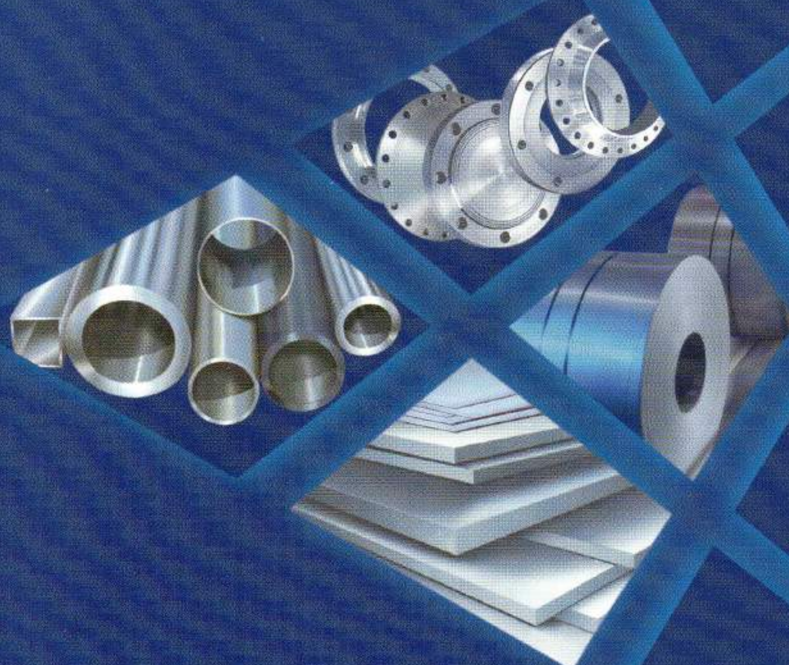
The ultimate steel solution



NEW SEAS ALLOYS LLP.

(AN ISO 9001-2008 CERTIFIED CO)

Certificate of Registration

The Governing Board of
Q.A. International Certification Limited
hereby grants to

NEW SEAS ALLOYS LLP

Address to which this Certificate refers :

Approved Scope to which this Certificate refers

Signed for and on behalf of the Board

CHIEF EXECUTIVE

SCHEME MANAGER

QA INTERNATIONAL

Our Vision :

To become an enterprising organisation in the field of Ferrous & Non ferrous products. To be known more for our quality of products and excellent service. Maintaining an uncompromising attitude towards quality of our products, service back-up.

Our Moto :

To provide quality products at reasonable price as per schedule and maintain good relationship with the best people in steel business

Company Profile

We are one of the leading exporter & stockist of stainless steel, inconel, monel, hastelloy, titanium, cupro nickle, duplex & super duplex stainless steel ferrous and non ferrous metals such as pipe and SS pipe fitting. Engaged in exporting of steel tubes, steel pipes, stainless steel pipes, stainless steel tubes etc.

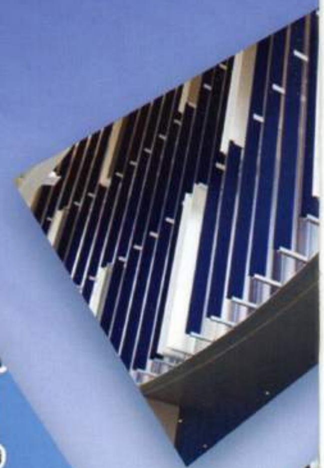
We are a professionally managed company started by a team of dynamic young entrepreneurs. We are in the business of exporting and importing of forged pipe fittings, nickel alloy pipe fittings, ferrous & non-ferrous metals / products used in various core industries.

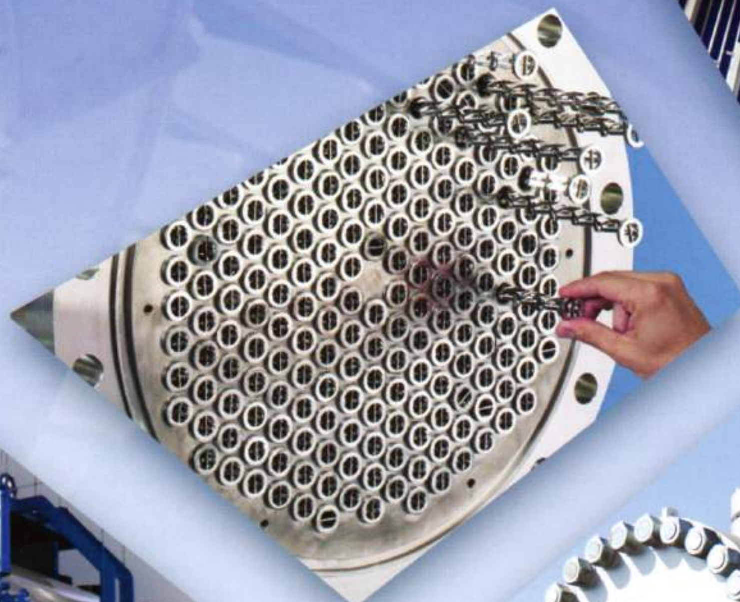
New Seas Alloys is a dynamic group, which was established over a decade ago to cater to growing demands of stainless steel raw materials. We have a team of young visionaries who end eavour for excellence in every aspect related to our products. as importers, exporter, dealers & stockists with huge stocks **New Seas Alloys** become within one of the most reliable source for quality within a short span. Our aim is to provide our buyers with everything in stainless steel under one roof viz. New Seas Alloys.

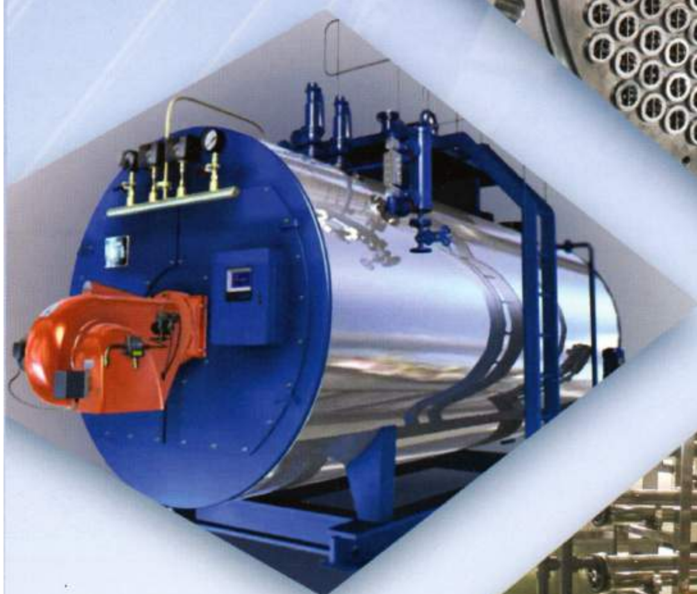
New Seas Alloys has tied up with one of the best manufacturers of steel in order to supply high quality & testified material / products to our customers at competitive rates. We can arrange for material against CT3/ARE4/H forms for exports. As registered dealers, we provide Modvat invoices so that you can avail of excise benefits. We can help you import any material/product strictly adhering to you preference & quality constraints. We can arrange for chemical, physical, mechanical, ultrasonic, micro, IGC and any other related test from govt. approved Laboratories. We are even ready for any third party inspection of our material/product.

We would appreciate if **New Seas Alloys** is enlisted on your record as one of your valued suppliers. Solely to have an everlasting & fruitful relationship with you.

Fabrication







A customer focused organisation we are committed to providing our clients with high quality, timely and cost effective solution, we offer innovative technology, proven design procedure and high quality standards to our clients, while at same time striving to suitably tailor our offering to the needs, constraints and resources of a given client.

NEW SEAS ALLOYS LLP.

Fabrication

We are innovative engineers, manufacturer & exporter of industrial & metal fabrication, industrial fabrication, metal fabricators, heavy fabrication, custom fabrication, fabrication works, steel fabrication, structural steel fabricators, fabrication services, industrial sheet metal fabrication. We have Obtain ISO 9001:2000 certification which bears testimony of our product quality.

- **PERFORATED PANELS**

  We provide Laser Cutting Services for Perforated Steel Panels & Vibrating Screens used in Food Processing, Chemical, Power, Defence, Agriculture, Architectural and other sectors.

- **PRECISION SHEET METAL FABRICATION**

  We offer customized CNC sheet metal fabrication and CNC machined components for high accuracy industrial needs & architectural applications.

- **TURNKEY PROJECTS**

  We execute turnkey projects ranging from industries such as power & electricity to telecom & food processing and more which need high accuracy, precision and true workmanship. We specialize in Stainless Steel & Aluminium fabrication.

- **EXTERIOR FACADES & CLADDING**

  We provide customized CNC Laser Cutting Services on Stainless Steel (upto 5 mm) & Mild Steel (upto 16 mm) for exterior facades, cladding and building outdoor panels that can totally add a new dimension to the architectural design.

- **RAILINGS & BALUSTRADES**

  Our Laser Cut railings and balustrades and designer panels add a totally new flavour to the building design with the durability and modern appearance of steel

- **BOILER**

  Industrial Boiler is a closed vessel in which water and other products fluid is heated. we provide three specialized Boiler that are well known for ther speciality 1) Three-drum boiler. 2) Fire-tube boiler. 3) Water-tube boiler.

- **FURNACE**

  The used of our Industrial Furace are for many specialized purpose like extraction of metal from ore, Oil Refineries and are Chemical Plants, power plant,

- **HEAT EXCHANGER**

  We provide Furnaces -Typical Applications / Shell-and-Tube Heat Exchangers / Shell-and-Tube Heat Exchangers / Fin-fan Heat Exchangers

- **STEEL TANKS**

  Available with us, is a sturdy range of Stainless Steel Storage Tanks and S. S. Storage Tanks that is offered to our clients in various specifications to choose from. Stainless Steel Tanks suppliers, Stainless Steel Tanks producers, Stainless Steel Tanks exporters, Stainless .

  Steel Tanks are regarding safe storage of petroleum products in factory-fabricated steel above and underground tanks.

NEW SEAS ALLOYS LLP.

Our Product Range

We are one of the leading manufacturer, Importer, Exporter and suppliers of Stainless Steel, Carbon Steel & Alloy steel in the shape of Pipes, Tubes, Rods, Sheets, Plates, Wires, Angles, Chanel, Coils, Strips and the entire range Pipe Fittings in the followings grades of materials.

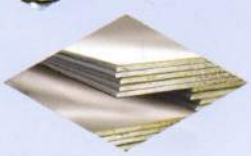
STAINLESS STEEL :- Grade TP-304, 304L, 304H, 316, 316L, 316H, 316TI, 317, 317L, 321, 347, 309, 310, 314, 409M, 409, 410 etc. in all required size & specifications.

DUPLEX :- S 32205, S 32750, S 32101, LDX 2101, SAF 2507.

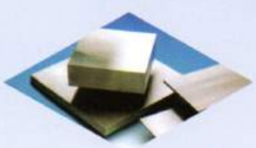
NICKEL BASE ALLOYS :- Inconel, Monel, Nickel, Hastalloy, Titanium - 904L.

CARBON STEEL PIPE :- ASTM A-106 GR. A, B&C, A-333, GR.I & 6, A-53 GR. A&B, ASTM A-210 GR, A-1 ,BS 3059, PART IM, SA 179, PART I I S 3589 GF 330, 410, etc.

ALLOY STEEL PIPE :- ASTM, A-335GR.P1, P5, P11, P12, P22, Plate. ASTM A-387 GR -11,12, 22,



BOILER QUALITY PLATE :- SA. 515 / 516 GR. 60, 70 & IS 2002,



HARDOX, SAIL HARD, SAILMA, CORTEN STEEL.

NON - FERROUS :- CUPRONICKEL - 70 - 30 & 90 - 10. COPPER, BRASS, ALUMINUM, Metals in all shapes & sizes.

PIPE FITTINGS :- B/W, S/W, SRD, Forged & Compression type with ferrules such as ELBOW TEES, REDUCERS, STUBENDS FLANGES, UNIONS, CAPS, NIPPLES, COUPLING, ELBOWLETS, WELDOLETS, NUTS, BOLTS, STUDS, WASHERS, & GASKETS etc. as per ASTM. A- 105, A - 181, Al 82,A-1 94, A-234, WPB, A - 350 LF, A - 403 WP A-120, WPL as per dimension ANSI B-16.9, 8-16.11 & 16.28 etc.

FERRULE FITTINGS :- In Single ferrule, double ferrule the shape of CONNECTER UNION, RED UNION, UNION TEE, UNION ELBOW, BULK HEAD UNION CROSS ETC. Nickel Alloys, 904L.

STAINLESS STEEL CHEMICAL COMPOSITIONS (%)

	C*	Mn*	P*	S*	SI*	Cr	Ni	Others
304	0.08	2.00	0.045	0.030	0.75	18.0-20.0	8.0- 10.5	NO.25
304L	0.03	2.00	0.045	0.030	0.75	18.0-20.0	8.0-12.0	NO.25
309S	**0.08**	**2.00**	**0.045**	**0.030**	**0.75**	**22.0-24.0**	**12 0 - 15.0**	
310S	**0.08**	**2.00**	**0.045**	**0.030**	**1.50**	**24.0-26.0**	**19.0 -22.0**	
314	0.15	1.5	0.045	0.030	1.5-2.5	23 - 27	19 - 23	
316	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0- 14.0	Mo 2.0-3.0, NO.10
316L	0.03	2.00	0.045	0.030	0.75	16.0-18.0	10.0- 14.0	Mo 2.0-3.0, -0.10
316Ti	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0- 14.0	NO.10
								Ti 5(C+N) Min, 0.70 Max
317L	0.03	2.00	0.045	0.030	0.75	18.0 -20.0	11.0-15.0	Mo3.0-4.0, NO.10
321	0.08	2.00	0.045	0.030	0.75	17.0 -19.0	9.0-12.0	Ti 5(C+N) Min, 0.70 Max
330	0.08	2.00	0.030	0.030	0.75-1.5	17.0 -20.0	34.0 -37.0	CU1
409M	**0.03**	**1.00**	**0.030**	**0.040**	**1.00**	**10.5 -11.75**	**0.5 Max**	**Ti 6(C) Min-0.75 Max**
410	0.15	1.00	0.030	0.030	1.00	11.5 -13.5	0.75	
430	0.12	1.00	0.030	0.040	1.00	16.0 -18.0		
431	0.2	1.00	0.04	0.030	1.00	15.0-17.0	1.25-2.50	EN 57
440C	0.95-1.0	1.00	0.04	0.03	1 00	16.0-180		
446	0.2	1.5	0.04	0.03	1.00	23.0-27.0	0.60 MAX	
17-4PH	0.07	1 0	0.04	0.03	1.0	15-17.50	3.0-5.0	CU 3 0 - 5.0
904L	**0.02**	**2.00**	**0.030**	**0.045**	**1.00**	**19.0 -23.0**	**23 0-28.0**	**MO 4.0-5.0, Cul.0-2.0**
* = Max.								

STAINLESS STEEL- MECHANICAL PROPERTIES

Mechanical Properties of wrought Stainless Steel
(All properties minimum specified as per code)

Type	UNS Designation	Condition	Tensile Strength Mpa	0.2% Proof Strength Mpa	Elongation % in 50mm	Hardness Brinell	ASTM Specification
304	S30400	Annealed	518	205	40	201	A240
304L	S30403	Annealed	485	170	40	202	A240
309S	S30900	Annealed	515	205	40	217	A167
310S	S31000	Annealed	515	205	40	217	A167
316	S31600	Annealed	515	205	40	217	A240
316L	S31603	Annealed	485	205	40	217	A240
316Ti	S31635	Annealed	515	205	40	217	A167
317L	S31703	Annealed	515	205	40	217	A240
321	S32100	Annealed	515	205	40	217	A240
330	No8330	Annealed	480	210	30	75	B536
409M	S40900	Annealed	380	205	22	179	A176
410	S41000	Annealed	450	205	22	217	A176
430	S43000	Annealed	450	205	22	183	A176
431	S43100	Annealed	965*	-	-	-	A580
440C	S44004	Annealed	760	450	14	223	A276
446	S44600	Annealed	515	275	20	217	A176
17-4PH	S17400	H1025	1070	1000	12	331	-
904L		Annealed	490	220	35	90	-

Stainless Steel 310

Plate, Sheet, Pipes, Coil, & Rod.

GENERAL INFORMATION :

Type 309,310 and type 314, austenitic stainless steels are typically used for elevated temperature applications. Their high chromium and nickel contents provides comparable Corrosion Resistance superior resistance to oxidation and the retention of a larger fraction of room temperature strength than the common austenitic alloys like Type 304.The alloys are available in plates, sheet, and strip pipe, rod & fittings.

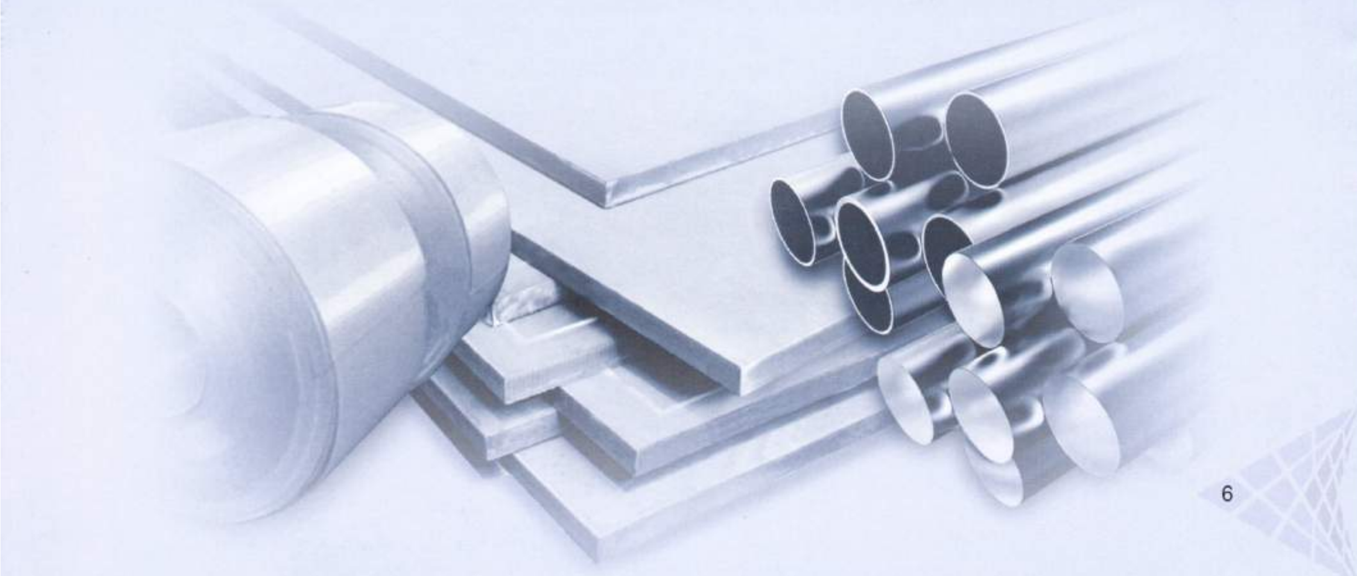
TYPES 309 & 309S

Types 309 and 309S are heat resistant stainless steels containing 22% chromium and 12% nickel. They display excellent oxidation resistance and elevated temperature strength. In Type 309S, the carbon content is limited to 0.08% and therefore it is more suited for service in the welded condition than Type 309.

Types 309 and 309S are more resistant to marine atmospheres than Type 304. These alloys are also resistant to sulfite liquors.

Types 309 and 309S have satisfactory oxidation resistance up to 2000°F for continuous service, and up to 1800°F for intermittent service

	Type 309 (UNS S30900)	Type 309S (UNS S30908)	Type 309H (UNS S30909)	Type 309SI (DIN 1.4828)	Type 310 (UNS S 31000)	Type 310S (UNS S 31008)	Type 310H (UNS S31009)	Type 310Si (DIN 1.4841)
C	0.20 -	0.08 -	0.04 min 0.10 max	0.20 -	0.25 -	0.08 -	0.04min 0.10 max	0.20 -
N	-	-	-	0.11	-	-	-	0.11
Mn	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
S	0.030	0.030	0.030	0.015	0.030	0.030	0.030	0.015
Si	0.75 -	0.75 -	0.75 -	1.50 min 2.50 max	1.50 -	1.50 -	0.75 -	1.50 min 2.50 max
Cr	22.00 min 24.00 max	22.00 min 24.00 max	22.00 min 24.00max	19.00 min 21.00 max	24.00min 26.00 max	24.00 min 26.00 max	24.00 min 26.00 max	24.00 min 26.00 max
Ni	12.00 min 15.00 max	12.00 min 15.00 max	12.00 min 15.00 max	11.00 min 13.00 max	19.00 min 22.00 max	19.00 min 22.00 max	19.00 min 22.00 max	19.00 min 22.00 max
Fe	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance



STAINLESS STEEL 310

Features

- Oxidation resistance to 2000°F
- Moderates strength at high temperatures
- Resistance to hot corrosion
- Low magnetic permeability
- Strength and toughness at cryogenic temperatures Availability

Physical Properties

Density	:	0.284lb/cu.in
	:	7860 kg/m3
Melting Range	:	2470-2555°F
	:	1355-1400'C

Mechanical Properties

Typical Room Temp. Mechanical Properties, Annealed

Ultimate tensile strength

psi	:	80,000
0.2% Offset yield strength, psi	:	35,000
Elongation, in 2", %	:	52
Reduction of area, %	:	72
Hardness, Rockwell B	:	75-85

Machinability

Machinability is rated at 35% of B-1112 rated at 100%

Forming

Formimg of Type 310 is similar to Type 309 and may be easily drawn or stamped

Forging

Forge at temperatures between 2000° F and 2200° F.

Annealing

Annealed between 1900° F and 2100° F. Water quench heavy sections and air cool lighter sections. Stress relive between 400° F and 750° F.

Corrosion

This grade possesses excellent corrosion resistance & withstands scaling at temperatures upto 2000° F. Its corrosion resistance reaches a maximum in the annealed condition.

Duplex Stainless Steel

General Characteristics

Austenitic - ferritic stainless steel also referred to as duplex stainless steels, combine many of the beneficial properties of ferritic and austenitic steels. Due to the high content of chromium and nitrogen, and often also molybdenum, these steels offer good resistance to localized and uniform corrosion. The duplex microstructure contributes to the high strength and high resistance to stress corrosion cracking. Duplex steels have good weld ability.

Chemical Composition

The typical chemical compositions of Duplex. The chemical composition of a specific steel grade may vary slightly between different national standards

Chemical Composition

	International Steel No		Chemical composition % Typical values					
	EN	ASTM	C	N	Cr	Ni	Mo	Others
Duplex	1.4162	S 32101	0.03	0.22	21	1.5	0.3	5Min
	1.4362	S 32304	0.02	0.10	23	4.8	0.3	-
	1.4462	S 32205	0.02	0.17	22	5.7	3.1	-
	1.4501	S 32760	0.02	0.25	25	7.0	3.8	W.Cu
	1.4410	S 32750	0.02	0.27	25	7.0	4.0	-

Characteristic Properties

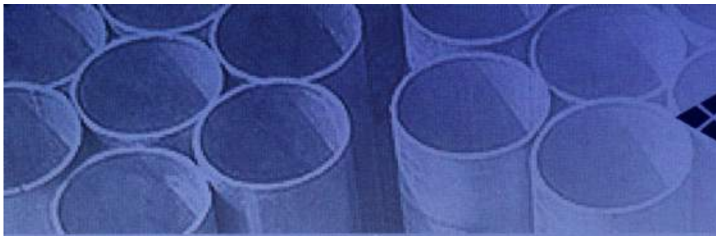
- Good to resistance to uniform corrosion
- Good to resistance to pitting and crevice corrosion
- High resistance to stress corrosion cracking and
- corrosion fatigue
- High mechanical strength
- Good abrasion and erosion resistance
- Good fatigue resistance
- High energy absorption
- Low thermal expansion
- Good weld ability

NEW SEAS ALLOYS LLP.

S / S Pipes & Tubes

DESIG-NATION OF D/A		OD CA	NOMINAL WALL THICKNESS													
			SCH.5S		SCH.5S		SCH.10S		SCH.10		SCH.20		SCH.30		SCH.40S	
(A)	(B)	Meter mm	Wall thk.	Weight Kg./Mtr.	Wall thk.	Weight Kg./Mtr.	Wall thk.	Weight Kg./Mtr.	Wall tick.	Weight Kg./Mtr.	Wall thk.	Weight Kg./Mtr.	Wall thk.	Weight Kg./Mtr.	Wall thk.	Weight Kg./Mtr.
6	Aa	10.3	1.24	0.28	-	-	1.24	0.28	-	-	1.50	0.33	-	-	1.73	0.37
8	/4	13.7	1.24	0.39	-	-	1.65	0.49	-	-	2.00	0.58	-	-	2.24	0.63
10	31e	17.1	1.24	0.49	-	-	1.65	0.63	-	-	2.00	0.74	-	-	2.31	0.84
15	1/2	21.3	1.65	0.80	1.65	0.80	2.11	1.00	2.11	1.00	2.30	1.07	-	-	2.77	1.27
20	3/4	26.7	1.65	1.03	1.65	1.03	2.11	1.28	2.11	1.28	2.55	1.52	-	-	2.87	1.69
25	1	33.4	1.65	1.30	1.65	1.30	2.77	2.09	2.77	2.09	2.55	1.94	-	-	3.38	2.50
32	1'/n	42.2	1.65	1.65	1.65	1.65	2.77	2.70	2.77	2.70	3.00	2.90	-	-	3.56	3.39
40	11/2	48.3	1.65	1.91	1.65	1.91	2.77	3.11	2.77	3.11	3.00	3.35	-	-	3.68	4.05
50	2	60.3	1.65	2.40	1.65	2.40	2.77	3.93	2.77	3.93	3.00	4.24	-	-	3.91	5.44
65	21/2	73.0	2.11	3.69	2.11	3.69	3.05	5.26	3.05	5.26	3.50	6.81	-	-	5.16	8.63
80	3	88.9	2.11	4.51	2.11	4.51	3.05	6.45	3 05	6.45	4.00	8.37	-	-	5.49	11.30
90	31/2	101.6	2.11	5.18	2.11	5:18	3.05	7.41	3.05	7.41	4.00	9.62	-	-	5.74	13.57
100	4	114.3	2.11	5.84	2.11	5.84	3.05	8.36	3.36	8.05	4.50	12.18	-	-	6.02	16.07
125	5	141.3	2.77	9.47	2.77	9.47	3.40	11.57	3.40	11.57	5.00	16.80	-	-	6.55	21.77
150	6	168.3	2.77	11.32	2.77	11.32	3.40	13.84	3.40	13.84	6.35	25.36	-	-	7.11	28.26
200	8	219.1	2.77	14.79	2.77	14.79	3.76	19.96	3.76	19.96	6.35	33.31	7.0	36.8	8.18	42.55
250	10	273.0	3.40	22.63	3.40	22.63	4.19	27.78	4.19	27.78	6.35	41.77	7.80	51.3	9.27	60.31
300	12	232.8	3.96	31.25	4.19	33.02	4.57	36.00	4.57	36.00	6.35	49.70	8.38	65.2	9.53	73.80
350	14	355.6	3.96	34.36	-	-	4.78	41.03	6.35	54.6	7.92	67.90	9.53	81.3	9.53	81.30
400	16	406.4	4.19	41.56	-	-	4.78	47.29	6.35	62.6	7.92	77.82	9.53	93.3	9.53	93.3
450	18	457.2	4.19	46.80	-	-	4.78	53.42	6.35	70.50	7.92	87.74	11.13	122.0	9.53	105.0
500	20	508.0	4.78	59.25	-	-	5.54	68.71	6.35	78.50	6.53	117.14	12.70	155.1	9.53	117.20
550	22	508.0	4.78	65.30	-	-	5.54	75.58	6.35	86.40	9.53	129.08	12.70	171.0	9.53	129.0
600	24	609.6	5.54	82.47	-	-	6.35	94.45	6.35	94.70	9.53	141.11	14.30	210.0	9.53	141.0
650	26	660.4	-	-	-	-	-	-	7.92	128.00	12.70	203.00	-	-	9.53	153.0
700	28	711.2	-	-	-	-	-	-	7.92	137.40	12.70	218.00	15.88	272.0	9.53	165.0
750	30	762.0	6.35	118.32	-	-	7.92	147.00	7.92	147.00	12.70	234.6	15.88	290.7	9.53	176.0
800	32	812.8	-	-	-	-	-	-	7.92	157.00	12.70	250.6	15.88	312.0	9.53	188.0
850	34	863.6	-	-	-	-	-	-	7.92	167.00	12.70	266.50	15.88	331.7	9.53	200.0
900	36	914.4	-	-	-	-	-	-	7.92	176.6	12.70	282.4	15.88	352.2	9.53	212.0

DESIG-NATION OF D/A		NOMINAL WALL THICKNESS																			
		SCH.40		SCH.60		SCH.80S/XS		SCH.80		SCH.100		SCH.120		SCH.140		SCH.160		SCHXXS	
(A)	(B)	Wall thk.	Weight Kg./Mtr.	Wall tick.	Weight Kg./Mtr.	Wall thk.	Weight Kg./Mtr	Wall tick.	Weight Kg/Mtr.	Wall thk.	Weight Kg./Mtr.	Wall tick.	Weight Kg./Mtr	Wall tick.	Weight Kg./Mtr	Wall thk.	Weight Kg./Mtr.	Wall thk.	Weight Kg./Mtr
6	Aa	1.73	0.37	-	-	2.41	0.47	2.41	0.47	-	-	-	-	-	-	-	-	-	-
8	/4	2.24	0.63	-	-	3.02	0.80	3.02	0.80	-	-	-	-	-	-	-	-	-	-
10	31e	2.31	0.84	-	-	3.20	1.10	3.20	1.10	-	-	-	-	-	-	-	-	-	-
15	1/2	2.77	1.27	-	-	3.73	1.62	3.73	1.62	-	-	-	-	-	-	4.78	1.95	7.47	3.64
20	3/4	2.87	1.69	-	-	3.91	2.20	3.91	2.20	-	-	-	-	-	-	5.54	2.90	7.82	5.45
25	1	3.38	2.50	-	-	4.55	3.24	4.55	3.24	-	-	-	-	-	-	6.35	4.24	9.09	7.77
32	1'/n	3.56	3.39	-	-	4.85	4.47	4.85	4.47	-	-	-	-	-	-	6.35	5.61	9.70	9.56
40	11/2	3.68	4.05	-	-	5.08	5.41	5.08	5.41	-	-	-	-	-	-	7.14	7.25	10.16	13.40
50	2	3.91	5.44	-	-	5.54	7.48	5.54	7.48	-	-	-	-	-	-	8.71	11.11	11.07	20.40
65	21/2	5.16	8.63	-	-	7.01	11.41	7.01	11.41	-	-	-	-	-	-	9.53	14.92	14.02	27.70
80	3	5.49	11.30	-	-	7.62	15.30	7.62	15.30	-	-	-	-	-	-	11.13	21.35	15.24	34.10
90	31/2	5.74	13.57	-	-	8.08	18.63	8.08	18.63	-	-	-	-	-	-	-	-	16.15	41.03
100	4	6.02	16.07	-	-	8.56	22.30	8.56	22.30	-	-	11.13	28.32	-	-	13.49	33.50	1712	57.40
125	5	6.55	21.77	-	-	9.53	30.90	9.53	30.90	-	-	12.70	40.20	-	-	15.88	49.11	19.05	79.22
150	6	7.11	28.26	-	-	10.97	42.50	10.97	42.50	-	-	14.27	54.20	-	-	18.24	67.50	21.95	108.0
200	8	8.18	42.55	10.31	53.1	12.70	64.50	12.70	64.50	15.10	75.92	18.24	90.40	20.62	100.9	23.01	111.2	22.23	155.0
250	10	9.27	60.31	12.70	81.50	12.70	81.50	15.10	96.00	18 24	114.70	21.41	133.0	25.40	155.0	25.58	172.3	25.40	187.0
300	12	10.31	79.7	14.27	109.0	12.70	97.40	17.45	132.0	2141	160.0	25.40	187.0	28.58	208.0	33.32	238.7	25.40	-
350	14	11.13	94.6	15.09	126.0	12.70	107.0	19.05	158.0	23.80	195.0	27.76	224.0	31.75	253.5	35.71	281.0	-	-
400	16	12.70	123.0	16.66	160.0	12.70	123.0	21.41	203.0	26.19	245.0	30.94	286.0	36.53	333.0	40.46	366.0	-	-
450	18	14.20	156.0	19.05	206.0	12.70	139.0	23.80	254.0	29.36	310.0	34.93	363.0	39.67	408.3	45.24	459.0	-	-
500	20	15.09	183.0	20.62	248.0	12.70	155.1	26.19	311.0	32.54	381.0	38.10	441.0	44.45	508.0	49.99	564.0	-	-
550	22	-	-	22.23	294.0	12.70	171.0	28.57	373.0	34.92	451.0	41.27	527.0	47.62	600.0	53.97	671.0	-	-
600	24	17.48	255.0	24.61	355.0	12.70	187.0	30.94	434.0	38.89	547.7	46.02	629.0	52.37	719.0	59.51	807.0	-	-
650	26	-	-	-	-	12.70	202.0	-	-	-	-	-	-	-	-	-	-	-	-
700	28	-	-	-	-	12.70	218.0	-	-	-	-	-	-	-	-	-	-	-	-
750	30	-	-	-	-	12.70	235.0	-	-	-	-								
800	32	17.48	342.0	-	-	12.70	251.0	-	-	-	-								
850	34	17.48	364.9	-	-	12.70	266.0	-	-	-	-								
900	36	17.48	420.6	-	-	12.70	282.0	-	-	-	-								

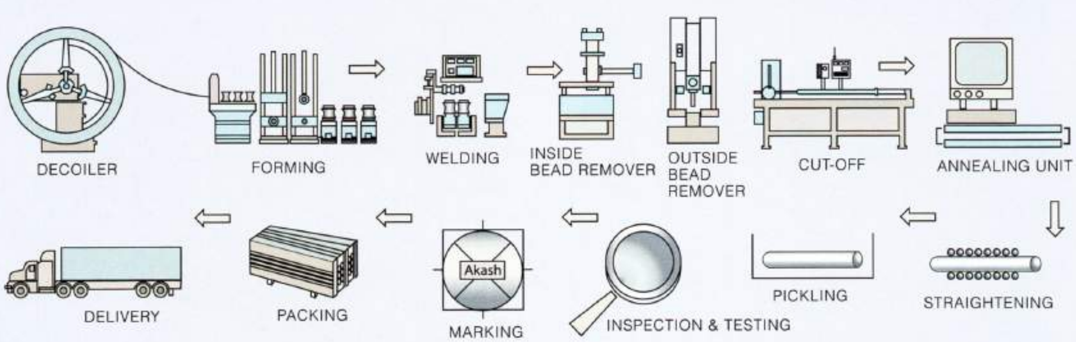


TOLERANCE: ASTM SPECIFICATION FOR TUBING & PIPING

Specification	Allowable Outside Diameter Variation in mm			Allowable Wall Thickness Variation Tolerance in mm				Exact Length Testing
	Nominal Diameter	Over	Under	%Over	Under	Over	Under	
ASTM-A213	Under 25.4	.1016	.1016	+20	-0	3.175	0	Tension Test
Seamless Boiler	25.4-38.1 incl	.1524	.1524	+22	-0	3.175	0	Flattening Test
Superheater and	38.1-50.8 excl	.2032	.2032	+22	-0	3.176	0	Flare Test
Heat Exchanger	50.8-63.5 excl	.254	.254	+2	-0	4.46	0	Hardness Test
Tubes	63.5-76.2 excl	.3048	.3048	+22	-0	4.76	0	100% Hydrostatic test
	76.2-101.6 incl	.381	.381	+22	-0	4.76	0	Refer to ASTM A-450
	Under 25.4	.1016	.1016	+10	-10	3.175	0	Tension Test
ASTM-A249	25.4-38.1 incl	1524	.1524	+10	-10	3.175	0	Flattening Test
Welder Boiler	38.1-50.8 excl	.2032	.2032	+10	-10	3.175	0	Flare Test
Superheater, Heat	50.0-63.5 excl	.254	.254	+10	-10	4.76	0	Reverse Bend Test
Exchanger And	63.5-76.2 excl	.3048	.3048	+10	-10	4.76	0	Hardness Test
Condenser Tubes	76.2-101.6 incl	.381	.381	+10	-10	4.76	0	100% Hydrostatic Test
				Minimum Wall tubes				*Reverse Flattening Test
				+ 18% 0 available				Refer to ASTM A-450
				On request				*Wherever applicable
	Under 12.7	.13	13	+15	-15	3.2	0	Flare Test
ASTM-A269	12.7-38.1 excl	.13	.13	+10	-10	3.2	0	Flance Test (Welded Only)
Seamless & Welded	38.1-88.9 excl	.25	.25	+10	-10	4.8	0	Hardness Test
Tubing for General	88.9-139.7 excl	.38	.38	+10	-10	4.8	0	Reverse Flattening Test
Service	139.7-203.2 excl	.76	.76	+10	-10	4.8	0	(Welded only)
								100% Hydrostatic Test
								Refer to ASTM A-269
ASTM-A270	25.4	.05	.20	+12.5	-12.5	3.2	0	Reverse flattening Test
Seamless & Welded	38.1	.05	.20	+12.5	-12.5	3.2	0	100% Hydrostastic Test
Sanitary Tubing	50.8	.05	.28	+12.5	-12.5	3.2	0	Externa' polish on all tubes
	60.5	.05	.28	+12.5	-12.5	3.2	0	
	76.2	.08	.30	+12.5	-12.5	3.2	0	Refer to ASTM A-270
	101.6	.08	.38	+12.5	-12.5	3.2	0	
ASTM-A312	3.175-38.1 incl	.4	.79	Minimum Wall		6.4	0	Tension Test
Seamless & Welded	38.1-1016 incl	.79	.79	12.5 % under			6.4	0 Flattening Test
pipe	101.6-203.2 incl	1.59	.79	nominal wall		6.4	0	100% Hydrostatic Test
				specified				
						(Normally Random		Refer to ASTM A-530
						Lengths ordered		
ASTM-A358	219.08-750mm	+0.5%		-0.3		6.0		Refer to ASTM A-530
Welded pipe	or 0.01 inch							

Pipe Processing

Plant at Gujarat



NICKEL 200 / 201*

Commercial pure nickel with good mechanical properties and excellent resistance to may corrosive media. Important characteristic are its magnetic and magnetostrictive properties, the high thermal and electrical conductivity at low gas content.

MONEL 400 (ALLOY 400)*

Alloy 400 is especially resistant to saline and other acids in ventilated condition. It is successfully employed in the salt winning process. Alloy 400 is especially suited for employment in sea brakage water at high speed, where resistance against cavitation and erosion is of great importance. This alloy is very resistant to solvents, glass etching agents, sulfuric and other acids and virtually to all alkalis. This grade is not sensitive to stress corrosion cracking in oxidizing media. Alloy 400 can be employed at temperatures up to 550" Celsius.

MONEL K-500 (ALLOY K-500)*

An age-hardening alloy with the same corrosion resistance as Alloy 400, though with increased tensile strength and hardness. Alloy K-500 retains its strength up to temperature of about 650° Celsius.

INCONEL 600 (ALLOY 600)*

Alloy 600 has excellent resistance to oxidation at temperatures upto 1175° Celsius and is also resistant to a variety of corrosive media. It retains its high strength up to about 650" Celsius. Even at lowest temperature, alloy 600 is employed in components of power plants. This grade can be welded without thermal retreatment.

INCONEL 625 (ALLOY 625)*

Excellent corrosion resistance with high strength and ductility at temperature upto 700° Celsius applicable upto 1100° Celsius. Alloy 625 is weldable without thermal retreatmet.

INCOLLOY 800 (H) (ALLOY 800 (H)*

This Alloy is resistant to corrosion resulting form hydrigen sulfied as well as to stress corrosion cracking. It is highly heat resistant and insensitive to the separation of sigma phase. Alloy 800 H with controlled carbon content improves furthermore the creep strength depending on time solution annealed condition.

INCOLLOY 825 (ALLOY 825)*

Resistance to sulfuric acid, phosphoric acid solvents and sea water as well as to many oxidising chemicals. Alloy 825 has good resistance to reducing acid. It can be employed without thermal treatment after the welding process.

HASTALLOY C-276 (ALLOY C-276)**

Today probably one of the best and manifold alloys on the market, hen employed in extremely corrosive reducing and oxidising applications. applications. Alloy C-276 has excellent resistance to strong oxidising media contaminated by chloride, dry chloride acid formate acid, acetic hydride solutions, sea water solutions and saline solutions. The alloys is resistant to the corrosive influence of we hydrochloride acid, hydrochloride chlorine diexide solutions.

HASTALLOY C-4 (Alloy C-4)**

Excellent resistance against strong oxidising agents, hot contaminated miniral acid, solvent, chlorine and media contaminated by chlorine (organic and inorganic), dry chloric acid, formic acid, acetic acid, acetic hydride solutions, sea water solutions and saline solution. This alloy has high ductility and corrosive resistance even in temperature range of 650-1040" celsius. Alloy C-4 is resistant against the formation of grain boundary carbides and can thus used in most cases without heat-treatment after welding.

INCOLLY DS (ALLOY DS)*

Alloy Ds is a heat resistant Ni-Cr-Fe alloy with Si addition for the employment at high temperatures where sufficient strength and corrosive resistance are required. Alloy Ds is heat-resistant upto 1100" Celsius when in fresh air. This alloy is especially resistant against changing oxidising / reducing conditions as well as the formation of sigma phase in the critical temperature range of 590-870" Celsius. Furthermore it is green rot. Due to high strength and heat resistance to alloy DS, smaller sections than usual can be manufactured from this material.

ALLOY 20*

Alloy 20 is a high-allyoed stainless steel. Its corrosion properties surpass those of usual stainless qualities. For example. alloy 20 has excellent stress corrosion to boiling 20-40% sulfuric acid. Although alloy 20 was originally developed for usage in sulfuric environment, its range application has been steadily extended and today also includes machining of artificial rubber, plastic, synthetic fiber etc. In pharmaceutical and food producing application, where purity has to be guaranteed, Alloy 20 is employed to prevent metalic contamination. The most important advantages of this grade are its excellent mechanical properties as well as its comparatively easy machine ability.

EXOTIC GRADES

EXOTIC	UNS No	W.NR	C(Max)	Mn(Max)	S(Max)	Si(Max)	Cr	Ni	Mo	Cu	Fe	Ti	Al	Other
ALLOY 200	N02200	2.4066	0.080	0.180	0.005	0.180	-	99.5+	-	-	-	-	-	-
ALLOY 201	N02201	2.4068	0.010	0.80	0.005	0.180	-	99.5+	-	0.130	0.200	-	-	-
ALLOY 205	N02205	2.4061	0.50	0.350	0.008	0.50	-	99.0 min	-	0.15max	0.20max	0.01-0.05	-	Mg-0.01-0.08
ALLOY 400	N04400	2.4360	0.300	1.000	0.024	0.200	-	63.0mim	-	28-34	2.5max	-	-	-
ALLOY K-500	N05500	2.4375	0.250	1.500	0.010	0.050	-	63.0min	-	27-33	2-Omax	0.35-0.85	2.3-3.14	-
ALLOY 800	N08800	1.4876	0.0100	1.500	0.015	1.000	19.0-23.0	30.0-35.0	-	0.75max	39.5min	0.15-0.60	0.15-0.60	-
ALLOY 800H	N08810	1.4958	0.0500	1.500	0.015	1.000	19.0-23.0	30.0-35.0	-	0.75max	39.5min	0.15-0.60	0.15-0.60	AL-TI-0.30-1.20
ALLOY 800HT	N08811	1.4959	0.0600	1.500	0.015	1.000	19.0-23.0	30.0-35.0	-	0.75max	39.5min	0.25-0.60	0.25-0.60	AL+TI-0.85-1.20
ALLOY 330	N08330	-	0.080	2.000	0.030	0.75-1.50	17.0-20.0	34.0-37.0	-	-	Sal	-	-	P-0.030max
ALLOY DS	-	1.4862	0.100	0.8 1.5	0.030	1.9-2.6	17.0-19.0	34.5-41.0	-	0.5max	Sal	0.2max	-	-
ALLOY 706	N09706	-	0.060	0.350	0.015	0.350	14.5-17.5	39.0-44.0	-	0.30max	-	1.5-2.0	0.40max	P-0.02max, Nb-2.5-3.3, B-0.006max, Co-1.0max
ALLOY 600	N06600	2.4816	0.150	1.000	0.015	0.050	14.0-17.0	72.0min	-	0.5max	6.0-10.0	-	-	-
ALLOY 601	N06601	2.4851	0.100	1.000	0.015	0.500	21.0-25.0	58.0-63.0	-	1.0max	Sal	-	1.0-1.7	-
ALLOY 825	N08825	2.4858	0 .025	0.100	0.030	0.500	19.5-23.5	38.0-46.0	2.5-3.0	1.5-3.0	Sal	0.6-1.2	0.200	-
ALLOY 625	N06625	2.4856	0.100	0.500	0.015	0.500	20.0-23.0	58.0min	8.0-10.0	-	5.0max	0.400	0.400	P-0.015,Nb-3.15-4.15,Co-1.0max
ALLOY X-750	N07750	2.4669	0.080	1.000	0.010	0.500	14.0-17.0	70.0min	-	0.50max	5.0-9.0	2.25-2.75	0.40-1.00	Co-1.00 max, N-0.70-1.20
ALLOY 718	N07718	2.4668	0.02-0.08	0.350	0.015	0.350	17.0-21.0	50.0-55.0	2.80-3.30	0.20max	Sal	0.70-1.15	0.30-0.70	P-0.015max, B 0.006max, Nb-0.75-5.50 Co-1.0max
ALLOY 617	N06617	2.4663	0 05-015	1.000	0.015	1.000	20.0-24.0	44.5min	8.0-10.0	0.5max	3.Omax	-0.6max	0.8-1.5	80.006 max. Co-10.0-15.0
ALLOY C4	N06455	2.4610	0.010	1.000	0.010	0.050	14.5-17.5	Bal	14.0-17.0	-	3.Omax	0.70max	-	P-0.025max,Co-2.0
ALLOY C22	N06022	2.4602	0.015	0.500	0.02	0.080	20.0-22.5	-	12.5-14.5	-	2.0-6.0	-	-	P-0.020max, Co-2.5max, V-0.35max W-2.5-3.5
ALLOY C276	N010276	2.4819	0.010	1.000	0.03	0.080	14.5-16.5	Bal	15-0-17.0	-	4.0-7.0	-	-	P-0.040max, W-3.0-4.5, Co-2.5max,V-0.35max
ALLOY B2	N010665	2.4617	0.010	1.000	-	0.008	0.4 -1.0	Bal	26.0-30.0	-	2.Omax	-	-	P-0.020max,Co-1.Omax, W-3.0-4.5, V-.35max
ALLOY B3	N010675	2.4600	0.0 0	3 000	-	0.100	1.0-3.0	65.0min	27.0-32.0	0.20max	1.5max	0.2max	0.50max	Co-3.Omax, W-3.Omax
ALLOY X	N06002	2.4665	0.05-0.15	1.000	0.030	1.000	20.5-23.0	Bal	8.0-10.0	0.50max	17.0-20.0	.15max	0-50max	P-0.040max, W-.2-1.0, Co-0.5-2.5,8-.01 max
ALLOY G3	N06985	2.4619	0.015	1.000	0.03	1.000	21.0-23.5	-	6.0-8.0	1.5-2.5	18.0-21.0	-	-	P-0.04max, Nb+ta-0.50max, Co-S.Omax,W-1.5max
ALLOY 75	N06075	2.4630-2.4951	0.08-0.15	1.000	-	1.000	18.0-21.0	Bal	-	0.5max	5.Omax	0.2-0.6	-	-
ALLOY 80A	N07080	2.4631-2.4952	0.100	1.000	0.015	1.000	18.0-21.0	Bal	-	0.2max	3.Omax	1.8-2.7	1.0-1-8	Co-2.Omax, B-0.008Max, Zi-0.15Max
ALLOY 901	N09901	2.4662	0.100	0.500	0 030	0.400	11.0-14.0	40.0-45.0	5.0-6.5	0.5max	Sal	2.8-3.1	0.35max	Co-1.0max
ALLOY 90	N07090	2.4632	0.130	1.000	0.015	1.000	18.0-21.0	Bal	-	0.2max	1.5max	2.0-3.0	1.0-2.0	Co-15.0-21.0, B-0.02max, Zi-0.15max
ALLOY 105	-	2.4634	0 .120	1.000	0.010	1.000	14.0-5.7	Bal	4.5-5.5	0.2max	1.0max	0.9-1.5	4.5-4.9	Co-18-22,B-0.003-0.010, Zi-0.15max
ALLOY 115	-	2.4636	0.2-0.2	1.000	0.015	1.000	14.0-16.0	Bal	3.0-5.0	0.2max	1.Omax	3.5-4.5	4.5-5.5	Co-13-155, 8-0.01-0.025, Zi-0.15max
ALLOY 263	N07263	2.4650	0.04-0.08	0.600	0.007	0.400	19.0-21.0	Bal	5.6-6.1	0.2max	0.7max	1.9-2.4	0.60max	B-0.005max,Co-19-21,Al+Ti-2.4-2.8
ALLOY 690	N06690	2.4642	0.020	0.300	0.015	0.300	27.0-31.0	58.0min	-	0.50max	8.0-10.0	0.300	0.300	-
ALLOY-20	N08020	-	0.070	2.000	0.035	1.000	19.0-21.0	32.0-38.0	2.0-3.0	3.0-4.0	Bal	-	-	P-0.045max, Nb+Ti-8x C-1.0
CN7M	-	-	0.070	1.500	0.040	1.500	19.0-22.0	27.5-3.05	2.0 to 3.0	-	-	-	-	P-0.040max
ALLOY 28	N08028	1.4563	0.0 5	2.000	0.030	0.700	26.0-28.0	30.0-32.0	3.0-4.0	1.0-1.4	Bal	-	-	P-0.030max, N-0.15-0.25
ALLOY 31	N08031	1.4562	0.0 5	2.000	0.010	0.300	26.0-28.0	30.0-32.0	6.0-7.0	1.00-1.40	Bal	-	-	P-0.020max, N-0.15-0.25
ALLOY 904L	N08904	1.4539	0.020	2.000	0.035	1.000	19.00-23.00	23.00-28.00	4.00-5.00	1.00-2.00	Bal	-	-	P-0.045max
ALLOYAL-6XN	N08367	NIL	0.030	2.000	0.030	1.000	20.00-22.00	23.50-25-50	6.00-7.00	0.75max	Bal	-	-	P-0.040max, N-0.15-0.25
ALLOY SMO-254	S31254	1.4547	0.020	1.000	0.010	0.800	19.5-20.5	17.5-18.5	6.0-6.5	0.50-1.00	Bal	-	-	P-0.030max, N-0.18-0.22
ALLOY SMO-654	S32654	1.4562	0.020	2.00-4.00	0.005	0.500	24.0-25.0	21.0-23.0	7.0-8.0	0.30-0.60	Bal	-	-	P-0.030max, N-0.45-0.55

AGE HARDENING I MARTENSTIC STEELS

COMMON Grade	-	UNS	C	Mn	P	S	Si	Cr	Ni	Mo	N	Other
NITRONIC-40	-	S21900	0.03max	8.0- 0.0	0.04max	0.03ma	00ma	19.0-21.5	5.5-7.5	-	0 5-0 0	-
NITRONIC-50	XM-19	S21910	0.06max	4.0-6.0	0.040max	0.030max	0.75max	20.5-23.5	11.5-13.5	1.50-3.0	0.20-0.40	Cb-0.10-0.30,v-0.10-0.30
NITRONIC-60	22-13-5	S21800	0.10max	7.0-9.0	0.060max	0.030max	3.5-4.5	16.0-18.0	8.0-9.0	-	0.08-0.18	-
13-8 MO	-	S13800	0.05max	0.10max	0.01max	0.008max	0.10max	12.25-13.25	7.50-8.5	2-2.5	-	N-0.01max,Al-0.9-1.35
15-7 MO	-	S 15700	0.09max	1.0max	0.04max	0.03max	1.0max	14.0-16.0	6.5-7.75	2.0-3.0	-	Al-0.75-1.50
17-4PH	-	S17400	0.07max	1.0max	0.04max	0.03max	1.0max	15.00-17.5	3.0-5.0	-	3.0-5.0	Nb+Ta - 0.15-0.45
17-7PH	630	517780	0.09max	1.0max	0.04max	0.04max	1.0max	16.0-18.0	6.5-7.75	-	-	Al-0.75-1.50
15.5PH	XM-12	S15500	0.07max	1.00max	0.040max	0.030max	1.00max	14.00-15.50	3.50-5.50	-	-	Cb+Ta0.15.0.45,Cu-2.5-0.5
A 286	1.4980	S 66286	0.08max	2.0max	-	-	1.0max	13.5-16.00	24.0-27.0	1.0-1.5	-	Ti-1.9-2.3, Al-0.35 MAX, V-0.1-0.5,8-M03-0.010

* Inconel, Incoloy & Monel is a register trademark of Special Metal Corporation
** Hastelloy is a register trademark of Haynes Internation Inc

Nickel 200*

Commercial pure (99.6%) wrought nickel with good mechanical and resistance to a range of corrosive media. Good thermal, electrical and magnetostrctive propertiesUsed for a variety of processing equipment, particularly to maintain product purity in handing foods, synthetic fibers and alkalies. Standard product forms are round, flats, pipe,tube, plate, sheet, forging, stock, strip and wire.

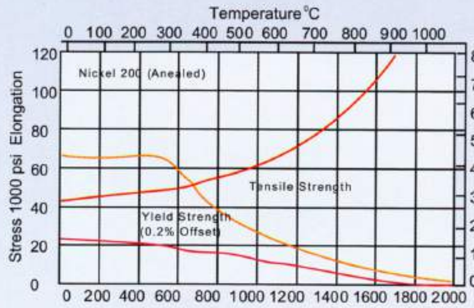
Limiting Chemical Composition, %

Ni.......99.0 min............Mn.....0.35 max. S...........0.01 max
Cu......0.25 max...........C.......0.15 max
Fe......0.40 max...........Si......0.35 max.

* Plus co.

Typical Mechanical Properties (Annealed)

Tensile Strength Psi 67.000
Mpa..462
Yield Strength (0.2% Offset), Psi 21.500
Mpa..148
Elongation,%..47



Physical Constants and Thermal Properties

Density, lb / in 3 .... 0.321
Mg/m 3 .... 8.89
Melting Range, °F 2615 2635
°C 1435 1446
Specific Heat, Btu/ lb' °F 0.109
J/Kg °C 456
Curie Temperature, °F 680
°C 360
Permeability .... Ferromagnetic
Coefficient of Expansion, 70-200° F, 10-6 in l °F................7.4
21-93 °C.pm/m °C 13.3
Thermal Conductivity, Btu • in ft2•h• °F 487
W/m •°C 70.2
Electrical Resistivity ohm cire mil/ft 58
• m 96

Specifications and Designations

UNS No 2200	DIN 17740, 17750-17754
BS 3072-3076 (NA11)	Wrekstoff Nr 2,4060
ASTM B 160 - B 163	
B 725. B 730	
ASME SB - 160-SB -163, Boiler	
Code Sections, III, VIII, IX	

Monel Alloys 400*

A nickel-copper alloy with high strength and A nickel-copper alloy with high strength and excellent corrosion resistance in a range of media including sea, water hydrofluoric chemical

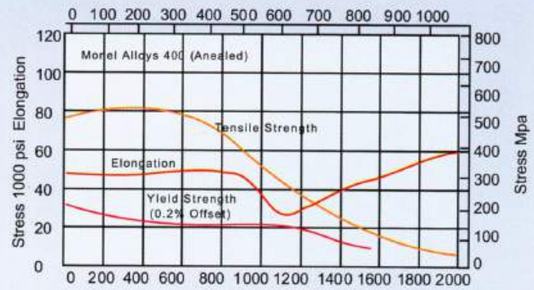
Limiting Chemical Composition, %

Ni.........63.0min.............Mn.....2.0 max. ....S.........0.01 max
Cu........28.0-34.0..........C.......0.3 max
Fe........2.5 max.............S.......0.24 max

* Plus co.

Typical Mechanical Properties (Annealed)

Tensile Strength Psi...67.000
Mpa...462
Yield Strength (0.2% Offset), Psi............................... 21.500
Mpa...148
Elongation,%..47



Physical Constants and Thermal Properties

Density, lb /in 0.318
Mg/m 8.80
Melting Range, °F .... 2370 - 2460
°C ....1300 - 1350
Specific Heat, Btu/ lb' °F 0.102
J/Kg °C 427
Curie Temperature, °F 70-120
°C 20-50
Coefficient of Expansion, 70-200° F, 10-6 in'/ °F..............7.7
21-93 °C /m °C 13.9
Thermal Conductivity, Btu • in ft2•h• °F 151
W/m 'C...21.8
Electrical Resistivity ohm cire mil/ft 329
• m 0.547

Specifications and Designations

UNS No 4400	SAE AMS 4544, 4574, 4545
BS 3072-3076 (NA-13)	4675, 4730, 4731, 7233
ASTM B 127, B 163 - B 165, B 564	DIN 17743, 17750 - 17754
ASME B 127, B 163 - SB - 165	Wrekstoff Nr 2.4360, 2.4361
SB -564, Boiler Code	Vd TUV 263
Sections III, IV, VIII, IX	MIL-T-1368, MIL-T-23520
ACEMA pr EN 2305	MIL-N-24106
AFNOR NU 30	QQ-N-281
	NACE MR - 01 - 75

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Inconel Alloys 600*

A nickel - chromium alloy with good oxidation resistance at high temperatures and resistance to chloride-ion stress corrosion cracking, corrosion by high-purity water, and caustic corrosion. Used for furnace components, in chemical and food processing, in nuclear engineering, and for sparking electrodes. Standard product forms are round, hexagon, extruded section, flats, forging stock,

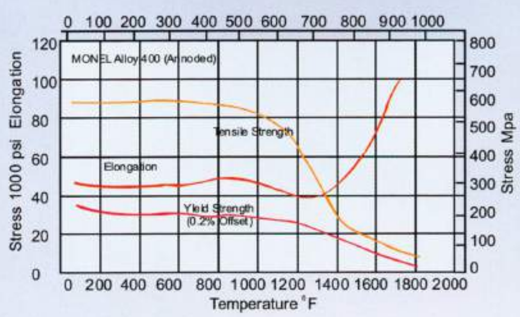
Limiting Chemical Composition, %

Nia.....72.0min.......C..0.15 max. Si...........0.5 max Cr......14.0-17.0.....Mn...1.0max. Cu..........0.5 max
Fe......6.0-10.0....S......0.015 max.

* Plus co.

Typical Mechanical Properties (Annealed)

Tensile Strength Psi 95000
Mpa..655
Yield Strength (0.2% Offset), Psi 45000
Mpa..310
Elongation,%...40



Physical Constants and Thermal Properties

Density, lb / in 3 .... 0.306
Mg/m 3 .... 8.47
Melting Range, °F ....22470 - 2575
°C ....1435 - 1413
Specific Heat, Btu/ lb' °F 0.106
J/Kg °C 444
Curie Temperature, °F ....-192
°C .... -124
Permeability at 200 oersted (15.9 KA/m)......................1.010
Coefficient of Expansion, 70-200° F, 10-6 in l °F................7.4
21-93 °C.pm/m °C 13.3
Thermal Conductivity, Btu • in ft2•h• °F 103
W/m •°C 14.9
Electrical Resistivity ohm cire mil/ft 620
• m 1.03

Specifications and Designations

BS 3072-3076 (NA14)
ASTM B 163-B 166, B 168
ASTM SB-163, SB-166-SB-168
ASTM B 516, B 517, B 564, B 751
SB-554
Boiler Code Sections I III,VIII, IX

SAE AMS 5540, 5580
5665, 5687, 7232
DIN 17742, 17750-17754
Wrekstoff Nr 2.4816
Vd TUV 305
NACE MR - 01 -75
QQ-W-390
MIL-R-5031, MIL-T-23227
MIL-N-23228, MIL-N-23229

Inconel Alloys 800*

A nickel-iron-alloy with good strength and excellent resistence to oxidation and carburization in high temperature atmospheres. It also resist corrosion by many aqueous environments. The alloy maintains a stable austenitic strucre during prolonged exposure to high temperatures. used for processing piping, heat enchanters, car buizing equipment, heating-element sheathing and nuclear steam-generator, tubing. Standard product forms are round, flats, forging stock, pipe, tube, plate, sheet, strip and wire.

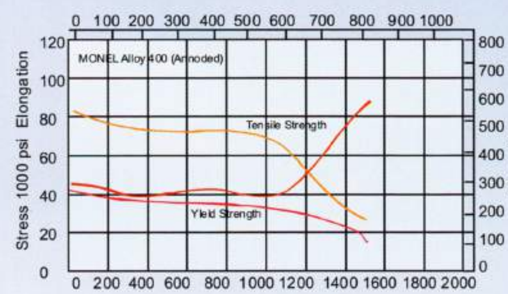
Limiting Chemical Composition, %

Ni.........30.0-35.0.0......Mn.......1.5max. Al.......0.15-0.60
Fe........39.5 min...........S......0.015 max. Tl......0.15-0.60
Cr......19.0-23.0......Si......1.0 max.
C...... .10 max.... Cu.....0.75 max.

Typical Mechanical Properties (Annealed)

Rupture Strength (1000h)

	Psi	Mpa
1000°F / 540°C	48 000	330
1100°F / 595°C	32 000	220
1200°F / 650°C	21 000	145
1300°F / 705°C	11 000	75



Physical Constants and Thermal Properties

Density, lb /in 0.287
Mg/m 7.94
Melting Range, °F .... 2475 - 2525
°C ....1357 - 1385
Specific Heat, Btu/ lb' °F 0.11
J/Kg °C 460
Curie Temperature, °F ....-.175
°C .... -.115
Coefficient of Expansion, 70-200° F, 10-6 in'/ °F...............7.7
Permeability at 200 oersted (15.9 KA/m).......................... 79
20-100 °C/m °C 14.4
Thermal Conductivity, Btu • in ft2•h• °F 80
W/m 'C...115
Electrical Resistivity ohm cire mil/ft 595
• m 0.989

Specifications and Designations

UNS No 8801
BS 3072-3076 (NA-15)
ASTM B 163 B 407 - B 409
B 514 B 515, B 564, B 751
ASTM SB 163, SB 407-
SB - 409, SB - 564
Boiler Code Sections I, III, VIII, IX

SAE AMS 4544, 4574, 4545
Wrekstoff Nr 1.4876
VdTUV 412
NACE MR 01 - 75
AFNOR Z5 NC 35-20

★ Inconel, Incoloy & Monel is a register trademark of Special Metal Corporation
★★ Hastelloy is a register trademark of Haynes Internation Inc

Inconel Alloys DS*

A nickel-iron-chromium alloy with an addition silicon. It has good high temperature strength and excellent resistance to oxidation and carburization. The silicon content makes alloy resistant to internal oxidation in high temperature atmospheres that very between oxidizing and reducing. Used in industrial furnaces and for heat treating baskets, trays and fixtures. Standard product forms are round, pipe, tube, plate, sheet, strip, and wire.

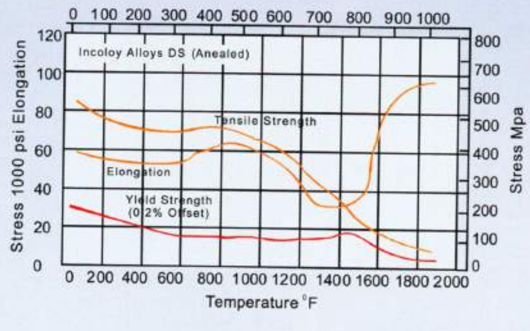
Limiting Chemical Composition, %

Ni.......34.5-41.0.......Si.......1.9-2.6 Cu..........0.50 max.
Fe......Reminder.......Mn......0.8-1.5 Ti...........0.20 max.
Cr......17.0-19.0........C.......0.10 max. S...........0.30 max.

* Plus co.

Typical Mechanical Properties (Solution Annealed)

Rupture Strength (1000h)	Psi	Mpa
1380°F / 750°C	7100	49
1560°F / 850°C	3800	26
1740°F / 950°C	2200	15
1920°F / 1050°C	970	6.7



Physical Constants and Thermal Properties

Density, lb / in 3 ...... 0.284
Mg/m 3 ...... 7.6
Melting Range, °F ...... 2430 - 2550
°C ...... 1330 - 1400
Specific Heat, Btu/ lb' °F 0.108
J/Kg °C 452
CurieTemperature, °F 680
°C 360
Permeability at 200 oersted (15.9 KA/m)...... 1.038
Coefficient of Expansion, 68-212° F, 10-6 in I °F...... 8.3
22-100 °C.pm/m °C 15.0
Thermal Conductivity, Btu • in ft2•h• °F 83.2
W/m •°C 12.0
Electrical Resistivity ohm cire mil/ft 650
• m 1.08

Specifications and Designations

BS 3072 - 3076 (Na17)

Inconel Alloys 330 (S.S.330)*

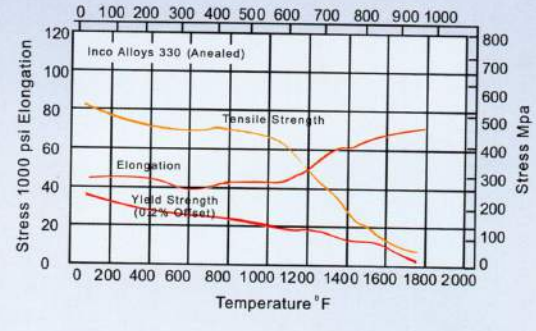
A nickel-iron-chromium alloy with an addition of silicon for enhanced oxidation resistance. It has good strength at high temperatures and excellent resistance to oxidation and carburizing and oxidizing atmospheres. Then allyos austenitic micro structure remains stable during long-time exposure ti high temperature. Used in industrial heating for furnace muffles, retorts and conveyor systems and for heat treating baskets and fixtures. Standard product forms are round, flats, forging stock, plate, sheet, strip and wire.

Limiting Chemical Composition, %

Ni.......30.0-35.0.0....Mn.....1.5max. Al......0.15-0.60
Fe.......39.5 min........S.......0.015 max. TI......0.15-0.60
Cr.......19.0-23.0.......Si......1.0 max.
C...... .10 max.......... Cu.....0.75 max.

Typical Mechanical Properties (Annealed)

Rupture Strength (1000h)	Psi	Mpa
1400°F / 760°C	7000	48
1600°F / 870°C	3100	21
1800°F / 980°C	1250	8.6
2000°F / 1095°C	780	5.4



Physical Constants and Thermal Properties

Density, lb /in 0.292
Mg/m 8.08
Melting Range, °F ...... 2450 - 2600
°C ...... 1345 - 1425
Specific Heat, Btu/ lb' °F 0.11
J/Kg °C 460
Permeability at 200 oersted (15.9 KA/m)...... 1.02
Coefficient of Expansion, 75-200° F, 10 in'/ °F...... 8.3
24-93 °C m/m °C 14.9
Thermal Conductivity, Btu • in ft2•h• °F 12.9
W/m 'C...... 612
Electrical Resistivity ohm cire mil/ft 1.017
• m 0.989

Specifications and Designations

UNS No 8330
ASTM B 511, B 512, B 535, B 536, B 546, B 710
ASME SB 511, SB 536, SB 710
Boiler Code Sections I, VIII, IX

SAE AMS 5592, 5716
SAE J 405 J 412

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Nimonic Alloy 75*

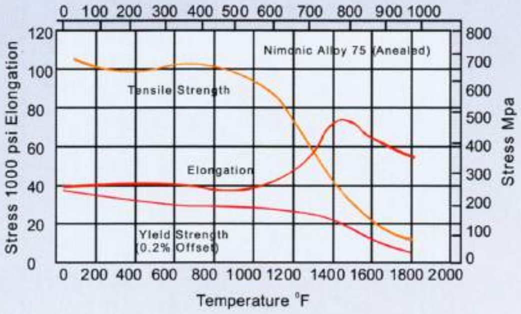
A nickel-chromium alloy with good mechanical properties and oxidation resistance at high temperatures. Used for sheet-metal fabrications in gas-turbine engines, for components of industrial furnaces, for heat-treating equipment and fixtures and in nuclear engineering. Standard product forms are round, hexagon, flats, extrude section, tube, pipe, plate, sheet, strip and wire.

Limiting Chemical Composition, %

Ni.....Reminder.....C.....0.08-0.15 Fe...........5.0 max.
Cr....18.0-21.0......Si..... 1.0 max Mn...........1.0 max.
Ti.....0.2-0.6...... Cu.....0.5 max

Typical Mechanical Properties (Annealed)

Rupture Strength (1000h)	Psi	Mpa
1400°F / 760°C	7000	40
1500°F / 815°C	3500	24
1600°F / 870°C	2200	15
1700°F / 925°C	1500	10
1800°F / 980°C	1200	8



Physical Constants and Thermal Properties

Density, lb / in 3 .... 0.302
Mg/m 3 ....8.37
Melting Range, °F 2440-2520
°C 1340-1380
Specific Heat, Btu/ lb' °F ....,,,,..0.110
J/Kg °C 461
Coefficient of Expansion, 68-212F, 10 in / F................6.1
20-100 °C.pm/m °C 11.0
Thermal Conductivity, Btu • in ft2•h• °F 81.1
W/m •°C 11.7
Electrical Resistivity ohm cire mil/ft 656
• m 1.09

Specifications and Designations

UNS No 6075	Wrekstoff Nr 2.4951, 2.4630
BSHR5, HR 203, HR 403	WL Nr 24630.
HR 504	AFNOR NC 20 T
DIN 17742, 17750 - 17752	AECMA Pr EN 2293, 2294
	2302, 2306 - 2308, 2402, 2411

Hastelloy Alloy C-276**

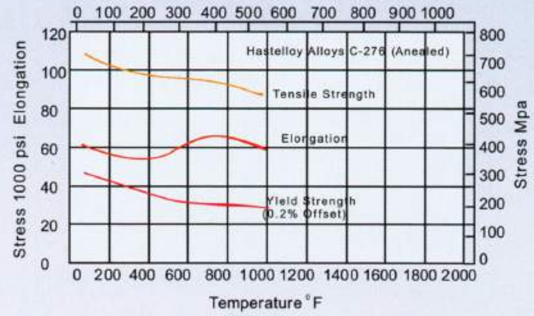
A nickel-molybdenum-chromium alloy with an addition of Tungsten having excellent corrosion resistance in a wide range of severe environments. The high molybdenum content makes the alloy especially resistant to pitting and crevice corrosion. The carbon content minimizes carbide precipitations during welded structures. Used in pollution control, chemical processing, pulp and paper production and waste treatment. standard product forms are round, forging stock, tube, pipe, plate, sheet, strip and wire.

Limiting Chemical Composition, %

Ni.....Reminder.....Co...........2.5 max. S......0.03
max.
Mo...15.0-17.0......Mn..........1.0 max. Si.....0.08 max.
Cr.....14.5-16.5......C...........0.01max.
Fe....4.0-7.0..........V............0.035 max.
W.....3.0-4.5..........P............0.04 max.

Typical Mechanical Properties (Annealed)

Tensile Strength Psi...115.000
Mpa..790
Yield Strength (0.2% Offset), Psi.......................... 60.000
Mpa..415
Elongation,%..50



Physical Constants and Thermal Properties

Density, lb /in 0.321
Mg/m 8.89
Melting Range, °F 2415-2500
°C 1325-1370
Specific Heat, Btu/ lb' °F 0.102
J/Kg °C 427
Coefficient of Expansion, 70-200° F, 10-6 in'/ °F..........6.8
21-93 °C /m °C 12.2
Thermal Conductivity, Btu • in ft2•h• °F 67.9
W/m 'C...9.8
Electrical Resistivity ohm cire mil/ft 739.2
• m 1.229
Permeability at 200 oersted (15.0 KA/m)............... 1.0002

Specifications and Designations

UNS No 10276	ASME SB-574, SB-575,
ASTM B 574, B 575, B 619	4SB-619, SB-622, SB-626
B 622, B 626, B 751	Boiler Code Sections I, III, VIII, IX
NACE MR 01 - 75	Werkstoff Nr. 2.4819
DIN 17744, 17750, 17752	

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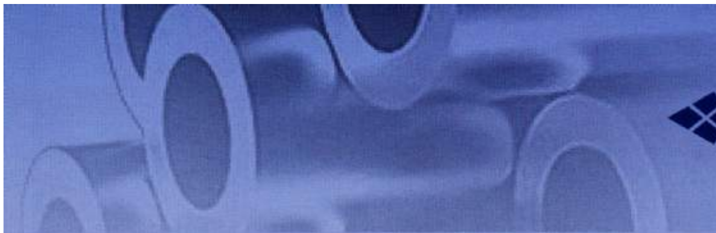
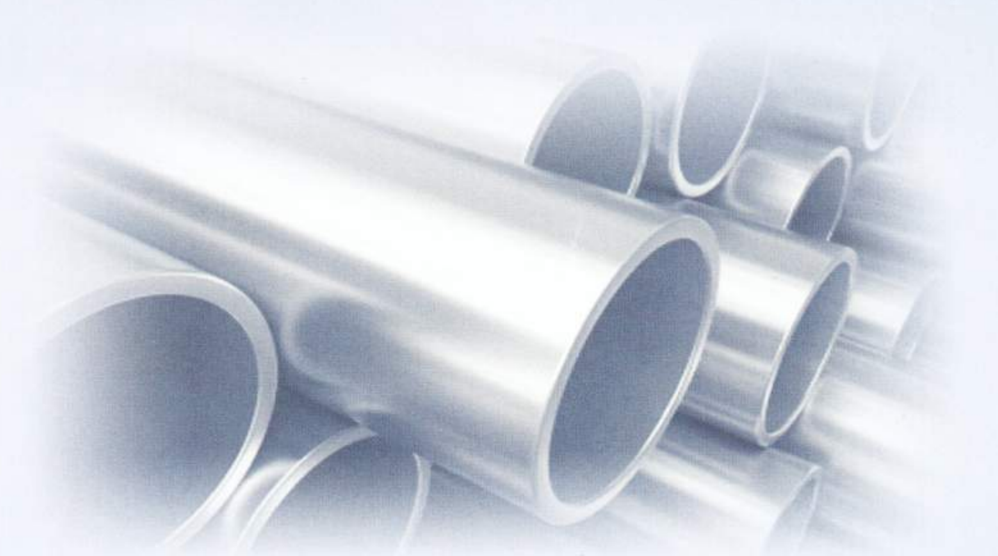


TITANIUM As per ASTM B 338

A. COMPOSITION							
ASTM GRADE sim DIN Grade	**1 (3.7025) % max**	**2 (3.7035) % max**	**5 (3.7055) % max**	**7 (3.7235) % max**	**9 (-) % max**	**11 (3.7225) % max**	**11 (3.7195) % max**
Nitrogen	0.03	0.03	0.03	0.03	0.02	0.03	0.03
Carbon	0.08	0.08	0.10	0.08	0.10	0.10	0.08
Hydrogen	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Iron	0.20	0.30	0.30	0.30	0.25	0.20	0.30
Oxygen	0.18	0.25	0.25	0.25	0.15	0.18	0.25
Aluminium -	-	6 . min	-	2.5-3.5	-	-	
Vanadium	-	-	4 . min	-	2.0-3.0	-	-
Pailadium	-	-	-	0.12-0.25	-	0.12-0.25	-
Molybedenum	-	-	-	-	-	-	0.2-0.4
Nickel	-	-	-	-	-	-	0.6-0.9
Residuals/Each	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Residuals/Total	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Titanium	Rem.	Rem.	Rem.	Rem.	Rem.	Rem.	Rem

B. Mechanical Properties (Annealed)							
	Mpa	**Mpa**	**Mpa**	**Mpa**	**Mpa**	**Mpa**	**Mpa**
Tensile strength (min)	240	345	450	345	620	240	483
Yield strength (min)	170	275	380	275	483	170	345
Yield strength (max)	310	450	550	450	-	310	-
Elongation % (min)	24	20	18	20	15	24	18



NEW SEAS ALLOYS LLP.

CARBON STEEL SEAMLESS PIPE DIMENSIONS & WEIGHT

ASA PIPE SCHEDULES WALL = WALL THICKNESS IN MILLI METER WT = WEIGHT IN KG PER METER

Nominal Pipe size	OD mm	Shedule 10		Shedule 20		Shedule 30		Standard		Shedule 40		Shedule 60		Extra Strong		Shedule 80		Shedule 100		Shedule 120		Shedule 140		Shedule 160			
		Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt
1/8	10.3	-	-	-	-	-	-	1.73	0.375	1.73	0.375	-	-	2.41	0.470	2.41	0.470	-	-	-	-	-	-	-	-	-	-
1/4	13.7	-	-	-	-	-	-	2.24	0.630	2.24	0.630	-	-	3.0	0.800	3.0	0.800	-	-	-	-	-	-	-	-	-	-
3/8	17.1	-	-	-	-	-	-	2.31	0.840	2.31	0.840	-	-	3.2	1.10	3.2	11.0	-	-	-	-	-	-	-	-	-	-
1/2	21.3	-	-	-	-	-	-	2.77	1.270	2.77	1.270	-	-	3.73	1.62	3.73	1.62	-	-	-	-	-	-	4.78	1.95	7.47	2.55
3/4	26.7	-	-	-	-	-	-	2.87	1.69	2.87	1.69	-	-	3.91	2.20	3.91	2.20	-	-	-	-	-	-	5.56	2.90	7.82	3.64
1	33.4	-	-	-	-	-	-	3.38	2.50	3.38	2.50	-	-	4.55	3.24	4.55	3.24	-	-	-	-	-	-	6.35	4.24	9.09	5.45
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	9.7	7.77
1-1/2	48.3	-	-	-	-	-	-	3.68	4.05	3.68	4.05	-	-	5.08	5.41	5.08	5.41	-	-	-	-	-	-	7.14	7.24	10.16	9.56
2	60.3	-	-	-	-	-	-	3.91	5.44	3.91	5.44	-	-	5.54	7.48	5.54	7.48	-	-	-	-	-	-	8.74	11.1	11.07	13.4
2-1/2	73.0	-	-	-	-	-	-	5.16	8.63	5.16	8.63	-	-	7.01	11.4	7.01	11.4	-	-	-	-	-	-	9.52	14.9	14.0	20.4
3	88.9	-	-	-	-	-	-	5.49	11.29	5.49	12.9	-	-	7.62	15.27	7.62	15.27	-	-	-	-	-	-	11.13	21.35	15.24	27.68
3-1/2	101.6	-	-	-	-	-	-	5.74	13.57	5.74	13.57	-	-	8.08	18.63	8.08	18.63	-	-	-	-	-	-	-	-	16.2	34.0
4	114.3	-	-	-	-	-	-	6.02	16.07	6.02	16.07	-	-	8.56	22.32	8.56	22.32	-	-	11.13	28.32	-	-	13.49	33.54	17.12	57.43
5	141.3	-	-	-	-	-	-	6.55	21.77	6.55	21.77	-	-	9.52	30.94	9.52	30.94	-	-	12.7	40.28	-	-	15.88	46.11	19.05	41.03
6	168.3	-	-	-	-	-	-	7.11	28.26	7.11	28.26	-	-	10.97	42.56	10.97	42.56	-	-	14.27	54.20	-	-	18.26	67.56	21.95	79.22
8	219.1	-	-	6.35	33.31	7.04	36.31	8.18	42.55	8.18	42.55	10.31	53.08	12.7	64.64	12.7	64.64	15.09	75.92	18.26	90.44	20.62	101	23.01	111.31	22.2	107.9
10	273.0	-	-	6.35	47.75	7.8	51.01	9.27	60.29	9.27	60.29	12.7	81.52	12.7	81.52	15.09	81.52	18.26	114.7	2.44	133.0	25.4	155.09	28.57	172.21	25.4	155.0
12	323.8	-	-	6.35	49.71	8.38	65.18	9.52	73.78	10.31	79.70	14.27	108.92	12.7	97.43	17.48	97.43	21.44	159.86	25.4	187.0	31.75	208	33.3	239.0	25.4	187.0
14	355.6	6.35	54.60	7.92	67.90	9.52	81.25	9.52	81.25	11.13	94.55	15.09	126.71	12.7	108.92	19.05	108.92	23.83	195.0	27.79	253.56	31.8	253.56	35.75	281.70	-	-
16	406.4	6.35	62.64	7.92	77.83	9.52	93.17	9.52	93.17	12.7	123.30	16.66	162.12	12.7	123.30	21.44	123.30	26.2	245.56	30.96	286.64	36.53	333.19	40.5	365.45	-	-
18	457.2	6.35	70.60	7.92	87.75	11.13	122.43	9.52	105.01	14.27	155.87	19.05	205.83	12.7	139.2	23.83	139.2	29.4	310.0	34.92	363.14	39.7	408.45	45.24	459.59	-	-
20	508.0	6.35	78.55	9.52	117.02	12.7	155.12	9.52	117.02	5.09	183.42	20.62	247.83	12.7	155.12	26.2	55.12	32.54	381.53	381	441.49	44.45	508.11	50.0	564.87	-	-
22	558.8	6.35	86.4	9.52	129.0	12.7	172.0	9.52	129.0			22.2	294.0	12.7	172.0	28.6	172.0	34.9	451.0	41.3	526.0	47.6	603.56	54.0	672.0	-	-
24	609.6	6.35	94.46	9.52	140.88	14.27	209.50	9.52	140.88	17.48	255.24	24.61	355.0	12.7	186.94	30.96	186.94	38.89	547.33	46.02	639.58	52.37	719.63	59.54	807.63	-	-
26	660.4	7.9	127.43	12.7	202.85			9.52	152.80	-	-	-	-	12.7	202.85	-	202.85										
28	711.2	7.9	137.0	12.7	219.0	15.9	272.0	9.52	165.0	-	-	-	-	12.7	219.0	-	219.0										
30	762.0	7.9	147.0	12.7	234.0	15.9	292.0	9.52	176.6	-	-	-	-	12.7	234.0	-	234.0										
32	812.8	7.9	157.0	12.7	250.5	15.9	312.45	9.52	188.0	-	-	-	-	12.7	250.0	-	250.0										
34	863.6	7.9	167.0	12.7	266.0	15.9	334.0	9.52	200.0	-	-	-	-	12.7	266.0	-	266.0										
36	914.4	7.9	177.0	12.7	283.0	15.9	352.0	9.52	212.0	-	-	-	-	12.7	283.0	-	283.0										

CHEMICAL AND MECHANICAL PROPERTIES OF CARBON STEEL AND ALLOY STEEL PIPES

Available Ex-stock with Test Certification and IBR Test Certification in form IIIA/IIIB
Available Ex-stock with LRS Certificate ASTM A 333/6 & ASTM 335 P-11

* Carbon Steel ERW pipe IBR	ASTM A 53 Grade A/B	Low Temperature seamless Pipes	ASTM A 333 Grade 6
Carbon Steel seamless Pipes IBR	ASTM A 106 Garde B	Low Temperature seamless Tubes	ASTM A 334 Grade 1,
* Carbon Steel seamless boiler	BS/3059168/Part I/CDS/ST-33	Heat Exchanger Tubes	ASTM A 179/ ASTM A 214
tubes IBR	BS/ 3059/68/Part I/HFs/ST-33	API Line Pipes	API 5 L Grade B
	ASTM 210 A-1/DIN 17175/ST 35-8	M S E R W Pipes	IS. 1239 Part 1 - 1979
Seamless boiler tubes	BS/3059/1978/Part I ERW-320	Hot Deep Galvanished Pipes	IS. 1239 Part 1 - 1979
" ERW boiler tubes IBR	BS/3059/1978/Part I CEW-320	Big diameter ERW Pipes	IS. 3589
CDW boiler tubes IBR	ASTM 335-P-1. P-5. P-11. P-22,P-9	M.S. Square & Rectangular Section	ISS 4923/ASTM -A500
`Alloy steel seamless Pipes	ASTM 213 F-11, F-22. ASTM 209 F1	M.S. General Engineering Tubes	BSS/ 1775. IS 3074
`Alloy steel seamless tubes	DIN 171745 Grade 3 15 M03.		ISS 4711, ISS 3601
	ASTM 200 P-4, P5. P11, P22 P7. P-9	ERW Air heater Tubes	BS/1175/ERW 11
	ASTM 199 P-4, P5. P11. P22, P7. P-9		

POPULAR STANDARDS AND SPECIFICATION

	CHEMICAL ANALYSIS											CHEMICAL ANALYSIS				
												Tensle Strengthen	Impact	Yedd Stress	Elongaton in	Hardness
	SPECIFICATION	C %	Mn %	P % Max	S % MIN	SI %	Cr %	Cu % Max	Mo %	NI % Max	Va % Max	MP a (min)	50F 4010	MP a (min)	50 mm MIN Transverse	(Max)
1	ASTM A531A	0.25 Max	0.95 Max	0.05	0.06		-	-	-	-	-	331	-	207	36	-
2	ASTM A531B	0.3 Max	1.20 Max	0.05	0.06	-	-	-	-	-	-	413	-	240	295	-
3	ASTM 106/A	0.25 Ma	0.27-093	0.025	0.025	0.10 MIN	0.40 Ma	0.4	0.15 Max	0.4	0.08	330	-	205	25,20	-
4	ASTM 1061E	0.30 Max	0.29-106	0.025	0.025	0.10 MIN	0.40 Ma	0.4	0.15 Max	0.4	0.08	415	-	240	16 5/12 0	-
5	ASTM 106/C	0.35 Max	0.29-106	0.025	0.025	0.10 MIN	0.40 Max	0.4	0.15 Max	0.4	0.08	485	-	275	1651120	-
6	ASTM A179	0.06-0 18	0.27-0 63	0.048	0.048	-	-	-	-	-	-	325	-	180	35	72HRB
7	ASTM A192	0.06-0 18	0.27-063	0.048	0.058	0.25 Ma	-	-	-	-	-	325	-	180	35	77HRB
8	ASTM A209/T1	0.10-020	0.30-080	0.045	0.045	0.10-050	-	-	0.44-0 65	-	-	380	-	205	30 22	80HRB
9	ASTM A209/T1A	0.15-0 25	0.30-080	0.045	0.045	0.10-050	-	-	0.44-0 65	-	-	365	-	195	30 22	81 HRB
10	ASTM A209/T1B	0.14 Max	0.30-080	0.045	0.045	0.10-050	-	-	0.44-0 65	-	-	415	-	220	30 22	77HRB
11	ASTM A210A-1	0.27 Max	0.93-Max	0.048	0.058	0.10 MIN	-	-	-	-	-	415	-	255	30122	79HRB
12	ASTM A2101C	0.35 Max	0.29-106	0.048	0.058	0.10 MIN	-	-	-	-	-	485	-	275	30 22	89HRB
13	ASTM A213/T2	0.10-0 20	0.30-061	0.045	0.045	0.10-030	0.50-081	-	0.44-0 65	-	-	415	-	205	30 22	85HRB
14	ASTM A213/T5	0.15 Max	0.30-060	0 03	0.03	0.050 Ma	4.00.6 00	-	0.44-0 65	-	-	415	-	205	30/22	85HRB
15	ASTM A213/T11	0.15 Max	0.30-060	0.03	0.03	0.05.100	1.00-1 50	-	0.44-0 65	-	-	415	-	205	30/22	85HRB
16	ASTM A213/T12	0.15 Ma	0.30-0 16	0.045	0.045	0.050 Ma	0.80-1 25	-	0.44-0 65	-	-	415	-	205	30 22	85HRB
17	ASTM A2131T22	0.15 Max	0.30-060	0.03	0.03	0.050 Ma	1.90 260	-	0.87-1 13	-	-	415	-	205	30 22	85HRB
18	ASTM A33311	0.30 Max	0.40-106	0.025	0.025	-	-	-	-	-	-	380	J14	205	25+20	-
19	ASTM A33316	0.30 Ma	0.29-106	0.025	0.025	0.10 MIN	-	-	-	-	-	415	J14	240	165 120	-
20	ASTM A334/1	0.30 Ma	0.40-106	0.025	0.025	-	-	-	-	-	-	380	J14	205	35/28	85HRB
21	ASTM A334/6	0.30 Max	0.29-106	0.025	0.025	0.10 MIN	-	-	-	-	-	415	J14	240	30 22	90HRB
22	ASTM A335/P1	0.10-0 20	0.3-0 80	0.025	0.025	0.10-050			044-0 65	-	-	380	-	205	20	-
23	ASTM A3351P2	0.10-0 20	0.3-0 61	0.025	0.025	0.10-030	0.50-0 81	-	0.44-0 65	-	-	380	-	205	20	-
24	ASTM A335/P5	0.15 Max	0.3-0 60	0.025	0.025	0.50 Ma	4.00.6 00	-	0.44-0 65	-	-	415	-	205	20	-
25	ASTM A3351P11	0.15 Max	0.3-0 60	0.025	0.025	0.50-100	1.00-1 50	-	0.44-0 65	-	-	415	-	205	20	-
26	ASTM A3351P12	0.15 Max	0.3-0 61	0.025	0.025	0.50 Ma	0.80-1 25		0.44-0 65	-	-	415	-	205	20	-
27	ASTM A3351P22	0.15 Max	0.3-0 61	0.025	0.025	0.50 Ma	1.90-2 60		0.87-1 13	-	-	415	-	205	20	-
28	SS1305911133	0.15 Max	0.30-0 70	0.050	0.050	-	-	-	-	-	-	324-441	-	186	25	-
29	SS1305912133	0.15 Max	040-070	0 050	0 050	0 10-0 35	-	-	-	-	-	324-441	-	186	21	-
30	6S1305912/45	0.12-0 18	090.120	004	0 035	0 10-0 35	-	-	-	-	-	441-560	-	245	22	-
31	BS1305912/620	0.10.0 15	0 40 0 70	0 04	004	0 10-0 35	0.70-1 10	-	0.45-065	-	-	441-618	-	235	22	-
32	DIN117175/ST35.8	0.17 Max	0 40 MIN	004	0 04	0 35-AX-	-	-	-	340-441	-	340-441	-			
33	DIN/17175/5T45.8	0.22 Max	0 40 MIN	004	004	0 10-0 35	-	-	-	-	-	441.540	-	235	25	-
34	DIN/17175/15M03	0.12-0 20	050-080	004	0 04	0 15-0 35	-	-	0.25-035	-	-	441.540		284-	21	-
35	OIN/17175113 CrM044	010-0 18	040-070	004	0 04	0 15-0 35	0.70 1 10	-	0.40-0 50	-	-	441 57n	-	294	22	-
36	SAE 52100	098-1 10	020-045	0 025	0 25	0 10-0 35	1.30 1 60	-	0.10 MIN	-				-	-	-

DIMENSIONS AND NOMINAL WEIGHTS OF BLACK STEEL TUBS IN ACCORDANCE WITH IS: 1239 (PART 1) - 1979

Nomina	Outside daimeter				Thickness						Weight of black tube						Diamention of sockets	
	Light		Medium & heavy		Light		Medium		Heavy		Light		Medium		Heavy		Outside	
											Plain	Screwed	Plain	Screwed	Plain	Screwed	Diameter	Length
Bore	Max	Min	Ma.	Min	mm	swg	mm	swg	mm	swg	End	Socketed	End	Socketed	End	Socketed	Min	Min
mm	mm	mm	mm	mm							kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	mm	mm
6	10.1	9.7	10.6	9.8	1.8	15	2.0	14	2.65	12	0.361	0.364	0.407	0.410	0.496	0.496	15	19
8	13.6	13.2	14.0	13.2	1.8	15	2.35	13	2.9	11	0.517	0.521	0.650	0.654	0.769	0.773	18.5	27
10	17.1	16.7	17.5	16.7	1.8	15	2.35	13	2.9	11	0.674	0.680	0.852	0.858	1.02	1.03	22	28
15	21.4	21.0	21.8	21.0	2.0	14	2.65	12	3.25	10	0.952	0.951	1.22	1.23	1.45	1.46	27	37
20	26.9	26.4	27.3	26.5	2.35	13	2.65	12	3.25	10	1.41	1.42	1.58	1.59	1.90	1.91	32.5	39
25	33.8	33.2	34.2	33.3	2.65	12	3.25	10	4.05	8	2.01	2.03	2.44	2.46	2.97	2.99	39.5	46
32	42.5	41.9	42.9	42.0	2.65	12	3.25	10	4.05	8	2.58	2.61	3.14	3.17	3.84	3.87	49	51
40	48.4	47.8	48.8	47.9	2.9	11	3.25	10	4.05	8	3.25	3.29	3.61	3.65	4.43	4.47	56	51
50	60.2	59.6	60.8	59.7	2.9	11	3.65	9	4.5	7	4.11	4.18	5.10	5.17	6.17	6.24	68	60
65	76.0	75.2	76.6	75.3	3.25	10	3.65	9	4.5	7	5.80	5.92	6.51	6.63	7.90	8.02	84	69
80	88.7	87.9	89.5	88.0	3.25	10	4.05	8	4.85	6	6.81	6.98	8.47	8.64	10.1	10.3	98	75
100	113.9	113.0	115.0	113.1	3.65	9	4.5	7	5.4	5	9.89	10.2	12.1	12.4	14.4	14.7	124	87
125	-	-	140.8	138.5	-	-	4.85	6	5.4	5	-	-	16.2	16.7	17.8	18.3	151	96
150	-	-	166.5	163.9	-	-	4.85	6	5.4	5	-	-	19.2	19.8	21.2	21.8	178	96

BIG DIAMETER ERW PIPES CONFIRM 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 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
4.85	22.59	25.62	32.07	38.18	-	-	-	-
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	-	93.13	-	-
9.53	-	51.50	60.24	73.75	81.21	-	105.00	117.00
12.70	-	-	-	-	107.28	123.00	139.00	155.00

Tolerance on Thickness and weight

The following manufacturing 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
	-12.5 percent

(b) Weight

(1) Single tube (light series)	+ 10 percent
	- 8 percent
(2) single tube (medium and heavy series)	± 10 percent

NEW SEAS ALLOYS LLP.

Special Alloy & Tools Steel Carbon Constructional Steels

IS: 1570/1961 Designation	ASP Designation	Nominal Chemistry			Equivalent Specifications			
		C	Mn	Si	BS: 970 Designation	SAE Designation	DIN Designation	GOST Designation
C-35	C-35	.35	.75	.25	En-8	1036	CK-35	-
C-40	C-40	.40	.75	.25	-	1040, 1038	-	-
C-45	C-45	.45	.75	.25	En-9	1042,1045,1046	CK-45	45
C-35	C-55	.55	.75	.25	En-43C	1055	-	55

Note: S & P limits will be guided by relevant specifications

		Chemical composition percent				
Specification No.	Materials	C	Si	Mn	S	P max
BS- 970/55	Wrought Steel-bars, Billets and forgings					
En-1A	Free Cutting Steel for machining	0.07-0.15	0.10 max	0.80-1.20	0.20-0.30	0.07
En-1 B	Free Cutting Steel for machining	0.07 - 0.15	0.10 max	0.80-1.40	0.30-0.60	0.06
En-2	General purpose cold forming steel0.20 max	--	0.80 max	0.06 max	0.06	
En-2A	Special purpose cold forming steel0.12 max	--	0.50 max	0.05 max	0.05	
En-2A/1	-----------" ------------" ------------"	0.10 max	--	0.05 max	0.04 max	0.04
En-2B	-----------" ------------" ------------"	0.15 max	--	0.50 max	0.05 max	0.05
En-5	Carbon Steel	2.25 - 0.35	0.05 - 0.35	0.05 - 0.35	0.06 max	0.04
En-8	Carbon Steel	0.35 - 0.45	0.05 - 0.35	0.60 - 1.00	0.06 max	0.05
En-8m	Carbon Steel-Free Cutting	0.35 - 0.45	0.25 max	0.90 - 1.30	0.12-0.20	0.06
En-9	Carbon Steel	0.50 - 0.60	0.50 - 0.35	0.05 - 0.80	0.06 max	0.06
En-32A	Carbon Case-hardening Steel	0.15 max	0.05 - 0.35	0.40 - 0.70	0.05 max	0.06
En-32B	-----------" ------------" ------------"	0.10 - 0.18	0.05 - 0.35	0.60 - 1.00	0.07 max	0.05
En-32C	-----------" ------------" ------------"	0.10 - 0.18	0.05 - 0.35	0.60 - 1.00	0.05 max	0.05
En-45	Silicon-Manganese Spring steel	0.50 - 0.60	1.50 - 2.00	0.70 - 1.00	0.05 max	0.05
En-45A	-----------" ------------" ------------"	0.55 - 0.63	1.70 - 2.00	0.70 - 1.00	0.05 max	0.05

		Chemical composition percent				Mechanical Properties		
Specification No.	Materials	C max	MN max	S max	P max	Tensil strength Kgf/mm2 min	Yield Stress Kgf/mm2	Elongation percent min.
BS-1449/64		--	--	--	--	--	--	--
Part-2A	Carbon Steel plates rolled by	--	--	--	--	--	--	--
the non-continuous process		--	--	--	--	--	--	--
En-2	Commercial Quality	--	--	--	--	--	--	--
En-2 A	Deep Drawing Quality	--	--	--	--	--	--	--
En-2A/1	Extra Deep Drawing Quality	0.20	0.90	--	0.06	--	--	--
En-2B	Flanging Quality	0.12	0.50	0.05	0.05	31.5	--	23
	0.10	0.50	0.04	0.04	29.9	--	26	--
Part-2B	Carbon steel Sheet rolled by the	0.15	0.50	0.05	0.05	31.5	--	23

non-continous process								
En-2	commercial Quality	0.20	--	--	--	--	--	--
En-2A	Deep Drawing Quality	0.12	0.50	0.05	0.05	--	--	--
En-2A/1	Extra Deep Drawing Quality	0.10	0.50	0.04	0.04	--	--	--
En-2B	Cold Forming Quality	0.15	0.60	0.05	0.05	31.5	--	20.5

+ No Tensile properties are specified but for design purposes the Tensile strength can be assumed to be of the order of 20 tons/inch2 Guage length Lo= 8 inch

IS - 2002 - 62 STEEL PLATES FOR BOILERS

Designation	Chemical Composition									
	C max	mn	Si max	P max	S max	Tensile Strength Kf / mm 2	Yield Strength Kf / mm2 min		Test	% min piece
IS 2002-1	0.18	0 2	0.15-0.35	0.035	0.040	36.7-49	24	23	5.65/Sc	24
IS 2002-2	0.20	0 2	0.15-0.35	0.035	0.40	41.7-54	27	26	5.65/Sc	22
IS 2002-3	0.22	0 2	0.15-0.35	0.035	0.040	46.8-59	29.5	29	5.65/Sc	21

IS - 2062 - 92 STEEL FOR GENERAL STRUCTURAL PURPOSE

Grade	Designation	Chemical Composition						Supply Tensile	Tensile Strength (min) Kg/mm2	Yield Strength (mm) Kg/mm2			% El in gauge length 5.56 / so	Bend Test	Std. Test Piece charpy V Notch Impact Energy joule min	Remark
		C max	Mn max	S max	P max	Si max	CE max			<20 mm	20-40 min	>40 min				
A	Fe 410 WA	0 23	1.5	0.050	0.050	-	0.42	As rolled	41.8	25.50	24.48	23.45	23	31	-	
B	FE 41 OWB	0.22	1.5	0.045	0.045	0.040	0.41	As Rolled Plates above 12mm may be normalised if agreed to between manufacturer & purchaser	41.8	25.50	24.48	23.45	t<25mm 3t for > 25mm			min Charpy impact energy to be at 0-C agreed betn. mfgrs. purchaser
C	FE 41OWC	0.20	1.5	0.040	0.040	0.040	0.39	As Rolled Plates above 12mm shall be normalise	41.8	25.50	24.48	23.45	23	21	27	impact properties to be guaranteed, at any one o two temp. 20c or 40 c as specified by purchaser

ASTM A 537-35 PRESSURE VESSEL PLATES. HEAT TREATED, CARBON MANGGANESES-SILICON STEEL

	Chemical composition										Heat Treatment	Tensile Strength			Elongation % min	
Desig-nation	C max		Min. thickness in mm t<1-1/2 (38)	Min. thickness in mm t>1-1/2	P max	S max	Cu max	Ni max	Cr max	Mo max		Thickness in mm	Tensile Strength Ksi (MPa)	Yield Strength Ksi (MPa) min	GL=8'n or 200 mm	GL=2 in or 50 mm
A 537-1	0.24	0.15-0.50	0.70-1.35	1.0-1.60	0.035	0.040	0.035	0.25	0.25	0.08	Normalised	t<2-1/2(64) 2-1/2t <(4(100)	70-90 (485 620) 65-85 (450-585)	50 (345) 45 (310)	18	22
A 537-2	0.24	0.15-0.50	0.70-1.35	1.0 1.60	0.035	0.040	0.035	0.25	0.25	0.08	Quenched & Normalised	T<2-1/2(64) 2-1/2<t (4(100)	80-100 (550-690) 75-95 (515-655)	60 (415) 55 (380)	-	22

ASTM A 285-80 PRESSURE VESSEL PLAT ES.CARBON STEEL LOW AND INTERMEDIATE TENSILE

	Chemical composition				Chemical composition			
Designation	C max	Mn max	P max	S max	Tensile Strength Ksi (MPa)	Yield Strength Ksi (MPa)	Elongation Gl + 8 in	Gls 2 in
A 2,35	0.7	0.90	0.035	0.035	45-65 (310-450)	24-(165)	27	30
A 285 B	0.22	0.90	0.035	0.035	50-70 (385-485)	27(185)	25	28
A 285 C	0.28	0.90	0.035	0.035	55-75 (380-515)	30(205)	23	27

Carbon Steel Plates - is 8500 / Sailma

CHEMICAL COMPOSITION						
Grade	Ladle Analysis					
IS 8500	C% Max	Mn% Max	S% Max	P% Max	Si% Max	C.E% Max
Fe 440	.20	1.30	.050 .040	.050 .040	45	40
Fe 440B	.20	1.30	.050 .040	.050 .040	45	40
Fe 490	.20	1.50	.050 .040	.050 .040	45	42
Fe 4908	.20	1.50	.050 .040	.050 .040	45	44
Fe 540	.20	1.60	.045 .040	.045 .040	45	44
Fe 540B	.20	1.60	.045 .040	.045 .040	45	44
Fe 570	.22	1.60	.045 .040	.045 .040	45	46
Fe 570B	.22	1.60	.045 .040	.045 .040	45	46
Fe 590	.22	1.60	.045 .040	.045 .040	45	48
Fe 590B	.22	1.80	.045 .040	.045 .040	45	48

MECHANICAL PROPERTIES										
Grade IS 8500	Tensile Strength (Min)	Yield Strength (Min)				Bend Elongation Percent (Min)	Charpy (Internal diameter) Min		V-notch Impact toughness, Joules, Min (Average of 3 Values) Room Temp - 20 C	
		<16 mm MPa	16-40 mm MPa	41-63 mm MPa	>63 mm MPa	5 65, S-o-	< 12mm	12-25 mm		
Fe 440	440	300	290	280	By agreement	22	2t	3t	-	-
Fe 440B	440	300	290	280	-	22	2t	3t	50	30
Fe 490	490	350	330	320	-	22	2t	3t	-	-
Fe 490B	490	350	330	320	-	22	2t	3t	50	25
Fe 540	540	410	390	380	-	20	2t	3t	-	-
Fe 540B	540	410	390	380	-	20	2t	3t	50	25
Fe 570	570	450	430	420	-	20	2t	3t	-	-
Fe 570B	570	450	430	420	-	20	2t	3t	45	20
Fe 590	590	450	430	420	-	20	2t	3t	-	-
Fe 590B	590	450	430	420	-	20	2t	3t	45	20

SAILMA High Strength Micro Alloy Structual steel (Semi Killed)

Chemical Composition

Grade	C% Max	Mn% Max	S% Max	P% Max	Nb V +Ti% Max
SAILMA 300	0 25	1.50	0.055	0.055	0.20
SAILMA 300HI	0.20	1.50	0.040	0.040	0.20
SAILMA 350	0.25	1.50	0.040	0.040	0.20
SAILMA 350HI	0.20	1.50	0.040	0.040	0.20
SAILMA 410	0.25	1.50	0 040	0.040	0.20
SAILMA410HI	0.20	1.50	0.040	0.040	0.20
SAILMA450	0.25	1.50	0.040	0.040	0.20
SAILMA450HI	0.20	1.50	0.040	0.040	0.25

Mechanical Properties

Grade	UTS (MPa)	YS (MPa) Min	El.% Min 5.WFSo	IMPACT CHARPYV		Bend Test
SAILMA 300	440-560	300	20	0'C-20"C Joules (Min)		3T
SAILMA 300HI	440-560	300	21	40	30	3T
SAILMA 350	490-610	350	20	-		3T
SAILMA 350HI	490-610	350	21	40	30	3T
SAILMA 410	510-660	410	19	-		3T
SAILMA 410HI	540-660	410	20	35	25	3T
SAILMA 450	570-720	450	18	-		3T
SAILMA 450HI	570-720	450	19	30	20	3T

ASTM A 515-78 VESSEL PLATES, CARBON STEEL, FOR INTERMEDIATE & HIGHER TEMP. SERVICE

	Chemical Composition, %						Tensile Test			
Designation	Thickness in (mm)	C max	Si	Mn max	P max	S max	Tensile Strength Ksi (MPa)	Yield Strength Ksi (MPa), min	Elongation, % min Gl= 8 in. "2	Gl= 2 in
A 515-55	1<1(25) 1 <t<2 (50) 2<t<4(100) 4<t<8(200) t<1	0.20 0.22 0.24 0.26 0.28					55-75 (380-515)	30(205)	23	27
A 515-60	t<1(25) 1 <t<2(50) 2<t<4(100) 4<t<8(200) t<8 t<1(25) 1 <t<2(50)	0.24 0.27 0.29 0.31 0.31 0.28 0.31	0.15-0.30	0.90	0.035	0.04	60-80 (415-550) 65-85	32(220)	21	25
A 515-65	2<t<4(100) 4<t<8(200) t<8	0.33 0.33 0.33	0.15-0.30	0.90	0.035	0.04	19 (450-585)	23 35(240)		
A 515-70	t<1(25) 1 <t<2(50) 2<t<4(100) 4<t<8(200) t<8	0.31 0.33 0.35 0.35 0.35	0.15-0.30	0.90	0.035	0.04	70-90 (485-620)	38(260)	17	21

ASTM A 515-78 VESSEL PLATES, CARBON STEEL, FOR INTERMEDIATE & LOWER TEMP. SERVICE

	Chemical Composition, %						Tensile Test			
Designation	Thickness in (mm)	C max	Si	Mn max	P max	S max	Tensile Strength Ksi (MPa)	Yield Strength Ksi (MPa), min or 200mm	Elongation, % min Gl= 8 in. *2 or 50mm	Gl= 2 in
A516-55	T<1/2 (13 1 <t<2(50) 2<t<4(100) 4<t<8(200) t>8	0.18 0.20 0.22 0.24 0.26	0.15-0.30 0.15-0.30	0.60-0.90 0.60-1.20	0.035 0.035	0.04 0.04	55-75 (380-515)	30(205)	23	27
A 516-60	T<1/2 (13 1<t<2(50) 2<t<4(100) 4<t<8(200) t>8	0.21 0.23 0.25 0.27 0.27	0.15-0.30 0.15-0.30	0.60-0.90 0.85-1.20	0.035 0.035	0.04 0.04	60-80 (415-550)	32(220)	21	25
A516-65	t<1/2(13) 1<t<2(50) 2<t<4(100) 4<t<8(200) t<8	0.24 0.26 0.28 0.29 0.29	0.15-0.30	0.85-1.20	0.035	0.04	65-85 (450-585)	35(240)	19	23
A 516-70	t<1/2(13) 1<t<2(50) 2<t<4<(100) 4<t8(200) t>8	0.27 0.28 0.30 0.31 0.31	0.15-0.30	0.85-1.20	0.035	0.04	70-90 (485-620)	38(260)	17	21

*1. Refer to Note *1 ASTM A.455.
*2. (1) Refer to note *2 for ASTM A.455
(2) For Plates over 3.5 in.(88.9 mm) in thickness, a deduction of 0.5% from the specified percentage of elongation in 2 in. (50 mm) shall be made for each increase of 0.5 in. of the specified thickness over 3.5 in. This deduction shall not exceed 3 %

Heat Treatment

Fine grain practice.

1. Plate 1.50 in (38 mm) and under in thickness are normally supplied in the as-rolled condition.
2. Plate over 1.50 in. in thickness shall be normalized.

*1. Grade 60 plate 0.50 in (13.mm) and under in thickness may be specified to have 0.85-1.20% managese on heat analysis.

*2. Refer to not *1 for ASTM A. 455.

*3. Refer to not *2 for ASTM A.455.

CHEMICAL COMPOSITION

ASTM A353-78 VESSEL PLATES, ALLOY STEEL, 9 PERCENT NICKEL, DOUBLE-NORMALIZED & TEMPERED									
Chemical Composition, %				Tensile Test					
Designation max	C	Si max	Mn max	P max	S	Ni	Tensile Strength Ksi (MPa)	Yield Strength Ksi (MPa) min	Elongation, % min Gl= 2 in or 50 mm
A 353	0.13	0.15 - 0.30	0.90	0.035	0.040	8.50-9.50	100 - 120 (690 - 825)	75 (515)	20

ASTM A387-78 PRESSURE VESSEL PLATES, ALLOY STEEL, CHROMIUM-MOLYBDENUM										
CHEMICAL COMPOSITION										
Designation	Specification	C max	Si	Mn	P max	S max	Cr	Mo	Tensile Strength Ksi (MPa)	Yield Strength (0.2% offset) Ksi (MPa)
									55-80	33
	Grade 2	0.21	0.15-0.30	0.55,-0.80	0.035	0.040	0.500.85	0.450.60	(380-550)	(230)
	Grade 12	0.17	0.1,5-0.30	0.40-0.65	0.035	0.040	0.80-1.15	0.45-0.60	55-80	33
									(380-550)	(230)
	Grade 11	0.17	0.50-0.80	0.40-0.65	0.035	0.040	1.00-1.50	0.45-0.65	60-85	35
									(415-585)	(240)
									60-85	30
	Grade 22	0.15**	0.50 max	0.30-0.60	0.035	0.035	2.00-2.50	0.90-1.10	(415-585)	(205)
	Grade 21	0.15*1	0.50 max	0.30-0.60	0.035	0.035	2.75-3.25	0.90-1.10	60-85	30
A 387									(415-585)	(205)
									60-85	30
	Grade 5	0.15	0.50 max	0.30-0.60	0.040	0.030	4.00-6.00	0.45--0.65	(415-585)	(205)
										30
	Grade 7	0.15	1.00 max	0.30-0.60	0.030	0.030	6.00-8.00	0.45-0.65	60 -55	(205)
									(415-85)	
	Grade 9	0.15	1.00 max	0.30-0.60	0.030	0.030	8.0010.00	0.90-1.10	60-85	30
								(415-585)	(205)	

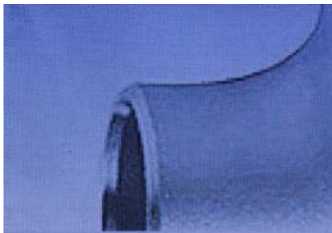
1) The carbon content for plates over 5 inch (127 mm) in thickness is 0.17% max. on product analysis.

2) a) For plates under 0.312 inch (7.92 mm) in thickness, a deduction of 1.25% from the specified percentage of elongation shall be made for each decrease of 0.031 inch (0.79 mm) of the specified thickness under 0.312 inch.

b) For plates over 3.5 inch (88.9 mm) in thickness, a deduction of 1.25% from the specified percentage of elongation in 2 inch (50 mm) shall be made for each increase of 0.05 inch of the specified thickness over 3.5 in this deduction shall not exceed 3%

c) For plates upto the including 3/4 inch thickness, if the percentage of elongation of an 8 inch or 200 mm gauge length test specimen falls not more than 3% below the amount prescribed, the elongation shall be considered satisfactory provided the percentage of elongation in 2 inch (50 mm) across the break is not less than 25 %.

3) Measured on round test specimen.
4) Measured on flat test specimen
5) Applicable to annealed and normalised-tempered materials
6) Not applicable to annealed materials



NEW SEAS ALLOYS LLP.

Product Range

Pipe, Pipes Fitting Like Elbow, Tee, Reducer, Stubend, Collar, Cap & Flange.

Material & Specification

1) Stainless Steel Pipe Fitting
   Specification : ASTM A 403 & A182, - SMO6-254, 904L, 317L, 304L, 316L, 321H, 347H.

2) Duplex Pipe Fitting
   Specification : Duplex SS BE.03 - ASTM A790, A815 - S318031 WP410,
   ASTM A744, A790, with UNS S31200, S31260, S3204, S32550, S32750, S32760.

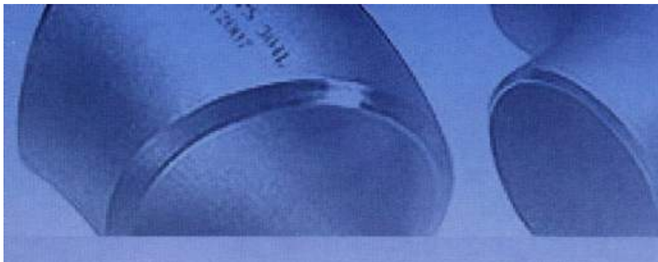
3) Carbon Steel Pipe Fitting (IBR & NON IBR)
   Specification : A234 - WPA, WPB, WPC, & ASTM A105.

4) Alloy Steel Pipe Fitting
   Specification : ASTM A335, A234, A182 - WP1 WP 51 / WP 91 / WP 12 / WP 22 / WP 91.

5) Inconel & Monel Pipe Fitting
   Specification : Inconel 600 / 601 / 625 - SB 366, ASTM B366 WPNC, Monel - 400.

6) .Cupro Nickel Pipe Fitting
   Speification : 90 / 10 CuNi UNS C 70600, 70 / 30 CuNi UNS C 71500

7) Titanim Pipe Fitting
   Specification : Titanium Commercially Pure Grade 1 & 2, Confirming to ASTM
   B - 337 Gr.2 / ASTM B - 265 Gr. 2 / ASTM B - 363 Gr. WPT2



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Materials Chemical Composition Mechanical Properties

Steel type	ASTM Grade	Chemical Composition									Mechanical Properties				
		C% max	Mn%	P% max	S% max	Si%	Cr%	Mo%	Ni%	Others	R.min Tebsile Strength MPa	S.min Yield Strength MPa	A% min (2/4D) Elongation		Impact test RCV (2) J
													Long	Trabsv	-
A234	WPB(1)	0.3	0.29-1.06	0.05	0.058	0.10 min	0.4	0.15	0.4	Cu=0.4 V=0.08 Cb=0.02	415-585	240	30	20	-
	WPC(1)	0.35	0.29-1.06	0.05	0.058	0.10 min	0.4	0.15	0.4	Cu=0.4 V=0.08 Cb=0.02	485-655	275	30	20	-45°C 17.6/13.6
A420	WPL/6(1)	0.3	0.6-1.35	0.035	0.04	0.15-0.30	0.3	0.12	0.4	Cu=0.4 V=0.08 Cb=0.02	415-585	240	30	16.5	-101°C 17.6/13.6
	WPL3	0.2	0.31-0.64	0.05	0.05	0.13-0.37	-	-	3.2-3.8	-	450-620	240	30	20	-
	WP1	0.28	0.30-0.9	0.045	0.045	0.10-0.50	-	0.44-0.65	-	-	380-550	205	30	20	-
	WP12CL1	0.05-0.2	0.3-0.8	0.045	0.045	0.60	0.8-1.25	0.44-0.65	-	-	415-585	220	30	20	-
	WP12CL2	-	-	-	-	-	-	-	-	-	485-655	275	30	20	-
A234	WP11CL1	0.5-0.15	0.3-0.6	0.3	0.3	0.5-10	1.0-1.5	0.44-0.65	-	-	415-585	205	30	20	-
	WP11CL2	0.5-0.2	0.3-0.9	0.4	0.4	0.5-10	1.0-1.5	0.44-0.65	-	-	485-655	275	30	20	-
	WP11CL3	-	-	-	-	-	-	-	-	-	520-690	310	30	20	-
	WP22CL1	0.05-0.15	0.3-0.6	0.04	0.04	0.5	1.9-2.6	0.87-11.3	-	-	415-585	205	30	20	-
	WP22CL3	-	-	-	-	-	-	-	-	-	520-690	310	30	20	-
	WP5	0.15	0.3-0.6	0.04	0.03	0.5	4.0-6.0	0.44-0.65	-	-	415-585	205	30	20	-
	WP9	0.15	0.3-0.6	0.03	0.03	0.25-10	8.0-10.0	0.9-1.10	-	-	415.585	205	30	20	-
	WP91	0.08-0.12	0.3-0.6	0.02	0.01	0.2-0.5	8.0-9.5	0.85-1.05	0.4	V=0.18-0.25 Cb=0.08-0.10 N=0.03-0.07 Al=0.04	585-760	415	20	-	-
A403	WP304	0.08	2	0.045	0.03	1	18.20	-	8.0-11.0	-	515	205	28	20	-
	WP304L	0.035	2	0.045	0.03	1	18.20	-	8.0-13.0	-	485	170	28	20	-
	WP304H	0.04-0.10	2	0.045	0.03	1	18.20	-	8.0-11.0	-	515	205	28	20	-
	WP316	0.08	2	0.045	0.03	1	18.20	2.0-3.0	11.0-14.0	-	515	205	28	20	-
	WP316L	0.035	2	0.045	0.03	1	18.20	2.0-3.0	10.0-16.0	-	485	170	28	20	-
	WP321	0.08	2	0.045	0.03	1	17.0-20.0	-	9.0-13.0	Ti=5xC max 0.70%	515	205	28	20	-
	WP321H	0.04-0.10	2	0.045	0.03	1	17.0-20.0	-	9.0-13.0	Ti=4xC max 0.60%	515	205	28	20	-
	WP347	0.08	2	0.045	0.03	1	17.0-20.0	-	9.0-13.0	Cb+Ta>=10x%C max 0.10%	515	205	28	20	-
	WP347H	0.04-0.10	2	0.045	0.03	1	17.0-20.0	-	9.0-13.0	Cb+Ta>=8x%C max 0.10%	515	205	28	20	-
	WPS31254	0.02	1	0.03	0.01	0.8	19.5-20.5	6.0-6.5	17.5-18.5	N=0.18-0.22 Cu=0.5-1.0	515	205	28	20	-
A815	S 31803	0.03	2	0.03	0.02	1	21.0-23.0	2.5-3.5	4.5-6.5	N=0.8-0.2	620	450	25	-	-
	WP 410	0.15	1	0.04	0.03	1	11.5-13.5	-	0.5	-	485-655	205	20	-	-
B366	WPNIC 10	0.06-0.10	1.5	-	0.015	1	19.0-23.0	-	30.0-35.0	Cu=0.75 Al=0.15-0.60	450	170	30	-	-
	WPNIC11	0.06-0.10	1.5	-	0.015	1	10.-23.0	-	30.0-35.0	Fe=39.5 min Al+Ti=0.85-1.20	450	170	30	-	-

Titanium Alloys, Nickel Alloys, Inconel Alloys, Coupro Nickel & Aluminum Alloys are also available upon request for each reduction of 0.01% below the specified carbon max, an increase of 0.06% Mn above the specified max will be permitted up to 1.35% max. 2) Relative to 10 x 10 specimen.

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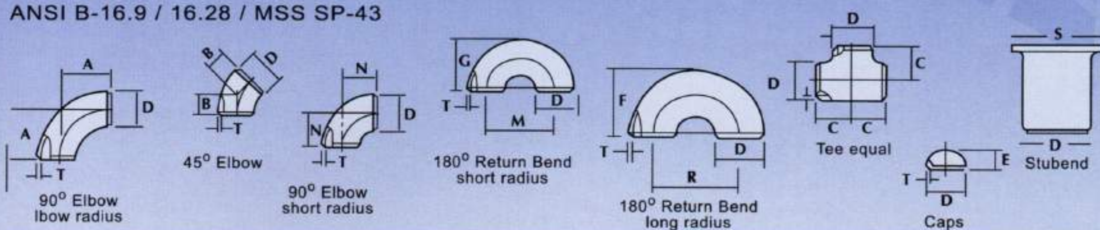
Butt Welding Pipe Fitting Dimensional Standard

ANSI B-16.9 / 16.28 / MSS SP-43



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	50.8	101.6
2	50	60.3	76	35	64	51	38	106	81	152	102	92	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	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	101.6	203.2
10	250	273.1	381	159	216	254	127	518	391	762	508	324	127.0	254.0
12	300	323.9	457	190	254	305	152	619	467	914	610	381	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	152.4	305.0
18	450	457.2	686	286	343	457	203	914	686	1372	914	500.4	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							

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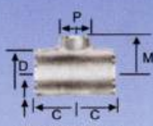
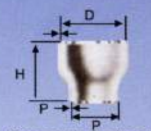
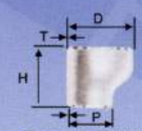
Butt - Welding Pipe Fitting
ANSI B 16.9 / 16.28



Reducing Tees



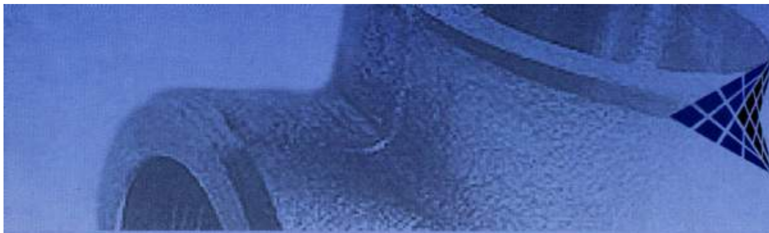
Concentric Reducers



Eccentric Reducers

Nominal Pipe Size		Outside Diamete		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	-
1/2 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	38	38	51
1 x 1/2	25 x 15	33.4	21.3	38	38	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	422	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 2	90 x 40	101.6	48.3	95	79	102
3 1/2 x 1 1/2	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 x8	250 x 200	273.1	219.1	216	203	178
10 x 6	250 x 150	273.1	168.1	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



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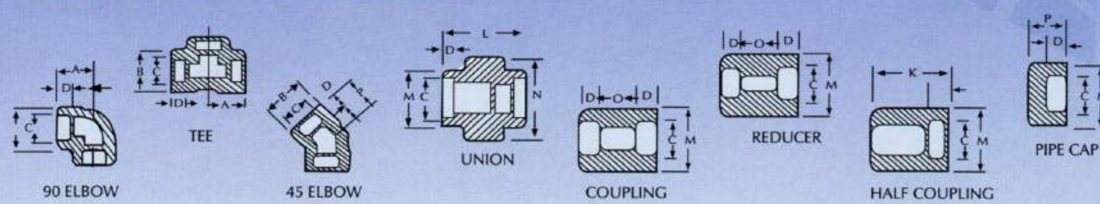
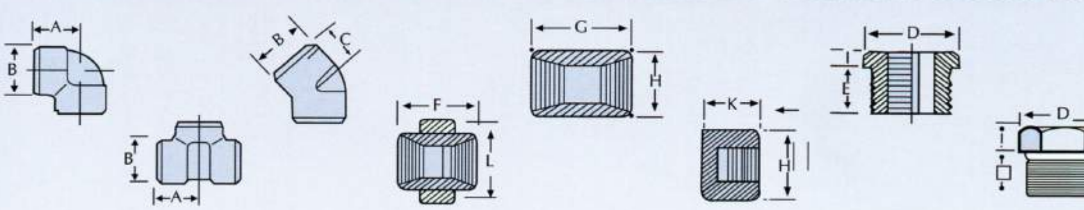
SOCKET WELD FITTING TO ANSI B-16.11



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"	172	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 "	334	37	46	40	25	64	452	60	22.5	13	33.8	13	9	17	42	50	50	40	94
1 1/4"	422	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	614	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 O.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	-	6	-	25	25	19	32	22	-
1/4"	137	25	25	19	35	19	25	16	11	43	3	6	32	29	33	22	35	25	27
3/8"	17.2	29	33	22	38	22	25	17.5	13	48	4	8	38	33	38	25	38	32	27
1/2"	21.3	33	38	25	48	29	32	22	15	51	5	8	46	38	46	29	48	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"	334	44	56	33	60	44	41	35	19	64	6	10	60	51	62	35	60	57	43
11/4"	42.2	51	62	35	67	57	44	445	21	70	7	14	72	60	75	43	67	64	46
11/2"	483	60	75	43	79	64	44	51	21	79	8	16	80	64	84	44	79	76	48
2 "	60.3	64	84	45	86	76	48	63.5	22	88	9	17	94	83	102	52	86	92	51
21/2"	73.02	83	102	52	92	92	60	76	27	118	10	21	122	95	121	64	92	108	64
3"	89.0	95	121	64	108	108	65	89	29	121	10	65	140	106	146	79	108	127	68
4"	114.5	114	152	79	121	140	68	117.5	32	150	13	25	180	114	152	79	121	159	75

SOCKET WELD PIPE FITTING - STANDARD DIMENSIONS

Nominal Pipe Size		Inch	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
		mm	3.2	6.4	9.5	12.7	19.0	25.4	31.7	38.1	50.8	63.5	76.2	101.6
Length	A	mm	25.4	25.4	28.6	35.0	38.1	44.4	47.6	50.8	63.5	63.5	69.9	76.2
Centre to Face	B	mm	20.6	20.6	24.6	28.6	33.3	38.1	44.4	50.8	60.3	76.2	85.7	106.3
Cap Length	C	mm	17.46	17.46	19.05	22 23	25.4	26.99	30.16	31.75	38.10	38.10	44.45	47.63
Out Side	D	mm	19.0	22.2	25.4	31.7	38.1	44.5	57.2	63.5	76.2	92.1	1080	139.7
Diameter	E	mm	22.2	22.2	25.4	33.3	38.1	46.0	55.5	62.0	75.4	92.0	109.5	146.0
Socket Bore	F	mm	10.7	14.1	17.5	21.7	27.0	33.8	42.5	48.0	61.1	74.0	89.8	115.4
	MIN	mm	9.5	9.5	9.5	9 5	12.7	12.7	127	12.7	15.9	15.9	15.9	19.0
Depth of Socket	G MAX	mm	9.5	9.5	11.1	12.7	14.3	15.9	17.5	19.0	22.2	22.2	25.4	28.6
	H MAX	mm	9.5	9.5	11.1	12.7	14.3	15.9	17.5	19.0	22.2	286	35.0	39.7
Centre to Socket	J	mm	11.1	11.1	13.5	15.8	19.0	22.2	27.0	31.7	38.1	41.2	57.1	66.6
Back face	K	mm	8.0	8.0	8.0	11.1	12.7	14.3	17.4	20.6	25.4	28.6	31.7	41.2
Centre to face	L	mm	17.46	19.0	19.0	22.2	25.4	28.6	33.3	35.0	42.8	52.4	63.5	79.3
Wall Thik minimum		mm	30.18	3.30	3.51	4.09	4.27	4 98	5.28	5.54	6.05	7.65	8.31	9.35
Bore		mm	6.45	8.86	12.14	15.42	20.55	26.26	34.67	40.51	52.12	61.95	77.17	101.50

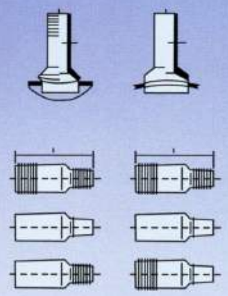
Nominal Pipe Size		Inch	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
		mm	3.2	6.4	9.5	12.7	19.0	25.4	31.7	38.1	50.8	63.5	76.2	101.6
	A	mm	31.7	35.0	38.1	47.6	50.8	60.3	66.7	79.4	85.7	92.1	108.0	120.7
Face to Face Length	B	mm	15.9	17.5	19.0	23.8	25.4	30.2	33.3	39.7	42.9	46.0	54.0	60.3
	C	mm	19.0	25.4	25.4	31.7	36.5	41.3	44.5	44.5	47.6	60.3	65.1	68.3
	D	mm	20.6	24.6	28.6	333	38.1	44.4	50.8	60.3	63.5	82.5	95.2	114.3
Face to Centre Length	E	mm	15.9	19.0	22.2	28.6	35.0	44.5	57.2	63.5	76.2	92.1	108.0	139.7
	F	mm	22.2	25.4	33.3	38.1	46.0	55.5	62.0	75.4	84.1	101.6	120.6	152.4
	G	mm	6.35	8.13	9.14	10.92	12.70	14.73	17.02	17.78	19.05	23.67	25 81	27.79
	H	mm	17.5	19.0	22.2	25.4	28.6	33.3	35.0	42.8	43.6	52.4	63.5	79.3

SWAGED NIPPOLETS

3000#

(In millimeters)

Run-Pipe Size	Outlet size	Wall-T	G	Unit Weight (kg)
36-3/4	1/2	7.3	23.9	0.36
36-1	3/4	7.9	30.2	0.56
36-1 1/4	1	8.9	36.6	0.84
36-1 1/2	1 1/4	9.7	44.5	1.22
36-2	1 1/2	10.2	50.8	2.00
36-2 1/2	2	11.2	65.0	3.12



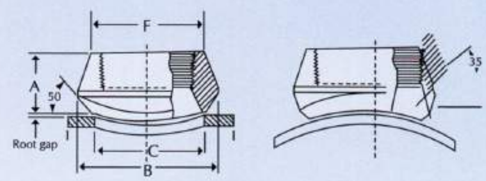
(In millimeters)

Large end Size	Small end Size	Length-L
1/2	3/8-1/8	70
3/4	1/2-1/8	76
1	3/4-1/8	89
1 1/4	1-1/8	102
1 1/2	1 1/4-1/8	114
2	1 1/2-1/8	165
2 1/2	2-1/8	178
3	2 1/2-1/8	203
3 1/2	3-1/8	203
4	3 1/2-1/8	229

FORGED STEEL OUTLET FITTING SOCKOLETS

3000#, 6000#

Outlet	A		B		C	
Size	3000#	6000#	3000#	6000#	3000#	6000#
1/2	25.4	31.8	34.9	44.5	23.8	19.1
3/4	27.0	365	44.5	50.8	30.2	25.4
1	33.3	39.7	54.0	61.9	36.5	33.3
1 1/4	33.3	41.3	651	69.9	44.5	38.1
1 1/2	34.9	42.9	73.0	82.6	50.8	49.2
2	38.1	52.4	88.9	103.2	65.1	69.9
2 1/2	46.0	-	103.2	-	76.2	-
3	50.8	-	122.2	-	93.7	-
4	57.2	-	152.4	-	120.7	-

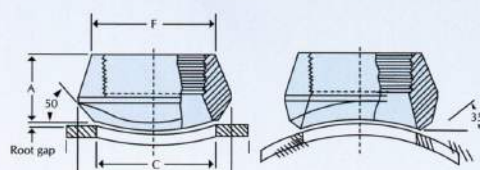


Applicable Run Pipe Sizes are From out-Let to 36" For the 3000# and 6000# Sockolets and Thredolets, Inside Bore, Thread, Socket Bore and Socket depth Dimensions are according to ANSI B 16.11 Pipe Schedule Numbers and Weight Designation are in Accordance with ANSI B36.10 When ordering Sockolets and Thredolets, Include The Quantity, Run and Ou-Let Size. Item And Rating (or Schedule Number) and material

FORGED STEEL OUTLET FITTING THREDOLETS

3000#, 6000#

Outlet	A		B		C	
Size	3000#	6000#	3000#	6000#	3000#	6000#
1/2	25.4	31.8	34.9	44.5	23.8	19.1
3/4	27.0	36.5	44.5	50.8	30.2	25.4
1	33.3	39.7	54.0	61.9	36.5	33.3
1 1/4	33.3	41.3	65.1	69.9	44.5	38.1
1 1/2	34.9	42.9	73.0	82.6	50.8	49.2
2	38.1	52.4	88.9	103.2	65.1	69.9
2 1/2	46.0	-	103.2	-	76.2	-
3	50.8	-	122.2	-	93.7	-
4	57.2	-	152.4	-	120.7	-



Applicable Run Pipe Sizes are From out-Let to 36" For the 3000# and 6000# Sockolets and Thredolets, Inside Bore, Thread, Socket Bore and Socket depth Dimensions are according to

ANSI B 16.11

Pipe Schedule Numbers and Weight Designation are in Accordance with

ANSI B36.10

When ordering Sockolets and Thredolets, Include The Quantity, Run and Ou-Let Size, Item And Rating (or Schedule Number) and material

Flanges

A Flange is Forged Steel, Alloy Steel & Stainless Steel, Design to connect section of Pipe or joint Pipe to Pressure Vessel, Valve, Pump or any other integral Flange Assembly.

Flanges are joint to each other by bolting & joint to pipe system by welding or threading.

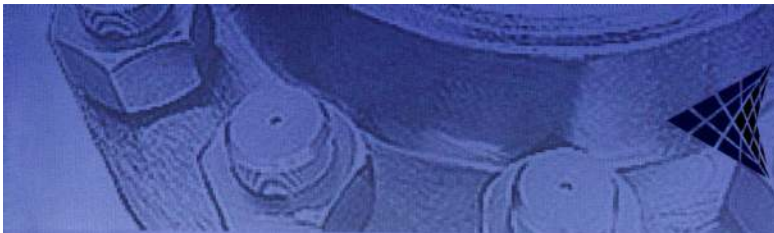
Size :- Nominal Pipe : 1/2", 3/4", 1", 1 1/4", 11/2", 2", 21/2", 3" UPTO 12 MM NB : 15, 20, 25, 32, 40, 50, 65, 80, UPTO 300 mm NB

Type :- Slip On, Weld -neck , Blind, Socket-weld, Threaded, Lap-joint (Stub-end) Ring Joint Threaded Reducing & Orifice

Std :- As per ASA B 16. 5 Class for 150 Lbs., 300 Lbs., 900 Lbs., 1500Lbs & 2500Lbs., As per DIN. ND - 6 -2631 (85 PSI), nd 10 -2632 (142 PSI) ND - 16-2633 (228 PSI), ND 402635 (569 PSI)

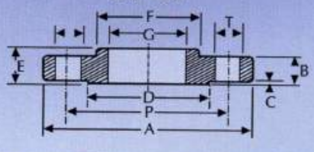
Material :- As per ASTM A 105 (High Temperature Service) As per ASTM A 181 (General Service) Carbon Steel Grade. ASTM A 182 for high Temperature Service for S.S 304 & SS 316. SS plate: A240 & 403 Type 304 & 316. M.S Plate : IS-226 - IS - 2206, IS - 2062 also profile cutting in M.S Plate & Fabricate.

Dimension :- As per ANSI B 16.5 for Forged steel Flange.

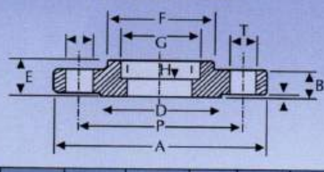


DIMENSIONS OF CLASS 150 FLANGES AS PER ANSI B 16.5

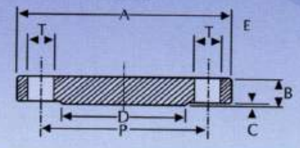
SLIP-ON



SOCKET WELD



BLIND



N.B.	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	T	No. of Holes
15	89	11.1	1.6	35	16	30	22.4	9.5	21.3	-	48	16	16	230	60.3	3.0	159	4
20	98	12.7	1.6	43	16	38	27.7	11.0	26.7	-	52	16	16	280	69.8	3.0	159	4
25	108	14.3	1.6	51	17	49	34.5	12.5	33.4	-	56	17	17	350	79.4	3.0	159	4
32	117	15.9	1.6	64	21	59	43.2	14.5	42.2	-	57	21	21	435	88.9	5.0	15.9	4
40	127	17.5	1.6	73	22	65	49.5	16.0	48.3	-	62	22	22	500	98.4	6.5	15.9	4
50	152	19.0	1.6	92	25	78	62.0	17.5	60.3	-	64	25	25	625	120.6	8.0	19.0	4
65	178	22.2	1.6	105	29	90	74.7	19.0	73.0	-	70	29	29	755	139.7	8.0	19.0	4
80	190	23.8	1.6	127	30	108	90.7	20.5	88.9	-	70	30	30	91 5	152.4	9.5	19.0	8
90	216	23.8	1.6	140	32	122	103.4	-	101.6	-	71	32	32	1040	177.8	9.5	19.0	8
100	229	23.8	1.6	157	33	135	116.1	-	114.3	-	76	33	33	1170	190.5	11.0	19.0	8
125	254	23.8	1.6	186	37	164	143.8	-	141.3	-	89	37	37	1450	215.9	11.0	22.2	8
150	279	25.4	1.6	216	40	192	170.7	-	168.3	-	89	40	40	1710	241.3	12.5	22.2	8
200	343	28.6	1.6	270	44	246	221.5	-	219.1	-	102	44	44	2220	293.4	12.5	22.2	8
250	406	30.2	1 6	324	49	305	276.4	-	273.0	-	102	49	49	2770	362.0	12.5	25.4	12
300	483	31.8	1.6	381	56	365	327.2	-	323.9	-	114	56	56	3280	431.8	12.5	25.4	12
350	533	34.9	1.6	413	57	400	359.2	-	355.6	-	127	57	79	3600	476.2	12.5	28.6	12
400	597	36.5	1.6	470	64	457	410.5	-	406.4	-	127	64	87	4110	539.8	12.5	28.6	16
450	635	39.7	1.6	533	68	505	461.8	-	457.2	-	140	68	97	4620	577.8	12.5	31.8	16
500	698	42.9	1.6	584	73	559	513.1	-	508.0	-	144	73	103	5140	635.0	12.5	31.8	20
600	813	47.6	1.6	692	83	664	616.0	-	609.6	-	152	83	111	6160	749.3	12.5	34.9	20

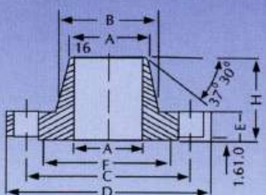
DIMENSIONS OF CLASS 300 FLANGES AS PER ANSI B 16.5

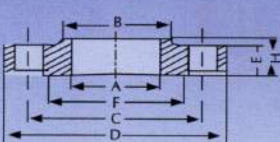
N.B.	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	T	No. of Holes
15	95	14.3	1.6	35	22	38	22.4	9.5	21.3	23.5	52	16	22	23.0	66.7	3.0	15.9	4
20	117	15.9	1.6	43	25	48	27.7	11.0	26.7	29.0	57	16	25	28.0	82.6	3.0	19.0	4
25	124	17.5	1.6	51	27	54	34.5	12.5	33.4	36.0	62	17	27	35.0	88.9	3.0	19.0	4
32	133	19.0	1.6	64	27	64	43.2	14.5	42.2	44.5	65	21	27	43.5	98.4	5.0	19.0	4
40	156	20.6	1.6	73	30	70	49.5	16.0	48.3	50.5	68	22	30	50.0	114.3	6.5	22.2	4
50	165	22.2	1.6	92	33	84	62.0	17.5	60.3	63.5	70	29	33	62.5	127.0	8.0	19.0	8
65	190	25.4	1.6	105	38	100	74.7	19.0	73.0	76.0	76	32	38	75.5	149.2	8.0	22.2	8
80	210	28.6	1.6	127	43	117	90.7	20.5	88.9	92.0	79	32	43	91.5	168.3	9.5	22.2	8
90	229	30.2	1.6	140	44	133	103.4	-	101.6	105.0	81	37	44	104	184.2	9.5	22.2	8
100	254	31.8	1.6	157	48	146	116.1	-	114.3	118.0	86	37	48	117.0	200.0	11.0	22.2	8
125	279	34.9	1.6	186	51	178	143.8	-	141.3	145.0	98	43	51	145.0	235.0	11.0	22.2	8
150	318	36.5	1.6	216	52	206	170.7	-	168.3	171.0	98	46	52	171.0	269.9	12.5	22.2	12
200	381	41.3	1.6	270	62	260	221.5	-	219.1	222.0	111	51	62	222.0	330.2	12.5	25.4	12
250	444	47.6	1.6	324	67	321	276.4	-	273.0	276.0	117	56	95	277.0	387.4	12.5	28.6	16
300	521	50.8	1.6	381	73	375	327.2	-	323.9	329.0	130	60	102	328.0	450.8	12.5	31.8	16
350	584	54.0	1.6	413	76	425	359.2	-	355.6	360.0	143	64	111	360.0	514.4	12.5	31.8	20
400	648	57.2	1.6	470	83	483	410.5	-	406.4	411.0	146	68	121	411.0	571.5	12.5	34.9	20
450	711	60.3	1.6	533	89	533	461.8	-	457.2	462.0	159	70	130	462.0	628.6	12.5	34.9	24
500	775	63.5	1.6	584	95	587	513.1	-	508.0	513.0	162	73	140	514.0	685.8	12.5	34.9	24
600	914	69.8	1.6	692	106	702	616.0	-	609.6	614.0	168	83	152	616.0	812.8	12.5	41.3	24

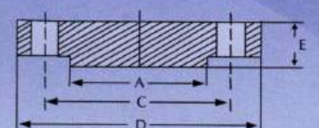
1) All dimensions are in Milimeters

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

DIMENSIONS OF CLASS 600 FLANGS AS PER ANSI B 16.5







N.B.	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	T	No. of Holes
15	95	14.3	6.4	35	22	38	22.4	9.5	213	23.5	52	16	22	230	667	3.0	15.9	4
20	117	15.9	6.4	43	25	48	27.7	11.0	267	29.0	57	16	25	280	820	3.0	19.0	4
25	124	17.5	6.4	51	27	54	34.5	12.5	334	36.0	62	17	27	350	889	3.0	19.0	4
32	133	20.6	6.4	64	29	64	43.2	14.5	422	44.5	67	21	29	435	984	5.0	19.0	4
40	156	22.2	6.4	73	32	70	49.5	16.0	483	505	70	22	32	500	1143	6.5	22.2	4
50	165	25.4	6.4	92	37	84	62.0	17.5	603	63.5	73	29	37	625	1270	8.0	19.0	8
65	190	28.6	6.4	105	41	100	74.7	19.0	730	76.0	79	32	41	755	1492	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	915	1683	9.5	22.2	8
90	229	34.9	6.4	140	49	133	103.4	-	1016	105.0	86	40	49	1040	1842	9.5	25.4	8
100	273	38.1	6.4	157	54	152	116.1	-	1143	118.0	102	41	54	1170	2159	11.0	25.4	8
125	330	44.4	6.4	186	60	189	143.8	-	1413	145.0	114	48	60	1450	2667	11.0	28.6	8
150	356	47.6	6.4	216	67	222	170.7	-	1683	171.0	117	51	67	1710	2921	125	28.6	12
200	419	55.6	6.4	270	76	273	221.5	-	2191	222.0	133	57	76	2220	3492	125	31.8	12
250	508	63.5	6.4	324	86	343	276.4	-	2730	276.0	152	65	111	2770	4318	125	34.9	16
300	559	66.7	6.4	381	92	400	327.2	-	3239	329.0	156	70	117	3280	4890	12.5	34.9	20
350	603	69.8	6.4	413	94	432	359.2	-	3556	360.0	165	73	127	3600	5270	125	38.1	20
400	686	76.2	6.4	470	106	495	410.5	-	4064	411.0	178	78	140	4110	6032	125	41.3	20
450	743	82.6	6.4	533	117	546	461.8	-	4572	462.0	184	79	152	4620	6540	12.5	44.4	20
500	813	88.9	6.4	584	122	610	513.1	-	5080	513.0	190	83	165	5140	7239	12.5	44.4	24
600	940	101.6	6 4	692	140	718	616.0		6096	614.0	203	92	184	6160	8382	12.5	50.8	24

DIMENSIONS OF CLASS 1500 FLANGS AS PER ANSI B 16.5

N.B.	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	T	No. of Holes
15	121	22.2	6.4	35	32	38	22.4	9 5	213	235	60	22	32	230	826	3.0	22.2	4
20	130	25.4	6.4	43	35	44	27.7	11 0	267	290	70	25	35	280	889	3.0	22.2	4
25	149	28.6	6.4	51	41	52	34.5	125	334	360	73	29	41	350	1016	3.0	25.4	4
32	159	28.6	6.4	64	41	64	43.2	14.5	422	445	73	30	41	435	1111	5.0	25.4	4
40	178	31.8	6.4	73	44	70	49.5	16.0	483	505	83	32	44	500	1238	6.5	28.6	4
50	216	38.1	6.4	92	57	105	62.0	17.5	603	635	102	38	57	625	1651	8.0	25.4	8
65	244	41.3	6.4	105	64	124	74.7	19.0	730	760	105	48	64	755	1905	8.0	28.6	8
80	267	47.6	6.4	127	73	133	-	-	889	92.0	117	51	73	915	2032	9.5	31.8	8
100	311	54.0	6.4	157	91	162	-	-	1143	1180	124	57	91	1170	2413	11.0	34.9	8
125	325	73.0	6.4	186	105	197	-	-	1413	1450	156	64	105	1450	2921	11.0	41.3	8
150	394	82.6	6.4	216	119	229	-	-	1683	1710	171	70	119	1710	3175	12.5	38.1	12
200	483	92.1	6.4	270	143	292	-	-	2191	2220	213	75	143	2220	3937	12.5	44.4	12
250	584	108.0	6.4	324	159	368	-	-	2730	2760	254	84	178	2770	4826	12.5	50.8	12
300	673	123.8	6.4	381	181	451	-	-	3239	3290	283	92	219	3280	5715	12.5	54.0	16
350	749	133.4	6.4	413	-	495	-	-	3566	-	298	-	241	3600	6350	12.5	60.3	16
400	826	146.1	6.4	470	-	552	-	-	4064	-	311	-	260	4110	7048	12.5	66.7	16
450	914	161.9	6.4	533	-	597	-	-	4572	-	327	-	276	4620	7747	12.5	73.0	16
500	984	178.0	6.4	584	-	641	-	-	5080	-	356	-	292	5140	8318	12.5	794	16
600	1168	203.0	6.4	692	-	762	-	-	6096	-	406	-	330	6160	9906	12.5	920	16

1) All dimensions are in Milimeters
2) Flamges except Lap Joint will be furnished with (1.6) Raised Face, which is included in "Thickness (C)" and "Lenght through Hub (Y)".

Weight of Flanges

150 LB PIPE FLANGES

N.B.		APPROXIMATE IN Kg				
Inches	Metric	Slip-on and Screwed	Socket Weld	Weld Neck	Blind	Lap Joint
1/2	15	.50	.50	.82	.82	.50
3/4	20	.91	.91	.82	.91	.91
1	25	.91	.91	1.00	1.00	.95
1 1/4	32	1.27	1.27	1.36	1.27	1.27
1 1/2	40	1.36	1.36	1.81	1.36	1.36
2	50	2.27	2.27	2.72	2.27	2.27
2 1/2	65	3.63	3.63	4.08	3.18	3.63
3	80	4.08	4.08	4.54	4.08	4.08
3 1/2	90	5.00	-	5.44	5.90	5.00
4	100	5.90	-	6.80	7.71	5.90

N.B.		APPROXIMATE IN Kg			
Inches	Metric	Slip-on and Screwed	Weld Neck	Blind	Lap Joint
5	125	6.80	8.62	9.07	6.80
6	150	8.62	10.89	11.79	8.62
8	200	13.61	17.69	20.41	13.61
10	250	19.50	23.59	31.75	19.50
12	300	29.03	36.29	49.90	29.03
14	350	35.38	49.90	59.42	47.63
16	400	42.18	63.50	77.11	63.50
18	450	54.43	68.04	94.80	72.57
20	500	72.12	81.65	123.40	88.45
24	600	95.25	117.93	186.40	124.74

300 LB PIPE FLANGES

N.B.		APPROXIMATE IN Kg				
Inches	Metric	Slip-on and Screwed	Socket Weld	Weld Neck	Blind	Lap Joint
1/2	15	.68	.68	.91	.91	.68
3/4	20	1.13	1.13	1.36	1.36	1.13
1	25	1.36	1.36	1.81	1.81	1.36
1 1/4	32	2.04	2.04	2.49	2.72	2.04
1 1/2	40	2.95	2.95	3.18	3.18	2.95
2	50	3.18	3.18	3.63	3.63	3.18
2 1/2	65	4.54	4.54	5.44	5.44	4.54
3	80	5.90	5.90	7.26	7.26	5.90
3 1/2	90	7.26	-	9.07	9.53	7.26
4	100	9.53	-	11.34	12.25	9.53

N.B.		APPROXIMATE IN Kg			
Inches	Metric	Slip-on and Screwed	Weld Neck	Blind	Lap Joint
5	125	11.79	15.42	15.88	11.79
6	150	15.88	20.41	22.68	15.88
8	200	24.49	31.75	36.74	24.49
10	250	34.93	44.91	57.61	34.93
12	300	49.90	64.41	83.46	63.50
14	350	74.39	84.37	107.10	86.18
16	400	99.79	111.60	139.30	113.40
18	450	127.00	138.40	176.90	133.80
20	500	147.40	171.50	223.20	167.80
24	600	222.30	247.20	342.00	249.50

600 LB PIPE FLANGES

N.B.		APPROXIMATE IN Kg				
Inches	Metric	Slip-do n and Screwed	Socket Weld	Weld Neck	Blind	Lap Joint
1/2	15	1.27	1.27	1.36	.91	.68
3/4	20	1.36	1.36	1.59	1.36	1.13
1	25	1.59	1.59	1.81	1.81	1.36
1 1/4	32	2.04	2.04	2.27	2.72	2.04
1 1/2	40	2.95	2.95	3.63	3.63	2.95
2	50	3.63	3.63	4.54	4.54	3.18
2 1/2	65	5.44	5.44	6.35	6.30	4.54
3	80	6.80	6.80	8.16	9.07	5.90
3 1/2	90	9.53	-	11.79	13.15	7.26
4	100	14.97	-	16.78	18.06	9.53

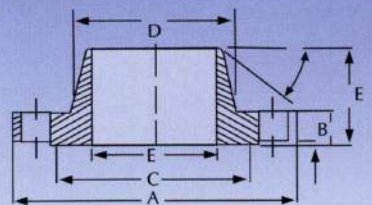
N.B.		APPROXIMATE IN Kg			
Inches	Metric	Slip-on and Screwed	Weld Neck	Blind	Lap Joint
5	125	28.58	30.84	30.84	28.58
6	150	36.29	36.74	39.01	36.29
8	200	44.00	50.80	63.05	44.00
10	250	80.29	88.45	108.90	88.45
12	300	97.52	102.50	133.80	108.80
14	350	117.50	157.40	171.50	131.50
16	400	166.00	218.20	239.00	181.40
18	450	215.50	251.70	301.60	212.70
20	500	277.60	313.00	387.80	285.80
24	600	370.10	443.20	533.00	392.80

1500 LB PIPE FLANGES

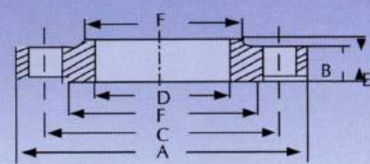
N.B.		APPROXIMATE IN Kg				
Inches	Metric	Slip-do n and Screwed	Socket Weld	Weld Neck	Blind	Lap Joint
1/2	15	1.27	1.27	1.36	.91	.68
3/4	20	1.36	1.36	1.59	1.36	1.13
1	25	1.59	1.59	1.81	1.81	1.36
1 1/4	32	2.04	2.04	2.27	2.72	2.04
1 1/2	40	2.95	2.95	3.63	3.63	2.95
2	50	3.63	3.63	4.54	4.54	3.18
21/2	65	5.44	5.44	6.35	6.30	4.54
3	80	6.80	6.80	8.16	9.07	5.90
3 1/2	90	9.53	-	11.79	13.15	7.26
4	100	14.97	-	16.78	18.06	9.53

N.B.		APPROXIMATE IN Kg			
Inches	Metric	Slip-on and Screwed	Weld Neck	Blind	Lap Joint
6	150	74.39	74.39	72.12	74.39
8	200	117.00	123.80	137.00	117.00
10	250	197.80	205.90	230.00	220.00
12	300	302.60	313.00	351.50	280.00
14	350	--	426.40	442.30	403.70
16	400	567.00	589.70	521.70	--
18	450	--	737.10	593.80	669.00
20	500	--	929.90	1009.30	805.20
24	600	--	1508.30	1644.40	1281.50

DIMENSIONAL TOLERANCES FOR FORGED STEEL FLANGES



This tolerance not covered by
ANSI B 16.5



Welding neck flanges
ANSI B 16.5

Outside Diameter (A)	**When O.D. is 24" or less**	**±1/16****	**Outside Dia. of Hub (F)**	**12" and smaller**	**+3/32"*-1/16"**
	When 0. D is over 24"	**± 1/8****		**Over 12"**	**± 1/8****
Inside Diameter (D)	Threaded	Within limits on Boring gauge		Bolt Circle	± 1/16*
				Bolt hole spacing	±1/32*
	Slip on and Lap Joint	10" and smaller + 1/32", -0"	**Drilling**	Eccentricity between 2' h" and smaller	
				bolt circle diameter	1/32" Max.
		12" and larger + 1/16"-0"		and machined facing	3" and larger
				Diameter	1/16" Max.
Diameter of Contact Face (C)	1/16 Raised Face	±1/32"	**Overall Height (E)**	On flanges 18" and smaller	+1/8"*-1/32"
				On flanges larger than 13"	+3/15"*-1/16"
	1/4 Raised Face, Tongue and		13" and smaller	+41/8"-0"	
	Groove of male and Female ± 1/64"		**Thickness (E)**	Over 18"	+ 3/16"-0"
Diameter of Counter bore	Same as for inside diameter		Where allowance has been left		
				On face for finish: All sizes + 1/8-1/16	

Outside Diameter (A)	When O. D. is 24: or less	± 1/16"	**Drilling**	Bolt Circle	±1/161"
	When O. D. is over 24"	± 1/8"		Bolt hole spacing	± 1/32"
smaller inside Diameter (D)	10" and smaller	± 1/32"		Eccentricity between /2" and smaller2/z" and	
	12" to 18"	± t 1/16		bolt circle diameter	1/32" max
				and machined facing	3" and larger
				diameter	1/16" max
	Over 18"	+ 1/8-1/16"	**Width of Land**	All sizes	± t 1/32"
Diameter of Contact Face (C)	1/16" Raised Face	± t 1/32"	**Angle of Hub Bevel**	All Sizes	± 2112"
	1/4" Raised face, Tongue and **± 1/64"**		18" and smaller	± 1/16	
	Groove, or Male and Female				
Diameter of Hub at Point of Welding (G)	5" and smaller	+3/32"-1/32"	**Overall Height (E)**	12" and larger ±	± 1/8"
	5" and larger	+5/32"-1/32		10" and smaller	+1/8"-0"
Diam ter of Huh at Base (F)	When "F" is 24" and smaller	± 1/8"*	**Thickness (E)**	Over 18"	+ 3/16"-0"
	When "F" is over 24"	± 1/8		Where allowanc has been left	
				on face for Finish, All sire	+1/8"*-1/16"*

LOW TEMP. FITTING CHEMICAL & PHYSICAL PROPERTIES

ASTM Grade	C	Min	Si	S	P	Cr	Ni	Mo	Other	Tensile Ksi (Mpa)	Yeild Ksi(Mpa)	Elongation % Strip/Round	Impact Jules.Av.min	Redn.in Area
A350LF1	0.30 MAX	0.60 1.35	0.15 0.30	0.040 MAX	0.035 MAX	0.30 MAX	0.40 MAX	0.12 MAX	Cu-0.4 max Cb-0.4 max Cb-0.02 max	60.85 (415.585)	0(205)	28/35	18/14	38
LF2	0.30 MAX	0.90 MAX	0.15 0.30	0.040 MAX	0.035 MAX	0.30 MAX	0.40 MAX	0.12 MAX	Cb-0.02 max Va-0.3	0.95 (485.655)	36(250)	30/22	20/16	36
LF3	0.20 MAX	0.6 1.35	0.20 0.35	0.040 MAX	0.035 MAX	0.30 MAX	3.25 3.75	0.12 MAX	Cu-0.4 max Cb-0.02 max Va-0.3 max	0.95 (485.655)	37.5(250)	30/22	20/16	35
LF5	0.30 MAX	0.60 1.35	0.20 0.35	0.040 MAX	0.035 MAX	0.30 MAX	1.0 2.0	0.12 MAX	Cu-0.4 max Cb-0.02 max Va-0.3 max	Ci.1.60.85(415.585) Ci.2.70.95(485.655)	Cl.1.30(205) Cl.2.37.5(260)	C1.1.28/25 C1.2.30/22	20/16	Cl 1 38 CL135
LF6	0.22 1.50	1.15 1.50	0.15 0.30	0.025 MAX	0.025 MAX	0.30 MAX	0.40 MAX	0.12 MAX	Cu-0.4 max Cb-0.02 max Va-0.04-0.11	C11.66-91(455-495) Cl.275-100(515-690)	52(360) 60(415)	Cl.1.30/22 Cl.2.28/20	20/16	40
LF9	0.20 MAX	0.40 1.06	-	0.040 MAX	0.040	0.30 MAX	1.60 2.24	-	Cb-0.02 max Cu -0.75-1.25 vA-0.03	63-88 (435-605)	46(315)	28/25	18/14	38
A420WPL-6	0.30 MAX	0.39 1.06	0.10 MIN	0.030 MAX	0.030 MAX	-	-	-	-	60-85 (415-585)	35(240)	30/22 Long. 16.5/12 Trans	17.6/13.6 17.6-13.6	-
WPL- 9	0.20 MAX	0.40 1.06	-	0.030	0.030	-	1.60 2.24	-	Cu-0.75-1.25	63-88 (435-610)	46(315)	28/20 Long 18/-Trans.	17.6/13.6 17.6/11.6	-
WPL 3	0.10 MAX	0.31 0.64	0.13 0.37	0.050	0.050	-	3.18 3.82	-	-	65-90 (450-620)	35(240)	30/22 Long 20/14 Trans	17.6/13.6 17.6/13.6	-
WPL 8	0.13 MAX	0.90 MAX	0.13 0.37	0.030	0.030	-	8.40 9.60	-	-	100-125 (690-865)	75(515)	22/16	33.9/27.1	-

S. S. ROUND BAR CHEMICAL & PHYSICAL PROPERTIES

ASTM Grade	C	Mn	Si	S	P	Cr	Ni	Mo	Other	Tensile Ksi (Mpa)	Yield Ksi(Mpa)	Elongation % Strip/Round	Impact Jules.Av.min	Redn.in Area
479 TP 304	0.08 MAX	2.00 MAX	1.00 MAX	0.030 MAX	0.045 MAX	18.0 20.0	8.0 11.0	-	N2-0.10 MAX	75000 (515)	3000 (205)	30	-	40
479 TP 316	0.08 MAX	2.00 MAX	1.00 MAX	0.030 MAX	0.045 MAX	16.0 18.0	10.0 14.0	2.0 3.0	N2-0.10 MAX	75000 (515)	30000 (250)	30	-	40
A479 TP 317 L	0.035 MAX	2.00 MAX	1.00 MAX	0.030 MAX	0.045 MAX	18.0 20.0	11.0 15.0	3.0 4.0	N2-0.10 MAX	75000 (515)	30000 (250)	30	-	40
A479 TP 310 S	0.08 MAX	2.00 MAX	1.00 MAX	0.030 MAX	0.045 MAX	24.0 26.0	19.0 22.0	-	-	75000 (515)	3000 (205)	30	-	40
TP 316 H	0.04 0.10	2.00 MAX	1.00 MAX	0.030 MAX	0.040 MAX	16.0 18.0	10.0 14.0	2.0 3.0	-	75000 (515)	30000 (205)	30	-	40
L79 TP 347 H	0.04 0.10	2.00 MAX	1.00 MAX	0.030 MAX	0.040 MAX	17.0 19.0	9.0 13.0	-	Cb--Bxc -13.0	75000 (515)	30000 (205)	30	-	40

LOW TEMP. FITTING CHEMICAL & PHYSICAL PROPERTIES

CEMICAL & PHYSICAL PROP. OF CARBON STEEL STAINLESS STEEL AND ALLOY STEEL FORGED FITTING

ASTM Grade	C	Mn	Si	S	P	Cr	Ni	Mo	Other	Tensile PSI (Kg/mm')	Yield PSI (Kg/mm-)	Elongation %	Hardness BHN	Redn. in Area
A105	0.35 max	0.60 1.05	0.35 max	0.050 max	0.040 max	-	-	-	-	70000 49.46	36000 (25.50)	30Strip 22Round	187	30% Round
A181 Cl 60 & 70	0.35 max	1.10 max	0.32 max	0.35 min	0.05 max	-	-	-	-	Cl.70-70000(49.46) Cl.60-60000(42.32)	30000(20.90) 36000(25.25)	22	-	35%
A 182 F 304	0.08 max	2.00 max	1.00 max	0.03 max	0.04 max	18.0 20.0	8.0 11.0	-	-	75000 (52.52)	30000 (20.90)	30	-	50%
A 182 F 304 L	0.085 max	2.00 max	1.00 max	0.03 max	0.04 max	18.0 20.0	8.0 13.0	-	-	70000 (49.46)	25000 (17-34)	30	-	50%
A 182 F 304 N	0.08 max	2.00 max	0.75 max	0.03 max	0.04 max	18.4 20.0	8.0 10.50	- -	- -	80000 (56.09)	35000 (24.47)	30(long) 25(trans)	-	50% (long) 45 (trans)
A 182 F 316	0.08 max	2.00 max	1.00 max	0.03 max	0.04 max	16 18.0	10.0 14.0	2.0 3.0	M=0.1-0.16	75000 (52.52)	30000 (20.90)	30	-	50%
A 182 F 316 L	0.35 max	2.00 max	1.00 max	0.03 max	0.04 max	16 18.0	10.0 15.0	2.0 3.0	-	70000 (49.46)	25000 (17.34)	30	-	50%
A 182 F 316 H	0.04 0.10	2.00 max	1.00 max	0.03 max	0.04 max	16 18.0	10. 14.0	2.0 3.0	-	75000 (52.52)	3000 (20.90)	30	-	50%
A 182 F 321	0.08 max	2.00 max	1.00 max	0.03	0.04	17 min	9 12.0	2.0 3.0	Ti=CX5 0.70 max	75000 (52.52)	30000 (20.90)	30	-	50%
A 182 F 310	0.15 max	2.00 max	1.00 max	0.03	0.04	24.0 26.0	19.0 22.0		-	75000 (52.52)	3000 (20.90)	30	-	50%
A 182 F 317/1	0.03 max	2.00 max	1.00 max	0.03	0.045	18.0 20.0	11.0 15.0	3.0 4.0	-	70000 (49.46)	25000 (17.34)	30	-	50%
A 182 F 347H	0.04 max	2.00 max	1.00 max	0.03 max	0.04 max	17.0 20.0	9.0 13.0	-	Cb+Ta+ -8C-1.0	75000 (52.52)	30000 (20.90)	30	-	50%
A 182 F1	0.28 max	0.60 0.90	0.15 0.35	0.045 max	0.045 max	-	-	0.44 0.65	-	70000 (49.46)	40000 (28.05)	20	143-192	30
A 182 F 12 class 2	0.10 0.20	0.30 0.80	0.10 0.60	0.04 max	0.04 max	0.8 1.25	-	0.44 0.65	-	70000 (49.46)	40000 (28.05)	20	143-207	30
A182 F 11 class 2	0.10 0.20	0.30 0.80	0.50 1.0	0.04 max	0.04 max	1.0 1.50	-	0.44 0.65	-	70000 (49.46)	40000 (28.05)	20	143-207	30
A 182 F 22 class 3	0.05 0.15	0.30 0.60	0.5 max	0.04 max	0.04 max	2.0 2.50	-	0.87 1.13	-	75000 (52.52)	45000 (31.7)	20	156-207	30
A 182 F5	0.15 max	0.30 0.60	0.5 max	0.03 max	0.03 max	4.0 6.0	0.5 max	0.44 0.65	-	70000 (49.46)	40000 (28.05)	20	143-217	35
A 182 F9	0.15 max	0.30 0.60	0.5 1.0	0.03 max	0.03 max	8.0 10.0	-	0.90 1.10	-	85000 (56.65)	55000 (38.75)	20	179-217	40

Fastners

- HEX HEAD SCREWS
- HEXAGON SOCKET CAP SCREWS
- HEX SOCKET COUNTERSUNK SCREWS
- BUTTON HEAD SOCKET SCREWS
- HEXAGON SOCKET SET SCREWS CONE POINT-CUP POINT
- CUP SQUARE (CARRIAGE BOLTS)
- SLOTTED CHEESE HEAD MACHINE SCREWS
- SLOTTED PAN HEAD MACHINE SCREWS
- SLOTTED COUNTERSUNK HEAD MACHINE SCREWS
- SLOTTED RAISED COUNTERSUNK HEAD MACHINE SCREWS
- CROSS RECESSED COUNTERSUNK MACHINE SCREWS
- COLLAR COMBINATION PHILIPS PAN HEAD MACHINE SELF TAPPING SCREWS
- CROSS RECESSED PAN HEAD MACHINE SCREWS
- HEXAGON HEAD TAPPING SCREWS TYPE AB
- SLOT PAN TAPPING SCREWS TYPE AB AND B
- SLOT COUNTERSUNK TAPPING SCREWS TYPE AB AND B
- SERRATED LOCK WASHERS
- SLOT RAISED/ COUNTERSUNK TAPPING SCREWS TYPE AB
- CROSS RECESSED PAN HEAD TAPPING SCREWS TYPE AB AND B
- CROSS RECESSED CSK TAPPING SCREWS TYPE AB AND B
- CROSS RECESSED RAISED /CSK TAPPING SCREWS TYPE AB AND B
- HEX HEAD BOLTS
- RAISED/COUNTERSUNK WOOD SCREWS SLOTTED AND CROSS RECESSED
- COUNTERSUNK WOOD SCREWS SLOTTED AND CROSS RECESSED
- ROUND HEAD WOOD SCREWS SLOTTED AND CROSS RECESSED
- HEXAGON HEAD WOOD SCREWS
- HEXAGON FULLNUTS
- HEXAGON THIN NUTS (LOCKNUT)
- NYLON INSERT SELF LOCKING NUTS
- SPRING WASHER
- PLAIN WASHERS
- THREADED RODS

Spiral-Y-Anchors

We are specialized in manufacturing superior quality Spiral Y-Anchors, these are widely used in various industrial applications.

Specifications

215 X 145 X 5 MM

190 X 45 X 5 MM.

185 X 105 X 5 MM.

175 X 30 X 5 MM.

155 X 70 X 5 MM.

90 X 30 X 5 MM.

80 X 30 X 5 MM.

V-Anchors

We are manufacturer & supplier of V-Anchor, to match all types of lining for cement, ceramic, steel, petrochemical, refinary industry for the retaining of monolithic, ceramic fiber and brick linings. Our anchors are suitable for single & dual layer lining, brick, ceramic, fiber and monolithic. All refractory anchor maderom stainless steel [SS] 304, 310, Alloy 601- inconel and other heat resistant alloys. Specifications:

55 X 15 X 05 MM.

Anchors and Crook Anchors

We manufacture a comprehensive range of refractory anchors for the cement, steel and petrochemical industry - for the retaining of castable and brick linings.

Y Anchors and Crook Anchors are offered for immediate dispatch. Various C Clips and Hangers for ceramic anchors to suit individual requirements.

Specifications

230 X 115 X 05 MM.
200 X 100 X 05 MM.
150 X 75 X 05 MM.
75 X 25 X 05 MM.

U-Anchors

We manufacture and export superior quality U-Anchors, these can be availed in various specifications like:

55 X 16 X 05 MM.

225 X 27 X 05 MM.
Wing Nut Type

Refractory Anchors

Unisteels & Engg. Co. (P) ltd. is leading expertise in cement, steel & furnace industries for refractory anchors. We are also manufacturing anchors for Oil & Gas refinery, Power Plants, Chemical Plants and other related industries. We are consistently research and develop modern methods to meet new demands of customers. We also offer customized solution and technical expertise for the refinement of existing method to meet increased demands and quality productions for our customers.

Our organization will assure the delivery of satisfaction to customer will be our primary priority. We also thank to the customers who give us supports and trust for giving us the opportunity as the refractory solution partner.

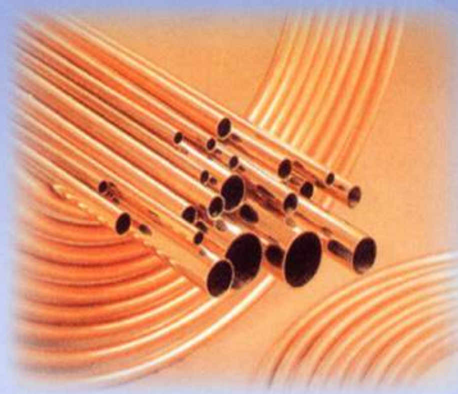
We produce a wide range of standard anchoring systems, to match all types of lining. We offer anchors suitable for single and dual layer lining, brick, ceramic, fiber and castable refractory.

Range & Form V shape, Y shape and crook anchors but as per clients drawings and requirements.

Stainless Steel
Grades: 304, 316, 310

Copper Alloy Tubes & Pipes

ASTM B88-02	: Standard Specification for Seamless Copper Brass Pipe and Tube
ASTM B135-02	: Standard Specification for Seamless Brass Tube
ASTM B1 11/SB111	: Copper and Copper Alloy Seamless Condenser Tubes and Ferrule
KS D5301	: Copper and Copper Alloy Tube for Heat Exchangers and Condensers
JIS H3300	: Copper and Copper Alloy Tube for Heat Exchangers and Condensers
BS2871 C	: Copper and Copper Alloy Tube for Heat Exchangers and Condensers
DIN 1787	: Copper and Copper Alloy Tube for Heat Exchangers and Condensers Copper Alloy Tube & Pipe
DIN 17671	: Wrought Copper and Copper Alloy Tubes Properties



Brass Tubes & Pipes

C2600,C2700,C2800	:	Aluminum Brass Tube & Pipe
C68700	:	Admiralty Tube & Pipe
C44300	:	Copper Nickel Tube & Pipe

C70600,C71000,C71500 The excellent corrosion resistance

- PVC Copper Tubes (Arai Approved)
  (Size 15mm, 8mm, 6mm)
  (in Straight Length & Coiled Form)
  (for LPGICNG Applications)
- CU-Ni Tubes (90 / 10 & 70 / 30)
  (for Brake Liners)
- Copper & Copper Alloy Tubes & Pipes

Finned Tubes & Brass Rods

Finned tube is high performance products for a very wide of application, shipbuilding, power plant, air conditioning, refrigeration and heating industries.

Material	: Copper, Al-Brass, Admiralty, Cu-Ni, Stainless, Titanium, Carbon etc.
Type	: Low & High, Inner groove, Corrugated,spiral, Turbo-Excel, Extruded etc.

Low Finned Tube

SMP Welding Consumables

BRAND NAME	DESCRIPTION	APPLICATION
SMP - E308	Easy welding in all positions without spattering. Finely rippled bead and self-peeling slags. The deposit metal is 18% Cr -8% Ni austenitic stainless steel and has excellent resistance to heat and corrosion.	Welding of AISI 301, 302, 304 Stainless steels. Fabrication and repair of stainless steel equipment used in the dairy, food processing, drug and chemical industries.
SMP - E308L	Easy welding in all positions without spattering, Finely-rippled head and self-peeling slags. Austenitic, Corrosion resistant 18%Cr - 8%Ni weld metal contains extra-low carbon to obtain resistance to intergranular corrosion due to carbide precipition	Welding of AISI 301, 302, 304, 304L and 308L Stainless steels. Fabrication and repair of stainless steel equipment used in the dairy, food processing, drug and chemical industries.
SMP - E309	The deposit metal is 22%Cr-12%Ni austenitic stainless steel (ferrite content of 13%) and has excellent resistance to crack.	Welding of AISI 309, 13Cr steel, 18Cr steel stainless clad steel. It is also suitable for joining of dissimilar materials such as stainless steel to mild steel.
SMP - E309L	Austenitic-ferritic (ferrite content of 10%), corrosion resistant 22% Cr-12%Ni weld metal contains extra-low carbon to obtain resistance to intergranular corrosion due to carbide presciption. This low carbon alloy, however, is not so strong at elevated temperature as the columbium-stabillized alloys.	Welding of AISI 309 Stainless steel. It is also suitable for joining of dissimilar materials such as 18%Cr 8%Ni stainless steel to mild steel and welding of clad surface of stainless clad steel.
SMP - E310	Weld deposit has flat, regular beads, with easy slag removal. Heat resistant up to 1,200°C (2.200F) in oxidizing and sulfurfrec atmosphere.	Welding of austenitic, heat-resistant Cr - Ni steels of the type. 25%Cr-20%Ni (NCT, AISI 310 Ugine NS 30, Avesta 254 E, Sandvik 15 RE 10). Fabrication and repair of furnace linings, furnace grates, burners, etc.
SMP - E312	Highly crack resistant because of austenitic - ferritic electrode with a ferrite content of 25-30%. Also highly suitable for stress compensating buffer layer on parent metals sensitive to cracking.	Suitable for welding dissimilar and problem steels, e.g. high alloy and unalloyed steels. Joining of all kinds of alloy and high-alloy steels.
SMP - E316	Easy welding in all position without spattering finely-rippled bead and self-peeling slag. Austenitic and corrosion-resistant weld deposit contains 2-3% molybdenum which provide creep resistance at elevatedtemperature and corrosion resistance against sulphuric acid.	Welding of 18%Cr-12%Ni-2.5%Mo stainless steel, AISI 316, 316L 317. Fabrication and repair of textile and other dyeing equipment, paper mill tanks, chemical tanks and equipment, picking tanks, salt processing equipment, alkali tanks, etc.
SMP - E316L	Extra - Low carbon content in the weld deposit to obtain resistance to intergranular corrosion due to carbide precipitation.	Welding of 18%Cr-12%Ni-2.5%Mo stainless steel, AISI 316, 316L, 317. Fabrication and repair of textile and other dyeing equipment, paper mill tanks, chemical tanks and equipment, picking tanks, salt processing equipment, alkali tanks, etc.
SMP - E317L	xtra - Low carbon content in the weld deposit to obtain resistance to intergranular corrosion due to carbide precipitation. SMP- E317L containing molybednum is higher than that of SMP- E316L, its weld metal has excellent resistance to non-oxisizing acid such as dilute sulfuric acid and is resistant for intercrystalline corrosion.	Welding of 18%Cr-12%Ni-3.5%Mo stainless steels, AISI 317, SUS 317L
SMP - E347	As its weld metal has austenitic structure containing Cb, its intergranular corrosion and heat resistance is excellent. It has the most excellent creep resistance at elevated temperature.	Welding of Ti or Cb stabilized stainless steels corresponding to AISI 347. 321, 301, 304, and 304L. Suitable for welding of chemical industry's plants, boilers and gasturbines
SMP - 308LF (FLUX COREDWIRE)		For welding types 301, 302, 304, 304L, 308 and 308L of stainless steel. May be used for welding types 321 and 347 if service temperature does not exceed 500" F(260°C). Low carbon content minimizes carbide precipitation. Ferrite values will lower as Impact toughness increases. Carbon content 0.04% maximum
SMP - 309LF (FLUX COREDWIRE)		Designed for welding type 309 wrought, or cast forms, but used extensively for welding type 304 to mild or carbon steel Also used for welding 304 clad sheets and for applying stainless steel sheet linings to carbon content 0.04% maximum.
SMP - 316LF (FLUX COREDWIRE)		For welding types 316 stainless. contains molybdenum which resists pitting corrosion induced by sulphuric and sulfurous acids, chlorides and cellulose solutions. Used widely in the rayon dye and paper making industries. Carbon content 0.04% maximum. Both pure CO, mixed gas (75%Argon / 25%CO.) can be used.

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0091- 98191 00421 / 0091 - 98200 33255

We are dealing with many well known brand companies products as mentioned following

We supply product under well known third party Inspection like ABS, LRS, DNV, GL, KR, NK, RINA, etc.

Grades :

AISI-304, 304L, 316, 316L, 316Ti, 321, 347, 310
Duplex: UNS - S32760, S31803, S31500
DIN 1.4307, 1.4306, 1.4401, 1.4404, 1.4571, 1.4301
1.4541 and Its Equivalents in NFA, JIS, etc.

Standards :

Confirming to International Specification of
ASTM A-213, A-249, A-269, A-312, A-358, A-554,
A-688 DIN 17455, 17456, 17457, 17458
EN : 10216-5, 10217-7 and Its Equivalents in
ASME, EN, NFA, JIS etc.

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