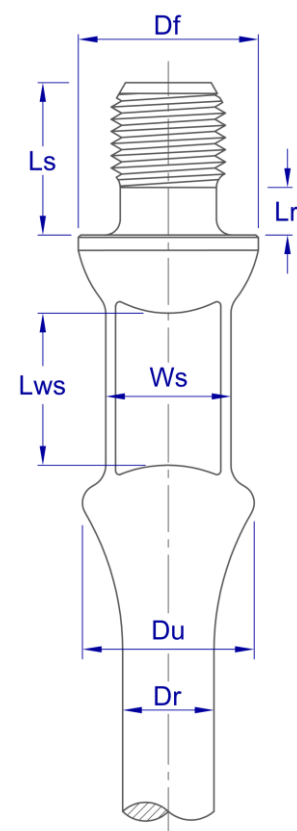


AlphaRod® Sucker & Pony Rod

Dimensions:

Available for both beam and progressive cavity pumping, Tenaris delivers sucker rods manufactured according to a rigorous quality assurance system that complies with ISO 9001 and API Q1 standards.

Nominal Size		Dr	Df	Ws	Lws (min)	Du	Lr	Ls
Rod	Units							
5/8"	in	0.625	1.25	0.875	1.25	1.219	0.516	1.25
		+0.007 -0.014	+0.005 -0.01	±0.031		+0.005 -0.125	+0.031 -0	+0.063 -0
	mm	15.88	31.75	22.23	31.75	30.96	13.11	31.75
		+0.18 -0.36	+0.13 -0.25	±0.79		+0.13 -3.18	+0.79 -0	+1.59 -0
3/4"	in	0.75	1.5	1	1.25	1.406	0.594	1.437
		+0.008 -0.016	+0.005 -0.01	±0.031		+0.005 -0.125	+0.031 -0	+0.063 -0
	mm	19.05	38.1	25.4	31.75	35.72	15.09	36.51
		+0.2 -0.41	+0.13 -0.25	±0.79		+0.13 -3.18	+0.79 -0	+1.59 -0
7/8"	in	0.875	1.625	1	1.25	1.5	0.672	1.625
		+0.008 -0.016	+0.005 -0.01	±0.031		+0.005 -0.125	+0.031 -0	+0.063 -0
	mm	22.23	41.28	25.4	31.75	38.1	17.07	41.28
		+0.2 -0.41	+0.13 -0.25	±0.79		+0.13 -3.18	+0.79 -0	+1.59 -0
1"	in	1	2	1.313	1.5	1.906	0.797	1.875
		+0.009 -0.018	+0.005 -0.01	±0.031		+0.005 -0.187	+0.031 -0	+0.063 -0
	mm	25.4	50.8	33.34	38.1	48.42	20.24	47.63
		+0.23 -0.46	+0.13 -0.25	±0.79		+0.13 -4.76	+0.79 -0	+1.59 -0
1 1/8"	in	1.125	2.25	1.5	1.625	2.187	0.875	2.125
		+0.01 -0.02	+0.015 -0.015	±0.031		+0.005 -0.187	+0.031 -0	+0.063 -0
	mm	28.58	57.15	38.1	41.28	55.56	22.23	53.98
		+0.25 -0.51	+0.38 -0.38	±0.79		+0.13 -4.76	+0.79 -0	+1.59 -0



Sucker Rods Nominal Lengths: 25 ft
(7.62 m)

Pony Rods Nominal Lengths:* 2, 4, 6, 8, 10, 12 ft
(0.61, 1.22, 1.83, 2.44, 3.05, 3.66 m)

*Other lengths might be available upon request.

Steel Grades:

The AlphaRod® series was created to overcome more demanding requirements and offer a solution to fatigue and corrosion-fatigue problems. During oil production sucker rods face operative productions that get tougher by the day. Mature conventional wells and non-conventional wells expose sucker rods in such ways that lead to an increase in premature fails. The new steel grades of the AlphaRod® generation were specially designed to satisfy these operative conditions.

Chemical Composition:

Typical chemical compositions (wt%) listed in the following table.

Grade	C (%)	Mn (%)	Si (%)	S (%)	P (%)	Cr (%)	Ni (%)	Mo (%)	Other (%)
AlphaRod® HS	0.23	0.55	0.25	0.01 max	0.015 max	0.95	0.30 max	0.45	B: 0.01 max, Ti: 0.1 max, Nb: 0.1 max
AlphaRod® CS	0.23	0.55	0.25	0.01 max	0.010 max	0.95	0.30 max	0.70	B: 0.01 max, Ti: 0.1 max, Nb: 0.1 max
AlphaRod® XS	0.15	0.35	0.25	0.01 max	0.015 max	3.60	0.30 max	0.05 max	B: 0.01 max, Ti: 0.1 max, V: 0.01-0.03

Mechanical Properties:

Mechanical properties are listed in the following table.

Grade	Yield Strength (0.2% offset)	Ultimate Tensile Stress	Elongation (8")	Reduction of Area	Hardness
AlphaRod® HS	Min 140 kpsi (Min 965 MPa)	145 to 160 kpsi (1000 to 1103 MPa)	13% Min	60% Min	35 HRC
AlphaRod® CS	Min 110 kpsi (Min 758 MPa)	118 to 133 kpsi (814 to 917 MPa)	14% Min	60% Min	26 HRC
AlphaRod® XS	Min 110 kpsi (Min 758 MPa)	118 to 133 kpsi (814 to 917 MPa)	14% Min	60% Min	26 HRC

Performance Data:

Maximum Pulling Force:

Grade	5/8"	3/4"	7/8"	1"	1 1/8"
AlphaRod® HS	34.4 klb (15.6 Ton)	49.4 klb (22.4 Ton)	67.2 klb (30.5 Ton)	88 klb (39.9 Ton)	111.3 klb (50.5 Ton)
AlphaRod® CS	26.9 klb (12.2 Ton)	38.8 klb (17.6 Ton)	52.9 klb (24 Ton)	69 klb (31.3 Ton)	87.5 klb (39.7 Ton)
AlphaRod® XS	26.9 klb (12.2 Ton)	38.8 klb (17.6 Ton)	52.9 klb (24 Ton)	69 klb (31.3 Ton)	87.5 klb (39.7 Ton)

Beam Pumping: Maximum allowable tensile stress

It is recommended that the modified Goodman stress diagram or the simplified formula listed below are used in the determination of the allowable range of stress applied to a sucker rod.

$$S_a = \left(\frac{UTS}{A} + B \cdot S_{min} \right) \cdot SF$$

Applied tensions can be compared to the maximum allowable using the Goodman formula:

$$\%Goodman = \frac{S_{max} - S_{min}}{S_a - S_{min}} \times 100$$

Where:

S_a = maximum allowable stress (psi or MPa)

S_{min} = minimum calculated or measured stress (psi or MPa)

S_{max} = maximum calculated or measured stress (psi or MPa)

UTS = minimum ultimate tensile strength (psi or MPa)

SF = Service factor (0.9 is recommended for corrosive environments)

Coefficients A and B are listed on Table 1.

Grade	A	B
AlphaRod® HS	2.7095	0.375
AlphaRod® CS	2.576	0.375
AlphaRod® XS	2.576	0.375

Table 1: Goodman coefficients

Progressive Cavity Pumping: Effective Stress

The effective rod stress in PCP applications can be calculated using the von Mises equation:

$$\sigma_e = \sqrt{\frac{C_1 \cdot L^2}{\pi^2 \cdot D^4} + \frac{C_2 \cdot T^2}{\pi^2 \cdot D^6}}$$

Where:

σ_e = Effective stress (kpsi or MPa)

L = Total axial load (lb or N)

T = Total torque (lb. ft or N. m)

D = Rod's body diameter (in or mm)

C_1 = Constant (Imperial system: 1.6×10^{-5} . International system: 16)

C_2 = Constant (Imperial system: 0.1106. International system: 7.68×10^8)

Other Technical Data:

Impact test (Charpy V-Notch, standard 10x10 specimen) typical values at room temperature:

- 180 Joules for CS and XS grades.
- 150 Joules for HS grade.

Microstructure: Min 90% martensitic transformation is verified by hardness testing to all HT lots.

Non Destructive Testing:

All raw material is carefully inspected using electromagnetic and/or ultrasonic methods to ensure the soundness of the final product.

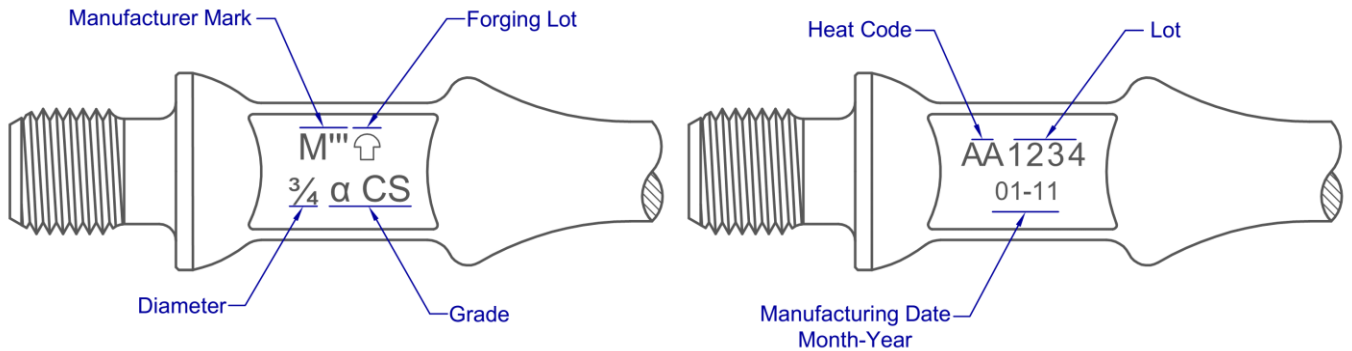
Color Code:

Rod's ends are painted according to the following table:

Grade	Color Code
AlphaRod® HS	Gold
AlphaRod® CS	Silver
AlphaRod® XS	Copper

*Displayed colors are for guidance only.

Marking:



Ordering Information:

When placing an order please attach the following information:

PDS:	SRAR
Product Family:	Sucker Rod (or Pony Rod)
Diameter:	1"
Grade:	AlphaRod® XS
Length:	25 ft

Labeling*:

		Metalmecánica S.A. Ruta 55 Km. 754,1 Villa Mercedes (San Luis) Made in Argentina		
		BOX N° 60000001	QTY:	
PRODUCT: SUCKER RODS		DATE:		
SPECIFICATION:				
ROD DIAM (in):				
GRADE:				
LENGTH: (ft)				
NET WEIGHT: (kg)				
SALES ORDER:				
DESTINATION:				

*Image for reference only

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