Shanxi Fenglei Drilling Tools Co., Ltd

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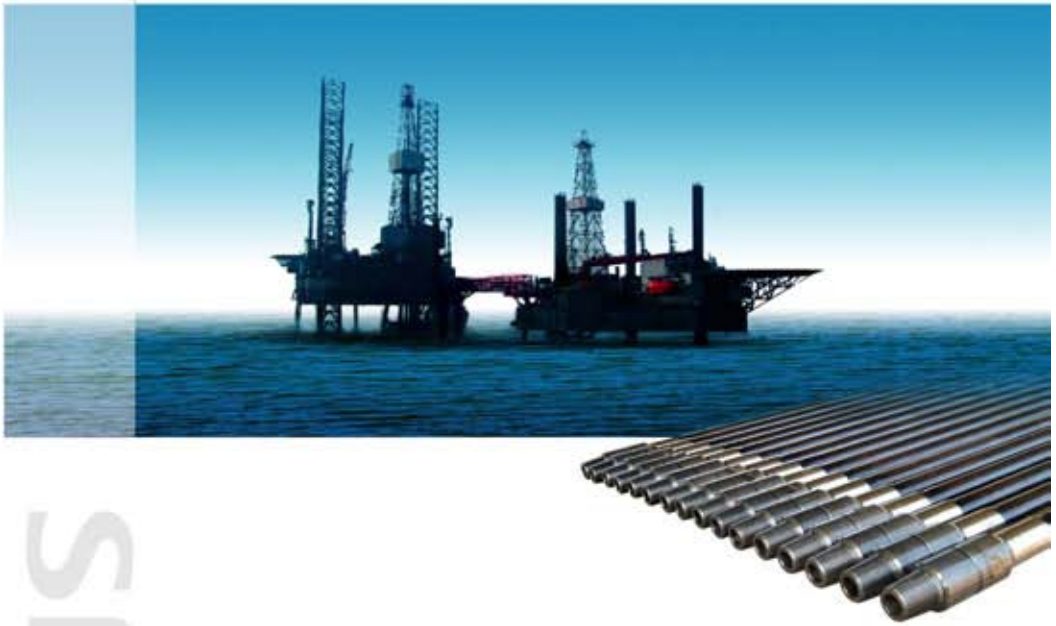
SFMC

Shanxi Fenglei Drilling Tools Co., Ltd



NO BETTER ADVERTISING FOR A COMPANY THAN
REGARDING THE PRODUCTS QUALITY AS ITS LIFE!

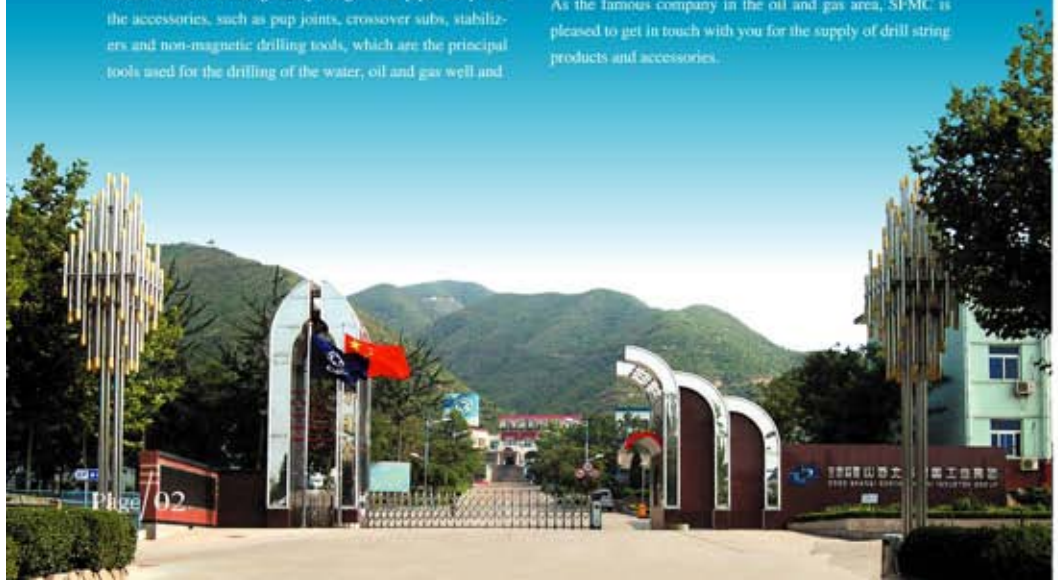
Brief Introduction of Shanxi Fenglei Drilling Tools Co., Ltd

Shanxi Fenglei Drilling Tools Co., Ltd (Former Shanxi Fenglei Machinery Manufacturing Co., Ltd, SFMC) is the leading manufacturer of drill string products, which is granted API Spec.7, 7-1, ISO9001, ISO 14001 and ISO 18000 certificates. The company was founded in 1968 and has been manufacturing the top quality drill collar, integral heavy wall drill pipe and kelly since 1978. The company was awarded API Spec 7 Certificate in 1993, Its drill pipe and welded heavy weight production lines was put into production in 2003. SFMC's drill string products are widely used by all the domestic oil fields controlled by Sinopec, CNPC and CNOOC. Its products also exported to most oil producing countries and areas, such as North sea area, North and south America, Middle East, North and west Africa area and Australia.

The company manufactures and sells a full range of drill string products including drill pipe, drill collar, integral and inertial friction welding heavy weight drill pipe, kelly and the accessories, such as pup joints, crossover subs, stabilizers and non-magnetic drilling tools, which are the principal tools used for the drilling of the water, oil and gas well and are located between the rig floor and drill bit. SFMC's drill string products are specifically designed for today's difficult and harsh drilling environments and include a wide variety of sizes, designs and metallurgy.

Quality is not only a word in SFMC. SFMC possesses robust technical staff, advanced customer-designed facilities, which assure the steady quality. Independent inspection unit is directly under the control of the general manager, which assures the highest degree of quality. SFMC pioneers a unique trepanning system, which is ideal for the precision machining of drill collars, integral heavy weight drill pipe and kelly. Our loyal customers believe that SFMC can supply its drill string components unmatched for reliability and perfect performance. All of the SFMC's products are manufactured in conformance to, or exceed API specifications as well as established industries standards, such as DS-1 and NS-1.

As the famous company in the oil and gas area, SFMC is pleased to get in touch with you for the supply of drill string products and accessories.



SFMC

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Product description

SFMC's drill pipes are manufactured in according to or exceed the requirement of API 5D, 7, and RP7G. The features are introduced as below:

The residual elements such as sulphur and phosphorus are strictly controlled in the pipe body and tool joints material during the steel making process, which makes the kind of material with high physical properties.

Heat Treatment is a decisive process in the production of tool joints and pipe body. Heat treatment must be uniform and deep enough to ensure required physical properties full length, especially in the critical sections of the connection and weld zone. Heat treatment programs are established on the basis of the actual chemical analysis of each heat of steel to ensure the materials meet or surpass the requirements of API Specification.

The drill pipe undergoes a full-length inspection that checks the defects; especially the strict inspections on weldneck/upset region are preformed with our both manual and automatic inspection equipments to ensure the high quality.

The thread is the most important factor for drill pipes. All threads would be machined with CNC Lathes and inspected with related thread gauges in conformance with API Specification. All threads would be phosphated or copperized and the roots are cold rolled to improve the resistance of galling during initial break-in and drilling operation. Upon the customer's request, The Break-in process is conduced to economize the rig handling time. All Connections would be equipped with pressed steel or plastics steel thread protectors.

Besides SFMC's logo , API monogram, serial number, OD, ID, type and size of connections are stamped on recessed mill flat up to requirements of API specification.

QHSE

Quality Statement

No matter when and where, the performance of the drill pipe is a critical factor to the drilling process. In order to control the quality during all manufacturing process, the quality control program is performed strictly with the requirement of API Q1 and ISO 9001. Every step of production, from the tube and tool joint material to finished drill pipe; SFMC ensures a high quality product.

SFMC established a standard Inspection Laboratory Center for physical and chemical testing, which is directly under the control of the general manager. All testing information obtained is recorded on SFMC inspection certificate furnished with each product, and all inspectors must have the relevant qualification.

In order to meet or exceed the requirements of the customer, SFMC manufactured its products adherence to the most rigorous industry standards or unique customer specifications and ensures that the products delivered to the field are immediately suitable for use.

API Specification 7
API Specification 5D
API Recommended Practice 7G
NS-1
DS-1
Customer-specified specification

Health, Safety and Environment statement

SFMC pays high attention to the health and safety of all employees and regards their life as the most valuable treasure of SFMC. All the equipments are safety-approved and inspected periodically.

Continuous employee vocational training programs are performed at SFMC and the international agreements and national laws about the employee's right are strictly abided.

The environmental protection policy, which is an important factor of SFMC's development, is executed not only in the office and workshop, but also the ground and even the mountain beside SFMC. To be the "Garden" is one of aims of SFMC for long development.

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Scope of the drill pipe products

SFMC provides a full range of inertial friction welding drill pipes in nominal sizes from 2-3/8" to 6-5/8" OD and various steel grades (E-75, X-95, G-105, S-135), which are manufactured in according to API Spec. 7, 5D and RP 7G latest edition and meeting the customer's specified requirements.

Pipe material

SFMC drill pipe performs a strict quality control on manufacturing and inspection process from the initial material selection to final inspection to meet the requirement of the customer. The drill pipe is manufactured with top-quality alloy steel, which SFMC will perform the strict mechanical and chemical re-inspection. The advanced inspection system can precisely detect the defects and check the dimensional tolerance to ensure API required 87.5 percent minimum wall thickness, and even provide 95.0 percent minimum wall thickness in each pipe.

Drill pipe joint processing

SFMC Tool Joints are made of AISI 4137H premium alloy steel fully Q&T with IPSEN furnace imported from Germany. All tool joints should be inspected by fluorescence magnetic particle and ultrasonic method.

Mechanical Properties of Tool Joints

Standard	Tensile Strength Rm Mpa	Yield Strength $R_{t0.5}$ Mpa	Elongation A %	Impact A_{kv} J (-20° C)		Hardness HB
API Spec.7	≥965.3	≥827.4	≥13	------		≥285
SY/T5290-2000	≥965	≥827	≥13	54		≥285
Q/PFL - J01 - 06-2003	≥980	≥860	≥13	Longitudinal Average≥68 Min≥54	Transverse Average≥54 Min≥45	285～341

Note： Q/PFL-J01-06-2003 is SFMC's own enterprise standard.

The threads and Bevel shoulders are machined by CNC Lathe and gauged to API specification, which provides interchangeability between various types of connections. All threads are phosphatized or coppered to reduce the possibility of connection galling.

Grade identification grooves are applied to API RP7G specification or to the customer's specific requirements.

Manufacturing Chart of SFMC drill pipes

Heat Treatment of Welded Zone

SFMC Drill pipes and tool joints are assembled by friction welding method. After removal of the weld bead, the heat affected zone is quenched and tempered in a unique system to improve mechanical properties. The welded zone is inspected by UT and MPI.

The welding between pipe body and tool joint is machined with powerful inertial friction welding machine. The welding process by means of computer control is swift and steady going.

The weld area is quenched and tempered through induction heating process, which is real-time controlled by computer.

The quality of welding zone is assured by means of magnetic particle, ultrasonic and hardness inspection during product process.

Weld Zone Technical Data

Grade	Yield Strength Min, Mpa	Tensile Strength Min, Mpa	Elongation %	Impact AKV J
E—75	517	689	13	20 (Average) 15 (Min.)
X—95	609	712		
G—105	655	724		
S—135	724	793		

Note: The yield and tensile strength of SFMC drill pipe on weld zone is higher about 100 Mpa than the set in API standard, the impact value is higher about 50 J than the request of API standard.

Make–up and Break–out service

The factory Make-up and Break-out services, which is the most important factor affecting the life of the tool joint connections, is regarded as an important element to save rig handling time and greatly improve the efficiency on rig floor. The controlled Make-up & Break-in procedures are consistently applied to every tool joint and ensure the connections quality. Suitable dope and correct torque value are essential for the Make-up and Break-out procedures. SFMC drill pipe will supply perfect factory Make-up and Break-out services if order and inquiries.

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Hardbanding and IPC

In order to optimize wear resistance, Hardbanding and Internal Plastic Coating are applied to the SFMC drill pipes.

Hardbanding is designed to weld on the Box Tool Joint and Shoulder Face. tungsten carbide particle and casing friendly type, such as ARNCO 100xt, ARNCO 300xt and TCS titanium are available depending on the request of customer.

Internal plastic coating, such as TK34, DPC and TC2000, are available.

SFMC DSTJ（Double Shoulder Tool Joint）

As the pipe body torsional yield is always higher than the tool joint torsional yield, the unmatched torsional yield maybe involves the connection's failure during drilling operation. SFMC DSTJ is effective to prevent those accidents.

- High torque resistance:SFMC DSTJ torsional yield is higher than API tool joint torsional yield to match the torsional yield of pipe body.
- Longer life & lower repair ratio than API tool joint.
- Interchangeability with API tool joint
- Suitable for sour drilling

Note: Any kind of drill stem accessories and drill pipe with API connections can be made up with SFMC DSTJ drill pipe.

When ordering drill pipe, please specify:

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

Mechanical properties of tool joint and pipe body

Specification	Drill Pipe Steel Grade	Yield Strength Min/Max (ksi)	Ultimate Strength Min/Max (ksi)	Max Hardness	Min Avg Charpy J (ft-lbs @ 75°F)
API	E-75	75/105	100/--	--	40
	X-95	95/125	105/--	--	40
	G-105	105/135	110/--	--	40
	S-135	135/165	145/--	--	40
	Tool Joint	120/--	140/--	341 HB	40

API Tool Joints

Connection style and size	Pipe: Upset type & size	Pipe: Nom Wt	Pipe: Grade	Tool joint: Outeside Dia Of Pin或 Box	Tool joint: Inside Dia Of Pin	Tool joint: Bevel Dia. of Pin & Box Shoulder	Tool joint: Total Length Tool Joint Pin.	Tool joint: Pin Tong Space	Tool joint: Box Tong Space	Tool joint: Combined Length of Pin & Box	Tool joint: Dia. Of Pin at Elevator Upset	Tool joint: Dia. Of Box at Elevator Upset	Torsional Ratio Pin to Pipe
		lb/ft		±1/32	±1/32	±1/64	+1/4 −3/8	±1/4	±1/4	±1/2	max	max	
				D	d	D_r	L_r	L_{re}	L_a	L	D_{er}	D_{eb}	
NC26 (2 3/8IF)	2 3/8EU	6.65	E75	3 3/8	1 3/4	3 17/64	10	7	8	15	2 9/16	2 9/16	1.10
			X95	3 3/8	1 3/4	3 17/64	10	7	8	15	2 9/16	2 9/16	0.87
			G105	3 3/8	1 3/4	3 17/64	10	7	8	15	2 9/16	2 9/16	0.79
NC31 (2 7/8IF)	2 7/8EU	10.4	E75	4 1/8	2 1/8	3 61/64	10 1/2	7	9	16	3 3/16	3 3/16	1.03
			X95	4 1/8	2	3 61/64	10 1/2	7	9	16	3 3/16	3 3/16	0.90
			G105	4 1/8	2	3 61/64	10 1/2	7	9	16	3 3/16	3 3/16	0.82
			S135	4 3/8	1 5/8	3 61/64	10 1/2	7	9	16	3 3/16	3 3/16	0.82
NC38 (3 1/2IF)	3 1/2EU	9.50	E75	4 3/4	3	4 37/64	11 1/2	8	10 1/2	18 1/2	3 7/8	3 7/8	0.91
		13.30	E75	4 3/4	2 11/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.98
			X95	5	2 9/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.87
			G105	5	2 7/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.86
			S135	5	2 1/8	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.80
		15.50	E75	5	2 9/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.97
			X95	5	2 7/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.83
			G105	5	2 1/8	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.90
NC40 (4FH)	3 1/2EU	15.50	S135	5 1/2	2 1/4	5 1/64	11 1/2	7	10	17	3 7/8	3 7/8	0.87
NC46 (4IF)	4IU	14.00	E75	5 1/4	2 13/16	5 1/64	11 1/2	7	10	17	4 3/16	4 3/16	1.01
			X95	5 1/4	2 11/16	5 1/64	11 1/2	7	10	17	4 3/16	4 3/16	0.86
			G105	5 1/2	2 7/16	5 1/64	11 1/2	7	10	17	4 3/16	4 3/16	0.93
			S135	5 1/2	2	5 1/64	11 1/2	7	10	17	4 3/16	4 3/16	0.87
NC46 (4IF)	4EU	14.00	E75	6	3 1/4	5 23/32	11 1/2	7	10	17	4 1/2	4 1/2	1.43
			X95	6	3 1/4	5 23/32	11 1/2	7	10	17	4 1/2	4 1/2	1.13
			G105	6	3 1/4	5 23/32	11 1/2	7	10	17	4 1/2	4 1/2	1.02
			S135	6	3	5 23/32	11 1/2	7	10	17	4 1/2	4 1/2	0.94
	4 1/2IU	13.75	E75	6	3 3/8	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	1.20
	4 1/2IEU	16.60	E75	6 1/4	3 1/4	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	1.09
			X95	6 1/4	3	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	1.01
			G105	6 1/4	3	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.91
			S135	6 1/4	2 3/4	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.81

Connection style and size	Pipe: Upset type & size	Pipe: Nom Wt	Pipe: Grade	Tool joint: Outeside Dia Of Pin或 Box	Tool joint: Inside Dia Of Pin	Tool joint: Bevel Dia. of Pin & Box Shoulder	Tool joint: Total Length Tool Joint Pin.	Tool joint: Pin Tong Space	Tool joint: Box Tong Space	Tool joint: Combined Length of Pin & Box	Tool joint: Dia. Of Pin at Elevator Upset	Tool joint: Dia. Of Box at Elevator Upset	Torsional Ratio Pin to Pipe
		lb/ft		±1/32	±1/32	±1/64	+1/4 −3/8	±1/4	±1/4	±1/2	max	max	
				D	d	D_r	L_r	L_{re}	L_a	L	D_{er}	D_{eb}	
NC50 (4 1/2IF)	4 1/2EU	20.00	E75	6 1/4	3	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	1.07
			X95	6 1/4	2 3/4	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.96
			G105	6 1/4	2 1/2	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.96
			S135	6 1/4	2 1/4	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.81
		13.75	E75	6 5/8	3 7/8	6 1/16	11 1/2	7	10	17	5	5	1.32
		16.60	E75	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5	5	1.23
			X95	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5	5	0.97
			G105	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5	5	0.88
			S135	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5	5	0.81
		20.00	E75	6 5/8	3 5/8	6 1/16	11 1/2	7	10	17	5	5	1.02
			X95	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5	5	0.96
			G105	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5	5	0.86
			S135	6 5/8	3	6 1/16	11 1/2	7	10	17	5	5	0.87
5 1/2 IF	5IEU	19.50	E75	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.92
			X95	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86
			G105	6 5/8	3 1/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.89
			S135	6 5/8	2 3/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86
		25.60	E75	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86
			X95	6 5/8	3	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86
			G105	5/8	2 3/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.87
		19.50	E75	7	3 3/4	6 23/32	13	8	10	18	5 1/8	5 1/8	1.53
			X95	7	3 3/4	6 23/32	13	8	10	18	5 1/8	5 1/8	1.21
			G105	7	3 3/4	6 23/32	13	8	10	18	5 1/8	5 1/8	1.09
			S135	7 1/4	3 1/2	6 23/32	13	8	10	18	5 1/8	5 1/8	0.98
		25.60	E75	7	3 1/2	6 23/32	13	8	10	18	5 1/8	5 1/8	1.21
			X95	7	3 1/2	6 23/32	13	8	10	18	5 1/8	5 1/8	0.95
			G105	7 1/4	3 1/2	6 23/32	13	8	10	18	5 1/8	5 1/8	0.99
			S135	7 1/4	3 1/4	6 23/32	13	8	10	18	5 1/8	5 1/8	0.83

API Drill Pipe (Combinations of Pipe body and Tool joints)

Nom Size	Nom Wt	Pipe Body				Tool Joints		
		Pipe		Upset	Grade	Connection	Outside Diameter of Pin & Box	Inside Diameter of Pin
		Wall Thickness	Inner Diameter					
in (mm)	Lb/ft	in (mm)					in (mm)	
2 3/8 (60.3)	6.65	0.280 (7.11)	1.815 (46.1)	EU	E	NC26 (2 3/8IF)	3-3/8 (85.7)	1 3/4 (44.45)
				EU	X	NC26 (2 3/8IF)	3-3/8 (85.7)	1 3/4 (44.45)
				EU	G	NC26 (2 3/8IF)	3-3/8 (85.7)	1 3/4 (44.45)
2 7/8 (73.0)	10.40	0.362 (9.19)	2.151 (54.6)	EU	E	NC31 (2 7/8IF)	4 1/8 (104.8)	2 1/8 (53.98)
				EU	X	NC31 (2 7/8IF)	4 1/8 (104.8)	2 (50.8)
				EU	G	NC31 (2 7/8IF)	4 1/8 (104.8)	2 (50.8)
				EU	S	NC31 (2 7/8IF)	4 3/8 (111.1)	1-5/8 (41.28)
3 1/2 (88.9)	9.50	0.254 (6.45)	2.992 (76.0)	EU	E	NC38 (3 1/2IF)	4 3/4 (120.7)	3 (76.2)
3 1/2 (88.9)	13.30	0.368 (9.35)	2.764 (70.3)	EU	E	NC38 (3 1/2IF)	4 3/4 (120.7)	2 11/16 (68.26)
				EU	X	NC38 (3 1/2IF)	5 (127)	2 9/16 (65.09)
				EU	G	NC38 (3 1/2IF)	5 (127)	2 7/16 (61.91)
				EU	S	NC38 (3 1/2IF)	5 (127)	2 1/8 (53.98)
3 1/2 (88.9)	15.50	0.449 (11.4)	2.602 (66.1)	EU	E	NC38 (3 1/2IF)	5 (127)	2 9/16 (65.09)
				EU	X	NC38 (3 1/2IF)	5 (127)	2 7/16 (61.91)
				EU	G	NC38 (3 1/2IF)	5 (127)	2 1/8 (53.98)
3 1/2 (88.9)	15.50	0.449 (11.4)	2.602 (66.1)	EU	S	NC40 (4FH)	5 1/2 (139.7)	2 1/4 (57.15)
4 (101.6)	14.00	0.330 (8.38)	3.340 (84.8)	IU	E	NC40 (4FH)	5 1/4 (133.4)	2-13/16 (71.44)
				IU	X	NC40 (4FH)	5 1/4 (133.4)	2-11/16 (68.26)
				IU	G	NC40 (4FH)	5 1/2 (139.7)	2 7/16 (61.91)
				IU	S	NC40 (4FH)	5 1/2 (139.7)	2 (50.8)
4 (101.6)	14.00	0.330 (8.38)	3.340 (84.8)	EU	E	NC46 (4IF)	6 (152.4)	3 1/4 (82.55)
				EU	X	NC46 (4IF)	6 (152.4)	3 1/4 (82.55)
				EU	G	NC46 (4IF)	6 (152.4)	3 1/4 (82.55)
				EU	S	NC46 (4IF)	6 (152.4)	3 (76.2)
4 1/2 (114.3)	13.75	0.271 (6.88)	3.958 (100.5)	IU	E	NC46 (4IF)	6 (152.4)	3-3/8 (85.73)
4 1/2 (114.3)	16.60	0.337 (8.56)	3.826 (97.2)	IEU	E	NC46 (4IF)	6 1/4 (158.8)	3 1/4 (82.55)
				IEU	X	NC46 (4IF)	6 1/4 (158.8)	3 (76.2)
				IEU	G	NC46 (4IF)	6 1/4 (158.8)	3 (76.2)
				IEU	S	NC46 (4IF)	6 1/4 (158.8)	2 3/4 (69.85)
4 1/2 (114.3)	20.00	0.430 (10.92)	3.640 (92.5)	IEU	E	NC46 (4IF)	6 1/4 (158.8)	3 (76.2)
				IEU	X	NC46 (4IF)	6 1/4 (158.8)	2 3/4 (69.85)
				IEU	G	NC46 (4IF)	6 1/4 (158.8)	2 1/2 (63.5)
				IEU	S	NC46 (4IF)	6 1/4 (158.8)	2 1/4 (57.2)

Nom Size	Nom Wt	Pipe Body				Tool Joints		
		Pipe		Upset	Grade	Connection	Outside Diameter of Pin & Box	Inside Diameter of Pin
		Wall Thickness	Inner Diameter					
in (mm)	Lb/ft	in (mm)					in (mm)	
4 1/2 (114.3)	13.75	0.271 (6.88)	3.958 (100.5)	EU	E	NC50 (4 1/2IF)	6 5/8 (168.28)	3 7/8 (98.43)
4 1/2 (114.3)	16.60	0.337 (8.56)	3.826 (97.1)	EU	E	NC50 (4 1/2IF)	6 5/8(168.28)	3 3/4 (95.25)
				EU	X	NC50 (4 1/2IF)	6 5/8 (168.28)	3 3/4 (95.25)
				EU	G	NC50 (4 1/2IF)	6 5/8 (168.28)	3 3/4 (95.25)
				EU	S	NC50 (4 1/2IF)	6 5/8 (168.28)	3 1/2 (88.90)
4 1/2 (114.3)	20.00	0.430 (10.92)	3.640 (92.5)	EU	E	NC50 (4 1/2IF)	6 5/8 (168.28)	3 5/8 (92.08)
				EU	X	NC50 (4 1/2IF)	6 5/8 (168.28)	3 1/2 (88.90)
				EU	G	NC50 (4 1/2IF)	6 5/8 (168.28)	3 1/2 (88.90)
				EU	S	NC50 (4 1/2IF)	6 5/8 (168.28)	3 (76.2)
5 (127)	19.50	0.362 (9.19)	4.276 (108.6)	IEU	E	NC50 (4 1/2IF)	6 5/8 (168.28)	3 3/4 (95.26)
				IEU	X	NC50 (4 1/2IF)	6 5/8 (168.28)	3 1/2 (88.90)
				IEU	G	NC50 (4 1/2IF)	6 5/8 (168.28)	3 1/4 (82.55)
				IEU	S	NC50 (4 1/2IF)	6 5/8 (168.28)	2 3/4 (69.85)
5 (127)	25.60	0.500 (12.7)	4.000 (101.6)	IEU	E	NC50 (4 1/2IF)	6 5/8 (168.28)	3 1/2 (88.90)
				IEU	X	NC50 (4 1/2IF)	6 5/8 (168.28)	3 (76.2)
				IEU	G	NC50 (4 1/2IF)	6 5/8 (168.28)	2 3/4 (69.85)
5 (127)	19.50	0.362 (9.19)	4.276 (108.6)	IEU	E	5 1/2FH	7 (177.80)	3 3/4 (95.25)
				IEU	X	5 1/2FH	7 (177.80)	3 3/4 (95.25)
				IEU	G	5 1/2FH	7 (177.80)	3 3/4 (95.25)
				IEU	S	5 1/2FH	7 1/4 (184.15)	3 1/2 (88.90)
5 (127)	25.60	0.500 (12.7)	4.000 (101.6)	IEU	E	5 1/2FH	7 (177.80)	3 1/2 (88.90)
				IEU	X	5 1/2FH	7 (177.80)	3 1/2 (88.90)
				IEU	G	5 1/2FH	7 1/4 (184.15)	3 1/2 (88.90)
				IEU	S	5 1/2FH	7 1/4 (184.15)	3 1/4 (82.55)

Note:

1. Customer can specify the Box ID, but the final decision belongs to manufacturer.
2. D_m & D_m are decided by the manufacturer, Size in above sheet is the final.
3. Customer can specify the Tong Space of Tool Joints.

Recommended New Tool Joints Make-up Torque Chart

Drill Pipe Size (in)	Conn. Type	Box OD(in)	Pin ID(in)	Make-Up Torque (ft-lb)
2 3/8	NC26	3 3/8	1 3/4	3,900
2 7/8	NC26	3 3/8	1 3/4	3,900
	NC31	4 1/8	2 1/8	6,400
	NC31	4 1/8	2	7,100
	NC31	4 1/8	1 5/8	4,400
3 1/2	NC31	4 1/8	2 1/8	6,400
	NC38	4 3/4	3	6,800
	NC38	4 3/4	2 11/16	9,700
	NC38	5	2 9/16	10,700
	NC38	5	2 7/16	11,700
	NC40	5 1/4	2 9/16	14,600
	NC40	5 3/8	2 7/16	15,600
	NC40	5 1/2	2 1/4	17,100
4	3 1/2XH	4 5/8	2 9/16	8,100
	NC40	5 1/4	2 13/16	12,400
	NC40	5 1/4	2 11/16	13,500
	NC40	5 1/2	2 7/16	15,600
	NC40	5 1/2	2 7/16	15,600
	NC46	5 3/4	3 1/4	17,600
	NC46	6	3	20,500
	NC46	6	3	50,500
	NC46	6	3 1/4	17,600
	NC46	6	3	20,500
	NC46	6	2 5/8	24,400
	NC46	6	2 7/8	21,900
4 1/2	NC46	6 1/4	3 1/4	17,600
	NC46	6 1/4	3	20,500
	NC46	6 1/4	2 3/4	23,200
	NC46	6 1/4	2 1/2	25,600
	NC50	6 3/8	3 3/4	19,800
	NC50	6 3/8	3 3/4	19,800
	NC50	6 3/8	3 5/8	21,600
	NC50	6 3/8	3 1/2	23,400
	NC50	6 3/8	2 7/8	30,300

Drill Pipe Size (in)	Conn. Type	Box OD(in)	Pin ID(in)	Make-Up Torque (ft-lb)
5	NC50	6 3/8	3 3/4	19,800
	NC50	6 3/8	3 1/2	23,400
	NC50	6 1/2	3 1/4	26,800
	NC50	6 1/2	3	30,000
	NC50	6 5/8	2 3/4	23,900
	5 1/2FH	7	3 1/2	37,400
	5 1/2FH	7 1/4	3 1/2	37,400
	5 1/2FH	7 1/4	3 1/4	41,200
5 1/2	5 1/2FH	7	4	29,200
	5 1/2FH	7	4	29,200
	5 1/2FH	7	3 3/4	33,400
	5 1/2FH	7 1/4	3 1/2	37,400
	5 1/2FH	7 1/4	3 1/2	37,400
	5 1/2FH	7 1/4	3 1/2	37,400
	5 1/2FH	7 1/2	3	44,600
	5 1/2FH	7 1/2	3	44,600
6 5/8	6 5/8FH	8	5	38,400
	6 5/8FH	8	5	38,400
	6 5/8FH	8	5	38,400
	6 5/8FH	8 1/4	4 3/4	44,600
	6 5/8FH	8 1/4	4 3/4	44,600
	6 5/8FH	8 1/4	4 3/4	44,600
	6 5/8FH	8 1/2	4 1/4	56,100
	6 5/8FH	8 1/2	4 1/4	56,100

Shanxi Fenglei Drilling Tools Co., Ltd

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SFMC

Shanxi Fenglei Drilling Tools Co., Ltd

NO BETTER ADVERTISING FOR A COMPANY THAN
REGARDING THE PRODUCTS QUALITY AS ITS LIFE!

SFMC
Shanxi Fenglei Drilling Tools Co., Ltd

Brief Introduction of Shanxi Fenglei Drilling Tools Co., Ltd

Company Introduction

Shanxi Fenglei Drilling Tools Co., Ltd (Former Shanxi Fenglei Machinery Manufacturing Co., Ltd, SFMC) is the leading manufacturer of drill string products, which is granted API Spec.7, 7-1, ISO 9001, ISO 14001 and ISO 18000 certificates. The company was founded in 1968 and has been manufacturing the top quality drill collar, integral heavy wall drill pipe and kelly since 1978. The company was awarded API Spec 7 Certificate in 1993, Its drill pipe and welded heavy weight production lines was put into production in 2003. SFMC's drill string products are widely used by all the domestic oil fields controlled by Sinopec, CNPC and CNOOC. Its products also exported to most oil producing countries and areas, such as North sea area, North and south America, Middle East, North and west Africa area and Australia.

The company manufactures and sells a full range of drill string products including drill pipe, drill collar, integral and inertial friction welding heavy weight drill pipe, kelly and the accessories, such as pup joints, crossover subs, stabilizers and non-magnetic drilling tools, which are the principal tools used for the drilling of the water, oil and gas well and are located between the rig floor and drill bit. SFMC's drill string products are specifically designed for today's difficult and harsh drilling environments and include a wide variety of sizes, designs and metallurgy.

Quality is not only a word in SFMC. SFMC possesses robust technical staff, advanced customer-designed facilities, which assure the steady quality. Independent inspection unit is directly under the control of the general manager, which assures the highest degree of quality. SFMC pioneers a unique trepanning system, which is ideal for the precision machining of drill collars, integral heavy weight drill pipe and kelly. Our loyal customers believe that SFMC can supply its drill string components unmatched for reliability and perfect performance. All of the SFMC's products are manufactured in conformance to, or exceed API specifications as well as established industries standards. Such as DS-1 and NS-1.

As the famous company in the oil and gas area, SFMC is pleased to get in touch with you for the supply of drill string products and accessories.

SFMC
Shanxi Fenglei Drilling Tools Co., Ltd

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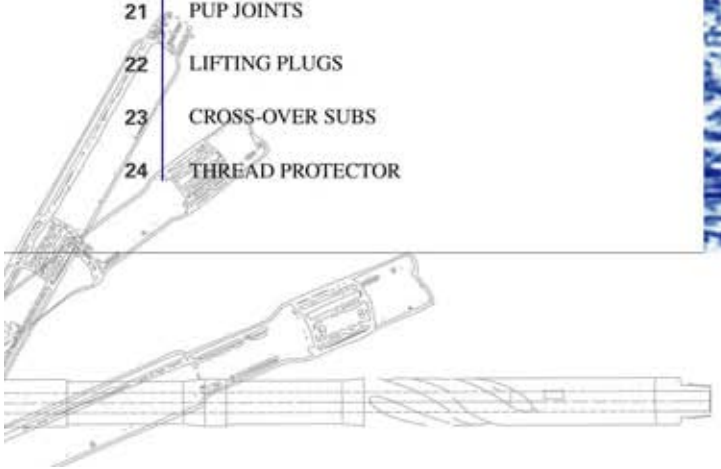


PRODUCTS DESCRIPTION

SFMC's Drill collar, integral heavy weight drill pipe (HWDP), kellys, pup joints and subs are made from premium chromium molybdenum alloy steel in accordance with API Spec.7-1 and API RP7G. Residual elements such as sulphur and phosphorus is reduced during the steel making process that make the kind of material with high physical properties. Its drill pipe and inertial friction welding HWDP are manufactured from high quality pipe body and tool joints, which meets or exceeds the requirement of API 5D, 7, 7-1 and RP7G.

The Heat Treatment is a decisive process in the production of drill stem products. Heat treatment must be uniform and deep enough to ensure the required physical properties full length, especially in critical thread sections. Heat treatment programs are established based on the actual chemical analysis of each heat of steel to ensure the materials meet or surpass the requirements of API Specification.

The threads are the most important factor for drilling string products. All threads would be machined with CNC Lathes and inspected with related thread gauges in conformance with API Specification. All threads would be phosphated or copperized and the roots are cold rolled to improve the resistance of galling during initial make-up & break-out and drilling operation. All Connections would be equipped with pressed steel or heavy duty lifting bail thread protectors.

Besides SFMC's logo , API monogram, serial number, OD, ID, Type and size of connections are stamped on recessed mill flat up to requirements of API specification.

QHSE

Quality Statement

No matter when and where, the performance of the drill tools is a critical factor to the drilling process. In order to control the quality during all manufacturing process, the quality control program is performed strictly with the requirement of API Q1 and ISO 9001. Every step of production, from the raw material to finished products; SFMC ensures a high quality product.

SFMC established a standard Inspection Laboratory Center for physical and chemical testing, which is directly under the control of the general manager. All testing information obtained is recorded on SFMC inspection certificate furnished with each product, and all inspectors must have the relevant qualification.

In order to meet or exceed the requirements of the customer, SFMC manufactured its products adherence to the most rigorous industry standards or unique customer specifications and ensures that the products delivered to the field are immediately suitable for use.

API Specification 7
API Specification 5D
API Recommended Practice 7G
NS-1
DS-1
Customer-specified specification

Health, Safety and Environment statement

SFMC pays high attention to the health and safety of all employees and regards their life as the most valuable treasure of SFMC. All the equipments are safety-approved and inspected periodically.

Continuous employee vocational training programs are performed at SFMC and the international agreements and national laws about the employee's right are strictly abided.

The environmental protection policy, which is an important factor of SFMC's development, is executed not only in the office and workshop, but also the ground and even the mountain beside SFMC. To be the "Garden" is one of aims of SFMC for long development.

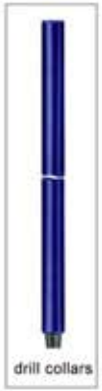
Certificates of SFMC and Quality Reports

SFMC
Shanxi Fenglei Drilling Tools Co., Ltd

DRILL COLLARS

SFMC has been manufactured drill collars for more than 30 years and was the first company to manufacture drill collars in China. All SFMC drill collars are made of AISI 4145 H or 4145H Modified alloy steel in accordance with API Specification 7-1, API Recommended Practice 7G and API Specification Q1 Latest Edition.

The bores are trepanned from one direction with no mismatch. All drill collars are Q&T full length by SFMC's own unique Power Frequency Induction Heating Treatment machine designed by SFMC, to ensure the Charpy "V" notch minimum impact strength of 40 ft-lb at 70°F and hardness from 285 to 341 BHN which are guaranteed one inch below the surface.


drill collars

The mechanical properties of SFMC drill collar along the whole length under the room temperature:

Outside diameter of drill collar inch	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

SFMC also manufactures special Drill Collars with Spiral, Slip and Elevator recesses, hardbarding.The Square Drill Collar is available.

SFMC drill collars are available in lengths from 10 to 31 feet and outside diameter from 3-1/8" to 10". The nominal sizes and other relevant and important sizes are listed here.

Connection interchange list >>

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

Note: NNC threads are the SFMC's own technology which could be interchangeable with API NC threads. NNC threads are better for reducing the roots stress than NC threads.

Chart of Drill Collar Data >>

Size 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	NC 23 2-3/8 Reg	325	336	345	357
3 1/2	1 1/2	1 1/4	NC 26 (2-3/8 IF)	NC 26 (2-3/8 IF)	358	370	384	397
4 1/8	2	1 3/4	NC 31 (2-7/8 IF)	NC 31 (2-7/8 IF)	469	485	503	520
4 1/4	2	1 3/4	NC 31 (2-7/8 IF)	NC 31 (2-7/8 IF)	509	526	541	559
4 1/2	2	1 3/4	NC 31 (2-7/8 IF)	NC 31 (2-7/8 IF)	585	605	617	638
4 3/4	2 1/4	2	NC 35	NC 38 (3-1/2 IF)	629	650	668	690
5	2 1/4	2	NC 38 (3-1/2 IF)	NC 38 (3-1/2 IF)	716	740	755	780
5 1/4	2 1/4	2	NC 38 (3-1/2 IF)	NC 38 (3-1/2 IF)	811	838	850	878
5 1/2	2 1/4	2	NC 38 (3-1/2 IF)	NC 38 (3-1/2 IF)	905	935	944	975
5 3/4	2 1/4	2 13/16	NC 40 (4FH)	4-1/2FH	1009	1043	905	935
6	2 1/4	2 13/16	NC 44	NC 40 4-1/2 FH	1114	1151	1011	1045
6 1/4	2 1/4	2 13/16	NC 46 (4 IF)	NC 46 (4 IF)	1224	1265	1123	1160
6 1/2	2 1/4	2 13/16	NC 46 (4 IF)	NC 50 (4-1/2 IF)	1340	1385	1237	1278
6 3/4	2 1/4	2 13/16	NC 46 (4 IF)	NC 50 (4-1/2 IF)	1466	1510	1355	1400
7	2 13/16	2 1/4	NC 50 (4-1/2 IF)	NC 50 (4-1/2 IF)	1481	1530	1577	1630
7 1/4	2 13/16	3	NC 50 (4-1/2 IF)	5-1/2 FH	1607	1661	1568	1620
7 1/2	2 13/16	2 3/4	NC 50 (4-1/2 IF)	5-1/2 Reg	1741	1799	1752	1810
7 3/4	2 13/16	3	NC 56 6-5/8 Reg	NC 56 6-5/8 Reg	1877	1940	1848	1910
8	2 13/16	3	NC 56 6-5/8 Reg	NC 56 6-5/8 Reg	2018	2085	1979	2045
8 1/4	2 13/16	3	6-5/8 Reg	6-5/8 Reg	2168	2240	2127	2198
8 1/2	2 13/16	3	6-5/8 Reg	6-5/8 Reg	2315	2392	2274	2350
8 3/4	2 13/16	3	6-5/8 Reg	6-5/8 Reg	2473	2555	2434	2515
9	3	2 13/16	NC 61 7-5/8 Reg	NC 61 7-5/8 Reg	2589	2675	2627	2715
9 1/4	3	2 13/16	NC 61 7-5/8 Reg	NC 61 7-5/8 Reg	2758	2850	2797	2890
9 1/2	3	2 13/16	7-5/8 Reg	7-5/8 Reg	2923	3020	2961	3060
9 3/4	3	2 13/16	NC 70 7-5/8 Reg	NC 70 7-5/8 Reg	3098	3200	3136	3240
10	3	2 13/16	NC 70 8-5/8 Reg	NC 70 8-5/8 Reg	3276	3385	3316	3427

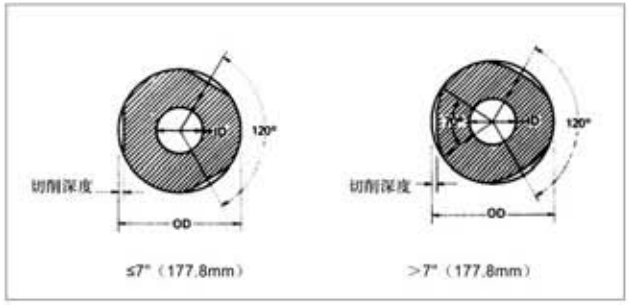
Note: 1. API standard length tolerance is +/-6"
2. The weights shown in table are for slick drill collars, the weight will lose 4% for the same size spiral drill collars

Additional Processing of Drill Collar

1、Spiral Grooves

Spiral grooved drill collars that act to prevent different pressure sticking in the hole are also available from SFMC. This type of drill collar minimizes the surface areas contacted with the wall of hole, and thus greatly reduce the probability of pressure differential detention occurring.

Every drill collar shall be left certain length uncut for both ends, 18"~24" from box shoulder and 12~22" from pin shoulder.




Spiral drill collar

usual sizes for spiral grooved drill collars >>

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 ± 1/32	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)	36±1	38±1	42±1	42±1	46±1	64±1	68±1	72±1

2、Slips and elevators recesses

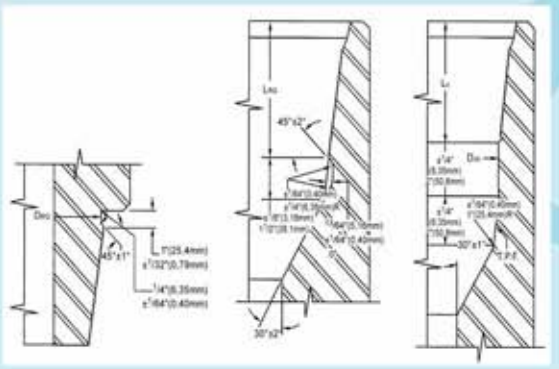
Slip and elevator recesses, which are machined in accordance with API RP 7G latest edition, are optional on SFMC drill collars. Slip and elevator recesses can be used together or separately.

Groove size >>

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

3、Stress Relieve Recesses

API pin stress relief and box boreback feature, which can reduce stress in the thread roots and significantly improve the connection fatigue life, is optional on SFMC drill collars if orders and inquiries specified.



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.

4、Cold rolling thread roots

SFMC 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.

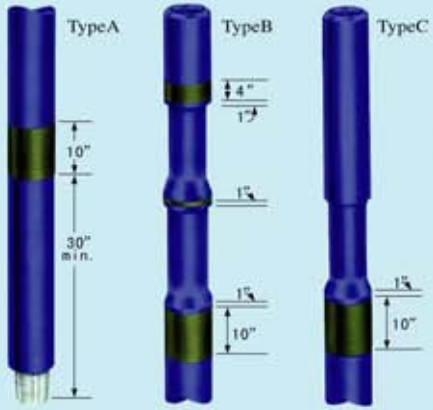
The surface of stress relief features as well as the roots of the threads is cold worked after gauging to API specification. Gauge stand-off will change after cold working of threads. This doesn't affect the interchangeability of connections and will improve the drilling performance. In such event, the connection shall also be stamped with a circle enclosing "CW" to indicate cold working after gauging.

Anti-Galling treatment

All SFMC drill collar threads would be phosphatized or copperized in order to lower the possibility of connection galling.

Phosphate coating

Copper plating



HARDBANDING(Flush or Raised)

5、Hardbanding

Hardbanding is provided for extending the drill collar operation life. SFMC drill collar offers the types and material of hardbanding options:
Iron-matrix powder Alloy
Tungsten Carbide Particle
TCS titanium
Arnco 100XT
Arnco 300XT

Hardbanding welding machine

(Flush or raised)

- Type A: Drill collar without slip and elevator recesses
- Type B: Drill collar with slip and elevator recesses
- Type C: Drill collar with slip recess only

On inquiries and orders please specify:

- Type (slick or spiral grooved)
- Outside and inside diameters and overall length
- Connection size and type
- API Stress Relief Groove on pin and box ends
- Cast or Pressed steel thread protectors.
- Other special request, for example: slip or elevator recess and hardbanding style.

SFMC
Shanxi Fenglei Drilling Tools Co., Ltd

NON–MAGNETIC DRILL TOOLS

Materials of SFMC Non-magnetic drill collars 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 mechenical properties and outstanding resistant to stress corrosion cracking and no tendency to galling.

Mechanical properties >>

SFMC non-magnetic has the listed mechenical properties along its overall length.

Size OD (in)	Yield Strength σ0.2 MPa (psi)	Tensile Strength σb MPa (psi)	Elongation δ4 %	Reduction of area %	Impact AKV ft.lb
3 1/8~6 3/4	≥ 758 (110, 000)	≥ 827 (120, 000)	≥ 18	50	≥50
7~10	≥ 689 (100, 000)	≥ 758 (110, 000)	≥ 20	50	≥50

Non–magnetic properties

Magnetic permeability
(when MPS=1×10^5/4πNm)

- Relative Max: 1.010
- Average: μr≤ 1.005

Magnetic Field Gradient (hot spots)

- Max: B ≤ 0.05 micro Tesla/100mm

Non-magnetic collars

Non-magnetic HWDP

Non-magnetic stabilizer

Types of SFMC Non–magnetic products

- Drill Collars
- Short Drill Collars
- Heavy Wall Drill Pipe
- Crossover Subs
- Integral Stabilizers

HEAVY WEIGHT DRILL PIPE

SFMC offers both integral and welding heavy weight drill pipes. The integral HWDP is manufactured from one piece of AISI 4145H solid bar, fully heat treated, all physical properties conform to API Spec 7-1 latest edition. The 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 1340 alloy steel. The mechanical and chemical property of tool joints and central pipe are conformity to API Spec 7-1 latest edition.

Heavy Weight Drill Pipe Materials >>

Construction	Heavy Weight Drill Pipe Material	Yield Stength Min/Max (ksi)	Ultimate Stength Min/Max (ksi)	Elongation (%)	Reduction of area (%)	Hardness Min/Max (Brinell HB)	Min. Avg Charpy (ft/lbs @+75°F)
Welded	Tool Joint: AISI 4145H or4137H Bar	120/-	140/-	13	45	285/340	41
	Pipe Body: AISI 1340 Tube	65/-	95/-	18	-	277/-	24
Integral	AISI 4145H Bar	120/-	140/-	13	45	285/340	41

SFMC HWDP, which provides the transition from drill collar to drill pipe, can easily solve problems arising in vertical holes in soft formation by replacing part of the drill collars.

Feature:

- 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

Heavy Weight Drill Pipe Specification >>

Nominal Size	Length ft	Tube			Tool Joint					
		ID	Wall thick-ness	End Upsets (B)	Connection Size and Type	Tool Joint OD	Tool Joint ID	Per foot lb	Per Joint (31 ft) kg	Make-torque (ft-lb)
2 7/8	31	1 1/2	0.688	2 15/16	NC 26 (2 3/8 IF)	3 3/8	1 1/2	17.26	247	3,800
3 1/2	31	2 1/16	0.719	3 7/8	NC 38 (3 1/2 IF)	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 (3 1/2 IF)	4 3/4 4 7/8	2 1/4	23.48	335	11,500
4	31	2 9/16	0.719	4 3/16	NC 40 (4 FH)	5 1/4 4 7/8	2 9/16	29.92	430	14,600
4 1/2	31	2 3/4	0.875	4 11/16	NC 46 (4 IF)	6 1/4	2 3/4	41.45	595	22,500
5	31	3	1	5 1/8	NC 50 (4 1/2 IF)	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
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

Spiral Heavy Weight Drill Pipe Specification >>

Nominal Size	Length ft	Tube			Tool Joint					
		ID	Wall thick-ness	End Upsets (B)	Connection Size and Type	Tool Joint OD	Tool Joint ID	Per foot lb	Per Joint (31 ft) kg	Make-torque (ft-lb)
2 7/8	31	1 1/2	0.688	2 15/16	NC 26 (2 3/8 IF)	3 3/8	1 1/2	18.31	261	3,800
3 1/2	31	2 1/16	0.719	3 7/8	NC 38 (3 1/2 IF)	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 (3 1/2 IF)	4 3/4 4 7/8	2 1/4	24.88	360	11,500
4	31	2 9/16	0.719	4 3/16	NC 40 (4 FH)	5 1/4 4 7/8	2 9/16	31.51	455	14,600
4 1/2	31	2 3/4	0.875	4 11/16	NC 46 (4 IF)	6 1/4	2 3/4	43.31	621	22,500
5	31	3	1	5 1/8	NC 50 (4 1/2 IF)	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
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 integral HWDP are the same as drill collar which shown in drill collar description.

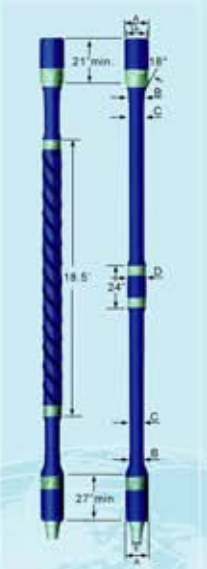
Hardbanding

HWDP's wear resistance hardbanding is standard on tool joints connections and central upset. Hardbanding is made by an automatic machine after preheating the pipe and is followed by stress relieving.

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
- The hardbanding is completely flush on both tool joints and 1/8" oversize on the central upset(fully flush on request).

The types of Hardbanding include Iron-Matrix powder alloy, Tungsten Carbide Sparticle, Arnco 100XT, 300XT and TCS titanium.



Internal Plastic Coating

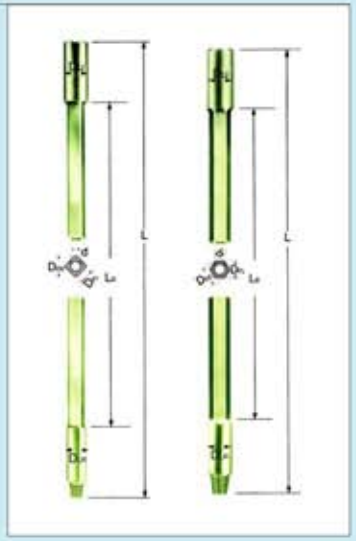
SFMC HWDP could be coated internally with DPC, TK 34 or TC2000 as customer's request, which are able to prevent corrosion and extend using time.

Intial Make up and Break out service

The factory Make-up and Break-out services, which is the most important factor affecting the life of the tool joint connections, is regarded as an important element to save rig handling time and greatly improve the efficiency on rig floor. The Controlled Make-up & Break-in procedures are consistently applied to every tool joint and ensure the connections quality. Suitable dope and correct toque value are essential for the Make-up & Break-in procedures. SFMC HWDP will supply perfect factory Make-up and Break-out services if order and inquiries

KELLY

SFMC Kellys are made from AISI 4145H modified alloy steel in accordance with API Spec.7-1 latest edition, which are 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. SFMC kelly bars are inspected by an ultrasonic unit over their full length and full section. The wall thickness of each flat of the drive section is verified ultrasonically. All kellys' connectons are fitted with pressed steel thread protectors on both ends and each kellys would be shipped with steel scabbard for marine transportation.



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Specification for Square kellys >>

Nom Size (in)	Lengths (ft)		Top Upset Joint				Bottom Upset		Bore	Drive Section		Weight (kg)	
			Standard		Optional								
	A	B	LH Connection	OD C (in)	LH Connection	OD C (in)	RH Connection	OD D (in)	E (in)	F (in)	G (in)	Sta	Opt
2 1/2	40 46	37 43	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC26 (2 3/8 IF)	3 3/8	1 1/4	3 1/4	2 1/2	410 465	360 420
3	40 46	37 43	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC26 (2 3/8 IF)	4 1/8	1 3/4	3 7/8	3	495 560	450 515
3 1/2	40 46 54	37 43 51	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC26 (2 3/8 IF)	4 3/4	2 1/4	4 3/7	3 1/2	600 670 760	555 630 730
4 1/4	40 46 54	37 43 51	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC46(4 IF)or NC50(4 1/2 IF)	6or6 3/8 - 6 1/2	2 4/5	5 1/2	4 1/4	825 940 1070	780 890 1040
5 1/4	40 46 54	37 43 51	6 5/8 Reg	7 3/4	--	--	NC50or 5 1/2 FH orNC56	7	3 1/4	6 3/4	5 1/4	1250 1430 1670	--
6	40 46 54	37 43 51	6 5/8 Reg	7 3/4	--	--	6 5/8 FH	8	3 1/2	7 5/8	6	1670 1920 2250	--

Specification for Square kellys >>

Nom Size (in)	Lengths (ft)		Top Upset Joint				Bottom Upset		Bore	Drive Section		Weight (kg)	
			Standard		Optional								
	A	B	LH Connection	OD C (in)	LH Connection	OD C (in)	RH Connection	OD D (in)	E (in)	F (in)	G (in)	Sta	Opt
3	40 46	37 43	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC26 (2 3/8 IF)	3 3/8	1 1/4	3.375	3	450 500	400 555
3 1/2	40 46 54	37 43 51	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC31 (2 7/8 IF)	4 1/8	1 3/4	3.937	3 1/2	580 670 780	535 620 730
4 1/4	40 46 54	37 43 51	6 5/8 Reg	7 3/4	4 1/2 Reg	5 3/4	NC38 (3 1/2 IF)	4 3/4	2 1/4	4.781	4 1/4	750 840 980	700 800 940
5 1/4	40 46 54	37 43 51	6 5/8 Reg	7 3/4	--	--	NC46(4 IF)or NC50(4 1/2 IF)	6or6 3/8 - 6 1/2	2 13/16 or 3 1/4	5.9	5 1/4	1020 1170 1350	--
6	40 46 54	37 43 51	6 5/8 Reg	7 3/4	--	--	NC50or 5 1/2 FH orNC56	7	3 1/2	6.812	6	1320 1500 1770	--

On inquiries and orders please specify:

- Kelly type (Square or Hexagonal)
- Working space and overall length
- Upper and lower connection size and style

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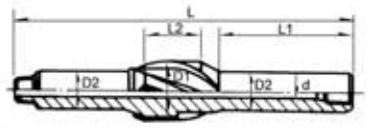
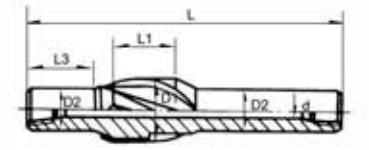
STABILIZERS

SFMC Stabilizers are made from premium chrome molybdenum alloy steel(except for non-magnetic style), heat treated by special procedure and obtain expected hardness, strength and impact value properties. All threads are made strictly in accordance with API specification. The hard banding of stabilizers employ"pressed in"Tungsten Carbide alloy buttons or other anti-wear materials. All stabilizers should be ultrasonic tested.

SFMC also provides non-magnetic stabilizers.



Near-bit Style



String Style

SFMC manufactures four kind of stabilizers as below:

- Integral spiral stabilizer(premium chrome molybdenum alloy steel and non-magnetic low carbin chrome manganese alloy steel).
- Interchangeable sleeve stabilizers.
- Sleeve Stabilizer.
- Integral Straight Rib Stabilizer.

Standard sizes and styles for stabilizers >>

OD at Two Ends (in)	String Type Stabilizers		Near-bit Type Stabilizers	
	Upper End (Internal Thread)	Upper End (External Thread)	Lower End (Internal Thread)	Lower End (Internal Thread)
4 3/4	NC 35	NC 35	NC 35	3 1/2 REG
6 1/4	NC 44 NC 46	NC 44 NC 46	NC 44 NC 46	4 1/2 REG
7	NC 50	NC 50	NC 50	4 1/2 REG
8	NC 56	NC 56	NC 56	6 5/8 REG
9	NC 61	NC 61	NC 61	7 5/8 REG

Mechanical properties of stabilizers >>

OD at Two Ends (in)	Tensile Strength σb MPa	Yield Strength σs MPa	Elongation δ3 %	Reduction of area %	Impact Akv J
4 3/4~6 1/4	≥965	≥758	≥13	40	≥54
7~9	≥931	≥689	≥13	40	≥54

Mechanical properties for sleeve >>

Tensile Strength σb MPa	Yield Strength σs MPa	Elongation δ3 %	Reduction of area %	Impact Akv J
≥735	≥539	≥13	30	≥47

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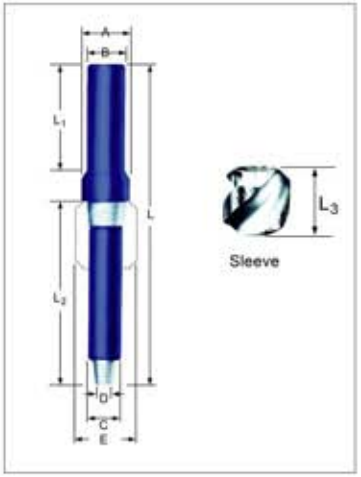
SLEEVE STABILIZERS

SFMC sleeve stabilizers are made of 4145H modified alloy steel. Heat treated to 285-341 Brinell Hardness and 54 Joules minimun impact value. The stabilizer consists of a one piece body and a sleeve which is jointed,the sleeve can be changed after fretted.



On inquiries and orders please specify:

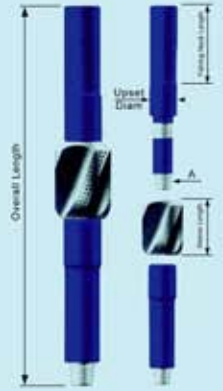
- Hole size and type(string or near-bit)
- Drill Collar OD and ID
- Size and type of connection
- Hardfacing type
- Sleeve Breaker

Sleeve stabilizers standard sizes >>

Tool Series	Hole Size Range(in)	DC Diameter(in)	Upset Diameter(in)	Bottom Neck Dia	Overall Length(in)	Fishin Neck Length(in)		Approx Wt (kg)	Sleeve Lenght(in)
						String Type	Near-bit Type		
47	6 1/4~7 1/2	4 3/4~5	5 3/4	4 3/4	65	27	22	125	14
62	8 1/2~9 7/8	6 1/4~6 3/4	7 1/2	6 1/4	65	27	22	220	14
65	8 1/2~9 7/8	3 1/2~7 1/4	7 3/4	6 1/2	65	27	22	260	14
77	12 1/4~17 1/2	7 3/4~8 1/4	9 1/4	7 3/4	66	27	22	370	16
85	12 1/4~17 1/2	8 1/2~9	9 7/8	8 1/2	66	27	22	460	18
96	14 3/4~20	9 1/2~10	11	9 5/8	66	27	22	550	22

INTERCHANGEABLE SLEEVE STABILIZERS

SFMC interchangeable sleeve stabilizers are made of 4145H alloy steel. Heat treated to 285-341 Brinell Hardness and 54 Joules minimum impact value. All kind of stabilizer is constructed of two pieces which are jointed by the center connection and one sleeve. Every stabilizer is equipped with a certain size of sleeve.



On inquiries and orders please specify:

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

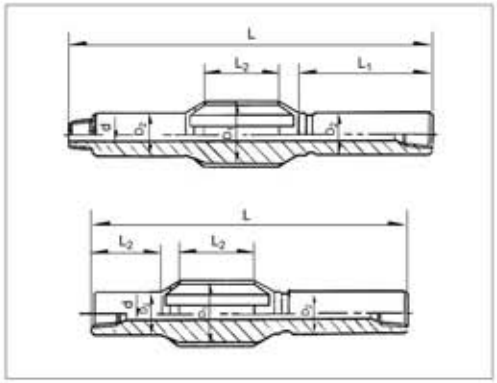
Interchangeable Sleeve Stabilizers standard sizes >>

Hole Size (in)	Sleeve			Body					Overall length (kg)
	Blade Width (in)	Length (in)	Approx Wt (in)	DC Size (in)	Bore (in)	Upset Diam (in)	Center Connection (A)	Approx Wt (kg)	
6 1/8 6 1/4 ~ 6 3/4	2	18	35	4 1/8 4 3/4	2	4 3/4	2 7/8 IF	125	64
7 3/8 ~ 7 3/4	2	18	45	5 3/4	2 1/4	5 3/4	3 1/2 IF	180	66
8 1/2 ~ 8 3/4	2 3/8	18	55	6 1/2	2 13/16	6 3/4	4 IF	250	68
9 1/2 ~ 11	2 3/4	18	65	7 1/4	2 13/16	7 1/2	4 1/2 IF	330	68
12 1/4 ~ 15 17 1/2	3 1/8	18	95	8 8 ~ 8 1/2	2 13/16	8 1/2	6 5/8 REG	520	72
12 1/4 ~ 17 1/2	3 1/8	24	130	9 1/2	3	9 1/2	7 5/8 REG	550	81
17 1/2 ~ 20	4	33	180	11 1/4	3	11 1/4	8 5/8 REG	810	90
22~ 26	4	33	250	9 1/2	3	9 1/4	7 5/8 REG	615	90

Note:Standard blade diameters for hole sizes(in):6 1/8~12 1/4:1/32 Under gage.

INTEGRAL STRAIGHT RIB STABILIZERS

SFMC straight rib stabilizers are made of AISI 4145H alloy steel by one piece of integral bar .Every stabilizer has four straight ribs that pressed Tungsten Carbide buttons or other type of hardfacing are located on the surface of the ribs. Ultrasonic inspection is performed on each stabilizer.



Integral Straight rib Stabilizers Size >>

Hole Size (in)	DC Size D2 (in)	Contact L2 (in)	Bore d (in)	Overall Lenght L ± 1" (in)			
				Short Type		Long Type	
				Near-bit L3=6"	String L1=14"	Near-bit L3=12"	String L1=28"
6~6 1/2	4 3/4	16/20	2	37/41	43/47	57/61	65/69
7 1/2~7 7/8 8 3/8~8 3/4	6 1/4~7	16/20 16/20/24	2 1/4 2 13/16	37/41 37/41/45	43/47 43/47/51	57/61 57/61/65	65/69 65/69/71
9 1/2~9 7/8	7	16/20/24	2 13/16	37/41/45	43/47/51	57/61/65	65/69/71
12 1/4 17 1/2	8~9	24/28 28/32	3	49/53 61/65	55/59 67/71	73/77 85/89	81/85 93/97

On inquiries and orders please specify:

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

PUP JOINTS

All pup joints are made from integral bars of AISI 4145H Modified chromium molybdenum alloy steel heat-treated to drill collar specifications.]These pup joints have a minimun yield strength of 110000 psi. Pup joints are furnished in all the popular sizes and lengths.

Nominal size:3 1/2"OD~6 5/8"OD; Length:5'~20'.

On inquiries and orders please specify:

- Drill pipe sizes
- Inside diameter
- Outside diameter of tool joints
- Connection size and type
- 18°or90°shoulder.
- Thread protector style

Pup Joint

Lifting Sub

LIFTING SUBS

SFMC lifting subs are made from AISI 4145H alloy steel according to API Specification 7.
Nominal size:3 1/2"OD~11"OD; Length:36"

Drill Collar Size	Approx Weight(kg)
3 1/2" ~ 3 7/8"	20
4" ~ 4 3/8"	25
4 1/2" ~ 4 7/8"	40
5" ~ 5 3/8"	45
5 1/2" ~ 5 7/8"	60
6" ~ 6 3/8"	70
6 1/2" ~ 6 7/8"	80
7" ~ 7 3/8"	85
7 1/2 ~ 7 7/8"	115
8" ~ 8 3/8"	125
8 1/2" ~ 8 7/8"	135
9" ~ 9 7/8"	145
9 1/2" ~ 9 7/8"	155
10"	160
11"	175

On inquiries and orders please specify:

- Drill collar OD
- Tool joint OD & ID
- Drill pipe OD
- Connection size and style
- 18°or 90°shoulder.

Note: The overall Lenght would he add 6"if Lifting Sub has upper box cinnection.

LIFTING PLUGS

SFMC lifting plugs are made from AISI 4145h alloy steel fully heat treated, and feature to API precision machined shoulders and threads.

SFMC provides three kinds of plug:

- Standard type
- Bail type
- Pin to Box type

On inquiries and orders please specify:

- Plug type
- Drill collar OD
- Lifting face OD
- Connection size and 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"	25	2 1/4"
5" ~ 5 3/8"	7"	28	2 1/4"
5 1/2" ~ 5 7/8"	7 1/2"	36	2 1/4"
6" ~ 6 3/8"	8"	45	2 1/4"
6 1/2" ~ 6 7/8"	8 1/2"	54	2 1/4"
7" ~ 7 3/8"	9"	60	2 13/16"
7 1/2 ~ 7 7/8"	9 1/2"	70	2 13/16"
8" ~ 8 3/8"	10"	80	2 13/16"
8 1/2" ~ 8 7/8"	10 1/2"	90	2 13/16"
9" ~ 9 7/8"	11"	105	2 13/16"
9 1/2" ~ 9 7/8"	11 1/2"	120	2 13/16"
10"	12"	130	2 13/16"
11"	13"	160	2 13/16"

CROSS-OVER SUBS

SFMC cross-over subs are made from 4145h alloy steel, that are heat-treated to drill collar specifications, it acts as connecting and change-over,deliver torque function in different types of drill tools. all connections are protected by a phosphated surface coating to minimize galling on initial make-up.

Specifcation and sizes >>

Type	Size (in)	Standards	σb (MPa)	σ0.2 (MPa)	δ4 %	A_{KV} (J)	HB
Rotary Joint	3 1/8~6 7/8	API Spec.7	≥965.3	≥758	≥13	---	>285
	7~10		≥931	≥689			
	3 1/8~7 3/4	SY5200-93	≥965	≥760	≥13	≥54	285~340
	8~11		≥930	≥690			277~340

On inquiries and orders please specify:

- O.D.,I.D.,and length.
- Connections,size,and type.

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THREAD PROTECTOR

SFMC thread protector could be either the pressed steel or the heavy duty lifting bail type. For nodular cast iron lifting bail and cast steel lifting bail(ASTM A216 WCB)are both available, They all have 60,000 psi tensile strength minimum. 30,000Min psi yield strength for cast steel,12%Min elongation for nodular cast iron.

Size of Protector with lifting bail >>

Drill collar OD Range(in)	Connection Size & Type	Pin protector Wt Lb	Box protector Wt Lb	Approx Wt per Set Lb
3 1/8 ~ 3 7/8	NC 23 2 3/8 REG NC 26 2 3/8 IF	6 6 6 6	5 5 5 6	11 11 11 12
4 1/8 ~ 4 3/4	2 7/8 IF NC 31 3 1/2 REG	7 7 7	6 6 6	13 13 13
4 1/2 ~ 5 1/4	NC 35 NC 38 3 1/2 IF	10 10 10	9 9 9	19 19 19
5 ~ 5 3/4	NC 40 4 FH	14 14	11 11	25 25
5 3/4 ~ 6 1/4	4 1/2 REG NC 44 4 1/2 FH	17 17 17	13 13 13	30 30 30
6 1/4 ~ 6 3/4	4 IF NC 46	18 18	14 14	32 32
6 3/4 ~ 7 1/2	5 1/2 REG NC 50 4 1/2 IF	21 21 21	18 18 18	39 39 39
7 3/4 ~ 8 1/4	5 1/2 FH 6 5/8 REG NC 56	28 28 28	23 23 23	51 51 51
8 1/4 ~ 9	NC 61	29	25	54
9 ~ 10	7 5/8 REG NC 70	35 35	31 31	66 66
10 ~ 11	8 5/8 REG	35	46	101

Note: The Bail type thread protectors are available as requests of users.

Size of Pressed steel protector >>

Drill collar OD Range	Connection Size & Type	Pin protector Wt Lb	Box protector Wt Lb	Approx Wt per Set Lb
3 1/8 ~ 3 7/8	2 3/8 REG NC 26 2 3/8 IF	1/2 1 1	1/3 3/4 3/4	1 1 3/4 1 3/4
4 1/8 ~ 4 3/8	NC 31 2 7/8 IF 2 7/8 REG 3 1/2 REG	1 1/2 1 1/2 1 1/2 1 1/2	1 1/4 1 1/4 1 1/4 1	2 3/4 2 3/4 2 3/4 2 1/2
4 1/2 ~ 5 1/8	NC 38 3 1/2 IF	2 1/4 2 1/4	1 3/4 1 3/4	4 4
5 ~ 5 3/4	3 1/2 FH NC 40 4 FH	1 3/4 2 1/4 2 1/4	1 1/2 2 1/4 2 1/4	3 1/4 4 1/2 4 1/2
5 3/4 ~ 6 1/4	4 1/2 REG 4 1/2 FH	2 1/2 2 1/2	1 1/2 2 1/4	4 4 3/4
6 1/4 ~ 6 3/4	4 IF NC 46	3 3	1 3/4 1 3/4	4 3/4 4 3/4
6 3/4 ~ 7 1/2	5 1/2 REG NC 50 4 1/2 IF	3 1/4 3 3	2 2 2	5 1/4 5 5
7 3/4 ~ 8 1/4	5 1/2 FH 6 5/8 REG	3 3/4 6 3/4	2 3/4 2 3/4	6 1/2 9 1/2
8 1/4	6 5/8 FH	6 1/2	5	11 1/2
9 ~ 10	7 5/8 REG	7 3/4	3 1/2	11 1/4