Pacific Pipe

World Class QUALITY

บริษัท แปซิฟิกไพพ์ จำกัด (มหาชน)

PACIFIC PIPE PUBLIC COMPANY LIMITED

Product Catalog
Version A0111

World Class QUALITY

PACIFIC PIPE PUBLIC COMPANY LIMITED

Pacific Pipe

provides the supreme product quality that suits your need.

High quality: With modern technologies, our products are certified by many internation standards : ISO 9001: 2008, UL, TIS, JIS, etc.

Preference: We offer a premium variety of products that will suit your needs such as ASTM, AS, BS, DIN, EN, JIS, TIS.

Cost effectiveness: With its durable and long-lasting steel, the maintenance cost is minimized.

Decorating: With the advanced designs, our products will support your outstanding architectural designs

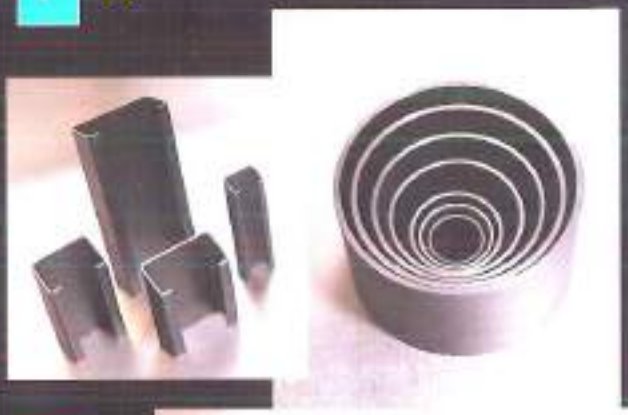
Made-to-order: We can customize the products based on your individual needs.

Fast delivery service: Many distribution networks are available across the country.

Some example of our products applications:

- Construction projects
- City & Industrial water system projec
- Fire protection system projects
- Irrigation projects
- Agriculture projects
- Interior design projects

Contents



PACIFIC PIPE PUBLIC COMPANY LIMITED

is one of the leading steel pipe manufacturers in Thailand with customers in more than 10 countries and employees of more than 500s throughout the country. We offers steel pipes, such as round black steel pipes, round galvanized steel pipes, square pipes and rectangular pipes, of various international standards with expertise and experience for over 35 years.

World Class QUALITY

บริษัท แปซิฟิกไพพ์ จำกัด (มหาชน)
PACIFIC PIPE PUBLIC COMPANY LIMITED

BUSINESS GOAL

"We aims to secure the leading position in the domestic market through our high product quality, vast product variety and superior delivery."

PLANTS AND DISTRIBUTION CENTERS

www.pacificpipe.co.th
email : info@pacificpipe.co.th

PACIFIC PIPE PUBLIC COMPANY LIMITED

PRAPRADAENG OFFICE & PLANT

Details: Head Office, Production Department, Accounting and Financial Department
Address: 298, 298/2 Suksawad Road,
Amphur Prasamutjedee, Samutprakarn, Thailand 10290.
Telephone No: [662] 816-2701, 816-2211, 816-2199
Fax No: [662] 463-9277, 816-2210

MAHACHAI PLANT

Details: Production Department
Address: 17/12 Samutsakorn Industrial Estate, Moo 2, Rama II Road,
Tambon Tasi, Amphur Muang, Samutsakorn, Thailand 74000
Telephone No: [66 34] 490-139-41
Fax No: [66 34] 490-090

LUMPINI OFFICE

Details: Marketing and Sales Department
Address: 1168/74 24th Flr. Lumpini Tower, Rama IV Road
Sathorn, Bangkok Thailand 10120
Telephone No: [662] 679-9000
Fax No: [662] 679-9075, 679-9201-4

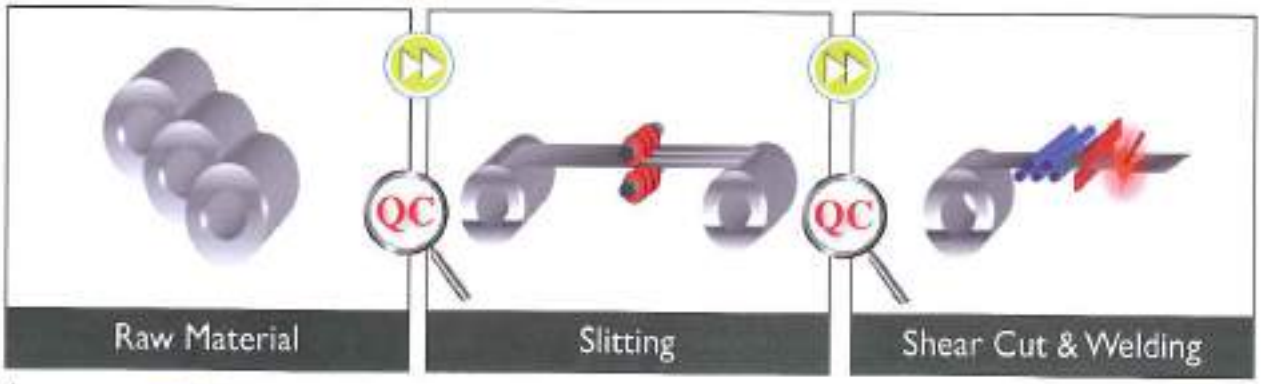
BANG-NA DISTRIBUTION CENTER

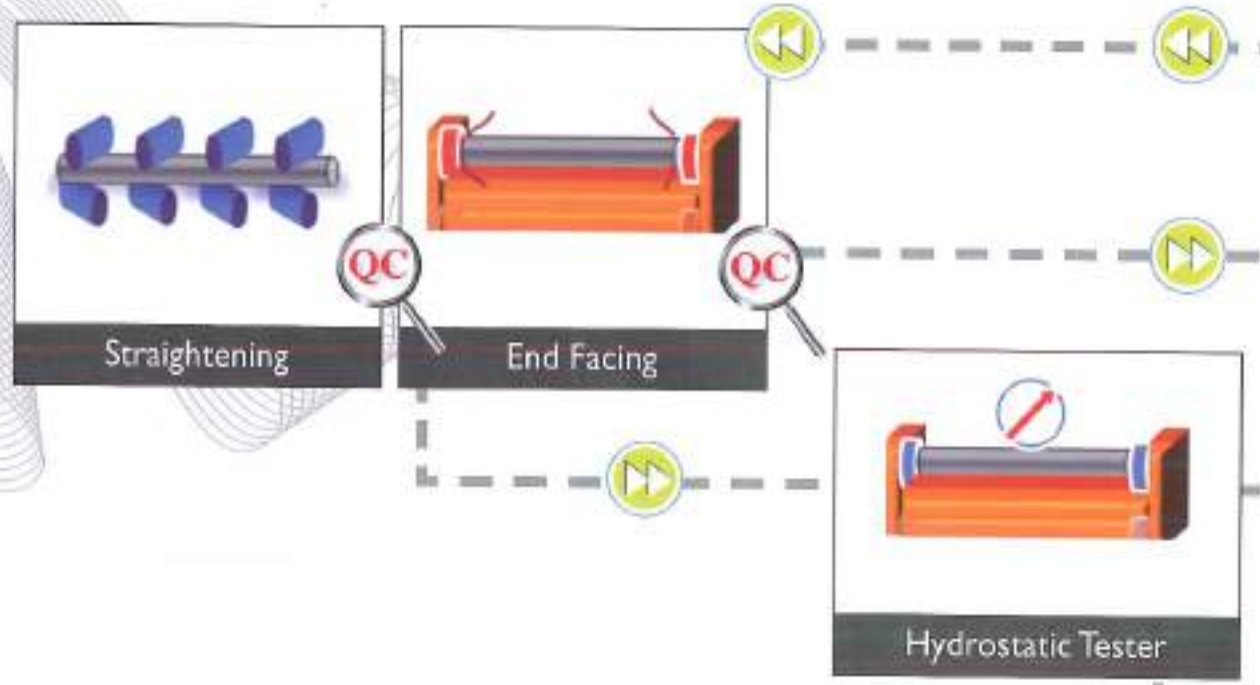
Details: Distribution Center
Address: 158 Moo 6 Soi Ratthanakosin 200 Years, Tambon Bangkaew
Amphur Bangkaew Samutprakarn Thailand 10560
Telephone No: [662] 705-5461-9
Fax No: [662] 705-5460

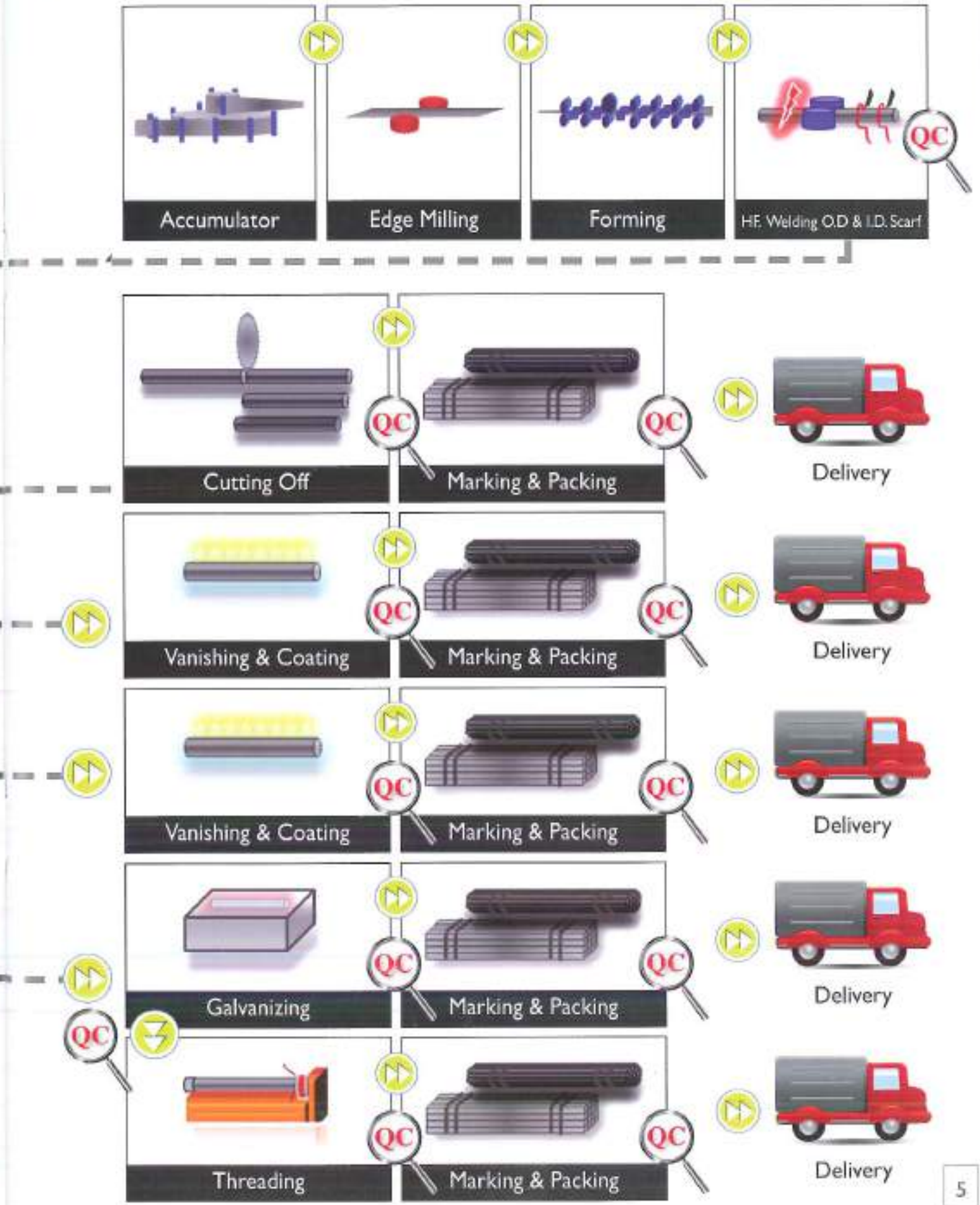
LAD LUM KAEW DISTRIBUTION CENTER

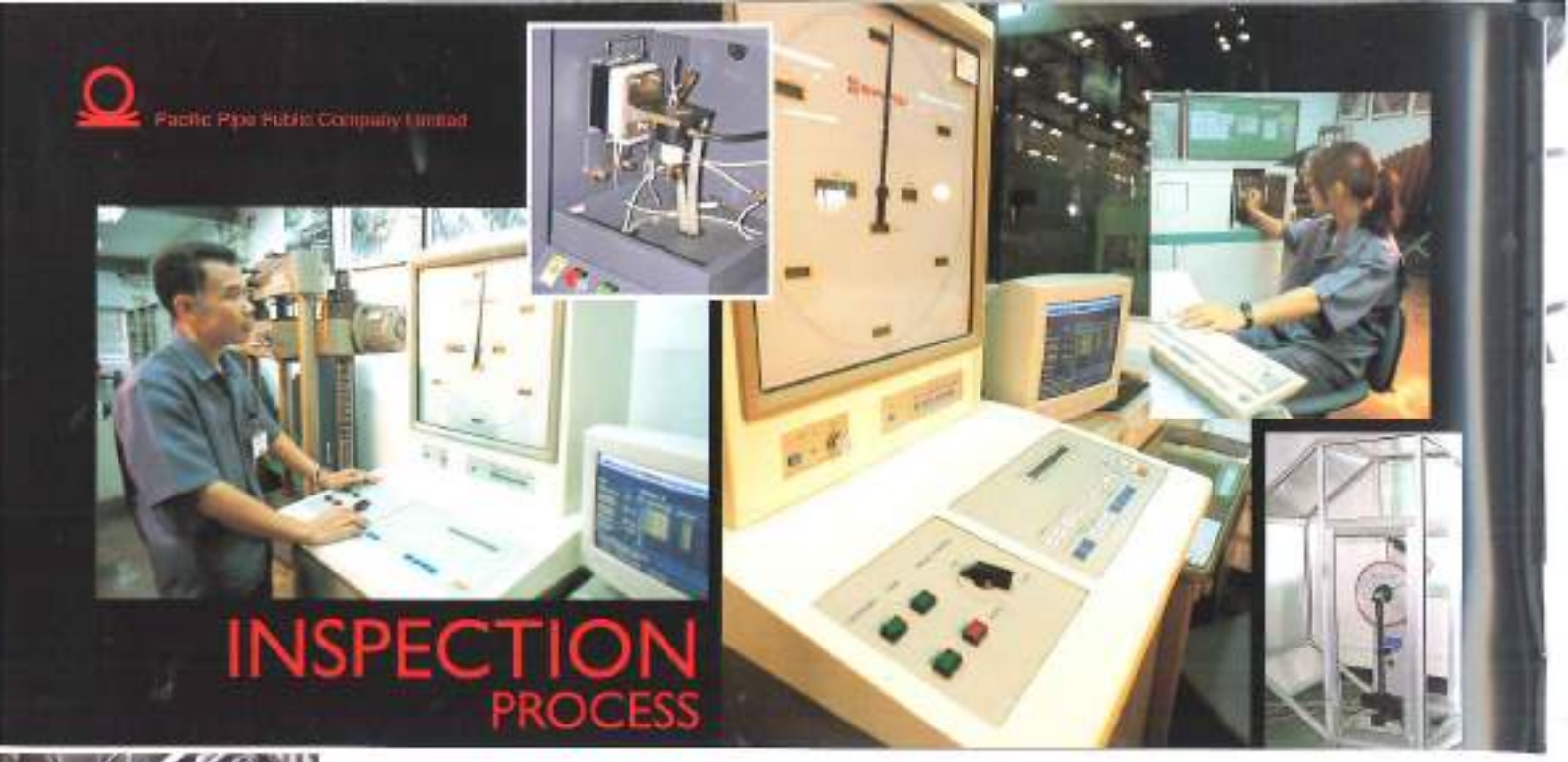
Details: Distribution Center
Address: 50/6 Moo 2 Tambon Namai, Amphur Lad Lum Kaew,
Pathumthani Thailand 12140
Telephone No: [662] 977-6137-8, 977-6165-7
Fax No: [662] 977-6139

PRODUCTION PROCESS






Accumulator
Edge Milling
Forming
HF. Welding O.D & I.D. Scarf
QC
Cutting Off
Marking & Packing
Delivery
Vanishing & Coating
Marking & Packing
Delivery
Vanishing & Coating
Marking & Packing
Delivery
Galvanizing
Marking & Packing
Delivery
Threading
Marking & Packing
Delivery



INSPECTION PROCESS

Our steel pipes are manufactured by the process of Electric Resistance Welded production system (ERW) and are inspected thoroughly the entire production process. The inspection is strictly controlled by our proficient technicians and skillful workers in order to assure that all products meet the expected quality standard and are worth customer's confidence.

1. Raw Material Inspection
   - 1.1 Chemical composition test on hot roll coils by SPECTROMETER
   - 1.2 Mechanical properties test
     - 1.2.1 Tensile test on strain of steels
     - 1.2.2 Strain-rate test of the amount of energy absorbed by a material during fracture called IMPACT TEST

2. General Inspection of Pipes
   - 2.1 Straightening inspection of pipes
   - 2.2 Surface inspection

3. Size Inspection
   - 3.1 Inspecting on pipe diameter
   - 3.2 Inspecting on pipe length
   - 3.3 Inspecting on wall thickness
   - 3.4 Inspecting on weight

4. Welding inspection by EDDY CURRENT FLAW DETECTOR

5. Pressure test by HYDROSTATIC PRESSURE TEST

6. Mechanical Property Testing
   - 6.1 Bending test
   - 6.2 Flattening test
   - 6.3 Expansion test

7. Zinc thickness and smoothness zinc coat testing

8. Threaded end inspection by THREADED RING GAUGE

QUALITY ASSURANCE

"We realize that quality control is the heart of production. Not only using modern technology, but we also examining our product in every production step by our experienced engineers. Our products now meet high quality standards and are certified by both domestic and international organizations."

Moreover, at present, Pacific Pipe is the first and sole steel pipe manufacturer, who obtain "TIS" certification for all standards from the Ministry of Industry and JIS mark scheme certificate of compliance from Japan Quality Assurance Organization. This enables us to stand firmly in the leading position of standard grade steel pipe market in Thailand.

Thai Industrial Standard Certification (TIS)
from the Thai Industrial Standard Institute of the Ministry of Industry

TIS 310 – Steel pipe for bicycle
TIS 107 – Hollow structural steel sections
TIS 276 – Steel pipe
TIS 277 – Galvanized steel pipe
TIS 427 – Electrically welded steel water pipe

Thai Industrial Standard Certification Compulsory Standard
(TIS Compulsory Standard)

TIS 1228 – Cold formed structural steel sections

Japanese Industrial Standard Certification (JIS)
From Japan Quality Assurance Organization

JIS G3444 – Carbon Steel Pipe for General Structural Proposes
JIS G3466 – Carbon Steel Square and Rectangular Pipe for Genera Structural Purpose
JIS G3452 – Carbon Steel Pipe for Ordinary Piping

ISO 9002 : 1994
"from an institution of the TÜV CERT Certification Body of Rheinsch – Westfalischer TÜV e.V. The Federal Republic of Germany"

ISO 9001 : 2008
"from an institution of the TÜV NORD CERT GmbH, The Federal Republic of Germany
At present, the Company is the first steel pipes manufacturer who awarded ISO 9001 : 2008 which be able to guarantee our quality to customer satisfaction and the Company's sustainable growth."

Productivity Standard : **METALLIC SPRINKLER PIPE**
from an Institution of Underwriters Laboratories Inc R, USA. in 2007

Awarded from The Customs Department of Thailand as **"An official GOLD CARD company"** on June 17, 2004

ISO 9001 : 2008 File Ex 15190

JIS Mark Scheme Certificate of Compliance from JQA

JIS G344 JIS G3466 JIS G3452

Our Pride and dignity Pacific Pipe get a standard guarantee by JIS Mark Scheme Certificate of Compliance from JQA

JQA (Japan Quality Assurance Organization) is a Japanese non-profit organization which has a main responsibility to issue a guarantee document for the products which are in line with the Japanese Industrial Standards (JIS) condition. The guaranteed product will be allowed to put the symbol (JIS) or JIS Mark upon it then the customers will acknowledge that this product can be used correctly and safely with reference to the Japanese industrial standard.

Pacific Pipe is the first steel manufacturer of Thaland who get the Japanese standard guarantee, JIS Mark Scheme Certificate of Compliance. Pacific Pipe aims for increasing a choice of high quality steel pipe for customers, both of steel pipe for general structural purposes and ordinary piping.


JQA

JIS Mark Scheme

Certificate of Compliance

STEEL PRODUCTS

Refer to Attached APPENDIX

Date of this Certificate Approved : March 22, 2011

Date of Expiry : March 21, 2016

OSAMU SOEJIMA
President
JAPAN QUALITY ASSURANCE ORGANIZATION

Certification No : JQTH10002
Date of issue : March 22, 2011

- JIS G3444 Carbon Steel Pipe for General Structural Purposes
- JIS G3466 Carbon Steel Square and Rectangular Pipe for General Structural Purposes
- JIS G3452 Carbon Steel Pipe for Ordinary Piping

Our products are certified by many international standards

ASTM	American Society of Testing and Materials
AS	Australian Standards
BS	British Standards
DIN	Deutsches Institut für Normung e.V.
EN	European Standards
JIS	Japanese Industrial Standards
TIS	Thai Industrial Standards

STANDARD SPECIFICATION

CARBON STEEL TUBES FOR GENERAL STRUCTURAL PURPOSES

Classification	Application	Standard Specification		Round Pipes		Rectangular Pipes	Square Pipes
				Black	Galvanized		
Carbon Steel Tubes for General Structural Purposes	Carbon Steel Tubes Civil Engineering, Architecture, Piles, Scaffolding and Other Structures etc.	ASTM A500	Grade A, B, C, D	✓		✓	✓
		AS 1163	C 250, C 350, C 450	✓		✓	✓
		BS 1139		✓	✓		
		EN 10219	235, 275 JOH, 355 J2H	✓		✓	✓
		JIS G 3444	STK 290, STK 400, STK 490, STK 500	✓			
		JIS G 3466	STKR 400, STKR 490			✓	✓
		TIS 107	HS 41, HS 50, HS 51	✓		✓	✓

CARBON STEEL TUBES FOR ORDINARY USES

Classification	Application	Standard Specifications		Round Pipes	
				Black	Galvanized
Carbon Steel Tubes for Ordinary Uses and Plumbing System	City & Industrial water/irrigation, Agriculture and Fire Protection System etc.	ASTM A53	Grade A, B	✓	✓
		EN 10255 (transition from BS 1387)	HEAVY	✓	✓
			MEDIUM	✓	✓
			L1, and L2	✓	✓
		JIS G 3452	SGP	✓	✓
		JIS G 3454	STPG 370, STPG 410	✓	
		TIS 276	TYPE 1, 2, 3, 4	✓	
		TIS 277			✓
		TIS 427	Class II, III, IV	✓	✓

HOT ROLLED STRUCTURE STEEL SECTION

Classification	Application	Standard Specification		Lip Channel Steel
Hot Rolled Structure Steel Section	Roof Framing and Other Structures etc.	TIS 1228	SSC 400	✓

PRODUCT LISTS

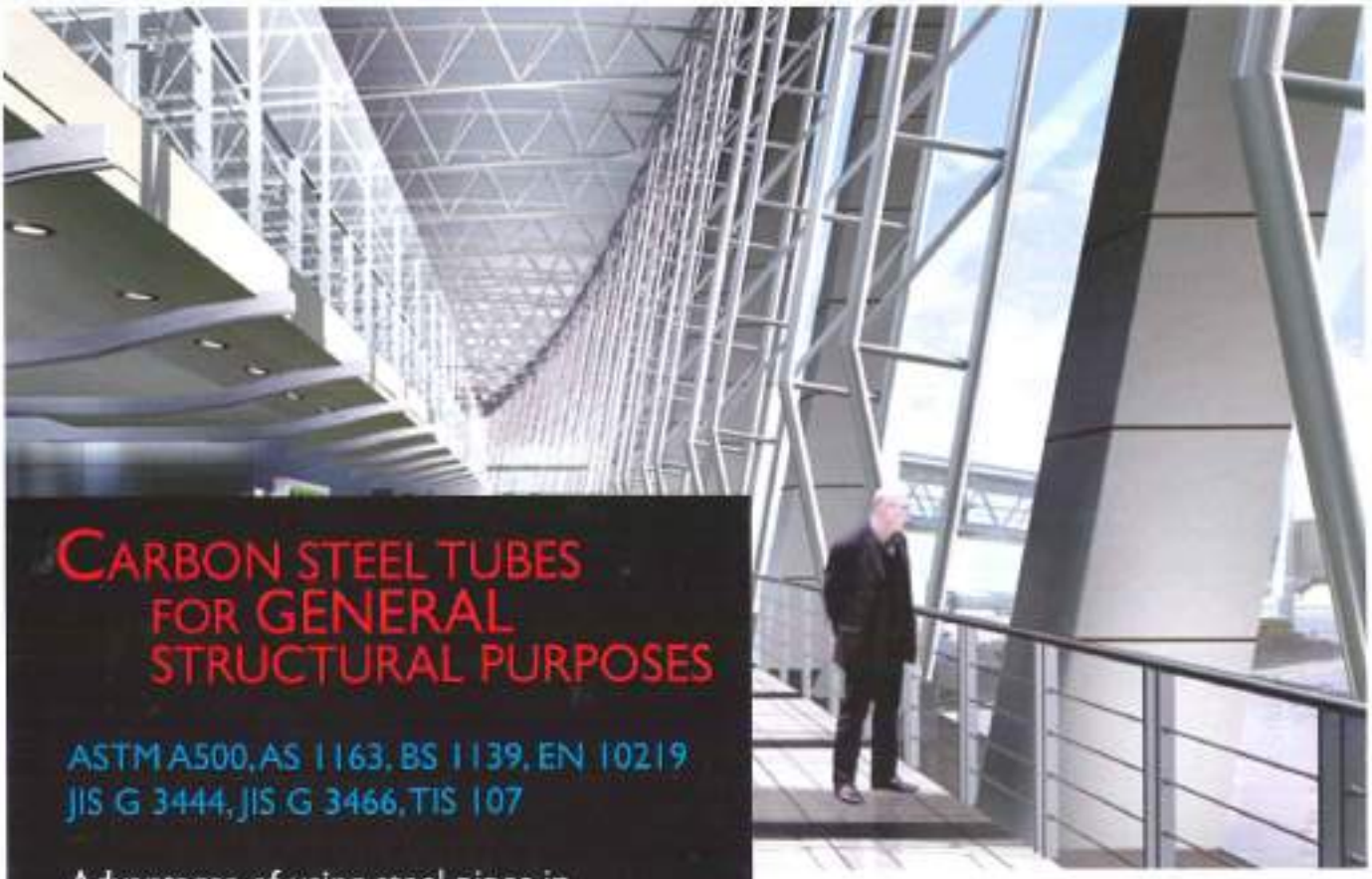
ERW TUBES & PIPES		SIZE RANGE	PRODUCTION OPTIONS
	Round Pipes ASTM A53 ASTM A500 AS 1163 EN 10255 (BS 1387) EN 10219 JIS G 3444 JIS G 3452 JIS G 3454 TIS 107 TIS 276 & 277 TIS 310 TIS 427	1/2 inch (DN 15 mm) - 16 inches (DN 400 mm)	Length - Standard Length 6 meters - Cut-To-Length is available upon request Thickness - 1.2 mm - 12.7 mm Surface Finished Options - Color Coating is available upon request - Galvanized Coating - Vanish Coating End Finished Options - Bevelled End - Plain End - Threaded End Standard Packing - Bundle is in Hexagonal Shape for Round Pipes - Bundle is in Hollow Shape for Hollow Pipes
	Rectangular Pipes ASTM A500 AS 1163 EN 10219 JIS G 3466 TIS 107	38 x 19 mm - 400 x 200 mm	
	Square Pipes ASTM A500 AS 1163 EN 10219 JIS G 3466 TIS 107	12 x 12 mm - 300 x 300 mm	

HOT ROLLED STRUCTURE STEEL SECTION		SIZE RANGE	PRODUCTION OPTIONS
	Lip Channel Steel TIS 1228	60 x 30 x 10 mm - 200 x 75 x 25 mm	Length - Standard Length 6 meters - Cut-To-Length is available upon request Thickness - 1.6 mm - 4.5 mm Surface Finished Options - Color Coating is available upon request - Vanish Coating

SPECIAL SIZE PIPES

ERW Pipe	Size	THICKNESS (MM)											
		3.20	4.00	4.50	5.00	6.00	6.30	7.00	8.00	9.00	10.00	12.00	12.70
Round Pipe	7"		E		E, U, H	E	E	U	E		E	E	E
	8"	V	E	I, U, V	E, N	E, I, U, V	E, A, N, T	A, I	E, A, I, U, N, T, B		E, A	E	E, A, B
	10"			V	E	E, I, H, V	E, A, N	I	E, A, I	A, I, N, B	E	E	E, A, B
	12"			V	E	E, I, V	E, H, N		E, I	I	E, I, A	E	E, N
	14"			V	E	E, I, V	E, A, N		E	A, I	E, A	E, I	E, I, N
	16"			V		E, V	E, V		E	I	E	E, I	E, I
Square Pipe	80x80	J		J									
	90x90	J, U	U, E	U, B	E	E, B	E		E				
	100x100	J, U, N	J, U, N, E	J, U, B	N, E	J, N, E, B	E		E	J, N	E	J, E	E
	120x120		E		E	E	E		E		E	E	E
	125x125	J		J, N, B	J, N	J, N, B				J, N		J	
	150x150		E	J, U, B	J, N, E	J, U, N, E, B	E		E	J, N, B	E	E	E
	200x200		E	J	N, E	J, U, N, E, B	E		J, U, E	J, U, N, B	E	J, E	E
	250x250				J, E	J, U, N, E, B	E		J, U, E	J, U, N, B	E	J, E	E, B
	300x300			J		J, U, E	E		E	J, U	E	J, U, E	E
Rectangular Pipe	100x75					B							
	120x80		E		E	E	E		E				
	125x50	U	U	U									
	125x75	J, U, N	J, U, N	J, U, B	N	J, B				B			
	150x50		N		N								
	150x75	J		B		B				B			
	150x80			J	J, U	J, U							
	150x100	J	N, E	J, U, B	N, E	J, U, N, E, B	E		E	J, B	E	E	E
	160x80		E		E	E	E		E		E	E	E
	200x100		N, E	J, U, B	N, E	J, U, N, E, B	E		E	J, N, B	E	E	E
	200x150			J, B		J, B				J, B			B
	250x150				J, N, E	J, N, E, B	E		E	J, N, B	E	J, E	E, B
	300x150					E	E		E		E	E	E
	300x200					J, E	E		E	J	E	J, E	E
	350x150					J				J		J	
	350x250					E	E		E		E	E	E
	400x200					J			E	J		J	E

A = ASTM A53 B = ASTM A500 C = EN 10255 (BS 1387) E = EN 10219 H = JIS G 3452
I = JIS G 3444 J = JIS G 3466 N = AS 1163 T = TIS 276,277 U = TIS 107 V = TIS 427



CARBON STEEL TUBES FOR GENERAL STRUCTURAL PURPOSES

ASTM A500, AS 1163, BS 1139, EN 10219 JIS G 3444, JIS G 3466, TIS 107

Advantages of using steel pipes in construction projects

A demand of using steel pipes in construction projects has significantly increased in today businesses. This is because of the following reasons:

- Strong and endurance materials
- Good presentation and adaptable into many forms
- Fasten a construction process
- Lower construction and maintenance cost
- Space efficiency as pipe is able to bear buckling and torsion better than other profiles
- Recyclable and sustainable

ISO 9001 : 2008 VALUE ADDED for CUSTOMERS

- Focus on develop competancy of Human Resources
- Focus on effectiveness of Training system results
- Increase the efficiency and reliablity of IT system
- Emphasize on Quality Management and Continuous Improvement
- Ensure our products satisfy customers' needs

CERTIFICATE TÜV NORD

Management System as per
ISO 9001 : 2008

Pacific Pipe Public Company Limited
Manufacturing of Steel Pipes and Galvanized Steel Pipes

Pacific Pipe is the first steel manufacturing company that listed in the Thailand top twenty companies who are certified ISO 9001:2008

ASTM A500

Carbon Steel Pipe for Structural Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)						MECHANICAL PROPERTIES					
	C Max	Si Max	Mn Max	P Max	S Max	Cu Max	Yield Strength		Tensile Strength		Elongation min	
							Round MPa	Shaped MPa	Round MPa	Shaped MPa	Round 2in (50.8 mm)	Shaped 2in (50.8 mm)
Grade A	0.300	-	1.400	0.045	0.045	0.18	230	270	310	310	25	25
Grade B	0.300	-	1.400	0.045	0.045	0.18	290	315	400	400	23	23
Grade C	0.270	-	1.400	0.045	0.045	0.18	315	345	425	425	21	21
Grade D	0.300	-	1.400	0.045	0.045	0.18	250	250	400	400	23	23

Nominal Size		Outside Diameter	Thickness	Weight (plain end)	Cross-sectional area	Geometrical moment of inertia	Modulus of section	Radius of gyration of area
mm	in	mm	mm	kg/m	(cm²)	(cm⁴)	(cm³)	(cm)
15	1/2"	21.30	2.77	1.27	1.613	0.708	0.665	0.662
20	3/4"	26.70	2.87	1.69	2.149	1.548	1.159	0.849
25	1"	33.4	2.64	2.00	2.552	3.041	1.821	1.092
			3.38	2.50	3.189	3.638	2.178	1.068
			4.55	3.24	4.126	4.399	2.634	1.033
32	1 1/4"	42.20	2.79	2.71	3.456	6.743	3.196	1.397
			3.56	3.39	4.323	8.137	3.856	1.372
			4.85	4.47	5.693	10.095	4.784	1.332
40	1 1/2"	48.30	2.90	3.25	4.138	10.705	4.433	1.608
			3.68	4.05	5.161	12.930	5.354	1.583
50	2"	60.30	3.07	4.33	5.522	22.672	7.520	2.026
			3.91	5.44	6.930	27.676	9.179	1.998
			5.54	7.48	9.534	36.104	11.975	1.946
65	2 1/2"	73.00	3.96	6.74	8.593	51.364	14.072	2.445
			4.78	8.04	10.249	59.913	16.415	2.418
			5.16	8.63	11.002	63.657	17.440	2.405
			7.01	11.41	14.539	80.031	21.926	2.346
80	3"	88.90	3.96	8.29	10.571	95.545	21.495	3.006
			4.78	9.92	12.637	112.140	25.228	2.979
			5.49	11.29	14.392	125.701	28.279	2.955
90	3 1/2"	101.60	3.96	9.53	12.152	145.053	28.554	3.455
			4.78	11.41	14.545	170.850	33.632	3.427
			5.74	13.57	17.293	199.349	39.242	3.395
100	4"	114.30	3.96	10.78	13.733	209.261	36.616	3.904
			4.78	12.91	16.453	247.155	43.247	3.876
			5.56	14.91	19.002	281.586	49.271	3.850
			6.02	16.07	20.487	301.173	52.699	3.834
125	5"	141.30	6.55	21.77	27.739	631.084	89.325	4.770
			9.53	30.97	39.467	861.079	121.880	4.671
150	6"	168.30	7.11	28.26	36.019	1172.095	139.286	5.704
			10.97	42.56	54.243	1686.484	200.414	5.576
200	8"	219.10	8.18	42.55	54.225	3019.910	275.665	7.463
			12.70	64.64	82.383	4403.608	401.972	7.311
250	10"	273.00	9.27	60.31	76.836	6688.508	490.001	9.330
			12.70	81.55	103.897	8820.505	646.191	9.214
300	12"	323.80	9.53	73.88	94.128	11631.494	718.437	11.116
			12.70	97.46	124.173	15047.403	929.426	11.008
350	14"	355.60	9.53	81.33	103.653	15529.184	873.407	12.240
			12.70	107.39	136.866	20143.557	1132.933	12.132
400	16"	406.40	9.53	93.27	118.868	23416.540	1152.389	14.036
			12.70	123.30	157.100	30478.000	1500.000	13.900

Dimension Tolerances
Outside Diameter : NPS ≤ 1 ½" ± 0.5% OD Not less than 0.13 mm.
NPS ≥ 2" ± 0.75% OD
Thickness : ±10%

ASTM A500

Square Hollow Section for Structural Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)						MECHANICAL PROPERTIES					
	C Max	Si Max	Mn Max	P Max	S Max	Cu Max	Yield Strength		Tensile Strength		Elongation min	
							Round MPa	Shaped MPa	Round MPa	Shaped MPa	Round 2in (50.8 mm)	Shaped 2in (50.8 mm)
Grade A	0.300	-	1.400	0.045	0.045	0.18	230	270	310	310	25	25
Grade B	0.300	-	1.400	0.045	0.045	0.18	290	315	400	400	23	23
Grade C	0.270	-	1.400	0.045	0.045	0.18	315	345	425	425	21	21
Grade D	0.300	-	1.400	0.045	0.045	0.18	250	250	400	400	23	23

Nominal Size		Thickness	Weight (plain end)	Cross-sectional area	Geometrical moment of inertia	Modulus of section	Radius of gyration of area
mm	in	mm	kg/m	A (cm²)	Ix, Iy (cm⁴)	Zx, Zy (cm³)	Ix, y (cm)
25.4 x 25.4	1" x 1"	2.41	1.62	2.07	1.75	1.38	0.92
		3.38	2.10	2.68	2.04	1.60	0.87
50.8 x 50.8	2" x 2"	2.79	4.00	5.16	19.41	7.64	1.94
		3.18	4.52	5.80	21.40	8.42	1.92
		3.91	5.44	6.94	24.67	9.71	1.89
		4.78	6.41	8.21	27.88	10.97	1.84
63.5 x 63.5	2 1/2" x 2 1/2"	3.58	6.43	8.25	48.35	15.23	2.42
		4.78	8.32	10.64	59.36	18.70	2.36
		6.35	10.56	13.13	66.84	21.05	2.26
76.2 x 76.2	3" x 3"	3.96	8.60	11.04	94.20	24.72	2.92
		4.78	10.21	13.07	108.49	28.47	2.88
		6.35	13.09	16.36	126.31	33.15	2.78
89.9 x 89.9	3 1/2" x 3 1/2"	3.96	10.24	13.05	154.44	34.74	3.44
		4.78	12.11	15.50	179.16	40.31	3.40
		6.35	15.62	19.59	213.28	47.98	3.30
		7.92	18.88	23.50	242.68	54.60	3.21
101.6 x 101.6	4" x 4"	4.78	13.85	17.92	275.30	54.19	3.92
		6.35	17.89	22.81	332.96	65.54	3.82
		7.92	21.61	27.53	384.04	75.60	3.74
127.0 x 127.0	5" x 5"	4.78	17.65	22.78	559.65	88.13	4.96
		6.35	22.94	29.26	691.23	108.86	4.86
		7.92	27.93	35.57	811.65	127.82	4.78
152.4 x 152.4	6" x 6"	4.78	21.44	27.64	992.88	130.30	5.99
		6.35	28.00	35.71	1242.75	163.09	5.90
		7.92	34.25	43.62	1475.70	193.66	5.82
		9.52	40.28	51.30	1684.99	221.13	5.73
177.8 x 177.8	7"x7"	4.78	25.07	32.49	1606.30	180.69	7.03
		6.35	32.80	42.17	2029.15	228.25	6.94
		7.92	39.16	51.67	2428.12	273.13	6.86
203.2 x 203.2	8" x 8"	6.35	37.85	48.62	3092.04	304.33	7.97
		7.92	46.49	59.71	3720.81	366.22	7.89
		9.52	54.80	70.65	4309.18	424.13	7.81
		12.70	70.46	89.86	5178.43	509.69	7.59
254.0 x 254.0	10" x 10"	6.35	47.96	61.32	6213.81	489.28	10.05
		7.92	59.13	75.81	7534.67	593.28	9.97
		9.52	69.98	89.99	8796.58	692.64	9.89
		12.70	90.69	115.67	10828.27	852.62	9.68

Dimension Tolerances

Length of side : ≤ 63.5 mm : ±0.51 mm
≤ 88.9 mm : ±0.64 mm
> 88.9 mm-139.7 mm : ±0.76 mm
> 139.7 mm : ±1%

Thickness : ±10%

ASTM A500 Rectangular Hollow Section for Structural Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)						MECHANICAL PROPERTIES					
	C Max	S Max	Mn Max	P Max	S Max	Cu Max	Yield Strength		Tensile Strength		Elongation min	
							Round MPa	Shaped MPa	Round MPa	Shaped MPa	Round 2in (50.8 mm)	Shaped 2in (50.8 mm)
Grade A	0.300	-	1.400	0.045	0.045	0.18	230	270	310	310	25	25
Grade B	0.300	-	1.400	0.045	0.045	0.18	290	315	400	400	23	23
Grade C	0.270	-	1.400	0.045	0.045	0.18	315	345	425	425	21	21
Grade D	0.300	-	1.400	0.045	0.045	0.18	250	250	400	400	23	23

Nominal Size		Thickness	Weight (plain end)	Cross-sectional area	Geometrical moment of inertia		Modulus of section		Radius of gyration of area	
mm	in	mm	kg/m	(cm^2)	(cm^4)		(cm^3)		(cm)	
				A	Ix	Iy	Zx	Zy	ix	iy
76.2 x 50.8	3" x 2"	3.58	6.43	8.25	63.01	33.42	16.54	13.16	2.76	2.01
		4.78	8.32	10.64	77.48	40.78	20.33	16.05	2.70	1.96
		6.35	10.56	13.13	86.86	45.72	22.80	18.00	2.57	1.87
101.6 x 50.8	4" x 2"	3.96	8.60	11.04	140.10	47.00	27.58	18.50	3.56	2.06
		4.78	10.21	13.07	161.40	53.68	31.77	21.13	3.51	2.03
		6.35	13.09	16.36	186.41	61.76	36.69	24.31	3.38	1.94
101.6 x 76.2	4" x 3"	3.96	10.24	13.05	188.08	120.47	37.02	31.62	3.80	3.04
		4.78	12.11	15.50	218.35	139.50	42.98	36.61	3.75	3.00
		6.35	16.62	19.59	259.68	165.77	51.12	43.51	3.64	2.91
127.0 x 76.2	5" x 3"	4.78	13.85	17.92	378.20	170.51	59.56	44.75	4.59	3.08
		6.35	17.89	22.81	456.23	205.22	71.85	53.86	4.47	3.00
		7.92	21.61	27.53	525.97	235.17	82.83	61.72	4.37	2.92
		9.52	25.06	31.96	581.13	258.44	91.52	67.83	4.26	2.84
152.4 x 76.2	6" x 3"	4.78	15.74	20.35	595.87	201.52	78.20	52.89	5.41	3.15
		6.35	20.42	26.04	726.36	244.68	95.32	64.22	5.28	3.07
		7.92	24.78	31.55	845.18	282.28	110.92	74.09	5.18	2.99
		9.52	28.85	36.79	943.43	312.56	123.81	82.04	5.06	2.91
152.4 x 101.6	6" x 4"	4.78	17.65	22.78	728.21	389.21	95.57	76.62	5.65	4.13
		6.35	22.94	29.26	898.49	479.51	117.91	94.39	5.54	4.05
		7.92	27.93	35.57	1055.35	561.00	138.50	110.43	5.54	3.97
		9.52	32.65	41.63	1190.62	630.55	156.25	124.12	5.35	3.89
203.2 x 101.6	8" x 4"	4.78	21.44	27.64	1475.06	503.11	145.18	99.04	7.31	4.27
		6.35	28.00	35.71	1841.61	626.05	181.26	123.24	7.18	4.19
		7.92	34.25	43.62	2185.69	737.97	215.13	145.27	7.08	4.11
		9.52	40.28	51.30	2493.58	836.30	245.43	164.63	6.97	4.04
203.2 x 152.4	8" x 6"	4.78	25.07	32.49	1953.15	1257.55	192.24	165.03	7.75	6.22
		6.35	32.80	42.17	2466.83	1587.01	242.80	208.27	7.65	6.13
		7.92	39.16	51.67	2953.25	1896.05	290.67	248.83	7.56	6.06
		9.52	47.21	60.97	3401.38	2179.36	334.78	286.01	7.47	5.98
		12.70	60.34	76.96	4006.04	2568.06	394.30	337.02	7.21	5.78
254.0 x 152.4	10" x 6"	6.35	37.85	48.62	4234.97	1931.27	333.46	253.45	9.33	6.30
		7.92	46.49	59.71	5097.46	2316.40	401.38	303.99	9.24	6.23
		9.52	54.80	70.65	5904.52	2673.74	464.92	350.88	9.14	6.15
		12.70	70.46	89.86	7068.32	3199.35	556.56	419.86	8.87	5.97

Dimension Tolerances

Length of side : ≤ 63.5 mm : ±0.51 mm
> 63.5-88.9 mm : ±0.64 mm
> 88.9 mm-139.7 mm : ±0.76 mm
> 139.7 mm : ±1%

Thickness : ±10%

AS1163

Carbon Steel Pipe for Structural Purposes

GRADES	CHEMICAL COMPOSITION (CAST OR PRODUCT ANALYSIS) % MAX							MECHANICAL PROPERTIES			
	C	Si	Mn	P	S	Al	CE	Yield Strength	Tensile Strength	Circular Hollow Sections	Rectangular Hollow Sections
C250, C250L0	0.120	0.050	0.500	0.030	0.030	0.10	0.250	250	320	22	18
C350, C350L0	0.200	0.045	1.600	0.030	0.030	0.10	0.430	350	430	20	16
C450, C450L0	0.200	0.045	1.700	0.030	0.030	0.10	0.430	450	500	16	14

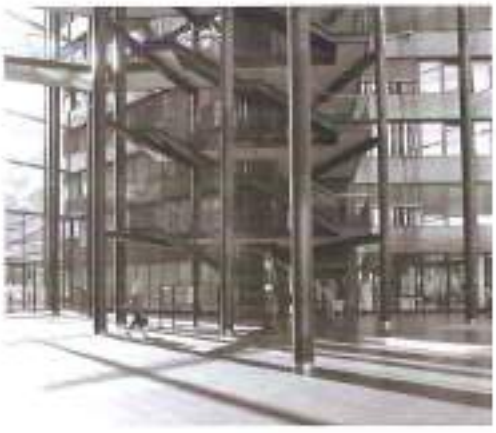
C250

Nominal Dimension		Outside Diameter	Thickness	Mass per unit length	Cross Sectional Area	Geometrical moment of inertia	Modulus of section	Radius of gyration
mm	in	mm	mm	kg/m	mm²	10^4 mm⁴	10^3 mm³	mm
15	1/2"	21.30	2.60	1.20	153	0.037	0.639	6.68
		21.30	3.20	1.43	182	0.008	0.723	6.50
20	3/4"	26.90	2.60	1.56	198	0.015	1.100	8.64
		26.90	3.20	1.87	238	0.017	1.270	8.46
25	1"	33.70	3.20	2.41	307	0.036	2.140	10.80
		33.70	4.00	2.93	373	0.042	2.490	10.60
32	1 1/4"	42.40	3.20	3.09	394	0.076	3.590	13.90
		42.40	4.00	3.79	483	0.090	4.240	13.60
40	1 1/2"	48.30	3.20	3.56	453	0.116	4.800	16.00
		48.30	4.00	4.37	557	0.138	5.700	15.70
		48.30	5.40	5.71	728	0.170	7.040	15.30
50	2"	60.30	3.60	5.03	641	0.259	8.580	20.10
		60.30	4.50	6.19	789	0.309	10.2	19.80
		60.30	5.40	7.31	931	0.354	11.8	19.50
65	2 1/2"	76.10	3.60	6.44	820	0.540	14.21	25.70
		76.10	4.50	7.95	1010	0.651	17.10	25.40
		76.10	5.90	10.20	1300	0.807	21.20	24.90
80	3"	88.90	4.00	8.38	1070	0.963	21.70	30.00
		88.90	5.00	10.30	1320	1.160	26.20	29.70
		88.90	5.90	12.10	1540	1.330	30.00	29.40
90	3 1/2"	101.60	4.00	9.63	1230	1.460	28.80	34.50
		101.60	5.00	11.90	1520	1.770	34.90	34.20
100	4"	114.30	4.50	12.20	1550	2.340	41.00	38.90
		114.30	5.40	14.50	1850	2.750	48.00	38.50
125	5"	139.70	5.00	16.60	2120	4.810	68.80	47.70
		139.70	5.40	17.90	2280	5.140	73.70	47.50
150	6"	165.10	5.00	19.70	2510	8.070	97.70	56.60
		165.10	5.40	21.30	2710	8.650	105.00	56.50

Dimension Tolerances
Outside Diameter : ± 1% with a minimum of ± 0.5 mm and a maximum of ± 10 mm
Thickness : ± 10%
Weight : -4%

C350

Nominal Dimension		Outside Diameter	Thickness	Mass per unit length	Cross Sectional Area	Geometrical moment of inertia	Modulus of section	Radius of gyration
mm	in	mm	mm	kg/m	mm²	10^4 mm⁴	10^3 mm³	mm
15	1/2"	21.30	2.00	0.95	121	0.006	0.536	6.86
20	3/4"	26.90	2.00	1.23	156	0.012	0.907	8.83
		26.90	2.30	1.40	178	0.014	1.01	8.7
25	1"	33.70	2.00	1.56	199	0.025	1.49	11.2
		33.70	2.60	1.99	254	0.031	1.84	11.0
32	1 1/4"	42.40	2.00	1.99	254	0.052	2.45	14.3
		42.40	2.60	2.55	325	0.065	3.05	14.1
40	1 1/2"	48.30	2.30	2.61	332	0.088	3.65	16.3
		48.30	2.90	3.25	414	0.107	4.43	16.1
50	2	60.30	2.30	3.29	419	0.177	5.85	20.5
		60.30	2.90	4.11	523	0.216	7.16	20.3
65	2 1/2"	76.10	2.30	4.19	533	0.363	9.55	26.1
		76.10	3.20	5.75	733	0.488	12.8	25.8
80	3"	88.90	2.60	5.53	705	0.657	14.8	30.5
		88.90	3.20	6.76	862	0.792	17.8	30.3
		88.90	4.80	9.96	1270	1.12	25.3	29.8
		88.90	5.50	11.30	1440	1.26	28.3	29.6
90	3 1/2"	101.60	3.60	6.35	809	0.991	19.5	35.0
		101.60	3.20	7.77	989	1.20	23.6	34.8
100	4"	114.30	3.20	8.77	1120	1.72	30.2	39.3
		114.30	3.60	9.83	1250	1.92	33.6	39.2
		114.30	4.80	13.00	1650	2.48	43.4	38.8
		114.30	6.00	16.00	2040	3.00	52.5	38.3
125	5"	139.70	3.00	10.10	1290	3.01	43.1	48.3
		139.70	3.50	11.80	1500	3.47	49.7	48.2
150	6"	165.10	3.00	12.00	1530	5.02	60.8	57.3
		165.10	3.50	13.90	1780	5.80	70.30	57.1
		168.30	4.80	19.40	2470	8.25	98	57.8
		168.30	6.40	25.60	3260	10.7	127	57.3
		168.30	7.10	28.20	3600	11.7	139	57
200	8"	219.10	4.80	25.40	3230	18.6	169	75.8
		219.10	6.40	33.60	4280	24.2	221	75.2
		219.10	8.20	42.60	5430	30.3	276	74.6
250	10"	273.10	4.80	31.80	4050	36.4	346	94.9
		273.10	6.40	42.10	5360	47.7	349	94.3
		273.10	9.30	60.50	7710	67.1	492	93.3
300	12"	323.90	6.40	50.10	6380	80.5	497	112
		323.90	9.50	73.70	9380	116	717	111
350	14"	355.60	6.40	55.10	7020	107	602	123
		355.60	9.50	81.10	10300	155	871	122
400	16"	406.40	6.40	63.10	8040	161	792	141
		406.40	9.50	93.00	11800	233	1150	140



BS1139
Tubes for Scaffolding

CHEMICAL COMPOSITION OF STEEL BY LADLE ANALYSIS (MAX)						MECHANICAL PROPERTIES (MIN)		
C %	Si %	Mn %	P %	S %	N %	Tensile strength Rm N/mm²	Yield strength ReH N/mm²	Elongation A (on Lo = 5.65 √So)
0.20	0.30	-	0.05	0.05	0.009	340-480	235	24

NOMINAL SIZE (OD)	OUTSIDE DIAMETER		WALL	WEIGHT
	Min	Max	Thickness	
mm	mm	mm	mm	kg/m
48.30	47.80	48.80	4.00	4.37

Dimension Tolerances : -10%, +Not specified
Thickness : L_o = Original gauge length of the tensile test piece.
S_o = Original cross-sectional area of the gauge length.
Weight : Single 4.37 kg/m, +12%, -8%
Bath ±7.5%

EN10219
Cold Formed Welded Structural Hollow Section of Non - Alloy and Fine Grain Steels

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					YIELD STRENGTH (MIN)	TENSILE STRENGTH (MIN)		ELONGATION % (MIN)	IMPACT TEST	MINIMUM AVERAGE ABSORBED ENERGY FOR STANDARD TEST PIECES
	C Max	Si Max	Mn Max	P Max	S Max	N/mm²	N/mm²			Test Temperature °C	
							t <3 mm	3 mm ≤ t ≤ 40 mm			
S235JRH	0.170	-	1.400	0.045	0.045	235	360 - 510	340 - 370	24	20	27
S275JOH	0.200	-	1.500	0.040	0.040	275	430 - 580	410 - 560	20	0	27
S275J2H	0.200	-	1.500	0.035	0.035	275	430 - 580	410 - 560	20	-20	27
S335JOH	0.220	0.550	1.600	0.040	0.040	355	510 - 680	490 - 630	20	0	27
S335J2H	0.220	0.550	1.600	0.035	0.035	355	510 - 680	490 - 630	20	-20	27

EN10219 Cold Formed Welded Structural Hollow Section of Non-Alloy and Fine Grain Steels

Normal Size	Outside diameter	Thickness	Mass / length	Cross Sectional Area	Geometrical moment of inertia	Modulus of section	Radius of gyration
mm	mm	mm	Kg/m	cm²	cm⁴	cm³	cm
1/2"	21.3	2.00	0.95	1.21	0.571	0.536	0.686
		2.50	1.16	1.48	0.664	0.623	0.671
		3.00	1.35	1.72	0.741	0.696	0.656
3/4"	26.9	2.00	1.23	1.56	1.22	0.907	0.883
		2.50	1.50	1.92	1.44	1.07	0.867
		3.00	1.77	2.25	1.63	1.21	0.852
1"	33.7	2.00	1.56	1.99	2.51	1.49	1.12
		2.50	1.92	2.45	3	1.78	1.11
		3.00	2.27	2.89	3.44	2.04	1.09
1 1/4"	42.4	2.00	1.99	2.54	5.19	2.45	1.43
		2.50	2.46	3.13	6.26	2.95	1.41
		3.00	2.91	3.71	7.35	3.42	1.4
		4.00	3.79	4.83	8.99	4.24	1.36
1 1/2"	48.3	2.00	2.28	2.91	7.81	3.23	1.64
		2.50	2.82	3.6	9.46	3.92	1.62
		3.00	3.35	4.27	11	4.55	1.61
		4.00	4.37	5.57	13.8	5.7	1.57
		5.00	5.34	6.8	16.2	6.69	1.54
2"	60.3	2.00	2.88	3.66	15.6	5.17	2.06
		2.50	3.56	4.54	19	6.3	2.05
		3.00	4.24	5.4	22.2	7.37	2.03
		4.00	5.55	7.07	28.2	9.34	2
		5.00	6.82	8.69	33.5	11.1	1.96
2 1/2"	76.1	2.00	3.65	4.66	32	8.4	2.62
		2.50	4.54	5.78	39.2	10.3	2.6
		3.00	5.41	6.89	46.1	12.1	2.59
		4.00	7.11	9.06	59.1	15.5	2.55
		5.00	8.77	11.2	70.9	18.6	2.52
		6.00	10.40	13.2	81.8	21.5	2.49
		6.30	10.80	13.8	84.8	22.3	2.48
3"	88.9	2.00	4.29	5.46	51.6	11.6	3.07
		2.50	5.33	6.79	63.4	14.3	3.06
		3.00	6.36	8.1	74.8	16.8	3.04
		4.00	8.35	10.7	96.3	21.7	3
		5.00	10.30	13.2	116	26.2	2.97
		6.00	12.30	15.6	135	30.4	2.94
		6.30	12.80	16.3	140	31.5	2.93
3 1/2"	101.6	2.00	4.91	6.26	77.6	15.3	3.52
		2.50	6.11	7.78	95.6	18.8	3.50
		3.00	7.29	9.29	113	22.3	3.49
		4.00	9.63	12.3	146	28.8	3.45
		5.00	11.90	15.2	177	34.9	3.42
		6.00	14.10	18	207	40.7	3.39
		6.30	14.80	18.9	215	42.3	3.38
4"	114.3	2.50	6.89	8.78	137	24	3.95
		3.00	8.23	10.5	163	28.4	3.94
		4.00	10.90	13.9	211	36.9	3.90
		5.00	13.50	17.2	257	45	3.87
		6.00	16.00	20.4	300	52.5	3.83
		6.30	16.80	21.4	313	54.7	3.82
		8.00	21.00	26.7	379	66.4	3.77
5"	139.7	3.00	10.10	12.9	301	43.1	4.83
		4.00	13.40	17.1	393	56.2	4.80
		5.00	16.60	21.2	481	68.8	4.77
		6.00	19.80	25.2	564	80.8	4.73
		6.30	20.70	26.4	589	84.3	4.72
		8.00	26.00	33.1	720	103	4.66
		10.00	31.00	40.7	862	123	4.60

Normal Size	Outside diameter	Thickness	Mass / length	Cross Sectional Area	Geometrical moment of inertia	Modulus of section	Radius of gyration
mm	mm	mm	Kg/m	cm²	cm⁴	cm³	cm
6"	168.3	3.00	12.20	15.6	532	63.3	5.85
		4.00	16.20	20.6	697	82.8	5.81
		5.00	20.10	25.7	856	102	5.78
		6.00	24.00	30.6	1009	120	5.74
		6.30	25.20	32.1	1053	125	5.73
		8.00	31.60	40.3	1297	154	5.67
		10.00	39.00	49.7	1564	186	5.61
7"	193.7	4.00	18.70	23.8	1073	111	6.71
		5.00	23.30	29.6	1320	136	6.67
		6.00	27.80	35.4	1560	161	6.64
		6.30	29.10	37.1	1630	168	6.63
		8.00	36.60	46.7	2016	208	6.57
		10.00	45.30	57.7	2442	252	6.50
		12.00	53.80	68.5	2839	293	6.44
		12.50	55.90	71.2	2934	303	6.42
8"	219.1	4.00	21.20	27	1564	143	7.61
		5.00	26.40	33.6	1928	176	7.57
		6.00	31.50	40.2	2282	208	7.54
		6.30	33.10	42.1	2386	218	7.53
		8.00	41.60	53.1	2960	270	7.47
		10.00	51.60	65.7	3598	328	7.40
		12.00	61.30	78.1	4200	383	7.33
		12.50	63.70	81.1	4345	397	7.32
10"	273	5.00	33.00	42.1	3781	277	9.48
		6.00	39.50	50.3	4487	329	9.44
		6.30	41.40	52.8	4696	344	9.43
		8.00	52.30	66.6	5852	429	9.37
		10.00	64.90	82.6	7154	524	9.31
		12.00	77.20	98.4	8356	615	9.24
		12.50	80.30	102	8697	637	9.22
12"	323.9	5.00	39.30	50.1	6369	393	11.3
		6.00	47.00	59.9	7572	468	11.2
		6.30	49.30	62.9	7929	490	11.2
		8.00	62.30	79.4	9910	612	11.2
		10.00	77.40	98.6	12158	751	11.1
		12.00	92.30	118	14320	884	11
		12.50	96.00	122	14847	917	11
14"	355.6	5.00	43.20	55.1	8464	476	12.4
		6.00	51.70	65.9	10071	566	12.4
		6.30	54.30	69.1	10547	593	12.4
		8.00	68.60	87.4	13201	742	12.3
		10.00	85.20	109	16223	912	12.2
		12.00	102.00	130	19139	1076	12.2
		12.50	106.00	135	19852	1117	12.1
16"	406.4	6.00	59.20	75.5	15128	745	14.2
		6.30	62.20	79.2	15849	780	14.1
		8.00	78.60	100	19874	978	14.1
		10.00	97.80	125	24476	1205	14
		12.00	117.00	149	28937	1424	14
		12.50	121.00	155	30031	1478	13.9

Dimension Tolerances

Outside Diameter : ±1% with a minimum of ±0.5 mm and a maximum of ± 10 mm

Thickness :

D ≤ 406.4 mm : t ≤ 5 mm ±10%
t > 5 mm ±0.5 mm

D > 406.4 mm : ± 10% with a maximum of 2 mm

Weight : ±6%

EN10219 Cold Formed Welded Structural Hollow Section of Non-Alloy and Fine Grain Steels

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					YIELD STRENGTH (MIN)	TENSILE STRENGTH (MIN)		ELONGATION % (MIN)	IMPACT TEST	Minimun average absorbed energy for standard test pieces J
	C Max	Si Max	Mn Max	P Max	S Max	N/mm²	N/mm²			Test temperature °C	
							t <3 mm	3 mm ≤ T ≤ 40 mm			
S235JRH	0.170	-	1.400	0.045	0.045	235	360 - 510	340 - 370	24	20	27
S275JOH	0.200	-	1.500	0.040	0.040	275	430 - 580	410 - 560	20	0	27
S275J2H	0.200	-	1.500	0.035	0.035	275	430 - 580	410 - 560	20	-20	27
S355JOH	0.220	0.550	1.600	0.040	0.040	355	510 - 680	490 - 630	20	0	27
S355J2H	0.220	0.550	1.600	0.035	0.035	355	510 - 680	490 - 630	20	-20	27

Length of size		Thickness	Mass/ length	Cross Sectional Area	Geometrical moment of inertia (cm⁴)	Modulus of section (cm³)	Radius of gyration (cm)
H	B	mm	kg/m	cm²	Ix, Iy	Zx, Zy	ix, iy
20	20	2.00	1.05	1.34	0.692	0.692	0.720
25	25	2.00	1.36	1.74	1.48	1.19	0.924
		2.50	1.64	2.09	1.69	1.35	0.899
		3.00	1.89	2.41	1.84	1.47	0.874
30	30	2.00	1.68	2.14	2.72	1.81	1.13
		2.50	2.03	2.59	3.16	2.1	1.1
		3.00	2.36	3.01	3.50	2.34	1.08
40	40	2.00	2.31	2.94	6.94	3.47	1.54
		2.50	2.82	3.59	8.22	4.11	1.51
		3.00	3.30	4.21	9.32	4.66	1.49
		4.00	4.20	5.35	11.1	5.54	1.44
50	50	2.00	2.93	3.74	14.1	5.66	1.95
		2.50	3.60	4.59	16.9	6.78	1.92
		3.00	4.25	5.41	19.5	7.79	1.90
		4.00	5.45	6.95	23.7	9.49	1.85
		5.00	6.56	8.36	27	10.8	1.80
60	60	2.00	3.56	4.54	25.1	8.38	2.35
		2.50	4.39	5.59	30.3	10.1	2.33
		3.00	5.19	6.61	35.1	11.7	2.31
		4.00	6.71	8.55	43.6	14.5	2.26
		5.00	8.13	10.4	50.5	16.8	2.21
80	80	3.00	7.07	9.01	87.8	22	3.12
		4.00	9.22	11.7	111	27.8	3.07
		5.00	11.30	14.4	131	32.9	3.03
		6.00	13.20	16.8	149	37.3	2.98
		6.30	13.50	17.2	149	37.1	2.94
		8.00	16.40	20.8	168	42.1	2.84
90	90	3.00	8.01	10.2	127	28.3	3.53
		4.00	10.50	13.3	162	36	3.48
		5.00	12.80	16.4	193	42.9	3.43
		6.00	15.10	19.2	220	49	3.39
		6.30	15.50	19.7	221	49.1	3.35
		8.00	18.90	24	255	56.6	3.25
100	100	3.00	8.96	11.4	177	35.4	3.94
		4.00	11.70	14.9	226	45.3	3.89
		5.00	14.40	18.4	271	54.2	3.84
		6.00	17.00	21.6	311	62.3	3.79
		6.30	17.50	22.2	314	62.8	3.76
		8.00	21.40	27.2	366	73.2	3.67

Length of size		Thickness	Mass/ length	Cross Sectional Area	Geometrical moment of inertia (cm⁴)	Modulus of section (cm³)	Radius of gyration (cm)
H	B	mm	kg/m	cm²	Ix, Iy	Zx, Zy	ix, iy
120	120	3.00	10.80	13.8	312	52.1	4.76
		4.00	14.20	18.1	402	67	4.71
		5.00	17.50	22.4	485	80.9	4.66
		6.00	20.70	26.4	562	93.7	4.61
		6.30	21.40	27.3	572	95.3	4.58
		8.00	26.40	33.6	677	113	4.49
150	150	4.00	18.00	22.9	808	108	5.93
		5.00	22.30	28.4	982	131	5.89
		6.00	26.40	33.6	1146	153	5.84
		6.30	27.40	34.8	1174	156	5.80
		8.00	33.90	43.2	1412	188	5.71
200	200	4.00	24.30	30.9	1968	197	7.97
		5.00	30.10	38.4	2410	241	7.93
		6.00	35.80	45.6	2833	283	7.88
		6.30	37.20	47.4	2922	292	7.85
		8.00	46.50	59.2	3566	357	7.76
		10.00	57.00	72.6	4251	425	7.65
		12.00	66.00	84.1	4730	473	7.50
		12.50	68.30	87	4859	486	7.47
250	250	5.00	38.00	48.4	4805	384	9.97
		6.00	45.20	57.6	5672	454	9.93
		6.30	47.10	60	5873	470	9.89
		8.00	59.10	75.2	7229	578	9.80
		10.00	73.70	92.6	8707	697	9.70
		12.00	86.80	108	9859	789	9.55
		12.50	88.00	112	10161	813	9.52
300	300	6.00	54.70	69.6	9964	664	12
		6.30	57.00	72.6	10342	689	11.9
		8.00	71.60	91.2	12801	853	11.8
		10.00	88.40	113	15519	1035	11.7
		12.00	104.00	132	17767	1184	11.6
		12.50	108.00	137	18348	1223	11.6

Dimension Tolerances
Outside Diameter :
Length of side :
<100 : ± 1% with a minimum of ± 0.5 mm
100-200 : ± 0.8%
≥200 : ± 0.6%
Thickness : t ≤ 5 mm ± 10%
t > 5 mm ± 0.5 mm
Weight : ± 6%

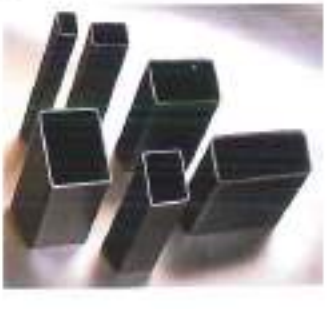
EN10219 Cold Formed Welded Structural Hollow Section of Non-Alloy and Fine Grain Steels

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					Yield strength (min)	Tensile strength (min)		ELONGATION % (MIN)	IMPACT TEST	MINIMUM AVERAGE ABSORBED ENERGY FOR STANDARD TEST PIECES J
	C Max	Si Max	Mn Max	P Max	S Max	N/mm²	N/mm² t<3 mm	N/mm² 3 mm ≤ T ≤ 40 mm		Test temperature °C	
S235JRH	0.170	-	1.400	0.045	0.045	235	360 - 510	340 - 370	24	20	27
S275J0H	0.200	-	1.500	0.040	0.040	275	430 - 580	410 - 560	20	0	27
S275J2H	0.200	-	1.500	0.035	0.035	275	430 - 580	410 - 560	20	-20	27
S355J0H	0.220	0.550	1.600	0.040	0.040	355	510 - 680	490 - 630	20	0	27
S355J2H	0.220	0.550	1.600	0.035	0.035	355	510 - 680	490 - 630	20	-20	27

Length of size		Thickness	Mass/ length	Cross Sectional Area	Geometrical moment of inertia (cm⁴)		Modulus of section (cm³)		Radius of gyration (cm)	
H	B	mm	kg/m	cm²	Ix	Iy	Zx	Zy	ix	iy
40	20	2.00	1.68	2.14	4.05	1.34	2.02	1.34	1.38	0.793
60	40	2.00	3.93	3.74	18.4	9.83	6.14	4.92	2.22	1.62
		2.50	3.60	4.59	22.1	11.7	7.36	5.87	2.19	1.60
		3.00	4.25	5.41	25.4	13.4	8.46	6.72	2.17	1.58
100	50	2.50	5.56	7.09	91.2	31.1	18.2	12.4	3.59	2.09
		3.00	6.60	8.41	106	36.1	21.3	14.4	3.56	2.07
		4.00	8.59	10.9	134	44.9	26.8	18	3.5	2.03
		5.00	10.50	13.4	158	52.5	31.6	21	3.44	1.98
		6.00	12.30	15.6	179	58.7	35.8	23.5	3.38	1.94
		6.30	12.50	15.9	176	58.2	35.1	23.3	3.32	1.91
120	80	3.00	8.96	11.4	230	123	38.4	30.9	4.49	3.29
		4.00	11.70	14.9	295	157	49.1	39.3	4.44	3.24
		5.00	14.40	18.4	353	188	58.9	46.9	4.39	3.20
		6.00	17.00	21.6	406	215	67.7	53.8	4.33	3.15
		6.30	17.50	22.2	408	217	68.1	54.3	4.28	3.12
		8.00	21.40	27.2	476	252	79.3	62.9	4.18	3.04
140	80	4.00	13.00	16.5	430	180	61.4	45.1	5.10	3.30
		5.00	16.00	20.4	517	216	73.9	54	5.04	3.26
		6.00	18.90	24	597	248	85.3	62	4.98	3.21
		6.30	19.40	24.8	603	251	86.1	62.9	4.93	3.19
		8.00	23.90	30.4	708	293	101	73.3	4.82	3.10
150	100	4.00	14.90	18.9	595	319	79.3	63.7	5.60	4.10
		5.00	18.30	23.4	719	384	95.9	76.8	5.55	4.05
		6.00	21.70	27.6	835	444	111	88.8	5.50	4.01
		6.30	22.40	28.5	848	453	113	90.5	5.45	3.98
		8.00	27.70	35.2	1008	536	134	107	5.35	3.90
		10.00	33.40	42.6	1162	614	155	123	5.22	3.80
160	80	4.00	14.20	18.1	598	204	74.7	50.9	5.74	3.35
		5.00	17.50	22.4	722	244	90.2	61	5.68	3.30
		6.00	20.70	26.4	836	281	105	70.2	5.62	3.26
		6.30	21.40	27.3	846	286	106	71.4	5.57	3.24
200	100	4.00	18.00	22.9	1200	411	120	82.3	7.23	4.23
		5.00	22.30	28.4	1459	497	146	99.4	7.17	4.19
		6.00	26.40	33.6	1703	577	170	115	7.12	4.14
		6.30	27.40	34.8	1739	591	174	118	7.06	4.12
		8.00	33.90	43.2	2091	705	209	141	6.95	4.04
		10.00	41.30	52.6	2444	818	244	164	6.82	3.94

Length of size		Thickness	Mass/ length	Cross Sectional Area	Geometrical moment of inertia (cm⁴)		Modulus of section (cm³)		Radius of gyration (cm)	
H	B	mm	kg/m	cm²	Ix	Iy	Zx	Zy	ix	iy
250	150	5.00	30.10	38.4	3304	1508	264	201	9.28	6.27
		6.00	35.80	45.6	3886	1768	311	236	9.23	6.23
		6.30	37.20	47.4	4001	1825	320	243	9.18	6.20
		8.00	46.50	59.2	4886	2219	391	296	9.08	6.12
		10.00	57.00	72.6	5825	2634	466	351	8.96	6.02
		12.00	66.00	84.1	6458	2925	517	390	8.77	5.90
		12.50	68.30	87	6633	3001	531	400	8.73	5.87
300	150	6.00	40.50	51.6	6074	2080	405	277	10.8	6.35
		6.30	42.20	53.7	6266	2150	418	287	10.8	6.32
		8.00	52.80	67.2	7684	2623	512	350	10.7	6.25
		10.00	64.80	82.6	9209	3125	614	417	10.6	6.15
		12.00	75.40	96.1	10298	3498	687	466	10.4	6.03
		12.50	78.10	99.5	10594	3595	706	479	10.3	6.01
300	200	6.00	45.20	57.6	7370	3962	491	396	11.3	8.29
		6.30	47.10	60	7624	4104	508	410	11.3	8.27
		8.00	59.10	75.2	9389	5042	626	504	11.2	8.19
		10.00	72.70	92.6	11313	6058	754	606	11.1	8.09
		12.00	84.80	108	12788	6854	853	685	10.9	7.96
		12.50	88.00	112	13179	7060	879	706	10.8	7.94
350	250	6.00	54.70	69.6	12457	7458	712	597	13.4	10.3
		6.30	57.00	72.6	12923	7744	738	620	13.3	10.3
		8.00	71.60	91.2	16001	9573	914	766	13.2	10.2
		10.00	88.40	113	19457	11588	1109	927	13.1	10.1
		12.00	104.00	132	22197	13261	1268	1061	13	10
		12.50	108.00	137	22922	13690	1310	1095	12.9	9.99
400	200	8.00	71.60	91.2	18974	6517	949	652	14.4	8.45
		12.50	108.00	137	27100	9260	1355	926	14.1	8.22

Tolerances
Length of size :
H,B < 100 : ± 1% with a minimum of ± 0.5 mm
100 ≤ H, B ≤ 200 : ± 0.8%
H, B > 200 ± 0.6%
Thickness :
t ≤ 5 mm ± 10%
t > 5 mm ± 0.5 mm
Weight : ±6%



JIS G3444 Carbon Steel Pipe for General Structural Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES		
	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %
STK 400	0.25	-	-	0.04	0.04	235	400	23
STK 490	0.18	0.55	1.50	0.04	0.04	315	490	23

Nominal Size	Outside Diameter	Thickness	Weight (Plain End)	Cross Sectional Area	Geometrical Moment Of Inertia	Modulus Of Section	Radius Of Gyration
mm	mm	mm	kg/m	cm²	cm⁴	cm³	cm
15	21.70	2.00	0.97	1.238	0.607	0.560	0.700
20	27.2	2.00	1.24	1.583	1.26	0.930	0.890
		2.30	1.41	1.799	1.41	1.03	0.880
25	34.00	2.30	1.80	2.291	2.89	1.70	1.12
32	42.70	2.30	2.29	2.919	5.97	2.80	1.43
		2.50	2.48	3.157	6.40	3.00	1.42
40	48.60	2.30	2.63	3.345	8.99	3.70	1.64
		2.50	2.84	3.621	9.65	3.97	1.63
		2.80	3.16	4.029	10.6	4.36	1.62
		3.20	3.58	4.564	11.8	4.86	1.61
50	60.50	2.30	3.30	4.205	17.8	5.90	2.06
		3.20	4.52	5.76	23.7	7.84	2.03
		4.00	5.57	7.1	28.5	9.41	2.00
65	76.30	2.80	5.08	6.465	43.7	11.5	2.60
		3.20	5.77	7.349	49.2	12.9	2.59
		4.00	7.13	9.085	59.5	15.6	2.58
80	89.10	2.80	5.96	7.591	70.7	15.9	3.05
		3.20	6.78	8.636	79.8	17.9	3.04
90	101.60	3.20	7.76	9.892	120	23.6	3.48
		4.00	9.63	12.26	146	28.8	3.45
		5.00	11.90	15.17	177	34.9	3.42
100	114.30	3.20	8.77	11.17	172	30.2	3.93
		3.50	9.58	12.18	187	32.7	3.92
		4.50	12.20	15.52	234	41	3.89
125	139.80	3.60	12.10	15.4	357	51.1	4.82
		4.00	13.40	17.07	394	56.3	4.8
		4.50	15.00	19.13	438	62.7	4.79
		6.00	19.80	25.22	566	80.2	4.74
150	165.20	4.50	17.80	22.71	734	88.9	5.68
		5.00	19.80	25.16	808	97.8	5.67
		6.00	23.60	30.01	952	115	5.63
		7.10	27.70	35.26	1100	134	5.6

Nominal Size	Outside Diameter	Thickness	Weight (plain end)	Cross Sectional Area	Geometrical moment of inertia	Modulus of section	Radius of gyration
mm	mm	mm	kg/m	cm²	cm⁴	cm³	cm
175	190.70	4.50	20.70	26.32	1140	120	6.59
		5.30	24.20	30.87	1330	139	6.56
		6.00	27.30	34.82	1490	156	6.53
		7.00	31.70	40.4	1710	179	6.5
		8.20	36.90	47.01	1960	206	6.46
200	216.30	4.50	23.50	29.94	1680	155	7.49
		5.80	30.10	38.36	2130	197	7.45
		6.00	31.10	39.64	2190	203	7.44
		7.00	36.10	46.03	2520	233	7.4
		8.00	41.10	52.35	2840	263	7.37
		8.20	42.10	53.61	2910	269	7.36
250	267.40	6.00	38.70	49.27	4210	315	9.24
		6.60	42.40	54.08	4600	344	9.22
		7.00	45.00	57.26	4860	363	9.21
		8.00	51.20	65.19	5490	411	9.18
		9.00	57.30	73.06	6110	457	9.14
		9.30	59.20	75.41	6290	470	9.13
300	318.50	6.00	46.20	58.91	7190	452	11.1
		6.90	53.00	67.55	8200	515	11
		8.00	61.30	78.04	9410	591	11
		9.00	68.70	87.51	10500	659	10.9
		10.30	78.30	99.73	11900	744	10.9
350	355.60	6.40	55.10	70.21	10700	602	12.3
		7.90	67.70	86.29	13000	734	12.3
		9.60	76.90	98	14700	828	12.3
		9.50	81.10	103.3	15500	871	12.2
		12.00	102.00	129.5	19100	1080	12.2
		12.70	107.00	136.8	20100	1130	12.2
400	406.40	7.90	77.60	98.9	19600	967	14.1
		9.00	88.30	112.4	22200	1090	14.1
		9.50	93.00	118.5	23300	1150	14
		12.00	117.00	148.7	28900	1420	14
		12.70	123.00	157.1	30500	1500	13.9

Dimension Tolerances

Outside Diameter :

Class 1 : OD < 50 : ±0.50mm
: OD ≥ 50 : ±1%

Class 2 : OD < 50 : ±0.25mm
: OD ≥ 50 : ±0.5%

Thickness :

Class 1 : t < 4.00 mm : -0.50mm, +0.60mm
: t ≥ 4.00 mm : +15%, -12.5%

Class 2 : t < 3.00 mm : ±0.3mm
: t ≥ 3.00 mm : ±10%

JIS G3466 Carbon Steel Square Pipe for General Structural Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES		
	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %
STKR 400	0.25	-	-	0.04	0.04	245	400	23
STKR 490	0.18	0.55	1.50	0.04	0.04	325	490	23

Nominal Size A	Nominal Size B	Thickness mm	Weight (plain end) kg/m	Cross Sectional Area cm²	Geometrical moment of inertia (cm⁴) Ix,Iy	Modulus of section (cm³) Zx,Zy	Radius of gyration (cm) ix,iy
40	40	1.60	1.88	2.392	5.79	2.9	1.56
		2.30	2.62	3.332	7.73	3.86	1.52
50	50	1.60	2.38	3.032	11.7	4.68	1.96
		2.30	3.34	4.252	15.9	6.34	1.93
		3.20	4.50	5.727	20.4	8.16	1.89
60	60	1.60	2.88	3.672	20.7	6.89	2.37
		2.30	4.06	5.172	28.3	9.44	2.34
		3.20	5.50	7.007	36.9	12.3	2.3
75	75	1.60	3.64	4.632	41.3	11	2.99
		2.30	5.14	6.552	57.1	15.2	2.95
		3.20	7.01	8.927	75.5	20.1	2.91
		4.50	9.55	12.17	98.6	26.3	2.85
80	80	2.30	5.50	7.012	69.9	17.5	3.16
		3.20	7.51	9.567	92.7	23.2	3.11
		4.50	10.30	13.07	122	30.4	3.05
90	90	2.30	6.23	7.932	101	22.4	3.56
		3.20	8.51	10.85	135	29.9	3.52
100	100	2.30	6.95	8.852	140	27.9	3.97
		3.20	9.52	12.13	187	37.5	3.93
		4.00	11.70	14.95	226	45.3	3.89
		4.50	13.10	16.67	249	49.9	3.87
		6.00	17.00	21.63	311	62.3	3.79
		9.00	24.10	30.67	408	81.6	3.65
125	125	3.20	12.00	15.33	376	60.1	4.95
		4.50	16.60	21.17	506	80.9	4.89
		5.00	18.30	23.36	553	88.4	4.86
		6.00	21.70	27.63	641	103	4.82
		9.00	31.10	39.67	865	138	4.67
150	150	4.50	20.10	25.67	896	120	5.91
		5.00	22.30	28.36	982	131	5.89
		6.00	26.40	33.63	1150	153	5.84
		9.00	38.20	48.67	1580	210	5.69

Nominal Size A	Nominal Size B	Thickness mm	Weight (plain end) kg/m	Cross Sectional Area cm²	Geometrical moment of inertia (cm⁴) Ix,Iy	Modulus of section (cm³) Zx,Zy	Radius of gyration (cm) ix,iy
175	175	4.50	23.70	30.17	145 x 10	166	6.93
		5.00	26.20	33.36	159 x 10	182	6.91
		6.00	31.10	39.63	186 x 10	213	6.86
200	200	4.50	27.20	34.67	2190	219	7.95
		6.00	35.80	45.63	2830	283	7.88
		8.00	46.90	59.79	3620	362	7.78
		9.00	52.30	66.67	3990	399	7.73
		12.00	67.90	86.53	4980	498	7.59
250	250	5.00	38.00	48.36	4810	384	9.97
		6.00	45.20	57.63	5670	454	9.92
		8.00	59.50	75.79	7320	585	9.82
		9.00	66.50	84.67	8090	647	9.78
		12.00	86.80	110.5	10300	820	9.63
300	300	4.50	41.30	52.67	7630	508	12
		6.00	54.70	69.63	9960	664	12
		9.00	80.60	102.7	14300	956	11.8
		12.00	106.00	134.5	18300	1220	11.7

Dimension Tolerances
Outside Diameter : ≤ 100 mm ; ± 1.5 mm
> 100 mm ; ± 1.5%

Thickness : < 3.00 mm ; ± 0.30 mm
≥ 3.00 mm ; ± 10%

JIS G3466 Carbon Steel Rectangular Pipe for General Structural Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES		
	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %
STKR 400	0.25	-	-	0.04	0.04	245	400	23
STKR 490	0.18	0.55	1.50	0.04	0.04	325	490	23

NOMINAL SIZE		THICKNESS	WEIGHT (PLAIN END)	CROSS SECTIONAL AREA	GEOMETRICAL MOMENT OF INERTIA (CM⁴)		MODULUS OF SECTION (CM³)		RADIUS OF GYRATION (CM)	
A	B	mm	kg/m	cm²	Ix	Iy	Zx	Zy	ix	iy
60	30	1.60	2.13	2.712	12.5	4.25	4.16	2.83	2.15	1.25
		2.30	2.98	3.791	16.8	5.65	5.61	3.76	2.11	1.22
		3.20	3.99	5.087	21.4	7.08	7.15	4.72	2.05	1.18
75	45	1.60	2.88	3.671	28.4	12.9	7.56	5.75	2.78	1.88
		2.30	4.06	5.171	38.9	17.6	10.4	7.82	2.74	1.84
		3.20	5.50	7.007	50.8	22.8	13.5	10.1	2.69	1.8
100	50	1.60	3.64	4.632	61.3	21.1	12.3	8.43	3.64	2.13
		2.30	5.14	6.552	84.8	29	17	11.6	3.6	2.1
		3.20	7.01	8.927	112	38	22.5	15.2	3.55	2.06
		4.50	9.55	12.17	147	48.9	29.3	19.5	3.47	2
125	75	2.30	6.95	8.852	192	87.5	30.6	23.3	4.65	3.14
		3.20	9.52	12.13	257	117	41.1	31.1	4.6	3.1
		4.00	11.70	14.95	311	141	49.7	37.5	4.56	3.07
		4.50	13.10	16.67	342	155	54.8	41.2	4.53	3.04
		6.00	17.00	21.63	428	192	68.5	51.1	4.45	2.98
150	75	3.20	10.80	13.73	402	137	53.6	36.6	5.41	3.16
150	80	4.50	15.20	19.37	563	211	75	52.9	5.39	3.3
		5.00	16.80	21.36	614	230	81.9	57.5	5.36	3.28
		6.00	19.80	25.23	710	264	94.7	66.1	5.31	3.24
150	100	3.20	12.00	15.33	488	262	65.1	52.5	5.64	4.14
		4.50	16.60	21.17	658	352	87.7	70.4	5.58	4.08
		6.00	21.70	27.63	835	444	111	88.8	5.5	4.01
		9.00	31.10	39.67	1130	595	151	119	5.33	3.87
200	100	4.50	20.10	25.67	1330	455	131	90.9	7.2	4.21
		6.00	26.40	33.63	1700	577	170	115	7.12	4.14
		9.00	38.20	48.67	2350	782	235	156	6.94	4.01
200	150	4.50	23.70	30.17	1760	1130	176	151	7.64	6.13
		6.00	31.10	39.63	2270	1460	227	194	7.56	6.06
		9.00	45.30	57.67	3170	2020	317	270	7.41	5.93
250	150	6.00	35.80	45.63	3890	1770	311	236	9.23	6.23
		9.00	52.30	66.67	5480	2470	438	330	9.06	6.09
		12.00	67.90	86.53	6850	3070	548	409	8.9	5.95
300	300	6.00	45.20	57.63	7370	3960	491	396	11.3	8.29
		9.00	66.50	84.67	10500	3630	702	563	11.2	8.16
		12.00	86.80	110.5	13400	7110	890	711	11	8.02
350	150	6.00	45.20	57.63	8910	2390	509	319	12.4	6.44
		9.00	66.50	84.67	12700	3370	726	449	12.3	6.31
		12.00	86.80	110.5	16100	4210	921	562	12.1	6.17
400	200	6.00	54.70	69.63	14800	5090	739	509	14.6	8.55
		9.00	80.60	102.7	21300	7270	1070	727	14.4	8.42
		12.00	106.00	134.5	27300	9230	1360	923	14.2	8.23

Dimension Tolerances
Outside Diameter : ≤ 100 mm : ± 1.5 mm
> 100 mm : ± 1.5%

Thickness : < 3.00 mm : ± 0.30 mm
≥ 3.00 mm : ± 10%

TIS 107 Carbon Steel Round Pipes for General Structural Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES			COLOR CODE
	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %	Material of Grade
HS 41	0.280	-	-	0.048	0.048	235	402	23	GREEN
HS 50	0.210	0.570	1.530	0.048	0.048	314	490	23	RED
HS 51	0.330	0.370	0.330-1.030	0.048	0.048	353	500	15	WHITE

NOMINAL SIZE		THICKNESS MM	WEIGHT (PLAIN END) KG/M	CROSS SECTIONAL AREA	GEOMETRICAL MOMENT OF INERTIA	MODULUS OF SECTION	RADIUS OF GYRATION
in	mm	STD	STD	cm²	cm⁴	cm³	cm
1/2"	15	2.00	0.97	1.238	0.607	0.56	0.70
3/4"	20	2.30	1.41	1.799	1.41	1.03	0.88
1"	25	2.30	1.80	2.291	2.89	1.70	1.12
1 1/4"	32	2.30	2.29	2.919	5.97	2.80	1.43
1 1/2"	40	2.30	2.63	3.345	8.99	3.70	1.64
		3.20	3.58	4.564	11.8	4.86	1.61
2"	50	3.20	4.52	5.760	23.7	7.84	2.03
		4.00	5.57	7.100	28.5	9.41	2
2 1/2"	65	3.20	5.77	7.349	49.2	12.9	2.59
		4.00	7.13	9.085	59.5	15.6	2.56
3"	80	3.20	6.78	8.636	79.8	17.9	3.04
		4.00	8.39	10.69	97	21.8	3.01
3 1/2"	90	3.20	7.76	9.892	120	23.6	3.48
		4.00	9.63	12.26	146	28.8	3.45
4"	100	3.20	8.77	11.17	172	30.2	3.93
		4.50	12.20	15.52	234	41	3.89
		5.60	15.00	19.13	283	49.6	3.85
5"	125	4.50	15.00	19.13	438	62.7	4.79
		6.00	19.80	25.22	566	80.9	4.74
6"	150	4.50	17.80	22.72	734	88.9	5.68
		6.00	23.60	30.01	952	115	5.63
7"	175	5.00	22.90	29.17	1260	132	6.57
		7.00	31.70	40.40	1710	179	6.50
8"	200	6.00	31.10	39.61	2190	303	7.44
		8.00	41.10	52.35	2840	363	7.37

Dimension Tolerances

Outside Diameter : ≤ 50 mm : ± 0.5 mm
> 50 mm : ± 1%

Thickness : 2.0 ≤ t ≤ 3.2 : ± 0.30 mm
4.0 ≤ t ≤ 8.0 : ± 10%

Weight : ± 10%

TIS 107 Carbon Steel Hollow Section Pipes for General Structural Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES			COLOR CODE
	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %	Material of Grade
HS 41	0.280	-	-	0.048	0.048	235	402	23	GREEN
HS 50	0.210	0.570	1.530	0.048	0.048	314	490	23	RED

NOMINAL SIZE		THICKNESS MM	WEIGHT (PLAIN END) KG/M	CROSS SECTIONAL AREA CM²	GEOMETRICAL MOMENT OF INERTIA CM⁴	MODULUS OF SECTION CM³	RADIUS OF GYRATION CM
A	B	STD	STD	STD	Ix,Iy	Zx,Zy	ix,iy
25	25	2.00	1.36	1.737	1.48	1.19	0.924
		2.30	1.53	1.972	1.61	1.29	0.904
32	32	2.30	2.04	2.596	3.71	2.32	1.2
		3.20	2.69	3.423	4.54	2.84	1.15
38	38	2.30	2.47	3.148	6.54	3.44	1.44
		3.20	3.29	4.191	8.18	4.3	1.4
50	50	2.30	3.34	4.252	15.9	6.34	1.93
		3.20	4.50	5.727	20.4	8.16	1.89
60	60	2.30	4.06	5.172	28.3	9.44	2.34
		3.20	5.59	7.007	36.9	12.3	2.3
		4.00	6.71	8.548	43.6	14.5	2.26
75	75	3.20	7.01	8.937	75.5	20.1	2.91
		4.00	8.59	10.948	90.2	24.1	2.87
90	90	3.20	8.51	10.85	135	29.9	3.52
		4.00	10.48	13.35	162	36	3.48
		4.50	11.67	14.87	178	39.5	3.46
100	100	3.20	9.52	12.13	187	37.5	3.93
		4.00	11.70	14.95	226	45.3	3.89
		4.50	13.10	16.67	249	49.9	3.87
150	150	4.50	20.10	25.67	896	120	5.91
		6.00	26.40	33.63	1150	153	5.84
175	175	4.50	23.70	30.17	1450	166	6.93
		6.00	31.10	39.63	1860	213	6.86
200	200	6.00	35.80	45.63	2830	283	7.88
		8.00	46.90	59.79	3620	362	7.78
		9.00	52.30	66.67	3990	399	7.73
250	250	6.00	45.20	57.63	5670	454	9.92
		8.00	59.20	75.79	7320	585	9.82
		9.00	66.50	84.67	8090	647	9.78
300	300	6.00	54.70	69.63	9960	664	12
		9.00	80.60	102.7	14300	956	11.8
		12.00	106.00	134.5	18300	1220	11.7

Dimension Tolerances

Outside Diameter : ≤ 100 mm : ± 0.5 mm
> 100 mm : ± 0.5%

Thickness : 2.0 ≤ t ≤ 3.2 : ± 0.30 mm
4.0 ≤ t ≤ 8.0 : ± 10%

Weight : ± 10%

TIS 107 Carbon Steel Rectangular Pipe for General Structural Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES			COLOR CODE
	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %	Material of Grade
HS 41	0.280	-	-	0.048	0.048	235	402	23	GREEN
HS 50	0.210	0.570	1.530	0.048	0.048	314	490	23	RED

NOMINAL SIZE		THICKNESS MM	WEIGHT (PLAIN END) KG/M	CROSS SECTIONAL AREA CM²	GEOMETRICAL MOMENT OF INERTIA CM⁴		MODULUS OF SECTION CM³		RADIUS OF GYRATION CM	
A	B	STD	STD	STD	Ix	Iy	Zx	Zy	ix	iy
50	25	2.30	2.44	3.102	9.31	3.1	3.72	2.48	1.73	1
		3.20	3.24	4.127	11.6	3.8	4.65	3.04	1.68	0.96
60	30	2.30	2.98	3.792	16.8	5.65	5.61	3.76	2.11	1.22
		3.20	3.99	5.087	21.4	7.08	7.15	4.72	2.05	1.18
75	38	2.30	3.81	4.85	34.6	12	9.23	6.3	2.67	1.57
		3.20	5.15	6.559	45	15.4	12	8.09	2.62	1.53
75	45	2.30	4.06	5.172	38.9	17.6	10.4	7.82	2.74	1.84
		3.20	5.50	7.007	50.8	22.8	13.5	10.1	2.69	1.8
90	45	2.30	4.60	5.862	61	20.8	13.6	9.22	3.23	1.88
		3.20	6.25	7.967	80.2	27.0	17.8	12.0	3.17	1.84
100	50	3.20	7.01	8.927	112	38	22.5	15.2	3.55	2.06
		4.00	8.59	10.95	142	46.7	28.4	18.7	3.55	2.03
		4.50	9.55	12.17	147	48.9	29.3	19.5	3.47	2
125	50	3.20	8.26	10.53	198	46.7	31.6	18.7	4.33	2.11
		4.00	10.2	12.95	338	55.6	38	22.6	4.28	2.07
		4.50	11.3	14.42	361	60.6	41.7	24.2	4.25	2.05
125	75	3.20	9.52	12.13	257	117	41.1	31.1	4.6	3.1
		4.00	11.70	14.95	311	141	49.7	37.5	4.56	3.07
		4.50	13.10	16.67	342	155	54.8	41.2	4.53	3.04
150	80	4.50	15.20	19.37	563	211	75	52.9	5.39	3.3
		6.00	19.80	25.23	710	264	94.7	66.1	5.31	3.24
150	100	4.50	16.60	21.17	658	352	87.7	70.4	5.58	4.08
		6.00	21.70	27.63	835	444	111	88.8	5.50	4.01
200	100	4.50	20.10	25.67	1330	455	133	90.9	7.2	4.21
		6.00	26.40	33.63	1700	577	170	115	7.12	4.14

Dimension Tolerances

Outside Diameter : b ≤ 100 mm : ± 1.5 mm
b > 100 mm : ± 1.5%

Thickness : 2.0 ≤ t ≤ 12 : ± 0.30 mm
4.0 < t ≤ 8.0 : ± 10%

Weight : ± 10%

CARBON STEEL TUBES FOR ORDINARY USES AND PLUMBING SYSTEM

ASTM A53 EN 10255 (BS 1387)
JIS G 3452 JIS G 3454
TIS 276 TIS 277 TIS 427

UNDERWRITERS LABORATORIES (UL)

- ✓ **UL** is an independent product safety certification organization that has been testing products and writing standards for safety for more than a century.
- ✓ **UL** was established in the U.S. since 1894
- ✓ **A** scope of UL services covers the verifiable of Raw Material especially Fire Protection System.
- ✓ **When** awarded in UL-listed means the UL has tested all of the devices to enusre they meet UL's requirements .
- ✓ **UL** standard is well recognized in an insurance industry in international market.

File Ex 15190

ASTM A53

Carbon Steel Pipe for Pressure Purposes

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES		
	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %
Grade A	0.250	-	0.950	0.050	0.045	205	330	As per standard
Grade B	0.300	-	1.200	0.050	0.045	240	415	As per standard

NOMINAL DIMENSION		OUTSIDE DIAMETER	THICKNESS	WEIGHT (PLAIN END)	TEST PRESSURE (KPA)		SCHEDULE
mm	in	mm	mm	kg/m	Grade A	Grade B	
15	1/2"	21.30	2.77	1.27	4830	4830	40
			3.73	1.62	5860	5860	80
20	3/4"	26.70	2.87	1.69	4830	4830	40
			3.91	2.20	5860	5860	80
25	1"	33.40	3.38	2.50	4830	4830	40
			4.55	3.24	5860	5860	80
32	1 1/4"	42.20	3.56	3.39	8270	8960	40
			4.85	4.47	12410	13100	80
40	1 1/2"	48.30	3.68	4.05	8270	8960	40
			5.08	5.41	12410	13100	80
50	2"	60.30	3.91	5.44	15860	17240	40
			5.54	7.48	17240	17240	80
65	2 1/2"	73.00	5.16	8.63	17240	17240	40
			7.01	11.41	17240	17240	80
80	3"	88.90	5.49	11.29	15310	17240	40
			7.62	15.27	17240	17240	80
90	3 1/2"	101.60	5.74	13.57	14000	16340	40
			8.08	18.63	19310	19310	80
100	4"	114.30	6.02	16.07	13100	15240	40
			8.56	23.32	18620	19310	80
125	5"	141.30	6.55	21.77	11510	13440	40
			9.53	30.94	16750	19310	80
150	6"	168.30	7.11	28.26	10480	12270	40
			10.97	42.56	16200	18890	80
200	8"	219.10	6.35	33.31	7170	8410	20
			7.04	36.31	7800	9310	30
			8.18	42.55	9240	10820	40
			10.31	53.08	11720	13790	60
			12.70	64.64	14410	16750	80
250	10"	273.00	6.35	41.75	5790	6760	20
			7.80	51.01	7100	8270	30
			9.27	60.29	8410	9860	40
300	12"	323.80	6.35	49.71	4900	5650	20
			8.38	65.18	6410	7520	30
			10.31	79.70	7930	9240	40
350	14"	355.60	6.35	54.69	4410	5170	10
			7.92	67.90	5520	6480	20
			9.52	81.25	6620	7720	30
			11.13	94.55	7790	9030	40
400	16"	406.40	6.35	62.64	3860	4550	10
			7.92	77.83	4830	5650	20
			9.52	93.17	5790	6760	30
			12.70	123.30	7720	9030	40

Dimension Tolerances
Outside Diameter : NPS ≤ 1 ½ in : ±0.40 mm
NPS ≥ 2 in : ± 1% from standard specified
Thickness : +Not Limit -12.5 %
Weight : ± 10%

File Ex 15190

Standard Pipe for EN 10255
(Transition from BS 1387)

MATERIAL OF GRADE		CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES		
Steel Name	Steel Number	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation %
S 195 T	1.0026	0.20	-	1.40	0.035	0.03	195	320 to 520	20

H Series

Nominal Size	Specified Outside Diameter	Designation of Thread	Outside Diameter		Wall Thickness	Calculated	
			Max	Min		Plain End	Threaded and Socketed
mm.	mm.		mm.	mm.	mm.	kg/m.	kg/m.
6	10.2	1/8	10.6	9.8	2.6	0.487	0.490
8	13.5	1/4	14.0	13.2	2.9	0.765	0.769
10	17.2	3/8	17.5	16.7	2.9	1.00	1.30
15	21.3	1/2	21.8	21.0	3.2	1.44	1.45
20	26.9	3/4	27.3	26.5	3.2	1.87	1.88
25	33.7	1	34.2	33.3	4.0	2.93	2.95
32	42.4	1 1/4	42.9	42.0	4.0	3.79	3.82
40	48.3	1 1/2	48.8	47.9	4.0	4.37	4.41
50	60.3	2	60.8	59.7	4.5	6.19	6.26
65	76.1	2 1/2	76.6	75.3	4.5	7.93	8.05
80	88.9	3	89.5	88.0	5.0	10.3	10.5
100	114.3	4	115.0	113.1	5.4	14.5	14.8
125	139.7	5	140.8	138.5	5.4	17.9	18.4
150	165.1	6	166.5	163.9	5.4	21.3	21.9

L Series

Nominal Size	Specified Outside Diameter	Designation of Thread	Outside Diameter		Wall Thickness	Calculated	
			Max	Min		Plain End	Threaded and Socketed
mm.	mm.		mm.	mm.	mm.	kg/m.	kg/m.
8	13.5	1/4	13.9	13.2	2.0	0.567	0.571
10	17.2	3/8	17.4	16.7	2.0	0.753	0.756
15	21.3	1/2	21.7	21.0	2.3	1.08	1.09
20	26.9	3/4	27.1	26.4	2.3	1.40	1.41
25	33.7	1	34.0	33.2	2.9	2.20	2.22
32	42.4	1 1/4	42.7	41.9	2.9	2.82	2.85
40	48.3	1 1/2	48.6	47.8	2.9	3.25	3.29
50	60.3	2	60.7	59.6	3.2	4.51	4.58
65	76.1	2 1/2	76.0	75.2	3.2	5.75	5.87
80	88.9	3	88.7	87.9	3.2	6.76	6.93
90	101.6	3 1/2	101.2	100.3	3.6	8.70	8.88
100	114.3	4	113.9	113.0	3.6	9.83	10.1
125	139.7	5	140.8	138.5	4.5	15.0	15.5
150	165.1	6	166.5	163.9	4.5	17.8	18.4

M Series

Nominal Size	Specified Outside Diameter	Designation of Thread	Outside Diameter		Wall Thickness	Calculated	
			Max	Min		Plain End	Threaded and Socketed
mm.	mm.		mm.	mm.	mm.	kg/m.	kg/m.
6	10.2	1/8	10.6	9.8	2.0	0.404	0.407
8	13.5	1/4	14.0	13.2	2.3	0.641	0.645
10	17.2	3/8	17.5	16.7	2.3	0.84	0.845
15	21.3	1/2	21.8	21.0	2.6	1.21	1.22
20	26.9	3/4	27.3	26.5	2.6	1.56	1.57
25	33.7	1	34.2	33.3	3.2	2.41	2.43
32	42.4	1 1/4	42.9	42.0	3.2	3.10	3.13
40	48.3	1 1/2	48.8	47.9	3.2	3.56	3.60
50	60.3	2	60.8	59.7	3.6	5.03	5.10
65	76.1	2 1/2	76.6	75.3	3.6	6.42	6.54
80	88.9	3	89.5	88.0	4.0	8.36	8.5
100	114.3	4	115.0	113.1	4.5	12.3	12.5
125	139.7	5	140.8	138.5	5.0	16.6	17.1
150	165.1	6	166.5	163.9	5.0	19.8	20.4

L1 Series

Nominal Size	Specified Outside Diameter	Designation of Thread	Outside Diameter		Wall Thickness	Calculated	
			Max	Min		Plain End	Threaded and Socketed
mm.	mm.		mm.	mm.	mm.	kg/m.	kg/m.
8	13.5	1/4	13.9	13.2	2.0	0.570	0.574
10	17.2	3/8	17.4	16.7	2.0	0.743	0.748
15	21.3	1/2	21.7	21.0	2.3	1.08	1.09
20	26.9	3/4	27.1	26.4	2.3	1.39	1.40
25	33.7	1	34.0	33.2	2.9	2.20	2.22
32	42.4	1 1/4	42.7	41.9	2.9	2.82	2.85
40	48.3	1 1/2	48.6	47.8	2.9	3.24	3.28
50	60.3	2	60.7	59.6	3.2	4.49	4.56
65	76.1	2 1/2	76.3	75.2	3.2	5.73	5.85
80	88.9	3	89.4	87.9	3.6	7.55	7.72
100	114.3	4	114.9	113.0	4.0	10.8	11.1

L2 Series

Nominal Size	Specified Outside Diameter	Designation of Thread	Outside Diameter		Wall Thickness	Calculated	
			Max	Min		Plain End	Threaded and Socketed
mm.	mm.		mm.	mm.	mm.	kg/m.	kg/m.
8	13.5	1/4	13.6	13.2	1.8	0.515	0.519
10	17.2	3/8	17.1	16.7	1.8	0.670	0.676
15	21.3	1/2	21.4	21.0	2.0	0.947	0.956
20	26.9	3/4	26.9	26.4	2.3	1.38	1.39
25	33.7	1	33.8	33.2	2.6	1.98	2.00
32	42.4	1 1/4	42.5	41.9	2.6	2.54	2.57
40	48.3	1 1/2	48.4	47.8	2.9	3.23	3.27
50	60.3	2	60.2	59.6	2.9	4.08	4.15
65	76.1	2 1/2	76.0	75.2	3.2	5.71	5.83
80	88.9	3	88.7	87.9	3.2	6.72	6.89
100	114.3	4	113.9	113.0	3.6	9.75	10.0

Dimension Tolerances

Thickness: H and M series and Type L : ± 10%
Type L1 and L2 : -8% with the plus tolerance limited by the mass tolerance

Weight: H and M series and Type L : ± 7.5% on bundles of 10 tons or more
Type L1 and L2 : +10%, -8% on individual tubes

Hydrostatictest: 50 bar

Color Marking

Series/Type	Color
H series	Red
M series	Blue
Type L	Green
Type L1	White
Type L2	Brown

JIS G3452

Carbon Steel Pipe for Ordinary Piping

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES		
	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %
SGP	-	-	-	0.04	0.04	-	290	25

NOMINAL SIZE	OUTSIDE DIAMETER	THICKNESS	WEIGHT (PLAIN END)
mm	mm	mm	kg/m
15	21.7	2.8	1.31
20	27.2	2.8	1.68
25	34.0	3.2	2.43
32	42.7	3.5	3.38
40	48.6	3.5	3.89
50	60.5	3.8	5.31
65	76.3	4.2	7.47
80	89.1	4.2	8.79
90	101.6	4.2	10.10
100	114.3	4.5	12.20
125	139.8	4.5	15.00
150	165.2	5.0	19.80
175	190.7	5.3	24.20
200	216.3	5.8	30.10
225	241.8	6.2	36.00
250	267.4	6.6	42.40
300	318.5	6.9	53.00
350	355.6	7.9	67.70
400	406.4	7.9	77.60

Dimension Tolerances

Outside Diameter : Size ≤ 1½ in : ±0.50 mm
2 in ≤ Size ≤ 5 in : ±1%
6 in ≤ Size ≤ 7 in : ±1.60 mm
Size ≥ 8 in : ±0.80%

Thickness : +Not specified, -12.5 %

JIS G3454

Carbon Steel Pipe for Pressure Service

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES		
	C Max	Si Max	Mn Max	P Max	S Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %
STKR 400	0.25	-	-	0.04	0.04	245	400	23
STKR 490	0.18	0.55	1.50	0.04	0.04	325	490	23

NOMINAL DIMENSION DN		OUTSIDE DIAMETER	THICKNESS	WEIGHT (PLAIN END)	HYDROSTATIC TEST PRESSURE (BAR)
mm.	inch	mm	mm	kg/m	Schedule 40
15	1/2"	21.70	2.80	1.31	60
20	3/4"	27.20	2.90	1.74	60
25	1"	34.00	3.40	2.57	60
32	1 1/4"	42.70	3.60	3.47	60
40	1 1/2"	48.60	3.70	4.10	60
50	2"	60.50	3.90	5.44	60
65	2 1/2"	76.30	5.20	9.12	60
80	3"	89.10	5.50	11.30	60
90	3 1/2"	101.60	5.70	13.50	60
100	4"	114.30	6.00	16.00	60
125	5"	139.80	6.60	21.70	60
150	6"	165.20	7.10	27.70	60
200	8"	216.30	8.20	42.10	60
250	10"	267.40	9.30	59.20	60
300	12"	318.50	10.30	78.30	60
350	14"	355.60	11.10	94.30	60
400	16"	406.40	12.70	123.00	60

Dimension Tolerances
Outside Diameter : ≤ 100 mm : ± 1.5 mm
> 100 mm : ± 1.5%

Thickness : < 3.00 mm : ± 0.30 mm
≥ 3.00 mm : ± 10%

Standard TIS 276 & 277
Black & Galvanized Steel Pipe

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)					MECHANICAL PROPERTIES			HYDROSTAT TEST
	C max	Si max	Mn max	P max	S max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %	bar
TIS TYPE 1	-	-	-	-	-	-	320	20	50
TIS TYPE 2	-	-	-	-	-	-	320	20	50
TIS TYPE 3	-	-	-	-	-	-	320	20	50
TIS TYPE 4	-	-	-	-	-	-	320	20	50

Type 1

NOMINAL DIMENSION DN		OUTSIDE DIAMETER MM.		THICKNESS MM.	WEIGHT	THREADS PER 25.4 MM.
mm.	inch	min	max	STD	kg/m	
15	1/2"	21.00	21.40	2.00	0.95	14
20	3/4"	26.40	26.90	2.30	1.38	14
25	1"	33.20	33.80	2.60	1.98	11
32	1 1/4"	41.90	42.50	2.60	2.54	11
40	1 1/2"	47.80	48.40	2.90	3.23	11
50	2"	59.60	60.20	2.90	4.08	11
65	2 1/2"	75.20	76.00	3.20	5.71	11
80	3"	87.90	88.70	3.20	6.72	11
100	4"	113.00	113.90	3.60	9.75	11

Type 2

NOMINAL DIMENSION DN		OUTSIDE DIAMETER MM.		THICKNESS MM.	WEIGHT	THREADS PER 25.4 MM.
mm.	inch	min	max	STD	kg/m	
15	1/2"	21.00	21.80	2.60	1.21	14
20	3/4"	26.50	27.30	2.60	1.56	14
25	1"	33.30	34.20	3.20	2.41	11
32	1 1/4"	42.00	42.90	3.20	3.10	11
40	1 1/2"	47.90	48.80	3.20	3.56	11
50	2"	59.70	60.80	3.60	5.03	11
65	2 1/2"	75.30	76.60	3.60	6.42	11
80	3"	88.00	89.50	4.00	8.36	11
100	4"	113.10	115.00	4.50	12.20	11
125	5"	138.50	140.80	5.00	16.60	11
150	6"	163.90	166.50	5.00	19.80	11

Type 3

NOMINAL DIMENSION DN		OUTSIDE DIAMETER MM.		THICKNESS MM.	WEIGHT	THREADS PER 25.4 MM.
mm.	inch	min	max	STD	kg/m	
15	1/2"	21.00	21.80	3.20	1.44	14
20	3/4"	26.50	27.30	3.20	1.87	14
25	1"	33.30	34.20	4.00	2.93	11
32	1 1/4"	42.00	42.90	4.00	3.79	11
40	1 1/2"	47.90	48.80	4.00	4.37	11
50	2"	59.70	60.80	4.50	6.19	11
65	2 1/2"	75.30	76.60	4.50	7.93	11
80	3"	88.00	89.50	5.00	10.30	11
100	4"	113.10	115.00	5.40	14.50	11
125	5"	138.50	140.80	5.40	17.90	11
150	6"	163.90	166.50	5.40	21.30	11

Type 4

NOMINAL DIMENSION DN		OUTSIDE DIAMETER MM.		THICKNESS MM.	WEIGHT	THREADS PER 25.4 MM.
mm.	inch	min	max	STD	kg/m	
65	2 1/2"	72.30	73.70	5.20	8.60	8
80	3"	88.00	89.80	5.50	11.30	8
100	4"	113.20	115.40	6.00	16.10	8
125	5"	139.90	142.70	6.60	21.80	8
150	6"	166.60	170.00	7.10	28.30	8
200(t)	8"	216.90	221.30	7.00	36.80	8
200(s)	8"	216.90	221.30	8.20	42.50	8

Dimension Tolerances
Thickness : Type 1 : -8% , +Not Limit
Type 2,3,4 : -12.5 % , +Not Limit

Weight : Type 1, 2, 3 : -8% , +10%
Type 4 : ± 5%

TIS 427

Electrically Welded Steel Water Pipe

MATERIAL OF GRADE	CHEMICAL COMPOSITION (%)						MECHANICAL PROPERTIES		
	C Max	Si Max	Mn Max	P Max	S Max	Cu Max	Yield Strength N/mm²	Tensile Strength N/mm²	Elongation %
Class (n)	0.250	-	-	0.040	0.050	0.20	165	310 - 380	30
Class (s)	0.250	-	-	0.040	0.050	0.20	205	380 - 450	25
Class (e)	0.300	-	-	0.040	0.050	0.20	230	> 415	23

NOMINAL SIZE		OUTSIDE DIAMETER	THICKNESS	MASS PER UNIT LENGTH	TEST PRESSURE (MPA)		
inch	mm.	mm.	mm.	kg/m	Class n	Class s	Class e
4"	100	101.6	2.70	6.59	5.26	6.45	7.33
			3.45	8.35	6.72	8.35	9.37
4 1/2"	115	114.3	2.70	7.43	4.68	5.81	6.52
			3.65	9.43	5.98	7.43	8.33
6"	150 A	152.4	2.70	9.97	4.38	5.45	6.11
			3.45	12.67	5.60	6.96	7.81
			4.80	17.47	7.80	9.69	10.87
			5.50	19.93	8.93	11.10	12.45
6 5/8"	150	168.3	2.70	11.03	3.97	4.93	5.53
			3.45	14.03	5.07	6.30	7.07
			4.80	19.35	7.06	8.77	9.84
			5.50	22.08	8.09	10.05	11.27
8"	200 A	203.0	3.45	16.98	4.21	5.23	5.86
			4.50	22.03	5.49	6.82	7.65
			4.80	23.46	5.85	7.27	8.16
			6.00	29.15	7.32	9.09	10.20
8 5/8"	200	219.1	3.45	18.35	3.90	4.84	5.43
			4.50	23.82	5.08	6.32	7.09
			4.80	25.37	5.42	6.74	7.56
			6.00	31.53	6.78	8.42	9.45
10"	250 A	254.0	3.45	21.32	3.81	4.73	5.31
			4.50	27.69	4.97	6.17	6.93
			4.80	29.50	5.30	6.59	7.39
			6.00	36.70	6.63	8.23	9.24
10 3/4"	250	273	3.45	22.93	3.54	4.40	4.94
			4.50	29.80	4.62	5.74	6.45
			4.80	31.75	4.93	6.13	6.87
			6.00	39.51	6.16	7.66	8.59
12"	300 A	304.8	4.50	33.33	4.14	5.15	5.77
			4.80	35.51	4.42	5.49	6.16
			6.00	44.21	5.52	6.86	7.70
12 3/4"	300	323.9	4.50	35.45	3.90	4.84	5.43
			4.80	37.77	4.16	5.16	5.79
			6.00	47.04	5.20	6.46	7.24
14"	350	355.6	4.80	41.53	3.79	4.70	5.28
			6.00	51.73	4.73	5.88	6.60
16"	400	406.4	4.80	47.54	3.31	4.12	4.62
			6.00	59.25	4.14	5.15	5.77
			6.35	62.65	4.38	5.45	6.11
			7.90	77.64	5.45	6.77	7.60

Dimension Tolerances
Outside Diameter : OD < 500 mm : ±1%

Thickness : +Not specified - 0.25 mm

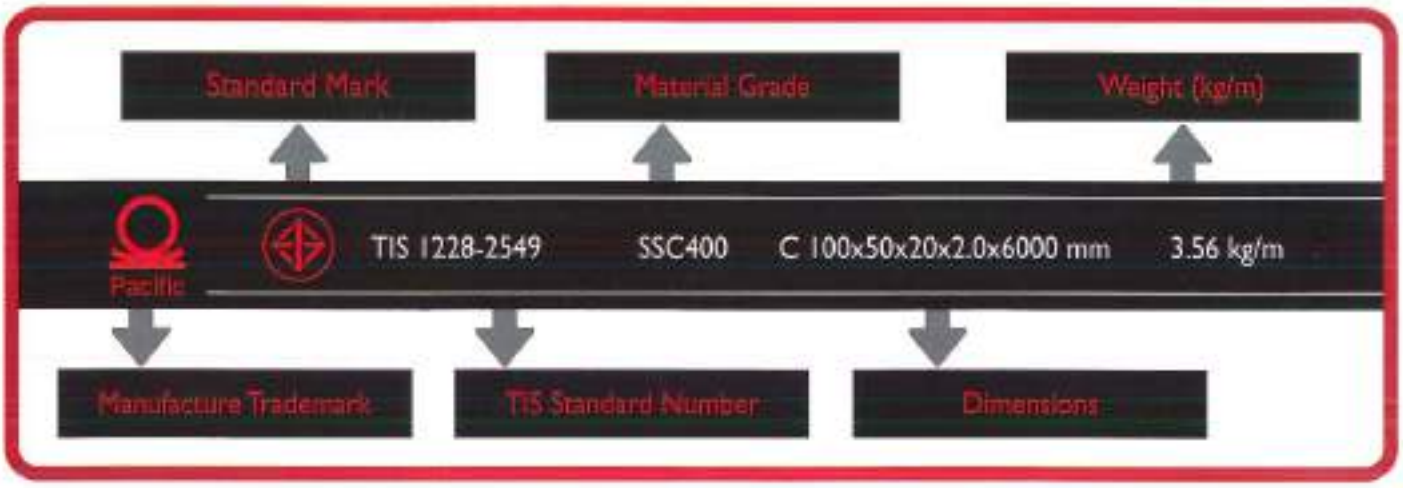
Lip Channel Steel

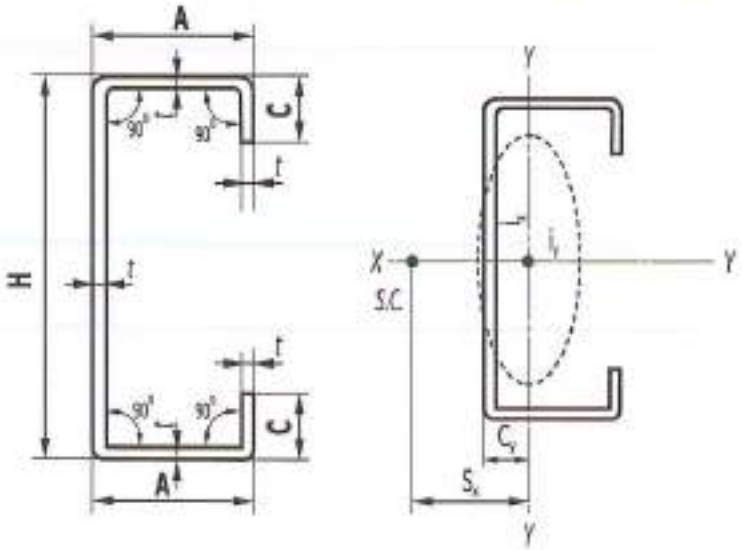
Product certification of the Thai Industrial Standards Institute (TISI) is base on 2 technical criteria

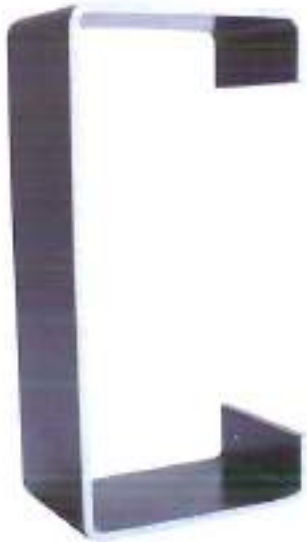
- The products are in conformity with the applicable standards
- Manufacturers have adequate quality control system to maintain the conformity of the products with the standards

Lip Channel Steel, the cold formed structure steel sections, has been compulsory certified by the standard TIS 1228-2549. This means that all the manufacturers, the distributors and the importers have to comply with this compulsory standard.

Compulsory certification mark for Lip Channel Steel







TIS 1228
Lip Channel Steel

DIMENSIONS	THICKNESS	CROSS SECTIONAL AREA	WEIGHT	CENTER OF GRAVITY		SECONDARY MOMENT OF AREA		RADIUS OF GYRATION OF AREA		MODULUS OF SECTION		CENTER OF SHEAR	
mm	mm	cm^2	kg/m	cm		cm^4		cm		cm^3		cm	
H X A x C	t	a		Cx	Cy	Ix	Iy	ix	iy	Zx	Zy	Sx	Sy
60 x 30 x 10	1.60	2.072	1.63	0	1.06	11.60	2.56	2.37	1.11	3.88	1.32	2.50	0
	2.00	2.537	1.99	0	1.06	14.00	3.01	2.35	1.09	4.65	1.55	2.50	0
	2.30	2.872	2.25	0	1.06	15.60	3.32	2.33	1.07	5.20	1.71	2.50	0
70 x 40 x 25	1.60	3.032	2.38	0	1.80	22.00	8.00	2.69	1.62	6.29	3.64	4.40	0
75 x 35 x15	2.30	3.677	2.89	0	1.29	31.00	6.58	2.91	1.34	8.28	2.98	3.10	0
75 x 45 x 15	1.60	2.952	2.32	0	1.72	27.10	8.71	3.03	1.72	7.24	3.13	4.10	0
	2.00	3.637	2.86	0	1.72	33.00	10.50	3.01	1.70	8.79	3.76	4.00	0
	2.30	4.137	3.25	0	1.72	37.10	11.80	3.00	1.69	9.90	4.24	4.00	0
90 x 45 x 20	1.60	3.352	2.63	0	1.73	42.60	10.50	3.56	1.77	9.46	5.80	4.20	0
	2.30	4.712	3.70	0	1.73	58.60	14.20	3.53	1.74	13.00	5.14	4.10	0
	3.20	6.367	5.00	0	1.72	76.90	18.30	3.48	1.69	17.10	6.57	4.10	0
100 x 50 x 20	1.60	3.672	2.88	0	1.87	58.40	14.00	3.99	1.95	11.70	4.47	4.50	0
	2.00	4.537	3.56	0	1.86	71.40	16.90	3.97	1.93	14.30	5.40	4.40	0
	2.30	5.172	4.06	0	1.86	80.70	19.00	3.95	1.92	16.10	6.06	4.40	0
	2.80	6.205	4.87	0	1.88	99.80	23.20	3.96	1.91	20.00	7.44	4.30	0
	3.20	7.007	5.50	0	1.86	107.00	24.50	3.90	1.87	21.30	7.81	4.40	0
	4.00	8.548	6.71	0	1.86	127.00	28.70	3.85	1.83	25.40	9.13	4.30	0
	4.50	9.469	7.43	0	1.86	139.00	30.90	3.82	1.81	27.70	9.82	4.30	0
120 x 40 x 20	3.20	7.007	5.50	0	1.32	144.00	15.30	4.53	1.48	24.00	5.71	3.40	0
120 x 60 x 20	2.30	6.092	4.78	0	2.13	140.00	31.30	4.79	2.27	23.30	8.10	5.10	0
	3.20	8.287	6.51	0	2.12	186.00	40.90	4.74	2.22	31.00	10.50	4.90	0
120 x 60 x 25	4.50	11.720	9.20	0	2.35	252.00	58.00	4.63	2.22	41.90	15.50	5.30	0
125 x 50 x 20	2.30	5.747	4.51	0	1.69	137.00	20.60	4.88	1.89	21.90	6.22	4.10	0
	3.20	7.807	6.13	0	1.68	181.00	26.60	4.81	1.85	29.00	8.02	4.00	0
	4.00	9.548	7.50	0	1.68	217.00	33.10	4.77	1.81	34.70	9.38	4.00	0
	4.50	10.590	8.32	0	1.68	238.00	33.50	4.74	1.78	38.00	10.00	4.00	0
150 x 50 x 20	2.30	6.322	4.96	0	1.55	210.00	21.90	5.77	1.86	28.00	6.33	3.80	0
	3.20	8.607	6.76	0	1.54	280.00	28.30	5.71	1.81	37.40	8.19	3.80	0
	4.50	11.720	9.20	0	1.54	368.00	35.70	5.60	1.75	49.00	10.50	3.70	0
150 x 65 x 20	2.30	7.012	5.50	0	2.13	248.00	41.10	5.94	2.42	33.00	9.37	5.20	0
	3.20	9.567	7.51	0	2.11	332.00	53.80	5.89	2.37	44.30	12.20	5.10	0
	4.00	11.750	9.22	0	2.11	401.00	63.70	5.84	2.33	53.50	14.50	5.00	0
150 x 75 x 20	3.20	10.210	8.01	0	2.51	366.00	76.40	5.99	2.74	48.90	15.30	5.10	0
	4.00	12.550	9.85	0	2.51	445.00	91.00	5.95	2.69	59.30	18.20	5.80	0
	4.50	13.970	11.00	0	2.50	489.00	99.10	5.92	2.66	65.20	19.80	6.00	0
150 x 75 x 25	3.20	10.530	8.27	0	2.66	375.00	83.60	5.97	2.82	50.00	17.30	6.40	0
	4.00	12.950	10.20	0	2.65	455.00	99.80	5.93	2.78	60.60	20.60	6.30	0
	4.50	14.420	11.30	0	2.65	501.00	109.00	5.90	2.75	66.90	22.50	6.30	0
200 x 75 x 20	3.20	11.810	9.27	0	2.19	716.00	84.10	7.79	2.67	71.60	15.80	5.40	0
	4.00	14.550	11.40	0	2.19	871.00	100.00	7.74	2.62	87.10	18.90	5.30	0
	4.50	16.220	12.70	0	2.19	963.00	109.00	7.71	2.60	96.30	20.60	5.30	0
200 x 75 x 25	3.20	12.130	9.52	0	2.33	736.00	92.30	7.70	2.76	73.60	17.80	5.70	0
	4.00	14.950	11.70	0	2.32	895.00	110.00	7.74	2.72	89.50	21.30	5.70	0
	4.50	16.670	13.10	0	2.32	990.00	121.00	7.61	2.69	99.00	23.30	5.60	0

TIS 1228
Lip Channel Steel

Dimensional Tolerances, Chemical Composition and Mechanical Properties of Lip Channel Steel

SPECIFIED ITEM AND DIMENSION			DIMENSIONAL TOLERANCES (MM)
Length of Side		A	± 1.5
	H	< 150	± 1.5
		150 ≤ H < 300	± 2.0
		≥ 300	± 3.0
		C	± 2.0
Thickness (t)		1.6	± 0.22
		2.0 and 2.3	± 0.25
		2.8	± 0.28
		3.2	± 0.30
		4.0 and 4.5	± 0.45
Length		≤ 7 m	+ 40, 0
		> 7 m	+ 40 and +5 for each m that the length exceeds 7 m
Angularity made by adjacent flat plate portions			± 1.5°
Unstraightness			Within 0.2% of whole length
Weight			± 10%

CHEMICAL COMPOSITION (%)	
C	0.28 (max)
P	0.06 (max)
S	0.06 (max)

MECHANICAL PROPERTIES	
Tensile Strength	400 – 540 MPa
Yield Strength	245 MPa (min)
Elongation	
t ≤ 5 mm	21% (min)
t > 5 mm	17% (min)

Lip Channel Steel Dimensions and Thickness

	WEIGHT (KG/M)						
	1.6	2.0	2.3	2.8	3.2	4.0	4.5
60 x 30 x 10	1.63	1.99	2.25	-	-	-	-
70 x 40 x 25	2.38	-	-	-	-	-	-
75 x 35 x 15	-	-	2.89	-	-	-	-
75 x 45 x 15	2.32	2.86	3.25	-	-	-	-
90 x 45 x 20	2.63	-	3.70	-	5.00	-	-
100 x 50 x 20	2.89	3.56	4.06	4.87	5.50	6.71	7.43
120 x 40 x 20	-	-	-	-	5.50	-	-
120 x 60 x 20	-	-	4.78	-	6.51	-	-
120 x 60 x 25	-	-	-	-	-	-	9.20
125 x 50 x 20	-	-	4.51	-	6.13	7.50	8.32
150 x 50 x 20	-	-	4.96	-	6.76	-	9.20
150 x 65 x 20	-	-	5.50	-	7.51	9.22	-
150 x 75 x 20	-	-	-	-	8.01	9.85	11.00
150 x 75 x 25	-	-	-	-	8.27	10.20	11.30
200 x 75 x 20	-	-	-	-	9.27	11.40	12.70
200 x 75 x 25	-	-	-	-	9.52	11.70	13.10

STANDARD SPECIFICATIONS
FOR WELDED CIRCULAR & NON - CIRCULAR STEEL

SPECIFICATION	SCOPE	GRADE OF TUBES	CHEMICAL COMPOSITION PERCENTAGE (MAX, UNLESS RANGE IS GIVEN)				
			C	Si	Mn	P	S
ASTM-A53	E.R.W.Carbon Steel Pipes	Grade A	0.25	-	0.95	0.050	0.045
		Grade B	0.30	-	1.20	0.050	0.045
ASTM A500	E.R.W.Carbon Steel Structural Tubing in Round	Grade A	0.30	-	1.40	0.045	0.045
		Grade B	0.30	-	1.40	0.045	0.045
		Grade C	0.27	-	1.40	0.045	0.045
		Grade D	0.30	-	1.40	0.045	0.045
	Rectangular Tubes and Square Tubes	Grade A	0.30	-	1.40	0.045	0.045
		Grade B	0.30	-	1.40	0.045	0.045
		Grade C	0.27	-	1.40	0.045	0.045
		Grade D	0.30	-	1.40	0.045	0.045
AS 1163	Structural Steel in Round Tube	C250 , C250LO	0.12	0.05	0.50	0.030	0.030
		C350 , C350LO	0.20	0.45	1.60	0.030	0.030
		C450 , C450LO	0.20	0.45	1.60	0.030	0.030
	Structural Steel in Square and Rectangular Tube	C250 , C250LO	0.12	0.05	0.50	0.030	0.030
		C350 , C350LO	0.20	0.45	1.60	0.030	0.030
		C450 , C450LO	0.20	0.45	1.60	0.030	0.030
BS 1139 TYPE4	E.R.W. Metal Scaffolding		0.20	0.30	-	0.050	0.050
EN 10255 (Transition from BS 1387)	E.R.W.Carbon Steel Tubes	Heavy Medium L, L1, and L2	0.20	-	1.40	0.035	0.030
EN 10219	Cold Formed Welded Structural Hollow Section	S275 J0H	0.20	-	1.50	0.040	0.040
		S275 J2H	0.20	-	1.50	0.035	0.035
		S355 J2H	0.22	0.55	1.60	0.035	0.035
JIS G 3444	E.R.W.Carbon Steel Pipes for General Structural Purposes	Grade - STK290	-	-	-	0.050	0.050
		Grade - STK400	0.25	-	-	0.040	0.040
		Grade - STK490	0.18	0.55	1.50	0.040	0.040
		Grade - STKS00	0.24	0.35	0.30-1.30	0.040	0.040
		Grade - STKS40	0.23	0.55	1.50	0.040	0.040
JIS G 3452	E.R.W.Carbon Steel Pipes for Ordinary uses	SGP	-	-	-	0.040	0.040
JIS G 3454	Carbon Steel Pipe for and Rectangular Pressure Service	STPG 370	0.25	0.35	0.30 - 0.90	0.040	0.040
		STPG 410	0.30	0.35	0.30 - 1.00	0.040	0.040
JIS G 3466	E.R.W.Carbon Steel Square Tubes for General Structural Purposes	STKR400	0.25	-	-	0.040	0.040
		STKR490	0.18	0.55	1.50	0.040	0.040
TIS 107	Round Pipes	HS-41	0.28	-	-	0.048	0.048
		HS-50=SS490	0.21	0.57	1.53	0.048	0.048
		HS-51=SS500	0.33	0.37	0.33-1.03	0.048	0.048
	Rectangular Tubes and Square Tubes	HS-41	0.28	-	-	0.048	0.048
		HS-50	0.21	0.57	1.53	0.048	0.048
TIS 2768377	Round Pipes	TIS TYPE 1	-	-	-	-	-
		TIS TYPE 2	-	-	-	-	-
		TIS TYPE 3	-	-	-	-	-
		TIS TYPE 4	-	-	-	-	-
TIS 427	Electrically Welded Steel Water Pipe	Class II	0.25	-	-	0.040	0.050
		Class III	0.25	-	-	0.040	0.050
		Class IV	0.30	-	-	0.040	0.050
TIS 1228	LIP Channel Steel	SSC400	0.28	-	-	0.060	0.060




MECHANICAL PROPERTIES			OTHER TESTS	DIMENSIONAL TOLERANCES		
Tensile Strength (min.) MPa	Yield Strength (min.) MPa	Elongation (% min.)	Hydrostatic Test kg/cm²	On Diameter	On Wall Thickness	Weight
330 415	205 240	- -	48.30-92.40 48.30-108.20	NPS ≤ 1 1/2 in : ± 0.4 mm NPS ≥ 2 in : ± 1%	+ Not Limit, - 12.5%	±10%
310 400 425 400	230 290 315 250	- - - -	- - - -	NPS ≤ 1 1/2 in : ± 0.5% with a minimum ± 0.13 mm. NPS ≥ 1 2 in : ± 0.75%	±10%	Not Specified
310 400 425 400	270 315 345 250	- - - -	- - - -	≤ 63.50 mm : ± 0.51 mm 63.5 mm - 88.9 mm : ± 0.64 mm 88.9 mm - 139.7 mm : ± 0.76 mm >139.70 mm : ± 1%		
320 430 500	250 350 500	22 20 16	- - -	± 0% with a minimum of ± 0.5 mm and a maximum of ± 1.0 mm.	±10%	- 4%, + Not Specified
320 430 500	250 350 500	18 16 14	- - -	± 1% with a minimum of ± 0.5 mm.	±10%	- 4%, + Not Specified
340-480	235	24	-	Outside Diameter : 48.3 mm, ± 0.5 mm Inside Diameter : 40.3 mm, - 2.6 mm include the welded zone	4.0 mm : + Not Specified, - 10%	Single 4.37 kg/m, + 12%, - 8% Batch ± 7.5%
330-520	195	20	50		Mand H Series and Type L : ± 10% Type L1 and L2 : + by mass to lecanse, -8%	Mand H Series and Type L : ± 7.5% on bundle of 10 tons or more Type L1 and L2 : + 10%, -8%
410-560 410-560 490-630	275 275 355	20 20 20	- - -	**Circular hollow sections** ± 1% with a minimum of ± 0.5 mm and a maximum of ± 10 mm **Square and rectangular hollow sections side length** H,B < 100 : ± 1% with a minimum of ± 0.5 mm, 100 ≤ H, B ≤ 200 : ± 0.8% H, B ≥ 200 : ± 0.6%	Circular hollow sections D ≤ 406 : 4 mm t ≤ 5 mm : ± 10% t > 5 mm : ± 0.5 mm D > 406 : 4 mm ± 10% with a maximum of 2 mm Square and rectangular hollow sections t ≤ 5 mm : ± 10% t > 5 mm : ± 0.5 mm	± 6%
290 400 490 500 540	- 235 315 355 390	30 23 23 15 20	- - - -	Class 1 OD < 50 mm, ± 0.5 mm OD ≥ 50 mm ± 1% Class 2 OD < 50 mm : ± 0.25 mm OD ≥ 50 mm : ± 0.5%	Class 1 < 4.0 mm : + 0.6 mm - 0.5 mm ≥ 4.0 mm : + 15% - 12.5% Class 2 < 3.0 mm : ± 0.3 mm ≥ 3.0 mm : ± 10%	Not Specified
290	-	30	-	Size ≤ 1 ½ in : ± 0.50 mm 2 in ≤ Size ≤ 5 in : ± 1% 6 in ≤ Size ≤ 7 in : ± 1.60 mm Size ≥ 8 in : ± 0.80%	+ Not Specified - 12.5%	Not Specified
370 410	215 245	30 25	- 60	< 25 mm : ± 0.3 mm ≥ 32 mm : ± 0.8% ≥ 350 mm : ± 0.5%	t < 3.00 : ± 0.30 mm t ≥ 3.00 : ± 10%	Not Specified
400 490	245 325	23 23	- -	≤ 100 mm : ± 1.5 mm > 100 mm : ± 1.5%	t < 3.0 mm : ± 0.3 mm, t ≥ 3.0 mm : ± 10%	Not Specified
402 490 500	235 314 353	23 23 15	- - -	≤ 50 mm : ± 0.5 mm > 50 mm : ± 1%	3.0 ≤ t ≤ 3.2 : ± 0.30 mm 4.0 ≤ t ≤ 8.0 : ± 10%	± 10%
402 490	235 314	23 23	- -	≤ 100 mm : ± 1.5 mm > 100 mm : ± 1.5%	2.0 ≤ t ≤ 3.2 : ± 0.30 mm 4.0 ≤ t ≤ 8.0 : ± 10%	
320 320 320 320	- - - -	20 20 20 20	50 50 50 50		TYPE 1 : + Not Specified, - 8% TYPE 2,3,4 : +Not Specified, - 12.5%	TYPE 1,2,3 : -8% +10% TYPE 4 : ± 5%
310 - 380 380 - 450 ≥ 415	165 205 230	30 25 23	- - -	OD < 500 mm : ± 1%	+ Not Specified ± 0.25 mm	Not Specified
400 - 540	245	≤ 5 mm = 21 > 5 mm = 17		**Length of side** A : ± 1.5 mm H < 150 mm : ± 1.5 mm 150 mm ≤ H < 300 mm : ± 2.0 mm H ≥ 300 mm : ± 3.0 mm C : ± 2.0 mm	1.60 mm : ± 0.22 mm 2.00 and 2.30 mm : ± 0.25 mm 2.80 mm : ± 0.28 mm 3.20 mm : ± 0.30 mm 4.00 and 4.50 mm : ± 0.45 mm	± 10%

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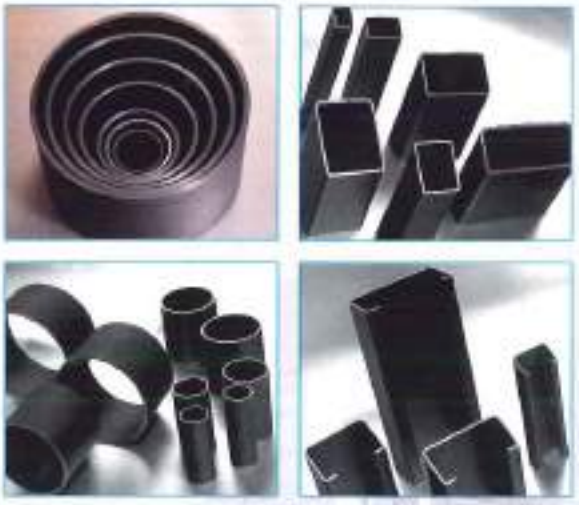

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