

STEEL PIPE



MEDIUM & HEAVY PIPE

GRADE C250

MANUFACTURING PROCESS

Grade C250 Pipe, for general mechanical and low pressure reticulation applications, is manufactured by cold-forming and high frequency Electric Resistance Welding. The cold-forming process enhances the strength, hardness and surface finish of the pipe and produces product to tight dimensional tolerances. Pipe is tested by using non-destructive Eddy Current methods during the process.

AUSTRALIAN STANDARDS

Grade C250 Pipe is manufactured and tested to comply with the requirements of the following specifications:

AS 1074 - Steel tubes and tubulars for ordinary service.

AS 1163 - Structural steel hollow sections (Grade C250, C250LO).

AS 4792 - Hot-dipped galvanised coating on ferrous hollow sections. Applied by a continuous or a specialised process.

LO indicates grades with guaranteed impact performances at 0°C. With impact guaranteed properties, the opportunities for the designer are now enhanced in low temperature service environments under AS 4100.

MECHANICAL PROPERTIES

Minimum Yield Strength	250 MPa
Minimum Tensile Strength	320 MPa
Minimum Elongation in 5.65 $\sqrt{S_0}$	22%

TOLERANCES

Straightness	} Refer to Australian Standards
Thickness Tolerance	
Dimensional Tolerance	
Length Tolerance	

If tighter tolerances are required, they must be specified at the time of order (conditions apply).

SUPPLY CONDITIONS - PAINTED FINISH

Red (Normal finish) or black (clear).

The coating thicknesses for these paints are:

Red & Black 12 microns average.

Note: Non-standard finishes, such as NOPC, are available if ordered prior to rollings. Conditions apply.

GALVANISED FINISH

Hot dipped galvanised pipe is manufactured and tested to meet the requirements of AS 4792.

Coating mass: 300 g/m² min average both sides.

The coating adherence of the galvanising is satisfactory for the pipe to be bent to a radius 6 times the diameter of the pipe.

STANDARD LENGTHS

(DN 20 - DN 150) Red/Black/Galvanised 6.5m

Note: DN stands for Nominal Size and replaces NB (Nominal Bore).

THICKNESS AND MARKING

Grade C250 pipe is available in medium (M) and heavy (H) wall thickness. These thicknesses are identified by the following end colour codes:

Medium (M)	Blue
Heavy (H)	Red



MEDIUM & HEAVY PIPE

WORKING PRESSURES – THREADED JOINTS TAPER/PARALLEL THREAD

Nominal Size DN (mm)	TYPE OF SERVICE											
	Water & Inert Oil		L.P.G.	Fuel Oil				Other Applications (Including Steam & Compressed Air)				
	Medium	Heavy	Med. & Heavy	Medium		Heavy		Medium		Heavy		
	Press.	Temp.	Press.	Temp.	Press.	Temp.	Press.	Temp.	Press.	Temp.		
	kPa	°C	kPa	°C	kPa	°C	kPa	°C	kPa	°C		
15	2070	100	2410	100	140	100	1030	100	1210	100	1210	100
20	2070	100	2410	100	140	100	1030	100	1210	100	1210	100
25	2070	100	2410	100	140	100	1030	100	1210	100	1210	100
32	1720	100	2070	100	140	100	1030	100	1030	100	1030	100
40	1720	100	2070	100	140	100	1030	100	1030	100	1030	100
50	1380	100	1720	100	140	100	860	100	860	100	860	100
65	1380	100	1720	100	–	–	860	100	860	100	860	100
80	1380	100	1720	100	–	–	860	100	860	100	860	100
100	1030	100	1380	100	–	–	690	100	690	100	690	100
125	1030	–	1380	–	–	–	–	–	–	–	–	–
150	860	–	1030	–	–	–	–	–	–	–	–	–

WORKING PRESSURES – WELDED JOINTS

Where AS 1074 pipe is used in pressure piping covered by AS 4041, the maximum pressure shall not exceed 1210 kPa for AS 1074 pipe up to and including DN 100 and 1030 kPa for AS 1074 pipe exceeding DN 100.

END PROCESSING THREADED PIPE OPTIONS

- Plain End
- Shouldered
- Roll Grooved
- Threaded

Screwed on one or both ends in accordance with AS 1074.

The tapered Whitworth thread used complies with the requirements of AS 1722, Part 1 and is suitable for both parallel and taper threaded sockets.

Grade C250 MASS AND BUNDLING DATA - Calculated in accordance with AS 1163												
DIMENSIONS		BUNDLING				MASS						
Designation d _o †	Nominal Size DN	Bundle Dimensions mm			Lengths Per Bundle	Metres Per Bundle	Nominal Mass				Mass Per Bundle	
		W	x	H			kg/m	Galv.	Black	Galv.	Black	Galv.
mm	mm	mm	mm	mm	6.5 m	m	Black	Galv.	Black	Galv.	Black	Galv.
13.5 x 2.3	8 M	Supplied in			400	2320	0.64	0.67	1560	1490	1.49	1.55
	2.9	8 H	Circular Bundles			400	2320	0.77	0.79	1310	1260	1.78
17.2 x 2.3	10 M	Supplied in			300	1950	0.84	0.88	1190	1140	1.64	1.71
	2.9	10 H	Circular Bundles			300	1950	1.02	1.05	985	951	1.98
21.3 x 2.6	15 M	364	318	217	1410.5	1.21	1.25	830	798	1.70	1.77	
	3.2	15 H	364	318	217	1410.5	1.44	1.48	695	674	2.03	2.09
26.9 x 2.6	20 M	350	306	127	825.5	1.56	1.60	642	623	1.29	1.32	
	3.2	20 H	350	306	127	825.5	1.87	1.92	535	522	1.54	1.58
33.7 x 3.2	25 M	327	327	91	591.5	2.41	2.46	415	406	1.42	1.46	
	4.0	25 H	327	327	91	591.5	2.93	2.99	341	335	1.73	1.77
42.4 x 3.2	32 M	383	337	61	396.5	3.09	3.17	323	316	1.23	1.26	
	4.0	32 H	383	337	61	396.5	3.79	3.86	264	259	1.50	1.53
48.3 x 3.2	40 M	436	384	61	396.5	3.56	3.64	281	274	1.41	1.44	
	4.0	40 H	436	384	61	396.5	4.37	4.45	229	225	1.73	1.77
60.3 x 3.6	50 M	422	374	37	240.5	5.03	5.14	199	195	1.21	1.24	
	4.5	50 H	422	374	37	240.5	6.19	6.30	161	159	1.49	1.51
76.1 x 3.6	65 M	533	472	37	240.5	6.44	6.57	155	152	1.55	1.58	
	4.5	65 H	533	472	37	240.5	7.95	8.08	126	124	1.91	1.94
88.9 x 4.0	80 M	445	397	19	123.5	8.38	8.54	119	117	1.03	1.05	
	4.9	80 H	445	397	19	123.5	10.3	10.6	99	97	1.25	1.27
101.6 x 4.0	90 M	508	454	19	123.5	9.63	9.81	104	102	1.19	1.21	
	4.9	90 H	508	454	19	123.5	11.9	12.2	86	84	1.44	1.47
114.3 x 4.5	100 M	571	509	19	123.5	12.2	12.4	82	81	1.50	1.53	
	5.4	100 H	571	509	19	123.5	14.50	14.7	69	68	1.79	1.82
139.7 x 5.0	125 M	699	382	13	84.5	16.6	16.9	60	59	1.40	1.42	
	5.4	125 H	699	382	13	84.5	17.9	18.1	56	55	1.51	1.53
165.1 x 5.0	150 M	660	451	10	65	19.7	20.0	51	50	1.28	1.30	
	5.4	150 H	660	451	10	65	21.3	21.6	47	46	1.38	1.40

Notes: 1. M= Medium, H= Heavy

LIGHT AND EXTRA LIGHT PIPE

GRADE C350

Grade C350 Pipe is a lightweight, high strength pipe for general mechanical and structural applications. It is manufactured by cold forming and high frequency electric resistance welding.

C350 is available in black, painted and galvanised finishes. Also available with one or both ends swaged in sizes from 25 NB to 50 NB.

SPECIFICATIONS

Manufactured and tested to meet the requirements of the following specifications:

AS 1163 Structural Steel Hollow Sections (Grade C350, C350L0).

AS 4792 Hot-dipped galvanised coating on ferrous hollow sections. Applied by a continuous or a specialised process.

MECHANICAL PROPERTIES

Minimum Yield Strength 350 MPa
 Minimum Tensile Strength 450 MPa
 Minimum Elongation in $5.65\sqrt{S_0}$ 20%

SUPPLY CONDITIONS

Surface Finish Black/Painted/Galvanised

Straightness } Refer to
 Thickness Tolerance } Australian
 Dimension Tolerance } Standards

Standard Length 6.5m
 Length Tolerance +50mm/-0mm

GALVANISING

Grade C350 pipe is manufactured and tested to meet the requirements of AS 4792 Galvanised coatings.

Coating Mass: 300g/m² min average both sides.

The coating adherence of the galvanising is satisfactory for the pipe to be bent to a radius 6 times the diameter of the pipe.

WELDING

The following consumables are recommended by AS 1554.1 when welding C350 sections.

Manual metal-arc (MMAW) E41XX, E48XX

Gas metal-arc (MIG) (GMAW) W50X

Grade C350		MASS AND BUNDLING DATA - Calculated in accordance with AS 1163											
DIMENSIONS		BUNDLING				MASS							
Designation d _o	Nominal Size DN	Bundle Dimensions mm		Lengths Per Bundle 6.5 m	Metres Per Bundle m	Nominal Mass				Mass Per Bundle			
		W	H			kg/m		m/tonne		tonnes			
mm	mm	mm	mm			Black	Galv.	Black	Galv.	Black	Galv.		
26.9 x 2.0	20 XL	350	306	127	825.5	1.228	1.275	814	784	1.014	1.053		
	20 LT	350	306	127	825.5	1.395	1.442	717	694	1.152	1.190		
33.7 x 2.0	25 XL	327	327	91	591.5	1.564	1.623	640	616	0.925	0.960		
	25 LT	327	327	91	591.5	1.994	2.053	501	487	1.180	1.214		
42.4 x 2.0	32 XL	383	337	61	396.5	1.993	2.069	502	483	0.790	0.820		
	32 LT	383	337	61	396.5	2.552	2.627	392	381	1.012	1.042		
48.3 x 2.3	40 XL	436	384	61	396.5	2.609	2.696	383	371	1.035	1.069		
	40 LT	436	384	61	396.5	3.247	3.333	308	300	1.287	1.321		
60.3 x 2.3	50 XL	422	374	37	240.5	3.290	3.399	304	294	0.791	0.818		
	50 LT	422	374	37	240.5	4.105	4.213	244	237	0.987	1.013		
76.1 x 2.3	65 XL	533	472	37	240.5	4.186	4.325	239	231	1.007	1.040		
	65 LT	533	472	37	240.5	5.753	5.890	174	170	1.384	1.417		
88.9 x 2.6	80 XL	445	397	19	123.5	5.534	5.696	181	176	0.683	0.703		
	80 LT	445	397	19	123.5	6.763	6.925	148	144	0.835	0.855		
101.6 x 2.6	90 XL	508	454	19	123.5	6.348	6.534	158	153	0.784	0.807		
	90 LT	508	454	19	123.5	7.765	7.951	129	126	0.959	0.982		
114.3 x 3.2	100 XL	571	509	19	123.5	8.768	8.977	114	111	1.083	1.109		
	100 LT	571	509	19	123.5	9.828	10.037	102	100	1.214	1.240		
139.7 x 3.0	125 XL	699	382	13	84.5	10.114	10.371	99	96	0.855	0.876		
	125 LT	699	382	13	84.5	11.756	12.013	85	83	0.993	1.015		
165.1 x 3.0	150 XL	660	451	10	65	11.993	12.298	83	81	0.780	0.799		
	150 LT	660	451	10	65	13.949	14.253	72	70	0.907	0.926		

Notes: 1. LT= Light, XL= Extra Light. End colour codes. Light (LT) Yellow, Extra Light (XL) Green.

APPLICATION GUIDE

COMMERCIAL PIPE APPLICATION GUIDE – TYPICAL PIPING SYSTEM MAKEUP

COMMERCIAL BLACK PAINTED

PIPE GRADE	TYPICAL JOINTING METHODS	TYPICAL COMPLEMENTARY FITTINGS
Light & Extra Light	Buttweld, Flanged, Roll Grooved, Shouldered	Flanges, Roll Grooved or Shouldered Fittings
Medium	Buttweld, Flanged, Roll Grooved, Shouldered, Threaded	Buttweld Fittings, Flanges, Roll Grooved or Shouldered Fittings, Black or Galvanised Screwed Fittings (Malleable Iron or Steel)
Heavy	Buttweld, Flanged, Cut Grooved Shouldered, Threaded	Buttweld Fittings, Flanges, Roll Grooved or Shouldered Fittings, Black or Galvanised Steel Screwed Fittings
Extra Heavy	Buttweld, Flanged	Buttweld Fittings, Flanges, Socket-Weld Fittings

COMMERCIAL GALVANISED

PIPE GRADE	TYPICAL JOINTING METHODS	TYPICAL COMPLEMENTARY FITTINGS
Light & Extra Light	Roll Grooved, Shouldered	Roll Grooved or Shouldered Fittings
Medium	Roll Grooved, Shouldered, Threaded	Roll Grooved or Shouldered Fittings Galvanised Malleable or Galvanised Steel Screwed Fittings, Screwed Flanges
Heavy	Shouldered, Threaded	Shouldered Fittings, Galvanised Steel Screwed Fittings, Screwed Flanges

LINEPIPE, CARBON AND STAINLESS STEEL

PIPE GRADE	TYPICAL JOINTING METHODS	TYPICAL COMPLEMENTARY FITTINGS
Various Wall Thicknesses and Schedules	Buttwelding Socket Welding Flanged Threaded Grooved Shouldered	Buttweld Fittings, O'let Fittings Socketweld Fittings & O'lets ANSI & Australian Flanges NPT & BSP Fittings, O'lets Roll Grooved System Shouldered System

The flanges and fittings listed in these charts are all available from Antec Piping Systems and are described in our "Pipe Fittings" and "Stainless Steel" catalogues.

Notes: The jointing methods and fittings listed above are typical of those selected by our customers when ordering Australian Standard steel pipe for reticulation (non-structural) use. Reference should be made to relevant piping codes and standards when selecting products or materials for specific applications. These charts are offered as a guide only and does not represent or replace any of the official piping codes or standards.

LINEPIPE

These pipes are used in a diverse range of fluid handling and structural applications from Petroleum and Chemical Processing to the Mining and allied industries. The general stock range for seamless and welded carbon steel pipes is 8mm to 600mm nominal diameter.

ASME B36.10. WELDED AND SEAMLESS WROUGHT STEEL PIPE

ASME B36.10 covers the standardization of dimensions of welded and seamless wrought steel pipe. It shows both imperial and metric units, the metric units being **soft conversions** of the imperial units.

On pages 12 and 13 we have shown only metric dimensions to ASME B36.10 for the more popular size range. We have also included inside diameter (I.D.) and metric nominal size (DN) which are not shown in ASME B36.10.

- 1. NOMINAL SIZE** – May be expressed in S.I. metric (mm) or imperial (inch) units.
- 2. OUTSIDE DIAMETER** – is shown to the nearest 0.1mm for outside diameters which are 406.4mm O.D. and smaller, and to the nearest 1.0mm for outside diameters larger than 406.4mm O.D. We have shown the equivalent inch size underneath in brackets – ().
- 3. WALL THICKNESS** – is shown rounded to the nearest 0.01mm.
- 4. INSIDE DIAMETER** – is not shown in ASME B36.10, however, by using the inch measurements in ASME B36.10, we have calculated the **inside diameter** (I.D.) in inches and used the factor 25.4 to convert to millimetres to the nearest 0.1mm
- 5. MASS (WEIGHT)** – is shown in kilograms per meter (kg/m) for plain end pipes. These are calculated values using the formula shown at the bottom of page 13 (taken from B36.10).
- 6. WALL THICKNESS DESIGNATIONS** – The wall thickness designations “Standard WT”, “Extra Strong” and “Double Extra-Strong”, have been commercially used designations for many years. Schedule numbers were added as a convenient designation for use in ordering pipe. Standard WT and Schedule 40 are identical for sizes up to **NPS 10** inclusive. All larger sizes of Standard WT have 9.53mm wall thickness. Extra-Strong and Schedule 80 are identical for sizes up to **NPS 8** inclusive. All larger sizes of Extra-Strong have 12.70mm wall thickness.
- 7. PIPE ENDS** – Unless otherwise specified pipe ends are normally supplied as below:-
 - Up to and including 48.3mm O.D. size are supplied with plain ends cut square.
 - Above 48.3mm O.D. sizes (except for Double Extra-Strong pipe) are supplied with plain ends bevelled.
 - All Double Extra-Strong pipe is supplied with plain ends cut square.
- 8. END PREPARATION**
 - Bevelled ends for API steel linepipe are normally to API specification i.e. Angle $30^{\circ+5^{\circ}}_{-0^{\circ}}$
 - Bevelled ends for steel pipe to ASTM specifications are normally to ASME B16.25 i.e. Angle $30^{\circ+5^{\circ}}_{-0^{\circ}}$

METRIC CONVERSION TERMINOLOGY

Soft conversion is an exact mathematical equivalent using known conversion factors from imperial to metric. eg. Inch to millimetres (mm) = 1 x 25.4. Therefore $12\frac{3}{4}$ inch x 25.4 = 323.85mm.

Soft conversion can only be applied to actual measurement, it cannot be applied to nominal sizes.

Hard conversion is where pipe manufactured to imperial sizes (O.D. x WT in actual inches) is replaced by pipe manufactured to metric sizes (O.D. x WT in actual millimetres [mm]).

Pipe is only quoted as a typical material example.

METHODS OF MANUFACTURE

SPECIFICATIONS

API 5L 5LX
ASTM A53
ASTM A106
ASTM A333
ASTM A335

SIZES

UP TO 762mm O.D.

SEAMLESS PIPE

In the seamless pipe-making process tube rounds are heated in a furnace, after which they are pierced, then rolled by the **Mandrel** or **Plug-Mill** process into pipes and tubes of specified diameters and wall thicknesses.

Seamless tubular products are generally hot-rolled, but can also be supplied cold-drawn (up to 273mm O.D.) when required.

The "Push-Bench" process can also be used in the manufacture of seamless pipe. In this process, a steel billet is furnace heated to the plastic state and partly punched at one end to take a mandrel. The billet is then forced by the mandrel through a series of gradually reducing dies, until the required outside diameter has been attained, the I.D. being determined by the size of the mandrel.

ELECTRIC-RESISTANCE WELDED PIPE (E.R.W.)

In Australia, as in modern installations overseas, ERW Linepipe has gained increased acceptance, where Seamless Pipe was once considered essential, because of its uniform quality and dimensions, and its cost advantage.

The ERW manufacturing process is described below:

At the pipe mill the strip is uncoiled, levelled and crop-sheared. It is then trimmed on both sides simultaneously to correct width and immediately fed into the forming and welding line. During the process, the strip is closely checked for surface defects.

A series of cold forming rolls changes the strip progressively into tubular form with abutting edges on top. The longitudinal edges are joined by high frequency electric resistance welding. The weld is then heat treated electrically. Special devices remove inside and outside flash from the weld to give uniform wall thickness of the pipe. The welded part is then heat-treated by post annealing to ensure adequate ductility at the weld and adjacent zone. The pipe is passed through a series of cold sizing rolls to progressively reduce the diameter to accurate size. This operation also increases strength and improves surface condition.

The pipe is then cut to specified length by a flying cut-off machine. After the straightening operation, ends of the pipe are cropped, then squared or bevelled depending on end finish requirements. The pipe is then hydrostatically tested to specified pressure. Also test specimens are taken during the process to check chemical and mechanical properties.

Each length of pipe is inspected by the ultrasonic method on the weld and checked as to diameter, wall thickness, surfaces, end finish, camber and concentricity. The length and weight of pipe is measured and recorded and protective coating is applied on the outside surface.

SPECIFICATIONS

API 5L & 5LX
ASTM A53, A135,
ASTM A252, A333

SIZES

UP TO 610mm O.D.

U.O.E. DOUBLE SUBMERGED ARC WELDED PIPE

SPECIFICATIONS

API 5L 5LX & 5LU
ASTM A53

SIZES

UP TO 1820mm O.D.

Steel plates are first U-shaped then O-formed by a hydraulic press. The seam is welded from inside and outside automatically by the submerged-arc process. Hydraulic expansion gives the pipe precise diameter and roundness and relieves residual stresses caused by forming and welding.

DIMENSIONS AND MASS

DIMENSIONS SHOWN ARE TO ASME B36.10

Nominal Size		Outside Diameter mm (inch)	Wall Thickness mm	Inside Diameter mm	Plain End Mass kg/m	Identification	
☆ NPS	⊕ DN					Standard (STD) X-Strong (XS) XX-Strong (XXS)	Schedule Number
1/8	6	10.3 (0.405)	1.73	6.8	0.37	STD	40
			2.41	5.5	0.47	XS	80
1/4	8	13.7 (0.540)	2.24	9.2	0.63	STD	40
			3.02	7.7	0.80	XS	80
3/8	10	17.1 (0.675)	2.31	12.5	0.84	STD	40
			3.20	10.7	1.10	XS	80
1/2	15	21.3 (0.840)	2.77	15.8	1.27	STD	40
			3.73	13.9	1.62	XS	80
			4.78	11.8	1.95	–	160
			7.47	6.4	2.55	XXS	–
3/4	20	26.7 (1.050)	2.87	20.9	1.69	STD	40
			3.91	18.9	2.20	XS	80
			5.56	15.5	2.90	–	160
			7.82	11.0	3.64	XXS	–
1	25	33.4 (1.315)	3.38	26.6	2.50	STD	40
			4.55	24.3	3.24	XS	80
			6.35	20.7	4.24	–	160
			9.09	15.2	5.45	XXS	–
1 1/4	32	42.2 (1.660)	3.56	35.1	3.39	STD	40
			4.85	32.5	4.47	XS	80
			6.35	29.5	5.61	–	160
			9.70	22.8	7.77	XXS	–
1 1/2	40	48.3 (1.900)	3.68	40.9	4.05	STD	40
			5.08	38.1	5.41	XS	80
			7.14	34.0	7.25	–	160
			10.15	27.9	9.55	XXS	–
2	50	60.3 (2.375)	3.91	52.5	5.44	STD	40
			5.54	49.2	7.48	XS	80
			8.74	42.9	11.11	–	160
			11.07	38.2	13.44	XXS	–
2 1/2	65	73.0 (2.875)	5.16	62.7	8.63	STD	40
			7.01	59.0	11.41	XS	80
			9.53	54.0	14.92	–	160
			14.02	45.0	20.39	XXS	–

Nominal Size		Outside Diameter mm (inch)	Wall Thickness mm	Inside Diameter mm	Plain End Mass kg/m	Identification	
☆ NPS	⊕ DN					Standard (STD) X-Strong (XS) XX-Strong (XXS)	Schedule Number
3	80	88.9 (3.500)	5.49	77.9	11.29	STD	40
			7.62	73.7	15.27	XS	80
			11.13	66.7	21.35	–	160
			15.24	58.4	27.68	XXS	–
3 1/2	90	101.6 (4.000)	5.74	90.1	13.57	STD	40
			8.08	85.4	18.64	XS	80
4	100	114.3 (4.500)	6.02	102.3	16.08	STD	40
			8.56	97.2	22.32	XS	80
			11.13	92.1	28.32	–	120
			13.49	87.3	33.54	–	160
			17.12	80.1	41.03	XXS	–
5	125	141.3 (5.563)	6.55	128.2	21.77	STD	40
			9.53	122.3	30.97	XS	80
			12.70	115.9	40.28	–	120
			15.88	109.6	49.12	–	160
			19.05	103.2	57.43	XXS	–
6	150	168.3 (6.625)	7.11	154.1	28.26	STD	40
			10.97	146.3	42.56	XS	80
			14.27	139.7	54.21	–	120
			18.26	131.8	67.57	–	160
			21.95	124.4	79.22	XXS	–
8	200	219.1 (8.625)	6.35	206.4	33.32	–	20
			7.04	205.0	36.82	–	30
			8.18	202.7	42.55	STD	40
			10.31	198.5	53.09	–	60
			12.70	193.7	64.64	XS	80
			15.09	188.9	75.92	–	100
			18.26	182.6	90.44	–	120
			20.62	177.8	100.93	–	140
			22.23	174.6	107.93	XXS	–
			23.01	173.1	111.27	–	160
10	250	273.1 (10.75)	6.35	260.3	41.76	–	20
			7.80	257.5	51.01	–	30
			9.27	254.5	60.29	STD	40
			12.70	247.7	81.53	XS	60
			15.09	242.9	95.98	–	80
			18.26	236.5	114.71	–	100
			21.44	230.2	133.01	–	120
			25.40	222.3	155.10	XXS	140
						28.58	215.9

☆ NPS: ASME term.

⊕ DN: SI Metric term.

All dimensions are nominal

NOTE: API and BS 1600 are dimensionally similar to ASME B36.10

DIMENSIONS AND MASS

DIMENSIONS SHOWN ARE TO ASME B36.10

Nominal Size		Outside Diameter mm (inch)	Wall Thickness mm	Inside Diameter mm	Plain End Mass kg/m	Identification	
☆ NPS	⊕ DN					Standard (STD) X-Strong (XS) XX-Strong (XXS)	Schedule Number
12	300	323.9 (12.75)	6.35	311.1	49.71	–	20
			8.38	307.1	65.19	–	30
			9.53	304.8	73.86	STD	–
			10.31	303.2	79.71	–	40
			12.70	298.5	97.44	XS	–
			14.27	295.3	108.93	–	60
			17.48	288.9	132.05	–	80
			21.44	281.0	159.87	–	100
			25.40	273.1	186.92	XXS	120
			28.58	266.7	208.08	–	140
			33.32	257.2	238.69	–	160
14	350	355.6 (14.00)	6.35	342.9	54.69	–	10
			7.92	339.8	67.91	–	20
			9.53	336.6	81.33	STD	30
			11.13	333.3	94.55	–	40
			11.91	331.8	100.95	–	–
			12.70	330.2	107.40	XS	–
			15.09	325.4	126.72	–	60
			19.05	317.5	158.11	–	80
			23.83	307.9	194.98	–	100
			27.79	300.0	224.66	–	120
			31.75	292.1	253.58	–	140
35.71	284.2	281.72	–	160			
16	400	406.4 (16.00)	6.35	393.7	62.65	–	10
			7.92	390.6	77.83	–	20
			9.53	387.4	93.27	STD	30
			12.70	381.0	123.31	XS	40
			16.66	373.1	160.13	–	60
			21.44	363.5	203.54	–	80
			26.19	354.0	245.57	–	100
			30.96	344.5	286.66	–	120
			36.53	333.3	333.21	–	140
			40.49	325.4	365.38	–	160
			18	450	457 (18.00)	6.35	444.5
7.92	441.4	87.71				–	20
9.53	438.2	105.17				STD	–
11.13	434.9	122.38				–	30
12.70	431.8	139.16				XS	–
14.27	428.7	155.81				–	40
19.05	419.1	205.75				–	60
23.83	409.5	254.57				–	80
29.36	398.5	309.64				–	100
34.93	387.4	363.58				–	120
39.67	377.9	408.28				–	140
45.24	366.7	459.39	–	160			

Nominal Size		Outside Diameter mm (inch)	Wall Thickness mm	Inside Diameter mm	Plain End Mass kg/m	Identification				
☆ NPS	⊕ DN					Standard (STD) X-Strong (XS) XX-Strong (XXS)	Schedule Number			
20	500	508 (20.00)	6.35	495.3	78.56	–	10			
			9.53	489.0	117.15	STD	20			
			12.70	482.6	155.13	XS	30			
			15.09	477.8	183.43	–	40			
			20.62	466.8	247.84	–	60			
			26.19	455.6	311.19	–	80			
			32.54	442.9	381.55	–	100			
			38.10	431.8	441.52	–	120			
			44.45	419.1	508.15	–	140			
			50.01	408.0	564.85	–	160			
			22	550	559 (22.00)	6.35	546.1	86.55	–	10
9.53	539.8	129.14				STD	20			
12.70	533.4	171.10				XS	30			
22.23	514.4	294.27				–	60			
28.58	501.7	373.85				–	80			
34.93	489.0	451.45				–	100			
41.28	476.2	527.05				–	120			
47.63	463.5	600.67				–	140			
53.98	450.8	672.30				–	160			
24	600	610 (24.00)				6.35	596.9	94.53	–	10
						9.53	590.6	141.12	STD	20
			12.70	584.2	187.07	XS	–			
			14.27	581.1	209.65	–	30			
			17.48	574.6	255.43	–	40			
			24.61	560.4	355.28	–	60			
			30.96	547.7	442.11	–	80			
			38.89	531.8	547.74	–	100			
			46.02	517.6	640.07	–	120			
			52.37	504.9	720.19	–	140			
			59.54	490.5	808.27	–	160			
26	650	660 (26.00)	7.92	644.6	127.36	–	10			
			9.53	641.4	152.88	STD	–			
28	700	711 (28.00)	12.70	635.0	202.74	XS	20			
			7.92	695.4	137.32	–	10			
30	750	762 (30.00)	9.53	692.2	164.86	STD	–			
			12.70	685.8	218.71	XS	20			
			15.88	679.5	271.23	–	30			
36	900	914 (36.00)	7.92	746.2	147.29	–	10			
			9.53	743.0	176.85	STD	–			
			12.70	736.6	234.68	XS	20			
42	1050	1067 (42.00)	15.88	730.2	292.20	–	30			
			7.92	898.6	176.97	–	10			
			9.53	895.4	212.57	STD	–			
42	1050	1067 (42.00)	12.70	889.0	282.29	XS	20			
			15.88	882.6	351.73	–	30			
			19.05	876.3	420.45	–	40			
42	1050	1067 (42.00)	9.53	1047.8	248.53	STD	–			
			12.70	1041.4	330.21	XS	–			

☆ NPS: ASME term.

⊕ DN: SI Metric term.

All dimensions are nominal

NOTE: API and BS 1600 are dimensionally similar to ASME B36.10

FORMULA TO ATTAIN APPROXIMATE MASS IN KILOGRAMS PER METRE (kg/m) FOR STEEL ROUND PIPE AND TUBING

$$M = (D - T) T \times 0.02466$$

EXAMPLE

Where: **m** = mass to the nearest 0.01 kg/m.

D = Outside Diameter in millimetres (mm).

(To nearest 0.1mm for O.D. up to 406.4mm)

(To nearest 1.0mm for O.D. 457mm and above)

t = Wall Thickness to nearest 0.01mm

NOMINAL SIZE: NPS-12. DN-300

O.D. = 323.9mm W.T. = 9.53mm

Step 1. 323.9 - 9.53 = 314.37

Step 2. 314.37 x 9.53 = 2995.9461

Step 3. 2995.9461 x 0.02466 = **73.88 kg/m**

PRESSURE/TEMPERATURE RATINGS

Please note:

The allowable working pressures for ASTM A106 Seamless Pipe are calculated from the stress values and relevant formulae as detailed in ASME B31.3. In 1982 the following chart was derived from ASME B31.3 to provide customers with a general comparative guide to working pressures for different pipe wall thicknesses. The chart is reproduced here on the explicit understanding that:

- It is a general guide only.
- It has not been updated to reflect any subsequent changes to ASME B31.3.
- It is not intended as a recommendation of allowable working pressures. Customers wishing to establish exact working pressures should refer to ASME B31.3, as well as any other relevant piping codes or industry regulations.

THE ASME CODE FOR PRESSURE PIPING including allowable stress values (SE) for metal temperatures † up to 595°C for Carbon Steel Pipe, but cautions that conversion of carbides to graphite (graphitization) may occur in Carbon Steel Pipes after prolonged exposures to temperatures over 425°C. For this reason, with temperatures above 425°C it is recommended that Alloy Steel Pipes should be used.

Allowable Stress values (SE) used in tabulated calculations are those approved for piping systems which come under Section B31.3 of the code.

The Pressure/Temperature Chart lists maximum allowable pressure ratings for Seamless Carbon Steel Pipe Grade B, with plain ends, at temperatures up to 450°C. The pressures shown can be used as the basis for calculating maximum allowable pressure ratings for other pipes by applying the following factors:

1. Seamless Grade A Pipes: Use 0.80 to 205°C, 0.85 from 260 to 370°C, 0.82 at 400°C, 0.86 at 425°C, and 0.90 at 450°C.
2. Electric Resistance Welded Pipes:
 Grade A. Use 0.68 to 205°C, 0.72 from 260 to 370°C, 0.70 at 400°C, 0.73 at 425°C, and 0.77 at 450°C.
 Grade B. Use 0.85 at all temperatures.

† For practical purposes, the metal temperature in a pipe can be considered to be equal to the temperature of the line fluid.

PRESSURE/TEMPERATURE RATINGS											
SEAMLESS CARBON STEEL PIPE. GRADE B, with plain ends. ASTM A106, API 5L & ASTM A53											
Nominal Size	Temp. °C ➤			-29 to 38	205	260	350	370	400	430	450
	Stress (SE) in kPa ➤			137800	137800	130221	117130	115752	89570	74412	59943
DN MM	Wall Thickness			MAXIMUM ALLOWABLE PRESSURE/TEMPERATURE RATINGS IN kPa FOR CHEMICAL PLANT AND PETROLEUM REFINERY PIPING SYSTEMS TO ANSI/ASME B31.3a — 1981							
	Sched. No.	mm									
15	STD	40	2.77	34416	34416	32528	29255	28910	22372	18589	14972
	XS	80	3.73	48092	48092	45446	40878	40396	31260	25969	20918
		160	4.78	62830	62830	59378	53404	52777	40837	33926	27333
	XXS		7.47	98245	98245	92836	83507	82522	63857	53053	42739
20	STD	40	2.87	28070	28070	26526	23860	23578	18245	15158	12209
	XS	80	3.91	39418	39418	37247	33506	33106	25617	21283	17142
		160	5.56	58152	58152	54955	49429	48843	37799	31398	25293
	XXS		7.82	83107	83107	78539	70643	69809	54024	44881	36152
25	STD	40	3.38	26251	26251	24804	22310	22048	17060	14173	11417
	XS	80	4.55	36283	36283	34285	30862	30474	23584	19595	15785
		160	6.35	52481	52481	49594	44606	44082	34112	28339	22827
	XXS		9.09	77030	77030	72793	65476	64704	50070	41595	33506
32	STD	40	3.56	21614	21614	20421	18369	18155	14049	11672	9404
	XS	80	4.85	30178	30178	28518	25651	25348	19616	16295	13125
		160	6.35	40596	40596	38364	34505	34099	26389	21924	17659
	XXS		9.70	64601	64601	61045	54906	54266	41988	34884	28097
40	STD	40	3.68	19444	19444	18375	16529	16329	12636	10500	8454
	XS	80	5.08	27402	27402	25900	23295	23019	17811	14800	11919
		160	7.14	39783	39783	37599	33816	33416	25858	21483	17308
	XXS		10.16	58779	58779	55547	49966	49374	38205	31742	25569
50	STD	40	3.91	16378	16378	15468	13925	13759	10645	8847	7124
	XS	80	5.54	23653	23653	22351	20105	19871	15378	12774	10287
		160	8.74	38866	38866	36731	33037	32652	25266	20987	16908
	XXS		11.07	50793	50793	48003	43173	42670	33017	27429	22096
65	STD	40	5.16	17914	17914	16929	15227	15048	11644	9674	7793
	XS	80	7.01	24818	24818	23447	21097	20849	16129	13401	10797
		160	9.53	34615	34615	32714	29420	29076	22503	18693	15055
	XXS		14.02	53081	53081	50159	45116	44585	34498	28662	23088
80	STD	40	5.49	15558	15558	14696	13222	13063	10108	8399	6766
	XS	80	7.62	21986	21986	20780	18693	18472	14290	11871	9563
		160	11.13	33079	33079	31253	28111	27780	21497	17859	14386
	XXS		15.24	46976	46976	44392	39928	39459	30536	25369	20436

* For temperatures above 425°C, see caution on graphitization.

PRESSURE/TEMPERATURE RATINGS

SEAMLESS CARBON STEEL PIPE. GRADE B, with plain ends. ASTM A106, API 5L & ASTM A53											
Nominal Size DN MM	Temp. °C ➤			-29 to 38	205	260	350	370	400	430	450
	Stress (SE) in kPa ➤			137800	137800	130221	117130	115752	89570	74412	59943
DN MM	Wall Thickness			MAXIMUM ALLOWABLE PRESSURE/TEMPERATURE RATINGS IN kPa FOR CHEMICAL PLANT AND PETROLEUM REFINERY PIPING SYSTEMS TO ANSI/ASME B31.3a — 1981							
		Sched. No.	mm								
100	STD	40	6.02	13187	13187	12464	11210	11079	8571	7124	5739
	XS	80	8.56	19058	19058	18010	16198	16012	12388	12094	8289
	XXS	120	11.13	25190	25190	23805	21407	21159	16371	13601	10955
		160	13.49	31019	31019	29310	26368	26058	20160	16750	13208
125	STD	40	6.55	11561	11561	10921	9825	9708	7517	6243	5038
	XS	80	9.53	17060	17060	16122	14503	14331	11093	9212	7421
	XXS	120	12.70	23130	23130	21855	19657	19430	15034	12492	10059
		160	15.88	29407	29407	27787	24997	24701	19113	15881	12795
150	STD	40	7.11	10500	10500	9928	8924	8819	6828	5670	4568
	XS	80	10.97	16474	16474	15571	14007	13842	10707	8895	7165
	XXS	120	14.27	21745	21745	20553	18486	18265	14138	11747	9460
		160	18.26	28325	28325	26768	24074	23784	18410	15296	12319
200	STD	20	6.35	7138	7138	6745	6063	5994	4637	3852	3100
		30	7.04	7924	7924	7489	6732	6656	5147	4279	3445
	XS	40	8.18	9246	9246	8737	7855	7765	6008	4995	4024
		60	10.31	11741	11741	11093	9977	9860	7627	6339	5105
250	XXS	80	12.70	14572	14572	13766	12388	12237	9474	7868	6338
		100	15.09	17452	17452	16488	14834	14655	11341	9426	7593
	XXS	120	18.26	21345	21345	20174	18148	17935	13876	11527	9288
		140	20.62	24308	24308	22971	20656	20415	15799	13125	10569
250	STD	20	6.35	5698	5698	5388	4844	4789	3707	3080	2480
		30	7.80	7028	7028	6642	5974	5905	4568	3796	3059
	XS	40	9.27	8385	8385	7923	7131	7048	5450	4527	3652
		60	12.70	11596	11596	10955	9853	9736	7538	6263	5043
300	XXS	80	15.09	13863	13863	13098	11781	11644	9012	7483	6028
		100	18.26	16922	16922	15992	14386	14214	10996	9136	7359
	XXS	120	21.44	20036	20036	18934	17032	16825	13022	10817	8716
		140	25.40	23998	23998	16474	20394	20153	15599	12960	10438
300	STD	160	28.58	27229	27229	25734	23143	22875	17700	14703	11844
		20	6.35	4795	4795	4534	4072	4024	3114	2591	2088
	XS	30	8.38	6359	6359	6008	5402	5540	4134	3431	2763
		40	9.53	7241	7241	6842	6153	6084	4706	3914	3149
350	XXS	60	14.27	10969	10969	10363	9322	9212	7131	5925	4768
		80	17.48	13525	13525	12850	11492	11362	8792	7303	5884
	XXS	100	21.44	16736	16736	15819	14227	14062	10879	9040	7283
		120	25.40	20015	20015	18913	17011	16811	13008	10804	8702
350	STD	140	28.58	22682	22682	21435	19278	19051	14744	12244	9866
		160	33.32	26740	26740	25273	22730	22461	17383	14441	11630
	XS	10	6.35	4361	4361	4120	3707	3665	2831	2356	1895
		20	7.92	5457	5457	5161	4644	4589	3548	2949	2377
350	XXS	30	9.53	6580	6580	6222	5595	5533	4279	3555	2866
		40	11.13	7717	7717	7310	6559	6477	5016	4168	3355
	XXS	60	12.70	8833	8833	8351	7510	7421	5739	4768	3845
		80	15.09	10541	10541	9963	8964	8861	6855	5691	4589
350	XXS	100	19.05	13421	13421	12684	11410	11272	8723	7248	5836
		120	23.83	16949	16949	16019	14407	14242	11017	9157	7372
	XXS	140	27.79	19933	19933	18837	16943	16743	12960	10762	8675
		160	31.75	22964	22964	21703	19519	19292	14931	12402	9990
350	XXS	160	35.71	26051	26051	24618	22144	21883	16936	14069	11334

* For temperatures above 425°C, see caution on graphitization.

PRESSURE/TEMPERATURE RATINGS

SEAMLESS CARBON STEEL PIPE. GRADE B, with plain ends. ASTM A106, API 5L & ASTM A53											
Nominal	Temp. °C ▶		-29 to 38	205	260	350	370	400	430	450	
	Stress (SE) in kPa ▶		137800	137800	130221	117130	115752	89570	74412	59943	
DN	Wall Thickness		MAXIMUM ALLOWABLE PRESSURE/TEMPERATURE RATINGS IN kPa FOR CHEMICAL PLANT AND PETROLEUM REFINERY PIPING SYSTEMS TO ANSI/ASME B31.3a — 1981								
MM	Sched. No.	mm									
400	STD	10	6.35	3810	3810	3603	3238	3197	2474	2060	1660
		20	7.92	4768	4768	4507	4051	4004	3100	2577	2074
		30	9.53	5746	5746	5429	4885	4830	3734	3100	2501
	XS	40	12.70	7703	7703	7283	6545	6470	5009	4162	3349
		60	16.66	10176	10176	9618	8654	8550	6614	5498	4430
		80	21.44	13208	13208	12478	11224	11093	8585	7131	5746
		100	26.19	16274	16274	15378	13835	13670	10576	8785	7076
		120	30.96	19409	19409	18341	16481	16302	12616	10480	8440
		140	36.53	23130	23130	21855	19657	19430	15034	12492	10059
		160	40.49	25824	25824	24404	21952	21697	16784	13945	11238
	450	STD	10	6.35	3383	3383	3197	2873	2839	2198	1826
20			7.92	4230	4230	3996	3597	3555	2749	2287	1839
30			9.53	5099	5099	4816	4334	4286	3314	2756	2219
XS		40	12.70	6835	6835	6456	5808	5739	4437	3686	2969
		60	16.66	9618	9618	9183	8354	8222	6389	5273	4194
		80	21.44	12478	12478	11885	10866	10715	8319	6913	5498
		100	26.19	16274	16274	15378	13835	13670	10576	8785	7076
		120	30.96	19409	19409	18341	16481	16302	12616	10480	8440
		140	36.53	23130	23130	21855	19657	19430	15034	12492	10059
		160	40.49	25824	25824	24404	21952	21697	16784	13945	11238
500		STD	10	6.35	3038	3038	2873	2584	2556	1977	1640
	20		7.92	3810	3810	3603	3238	3197	2474	2060	1660
	30		9.53	4582	4582	4327	3893	3852	2976	2474	1991
	XS	40	12.70	5746	5746	5429	4885	4830	3734	3100	2501
		60	16.66	7703	7703	7283	6545	6470	5009	4162	3349
		80	21.44	10176	10176	9618	8654	8550	6614	5498	4430
		100	26.19	13208	13208	12478	11224	11093	8585	7131	5746
		120	30.96	16274	16274	15378	13835	13670	10576	8785	7076
		140	36.53	19409	19409	18341	16481	16302	12616	10480	8440
		160	40.49	23130	23130	21855	19657	19430	15034	12492	10059
	600	STD	10	6.35	2529	2529	2391	2150	2129	1647	1364
20			7.92	3238	3238	3038	2738	2717	2060	1660	1323
30			9.53	3996	3996	3746	3371	3350	2576	2060	1660
XS		40	12.70	4885	4885	4611	4161	4140	3100	2501	2001
		60	16.66	6545	6545	6183	5643	5622	4286	3314	2666
		80	21.44	8585	8585	8143	7503	7482	5622	4286	3314
		100	26.19	11093	11093	10551	9711	9690	7314	5746	4430
		120	30.96	13835	13835	13293	12253	12232	9222	7131	5746
		140	36.53	16481	16481	15939	14799	14778	11116	8785	7076
		160	40.49	19430	19430	18888	17648	17627	13454	10480	8440
600		STD	10	6.35	22048	22048	20835	18741	18520	14331	11906
	20		7.92	2838	2838	2673	2384	2363	1833	1506	11906
	30		9.53	3511	3511	3346	2977	2956	2276	1833	1506
	XS	40	12.70	4327	4327	4162	3673	3652	2876	2287	1839
		60	16.66	5746	5746	5481	4892	4871	3734	3100	2494
		80	21.44	7703	7703	7438	6649	6628	5009	4162	3349
		100	26.19	10176	10176	9711	8822	8801	6614	5498	4430
		120	30.96	13208	13208	12643	11554	11533	8785	7131	5746
		140	36.53	16274	16274	15709	14520	14499	10934	8785	7076
		160	40.49	19409	19409	18844	17655	17634	13360	10480	8440
	600	STD	10	6.35	22048	22048	20835	18741	18520	14331	11906
20			7.92	2838	2838	2673	2384	2363	1833	1506	11906
30			9.53	3511	3511	3346	2977	2956	2276	1833	1506
XS		40	12.70	4327	4327	4162	3673	3652	2876	2287	1839
		60	16.66	5746	5746	5481	4892	4871	3734	3100	2494
		80	21.44	7703	7703	7438	6649	6628	5009	4162	3349
		100	26.19	10176	10176	9711	8822	8801	6614	5498	4430
		120	30.96	13208	13208	12643	11554	11533	8785	7131	5746
		140	36.53	16274	16274	15709	14520	14499	10934	8785	7076
		160	40.49	19409	19409	18844	17655	17634	13360	10480	8440
600		STD	10	6.35	22048	22048	20835	18741	18520	14331	11906
	20		7.92	2838	2838	2673	2384	2363	1833	1506	11906
	30		9.53	3511	3511	3346	2977	2956	2276	1833	1506
	XS	40	12.70	4327	4327	4162	3673	3652	2876	2287	1839
		60	16.66	5746	5746	5481	4892	4871	3734	3100	2494
		80	21.44	7703	7703	7438	6649	6628	5009	4162	3349
		100	26.19	10176	10176	9711	8822	8801	6614	5498	4430
		120	30.96	13208	13208	12643	11554	11533	8785	7131	5746
		140	36.53	16274	16274	15709	14520	14499	10934	8785	7076
		160	40.49	19409	19409	18844	17655	17634	13360	10480	8440

* For temperatures above 425°C, see caution on graphitization.

MATERIAL SPECIFICATIONS FOR PIPING COMPONENTS

PIPING COMPONENT SPECIFICATIONS

This page shows comparable ASTM and API specifications for the basic components of welded piping systems. Specification numbers and material grades are shown; for example, ASTM specification A106 Grade B is indicated in the table as A106-B. Other specifications exist and may be required for special piping systems. Materials shown are those most frequently used today.

Also tabulated are the permissible raw material specifications which are used in the manufacture of welding fittings. Selection from these is at the discretion of the fitting manufacturer.

MATERIAL		PIPING COMPONENTS			RAW MATERIAL FOR WELDING FITTINGS	
		Pipe	Welding Fittings *	Flanges	Pipe	Forgings
Carbon Steel	Grade B	A53-B A106-B A135-B A139-B API-5L-B	A234-WPB	A105	A106-B	A105
	Grade C	A106-C	A234-WPC	A105	A106-C	
	Low Temperature	A333-6	A420-WPL6	A350-LF2	A333-6	A350-LF2
	High Yield	A381-35	Grade WPY35 § II	A105	A106-B	A105
API-5LX-X42, X46, X52		Grade WPY42 § II Grade WPY52 § II	A182-F1 -	A381-42 A381-52	182-F1 -	
Carbon Moly-Steel	1/2 Mo	A155-CM70	A234-WP1	A182-F1	A335-P1	A182-F1
		A335-P1 A369-FP1				
Chrome Moly-Steel	1/2Cr-1/2Mo	A155-1/2CR A335-P2 A369-FP2	Grade WP2 §	A182-F2	A335-P2	A182-F2
	1Cr-1/2Mo	A155-1CR A335-P12 A369-FP12	A234-WP12	A182-F12	A335-P12	A182-F12
	1 1/4Cr-1/2Mo	A155-1 1/4CR A335-P11 A369-FP11	A234-WP11	A182-F11	A335-P11	A182-F11
	2 1/4Cr-1Mo	A155-2 1/4CR A335-P22 A369-FP22	A234-WP22	A182-F22	A335-P22	A182-F22
	5Cr-1/2Mo	A155-5CR A335-P5 A369-FP5	A234-WP5	A182-F5	A335-P5	A182-F5
	7Cr-1/2Mo	A335-P7 A369-FP7	Grade WP7	A182-F7	A335-P7	A182-F7
	9Cr-1Mo	A335-P9 A369-FP9	Grade WP9	A182-F9	A335-P9	A182-F9
Low Temp Ferritic Steel	3 1/2Ni	A333-3	A420-WPL3	A350-LF3	A333-3	A350-LF3
	Cu-Ni Low Alloy Steel	A333-9	A420-WPL9	A350-LF9	A333-9	A350-LF9

* When fittings are of welded construction, the fitting manufacturer shall supplement the grade symbol marking with the letter "W".

§ No ASTM specification has been written. The welding fitting grade symbol is that recommended by MSS Standard SP-25, and the raw materials shown are those commonly used.

II The numerals in these grade symbols are the first two numbers of the minimum guaranteed yield strength of the fittings. Fittings having other minimum yield strengths may be similarly designated by using the applicable numerals.

STAINLESS STEEL PIPE



Antec offers a stock range of Stainless Steel seamless and longitudinally welded pipe to American standards, with other specifications (eg: spirally welded) available to order. The specifications applicable to our stock range are:

MATERIAL SPECIFICATIONS

ASTM A312 (latest edition), Seamless and Welded Austenitic Stainless Steel Pipe. Applicable stock grades are TP304/304L and TP316/316L. Pipe is generally dual certified within each grade. The mechanical and chemical properties applicable to these grades are detailed in the book of ASTM standards. The following chemical analysis chart provides a general comparison between the popular grades.

CHEMICAL COMPOSITION

SYMBOL	Chemical Composition (%)							
	C	Si	Mn	P	S	Ni	Cr	Mo
TP304	0.080	1.00	2.0	0.045	0.030	8.00-11.00	18.00-20.00	
TP304L	0.035	1.00	2.0	0.045	0.030	8.00-13.00	18.00-20.00	
TP316	0.080	1.00	2.0	0.045	0.030	11.00-14.00	16.00-18.00	2.00-3.00
TP316L	0.035	1.00	2.0	0.045	0.030	10.00-14.00	16.00-18.00	2.00-3.00

DIMENSIONAL SPECIFICATIONS

ANSI/ASME B36.10 (Welded and Seamless Wrought Steel Pipe) and ANSI/ASME B36.19 (Stainless Steel Pipe). These standards cover the dimensions of seamless and welded pipe in this section. The nominal pipe sizes, wall thicknesses and internal diameters for popular sizes and schedules are shown in the table opposite.

WEIGHTS

Weights for Stainless Steel pipes vary according to material grade. Austenitic stainless steels are generally slightly heavier than carbon steel, for example:

Pipe Size	Schedule	Kg/m CS A106	Kg/m SS 304L	Kg/m SS 316L
80	40	11.29	11.40	11.50

STAINLESS STEEL PIPE

Nominal Size DN	OUTSIDE DIAMETER mm	NOMINAL WALL THICKNESS & INSIDE DIAMETER - millimetres							
		SCHEDULE 5S		SCHEDULE 10S		SCHEDULE 40S		SCHEDULE 80S	
		Wall Thickness	Inside Diameter	Wall Thickness	Inside Diameter	Wall Thickness	Inside Diameter	Wall Thickness	Inside Diameter
6	10.29	-	-	1.24	7.81	1.73	6.83	2.41	5.47
8	13.72	-	-	1.65	10.42	2.24	9.24	3.02	7.68
10	17.15	-	-	1.65	13.85	2.31	12.53	3.20	10.75
15	21.34	1.65	18.04	2.11	17.12	2.77	15.80	3.73	13.88
20	26.67	1.65	23.37	2.11	22.45	2.87	20.93	3.91	18.85
25	33.40	1.65	30.10	2.77	27.86	3.38	26.64	4.55	24.30
32	42.16	1.65	38.86	2.77	36.62	3.56	35.04	4.85	32.46
40	48.26	1.65	44.96	2.77	42.72	3.68	40.90	5.08	38.10
50	60.32	1.65	57.03	2.77	54.79	3.91	52.51	5.54	49.25
65	73.02	2.11	68.81	3.05	66.93	5.16	62.71	7.01	59.01
80	88.90	2.11	84.68	3.05	82.80	5.49	77.92	7.62	73.66
100	114.30	2.11	110.08	3.05	108.20	6.02	102.26	8.56	97.18
125	141.30	2.77	135.76	3.40	134.50	6.55	128.19	9.52	122.25
150	168.28	2.77	162.74	3.40	161.47	7.11	154.05	10.97	146.33
200	219.08	2.77	213.54	3.76	211.56	8.18	202.72	12.70	193.68
250	273.05	3.40	266.24	4.19	264.67	9.27	254.51	12.70	247.65
300	323.85	3.96	315.93	4.57	314.71	9.52	304.08	12.70	298.45
350	355.60	3.96	347.68	4.78	346.05	-	-	-	-
400	406.40	4.19	398.02	4.78	396.85	-	-	-	-
450	457.20	4.19	448.82	4.78	447.65	-	-	-	-
500	508.00	4.78	498.45	5.54	496.93	-	-	-	-
600	609.60	5.54	598.53	6.35	596.90	-	-	-	-
750	762.00	6.35	749.30	7.92	746.16	-	-	-	-