Tenaris

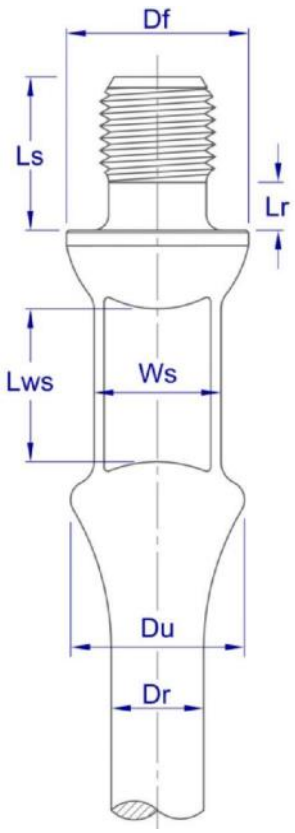
Sucker Rod String: Sucker & Pony Rod
PDS: SRAR
Short Name: R03
Effective Date: 28/08/2024
Previous Revision: 16/03/2020

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 / Rod	Units	Dr	Df	Ws	Lws (min)	DU	Lr	Ls
5/8"	in	0.63	1.25	0.88	1.25	1.22	0.52	1.25
		+0.007 -0.014	+0.005 -0.01	± 0.031		+0.005 -0.125	+0.031 -0	+0.63 -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	1.50	1.00	1.25	1.41	0.59	1.44
		+0.008 -0.016	+0.005 -0.01	± 0.031		+0.005 -0.125	+0.031 -0	+0.63 -0
	mm	19.05	38.10	25.40	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	0.88	1.63	1.00	1.25	1.50	0.67	1.63
		+0.008 -0.016	+0.005 -0.01	± 0.031		+0.005 -0.125	+0.031 -0	+0.63 -0
	mm	22.23	41.28	25.40	31.75	38.10	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	1.00	2.00	1.31	1.50	1.91	0.80	1.88
		+0.009 -0.018	+0.005 -0.01	± 0.031		+0.005 -0.187	+0.031 -0	+0.63 -0
	mm	25.40	50.80	33.34	38.10	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	1.13	2.25	1.50	1.63	2.19	0.88	2.13
		+0.01 -0.02	+0.015 -0.015	± 0.031		+0.005 -0.187	+0.031 -0	+0.63 -0
	mm	28.58	57.15	38.10	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, 30 ft (7.62, 9.14 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	Others
AlphaRod® HS	0.25	0.55	0.25	0.01 max	0.01 max	0.95	0.30 max	0.45	B: 0.01 max, Ti: 0.1 max, Nb: 0.1 max
AlphaRod® CS	0.25	0.55	0.25	0.01 max	0.01 max	0.95	0.30 max	0.45	B: 0.01 max, Ti: 0.1 max, Nb: 0.1 max

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 135 kpsi (min 931 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	70% min	26 HRC

Performance Data:

Maximum Pulling Force:

	Rod Outer Diameter				
Grade	5/8''	3/4''	7/8''	1''	1 1/8''
AlphaRod® HS	34.4 klb (15.6 Ton)	47.6 klb (21.6 Ton)	65 klb (29.5 Ton)	84.8 klb (38.8 Ton)	107.4 (48.7 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)

Beam Pumping: Maximum allowable tensile stress

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

$$S_a = \frac{UTS}{A} + B * S_{min} * SF$$

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

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

Table 1: Goodman coefficients.

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

Where:

Sa = 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. For corrosive environments, a value of 0.9 is recommended

Coefficients A and B are listed on Table 1.

Progressive Cavity Pumping: Effective Stress

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

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

Where:

σ_e = Effective stress (kpsi or Mpa)

L = Total axial load (lbf or N)

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

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

C_1 = Constant (For imperial system= $1.6x10^{-5}$. For international system= 16)

C_2 = Constant (For imperial system= 0.1106. For international system= $7.68x10^{8}$)

Other Technical Data:

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

- 180 Joules for CS grade.
- 150 Joules for HS grade.

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

Color Code:

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

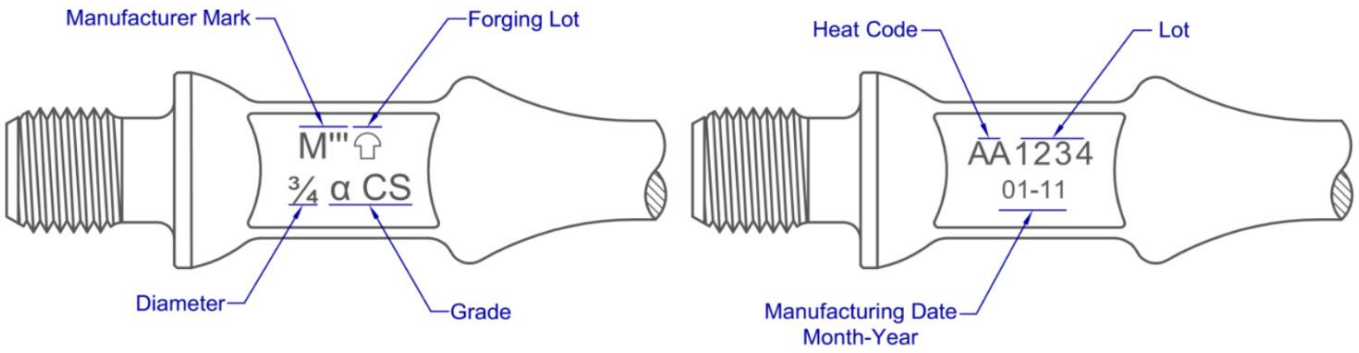
Grade	Color Code
AlphaRod® HS	Gold
AlphaRod® CS	Silver

*Displayed colors are for guidance only.

Non Destructive Testing:

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

Marking:



Labeling:*

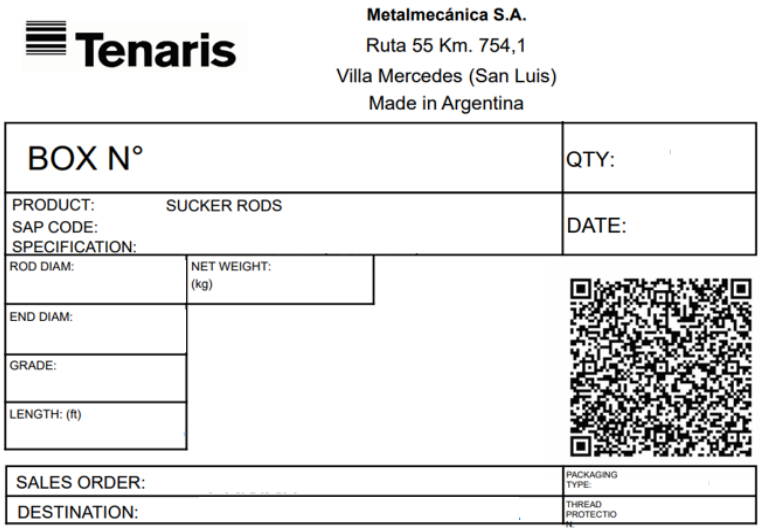


*Image for reference only.

Ordering Information:

When placing an order please attach the following information:

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