

## SUCKER ROD SPECIFICATIONS GRADE "D"

Mfg.	UPCO	UPCO	UPCO	AOT	AOT	Weatherford	Weatherford	Weatherford	Weatherford	Weatherford
Grade	CD	AD	KD	75	78	Axelson S-67	Axelson S-87	EVI "KD"	Trico D-61	Trico D-63
Metal Type	Carbon Steel	Chrome-Moly	Special Alloy							
	1541M	4142M	4720	A-4330A	A-4142M	1029MD	3130MD	Special	4142	4720SR
Heat treatment	Full length	Full length	Full length	Normalized &	Normalized	Quenched &	Quenched &	Normalized &	Normalized &	Normalized &
	Normalized	Normalized	Normalized	tempered	tempered	tempered	tempered	tempered	tempered	tempered
	and tempered	and tempered	and tempered							
Chemical Properties										
(C) Carbon	0.40 - 0.44	0.40 - 0.45	0.19 - 0.23	0.30 - 0.35	0.40 - 0.45	0.22 - 0.29	0.22 - 0.29	0.18 - 0.25	0.40 - 0.45	0.19 - 0.23
(Mn) Manganese	1.35 - 1.55	0.75 - 1.00	0.85 - 1.05	0.60 - 1.20	0.65 - 1.10	1.00 - 1.32	0.71 - 1.00	0.60 - 1.05	0.75 - 1.00	0.85 - 1.05
(P) Phosphorous	0.035 max.	0.035 max.	0.35 max.	0.035 max.	0.035 max.	0.025 max.	0.025 max.	0.04 max.	0.035 max.	0.035 max.
(S) Sulfur	0.040 max.	0.40 max.	0.040 max.	0.40 max.	0.040 max.	0.040 max.	0.035 max.	0.40 max.	0.040 max.	0.40 max.
(Cr) Chromium	0.25 max.	0.80 - 1.10	0.80 - 1.05	0.80 - 1.00	0.80 - 1.10	0.20 max.	0.41 - 0.65	0.60 - 1.05	0.80 - 1.10	0.80 - 1.05
(Si) Silicon	0.20 - 0.30	0.15 - 0.30	0.15 - 0.35	0.15 - 0.35	0.15 - 0.35	0.15 - 0.30	0.15 - 0.35	0.15 - 0.35	0.15 - 0.30	0.15 - 0.35
(Fe) Iron										
(B) Boron										
(Co) Cobalt										
(Ni) Nickel	0.25 max.	0.25 max	0.90 - 1.20	1.65 - 2.00	0.45 max.	0.15 max.	0.70 - 1.00	0.90 - 1.50	0.25 max.	0.90 - 1.20
(Cu) Copper	0.35 max	0.45 max.	0.40 - 0.60	0.35 max.	0.35 max.	0.35 max.	0.35 max.		0.45 max.	0.40 - 0.60
(Mo) Molybdenum	0.05 max.	0.15 - 0.25	0.22 - 0.30	0.20 - 0.30	0.15 - 0.25	0.05 max.	0	0.20 - 0.30	0.15 - 0.25	0.22 - 0.30
(V) Vanadium	0.05 max.	0.02 - 0.30	0.20 - 0.30	0.035 - 0.055	0.30 - 0.50				0.02 - 0.03	0.02 - 0.03
(Nb) Niobium										
Physical Properties										
Tensile, ksi	115 - 140	115 - 140	115 - 140	120 - 140	120 - 140	120 min.	125 min.	115 - 140	115 - 140	115 - 140
Yield, ksi	85 min.	85 min.	85 min.	90 min.	90 min.	110 - 125	115 - 130	90 min.	85 - 110	85 - 110
Elongation,8, in.%	10 min.%	10 min.	10 min.	10 min	10 min.	11 - 17	12 - 17	14 min.	10 - 15	14 min.
Reduction %	40 min.%	40 min.	40 min	45 min.	45 min.	55 - 65	55 - 65	50 min.	45 - 65	50 - 60
Hardness-Bn	229 - 293	229 - 293	229 - 293%	240 - 290	240 - 290	248 - 277	248 - 280	227 min.	240 - 290	227 - 260
Hardness-Rc	21 - 31	21 - 31	21 - 31	23 - 30	23 - 30	24 - 29	24 - 30	21 min.	23 - 31	21 - 24

Specifications shown are based on manufacturers published information

## SUCKER ROD SPECIFICATIONS HIGH STRENGTH

Mfg.	UPCO	Norris/AOT	Norris/AOT	Weatherford	Weatherford	Weatherford	Weatherford	Tenaris	Tenaris	Tenaris
Grade	H.S.	96	97	Axelson S-88	EVI EL	EVI XD	Trico T-66	Plus	UHS-NR	Special
<b>Metal Type</b>	4138 Special	A4138M	A-4330A	3130Md	4138Md	4138 Md	4138M	1530M	4330M	4138M
<b>Heat treatment</b>	Full length	Normalized	Normalized	Quenched	Induction	Normalized	Normalized	Normalized	Normalized	Normalized
	Normalized and tempered	and tempered	and tempered	and tempered	Case hardened	and tempered	and tempered	and Superf.temp	and tempered	and tempered
<b>Chemical Properties</b>										
(C) Carbon	0.38 - 0.42	0.38 - 0.43	0.30 - 0.35	0.22 – 0.29	0.38 - 0.42	0.38 - 0.42	0.38 - 0.42	0.31 - 0.36	0.30 - 0.35	0.38 – 0.43
(Mn) Manganese	1.20 - 1.40	0.90 - 1.50	0.60 - 1.20	0.71 - 1.00	0.75 - 1.00	0.75 - 1.00	1.20 – 1.40	0.60 - 1.05	0.70 – 0.95	1.10 – 1.40
(P) Phosphorous	0.035 max.	0.035 max.	0.35 max.	0.025 max.	0.025 max.	0.035 max.	0.025 max.	0.04 max.	0.025 max.	0.025 max.
(S) Sulfur	0.040 max.	0.040 max.	0.040 max.	0.035 max.	0.035 max.	0.040 max.	0.025max.	0.40 max.	0.025 max.	0.025 max.
(Cr) Chromium	0.55 – 0.85	0.55 – 0.85	0.80 - 1.00	0.41 – 0.65	0.65 – 0.85	0.70 – 0.85	0.20 max	0.60 - 1.05		0.60 – 0.90
(Si) Silcon	0.20 - 0.35	0.20 – 0.35	0.15 - 0.35	0.15 - 0.35	0.20 - 0.35	0.20 – 0.35	0.25 - 0.40		0.15 – 0.35	0.20 – 0.40
(Fe) Iron										
(B) Boron										
(Co) Cobalt										
(Ni) Nickel	0.30 max.	0.30 max	1.65 – 2.00	0.70 – 1.00	0.30 max.	0.30 max.	0.30 max.	0.15 max.	1.65 – 2.00	0.30 max
(Cu) Copper	0.35 max	0.35 max.	0.35 max.	0.35 max.	0.35 max.	0.35 max.	0.35 max.	0.25 max.	0.25 max.	0.25 max.
(Mo) Molybenum	0.24 – 0.32	0.25 - 0.35	0.22 - 0.30	0.05 max	0.35 - 0.45	0.35 – 0.45	0.24 – 0.32	0.05 max.	0.20 – 0.30	0.025 – 0.35
(V) Vanadium	0.045 – 0.065	0.045 – 0.065	0.035 – 0.055		0.25 - 0.035	0.025 – 0.035	0.08 – 0.10	0.10 – 0.15	0.35 – 0.70	
(Nb) Niobium	0.030 – 0.040	0.027-0.043			0.035 – 0.045					
<b>Physical Properties</b>										
Tensile, ksi	140 - 160	135 - 150	140 - 150	145 min.		140 - 150	140 - 150	140 - 160	140 - 160	140 - 160
Yield, ksi	105 min.	115 min.	115 min.	130 - 145		115 min.	115 – 125 min.	115 min.	115 min.	115 min.
Elongation,8 in.,%	8 min.	10 min.	10 min.	11 - 17		14 min.	10 - 18			
Reduction %	30 min.	45 min.	45 min	50 - 65		45 min.	40 - 55			
Hardness-Bn	285 - 331	280 - 313	290 - 313	285 - 311		311 max.	290 - 311		331	
Hardness-Rc	30 - 36	29 - 32	30 - 32	30 - 32		32 max.	30 - 32		35	

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