LIFTING SOLUTIONS

ENDLESS ROD®

CONTINUOUS SUCKER ROD

Material Specifications

EXPERIENCE
PERFORMANCE

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ENDLESS ROD MATERIAL SPECIFICATION

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 r equire 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 and require a medium-strength product.

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.

NM GRADE

AISI 41 Modified Series 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 medium-strength product.

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	Min. Tensile Strength (ksi)	Min. Yield Strength (ksi)	Max. Average Hardness (HRC)
D	C-Mn	115	85	28
DS	C-Mn	140	115	36
CD	Cr-Mo	115	90	28
CM	Cr-Mo	130	110	32
CS	Cr-Mo	140	115	36
ND	Ni-Cr-Mo	115	90	30
NM	Cr-Mo	125	110	32
NS	Ni-Cr-Mo	140	115	36

MAXIMUM SERVICE

Grade	3/4 in.		13/16 in.		7/8 in.		1 in.		1-1/8 in.		1-3/16 in.	
	Torque (ft*lb)	Rig Pull (daN)	Torque (ft*lb)	Rig Pull (daN)	Torque (ft*lb)	Rig Pull (daN)	Torque (ft*lb)	Rig Pull (daN)	Torque (ft*lb)	Rig Pull (daN)	Torque (ft*lb)	Rig Pull (daN)
D	410	15,000	520	18,000	650	21,000	970	27,000	1,390	34,000	1,630	39,000
DS	550	21,000	710	24,000	890	28,000	1,330	37,000	1,890	46,000	2,220	52,000
CD	430	16,000	550	19,000	690	22,000	1,030	29,000	1,470	36,000	1,730	41,000
CM	500	20,000	640	23,000	800	27,000	1,190	35,000	1,700	45,000	640	23,000
CS	550	21,000	710	24,000	890	28,000	1,330	37,000	1,890	46,000	2,220	52,000
ND	430	16,000	550	19,000	690	22,000	1,030	29,000	1,470	36,000	1,730	41,000
NM	500	20,000	640	23,000	800	27,000	1,190	35,000	1,700	45,000	2,000	50,000
NS	550	21,000	710	24,000	890	28,000	1,330	37,000	1,890	46,000	2,220	52,000

ENDLESS ROD MATERIAL SPECIFICATION

GRADE CROSS REFERENCE

Grade	Material (AISI)
D	1537
DS	1537
CD	4119
CM	4119
CS	4119
ND	4318
NM	4318
NS	4318

SIZE AND WEIGHT REFERENCE

Size in. *(mm)*	Weight lb/ft *(kg/m)*
3/4 (19.1)	1.50 (2.24)
13/16 (20.6)	1.76 (2.63)
7/8 (22.2)	2.04 (3.05)
1 (25.4)	2.67 (3.97)
1-1/8 (28.6)	3.38 (5.05)
1-3/16 (30.18)	3.78 (5.62)

TORQUE COMPARISON

Grade	3/4 in.	7/8 in.	1 in.	1-1/8 in.	1-3/16 in.	Min. Tensile Strength (ksi)
	Allowable Torque (ft*lb)					
D	410	650	970	1,390	1,630	115
DS	550	890	1,330	1,890	2,220	140
CD	430	690	1,030	1,470	1,720	115
CM	500	800	1,190	1,700	2,000	130
CS	550	890	1,330	1,890	2,220	140
ND	430	690	1,030	1,470	1,720	115
NM	500	800	1,190	1,700	2000	125
NS	550	890	1,330	1,890	2,220	140

CHEMICAL PROPERTIES (%)

Grade	AISI	C	Mn	P (Max)	S (Max)	Si	Ni	Cr	Mo	Al	Ti	Cu
D	1537	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	1537	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
CD	4119	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
CM	4119	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	4119	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
ND	4318	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
NM	4318	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	4318	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

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ENDLESS ROD®

INCREASE YOUR OPERATION EFFICIENCY

VERSATILE TRANSPORT

Lifting Solutions Endless Rod® continuous sucker rod is manufactured to precise specifications using state-of-the-art technology, superior processes, and the highest quality material. The result is a premium continuous sucker rod—one uniform diameter with only two connections—that is suitable for a multitude of well conditions in RRP and PCP applications.

FEATURES AND BENEFITS

- Reduce overall intervention frequency over the life cycle of your well
- Lower production costs by increasing pump life and reducing energy usage
- Decrease tubing wear and rod break related interventions
- Minimize pressure losses around couplings by increasing annular space
- Lower string weight
- Reduce power and equipment requirements and use smaller pumping units at surface
- Increase service efficiency
- Reduce bridging of solids with a constant velocity of fluid and solids in the tubing
- Run larger-size rods in smaller diameter tubing

SIZES

Endless Rod is available in the same metallurgies and sizes as conventional rod. Product selection is based on load requirements and fluid properties to best suit the application.

CONVENTIONAL ROD STRING ENDLESS ROD® STRING