T-Rod™ Torque Rods and Hi-T™ Couplings

Specialized technology for progressing-cavity applications

Applications

- Progressing-Cavity Pump (PCP) systems with conventional drive heads
- High-torque PCP systems that do not require centralizing

Features and Benefits

- When used with Ultrahigh-Strength EL Sucker Rod, Hi-T Couplings* are ideal for high-torque applications that require centralizing
- Smaller upset and wrench-flat increases flexibility in deviated wellbores and decreases flow losses in pumping systems due to smaller connections
- Large diameter rods with smaller pins increase T-Rod torque tolerances within small diameter tubing

Tool Description

Weatherford T-Rod Sucker Rod and Hi-T Couplings provide ideal performance within demanding, high-torque environments generated by PCP systems. T-Rods are specifically designed to withstand the higher, rotational torque consistently applied by typical PCP drive-head systems as well as the additional peak-torque produced from gas pockets and variations in liquid phases. T-Rods provide added strength for the vertical loads and rotational forces that conventional sucker rods were never designed to tolerate. T-Rods are manufactured from special bar quality (SBQ) steel and held to the same stringent, quality-control measures and handling required for all Weatherford sucker rods. All T-Rods also run through the Weatherford proprietary shot-peen process that defers fatigue cracks and extends run life, when compared to other sucker-rod manufacturing.

Weatherford Hi-T Couplings provide additional strength benefits when used with T-Rods—further maximizing the high-torque endurance needed to handle PCP applications and deep, high-load wells. Hi-T Coupling threads are cold formed, which results in a compressive stress at the root of the threads and provides maximum strength at the greatest weak point of cut-thread couplings. Plus, Hi-T Couplings have finished, grind-end faces with zero-phosphate coatings for optimal torque make-up.

*Weatherford recommends changing sucker-rod couplings after three make-ups, provided connection threads are inspected and deemed fit for reuse.

Weatherford T-Rod Sucker Rod and Hi-T Couplings

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T-Rod™ Torque Rods and Hi-T™ Couplings

Torque Rod Mechanical Properties

API Grade	Grade	Material	Tensile Strength	Yield Strength (Min)	Elongation (8-in.)	Reduction	Heat Treatment
DA Alloy	QD20	20CrMoA	115 to 140 ksi (792 to 965 MPa)	105 ksi 724 (MPa)	10% Min	45% Min	Quenched and Tempered
DS Special	KD	4720SR	115 to 140 ksi (792 to 965 MPa)	90 ksi (620 MPa)	10% Min	45% Min	Normalized and Tempered
HA Alloy	QX30	30CroMoA	140 to 155 ksi (965 to 1069 MPa)	120 ksi (827 MPa)	10% Min	40% Min	Quenched and Tempered
HS Special	HD	4333MV	140 to 155 ksi (965 to 1069 MPa)	115 ksi (792 MPa)	10% Min	40% Min	Normalized and Tempered
HY	EL	Proprietary					Normalized and Tempered/ Case Hardened

Torque Rod Chemical Composition

Grade	Steel Type	C	Mn	Si	Ni	Cr	Mo	Ph	S	Other
QD20	20CrMoA	0.17 to 0.24%	0.40 to 0.70%	0.17 to 0.37%	0.30 Max	0.80 to 1.10%	.015 to 0.25%	0.025% Max	0.20% Max	0.20% Max Cu
KD	4720SR	0.19 to 0.23%	0.85 to 1.05%	0.15 to 0.35%	0.9 to 1.20%	0.80 to 1.05%	0.22 to 0.30%	0.030% Max	0.040% Max	0.45% Max Cu 0.055 to 0.075% VA
QX30	30CroMoA	0.26 to 0.33%	0.40 to 0.70%	0.17 to 0.37%	0.30 Max	0.80 to 0.1.10%	0.15 to 0.25	0.025% Max	0.035% Max	0.20% Max Cu
HD	4333SRX	0.30 to 0.35%	0.90 to 1.10%	0.15 to 0.35%	1.65 to 2.00%	0.65 to 0.85%	0.13 to 0.25%	0.035% Max	0.040% Max	0.08 to 0.10%Va
EL	Proprietary									

T-Rod™ Torque Rods and Hi-T™ Couplings

Torque Rod Capacities

Grade[ab]	Size[ae]	Yield Strength	Specified Torque Limit[cd]
QD20	1 x 7/8 in. MP (25.4 x 22.23 mm)	105 ksi (724 MPa)	1,150 ft-lbs (1,559 N•m)
	1-1/4 x 1 in. MP (31.75 x 25.4 mm)		2,330 ft-lbs (3,159 N•m)
KD	1 x 7/8 in. MP (25.4 x 22.23 mm)	90 ksi (621 MPa)	1,000 ft-lbs (1,355 N•m)
	1-1/4 x 1 in. MP (31.75 x 25.4 mm)		2,000 ft-lbs (2,711 N•m)
QX30	1 x 7/8 MP (25.4 x 22.23 mm)	120 ksi (827 MPa)	1,300 ft-lbs (1,762 N•m)
	1-1/4 x 1 MP (31.75 x 25.4 mm)		2,670 ft-lbs (3,470 N•m)
	1-1/4 x 1-1/8 MP (31.75 x 28.58 mm)		2,670 ft-lbs (3,470 N•m)
	1-1/2 x 1-1/8 MP (38.1 x 28.58 mm)		3,450 ft-lbs (4,677 N•m)
HD	1 x 7/8 MP (25.4 x 22.23 mm)	115 ksi (793 MPa)	1,250 ft-lbs (1,694 N•m)
	1-1/4 x 1 MP (31.75 x 25.4 mm)		2,560 ft-lbs (3,470 N•m)
	1-1/4 x 1-1/8 MP (31.75 x 28.58 mm)		2,560 ft-lbs (3,470 N•m)
	1-1/2 x 1-1/8 MP (38.1 x 28.58 mm)		3,300 ft-lbs (4,474 N•m)
EL	7/8 (22.23 mm)	Proprietary	1,250 ft-lbs (1,694 N•m)
	1 (25.4 mm)		2,050 ft-lbs (2,779 N•m)
	1-1/8 (28.58 mm)		2,920 ft-lbs (3,958 N•m)

MP = Modified extended pin.
[a] Not all sucker-rod grades and sizes are listed in this table. For more information, contact an authorized Weatherford representative.
[b] Provided satisfactory corrosion inhibiting practices are followed.
[c] Weatherford recommends applying a service factor to the specified torque limit based on operating conditions.
[d] Hi-T couplings and special makeup procedure required.
[e] Hi-T 5-in. couplings are required for all 1-1/4 x 1-1/8 in. sizes.

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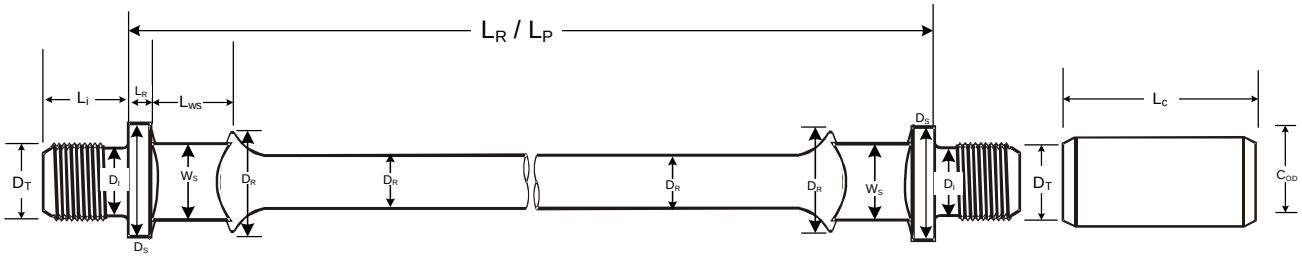
T-Rod™ Torque Rods and Hi-T™ Couplings

Torque Rod Specifications

		Nominal Size			
ID	Description	1.000 x 7/8 in. (25.4 x 22.2 mm) Modified SRP3	1.250 x 1 in. (31.75 x 25.4 mm) Modified SRP	1.250 x 1-1/8 in. (31.75 x 28.58 mm) Modified SRP	1.500 x 1-1/8 in. (38.1 x 28.58 mm) Modified SRP
DR	Rod body diameter	1.000 in. (25.4 mm)	1.250 in. (31.75 mm)	1.250 in. (31.75 mm)	1.500 in. (38.10 mm)
DS	Pin shoulder OD	1.625 in. (41.28 mm)	2.000 in. (50.80 mm)	2.265 in. (57.53 mm)	2.350 in (59.69 mm)
DT	Nominal thread diameter	1.187 in. (30.16 mm)	1.375 in. (34.93 mm)	1.562 in. (39.69 mm)	1.562 in. (39.69 mm)
Li	Pin length	1.770 in. (44.95 mm)	1.870 in. (47.63 mm)	2.400 in. (60.96 mm)	2.444 in. (62.07 mm)
WS	Wrench square width	1.000 in. (25.40 mm)	1.313 in. (33.34 mm)	1.500 in. (38.10 mm)	
LWS	Wrench square length	1.250 in. (31.75 mm)	1.500 in. (38.10 mm)	1.630 in. (41.28 mm)	
DB	Bead diameter	1.500 in. (38.1 mm)	1.900 in. (48.42 mm)	2.187 in. (55.63 mm)	
DI	Stress relief diameter	1.040 in. (26.42 mm)	1.220 in. (31.17 mm)	1.414 in. (35.92 mm)	
LR	Sucker rod length	25 and 30 ft (7.62 and 9.144 m)			
LP	Pony rod length	2, 4, 6, 8, 10 ft (.6, 1.2 ,1.8, 2.4, 3 m)			
LC	Coupling length	4.00 in. (101.60 mm)			5.000 in. (127.00 mm)
COD	Coupling OD, SH	1.625 in. (41.30 mm)	2.000 in. (80.80 mm)	2.250 in. (53.00 mm)	
COD	Coupling OD, FH	1.812 in. (46.00 mm)	2.187 in. (55.60 mm)	2.375 in. (60.30 mm)	–



T-Rod™ Torque Rods and Hi-T™ Couplings

Coupling Selection[a]

Coupling	Application	Tensile Minimum
Hi-T™ Grade T	High-torque or heavy load, noncorrosive	130 ksi (896 MPa)
Hi-T Grade SM	High-torque or heavy load, abrasive/properly inhibited	
Racer™ Hi-T	Severe side loads/PCP-torque/properly inhibited	

Coupling Mechanical Specifications

Coupling	Grade		Yield Strength	Tensile Strength	Elongation	ROA	HRC	BHN
Hi-T T	35CrMoA or 8630	Min	115 ksi (793 MPa)	130 ksi (896 MPa)	13%	50%	27	264
		Max	—	145 ksi (1,000 MPa)	—	—	32	301
Hi-T SM		Min	115 ksi (793 MPa)	130 ksi (896 MPa)	13%	50%	27	264
		Max	—	145 ksi (1,000 MPa)	—	—	32	301

Coupling Chemistry

Grade[b]	C	Mn	Si	P	S	Cr	Mo	Ni	Cu
35CrMoA	0.32%Mn	0.40%Mn	0.17%Mn	–	–	0.80%Mn	0.15%Mn	–	–
	0.40%Mx	0.70%Mx	0.37%Mx	0.03%Mx	0.025%Mx	1.10%Mx	0.25%Mx	0.25%Mx	0.3%Mx
8630	0.26%Mn	0.70%Mn	0.15%Mn	–	–	0.40%Mn	0.15%Mn	0.40%Mn	–
	0.33%Mx	0.90%Mx	0.35%Mx	0.03%Mx	0.025%Mx	0.70%Mx	0.25%Mx	0.85%Mx	0.3%Mx

[a] Hi-T coupling and special makeup procedures required for all torque rods.
[b] This grade specification pertains to AISI 41XX/8630 or similar grade (30CroMo/35CroMo) bar and seamless tubing suitable for API-11B.

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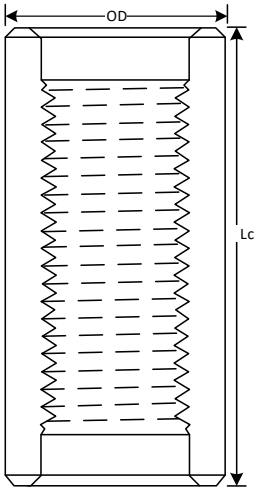
Coupling Dimensions

API Size[a]	Thread Diameter	OD (C_{OD})		Weight		Length
		Standard	Slimhole	Standard	Slimhole	
7/8 in. (22.20 mm)	1.188 in. (30.18 mm)	1.812 in. (46.00 mm)	1.625 in. (41.30 mm)	1.80 in. (0.82 mm)	1.50 in. (0.68 mm)	4 in. (101.60 mm)
1 in. (25.40 mm)	1.375 in. (34.93 mm)	2.187 in. (55.60 mm)	2.00 in. (50.80 mm)	2.58 in. (1.17 mm)	2.01 in. (0.91 mm)	4 in. (101.60 mm)
1-1/8 in.[b] (28.58 mm)	1.563 in. (39.70 mm)	2.375 in. (60.33 mm	2.258 in. (57.35 mm)	3.13 in. (1.42 mm)	2.80 in. (1.27 mm)	4.5 in. (114.30 mm)
1-1/8 in.[c] (28.58 mm)	1.563 in. (39.70 mm)	2.375 in. (60.33 mm	2.258 in. (57.35 mm)	3.47 in. (1.57 mm)	3.11 in. (1.41 mm)	5 in. (127.00 mm)

Coupling Coating Specifications

Coating	Surface Finish OD	Surface Hardness	Thickness
Hi-T™ Spray Metal SM	63 R_a µin (1.6 µm)	43 to 47 HRC	0.01 to 0.02 in. (0.25 to 0.51 mm)
Racer™ Hi-T	0.08 to 0.1 µin (2.032 to 2.54 µm) CoF	DLC	Proprietary



[a] All dimensions according to API 11B latest additions except for the 1-1/8 in. SH SR Couplings.
[b] Weatherford recommends replacing sucker-rod couplings after three makeups, provided connection threads are inspected between makeups and deemed acceptable for reuse.
[c] Hi-T 5-in. couplings are required for all 1-1/4 × 1-1/8 in. torque rods, contact a Weatherford representative for more information.