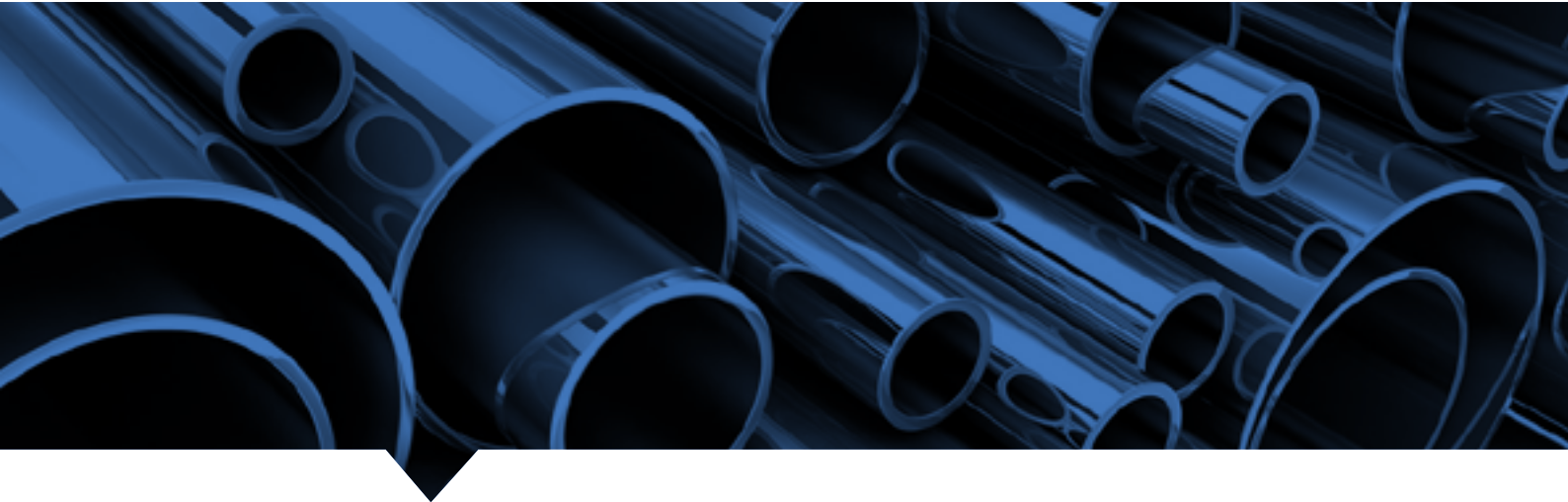
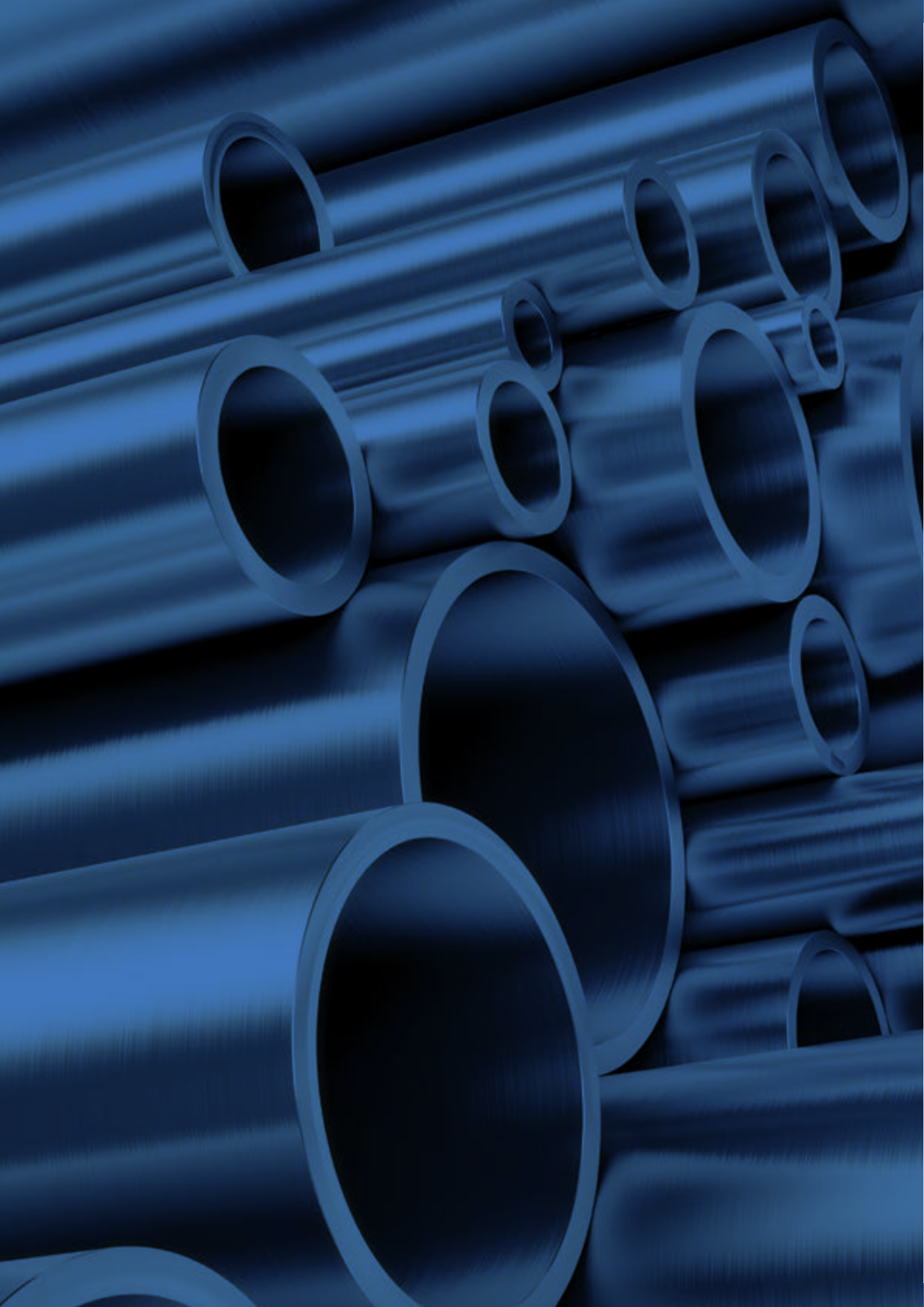




Advanced Piping Solutions



Preface

THL Tube & Pipe Industries LLC is a fully owned subsidiary of **TAURANI HOLDINGS LTD. THL Tube & Pipe Industries LLC** is one of the leading manufacturers, stockist and distributors of high frequency welded steel pipes and tubes in the United Arab Emirates. Spread over 25,000 square meters, the company is well positioned to cater to a diverse clientele across many sectors from Oil & Gas to Onshore Exploration, Water Treatment and Desalination to Petrochemical & Refinery, Agriculture and Water Irrigation to Scaffolding and Handrail Equipment.

The mill's manufacturing size range consists of Round pipes from sizes 4" to 12", Square tubes from size 40 x 40 to 250 x 250 and Rectangular tubes from size 60 x 40 to 300 x 200 in thicknesses from 1.5 mm to 12.7mm, using material Grades S235JR, S275J0, S275J2, S355J0, S355J2 and as per client/ customer requirements. One of the production lines is specially dedicated for manufacturing structural tubing in standards as per ASTM A500, AS/ NZS 1163 and EN10219.

The mill has various certifications as below:

- a) Certified by BM Trade for ISO 9001 certification.
- b) Certified by TUV Rheinland for ISO 14001 & OHSAS 18001
- c) Certified by API for API 5L Grade A25 to X70 PSL1 & API 5L Grade B to X80 PSL2 and also in API 5CT Grade H40, J55 & K55.
- d) Certified by TUV Nord for CE marking for manufacture as per EN 10255 & EN 10219 standards.
- e) Certified by TUV Rheinland for Factory production control for manufacture as per EN 10219 & AS/ NZS 1163.

THL's growth trajectory is well piloted by its able management and intricately supported by its dedicated human capital. With its manufacturing facilities in Dubai Investment Park and an amicable sales and stocking/ distribution network across GCC, Europe, Australia, Canada and North America, the company is well positioned to efficiently service its vast customer base across five continents.

Under the aegis of its gifted leadership and committed work force, the company has and will continue upgrading its services and keeps on enhancing its already vast product portfolio to match its every customer's requirement and is well poised to broaden its spectrum across many other emerging markets.

Our Mission

- Continually building our skills and knowledge to meet the growing and diverse needs of customers.
- Ensuring that the solutions are flexible to suit each customer with a focus on high service standards, on time deliveries and competitive prices.
- Sustaining our reputation as a reliable and customer-oriented pipe & tube manufacturer and supplier in the market.
- Achieving profitable growth, operational and organizational excellence without compromising from our values and business ethics.

Our Vision

- Maintaining quality, integrity and high standard at all levels of operation.
- Re-defining the standards of 'customer service' by exceeding customer expectations.
- Keeping our name synonymous with reliability, customer satisfaction and innovation.

Product Range

Product Finder



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- ▶ Square Tubes
- ▶ Rectangular Tubes
- ▶ Specialized Pipes & Tubes

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ROUND PIPES



ASTM A53 ERW Black & GI Steel Pipes

Dimensional range & weight according to ASTM A53 / ASME B36.10

Size		Outside Diameter		Wall Thickness		Weight per Unit Length (Plain End)		Weight Class	Schedule No.	Test Pressure (psi)		Pieces Per Bundle
NPS	DN	in	mm	in	mm	lb/ft	kg/m			Grade A	Grade B	
4	100	4.500	114.3	0.120	3.05	5.62	8.37	---	10	961	1121	19
				0.125	3.18	5.85	8.71	---	---	1000	1170	19
				0.156	3.96	7.24	10.78	---	---	1250	1460	19
				0.188	4.78	8.67	12.91	---	30	1500	1750	14
				0.219	5.56	10.02	14.91	---	---	1750	2040	14
				0.237	6.02	10.80	16.07	STD	40	1900	2210	10
				0.250	6.35	11.36	16.90	---	---	2000	2330	10
				0.281	7.14	12.67	18.87	---	---	2250	2620	10
				0.312	7.92	13.97	20.78	---	---	2500	2800	10
				0.337	8.56	15.00	22.32	XS	80	2700	2800	10
5	125	5.563	141.3	0.134	3.40	7.78	11.56	---	10	870	1014	14
				0.156	3.96	9.02	13.41	---	---	1010	1180	14
				0.188	4.78	10.80	16.09	---	---	1220	1420	10
				0.219	5.56	12.51	18.61	---	---	1420	1650	10
				0.258	6.55	14.63	21.77	STD	40	1670	1950	7
				0.281	7.14	15.87	23.62	---	---	1820	2120	7
				0.312	7.92	17.51	26.05	---	---	2020	2360	7
				0.344	8.74	19.19	28.57	---	---	2230	2600	7
				0.375	9.52	20.80	30.94	XS	80	2430	2800	7
				0.500	12.70	27.06	40.28	---	120	2800	2800	7

ASTM A53 ERW Black & GI Steel Pipes

Dimensional range & weight according to ASTM A53 / ASME B36.10

Size		Outside Diameter		Wall Thickness		Weight per Unit Length (Plain End)		Weight Class	Schedule No.	Test Pressure (psi)		Pieces Per Bundle
NPS	DN	in	mm	in	mm	lb/ft	kg/m			Grade A	Grade B	
6	150	6.625	168.3	0.134	3.40	9.30	13.83	---	10	728	848	10
				0.188	4.78	12.94	19.27	---	---	1020	1190	10
				0.219	5.56	15.00	22.31	---	---	1190	1390	7
				0.250	6.35	17.04	25.36	---	---	1360	1580	7
				0.280	7.11	18.99	28.26	STD	40	1520	1780	7
				0.312	7.92	21.06	31.32	---	---	1700	1980	7
				0.344	8.74	23.10	34.39	---	---	1870	2180	7
				0.375	9.52	25.05	37.28	---	---	2040	2380	7
				0.432	10.97	28.60	42.56	XS	80	2350	2740	7
8	200	8.625	219.1	0.188	4.78	16.96	25.26	---	---	780	920	4
				0.203	5.16	18.28	27.22	---	---	850	1000	4
				0.219	5.56	19.68	29.28	---	---	910	1070	4
				0.250	6.35	22.38	33.31	---	20	1040	1220	4
				0.277	7.04	24.72	36.31	---	30	1160	1350	4
				0.312	7.92	27.73	41.24	---	---	1300	1520	4
				0.322	8.18	28.58	42.55	STD	40	1340	1570	4
				0.344	8.74	30.45	45.34	---	---	1440	1680	4
				0.375	9.52	33.07	49.20	---	---	1570	1830	4
				0.406	10.31	35.67	53.08	---	60	1700	2000	4
				0.438	11.13	28.33	57.08	---	---	1830	2130	4

ASTM A53 ERW Black & GI Steel Pipes

Dimensional range & weight according to ASTM A53 / ASME B36.10

Size		Outside Diameter		Wall Thickness		Weight per Unit Length (Plain End)		Weight Class	Schedule No.	Test Pressure (psi)		Pieces Per Bundle
NPS	DN	in	mm	in	mm	lb/ft	kg/m			Grade A	Grade B	
8	200	8.625	219.1	0.500	12.70	43.43	64.64	XS	80	2090	2430	4
10	250	10.750	273.0	0.188	4.78	21.23	31.62	---	---	630	730	4
				0.203	5.16	22.89	34.08	---	---	680	800	4
				0.219	5.56	24.65	36.67	---	---	730	860	4
				0.250	6.35	28.06	41.75	---	20	840	980	4
				0.279	7.09	21.23	46.49	---	---	930	1090	4
				0.307	7.80	34.27	51.01	---	30	1030	1200	4
				0.344	8.74	38.27	56.96	---	---	1150	1340	4
				0.365	9.27	40.52	60.29	STD	40	1220	1430	4
				0.438	11.13	48.28	71.87	---	---	1470	1710	4
				0.500	12.70	54.79	81.52	XS	60	1670	1950	4
12	300	12.750	323.8	0.219	5.56	29.34	43.63	---	---	620	720	2
				0.250	6.35	33.41	49.71	---	20	710	820	2
				0.281	7.14	37.46	55.75	---	---	790	930	2
				0.312	7.92	41.48	61.69	---	---	880	1030	2
				0.330	8.38	43.81	65.18	---	30	930	1090	2
				0.344	8.74	45.62	67.90	---	---	970	1130	2
				0.375	9.52	49.61	73.78	STD	---	1060	1240	2
				0.406	10.31	53.57	79.70	---	40	1150	1340	2
				0.438	11.13	57.65	85.82	---	---	1240	1440	2

ASTM A53, ERW Black & GI Steel Pipes

Dimensional range & weight according to ASTM A53 / ASME B36.10

Size		Outside Diameter		Wall Thickness		Weight per Unit Length (Plain End)		Weight Class	Schedule No.	Test Pressure (psi)		Pieces Per Bundle
NPS	DN	in	mm	in	mm	lb/ft	kg/m			Grade A	Grade B	
12	300	12.750	323.80	0.500	12.70	65.48	97.43	XS	—	1410	1650	2

1. Tolerances:

- Outside Diameter
- :
- Pipe size NPS 2 or larger , the outside diameter shall not vary more than +/-1% from the specified outside diameter.
- Thickness
- :
- The minimum wall thickness at any point shall be not more than 12.5% under the specified wall thickness.
- Weight
- :
- The weight of the pipe shall not more than +/-10% of the specified weight

2. Ends Finish
- :
- Plain-end beveled with ends beveled to an angle of 30°, +5°, -0°, measured from a line drawn perpendicular to the axis of the pipe, and with a root face of 1⁄16in. ± 1⁄32 in. [1.6mm ± 0.8mm].

3. Testing:

Chemical Composition (max %)

Grade	C%	Mn%	P%	S%	Cu%	Ni%	Cr%	Mo%	V%	Cu+Ni+Cr+Mo+V
A	0.25	0.95	0.05	0.045	0.40	0.40	0.40	0.15	0.08	1.00
B	0.30	1.20	0.05	0.045	0.40	0.40	0.40	0.15	0.08	1.00

Mechanical Properties

	Grade A	Grade B
Yield Strength	205 MPa (min)	240 MPa (min)
Tensile Strength	330 MPa (min)	415 MPa (min)
Elongation%	19 - 36% or as per ASTM A53	

ASTM A53 ERW Black & GI Steel Pipes

- Flattening Test (0 & 90 deg)
- :
- For pipes over NPS 2
- Stage - 1
- :
- For ductility of weld, no cracks or breaks on the inside or outside surface at the weld, flatten up to 2/3 of outside dia of pipe.
- Stage - 2
- :
- For ductility of steel, no cracks or breaks on the inside or outside surface away from the weld, flatten upto 1/3 of outside dia of pipe.
- Stage - 3
- :
- For soundness, full flattening for testing of laminated and unsound material.
- Leak Tightness test
- :
-
- i) Online NDT(Eddy Current)
- :
- Weld seam of each pipe shall be tested by Eddy current test
- ii) Hydro test
- :
- Each pipe shall be tested by hydro test, test pressure as per above table and holding time min. 5 second.
- Heat Treatment
- :
- The weld seam of the ERW Pipe in Grade B shall be heat treated after welding to a minimum temperature of 540° C, so that no untempered martensite remains.
4. Surface Protection
- i) Black Coating
- :
- Pipes are uniformly varnished externally over their full length.
- ii) Galvanizing :
- :
- Average 550 G m/mm2 but one side should not be less than 490 G m/mm².
Free from bare spot, black spot, rough, over coating, peel off or any other surface defect
5. Marking
- :
- Online stenciling as per the standard & customer requirement.
6. Packing
- :
- Hexagonal Type

ASTM A135 ERW Black & G I Steel Pipes

Dimensional range, Weight & Test Pressure according to ASTM A135 Grade - A & B , Schedule - 10

Size		Outside Diameter		Wall Thickness		Weight per Unit Length (Plain End)		Test Pressure (psi)		Pieces Per Bundle
NPS	DN	in	mm	in	mm	lb/ft	kg/m	Grade A	Grade B	
4	100	4.500	114.30	0.120	3.05	5.62	8.37	900	1100	19
5	125	5.563	141.30	0.134	3.40	7.78	11.58	850	1000	10
6	150	6.625	168.30	0.134	3.40	9.30	13.83	728	848	10

1. Tolerances:

- a) Thickness: The minimum wall thickness at any point shall be not more than 12.5% under the specified wall thickness.
- b) Diameter: The outside diameter shall not vary more than ±1% from the nominal size specified.
- c) Weight: The weight of the pipe shall not more than ±10% of the specified weight.

2. Ends:

- a): End finish shall be at the option of manufacturer which is nominally square cut with the axis of tube and free from excessive burrs.
- b) If specified: Bevelled with ends beveled to an angle of 30, +5/-0 degree measured from a line perpendicular to the axis of the pipe with a root face of 1.6 mm ± 0.8 mm.

3. Testing:

- Chemical Composition (max%)

GR.A

GR.B

: C -0.25%, Mn -0.95%, S -0.035%, P -0.035%
: C -0.30%, Mn -1.20%, S 0.035%, P -0.035%
- Mechanical Testing (min)

GR.A

GR.B

: Yield Strength-205 N/mm², Tensile Strength-330 N/mm², Elongation-35% Min.
: Yield Strength-240 N/mm², Tensile Strength-415 N/mm², Elongation-30% Min.

ASTM A135 ERW Black & G I Steel Pipes

- Flattening Test

Stage - 1

Stage - 2

Stage - 3

: Weld located 0 & 90 degree from line of direction of force.
: For ductility of weld, no cracks or breaks on the inside or outside surface at the weld, flatten up to 2/3 of outside dia of pipe.
: For ductility of steel, no cracks or breaks on the inside or outside surface away from the weld, flatten upto 1/3 of outside dia of pipe.
: For soundness, full flattening for testing of laminated and unsound material.

Leak Tightness test:

- i): Online NDT(Eddy Current)
- ii): Hydro testing at pressure as per above Table and holding time Min. 5 Second.

4. Heat Treatment

: The weld seam of the ERW Pipe in Grade B shall be heat treated after welding to a minimum temperature of 540° C, so that no untempered martensite remains.

5. Surface Protection:

- i) Black Coating

: Pipes are uniformly varnished externally over their full length.
- ii) Galvanizing

: The average 460 Gm/mm² but one side should not be less than 400Gm/mm² or specified by customer.
Free from bare spot, black spot, rough, over coating, peel off or any other surface defect.

6. Marking

: Online stenciling as per the standard & customer requirement.

7. Packing

: Hexagonal Type

ASTM A795 ERW Black & GI Steel Pipes

A) Dimensions, Weight & Test Pressure For Light-Weight Fire Protection Pipe-Schedule 10^A

Size		Outside Diameter		Wall Thickness		Weight per Unit Length (Plain End)		Schedule No.	Test Pressure	Pieces Per Bundle
NPS	DN	in	mm	in	mm	lb/ft	kg/m		(psi)	
4	100	4.500	114.30	0.120	3.05	5.62	8.37	10	1200	19
5	125	5.563	141.30	0.134	3.40	7.78	11.56	10	1200	14
6	150	6.625	168.30	0.134	3.40	9.30	13.83	10	1000	10
8	200	8.625	219.10	0.188	4.78C	16.96	25.26	---	800	4
10	250	10.750	273.10	0.188	4.78C	21.23	31.62	--	700	2

^AA)- Schedule 10 corresponds to Schedule 10S as listed in ANSI B36.19 for NPS 4 through 6 [DN 100 through 150] only. C) -Not Schedule 10.

B) Dimensions, Weight & Test Pressure For Standard-Weight Fire Protection Pipe-Schedule 30 and Schedule 40

Size		Outside Diameter		Wall Thickness		Weight per Unit Length (Plain End)		Schedule No.	Test Pressure	Pieces Per Bundle
NPS	DN	in	mm	in	mm	lb/ft	kg/m		(psi)	
4	100	4.500	114.3	0.237	6.02	10.80	16.09	40	1200	10
5	125	5.563	141.3	0.258	6.55	14.63	21.79	40	1200	7
6	150	6.625	168.3	0.280	7.11	18.99	28.29	40	1200	7
8	200	8.625	219.1	0.277	7.04	24.72	36.82	30	1200	4
10	250	10.750	273.1	0.307	7.80	34.27	51.05	30	1000	2

1. Tolerances:

- a) Thickness : The minimum wall thickness at any point shall be not more than 12.5% under the specified wall thickness.
- b) Diameter : The outside diameter shall not vary more than ±1% of OD.
- c) Weight : The weight of the pipe shall not more than ±5% of the specified weight.

ASTM A795 ERW Black & GI Steel Pipes

2. Ends : Each end of pipe shall be furnish plain end unless otherwise specified.

3. Testing:

Chemical Composition (max %) : GR.A : C -0.25%, Mn - 0.95%, S - 0.035%, P - 0.035%
: GR.B : C - 0.30%, Mn - 1.20%, S - 0.035%, P - 0.035%

Mechanical Testing (min) : GR.A : Yield Strength-205 N/mm²,Tensile Strength-330 N/mm², Elongation-25 to 30%
: GR.B : Yield Strength-240 N/mm²,Tensile Strength-415 N/mm², Elongation-25 to 30%

Flattening Test : Weld located 0 & 90 degree from line of direction of force.

Stage - 1 : For ductility of weld, no cracks or breaks on the inside or outside surface at the weld , flatten up to 2/3 of outside dia of pipe.

Stage - 2 : For ductility of steel,no cracks or breaks on the inside or outside surface away from the weld , flatten upto 1/3 of outside dia of pipe.

Stage - 3 : For soundness , full flattening for testing of laminated and unsound material.

4. Leak Tightness test

- i) : Online NDT(Eddy Current)
- ii) : Hydro testing at pressure as per above Table and holding time Min. 5 Second.

5. Heat Treatment : The weld seam of the ERW Pipe in Grade B shall be heat treated after welding to a minimum temperature of 540° C, so that no untempered martensite remains.

ASTM A795 ERW Black & GI Steel Pipe

6. Surface Protection

- i) Black Coating

:

Tubes are uniformly varnished externally over their full length.
- ii) Galvanizing :

:

The average 460 Gm/mm² but one side should not be less than 400Gm/mm² or specified by customer

Free from bare spot, black spot, rough, over coating, peel off or any other surface defect.

7. Marking

:

Online stenciling as per the standard & customer requirement.

8. Packing

:

Hexagonal Type

BS EN 10255:2004+A1:2007

Technical Data of Pipes Conforming to BS EN 10255:2004+A1:2007 for Non-alloy steel tubes suitable for welding and threading.

Class	Nominal Size		Outside Diameter		Wall Thickness (mm)	Weight of Pipe Plain End (kg/m)	Test Pressure	Pieces per Bundle
	NPS	OD	min.	max.			bar	
Type - L	4"	114.3	113.0	113.9	3.6	9.83	50	14
	5"	139.7	138.5	140.8	4.5	15.00	50	10
	6"	165.1	163.9	166.5	4.5	17.80	50	10
Type - L1	4"	114.3	113.0	114.9	4.0	10.80	50	14
Type - L2	4"	114.3	113.0	113.9	3.6	9.75	50	14
Medium	4"	114.3	113.1	115.0	4.5	12.20	50	14
	5"	139.7	138.5	140.8	5.0	16.60	50	10
	6"	165.1	163.9	166.5	5.0	19.80	50	7
Heavy	4"	114.3	113.1	115.0	5.4	14.50	50	10
	5"	139.7	138.5	140.8	5.4	17.90	50	7
	6"	165.1	163.9	166.5	5.4	21.30	50	7

Tolerances:

1. Outside Diameter

:

As per the above table
2. Thickness

:

±10%. for M and H series & Type L

:

-8% with the plus tolerance limited by the mass tolerance, for Types L1 and L2.
3. Weight

:

±7.5% on bundles of 10 tons or more, for M and H series and Type L

:

+10%, -8% on individual tubes for Types L1 and L2.
4. Straightness

:

Straightness shall not exceed 0.002 L.

BS EN 10255:2004+A1:2007

Technical Data of Pipes Conforming to BS EN 10255:2004+A1:2007 for Non-alloy steel tubes suitable for welding and threading.

5. Ends : Cut cleanly and nominally square with the axis of the tube and free from excessive burrs.

6. Chemical Composition (max %) : C -0.20%, Mn -1.40%, S -0.030% & P -0.035%

7. Mechanical Properties : Tensile Strength : 320 to 520 N/mm²,
Yield Strength : 195 N/mm² (minimum)
% Elongation : 20% minimum

8. Flattening Test : For above NPS 2" - Welded tubes shall be flattened with the weld placed alternately at 0° or 90° to the direction of the force. For Weld Test - Flatten up to 75% of original dia of the tube. No cracks in the weld. For Material other than Weld-Flatten up to 60% of original tube OD. No cracks in the metal other than in the weld.

9. Leak Tightness test

- a) : Online NDT (Eddy Current) OR
- b) : Hydro testing at pressure as per above table and holding time min. 5 second.

10. Surface Protection : Galvanizing coating as per EN 10240 A.1 / EN ISO 1461 / customer requirement.

11. Marking : Stenciling as per standard & customer requirement.

12. Packing : Hexagonal Type

13. Colour Coding : For Type L -- Green
For Type L1 -- White
For Type L2 -- Brown
For Medium -- Blue
For Heavy -- Red

BS 1387

Technical Data of Pipes Conforming to BS 1387 for plain end steel tubes

Class	Nominal Size		Outside Diameter		Wall Thickness (mm)	Weight of Tube Plain End (kg/m)	Test Pressure	Pieces Per Bundle
	NPS	DN	min.	max.			bar	
L	4"	100	113.0	113.9	3.6	9.75	50	14
M	4"	100	113.3	114.9	4.5	12.2	50	14
	5"	125	138.7	140.6	5.0	16.6	50	10
	6"	150	164.1	166.1	5.0	19.7	50	7
H	4"	100	113.3	114.9	5.4	14.5	50	10
	5"	125	138.7	140.6	5.4	17.9	50	10
	6"	150	164.1	166.1	5.4	21.3	50	7

Tolerances:

1. Outside Diameter : As per the above table

2. Thickness

Light	Medium	Heavy
-8%	-10%	-10%
+Unlimited	+Unlimited	+Unlimited

3. Weight : +10%/-8% (Single tube)

4. Straightness : 0.2% of the length.

5. Ends : Cut cleanly and nominally square with the axis of the tube and free from excessive burrs.

BS 1387

Technical Data of Pipes Conforming to BS 1387 for plain end steel tubes

- 6. Chemical Composition (max %)** : C-0.20%, Mn-1.20%, S-0.045% & P-0.045%
- 7. Mechanical Properties** :

Tensile Strength : 320 to 460 N/mm²,

Yield Strength : 195 N/mm² (minimum)

% Elongation : 20% minimum
- 8. Flattening Test (90°)** :

For Weld Test - Flatten up to 75% of original OD of tube. No cracks in the weld.

For Material-Flatten up to 60% of original OD of tube. No cracks in the metal other than in the weld.
- 9. Leak Tightness test**

a) : Online NDT (Eddy Current) OR

b) : Hydro testing at pressure as per above table and holding time min. 5 second.
- 10. Surface Protection** : Black & Galvanizing coating as per standard / customer requirement.
- 11. Packing** : Hexagonal Type
- 12. Colour Coding** :

For Light -- Brown

For Medium -- Blue

For Heavy -- Red

AS 1074

Technical Data of Pipes Conforming to AS 1074 for Steel tubes and tubulars for ordinary service

Class	Nominal Size		Outside Diameter		Wall Thickness (mm)	Weight of Pipe Plain End (kg/m)	Test Pressure	Piece Per Bundle
	NPS	DN	min.	max.			bar	
L	4"	100	113.0	113.9	3.6	9.75	50	14
M	4"	100	113.3	114.9	4.5	12.20	50	14
	5"	125	138.7	140.6	5.0	16.60	50	10
	6"	150	164.1	166.1	5.0	19.70	50	7
H	4"	100	113.3	114.9	5.4	14.50	50	10
	5"	125	138.7	140.6	5.4	17.90	50	10
	6"	150	164.1	166.1	5.4	21.30	50	7

Tolerances:

1. Outside Diameter : As per the above table

2. Thickness:

Light	Medium	Heavy
-8%	-10%	-10%
+unlimited	+unlimited	+unlimited

3. Weight : +10%/-8% (Single tube)

4. Straightness : 0.2% of the length.

5. Ends : Cut cleanly and nominally square with the axis of the tube and free from excessive burrs.

AS 1074

Technical Data of Pipes Conforming to AS 1074 for Steel tubes and tubulars for ordinary service

6. Chemical Composition (max %) : S-0.045% , P-0.045% & CE-0.40%

7. Mechanical Properties : Tensile Strength : 320 to 460 N/mm²,
: Yield Strength : 195 N/mm² (minimum)
: %Elongation : 20% minimum

8. Flattening Test (90°) : For weld Test - Flatten up to 75% of original OD of tube. No cracks in the weld.
For Material-Flatten up to 60% of original OD of tube. No cracks in the metal other than in the weld.

9. Leak Tightness test:

- a) : Online NDT (Eddy Current) OR
- b) : Hydro testing at pressure as per above table and holding time min. 5 second.

10. Surface Protection : Black & Galvanizing coating as per standard / customer requirement.

11. Packing : Hexagonal Type

12. Colour Coding : For Light -- Brown
For Medium -- Blue
For Heavy -- Red

ASTM A500 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter	Wall Thickness (T)		Mass per unit length		Pieces/bdls
mm	inch	mm	kg/m	lb/ft	
114.3	0.098	2.50	6.89	4.632	19
	0.118	3.00	8.23	5.534	19
	0.157	4.00	10.88	7.312	14
	0.197	5.00	13.48	9.057	14
	0.236	6.00	16.02	10.769	10
	0.248	6.30	16.78	11.276	10
	0.315	8.00	20.97	14.093	10
	0.394	10.00	25.72	17.285	7
139.7	0.118	3.00	10.11	6.796	14
	0.157	4.00	13.39	8.996	14
	0.197	5.00	16.61	11.162	10
	0.236	6.00	19.78	13.295	10
	0.248	6.30	20.72	13.928	7
	0.315	8.00	25.98	17.461	7
	0.394	10.00	31.98	21.495	7
	0.472	12.00	37.79	25.396	7
141.3	0.118	3.00	10.23	6.876	14
	0.157	4.00	13.54	9.102	14
	0.197	5.00	16.81	11.294	10
	0.236	6.00	20.02	13.454	10

ASTM A500 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
141.3	0.248	6.30	20.97	14.095	7
	0.315	8.00	26.30	17.673	7
	0.394	10.00	32.38	21.760	7
	0.472	12.00	38.26	25.714	7
165.1	0.118	3.00	11.99	8.059	10
	0.157	4.00	15.89	10.679	10
	0.197	5.00	19.74	13.266	10
	0.236	6.00	23.54	15.820	7
	0.248	6.30	24.67	16.580	7
	0.315	8.00	30.99	20.828	7
	0.394	10.00	38.25	25.704	7
	0.472	12.00	45.31	30.447	4
168.3	0.118	3.00	12.23	8.218	10
	0.157	4.00	16.21	10.892	10
	0.197	5.00	20.13	13.532	10
	0.236	6.00	24.01	16.138	7
	0.248	6.30	25.17	16.914	7
	0.315	8.00	31.62	21.253	7
	0.394	10.00	39.04	26.234	4
	0.472	12.00	46.25	31.084	4

ASTM A500 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
177.8	0.157	4.00	17.14	11.521	7
	0.197	5.00	21.31	14.319	7
	0.236	6.00	25.42	17.083	4
	0.248	6.30	26.64	17.906	4
	0.315	8.00	33.50	22.512	4
	0.394	10.00	41.38	27.809	4
	0.472	12.00	49.06	32.973	4
193.7	0.157	4.00	18.71	12.575	7
	0.197	5.00	23.27	15.636	7
	0.236	6.00	27.77	18.664	7
	0.248	6.30	29.11	19.566	7
	0.315	8.00	36.63	24.620	4
	0.394	10.00	45.30	30.444	4
	0.472	12.00	53.77	36.135	4
219.1	0.157	4.00	21.22	14.259	4
	0.197	5.00	26.40	17.741	4
	0.236	6.00	31.53	21.190	4
	0.248	6.30	33.06	22.218	4
	0.315	8.00	41.65	27.988	4
	0.394	10.00	51.56	34.653	4

ASTM A500 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
219.1	0.472	12.00	61.29	41.186	4
244.5	0.157	4.00	23.72	15.943	4
	0.197	5.00	29.53	19.846	4
	0.236	6.00	35.29	23.715	4
	0.248	6.30	37.01	24.870	4
	0.315	8.00	46.66	31.355	2
	0.394	10.00	57.83	38.863	2
	0.472	12.00	68.80	46.238	2
273.1	0.157	4.00	26.54	17.839	2
	0.197	5.00	33.06	22.216	2
	0.236	6.00	39.52	26.559	2
	0.248	6.30	41.45	27.856	2
	0.315	8.00	52.30	35.147	2
	0.394	10.00	64.88	43.602	2
	0.472	12.00	77.26	51.925	2
323.9	0.197	5.00	39.32	26.425	2
	0.236	6.00	47.04	31.611	2
	0.248	6.30	49.34	33.160	2
	0.315	8.00	62.32	41.882	2
	0.394	10.00	77.41	52.021	2

ASTM A500 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
323.9	0.472	12.00	92.30	62.028	2

TOLERANCES ON SHAPE AND MASS

Characteristic	Circular hollow sections	Outside flat Dimensions for Square and Rectangular hollow sections	
		OD Flat dimensions in. (mm)	Permissible Variations over and under flat dimensions (a) in.[mm]
External dimensions	± 0.75% of the specified outside diameter	2 1/2 [65] or under	0.020 [0.5]
		Over 2 1/2 - 3 1/2 [65 - 90]	0.025 [0.6]
		Over 3 1/2 - 5 1/2 [90 - 140]	0.030 [0.8]
		Over 5 1/2 [140]	0.01 times large flat dimension
Thickness(T)	±10% of the specified wall thickness.		
Squareness of sides(Ø)	--	90° ± 2°	
External corner profile	--	The radius of each outside corner of the section shall not exceed three times the specified wall thickness	
Twist	--	OD Flat dimensions in. (mm)	Max. Permissible Variation Twist per meter of length in.(mm)
		1 1/2 [40] and under	0.05 [1.3]
		Over 1 1/2 - 2 1/2 [40 -65]	0.062 [1.6]
		Over 2 1/2 - 4 [65 - 100]	0.075 [1.9]
		Over 4 - 6 [100 - 150]	0.087 [2.2]

ASTM A500 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Characteristic	Circular hollow sections	Outside flat Dimensions for Square and Rectangular hollow sections	
Twist	--	Over 6 - 8 [150 - 200]	0.100 [2.5]
		Over 8 [200]	0.112 [2.8]
Straightness	0.20 % of total length [10mm x length (in meters) divided by 5]		
Length	-0/+20mm		

(a) The permissible variations include allowances for convexity and concavity. For rectangular tubing having a ratio of outside large to small flat dimension less than 1.5, and for square tubing, the permissible variations in small flat dimension shall be identical to the permissible variations in large flat dimension. For rectangular tubing having a ratio of outside large to small flat dimension in the range of 1.5 to 3.0 inclusive, the permissible variations in small flat dimension shall be 1.50 times the permissible variations in large flat dimension. For rectangular tubing having a ratio of outside large to small flat dimension greater than 3.0, the permissible variations in small flat dimension shall be 2.0 times the permissible variations in large flat dimension.

CHEMICAL COMPOSITION:

Element	Composition, %			
	Grades A & B		Grade C	
	Heat Analysis	Product Analysis	Heat Analysis	Product Analysis
Carbon , max ^A	0.26	0.30	0.23	0.27
Manganese, max ^A	1.35	1.40	1.35	1.40
Phosphorus, max	0.035	0.045	0.035	0.045
Sulfur, max	0.035	0.045	0.035	0.045
Copper, min ^B	0.20	0.18	0.20	0.18
A) For each reduction of 0.01 percentage point below the specified maximum for carbon, an increase of 0.06 percentage point above the specified maximum for manganese is permitted, up to a maximum of 1.50% by heat analysis and 1.60 % by product analysis. B) If copper-containing steel is specified in the purchase order.				

ASTM A500 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

MECHANICAL PROPERTIES :

Round Structural Tubing			
	Grades A	Grades B	Grade C
Tensile strength, min, psi [MPa]	45 000 [310]	58 000 [400]	62 000 [425]
Yield strength, min, psi [MPa]	33 000 [230]	42 000 [290]	46 000 [315]
Elongation in 2 in. [50 mm] min%	25 ^A	25 ^B	25 ^C
Shaped Structural Tubing			
	Grades A	Grades B	Grade C
Tensile strength , min, psi [MPa]	45 000 [310]	58 000 [400]	62 000 [425]
Yield strength , min, psi [MPa]	39 000 [270]	46 000 [315]	50 000 [345]
Elongation in 2 in. [50 mm] min%	25 ^A	23 ^B	21 ^C
A) Applies to specified wall thicknesses (t) equal to or greater than 0.120 in. [3.05mm]. For lighter specified wall thicknesses, the minimum elongation values shall be calculated by the formula: percent elongation in 2 in. [50 mm] = 0.56t + 17.5,rounded to the nearest percent. For A500M use the following formula: 2.2t + 17.5,rounded to the nearest percent. B) Applies to specified wall thicknesses (t) equal to or greater than 0.180 in. [4.57 mm]. For lighter specified wall thicknesses, the minimum elongation values shall be calculated by the formula: percent elongation in 2 in. [50 mm] = 0.61t + 12, rounded to the nearest percent. For A500M use the following formula: 2.4t + 12,rounded to the nearest percent. C) Applies to specified wall thicknesses (t) equal to or greater than 0.120 in. [3.05mm]. For lighter specified wall thicknesses, the minimum elongation values shall be by agreement with the manufacturer.			

- Flattening Test

: The flattening test shall be made on round structural tubing only, keep the weld located 90°, the first step for ductility of the weld and flatten upto 66% of OD, no cracks or break on the weld. For the second step, no cracks or breaks on the parent material and the third step for sound ness, full flatten for evidence of laminated or unsound material.
- Surface Protection

: Black & Galvanizing coating as per customer requirement.
- Workmanship

: Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.
- Packing

: Hexagonal Type
- Marking

: Online stenciling as per the standard & customer requirement.

EN 10219-1 & 2 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter (D)	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
114.3	0.098	2.50	6.89	4.630	10
	0.118	3.00	8.23	5.531	10
	0.157	4.00	10.90	7.325	10
	0.197	5.00	13.50	9.073	10
	0.236	6.00	16.00	10.753	10
	0.248	6.30	16.80	11.290	10
	0.315	8.00	21.00	14.113	10
	0.394	10.00	25.72	17.285	10
139.7	0.118	3.00	10.10	6.788	7
	0.157	4.00	13.40	9.005	7
	0.197	5.00	16.60	11.156	7
	0.236	6.00	19.80	13.306	7
	0.248	6.30	20.70	13.911	7
	0.315	8.00	26.00	17.473	7
	0.394	10.00	32.00	21.505	7
	0.472	12.00	37.80	25.403	7
165.1	0.118	3.00	11.99	8.059	7
	0.157	4.00	15.89	10.679	7
	0.197	5.00	19.74	13.266	7
	0.236	6.00	23.54	15.820	7

EN 10219-1 & 2 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter (D)	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
165.1	0.248	6.30	24.67	16.580	7
	0.315	8.00	30.99	20.828	7
	0.394	10.00	38.25	25.704	7
	0.472	12.00	45.31	30.447	7
168.3	0.118	3.00	12.20	8.199	7
	0.157	4.00	16.20	10.887	7
	0.197	5.00	20.10	13.508	7
	0.236	6.00	24.00	16.129	7
	0.248	6.30	25.20	16.935	7
	0.315	8.00	31.60	21.237	7
177.8	0.394	10.00	39.00	26.210	7
	0.472	12.00	46.25	31.082	7
	0.157	4.00	17.10	11.492	4
	0.197	5.00	21.30	14.315	4
	0.236	6.00	25.40	17.070	4
	0.248	6.30	26.60	17.876	4
193.7	0.315	8.00	33.50	22.513	4
	0.394	10.00	41.40	27.823	4
	0.472	12.00	49.10	32.997	4
193.7	0.157	4.00	18.70	12.567	4

EN 10219-1 & 2 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter (D)	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
193.7	0.197	5.00	23.30	15.659	4
	0.236	6.00	27.80	18.683	4
	0.248	6.30	29.10	19.556	4
	0.315	8.00	36.60	24.597	4
	0.394	10.00	45.30	30.444	4
	0.472	12.00	53.80	36.156	4
219.1	0.157	4.00	21.20	14.247	4
	0.197	5.00	26.40	17.742	4
	0.236	6.00	31.50	21.169	4
	0.248	6.30	33.10	22.245	4
	0.315	8.00	41.60	27.957	4
	0.394	10.00	51.60	34.677	4
	0.472	12.00	61.30	41.196	4
244.5	0.157	4.00	23.72	15.941	4
	0.197	5.00	29.50	19.825	4
	0.236	6.00	35.30	23.723	4
	0.248	6.30	37.00	24.866	4
	0.315	8.00	46.70	31.384	4
	0.394	10.00	57.80	38.844	4
	0.472	12.00	68.80	46.237	4

EN 10219-1 & 2 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter (D)	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
273.1	0.157	4.00	26.53	17.829	4
	0.197	5.00	33.00	22.177	4
	0.236	6.00	39.50	26.546	4
	0.248	6.30	41.40	27.823	4
	0.315	8.00	52.30	35.148	4
	0.394	10.00	64.90	43.616	4
	0.472	12.00	77.20	51.882	4
323.9	0.197	5.00	39.30	26.411	2
	0.236	6.00	47.00	31.586	2
	0.248	6.30	49.30	33.132	2
	0.315	8.00	62.30	41.868	2
	0.394	10.00	77.40	52.016	2
	0.472	12.00	92.30	62.030	2

TOLERANCES ON SHAPE AND MASS:

Characteristic	Circular hollow sections	Square and Rectangular hollow sections	
External dimensions (D,B & H)	± 1%, with a minimum of ±0.5 mm and a maximum of ± 10 mm	Side length (mm)	Tolerance
		H, B < 100	± 1% with a min. ± 0.5mm
		100 ≤ H, B ≤ 200	± 0.8%
		H,B > 200	± 0.6%

EN 10219-1 & 2 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Characteristic	Circular hollow sections	Square and Rectangular hollow sections
Thickness(T)	For D ≤ 406.4 mm, T ≤ 5.0mm ±10% T > 5.0mm ± 0.5mm	T ≤ 5.0mm ± 10% T > 5.0mm ± 0.5mm
Out of roundness(O)	2% for hollow sections having a diameter to thickness ratio not exceeding 100	---
Concavity/Convexity	---	Max. 0.8 % with a minimum of 0.5mm
Squareness of sides(Ø)	---	90° ± 1°
External corner profile	---	T≤6.0mm : 1.6T to 2.4T, 6.0 <T≤10.0mm : 2.0T to 3.0T, T>10.0mm : 2.4T to 3.6T
Twist	---	2.0 mm plus 0.5mm/m length
Straightness	0.20% of total length and 3.0 mm over any 1m length	0.15% of total length and 3.0 mm over any 1m length
Mass per unit length	± 6% on individual delivered length	
Length	-0/+20mm	

CHEMICAL COMPOSITION:

Grade	Chemical composition % max.						
	C	Si	Mn	P	S	N	Carbon Equivalent(CEV)
S235JRH	0.17	--	1.40	0.040	0.040	0.009	0.35
S275J0H	0.20	--	1.50	0.035	0.035	0.009	0.40
S275J2H	0.20	--	1.50	0.030	0.030	--	0.40
S355J0H	0.22	0.55	1.60	0.035	0.035	0.009	0.45

EN 10219-1 & 2 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Grade	Chemical composition % max.						
	C	Si	Mn	P	S	N	Carbon Equivalent(CEV)
S355J2H	0.22	0.55	1.60	0.030	0.030	--	0.45
Carbon Equivalent : Max carbon equivalent shall be CEV = C + (Mn/6) + (Cr + Mo + V)/5 + (Ni + Cu)/15							

MECHANICAL PROPERTIES:

Grade	Min. Yield Strength R _{eh} (MPa)	Tensile Strength R _m (MPa)		Minimum Elongation %	Min. Impact Energy(J)		
		T < 3 mm	T ≥ 3 mm		-20°C	0°C	20°C
S235JRH	235	360-510	360-510	24	--	--	27
S275J0H	275	430-580	410-560	20	--	27	--
S275J2H					27	--	--
S355J0H	355	510-680	470-630	20	--	27	--
S355J2H					27	--	--

* For section sizes D/T < 15 (round) and (B+H) / 2T < 12.5(square & rectangular) the minimum elongation is reduced by 2

- Workmanship

: Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.
- Packing

: Hexagonal Type
- Marking

: Online stenciling as per the standard & customer requirement.

AS/NZS 1163 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter (do)	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
114.3	0.126	3.20	8.77	5.894	19
	0.142	3.60	9.83	6.606	19
	0.177	4.50	12.20	8.199	14
	0.189	4.80	13.00	8.737	14
	0.213	5.40	14.50	9.745	10
	0.236	6.00	16.00	10.753	10
139.7	0.118	3.00	10.10	6.788	14
	0.138	3.50	11.80	7.930	10
	0.197	5.00	16.60	11.156	10
	0.213	5.40	17.90	12.030	10
165.1	0.118	3.00	12.00	8.065	10
	0.138	3.50	13.90	9.341	10
	0.197	5.00	19.70	13.239	10
	0.213	5.40	21.30	14.315	7
168.3	0.189	4.80	19.40	13.038	10
	0.252	6.40	25.60	17.204	7
	0.280	7.10	28.20	18.952	7
219.1	0.189	4.80	25.40	17.070	4
	0.252	6.40	33.60	22.581	4
	0.323	8.20	42.60	28.629	4

AS/NZS 1163 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter (do)	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	inch	mm	kg/m	lb/ft	
273.1	0.189	4.80	31.80	21.371	2
	0.252	6.40	42.10	28.293	2
	0.366	9.30	60.50	40.659	2
323.9	0.252	6.40	50.10	33.669	2
	0.374	9.50	73.70	49.530	2
	0.500	12.70	97.50	65.524	2

TOLERANCES ON SHAPE AND MASS:

Characteristic	Circular hollow sections	Square and Rectangular hollow sections
External dimensions (do,d & b)	± 1%, with a minimum of ±0.5 mm and a maximum of ± 10 mm	± 1%, with a minimum of ±0.5 mm
Thickness(t)	±10%	±10%
Out of roundness(o)	± 2% for hollow sections having a diameter to thickness ratio not exceeding 100	---
Concavity/Convexity	---	Max. 0.8% or 0.5mm, Whichever is greater
Squareness of sides	---	90° ± 1°
External corner profile	---	Perimeter (mm) Equivalent to 50X50 or less : 1.5t to 3.0t Equivalent to greater than 50X50 : 1.8t to 3.0t
Twist	---	2.0+ 0.5 mm/m length
Straightness	0.20% of total length	0.15% of total length

AS/NZS 1163 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Characteristic	Circular hollow sections	Square and Rectangular hollow sections
Mass per unit length	Not less than 0.96 times the specified mass on individual Length	
Length	-0/ +20mm	

CHEMICAL COMPOSITION :

Grade	Chemical composition % max.												
	C	Si	Mn	P	S	Cr	Mo	Al	Ni	Cu	Ti	Micro-alloying elements	CE
C250/ C250LO	0.12	0.05	0.50	0.03	0.03	0.15	0.10	0.10	0.25	0.25	0.04	0.03(Note-1)	0.25
C350/ C350LO	0.20	0.25	1.60	0.03	0.03	0.30	0.10	0.10	0.25	0.25	0.04	0.15(Note-2)	0.43
C450/ C450LO	0.20	0.25	1.70	0.03	0.03	0.50	0.35	0.10	0.25	0.25	0.04	0.15(Note-2)	0.43
Note-1) Nb - 0.010 Max						Note-2) V - 0.10 Max.							
Carbon Equivalent : Carbon equivalent shall be calculated from the following formula. CEV = C + (Mn / 6) + (Cr + Mo + V) / 5 + (Ni + Cu) / 15													

MECHANICAL PROPERTIES:

Grade	Min. Yield Strength (MPa)	Tensile Strength (MPa)	Minimum Elongation %	Test Temp.	Minimum Impact Energy(J)					
					Size of Test piece					
					10 X 10 mm		10 X 7.5 mm		10 X 5.0 mm	
					Average of 3 tests	Individual Test	Average of 3 tests	Individual Test	Average of 3 tests	Individual Test
C250/C250LO	250	320	18	0°C	27	20	22	16	18	13

AS/NZS 1163 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

MECHANICAL PROPERTIES:

Grade	Min. Yield Strength (MPa)	Tensile Strength (MPa)	Minimum Elongation %	Test Temp.	Minimum Impact Energy(J)					
					Size of Test piece					
					10 X 10 mm		10 X 7.5 mm		10 X 5.0 mm	
					Average of 3 tests	Individual Test	Average of 3 tests	Individual Test	Average of 3 tests	Individual Test
C350/C350LO	350	430	16	0°C	27	20	22	16	18	13
C450/C450LO	450	500	14							

- Flattening Test (90°)

: The test piece shall be flattened until the distance between the surfaces is 0.75do or less.
- Workmanship

: Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.
- Marking

: Stenciling as per the standard & customer requirement.
- Packing

: Hexagonal Type

API 5L Welded Steel Line Pipes

Technical Data of Pipes Conforming to API 5L

Size	Outside Diameter		Wall Thickness		Mass of Plain End Pipe		Standard Test Pressure									
	mm	in	mm	in	kg/m	lb/ft	Gr.A	Gr.B	Gr.X42	Gr.X46	Gr.X52	Gr.X56	Gr.X60	Gr.X65	Gr.X70	
							MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa
4½	114.3	4.500	3.20	0.125	8.77	5.85	7.1	8.2	9.7	10.8	12.1	13.1	13.9	15.1	16.3	
			3.60	0.141	9.83	6.57	7.9	9.3	11.0	12.1	13.6	14.7	15.7	17.0	18.3	
			4.00	0.156	10.88	7.24	8.8	10.3	12.2	13.4	15.1	16.4	17.4	18.9	20.4	
			4.40	0.172	11.92	7.96	9.7	11.3	13.4	14.8	16.6	18.0	19.2	20.5	20.5	
			4.80	0.188	12.96	8.67	10.6	12.3	14.6	16.1	18.1	19.7	20.5	20.5	20.5	
			5.20	0.203	13.99	9.32	11.5	13.4	15.8	17.5	19.7	20.5	20.5	20.5	20.5	
			5.60	0.219	15.01	10.02	12.3	14.4	17.0	18.8	20.5	20.5	20.5	20.5	20.5	
			6.00	0.237	16.02	10.80	13.2	15.4	18.3	20.2	20.5	20.5	20.5	20.5	20.5	
			6.40	0.250	17.03	11.36	14.1	16.5	19.5	20.5	20.5	20.5	20.5	20.5	20.5	
			7.10	0.281	18.77	12.59	15.7	18.3	20.5	20.5	20.5	20.5	20.5	20.5	20.5	
			7.90	0.312	20.73	13.97	17.4	19.0	20.5	20.5	20.5	20.5	20.5	20.5	20.5	
5⅝	141.3	5.563	3.20	0.125	10.90	7.27	5.7	6.7	7.9	8.7	9.8	10.6	11.3	12.2	13.2	
			4.00	0.156	13.54	9.02	7.1	8.3	9.9	10.9	12.2	13.2	14.1	15.3	16.5	
			4.80	0.188	16.16	10.80	8.6	10.0	11.8	13.0	14.7	15.9	16.9	18.3	19.8	
			5.60	0.219	18.74	12.51	10.0	11.7	13.8	15.2	17.1	18.5	19.7	20.5	20.5	
			6.60	0.258	21.92	14.63	11.8	13.7	16.3	17.9	20.2	20.5	20.5	20.5	20.5	
			7.10	0.281	23.50	15.87	12.7	14.8	17.5	19.3	20.5	20.5	20.5	20.5	20.5	
			7.90	0.312	25.99	17.51	14.1	16.4	19.5	20.5	20.5	20.5	20.5	20.5	20.5	
			8.70	0.344	28.45	19.19	15.5	18.1	20.5	20.5	20.5	20.5	20.5	20.5	20.5	
6⅝	168.3	6.625	3.20	0.125	13.03	8.69	4.8	5.6	8.3	9.1	10.3	11.1	11.8	12.8	13.8	

API 5L Welded Steel Line Pipes

Technical Data of Pipes Conforming to API 5L

Size	Outside Diameter		Wall Thickness (mm)		Weight per Unit Length (Plain End)		Standard Test Pressure									
	mm	in	mm	in	kg/m	lb/ft	Gr.A	Gr.B	Gr.X42	Gr.X46	Gr.X52	Gr.X56	Gr.X60	Gr.X65	Gr.X70	
							MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa
6 ⁵ / ₈	168.3	6.625	3.60	0.141	14.62	9.77	5.4	6.3	9.3	10.3	11.6	12.5	13.3	14.4	15.6	
			4.00	0.156	16.21	10.79	6.0	7.0	10.3	11.4	12.8	13.9	14.8	16.0	17.3	
			4.40	0.172	17.78	11.87	6.6	7.7	11.4	12.5	14.1	15.3	16.3	17.6	19.0	
			4.80	0.188	19.35	12.94	7.2	8.4	12.4	13.7	15.4	16.7	17.8	19.3	20.5	
			5.20	0.203	20.91	13.94	7.8	9.1	13.4	14.8	16.7	18.1	19.2	20.5	20.5	
			5.60	0.219	22.47	15.00	8.4	9.8	14.5	16.0	18.0	19.5	20.5	20.5	20.5	
			6.40	0.250	25.55	17.04	9.6	11.2	16.5	18.3	20.5	20.5	20.5	20.5	20.5	
			7.10	0.280	28.22	18.99	10.6	12.4	18.4	20.2	20.5	20.5	20.5	20.5	20.5	
			7.90	0.312	31.25	21.06	11.8	13.8	20.4	20.5	20.5	20.5	20.5	20.5	20.5	
			8.70	0.344	34.24	23.10	13.0	15.2	20.5	20.5	20.5	20.5	20.5	20.5	20.5	
			9.50	0.375	37.20	25.05	14.2	16.6	20.5	20.5	20.5	20.5	20.5	20.5	20.5	
8 ⁵ / ₈	219.1	8.625	3.20	0.125	17.04	11.36	3.7	4.3	6.4	7.0	7.9	8.5	9.1	9.9	10.6	
			4.00	0.156	21.22	14.12	4.6	5.4	7.9	8.8	9.9	10.7	11.4	12.3	13.3	
			4.80	0.188	25.37	16.96	5.5	6.4	9.5	10.5	11.8	12.8	13.6	14.8	15.9	
			5.20	0.203	27.43	18.28	6.0	7.0	10.3	11.4	12.8	13.9	14.8	16.0	17.3	
			5.60	0.219	29.48	19.68	6.4	7.5	11.1	12.3	13.8	15.0	15.9	17.3	18.6	
			6.40	0.250	33.57	22.38	7.4	8.6	12.7	14.0	15.8	17.1	18.2	19.7	20.5	
			7.00	0.277	36.61	24.72	8.1	9.4	13.9	15.3	17.3	18.7	19.9	20.5	20.5	
			7.90	0.312	41.14	27.73	9.1	10.6	15.7	17.3	19.5	20.5	20.5	20.5	20.5	
			8.20	0.322	42.65	28.58	9.4	11.0	16.3	18.0	20.2	20.5	20.5	20.5	20.5	

API 5L Welded Steel Line Pipes

Technical Data of Pipes Conforming to API 5L

Size	Outside Diameter		Wall Thickness		Mass of Plain End Pipe		Standard Test Pressure									
	mm	in	mm	in	kg/m	lb/ft	Gr.A	Gr.B	Gr.X42	Gr.X46	Gr.X52	Gr.X56	Gr.X60	Gr.X65	Gr.X70	
							MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa
8 ⁵ / ₈	219.1	8.625	8.7	0.344	45.14	30.45	10.0	11.7	17.3	19.1	20.5	20.5	20.5	20.5	20.5	
			9.5	0.375	49.10	33.07	10.9	12.7	18.9	20.5	20.5	20.5	20.5	20.5	20.5	
10 ³ / ₄	273.1	10.750	4.0	0.156	26.54	17.67	3.7	4.3	7.2	8.0	9.0	9.7	10.3	11.2	12.1	
			4.8	0.188	31.76	21.23	4.4	5.2	8.7	9.6	10.8	11.7	12.4	13.4	14.5	
			5.2	0.203	34.35	22.89	4.8	5.6	9.4	10.4	11.7	12.6	13.4	14.6	15.7	
			5.6	0.219	36.94	24.65	5.2	6.0	10.1	11.2	12.5	13.6	14.5	15.7	16.9	
			6.4	0.250	42.09	28.06	5.9	6.9	11.6	12.7	14.3	15.5	16.5	17.9	19.3	
			7.1	0.279	46.57	31.23	6.6	7.6	12.8	14.1	15.9	17.2	18.3	19.9	20.5	
			7.8	0.307	51.03	34.27	7.2	8.4	14.1	15.5	17.5	18.9	20.1	20.5	20.5	
			8.7	0.344	56.72	38.27	8.0	9.4	15.7	17.3	19.5	20.5	20.5	20.5	20.5	
			9.3	0.365	60.50	40.52	8.6	10.0	16.8	18.5	20.5	20.5	20.5	20.5	20.5	
			11.1	0.438	71.72	48.28	10.2	11.9	20.0	20.5	20.5	20.5	20.5	20.5	20.5	
12 ³ / ₄	323.9	12.750	4.4	0.172	34.67	23.13	3.4	4.0	6.7	7.4	8.3	9.0	9.6	10.4	11.2	
			4.8	0.188	37.77	25.25	3.7	4.4	7.3	8.1	9.1	9.8	10.5	11.3	12.2	
			5.2	0.203	40.87	27.23	4.0	4.7	7.9	8.7	9.8	10.6	11.3	12.3	13.2	
			5.6	0.219	43.96	29.34	4.4	5.1	8.5	9.4	10.6	11.5	12.2	13.2	14.3	
			6.4	0.250	50.11	33.41	5.0	5.8	9.7	10.7	12.1	13.1	13.9	15.1	16.3	
			7.1	0.281	55.47	37.46	5.5	6.4	10.8	11.9	13.4	14.5	15.5	16.8	18.1	
			7.9	0.312	61.56	41.48	6.1	7.2	12.0	13.3	14.9	16.2	17.2	18.7	20.1	
			8.4	0.330	65.35	43.81	6.5	7.6	12.8	14.1	15.9	17.2	18.3	19.8	20.5	

API 5L Welded Steel Line Pipes

Technical Data of Pipes Conforming to API 5L

Size	Outside Diameter		Wall Thickness (mm)		Weight per Unit Length (Plain End)		Standard Test Pressure									
	mm	in	mm	in	kg/m	lb/ft	Gr.A	Gr.B	Gr.X42	Gr.X46	Gr.X52	Gr.X56	Gr.X60	Gr.X65	Gr.X70	
							MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa	MPa
			8.70	0.344	67.62	45.62	6.8	7.9	13.2	14.6	16.4	17.8	18.9	20.5	20.5	
			9.50	0.375	73.65	49.61	7.4	8.6	14.5	16.0	17.9	19.4	20.5	20.5	20.5	
			10.30	0.406	79.65	53.57	8.0	9.3	15.7	17.3	19.5	20.5	20.5	20.5	20.5	
			11.10	0.438	85.62	57.65	8.6	10.1	16.9	18.6	20.5	20.5	20.5	20.5	20.5	

Tolerances :

1) Outside Diameter of Body & Ends:

Specified Outside Diameter D mm(in)	Body Tolerances mm(in)	Ends Tolerances mm(in)	Out -of-roundness tolerances mm(in)	
			Pipe except the end	Pipe end
114.3 (4.500) to 168.3(6.625)	±0.0075 D	-0.4 (0.016) to +1.6(0.063)	0.020 D for D/t ≤ 75	0.015 D for D/t ≤ 75
> 168.3(6.625) to 610(24.000)	± 0.0075 D, but maximum of ± 3.2 (0.0125)	± 0.005 D, but maximum of ± 1.6 (0.063)		

2) Thickness Tolerances mm(in) :

3) Mass Tolerances :

≤ 5.0(0.197) = ± 0.5 (0.020)	a) for pipe in grade A25 = +10.0%, - 5.0 % of nominal mass
> 5.0(0.197) to < 15.0(0.591) = ± 0.1t	b) for all other pipes = +10.0% , - 3.5 % of nominal mass
(where t = wall thickness)	c) mass of 18 tonnes or more = - 1.75%

API 5L Welded Steel Line Pipes

Technical Data of Pipes Conforming to API 5L

Mechanical Properties(Tensile):

PSL I Pipe	Gr. A or L210	Gr. B or L245	Gr. X42 or L290	Gr. X46 or L320	Gr. X52 or L360	Gr. X56 or L390	Gr. X60 or L415	Gr. X65 or L450	Gr. X70 or L485
Yield Strength MPa (min)	210	245	290	320	360	390	415	450	485
Tensile Strength MPa (min)	335	415	415	435	460	490	520	535	570
Elongation % minimum	Min .Elong. shall be determined by $A_f = 1940 A^{0.2} / U^{0.9}$ (Where A= Area of test specimen, U= Min. specified tensile strength)								

PSL 2 Pipe	Gr. B or L245	Gr. X42 or L290	Gr. X46 or L320	Gr. X52 or L360	Gr. X56 or L390	Gr. X60 or L415	Gr. X65 or L450	Gr. X70 or L485	Gr. X80 or L555
Yield Strength MPa (min)	245 - 450 ^e	290 - 495	320 - 525	360 - 530	390 - 545	415 - 565	450 - 600	485 - 635	555 - 705
Tensile Strength MPa (min)	415 - 655	415 - 655	435 - 655	460 - 760	490 - 760	520 - 760	535 - 760	570 - 760	625 - 825
Elongation % minimum	Min .Elong. shall be determined by $A_f = 1940 A^{0.2} / U^{0.9}$ (Where A= Area of test specimen, U= Min. specified tensile strength)								
Ratio (YS/TS) Max.	0.93								
e= For pipe requiring longitudinal testing , the maximum yield strength shall be ≤ 495 Mpa									

Chemical Properties : Composition (Max. %):

PSL I	C	Mn	P	S	Cu	Ni	Cr	Mo	V + Nb	Nb + V + Ti
Grade A or L210	0.22	0.90	0.030	0.030	0.50	0.50	0.50	0.15	--	--
Grade B or L245	0.26	1.20	0.030	0.030	0.50	0.50	0.50	0.15	≤ 0.6	≤ 0.15
Grade X42 or L290	0.26	1.30	0.030	0.030	0.50	0.50	0.50	0.15	--	≤ 0.15
Grade X46 or L320	0.26	1.40	0.030	0.030	0.50	0.50	0.50	0.15	--	≤ 0.15
Grade X52 or L360	0.26	1.40	0.030	0.030	0.50	0.50	0.50	0.15	--	≤ 0.15
Grade X56 or L390	0.26	1.40	0.030	0.030	0.50	0.50	0.50	0.15	--	≤ 0.15
Grade X60 or L415	0.26	1.40	0.030	0.030	0.50	0.50	0.50	0.15	--	≤ 0.15

API 5L Welded Steel Line Pipes

Technical Data of Pipes Conforming to API 5L

Chemical Properties : Composition (Max. %):

PSL I	C	Mn	P	S	Cu	Ni	Cr	Mo	V + Nb	Nb + V + Ti
Grade X65 or L450	0.26	1.45	0.030	0.030	0.50	0.50	0.50	0.15	--	≤ 0.15
Grade X70 or L485	0.26	1.65	0.030	0.030	0.50	0.50	0.50	0.15	--	≤ 0.15

PSL 2	C	Si	Mn	P	S	V	Nb	Ti	Cu	Ni	Cr	Mo	CE _{IIW}	CE _{PCM}
Grade BM or L245	0.22	0.45	1.20	0.025	0.015	0.05	0.05	0.04	0.50	0.30	0.30	0.15	0.43	0.25
Grade X42M or L290	0.22	0.45	1.30	0.025	0.015	0.05	0.05	0.04	0.50	0.30	0.30	0.15	0.43	0.25
Grade X46M or L320	0.22	0.45	1.30	0.025	0.015	0.05	0.05	0.04	0.50	0.30	0.30	0.15	0.43	0.25
Grade X52M or L360	0.22	0.45	1.40	0.025	0.015	≤ 0.15			0.50	0.30	0.30	0.15	0.43	0.25
Grade X56M or L390	0.22	0.45	1.40	0.025	0.015	≤ 0.15			0.50	0.30	0.30	0.15	0.43	0.25
Grade X60M or L415	0.12	0.45	1.60	0.025	0.015	≤ 0.15			0.50	0.50	0.50	0.50	0.43	0.25
Grade X65M or L450	0.12	0.45	1.60	0.025	0.015	≤ 0.15			0.50	0.50	0.50	0.50	0.43	0.25
Grade X70M or L485	0.12	0.45	1.70	0.025	0.015	≤ 0.15			0.50	0.50	0.50	0.50	0.43	0.25
Grade X80M or L555	0.12	0.45	1.85	0.025	0.015	≤ 0.15			0.50	1.00	0.50	0.50	0.43	0.25

Destructive & Non-Destructive Testing:

Hydrostatic testing	:	100% of pipe shall be tested at a Pressure specified in above table.
NDT	:	Weld seam of each pipe shall be tested by online Eddy Current test
Flattening	:	For Pipes over 2.875" i) No opening of the weld before the distance between the plates is less than 50% of the original outside diameter. ii) There shall be no crack or break other than in the weld before the distance between the plates is less than 33% of the original outside diameter. iii) No evidence of lamination or burnt metal shall develop during the flattening until opposite wall of the pipe meet.
Metallography :	:	Micro Structure and Micro Hardness (HV10) test are carried out.
Impact Testing :	:	For Only PSL 2 pipes up to Grade X70 (at 0°C), Minimum average absorbed energy = 27J , Minimum Individual absorbed energy = 22J
Marking:	:	Stenciling as per the specification & customer requirement.

API 5CT Electric Welded Steel Pipes

Technical Data of Pipes Conforming to API 5CT

Label	Specific Outside Diameter		Wall Thickness		Mass of Plain end Pipe		Standard Test Pressure		
	mm	inch	mm	inch	kg/m	lb/ft	H40 MPa	J55 MPa	K55 MPa
4-1/2	114.30	4.500	5.21	0.205	14.02	9.41	20.1	27.6	27.6
			5.69	0.224	15.24	10.24	22.0	30.2	30.2
			6.35	0.250	16.91	11.36	24.5	33.7	33.7
			7.37	0.290	19.44	13.05	28.5	39.1	39.1
5-1/2	139.70	5.500	6.20	0.244	20.41	13.71	19.6	26.9	26.9
			6.98	0.275	22.85	15.36	22.1	30.3	30.3
			7.72	0.304	25.13	16.89	24.4	33.5	33.5
			9.17	0.361	29.52	19.83	29.0	39.8	39.8
6-5/8	168.28	6.625	7.32	0.288	29.06	19.51	19.2	26.4	26.4
			8.94	0.352	35.13	23.60	23.5	32.2	32.2
			10.59	0.417	41.18	27.67	27.8	38.2	38.2
			12.06	0.475	46.46	31.23	31.6	43.5	43.5
7	177.80	7.00	5.87	0.231	24.89	16.72	14.6	20.0	20.0
			6.91	0.272	29.12	19.56	17.2	23.6	23.6
			8.05	0.317	33.70	22.65	20.0	27.5	27.5
			9.19	0.362	38.21	25.69	22.8	31.3	31.3
			10.36	0.408	42.78	28.75	25.7	35.3	35.3
			11.51	0.453	47.20	31.70	28.6	39.3	39.3
7-5/8	193.68	7.625	7.62	0.300	34.96	23.49	17.4	23.9	23.9
			8.33	0.328	38.08	25.59	19.0	26.1	26.1

API 5CT Electric Welded Steel Pipes

Technical Data of Pipes Conforming to API 5CT

Label	Specific Outside Diameter		Wall Thickness		Mass of Plain end Pipe		Standard Test Pressure		
	mm	inch	mm	inch	kg/m	lb/ft	H40 MPa	J55 MPa	K55 MPa
7-5/8	193.68	7.625	9.52	0.375	43.24	29.06	21.7	29.8	29.8
			10.92	0.430	49.22	33.07	24.9	34.2	34.2
8-5/8	219.08	8.625	6.71	0.264	35.14	23.60	13.5	18.6	18.6
			7.72	0.304	40.24	27.04	15.6	21.4	21.4
			8.94	0.352	46.33	31.13	18.0	24.7	24.7
			10.16	0.400	52.35	35.17	20.5	28.1	28.1
9-5/8	244.48	9.625	11.43	0.450	58.53	39.33	23.0	31.6	31.6
			7.92	0.312	46.20	31.06	14.3	19.6	19.6
			8.94	0.352	51.93	34.89	16.1	22.2	22.2
			10.03	0.395	57.99	38.97	18.1	24.9	24.9
			11.05	0.435	63.61	42.73	20.0	27.4	27.4
10-3/4	273.05	10.750	11.99	0.472	68.75	46.18	21.7	29.7	29.7
			7.09	0.279	46.50	31.23	8.6	11.8	11.8
			8.89	0.350	57.91	38.91	10.8	14.8	14.8
			10.16	0.400	65.87	44.26	12.3	16.9	16.9
			11.43	0.450	73.75	49.55	13.9	19.0	19.0

API 5CT Electric Welded Steel Pipes

Technical Data of Pipes Conforming to API 5CT

Tolerances :

1) Outside Diameter :

Label I mm(in)	Outside Diameter, D
D ≥ 114.3 (4.500)	+ 1% of D - 0.5% of D

2) Wall Thickness :

Tolerance for Pipe
- 12.5%

3) Mass :

Single Lengths
+ 6.5% - 3.5%

Mechanical Properties:

Group 1	Grade - H40	Grade - J55	Grade - K55
Yield Strength MPa (min)	276 - 552	379 - 552	379 - 552
Tensile Strength MPa (min)	414	517	655
Elongation % minimum : Min .Elong. shall be determined by : $e = 1942.57 A^{0.2} / U^{0.9}$ (Where A= Area of test specimen, U= Min. specified tensile strength)			

Flattening Test:

Grade	D/t ratio	Distance between plates - mm
H40	W 16 <16	0.5 X D D X (0.830-0.020 6 D/t)
J55 K55	W 16 3.93 to 16 < 3.93	0.65 X D D X (0.980-0.020 6 D/t) D X (1.104 - 0.051 8 D/t)
Where t= Wall thickness & D=Outside diameter		

API 5CT Electric Welded Steel Pipes

Technical Data of Pipes Conforming to API 5CT

Chemical Properties : Composition (Max. %)

Group I	C	Mn	P	S
Grade H40	--	--	0.030	0.030
Grade J55	--	--	0.030	0.030
Grade K55	--	--	0.030	0.030

Destructive & Non-Destructive Testing :

Hydrostatic testing	: 100% of pipe shall be tested at a pressure specified in above table.
NDT Group 1	: Weld seam of each pipe shall be tested by online Eddy Current test
Flattening Test	: i) No opening of the weld before the distance between the plates specified in above table. ii) No evidence of lamination or burnt metal shall develop during the flattening until opposite wall of the pipe meet.
Drift Test :	: Each length of pipe shall be drift tested throughout its entire length.
Charpy V Notch :	: Grades H40, J55 & K55 Type 1:There is no mandatory CVN impact requirement.
Marking:	: Stenciling as per the specification & customer requirement.

SQUARE TUBES

ASTM A500 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/ bdl	Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/ bdl
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
1 3/5 x 1 3/5	40 x 40	0.059	1.50	1.81	1.216	81	2 1/3 x 2 1/3	60 x 60	0.197	5.00	8.42	5.659	25
		0.079	2.00	2.37	1.593	81			0.236	6.00	9.87	6.633	20
		0.098	2.50	2.92	1.962	64	2 1/2 x 2 1/2	63.5 x 63.5	0.059	1.50	2.90	1.949	49
		0.118	3.00	3.45	2.319	64			0.079	2.00	3.80	2.554	49
		0.157	4.00	4.46	2.997	49			0.118	3.00	5.60	3.763	36
		0.197	5.00	5.28	3.548	49			0.157	4.00	7.20	4.839	25
		0.236	6.00	6.96	4.677	36			0.197	5.00	8.70	5.847	25
2 x 2	50 x 50	0.059	1.50	2.28	1.532	64			0.236	6.00	10.30	6.922	20
		0.079	2.00	2.96	1.989	49	2 5/9 x 2 5/9	65 x 65	0.059	1.50	3.03	2.036	49
		0.098	2.50	3.71	2.493	49			0.079	2.00	4.05	2.722	49
		0.118	3.00	4.28	2.876	49			0.118	3.00	5.98	4.019	36
		0.157	4.00	5.51	3.703	36			0.157	4.00	7.85	5.276	25
		0.197	5.00	6.85	4.603	36			0.197	5.00	9.61	6.458	25
		0.236	6.00	7.99	5.370	25			0.236	6.00	11.30	7.594	20
2 1/3 x 2 1/3	60 x 60	0.059	1.50	2.71	1.821	49	3 x 3	75 x 75	0.059	1.50	3.49	2.345	36
		0.079	2.00	3.56	2.392	49			0.079	2.00	4.51	3.031	36
		0.098	2.50	4.47	3.004	36			0.098	2.50	5.63	3.784	36
		0.118	3.00	5.19	3.488	36			0.118	3.00	6.60	4.435	36
		0.157	4.00	6.71	4.509	25			0.157	4.00	8.60	5.780	25
		0.177	4.50	7.82	5.255	25			0.177	4.50	9.90	6.653	25

ASTM A500 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
3 x 3	75 x 75	0.197	5.00	10.49	7.050	20	3 6/11 x 3 6/11	90 x 90	0.157	4.00	10.70	7.191	25
		0.236	6.00	12.30	8.266	20			0.197	5.00	13.30	8.938	20
3 1/7 x 3 1/7	80 x 80	0.079	2.00	4.83	3.246	36			0.236	6.00	15.50	10.417	16
		0.098	2.50	6.01	4.039	36	4 x 4	100 x 100	0.315	8.00	20.10	13.508	12
		0.118	3.00	7.18	4.825	25			0.079	2.00	6.20	4.167	25
		0.157	4.00	9.41	6.324	25			0.098	2.50	7.55	5.074	25
		0.177	4.50	10.60	7.124	25			0.118	3.00	9.03	6.069	20
		0.197	5.00	11.60	7.796	20			0.157	4.00	12.17	8.179	20
		0.236	6.00	13.60	9.140	16			0.177	4.50	13.37	8.985	16
		0.315	8.00	17.50	11.761	12			0.197	5.00	14.80	9.946	16
3 1/2 x 3 1/2	89 x 89	0.079	2.00	5.40	3.629	25			0.217	5.50	16.68	11.210	12
		0.098	2.50	6.70	4.503	25			0.236	6.00	17.28	11.613	12
		0.118	3.00	8.00	5.376	25			0.315	8.00	22.60	15.188	9
		0.157	4.00	10.40	6.989	20			0.394	10.00	27.40	18.414	9
		0.197	5.00	12.70	8.535	16			0.472	12.00	32.10	21.573	8
		0.236	6.00	15.00	10.081	16	4 11/15 x 4 11/15	120 x 120	0.118	3.00	11.20	7.527	20
		0.315	8.00	18.70	12.567	12			0.157	4.00	14.40	9.677	16
3 6/11 x 3 6/11	90 x 90	0.079	2.00	5.50	3.696	36			0.197	5.00	17.80	11.962	12
		0.098	2.50	6.80	4.570	36			0.236	6.00	21.20	14.247	12
		0.118	3.00	8.10	5.444	36			0.315	8.00	27.60	18.548	9

ASTM A500 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
		0.394	10.00	33.70	22.648	9	6 3/10 x 6 3/10	160 x 160	0.472	12.00	50.80	34.140	4
		0.472	12.00	39.50	26.546	8			0.157	4.00	19.30	12.970	12
5 x 5	125 x 125	0.118	3.00	11.61	7.802	20			0.197	5.00	24.10	16.196	9
		0.157	4.00	15.10	10.148	16			0.236	6.00	28.70	19.288	6
		0.197	5.00	18.60	12.500	12			0.315	8.00	37.60	25.269	6
		0.236	6.00	22.10	14.852	12			0.394	10.00	46.30	31.116	4
		0.315	8.00	28.90	19.422	9			0.472	12.00	54.60	36.694	4
		0.394	10.00	35.30	23.723	8	7 3/32 x 7 3/32	180 x 180	0.157	4.00	21.78	14.637	9
		0.472	12.00	41.40	27.823	8			0.197	5.00	27.30	18.347	9
5 12/23 x 5 12/23	140 x 140	0.157	4.00	17.00	11.425	12			0.236	6.00	32.50	21.841	9
		0.197	5.00	21.00	14.113	9			0.315	8.00	42.70	28.696	4
		0.236	6.00	24.90	16.734	9			0.394	10.00	52.50	35.282	4
		0.315	8.00	32.60	21.909	6			0.472	12.00	62.10	41.734	4
		0.394	10.00	40.00	26.882	6	8 x 8	200 x 200	0.157	4.00	24.90	16.734	6
		0.472	12.00	47.00	31.586	4			0.197	5.00	30.40	20.430	6
6 x 6	150 x 150	0.157	4.00	18.55	12.466	12			0.236	6.00	36.20	24.328	4
		0.197	5.00	22.60	15.188	9			0.315	8.00	47.70	32.056	4
		0.236	6.00	26.80	18.011	9			0.394	10.00	58.80	39.516	4
		0.315	8.00	35.10	23.589	6			0.472	12.00	69.60	46.774	2
		0.394	10.00	43.10	28.965	6	10 x 10	250 x 250	0.197	5.00	38.30	25.739	4

ASTM A500 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/ bdl	Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/ bdl
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
10 x 10	250 x 250	0.236	6.00	45.70	30.712	4	10 x 10	250 x 250	0.394	10.00	74.50	50.067	2
		0.315	8.00	60.30	40.524	4			0.472	12.00	88.50	59.476	2

TOLERANCES ON SHAPE AND MASS:

Characteristic	Circular hollow sections	Outside flat Dimensions for Square and Rectangular hollow sections	
		OD Flat dimensions in. (mm)	Permissible Variations over and under flat dimensions (a) in.[mm]
External dimensions	± 0.75% of the specified outside diameter	2 1/2 [65] or under	0.020 [0.5]
		Over 2 1/2 - 3 1/2 [65 - 90]	0.025 [0.6]
		Over 3 1/2 - 5 1/2 [90 - 140]	0.030 [0.8]
		Over 5 1/2 [140]	0.01 times large flat dimension
Thickness(T)	±10% of the specified wall thickness.		
Squareness of sides(Ø)		90° ± 2°	
External corner profile	--	The radius of each outside corner of the section shall not exceed three times the specified wall thickness	
Twist	--	OD Flat dimensions in. (mm)	Max. Permissible Variationsin Twist per meter of length in.(mm)
		1 1/2 [40] and under	0.05 [1.3]
		Over 1 1/2 - 2 1/2 [40 -65]	0.062 [1.6]
		Over 2 1/2 - 4 [65 - 100]	0.075 [1.9]
		Over 4 - 6 [100 - 150]	0.087 [2.2]
		Over 6 - 8 [150 - 200]	0.100 [2.5]
		Over 8 [200]	0.112 [2.8]

ASTM A500 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Characteristic	Circular hollow sections	Outside flat Dimensions for Square and Rectangular hollow sections	
		OD Flat dimensions in. (mm)	Permissible Variations over and under flat dimensions (a) in.[mm]
Straightness	0.20% of total length [10mm x length (in meters) divided by 5]		
Length	-0/+20mm		
(a) The permissible variations include allowances for convexity and concavity. For rectangular tubing having a ratio of outside large to small flat dimension less than 1.5, and for square tubing, the permissible variations in small flat dimension shall be identical to the permissible variations in large flat dimension. For rectangular tubing having a ratio of outside large to small flat dimension in the range of 1.5 to 3.0 inclusive, the permissible variations in small flat dimension shall be 1.50 times the permissible variations in large flat dimension. For rectangular tubing having a ratio of outside large to small flat dimension greater than 3.0, the permissible variations in small flat dimension shall be 2.0 times the permissible variations in large flat dimension			

CHEMICAL COMPOSITION:

Element	Composition%			
	Grades A & B		Grade C	
	Heat Analysis	Product Analysis	Heat Analysis	Product Analysis
Carbon , max ^A	0.26	0.3	0.23	0.27
Manganese, max ^A	1.35	1.4	1.35	1.4
Phosphorus, max	0.035	0.045	0.035	0.045
Sulfur, max	0.035	0.045	0.035	0.045
Copper, min ^B	0.2	0.18	0.2	0.18
A) For each reduction of 0.01 percentage point below the specified maximum for carbon, an increase of 0.06 percentage point above the specified maximum for manganese is permitted, up to a maximum of 1.50% by heat analysis and 1.60% by product analysis. B) If copper-containing steel is specified in the purchase order.				

ASTM A500 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

MECHANICAL PROPERTIES :

Round Structural Tubing				A) Applies to specified wall thicknesses (t) equal to or greater than 0.120 in. [3.05mm]. For lighter specified wall thicknesses, the minimum elongation values shall be calculated by the formula: percent elongation in 2 in. [50 mm] = 0.56t + 17.5,rounded to the nearest percent. For A500M use the following formula: 2.2t + 17.5, rounded to the nearest percent. B) Applies to specified wall thicknesses (t) equal to or greater than 0.180 in. [4.57 mm]. For lighter specified wall thicknesses, the minimum elongation values shall be calculated by the formula: percent elongation in 2 in. [50 mm] = 0.61t + 12, rounded to the nearest percent. For A500M use the following formula: 2.4t + 12, rounded to the nearest percent. C) Applies to specified wall thicknesses (t) equal to or greater than 0.120 in. [3.05mm]. For lighter specified wall thicknesses, the minimum elongation values shall be by agreement with the manufacturer.
	Grades A	Grades B	Grades C	
Tensile strength, min, psi [MPa]	45 000 [310]	58 000 [400]	62 000 [425]	
Yield strength, min, psi [MPa]	33 000 [230]	42 000 [290]	46 000 [315]	
Elongation in 2 in. [50 mm] min%	25 ^A	25 ^B	25 ^C	
Shaped Structural Tubing				
	Grades A	Grades B	Grades C	
Tensile strength , min ,psi [MPa]	45 000 [310]	58 000 [400]	62 000 [425]	
Yield strength , min ,psi [MPa]	39 000 [270]	46 000 [315]	50 000 [345]	
Elongation in 2 in. [50 mm] min%	25 ^A	23 ^B	21 ^C	

Workmanship : Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.

Packing : Hexagonal Type

Marking : Online stenciling as per the standard & customer requirement.

EN 10219-1 & 2 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/ bdl	Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/ bdl
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
1 3/5 x 1 3/5	40 x 40	0.059	1.50	1.77	1.188	81	2 1/3 x 2 1/3	60 x 60	0.177	4.50	7.43	4.995	25
		0.071	1.80	2.09	1.407	81			0.197	5.00	8.13	5.464	25
		0.079	2.00	2.31	1.552	81			0.236	6.00	9.45	6.351	20
		0.098	2.50	2.82	1.895	64	2 1/2 x 2 1/2	63.5 x 63.5	0.059	1.50	2.87	1.929	49
		0.118	3.00	3.30	2.218	64			0.079	2.00	3.78	2.540	49
		0.157	4.00	4.20	2.823	49			0.118	3.00	5.52	3.710	36
2 x 2	50 x 50	0.196	5.00	5.00	3.360	49			0.157	4.00	7.15	4.805	25
		0.236	6.00	5.70	3.831	36			0.197	5.00	8.68	5.833	25
		0.059	1.50	2.24	1.504	64	2 5/9 x 2 5/9	65 x 65	0.236	6.00	10.11	6.794	20
		0.079	2.00	2.93	1.969	49			0.059	1.50	2.95	1.983	49
		0.098	2.50	3.60	2.419	49			0.079	2.00	3.88	2.608	49
		0.118	3.00	4.25	2.856	49			0.118	3.00	5.66	3.804	36
2 1/3 x 2 1/3	60 x 60	0.157	4.00	5.45	3.663	36			0.157	4.00	7.34	4.933	25
		0.197	5.00	6.56	4.409	36			0.197	5.00	8.91	5.988	25
		0.236	6.00	7.56	5.081	25			0.236	6.00	10.39	6.983	20
		0.059	1.50	2.71	1.821	49	3 x 3	75 x 75	0.059	1.50	3.42	2.298	36
		0.079	2.00	3.56	2.392	49			0.079	2.00	4.50	3.026	36
		0.098	2.50	4.39	2.950	36			0.098	2.50	5.56	3.739	36
		0.118	3.00	5.19	3.488	36			0.118	3.00	6.60	4.435	36
		0.157	4.00	6.71	4.509	25			0.157	4.00	8.59	5.776	25

EN 10219-1 & 2 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
3 x 3	75 x 75	0.177	4.50	9.55	6.419	25	3 6/11 x 3 6/11	90 x 90	0.079	2.00	5.45	3.663	36
		0.197	5.00	10.50	7.056	20			0.098	2.50	6.74	4.530	36
		0.236	6.00	12.30	8.266	20			0.118	3.00	8.01	5.383	36
3 1/7 x 3 1/7	80 x 80	0.079	2.00	4.82	3.237	36			0.157	4.00	10.50	7.056	25
		0.098	2.50	5.96	4.003	36			0.197	5.00	12.80	8.602	20
		0.118	3.00	7.07	4.751	25			0.236	6.00	15.10	10.148	16
		0.157	4.00	9.22	6.196	25			0.315	8.00	18.90	12.702	12
		0.177	4.50	10.26	6.894	25	4 x 4	100 x 100	0.079	2.00	6.07	4.081	25
3 1/2 x 3 1/2	89 x 89	0.197	5.00	11.30	7.594	20			0.098	2.50	7.53	5.058	25
		0.236	6.00	13.20	8.871	16			0.118	3.00	8.96	6.022	20
		0.315	8.00	16.40	11.022	12			0.157	4.00	11.70	7.863	20
		0.354	9.00	17.90	12.030	12			0.177	4.50	13.08	8.793	16
		0.079	2.00	5.38	3.616	25			0.197	5.00	14.40	9.677	16
3 1/2 x 3 1/2	89 x 89	0.098	2.50	6.66	4.476	25			0.217	5.50	15.71	10.556	12
		0.118	3.00	7.92	5.323	25			0.236	6.00	17.00	11.425	12
		0.157	4.00	10.35	6.956	20			0.315	8.00	21.40	14.382	9
		0.197	5.00	12.68	8.522	16			0.354	9.00	23.53	15.813	9
		0.236	6.00	14.91	10.020	16			0.394	10.00	25.60	17.204	9
		0.315	8.00	18.62	12.513	12			0.472	12.00	28.31	19.026	8
		0.354	9.00	20.43	13.730	12	4 11/15 x 4 11/15	120 x 120	0.098	2.50	9.10	6.116	20

EN 10219-1 & 2 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
4 11/15 x 4 11/15	120 x 120	0.118	3.00	10.80	7.258	20			0.315	8.00	31.40	21.102	6
		0.157	4.00	14.20	9.543	16			0.394	10.00	38.10	25.605	6
		0.197	5.00	17.50	11.761	12			0.472	12.00	43.40	29.167	4
		0.236	6.00	20.70	13.911	12	6 x 6	150 x 150	0.157	4.00	18.00	12.097	12
		0.315	8.00	26.40	17.742	9			0.197	5.00	22.30	14.987	9
		0.354	9.00	29.20	19.624	9			0.236	6.00	26.40	17.742	9
		0.394	10.00	31.80	21.371	9			0.315	8.00	33.90	22.782	6
		0.472	12.00	35.80	24.059	8			0.354	9.00	37.66	25.309	6
5 x 5	125 x 125	0.098	2.50	9.49	6.378	20			0.394	10.00	41.30	27.755	6
		0.118	3.00	11.31	7.601	16			0.472	12.00	47.10	31.653	4
		0.157	4.00	14.90	10.013	16	6 3/10 x 6 3/10	160 x 160	0.157	4.00	19.30	12.970	12
		0.197	5.00	18.30	12.298	12			0.197	5.00	23.80	15.995	9
		0.236	6.00	21.70	14.583	12			0.236	6.00	28.30	19.019	9
		0.315	8.00	27.70	18.616	9			0.315	8.00	36.50	24.530	6
		0.354	9.00	30.60	20.565	9			0.394	10.00	44.40	29.839	4
		0.394	10.00	33.40	22.446	8			0.472	12.00	50.90	34.207	4
5 12/23 x 5 12/23	140 x 140	0.472	12.00	37.70	25.336	8	7 3/32 x 7 3/32	180 x 180	0.157	4.00	21.80	14.651	9
		0.157	4.00	16.80	11.290	12			0.197	5.00	27.00	18.145	9
		0.197	5.00	20.70	13.911	9			0.236	6.00	32.10	21.573	9
		0.236	6.00	24.50	16.465	9			0.315	8.00	41.50	27.890	4

EN 10219-1 & 2 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
8 x 8	200 x 200	0.394	10.00	50.70	34.073	4	8 x 8	200 x 200	0.472	12.00	66.00	44.355	2
		0.472	12.00	58.50	39.315	4	10 x 10	250 x 250	0.157	4.00	30.57	20.544	4
		0.157	4.00	24.30	16.331	6			0.197	5.00	38.00	25.538	4
		0.197	5.00	30.10	20.228	6			0.236	6.00	45.20	30.376	4
		0.236	6.00	35.80	24.059	4			0.315	8.00	59.10	39.718	4
		0.315	8.00	46.50	31.250	4			0.394	10.00	72.70	48.858	2
		0.394	10.00	57.00	38.306	4			0.472	12.00	84.80	56.989	2

TOLERANCES ON SHAPE AND MASS

Characteristic	Circular hollow sections	Square and Rectangular hollow sections	
		Side length (mm)	Tolerance
External dimensions (D,B & H)	± 1%, with a minimum of ± 0.5 mm and a maximum of ± 10 mm	H, B < 100	± 1% with a min. ± 0.5mm
		100 ≤ H, B ≤ 200	± 0.8%
		H,B > 200	± 0.6%
Thickness(T)	For D ≤ 406.4 mm, T ≤ 5.0mm ± 10% T > 5.0mm ± 0.5mm	T ≤ 5.0mm ± 10% T > 5.0mm ± 0.5mm	
Out of roundness(O)	2% for hollow sections having a diameter to thickness ration not exceeding 100	--	
Concavity/Convexity	--	Max. 0.8% with a minimum of 0.5mm	
Squareness of sides(Ø)	--	90° ± 1°	

EN 10219-1 & 2 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Characteristic	Circular hollow sections	Square and Rectangular hollow sections	
		Side length (mm)	Tolerance
External corner profile	--	T≤6.0mm : 1.6T to 2.4T, 6.0 <T≤10.0mm : 2.0T to 3.0T, T>10.0mm : 2.4T to 3.6T	
Twist		2.0 mm plus 0.5mm/ m Length	
Straightness	0.20% of total length and 3.0 mm over any 1m length	0.15% of total length and 3.0 mm over any 1m length	
Mass per unit length	± 6% on individual delivered length		
Length	-0/+20mm		

CHEMICAL COMPOSITION:

Grade	Chemical composition % max.						
	C	Si	Mn	P	S	N	Carbon Equivalent(CEV)
S235JRH	0.17	--	1.40	0.040	0.040	0.009	0.35
S275J0H	0.20	--	1.50	0.035	0.035	0.009	0.40
S275J2H	0.20	--	1.50	0.030	0.030	--	0.40
S355J0H	0.22	0.55	1.60	0.035	0.035	0.009	0.45
S355J2H	0.22	0.55	1.60	0.030	0.030	--	0.45
Carbon Equivalent : Max. carbon equivalent shall be CEV = C + (Mn / 6) + (Cr + Mo + V) / 5 + (Ni + Cu) / 15							

EN 10219-1 & 2 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

MECHANICAL PROPERTIES:

Grade	Min. Yield Strength R _{eh} (MPa)	Tensile Strength R _m (MPa)		Minimum Elongation %	Min. Impact Energy(J)		
		T < 3 mm	T ≥ 3 mm		-20°C	0°C	20°C
S235JRH	235	360-510	360-510	24	--	--	27
S275J0H	275	430-580	410-560	20	--	27	--
S275J2H					27	--	--
S355J0H	355	510-680	470-630	20	--	27	--
S355J2H					27	--	--
* For section sizes D/T < 15 (round) and (B+H) / 2T < 12.5(square & rectangular) the minimum elongation is reduced by 2							

- Workmanship

: Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.
- Packing

: Box Type
- Marking

: Online stenciling as per the standard & customer requirement.

AS/NZS 1163 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

SQUARE HOLLOW SECTIONS													
Size (bxb)		Wall Thickness (t)		Mass per unit length		Pieces/ bdl	Size (bxb)		Wall Thickness (t)		Mass per unit length		Pieces/ bdl
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
1 3/5 x 1 3/5	40 x 40	0.063	1.60	1.88	1.263	81	3 1/2 x 3 1/2	89 x 89	0.197	5.00	12.50	8.401	16
		0.079	2.00	2.31	1.552	81			0.236	6.00	14.60	9.812	16
		0.098	2.50	2.82	1.895	64	4 x 4	100 x100	0.118	3.00	8.96	6.022	20
		0.157	4.00	4.09	2.749	49			0.157	4.00	11.60	7.796	20
2 x 2	50 x 50	0.063	1.60	2.38	1.599	64			0.197	5.00	14.20	9.543	16
		0.079	2.00	2.93	1.969	49			0.236	6.00	16.70	11.223	12
		0.098	2.50	3.60	2.419	49			0.354	9.00	23.50	15.793	9
		0.118	3.00	4.25	2.856	49	5 x 5	125 x125	0.157	4.00	14.80	9.946	16
		0.157	4.00	5.35	3.595	36			0.197	5.00	18.20	12.231	12
2 9/16 x 2 9/16	65 x 65	0.079	2.00	3.88	2.608	49			0.236	6.00	21.40	14.382	12
		0.098	2.50	4.78	3.212	36	6 x 6	150 x 150	0.354	9.00	30.60	20.565	9
		0.118	3.00	5.66	3.804	36			0.197	5.00	22.10	14.852	9
3 x 3	75 x 75	0.098	2.50	5.56	3.737	36			0.236	6.00	26.20	17.608	9
		0.118	3.00	6.60	4.435	36			0.354	9.00	37.70	25.336	6
		0.138	3.50	7.53	5.060	36	8 x 8	200 x 200	0.197	5.00	29.90	20.094	6
		0.157	4.00	8.49	5.706	25			0.236	6.00	35.60	23.925	4
		0.197	5.00	10.30	6.922	20			0.354	9.00	51.80	34.812	4
		0.236	6.00	12.00	8.065	20	10 x 10	250 x 250	0.236	6.00	45.00	30.242	4
3 1/2 x 3 1/2	89 x 89	0.138	3.50	9.06	6.089	25			0.354	9.00	65.90	44.288	4

AS/NZS 1163 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

TOLERANCES ON SHAPE AND MASS:

Characteristic	Circular hollow sections	Square and Rectangular hollow sections
External dimensions (do,d & b)	± 1%, with a minimum of ±0.5 mm and a maximum of ± 10 mm	± 1%, with a minimum of ±0.5 mm
Thickness(t)	± 10%	± 10%
Out of roundness(o)	± 2% for hollow sections having a diameter to thickness ratio not exceeding 100	---
Concavity/Convexity	---	Max. 0.8% or 0.5mm, Whichever is greater
Squareness of sides	---	90° ± 1°
External corner profile	---	Perimeter (mm) Equivalent to 50X50 or less : 1.5t to 3.0t Equivalent to greater than 50X50 : 1.8t to 3.0t
Twist	---	2.0+ 0.5 mm/m length
Straightness	0.20% of total length	0.15% of total length
Mass per unit length	Not less than 0.96 times the specified mass on individual Length	
Length	-0/+20mm	

CHEMICAL COMPOSITION:

Grade	Chemical composition % max.												
	C	Si	Mn	P	S	Cr	Mo	Al	Ni	Cu	Ti	Micro-alloying elements	Ce
C250/ C250LO	0.12	0.05	0.50	0.03	0.03	0.15	0.10	0.10	0.25	0.25	0.04	0.03(Note-1)	0.25

AS/NZS 1163 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

CHEMICAL COMPOSITION :

Grade	Chemical composition % max.												
	C	Si	Mn	P	S	Cr	Mo	Al	Ni	Cu	Ti	Micro-alloying elements	Ce
C350/ C350LO	0.20	0.25	1.60	0.03	0.03	0.30	0.10	0.10	0.25	0.25	0.04	0.15(Note-2)	0.43
C450/ C450LO	0.20	0.25	1.70	0.03	0.03	0.50	0.35	0.10	0.25	0.25	0.04	0.15(Note-2)	0.43
Note-1) Nb-0.010 Max						Note-2) V-0.10 Max							
Carbon Equivalent : Carbon equivalent shall be calculated from the following formula. CEV = C + (Mn / 6) + (Cr + Mo + V) / 5 + (Ni + Cu) / 15													

MECHANICAL PROPERTIES:

Grade	Min. Yield Strength (MPa)	Tensile Strength (MPa)	Minimum Elongation%	Test Temp.	Minimum Impact Energy(J)					
					Size of Test piece					
					10 X 10 mm		10 X 7.5 mm		10 X 5.0 mm	
					Average of 3 tests	Individual Test	Average of 3 tests	Individual Test	Average of 3 tests	Individual Test
C250/C250LO	250	320	18	0°C	27	20	22	16	18	13
C350/C350LO	350	430	16							
C450/C450LO	450	500	14							

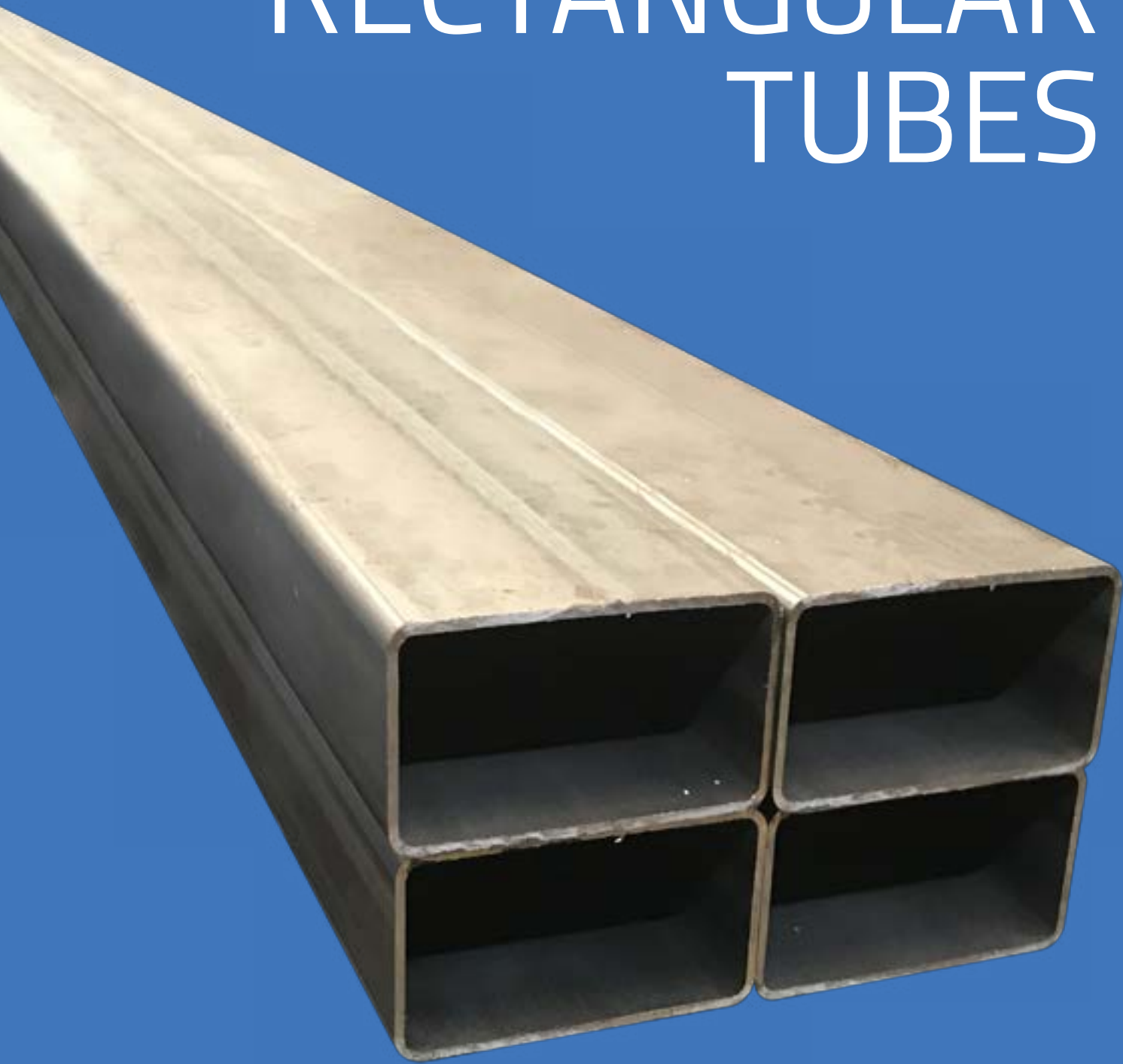
- Workmanship**

: Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.
- Marking**

: Stenciling as per the standard & customer requirement.
- Packing**

: Box Type

RECTANGULAR TUBES



ASTM A500 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
2 1/3 x 1 3/5	60 x 40	0.059	1.50	2.28	1.532	81	3 x 2	75 x 50	0.236	6.00	10.66	7.164	25
		0.079	2.00	2.96	1.989	64	3 1/7 x 1 3/5	80 x 40	0.059	1.50	2.71	1.821	49
		0.098	2.50	3.71	2.493	64			0.079	2.00	3.56	2.392	49
		0.118	3.00	4.28	2.876	49			0.098	2.50	4.47	3.004	36
		0.157	4.00	5.51	3.703	49			0.118	3.00	5.19	3.488	36
		0.197	5.00	6.85	4.603	49			0.157	4.00	6.71	4.509	25
		0.236	6.00	7.99	5.370	25			0.197	5.00	8.42	5.659	25
2 9/16 x 1 3/8	65 x 35	0.059	1.50	2.28	1.532	81	4 X 2	100 x 50	0.236	6.00	9.87	6.633	20
		0.079	2.00	2.96	1.989	64			0.059	1.50	3.49	2.345	49
		0.098	2.50	3.71	2.493	64			0.079	2.00	4.51	3.031	49
		0.118	3.00	4.28	2.876	49			0.098	2.50	5.63	3.784	36
		0.157	4.00	5.51	3.703	49			0.118	3.00	6.60	4.435	36
		0.197	5.00	6.85	4.603	49			0.157	4.00	8.60	5.780	25
		0.236	6.00	7.99	5.370	25			0.177	4.50	9.90	6.653	20
3 x 2	75 x 50	0.059	1.50	2.90	1.949	49	4 x 2 1/3	100 x 60	0.197	5.00	10.49	7.050	20
		0.079	2.00	3.85	2.587	49			0.236	6.00	12.30	8.266	20
		0.098	2.50	4.80	3.226	36			0.079	2.00	4.83	3.246	49
		0.118	3.00	5.73	3.851	36			0.118	3.00	7.18	4.825	36
		0.157	4.00	7.58	5.094	25			0.157	4.00	9.41	6.324	25
		0.197	5.00	8.60	5.780	25			0.197	5.00	11.60	7.796	20

ASTM A500 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
4 x 2 1/3	100 x 60	0.236	6.00	13.60	9.140	20	5 x 3	125 x 75	0.177	4.50	13.37	8.985	16
		0.315	8.00	17.50	11.761	20			0.197	5.00	14.80	9.946	16
4 11/16 x 2 1/3	120 x 60	0.098	2.50	6.80	4.570	30			0.217	5.50	16.68	11.210	16
		0.118	3.00	8.10	5.444	25			0.236	6.00	17.28	11.613	9
		0.157	4.00	10.70	7.191	25			0.315	8.00	22.60	15.188	9
		0.177	4.50	11.99	8.058	20	6 x 3	150 x 75	0.079	2.00	6.99	4.698	25
		0.197	5.00	13.30	8.938	20			0.098	2.50	8.68	5.833	25
		0.236	6.00	15.50	10.417	20			0.118	3.00	10.46	7.030	25
		0.315	8.00	20.10	13.508	16			0.157	4.00	13.85	9.308	20
4 11/16 x 3 1/7	120 x 80	0.118	3.00	9.03	6.069	20			0.177	4.50	15.44	10.376	16
		0.157	4.00	12.17	8.179	16			0.197	5.00	17.23	11.579	16
		0.197	5.00	14.80	9.946	16			0.236	6.00	20.49	13.770	9
		0.236	6.00	17.28	11.613	12			0.315	8.00	27.19	18.273	9
		0.315	8.00	22.60	15.188	9	6 3/10 x 3 1/7	160 x 80	0.118	3.00	11.20	7.527	20
		0.394	10.00	27.40	18.414	9			0.157	4.00	14.40	9.677	16
5 x 3	125 x 75	0.472	12.00	32.10	21.573	9			0.197	5.00	17.80	11.962	16
		0.098	2.50	7.55	5.074	30			0.236	6.00	21.20	14.247	12
		0.118	3.00	9.03	6.069	24	6 x 4	150 x 100	0.315	8.00	27.60	18.548	9
		0.157	4.00	12.17	8.179	20			0.118	3.00	11.61	7.802	20
									0.157	4.00	15.10	10.148	16

ASTM A500 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
6 x 4	150 x 100	0.197	5.00	18.60	12.500	12	10 x 4	250 x 100	0.315	8.00	41.40	27.823	4
		0.236	6.00	22.10	14.852	9			0.394	10.00	51.00	34.274	4
		0.315	8.00	28.90	19.422	9			0.472	12.00	60.20	40.457	2
		0.394	10.00	35.30	23.723	6	10 x 6	250 x 150	0.157	4.00	24.90	16.734	6
8 x 4	200 x 100	0.472	12.00	41.40	27.823	6			0.197	5.00	30.40	20.430	6
		0.157	4.00	18.55	12.466	12			0.236	6.00	36.20	24.328	4
		0.197	5.00	22.60	15.188	9			0.315	8.00	47.70	32.056	4
		0.236	6.00	26.80	18.011	9			0.394	10.00	58.80	39.516	4
		0.315	8.00	35.10	23.589	6			0.472	12.00	69.60	46.774	2
8 x 6	200 x 150	0.394	10.00	43.10	28.965	6	12 x 4	300 x 100	0.157	4.00	24.90	16.734	4
		0.472	12.00	50.80	34.140	4			0.197	5.00	30.40	20.430	4
		0.157	4.00	21.80	14.651	9			0.236	6.00	36.20	24.328	4
		0.197	5.00	26.50	17.809	9			0.315	8.00	47.70	32.056	2
10 x 4	250 x 100	0.236	6.00	31.50	21.169	6			0.394	10.00	58.80	39.516	2
		0.315	8.00	41.40	27.823	6			0.472	12.00	69.60	46.774	2
		0.394	10.00	51.00	34.274	4	12 x 6	300 x 150	0.197	5.00	34.03	22.870	4
		0.472	12.00	60.20	40.457	4			0.236	6.00	40.50	27.218	4
		0.157	4.00	21.80	14.651	4			0.315	8.00	52.80	35.484	2
		0.197	5.00	26.50	17.809	4			0.394	10.00	64.80	43.548	2
		0.236	6.00	31.50	21.169	4			0.472	12.00	75.40	50.672	2

ASTM A500 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
12 x 8	300 x 200	0.197	5.00	38.30	25.739	4	12 x 8	300 x 200	0.394	10.00	74.50	50.067	2
		0.236	6.00	45.70	30.712	4			0.472	12.00	88.50	59.476	2
		0.315	8.00	60.30	40.524	2							

TOLERANCES ON SHAPE AND MASS

Characteristic	Circular hollow sections	Outside flat Dimensions for Square and Rectangular hollow sections	
		OD Flat dimensions in. (mm)	Permissible Variations over and under flat dimensions (a) in.[mm]
External dimensions	± 0.75% of the specified outside diameter	2½ [65] or under	0.020 [0.5]
		Over 2½ - 3½ [65 - 90]	0.025 [0.6]
		Over 3½ - 5½ [90 - 140]	0.030 [0.8]
		Over 5½ [140]	0.01 times large flat dimension
Thickness(T)	±10% of the specified wall thickness.		
Squareness of sides(Ø)		90° ± 2°	
External corner profile	--	The radius of each outside corner of the section shall not exceed three times the specified wall thickness	
Twist	--	OD Flat dimensions in. (mm)	Max. Permissible Variations in Twist per meter of length in.(mm)
		1½ [40] and under	0.05 [1.3]
		Over 1½ - 2½ [40 -65]	0.062 [1.6]
		Over 2½ - 4 [65 - 100]	0.075 [1.9]
		Over 4 - 6 [100 - 150]	0.087 [2.2]
		Over 6 - 8 [150 - 200]	0.100 [2.5]
		Over 8 [200]	0.112 [2.8]

ASTM A500 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Straightness	0.20 % of total length [10mm x length (in meters) divided by 5]
Length	-0 / +20mm
(a) The permissible variations include allowances for convexity and concavity. For rectangular tubing having a ratio of outside large to small flat dimension less than 1.5, and for square tubing, the permissible variations in small flat dimension shall be identical to the permissible variations in large flat dimension. For rectangular tubing having a ratio of outside large to small flat dimension in the range of 1.5 to 3.0 inclusive, the permissible variations in small flat dimension shall be 1.50 times the permissible variations in large flat dimension. For rectangular tubing having a ratio of outside large to small flat dimension greater than 3.0, the permissible variations in large flat dimension. For rectangular tubing having a ratio of outside large to small flat dimension greater than 3.0, the permissible variations in small flat dimension shall be 2.0 times the permissible variations in large flat dimension.	

CHEMICAL COMPOSITION :

Element	Composition %			
	Grades A & B		Grade C	
	Heat Analysis	Product Analysis	Heat Analysis	Product Analysis
Carbon , max ^A	0.26	0.3	0.23	0.27
Manganese, max ^A	1.35	1.4	1.35	1.4
Phosphorus, max	0.035	0.045	0.035	0.045
Sulfur, max	0.035	0.045	0.035	0.045
Copper, min ^B	0.2	0.18	0.2	0.18
A) For each reduction of 0.01 percentage point below the specified maximum for carbon, an increase of 0.06 percentage point above the specified maximum for manganese is permitted, up to a maximum of 1.50% by heat analysis and 1.60% by product analysis. B) If copper-containing steel is specified in the purchase order.				

ASTM A500 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

MECHANICAL PROPERTIES:

Round Structural Tubing				A) Applies to specified wall thicknesses (to) equal to or greater than 0.120 in. [3.05mm]. For lighter specified wall thicknesses, the minimum elongation values shall be calculated by the formula: percent elongation in 2 in. [50 mm] = 0.56t + 17.5,rounded to the nearest percent. For A500M use the following formula: 2.2t + 17.5, rounded to the nearest percent. B) Applies to specified wall thicknesses (t) equal to or greater than 0.180 in. [4.57 mm]. For lighter specified wall thicknesses, the minimum elongation values shall be calculated by the formula: percent elongation in 2 in. [50 mm] = 0.61t + 12, rounded to the nearest percent. For A500M use the following formula: 2.4t + 12, rounded to the nearest percent. C) Applies to specified wall thicknesses (t) equal to or greater than 0.120 in. [3.05mm]. For lighter specified wall thicknesses, the minimum elongation values shall be by agreement with the manufacturer.
	Grades A	Grades B	Grades C	
Tensile strength, min, psi [MPa]	45 000 [310]	58 000 [400]	62 000 [425]	
Yield strength, min, psi [MPa]	33 000 [230]	42 000 [290]	46 000 [315]	
Elongation in 2 in. [50 mm] min%	25 ^A	25 ^B	25 ^C	
Shaped Structural Tubing				
	Grades A	Grades B	Grades C	
Tensile strength , min ,psi [MPa]	45 000 [310]	58 000 [400]	62 000 [425]	
Yield strength , min ,psi [MPa]	39 000 [270]	46 000 [315]	50 000 [345]	
Elongation in 2 in. [50 mm] min%	25 ^A	23 ^B	21 ^C	

Workmanship : Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.

Marking : Hexagonal Type

Packing : Online stenciling as per the standard & customer requirement.

EN 10219-1 & 2 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
2 1/3 x 1 3/5	60 x 40	0.059	1.50	2.24	1.504	81	3 x 2	75 x 50	0.118	3.00	5.42	3.644	36
		0.071	1.80	2.66	1.786	64			0.157	4.00	7.02	4.720	25
		0.079	2.00	2.93	1.969	64			0.197	5.00	8.52	5.726	25
		0.098	2.50	3.60	2.419	49			0.236	6.00	9.92	6.667	25
		0.118	3.00	4.25	2.856	49	3 1/7 x 1 3/5	80 x 40	0.059	1.50	2.71	1.821	49
		0.157	4.00	5.45	3.663	49			0.071	1.80	3.22	2.166	49
		0.197	5.00	6.56	4.409	36			0.079	2.00	3.56	2.392	49
		0.236	6.00	7.56	5.081	25			0.098	2.50	4.39	2.950	36
2 9/16 x 1 3/8	65 x 35	0.059	1.50	2.24	1.504	81			0.118	3.00	5.19	3.488	36
		0.071	1.80	2.66	1.786	64			0.157	4.00	6.71	4.509	25
		0.079	2.00	2.93	1.969	64			0.197	5.00	8.13	5.464	25
		0.098	2.50	3.60	2.419	49			0.236	6.00	9.45	6.351	20
		0.118	3.00	4.25	2.856	49	4 x 2	100 x 50	0.059	1.50	3.42	2.298	49
		0.157	4.00	5.45	3.663	49			0.079	2.00	4.50	3.026	49
		0.197	5.00	6.56	4.409	36			0.098	2.50	5.56	3.737	36
		0.236	6.00	7.56	5.081	25			0.118	3.00	6.60	4.435	36
3 x 2	75 x 50	0.059	1.50	2.83	1.900	49			0.157	4.00	8.59	5.773	25
		0.071	1.80	3.37	2.261	49			0.177	4.50	9.55	6.419	20
		0.079	2.00	3.72	2.499	49			0.197	5.00	10.50	7.056	20
		0.098	2.50	4.58	3.080	36			0.236	6.00	12.30	8.266	20

EN 10219-1 & 2 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
4 x 2 1/3	100 x 60	0.079	2.00	4.82	3.237	49	4 11/16 x 3 1/7	120 x 80	0.197	5.00	14.40	9.677	16
		0.098	2.50	5.96	4.003	36			0.236	6.00	17.00	11.425	12
		0.118	3.00	7.07	4.751	36			0.276	6.30	17.50	11.761	12
		0.157	4.00	9.22	6.196	25			0.315	8.00	21.40	14.382	9
		0.177	4.50	10.26	6.894	20			0.354	9.00	23.53	15.813	9
		0.197	5.00	11.30	7.594	20			0.394	10.00	25.60	17.204	9
		0.236	6.00	13.20	8.871	20			0.472	12.00	28.31	19.026	9
		0.315	8.00	16.40	11.022	20			0.098	2.50	7.53	5.058	30
4 11/16 x 2 1/3	120 x 60	0.098	2.50	6.74	4.530	30	5 x 3	125 x 75	0.118	3.00	8.96	6.022	24
		0.118	3.00	8.01	5.383	25			0.157	4.00	11.70	7.863	20
		0.157	4.00	10.50	7.056	25			0.177	4.50	13.08	8.793	16
		0.177	4.50	11.67	7.843	20			0.197	5.00	14.40	9.677	16
		0.197	5.00	12.80	8.602	20			0.236	6.00	17.00	11.425	9
		0.236	6.00	15.10	10.148	20			0.315	8.00	21.40	14.382	9
		0.248	6.30	15.50	10.417	20			0.079	2.00	6.86	4.610	25
		0.315	8.00	18.90	12.702	16			0.098	2.50	8.51	5.718	25
4 11/16 x 3 1/7	120 x 80	0.079	2.00	6.07	4.079	20	6 x 3	150 x 75	0.118	3.00	10.13	6.808	25
		0.098	2.50	7.53	5.060	20			0.157	4.00	13.30	8.941	20
		0.118	3.00	8.96	6.022	20			0.177	4.50	14.85	9.981	16
		0.157	4.00	11.70	7.863	16			0.197	5.00	16.37	11.003	12

EN 10219-1 & 2 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
6 x 3	150 x 75	0.217	5.50	17.87	12.007	9	8 x 4	200 x 100	0.236	6.00	26.40	17.742	9
		0.236	6.00	19.34	12.997	9			0.315	8.00	33.90	22.782	6
		0.315	8.00	24.53	16.485	9			0.394	10.00	41.30	27.755	6
		0.354	9.00	27.07	18.192	9			0.472	12.00	47.10	31.653	4
6 x 4	150 x 100	0.118	3.00	11.31	7.601	20	8 x 6	200 x 150	0.157	4.00	21.20	14.247	9
		0.157	4.00	14.90	10.013	16			0.197	5.00	26.20	17.608	9
		0.197	5.00	18.30	12.298	12			0.236	6.00	31.11	20.907	6
		0.236	6.00	21.70	14.583	9			0.315	8.00	40.23	27.036	6
		0.315	8.00	27.70	18.616	9			0.394	10.0	49.10	32.997	4
		0.354	9.00	30.60	20.565	9			0.472	12.0	56.60	38.038	4
		0.394	10.00	33.40	22.446	6	10 x 4	250 x 100	0.157	4.00	21.20	14.247	6
		0.472	12.00	37.70	25.336	6			0.197	5.00	26.20	17.608	6
6 3/10 x 3 1/7	160 x 80	0.118	3.00	10.80	7.258	20			0.236	6.00	31.11	20.907	4
		0.157	4.00	14.20	9.543	16			0.315	8.00	40.23	27.036	4
		0.197	5.00	17.50	11.761	16			0.394	10.00	49.10	32.997	4
		0.236	6.00	20.70	13.911	12			0.472	12.00	56.60	38.038	2
		0.315	8.00	26.40	17.742	9	10 x 6	250 x 150	0.157	4.00	24.29	16.324	6
		0.354	9.00	29.20	19.624	9			0.197	5.00	30.10	20.228	6
8 x 4	200 x 100	0.157	4.00	18.00	12.097	12			0.236	6.00	35.80	24.059	4
		0.197	5.00	22.30	14.987	9			0.315	8.00	46.50	31.250	4

EN 10219-1 & 2 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXH)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
12 x 4		0.394	10.00	57.00	38.306	4	12 x 6	300 x 150	0.236	6.00	40.50	27.218	4
		0.472	12.00	66.00	44.355	2			0.315	8.00	52.80	35.484	2
	300 x 100	0.157	4.00	24.30	16.331	4			0.394	10.00	64.80	43.548	2
		0.197	5.00	30.10	20.228	4			0.472	12.0	75.40	50.672	2
		0.236	6.00	35.80	24.059	4	12 x 8	300 x 200	0.157	4.00	30.60	20.565	4
		0.315	8.00	46.50	31.250	2			0.197	5.00	38.00	25.538	4
		0.394	10.00	57.00	38.306	2			0.236	6.00	45.20	30.376	4
		0.472	12.00	66.00	44.355	2			0.315	8.00	59.10	39.718	2
	300 x 150	0.157	4.00	27.43	18.434	4			0.394	10.00	72.70	48.858	2
		0.197	5.00	34.03	22.870	4			0.472	12.00	84.80	56.989	2

TOLERANCES ON SHAPE AND MASS:

Characteristic	Circular hollow sections	Square and Rectangular hollow sections	
		Side length (mm)	Tolerance
External dimensions (D,B & H)	± 1%, with a minimum of ±0.5 mm and a maximum of ±10 mm	H, B < 100	± 1% with a min. ± 0.5mm
		100 ≤ H, B ≤ 200	± 0.8%
		H,B > 200	± 0.6%
Thickness(T)	For D ≤ 406.4 mm, T ≤ 5.0mm ± 10% T > 5.0mm ± 0.5mm	T ≤ 5.0mm ± 10% T > 5.0mm ± 0.5mm	
Out of roundness(O)	2% for hollow sections having a diameter to thickness ration not exceeding 100	--	

EN 10219-1 & 2 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

Concavity/Convexity	--	Max. 0.8 % with a minimum of 0.5mm
Squareness of sides(Ø)	--	90° ± 1°

Characteristic	Circular hollow sections	Square and Rectangular hollow sections	
		Side length (mm)	Tolerance
External corner profile	--	T≤6.0mm : 1.6T to 2.4T, 6.0 <T≤10.0mm : 2.0T to 3.0T, T>10.0mm : 2.4T to 3.6T	
Twist		2.0mm plus 0.5mm/m lenght	
Straightness	0.20 % of total length and 3.0 mm over any 1m length	0.15 % of total length and 3.0 mm over any 1m length	
Mass per unit length	± 6% on indivisual delivered length		
Length	-0/ +20mm		

CHEMICAL COMPOSITION:

Grade	Chemical composition % max.						
	C	Si	Mn	P	S	N	Carbon Equivalent(CEV)
S235JRH	0.17	--	1.40	0.040	0.040	0.009	0.35
S275J0H	0.20	--	1.50	0.035	0.035	0.009	0.40
S275J2H	0.20	--	1.50	0.030	0.030	--	0.40
S355J0H	0.22	0.55	1.60	0.035	0.035	0.009	0.45
S355J2H	0.22	0.55	1.60	0.030	0.030	--	0.45
Carbon Equivalent : Max. carbon equivalent shall be CEV = C + (Mn / 6) + (Cr + Mo + V) / 5 + (Ni + Cu) / 15							

EN 10219-1 & 2 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

MECHANICAL PROPERTIES:

Grade	Min. Yield Strength R_{eh} (MPa)	Tensile Strength (MPa)		Minimum Elongation %	Min. Impact Energy (J)		
		T<3 mm	T≥3 mm		-20 °C	0 °C	20 °C
S235JRH	235	360-510	360-510	24	-	-	27
S275J0H	275	430-580	410-560	20	-	27	-
S275J2H					27	-	-
S355J0H	355	510-680	470-630	20	-	27	-
S355J2H					27	-	-

* For section sizes D/T < 15 (round) and (B+H) / 2T < 12.5 (Square & rectangular) the minimum elongation is reduce by 2

- Workmanship

: Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.
- Marking

: Online Stenciling as per the standard & customer requirement.
- Packing

: Box Type

AS/NZS 1163 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

RECTANGULAR HOLLOW SECTIONS													
Size (dxb)		Wall Thickness (t)		Mass per unit length		Pieces/bdls	Size (dxb)		Wall Thickness (t)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
2 ⁹ / ₁₆ x 1 ³ / ₈	65 x 35	0.079	2.00	2.93	1.969	64	5 x 3	125 x 75	0.118	3.00	8.96	6.022	24
		0.098	2.50	3.60	2.419	49			0.157	4.00	11.60	7.796	20
		0.118	3.00	4.25	2.856	49			0.197	5.00	14.20	9.543	16
3 x 2	75 x 50	0.079	2.00	3.72	2.500	49	6 x 4	150 x 100	0.157	4.00	14.80	9.950	16
		0.098	2.50	4.58	3.078	36			0.197	5.00	18.20	12.230	12
		0.118	3.00	5.42	3.642	36			0.236	6.00	21.40	14.380	9
		0.157	4.00	6.92	4.651	25	8 x 4	200 x 100	0.157	4.00	17.90	12.030	12
4 x 2	100 x 50	0.079	2.00	4.50	3.024	79			0.197	5.00	22.10	14.850	9
		0.098	2.50	5.56	3.737	36			0.236	6.00	26.20	17.610	9
		0.118	3.00	6.60	4.435	36			0.354	9.00	37.70	25.340	6
		0.138	3.50	7.53	5.060	25	10 x 6	250 x 150	0.197	5.00	29.90	20.090	6
		0.157	4.00	8.49	5.706	25			0.236	6.00	35.60	23.920	4
4 x 2	100 x 50	0.197	5.00	10.30	6.922	20			0.354	9.00	51.80	34.810	4
		0.236	6.00	12.00	8.065	20							

AS/NZS 1163 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

TOLERANCES ON SHAPE AND MASS:

Characteristic	Circular hollow sections	Square and Rectangular hollow sections
External dimensions (do,d & b)	± 1%, with a minimum of ±0.5 mm and a maximum of ± 10 mm	± 1%, with a minimum of ±0.5 mm
Thickness(t)	± 10%	± 10%
Out of roundness(o)	± 2% for hollow sections having a diameter to thickness ratio not exceeding 100	---
Concavity/Convexity	---	Max. 0.8% or 0.5mm, Whichever is greater
Squareness of sides	---	90° ± 1°
External corner profile	---	Perimeter (mm) Equivalent to 50X50 or less : 1.5t to 3.0t Equivalent to greater than 50X50 : 1.8t to 3.0t
Twist	---	2.0+ 0.5 mm/m length
Straightness	0.20% of total length	0.15% of total length
Mass per unit length	Not less than 0.96 times the specified mass on individual Length	
Length	-0/ +20mm	

CHEMICAL COMPOSITION:

Grade	Chemical composition % max.												
	C	Si	Mn	P	S	Cr	Mo	Al	Ni	Cu	Ti	Micro-alloying elements	Ce
C250/C250L0	0.12	0.05	0.50	0.03	0.03	0.15	0.10	0.10	0.25	0.25	0.04	0.03(Note-1)	0.25

AS/NZS 1163 Cold Formed Welded Rectangular Tubes

Nominal dimensions and sectional properties of rectangular hollow sections

CHEMICAL COMPOSITION:

Grade	Chemical composition % max.												
	C	Si	Mn	P	S	Cr	Mo	Al	Ni	Cu	Ti	Micro-alloying elements	Ce
C350/ C350LO	0.20	0.25	1.60	0.03	0.03	0.30	0.10	0.10	0.25	0.25	0.04	0.15(Note-2)	0.43
C450/ C450LO	0.20	0.25	1.70	0.03	0.03	0.50	0.35	0.10	0.25	0.25	0.04	0.15(Note-2)	0.43
Note-1) Nb-0.010 Max.						Note-2) V-0.10 Max.							
Carbon Equivalent : Carbon equivalent shall be calculated from the following formula. CEV = C + (Mn / 6) + (Cr + Mo + V) / 5 + (Ni + Cu) / 15													

MECHANICAL PROPERTIES:

Grade	Min. Yield Strength (MPa)	Tensile Strength (MPa)	Minimum Elongation %	Test Temp.	Minimum Impact Energy(J)					
					Size of Test piece					
					10 X 10 mm		10 X 7.5 mm		10 X 5.0 mm	
					Average of 3 tests	Individual Test	Average of 3 tests	Individual Test	Average of 3 tests	Individual Test
C250/C250L0	250	320	18	0°C	27	20	22	16	18	13
C350/C350L0	350	430	16							
C450/C450L0	450	500	14							

- Workmanship

: Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.
- Marking

: Stenciling as per the standard & customer requirement.
- Packing

: Box Type

SPECIALIZED PIPES & TUBES



Shoulder Pipes

Plain Pipe Requirements: ERW Pipe (AS 1074/ API 5L B PSL1)

Nominal Pipe Diameter	Nominal Wall Thickness	Nominal Weight	Galvanise Weight	Test Pressure	Max. Safe Working Pressure	Max. Recommended Field test Pressure	Pieces Per Bundle
mm	mm	kg/m	gm/m ²	KPa	KPa	KPa	
114.3	2.0	5.7	390	7056	3781	5998	7
165.1	2.5	10.3	390	6093	3265	5179	7
165.1	2.8	11.5	390	6835	3663	5810	7
219.1	3.5	18.9	390	6432	3447	5468	7
219.1	4.0	21.5	390	7367	3947	6262	7

Shoulder Ring Requirements: Material Grade ASTM A53 Grade B/ASTM A 106 Gr. B/ AS 1074

Pipe Diameter (mm)	Nominal Ring Thickness (mm)	Specified Shoulder Outside dia.(mm)	Specified Ring Length (mm)	Maximum out of Square (mm)
114.3	4.0+/-0.15	122.0+/-0.8	17.5+/-0.4	0.1
165.1	4.8+/-0.15	174.5+/-0.8	17.5+/-0.4	0.1
219.1	6.5/-0.15	232.0+/-0.8	20.5+/-0.4	0.1

1. Tolerance for plain End Pipe :

- a) Thickness : The minimum wall thickness at any point shall be no less than 90% of Nominal wall thickness.
- b) Diameter : The tolerance on the nominal outside diameter of the pipes shall be the greater of +/- 1% of the diameter and +/- 0.5 mm.
- c) Weight : The weight of any mill length pipe shall not be less than 96% of the normal length.

2. End Squareness : Each pipe shall be cut with squareness not exceeding 0.5mm.

Shoulder Pipes

Plain Pipe Requirements: ERW Pipe (AS 1074/ API 5L B PSL1)

3. Straightness

: Pipes Shall not deviate from a straight line by more than the length divided by 500 at the centre of pipe length.
4. Weld Bead

: The external Weld bead shall be trimmed to an essentially flush condition. The maximum height of the internal weld bead shall not exceed 1.5mm
5. Chemical Composition (%max)

S - 0.045%, P - 0.050% & CE - 0.40%
6. Mechanical (min)

: Yield Strength-245 N/mm²,Tensile Strength-340 N/mm²,
Elongation-15%
7. Flattening Test

: Applicable to tubes greater than nominal sizes of 60 mm OD & weld located 0/90 degree from line of the direction of force.

For Weld

: Flatten up to 75% of Original tube OD. No cracks in the weld.

For Material

: Flatten up to 60% of Original tube OD. No cracks in the metal other than weld.
8. Leak Tightness Test

a)

: Online NDT(Eddy Current)

b)

: Hydro testing at pressure as per above Table and holding time Min. 5 Second.
9. Zinc Coating

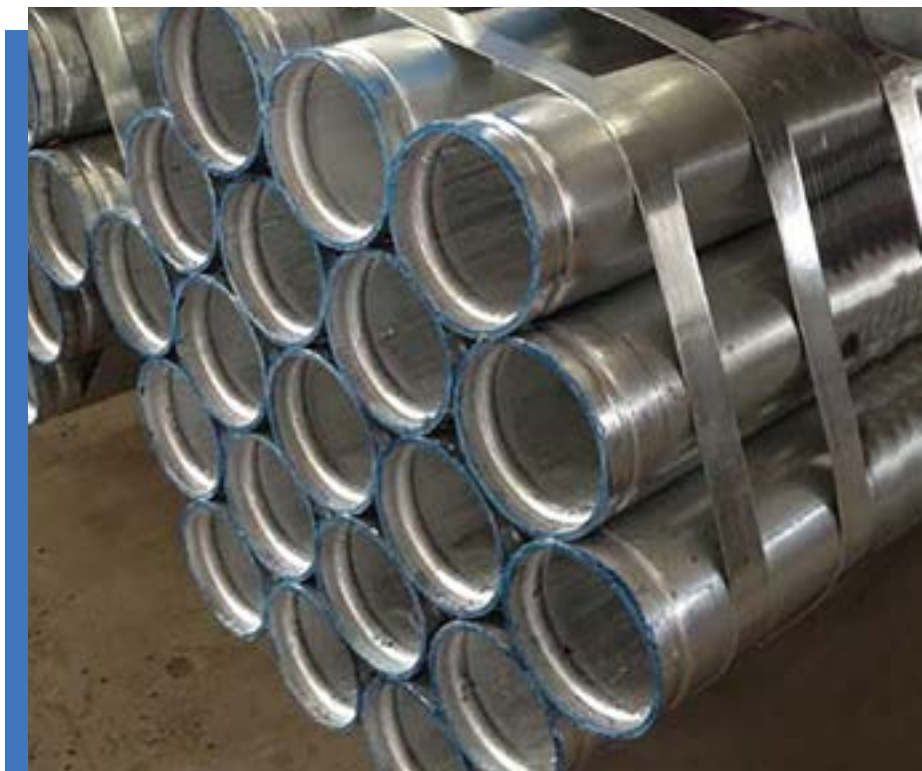
: Average coating thickness 390 Gm/mm² or 55 Micron Minimum. Free from bare Spot,Black spot,rough,overcoating, Peel off or any other surface defect.
10. Marking

: Stenciling as per the standard & customer requirement.
11. Packing

: Hexagonal Type

Black & Galvanized Rolled Grooved Pipes

Roll Grooved in Victaulic Grooving Machines in Sizes 4" to 8" in pipe thicknesses as per Sch.10 & Sch. 40



Water Based Blue Painted Tubes

SHS & RHS, manufactured as per AS 1163 in Grades C250, C350LO & C450LO, are painted with water based Blue color paint from sizes 40 x 40 to 150 x 150 (SHS) & 60 x 40 to 200 x 100 (RHS) for structural applications.



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CERTIFICATE OF REGISTRATION

This is to certify that

THL Tube & Pipe Industries L.L.C.

Plot No. 597-616 (F-013)

P.O. Box 49695, DIP

Dubai

United Arab Emirates

has been audited and found to meet the requirements of standard
ISO 9001:2008 Quality Management System

Scope of certification
 Manufacture & Supply of Round, Square & Rectangular ERW Steel Pipes

Karen Prendergast
 Sector Director - Certification
 Exova BM TRADA

Exova (UK) Ltd, (T/A Exova BM TRADA), Chiltern House, Stocking Lane, High Wycombe, Buckinghamshire, HP14 4HD, UK
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The use of the UKAS accreditation mark indicates accreditation in respect of those activities covered by the accreditation certification D12

Multiple clients: The scope of certification shown above includes the participating sites shown in appendix A

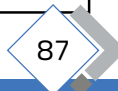
Certificate number: 8852

Issue number: 2017-01

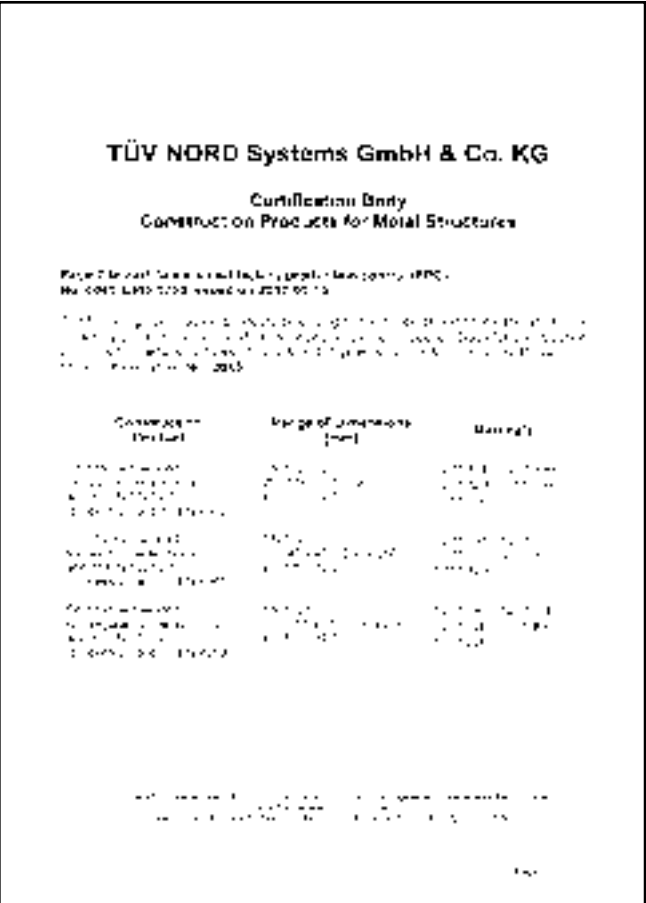
Certificate start date: 18 January 2015

Certificate expiry date: 17 January 2018

Date of initial certification: 18 January 2012



Certifications



Certifications



Certifications



Certificate of Compliance

This certificate is issued for the following:

Steel Pipe for Automatic Fire Sprinkler Systems

Product	Listing Country	Nominal Pipe Size, in.	Rated Working Pressure, psi	Rated Working Pressure, kPa	Certification Type
Schedule 10 ^{a,c,d,m,n,p}	U.A.E.	4, 5, 6, 8	300	2070	FM Approved

Notes:

- a - FM Approved for use with FM Approved pipe couplings on rolled grooves.
- c - FM Approved for use in welded systems when supplied with standard bevel on ends.
- d - When hot dip galvanized by factory, the sprinkler pipe is FM Approved for dry pipe systems.
- m - FM Approved for use in all steel sprinkler systems composed of uncoated steel pipe.
- n - FM Approved for use in hybrid sprinkler systems composed of uncoated steel and plastic piping.
- p - Manufactured out of ASTM A135 / A135M Grade A or B steel.

Prepared for: THL Tube & Pipe Industries LLC, P.O. Box 49695, Plot No 597-616 (F013), Dubai Investment Park 2, Dubai, United Arab Emirates

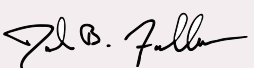
Manufacturing Location: THL Tube & Pipe Industries LLC, P.O. Box 49695, Plot No 597-616 (F013), Dubai Investment Park 2, Dubai, United Arab Emirates

FM Approvals Class: 1630 – “Steel Pipe for Automatic Fire Sprinkler Systems”

Approval Identification: 3058457 Approval Granted: October 2, 2017

To verify the availability of the Approved product, please refer to www.approvalguide.com

Said Approval is subject to satisfactory field performance, continuing Surveillance Audits, and strict conformity to the constructions as shown in the Approval Guide, an online resource of FM Approvals.


David B. Fuller
VP, Manager – Fire Protection
FM Approvals
1151 Boston-Providence Turnpike
Norwood, MA 02062 USA


Member of the FM Global Group



Certificate of Compliance

This certificate is issued for the following:

Steel Pipe for Automatic Fire Sprinkler Systems

Product	Listing Country	Nominal Pipe Size, in.	Rated Working Pressure, psi	Rated Working Pressure, kPa	Certification Type
Schedule 40 ^{a,c,d,e,f,m,n,p}	U.A.E.	4, 5, 6, 8, 10, 12	300	2070	FM Approved

Notes:

- a - FM Approved for use with FM Approved pipe couplings on rolled or cut grooves.
- c - FM Approved for use in welded systems when supplied with standard bevel on ends.
- d - When hot dip galvanized by factory, the sprinkler pipe is FM Approved for dry pipe systems.
- e - Any FM Approved coupling or fitting suitable for use with Schedule 10 pipe may be used with this product at the lower rated pressure of the pipe or fitting.
- f - This product is not FM Approved for threaded connections.
- m - FM Approved for use in all steel sprinkler systems composed of uncoated steel pipe.
- n - FM Approved for use in hybrid sprinkler systems composed of uncoated steel and plastic piping.
- p - Manufactured out of ASTM A53 / A53M Grade A or B steel.

Prepared for: THL Tube & Pipe Industries LLC, P.O. Box 49695, Plot No 597-616 (F013), Dubai Investment Park 2, Dubai, United Arab Emirates

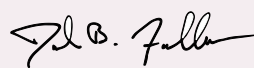
Manufacturing Location: THL Tube & Pipe Industries LLC, P.O. Box 49695, Plot No 597-616 (F013), Dubai Investment Park 2, Dubai, United Arab Emirates

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Quality Policy



THL Pipe is committed to manufacturer of tubular products to various standards and meet customer’s requirements with highest quality, economical cost & timely delivery.

THL is also committed to comply and continually strive to enhance its quality management system by upgradation of technology with dedicated teamwork.

THL Pipe ensures that Quality Policy is communicated, understood, implemented & maintained at all levels.

Quality Objectives

- To improve customer satisfaction levels.
- To maximize yield through continual improvement & resource optimization.
- To monitor and ensure the on time delivery.
- Training and development of employees at all levels.

HSE Policy

Occupational Health, Safety and Environmental (HSE) Policy

The Management of THL gives full backing to this policy and will fully support all persons implementing it. Successful implementation of this policy requires the wholeheartedly commitment of everyone in the Company and acceptance by individual employees of their responsibilities to:

- Ensure that Personnel safety and long term health of our employees and other individuals that may be affected by our activities and the protection of the environment, receives equal priority with our business objectives.
 - Maintain safety standards through safety training, encouraging interest and enthusiasm in safety and by developing personal responsibility for safety rests with the Safety Management of the company and the safety matters are held in equal importance to other business objectives.
 - Ensure that clear communication systems exist for all HSE issues through structured meetings, presentations and publications.
 - Undertake assessments to ensure that the competence of all our employees in performing their respective roles.
 - Take reasonable care for the Occupational Health & Safety of themselves and for other persons who may be affected by their acts or omissions at work.
 - To prevent environmental pollution, incidents and other accidents within the activities of the organization.
 - To co-operate with the Company by adhering to Company & local / international rules and applicable legal requirements
 - safe working practices and all instructions necessary to enable the Company to comply with its duties.
- Encourage all employees to contribute to the improvement of THL safety procedures and continually improve the performance of Occupational Health, Safety and Environmental management system performance.

Quality Plan & Testing Equipment



Incoming Material Control

S.No.	Characteristics / Type of Check	Quantum / Freq of Check	Test Procedures / Checks For
1	Visual Inspection	100%	Surface defects, Damaged Edges
2	Dimensional Inspection	100%	Measuring Tape, Micrometer & Digital Thickness Gauge
3	Mechanical Properties	Sample Testing for Verification	Universal Testing Machine (60 Ton)
4	Chemical Composition	Sample Testing for Verification	Spectro

Process Quality Control

Slitting Line

S.No.	Characteristics / Type of Check	Quantum / Freq of Check	Test Procedures / Checks For
1	Visual Inspection	100%	Tool/ Roll marks, Lamination, Burrs, Dents Etc.
2	Dimensional Inspection, Inspection 100% (Width and Thickness)	Hourly	Vernier, Micrometer, Measuring Tap & Digital Thickness Gauge

Tube Welding

S.No.	Characteristics / Type of Check	Quantum / Freq of Check	Test Procedures / Checks For
1	Visual Inspection	100%	Tool/ Roll marks, Over Lap, Weld Beads, Straightness
2	Dimensional Inspection (Outside Diameter, Thickness, Length)	Hourly	Vernier, Micrometer, Measuring Tap
3	Metrological Tests (Squareness of the Pipe Ends, Corner Radius)	Hourly	Filler/ Radius Gauge
4	Mechanical Properties	One Sample/ Heat/ Lot	UTM (60 Ton)
5	Chemical Properties	Two Sample/ Heat/ Lot	Spectrometer
6	Technological Tests (Flattening/ Drift Expansion Test)	Hourly	UTM (60 Ton)
7	NDT (Eddy Current)/ Hydro Test	100%	Leak Tightness as per relevant Std. Hydrostatic Pressure shall be applied as per relevant Std.

Painting

S.No.	Characteristics / Type of Check	Quantum / Freq of Check	Test Procedures / Checks For
1	Visual Inspection	100%	Bare Spot, Rough Surface
2	Paint Thickness	Hourly	With Elco Meter (Thickness in Micron)

Final Inspection

S.No.	Characteristics / Type of Check	Quantum / Freq of Check	Test Procedures / Checks For
1	Visual	100%	All Defects of Process Control, Marking, Quantity
2	Dimensional	At Random	Measuring Instruments

List of Inspection, Measuring & Test Equipment

FOR CHEMICAL TESTING

Spectro

FOR MECHANICAL TESTING

Universal Testing Machine

Hardness Tester, Micro Scope

Impact Testing Machine

FOR SAMPLE PREPARATION

Polishing Machine, Notch Broaching machine

FOR METROLOGICAL TESTING

Slip, Thickness Gauges, Radius Gauges

Bevel Protector, Profile projector

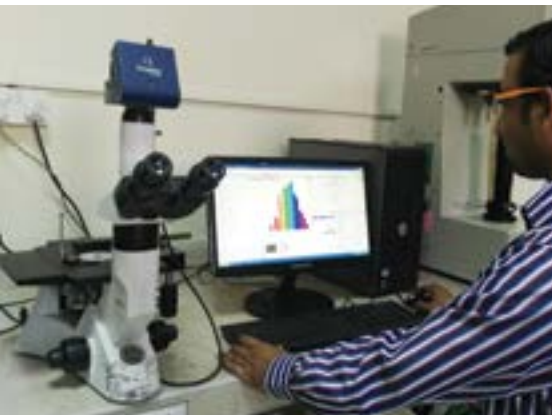
FOR DIMENSIONS

Vernier Calipers, Micrometers, Steel Tapes

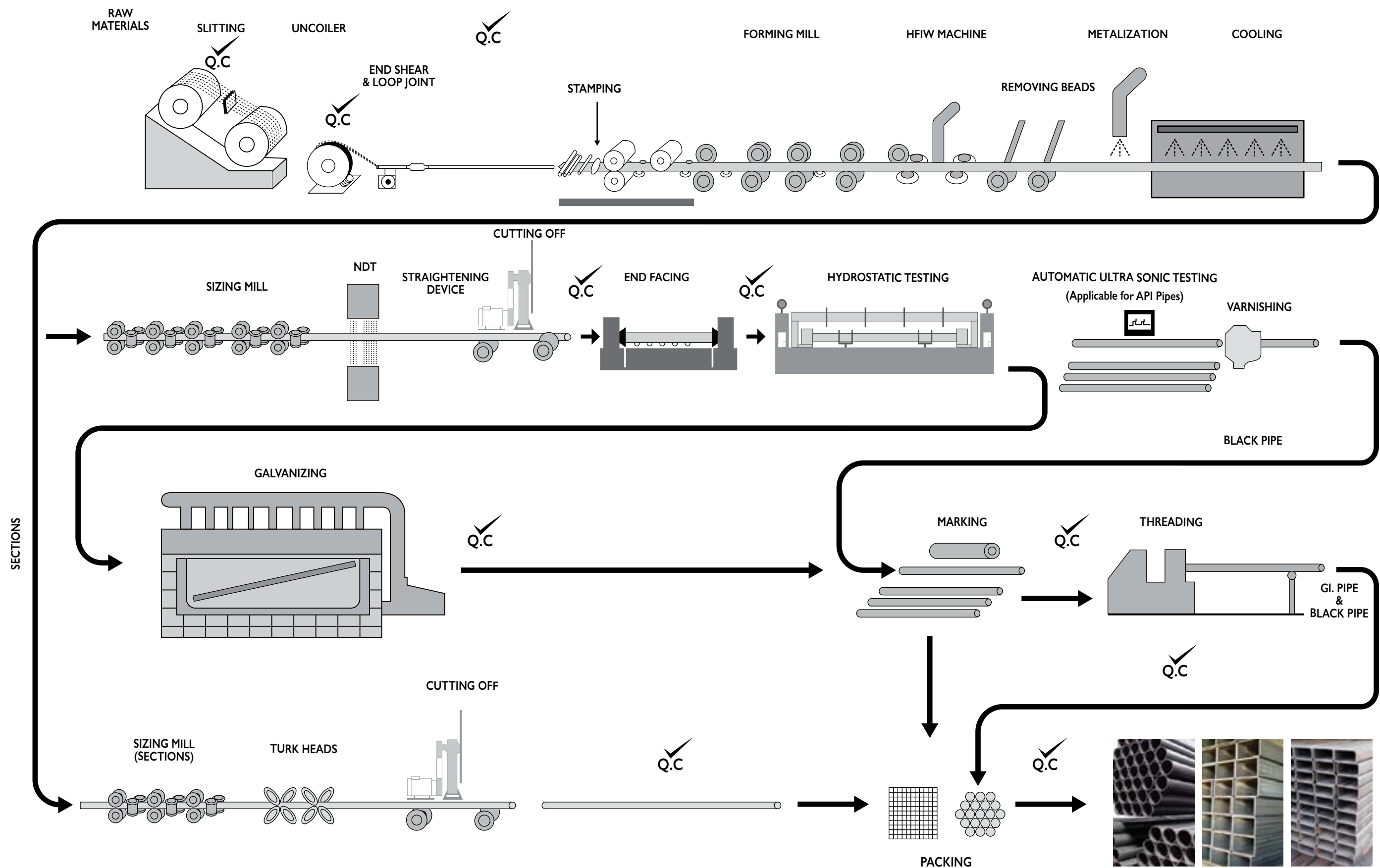
FOR LEAK TIGHTNESS TEST

On line NDT Machines (Eddy Current)

Hydro Static Pressure Testing Machines



Process Flow Chart



Manufacturing Procedure For Pipes / Tubes

Hot Rolled Coils

: HR Coils for production of pipes will be procured from SABIC/ JSW/ TATA or any other approved vender.
The steel shall be of fully killed, with grain size ASTM 7 or finer as per ASTM E 112.
Mechanical properties of HR Coil material shall confirm to TDC of raw material / applicable standard.

Forming of Pipe

: Slit is passed through horizontal and vertical forming rolls to receive a defined diameter open edge round pipe suitable for welding.

At the final stage of forming, rolls are provided with guide fins to have a proper proportionate gap & correct entry in welding roll.

Welding

: The performed shape of pipe is finally passed through welding heads 'V' edges controlled by the seam guide. The welding process is ERW with high frequency induction welder.

The fusion takes place through five roll assembly set at the Mill which ensures proper welding.

Bead scarfing shall be done as per applicable standard & Client specification.

Welding parameters, like-current, voltage, welding speed and heat treatment temperature shall be monitored.

The welding temperature shall be adequate to form weld. By controlling various controlling parameters, desired welding quality is achieved.

Seam Normalising

: Seam normalising is carried out on weld and HAZ after the welding. The normalising equipment is based on medium frequency. Seam normalising temperature is monitored by the non contact temperature indicator.

Sizing

: The water cooled pipe is passed through a set of sizing roll which controls the ovality and required dimensions stipulated in respective specification. This is finally verified by measuring gauge.

Cutting of Pipes

: The pipes are cut to length by cut of carriage (COC) as per client requirement.

End chamfering

Square cut : Cut cleanly and nominally square with the axis of the pipe and free from burrs.

Bevelling : Each pipe is transferred to end preparation stand where both ends of the pipe are bevelled at an angle 30,-0/+5 degree with root face 0.063" ± 0.031" (1.60mm, ±0.80mm).

Hydrostatic Testing

: Pipes are taken from mill as per plan. Clean the internal dia of pipe properly to avoid any chips and ID bead. The requirements (test pressure & holding time) are verified as per applicable standards. Pipes are checked for any leakage during testing.

Final Inspection

: Dimension of pipe shall be measured by calibrated gauges and acceptance as per the applicable standard.

Marking/ Labelling

: The relevant marking stipulated in applicable standard / specification shall be Paint / Inkjet stencilled on each length of the pipe.

Additionally, the pipes shall be bundled as per Client requirement and each bundle tagged with permanent & legible label at both end.

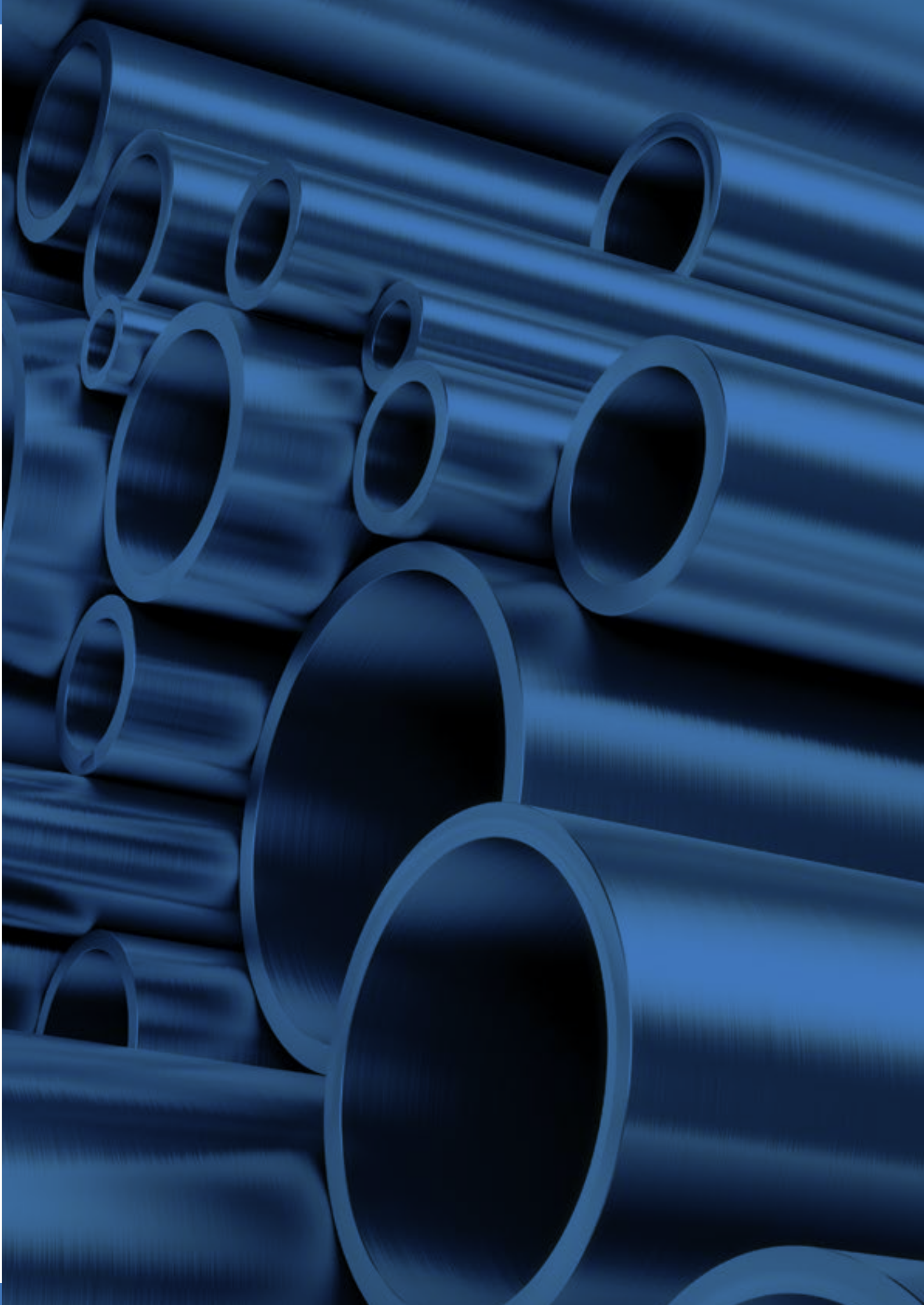
Storage, Packing and Handling

: Sufficient care should be exercised while storing, packing and handling of products. While storing and transporting them, adequate ventilation should be provided. It is necessary to store galvanized pipes with space in between them.

Testing

: Materials testing like Flattening Test, Tensile Test, Impact Test, Metallographic Test & Chemical analysis are carried out as per work instruction / applicable standard. Result of the same is recorded.

Location Map





تي اتش ال لصناعات الانابيب والمواسير ش. ذ. م. م.
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