

# ENDLESS ROD<sup>®</sup>

## CONTINUOUS SUCKER ROD MATERIAL SPECIFICATIONS

### EXPERIENCE PERFORMANCE.

Artificial lift products and services that consistently outperform the market and reduce OPEX.



# 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 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.

## 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	Min. Tensile Strength (ksi)	Min. Yield Strength (ksi)	Max. Average Hardness (HRC)
<b>D</b>	C-Mn	115	85	28
<b>DS</b>	C-Mn	140	115	36
<b>CD</b>	Cr-Mo	115	90	28
<b>CS</b>	Cr-Mo	140	115	36
<b>ND</b>	Ni-Cr-Mo	115	90	30
<b>NS</b>	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)
<b>D</b>	410	15,000	520	18,000	650	21,000	970	27,000	1,390	34,000	1,630	39,000
<b>DS</b>	550	21,000	710	24,000	890	28,000	1,330	37,000	1,890	46,000	2,220	52,000
<b>CD</b>	430	16,000	550	19,000	690	22,000	1,030	29,000	1,470	36,000	1,730	41,000
<b>CS</b>	550	21,000	710	24,000	890	28,000	1,330	37,000	1,890	46,000	2,220	52,000
<b>ND</b>	430	16,000	550	19,000	690	22,000	1,030	29,000	1,470	36,000	1,730	41,000
<b>NS</b>	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)
<b>D</b>	1537
<b>DS</b>	1537
<b>CD</b>	4119
<b>CS</b>	4119
<b>ND</b>	4318
<b>NS</b>	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)					
 <b>D</b>	410	650	970	1,390	1,630	115
 <b>DS</b>	550	890	1,330	1,890	2,220	140
 <b>CD</b>	430	690	1,030	1,470	1,720	115
 <b>CS</b>	550	890	1,330	1,890	2,220	140
 <b>ND</b>	430	690	1,030	1,470	1,720	115
 <b>NS</b>	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
<b>D</b>	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
<b>DS</b>	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
<b>CD</b>	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
<b>CS</b>	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
<b>ND</b>	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
<b>NS</b>	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

# 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

