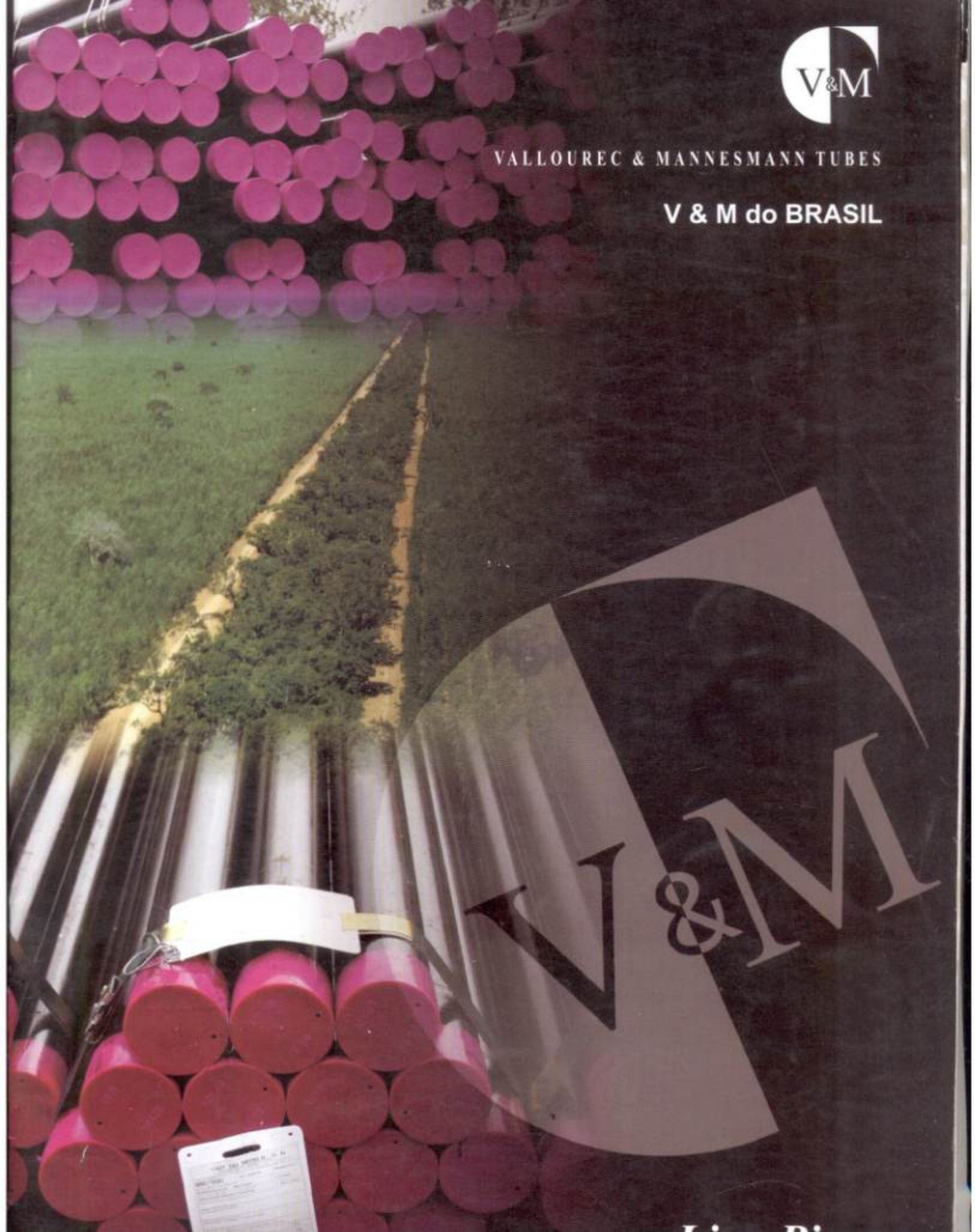

V&M
VALLOUREC & MANNESMANN TUBES
V & M do BRASIL
V&M


VALLOUREC & MANNESMANN TUBES

OUR COMPANY

Established in 1952 by German company Mannesmannröhren-Werke, the former Mannesmann set up production facilities in Brazil in order to meet the needs of the then emerging national oil industry.

In June 2000, the company was incorporated to the VALLOUREC & MANNESMANN TUBES Group (V & M TUBES), taking on its new name **V & M do BRASIL S. A.**.

The Company's Industrial Complex the Barreiro Integrated Plant is located in Belo Horizonte (capital city of the Brazilian State of Minas Gerais) and covers an area of 3 million square meters. Its annual production capacity amounts to some 600 hundred thousand tons of seamless steel tubes.

In addition to the Barreiro Plant, subsidiaries V & M FLORESTAL and V & M MINERAÇÃO further compound the V & M do BRASIL Group. Those subsidiary companies supply the essential raw materials used in the steel-making process, namely, charcoal and iron ore, thus enabling sustainable steel production. Given this independence from other companies, **V & M do BRASIL** is in position to offer competitive delivery times and to produce materials with various steel grades according to the specific demands of each individual client.

V & M do BRASIL aims at maintaining the best offer of seamless steel tubes and thereby keeping the lead in the national market, while further representing a decisive competitive edge for the VALLOUREC & MANNESMANN TUBES Group in the international market.

To that effect, it is necessary to sustain excellence at every phase of the integrated process.

We work hard to set the benchmark in all aspects from iron ore and charcoal production to final product delivery to our clients.

INTEGRATED MANAGEMENT SYSTEM

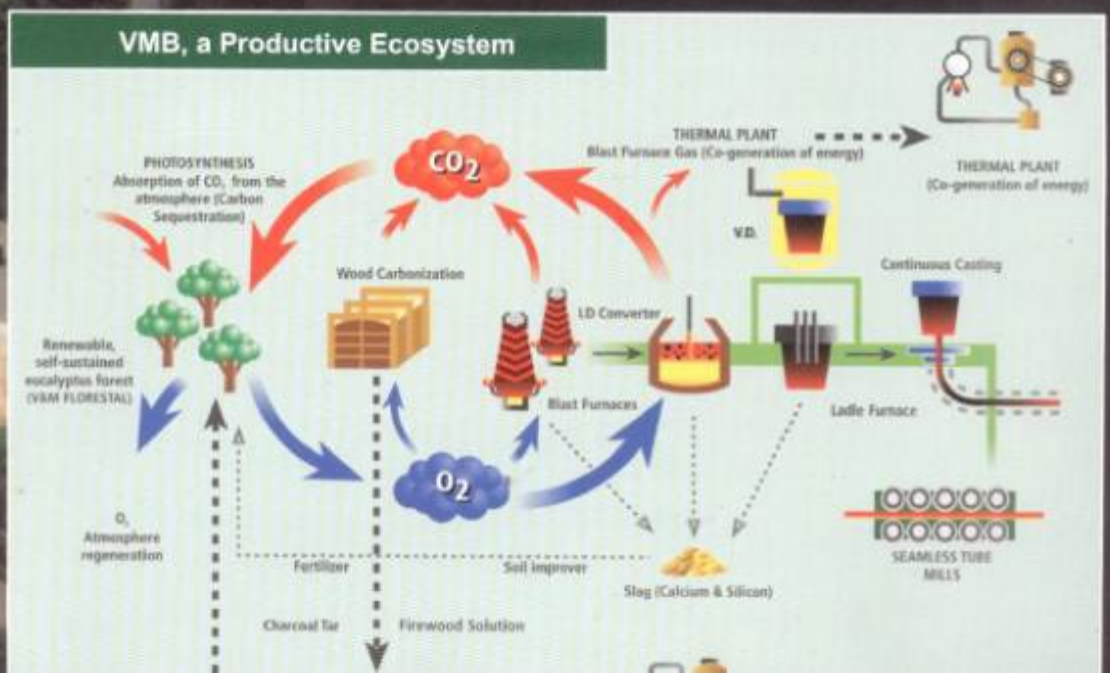
It is at the core of **V & M do BRASIL**'s policy to operate with high quality standards and modern technologies, with the aim to keep our market lead by offering products and services that really meet our clients' needs, while further promoting health & safety at work, protecting the environment and preventing pollution, in full compliance with all applicable standards and legislation, always seeking continuous improvement in performance.

ENVIRONMENTAL RESPONSIBILITY

Covering some 127 thousand hectares the equivalent to no fewer than 160.000 football fields, V & M FLORESTAL's growing eucalyptus forests contribute to reducing the greenhouse effect, as they sequestrate CO_2 and release oxygen into the atmosphere.

V & M do BRASIL manufactures seamless tubes with steel produced by using charcoal as a reductant in the process. This means that, for each ton of steel produced at the Barreiro Plant's steelworks fueled by charcoal supplied by V & M FLORESTAL , the atmosphere is spared 1.8 tons of CO_2 which would otherwise be accumulating in it. By resorting to such environmentally correct, economically feasible and socially fair industrial processes, **V & M do BRASIL** has earned the right to identify its products with the "Green Tube" label.

For having successfully achieved such remarkable balance between technology use and nature conservation, **V & M do BRASIL** has been awarded major international certifications, such as API-Q1, ISO TS 16949, ISO 9001, ISO 14001 and OHSAS 18001.



V & M TUBES

Vallourec & Mannesmann Tubes is a world leader in the manufacture of seamless steel tubes, with steelworks and production plants in Brazil, France, Germany, United States and China.
Thus, **V & M do BRASIL**'s range of line pipes is complemented by products manufactured by other companies comprising the Group.

MAIN CERTIFICATIONS

ISO/TS 16949	Quality Management System for the Automotive Industry
API-Q1	Quality Management System for the Oil Industry
ISO 9001	Quality Management System
ISO 14001	Environmental Management System
OHSAS	Occupational Health & Safety Management System
DNV	Approval of Manufacturer
Shell Certificate	Management System

MAKING THE DIFFERENCE IN PRODUCT PERFORMANCE

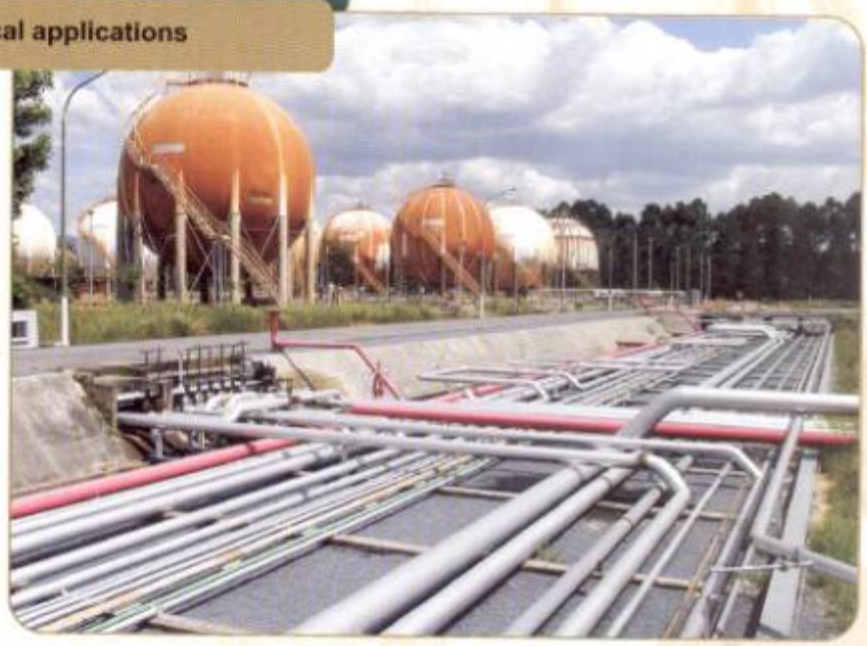
V & M do BRASIL seamless steel tubes have an industry-wide reputation for reliability in fluid transportation and storage.

Our products meet the most demanding specifications for mechanical performance, dimensional precision and structural integrity.

State-of-the art manufacturing technology ensures flawless performance even under extreme conditions of temperature variation, high working pressures, corrosive and abrasive environments, etc.

The reliability of **V & M do BRASIL** products guarantees the highest standards of safe pipeline operation in sensitive and inaccessible locations such as forests, mountains, off-shore operations, urban areas and nature reserves.

Petrochemical applications



Liquid pig iron from the blast furnace is transformed into steel at the LD Converter by injecting pure oxygen. Automatic temperature measurements during the process, coupled with the submerged blowing technology (using nitrogen or argon), result in high levels of system reliability and yield, and in top quality liquid steel.

SECONDARY METALLURGY

Secondary Metallurgy includes a Ladle Furnace, a Vacuum Degassing Unit and a Rinse Station.

At the Ladle Furnace, temperature adjustments and chemical analysis are controlled by a modern supervisory system, ensuring excellent repeatability, process control, and the desired quality.
The equipment features the following functionalities: wire alloy injection, CaSi treatment and stirring of the liquid steel by argon bubbling.

Material treatment in the Ladle Furnace thus contribute to increasing steel purity and homogeneity.

The Vacuum Degassing Unit enables the removal of gases such as oxygen, nitrogen and hydrogen from the liquid steel.

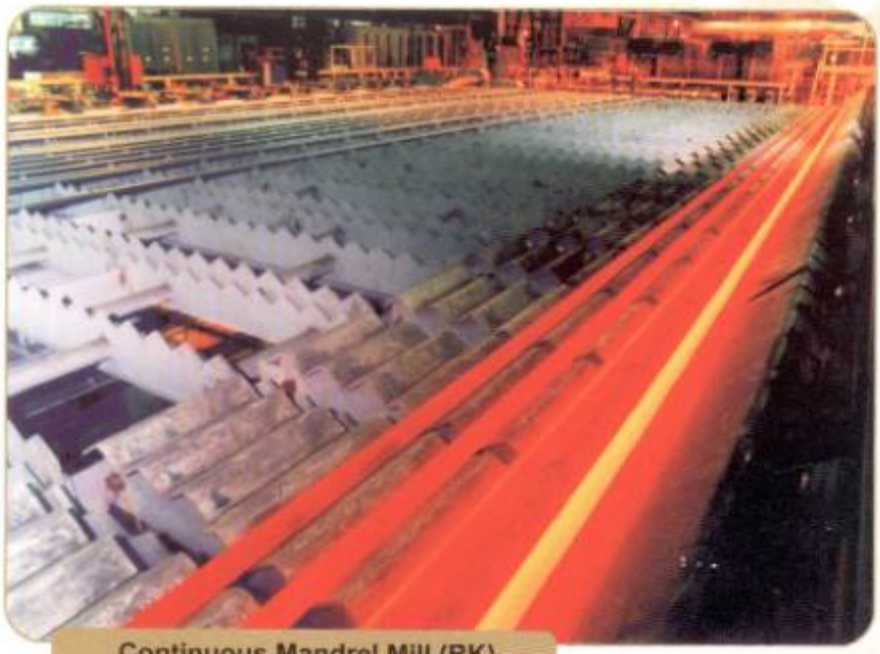
In the sequence of production, the steels are further treated at the Rinse Station, where argon is gently passed through the material with the purpose of achieving high levels of purity of the liquid metal.

CONTINUOUS CASTING

The liquid steel is finally solidified in a four-shaft continuous casting machine, resulting in solid bars of 180, 194 and 230 mm of diameter.

The continuous casting unit is further equipped with a double electromagnetic stirring system which contributes to greater internal homogeneity of the solidified bar, thus improving steel quality.

V & M do BRASIL operates two seamless rolling mills producing pipes from 26.7 mm (3/4") to 355.6 mm (14") in diameter. The raw materials are solid steel billets with 180 to 230 mm in diameter, heated to 1280° C.



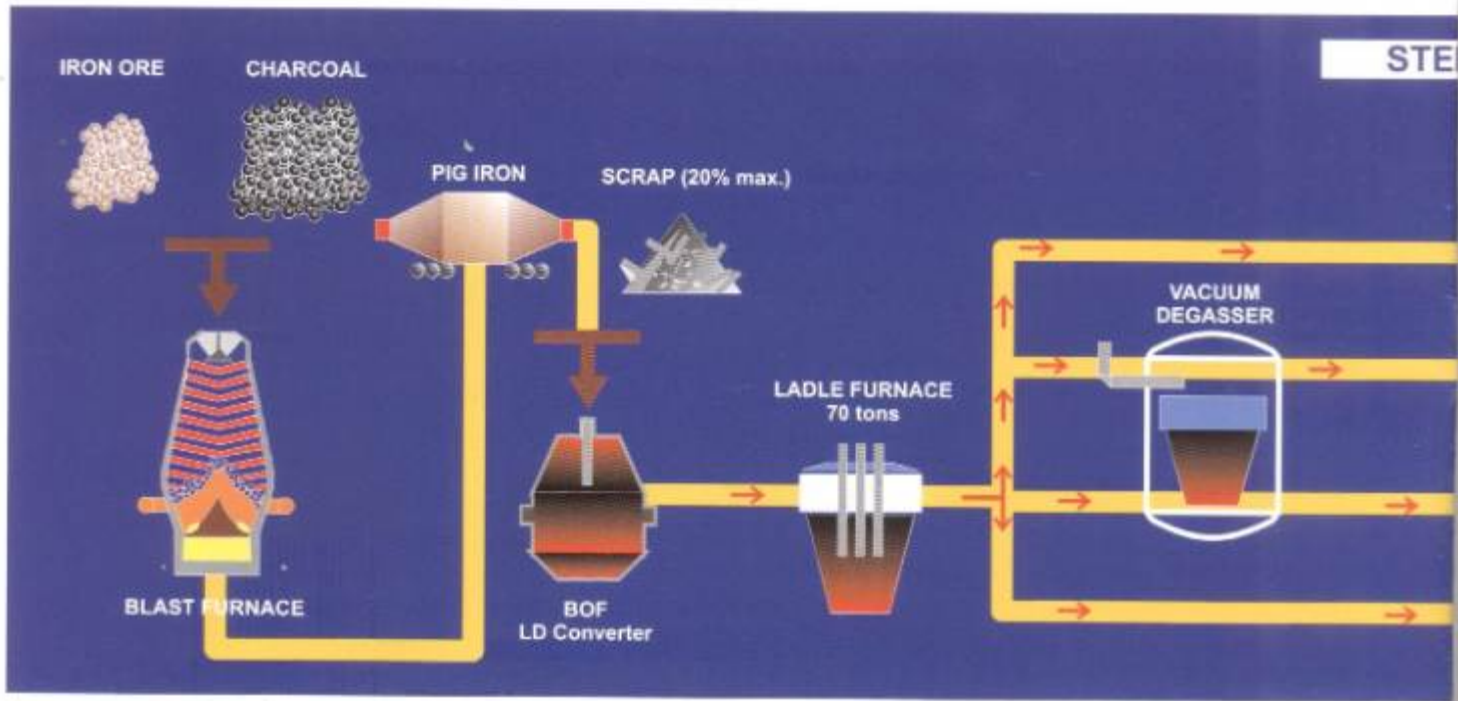
Continuous Mandrel Mill (RK)

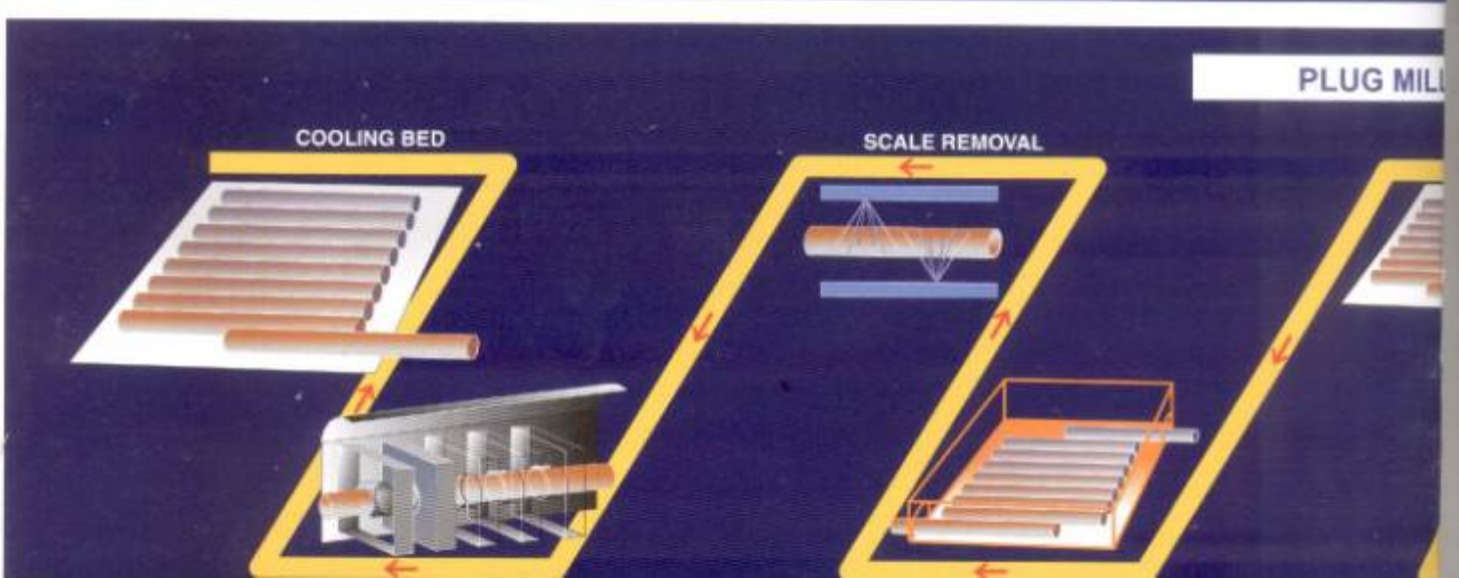
Plug Mill

Billet piercing takes place at the Piercing Mill, present in both facilities. Rotation of double cone-shaped rolls generates shearing stresses at billet center, thus forming an axial cavity. This cavity is then expanded and has its surface smoothed out by a piercing plug positioned at the end of a long rod.

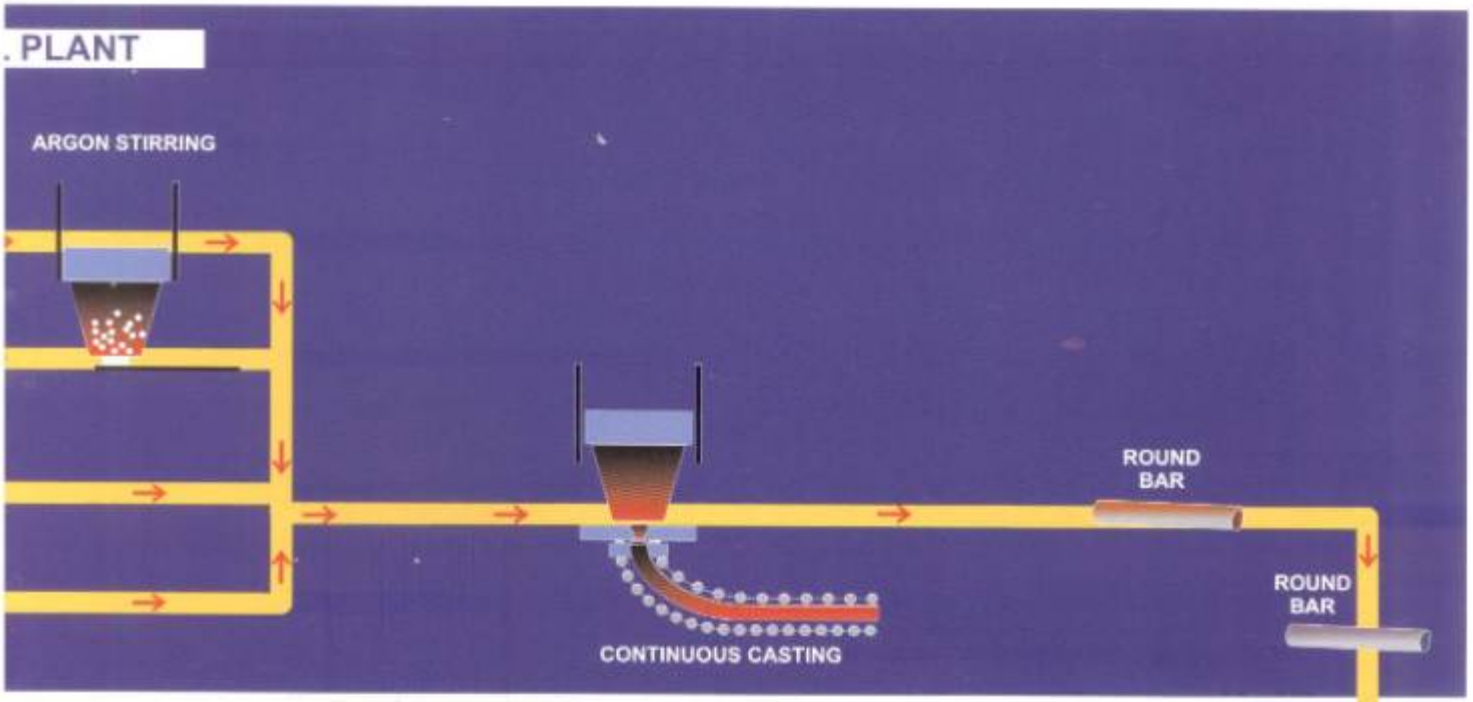
The resulting pierced block or "lupa" (Portuguese for bloom) is then formed by a series of subsequent rollers into a tube with its desired final dimensions.

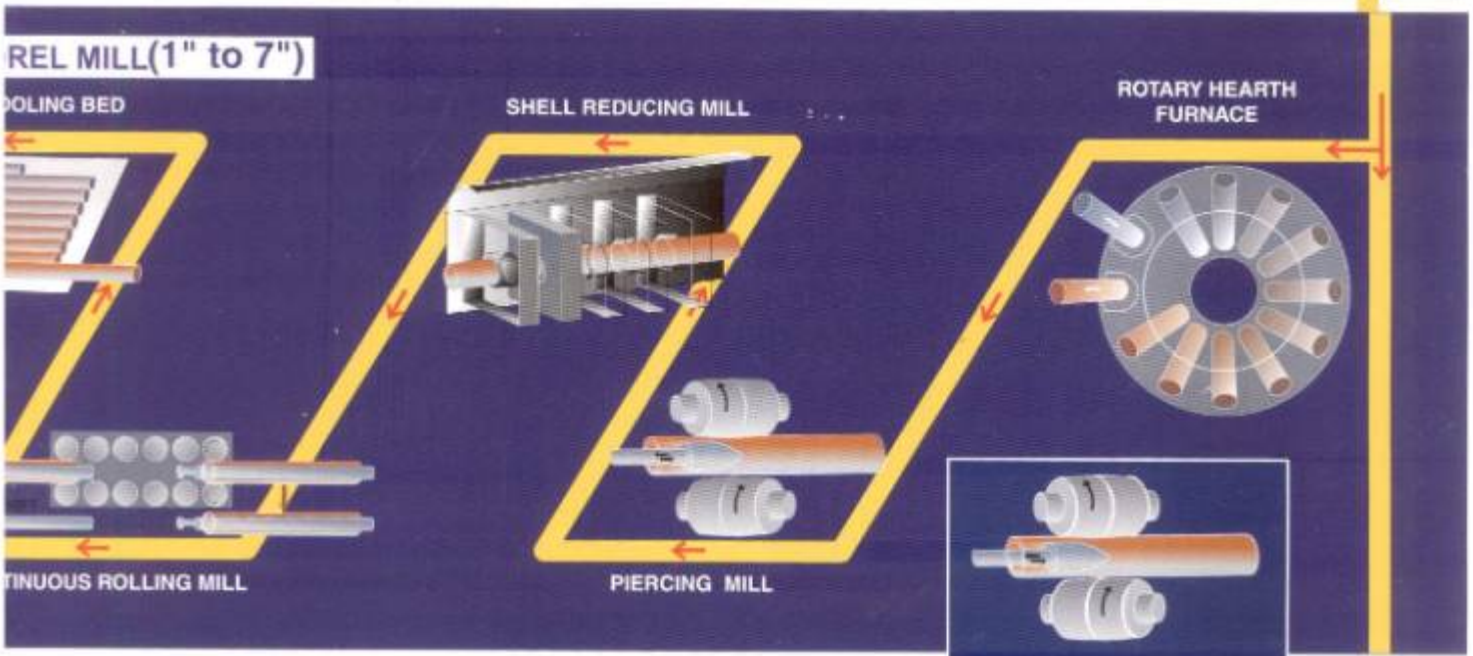
PRODUCTION FLOWCHART





PRODUCTION FLOWCHART





To ensure optimum product quality and uniformity, **V & M do BRASIL** operates a system of process controls and checks at various stages of the production process.

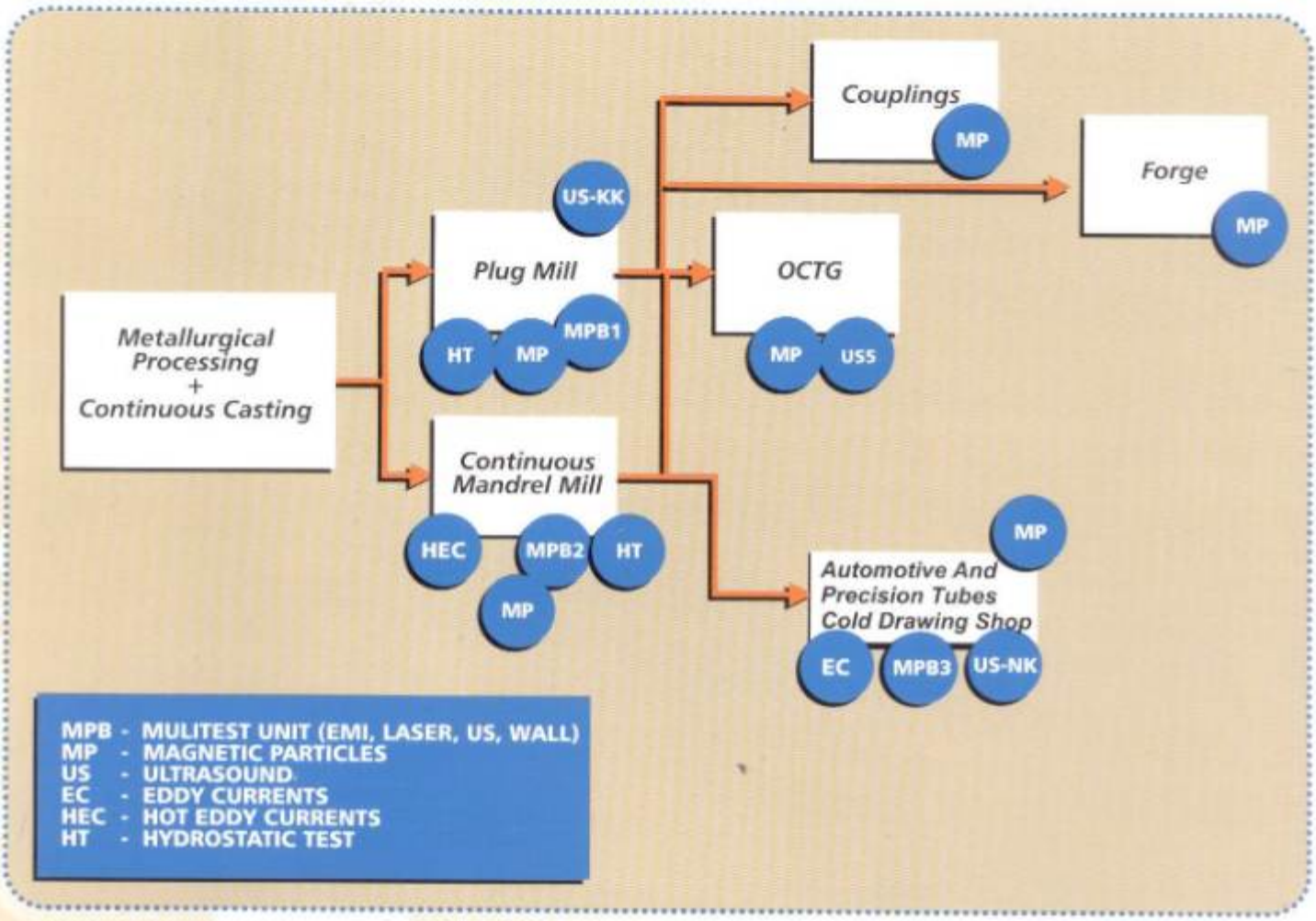
To stay abreast of market developments and technological advances, VMB uses automated computer-controlled systems for measurement, process control and inspection by means of Non-Destructive Tests considered the state-of-the-art in technology.

These systems use electromagnetic techniques (magnetic dispersion flux and eddy currents), ultrasound, magnetic particle inspection, gamma rays and laser measurements. Moreover, they feature multifunctional testing and measuring equipment (known as "multitestblocks") comprising devices with various functions assembled on a single platform.

All the pieces of this NDT equipment are centrally operated and feature their own fully automated, computerized panels, which can be used for feed benches or mechanical adjustments, or to set parameters for marking selection.

Quality records are made available by the system, as evidence of product conformity and as a mean to provide technical information capable of enabling increased reliability and improvements in production processes, thus enhancing quality assurance on the tubes manufactured by **V & M do BRASIL**.

The chart below shows the location of various equipment items along the production flow:



1• Heat Treatment

V & M DO BRASIL relies on both on- and off-line equipment to lend a wide range of mechanical properties and micro-structural characteristics to its line pipes.

The following heat treatment processes can be applied to different grades of steel:

- X46 and below: normalizing
- X52 and X56: normalizing or quenching and tempering
- X60 and above: quenching and tempering

V & M do BRASIL's quenching equipment perform heat treatment with cooling through water or air, in the case of tubes made in special grades (13% Cr). Off-line normalizing treatments are also provided at this same installation.

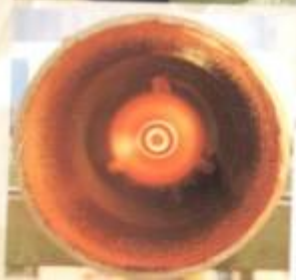
V & M do BRASIL can also perform cold calibration of tube ends. Particularly important for its quenched and tempered product line, this capability enables stricter dimensional tolerances to be applied, thus allowing higher productivity of butt-welding operations out in the field.

Quenching

2• Coating

Coating processes are performed by Bredero Shaw at the **V & M do BRASIL** plant in Belo Horizonte. Pipes for underground or submerged pipelines can be supplied with the following anti-corrosion coatings:

- ► Anti-Corrosion Coatings: FBE, 3LPP, 3LPE and Dual Layer FBE;
- ► Flow Assurance Coating: Thermotite® Polypropylene Insulation Systems;
- ► Internal Coating: Flowcoat and Sureflow® FEC Thin Film Internal Epoxy Coating.



Nominal pipe diameter:	2" (60,3 mm) to 14" (355,6 mm)
Length:	8m (26.25 ft.) to 14m (45.93 ft.)
Max. pipe weight:	4000 kg. (8818 lb.)
Application:	FBE (Fusion Bonded Epoxy) external coatings and multi-layer Polyethylene or Polypropylene coating systems
Standards and specifications:	Brazilian (Petrobras), German (DIN), French (NFA), Canadian or other technical standards and specifications can be applied, subject to consultation.

The Green Tube

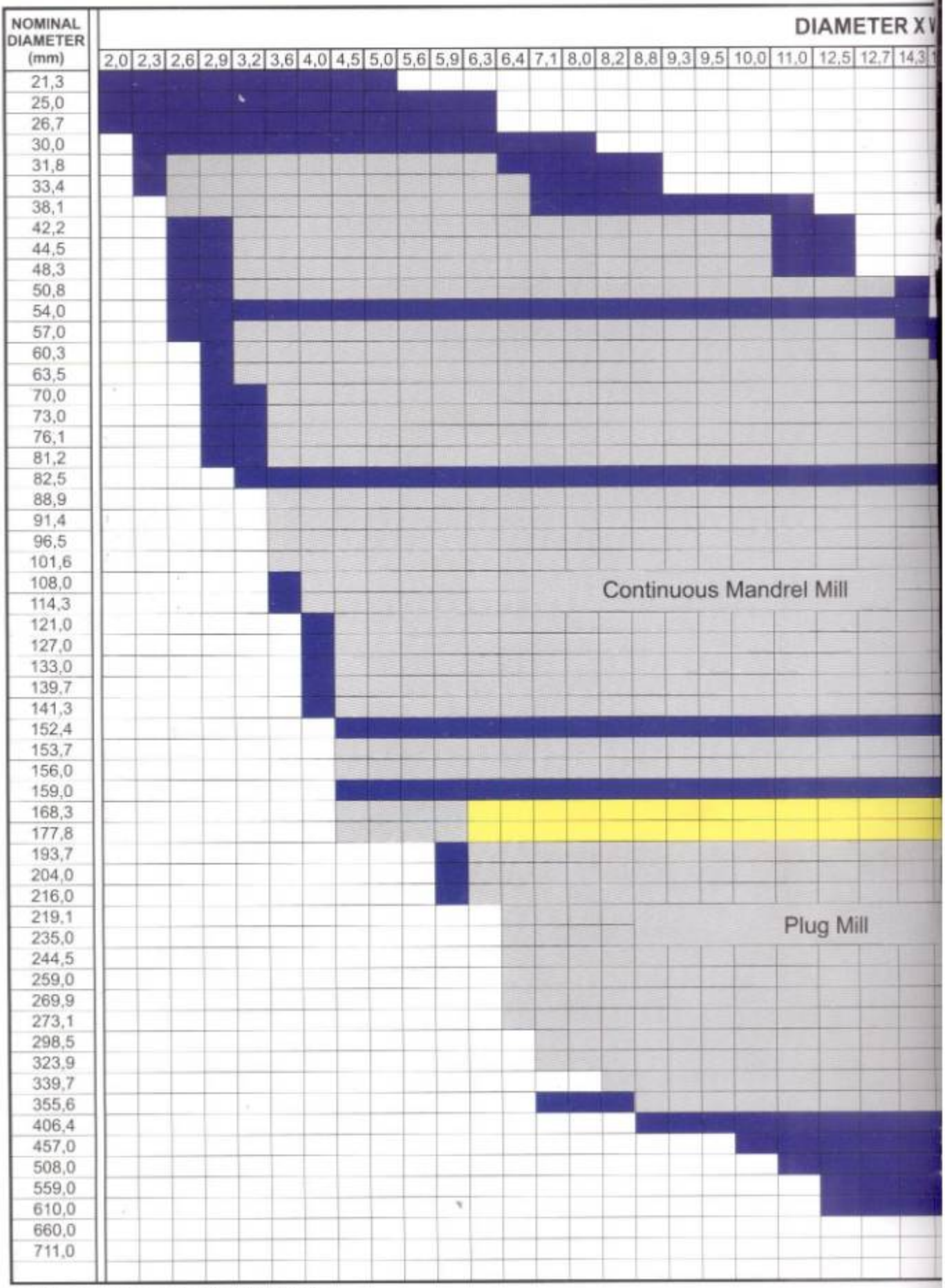
The reductant used by **V & M do BRASIL** in the manufacture of steel is charcoal, which originates from eucalyptus forests planted and managed by its subsidiary V & M FLORESTAL. With the use of charcoal (a sustainable biofuel) instead of metallurgic coke (a non-renewable fossil fuel), the Company boasts a favorable balance between emissions and absorption of carbon dioxide (CO_2) - main greenhouse gas.

With a view to ensuring success and sustaining its activities in the long term, the Company works strategically for continuous improvement of environmental quality in the areas under its influence. **V & M do BRASIL** works within the concept of "Sustainable Time", created as a landmark to represent Company's commitment to the economic, social and environmental sustainability of its business.

Since 1999, the Company has been establishing environmental goals for all units, maintaining a process of continuous improvement monitored by reference to several performance indicators.

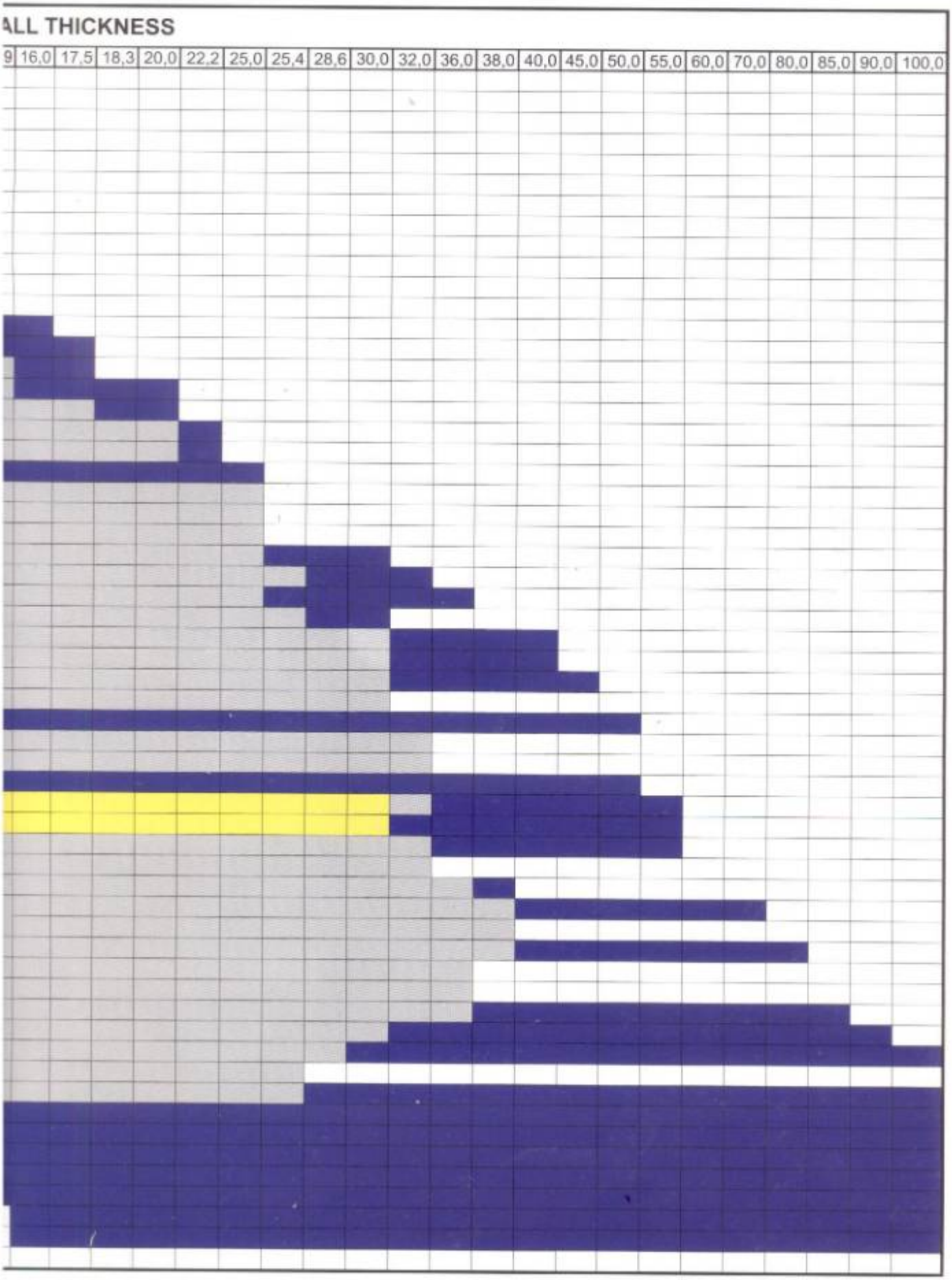
In addition to a permanent follow-up on its environmental performance, the Company started in 2007 a series of socio-environmental actions oriented towards the optimization of specific aspects of its management and relationship with the communities in which it operates. The actions are managed by Environmental Working Groups, created with a focus on the study and proposal of solution for problems regarding air emissions, liquid effluents, noises and solid waste, with the purpose of eliminating, minimizing or controlling possible disturbances caused by the Company's industrial activities.

HOT ROLLED SEAMLESS STEEL TUBES



Sizes produced at V & M do BRASIL

Sizes produced both at the Continuous Mandrel Mill and at the Plug Mill of V & M do BRASIL


ALL THICKNESS
9 16,0 17,5 18,3 20,0 22,2 25,0 25,4 28,6 30,0 32,0 36,0 38,0 40,0 45,0 50,0 55,0 60,0 70,0 80,0 85,0 90,0 100,0

API 5L - Line Pipe - PSL1

1 - Chemical composition (%)

Grade	C (max.)	Mn. (max.)	P		S (max.)	Ti (max.)
			(min.)	(max.)		
A25 Cl I	0.21	0.60	-	0.030	0.030	-
A25 Cl II	0.21	0.60	0.045	0.080	0.030	-
A	0.22	0.90	-	0.030	0.030	-
B	0.28	1.20	-	0.030	0.030	0.040
X42	0.28	1.30	-	0.030	0.030	0.040
X46/ 52/ 56	0.28	1.40	-	0.030	0.030	0.040
X60	0.28	1.40	-	0.030	0.030	0.040
X65 / 70	0.28	1.40	-	0.030	0.030	0.060

Obs.: 1) Each 0.01% reduction in maximum specified carbon allows a 0.05% increase in maximum specified manganese, up to a limit of 1.50% for grades X42 to X52, 1.65% for grades X56 to X65, and 2.00% for grade X70.

2 - Mechanical properties

Grade	Yield Strength - min.		Tensile Strength - min.	
	psi	Mpa	psi	Mpa
A25	25.000	172	45.000	310
A	30.000	207	48.000	331
B	35.000	241	60.000	414
X42	42.000	290	60.000	414
X46	46.000	317	63.000	434
X52	52.000	359	66.000	455
X56	56.000	386	71.000	490
X60	60.000	414	75.000	517
X65	65.000	448	77.000	531
X70	70.000	483	82.000	565

Note: Elongation as per standard.

3 - Lengths

As per Table 11 of API-5L Standard	**6 m (20 ft):** 2.74 to 6.86m (9.0 to 22.5 ft). with 5.33m minimum average (17.5 ft). **12 m (40 ft):** 4.27 to 13.72 m (14.0 to 45.0 ft). with 10.67m minimum average (35.0 ft).
Standard Manufacturing Lenghts	4.0 to 8.0 meters.
Other lengths or ranges	Upon request.

4 - End finish

- Plain
- Beveled: ≥ 2" (60.3 mm)
- Threads and couplings as per API 5B Std: 60.3mm (2") to 273.1mm (10")

5 - Tolerances

Outside diameter	Up to 48.3mm (1.9"): + 0.41mm (+0.016 in.) - 0.79mm (-0.031 in.) 60.3mm (2.3/8") and larger: +/- 0.75%
Wall thickness	Ø up to 73.0mm (2.7/8"): Grades A, B, A25: + 20% - 12.5% Grades X42 to X70: + 15% - 12.5% Ø 88.9mm (3.1/2") and larger: Grades A, B, A25: + 15% - 12.5% Grades X42 to X70: + 15% - 12.5%
Weight	**Per tube:** Grades A, B and X42 to X70: +10% - 3.5% Grade A25: +10% -5% **Per lot:** Grades A, B and X42 to X70: - 1.75% Grade A25: - 2.5%

6 - Testing

API 5L/Line Pipe/ PSL2 • For PSL2, only outside diameters from 114.30 to 355.60mm

1 - Chemical composition (%)

Grade	C (max.)	Mn. (max.)	P (max.)	S (max.)	Ti (max.)
B	0.24	1.20	0.025	0.015	0.040
X42	0.24	1.30	0.025	0.015	0.040
X46/ 52/ 56/ 60	0.24	1.40	0.025	0.015	0.040
X65/ 70/ 80	0.24	1.40	0.025	0.015	0.060

Note: 1) Each 0.01% reduction in maximum specified carbon allows a 0.05% increase in maximum specified manganese, up to a limit of 1.50% for grades X42 to X52, 1.65% for grades X56 to X65, and 2.00% for grades X70 and X80.

2) Maximum carbon equivalent: values for wall thickness up to 20.3mm and up to Grade X70. Wall thickness above that and Grade X80 upon request.

CE(Pcm) = 0.255 for carbon content = 0.12%, calculated through the formula:

$$C + \frac{Si}{30} + \frac{Mn}{20} + \frac{Cu}{20} + \frac{Ni}{60} + \frac{Cr}{20} + \frac{Mo}{15} + \frac{V}{10} + 5B$$

CE(IIW) = 0.43% for carbon content = 0.12%, calculated through the formula:

$$CE(IIW) = C + \frac{Mn}{6} + \frac{(Cu + Mo + V)}{5} + \frac{(Ni + Cu)}{15}$$

2 - Mechanical properties

Grade	Yield Strength				Tensile Strength			
	(min.)		(max.)		(min.)		(max.)	
	psi	Mpa	psi	Mpa	psi	Mpa	psi	Mpa
B	35.000	241	65.000	448	60.000	414	110.000	758
X42	42.000	290	72.000	496	60.000	414	110.000	758
X46	46.000	317	76.000	524	63.000	434	110.000	758
X52	52.000	359	77.000	531	66.000	455	110.000	758
X56	56.000	386	79.000	544	71.000	490	110.000	758
X60	60.000	414	82.000	565	75.000	517	110.000	758
X65	65.000	448	87.000	600	77.000	531	110.000	758
X70	70.000	483	90.000	621	82.000	565	110.000	758
X80	80.000	552	100.000	690	90.000	621	120.000	827

Note: Elongation as per standard.

3 - Lengths

As per Table 11 of API 5L Standard	**6 m (20 ft):** 2.74 to 6.86m (9.0 to 22.5 ft). with 5.33m minimum average (17.5 ft). **12 m (40 ft):** 4.27 to 13.72 m (14.0 to 45.0ft) with 10.67 m minimum average (35.0 ft).
Standard Manufacturing Lenghts	4.0 to 8.0 meters.
Other lengths or ranges	Upon request.

4 - End finish

- Plain
- Beveled: ≥ 2" (60.3 mm)
- Threads and couplings as per API 5B Std: 60.3mm (2") to 273.1mm (10")

5 - Tolerances

Outside diameter	114.3mm (4.1/2") and larger:	+/- 0.75%
Wall thickness	Ø 114.3mm (4.1/2") and larger:	+ 15% - 12.5%
Weight	**Per tube:** +10% - 3.5% **Per lot:** - 1.75%	

6 - Testing

In addition to technological and physical testing, each pipe undergoes a specified hydrostatic test according to size range and steel type, as well as an NDT as per API 5L Std. Impact tests are also carried out with PSL2, for pipe

SEAMLESS STEEL PIPES FOR OIL PRODUCTS CONVEYANCE AND OTHER PURPOSES

TRI-STANDARD MANUFACTURED PIPES • GRADE B STEEL

Tri-Standard pipes manufactured in Grade B steel have been developed by V & M do Brasil, for seamless pipes only, to comply simultaneously with ASTM-A-106, A-53 and API 5L standards, maintaining quality levels and ensuring that the technical specifications of each standard are duly met (chemical composition, mechanical properties and dimensional tolerances), as shown in the table below:

	ASTM-A-53	ASTM-A-106	API-5L / PSL1	Tri-standard
Use	General purpose seamless or seam pipes.	Seamless pipes for high temperatures. The carbon-steel shall always be silicon- and aluminum-killed.	Welded or seamless pipes for use in oil pipelines, gas pipelines and other purposes.	Pipes conforming with ASTM-A-106, A-53 and API-5L standards. Exclusive for seamless pipes.

Tolerances				
Outside diameter (168.3mm)	-1.68 mm / +1.68 mm	-0.79 mm / +1.59 mm	+/- 1.26 mm	- 0.79 mm / + 1.26 mm
Wall	-12.50%	-12.50%	-12.5% / + 15%	-12.5% / + 15%

Chemical composition (Gr.B)				
C	Max. 0.30	Max. 0.30	Max. 0.28	Max. 0.28
Mn	Max. 1.20	0.29 – 1.06 (1)	Max. 1.20	0.29 – 1.06 (2)
P	Max. 0.050	Max. 0.035	Max. 0.030	Max. 0.030
S	Max. 0.045	Max. 0.035	Max. 0.030	Max. 0.030
Si	-	Min. 0.10	-	Min. 0.10
Cr	Max. 0.40	Max. 0.40	Max. 0.40	Max. 0.40
Cu	Max. 0.40	Max. 0.40	Max. 0.40	Max. 0.40
Mo	Max. 0.15	Max. 0.15	Max. 0.15	Max. 0.15
Ni	Max. 0.40	Max. 0.40	Max. 0.40	Max. 0.40
V	Max. 0.08	Max. 0.08	Max. 0.08	Max. 0.08

Mechanical properties (Gr.B)					
Yield Strength, min.	psi	35.000	35.000	35.000	35.000
	Mpa	240	240	241	241
Tensile Strength, min.	psi	60.000	60.000	60.000	60.000
	Mpa	415	415	414	415

Note:(1) Each 0.01% reduction in maximum specified carbon allows a 0.06% increase in maximum specified manganese, up to 1.35%.
(2) For tri-standard pipes, maximum manganese is 1.20%, as per API 5L above.

Length
- Standard manufacturing lengths 4 to 8 meters or 8 to 13 meters
- Other lengths or ranges upon request.

End finish
- Plain
- Beveled = 2" (60.3 mm)

Technological Testing: Bending
ASTM A-53 and ASTM A-106 Standards are requested for pipes up to 2". API-5L Standard does not require this test. Tri-Standard Pipes are tested up to 2". For diameters above 2". this technological test is not required by any of the three Standards.

Testing

DIMENSIONS • API-5L / LINE PIPE AND TRI-STANDARD

External diameter		Wall thickness		Weight	Lengths	
pol	mm	pol	mm	kg/m	20 pés	40 pés
0.540	13.7	0.088	2.2	0.62	x	x
		0.119	3.0	0.79	x	x
0.675	17.1	0.091	2.3	0.84	x	x
		0.126	3.2	1.10	x	x
0.840	21.3	0.095	2.4	1.12	x	x
		0.109	2.8	1.27	x	x
		0.147	3.7	1.62	x	x
		0.188	4.8	1.95	x	x
1.050	26.7	0.113	2.9	1.69	x	x
		0.154	3.9	2.20	x	x
1.315	33.4	0.133	3.4	2.50	x	x
		0.179	4.5	3.24	x	x
1.660	42.2	0.140	3.6	3.39	x	x
		0.191	4.9	4.47	x	x
		0.382	9.7	7.77	x	x
1.900	48.3	0.145	3.7	4.05	x	x
		0.200	5.1	5.41	x	x
		0.400	10.2	9.56	x	x
2 3/8	60.3	0.126	3.2	4.51	x	x
		0.141	3.6	5.03	x	x
		0.154	3.9	5.44	x	x
		0.172	4.4	6.07	x	x
		0.188	4.8	6.57	x	x
		0.218	5.5	7.48	x	x
		0.250	6.4	8.51	x	x
		0.281	7.1	9.31	x	x
		0.436	11.1	13.44	x	x
2 7/8	73.0	0.141	3.6	6.16	x	x
		0.156	4.0	6.81	x	x
		0.172	4.4	7.44	x	x
		0.188	4.8	8.04	x	x
		0.203	5.2	8.63	x	x
		0.216	5.5	9.16	x	x
		0.250	6.4	10.51	x	x
		0.276	7.0	11.41	x	x
		0.552	14.0	20.39	x	x
3 1/2	88.9	0.141	3.6	7.53	x	x
		0.156	4.0	8.37	x	x
		0.172	4.4	9.17	x	x
		0.188	4.8	9.92	x	x
		0.216	5.5	11.29	x	x
		0.250	6.4	13.02	x	x
		0.281	7.1	14.32	x	x
		0.300	7.6	15.27	x	x
		0.600	15.2	27.68	x	x
4	101.6	0.141	3.6	8.70	x	x
		0.156	4.0	9.63	x	x
		0.172	4.4	10.55	x	x
		0.188	4.8	11.41	x	x
		0.226	5.7	13.57	x	x
		0.250	6.4	15.02	x	x
		0.281	7.1	16.55	x	x
		0.318	8.1	18.63	x	x

External diameter		Wall thickness		Weight	Lengths	
pol	mm	pol	mm	kg/m	20 pés	40 pés
4 1/2	114.3	0.156	4.0	10.88	x	x
		0.172	4.4	11.92	x	x
		0.188	4.8	12.91	x	x
		0.203	5.2	13.99	x	x
		0.219	5.6	15.01	x	x
		0.237	6.0	16.08	x	x
		0.250	6.4	17.03	x	x
		0.281	7.1	18.77	x	x
		0.312	7.9	20.73	x	x
		0.337	8.6	22.32	x	x
		0.438	11.1	28.32	x	x
		0.531	13.5	33.54	x	x
		0.674	17.1	41.03	x	x
5 9/16	141.3	0.188	4.8	16.09	x	x
		0.219	5.6	18.74	x	x
		0.258	6.6	21.77	x	x
		0.281	7.1	23.50	x	x
		0.312	7.9	25.99	x	x
		0.344	8.7	28.45	x	x
		0.375	9.5	30.97	x	x
		0.500	12.7	40.28	x	x
		0.625	15.9	49.12	x	x
		0.750	19.1	57.43	x	x
6 5/8	168.3	0.188	4.8	19.27	x	x
		0.203	5.2	20.91	x	x
		0.219	5.6	22.47	x	x
		0.250	6.4	25.55	x	x
		0.280	7.1	28.26	x	x
		0.312	7.9	31.25	x	x
		0.344	8.7	34.24	x	x
		0.375	9.5	37.20	x	x
		0.432	11.0	42.56	x	x
		0.500	12.7	48.73	x	x
		0.562	14.3	54.21	x	x
		0.625	15.9	59.76	x	x
		0.719	18.3	67.57	x	x
		0.750	19.1	70.27	x	x
		0.864	21.9	79.22	x	x
		0.875	22.2	80.07	x	x

DIMENSIONS • API-5L / LINE PIPE AND TRI-STANDARD

External diameter		Wall thickness		Weight	Lengths	
pol	mm	pol	mm	kg/m	20 pés	40 pés
8 5/8	219.1	0.250	6.4	33.32	x	x
		0.277	7.0	36.82	x	x
		0.312	7.9	41.14	x	x
		0.322	8.2	42.55	x	x
		0.344	8.7	45.14	x	x
		0.375	9.5	49.10	x	x
		0.438	11.1	56.94	x	x
		0.500	12.7	64.64	x	x
		0.562	14.3	72.22	x	x
		0.625	15.9	75.92	x	x
		0.719	18.3	90.44	x	x
		0.750	19.1	94.20	x	x
		0.812	20.6	100.93	x	x
		0.875	22.2	107.92	x	x
		1.000	25.4	121.33	x	x
10 3/4	273.1	0.250	6.4	41.77	x	x
		0.279	7.1	46.57	x	x
		0.307	7.8	51.03	x	x
		0.344	8.7	56.72	x	x
		0.365	9.3	60.29	x	x
		0.438	11.1	71.72	x	x
		0.500	12.7	81.53	x	x
		0.562	14.3	91.26	x	x
		0.625	15.9	100.85	x	x
		0.719	18.3	114.99	x	x
		0.812	20.6	128.27	x	x
		0.875	22.2	137.36	x	x
		0.938	23.8	146.30	x	x
		1.000	25.4	155.10	x	x

External diameter		Wall thickness		Weight	Lengths	
pol	mm	pol	mm	kg/m	20 pés	40 pés
12 3/4	323.9	0.281	7.1	55.76	x	x
		0.312	7.9	61.56	x	x
		0.330	8.4	65.19	x	x
		0.344	8.7	67.62	x	x
		0.375	9.5	73.88	x	x
		0.406	10.3	79.73	x	x
		0.438	11.1	85.62	x	x
		0.500	12.7	97.46	x	x
		0.562	14.3	108.93	x	x
		0.625	15.9	120.76	x	x
		0.688	17.5	132.08	x	x
		0.750	19.1	143.56	x	x
		0.812	20.6	154.08	x	x
		0.875	22.2	165.17	x	x
		0.938	23.8	176.13	x	-
		1.000	25.4	186.97	x	-
		1.062	27.0	197.68	x	-
		1.125	28.6	208.14	x	-
14	355.6	0.344	8.7	74.42	x	x
		0.375	9.5	81.33	x	x
		0.406	10.3	87.71	x	x
		0.438	11.1	94.55	x	x
		0.469	11.9	100.86	x	x
		0.500	12.7	107.39	x	x
		0.562	14.3	120.36	x	x
		0.625	15.9	133.19	x	x
		0.688	17.5	146.04	x	x
		0.750	19.1	158.10	x	x
		0.812	20.6	170.18	x	-
		0.875	22.2	182.52	x	-
		0.938	23.8	194.98	x	-
		1.000	25.4	206.83	x	-

NOTE: Other diameters / walls may be manufactured upon request.

ASTM A-53 WITH QUALITY REQUIREMENTS

1 - Chemical composition (%)

Grade	C (max.)	Mn. (max.)	P (max.)	S (max.)	Cr (max.)	Cu (max.)	Mo (max.)	Ni (max.)	V (max.)
A	0.25	0.95	0.05	0.045	0.40	0.40	0.15	0.40	0.08
B	0.30	1.20	0.05	0.045	0.40	0.40	0.15	0.40	0.08

2 - Mechanical properties

Grade	Yield Strength - min.		Tensile Strength - min.	
	psi	Mpa	psi	Mpa
A	30.000	205	48.000	330
B	35.000	240	60.000	415

Note: Elongation as per standard.

3 - Lengths

Single random lengths	From4.88 to 6.71 m with up to 5% of 3.66 to 4.88
Double random lengths	Minimum average length 10.67 and minimum length 6.71 m
Standard Manufacturing lengths	4 to 8m or 8 to 13 m
Other Fixed lengths or ranges	Upon request
Note:	The following double random length pipes cannot be supplied: 10" gauge / wall thickness= 28.58 mm; 12" gauge / wall thickness = 23.83 mm 14" gauge / wall thickness = 20.62 mm.

4 - End finish

- Plain
- Beveled: ≥ 2" (60.3 mm)

5 - Tolerances

Outside diameter	Up to 1 ½" (48.3mm) +/- 0.4mm
Wall thickness	At no point will minimum wall thickness be more than 12.5% below the specified nominal wall thickness.
Weight	+/- 10%

6 - Testing

In addition to technological and physical testing, each pipe undergoes a hydrostatic or electric NDT according to gauge and steel type.

ASTM A-106 For high temperatures

1 - Chemical composition (%)

Grade	C (max.)	Mn. (max.)	Si (min.)	P (max.)	S (max.)	Cr (max.)	Cu (max.)	Mo (max.)	Ni (max.)	V (max.)
A	0.25	0.27 / 0.93	0.10	0.035	0.035	0.40	0.40	0.15	0.40	0.08
B	0.30	0.29 / 1.06	0.10	0.035	0.035	0.40	0.40	0.15	0.40	0.08
C	0.35	0.29 / 1.06	0.10	0.035	0.035	0.40	0.40	0.15	0.40	0.08

Note: 1) Each 0.01% reduction in maximum specified carbon allows a 0.06% increase in maximum specified manganese, up to a limit of 1.35%.

2 - Mechanical properties

Grade	Yield Strength - min.		Tensile Strength - min.	
	psi	Mpa	psi	Mpa
A	30.000	205	48.000	330
B	35.000	240	60.000	415
C	40.000	275	70.000	485

Note: Elongation as per standard.

3 - Lengths

Single random lengths	From 4.8 to 6.7 m with up to 5% of 3.7 to 4.8 m
Double random lengths	Minimum average 10.7 m and minimum length 6.7 m with up to 5% of 4.8 to 6.7m
Standard Manufacturing lengths	4 to 8m or 8 to 13 m
Other Fixed lengths or ranges	Upon request
Note:	The following double random length pipes cannot be supplied: 10" gauge / wall thickness= 28.58 mm; 12" gauge / wall thickness = 23.83 mm 14" gauge / wall thickness = 20.62 mm.

4 - End finish

- Plain
- Beveled: ≥ 2" (60.3 mm)

5 - Tolerances

Outside diameter	from 1 /8" up to 1 1/2"	+/- 0.4mm
	> 1 1/2" up to 4"	+/- 0.8mm
	> 4" up to 8"	+ 1.6mm - 0.8mm
	> 8"	+ 2.4mm - 0.8mm
Wall thickness	At no point will minimum wall thickness be more than 12.5% below the specified nominal wall thickness.	
Weight	+/- 10%	

6 - Testing

In addition to technological and physical testing, each pipe undergoes a hydrostatic or electric NDT according to gauge and steel type.

ASTM A-333

1 - Chemical composition (%)

Grade	C (max.)	Si (min)	Mn. (max.)	P (max.)	S (max.)
1	0.30	—	0.40 / 1.06	0.025	0.025
6	0.30	0.10	0.29 / 1.06	0.025	0.025

Note: 1) Each 0.01% reduction in maximum specified carbon allows a 0.06% increase in maximum specified manganese, up to a limit of 1.35%.

2 - Mechanical properties

Grade	Yield Strength - min.		Tensile Strength - min.	
	psi	Mpa	psi	Mpa
1	30.000	205	55.000	380
6	35.000	240	60.000	415

Note: Elongation as per standard.

3 - Lengths

Single random lengths	From 4.88 to 6.71 m with up to 5% of 3.66 to 4.88
Double random lengths	Minimum average length 10.67 and minimum length 6.71 m. with up to 5% of 4.80 to 6.70m
Standard Manufacturing lengths	4 to 8 mor8 to 13 m
Other Fixed lengths or ranges	Upon request
Note:	The following double random length pipes cannot be supplied: 10" gauge / wall thickness= 28.58 mm; 12" gauge / wall thickness = 23.83 mm 14" gauge / wall thickness = 20.62 mm.

4 - End finish

- Plain
- Bevelled: ≥ 2" (60.3 mm)

5 - Tolerances

Outside diameter	≤ 48.3mm	+ 0.4 / - 0.8mm
	> 48.3 ≤ 114.3mm	+ 0.8 / - 0.8mm
	> 114.3mm ≤ 219.1mm	+ 1.6 / - 0.8mm
	> 219.1mm	+ 2.4 / - 0.8mm
Wall thickness	At no point will minimum wall thickness be more than 12.5% below the specified nominal wall thickness.	
Weight	Outside diameter = 323.8mm	+ 10.0% / - 3.5%
	Outside diameter > 323.8mm	+ 10.0% / - 5.0%

6 - Testing

In addition to technological and physical testing, each pipe undergoes a hydrostatic or electric NDT according to

ASTM A-53 / A-106 / A-333

Nom. Diam.	External Diameter		Wall thickness		Weight	Esp.	Lengths	
pol.	pol.	mm	pol.	mm	kg/m	SCH	SRL	DRL
1/4	0.540	13.7	0.09	2.24	0.63	STD/40	X	X
			0.12	3.02	0.80	XS/80	X	X
3/8	0.675	17.1	0.073	1.85	0.70	30	X	X
			0.091	2.31	0.84	STD/40	X	X
			0.126	3.20	1.10	XS/80	X	X
1/2	0.840	21.3	0.095	2.41	1.12	30	X	X
			0.109	2.77	1.27	STD/40	X	X
			0.147	3.73	1.62	XS/80	X	X
			0.188	4.78	1.95	160	X	X
			0.294	7.47	2.55	XXS	X	X
3/4	1.050	26.7	0.095	2.41	1.44	30	X	X
			0.113	2.87	1.69	STD/40	X	X
			0.154	3.91	2.20	XS/80	X	X
			0.219	5.56	2.90	160	X	X
			0.308	7.82	3.64	XXS	X	X
1	1.315	33.4	0.114	2.90	2.18	30	X	X
			0.133	3.38	2.50	STD/40	X	X
			0.179	4.55	3.24	XS/80	X	X
			0.250	6.35	4.24	160	X	X
			0.358	9.09	5.45	XXS	X	X
1 1/4	1.660	42.2	0.117	2.97	2.87	30	X	X
			0.126	3.20	3.08		X	X
			0.140	3.56	3.39	STD/40	X	X
			0.191	4.85	4.47	XS/80	X	X
			0.250	6.35	5.61	160	X	X
			0.382	9.70	7.77	XXS	X	X
1 1/2	1.900	48.3	0.125	3.18	3.53	30	X	X
			0.145	3.68	4.05	STD/40	X	X
			0.200	5.08	5.41	XS/80	X	X
			0.281	7.14	7.25	160	X	X
			0.400	10.15	9.56	XXS	X	X
2	2.375	60.3	0.125	3.18	4.48	30	X	X
			0.141	3.58	5.01		X	X
			0.154	3.91	5.44	STD/40	X	X
			0.172	4.37	6.03		X	X
			0.188	4.78	6.54		X	X
			0.218	5.54	7.48	XS/80	X	X
			0.250	6.35	8.45		X	X
			0.281	7.14	9.36		X	X
			0.344	8.74	11.11	160	X	X
			0.436	11.07	13.44	XXS	X	X
2 1/2	2.875	73.0	0.125	3.18	5.48		X	X
			0.141	3.58	6.13		X	X
			0.156	3.96	6.74		X	X
			0.172	4.37	7.40		X	X
			0.188	4.78	8.04	30	X	X
			0.203	5.16	8.63	STD/40	X	X
			0.216	5.49	9.14		X	X
			0.250	6.35	10.44		X	X
			0.276	7.01	11.41	XS/80	X	X
			0.375	9.53	14.92	160	X	X
			0.552	14.02	20.39	XXS	X	X

Diameter / walls supplied as cold drawn.

Nom. Diam.	External Diameter		Wall thickness		Weight	Esp.	Lengths	
pol.	pol.	mm	pol.	mm	kg/m	SCH	SRL	DRL
3	3.500	88.9	0.141	3.58	7.53		X	X
			0.156	3.96	8.29		X	X
			0.172	4.37	9.11		X	X
			0.188	4.78	9.92	30	X	X
			0.216	5.49	11.29	STD/40	X	X
			0.250	6.35	12.93		X	X
			0.281	7.14	14.40		X	X
			0.300	7.62	15.27	XS/80	X	X
			0.438	11.13	21.35	160	X	X
			0.600	15.24	27.68	XXS	X	X
3 1/2	4.000	101.6	0.141	3.58	8.65		X	X
			0.156	3.96	9.53		X	X
			0.172	4.37	10.48		X	X
			0.188	4.78	11.41	30	X	X
			0.226	5.74	13.57	STD/40	X	X
			0.250	6.35	14.92		X	X
			0.281	7.14	16.63		X	X
			0.318	8.08	18.63	XS/80	X	X
4	4.500	114.3	0.156	3.96	10.78		X	X
			0.172	4.37	11.85		X	X
			0.188	4.78	12.91	30	X	X
			0.203	5.16	13.89		X	X
			0.219	5.56	14.91		X	X
			0.237	6.02	16.07	STD/40	X	X
			0.250	6.35	16.90		X	X
			0.281	7.14	18.87		X	X
			0.312	7.92	20.78		X	X
			0.337	8.56	22.32	XS/80	X	X
			0.438	11.13	28.32	120	X	X
			0.531	13.49	33.54	160	X	X
			0.674	17.12	41.03	XXS	X	X
5	5.563	141.3	0.188	4.78	16.09		X	X
			0.219	5.56	18.61		X	X
			0.258	6.55	21.77	STD/40	X	X
			0.281	7.14	23.62		X	X
			0.312	7.92	26.05		X	X
			0.344	8.74	28.57		X	X
			0.375	9.53	30.97	XS/80	X	X
			0.500	12.70	40.28	120	X	X
			0.625	15.88	49.11	160	X	X
			0.750	19.05	57.43	XXS	X	X

NOTE: Other diameters / walls may be manufactured upon request.

ASTM A-53 / A-106 / A-333

Nom. Diam.	External Diameter		Wall thickness		Weight	SCH	Lengths	
pol.	pol.	mm	pol.	mm	kg/m		SRL	DRL
6	6.625	168.3	0.188	4.78	19.27		X	X
			0.203	5.16	20.76		X	X
			0.219	5.56	22.31		X	X
			0.250	6.35	25.36		X	X
			0.280	7.11	28.26	STD/40	X	X
			0.312	7.92	31.32		X	X
			0.344	8.74	34.39		X	X
			0.375	9.53	37.31		X	X
			0.432	10.97	42.56	XS/80	X	X
			0.500	12.70	48.73		X	X
			0.562	14.27	54.20	120	X	X
			0.625	15.88	59.69		X	X
			0.719	18.26	67.56	160	X	X
			0.750	19.05	70.11		X	X
			0.864	21.95	79.22	XXS	X	X
			0.875	22.23	80.07		X	X
8	8.625	219.1	0.250	6.35	33.31	20	X	X
			0.277	7.04	36.81	30	X	X
			0.312	7.92	41.24		X	X
			0.322	8.18	42.55	STD/40	X	X
			0.344	8.74	45.34		X	X
			0.375	9.53	49.25		X	X
			0.406	10.31	53.08	60	X	X
			0.438	11.13	57.08		X	X
			0.500	12.70	64.64	XS/80	X	X
			0.562	14.27	72.08		X	X
			0.594	15.09	75.92	100	X	X
			0.625	15.88	79.58		X	X
			0.719	18.26	90.44	120	X	X
			0.750	19.05	93.98		X	X
			0.812	20.62	100.92	140	X	X
			0.875	22.23	107.92	XXS	X	X
			0.906	23.01	111.27	160	X	X
			1.000	25.40	121.33		X	X
10	10.750	273.0	0.250	6.35	41.77	20	X	X
			0.279	7.09	46.51		X	X
			0.307	7.80	51.00	30	X	X
			0.344	8.74	56.98		X	X
			0.365	9.27	60.31	STD/40	X	X
			0.438	11.13	71.90		X	X
			0.500	12.70	81.55	XS/60	X	X
			0.562	14.27	91.08		X	X
			0.594	15.09	96.01	80	X	X
			0.625	15.88	100.73		X	X
			0.719	18.26	114.75	100	X	X
			0.812	20.62	128.38		X	X
			0.844	21.44	133.06	120	X	X
			0.875	22.23	137.52		X	X
			0.938	23.83	146.48		X	X
			1.000	25.40	155.15	XXS/140	X	X
			1.125	28.58	172.33	160	X	-
			1.250	31.75	188.97		X	-

Nom. Diam.	External Diameter		Wall thickness		Weight	SCH	Lengths	
pol.	pol.	mm	pol.	mm	kg/m		SRL	DRL
12	12.750	323.8	0.281	7.14	55.76		X	X
			0.312	7.92	61.71		X	X
			0.330	8.38	65.20	30	X	X
			0.344	8.74	67.93		X	X
			0.375	9.53	73.88	STD	X	X
			0.406	10.31	79.73	40	X	X
			0.438	11.13	85.84		X	X
			0.500	12.70	97.46	XS	X	X
			0.562	14.27	108.96	60	X	X
			0.625	15.88	120.62		X	X
			0.688	17.48	132.08	80	X	X
			0.750	19.05	143.21		X	X
			0.812	20.62	154.21		X	X
			0.844	21.44	159.91	100	X	X
			0.875	22.23	165.37		X	X
			0.938	23.83	176.33		X	-
			1.000	25.40	186.97	XXS/120	X	-
			1.062	26.97	197.48		X	-
			1.125	28.58	208.14	140	X	-
14	14.000	355.6	0.344	8.74	74.76		X	X
			0.375	9.53	81.33	STD/30	X	X
			0.406	10.31	87.79		X	X
			0.438	11.13	94.55	40	X	X
			0.469	11.91	100.94		X	X
			0.500	12.70	107.39	XS	X	X
			0.562	14.27	120.11		X	X
			0.594	15.09	126.71	60	X	X
			0.625	15.88	133.03		X	X
			0.688	17.48	145.75		X	X
			0.750	19.05	158.10	80	X	X
			0.812	20.62	170.33		X	-
			0.875	22.23	182.75		X	-
			0.938	23.83	194.96	100	X	-
			1.000	25.40	206.83		X	-

NOTE: Other diameters / walls may be manufactured upon request.

The main international standards for seamless steel line pipes are API-5L, ASTM A-106, ASTM A-333

MEASUREMENTS AS PER ASTM STANDARDS A-106, A-333 and ASTM A-53 /

DIMENSIONS AND THEORETICAL WEIGHT AS PER ANSI B36. 10M - 1996

DN pol.	DN mm	DE pol.	DE mm	Wall Thickness / Weight/ Metro	SCHEDULE NUMBER 20	30	40	60	80	100	120	140	160	STD	XS	XXS
1/4	-	0.540	13.7	mm	-		2.24	-	3.02	-	-	-	-	2.24	3.02	-
				kg/m	-		0.63	-	0.80	-	-	-	-	0.63	0.80	-
3/8	10	0.675	17.1	mm	-	1.85	2.31	-	3.20	-	-	-	-	2.31	3.20	-
				kg/m	-	0.70	0.84	-	1.10	-	-	-	-	0.84	1.10	-
1/2	15	0.840	21.3	mm	-	2.41	2.77	-	3.73	-	-	-	4.78	2.77	3.73	7.47
				kg/m	-	1.12	1.27	-	1.62	-	-	-	1.95	1.27	1.62	2.55
3/4	20	1.05	26.7	mm	-	2.41	2.87	-	3.91	-	-	-	5.56	2.87	3.91	7.82
				kg/m	-	1.44	1.69	-	2.20	-	-	-	2.90	1.69	2.20	3.64
1	25	1.315	33.4	mm	-	2.90	3.38	-	4.55	-	-	-	6.35	3.38	4.55	9.09
				kg/m	-	2.18	2.50	-	3.24	-		-	4.24	2.50	3.24	5.45
1 1/4	32	1.66	42.2	mm	-	2.97	3.56	-	4.85	-	-	-	6.35	3.56	4.85	9.70
				kg/m	-	2.87	3.39	-	4.47	-	-	-	5.61	3.39	4.47	7.77
1 1/2	40	1.9	48.3	mm	-	3.18	3.68	-	5.08	-	-	-	7.14	3.68	5.08	10.15
				kg/m	-	3.53	4.05	-	5.41	-	-	-	7.25	4.05	5.41	9.55
2	50	2.375	60.3	mm	-	3.18	3.91	-	5.54	-	-	-	8.74	3.91	5.54	11.07
				kg/m	-	4.48	5.44	-	7.48	-	-	-	11.11	5.44	7.48	13.44
2 1/2	65	2.875	73.0	mm	-	4.78	5.16	-	7.01	-	-	-	9.53	5.16	7.01	14.02
				kg/m	-	6.04	6.63	-	11.41	-	-	-	14.92	6.63	11.41	20.39
3	80	3.500	88.9	mm	-	4.78	5.49	-	7.62	-	-	-	11.13	5.49	7.62	15.24
				kg/m	-	9.92	11.29	-	15.27	-	-	-	21.35	11.29	15.27	27.66
3 1/2	-	4	101.6	mm	-	4.78	5.74	-	8.08	-	-	-	-	5.74	8.08	-
				kg/m	-	11.41	13.57	-	18.64	-	-	-	-	13.57	18.64	-
4	100	4.500	114.3	mm	-	4.78	6.02	-	8.56	-	11.13	-	13.49	6.02	8.56	17.12
				kg/m	-	12.91	16.07	-	22.32	-	28.32	-	33.54	16.07	22.32	41.03
5	125	5.563	141.3	mm	-	-	6.55	-	9.53	-	12.70	-	15.88	6.55	9.53	19.05
				kg/m	-	-	21.77	-	30.97	-	40.28	-	49.12	21.77	30.97	57.43
6	150	6.625	168.3	mm	-	-	7.11	-	10.97	-	14.27	-	18.26	7.11	10.97	21.95
				kg/m	-	-	28.26	-	42.56	-	54.20	-	67.56	28.26	42.56	79.22
8	200	8.625	219.1	mm	6.35	7.04	8.18	10.31	12.70	15.09	18.26	20.62	23.01	8.18	12.70	22.23
				kg/m	33.31	36.81	42.55	53.06	64.64	75.92	90.44	100.92	111.27	42.55	64.64	107.92
10	250	10.750	273.0	mm	6.35	7.80	9.27	12.70	15.09	18.26	21.44	25.40	28.58	9.27	12.70	25.40
				kg/m	41.77	51.00	60.30	81.55	96.01	114.75	133.06	155.15	172.33	60.30	81.55	155.15
12	300	12.750	323.8	mm	6.35	8.38	10.31	14.27	17.48	21.44	25.40	28.58	33.32	9.53	12.70	25.40
				kg/m	49.73	65.20	79.73	108.93	132.08	159.91	186.97	208.08	238.76	73.88	97.48	186.97
14	350	14.000	355.6	mm	7.92	9.53	11.13	15.09	19.05	23.83	27.79	31.75	35.71	9.53	12.70	-
				kg/m	67.90	81.33	94.55	126.71	158.10	194.96	224.65	253.56	281.70	81.33	107.39	-
16	400	16.000	406.4	mm	7.92	9.53	12.70	16.66	21.44	26.19	30.96	36.53	40.49	9.53	12.70	-
				kg/m	77.83	93.27	123.31	160.13	203.54	245.57	286.66	333.21	365.38	93.27	123.31	-
18	450	18.000	457.0	mm	7.92	11.13	14.27	19.05	23.83	29.36	34.93	39.67	45.24	9.53	12.70	-
				kg/m	87.71	122.38	155.81	205.75	254.57	309.64	363.58	408.28	459.39	105.17	139.16	-
20	500	20.000	508.0	mm	9.53	12.70	15.09	20.62	26.19	32.54	38.10	44.45	50.01	9.53	12.70	-
				kg/m	117.15	155.13	183.43	247.84	311.19	381.55	441.52	508.15	564.85	117.15	155.13	-
22	...	22.000	559.0	mm	9.53	12.70	-	22.23	28.58	34.93	41.28	47.63	53.98	9.53	12.70	-
				kg/m	129.14	171.10	-	294.27	373.85	451.45	527.05	600.67	672.30	129.14	171.10	-
24	600	24.000	610.0	mm	9.53	14.27	17.48	24.61	30.96	38.89	46.02	52.37	59.54	9.53	12.70	-
				kg/m	141.12	209.65	255.43	355.28	442.11	547.74	640.07	720.19	808.27	141.12	187.07	-

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