

# SATAREM DRILL PIPE (API Spec 5DP)



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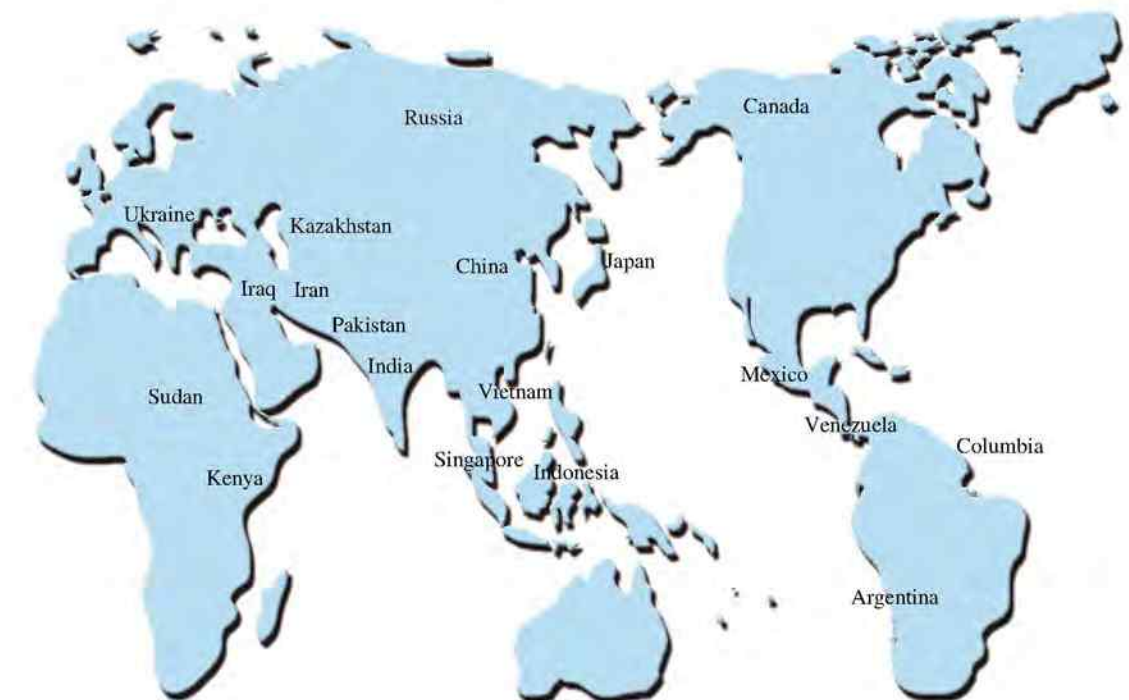
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The ultimate power of interpretation owned by SATAREM co., LTD

## Network Marketing



Satarem Group is a international conglomerate company. Our cooperative partners provides all kinds pipes for users and wins their praises by its advanced technology, high-quality raw materials, sophisticated equipments, excellent management system and thoughtful after-sales service. Its brand drill pipes are appraised as "Satisfactory Products to the Users of the Whole Country". The prodcuts are extensively used in many oilfields at home and more than 20 countries and reigons abroad such as Canada, Singapore, Indonesia, Pakistan, Argentina and Malaysia, etc.





# PRODUCTION EQUIPMENT

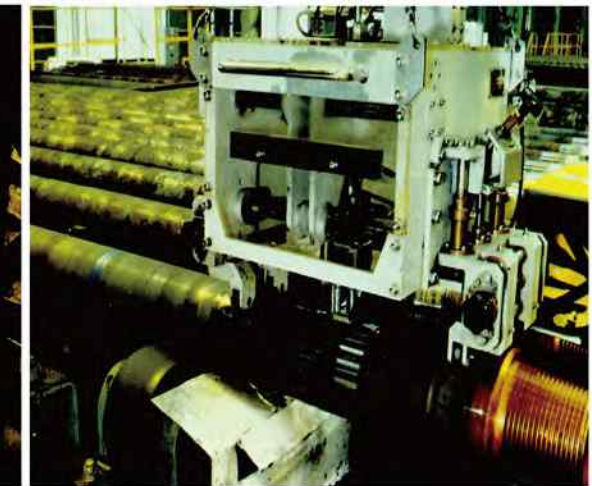
Our drill pipe production line have equipped with high-tech equipments and technology which were totally transferred from Japan, Besides, it also has equipped with the world most advanced equipments for tool joint machining and friction welding such as Automation Roller Hearth heat-treatment equipment (manufactured by CHUGAI RO CO.,LTD), on line Brinell Hardness Tester ( manufactured by Switzerland ), Tool Joint NC Machine ( Produced by HITACHI SEIKI), M250 Friction Welding Machine (Manufactured by THOMPSON, England) and KUKA 6 Shafts Robot( Produced by Germany). All these equipment and facilities guarantee our product's quality within the high and stable level as well as can meet customers' requirements.



Threading



MPI of Tool Joint



Ultrasonic Inspection of Weld Line



inside&outside machining



Heat treatment to Tool Joint



Production Line



## Drill Pipe Production Flow

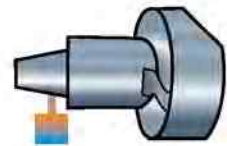


Inside & Outside Machining

Quenching of Tool Joint

Tempering of Tool Joint

Hardness MPI

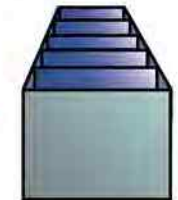
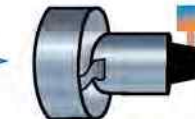
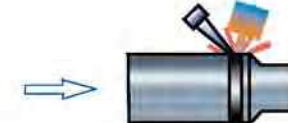


Hardfacing

Threading

Thread Inspection

Thread Surface Treatment



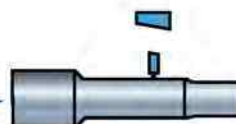
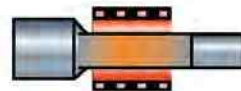
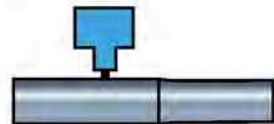
## Friction Welding Line

Pipe End Machining

Friction Welding

Annealing of Weld Line

Cutting of Bead



Weld Area Quenching

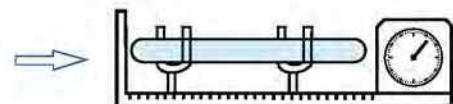
Weld Area Tempering

Weld Area Inspection



Weighing & Length Measuring

Make up & Break out





## Drill Pipe Products

### Drill Pipe with API Standards

To satisfy the requirements of normal wells, our produces high-quality drill pipes with steel grade from E75 to S135, and OD (Outside Diameter) from 2-3/8" to 6-5/8" .

Mechanical Properties of Pipe Body							
Standard	Grade		Yield Strength		Tensile Strength	Elongation	Average Impact Energy
			MIN	MAX	MIN	MIN	
			ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	%	fb-lbs(J)
APISpec 5DP	Group1	E-75	75(517)	105(724)	100(689)	API formula	40(54)
		X-95	95(655)	125(862)	105(724)	API formula	40(54)
	Group2	G-105	105(724)	135(931)	115(793)	API formula	40(54)
		S-135	135(931)	165(1138)	145(1000)	API formula	40(54)

Mechanical Properties of Tool Joint							
Standard	Grade		Yield Strength		Tensile Strength	Elongation	Average Impact Energy
			MIN	MAX	MIN	MIN	
			ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	%	fb-lbs(J)
APISpec 5DP			120(827)		140(965)	13	-



### V-150 High Strength Drill Pipe

For super deep wells drilling, S-135 drill pipe( the highest steel grade in API series )can not meet the technical requirements. In order to fit for deep well's exploration, we have developped the V-150 drill pipe. This kind of drill pipe has very high strength in tool joint (improved from 120ksi to 130ksi) and pipe body. Although strength be improved, there are still enough impact toughness and higher comprehensive mechanical properties in pipe body and tool joint, which can meet super deep well drilling.

Mechanical Properties of Pipe Body					
Grade	Yield Strength		Tensile Strength	Elongation	Average Impact Energy
	MIN	MAX	MIN	MIN	
	ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	%	fb-lbs(J)
V-150	150(1034)	165(1138)	160(1103)	13	59(80)





## Drill Pipe Products

### Sour Service Drill Pipe

For domestic sour-contained wells' drilling, the common solutions are: adopting low-steel-grade drill pipes, mud inhibition, adding sulfur elimination, or oil based mud to ensure the safety of drilling. However, the considerable risk are still exists. In this circumstances, we have developed this kind of drill pipe to meet the exploration and development requirements of sour wells.

Product Characteristics:

- (1) Strictly control of the chemical components.
- (2) Strict control of mechanical properties, hardness and microstructure of tool joint, pipe body and weld area.
- (3) Higher loading ratio of NACE (A) test

#### Mechanical Properties of Pipe Body

Grade	Yield Strength		Tensile Strength		Hardness	SSC Test
	MIN	MAX	MIN			
	ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	HRC MAX		
BNK C95S	95(655)	110(758)	105(724)	26		85
BNK C105SS	105(724)	120(827)	115(793)	29		85

#### Mechanical Properties of Tool Joint

Grade	Yield Strength		Tensile Strength		Hardness	SSC Test
	MIN	MAX	MIN			
	ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	ksi(N/mm <sup>2</sup> )	HRC MAX		
BNKTJ95	95(655)	110(758)	105(724)	26		85
BNKTJ110	110(758)	125(862)	125(862)	33		65

### 5" EUE Drill Pipe

5" EUE Drill Pipe, The main advantages of this kind of drill pipe are :

- (1) Changing the shape of M.I.U., decreasing stress concentration, and fatigue failure accident.
- (2) Enlarging inside diameter of the tool joint and throat, reducing mud water horsepower loss as well as improving circulation efficiency by more than 20%.
- (3) Special materials have been used for tool joints and pipe body which can enhance the comprehensive mechanical properties of drill pipes.

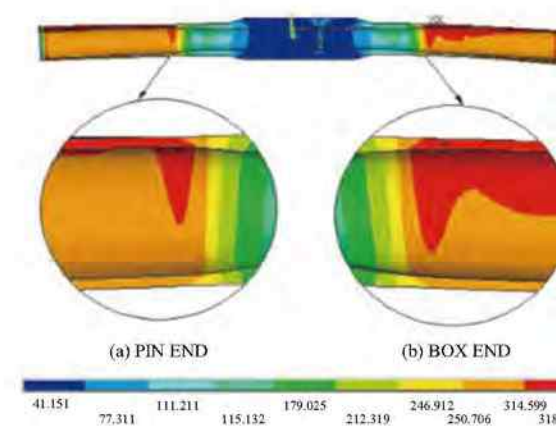
#### Dimension Comparison Table

Unit:mm

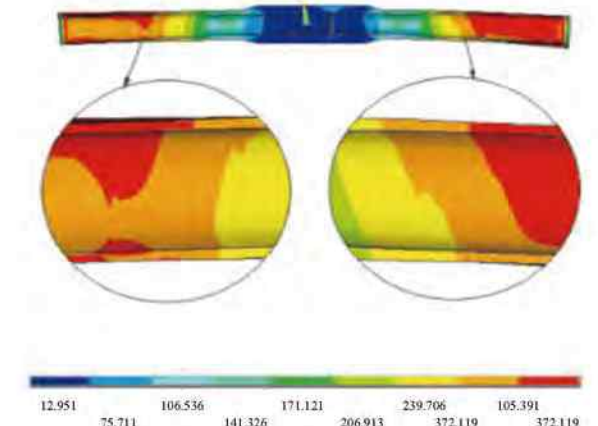
Specification	Tool Joint			Weld Area		Pipe Body	
	ODJoint	ID(PIN)	ID(BOX)	OD(Weld Ring)	OD	ID	OD
5" EUE	172	88.9	100	136	136	100	127
5" Normal S135	168.3	69.9	88.9	130.2	130.2	94.7	127

#### Mechanical Properties Comparison Table

Grade	Tool Joint		Weld Area		Pipe Body	
	Tensile Strength	Yield Strength	Impact Energy	Single Impact Energy	Average Impact Energy	
	MPa	MPa	J	J	J	
5" EUE	≥1000	931-1138	≥45	≥80	≥90	
5" Normal S135	≥965	≥827	≥20	≥38	≥47	



Von Mises Equivalent Stress Distribution on API Standard upset MIU.



Von Mises Equivalent Stress Distribution ON EUE upset MIU



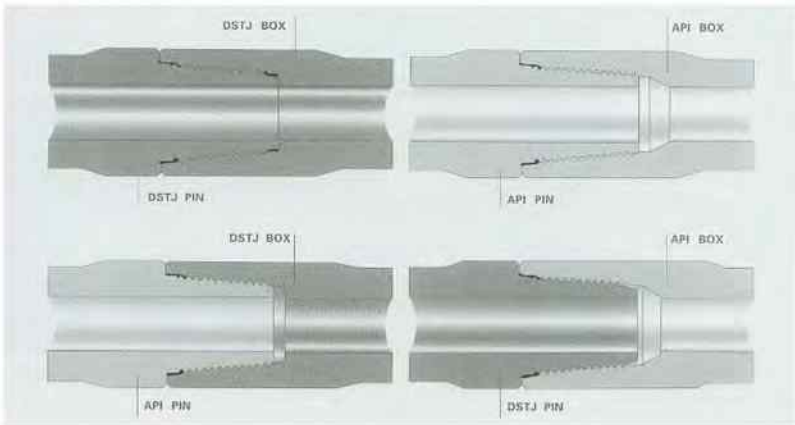


# Drill Pipe Products

## DSTJ(Double Shoulder Tool Joint)

### Advantage of DSTJ

- Improve torsional strength by more than 35%.
- The ID of tool joint can be reasonably enlarged to ensure the conformity between tool joint and pipe body. For example, the ID of tool joint for 5" S135 drill pipe can be enlarged from 2-3/4" to 3-1/4" .
- Box thread expansion accidents can be effectively avoided.
- Protect thread from corrosion in sour well.
- Interchangeable with API standard thread due to reasonable design of size.
- Decrease the dimension limitation for degrading and rejection of the tool joint.



DSTJ can be interchanged with API Standard Tool Joint



After using DSTJ, thread failure in drilling complex and high torque wells can be effectively decreased.

## High Strength & Small Size Drill Pipe

API standard 2-3/8" to 2-7/8" drill pipe for slim hole wells drilling, normally the torsional strength can not meet the requirement, also the water horsepower lossing is very large which will affect the mug circulation. In this case, we have developped the small size drill pipe. This kind of drill pipe adopts advanced high-strength materials and DSTJ techniques which can improve tool joint's strength to 135ksi, so the requirements of slim hole well can be easily satisfied.

Type	Thread Connection	Nomal API S135 Drill Pipe	High Strength & Small Size Drill Pipe
Tool Joint OD	NC31	4-3/8"	4-1/8"
	NC26	3-3/8"	3-1/2"
Tool Joint ID	NC31	1-5/8"	1-7/8"
	NC26	1-3/4"	1-5/8"
Torsional Strength	NC31	23.7KN.m	DSTJNC31 28.4KN.m
	NC26	9.50KN.m	DSTJNC26 15.4KN.m



### ARNCO Series Hardfacing

ARNCO series hardfacing is inclined to protect casing and can be rewelded after wear off. This kind of hardfacing is classified as ARNCO 100 XT, ARNCO150XT, ARNCO 200 XT, and ARNCO 300 XT.

### Tungsten Carbide Hardfacing Series

The tungsten carbide hardfacing features high resistance of wear. There are two kind of them which normally used. They are S3000 and S6000. S3000 is a kind of coarse tungsten carbide grain which has high density and strong resistance of wear, applicable to bare holes. S6000 is also a kind of coarse tungsten carbide grain, but is mainly melted into the internal of hardfacing to protect casings and, meanwhile, avoid wear on casings.

## Hard Banding Series



### ARMACOR-M Hardfacing

ARMACOR-M hardfacing is similar to ARNCO series which is inclined to protect casing. It is mainly used by overseas customers.



ARNCO 200XT Hardfacing



ARNCO 300XT Hardfacing



ARMACOR-M Hardfacing