



MANUFACTURE/SALES/RENTAL/SERVICE



SFD T
DRILLING SOLUTIONS

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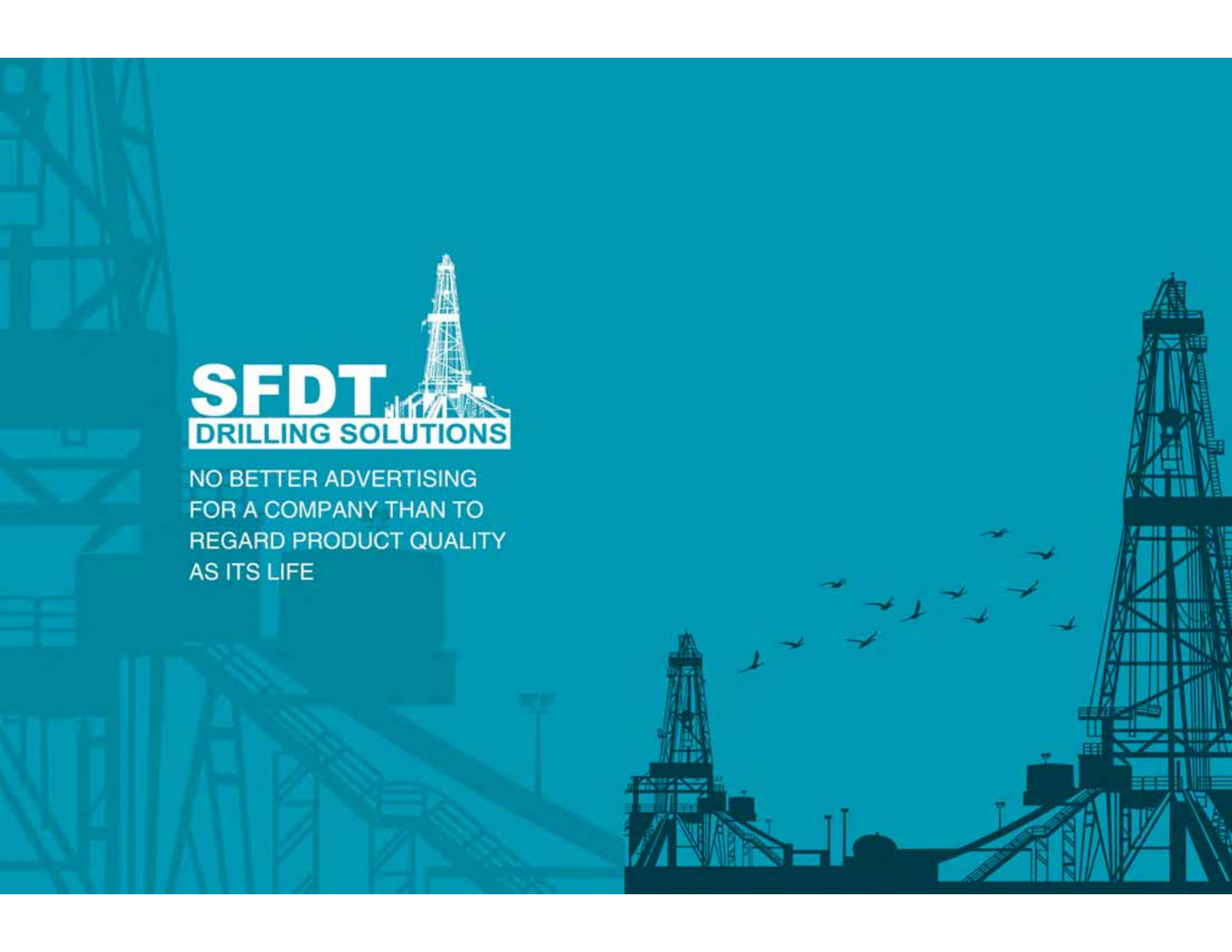
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Shanxi Fenglei Drilling Tools Co., Ltd



SFDT **DRILLING SOLUTIONS**

NO BETTER ADVERTISING
FOR A COMPANY THAN TO
REGARD PRODUCT QUALITY
AS ITS LIFE



Introduction about SFDT

Shanxi Fenglei Drilling Tools Co., Ltd (SFDT) is one of Chinese largest fully integrated manufacturer of drill stem products and holds API Spec.7-1, API 5DP, API Q1, NS-1, Gost, ISO 9001, ISO 14001 and ISO 18000 certificates. SFDT is a state-owned enterprise and started its drilling stem business in 1970's. SFDT manufactured Chinese first piece of drill collar in 1978 and now manufactures a full range of drill stem products including drill pipe, drill collar, heavy weight drill pipe, down hole motor and other drilling components, such as kelly, non-magnetic drilling tools, lifting plug, subs, lift caps, and SFDT's proprietary drill stem products.

Quality is not only a word in SFDT. Investment in quality and technology is a permanent commitment at SFDT. SFDT possesses robust technical staff and advanced customer-designed facilities, which offer an outstanding quality assurance capability. The independent inspection unit directly under the control of the general manager assures the highest degree of quality. All employees are fully

instructed in the importance of quality and strict quality management systems are applied in our operations. All SFDT's products under every manufacturing process insure conformance to, or exceed API specifications as well as established industries standards the customer requires.

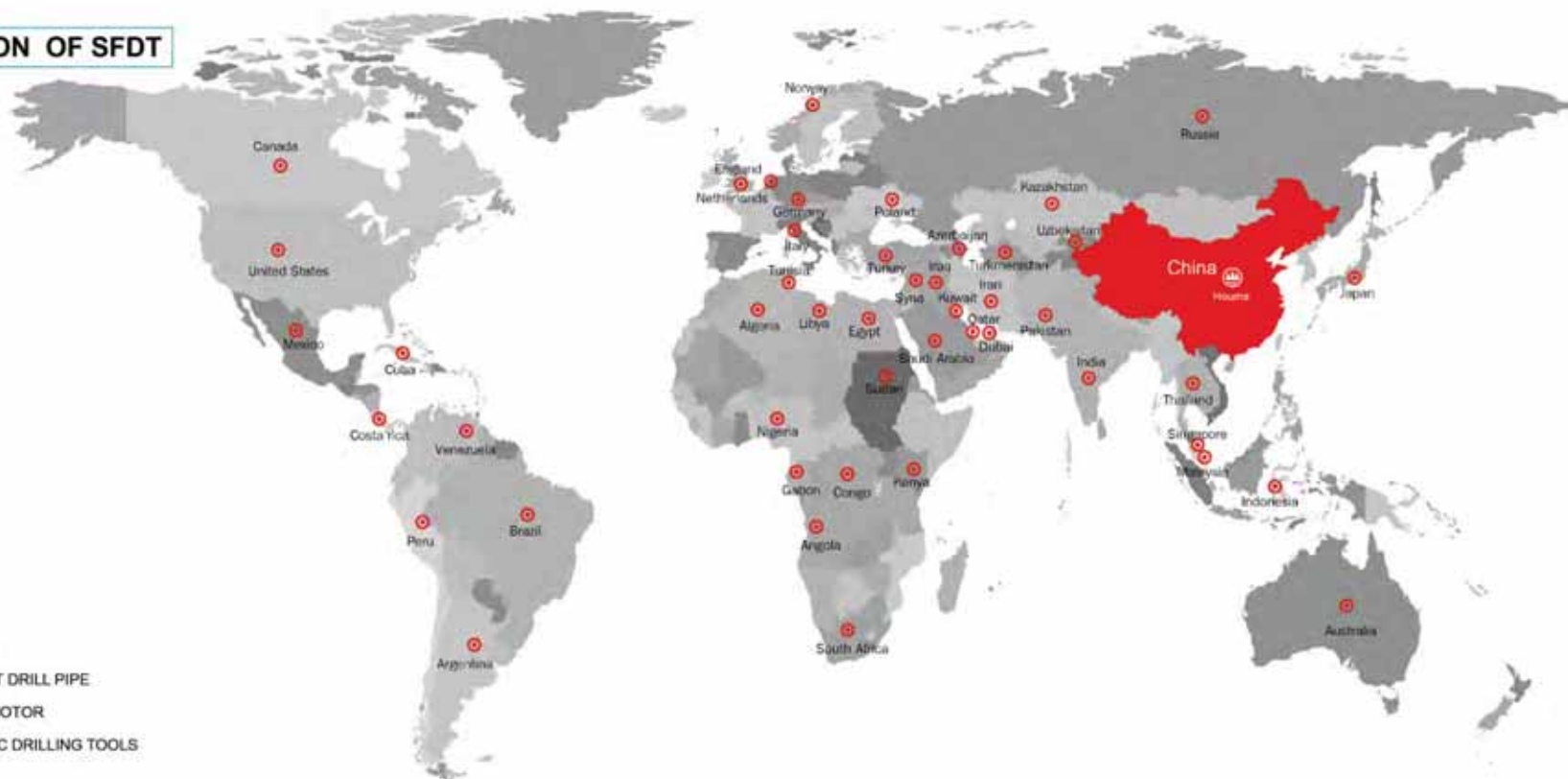
SFDT's products are widely used in the domestic oil fields controlled by Sinopec, CNPC and CNOOC. Also SFDT exports its products to North and South America, North Sea, Middle East, Southeast Asia and former USSR countries.

As a drill stem component manufacturer over 40 years, SFDT accumulates wide experience in drilling stem design, manufacturing, testing and operation aspects. SFDT would like to share its achievements in the related aspects with anyone who is interested in SFDT's products all over the world.





SALES REGION OF SFDT



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PART OF SFDT CUSTOMERS





DRILL PIPE

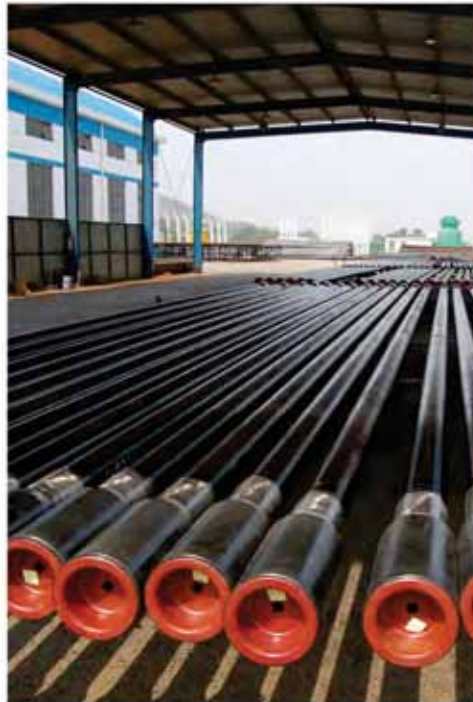
• Scope of SFDT's drill pipe

SFDT provides a full range of drill pipes in nominal sizes from 2-3/8" to 6-5/8" OD with API and non-API thickness and steel grades. Sour services steel grade is available by special request. SFDT offers drill pipes with the following specifications:

- API 5DP
- NS-1
- DS-1
- IRP
- Customer-supplied specification

• Design

During drill pipe's operation, the short or irregular upset areas will cause the stress concentration and fatigue cracks, which may ultimately result in drill pipe failure. The life of drill pipe would be extended if the drill pipe manufacturer applies the fatigue resistant design on the pipe body upset area. SFDT offers a proprietary design of oversized minimum internal upset (MIU) during pipe body end forging to form a smooth transitional upsetting area.



• Drill Pipe Manufacturing Chart

Pipe Body:

Inspection after receipt → Ending Upsetting → Full Length Heat Treatment → Straightening →
UT Inspection → Pipe End Machining → MP inspection of Ending & Upsetting area → Ready for Welding

Too Joints:

Quenching → Tempering → UT&MP inspection → OD turning → Threading → Threading Measurement →
cold rolling (if specified) → Phosphated coating → Makeup & break out (if specified) →
Hardfacing (if specified) → Ready for Welding

Welding:

Inertial Friction Welding → Flash Removal → Welding Zone Heat Treatment → Welding Zone Grinding →
Welding Zone Inspection (Hardness, UT, MPI, etc) → Length & Weight Measurement →
Internal Plastic Coating (if specified) → External Painting → Final Inspection → Packing → Ready for Shipment

• Pipe Upsetting Procedure

The green pipe supplied to SFDT is manufactured by reputable domestic and overseas tube manufacturers. All pipes are strictly inspected upon receipt to verify that meet SFDT's requirement. The advanced inspection system can precisely detect the dimensional tolerance and ensure a 95 percent minimum wall thickness on every pipe. The tube ends are forged on a special designed upsetting machine, which can optimize forging efficiency and offers an oversized minimum internal upset. The mechanical properties after Q&T with heat treatment furnace controlled by computer are verified through rigorous testing.





• Tool Joints

SFDT's tool joints are made of AISI 4137H premium alloy steel fully Q&T with IPSEN furnace imported from Germany. All tool joints are inspected by fluorescence magnetic particle and ultrasonic method.

The connections are machined by CNC Lathe and gauged to API or customer specified specification. All threads are phosphatized to reduce the possibility of connection galling. SFDT can supply extra-long tool joints on its drill pipe to increase long space, and allows several connection recuts to save the drilling investment.



Mechanical Properties of Tool Joints

Standard	Tensile Strength Rm Mpa	Yield Strength R _{0.2} Mpa	ElongationA%	Impact AKV J (-20°C)		HardnessHB
API Spec-5DP	≥965	≥827	≥13	≥54		285~341
Q/PFL•J08•04•2010	≥980	860~1034	≥13	Longitudinal Average≥70 Min≥61	Transverse Average≥52 Min≥43	285~341

Note: Q/PFL•J08•04•2010 is SFDT's own enterprise standard.

• High Performance Connection

Double Shoulder and Hi-Torque connections

SFDT's SHT™ (Hi-Torque) and HDS™ (double shoulder tool joint) connection offer higher torsional capacity than API standard connections. The additional strength provides security guarantee when the drill pipes are operated in high- risks or rugged conditions. SFDT's HDS™ connection is not only a high performance, but also fully interchangeable with corresponding API connections.



SHT™ connection

FL™ series connections

As the second generation Hi-performance connection, FL™ series connections (FL38, 39, 54 and 57) are a patented high-performance connection designed by SFDT. FL™ series connections offer higher torsional capacity than SHT™ and HDS™ connections. SFDT's drill pipe and HWDP with FL™ series connections are operated in COSL's offshore ultra-deep exploration and show is reliability for the ultra-deep drilling project. The FL™ series connections provide more security guarantee for the drill pipe operation in different high-risk and rugged conditions.

Data of 5-7/8"Drill Pipe with FL 57 connection, S-135	
Connection Type	FL57
Pin Length /mm	184.15
Taper/in	1/16
Lead/mm	7.257
TJ OD/mm	177.8
TJ ID/mm	107.95
Yield Strength/psi	120000
Torsional Strength ft-lbs	95371
Tensile Strength/lbs	1220796
Wall Thickness/mm	9.17
Yield Strength/psi	135000
Tensile Strength/lbs	844223
Torsional Strength ft-lbs	105511
Collapse psi	10820
Burst psi	15700





• Assembly of Drill Pipe and Tool Joints



SFDT's drill pipe and tool joints are assembled through a friction welding method, which is high-integrity and reliable, and produce consistent and uniform weld zone properties. MT1400 inertial friction welding machine controlled by computer is swift and steady going on the welding process.

After removal of weld bead by an automatic lathe, the internal and external surface of welding zone is polished and free of stress risers. The heat affected zone is quenched and tempered in a unique induction heating system to improve mechanical properties. Quality of welding zone is assured by means of magnetic particle, ultrasonic and hardness inspection during manufacturing process.



Weld Zone Technical Data

Grade	Yield Strength Min. Mpa	Tensile Strength Min. Mpa	Elongation %	Impact AKV J	Note
E-75	517	689	13	30(Average)	PSL-1
X-95	609	712		25(Min.)	+20°C
G-105	655	724		42(Average)	PSL-3
S-135	724	793		32(Min.)	-20°C

Note: The yield and tensile strength on weld zone is higher than the data specified in API Spec. 5DP.

• Special Grade Drill Pipe

SFDT offers SS-75, SS-95 and SS-105 drill pipes for service in H₂S, high temperature and high pressure conditions. SS-75, SS-95 and SS-105 have optimum fracture toughness, controlled yield strength and restricted hardness to against hydrogen embrittlement. The tubes are manufactured and tested in accordance with NACE MR0175 and Canadian IRP 1.8 sour service specifications.

Mechanical Property of SS Drill Pipe

	SS-75	SS-95	SS-105
Yield Strength Ksi	75/95	95/110	105/120
Tensile Strength Ksi	95/115	105/130	115/140
Min. Single Value Charpy-V J	70	80	80
Hardness Rockwell C* (HRC)	Min. Avg HRC	22	25
	Single Point Reading	24	27
Min. Elongation %	17	17	17

Mechanical Property of SS Tool Joint

Yield Strength Ksi	110/125
Tensile Strength Ksi	125/145
Min. Single Value Charpy-V J	90
Max. Avg Hardness Rockwell (HRC)	30
Min. Elongation %	15

Note:

1. Testing frequency of pipe, tool joints and welding should be one set of three specimens per heat, per heat treat lot or every 200 pipe, tool joint set and welding-finished pipe, whichever is the more frequent.
2. No hardness single reading above 32.0 HRC.





• Hardbanding and IPC

In order to optimize wear resistance, Hardbanding is applied to the SFDT's drill pipes.

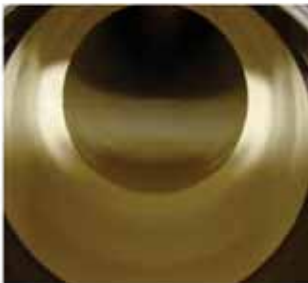
SFDT can supply the below hardbanding options on its drill pipe.

- Amco100xt, Amco150xt, Amco300xt, Amco 350xt.
- Tuboscope TCS 8000 and TCS Ti
- Armacor M Star
- Duraband and Tuffband
- Smooth-X
- Iron-matrix powder Alloy
- Tungsten Carbide Particle



The below Internal plastic coating is available.

- DPC, TK34, TK34-P
- TC-2000, TC-2000SS and TC2000P



• Factory Make-up and Break-out Services

Time is money during the drilling operation. If a thread galling occurs during drilling operation, the repair or replacement will lost rig time. Proper factory Make-up and Break-out procedure is not only an important factor affecting the life of connections, but also save rig time and improve the efficiency on drilling operation. If request, SFDT applies factory Make-up and Break-out procedures to tool joints and ensure the connections performance.

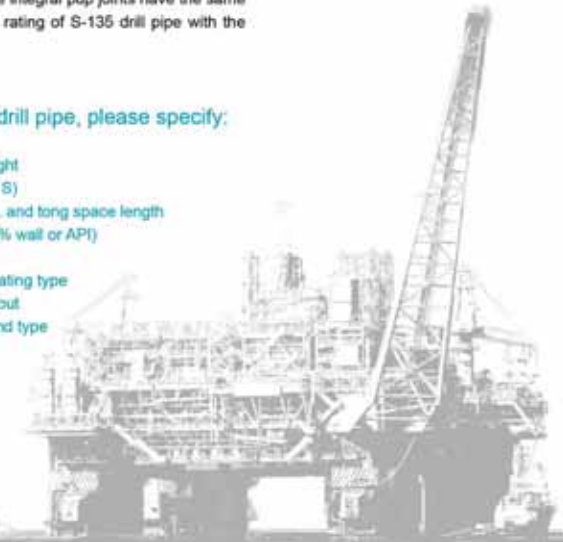


• Pup Joint

SFDT's pup joints (short drill pipe) are integral type and made of AISI 4145H Mod. alloy steel. Its mechanical properties meet or exceed the requirement API Specification 7-1. The integral pup joints have the same tensile and torsional rating of S-135 drill pipe with the same pin ID.

When ordering drill pipe, please specify:

1. Tube size and weight
2. Grade (E, X, G, or S)
3. Tool joint O.D., I.D. and tong space length
4. Wall thickness (95% wall or API)
5. Hardbanding type
6. Internal Plastic Coating type
7. Make-up & Break-out
8. Connection size and type





DRILL PIPE

3-1/2	15-30	9-13/5	11-1	0-44/9	500,093	30,104	30,308	HDS NC 38	2	2-1/8	8	10-1-1/2	22,208	828,830	37,500	0-0/7	17-0/7	
3-1/2	15-30	9-13/5	11-1	0-44/9	500,093	30,104	30,308	NC 40	5-1/2	2-1/4	7	10	108,016	994,596	42,543	0-8/7	17-6/1	
1-1/2	15-30	8-13/8	11-1	0-44/9	500,093	30,104	30,308	HDS NC 40	5-1/2	2-1/4	7	10	272,400	711,861	31,487	1-3/4	15-0/8	
4	14-00	8-7/8	11-1	0-33	285,350	23,288	11,354	10,828	5-1/4	2-13/16	9	15	18,726	486,980	31,178	1-3/4	15-0/8	
4	14-00	8-7/8	11-1	0-33	285,350	23,288	11,354	HDS NC 40	5-1/2	2-1/4	7	10	272,400	684,590	42,410	1-0/5	15-0/8	
4	14-00	8-7/8	11-1	0-33	285,350	23,288	11,354	10,828	FL 39	4-7/8	2-13/16	10	15	19,746	486,290	32,410	1-4/1	15-2/9
4	14-00	8-7/8	11-1	0-33	285,350	23,288	11,354	10,828	NC 46	5-1/4	2-13/16	9	10	19,000	486,000	33,200	0-86	15-3/1
4	14-00	8-7/8	11-1	0-33	301,454	29,498	14,382	13,716	5-1/4	2-13/16	9	10	15,800	776,406	33,500	0-86	15-2/9	
4	14-00	8-7/8	11-1	0-33	301,454	29,498	14,382	13,716	HDS NC 48	5-1/2	2-1/4	7	10	272,400	684,590	42,410	1-3/4	15-0/8
4	14-00	8-7/8	11-1	0-33	301,454	29,498	14,382	13,716	FL 39	4-7/8	2-13/16	10	15	19,746	506,290	32,210	1-12	15-2/9
4	14-00	8-7/8	11-1	0-33	301,454	29,498	14,382	13,716	NC 40	5-1/2	2-1/4	7	10	19,000	901,000	33,200	1-13	16-2/2
4	14-00	8-10/8	11-1	0-33	309,052	32,003	13,906	13,559	NC 40	5-1/2	2-1/4	7	10	19,000	897,101	30,114	0-82	15-8/7
4	14-00	8-10/8	11-1	0-33	309,052	32,003	13,906	13,559	5-1/4	2-13/16	9	15	18,726	486,980	31,178	0-86	15-0/8	
4	14-00	8-10/8	11-1	0-33	309,052	32,003	13,906	13,559	HDS NC 48	5-1/2	2-1/4	7	10	272,400	684,590	42,410	1-3/4	15-0/8
4	14-00	8-10/8	11-1	0-33	309,052	32,003	13,906	13,559	FL 39	4-7/8	2-13/16	10	15	19,746	506,290	32,210	1-11	15-2/9
4	14-00	8-10/8	11-1	0-33	309,052	32,003	13,906	13,559	NC 40	5-1/4	2-7/16	7	10	19,000	901,000	33,200	1-82	16-3/9
4	14-00	8-13/5	11-1	0-33	513,646	41,918	20,137	19,491	NC 40	5-1/2	2-1/4	7	10	17,848	897,101	29,747	0-71	16-2/9
4	14-00	8-13/5	11-1	0-33	513,646	41,918	20,137	19,491	5-1/4	2-13/16	9	15	20,902	686,250	34,570	0-83	16-1/2	
4	14-00	8-13/5	11-1	0-33	513,646	41,918	20,137	19,491	HDS NC 48	5-1/2	2-1/4	7	10	272,400	684,590	42,410	1-08	15-0/8
4	14-00	8-13/5	11-1	0-33	513,646	41,918	20,137	19,491	FL 39	4-7/8	2-13/16	10	15	22,408	721,920	37,240	0-93	16-4/7
4	14-00	8-13/5	11-1	0-33	513,646	41,918	20,137	19,491	NC 46	6	3	10	23,600	1,090,000	40,000	0-01	16-4/7	
4-1/2	13-25	8-2/5	11-1	0-271	270,030	25,900	7,904	2,172	NC 30	6-5/8	3-3/8	7	10	18,900	893,500	30,500	1-18	15-1/2
4-1/2	13-25	8-2/5	11-1	0-271	270,030	25,900	7,904	2,172	NC 30	6-5/8	3-3/8	7	10	228,210	1,015,000	70,500	1-47	15-9/8
4-1/2	16-00	8-2/5	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	2-1/4	7	10	17,800	907,104	33,993	1-08	16-4
4-1/2	16-00	8-2/5	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	26,250	883,590	43,700	1-21	16-2/9	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	25,800	939,400	37,000	1-32	18-3
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3	7	10	20,900	1,008,427	39,659	0-92	18-6/4
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	27,900	882,800	46,210	1-38	18-2/9	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3	7	10	32,500	1,032,500	43,730	1-38	18-6/4
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3-1/4	7	10	25,800	939,600	37,000	0-96	18-8/7
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	20,900	1,008,427	39,659	0-92	18-6/4	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	3	7	10	27,900	882,800	46,210	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	32,500	1,032,500	43,730	1-38	18-6/4
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3-1/4	7	10	27,900	882,800	46,210	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	20,900	1,008,427	39,659	0-92	18-6/4	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	3	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3-1/4	7	10	27,900	882,800	46,210	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	20,900	1,008,427	39,659	0-92	18-6/4	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	3	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3-1/4	7	10	27,900	882,800	46,210	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	20,900	1,008,427	39,659	0-92	18-6/4	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	3	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3-1/4	7	10	27,900	882,800	46,210	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	20,900	1,008,427	39,659	0-92	18-6/4	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	3	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3-1/4	7	10	27,900	882,800	46,210	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	20,900	1,008,427	39,659	0-92	18-6/4	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	3	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3-1/4	7	10	27,900	882,800	46,210	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	20,900	1,008,427	39,659	0-92	18-6/4	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	3	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3-1/4	7	10	27,900	882,800	46,210	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	20,900	1,008,427	39,659	0-92	18-6/4	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	3	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 30	6-1/4	3-1/4	7	10	27,900	882,800	46,210	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	5-1/4	2-1/4	7	10	20,900	1,008,427	39,659	0-92	18-6/4	
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	NC 46	6-1/4	3	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16-00	8-7/8	11-1	0-337	330,558	30,007	10,302	9,829	HDS NC 46	6-1/4	3-1/4	7	10	32,500	1,032,500	43,730	1-38	18-2/9
4-1/2	16																	



5	25.60	S-135	HEU	0.500	954200	94100	24100	251600	5-1/2 FH	7-14	3-1/4	8	10	47501	1700000	78700	0.84	29.43
5	25.60	S-135	HEU	0.500	954600	94100	24100	251600	HDS S-630 FH	6-5/8	2-3/4	7	10	55740	1372400	92410	0.99	28.73
5	25.60	S-135	HEU	0.500	954800	94100	24100	251600	HDS S-630 FH	7-1/4	3-1/4	8	10	60380	1,717,010	114,300	1.21	29.45
5	25.60	S-135	HEU	0.500	954900	94100	24100	251600	S-617-5 FH	6-5/8	3-1/2	9	15	38078	1,090,710	64,800	0.69	28.53
5-1/2	21.00	I-25	HEU	0.361	433000	50700	8410	8410	5-1/2 FH	7	4	8	10	33400	1270000	55700	1.10	23.82
5-1/2	21.00	E-75	HEU	0.361	433000	50700	8410	8410	HDS S-617 FH	7	4	8	10	44130	1,244,430	71,500	1.49	23.82
5-1/2	21.00	E-75	HEU	0.361	433000	50700	8410	8410	S-617-5 FH	7	4	10	15	45432	1,244,440	75,720	1.49	25.32
5-1/2	21.00	E-75	HEU	0.361	433000	50700	8410	8410	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	1.84	24.73
5-1/2	21.00	X-65	HEU	0.361	554000	64200	10000	10000	5-1/2 FH	7	3-3/4	8	10	33700	1450000	62000	0.08	24.45
5-1/2	21.00	X-65	HEU	0.361	554000	64200	10000	10000	HDS S-1/2 FH	7	3-3/4	8	10	52560	1,627,140	87,110	1.36	24.45
5-1/2	21.00	X-65	HEU	0.361	554000	64200	10000	10000	S-617-5 FH	7	4	10	15	45432	1,244,440	75,720	1.18	25.42
5-1/2	21.00	G-105	HEU	0.361	554000	64200	10000	10000	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	1.46	21.72
5-1/2	21.00	G-105	HEU	0.361	612000	71000	10000	12100	5-1/2 FH	7-1/4	3-1/2	8	10	43300	1620000	72200	1.82	25.3
5-1/2	21.00	G-105	HEU	0.361	612000	71000	10000	12100	HDS S-1/2 FH	7-1/4	3-1/2	8	10	60500	1,757,010	114,300	1.61	25.1
5-1/2	21.00	G-105	HEU	0.361	612000	71000	10000	12100	S-617-5 FH	7	4	10	15	45432	1,244,440	75,720	1.37	25.42
5-1/2	21.00	G-105	HEU	0.361	612000	71000	10000	12100	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	1.85	24.72
5-1/2	21.00	S-135	HEU	0.361	325000	47700	12700	13500	5-1/2 FH	7-1/4	3	8	10	52160	1030000	40000	0.39	26.4
5-1/2	21.00	S-135	HEU	0.361	785000	97100	12700	13500	HDS S-1/2 FH	7-1/2	3	8	10	76500	1,684,270	127,000	1.31	26.43
5-1/2	21.00	S-135	HEU	0.361	785000	97100	12700	13500	S-617-5 FH	7	4	10	15	45432	1,244,440	75,720	0.96	25.42
5-1/2	21.00	S-135	HEU	0.361	785000	97100	12700	13500	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	0.98	24.72
5-1/2	24.70	E-75	HEU	0.415	497000	56600	10500	9000	5-1/2 FH	7	4	8	10	33400	1270000	55700	0.98	26.35
5-1/2	24.70	E-75	HEU	0.415	497000	56600	10500	9000	HDS S-1/2 FH	7	4	8	10	44130	1,244,430	71,500	1.30	26.35
5-1/2	24.70	E-75	HEU	0.415	497000	56600	10500	9000	S-617-5 FH	7	4	10	15	45432	1,244,440	75,720	1.34	27.65
5-1/2	24.70	E-75	HEU	0.415	497000	56600	10500	9000	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	1.85	27.14
5-1/2	24.70	X-65	HEU	0.415	630000	71700	12800	12800	5-1/2 FH	7	3-1/2	8	10	43300	1630000	72200	1.61	27.79
5-1/2	24.70	X-65	HEU	0.415	630000	71700	12800	12800	HDS S-61/2 FH	7	3-1/2	8	10	59400	1,897,500	93,110	1.31	27.79
5-1/2	24.70	X-65	HEU	0.415	630000	71700	12800	12800	S-617-5 FH	7	4	10	15	45432	1,244,440	75,720	1.06	27.85
5-1/2	24.70	X-65	HEU	0.415	630000	71700	12800	12800	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	1.91	27.25
5-1/2	24.70	G-105	HEU	0.415	805000	79200	14000	13000	5-1/2 FH	7-1/4	3-1/2	8	10	43300	1630000	72200	0.91	27.79
5-1/2	24.70	G-105	HEU	0.415	805000	79200	14000	13000	HDS S-1/2 FH	7-1/4	3-1/2	8	10	61900	1,897,560	102,600	1.30	27.79
5-1/2	24.70	G-105	HEU	0.415	805000	79200	14000	13000	S-617-5 FH	7	4	10	15	45432	1,244,440	75,720	0.96	27.85
5-1/2	24.70	G-105	HEU	0.415	805000	79200	14000	13000	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	1.98	27.25
5-1/2	24.70	S-135	HEU	0.415	805000	79200	14000	13000	5-1/2 FH	7-1/2	3	8	10	72100	1030000	66000	0.85	26.92
5-1/2	24.70	S-135	HEU	0.415	805000	79200	14000	13000	HDS S-61/2 FH	7-1/2	3	8	10	76500	1,684,270	127,500	1.25	26.92
5-1/2	24.70	S-135	HEU	0.415	805000	79200	14000	13000	S-617-5 FH	7	4	10	15	45432	1,244,440	75,720	0.74	27.85
5-1/2	24.70	S-135	HEU	0.415	805000	79200	14000	13000	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	0.92	27.25
5-1/2	24.70	G-105	HEU	0.361	655000	82900	10200	10200	5-1/2 FH	7	4-1/4	10	15	56124	1,190,260	93,400	1.14	26.48
5-1/2	24.70	G-105	HEU	0.361	655000	82900	10200	10200	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	0.69	26.48
5-1/2	24.70	G-105	HEU	0.361	655000	82900	10200	10200	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	1.02	29.12
5-1/2	24.70	G-105	HEU	0.361	655000	82900	10200	10200	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	0.79	29.12
5-1/2	24.70	G-105	HEU	0.361	655000	82900	10200	10200	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	0.87	29.67
5-1/2	24.70	G-105	HEU	0.361	655000	82900	10200	10200	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	0.63	30.12
5-1/2	24.70	G-105	HEU	0.361	655000	82900	10200	10200	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	0.80	30.52
5-1/2	24.70	G-105	HEU	0.361	655000	82900	10200	10200	FL 37	7	4-1/4	10	15	56124	1,190,260	93,400	0.70	31.97



DRILL COLLAR

• Scope of SFDT's Drill Collar

Since SFDT manufactured the first piece of drill collar of China in 1978, SFDT has supplied over four hundred thousand of drill collars to domestic and overseas markets. Today, SFDT provides a full range of slick and spiral drill collars manufactured with AISI 4145H mod. alloy steel, special sour service steel and non-magnetic alloys solid bar in accordance with popular and prevailing industry standards:

• API Spec. 7-1, 7-2
• DS-1
• NS-1

SFDT offers a unique trepanning procedure from one direction with no mismatch, which is ideal for the precision machining of drill collar's ID. All drill collars are Q&T overall length by SFDT's gas and power frequency induction heating treatment machine, which guarantee the mechanical properties 1" below surface at ambient temperature to meet the customer specified specifications.

OD of drill collar in	Tensile strength Mpa	Yield Strength Mpa	Elongation (L=4D) %	Impact AKV J	Brinell Hardness HB
3-1/8-6-3/4	≥965	≥758	≥13	≥54	≥285
7-11	≥930	≥689	≥13	≥54	≥285



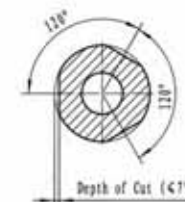
Spiral Drill Collar

Slick Drill Collar

Special 11" and 14" OD spiral drill collars with 31 foot length are available if request.

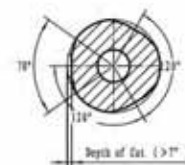
• Spiral Drill Collar

In order to reduce differential pressure sticking, the drill collar surface can be spiral-grooved with SFDT's unique triple-headed milling machines. SFDT's spiral drill collar reduces its contact area with the wall of the hole and it is a perfect solution for deep, directional or deviated drilling.



• Pony Collar

Excepting the standard 30 and 31 foot length drill collar, SFDT provides pony collars with various of length in order to adjust the length and control the placement of components in bottom-hole assembly(BHA). Pony collars are machined with AISI 4145 H Mod. alloy steel and meet the requirements of API Spec. 7-1.



OD Range (in)	4-4 3/8	4 1/2-5 1/8	5 1/4-5 3/4	5 7/8-6 3/8	6 1/2-7	7 1/8-7 7/8	8-8 7/8	9-9 7/8
Depth of cut (in)	6/32	7/32±1/32	1/4±1/32	9/32±1/16	5/16±1/16	11/32±1/16	3/8±1/16	13/32±3/32
Spiral pitch (in)	±1/32	7/32	42±1	42±1	46±1	64±1	68±1	72±1





Connection interchange list

Connection Name	Size						
Numbered Connection NC	26	31	38	40	46	50	
HDS			38	40	46	50	5 1/2
Internal Flush IF	2 3/8	2 7/8	3 1/2		4	4 1/2	
Full hole FH				4			5 1/2
Slim hole SH	2 7/8	3 1/2	4 1/2				
Extra hole XH				4 1/2	5		

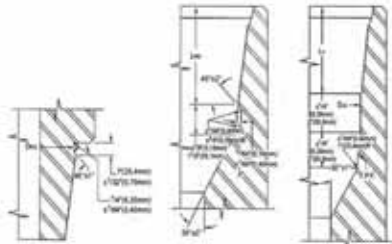
Note: HDS connection is designed by SFD to distribute the torque force between the two shoulders and offers additional torsional strength for high torque applications than API standard thread. SFD's HDS connection is interchangeable with corresponding API thread.

• Additional Processing of Drill Collar

Anti-Galling treatment

1. Stress relief features

The Stress relief features improve bending strength of pin and box connections and enhance the durability and resist connection fatigue.



Note: As indicated in API Spec. 7-1 Latest Edition, connections NC23, NC26 (2 3/8 IF) and NC31 (2 7/8 IF) have not enough metal to accommodate stress relief features.

2. Cold rolling

SFD drill collar thread roots and stress relief features are cold rolled, which is helpful to reduce the fatigue failure of threads by minimizing crack initiation.



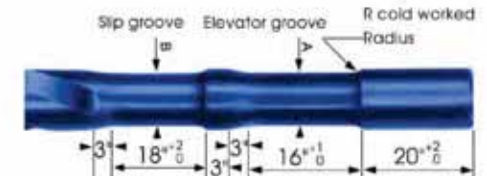
3. Phosphatized Coating

All SFD drill collar threads would be phosphatized to lower the possibility of connection galling.

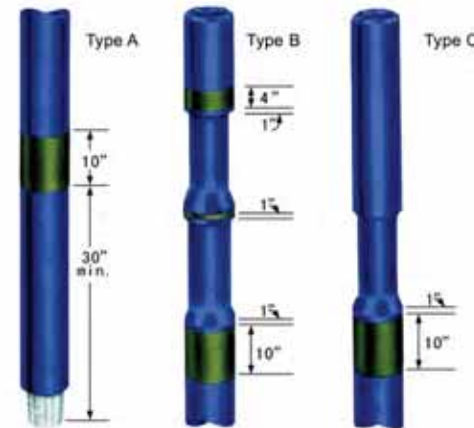


Slips and Elevator Recesses

SFD offers slip and elevator recesses options on drill collars, which improve handling efficiency and safety. Slip and elevator recesses are machined in accordance with API Spec. 7-1 latest edition or customer specified size, and can be used together or separately.



OD	10	9 3/4	9 1/2	9	8 1/2	8	7 3/4	7 1/2	7 1/4	7	6 3/4	6 1/2	6 1/4	6	5 3/4	4 3/4	4 1/8
A	9 1/8	8 7/8	8 5/8	8 1/8	7 3/4	7 1/4	7	6 3/4	6 1/2	6 1/4	6	5 7/8	5 5/8	5 3/8	5 1/8	4 1/4	3 11/16
B	9 1/2	9 1/4	9	8 1/2	8	7 1/2	7 1/4	7	6 3/4	6 1/2	6 1/4	6	5 3/4	5 3/4	5 1/4	4 3/8	3 3/4
R	1/4	1/4	1/4	1/4	3/16	3/16	3/16	3/16	3/16	3/16	3/16	1/8	1/8	1/8	1/8	1/8	1/8



Hardbanding(Flush or Raised)

Hardbanding

Hardbanding is provided for extending the drill collar operation life. SFD offers raised and flush options for hardbanding application.

Hardbanding is recommended on drill collars with slip and elevator recesses and is applied in a 4" long wear pad above the elevator recess, a 1" long wear pad above the slip recess and a 10" long wear pad under the slip recess. For drill collars with slip recess only, hardbanding is applied to a 10" long wear pad under the slip recess. For drill collars without any recess, hardbanding is applied in a 10" long wear pad located 30" from the end of the pin.



Specifications of SFDT's Drill Collar

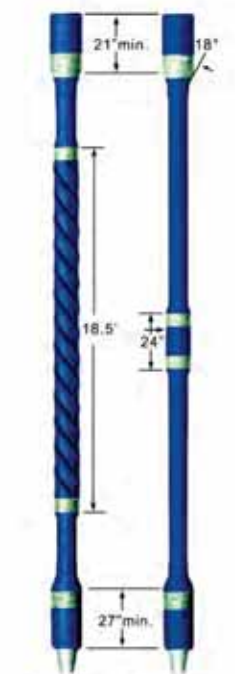
OD (in)	Bore		Connection style and size		Approx. Weight kg		Approx. weight kg	
	Standard (in)	Optional (in)	For standard bore	For optional bore	Std. bore		Opt. bore	
					30ft	31ft	30ft	31ft
3 1/8	1 1/4	1	NC 23	2 3/8 Reg	296	306	315	326
3 1/4	1 1/4	1	NC 23	2 3/8 Reg	325	336	345	357
3 1/2	1 1/2	1 1/4	NC 26	-	362	373	386	400
4 1/8	2	1 3/4	NC 31	-	469	485	503	520
4 1/4	2	1 3/4	NC 31	-	509	526	543	561
4 1/2	2	1 3/4	NC 31	-	588	607	621	642
4 3/4	2 1/4	2	NC35	NC38	632	653	671	693
5	2 1/4	2	NC 38	-	721	745	760	785
5 1/4	2 1/4	2	NC 38	-	815	841	853	881
5 1/2	2 1/4	2	NC 38	-	911	940	950	980
5 3/4	2 1/4	2 13/16	NC 40	4 1/2 FH	1013	1046	911	941
6	2 1/4	2 13/16	NC 44	NC 40 or 4 1/2 FH	1118	1155	1016	1050
6 1/4	2 1/4	2 13/16	NC 44	NC 46	1230	1270	1128	1165
6 1/2	2 1/4	2 13/16	NC 46	NC 50	1345	1390	1242	1283
6 3/4	2 1/4	2 13/16	NC 46	NC 50	1466	1510	1361	1406
7	2 13/16	2 1/4	NC 50	-	1486	1535	1589	1641
7 1/4	2 13/16	3	NC 50	5 1/2 FH	1616	1670	1596	1628
7 1/2	2 13/16	2 3/4	NC 50	5 1/2 Reg	1748	1806	1761	1818
7 3/4	2 13/16	3	NC 56	6 5/8 Reg	1887	1950	1848	1910
8	2 13/16	3	NC 56	6 5/8 Reg	2030	2095	1990	2054
8 1/4	2-13/16	3	6 5/8 Reg	-	2177	2248	2137	2207
8 1/2	2 13/16	3	6 5/8 Reg	-	2327	2403	2287	2362
9	3	2 13/16	NC 61	7 5/8 Reg	2605	2690	2645	2730
9 1/2	3	2 13/16	7 5/8 Reg	-	2938	3035	2978	3076
9 3/4	3	2 13/16	NC 70	7 5/8 Reg	3112	3214	3152	3255
10	3	2 13/16	NC 70	8 5/8 Reg	3291	3400	3331	3440
11	3	-	8 5/8 Reg	-	4090	4225	-	-
14	3 1/2	-	8 5/8 Reg	-	6708	6727	-	-

Note: 1. API standard length tolerance is $\pm 6"$

2. The weights shown in table are for slick drill collars, the weight will lose 4% for the same size spiral drill collars.

When ordering drill collar, please specify:

- Type (slick or spiral grooved)
- OD, ID and length
- Connection size and type
- API Stress Relief Groove on pin and box ends
- Cast or Pressed steel thread protectors.
- Other special request, such as material, slip, elevator recesses and hardbanding



Standard HWDP / Spiral HWDP

HEAVY WEIGHT DRILL PIPE

SFDT offers both slick and spiral grooved heavy weight drill pipes, which are designed to provide a gradual transition between drill pipe and drill collar. SFDT's HWDP improves the fatigue resistance of the drill string and is suited for most applications including vertical, extended reach and horizontal wells. The both integral and inertial friction welding types of HWDP are available.

SFDT's integral HWDP is manufactured from one piece of AISI 4145H Mod. alloy steel bar, fully heat treated, all physical properties are conform with API Spec 7-1, DS-1 or NS-1 standards. SFDT's welding HWDP is assembly by two pieces of tool joints and one piece of central pipe by inertial friction welding. The tool joints are manufactured from AISI 4145H or 4137H alloy steel and the central pipe is manufactured from AISI 1340H alloy steel. The mechanical and chemical properties of tool joints and central pipe are conformity to API Spec 7-1, DS-1 or NS-1 standards.

Features

- Reduced torque in high-rpm, deep drilling.
- Less trip time as compared to handling a long string of drill collars.
- Fewer tool-joint connection failures.
- Easy in handling and transporting to and from locations
- Helpful for keep direction of directional well

Mechanical Property of Heavy Weight Drill Pipe

Construction	Material	Yield Strength Min/Max (ksi)	Ultimate Strength	Elongation (%)	Reduction of area (%)	Hardness Min/Max (HRC/HRB)	Min. Avg Charpy (ft/lbs @ +75°F)
Welded	Tool Joint: AISI 4145H or 4137H Bar	120/-	140/-	13	45	285/340	54J
	Pipe Body: AISI 1340 Tube	65/-	95/-	18	-	205/-	24J
Integral	AISI 4145H Bar	110/-	140/-	13	45	285/-	54J



In order to optimize wear resistance, hardbanding is applied to the SFDT's heavy weight drill pipe.

Standard Bands:

- one 4" wear band on both pin and box end, plus one 1" band on 18" shoulder of box.
- two 3" wear bands on central upsets

SFDT offers the below hardbanding options on its heavy weight drill pipe.

- Tungsten Carbide Particle
- Arnco100xt, Arnco150xt, Arnco300xt, Arnco 350xt.
- Tuboscope TCS 8000 and TCS Ti
- Armacor M Star
- Duraband, Tuffband, and Ultraband
- Smooth-X

Heavy Weight Drill Pipe Specifications

Nominal Size	Length ft	Tube			Tool Joint			Per foot lb	Per Joint (31 ft) kg	Make-torque (ft-lb)
		ID	Wall thick-ness	End Upsets	Connection Size and Type	Tool Joint OD	Tool Joint ID			
2 7/8	31	2	0.438	3 3/16	NC 31	4 1/8	2	14.58	205	7,250
3 1/2	31	2 1/16	0.719	3 7/8	NC 38	4 3/4	2 1/16	25.65	370	11,500
3 1/2	31	2 1/4	0.625	3 7/8	NC 38	5	2 1/4	23.48	335	11,500
4	31	2 9/16	0.719	4 3/16	NC 40	5 1/4	2 9/16	29.92	430	14,600
4 1/2	31	2 3/4	0.875	4 11/16	NC 46	6 1/4	2 3/4	41.45	595	22,500
5	31	3	1	5 1/8	NC 50	6 5/8	3	50.38	710	30,000
5 1/2	31	3 1/4	1.125	5 11/16	5 1/2 FH	7 1/4	3 1/4	61.63	890	41,200
5 1/2	31	3 1/4	1.125	5 11/16	HDSS 1/2 FH	7 1/4	3 1/4	61.63	890	59,600
5 7/8	31	4	0.938	6	FL57	7	4	57.42	808.1	63,996
6 5/8	31	4 1/2	1.063	6 5/16	6 5/8 FH	8	4 1/2	71.43	1030	50,500

The below Internal plastic coating is available if request

- DPC, TK34, TK34-P
- TC-2000, TC-2000SS and TC2000P

Factory Make-up and Break-out Services

The factory Make-up and Break-out procedure is necessary and important factor to extend the life of connections and improve the efficiency on drilling operation. If request, SFDT applies factory Make-up & Break-in procedures to its HWPD and ensure the connections performance and resist thread galling.

Spiral Heavy Weight Drill Pipe Specifications

Nominal Size	Length ft	Tube			Tool Joint			Per foot lb	Per Joint (31 ft) kg	Make-torque (ft-lb)
		ID	Wall thick-ness	End Upsets	Connection Size and Type	Tool Joint OD	Tool Joint ID			
2 7/8	31	2	0.438	3 3/16	NC 31	4 1/8	2	18.31	261	7,250
3 1/2	31	2 1/16	0.719	3 7/8	NC 38	4 3/4	2 1/16	27.14	390	11,500
3 1/2	31	2 1/4	0.625	3 7/8	NC 38	4 3/4	2 1/4	24.88	360	11,500
4	31	2 9/16	0.719	4 3/16	NC 40	5 1/4	2 9/16	31.51	455	14,600
4 1/2	31	2 3/4	0.875	4 11/16	NC 46	6 1/4	2 3/4	43.31	621	22,500
5	31	3	1	5 1/8	NC 50	6 5/8	3	52.34	750	30,000
5 1/2	31	3 1/4	1.125	5 11/16	5 1/2 FH	7 1/4	3 1/4	63.87	915	41,200
5 1/2	31	3 1/4	1.125	5 11/16	HDSS 1/2 FH	7 1/4	3 1/4	63.87	915	59,600
5 7/8	31	4	0.938	6	FL57	7	4	65.43	921	63,996
6 5/8	31	4 1/2	1.063	6 5/16	6 5/8 FH	8	4 1/2	74.62	1070	50,500

Note: Spiral features of HWDTP are same as drill collar which shown in drill collar description.

When ordering heavy weight drill pipe, please specify:

1. Construction type: integral or friction weld
2. Length, tool joint O.D, I.D and tong space length
3. Connection type and size (API stress relief recess)
4. Hardbanding type
5. Internal Plastic coating type
6. Make-up & Break-out



DOWN HOLE MOTOR

SFDT's down-hole motor is a kind of down-hole power drilling tool that transforms the fluid power into mechanical energy. When the fluid flows into the screw motor, pressure drop is produced between the inlet and outlet of the motor, and then the pressure drop drives the motor rotator to rotate, and transmits the torque to bit by universal shaft and transmission shaft.



SFDT offers a complete line of down-hole motors which are designed with its patented technology in high torque power sections and provide a durability and longevity service. SFDT dedicates in the R&D on new technique of down-hole motor and applies its new technology to

rotor for coating-off resistance. Not only are the strength and life of down-hole motor greatly improved, but also drilling cost and drilling time are reduced. SFDT offers down-hole motor with various of specifications upon customer's request.

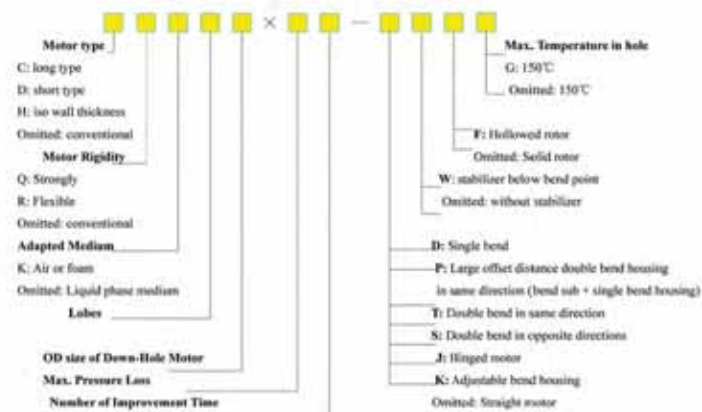
• Features

- Attrition of drill pipe is greatly declined due to no drill assembly rotation when down-hole screw motor transmits torque to drive bit
- Special drill assembly with high deflection rate is provided
- Torque is in linear relationship with pressure drop when the liquid flows into the screw motor
- Suitable for all kinds of bits.

SFDT's down-hole motor is applicable for the specific drilling applications, including:

- Directional Drilling
- Horizontal Drilling
- Composite Drilling
- Geothermal Drilling
- Workover
- Coal Methane Drilling
- HDD/River Crossing

Down-Hole Motor Mode





SFDT would configure the down-hole motor for various of drilling applications. In order to select and order the right down-hole motor, it is very important to consider the drilling conditions, such as hole size, well profile, drilling fluid, hole temperature, drilling pressure and flow rate. SFDT recommends to contact SFDT's local sales representative to discuss the down-hole motor details, or directly supply SFDT at least above specified comprehensive information and the below basic information:

1. Mode and Nom. Size
2. Bending angle
3. Stabilizer OD and type
4. Connection and type

Specifications of SFDT's Down-Hole Motor

Mode	Nom. Size		Lobe	Stage	Length		Hole size		Top Conn.	Bottom Conn.	Flow Rate	
	mm	in			m	ft	mm	in			lpm	gpm
7LZ120 x 7.0	120	4.34	7.8	4	6	19.7	149-200	5.78-7.78	3.1/2REG	3.1/2REG	760-1480	200-390
7LZ127 x 7.0	127	5	7.8	4	6	19.7	149-200	5.78-7.78	3.1/2REG	3.1/2REG	760-1480	200-390
7LZ165 x 7.0	165	6.1/2	7.8	5	7.7	25.2	213-251	8.38-9.78	4.1/2REG	4.1/2REG	1150-2290	304-605
5LZ172 x 7.0	172	6.3/4	7.8	5	7.6	24.9	213-251	8.38-9.78	NC46	4.1/2REG	950-1900	251-502
7LZ172 x 7.0	172	6.3/4	7.8	5	8	26.2	213-251	8.38-9.78	NC46	4.1/2REG	1200-2310	304-605
5LZ197 x 7.0	197	7.3/4	5.6	5	7.6	24.9	251-311	9.78-12.1/4	5-1/2REG	6-5/8REG	1110-2220	293-587
5LZ203 x 7.0	203	8	5.6	5	8.1	26.6	251-311	9.78-12.1/4	6-5/8REG	6-5/8REG	1320-3360	349-888
5LZ216 X 7.0	216	8.1/2	5.6	5	7.5	24.6	251-311	9.78-12.1/4	6-5/8REG	6-5/8REG	1290-2430	323-642
7LZ216 x 7.0	216	8.1/2	7.8	5	7.5	24.6	251-311	9.78-12.1/4	6-5/8REG	6-5/8REG	1410-2600	373-686
5LZ228 x 7.0	228	9	5.6	5	7.5	24.6	251-311	9.78-12.1/4	6-5/8REG	6-5/8REG	1230-2430	323-642
7LZ244 x 7.0	244	9.5/8	7.8	6	10	32.8	311-445	12.1/4-17.1/2	6-5/8REG	6-5/8REG	2270-4160	600-1099

Mode	Revolutions No load		Rotary Speed No Load	Working Pressure Drop		Max. Pressure Drop		Working Pressure		Max. Working Pressure		Working Torque		Max. Torque	
	rev/l	rev-gal	rpm	kpa	psi	kpa	psi	kN	lbf	kN	lbf	N-m	ft-lb	N-m	ft-lb
7LZ120 x 7.0	0.17	0.64	130-200	3200	464	4400	638	50	11240	100	22480	2500	1845	3280	2580
7LZ127 x 7.0	0.17	0.64	130-200	3200	464	4400	638	50	11240	100	22480	2500	1845	3280	2580
7LZ165 x 7.0	0.08	0.3	95-190	4000	580	5500	798	80	17985	160	35970	6100	4700	8600	6344
5LZ172 x 7.0	0.1	0.38	80-150	4000	580	5500	798	100	22481	170	38218	5200	3836	7300	5385
7LZ172 x 7.0	0.07	0.27	95-190	4000	580	5500	798	100	22481	170	38218	7100	5238	10000	7377
5LZ197 x 7.0	0.07	0.27	80-156	4000	580	5500	798	150	33721	200	44962	6300	4648	8800	6492
5LZ203 x 7.0	0.07	0.25	85-225	4000	580	5500	798	155	34845	250	56202	8200	6049	11000	8115
5LZ216 X 7.0	0.06	0.22	75-145	4000	580	5500	798	180	40466	300	67443	7600	5607	11000	8115
7LZ216 x 7.0	0.05	0.2	70-135	4000	580	5500	798	220	49458	330	74187	9800	7236	15800	10180
5LZ228 x 7.0	0.06	0.22	75-145	4000	580	5500	798	180	40466	300	67443	7600	5607	11000	8115
7LZ244 x 7.0	0.03	0.11	70-130	4800	686	6600	957	229	49458	330	74187	28000	15197	29100	21467

NON-MAGNETIC DRILLING TOOLS



Non-magnetic Drill collars



Non-magnetic HWDP

SFDT's non-magnetic drilling tools are made from chrome manganese low carbon austenitic alloy which has following characteristic:

- The chemical composition should be controlled strictly during the refining and forging process.
- With excellent lower Magnetic permeability, high strength of mechanical properties and outstanding resistant to stress corrosion cracking and no tendency to galling.

SFDT's non-magnetic drilling tools have the listed mechanical properties along its overall length.

Non-magnetic properties

Magnetic permeability (when MPS=1×105/4nNm)

- Relative Max: 1.010
- Average: $\mu \leq 1.005$
- Magnetic Field Gradient (hot spots)
- Max: $B \leq 0.05$ micro Tesla/100mm

Hardbanding available: Ultraband

The below Non-magnetic drilling tools are available:

- Drill Collar
- Pony Collar
- Heavy Weight Drill Pipe
- Pup Joint
- Stabilizer



Non-magnetic stabilizer

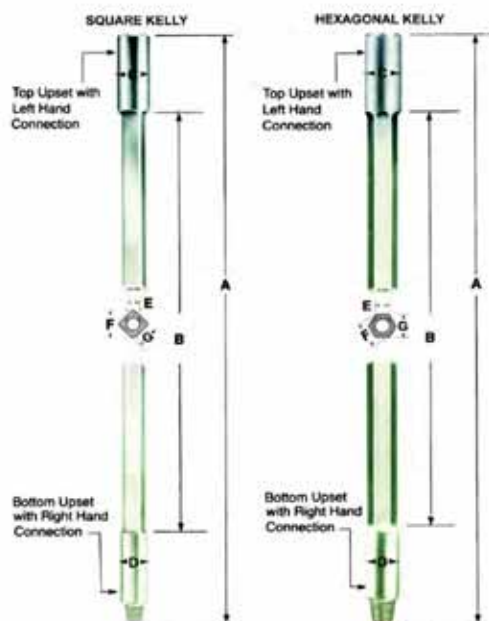


KELLY

SFD's Kelly is made from AISI 4145H Mod. alloy steel in accordance with API Spec. 7-1, which is quenched and tempered along full length. A hardness range of 285 to 341 BHN and a minimum impact value of 54 Joules as per ASTM A 370 Charpy-V, these values are guaranteed one inch below the surface. SFD's kelly is inspected by an ultrasonic unit over its full length and full section. The wall thickness of each flat of the drive section is verified ultrasonically. All connections are fitted with pressed steel thread protectors on both ends and each kelly would be shipped with steel scabbard for marine transportation.

When ordering kelly, please specify:

1. Kelly type (Square or Hexagonal)
2. Working space and overall length
3. Upper and lower connections

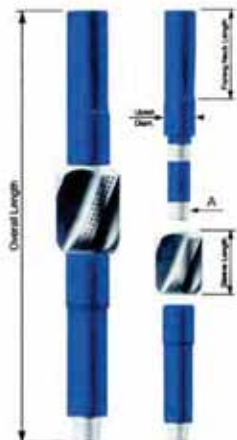


Specifications for Square Kelly

Nom. Size (in)	Lengths (ft)	Top Upset Joint			Bottom Upset		Bore	Drive Section			Weight (kg)	
		Standard	Optional									
2 1/2	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC26	3 3/8	1 1/4	3 1/4	2 1/2	410	560
	46										465	420
3	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC31	4 1/8	1 3/4	3 7/8	3	495	450
	46										560	515
3 1/2	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC38	4 3/4	2 1/4	4 3/7	3 1/2	600	555
	46										670	630
4 1/4	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC46 or NC50	6 1/4	2 13/16	5 1/2	4 1/4	780	730
	46										825	780
5 1/4	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC50 or 5 1/2 FH or NC56	6 3/8	3 1/4	6 3/4	5 1/4	940	890
	46										1070	1040
6	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	5 1/2 FH or 6 5/8 FH	7	3 1/2	7 5/8	6	1250	—
	46										1430	—
8	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	5 1/2 FH or 6 5/8 FH	7	3 1/2	7 5/8	6	1670	—
	46										1920	—
10	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	5 1/2 FH or 6 5/8 FH	7	3 1/2	7 5/8	6	2250	—
	46										2250	—

Specifications for Hex. Kelly

Nom. Size (in)	Lengths (ft)	Top Upset Joint			Bottom Upset		Bore	Drive Section			Weight (kg)	
		Standard	Optional									
3	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC26	3 3/8	1 1/4	3 3/8	3	450	400
	46										500	555
3 1/2	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC31	4 1/8	1 3/4	5 31/32	3 1/2	580	535
	46										670	620
4 1/4	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC38	4 3/4	2 1/4	4 13/16	4 1/4	780	730
	46										840	800
5 1/4	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC46 or NC50	6 1/4 or 6 5/8	3 or 3 1/4	5 31/32	5 1/4	1020	—
	46										1170	—
6	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC50 or 5 1/2 FH or NC56	7	3 1/2	6 13/16	6	1320	—
	46										1500	—
8	40	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	5 1/2 FH or 6 5/8 FH	7	3 1/2	7 5/8	6	1770	—
	46										1770	—



STABILIZERS

The stabilizer is a kind of drilling tool which prevents from well deviation by stabilizing the BHA and keeping drill collars and drill pipes away from the hole wall. It is helpful to reduce vibration, drill pipe whirl, and wellbore tortuosity. SFDT's stabilizers are made from premium chrome molybdenese alloy steel (except non-magnetic style), quenched and tempered along full length. A hardness range of 285 to 341 BHN and a minimum impact value of 54 Joules as per ASTM A 370 Charpy-V, these values are guaranteed one inch below the surface. All threads are machined strictly in accordance with API Spec 7-2.

SFDT offers integral spiral blade stabilizer, straight blade stabilizer and replaceable sleeve stabilizer, which of them include drill string type and near bit type. The hardbanding of stabilizers employs "pressed in" tungsten carbide alloy buttons (such as HF3000 and HF5000). All stabilizers would be ultrasonic tested.



The below kinds of stabilizers are available:

- Integral spiral stabilize
- straight blade stabilizer
- Replaceable sleeve stablizer

SFDT also provides non-magnetic stabilizers.

Integral Spiral Blades Stabilizers Specification

Hole OD	Fishing OD	Up Conn. API	Down Conn.	ID	Fishing Length	Blade Length	Blade Width	OAL	Remark
in	in			in	m	mm	in	in	
5 7/8	4 3/4	NC38	NC38	2 1/4	20	16	2 1/4	57	String
			3 1/2 REG						Near bit
8 1/2	7	NC50	NC50	2 13/16	20	16	2 1/2	60	String
			4 1/2 REG						Near bit
12 1/4	8	NC56	NC56	2 13/16	20	16	3 1/2	63	String
									Near bit
17 1/2	9	NC61	NC61	3	20	18	4 3/4	72 1/2	String
									Near bit
22	9 1/2	7 5/8 REG	7 5/8 REG	3	30	20	4 3/4	93	String
									Near bit
26	9 1/2	7 5/8 REG	7 5/8 REG	3	30	20	4 3/4	93	String
									Near bit
28	9 1/2	7 5/8 REG	7 5/8 REG	3	30	20	4 3/4	98	String
									Near bit

Replaceable Sleeve Stabilizer Specification

Hole OD in	sleeve			body			ID mm	OAL in
	Sleeve in	length in	Weight Kg	Up OD in	Conn.	Weight Kg		
6 1/8-6 3/4	2	18	35	4 3/4	2 7/8 IF	125	2	64
7 5/8-7 3/4	2	18	45	5 3/4	3 1/2 IF	180	2 1/4	66
8 1/2-8 3/4	2 3/8	18	55	6 1/2	4 IF	250	2 13/16	68
9 1/2-11	2 3/4	18	65	7 1/4	4 1/2 IF	330	2 13/16	68
12 1/4-17 1/2	3 1/8	18	95	8	6 5/8 REG	520	2 13/16	72
17 1/2-20	3 1/8	24	130	9 1/2	7 5/8 REG	550	3	81
17 1/2-20	4	33	180	11 1/4	8 5/8 REG	810	3	90
22-26	4	33	250	9 1/2	7 5/8 REG	515	3	90

When ordering stabilizer, please specify:

- Hole Size and type (drilling string or near-bit)
- Drill Collar OD and ID
- Size and type of connection

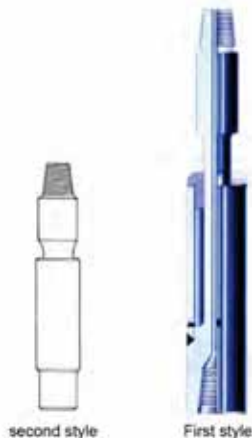
- Hardfacing type
- API stress relief groove or bore back
- Bore for float valve.



SUB

The subs act as connecting and change-over, deliver torque function in different types of drill tools.

SFDT offers cross-over sub, bit sub, lifting sub, Junk sub (Boot basket), Kelly saver sub, straight OD sub, float valve sub and customer designed subs. SFDT's subs are made from 4145H Mod. alloy steel, heat-treated according to drill collar specifications to ensure A hardness range of 285 to 341 BHN and a minimum impact value of 54 Joules as per ASTM A 370 Charpy-V, these values are guaranteed one inch below the surface. All connections are phosphated coated to minimize galling before initial make-up and drilling operation.



The Junk Sub (Boot Basket) is designed to prevent cuttings that is too heavy to be circulated from settling to the hole bottom.

First Style: Type and Size of Junk Sub

Hole Size	4 1/4 to 5 3/8	4 5/8 to 4 7/8	5 1/8 to 5 7/8	6 to 6 3/8	6 1/2 to 7 1/2	7 1/2 to 8 1/2	8 5/8 to 9 5/8	9 5/8 to 11 5/8	11 1/2 to 13
API Connection (Pin)	2 3/8	2 7/8	3 1/2	3 1/2	3 1/2	4 1/2	4 1/2	6 5/8	6 5/8
O.D. of Body (Top Conn.)	3 1/8	3 3/4	4 1/4	4 1/4	4 1/4	5 1/2	5 1/2	7 3/4	7 3/4
O.D. of Body (Under Cup) O.D. of Cup	2	2 5/8	3 1/8	3 1/4	3 1/4	4 1/2	4 1/2	5 3/4	5 3/4
I.D. of Cup	3 11/16	4	4 1/2	5	5 1/2	6 5/8	7	8 5/8	9 5/8
Diam. of Bore	3 5/16	3 5/8	4 1/4	4 9/16	4 7/8	5 15/16	6 9/32	7 15/16	8 17/32
	3/4	1 1/4	1 1/2	1 1/2	1 1/2	2 1/4	2 1/4	3 1/2	3 1/2
SFDT Assembly Part No	DLB-501	DLB-502	DLB-503	DLB-504	DLB-505	DLB-506	DLB-507	DLB-508	DLB-509
Length of Cup	10	10	10	10	10	10	10	10	10
Total Length	29	29 1/2	30 1/2	30 1/2	30 1/2	31 1/2	31 1/2	33	33
SFDT Assembly Part No	DLB-531	DLB-532	DLB-533	DLB-534	DLB-535	DLB-536	DLB-537	DLB-538	DLB-539
Length of Cup	20	20	20	20	20	20	20	20	20
Total Length	43 1/2	44	45	45	45	46	46	48	48
SFDT Assembly Part No	DLB-551	DLB-552	DLB-553	DLB-554	DLB-555	DLB-556	DLB-557	DLB-558	DLB-559
Length of Cup	30	30	30	30	30	30	30	30	30
Total Length	53 1/2	54	55	55	55	56	56	58	58

Note: all dimensions in above table are in inch unless specified.

Second style: Type and Size of Junk Sub

SFDT Assembly Part No	Casing Size	API Reg. Connection	Bore	Skirt O.D.	Skirt I.D.	Skirt Length	Total Length
DLB-701	4 1/2" - 5"	2 3/8"	1"	3 3/4"	3 3/8"	10"	32"
DLB-702	5 1/2"	2 7/8"	1 1/4"	4"	3 5/8"		32"
DLB-703	6 5/8" - 7 5/8"	3 1/2"	1 1/2"	4 7/8"	4 1/2"		32"
DLB-704	7 1/2" - 8 1/2"	4 1/2"	2 1/4"	6 5/8"	6"		34"
DLB-705	8 5/8" - 9 5/8"	4 1/2"	2 1/4"	7"	6 1/4"		34"
DLB-706	9 5/8" - 11 3/8"	6 5/8"	3 1/2"	8 1/2"	7 7/8"		34"
DLB-707	11 1/2" - 13 3/8"	6 5/8"	3 1/2"	9 5/8"	8 1/2"		34"
DLB-708	13 1/2" - 17 1/2"	7 5/8"	4"	12 7/8"	11 5/8"		35"

Note: all dimensions in above table are in inch unless specified.

When ordering sub, please specify:

- Type
- Connection size and type
- OD, ID and length
- SFDT assembly No.



LIFTING PLUGS

SFDI provides three kinds of plug:

- Standard type
- Ball type
- Pin to Box type

Drill Collar Size (A)	Lifting Plate Dia (B)	Approx. Weight (kg)	Conn. Bore (C)
3-1/2" 3-7/8"	5-1/2"	16	1-1/2"
4" 4-3/8"	6"	18	2"
4-1/2" 4-7/8"	6-1/2"	23	2-1/4"
5" 5-3/8"	7"	26	2-1/4"
5-1/2" 5-7/8"	7-1/2"	32	2-1/4"
6" 6-3/8"	8"	37	2-1/4"
6-1/2" 6-7/8"	8-1/2"	41	2-1/4"
7" 7-3/8"	9"	46	2-13/16"
7-1/2" 7-7/8"	9-1/2"	54	2-13/16"
8" 8-3/8"	10"	58	2-13/16"
8-1/2" 8-7/8"	10-1/2"	60	2-13/16"
9" 9-3/8"	11"	68	2-13/16"
9-1/2" 9-7/8"	11-1/2"	75	2-13/16"
10"	12"	81	2-13/16"
11"	13"	111	2-13/16"



Note: The overall length will add 6" if the lifting sub has upper box connection.

THREAD PROTECTOR

SFDI offers three types of thread protectors, which are manufactured from aluminum alloy, cast steel (lifting bail type) and pressed steel. The aluminum alloy thread protector features high strength, lightness and environmentally friendly. The lifting bail type is manufactured from cast steel (ASTM A216 WCB) which has min. 60,000 psi tensile strength, min. 30,000 psi yield strength and 12% min. elongation.



Lifting Bail Type Thread Protector



Aluminum Alloy Thread Protector

EQUIPMENT AND WORKSHOP OF SFDI

