



Introduction about SFDT

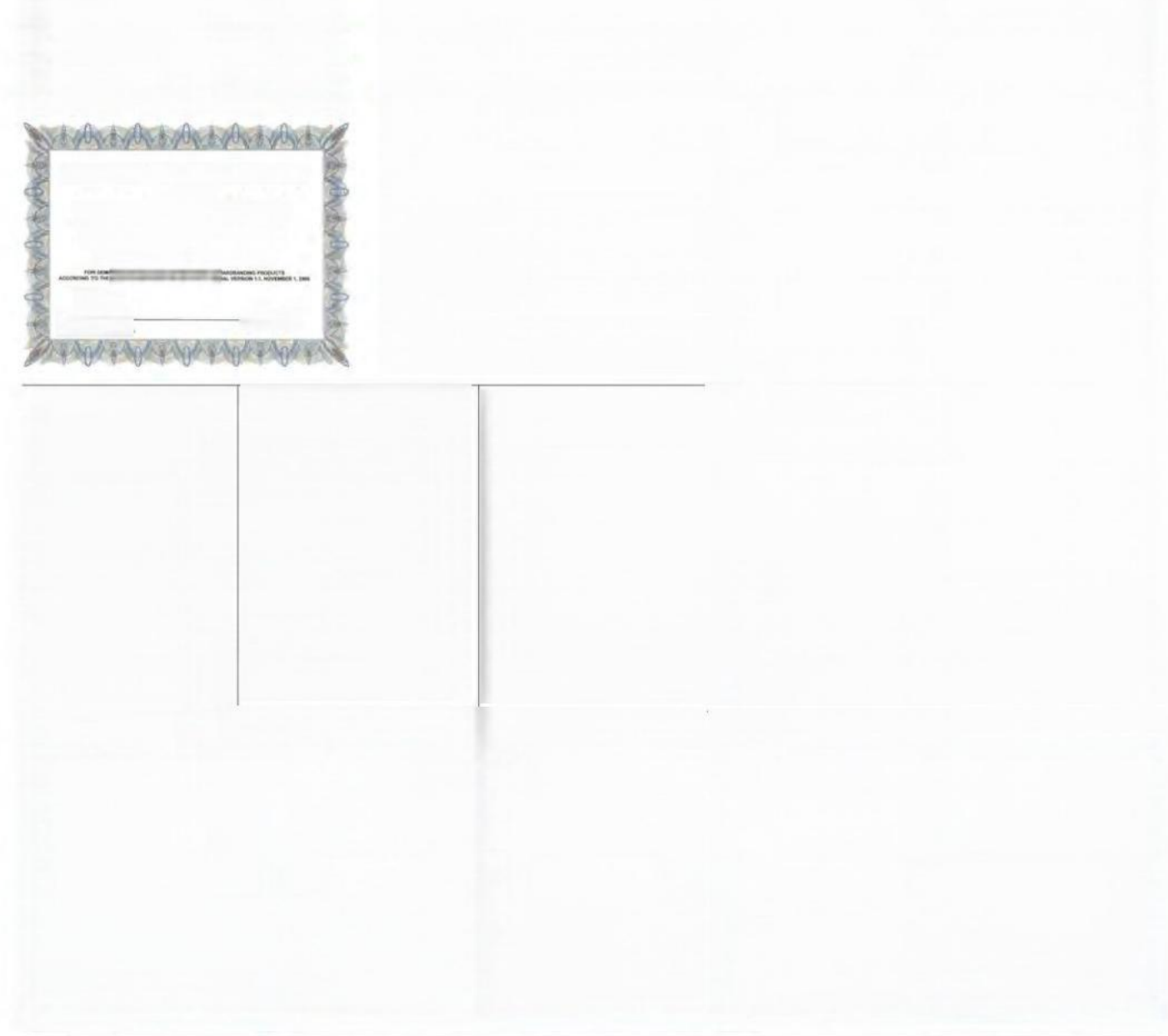
Shanxi Fenglei Drilling Tools Co.,Ltd(SFDT)is one of Chinese largest fully integrated manufacturer of drill stem products and holds API Spec.7-1,API 5DP,API Q1,NS-1,Gost,ISO 9001,ISO 14001 and ISO 18000 certificates. SFDT is a state-owned enterprise and started its drilling stem business in 1970's.SFDT 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 drillstem products.

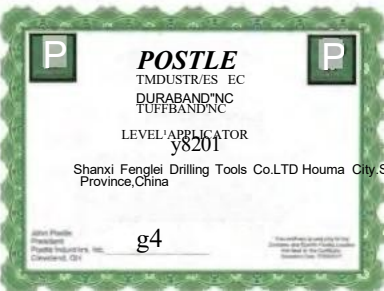
Quality is not only a word in SFDT.Investment in quality and technology is a permanent commitment at SFDT. SFDT possesses robust technical staff and advanced customer-designed facilities,which offer an outstanding quality assurance capability.The independent inspection unit directly under the control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

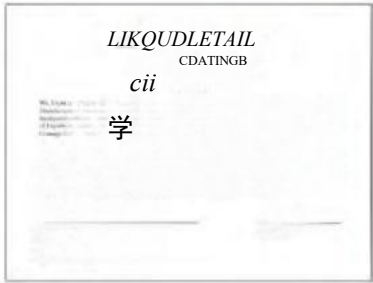
As a drill stem component manufacturer over 40 years, SFDT accumulates wide experience in drilling stem design,manufacturing,testing and operation aspects, SFDT would like to share its achievements in the related aspects with anyone who is interested in SFDT's products all over the world.





CERTIFICATE OF ACHIEVEMENT
AWARDED TO

Shanxi Fenglei Drilling Tools Co., Ltd.
Houma City, Shanxi Province, China
ARNC CERTIFIED APPLICATOR



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SALES REGION OF SFD T



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DRILL PIPE

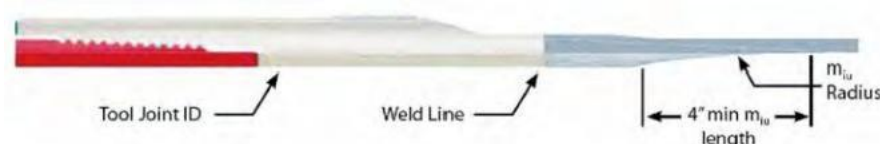
·Scope of SFDT's drill pipe

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 → Fu 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 tong space,and allows several connection recuts to save the drilling investment.



Mechanical Properties of Tool Joints

Standard	Tensile Strength Rm Mpa	Yield Strength Rro. 2 Mpa	ElongationA%	Impact AKVJ(-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 SHTTM(Hi-Torque)and HDSTM(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 HDSTM connection is not only a high performance,but also fully interchangeable with corresponding API connectons.



SHTTM connection

FLTM series connections

As the second generation Hi-performance connection,FLTM series connections (FL38,39,54 and 57)are a patented high-performance connection designed by SFDT.FLTM series connections offer higher torsional capacity than SHTTM and HDSTM connections.SFDT's drill pipe and HWDP with FLTM series connections are operated in COSL's offshore ultra-deep exploration and show is reliability for the ultra-deep drilling project.The FLTM 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 FL57 connection,S-135	
Connection Type	FL57
Pin Length/mm	184.15
Taper/in	1/16
Lead/mm	7.257
TJOD/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/bs	844223
Torsional Strength/f-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 +20℃
X—95	609	712		25 (Min.)	
G—105	655	724		42 (Average)	PSL-3 -20℃
S—135	724	793		32 (Min)	

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-VJ	70	80	80
Hardness Rockwell“C” (HRC)	Min. Avg HRC	22	25
	Single Point Reading	28	28
	-/24	18/27	21/29
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-VJ	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 drillpipes.

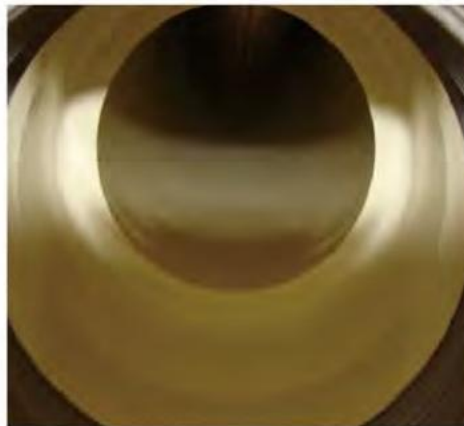
SFDT can supply the below hardbanding options on its drill pipe.

- Arnco100xt, Arnco150xt, Arnco300xt, Arnco 350xt.
- Tuboscope TCS 8000 and TCS Ti
- Amacor 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 reparation 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



Pipe Body										Tool Joint								Assembly
Pipe OD	Nominal Pipe Weight	Pipe Material Grade	Upser Style	Wall Thickness	Pipe Tensile Strength	Pipe Torsional Strength	Minimum Collapse Pressure	Minimum Internal Yield Pressure	Connection	Ousside Diameter of Pin&Box	Inside Diameter of Pin	Pin Tong Space	Box Tong Spnce	Make-Lp Tonque	Tensile Strength	Torsional Strength	Torsional Ratio.Pin to Pipe	Approx. Actual Weight
In	Lb. P1			In.	Lb	Ft.Lbs	PSI.	PS. I.		in	in	in	in	fi-lb	Lbs	FL. -Lbs		Lb./Pi
2-3/8	6.65	E-75	EU	0.28	138.214	6,250	15.599	15,474	NC26	3-3/8	1-3/4	7	8	3900	313,681	6.875	1.1	7.05
2-3/8	6.65	E-75	EU	0.28	138,214	6.250	15.599	15,474	SHT26	3-3/8	1-3/4	9	12	5508	303.140	9.180	1.47	7.25
2-3/8	6.65	E-75	EU	0.28	138.214	6.250	15.599	15.474	HDS NC26	3-3/8	1-3/4	7	8	5190	303.790	8.660	1.39	7.05
2-3/8	6.65	X-95	EU	0.28	175,072	7.917	19.759	19.600	NC 26	3-3/8	1-3/4	7	8	3900	313.681	6.875	0.87	7.14
2-3/8	6.65	X-95	EU	0.28	175,072	7.917	19.759	19,600	SHT26	3-3/8	1-3/4	9	12	5508	303,140	9.180	1.16	7.25
2-3/8	6.65	X-95	EU	0.28	175,072	7.917	19.759	19.600	HDS NC26	3-3/8	1-34	7	8	5190	303.790	8.660	1.09	7.14
2-3/8	6.65	G-105	EU	0.28	193,500	8,751	21.839	21,663	NC 26	3-3/8	1-3/4	7	8	3900	313.681	6.875	0.79	7.14
2-3/8	6.65	G-105	EU	0.28	193,500	8.751	21.839	21.663	SHT26	3-3/8	1-3/4	9	12	5508	303,140	9.180	1.05	7.25
2-3/8	6.65	G-105	EU	0.28	193,500	8.751	21,839	21.663	IDS NC26	3-3/8	1-3/4	7	8	5190	303,790	8,660	0.99	7.14
2-7/8	10.40	E-75	EU	0.362	214,344	11,554	16,509	16,526	NC 31	4-1/8	2-1/8	7	9	6400	447.130	11,871	1.03	10.95
2-7/8	10.40	E-75	EU	0.362	214.344	11,554	16,509	16.526	SHT31	4-1/8	2-1/8	9	13	9672	434,820	16.120	1.40	11.26
2-78	10.40	E-75	EU	0.362	214,344	11,554	16.509	16.526	HDS NC31	41/8	2-178	7		8950	435.220	14,920	1.29	10.95
2-78	1040	X-95	EU	0.362	271.503	14,635	20.911	20.933	NC 31	4-1/8	2	7	9	7100	495,726	13.196	0.90	11.14
2-718	10.40	X-95	EU	0.36	271.503	14.635	20.911	20.933	SHT31	4-1/8	2-178	9	13	9672	434,820	16.120	1.10	11.26
2-7/8	10.40	X-95	EU	0.362	27L.503	14,635	20,911	20,933	HDS NC31	4-1/8	2-1/8	7	9	8950	435.220	14,920	1.02	11.14
2-7/8	10.40	G-105	EU	0.362	300,082	16.176	23,12	23,137	NC 31	4-1/8	2		9	7100	495,726	13,196	0.82	11.14
2-7/8	10.40	G-105	EU	0.362	300.082	16,176	23,112	23,137	SHT31	4-1/8	2-1/8	9	13	9672	434,820	16.120	1.00	11.26
2-7/8	10.40	G-105	EU	0.362	300,082	16.176	23,112	23,137	HDS NC31	4-1/8	2-1/8	7	9	8950	435.220	14,920	0.92	11.14
2.-7/8	10.40	S-135	IU	0.362	385,820	20.798	29.716	29.747	PAC	4-1/8	1-1/2	9	11	4980	266.370	8.300	0.40	10.38
2-7/8	10.40	S-135	EU	0.362	385.820	20.798	29.716	29.747	NC31	43/8	1-5/8	7	9	4400	623,844	16,946	0.81	11.63
2-78	10.40	S-135	EU	0.362	385.820	20.798	29.716	29.747	SHT31	4-1/8	2-1/8	9	13	9672	434,820	16,120	0.78	11.39
2-718	10.40	S-135	EU	0.362	385.820	20.798	29.716	29.747	HDS NC3L	4-1/8	2-1/8	7	9	8950	435.220	14,920	0.72	11.14
3-1/2	13.30	E-75	EU	0.36%	271.569	18.551	14,113	13,800	NC 38	4-3/4	2-11/16	8	10-1/2	9700	587.308	18.107	0.98	14.02
3-1/2	13.30	E-75	EU	0.368	271,569	18.551	14,113	13.800	SHT38	4-3/4	2-1/16	10	15-1/2	15030	572,190	25,050	1.35	14.45
3-12	13.30	E-75	EU	0.368	271,569	18,551	14,113	13,800	HDS NC38	4-3/4	2-11/16	8	10-1/2	13390	572,690	22.330	1.20	14.02
3-1/2	13.30	X-95	EU	0.368	343.988	23,498	17,877	17,480	NC38	4-3/4	2-11/16	8	10-1/2	9700	587,308	18,107	0.77	14.71
3-1/2	13.30	X-95	EU	0.368	343,988	23.498	17.877	17.480	NC 38	5	2-9/16	8	10-1/2	10700	649.158	20.326	0.87	14.63
3-1/2	13.30	X-95	EU	0.368	343,988	23.498	17.877	17.480	SHT38	4-34	2-11/16	10	15-172	15030	572,190	25.050	1.07	14.45
3-1/2	13.30	X-95	EU	0.368	343,988	23,498	17,877	17,480	HDS NC38	5	2-9/16	8	10-1/2	15680	635,030	26.140	1.11	14.32
3-1/2	13.30	G-105	EU	0.368	380.197	25,972	19.758	19,320	NC38	4-7/8	2-9/16	8	10-12	12057	649158	20326	0.78	14.81
3-1/2	13.30	G-105	EU	0.368	380,197	25,972	19.758	19,320	NC 38	5	2-7/16	8	10-1/2	13221	708.063	22.213	0.86	14.73
3-1/2	13.30	G-105	EU	0.368	380,197	25.972	19.758	19,320	SHT38	43/4	2-11/16	10	15-1/2	15030	572.190	25.050	0.96	14.45
3-1/2	13,30	G-105	EU	0.368	380,.197	25,972	19.758	19,320	HDS NC38	5	2-7/16	8	10-1/2	17670	693,460	29,460	1.33	14,73
3-1/2	13.30	S-135	EU	0.368	488,825	33.393	25.404	24,840	NC38	5	2-1/8	8	10-1/2	15902	842,440	26.515	0.79	15.02
3-1/2	13.30	S-135	EU	0.368	488,825	33.393	25.404	24.840	SHT38	4-3/4	2-11/16	10	15-1/2	15030	572.190	25.050	0.75	14.63
3-1/2	13.30	S-135	EU	0.368	488,825	33.393	25.404	24.840	HDS NC38	5	2-1/8	4	10-1/2	22200	828,070	37.000	1.11	15.02
3-1/2	15.50	E-75	EU	0.449	322.775	21.086	16.774	16.838	NC38	5	2-9/16	8	10-12	10700	649.158	20.326	0.96	16.59
3-1/2	15.50	E-75	EU	0.449	322.775	21.086	16.774	16.838	SHT38	4-3/4	2-9/16	10	15-12	15030	572,190	25.050	1.19	16.71
3-1/2	15.50	E-75	EU	0.449	322.775	21,086	16.774	16,838	HDS NC38	5	2-9/16	8	10-1/2	15680	635.030	26.140	1.24	16.59
3-1/2	15.50	X-95	EU	0.449	408,848	26.709	21.247	21.,328	NC38	5	2-7/16	8	10-1/2	11700	708.063	22,213	0.83	16.85
3-1/2	15.50	X-95	EU	0.449	408.848	26.709	21.247	21328	SHT38	4-3/4	2-9/16	HO	15-1/2	15030	572,190	25,050	0.94	16.71
3-1/2	15.50	X-95	EU	0.449	408.848	26.709	21,247	21,328	HDS NC38	5	2-7/16	8	10-12	17670	693,460	29,460	1.10	16.85
3-1/2	15.50	G-105	EU	0.449	451,885	29.520	23,484	23.573	NC 38	5	2-1/8	8	10-1/2	15902	842.440	26.515	0.90	17.07
3-1/2	15.50	G-105	EU	0.449	451,885	29.520	23.484	23,573	SHT38	4-3/4	2-9/16	10	15-1/2	15030	572,190	25.050	0.85	16.71
3-12	15.50	G-105	EU	0.449	451.885	29.520	23.484	23,573	HDS NC38	5	2-1/8	8	10-1/2	22200	828,070	37000	1.25	17.07
3-1/2	15.50	S-135	EU	0.449	580,995	37,954	30.194	30.308	NC 38	5	2-1/8	8	10-1/2	15902	842,440	26,515	0.70	[7.07
3-1/2	15.50	S-135	EU	0.449	580.995	37.954	30.194	30.308	SHT38	4-3/4	2-7/16	10	15-1/2	15030	572,190	25.050	0.66	16.9

3-1/2	15.50	S-135	EU	0.449	580.995	37.954	30.194	30.308	HDS NC38	5	2-178	8	10-1/2	22200	828.070	37.000	0.97	17.07
3-12	15.50	S-135	EU	0.449	580.995	37,954	30,194	30.308	NC40	5-1/2	2-1/4	7	10	19616	979,996	32,943	0.87	17.61
3-172	15.50	S-135	EU	0.449	580.995	37.954	30,194	30.308	HDS NC40	5-1/2	2-14	7	10	27240	964.590	45.4T0	1.20	17.61
4	14.00	E-75	IU	0.33	285.359	23,288	11.354	10.828	NC40	3-1/4	2-13/16	7	10	14000	711.611	23.487	1.01	15.06
4	14.00	E-75	IU	0.33	285.359	23.288	11,354	10.828	SHT40	5-1/4	2-13/16	9	15	18726	696,990	31,210	1.34	15.93
4	14.00	E-75	IU	0.33	285,359	23.288	11,354	10.828	HDS NC40	5-1/2	2-1/4	7	10	27240	964,590	45.410	1.95	15.06
4	14.00	E-75	IU	0.33	285,359	23.288	11,354	10,828	FL39	47/8	2-13/16	10	15	19746	598,290	32.910	1.41	13.29
	14.00	E-75	EU	0.33	285,359	23.288	11,354	10.828	NC46	6	3-1/4		10	19900	901.000	33.200	1.43	15.91
4	14.00	X-95	IU	0.33	361,454	29.498	14,382	13.716	NC 40	5-1/4	2-11/16	7	10	15300	776.406	25.500	0.86	15.29
	14.00	X-95	IU	0.33	361,454	29.498	14,382	13,716	SHT40	5-1/4	2-13/16	9	15	18726	696,990	31.210	1.06	15.93
4	14.00	X-95	IU	0.33	361.454	29.498	14.382	13,716	HDS NC40	5-1/2	2-1/4	7	10	27240	964.590	45.410	1.54	15.68
4	14.00	X-95	IU	0.33	361.454	29.498	14.382	13.716	FL39	47/8	2-13/16	10	15	19746	598,290	32.910	1.12	15.29
4	14.00	X-95	EU	0.33	361,454	29.498	14,382	13.716	NC 46	6	3-1/4	7	10	19900	901,000	33,200	1.13	16.22
4	14.00	G-105	IU	0.33	399,502	32.603	15,896	15,159	NC 40	5-1/2	2-7/16	7	10	15600	897,161	30,114	0.92	15.87
4	14,00	G-105	IU	0.33	399.502	32,603	15,896	15,159	SHT40	5-1/4	2-13/16	9	15	18726	696,990	31.210	0.96	15.93
4	14.00	G-105	IU	0.33	399,502	32.603	15,896	15,159	HDS NC40	5-1/2	2-1/4	7	10	27240	964,590	45,410	1.39	15.68
	14.00	G-105	IU	0.33	399,502	32.603	15.896	15.159	FL39	4-7/8	2-13/16	10	15	19746	598.290	32,910	1.01	15.29
4	14.00	G-105	EU	0.33	399502	32.603	15.896	15.159	NC46	6	3-1/4	7	10	19900	901.0000	33.200	1.02	16.79
	14.00	S-135	IU	0.33	513.646	41,918	20,137	19,491	NC 40	5-1/2	2-7/16	7	10	17858	897,161	30.114	0.72	16.15
4	14.00	S-135	IU	0.33	513.646	41,918	20.137	19.491	NC 40	5-1/4	2-7/16	7	10	17848	897.161	29747	0.71	16.26
4	14.00	S-135	IU	0.33	513,646	41,918	20,137	19.491	SHT40	5-1/4	2-1/16	9	15	20982	760,250	34.970	0.83	16.12
4	14.00	S-135	IU	0.33	513,646	41,918	20,137	19,491	IDS NC40	5-1/2	2-1/4	7	10	27240	964,590	45,410	1.08	15,68
4	14.00	S-135	IU	0.33	513.646	41,918	20.137	19.491	FL 39	47/8	2-9/16	10	15	22488	723,920	37.480	0.89	15.67
4	14.00	S-135	EU	0.33	513,646	41,918	20,137	19.491	NC 46	6	3	7	10	23400	1,050.000	39.000	0.93	16.44
4-1/2	13.75	E-75	IU	0.271	270.030	25,900	7.904	7.172	NC46	6	33/8	7	10	18390	805530	30650	1.18	15.12
4-1/2	13.75	E-75	EU	0.271	270,030	25,900	7.904	7.172	NC50	6-3/8	334	7	10	22830	919880	38050	1.47	15.9
4-1/2	16.60	E-75	IEU	0.337	330558	30,807	10,392	9,829	NC 46	6-1/4	3-174	7	10	17600	901,164	33,993	1.10	184
4-12	16.60	E-75	IEU	0.337	330.558	30,807	10.392	9.829	SHT 46	6-1/4	3-1/4	9	15	27906	882,890	46,510	1.51	19.59
4-172	16.60	E-75	IEU	0.337	330.558	30,807	10.392	9.829	HDS NC46	6-1/4	3-1/4	7	10	26220	883,580	43,700	1.42	18.4
4-1/2	16.60	E-75	EU	0.337	330,558	30,807	10,392	9.829	NC50	6-5/8	3-34	7	10	22400	939,000	37.300	1.21	18.5
4-1/2	16.60	X-95	IEU	0.337	418,707	39,022	12,763	12,450	NC 46	6-1/4	3	7	10	20500	,048.427	39.659	1.02	18.64
4-1/2	16.60	X-95	IEU	0.337	418,707	39.022	12.763	12,450	SHT46	6-1/4	3-1/4	9	15	27906	882,890	46.510	1.19	19.59
4-1/2	16.60	X-95	IEU	0.337	418,707	39.022	12,763	12.450	HDS NC46	6-1/4	3	7	10	32260	1,030.850	53.770	1.38	18.64
4-1/2	16.60	X-95	EU	0.337	418,707	39,022	12.763	12.450	NC50	6-5/8	3-3/4	7	10	22400	939,000	37.300	0.96	18.87
4-1/2	16.60	G-105	IEU	0.337	462,781	43.130	13.825	13.761	NC 46	6-1/4	3	7	10	20500	1.048.427	39,659	0.92	18.64
4-1/2	16.60	G-105	IEU	0.337	462,781	43,130	13.825	13.761	SHT46	6-1/4	3-1/4	9	15	27906	882,890	46.570	1.08	19.59
4-1/2	16.60	G-105	IEU	0.337	462,781	43,130	13,825	13.761	HDS NC46	6-1/4	3	7	10	32260	1,030850	53,770	1.25	18.64
4-1/2	16.60	G-105	EU	0.337	462,781	43.130	13.825	13,761	NC50	6-5/8	3-34	7	10	22400	939,000	37,300	0.86	18.87
4-1/2	16.60	S-135	IEU	0.337	595,004	55.453	16,769	17,693	NC46	6-1/4	2-3/4	7	10	23200	1,183.908	44,871	0.81	18.86
4-1/2	16.60	S-135	IEU	0.337	595.004	55.453	16,769	17,693	SHT 46	6-1/4	3-1/4	9	15	27906	882,890	46,510	0.84	19.59
4-1/2	16.60	S-135	IEU	0.337	595,004	55.453	16.769	17.693	HDS NC46	6-1/4	2-34	7	10	37740	1,166.330	62.900	1.13	18.86
4-1/2	16.60	S-135	EU	0.337	595.004	55.453	16.769	17.693	NC50	6-5/8	3-172	7	10	26700	1,110.000	44,500	0.80	19.14
4-1/2	20.00	E-75	IEU	0.43	412,358	36.901	12.964	12.542	NC 46	6-1/4	3	7	10	20500	1,048.427	39.659	1.07	22.15
4-1/2	20.00	E-75	IEU	0.43	412,358	36.901	12.964	12,542	SHT 46	6-1/4	3-1/4		15	27906	882,890	46.510	1.26	22.89
4-1/2	20.00	E-75	IEU	0.43	412,358	36,901	12,964	12,542	HDS NC46	6-1/4	3	7	10	32260	1,030.850	53,70	1.46	22.15
4-1/2	20.00	E-75	EU	0.43	412,358	36,901	12,964	12,542	NC50	6-5/8	3-5/8	7	Jn	24500	1030000	40900	1.11	22.14
4-1/2	20.00	X-95	IEU	0.43	522,000	46.700	16,400	15,900	NC46	6-1/4	2-3/4	7	10	26600	1,183,908	44,871	0.96	22.65
4-12	20.00	X-95	IEU	0.43	522.000	46.700	16.400	15,900	SHT46	6-1/4	3-14	9	15	27906	882,890	46.510	1.00	22.89
4-12	20.00	X-95	IEU	0.43	522,000	46,700	16.400	15,900	HDS NC46	6-1/4	2-3/4	7	10	37740	1.166.330	62,900	1.35	22.65
4-172	20.00	X-95	EU□	0.43	522,000	46.700	16.400	15.900	NC50	6-5/8	3-172	7	10	26700	1110000	44500	0.95	22.61
4-1/2	20.00	G-105	IEU	0.43	577,000	51.700	18.100	17.600	NC 46	6-1/4	2-172	7	10	29600	1310000	49300	0.95	22.84
4-1/2	20.00	G-105	IEU	0.43	577.000	51,700	18.100	17.600	SHT 46	6-1/4	3-1/4	9	15	27906	882,890	46.510	0.90	22.89

Pipe Bodly									Tool Joint									Assembly
Pipe oD	Nominal Pipe Weight	Pipe Material Grade	Upset Style	Wall Thickness	Pipe Tensile Srengh	Pipe Torsional Strength	Minimum Collapse Pressure	Minimum Internal Yield Pressure	Connection	Outside Diameter of Pin&Box	Inside Diameter of Pin	Pin Tong Space	Box Tong Space	Make-Up Torque	Tensile Srengh	Torsional Strength	Torsional Ratio.Pin to Pipe	Approx. Actual Weight
In	Lb/Ft			In.	Lb	Ft.-Lbs	P. SI.	PSI.		in	in	in	in	fi-lb	Lbs	Ft.-Lbs		Lb. /F
4-1/2	20.00	G-105	IEU	0.43	57,000	51,700	18,100	17,600	HDS NC46	6-1/4	2-1/2	7	10	42660	1,290,030	71,110	1.38	22.84
4-1/2	20.00	G-105	EU	0.43	577,000	51,700	18,100	17,600	NC50	6-5/8	3-1/2	7	10	26700	111000	44500	0.86	22.61
4-1/2	20.00	S-135	IEU	0.43	742,000	66,400	23,300	22,600	NC 46	6-1/4	2-1/4	7	10	32300	1420000	53800	0.81	23.01
4-1/2	20.00	S-135	IEU	0.43	742000	66.400	23,300	22.600	SHT 46	6-1/4		9	15	33918	1,031,360	56,530	0.85	23.34
4-1/2	20.00	S-135	IEU	0.43	742.000	66.400	23.300	22.600	HDS NC46	6-1/4	2-1/4		10	47050	1,401,950	78,420	1.18	23.01
4-1/2	20.00	S-135	EU	0.43	742.000	66.400	23.300	22.600	NC50	6-5/8	3		10	34500	1420000	57500	0.87	23.09
5	19.50	E-75	IEU	0.362	396000	41200	9960	9,500	NC50	6-5/8	3-3/4	7	10	22400	939000	37300	0.91	21.37
5	19.50	E-75	IEU	0.362	396000	41200	9960	9,500	5-1/2FH	3-3/4	3-3/4	8	10	37700	1450000	62900	1.53	22.35
5	19.50	E-75	IEU	0.362	396000	41200	9960	9,500	HDS NC50	6-5/8	3-3/4	7	10	28830	919,880	48,060	1.17	21.37
5	19.50	E-75	IEU	0.362	396000	41200	996	9,500	HDS 5-1/2 FH	7	3-3/4	8	10	52260	1,427,140	87,110	2.11	22.35
5	19.50	X-95	IEU	0.362	501000	52100	12000	12000	NC50	6-3/8	3-1/2	7	10	26700	1110000	44500	0.85	21.9
5	19.50	X-95	IEU	0.362	501000	52100	12000	12000	5-1/2FH	7	3-1/2	8	10	37700	1450000	62900	1.21	22.61
5	19.50	X-95	IEU	0.362	501000	52100	12000	12000	HDS NC50	6-5/8	3-1/2	7	10	36470	1,090,710	60,790	1.17	21.9
5	19.50	X-95	IEU	0.362	501000	52100	12000	12000	HDS 5-1/2 FH	7	3-1/2	∞	10	55860	1,597,960	93,110	1.79	22.61
5	19.50	X-95	IEU	0.362	501000	52100	12000	12000	SHT 50	6-5/8	3-3/4	9	15	31302	918,490	52,170	1.00	22.57
5	19.50	G-105	IEU	0.362	554000	57600	13000	13,300	NC50	6-5/8	3-1/2	7	10	30700	1270000	51200	0.89	22.15
	19,50	G-105	IEU	0.362	554000	57600	13000	13,300	5-1/2FH	7	3-3/4	8	10	37700	1450000	62900	1.09	22.61
5	19.50	G-105	IEU	0.362	554000	57600	13000	13,300	HDS NC50	6-5/8	3-1/2	7	10	36470	1,090,710	60,790	1.06	22.15
5	19.50	G-105	IEU	0.362	554000	57600	13000	13,300	HDS5-1/2 FH	7	3-3/4	8	10	52260	1,427,140	87,110	1.51	22.61
5	19,50	G-105	IEU	0.362	554000	57600	13000	13,300	SHT50	6-5/8	3-1/2	9	15	38928	1,090,710	64,880	1.13	23.1
5	19.50	S-135	IEU	0.362	712,000	74,100	15,700	17,100	NC50	6-5/8	2-3/4	7	10	38000	1550000	63400	0.86	22.59
5	19.50	S-135	IEU	0.362	712,000	74,100	15,700	17,100	5-1/2FH	7-1/4	3-1/2	8	10	43300	1620000	72200	0.97	23.49
5	19.50	S-135	IEU	0.362	712,000	74,100	15,700	17,100	HDS NCS0	6-5/8	2-3/4	7	10	55740	1,532,490	92,910	1.25	22.59
5	19.50	S-135	IEU	0.362	712,000	74,100	15,700	17,100	IDS5-1/2 FH	7-1/4	3-1/2		10	61590	1,597,960	102,650	1.39	23.49
5	19.50	S-135	IEU	0.362	712,000	74,100	15,700	17,100	SHT50	6-5/8	3-1/2	9	115	38928	1,090,710	64,880	0.88	23.1
5	25.60	E-75	IEU	0.500	530000	52300	13500	13,100	NC50	6-3/8	3-1/2	7	10	26700	110000	44500	0.85	28.08
5	25.60	E-75	IEU	0.500	530000	52300	13500	13,100	5-1/2EH	7	3-1/2	8	10	37700	1620000	62900	1.20	28.35
5	25.60	E-75	IEU	0.500	530000	52300	13500	13,100	HDS NC50	6-5/8	3-1/2	7	10	36470	1,090,710	60,790	1.16	28.08
5	25.60	E-75	IEO	0.500	530000	52300	13500	13,100	HDS 5-1/2 FH	7	3-1/2	8	10	55860	1,597,960	93,110	1.78	28.35
5	25.60	E-75	IEU	0.500	530000	52300	13500	13,100	SHT 50	6-5/8	3-1/2	9	15	38928	1,090,710	64,880	1.24	28.01
5	25.60	X-95	IEU	0.500	672000	66200	17100	16,600	NC50	6-5/8	3	7	10	34500	1420000	57500	0.87	28.1
5	25.60	X-95	IEU	0.500	672000	66200	17100	16,600	5-1/2FHI	7	3-1/2	8	10	37700	1620000	62900	0.95	28.59
5	25.60	X-95	IEL	0.500	672000	66200	17100	16,600	HDS NC50	6-5/8	3	1	10	49920	1,397,010	83,200	1.26	28.1
5	25.60	X-95	IEU	0.500	672000	66200	17100	16,600	HDS5-1/2 FH	7	3-1/2	8	10	55860	1,597,960	93,11	141	28.89
5	25,60	X95	IEU	0.500	672000	66200	17100	16,600	SHT 50	6-5/8	3-1/2	9	15	38928	1,090,710	64,880	0.98	28.53
5	25.60	G-105	IEU	0.500	742000	73200	18900	18,400	NC50	6-5/8	2-3/4	7	10	38000	1550000	63400	0.87	28.31
5	25.60	G-105	IEU	0.500	742000	73200	18900	18,400	5-1/2FH	7-1/4	3-1/2	8	10	43300	1620000	12200	0.99	29.17
5	25.60	G-105	IEU	0.500	742000	73200	18900	18,400	HDS NC50	6-5/8	2-3/4		10	55740	1,532,490	92,910	1.27	28.31
5	25.60	G-105	IEU	0.500	742000	73200	18900	18,400	HDS5-1/2 FH	7-11/4	3-12	8	10	61590	1,597,960	102,650	1.40	29.17
5	25.60	G-105	IEU	0.500	742000	73200	18900	18,400	SHT 50	6-5/8	3-1/2	9	15	38928	1,090,710	64,880	0.89	28.53
5	25.60	S-135	IEU	0.500	954000	94100	24300	23,600	NC50	6-5/8	2-3/4		10	38000	1550000	63400	0.67	28.73

5	25.60	S-135	IEU	0.500	954000	94100	24300	23,600	5-1/2FH	7-1/4	3-1/4	8	10	47200	1780000	78700	0.84	29.45
5	25.60	S-135	IEU	0.500	954000	94100	24300	23,600	HDS NC50	6-5/8	2-3/4	7	10	55740	1,532,490	92,910	0.99	28.73
5	25.60	S-135	IEU	0.500	954000	94100	24300	23,600	HDS5-1/2 FH	7-1/4	3-1/4	8	10	68580	1,757,010	114,300	1.21	29.45
5	25.60	S-135	TEU	0.500	954000	94100	24300	23,600	SHT 50	6-5/8	3-1/2	9	15	38928	1,090,710	64,880	0.69	28.53
5-172	21.90	E-75	TEU	0.361	437000	50700	8410	8,610	5-1/2FH	7	4	8	10	33400	1270000	55700	1.10	23.82
5-1/2	21,90	E-75	EU	0.361	437000	50700	8410	8,610	HDS5-1/2 FH	7	4	8	10	44130	1,244,530	73,560	1.45	23.82
5-1/2	21.90	E-75	IEU	0.361	437000	50700	8410	8,610	SHT55	7	4	10	15	45432	1,244,540	75,720	1.49	25.32
5-172	21.90	E-75	IEU	0.361	437000	50700	8410	8,610	FL57	7	4-1/4	10	15	56124	1,199,200	93,540	1.84	24.73
5-172	21.90	X-95	IEU	0.361	554000	64200	10000	10,900	5-1/2EH	7	3-3/4	8	10	37700	1450000	62900	0.98	24.45
5-1/2	21.90	X-95	IEU	0.361	554000	64200	10000	10,900	HDS 5-1/2 FH	7	3-3/4	8	10	52260	1,427,140	87,110	1.36	24.45
5-172	21.90	X-95	IEU	0.361	554000	64200	10000	10,900	SHT55	7	4	10	15	45432	1,244,540	75,720	1.18	25.42
5-172	21.90	X-95	IEU	0.361	554000	64200	10000	10,900	FL57	7	+1/4	10	15	56124	1,199,200	93,540	1.46	24.72
5-1/2	21.90	G-105	IEU	0.361	612000	71000	10800	12,100	5-1/2FH	7-1/4	3-1/2	8	10	43300	1620000	72200	1.02	25.3
5-1/2	21.90	G-105	IEU	0.361	612000	71000	10800	12,100	HDS5-1/2 FH	7-1/4	3-1/2	8	10	68580	1,757,010	114,300	1.61	25.3
5-1/2	21.90	G-105	IEU	0.361	612000	71000	10800	12100	SHT55	7		10	15	45432	1,244,540	75,720	1.07	25.42
5-1/2	21.90	G-105	IEU	0.361	612000	71000	10800	12,100	FL57	7	4-1/4	10	15	56124	1,199,200	93,540	1.32	24.72
5-1/2	21,90	S-135	IEU	0.361	787000	97300	12700	15,500	5-1/2FHI	7-1/4	3	8	10	52100	1930000	86800	0.89	26.4
5-172	21.90	S-135	IEU	0.361	787000	97300	12700	15,500	HDS5-1/2 FH	7-1/2	3	8	10	76550	1,904,270	127,590	1.31	26.43
5-1/2	21.90	S-135	IEU	0.361	787000	97300	12700	15,500	SHT 55	7	4	10	15	45432	1,244,540	75,720	0.78	25.42
5-1/2	21.90	S-135	IEU	0.361	787000	97300	12700	15,500	FL, 57	7	4-1/4	10	15	56124	1,199,200	93,540	0.96	24.72
5-1/2	24.70	E-75	IEU	0.415	497000	56600	10500	9,900	5-1/2FH		4	8	10	33400	1270000	55700	0.98	26.35
5-172	24.70	E-75	IEU	0.415	497000	56600	10500	9,900	HDS5-1/5 FH	7	4	8	10	44130	1,244,530	73,560	1.30	26.35
5-1/2	24.70	E-75	IU	0.415	497000	56600	10500	9,900	SHT 55	7	4	10	15	45432	1,244,540	75,720	1.34	27,85
5-1/2	24.70	E-75	IEU	0.415	497000	56600	10500	9,900	FL57	7	4-1/4	10	15	56124	1,199,200	93,540	1.65	27.14



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 drillcollars 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 drillcollars 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.



Spiral Drill Collar

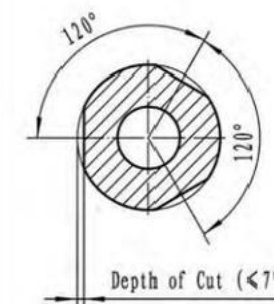
Slick Drill Collar

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

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

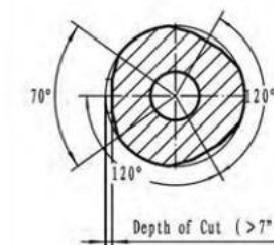
· Spiral Drill Collar

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 drillcollar 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)	4~43/8	41/2~51/8	51/4~53/4	57/8~63/8	61/2~7	71/8~77/8	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	51/2
Internal Flush IF	23/8	27/8	31/2		4	41/2	
Full hole FH				4			51/2
Slim hole SH	27/8	31/2	41/2				
Extra hole XH					41/2	5	

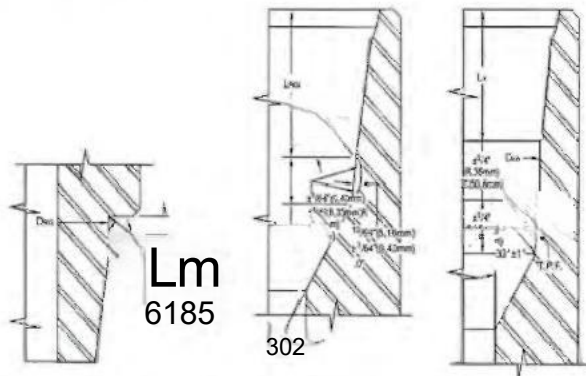
Note:HDS connection is designed by SFDT to distribute the torque force between the two shoulders and offers additional torsional strength for high torque applications than API standard thread.SFDT's HDS connection is interchangeable with corresponding API thread.

-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(23/8 IF)and NC31(27/8IF)have not enough metal to accommodate stress relief features.

2.Cold rolling

SFDT 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.



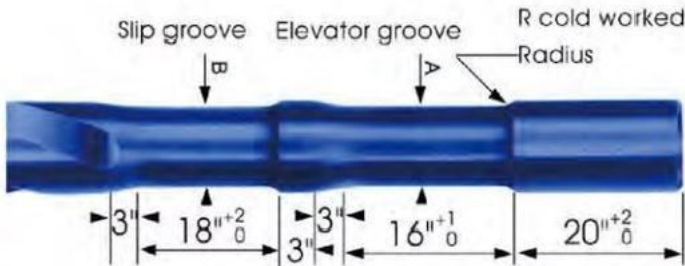
3.Phosphatized Coating

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

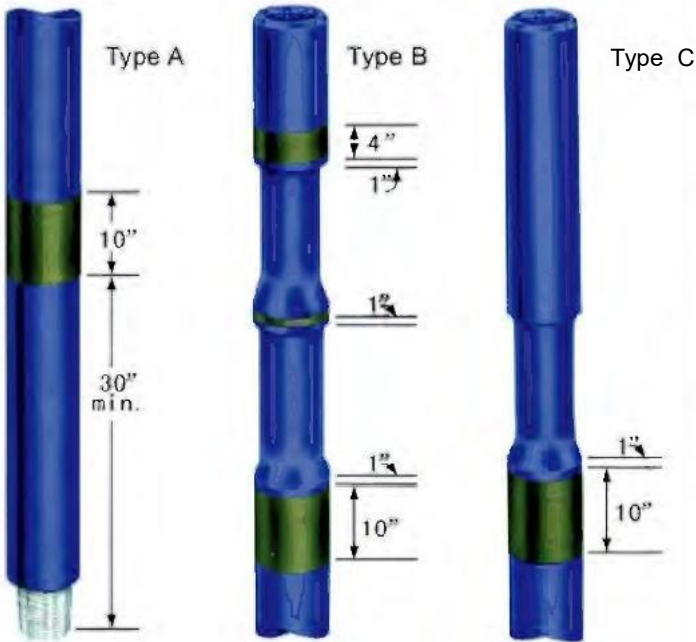


Slips and Elevator Recesses

SFDT 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	93/4	91/2	9	81/2	8	73/4	71/2	71/4	7	63/4	61/2	61/4	6	53/4	43/4	41/8
A	91/8	87/8	85/8	81/8	73/4	71/4	7	63/4	61/2	61/4	6	57/8	55/8	53/8	51/8	41/4	11/16
B	91/2	91/4	9	81/2	8	71/2	71/4	7	63/4	61/2	61/4	6	53/4	53/4	51/4	43/8	33/4
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

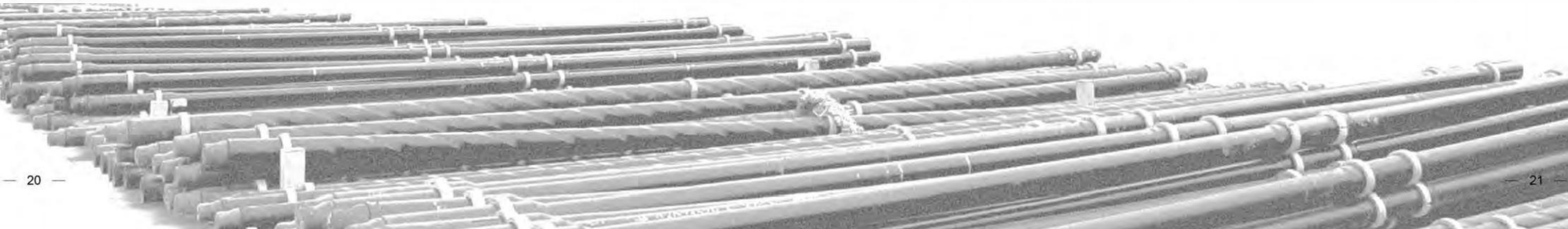


Hardbanding(Flush or Raised)

Hardbanding

Hardbanding is provided for extending the drill collar operation life.SFDT 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	31	30ft	31ft
31/8	11/4	1	NC 23	2318 Reg	296	306	315	326
3. 1/4	11/4	1	NC 23	2318 Reg	325	336	345	357
31/2	11/2	11/4	NC 26		362	373	386	400
41/8	2	13/4	NC 31		469	485	503	520
41/4	2	13/4	NC 31		509	526	543	561
41/2	2	13/4	NC 31		588	607	621	642
43/4	21/4	2	NC35	NC38	632	653	671	693
5	21/4	2	NC 38		721	745	760	785
5. 1/4	21/4	2	NC 38		815	841	853	881
51/2	21/4	2	NC 38		911	940	950	980
53/4	21/4	213/16	NC 40	41/2FH	1013	1046	911	941
6	21/4	213/16	NC 44	NC 40 or 41/2 FH	1118	1155	1016	1050
61/4	21/4	213/16	NC 44	NC 46	1230	1270	1128	1165
61/2	21/4	213/16	NC 46	NC 50	1345	1390	1242	1283
63/4	21/4	213/16	NC 46	NC 50	1466	1510	1361	1406
7	2. 13/16	21/4	NC 50		1486	1535	1589	1641
71/4	213/16	3	NC 50	51/2 FH	1616	1670	1596	1628
712	213/16	23/4	NC 50	512 Reg	1748	1806	1761	1818
73/4	213/16	3	NC 56	65/8 Reg	1887	1950	1848	1910
8	213/16	3	NC 56	65/8 Reg	2030	2095	1990	2054
8114	2-13/16	3	65/8 Reg		2177	2248	2137	2207
81/2	213/16	3	65/8 Reg		2327	2403	2287	2362
9	3	213/16	NC61	75/8 Reg	2605	2690	2645	2730
91/2	3	213/16	75/8 Reg		2938	3035	2978	3076
93/4	3	213/16	NC 70	75/8 Reg	3112	3214	3152	3255
10	3	213/16	NC 70	85/8 Reg	3291	3400	3331	3440
11	3		85/8 Reg		4090	4225	-	
14	31/2		85/8 Reg		6708	6727		

Note:1.API standard length tolerance is+/-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:

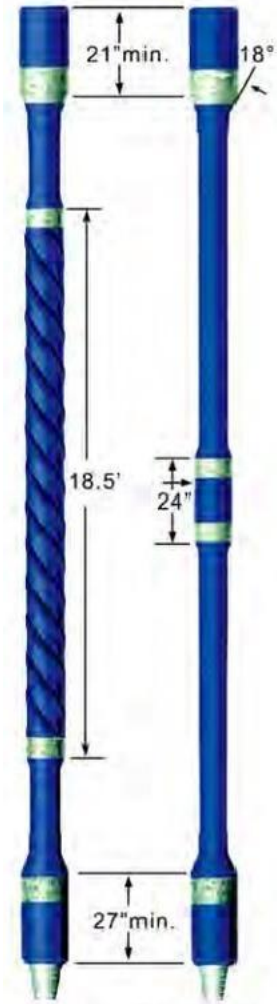
- Type(slick or spiral grooved)

·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 Spec7-1,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 (Brinell HB)	Min. Avg Charpy (f/Lbs@+75° F)
Welded	Tool Joint:AIST 4145H or4137H 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 Ib	Per Joint (31ft) kg	Make-torque (ft-lb)
		ID	Wall thick-ness	End Upsets	Connection Size and Type	Tool Joint OD	Tool Joint ID			
27/8	31	2	0.438	33/16	NC 31	41/8	2	14.58	205	7,250
31/2	31	21/16	0.719	37/8	NC 38	43/4	21/16	25.65	370	11,500
31/2	31	21/4	0.625	37/8	NC 38	5	21/4	23.48	335	11,500
4	31	29/16	0.719	43/16	NC 40	51/4	29/16	29.92	430	14,600
41/2	31	23/4	0.875	411/16	NC 46	61/4	23/4	41.45	595	22,500
5	31	3	1	51/8	NC 50	65/8	3	50.38	710	30,000
51/2	31	31/4	1.125	511/16	51/2FH	71/4	31/4	61.63	890	41,200
51/2	31	31/4	1.125	51/16	HDS51/2FH	71/4	31/4	61.63	890	59,600
57/8	31	4	0.938	6	FL57	7	4	57.42	808.1	63,996
65/8	31	41/2	1.063	65/16	65/8FH	8	41/2	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 HWPDP and ensure the connections performance and resist thread galling.

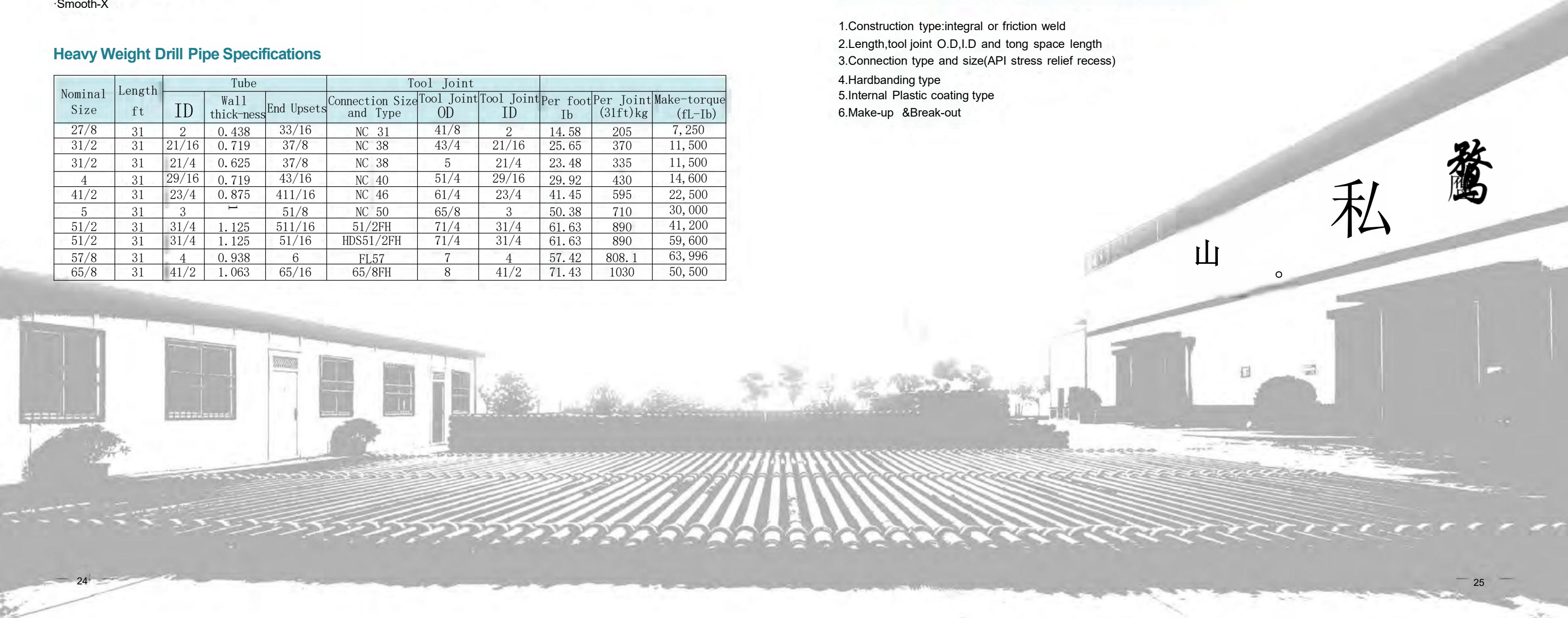
Spiral Heavy Weight Drill Pipe Specifications

Nominal Size	Length ft	Tube			Tool Joint			Per foot Ib	Per Joint (31f) kg	Make-torque (ft-lb)
		ID	Wall thick-ness	End Upsets	Connection Size and Type	Tool Joint OD	Tool Joint ID			
27/8	31	2	0.438	33/16	NC31	41/8	2	18.31	261	7,250
31/2	31	21/16	0.719	378	NC38	43/4	21/16	27.14	390	11,500
31/2	31	21/4	0.625	37/8	NC38	43/4	21/4	24.88	360	11,500
4	31	29/16	0.719	43/16	NC40	51/4	29/16	31.51	455	14,600
41/2	31	23/4	0.875	411/16	NC46	61/4	23/4	43.31	621	22,500
5	31	3	1	51/8	NC 50	65/8	3	52.34	750	30,000
51/2	31	31/4	1.125	511/16	51/2FH	71/4	31/4	63.87	915	41,200
51/2	31	31/4	1.125	511/16	HDS51/2FH	71/4	31/4	63.87	915	59,600
57/8	31	4	0.938	6	FL57	7	4	65.43	921	63,996
65/8	31	41/2	1.063	65/16	65/8FH	8	41/2	74.62	1070	50,500

Note:Spiral features ofHWPDPare 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



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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.

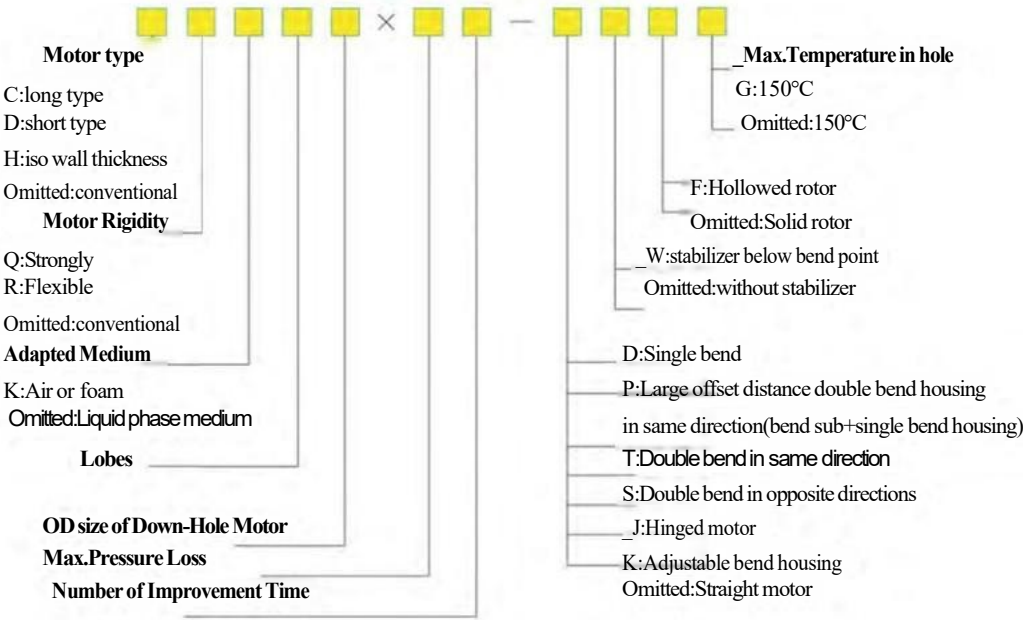
Features

- 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	f	mm	in			lpm	gpm
7LZ120x7.0	120	43/4	7:8	4	6	19.7	149-200	57/8-77/8	31/2REG	31/2REG	760-1480	200-390
7LZ127x7.0	127	5	7:8	4	6	19.7	149-200	57/8-77/18	31/2REG	31/2REG	760-1480	200-390
7LZ165x7.0	165	61/2	7:8	5	77	252	213-251	83/8-97/8	41/2REG	41/2REG	1150-2290	304-605
5LZ172x7.0	172	63/4	5:6	5	7.6	24.9	213-251	83/8-97/18	NC46	41/2REG	950-1900	251-502
7LZ172x7.0	172	63/4	7:8		8	26.2	213-251	83/8-97/8	NC46	41/2REG	1200-2310	304-605
5LZ197x7.0	197	73/4	5:6	5	7.6	24.9	251-311	97/8-121/4	5-1/2REG	6-5/8REG	1110-2220	293-587
5LZ203x7.0	203	8	5:6	5	8.1	26.6	251-311	97/8-121/4	6-5/8REG	6-5/8REG	1320-3360	349-888
5LZ216x7.0	216	81/2	5:6	5	7.5	24.6	251-311	97/8-121/4	6-5/8REG	6-5/8REG	1230-2430	325-642
7LZ216x7.0	216	81/2	7:8	5	7.5	24.6	251-311	97/8-121/4	6-5/8REG	6-5/8REG	1410-2600	373-686
5LZ228x7.0	228	9	5:6	5	7.5	24.6	251-311	97/8-121/4	6-5/8REG	6-5/8REG	1230-2430	325-642
7LZ244x7.0	244	95/8	7:8	6	10	32.8	311-445	121/4-171/2	6-5/8REG	6-5/8REG	2270-4160	600-1099

Mode	Revolution No load		Rotary Speed No Load	Working Pressure Drop		Max. Pressure Drop		Working Pressure		Max. Working Pressure		Working Torque		Max. Torque	
	revl	rev/gal		kpa	psi	kpa	psi	kN	Ibf	kN	Ibf	N-m	Ib-t	N-m	Ib-t
7LZ120x7.0	0.17	0.64	130-260	3200	464	4400	638	50	11240	100	22480	2500	1845	3280	2580
7LZ127x7.0	0.17	0.64	130-260	3200	464	4400	638	50	11240	100	22480	2500	1845	3280	2580
7LZ165x7.0	0.08	0.3	95-190	4000	580	5500	798	80	17985	160	35970	6100	4500	8600	6344
5LZ172x7.0	0.1	0.38	80-150	4000	580	5500	798	100	22481	170	38218	5200	3836	7300	5385
7LZ172x7.0	0.07	0.27	95-190	4000	580	5500	798	100	22481	170	38218	7100	5238	10000	7377
5LZ197x7.0	0.07	0.27	80-158	4000	580	5500	798	150	33721	200	44962	6300	4648	8800	6492
5LZ203x7.0	0.07	0.25	85-225	4000	580	5500	798	155	34845	250	56202	8200	6049	1000	8115
5LZ216x7.0	0.06	0.22	75-145	4000	580	5500	798	180	40466	300	67443	7600	5607	11000	8115
7LZ216x7.0	0.05	0.2	70-135	4000	580	5500	798	220	49458	330	74187	9800	7230	13800	10180
5LZ228x7.0	0.06	0.22	75-145	4000	580	5500	798	180	40466	300	67443	7600	5607	11000	8115
7LZ244x7.0	0.03	0.11	70-130	4800	696	6600	957	220	49458	330	74187	20600	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=1×105/4πNm)

- Relative Max:1.010
- Average:μr≤1.005

Magnetic Field Gradient(hot spots)

- Max:B≤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



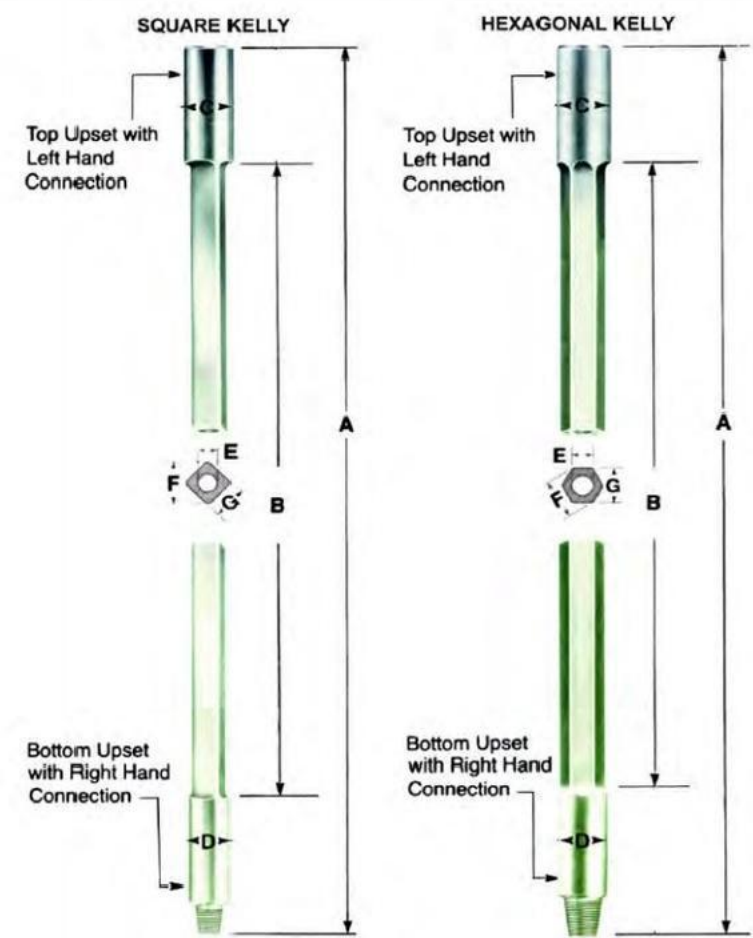
Non-magnetic stabilizer



KELLY

SFDT'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.SFDT's kelly is inspected by an ultrasonic unit over its full length and fullsection.The wallthickness 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

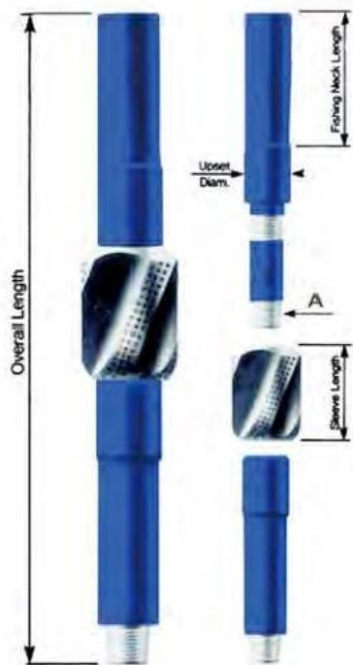


Specifications for Square Kelly

Nom. Size (in)	Lengths (ft)	Top Upset Joint				Bottom Upset		Bore	Drive Section		Weight (kg)	
		Standard	Optional									
21/2	40	65/8 Reg	734	41/2Reg	53/4	NC26	33/8	11/4	31/4	21/2	410	360
	46										465	420
3	40	6518 Reg	73/4	41/2Reg	53/4	NC31	41/8	13/4	37/8	3	495	450
	46										560	515
31/2	40	65/8 Reg	73/4	41/2Reg	53/4	NC38	43/4	21/4	43/7	31/2	600	555
	46										670	630
	54										780	730
	40										825	780
41/4	46	65/8 Reg	73/4	41/2 Reg	53/4	NC46 or NC50	61/4	213/16	51/2	41/4	940	890
	54										1070	1040
	40										1250	780
51/4	46	65/8 Reg	73/4	---	---	NC50 or 51/2 FH or NC56	63/8 7	31/4	63/4	51/4	1430	---
	54										1670	---
	40										1670	---
6	46	65/8 Reg	73/4	---	---	51/2FH 65/8FH	7 8	31/2	75/8	6	1920	---
	54										2250	---
	40										1670	---

Specifications for Hex.Kelly

Nom. Size (in)	Lengths (ft)	Top Upset Joint				Bottom Upset		Bore	Drive Section		Weigh (kg)	
		Standard	Optional									
	A	LH Connection	OD (in)	LH Connection	ODC (in)	RH Connection	OD D (in)	E (in)	F (in)		Sta.	Opt.
3	40	65/8 Reg	73/4	41/2Reg	53/4	NC26	33/8	11/4	33/8	3	450	400
	46										500	555
31/2	40	65/8 Rg	73/4	41/2Reg	53/4	NC31	41/8	13/4	331/32	31/2	580	535
	46										670	620
	54										780	730
41/4	40	65/8 Reg	73/4	41/2Reg	53/4	NC38	43/4	214	413/16	41/4	750	700
	46										840	800
	54										980	940
51/4	40	6518 Reg	73/4	---	---	NC46 or NC50	61/4 or 63/8	3 or 31/4	531/32	51/4	1020	---
	46										1170	---
	54										1350	---
6	40	65/8 Reg	73/4	---	---	NC 50 or 51/2 FH or NC56	7	31/2	613/16	6	1320	---
	46										1500	---
	54										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 stabilizer

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	in	mm	in	in	
57/8	43/4	NC38	NC38	21/4	20	16	21/4	57	String
			31/2REG						Near bit
81/2	7	NC50	NC50	213/16	20	16	21/2	60	String
			41/2REG						Near bit
121/4	8	NC56	NC56	213/16	20	16	31/2	63	String
									Near bit
171/2	9	NC61	NC61	3	20	18	43/4	721/2	String
									Near bit
22	91/2	75/8REG	75/8REG	3	30	20	43/4	93	String
									Near bit
26	91/2	75/8REG	75/8REG	3	30	20	43/4	93	String
									Near bit
28	91/2	75/8REG	75/8REG	3	30	20	43/4	98	String
									Near bit

Replaceable Sleeve Stabilizer Specification

Hole OD in	sleeve			body			ID mm	OALin
	Sleve in	length in	Weight Kg	UpOD in	Conn.	Weight Kg		
61/8~63/4	2	18	35	43/4	27/8TF	125	2	64
73/8~73/4	2	18	45	53/4	31/2IF	180	21/4	66
81/2~83/4	23/8	18	55	61/2	4IF	250	213/16	68
91/2~11	23/4	18	65	71/4	41/2IF	330	213/16	68
121/4~171/2	31/8	18	95	8	65/8REG	520	213/16	72
171/2~20	31/8	24	130	91/2	75/8REG	550	3	81
171/2~20	4	33	180	111/4	85/8REG	810	3	90
22~26	4	33	250	91/2	75/8REG	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 ASTMA 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.



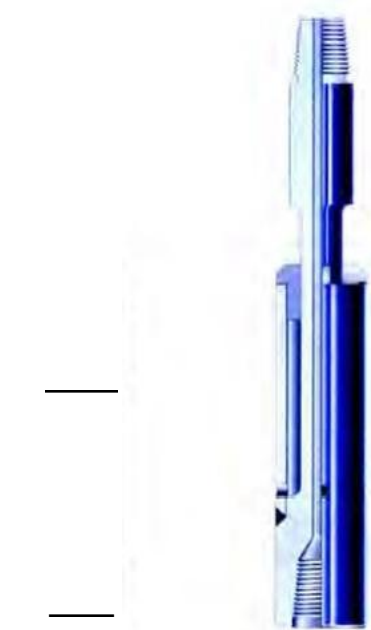
Bit Sub

Kelly Saver Sub



Reduced Section Sub

Straight OD SubS



second style

First style

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	41/4to 53/8	45/8 to 47/8	51/8 to 57/8	6 to 63/8	61/21071/2	71/2to 81/2	85/8 to 95/8	958 to 115/8	111/2to 13
API Connection (Pin)	23/8	27/8	31/2	31/2	31/2	41/2	41/2	65/8	65/8
O. D. of Body (Top Conn.)	31/8	33/4	41/4	41/4	41/4	51/2	51/2	734	734
OD. of Body (Under Cup) O. D. of Cup	2	25/8	31/8	31/4	31/4	41/2	41/2	53/4	53/4
ID. of Cup	311/16	4	41/2	5	51/2	65/8	7	85/8	95/8
Diam. of Bore	35/16	35/8	41/4	49/16	47/8	515/16	69/32	715/16	817/32
	3/4	11/4	11/2	11/2	11/2	21/4	21/4	31/2	31/2
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	291/2	301/2	301/2	301/2	311/2	311/2	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	431/2	44	45	45	45	46	46	48	48
SFDT Assenbly 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	531/2	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

SFDTAssembly Part No.	Casing Size	API Reg.	Bore	Skirt O.D	Skirt ID	Skirt	Total
		Connection				Length	Length
DLB-701	41/2"-5"	23/8"	1"	3. 3/4"	33/8"	10"	32"
DLB-702	51/2"	27/8"	11/4"	4"	35/8"		32"
DLB-703	65/8"-75/8"	31/2"	11/2"	47/8"	41/2"		32"
DLB-704	71/2"-81/2"	41/2"	21/4"	65/8"	6"		34 "
DLB-705	85/8"-95/8"	41/2"	21/4"	7"	61/4"		34"
DLB-706	95/8" -113/8"	65/8"	31/2"	81/2"	77/8"		34"
DLB-707	111/2"-133/8"	65/8"	31/2"	95/8"	81/2"		34"
DLB-708	131/2"-171/2"	75/8"	4"	127/8"	115/8"		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
- Bail type
- Pin to Box type

Drill Collar	Lifting	Approx.	Conn.
Size	Plate Dia.	Weight	Bore
(A)	(B)	(kg)	(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 overll length will ad 6" if the iting 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 BailType Thread Protector



Aluminum Alloy Thread Protector

EQUIPMENT AND WORKSHOP OF SFDI

