



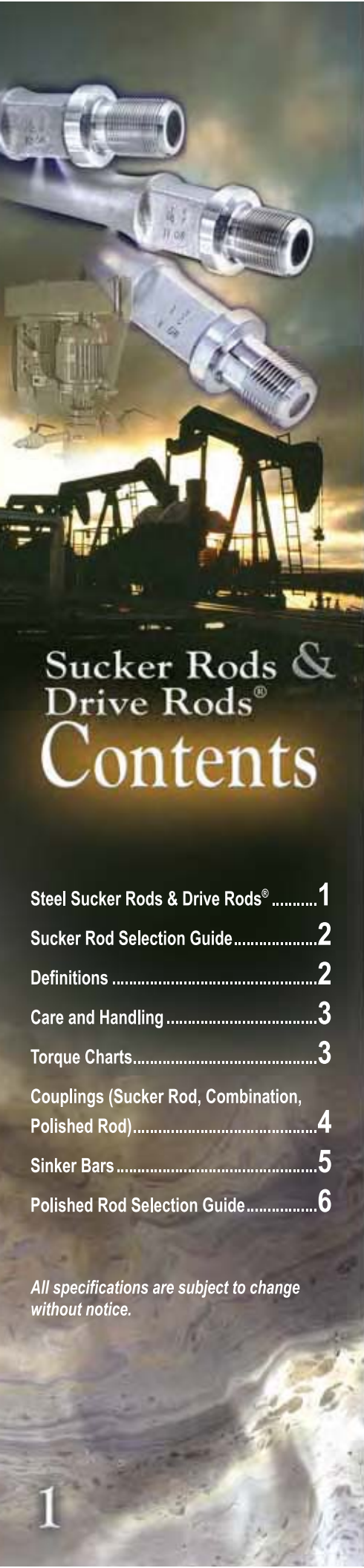
**ALBERTA  
OIL TOOL**

A **DOVER** COMPANY

Sucker Rods &  
Drive Rods®



**PERFORMANCECOUNTS**



# Steel Sucker Rods & Drive Rods®

## Sucker Rods

- Dimensions and tolerances conform to API Specification 11B and AISI Steel Products Manual.
- Available in 5/8" (15.88mm), 3/4" (19.05mm), 7/8" (22.23mm), 1" (25.40mm) and 1-1/8" (28.58mm) body diameter.
- Full length normalized to relieve residual stresses, air quenched and tempered to refine and homogenize the grain structure.
- Shotpeened to improve fatigue life.

## Drive Rods®

- Specifically designed to withstand the high torque levels experienced in Progressing Cavity Pump applications.
- Furnished with modified pins to maximize their torque capacity.
- Modified pins provide a minimum 50% increase in torque over conventional API thread connections.
- Available in 1" (25.40mm), 1-1/4" (31.75mm) and 1-1/2" (38.10mm) body diameter.

## Drive Rod® Pressure Loss Improvements

- 1" Drive Rods® with 7/8" Full Size Couplings: 22% improvement over Sucker Rods with 1" Slim Hole Couplings
- 1" Drive Rods® with 7/8" Slim Hole Couplings: 39% improvement over Sucker Rods with 1" Slim Hole Couplings
- 1-1/4" Drive Rods®: The pressure loss across the coupling is the same as conventional 1" Sucker Rod and 23% less than conventional 1-1/8" Sucker Rods.
- 1-1/2" Drive Rods®: The pressure loss across the coupling is the same as conventional 1-1/8" Sucker Rods.

## Tubing Flow Area Comparison

### 1-1/4" Drive Rods® with 1" slim hole couplings (2" outside diameter) in 3 1/2" Tubing

- 27% more flow area than 1-1/8" sucker rods with 1-1/8" slim hole couplings (special 2.250" O.D.)
- 50% more flow area than 1-1/8" sucker rods with 1-1/8" regular couplings (2.375" outside diameter)
- Up to 47% increase in allowable torque

### 1" with 7/8" pins in 2 7/8" Tubing

- 1" with 7/8" regular couplings (1-13/16" O.D.): 37% more flow area than 1" slim hole couplings

### 1" with 7/8" pins in 3 1/2" Tubing

- 1" with 7/8" slim hole coupling (1-5/8" O.D.): 28% more flow area than 1" slim hole couplings  
51% more flow area than 1" regular couplings
- 1" with 7/8" regular couplings (1-13/16" O.D.): 15% more flow area than 1" slim hole couplings  
36% more flow area than 1" regular couplings

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All specifications are subject to change without notice.

AOT Type	54	78	75	96	97
AISI Grade	C-1541-VM	A-4142M	A-4330-M	A-4138-M	A-4330-M
API Grade	D	D	D	SPECIAL	SPECIAL
	<b>RANGE</b>	<b>RANGE</b>	<b>RANGE</b>	<b>RANGE</b>	<b>RANGE</b>
Carbon	.40/.44	.38/.43	.30/.34	.38/.42	.30/.34
Manganese	1.40/1.60	.80/1.00	.80/1.00	1.10/1.40	.80/1.00
Phosphorus	.040 Mx.	.035 Mx.	.035 Mx.	.035 Mx.	.035 Mx.
Sulfur	.040 Mx.	.035 Mx.	.040 Mx.	.035 Mx.	.040 Mx.
Silicon	.15/.35	.15/.35	.15/.35	.20/.35	.15/.35
Copper	.35 Mx.	.35 Mx.	.35 Mx.	.35 Mx.	.35 Mx.
Nickel	.25 Mx.	.25 Mx.	1.65/1.85	.30 Mx.	1.65/1.85
Chromium	.20 Mx.	.90/1.10	.80/1.00	.55/.85 Mx.	.80/1.00
Molybdenum	.06 Mx.	.15/.25	.20/.30	.25/.35	.20/.30
Vandium	.07/.09	.030/.045	.07/.09	.045/.065	.07/.09
Columbium (Niobium)	-	-	-	.027/.043	-

All specifications are subject to change without notice.  
API Grades C and K information available upon request.

# Sucker Rod Selection Guide

Alberta Oil Tool manufactures the following types of Sucker Rods, Progressing Cavity Pump Drive Rods® & Pony Rods to meet any pumping condition. API grades C and K information available upon request.



**Type 54 API Grade D (Carbon)** - AISI C-1541-VM Carbon-Manganese Alloy Steel. Designed for medium to heavy loads at any depth in non-corrosive well fluids. This grade can be utilized in both reciprocating and Progressing Cavity Pump (PCP) applications.

**Type 78 API Grade D (Alloy)** - AISI A-4142-M Chromium-Molybdenum Alloy Steel. Designed for heavy rod loads at any depth in mild to medium corrosive well fluids that are effectively inhibited against corrosion attack. This grade has been alloyed and effectively heat-treated to resist corrosion and fatigue. Type 78 rods are recommended for both reciprocating and Progressing Cavity Pump (PCP) applications.

**Type 75 API Grade D (Special Alloy)** - AISI A-4330-M Nickel-Chromium-Molybdenum Alloy Steel. Designed for heavy loads at any depth in corrosive well fluids that are effectively inhibited against corrosion attack. This grade has been alloyed and then effectively heat-treated to maximize its corrosion and fatigue resistance. Type 75 rods are ideally suited for both reciprocating and Progressing Cavity Pump (PCP) applications.

**Type 96 Special High Strength Grade** - AISI A-4138-M Chromium-Molybdenum Alloy Steel. Designed for extra heavy loads at any depth in corrosive well fluids that are effectively inhibited against corrosion attack. This grade has been alloyed, effectively heat treated, to resist corrosion and fatigue. Type 96 rods are designed for reciprocating applications but can be utilized in some Progressing Cavity Pump (PCP) applications.

**Type 97 Special High Strength Grade** - AISI A-4330-M Nickel-Chromium-Molybdenum Alloy Steel. Designed for extra heavy loads at any depth in corrosive well fluids that are effectively inhibited against corrosion attack. This grade has been alloyed, effectively heat treated, to maximize its corrosion and fatigue resistance. Type 97 rods are designed for reciprocating applications but can be utilized in some Progressing Cavity Pump (PCP) applications.

**Pony Rods** - manufactured to the same dimensions, tolerances and grades as our Sucker Rods and Drive Rods®. Standard lengths: 1' (.30 m) – machined only, 2' (.61 m), 4' (1.22 m), 6' (1.83 m), 8' (2.44 m) and 10' (3.05 m). Other lengths are available on request.

## Definitions Loads

- \*Light = less than 25,000 psi (172 Mpa)
- \*Medium = 25,000 psi to 35,000 psi (172 Mpa to 241 Mpa)
- \*Heavy = 35,000 psi to 42,000 psi (241 Mpa to 290 Mpa)
- \*Extra Heavy = 42,000 psi and greater (290 Mpa)

## Seating Depth and/or Sucker Rod String Lengths

- \*Shallow = less than 4,000 ft. (1219 m)
- \*Medium = 4,000 ft. to 7,000 ft. (1219 m to 2134 m)
- \*Deep = 7,000 ft. and deeper (2134 m)

Definitions not intended as design criteria. Call your nearest AOT representative for specific rod string design recommendations.

AOT Type Physical Properties - as normalized and tempered	54	78	75	96	97
Tensile, ksi	115/140	120/140	120/140	138/150	140/150
Yield, ksi	85 min.	100 min.	100 min.	115 min.	115 min.
EI, 8" %	15 min.	10 min.	10 min.	10 min.	10 min.
Reduction in Area %	50 min.	45 min.	45 min.	45min.	45 min.
Hardness, Rc	22/30	22/30	22/30	29/33	30/33

Rod Description	± 0.031 Wrench Square Size
5/8"	7/8" (.875)
3/4"	1" (1.000)
7/8"	1" (1.000)
1"	1-5/16"(1.312)
1" with 7/8" pin	1" (1.000)
1-1/4" with 1" pin	1-5/16"(1.312)
1-1/4" with 1-1/8" pin	1-1/2 (1.500)
1-1/2" with 1-1/8" pin	1-1/2 (1.500)

Rod Pin Size	Nominal Diameter of Pin
5/8"	15/16"
3/4"	1-1/16"
7/8"	1-3/16"
1"	1-3/8"
1 1/8"	1-9/16"

Drive Rod® is a registered trademark  
of Alberta Oil Tool.

# Maximum Service Torque for Sucker Rods, Drive Rods<sup>®</sup> and Pony Rods

All torque values are ft. lbs.

Rod Size	Grade D Carbon (54)	Grade D Alloy (78)	Grade D Special Alloy (75)	Special Service (96)	Special Service (97)
7/8"	675	735	750	800	800
1"	1,010	1,100	1,110	1,200	1,200
*1" Drive Rods	N.A.	1,100	1,110	1,200	1,200
1 1/8"	N.A.	1,570	N.A.	N.A.	1,700
*1-1/4" Drive Rods	N.A.	2,000	2,100	2,500	2,500
*1 1/2" Drive Rods	N.A.	3,000	3,150	3,750	3,750

- All values based on rods and couplings in like new condition.
- \* Non-API Drive Rods<sup>®</sup> specifically designed for torsional application.
- No derating factor for slimhole couplings when High Strength Couplings are used.
- Values based on actual test results.
- E116 Norris/O'Bannon Rod Elevator for 1 1/4" Drive Rods<sup>®</sup>.
- E115 (Modified) Norris/O'Bannon Rod Elevator for 1 1/2" Drive Rods<sup>®</sup>.
- To maximize rod fatigue life, AOT recommends using a .8 safety factor.

**NOTE:** Correct sucker rod makeup is critical to the operation of a Progressing Cavity Pump installation.

## Care and Handling

### Sucker Rods and Drive Rods<sup>®</sup> Standard Bundle Data

Rod Size	5/8"	3/4"	7/8"	1"	1" w 7/8" pin	1 1/8"	1 1/4"	1 1/4" w 1 1/8" pin	1 1/2"
Rods per bundle	120	60	60	60	60	40	40	40	30
Footage per bundle	3,000	1,500	1,500	1,500	1,500	1,000	1,000	1,000	750
Bundle weight	3,450	2,470	3,355	4,375	4,158	3,705	4,345	4,472	4,705
Rod weight per foot (lb.)	1.14	1.62	2.19	2.89	2.77	3.68	4.34	4.47	6.23
Rod weight (lb.)	28.5	40.5	54.8	72.3	69.3	92	108.5	111.8	155.8
Export crating* Rods per crate	150	143	143	110	110	80	80	80	60

\* Custom sized bundles may be arranged

All specifications are subject to change without notice.

## Couplings (Sucker Rod, Polished Rod, Combination)

Alberta Oil Tool and Sprayloy sucker rod couplings are manufactured from AISI-8630 alloy special quality cold-formed blanks or cold drawn seamless mechanical steel tubing. The heat-treated blanks are machined to size and have a hardness of HRA 56-62. Couplings are machined; threaded using a cold forming rolled thread tap for thread strength and fatigue resistance. Then coated for anti-galling and lubrication properties. Dimensions and tolerance conform to API Spec 11B, latest edition. Quality control consists of process, random, and batch inspections.

Type T couplings are recommended for installation where abrasion or corrosion-abrasion are not a problem. Sucker rod couplings are available in box and box, pin and pin, or box and pin styles in all sucker rod sizes and combination of sizes. Couplings are available in API full-size and slimhole. Polished rod couplings and subcouplings are available in box and box styles in all sucker rod sizes and combination of sizes, and in full-size and slimhole outside diameters. Polished rod couplings are to be used with current API polished rods with the nine-degree cone pin.

AOT High Strength couplings are manufactured from 4130 heat treated material. These couplings have a minimum yield strength of 105,000 psi (723 Mpa) and a material hardness of 26-30 Rc. These specifications are designed to maximize connection load capacity and are ideally suited for P.C. application.

Properties of Type T Couplings			
Chemical Properties, %		Mechanical Properties	
Carbon	.20/.33	Tensile Strength, psi	95,000 min.
Manganese	.70/.90	Yield Strength	80/100,000
Phosphorus	.03 Mx.	Elongation, 2", %	16 min.
Sulfur	.03 Mx.	Reduction in Area, %	50 min.
Silicon	.15/.30	Hardness Brinell	195/243
Chromium	.40/.60	HRA	56/62
Molybdenum	.15/.25		
Nickel	.40/.70		

All specifications are subject to change without notice. The above values are average values and may vary from actual elements. The term box refers to an internal threaded coupling.

Rod Size, IN. (mm)	Outside Diameter, IN. (mm)		Coupling length	Approx. Wt., LBS. (kg)	Suggested Max. Stress Derating Factors for Slim Hole Couplings in Beam Pumping Applications
	Full Size	Slim Hole			
5/8" (15.88)	1 1/2" (38.1)	1 1/4" (31.75)	4"	1.3 (.59)	.80
3/4" (19.05)	1 5/8" (41.28)	1 1/2" (38.10)	4"	1.4 (.64)	.93
7/8" (22.23)	1 13/16" (46.04)	1 5/8" (41.28)	4"	1.7 (.77)	.80
1" (25.40)	2 3/16" (55.56)	2" (50.80)	4"	2.7 (1.22)	1.00
*1 1/8" (28.58)	2 3/8" (60.33)	2 1/4" (57.15)	4 1/2"	3.4 (1.54)	-

• \*1 1/8" High Strength Couplings are 5" in length.

# Sinker Bars

AOT Sinker Bars are manufactured from special quality hot rolled carbon manganese steel bars. Sinker bar dimensions and tolerances conform to API Spec. 11B, latest edition and AISI steel products manual. Sinker bars have a reduced section on one end for elevator seating and lifting. Pin blanks are machined and dimensions gauged. Pin threads are cold-formed to strengthen the thread from fatigue. An inhibitor lubricant is applied to each pin and thread protector installed. An oil soluble coating protects AOT sinker bars from atmospheric corrosion in storage. Sinker bars are bundled to prevent handling damage during transportation.

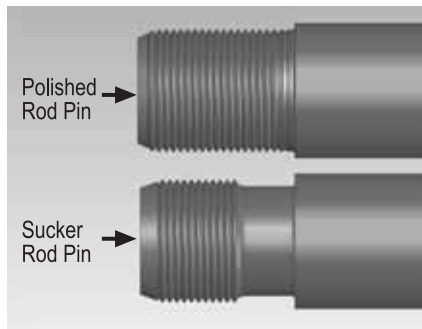
Special sizes and materials are available upon request.

Size OD, in.	Length, ft.	API Pin Size, in.	Lbs. per ft.	Elevator Rod Size, in.	Width of Wrench Flat
1 1/4"	25	5/8", 3/4", 7/8"	4.2	7/8	1
1 1/2"	25	3/4", 7/8" *	6.0	1	1.312
1 5/8"	25	7/8"	7.06	1	1.312

\* 1 1/2" with 7/8" pins is a Non-API product.

**NOTE: 1 1/4" supplied with 3/4" and 7/8" polished rod pins due to insufficient shoulder.**

Alberta Oil Tool (AOT) manufactures sinker bars with several combinations of body diameter and pin size. Some of these combinations are furnished with a Sucker Rod pin and others come with a Polished Rod pin. The table below lists each size of sinker bar produced by AOT along with its corresponding pin type.



Diameter	Pin Size	Pin Type
1 1/4"	3/4"	Polished Rod
1 1/4"	7/8"	Polished Rod
1 1/2"	3/4"	Sucker Rod
1 1/2"	7/8"	Sucker Rod
1 5/8"	7/8"	Sucker Rod

When installing sinker bars, it is imperative that the pin type be noted and the proper coupling be selected. Sucker Rod pins and Polished Rod pins are very different not only in overall size, but also in the shape of the thread profile. Polished Rod threads have a 9° taper on the final threads which, when used in conjunction with a Polished Rod Coupling, provide a mechanical lock between the rod and coupling. Sucker Rod pins, and likewise Sucker Rod Couplings, do not have this tapered thread. Because of this, a Sucker Rod Coupling cannot be used with a Polished Rod pin. The tapered threads of the Polished Rod pin will not mate properly with the parallel threads of the Sucker Rod Coupling. The parallel threads of the Sucker Rod pin will not interfere with the tapered, internal threads of the Polished Rod coupling.

After the proper coupling has been selected, a sinker bar connection should be made up using the same procedure as any other rod. The circumferential displacement should be measured using AOT's, "type 78, 75 & 54" Makeup cards (Black Card). The proper measurement on the card will correspond with the size of pin on the sinker bar.

Again, when installing sinker bars, it is very important to remember:

**A Polished Rod Coupling can be used with either a Polished Rod pin or a Sucker Rod pin, however  
A Sucker Rod Coupling can only be used with a Sucker Rod pin, not a Polished Rod pin.**

All specifications are subject to change without notice.

## Polished Rod Selection Guide

AOT Polished Rods and Polished Rod Couplings are manufactured in accordance to the latest edition of the API specification 11B. AOT Polished Rods and couplings are furnished with cold-formed fully rolled threads. This technique ensures a perfect thread on each and every pin. The burnished thread surface that results from rolled threads improves resistance to corrosion and reduces abrasion within the thread. The work hardened flank provides increased surface tensile, yield and shear strength. Due to pressure deformation, a residual compressive stress system builds up at the thread root, which counteracts tensile loading. When compared to cut threads, the load capacity of the rolled thread is increased by 6 - 12%.

**Alloy Steel** - Manufactured from chromium - molybdenum alloy steel (4140) and designed for light to heavy loads at any depth in mild to medium corrosive well fluids that are effectively inhibited against corrosion. This polished rod has a minimum tensile strength of 125,000 PSI and has been alloyed to improve its hardenability and increase its resistance to corrosion and abrasion. It can be used with all AOT Sucker Rod grades.

**Norloy Steel** - Manufactured from a nickel - chromium - molybdenum alloy steel (8620) and designed for light to heavy loads in severely corrosive well fluids that are effectively inhibited against corrosion. The norloy polished rod has a minimum tensile strength of 100,000 PSI. The addition of nickel to this polished rod further increases its corrosion resistance and improves toughness. It can be used with all Norris Sucker Rod grades but is ideally suited for use in conjunction with type 75 rods.

**Stainless Steel** - Manufactured from Type 431 stainless steel. This polished rod has a minimum tensile strength of 115,000 PSI and has the best corrosion resistance properties of all AOT grades. It has excellent tensile and torque strength and good toughness, making it ideally suited for progressing cavity pump application. This grade exhibits excellent resistance to a wide variety of corrosion media including salt water. Designed for any loads at any depth where corrosion is a problem or where other AOT Polished Rod grades are not applicable. This polished rod can be used with all AOT Sucker Rod grades.

**Sprayloy** - These hard surfaced polished rods are made from cold finished 1045 carbon steel with a hard spraymetal surface applied to the O.D. They are recommended for abrasive and corrosive conditions under moderate to heavy loads.

## Maximum Allowable Torque for Polished Rods

All torque values are ft. lbs.

Rod Size	Piston (C1045)	Norloy (8620)	431 SS	4140 Alloy	4140 Special
1 1/4" with 3/4" pin	1,500	1,500	1,500	1,500	-
1 1/4" with 7/8" pin	1,800	1,800	1,800	1,800	-
1 1/2" with 1" pin	2,800	2,800	2,800	2,800	-
1 1/2" Upset	-	-	-	-	3,750

•To maximize rod fatigue life, AOT recommends using a .8 safety factor.



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