



ENDLESS ROD[®]

CONTINUOUS SUCKER ROD SPECIFICATIONS

MATERIAL SPECIFICATIONS

D GRADE

AISI 15 Modified Series Carbon Alloy Steel

Recommended for non-corrosive wellbore environments.

DS GRADE HIGH STRENGTH

AISI 15 Modified Series Carbon Alloy Steel

Recommended for non-corrosive wellbore environments that require a high-strength product.

CD GRADE

AISI 41 Modified Series Chrome-Moly Alloy Steel

Recommended for mildly corrosive wellbore environments that are effectively inhibited against corrosion.

CM GRADE MID STRENGTH

AISI 41 Modified Series Chrome-Moly Alloy Steel

Recommended for mildly corrosive wellbore environments that are effectively inhibited against corrosion.

CS GRADE HIGH STRENGTH

AISI 41 Modified Series Chrome-Moly Alloy Steel

Recommended for mildly corrosive wellbore environments that are effectively inhibited against corrosion and require a high-strength product.

ND GRADE

AISI 43 Modified Series Nickel-Chrome-Moly Alloy Steel

Promotes improved durability related to fatigue resistance. Recommended for mildly corrosive wellbore environments that are effectively inhibited against corrosion.

NS GRADE HIGH STRENGTH

AISI 43 Modified Series Nickel-Chrome-Moly Alloy Steel

Promotes improved durability related to fatigue resistance. Recommended for mildly corrosive wellbore environments that are effectively inhibited against corrosion and require a high-strength product.

MATERIAL PROPERTIES

Grade	Material	AISI Designation	Min. Tensile Strength ksi (MPa)	Min. Yield Strength ksi (MPa)	Max. Average Hardness (HRC)
D	C-Mn	1537	115 (792)	85 (586)	28
DS	C-Mn	1537	140 (964)	115 (792)	36
CD	Cr-Mo	4119	115 (792)	90 (620)	28
CM	Cr-Mo	4119	130 (895)	110 (758)	32
CS	Cr-Mo	4119	140 (964)	115 (792)	36
ND	Ni-Cr-Mo	4318	115 (792)	90 (620)	30
NM	Ni-Cr-Mo	4318	130 (895)	110 (758)	32
NS	Ni-Cr-Mo	4318	140 (964)	115 (792)	36

CHEMICAL COMPOSITION (%)

Grade	C	Mn	P (Max)	S (Max)	Si	Ni	Cr	Mo	Al	Ti	Cu
D	0.32–0.36	1.20–1.50	0.015	0.010	0.15–0.35	0.20 Max	0.10–0.20	0.040 Max	0.02–0.05	–	0.25 Max
DS											
CD											
CM	0.18–0.21	0.30–0.50	0.015	0.010	0.15–0.35	0.20 Max	1.70–1.90	0.15–0.25	0.02–0.05	0.005 –0.020	0.20 –0.30
CS											
ND											
NM	0.17–0.20	0.55–0.75	0.015	0.010	0.15–0.35	1.00–1.20	0.80–1.00	0.25–0.30	0.02–0.05	0.005 –0.020	0.20 –0.30
NS											

COATING TECHNOLOGIES (ENHANCED CORROSION AND WEAR RESISTANCE)

Technology	Material	Bonded	Servicable Rod Weight lbs (kg)	Corrosion Resistance	Wear Resistance	Applicability
EthyFlex	HDPE	No	up to 10000 (4545)	Superior, Barrier	Good	All Grades, All Sizes
KeBond	PolyKetone	Yes	up to 20000 (9091)	Superior, Barrier	Excellent	All Grades, All Sizes

*Grade selection is application specific. Please contact an LS representative for more information.

TECHNICAL SPECIFICATIONS

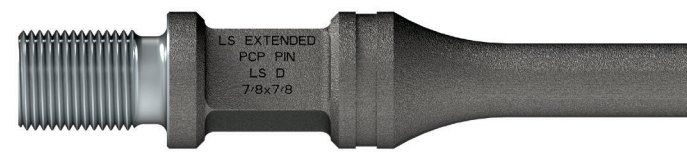
TENSILE STRENGTH AND TORQUE LIMIT COMPARISON

Rod Size		Lifting Solutions ENDLESS ROD®							Weatherford COROD				Champion X PROROD®				Lightning Rod™												
		AISI Designation	Min Tensile ksi (MPa)	3/4	7/8	1	1-1/8	1-3/16	Equivalent Grade	AISI Designation	Min Tensile ksi (MPa)	3R 13/16	4R 7/8	6R 1	8.5R 1-5/32	Equivalent Grade	AISI Designation	Min Tensile ksi (MPa)	13/16	7/8	1	1-1/8	Equivalent Grade	AISI Designation	Min Tensile ksi (MPa)	3/4	7/8	1	1-1/8
Rod Weight		lbs/ft (kg/m)																											
Tensile Strength			Maximum Rig Pull lbs (DaN)							Maximum Rig Pull lbs (DaN)						Maximum Rig Pull lbs (DaN)						Maximum Rig Pull lbs (DaN)							
	D	1537	115 (792)	33720 (15000)	47208 (21000)	60696 (27000)	76432 (34000)	85424 (38000)	D/DR	1536M	115	39623 (17626)	45972 (20450)	60049 (26712)	-	620C	1536M	120 (827)	44326 (19718)	51407 (22868)	67146 (29869)	84981 (37803)	D15C	1536	120	-	-	-	-
	DS	1537	140 (964)	47208 (21000)	62944 (28000)	83176 (37000)	103408 (46000)	114648 (51000)	-	-	-	-	-	-	800C	1536M	135 (931)	-	-	77711 (34569)	98402 (43773)	-	-	-	-	-	-	-	
	CD	4119	115 (792)	35968 (16000)	49456 (22000)	65192 (29000)	80928 (36000)	89920 (40000)	DE/DER	4120M	115	41954 (18663)	48658 (21645)	63582 (28284)	-	780M	4120M	120 (827)	44326 (19718)	51407 (22868)	67146 (29869)	84981 (37803)	D41M	4119	120	-	-	-	-
	CM	4119	130 (895)	44960 (20000)	60696 (27000)	80928 (36000)	101160 (45000)	112400 (50000)	ME/MER	4120M	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	CS	4119	140 (964)	47208 (21000)	62944 (28000)	83176 (37000)	103408 (46000)	114648 (51000)	SE/SER	4120M	140	53669 (23874)	62198 (27668)	81243 (36140)	-	960M	4120M	140 (965)	53658 (23869)	62231 (27683)	81281 (36157)	102873 (45762)	H41M	4119	125	-	-	-	-
	ND	4318	115 (792)	35968 (16000)	49456 (22000)	65192 (29000)	80928 (36000)	89920 (40000)	DWR	4320M	115	41954 (18663)	48658 (21645)	63582 (28284)	-	750N	4320M	125 (862)	46659 (20756)	54114 (24072)	70679 (31441)	89455 (39793)	D43N	4318	140	-	-	-	-
	NM	4318	130 (895)	44960 (20000)	60696 (27000)	80928 (36000)	101160 (45000)	112400 (50000)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	NS	4318	140 (964)	47208 (21000)	62944 (28000)	83176 (37000)	103408 (46000)	114648 (51000)	SWR	4320M	145	53669 (23874)	62198 (27668)	81243 (36140)	-	970N	4320M	140 (965)	55991 (24907)	64938 (28887)	84815 (37729)	107344 (47751)	H43N	4318	145	-	-	-	-
Torque Limits			Maximum Torque ft*lbs (N*m)							Maximum Torque ft*lbs (N*m)						Maximum Torque ft*lbs (N*m)						Maximum Torque ft*lbs (N*m)							
	D	1537	115 (792)	410 (556)	650 (881)	970 (1315)	1390 (1885)	1630 (2210)	D/DR	1536M	115	500 (678)	640 (868)	955 (1295)	1490 (2020)	620C	1536M	120 (827)	540 (732)	680 (922)	1015 (1376)	1445 (1959)	D15C	1536	120	500 (678)	680 (922)	1015 (1376)	1445 (1959)
	DS	1537	140 (964)	550 (746)	890 (1207)	1330 (1803)	1890 (2562)	2220 (3010)	-	-	-	-	-	-	800C	1536M	135 (931)	-	-	1242 (1684)	1768 (2397)	-	-	-	-	-	-		
	CD	4119	115 (792)	430 (583)	690 (936)	1030 (1396)	1470 (1993)	1720 (2332)	DE/DER	4120M	115	-	640 (868)	955 (1295)	1490 (2020)	780M	4120M	120 (827)	565 (766)	735 (997)	1110 (1505)	1535 (2081)	D41M	4119	120	525 (712)	735 (997)	1100 (1491)	1535 (2081)
	CM	4119	130 (895)	500 (678)	800 (1085)	1190 (1613)	1700 (2305)	2000 (2712)	ME/MER	4120M	130	-	800 (1085)	1195 (1620)	1845 (2501)	-	-	-	-	-	-	-	-	-	-	-	-		
	CS	4119	140 (964)	550 (746)	890 (1207)	1300 (1763)	1890 (2562)	2220 (3010)	SE/SER	4120M	140	700 (949)	900 (1220)	1300 (1763)	2000 (2712)	960M	4120M	140 (965)	725 (983)	900 (1220)	1350 (1830)	1900 (2576)	H41M	4119	125	670 (908)	900 (1220)	1350 (1830)	1900 (2576)
	ND	4318	115 (792)	430 (583)	690 (936)	1030 (1396)	1470 (1993)	1720 (2332)	DWR	4320M	115	-	-	955 (1295)	1490 (2020)	750N	4320M	125 (862)	580 (786)	750 (1017)	1110 (1505)	1550 (2102)	D43N	4318	140	535 (725)	750 (1017)	1110 (1505)	1550 (2102)
	NM	4318	130 (895)	500 (678)	800 (1085)	1190 (1613)	1470 (1993)	1720 (2332)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	NS	4318	140 (964)	550 (746)	890 (1207)	1330 (1803)	1890 (2562)	2220 (3010)	SWR	4320M	145	700 (949)	900 (1220)	1300 (1763)	2000 (2712)	970N	4320M	140 (965)	725 (983)	900 (1220)	1350 (1830)	1900 (2576)	H43N	4318	145	670 (908)	900 (1220)	1350 (1830)	1900 (2576)

* Comparison information obtained from www.aperygals.com, www.weatherford.com and www.lpsus.net

PIN ENDS

PIN END CONFIGURATIONS TENSILE STRENGTH AND TORQUE LIMITS



		API Sucker Rod Pins RRP Pins (Preferred in Reciprocating Applications)								LS Extended Thread PCP Pins (Preferred in Rotary Applications)							
Rod Size	in	3/4	7/8	1	1	1-1/8	1-1/8	1-3/16	1-3/16	3/4	7/8	1*	1	1-1/8*	1-1/8	1-3/16*	1-3/16
	mm	(19.1)	(22.2)	(25.4)	(25.4)	(28.6)	(28.6)	(30.1)	(30.1)	(19.1)	(22.2)	(25.4)	(25.4)	(28.6)	(28.6)	(30.1)	(30.1)
Pin Size	in	3/4	7/8	7/8	1	1	1-1/8	1	1-1/8	3/4	7/8	7/8	1	1	1-1/8	1	1-1/8
	mm	(19.1)	(22.2)	(22.2)	(25.4)	(25.4)	(28.6)	(25.4)	(28.6)	(19.1)	(22.2)	(22.2)	(25.4)	(25.4)	(28.6)	(25.4)	(28.6)
Load Rating		Maximum Rig Pull lbs (DaN)								Torque Rating ft*lbs (N*m)							
D		33720 (15000)	47208 (21000)	47208 (21000)	60696 (27000)	60696 (27000)	76432 (34000)	60696 (27000)	85424 (38000)	410 (556)	650 (881)	750 (1017)	970 (1315)	1350 (1830)	1638 (2221)	1350 (1830)	1638 (2221)
DS		47208 (21000)	62944 (28000)	62944 (28000)	83176 (37000)	83176 (37000)	103408 (46000)	83176 (37000)	114648 (51000)	550 (746)	890 (1207)	850 (1152)	1330 (1803)	1600 (2169)	2200 (2983)	1600 (2169)	2220 (3010)
CD		35968 (16000)	49456 (22000)	49456 (22000)	65192 (29000)	65192 (29000)	80928 (36000)	65192 (29000)	89920 (40000)	430 (583)	690 (936)	750 (1017)	1030 (1396)	1350 (1830)	1730 (2346)	1350 (1830)	1730 (2346)
CM		44960 (20000)	60696 (27000)	60696 (27000)	80928 (36000)	80928 (36000)	101160 (45000)	80928 (36000)	112400 (50000)	510 (691)	830 (1125)	790 (1071)	1240 (1681)	1490 (2020)	2060 (2793)	1490 (2020)	2060 (2793)
CS		47208 (21000)	62944 (28000)	62944 (28000)	83176 (37000)	83176 (37000)	103408 (46000)	83176 (37000)	114648 (51000)	550 (746)	890 (1207)	850 (1152)	1330 (1803)	1600 (2169)	2220 (3010)	1600 (2169)	2220 (3010)
ND		35968 (16000)	49456 (22000)	49456 (22000)	65192 (29000)	65192 (29000)	80928 (36000)	65192 (29000)	89920 (40000)	430 (583)	690 (936)	750 (1017)	1030 (1396)	1350 (1830)	1730 (2346)	1350 (1830)	1730 (2346)
NM		44960 (20000)	60696 (27000)	60696 (27000)	80928 (36000)	80928 (36000)	101160 (45000)	80928 (36000)	112400 (50000)	510 (691)	830 (1125)	790 (1071)	1240 (1681)	1490 (2020)	2060 (2793)	1490 (2020)	2060 (2793)
NS		47208 (21000)	62944 (28000)	62944 (28000)	83176 (37000)	83176 (37000)	103408 (46000)	83176 (37000)	114648 (51000)	550 (746)	890 (1207)	850 (1152)	1330 (1803)	1600 (2169)	2220 (3010)	1600 (2169)	2220 (3010)

*Non-API; requires high-strength coupling to achieve torque rating. *Torque values based on rod body, pin size, coupling type, and proper welding procedures.

SUCKER ROD COUPLING OUTSIDE DIAMETERS

Rod Size	(in)	3/4	7/8	1	1-1/8 in
	(mm)	19.1	22.2	25.4	28.6
Outside Diameter	in (mm)				
Slimhole		1.500 (38.1)	1.625 (41.3)	2.000 (50.8)	2.250 (57.2)
Fullsize		1.625 (41.3)	1.812 (46.0)	2.187 (55.6)	2.375 (60.3)
Oversize		1.812 (46.0)	2.000 (50.8)	2.375 (60.3)	-

API EUE TUBING INSIDE DIAMETERS

Tubing Size	(in)	2-3/8	2-7/8	3-1/2	4-1/2
	(mm)	60.3	73.0	88.9	114.3
Weight	lbs/ft	4.70	6.50	9.30	12.75
	kg/m	5.97	9.69	13.87	19.02
Inside Diameter	in (mm)				
Bare Tubing ID		1.995 (50.7)	2.441 (62.0)	2.992 (76.0)	3.958 (100.5)
Bare Tubing Drift		1.901 (48.3)	2.347 (59.6)	2.867 (72.8)	3.833 (97.4)
Lined Tubing Drift		1.600 (40.6)	2.000 (50.8)	2.500 (63.5)	3.400 (86.4)