

Data sheet: S5

## Seamless tubes

### General description

ArcelorMittal South Africa, Vereeniging Steel produces an extensive range of seamless carbon and alloy steel tubes in both hot-rolled and cold-drawn condition.

*The full range consists of:*

1. Hot finished seamless line pipe for the conveyance of water, gaseous and liquid hydrocarbons used in the oil and natural gas industry.
2. Hot finished seamless casing and tubing used in the OCTG industry.
3. Cold-drawn precision seamless tubes for the manufacture of drill rods, boiler tubes and mechanical tubing. The cold-drawn tubing is manufactured for local use in the RSA only.

The then ArcelorMittal Seamless Tubes commenced production of seamless tubes in 1927 and due to continuous upgrading, has remained at the forefront of tube manufacturing technology.

The flexible, fully integrated facility enables ArcelorMittal South Africa to supply a high quality product to close dimensional tolerances and excellent surface finish in a variety of international grades. Mittal Steel South Africa is in possession of an ISO SANS 9001: 2000 certificate issued by the South African Bureau of Standards and two API licenses, for line pipe (5L) and casing and tubing (5CT) respectively.

### 1. Hot-finished seamless line pipe

Seamless line pipe is produced to comply with the specifications API 5L, PSL1 and PSL2, ASTM A106 and ASTM A53. Material can also be supplied to the equivalent EN 10208 Part 2. The product range is limited to the sizes given in table 1, with wall thickness to ANSI B36.10.

### Steel grades

Three basic steel grades are used for the production of the different grades of material in the API 5L specification. The main chemical elements will comply with the following maximum limits:

#### Chemical composition PSL1

Grade	C	Mn	S	P
B	0,20%	1,05%	0,030%	0,030%
X42	0,20%	1,05%	0,030%	0,030%
X52	0,20%	1,40%	0,030%	0,030%

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## Chemical composition PSL2

Grade	C	Mn	S	P
B	0,20%	1,05%	0,015%	0,025%
X42	0,20%	1,05%	0,015%	0,025%
X52	0,20%	1,40%	0,015%	0,025%

Stricter requirements on chemical composition are often applied at a customer's request.

The available sizes for hot-rolled line pipe are given below:

Outside diameter (mm)	Wall thickness (mm)	Mass kg/m	Length range		
			6m/20'	9,1m/30'	12m/40'
33,4	3,38	2,50	X	X	X
33,4	4,45	3,23	X	X	X
42,2	3,56	3,38	X	X	X
42,2	4,85	4,47	X	X	X
48,3	3,68	4,05	X	X	X
48,3	5,08	5,41	X	X	X
60,3	3,91	5,44	X	X	X
60,3	5,54	7,48	X	X	X
73,0	5,16	8,62	X	X	X
73,0	7,01	11,41	X	X	X
73,0	9,52	14,91	X	X	-
88,9	5,49	11,29	X	X	X
88,9	7,62	15,27	X	X	X
88,9	11,13	21,35	X	X	-
101,6	5,74	13,57	X	X	X
101,6	8,08	18,62	X	X	X
114,3	6,02	16,07	X	X	X
114,3	8,56	22,31	X	X	X
114,3	13,49	33,53	X	X	X
168,3	7,11	28,26	X	X	X
168,3	10,97	42,56	X	X	X
168,3	18,26	67,55	X	X	

## Dimensional tolerances

The dimensional tolerances used are in strict accordance with the API 5L specification:

Criteria	Minus	Plus
OD body	0,75% of nominal	0,75% of nominal
OD Ends	0,4mm	1,59mm
Wall thickness	12,5% of nominal	15% of nominal
Length, cutting tolerance	0mm	50mm
Mass, per carload	3,5%	6,5%
Mass, per tube	1,75%	-

## Mechanical properties

The line pipe supplied by ArcelorMittal South Africa is in accordance with the API 5L requirement for mechanical properties.

Grade	UTS MPa	SMYS MPa	% Elongation In 50 mm
B	415 min	241 min	To formula in API 5L
X42	415 min	289 min	
X52	455 min	358 min	

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All hot-finishing processes are done and completed above a temperature of 860°C. The hardness of the material is in all instances below 22HRc, thus complying with the NACE MR 01-75 requirement for carbon steels.

### End preparation

All line piping is square cut to the tolerance specified and bevelled to ANSI B16.25. An angle of 30° (-0°, +5°) and a landing of 1,6 mm, ±0,8 mm is applied. Schedule 160 material is supplied without bevelling.

### Non-destructive testing

All material is hydrostatically tested to the requirements of API 5L. The standard pressure is limited to 20,7 MPa (3000 psi). Electro-magnetic inspection is carried out on all line pipes. The reference notch used is 12,5% of nominal wall thickness. On request, ultrasonic testing to API 5L or API 5CT may be done with a reference notch of either 5% or 10% of nominal wall thickness.

### Coating

A choice of black or clear varnish exists for coating of the line pipe. This coating is a solvent-deposited non-toxic phenolic PVB that can be used as a base coat for most overcoats. This coating provides atmospheric resistance to oxidation for a period of 6 to 12 months.

### Marking

Identification marking is applied to every pipe by means of paint stencilling along the length of the pipe and is in full accordance with Appendix I of API 5L. Colour band marking may be applied at a customer's request. Additional information pertaining to the bundle is printed on a weatherproof plastic label attached to the bundle.

### Bundling

Material is supplied in hexagon bundles of between 2 and 4 tons to the following schedule:

OD size range	Tubes per bundle
33,4	61
42,2 – 60,3	37,19
73,0 – 114,3	19,10
114,3 – 168,3	10,7

*All bundles are secured with galvanised strapping.*

## 2. Hot-rolled seamless casing and tubing (OCTG)

Casing and tubing is produced to the specification API 5CT in the grades J55, K55 and N80 (normalised). The material is supplied with plain end finishing only.

### Steel grades

Two steel grades are used for production of OCTG material with chemical composition in compliance with the following maximum limits:

Grade	C	Mn	S	P
J/K55	0,36%	1,60%	0,030%	0,030%
N80	0,45%	1,60%	0,030%	0,030%

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## Mechanical properties

The OCTG material complies fully with the mechanical property requirements of API 5CT.

Grade	UTS min	Yield
J55	517 MPa	379 – 552 MPa
	75 000 psi	55 – 80 ksi
K55	655 MPa	379 – 552 MPa
	95 000 psi	55 – 80 ksi
N80	689 MPa	552 – 758 MPa
	100 000 psi	80 – 110 ksi

## Size range

ArcelorMittal Steel South Africa can supply OCTG material listed in the following table:

Outside diameter mm	Wall thickness mm	Weight designation Lb/ft	Length range
60,3	4,83	4,00	2
73,0	5,51	6,40	2
114,3	5,68	10,50	2,3
114,3	6,35	11,60	2,3
139,7	6,98	15,5	2,3
177,8	8,08-10,36	23-29	2,3

## Dimensional tolerances

The dimensional tolerances used are in strict accordance with the API 5CT specification

Criteria	Minus	Plus
OD body < 4,5"	0,031"	0,031"
OD body > 4,5"	0,5% of nominal	1,0% of nominal
Wall thickness	12,5% of nominal	-
Length, cutting tolerance	0mm	50mm
Mass, per carload	3,5%	6,5%
Mass, per tube	1,75%	-

## Non-destructive testing

All material is hydrostatically tested to the requirements of API 5CT. The standard pressure is limited to 20,7 MPa (3000 psi).

Electro-magnetic inspection to SR1 is carried out on all line pipes. The reference notch used is 12,5% of nominal wall thickness. On request, ultrasonic testing to SR2 may be done with a reference notch of either 5% or 10% of nominal wall thickness.

## Coating

A choice of black or clear varnish exists for coating of the OCTG material. This coating is a solvent-deposited non-toxic phenolic PVB that provides atmospheric resistance to oxidation for a period of 6 to 12 months.

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## Marking

Identification marking is applied to every pipe by means of paint stencilling along the length of the pipe and is in full accordance with Appendix D of API 5CT. Colour band marking is applied in accordance with said specification.

Additional information pertaining to the bundle is printed on a weatherproof plastic label that is attached to the bundle.

## Bundling

Material is supplied in hexagon bundles of between 2 and 3 tons to the following schedule:

OD size range	Tubes per bundle
60,3-73,0	37,19
114,3	19,10
139,7	10
177,8	7

*All bundles are secured with galvanised strapping.*

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