance plans are prepared in accordance with specific requirements stated by the customer and respective ASTM specifications, Mandatory and supplementary requirements are translated to special instructions and audits performed during manufacture and inspection.

Inspection stages and check hold points are decided to carry out in process inspection and record important stages of inspection and tests.

ORGANISATION:

A separate Quality Assurance/Control Department functions under the control of management, independent of production. The Quality Assurance Department oversees all important quality functions and performs the following activities.

MATERIAL CONTROL SYSTEM:

This system controls the quality of all incoming material. The incoming material specifications are co-related with Raw Material test certificates of the material. The checks and test are documented. The material is given internal control No. and same is recorded for future reference.

PROCESS CONTROL SYSTEMS:

During forming, Forging and Heat treatment, process control system outlines in process checks and controls to be followed during heat treatment and testing. Forging and interim heat treatment in the process control reduces the chances of introduction of variables in the process.

Each lot of fittings as defined in ASTM specifications are subjected to heat treatment and testing. Testing is performed in accordance with specification requirements. Test data is evaluated by QA department and recorded in appropriate format, supplementary test like radiography, ultrasonic, corrosion testing etc. is done as per code guide lines.

MACHINING AND DIMENSIONAL CONTROL:

Suitable fixtures and templates are used to maintain dimensional accuracy. Necessary gauges and callipers are calibrated periodically to maintain their accuracy.

FINISHING PAINTING & MARKING:

Carbon and alloy steel fitting are shot ballasted or pickled and painted. Stainless steel fittings are pickled and passivated. All fittings are marked with size, schedule, specification and manufacturer stamp. Equipment calibration and audits are done as per quality plans.

CERTIFICATION & SUPPLEMENTARY TEST:

Fittings supplied to the QAP are supplied with test certificate. Test certificate incorporates, Chemical, Mechanical and Hardness properties, also it gives details of Heat treatment, Hydro test pressure, Supplementary test and stamping details.

Additional information and test data is furnished as per customer requirement.





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